AFML-TR-67-259

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COMPILATION OF TENSILE AND CREEP RUPTURE DATA OF SEVERAL Al, Mg, Ti, AND STEEL ALLOYS, AND Ni SUPERALLOYS

MATERIALS INFORMATION BRANCH

FOREWORD

This report was prepared by personnel of The Design Information Development In-house Group, Materials Information Branch, Materials Applications Division, Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio.

This program was conducted under Project No. 7381, "Materials Applications," Task No. 738103, "Data Collection and Correlation," with Mr. E. L. Horne as Project Engineer. This report covers data generated for a variety of materials since 1956. It is now being compiled for the record by Sidney O. Davis and Lt Nathan G. Tupper, Air Force Materials Laboratory, Roger M. Niemi, Monsanto Research Corp., Lt Col William W. Kirk and Lt Col Clifford Sorensen, USAF Reservists and Richard G. Coy, University of Dayton Research Institute. The report was submitted by the authors in November 1967.

The testing was done by three different laboratories under Air Force contract as listed below.

Metcut Research Associates, Inc.
Contract No. AF 33(600)-32008
Contract No. AF 33(600)-36430

Joliet Metallurgical Laboratories, Inc.
Contract No. AF 33(616)-6224
Contract No. AF 33(600)-36462

New England Materials Laboratories, Inc.
Contract No. AF 33(616)-6200
Contract No. AF 33(616)-6202

Data reduction and curve plotting were performed by the Monsanto Research Corporation under Contract No. AF 33(616)-8483.

This technical report has been reviewed and is approved.

D. A. SHINN
Chief, Materials Information Branch
Materials Application Division
AF Materials Laboratory

ABSTRACT

A program was conducted to determine the feasibility and possible advantage of processing conventional creep data through the use of computer program technology and to make generally available previously unpublished creep data. Computer programs were developed to fit data, make necessary calculations, tabulate results, and plot finished curves ready for design use. Raw creep data on 24 materials conducted over several years were processed and are presented in the normal format of tensile and creep data.

This abstract has been approved for public release and sale; its distribution is unlimited.

TABLE OF CONTENTS

ILLUSTRATIONS

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

ILLUSTRATIONS (CONT)

LIST OF TABLES

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

LIST OF TABLES (CONT)

SECTION I

INTRODUCTION

During a period of several years a number of aerospace materials were purchased and tested for tensile and creep properties. These data have been provided to those needing them. However, because the entire data have not been formally recorded, this report has been prepared as a means of ensuring that the data are permanently available to those having an interest. The potential user of this data is cautioned that changes in chemistry, heat treatments, and processing may have occurred since the materials in this report were originally procured. Consequently, he should check current practice against the reported material conditions before using any of the reported data. The data contained herein consist of one of the largest single groups of creep data known. The following sections described how the data were processed.

HISTORICAL METHODS OF DATA REDUCTION

In the past it has been common practice to reduce raw creep data to usable design data by manually plotting the raw data as the percent of linear deformation versus the logarithm of time involved. A family of curves is generated in this manner by varying the amount of load (which is converted to stress) and temperature. From these basic curves all other design data are inferred by computing curve slopes, by extrapolation along curves, or extrapolation between curves in the family. This is a tedious and time consuming chore, and is subject to human error.

To further complicate the problems of a manual approach to data reduction, creep data in general contain extensive scatter. This situation is understandable since the material itself may be undergoing time dependent change throughout the test, and since the deformations being measured are so minute and occur so slowly over such a long time. However, the net result is scattered raw data upon which the test engineer must impose considerable personal judgment in manually locating his basic curve. Then all other output data are based on this initial plot.

PROPOSED METHODS OF DATA REDUCTION

At the present time, more and more creep data are being recorded automatically. Simply because there is an ever increasing need for information about materials behavior in new environments, and a need for new materials themselves, it has become necessary to improve the methods of accumulating this information. There are now available and in use systems for automatic data acquisition and logging which will systematically scan large numbers of creep frames, pick off necessary readings, and compile raw data on tape or punched cards.

Once these raw data are available in a format which can be mechanically processed, the next logical extension is a series of computer programs which will reduce the raw data into the several usable forms discussed above. This approach was the basis for the program which was conducted in the Design Information Inhouse Facility of the AFML Applications Division and which is the basis for this report.

DATA REDUCTION PROGRAMS

A program was undertaken to investigate several facets of creep data reduction through computer techniques to determine to what extent gains could be made in speed, labor content,

accuracy, generation of new design parameters, or more complete usage of available raw data. Computer programs were set up, and raw data on several materials were processed to accomplish:

1. Curve fitting of raw data
2. Computation of minimum creep rate data
3. Comparing of actual data against an empirical concept of creep data proposed by others

Raw data previously unpublished, was used for input to the computer programs. These data were previously compiled by various testing laboratories under Air Force contracts on a wide variety of metallic structural materials in four general classifications.

1. Aluminum and Magnesium alloys
2. Titanium alloys
3. Steel alloys
4. Nickel based superalloys

DATA PRESENTED

Along with the basic program purpose (discussion of computer technology applied to data reduction), the actual data generated on the creep properties of the several materials tested will be presented in the conventional format.

SECTION II

DATA REDUCTION PROCEDURES

GENERAL

This portion of the work, which was the underlying purpose of this program, was performed primarily by Monsanto Research Corporation under Air Force Contract. Air Force Materials Laboratory personnel provided some computer programming assistance using an inhouse computer facility, and also provided overall program technical guidance.

The several procedures tried were based on the assumption that raw data would be available on tape or punched cards which a computer could readily accept for processing. Therefore, to try various computer programs, the first task was to draw existing raw data from the files and have it punched into cards. The raw data selected was conventional creep and tensile data taken over the last several years by several laboratories which had not been

reduced to useful form. The actual materials involved and the test conditions and procedures will be detailed in a later section of this report.

CURVE FITTING PROGRAM

Raw creep data as taken from a creep frame are simply plastic deformations of the sample over a time base. In spite of highly accurate test procedures and controls normally employed, these data are often scattered and unpredictable. The slightest errors in calibration or reading become important when the usual incremental creep reading is in terms of a few thousandths of 1%, and the test times are normally up to 1000 hours' duration. Testing times can range from several hours to years. Yet, it is from these data that we must plot a curve describing the creep properties of a particular material under given load and temperature conditions. From the shape, slope, and values of this curve, along with the rest of the family of curves on the same material under other loads at temperatures, we extrapolate and compute all of the creep design data on which decisions are based on the usage of this material. Therefore, it becomes extremely important that the curve finally put on paper be the most representative plot of the data. This is difficult to do by judgment or by normal techniques of curve fitting, and there is much possibility of human error.

On the other hand, there are many accepted mathematical techniques for curve fitting. The main problem is that as these procedures are refined to become more and more accurate and adaptable to wide ranges of data, they also become impossibly complex for manual solution. They are, however, completely adaptable to conventional computer programming. As a first step in our program for data reduction it was decided to employ such a computer program to give us basic curves which were mathematically fitted to the raw data.

Monsanto Research Corporation has in its computer program library a very complex and sophisticated program which has been developed and refined over the years to the point where it can be used to fit curves to almost any data of any mathematical form. It is fundamentally a multiple regression routine which, through subprograms or modification, can be set up to best handle the particular type of data being considered for the particular problem to be solved. In oversimplified terms this basic routine was modified to process the data for this program in the following two-step manner.

1. The first step was to fit a curve, by the least mean squares technique, to each set of raw data for a given material under specific test conditions. All raw data points were used.

2. The second step was to check the probable validity of each raw data point against this trial fit. In essence, each point was mathematically compared to the curve representing all points. The errors, standard deviations, and probability values were computed for each point. An analysis of these values then showed which points were within an acceptable range of experimental error, and which points were probably erroneous and the result of bad readings or other unexplainable testing variables. These "bad readings" were then dropped out of the raw data and a second and final curve was fitted to the remaining "good data" points. Approximately 13,000 raw data points were processed through this program, curves were developed, and then values were picked off these curves by the computer at convenient time intervals and printed back out as new data points. Both the raw data and equivalent new data points from the fitted curves are shown in tabular form for each of the materials tested. These tables appear in the appropriate appendix covering each class of material tested.

CURVE PLOTTING PROGRAM

The next task undertaken was to mechanically plot the several families of fitted curves which had been generated by the above program. A simple subprogram was set up so that the Monsanto Research Corporation computer could prepare a suitable magnetic tape for input to

a Benson-Lehner plotter available at W-PAFB. Machine plots were made of all generated fitted curves and a sample plot of one material is shown in Figure 1.

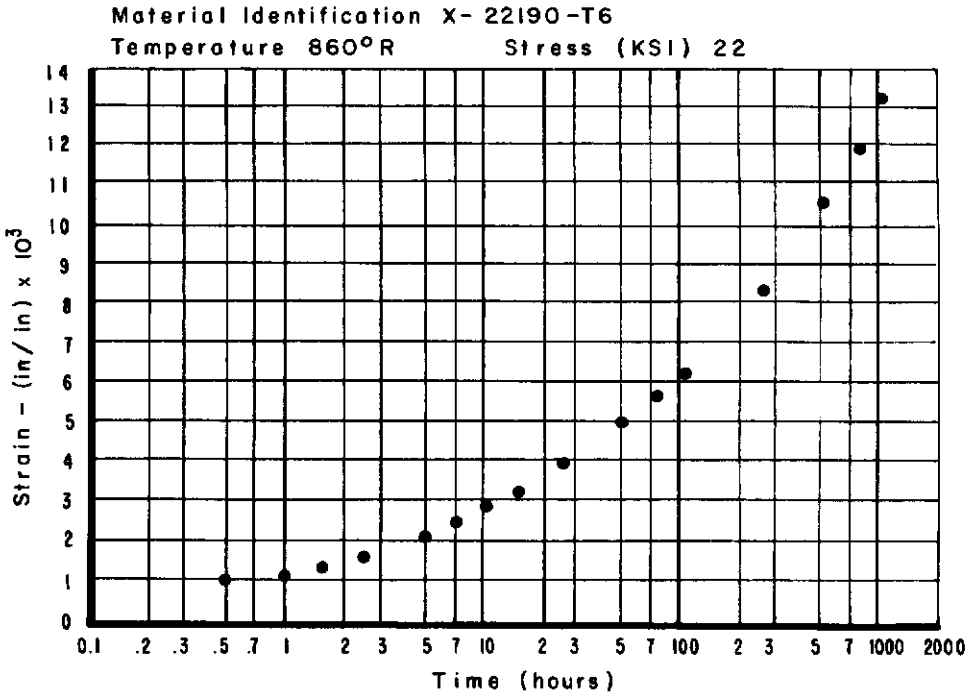


Figure 1. Sample Curve from Benson-Lehner Plotter

Certain procedural problems were encountered in using these machine plots directly in this report. These were purely mechanical problems of combining the desired family of curves on a single page, obtaining accurate registration of point values on logarithm scales, and certain limitations in the available plotter. Therefore, the data shown in plotted form in the appendices of this report for the several materials involved have been plotted in the conventional manner from the fitted data. However, this in no way implies that mechanical plotted output is not feasible and desirable in future programs.

EMPIRICAL FORMULA PROGRAM

Having a good set of smooth curves of creep data available for a material does not solve all of the problems of the designer. This is because creep data are taken only at a few representative test conditions of load and temperature which attempt to bracket anticipated usage stress environments at temperature. To predict how a material will behave under a certain specific set of conditions, it is usually necessary to extrapolate or interpolate from the available test data. It has always been a fond hope that a formula could be developed which would accurately express material behavior over wide ranges of the three variables of load, temperature, and time.

There are now in common practice several empirical procedures which accurately approximate creep behavior over limited portions of the creep curve. These are well known and do not need discussion at this time. However, The Boeing Company has postulated an empirical

relationship covering the full range of creep behavior which is in the form of an activation series equation and is written

$$\epsilon = Ae^{B/T}{}_{\sigma}ce^{D/T}{}_{t}Ee^{F/T}$$

where

ϵ = strain in inches/inch
T = temperature in °R
σ = stress in KSI
t = time in hours

and A, B, C, D, E, and F are six constants derived from testing the material by usual creep test methods.

The discussion of this equation and its derivation are covered completely in ASD Technical Report 61-216.

As part of the work of this program on data reduction it was decided to evaluate the validity of the Boeing formula over the wide range of creep data already in a form readily handled by a computer. This was accomplished by again setting up a modification for the master Monsanto Research Corporation computer program in the form of a six-step multiple regression routine. The data points developed from the fitted curves for each material were fed into the computer which then solved for the six constants in the formula. Again, in oversimplified terms, the computer solved for constants for each specific set of data points related to a particular test, checked validity of these results on a statistical basis to reject some points outside of acceptable levels, recomputed, and eventually furnished each constant for each material on the basis of the best solution for all data available on that material. This, then, gave an empirical expression for each material to express strain over wide ranges of variation in load, temperature, or time.

The next step in this program was to set up a method of testing the accuracy of these derived equations against known experimental test results. A computer program, for the IBM 7094 computer at W-PAFB, was developed by Air Force Materials Laboratory personnel which would use the test load, temperature, and time values which actually were used when this test data was obtained. Strain values were then computed from the derived equations and these computed values were mathematically compared to the actual observed values taken during the tests. A percentage error calculation was made for each pair of values so obtained. This computer program is shown in Figure 2. Figure 3 shows sections of the comparison data obtained which indicate the wide variations in the percentage error values.

The following general observations were made from these mathematical comparisons.

1. When constants for the Boeing formula were derived from sets of test data in which the variations in load or temperature were not great, these constants could be used to compute stress at intermediate values with some degree of accuracy.

2. When data based on progressively wider values of variable test conditions were used, the constants computed gave progressively wider errors between computed and observed strain values. This is particularly true at the extremes of the test condition ranges.

3. Certain materials showed much better agreement between computed values and observed values than did other materials. The reason for this is not understood and was not in the scope of this program.

```
CORRELATION OF CREEP DATA USING BOEING EQUATION
   READ(5, 100)A,B,C,D,E,F
100          Format(6E12.5)
             Write(6.103)A,B,C,D,E,F
103          Format(1H1,6E20.5/)
 20          Read(5,101)AE,S,T,TEM
101          Format(30X,4E10.3)
             AE=AE/100
             TR=TEM + 460.
             BT=B/TR
             DT=D/TR
             FT=F/TR
             CEL=C*EXP(DT)*ALOG(S)
             EEL=E*EXP(FT)*ALOG(T)
             PW=BT+CEL+EEL
             EC1=A*EXP(PW)/1000.
             PE=(EC1 - AE)* 100. /AE
             Write(6,102) TEM,S,T,AE,EC1,PE
102          Format(F15.0,2F15.1,2F25.7,F15.1)
             Go to 20
             end
```

Figure 2. Computer Program for Error Analysis

Temp. (°F)	Stress (ksi)	Time (Hrs)	Strain (Actual)	Strain (Calculated)	Error (%)
1350.	45.0	15.8	0.00030	0.00376	1152.3
1350.	45.0	18.2	0.00050	0.00399	698.3
1350.	45.0	22.5	0.00080	0.00437	446.5
1350.	45.0	27.9	0.00090	0.00479	432.7
1350.	45.0	41.3	0.00135	0.00567	320.1
1350.	45.0	54.5	0.00235	0.00639	171.8
1350.	45.0	73.3	0.00310	0.00725	134.0
1350.	45.0	86.2	0.00450	0.00777	72.8
1350.	45.0	102.2	0.00600	0.00836	39.4
1500.	16.0	5.8	0.00060	0.00093	54.8
1500.	16.0	8.3	0.00070	0.00114	63.4
1500.	16.0	32.7	0.00085	0.00254	198.5
1500.	16.0	40.9	0.00140	0.00289	106.4
1500.	16.0	65.5	0.00155	0.00380	145.1
1500.	16.0	70.9	0.00180	0.00398	121.0
1500.	16.0	95.4	0.00235	0.00473	101.1
1500.	16.0	120.0	0.00315	0.00540	71.5
1500.	16.0	143.8	0.00420	0.00600	42.8
1500.	16.0	168.6	0.00680	0.00658	-3.2
1500.	16.0	190.9	0.00740	0.00707	-4.4
1500.	16.0	201.6	0.00830	0.00730	-12.0
1500.	16.0	216.7	0.01010	0.00761	-24.6
1650.	2.0	0.4	0.00005	0.00000	-94.5
1650.	2.0	1.8	0.00010	0.00001	-91.5
1650.	2.0	21.3	0.00015	0.00005	-63.6
1650.	2.0	45.4	0.00020	0.00010	-51.6
1650.	2.0	93.5	0.00025	0.00017	-33.3
1650.	2.0	107.7	0.00035	0.00019	-47.0
1650.	2.0	163.4	0.00040	0.00025	-36.4
1650.	2.0	235.1	0.00050	0.00033	-33.1
1650.	2.0	501.0	0.00060	0.00059	-1.3
1650.	2.0	627.3	0.00070	0.00070	0.2
1650.	2.0	779.7	0.00080	0.00083	3.3
1650.	2.0	834.6	0.00090	0.00087	-3.3
1650.	2.0	1036.6	0.00100	0.00102	2.4
1650.	3.0	25.9	0.00020	0.00016	-19.8
1650.	3.0	49.1	0.00025	0.00026	3.9
1650.	3.0	69.9	0.00030	0.00034	13.1
1650.	3.0	88.9	0.00035	0.00041	16.2
1650.	3.0	105.9	0.00040	0.00046	16.0
1650.	3.0	117.6	0.00045	0.00050	11.6
1650.	3.0	129.1	0.00055	0.00054	-2.0
1650.	3.0	145.2	0.00060	0.00059	-1.9
1650.	3.0	177.8	0.00065	0.00069	5.5
1650.	3.0	200.0	0.00070	0.00075	7.1
1650.	3.0	279.4	0.00090	0.00096	7.2
1650.	3.0	296.5	0.00110	0.00101	-8.3
1650.	3.0	361.8	0.00120	0.00117	-2.3
1650.	3.0	391.4	0.00130	0.00124	-4.3
1650.	3.0	433.1	0.00200	0.00134	-32.9
1650.	3.0	448.6	0.00220	0.00138	-37.3
1650.	3.0	474.4	0.00280	0.00144	-48.6

Material - Nimonic 90 - 22
Calculated Exponents

A $.2362 \times 10^{-2}$	C $.8143 \times 10$	E $.2283 \times 10^{2}$
BB $.1590 \times 10^{4}$	D $.2676 \times 10^{4}$	F $.7195 \times 10^{4}$

Figure 3. Sample Printout of Error Calculations

4. In conclusion, although the Boeing formula in the present state is satisfactory for presenting results of creep testing, it would probably not be suitable for predicting creep behavior over the wide ranges of environments of interest to the designer for other conditions or materials.

MINIMUM CREEP RATE

As a last state in the data reduction effort of this program it was decided to set up a procedure for computation of minimum creep rate, which is also an important design parameter derived from the creep curve. Creep rate is simply $\Delta\epsilon/\Delta t$, or the slope of this creep curve, and minimum creep rate has historically been determined by measuring the slope of the plotted curve at its flattest point (secondary state creep), or taking the apparent slope of the curve over the flat region of the secondary creep range. These procedures again are possible sources of human error, both in establishing the shape of the creep curve and in accurately measuring its slope.

To avoid these problems a minimum creep rate program was written for the Monsanto Research Corporation computer in conjunction with the basic routines described above. The description of what this program does is as follows:

"This program performs the function of calculating a minimum creep rate for a set of creep test data. It can perform these calculations on any set of strain-time data providing input parameters are met and are consistent with available computer facilities. The program contains an executive routine and five subroutines.

Executive Routine - Used to control the logical flow of the program.

Subroutine (1) - Inputs data

Subroutine (7) - Sequences the input data by temperature, stress, strain, and time; stores the data in arrays of one and two dimensions; and prints out a sequenced list of all input data for the run.

Subroutines VDECOM and DEDCP - Work in conjunction with each other and with Subroutine (1), allowing input data to be inserted via a format known as V. This format allows the programmer to list data on cards with only one space of separation.

Subroutine (10) - Performs all of the minimum creep rate calculations. This consists of selecting a set of strain-time data and subtracting $\epsilon(j+1)$ from $\epsilon(j)$ to define a delta strain ($\Delta\epsilon$) and delta temperature (Δt) to calculate a creep rate ($\Delta\epsilon/\Delta t$). By the use of cascaded DO loops, a minimum creep rate for a given set of data is selected by a minimum function procedure which is a library program of the IBM 7094 programming system. This subroutine also prints out a list of temperature, stress, delta time, delta strain, creep rate, and minimum creep rate for the data run. Then the program proceeds to the next selected array. The program can only define a minimum creep rate if one exists within a particular set of data. If one is not found, the program will print out the smallest creep rate it has encountered, and will note the fact that this is not a true 'minimum' value."

The minimum creep rate data generated in this manner is shown in tabular form in the appropriate appendices for the materials tested.

SECTION III

DATA PRESENTED

GENERAL

The second major purpose of this program was to present the actual creep data generated through the data reduction efforts previously described. The raw data inputs to the program had been obtained over several years in the past through contracts with three testing laboratories. This accumulation represented approximately 13,000 individual readings, on 24 different materials which had not been previously prepared for publication. Some of the early data is not as complete or meaningful as is generally dictated by today's testing and reporting standards. However, it should still be valuable and useful to designers in a field where all such data adds to the limited amount now available.

DATA FORMAT

To provide for ease of reading and clarity of this report, all actual data presented, as well as information on materials tested and test procedures, have been placed in four appendices broken down by material groupings as follows:

Appendix I - Aluminum and Magnesium Based Alloys
This grouping includes:
X-2219-T6 Rod-Bare Aluminum
X2219-T6 Sheet-Bare Aluminum
X-2219-T6 Sheet-Alclad Aluminum
DOW HK 31XA-H24 Magnesium
DOW HM 21XA-T8 Magnesium

Appendix II - Titanium Based Alloys
This grouping includes:
C-130AM Rod
C-110M Sheet
TMCA Ti-140A Sheet
TMCA Ti-6Al-4V Sheet
MS Ti-6Al-4V Sheet
MST-821 Sheet
TMCA-811 Sheet
Ti-2.5Al-16V Sheet

Appendix III - Iron Based Alloys
This grouping includes:
422 SS Sheet
PH 15-7 Sheet
V 57C Rod
AM350 Sheet
321 SS Sheet

Appendix IV - Nickel Based Alloys
This grouping includes:
HMR 235 Sheet
Nimonic 90 Sheet

Each appendix includes the appropriate information on the specific materials tested, such as:

Chemical Composition

Heat Treatment

Specimen Preparations

Test Equipment

Test Procedure

Each appendix also presents appropriate data generated to express the usual tensile and creep properties of each material tested at room temperature and at elevated temperatures. This includes:

Tensile Strength	Tabular
Creep Deformation vs Time at Constant Stress (Raw Data)	Tabular
Creep Deformation vs Time at Constant Stress (Fitted Data)	Tabular
Creep Deformation vs Time at Constant Stress (Fitted Data)	Plotted
Creep Deformation and Rupture Data (Fitted Data)	Tabular
Stress vs Time for Constant Deformation (Fitted Data)	Plotted
Minimum Creep Rate	Tabular
Minimum Creep Rate	Plotted

SECTION IV

CONCLUSIONS

GENERAL

Computer methods for the handling and reduction of creep data are feasible and are superior to the manual methods used in the past. Data are handled much more rapidly and many calculations are now feasible which were too time consuming in the past. Human judgment and error in choice of data points to be used, and in curve fittings, are eliminated. The smoothed or fitted data produced by computer programs are more easily presented in many forms usable to the designer.

SPECIFIC

Curve fitting of raw data, and then using the fitted curve as the basis for further calculation is feasible and desirable.

Automatic curve plotting form fitted data is a preferred way of presenting creep data and is less laborious.

Neither the empirical relationship of creep behavior as suggested by The Boeing Company nor others suggested in the past are sufficiently accurate over a wide range of test conditions to merit usage for predicting or extrapolating material behavior. However, the Boeing procedure is an acceptable and satisfactory way of presenting the test results of a creep test program.

The materials data presented in the appendices of this report will allow potential users of these materials to evaluate them more completely than is usually possible from other sources.

APPENDIX I

ALUMINUM AND MAGNESIUM BASED ALLOYS

MATERIALS TESTED AND APPLICATIONS

1. X-2219-T6 (Bare Rod) - This material was purchased in 1956 from Aluminum Company of America as a stock item in plate form. The plate purchased was from their lot No. 61041 and was 2 in. x 24 in. x 48in.

2. X-2219-T6 (Bare Sheet) - This material was purchased in 1956 from Aluminum Company of America as a stock item in sheet form. The sheet purchased was from their lot No. 06448 and was .064 in. x 24 in. x 48 in. and flat mill finished.

3. X-2219-T6 (Alclad Sheet) - This material was purchased in 1956 from Aluminum Company of America as a stock item in sheet form. The .064 in. x 24 in. x 48 in. sheet was purchased from their lot No. 06444 and was flat mill finished.

4. HK-31 Magnesium Alloy Sheet - This material was purchased in 1956 from Dow Chemical Company, Madison, Illinois, as a stock item in sheet form. In size, the two sheets purchased were .065 in. x 48 in. x 144 in. and were listed as Dow metal sheet, condition: HK 31 XA-H 24.

5. HM-21XA Magnesium Alloy Sheet - This material was purchased in 1956 from Dow Chemical Company as an experimental alloy in sheet form. In size, the two sheets purchased were .063 in. x 48 in. x 144 in. and were listed as Heat No. 90 Mo 513463, lot 346, Net 54 condition T-8 (solution treated, cold worked, artificially aged).

No specific heat treatment information was given other than that listed above. Nominal chemical compositions for these five alloys are given in Table 1.

TEST PROCEDURES

These five materials were tested by Metcut Research Associates, Inc., Cincinnati, Ohio, under contract No. AF 33(600)-32008. This contract called for all test specimens to be prepared by the Air Force Materials Laboratory Machine Shop and furnished to Metcut. Specimens were prepared in accordance with the drawings shown in Figure 4. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

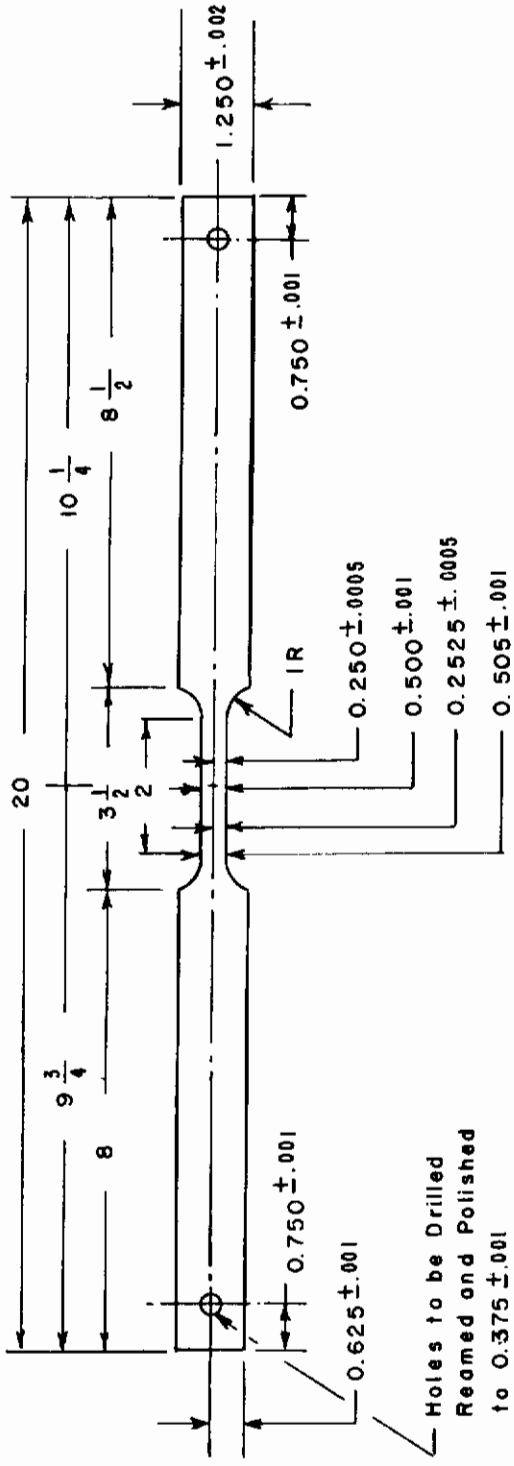
"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

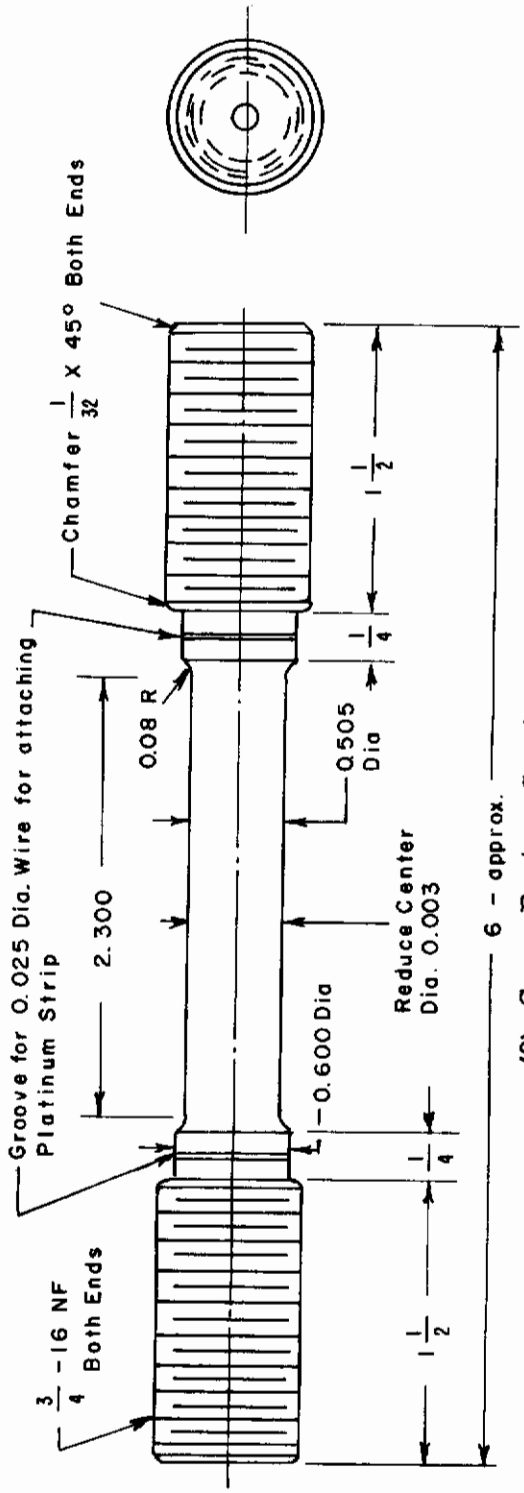
"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Lima-Hamilton Tensile Machine equipped with strain pacing instrumentation was used for all tensile tests. Standard loading rates were used with strain measured with an extensometer at all test temperatures. The resultant tensile data are presented in Tables 2 through 6.

Lever-type creep test frames were used for creep testing. Test furnaces were provided with quartz viewing ports to permit optical measurement of creep deformation using the conventional platinum-strip/microscope method. Creep data are presented in Tables 7 through 56 and Figures 5 through 39.

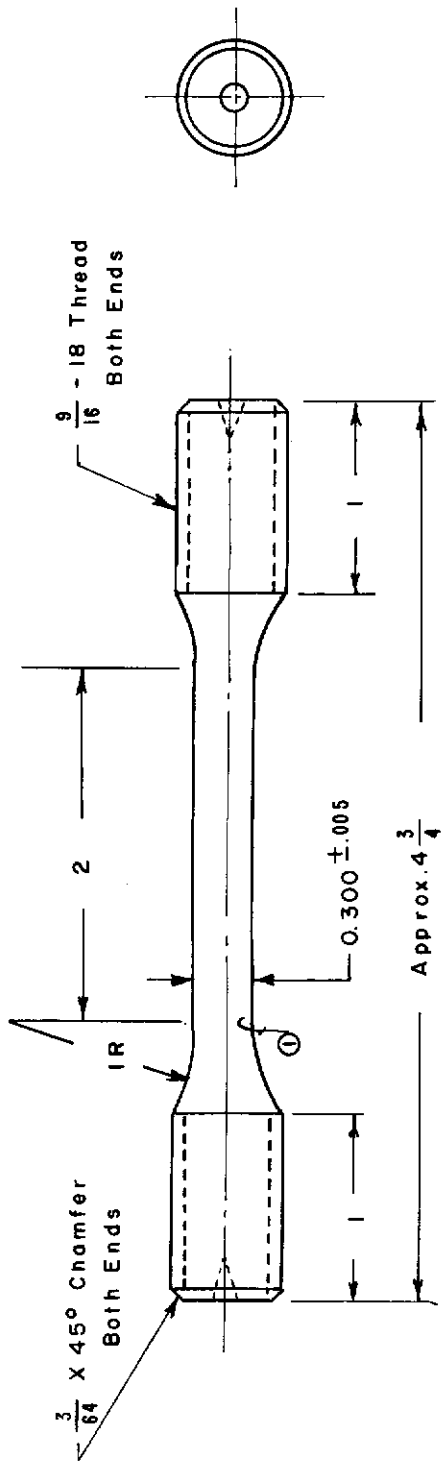


(1) Sheet Stress-Rupture Specimen

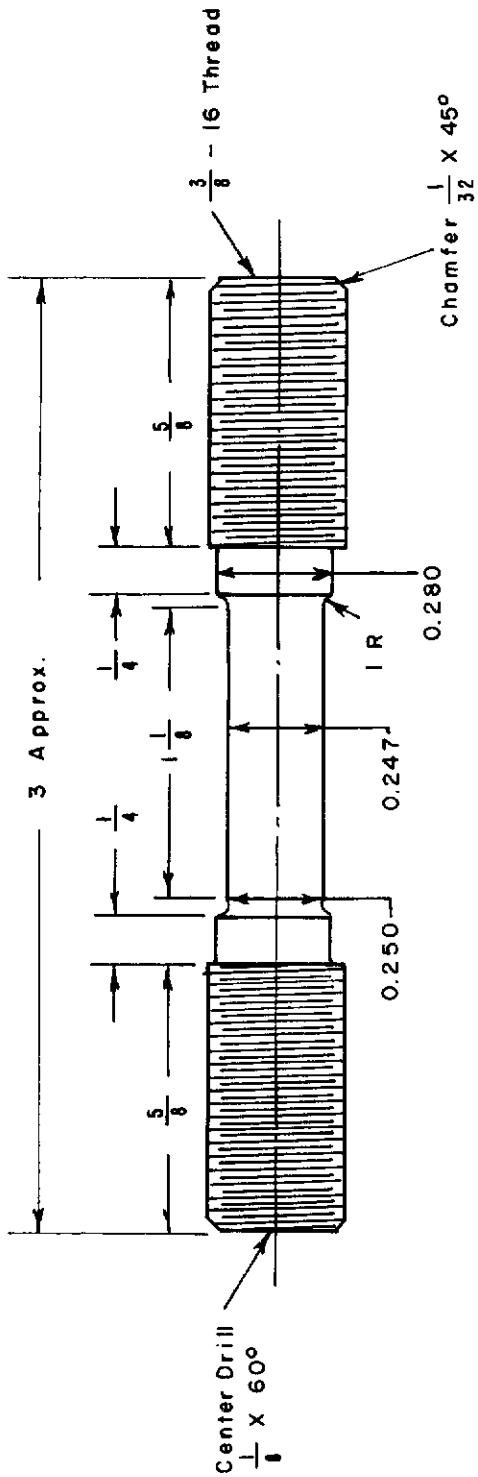


(2) Creep Rupture Specimen

Figure 4. Specimen Drawings (1 - 4)



(3) Creep Rupture Specimen-Plain



(4) Specimen-Machined Tensile

Figure 4. (CONT)

TABLE 1

Nominal Chemical Composition of
Aluminum and Magnesium Based Alloys

Element	X-2219 *①②③	Alclad on X-2219 * ③	HK-31 * ④	HM-21 * ⑤
Al	Bal	Bal	-	-
Cu	6.0	0-.1	-	-
Fe + Si	-	.7	Bal	Bal
Mg	-	0-.1	0-.15	.54
Mn	.3	0-.1	2.5-4.0	2.3
Th	-	-	-	-
Zn	-	.8-1.3	-	-
Zr	.2	-	.45-1.0	-

Notes: Numbers shown below material designation
①refer to the material number in the listing of "Materials Tested."
* Nominal composition - actual not known

TABLE 2

Tensile Test Data for Bare X-2219-T6 Round Bars (1000 Hr)

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (KSI)		Elongation (% in 2 inches)	Reduction in Area (%)
		.02% offset	0.2% offset		
75	58.3	29.5	36.9	14	33
"	57.5	28.9	34.5	11	28
"	57.7	29.1	35.3	12	32
400	35.9	25.2	29.2	21	64
"	36.5	23.1	28.7	18	62
"	34.9	23.1	28.2	25	73
500	26.5	16.6	23.5	23	76
"	26.1	17.8	22.2	23	75
"	26.4	18.4	22.5	22	77
600	19.1	13.4	16.8	28	83
"	19.2	14.6	17.5	26	84
"	24.0	15.6	18.0	23	79

*To convert to ° R add 460

TABLE 3

Tensile Test Data for Bare X-2219-T6 Sheet (100 Hr)

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (KSI)		Elongation (% in 2 inches)
		.02% offset	0.2% offset	
75	61	36	43	10
"	61	38	43	10
"	61	36	43	11
400	34	24	30	14
"	35	26	31	14
"	35	26	31	12
500	25	14	23	15
"	25	15	22	12
"	24	17	23	12
600	18	14	17	20
"	22	13	16	14

*To convert to ° R add 460

TABLE 4

Tensile Test Data for Alclad X-2219-T6 Sheet (100 Hr)

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (KSI)		Elongation (% in 2 inches)
		.02% offset	0.2% offset	
75	59.2	31.6	38.9	10
"	59.0	32.9	38.6	10
"	56.0	32.0	38.8	10
400	31.4	21.1	27.7	14
"	31.2	21.9	27.4	15
"	31.7	21.9	27.7	14
500	23.5	14.1	22.5	13
"	23.3	17.3	21.9	14
"	24.8	17.3	22.4	15
600	15.5	13.5	14.8	14
"	16.1	11.6	15.4	13
"	15.5	11.0	14.0	15

*To convert to ° R add 460

TABLE 5

Tensile Test Data for DOW HK 31XA-H24 (1000 Hr)

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (KSI)		Elongation (% in 2 inches)
		.02% offset	0.2% offset	
75	35.10	19.30	30.4	4
"	34.80	17.10	30.5	4
"	35.20	19.20	31.9	9
400	20.20	14.40	20.2	17
"	19.90	16.20	19.2	21
"	20.60	15.40	19.7	21
500	17.20	13.00	16.2	17
"	17.80	11.60	16.5	16
"	17.70	10.70	16.5	17
600	9.64	5.68	6.9	61
"	9.82	5.69	6.9	65
"	9.83	5.34	6.0	73

*To convert to ° R add 460

TABLE 6

Tensile Test Data for DOW HM 21XA-T8

Test Temperature (° F)**	Ultimate Tensile Strength (KSI)	Yield Strength (KSI)		Elongation (% in 2 inches)
		.02% offset	0.2% offset	
R. T.	30.9	9.70	21.2	5*
"	31.4	13.20	24.4	3*
"	32.1	11.60	23.1	8*
400	17.4	13.90	17.4	24
"	17.1	12.70	16.2	27
"	16.9	12.40	16.0	24
500	15.6	10.80	14.5	10
"	15.7	10.90	14.0	19
"	15.4	9.74	13.8	9
600	12.4	8.24	11.4	35
"	12.4	8.02	10.9	16
"	12.4	8.40	11.1	23

*Sample Failed at Extensometer Clamp
**To convert to ° R add 460

CREEP DATA FOR

X-2219-T6 ROD (BARE)

(ALUMINUM BASED)

TABLE 7

Deformation Versus Time (Raw Data) for X-2219-T6 Rod (Bare) at 400° F (860° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	3.00000E-04	0.500
	4.00000E-04	1.000
	5.00000E-04	2.500
	6.00000E-04	10.000
	8.00000E-04	25.000
	9.00000E-04	75.000
	10.00000E-04	250.000
	1.40000E-03	500.000
	1.50000E-03	750.000
	1.60000E-03	1000.000
20.0000	5.00000E-04	0.500
	7.00000E-04	1.000
	10.00000E-04	1.500
	1.20000E-03	2.500
	1.60000E-03	5.000
	1.80000E-03	7.500
	1.90000E-03	10.000
	2.00000E-03	15.000
	2.20000E-03	25.000
	2.60000E-03	50.000
	2.90000E-03	75.000
	3.10000E-03	100.000
	4.00000E-03	250.000
	5.20000E-03	500.000
	5.90000E-03	750.000
	6.10000E-03	1000.000
22.0000	9.00000E-04	0.500
	1.20000E-03	1.000
	1.40000E-03	1.500
	1.70000E-03	2.500
	2.20000E-03	5.000
	2.60000E-03	7.500

TABLE 7 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.00000E-03	10.000
	3.30000E-03	15.000
	3.80000E-03	25.000
	5.10000E-03	50.000
	5.90000E-03	75.000
	6.40000E-03	100.000
	8.40000E-03	250.000
	1.06000E-02	500.000
	1.23000E-02	750.000
	1.33000E-02	1000.000
22.4000	10.00000E-04	0.500
	1.40000E-03	1.000
	1.50000E-03	1.500
	1.70000E-03	2.500
	2.50000E-03	5.000
22.4000	3.00000E-03	7.500
	3.60000E-03	10.000
	4.20000E-03	15.000
22.5000	6.00000E-04	0.500
	8.00000E-04	1.000
	1.10000E-03	1.500
	1.60000E-03	2.500
	2.40000E-03	5.000
	3.00000E-03	7.500
	3.40000E-03	10.000
	4.00000E-03	15.000
	4.80000E-03	25.000
	6.50000E-03	50.000
	8.00000E-03	75.000
	9.00000E-03	100.000
	1.03000E-02	150.000
	1.12000E-02	200.000
	1.25000E-02	250.000
	1.85000E-02	500.000
	2.33000E-02	750.000
	3.05000E-02	1000.000

TABLE 7 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	10.00000E-04	0.500
	1.40000E-03	1.000
	1.70000E-03	1.500
	2.20000E-03	2.500
	3.10000E-03	5.000
	3.80000E-03	7.500
	4.30000E-03	10.000
	5.30000E-03	15.000
	6.60000E-03	25.000
	8.50000E-03	50.000
	10.00000E-03	75.000
	1.13000E-02	100.000
	1.33000E-02	150.000
	1.48000E-02	200.000
	1.60000E-02	250.000
	2.08000E-02	500.000
	2.13000E-02	750.000
24.0000	2.30000E-03	0.500
	3.00000E-03	1.000
	4.00000E-03	1.500
	5.00000E-03	2.500
	6.80000E-03	5.000
	8.00000E-03	7.500
	8.90000E-03	10.000
	1.02000E-02	15.000
	1.15000E-02	25.000
24.0000	1.35000E-02	50.000
	1.55000E-02	75.000
	1.73000E-02	100.000
	3.93000E-02	150.000

TABLE 7 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	3.00000E-03	0.500
	3.80000E-03	1.000
	4.20000E-03	1.500
	5.20000E-03	2.500
	7.30000E-03	5.000
	9.20000E-03	7.500
	1.07000E-02	10.000
	1.30000E-02	15.000
	1.72000E-02	25.000
	2.25000E-02	50.000
	2.33000E-02	75.000
26.5000	3.00000E-03	0.500
	5.00000E-03	1.000
	7.00000E-03	1.500
	1.20000E-02	2.500
	1.50000E-02	5.000
	1.60000E-02	10.000
	2.20000E-02	15.000
28.0000	6.00000E-03	0.500
	10.00000E-03	1.000
	1.50000E-02	1.500
	2.20000E-02	2.500
	2.80000E-02	5.000
30.0000	1.65000E-02	0.500
	3.80000E-02	1.000

33

TABLE 8

Deformation Versus Time (Fitted Data) for X-2219-T6 Rod (Bare) at 400° F (860° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	3.00460E-04	0.500
	3.91970E-04	1.000
	5.02470E-04	2.500
	6.49770E-04	10.000
	7.42720E-04	25.000
	8.74720E-04	75.000
	1.10468E-03	250.000
	1.31857E-03	500.000
	1.48600E-03	750.000
	1.62861E-03	1000.000
20.0000	6.75520E-04	1.000
	9.86950E-04	1.500
	1.28973E-03	2.500
	1.59264E-03	5.000
	1.73947E-03	7.500
	1.84035E-03	10.000
	1.98887E-03	15.000
	2.20560E-03	25.000
	2.59329E-03	50.000
	2.88845E-03	75.000
	3.13395E-03	100.000
	4.13418E-03	250.000
	5.10819E-03	500.000
	5.74993E-03	750.000
	6.22799E-03	1000.000
22.0000	9.55570E-04	0.500
	1.17241E-03	1.000
	1.36345E-03	1.500
	1.67162E-03	2.500
	2.21042E-03	5.000
	2.59072E-03	7.500
	2.89037E-03	10.000
	3.35617E-03	15.000
	4.01984E-03	25.000

TABLE 8 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.07498E-03	50.000
	5.78953E-03	75.000
	6.34836E-03	100.000
	8.49444E-03	250.000
	1.06234E-02	500.000
	1.21492E-02	750.000
	1.33894E-02	1000.000
22.4000	1.00059E-03	0.500
	1.39906E-03	1.000
	1.49237E-03	1.500
	1.72401E-03	2.500
	2.44595E-03	5.000
	3.07292E-03	7.500
22.4000	3.56015E-03	10.000
	4.20489E-03	15.000
22.5000	2.11350E-03	5.000
	2.84644E-03	7.500
	3.41295E-03	10.000
	4.24864E-03	15.000
	5.32639E-03	25.000
	6.82552E-03	50.000
	7.79037E-03	75.000
	8.57796E-03	100.000
	9.95676E-03	150.000
	1.12362E-02	200.000
	1.24771E-02	250.000
	1.84783E-02	500.000
	2.42634E-02	750.000
	2.98463E-02	1000.000
23.0000	1.27239E-03	1.000
	1.77812E-03	1.500
	2.35073E-03	2.500
	3.16387E-03	5.000
	3.73711E-03	7.500
	4.21593E-03	10.000

RUN 12

TABLE 8 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.02093E-03	15.000
	6.29598E-03	25.000
	8.56422E-03	50.000
	1.01927E-02	75.000
	1.14772E-02	100.000
	1.34476E-02	150.000
	1.49360E-02	200.000
	1.61252E-02	250.000
	1.98327E-02	500.000
	2.18243E-02	750.000
24.0000	7.25844E-03	5.000
	7.96443E-03	7.500
	8.61938E-03	10.000
	9.78493E-03	15.000
	1.16005E-02	25.000
	1.39644E-02	50.000
	1.50668E-02	75.000
	1.74479E-02	100.000
	3.92932E-02	150.000
25.0000	2.98472E-03	0.500
	3.73490E-03	1.000
	4.32448E-03	1.500
	5.27061E-03	2.500
	7.24725E-03	5.000
25.0000	8.99914E-03	7.500
	1.05784E-02	10.000
	1.32862E-02	15.000
	1.72929E-02	25.000
	2.22978E-02	50.000
	2.33834E-02	75.000

TABLE 8 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
26.5000	2.81765E-03	0.500
	5.31418E-03	1.000
	7.49044E-03	1.500
	1.09663E-02	2.500
	1.55233E-02	5.000
	1.58626E-02	10.000
	2.20255E-02	15.000
28.0000	5.62125E-03	0.500
	1.05967E-02	1.000
	1.49509E-02	1.500
	2.17956E-02	2.500
	2.80354E-02	5.000
30.0000	1.65000E-02	0.500
	3.80000E-02	1.000

TABLE 9

Bare X-2219-T6 Bars Creep Deformation and Rupture Data at 400° F (860° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
22.0	1108	10.5	.25	.66	10	49	235
22.4	963.4	6.5	.18	.5	7.5	-	-
22.5	169.9	11.5	.31	1.33	7.5	27	145
23.0	84.6	13.0	.29	1.0	4.9	14	75
24.0	25.4	17.5	.26	-	1.0	2.5	14
25.0	5.5	21.5	.51	-	.5	2.3	8.7
26.5	1.3	23.0	.66	-	.5	1.0	2.1
28.0			1.52	-	-	-	-
30.0				-	.8	-	-

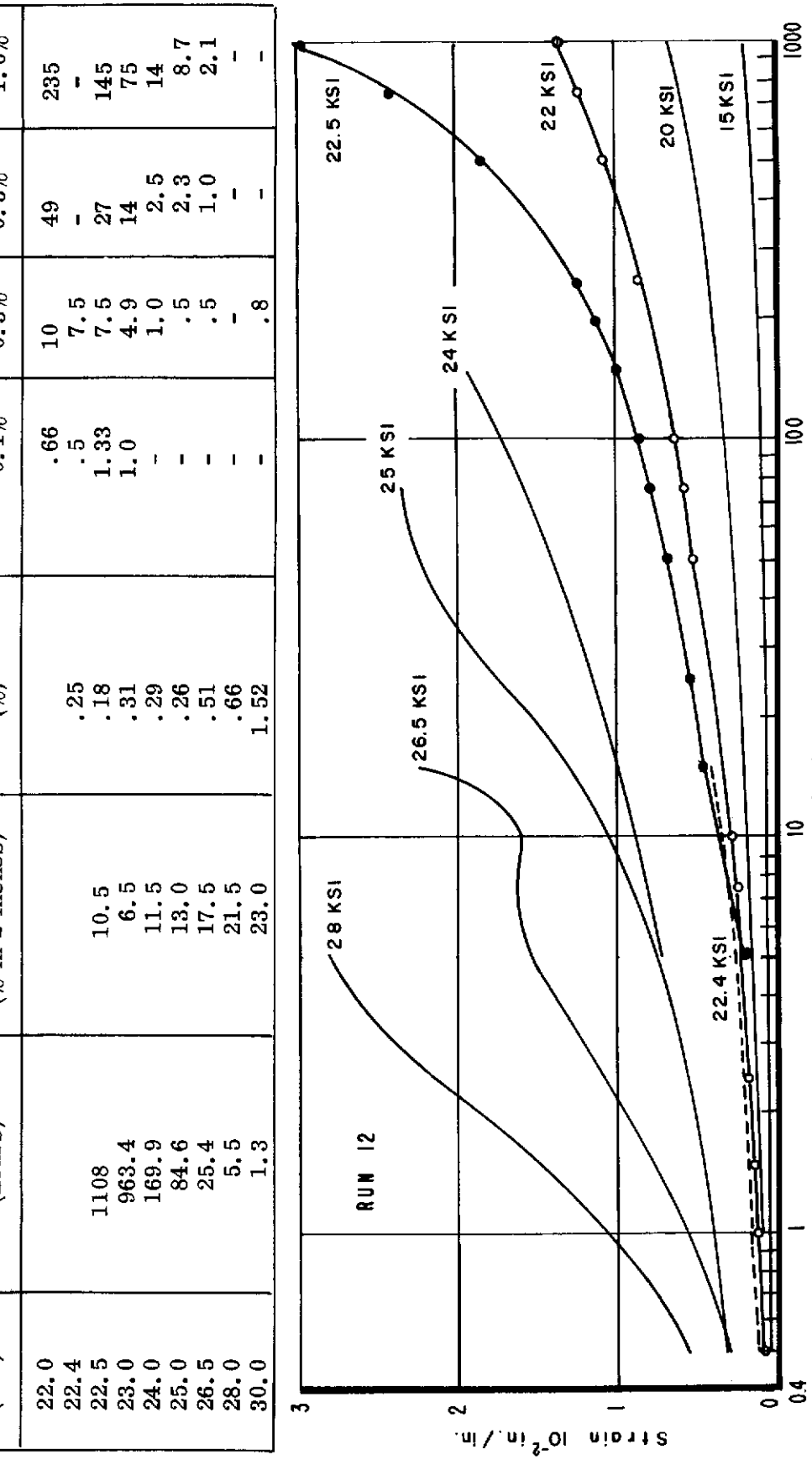


Figure 5. Creep Deformation Versus Log Time of X-2219-T6 Rod (Bare) at 400°F (860°R)

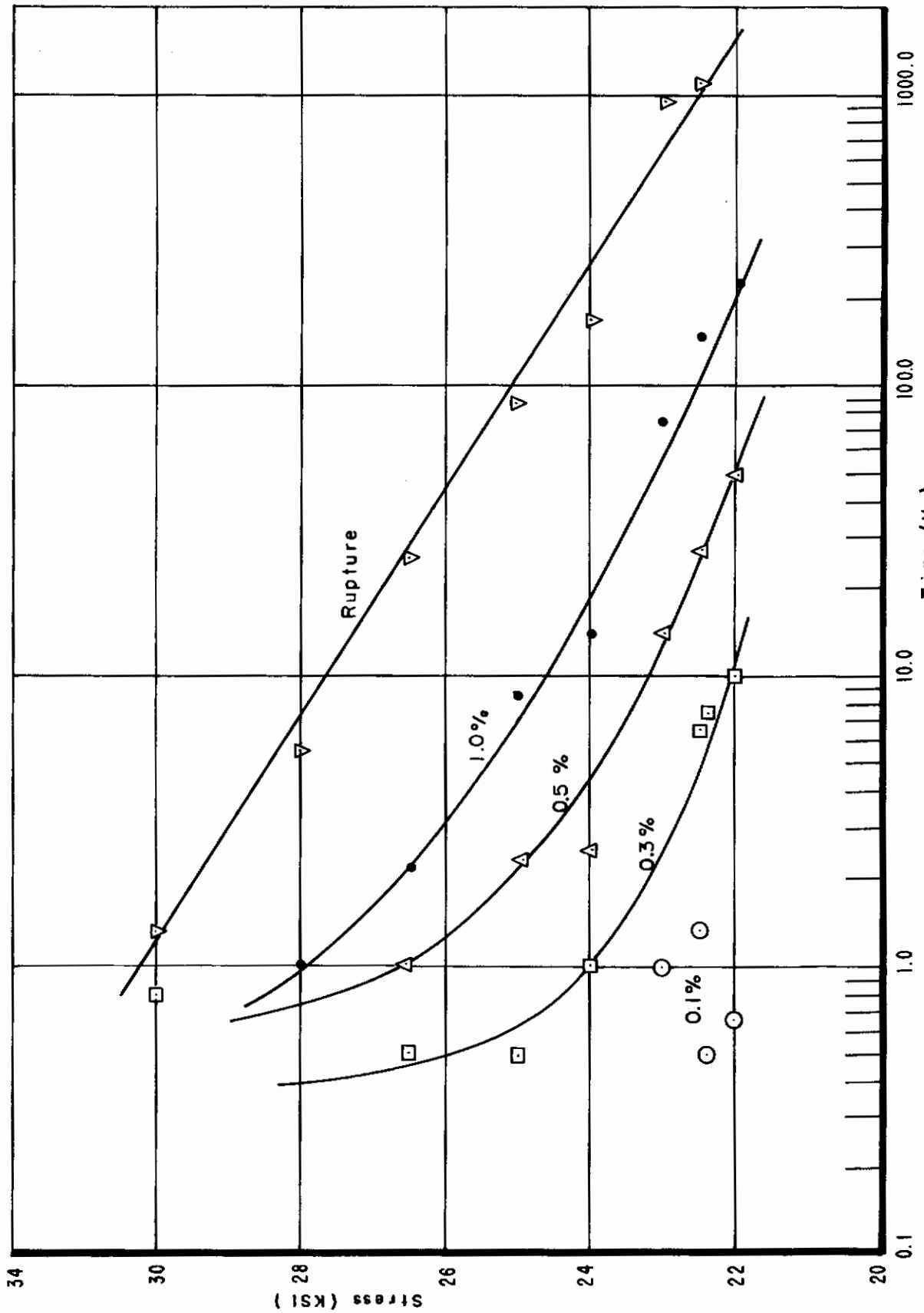


Figure 6. Creep Rupture Properties of X-2219-T6 Rod (Bare) at 400°F (860° R)

TABLE 10

Deformation Versus Time (Raw Data) for X-2219-T6 Rod (Bare) at 500° F (960° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
9.0000	5.00000E-04	5.000
	6.00000E-04	10.000
	8.00000E-04	25.000
	10.00000E-04	75.000
	1.10000E-03	100.000
	1.20000E-03	250.000
	1.30000E-03	500.000
	1.40000E-03	750.000
	1.50000E-03	1000.000
12.0000	10.00000E-05	0.500
	2.00000E-04	1.000
	4.00000E-04	1.500
	5.00000E-04	2.500
	8.00000E-04	5.000
	10.00000E-04	7.500
12.0000	1.10000E-03	10.000
	1.20000E-03	15.000
	1.30000E-03	50.000
	1.40000E-03	100.000
	1.80000E-03	250.000
	2.20000E-03	500.000
	2.60000E-03	750.000
	2.90000E-03	1000.000
15.0000	7.00000E-04	0.500
	8.00000E-04	1.000
	10.00000E-04	1.500
	1.20000E-03	2.500
	1.50000E-03	5.000
	1.80000E-03	7.500
	1.90000E-03	10.000
	2.20000E-03	15.000
	2.30000E-03	25.000
	2.50000E-03	50.000
	2.70000E-03	75.000
	3.40000E-03	100.000

TABLE 10 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.60000E-03	250.000
	6.10000E-03	500.000
	7.50000E-03	750.000
	8.80000E-03	1000.000
16.0000	4.00000E-04	0.500
	6.00000E-04	1.000
	8.00000E-04	1.500
	1.10000E-03	2.500
	1.40000E-03	5.000
	1.60000E-03	7.500
	1.70000E-03	10.000
	1.90000E-03	15.000
	2.10000E-03	25.000
	2.80000E-03	50.000
	3.20000E-03	75.000
	3.60000E-03	100.000
	5.40000E-03	250.000
	6.00000E-04	0.500
	8.00000E-04	1.000
	1.10000E-03	1.500
	1.40000E-03	2.500
	2.00000E-03	5.000
	2.20000E-03	7.500
	2.40000E-03	10.000
	2.70000E-03	15.000
	3.50000E-03	25.000
	4.20000E-03	50.000
	4.50000E-03	75.000
16.0000	4.80000E-03	100.000
	6.20000E-03	250.000
	7.60000E-03	500.000
	8.50000E-03	750.000
	1.03000E-02	1000.000
17.0000	4.00000E-04	0.500
	6.00000E-04	1.000
	9.00000E-04	1.500

TABLE 10 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.20000E-03	2.500
	1.90000E-03	5.000
	2.30000E-03	7.500
	2.80000E-03	10.000
	3.30000E-03	15.000
	3.60000E-03	25.000
	5.20000E-03	50.000
	6.30000E-03	75.000
	7.40000E-03	100.000
	9.00000E-03	150.000
	1.11000E-02	200.000
	3.00000E-04	0.500
	6.00000E-04	1.000
	8.00000E-04	1.500
	1.50000E-03	2.500
	2.50000E-03	5.000
	3.00000E-03	7.500
	3.70000E-03	10.000
	4.20000E-03	15.000
	5.00000E-03	25.000
	6.20000E-03	50.000
	8.40000E-03	75.000
	9.30000E-03	100.000
	1.07000E-02	150.000
	1.20000E-02	200.000
	1.33000E-02	250.000
	1.70000E-02	350.000
18.0000	1.80000E-03	0.500
	2.20000E-03	1.000
	2.60000E-03	1.500
	3.20000E-03	2.500
	4.40000E-03	5.000
	5.40000E-03	7.500
	6.30000E-03	10.000
	7.80000E-03	15.000
	10.00000E-03	25.000
	1.40000E-02	50.000
	1.60000E-02	75.000

TABLE 10 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
19.0000	3.50000E-03	0.500
		1.000
19.0000	6.00000E-03	1.500
	6.50000E-03	2.500
	8.00000E-03	5.000
	1.10000E-02	7.500
	1.25000E-02	10.000
	1.35000E-02	15.000
	1.65000E-02	
20.5000	5.00000E-03	0.500
	10.00000E-03	1.000
	1.30000E-02	1.500
	1.80000E-02	2.500

TABLE 11

Deformation Versus Time (Fitted Data) for X-2219-T6 Rod (Bare) at 500° F (960° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
9.0000	4.77720E-04	5.000
	6.30900E-04	10.000
	8.12590E-04	25.000
	1.00477E-03	75.000
	1.05213E-03	100.000
	1.20302E-03	250.000
	1.32806E-03	500.000
	1.41194E-03	750.000
	1.47881E-03	1000.000
12.0000	5.20630E-04	2.500
	8.27600E-04	5.000
	9.72820E-04	7.500
	1.05967E-03	10.000
	1.16042E-03	15.000
	1.35551E-03	50.000
	1.46386E-03	100.000
	1.74384E-03	250.000
	2.18017E-03	500.000
	2.57646E-03	750.000
	2.93899E-03	1000.000
15.0000	7.84660E-04	1.000
	9.87990E-04	1.500
	1.23988E-03	2.500
	1.56166E-03	5.000
15.0000	1.74008E-03	7.500
	1.86344E-03	10.000
	2.03685E-03	15.000
	2.26719E-03	25.000
	2.64808E-03	50.000
	2.94386E-03	75.000
	3.20514E-03	100.000
	4.48420E-03	250.000
	6.15415E-03	500.000
	7.54450E-03	750.000
	8.76609E-03	1000.000

TABLE 11 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
16.0000	3.75580E-04	0.500
	6.49430E-04	1.000
	8.23650E-04	1.500
	1.05183E-03	2.500
	1.37020E-03	5.000
	1.56169E-03	7.500
	1.70236E-03	10.000
	1.91324E-03	15.000
	2.21688E-03	25.000
	2.75809E-03	50.000
	3.19041E-03	75.000
	3.57275E-03	100.000
	5.41332E-03	250.000
	6.19770E-04	0.500
	8.39540E-04	1.000
	1.03670E-03	1.500
	1.35501E-03	2.500
	1.89453E-03	5.000
	2.25373E-03	7.500
	2.52183E-03	10.000
	2.91146E-03	15.000
	3.41184E-03	25.000
	4.09899E-03	50.000
	4.51455E-03	75.000
	4.82637E-03	100.000
	6.06465E-03	250.000
	7.56195E-03	500.000
	8.66575E-03	750.000
	1.00722E-02	1000.000
17.0000	3.96970E-04	0.500
	6.14240E-04	1.000
	8.56720E-04	1.500
	1.25524E-03	2.500
	1.91562E-03	5.000
	2.34778E-03	7.500
	2.67296E-03	10.000
	3.16404E-03	15.000

TABLE 11 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.0000	3.87174E-03	25.000
	5.16181E-03	50.000
	6.25207E-03	75.000
	7.26949E-03	100.000
	9.19439E-03	150.000
	1.10268E-02	200.000
	7.62010E-04	1.500
	1.49898E-03	2.500
	2.51058E-03	5.000
	3.11670E-03	7.500
	3.55944E-03	10.000
	4.21386E-03	15.000
	5.12581E-03	25.000
	6.46280E-03	50.000
	7.64113E-03	75.000
	8.86829E-03	100.000
	1.06859E-02	150.000
	1.23174E-02	200.000
	1.38291E-02	250.000
	1.66078E-02	350.000
18.0000	1.76731E-03	0.500
	2.27610E-03	1.000
	2.60495E-03	1.500
	3.16191E-03	2.500
	4.36078E-03	5.000
	5.38766E-03	7.500
	6.28768E-03	10.000
	7.81094E-03	15.000
	1.01394E-02	25.000
	1.38372E-02	50.000
	1.60660E-02	75.000

TABLE 11 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
19.0000	3.55442E-03	0.500
	5.69874E-03	1.000
	6.76903E-03	1.500
	8.18858E-03	2.500
	1.06024E-02	5.000
	1.24153E-02	7.500
	1.39165E-02	10.000
	1.63550E-02	15.000
20.5000	4.70724E-03	0.500
	1.02446E-02	1.000
	1.34837E-02	1.500
	1.75645E-02	2.500

TABLE 12

Bare X-2219-T6 Creep Deformation and Rupture Data at 500° F (960° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformatior (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
17.0	468.1	-	.19	1.83	12	43	177
17.0	411.1	3.5	.20	1.8	7.5	25	125
18.0	91	9.5	.22	-	2.1	6.5	25
19.0	25.2	16.0	.32	-	-	.8	4.1
20.5	5.1	20.5	.36	-	-	.5	1.0
24.0	.2	23.5	1.31	-	-	-	-

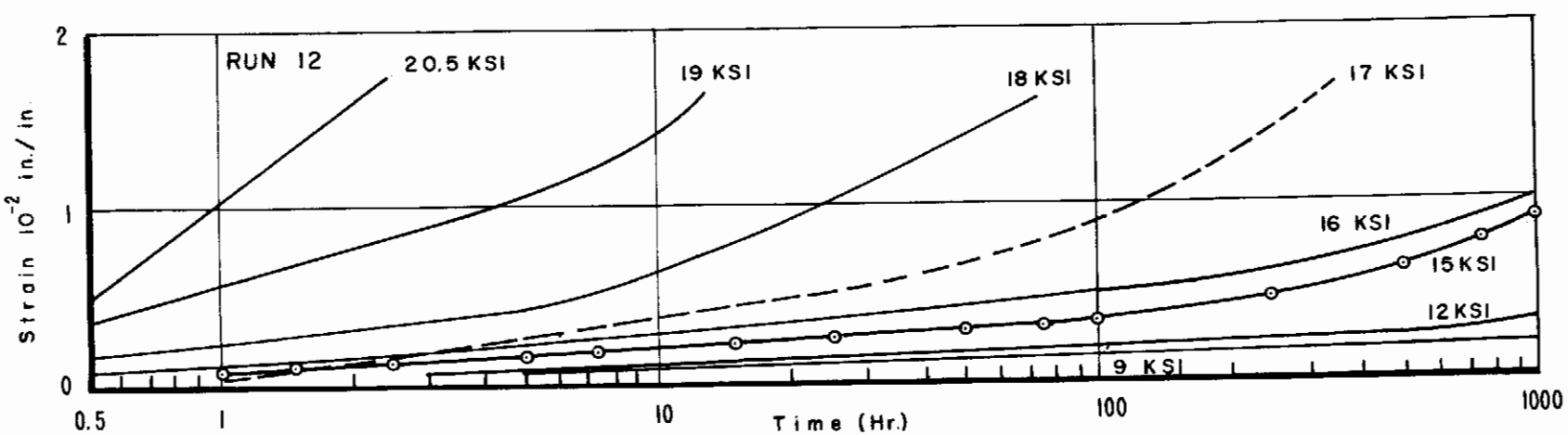


Figure 7. Creep Deformation Versus Log Time of X-2219-T6 Rod (Bare) at 500°F (960°R)

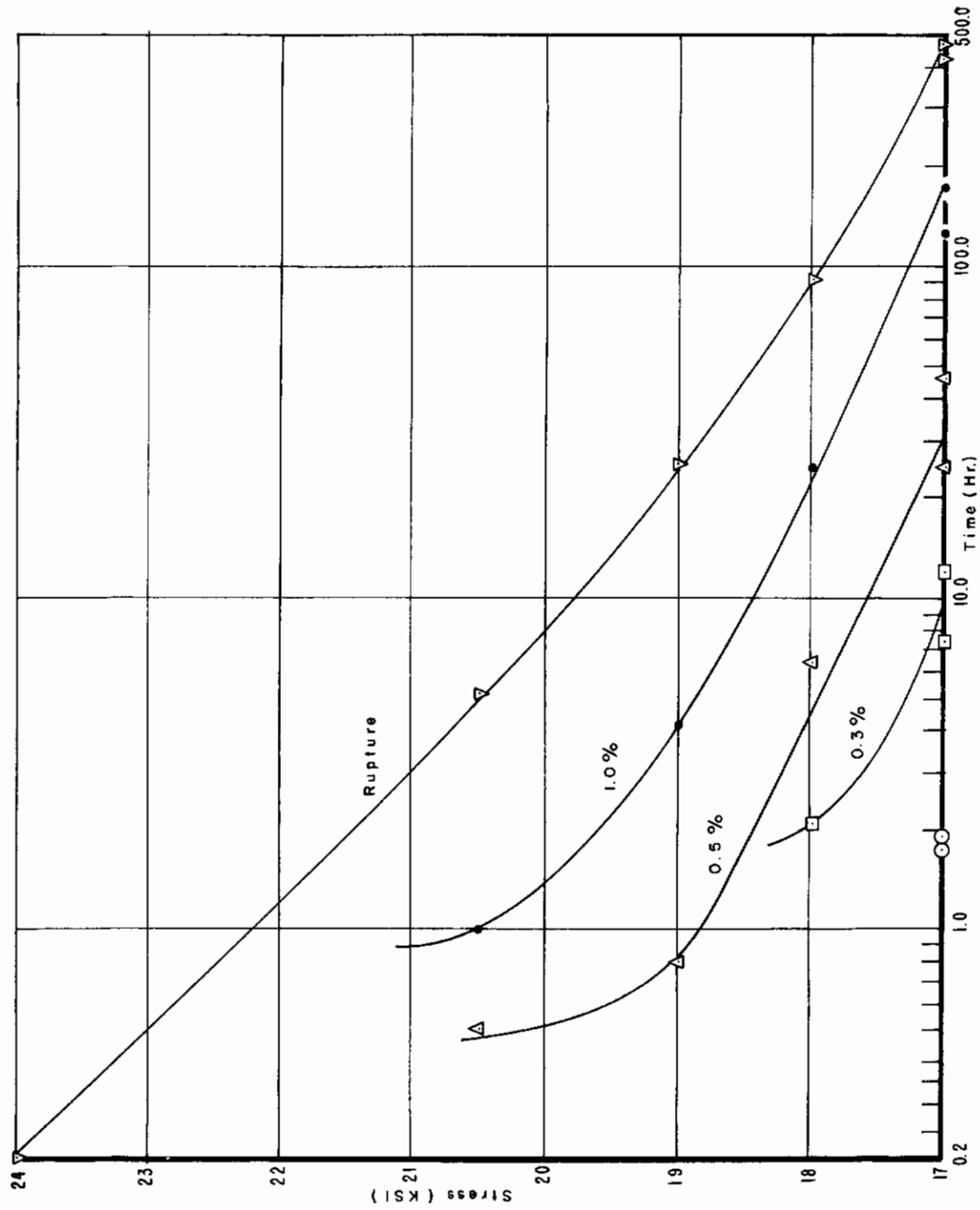


Figure 8. Creep Rupture Properties of X-2219-T6 Rod (Bare) at 500°F (960°R)

TABLE 13

Deformation Versus Time (Raw Data) for X-2219-T6 Rod (Bare) at 600° F (1060° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.5000	10.00000E-05	5.000
	2.00000E-04	15.000
	4.00000E-04	50.000
	6.00000E-04	75.000
	7.00000E-04	100.000
	10.00000E-04	250.000
	1.10000E-03	500.000
	1.30000E-03	750.000
	1.50000E-03	1000.000
5.0000	10.00000E-05	15.000
	2.00000E-04	25.000
	6.00000E-04	50.000
	9.00000E-04	75.000
	1.10000E-03	100.000
	2.30000E-03	250.000
	3.20000E-03	500.000
	3.80000E-03	750.000
	4.60000E-03	1000.000
7.5000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	1.500
	5.00000E-04	5.000
	6.00000E-04	10.000
	7.00000E-04	15.000
	1.20000E-03	25.000
	1.60000E-03	50.000
	1.80000E-03	75.000
	2.00000E-03	100.000
	2.50000E-03	150.000
	3.00000E-03	200.000
	3.70000E-03	250.000
	5.20000E-03	350.000
8.0000	10.00000E-05	1.000
	2.00000E-04	2.500

TABLE 13 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.0000	3.00000E-04	15.000
	4.00000E-04	25.000
	10.00000E-04	50.000
	1.40000E-03	75.000
	1.70000E-03	100.000
	2.10000E-03	150.000
	2.50000E-03	200.000
	3.00000E-03	250.000
	8.60000E-03	500.000
8.2000	10.00000E-05	1.500
	2.00000E-04	2.500
	3.00000E-04	7.500
	4.00000E-04	10.000
	5.00000E-04	25.000
	6.00000E-04	50.000
	7.00000E-04	75.000
	8.00000E-04	100.000
	9.00000E-04	150.000
	1.20000E-03	200.000
	1.50000E-03	250.000
	4.50000E-03	500.000
	6.60000E-03	600.000
9.0000	5.00000E-04	0.500
	6.00000E-04	1.500
	7.00000E-04	7.500
	8.00000E-04	15.000
	1.10000E-03	25.000
	1.40000E-03	50.000
	1.80000E-03	75.000
	2.00000E-03	100.000
	2.60000E-03	150.000
	3.10000E-03	200.000
	3.60000E-03	250.000
	4.80000E-03	350.000

TABLE 13 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	8.00000E-04	0.500
	10.00000E-04	1.000
	1.20000E-03	1.500
	1.40000E-03	2.500
	1.70000E-03	5.000
	1.80000E-03	7.500
	1.90000E-03	15.000
	2.40000E-03	25.000
	3.10000E-03	50.000
	3.70000E-03	75.000
	4.40000E-03	100.000
	5.80000E-03	150.000
	7.80000E-03	200.000
11.0000	3.00000E-04	0.500
	4.00000E-04	1.000
	5.00000E-04	1.500
	7.00000E-04	2.500
	9.00000E-04	5.000
	1.10000E-03	7.500
	1.20000E-03	10.000
	1.50000E-03	15.000
	2.00000E-03	25.000
	2.90000E-03	50.000
	3.50000E-03	75.000
	4.30000E-03	100.000
	6.30000E-03	150.000
	9.80000E-03	200.000
12.0000	2.00000E-04	0.500
	4.00000E-04	1.000
	7.00000E-04	1.500
	10.00000E-04	2.500
	1.50000E-03	5.000
	1.90000E-03	7.500
	2.20000E-03	10.000
	2.60000E-03	15.000
	3.30000E-03	25.000
	4.70000E-03	50.000

TABLE 13 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.0000	2.000000E-03	0.500
	4.000000E-03	1.000
	5.000000E-03	1.500
	7.000000E-03	2.500
	1.300000E-02	5.000

TABLE 14

Deformation Versus Time (Fitted Data) for X-2219-T6 Rod (Bare) at 600° F (1060° R)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.5000	2.08360E-04	15.000
	4.31080E-04	50.000
	5.63760E-04	75.000
3.5000	6.76470E-04	100.000
	1.03071E-03	250.000
	1.08509E-03	500.000
	1.30532E-03	750.000
	1.49917E-03	1000.000
5.0000	1.85630E-04	25.000
	6.01510E-04	50.000
	9.09570E-04	75.000
	1.16161E-03	100.000
	2.18071E-03	250.000
	3.21125E-03	500.000
	3.93678E-03	750.000
	4.51291E-03	1000.000
7.5000	3.77850E-04	1.500
	4.89050E-04	5.000
	6.38900E-04	10.000
	7.78640E-04	15.000
	1.02976E-03	25.000
	1.51568E-03	50.000
	1.84764E-03	75.000
	2.08316E-03	100.000
	2.46417E-03	150.000
	2.96903E-03	200.000
	3.72383E-03	250.000
	5.10780E-03	350.000
8.0000	2.76690E-04	15.000
	4.89150E-04	25.000
	9.57040E-04	50.000
	1.34520E-03	75.000

TABLE 14 (CONT)

RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.66690E-03	100.000
	2.16398E-03	150.000
	2.55442E-03	200.000
	2.94437E-03	250.000
	8.60222E-03	500.000
8.2000	2.62560E-04	7.500
	3.62230E-04	10.000
	6.18650E-04	25.000
	6.55600E-04	50.000
	6.37990E-04	75.000
	6.53360E-04	100.000
	8.18900E-04	150.000
	1.14035E-03	200.000
	1.58095E-03	250.000
	4.80749E-03	500.000
	6.36292E-03	600.000
9.0000	5.49130E-04	0.500
	5.70050E-04	1.500
	6.92470E-04	7.500
	8.38180E-04	15.000
	1.02062E-03	25.000
	1.42429E-03	50.000
	1.76664E-03	75.000
	2.06394E-03	100.000
	2.58213E-03	150.000
	3.07851E-03	200.000
	3.61539E-03	250.000
	4.79859E-03	350.000
10.0000	8.06760E-04	0.500
	1.02589E-03	1.000
	1.17175E-03	1.500
	1.37141E-03	2.500
	1.65289E-03	5.000
	1.81378E-03	7.500
	2.08946E-03	15.000
	2.34272E-03	25.000
	2.96414E-03	50.000
	3.66005E-03	75.000

TABLE 14 (CONT) RUN 12

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.41260E-03	100.000
	6.01345E-03	150.000
	7.67505E-03	200.000
11.0000	5.96280E-04	1.500
	5.50900E-04	2.500
	8.41480E-04	5.000
	1.13126E-03	7.500
	1.35638E-03	10.000
	1.66701E-03	15.000
	2.02394E-03	25.000
	2.62980E-03	50.000
	3.37425E-03	75.000
	4.32527E-03	100.000
	6.71820E-03	150.000
	9.56509E-03	200.000
12.0000	1.92820E-04	0.500
	4.39950E-04	1.000
	6.57630E-04	1.500
	9.93320E-04	2.500
	1.53577E-03	5.000
	1.89523E-03	7.500
	2.17332E-03	10.000
	2.61281E-03	15.000
	3.29929E-03	25.000
	4.69983E-03	50.000
14.0000	2.00487E-03	0.500
14.0000	3.98924E-03	1.000
	5.00385E-03	1.500
	7.00208E-03	2.500
	1.29999E-02	5.000

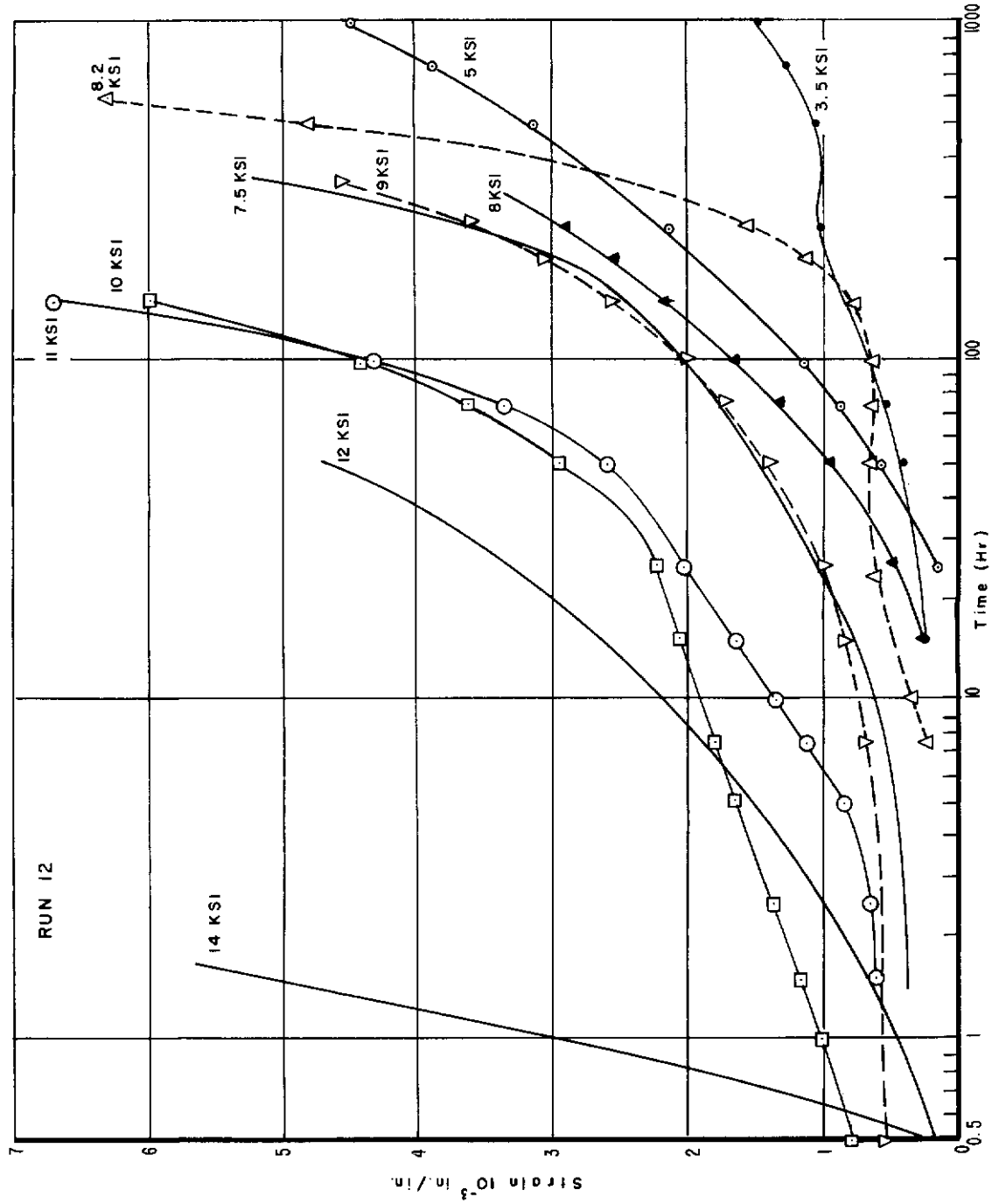


Figure 9. Creep Deformation Versus Log Time of X-2219-T6 Rod (Bare) at 600°F (1060°R)

TABLE 15

Bare X-2219-T6 Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
7.5	472.2	5.5	.11	21	200	330	-
8.0	550	4.8	.17	50	250	350	-
8.2	710.8	2.0	.13	167	375	525	-
9.0	461.3	6.0	.05	17	290	-	-
10.0	256.4	5.0	.05	1.0	47	120	-
11.0	251.9	4.5	.17	6.25	54	117	-
12.0	71.9	13.5	.10	2.5	19	-	-
14.0	6.6	17.5	.25	-	.75	1.5	3.75
17.0	.2	-	2.6	-	-	-	-

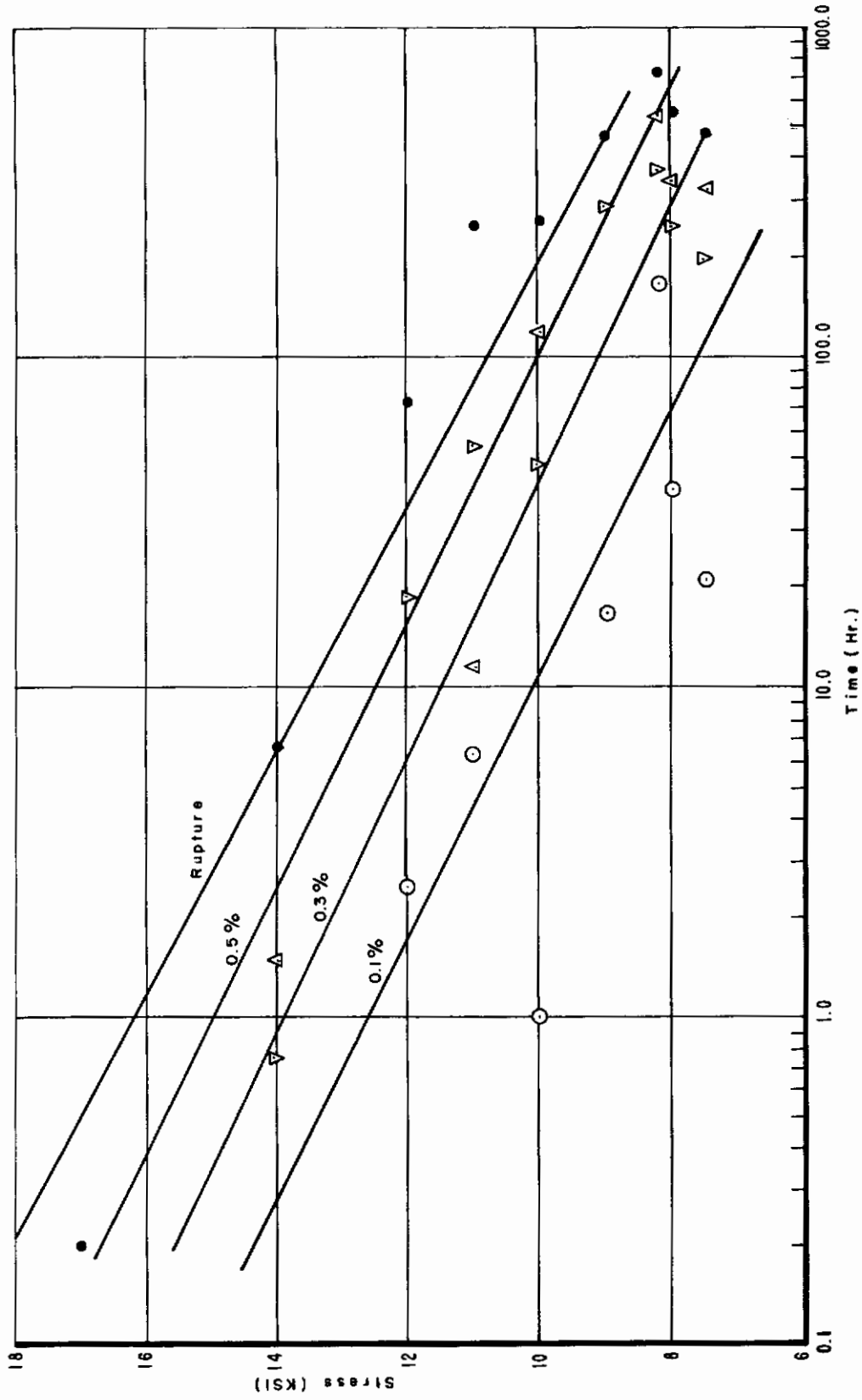


Figure 10. Creep Rupture Properties of X-2219-T6 Rod (Bare) at 600°F (1060°R)

TABLE 16

Minimum Creep Rate of X-2219-T6 Rod (Bare) at 400°, 500°, and 600° F

Test Temperature	Stress (KSI)	Min. Creep Rate (in/in/hr)
400° F (860° R)	24.0	4.41×10^{-5}
400° F	26.5	6.79×10^{-5}
500° F (960° R	16.0	1.23×10^{-5}
500° F	17.0	3.66×10^{-5}
600° F (1060° R)	3.5	2.18×10^{-7}
	7.5	7.62×10^{-6}
	8.0	7.80×10^{-6}
	8.2	6.15×10^{-7}
	9.0	9.93×10^{-6}
	10.0	2.49×10^{-5}
	11.0	2.42×10^{-5}
	14.0	2.00×10^{-3}

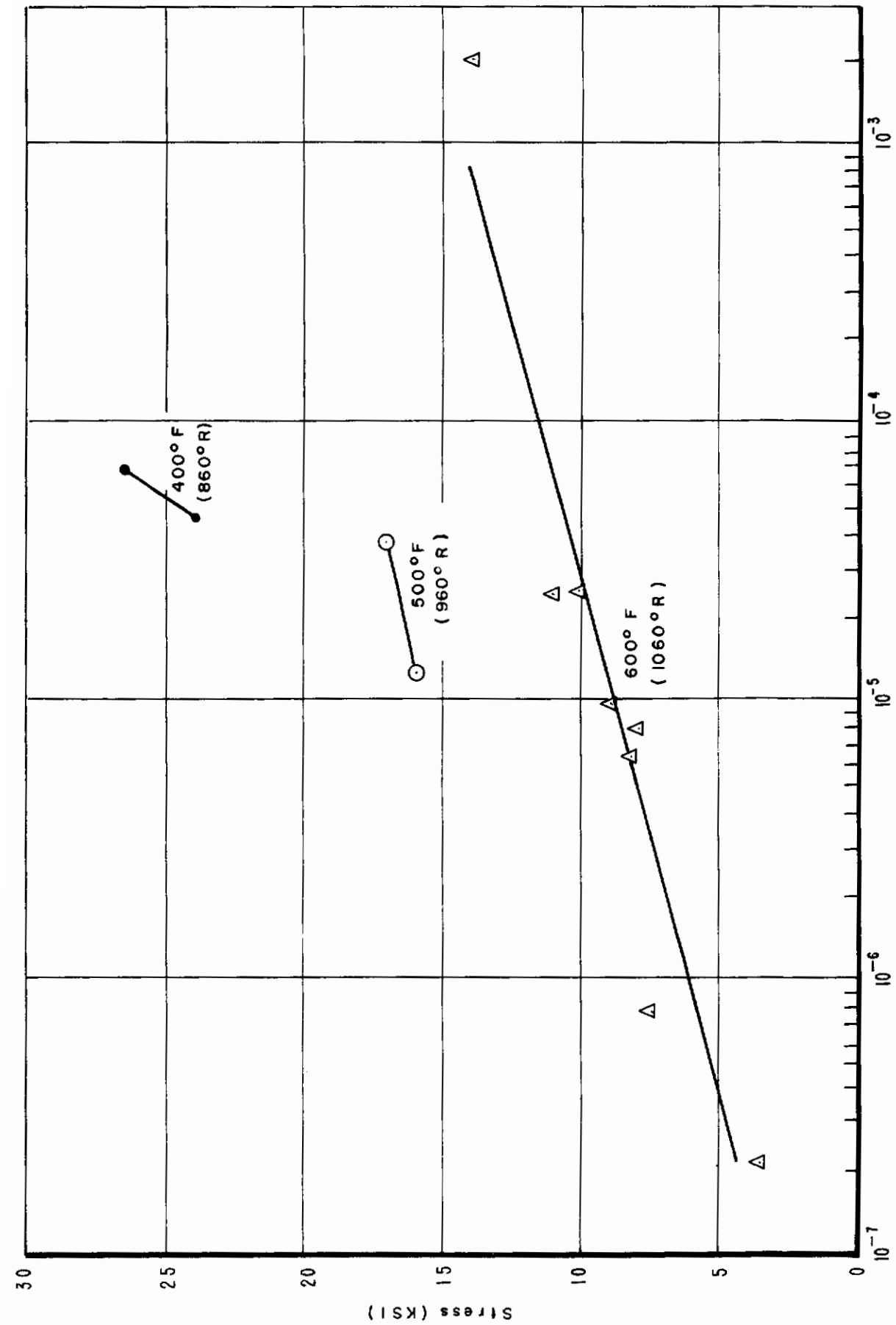


Figure 11. Minimum Creep Rate of X-2219-T6 Rod (Bare) at 400°, 500°, and 600°F

CREEP DATA FOR

X-2219-T6 SHEET (BARE)

(ALUMINUM BASED)

TABLE 17

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Bare) at 400° F (860° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	10.00000E-05	1.500
	1.20000E-04	2.500
	1.50000E-04	5.000
	1.90000E-04	7.500
	2.20000E-04	10.000
	3.00000E-04	15.000
	4.00000E-04	25.000
	6.00000E-04	50.000
	8.00000E-04	75.000
	1.20000E-03	100.000
16.0000	1.50000E-04	5.000
	2.50000E-04	7.500
	3.50000E-04	10.000
	5.00000E-04	15.000
	8.00000E-04	25.000
	1.30000E-03	50.000
	1.80000E-03	75.000
	2.30000E-03	100.000
21.0000	4.00000E-04	0.500
	8.00000E-04	1.000
	10.00000E-04	1.500
	1.30000E-03	2.500
	1.80000E-03	5.000
	2.10000E-03	7.500
	2.40000E-03	10.000
	3.00000E-03	15.000
	4.30000E-03	25.000
	7.50000E-03	50.000
	1.05000E-02	75.000
	1.35000E-02	100.000
22.5000	1.10000E-03	0.500
	1.40000E-03	1.000
	1.80000E-03	1.500
	2.30000E-03	2.500
	2.70000E-03	5.000

TABLE 17 (CONT)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.20000E-03	7.500
	3.80000E-03	10.000
	4.50000E-03	15.000
	6.10000E-03	25.000
	1.05000E-02	50.000
	1.45000E-02	75.000
	1.90000E-02	100.000
24.0000	1.50000E-03	0.500
	2.00000E-03	1.000
	2.40000E-03	1.500
	3.20000E-03	2.500
24.0000	5.30000E-03	5.000
	7.30000E-03	7.500
	9.20000E-03	10.000
	1.35000E-02	15.000
	2.15000E-02	25.000
25.5000	2.00000E-03	0.500
	3.00000E-03	1.000
	3.80000E-03	1.500
	5.00000E-03	2.500
	7.10000E-03	5.000
	9.00000E-03	7.500
	1.10000E-02	10.000
	1.50000E-02	15.000
	2.50000E-02	25.000
27.0000	4.70000E-03	0.500
	8.50000E-03	1.000
	10.00000E-03	1.500
	1.50000E-02	2.500
	2.80000E-02	5.000
	8.80000E-02	7.500
32.0000	2.05000E-02	0.500
	6.50000E-02	1.000

TABLE 18

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Bare) at 400° F (860° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	1.05050E-04	1.500
	1.19460E-04	2.500
	1.54710E-04	5.000
	1.88890E-04	7.500
	2.21980E-04	10.000
	2.84930E-04	15.000
	3.97990E-04	25.000
	6.12500E-04	50.000
	7.93510E-04	75.000
	1.20096E-03	100.000
16.0000	1.37600E-04	5.000
	2.63030E-04	7.500
	3.58150E-04	10.000
	5.11300E-04	15.000
	7.64240E-04	25.000
	1.31229E-03	50.000
	1.81464E-03	75.000
	2.28873E-03	100.000
21.0000	3.98480E-04	0.500
	7.90000E-04	1.000
	1.01966E-03	1.500
	1.31293E-03	2.500
	1.75639E-03	5.000
	2.09535E-03	7.500
	2.41134E-03	10.000
	3.03360E-03	15.000
	4.29370E-03	25.000
	7.46281E-03	50.000
	1.05385E-02	75.000
	1.34872E-02	100.000
22.5000	1.07110E-03	0.500
	1.50011E-03	1.000
	1.78022E-03	1.500

RUN 14

TABLE 18 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.16720E-03	2.500
	2.79309E-03	5.000
	3.26823E-03	7.500
	3.69719E-03	10.000
	4.51595E-03	15.000
	6.14771E-03	25.000
	1.03624E-02	50.000
	1.46569E-02	75.000
	1.89399E-02	100.000
24.0000	1.49397E-03	0.500
	2.01353E-03	1.000
	2.40443E-03	1.500
	3.19733E-03	2.500
24.0000	5.24365E-03	5.000
	7.29320E-03	7.500
	9.33391E-03	10.000
	1.34017E-02	15.000
	2.15182E-02	25.000
25.5000	2.00372E-03	0.500
	2.99516E-03	1.000
	3.78995E-03	1.500
	5.00184E-03	2.500
	7.15000E-03	5.000
	9.00068E-03	7.500
	1.08951E-02	10.000
	1.50778E-02	15.000
	2.49856E-02	25.000
27.0000	4.48115E-03	0.500
	8.32368E-03	1.000
	1.09838E-02	1.500
	1.42654E-02	2.500
	2.81792E-02	5.000
	8.79667E-02	7.500
32.0000	2.05000E-02	0.500
	6.50000E-02	1.000

TABLE 19

Bare X-2219-T6 Creep Deformation and Rupture Data at 400° F (860° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
21.0	-	-	.18	1.5	15	31	71
22.5	142.0	4	.28	-	6.5	18	46
24.0	42.9	7	.41	-	2.3	4.6	11
25.5	34.7	7	.22	-	1.0	2.5	8.75
27.0	8.0	11	.37	-	-	.55	1.5
32.0	1.1	13	.74	-	-	-	-

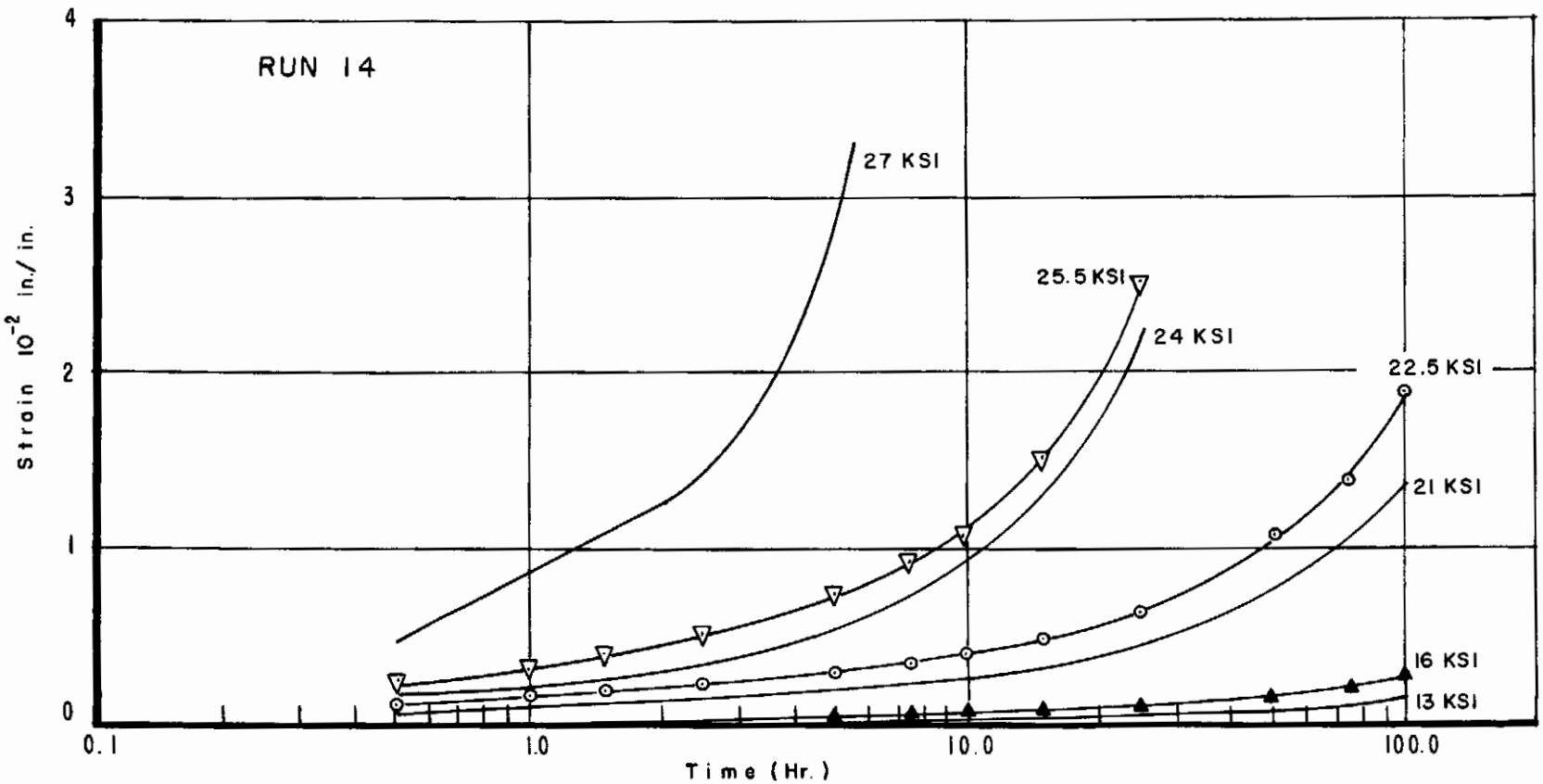


Figure 12. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Bare) at 400°F (860°R)

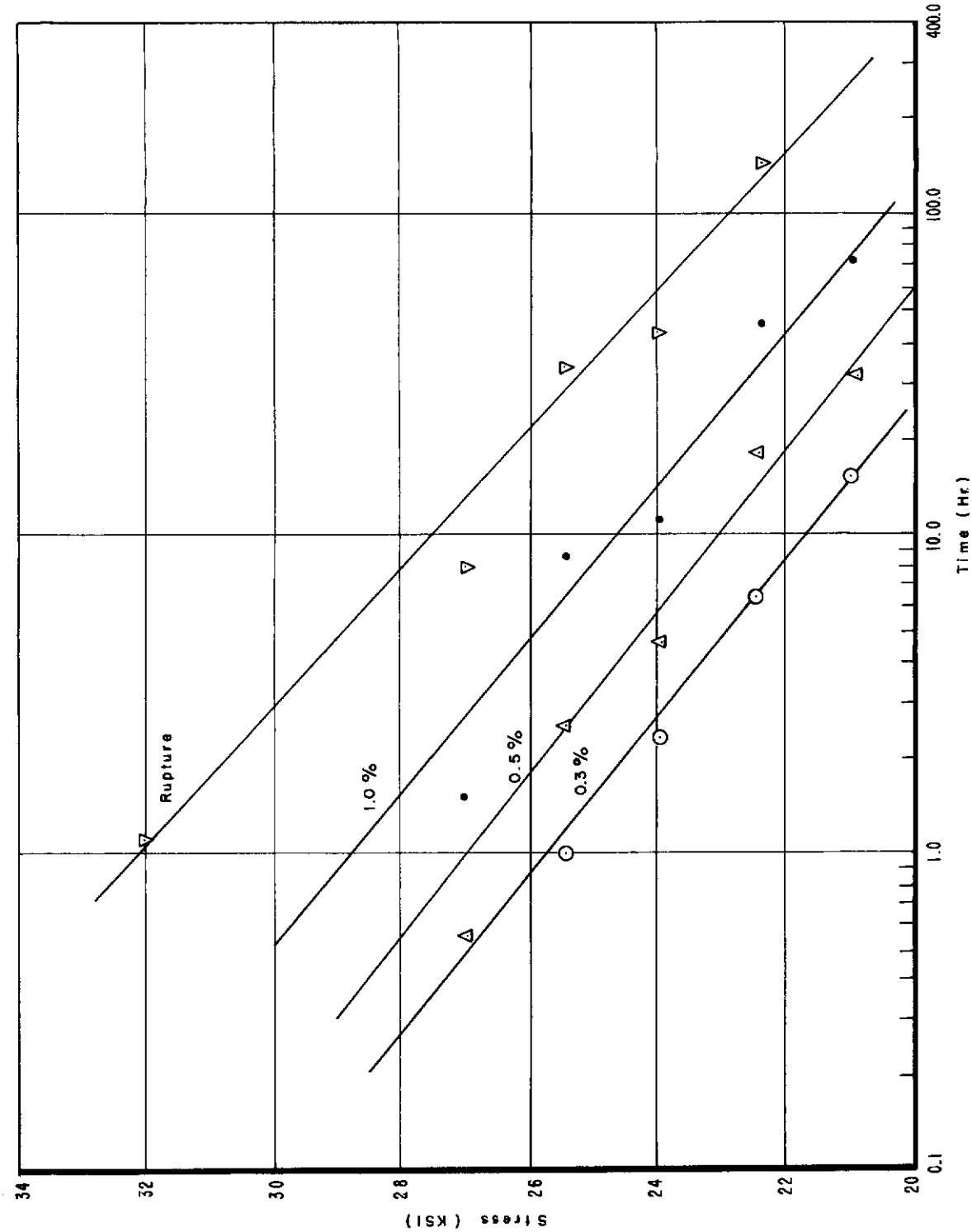


Figure 13. Creep Rupture Properties of X-2219-T6 Sheet (Bare) at 400°F (860°R)

TABLE 20

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Bare) at 500° F (960° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	5.00000E-05	1.000
	8.00000E-05	2.500
	1.20000E-04	5.000
	1.80000E-04	7.500
	2.50000E-04	10.000
	3.70000E-04	15.000
	5.80000E-04	25.000
	10.00000E-04	50.000
	1.20000E-03	75.000
	1.50000E-03	100.000
8.0000	3.00000E-04	0.500
	5.00000E-04	1.000
	6.00000E-04	1.500
	8.00000E-04	2.500
	1.10000E-03	5.000
	1.20000E-03	7.500
	1.30000E-03	10.000
	1.40000E-03	15.000
	1.90000E-03	25.000
	3.00000E-03	50.000
	4.20000E-03	75.000
	5.10000E-03	100.000
12.0000	7.00000E-04	1.000
12.0000	9.00000E-04	1.500
	1.30000E-03	2.500
	2.00000E-03	5.000
	2.60000E-03	7.500
	3.00000E-03	10.000
	3.90000E-03	15.000
	5.80000E-03	25.000
	1.05000E-02	50.000
	1.55000E-02	75.000
	2.20000E-02	100.000

TABLE 20 (CONT)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.5000	2.00000E-03	5.000
	2.50000E-03	7.500
	2.90000E-03	10.000
	4.00000E-03	15.000
	6.00000E-03	25.000
	10.00000E-03	50.000
	1.50000E-02	75.000
	3.50000E-02	100.000
16.0000	1.70000E-03	5.000
	2.20000E-03	7.500
	2.80000E-03	10.000
	4.70000E-03	15.000
	7.40000E-03	25.000
	1.45000E-02	50.000
	2.70000E-02	75.000
17.0000	1.20000E-03	0.500
	1.90000E-03	1.000
	2.10000E-03	1.500
	2.70000E-03	2.500
	4.10000E-03	5.000
	5.60000E-03	7.500
	6.70000E-03	10.000
	9.30000E-03	15.000
	1.45000E-02	25.000
	2.75000E-02	50.000
18.0000	7.90000E-03	0.500
	10.00000E-03	1.000
	1.15000E-02	1.500
	1.50000E-02	2.500
	2.30000E-02	5.000
	3.10000E-02	7.500
19.5000	3.50000E-03	0.500
	6.00000E-03	1.000
	8.50000E-03	1.500
	1.60000E-02	2.500
19.5000	3.50000E-02	5.000
21.0000	2.30000E-02	0.500

TABLE 21

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Bare) at 500° F (960° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	5.15200E-05	1.000
	7.36600E-05	2.500
	1.23780E-04	5.000
	1.65300E-04	7.500
	2.48210E-04	10.000
	3.68300E-04	15.000
	5.77310E-04	25.000
	9.68830E-04	50.000
	1.25288E-03	75.000
	1.47589E-03	100.000
8.0000	2.76640E-04	0.500
	5.21890E-04	1.000
	6.49470E-04	1.500
	8.02200E-04	2.500
	1.01469E-03	5.000
	1.15884E-03	7.500
	1.28148E-03	10.000
	1.50464E-03	15.000
	1.93108E-03	25.000
	3.00366E-03	50.000
	4.08776E-03	75.000
	5.16761E-03	100.000
12.0000	7.59220E-04	1.000
12.0000	8.62070E-04	1.500
	1.20635E-03	2.500
	2.00324E-03	5.000
	2.61342E-03	7.500
	3.11691E-03	10.000
	3.98753E-03	15.000
	5.63724E-03	25.000
	1.03308E-02	50.000
	1.58308E-02	75.000
	2.18524E-02	100.000
15.5000	1.85522E-03	5.000
	2.43352E-03	7.500
	3.00324E-03	10.000

TABLE 21 (CONT)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.10652E-03	15.000
	6.10997E-03	25.000
	9.82793E-03	50.000
	1.50764E-02	75.000
	3.49871E-02	100.000
16.0000	1.53862E-03	5.000
	2.28652E-03	7.500
	3.03334E-03	10.000
	4.52056E-03	15.000
	7.44251E-03	25.000
	1.44993E-02	50.000
	2.70000E-02	75.000
17.0000	1.22815E-03	0.500
	1.79403E-03	1.000
	2.15223E-03	1.500
	2.76071E-03	2.500
	4.13819E-03	5.000
	5.45306E-03	7.500
	6.74814E-03	10.000
	9.32630E-03	15.000
	1.45022E-02	25.000
	2.74970E-02	50.000
18.0000	7.88870E-03	0.500
	1.00100E-02	1.000
	1.15845E-02	1.500
	1.48349E-02	2.500
	2.31377E-02	5.000
	3.09442E-02	7.500
19.5000	3.24360E-03	0.500
	6.06015E-03	1.000
	9.05617E-03	1.500
	1.55866E-02	2.500
19.5000	3.50534E-02	5.000
21.0000	2.30000E-02	0.500

TABLE 22

Bare X-2219-T6 Creep Deformation and Rupture Data at 500° F (960° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
16.0	76.1	4	.19	2.1	10.6	16	33
17.0	63.3	7	.22	-	3.1	6.5	16.5
18.0	12.7	10	-	-	-	-	1.0
19.5	6.2	8	.29	-	-	.8	1.64
21.0	1.0	16	.33	-	-	-	-

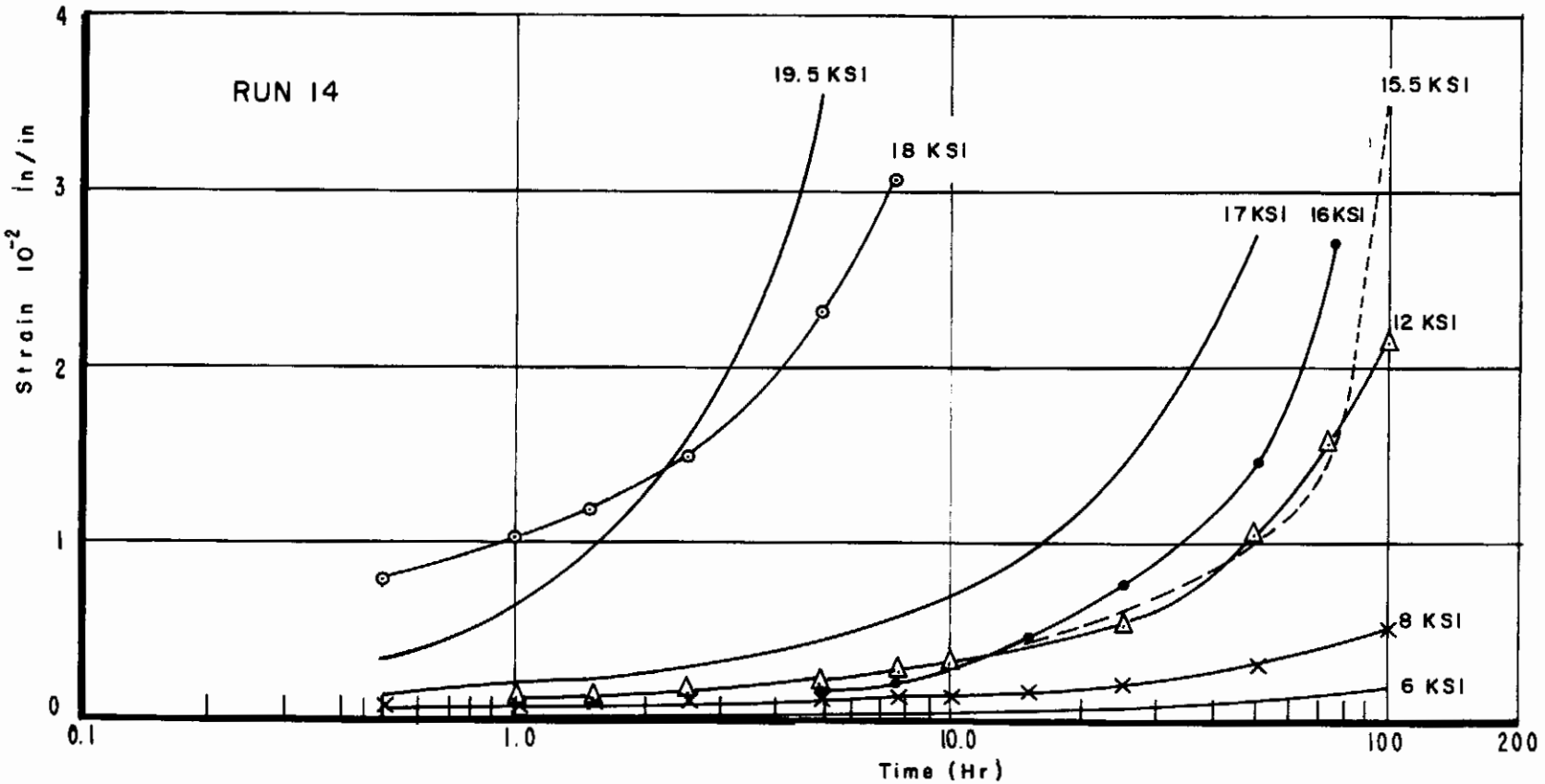


Figure 14. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Bare) at 500°F (960°R)

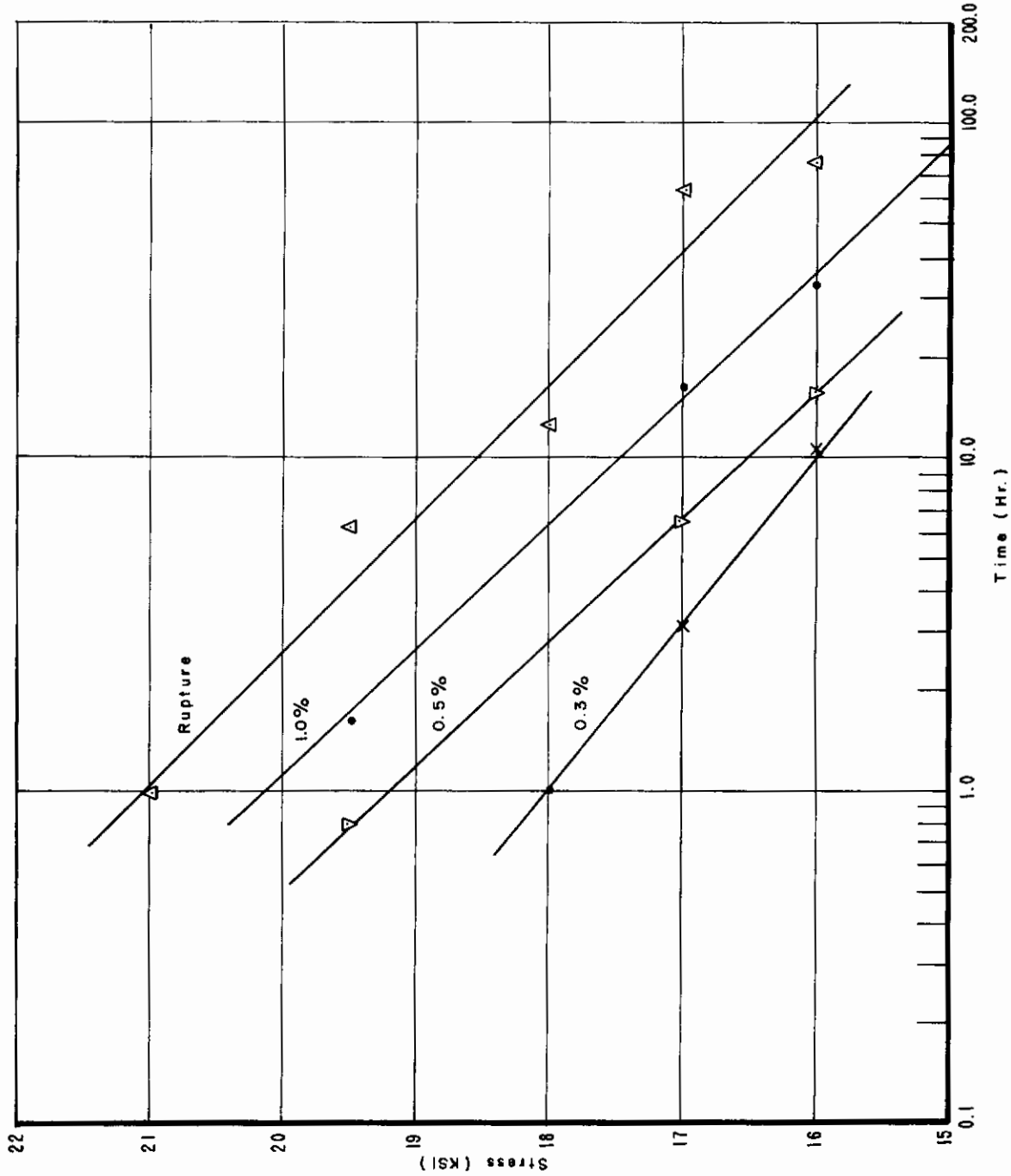


Figure 15. Creep Rupture Properties of X-2219-T6 Sheet (Bare) at 500°F (960°R)

TABLE 23

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Bare) at 600° F (1060° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.2000	3.00000E-04	15.000
	4.00000E-04	25.000
	5.00000E-04	50.000
	5.00000E-04	100.000
1.8000	5.00000E-04	10.000
	6.00000E-04	15.000
	8.00000E-04	25.000
	1.50000E-03	50.000
	2.10000E-03	75.000
	5.50000E-03	100.000
2.5000	3.00000E-04	1.000
	6.00000E-04	2.500
	1.30000E-03	5.000
	1.70000E-03	7.500
	2.00000E-03	10.000
	2.80000E-03	15.000
	4.20000E-03	25.000
	7.30000E-03	50.000
	1.20000E-02	75.000
	1.55000E-02	100.000
3.5000	1.20000E-03	7.500
	1.50000E-03	10.000
	2.60000E-03	15.000
	5.30000E-03	25.000
	1.40000E-02	50.000
	2.90000E-02	75.000
	3.40000E-02	100.000
	6.30000E-02	200.000
5.0000	10.00000E-04	0.500
	1.40000E-03	1.000
	1.80000E-03	1.500
	2.40000E-03	2.500

TABLE 23 (CONT)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.20000E-03	5.000
	7.00000E-03	7.500
	9.30000E-03	10.000
	1.40000E-02	15.000
	2.60000E-02	25.000
	6.55000E-02	50.000
6.0000	10.00000E-04	1.000
	1.50000E-03	1.500
	2.00000E-03	2.500
6.0000	4.00000E-03	5.000
	5.50000E-03	7.500
	7.30000E-03	10.000
	1.05000E-02	15.000
	1.80000E-02	25.000
	3.90000E-02	50.000
9.0000	1.30000E-03	0.500
	2.00000E-03	1.000
	2.70000E-03	1.500
	4.30000E-03	2.500
	8.00000E-03	5.000
	1.15000E-02	7.500
	1.50000E-02	10.000
	2.70000E-02	15.000
12.0000	3.10000E-03	0.500
	5.50000E-03	1.000
	9.50000E-03	1.500
	1.70000E-02	2.500
15.0000	1.05000E-02	0.500
	2.60000E-02	1.000

TABLE 24

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Bare) at 600° F (1060° R)

RUN 14

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.2000	3.28090E-04	15.000
	3.82910E-04	25.000
	4.57300E-04	50.000
	5.31700E-04	100.000
1.8000	5.11530E-04	10.000
	5.78020E-04	15.000
	8.13040E-04	25.000
	1.49652E-03	50.000
	2.10198E-03	75.000
	5.49974E-03	100.000
2.5000	2.83910E-04	1.000
	6.58860E-04	2.500
	1.24033E-03	5.000
	1.68814E-03	7.500
	2.07052E-03	10.000
	2.75885E-03	15.000
	4.08831E-03	25.000
	7.67227E-03	50.000
	1.15789E-02	75.000
	1.56598E-02	100.000
3.5000	8.71970E-04	7.500
	1.23473E-03	10.000
	2.59703E-03	15.000
	6.25998E-03	25.000
	1.61962E-02	50.000
	2.55897E-02	75.000
	3.42646E-02	100.000
	6.35858E-02	200.000

RUN 14

TABLE 24 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	9.76180E-04	0.500
	1.53267E-03	1.000
	1.68333E-03	1.500
	2.29014E-03	2.500
	4.51779E-03	5.000
	6.83126E-03	7.500
	9.16091E-03	10.000
	1.41301E-02	15.000
	2.59773E-02	25.000
	6.55002E-02	50.000
6.0000	1.04814E-03	1.000
	1.36477E-03	1.500
	2.13636E-03	2.500
6.0000	3.92736E-03	5.000
	5.57023E-03	7.500
	7.19762E-03	10.000
	1.05763E-02	15.000
	1.79772E-02	25.000
	3.90020E-02	50.000
9.0000	1.22024E-03	0.500
	2.00313E-03	1.000
	2.78204E-03	1.500
	4.32073E-03	2.500
	7.99861E-03	5.000
	1.14492E-02	7.500
	1.50282E-02	10.000
	2.69979E-02	15.000
12.0000	3.09999E-03	0.500
	5.50000E-03	1.000
	9.50000E-03	1.500
	1.70000E-02	2.500
15.0000	1.05000E-02	0.500
	2.60000E-02	1.000

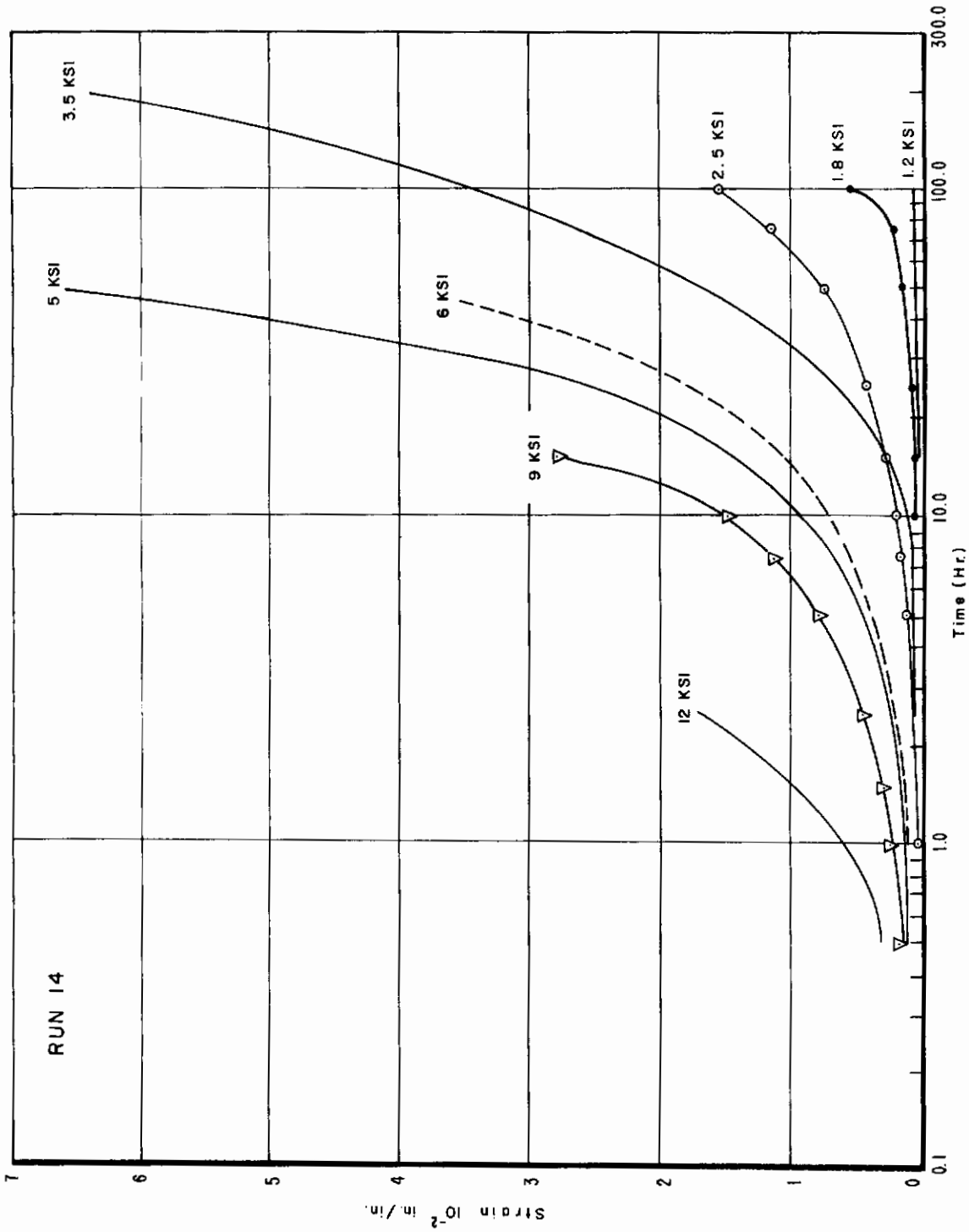


Figure 16. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Bare) at 600°F (1060°R)

TABLE 25

Bare X-2219-T6 Sheet Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
5.0	57.9	13	.05	.5	3.3	5.7	10.7
6.0	56.2	7	.07	1.0	3.7	6.7	14.2
9.0	18.8	7	.05	-	1.7	3.0	6.6
12.0	3.6	6	.16	-	.05	.9	1.57

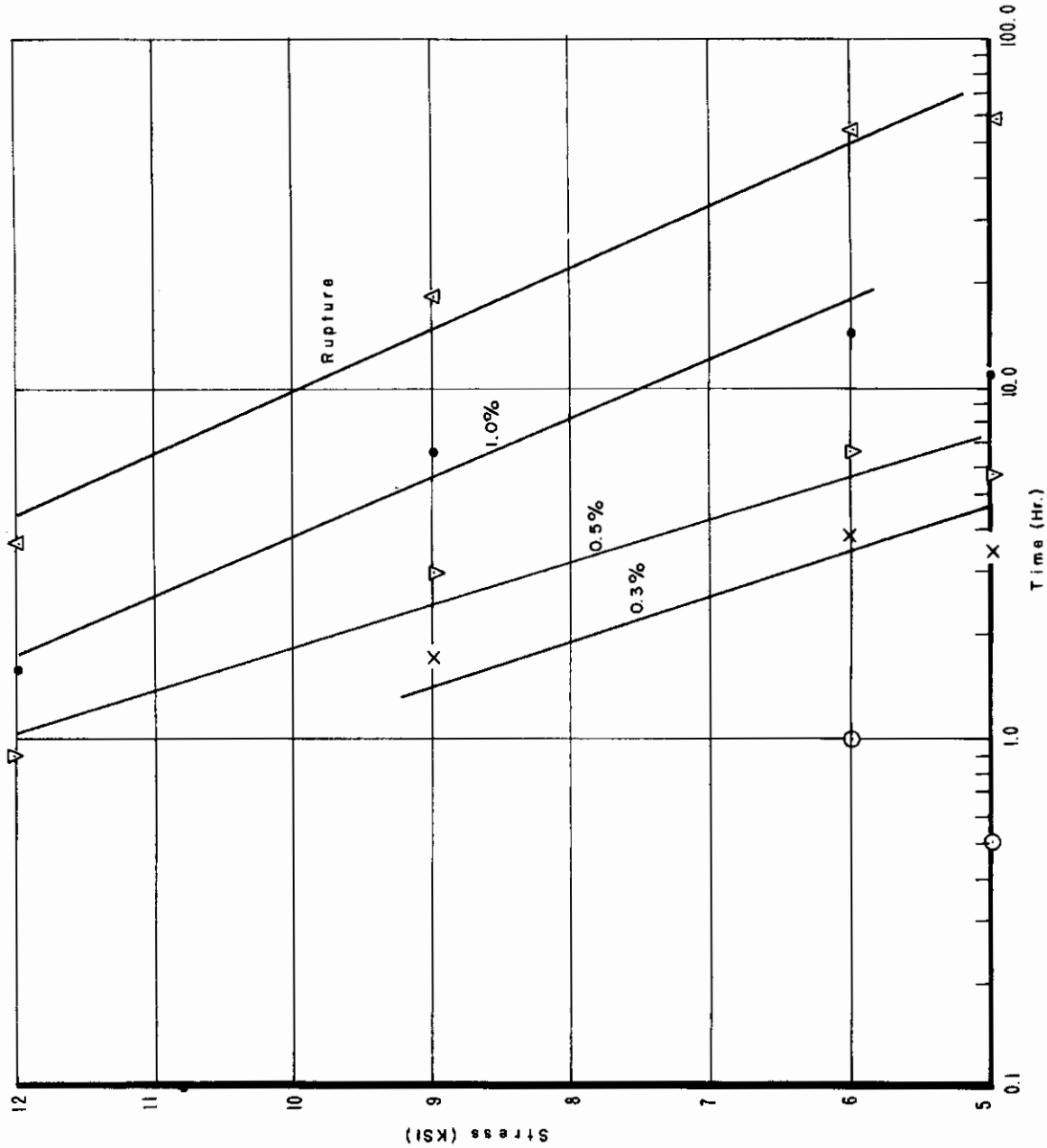


Figure 17. Creep Rupture Properties of X-2219-T6 Sheet (Bare) at 600°F (1060°R)

TABLE 26

Minimum Creep Rate for Bare X-2219-T6 Sheet at 400°, 500°, and 600° F

Test Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
400° F (860° R)	13.0	7.24×10^{-6}
"	22.5	1.63×10^{-4}
"	24.0	7.82×10^{-4}
"	25.5	7.40×10^{-4}
"	27.0	3.28×10^{-3}
500° F (960° R)	8.0	4.26×10^{-5}
"	12.0	1.65×10^{-4}
"	15.5	1.49×10^{-4}
"	16.0	2.82×10^{-4}
"	17.0	5.16×10^{-4}
"	19.5	5.63×10^{-3}
600° F (1060° R)	1.8	1.33×10^{-5}
"	2.5	1.33×10^{-4}
"	3.5	1.45×10^{-4}
"	5.0	3.01×10^{-4}
"	6.0	6.33×10^{-4}
"	9.0	1.38×10^{-3}
"	12.0	4.8×10^{-3}

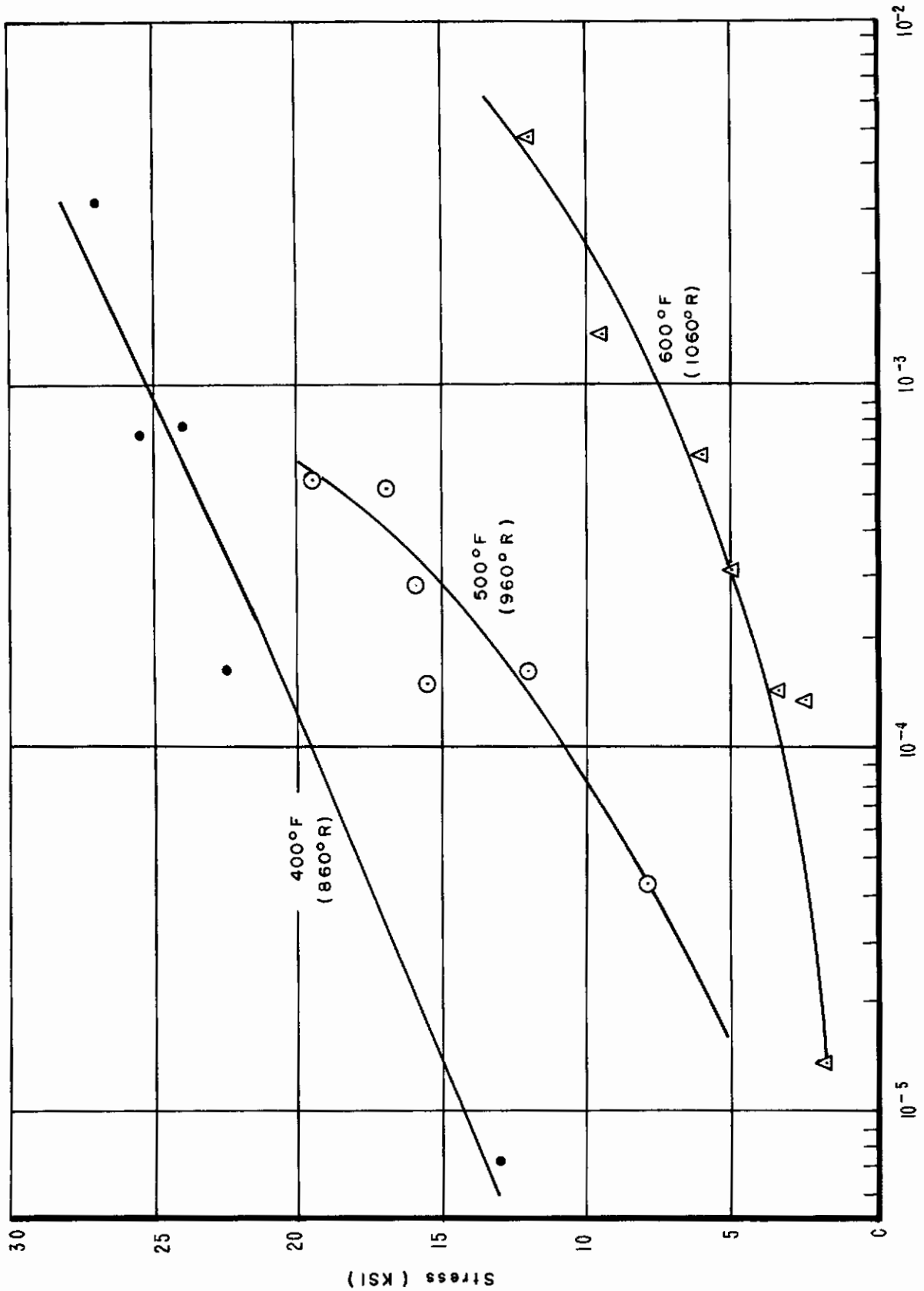


Figure 18. Minimum Creep Rate of X-2219-T6 Sheet (Bare) at 400°, 500°, and 600°F

CREEP DATA FOR

X-2219-T6 SHEET (ALCLAD)

(ALUMINUM BASED)

TABLE 27

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Alclad) at 400° F (860° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.0000	10.00000E-05	5.000
	2.00000E-04	10.000
	3.00000E-04	25.000
	6.50000E-04	50.000
	9.50000E-04	75.000
	1.10000E-03	100.000
15.0000	6.50000E-04	7.500
	8.00000E-04	10.000
	9.00000E-04	15.000
	1.20000E-03	25.000
	1.80000E-03	50.000
	2.50000E-03	75.000
	2.80000E-03	100.000
20.0000	8.00000E-04	0.500
	1.10000E-03	1.000
	1.30000E-03	1.500
	1.50000E-03	2.500
	2.00000E-03	5.000
	2.30000E-03	7.500
	2.50000E-03	10.000
	3.50000E-03	15.000
	4.90000E-03	25.000
	7.50000E-03	50.000
	9.70000E-03	75.000
	1.20000E-02	100.000

TABLE 27 (CONT)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	7.30000E-04	0.500
	1.60000E-03	1.000
	1.90000E-03	1.500
	2.60000E-03	2.500
	4.00000E-03	5.000
	5.50000E-03	7.500
	6.40000E-03	10.000
	8.00000E-03	15.000
	1.10000E-02	25.000
	1.85000E-02	50.000
	2.50000E-02	75.000
	3.20000E-02	100.000
	5.60000E-02	150.000
25.0000	2.80000E-03	0.500
	4.20000E-03	1.000
	5.60000E-03	1.500
	9.00000E-03	2.500
	1.35000E-02	5.000
	1.80000E-02	7.500
	2.35000E-02	10.000
	3.50000E-02	15.000
26.0000	6.50000E-03	0.500
	1C.00000E-03	1.000
	1.30000E-02	1.500
	1.80000E-02	2.500
28.0000	1.40000E-02	0.500
	2.30000E-02	1.000
	3.10000E-02	1.500
	6.00000E-02	2.500

TABLE 28

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Alclad) at 400° F (860° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.0000	1.91380E-04	10.000
	3.28000E-04	25.000
	6.40530E-04	50.000
	9.06860E-04	75.000
	1.13322E-03	100.000
15.0000	6.79570E-04	7.500
	7.51500E-04	10.000
	9.06090E-04	15.000
	1.20911E-03	25.000
	1.85996E-03	50.000
	2.39355E-03	75.000
	2.85018E-03	100.000
20.0000	7.97790E-04	0.500
	1.12890E-03	1.000
	1.27716E-03	1.500
	1.48293E-03	2.500
	1.91790E-03	5.000
	2.32549E-03	7.500
	2.71385E-03	10.000
	3.44174E-03	15.000
	4.75008E-03	25.000
	7.50469E-03	50.000
	9.83921E-03	75.000
	1.19202E-02	100.000
23.0000	2.03712E-03	2.500
	4.49327E-03	5.000
	5.81297E-03	7.500
	6.70667E-03	10.000
	8.01180E-03	15.000
	1.02236E-02	25.000
	1.67801E-02	50.000
	2.50162E-02	75.000
	3.43672E-02	100.000
	5.50008E-02	150.000

TABLE 28 (CONT)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	2.82720E-03	0.500
	3.97269E-03	1.000
	5.99004E-03	1.500
	8.77076E-03	2.500
	1.34628E-02	5.000
	1.81707E-02	7.500
	2.33969E-02	10.000
	3.50090E-02	15.000
26.0000	5.86491E-03	0.500
	1.07642E-02	1.000
	1.36301E-02	1.500
26.0000	1.72407E-02	2.500
28.0000	1.40000E-02	0.500
	2.30000E-02	1.000
	3.10000E-02	1.500
	6.00000E-02	2.500

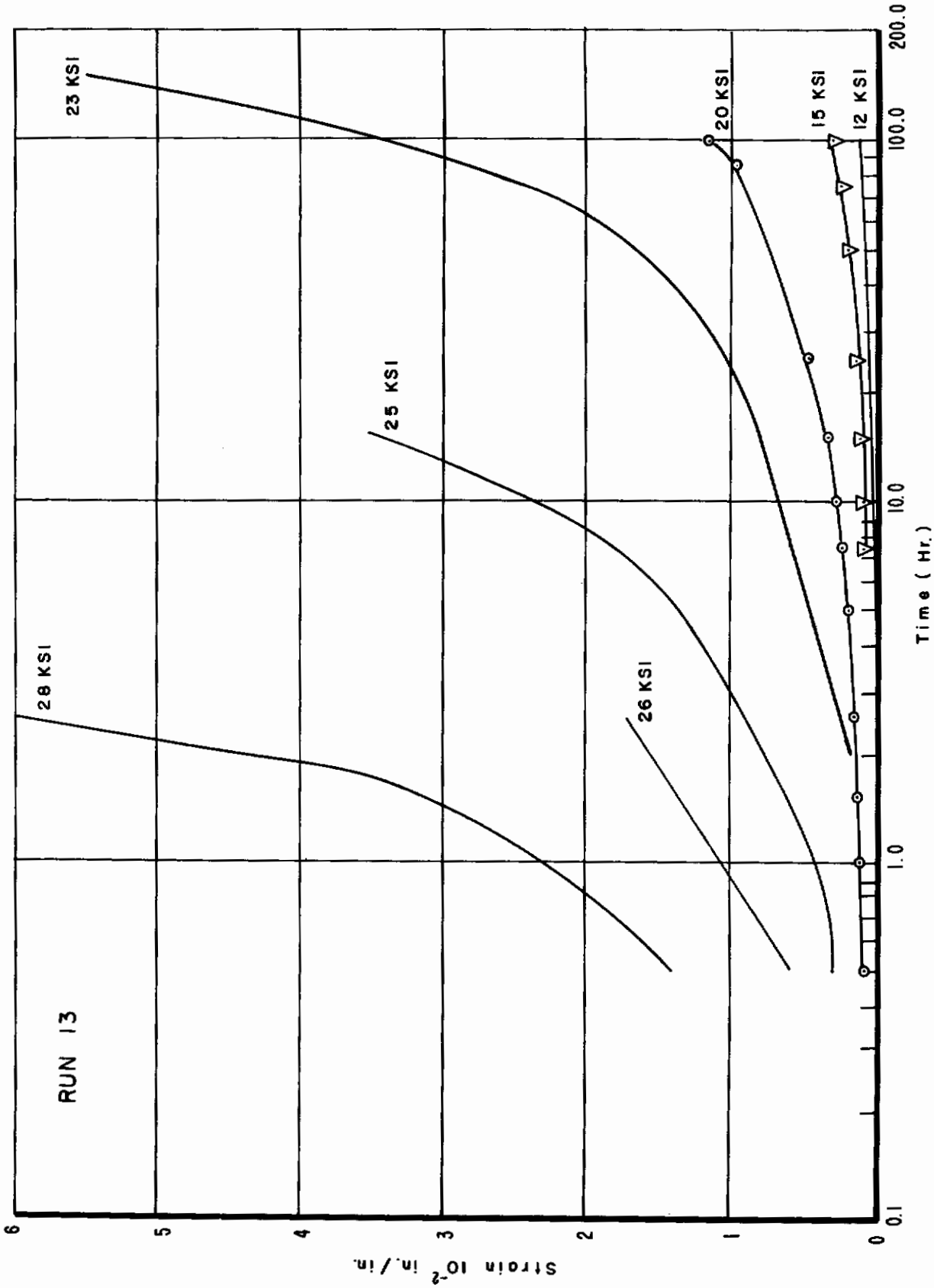


Figure 19. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Alclad) at 400°F (860°R)

TABLE 29

Alclad X-2219-T6 Sheet
Creep Deformation and Rupture Data at 400° F (860° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
12.0	-	-	.10	92	-	-	-
20.0	-	-	.235	.8	12.5	26	78
23.0	151.2	7	.305	-	3.2	6.7	21
25.0	21.5	9	.36	-	.57	1.28	3.0
26.0	4.7	4	.525	-	-	-	1.0
28.0	3.1	14	.395	-	-	-	-
30.0	.3	8	1.03	-	-	-	-

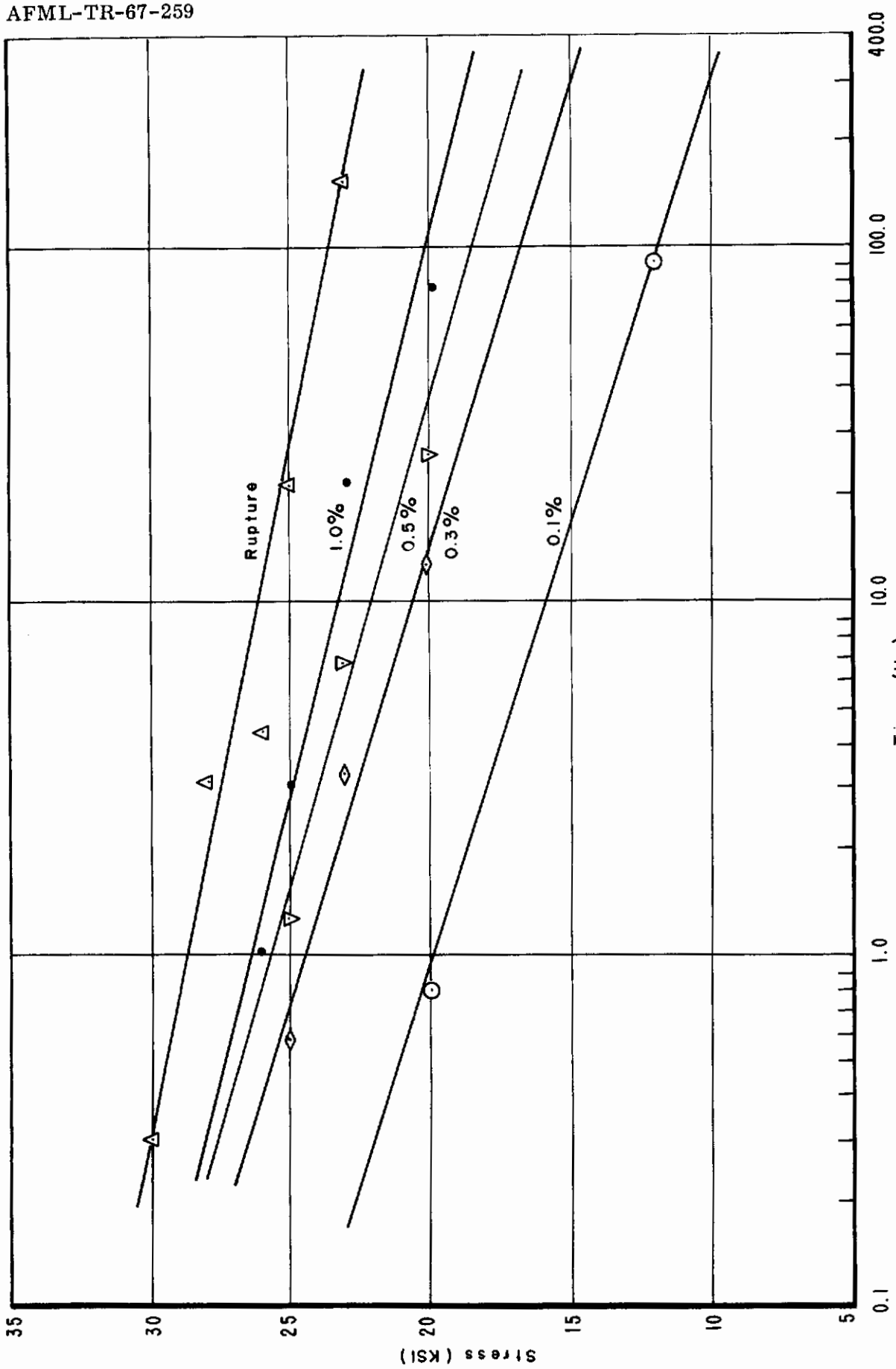


Figure 20. Creep Rupture Properties of X-2219-T6 Sheet (Alclad) at 400°F (860°R)

TABLE 30

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Alclad) at 500° F (960° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	10.00000E-05	1.000
	2.00000E-04	2.500
	3.00000E-04	5.000
	3.80000E-04	7.500
	4.50000E-04	10.000
	5.00000E-04	15.000
	5.50000E-04	25.000
	8.00000E-04	50.000
	10.00000E-04	75.000
	1.05000E-03	100.000
7.0000	5.50000E-04	0.500
	6.50000E-04	1.000
	7.00000E-04	1.500
	8.20000E-04	2.500
	10.00000E-04	5.000
	1.20000E-03	7.500
	1.30000E-03	10.000
	1.54000E-03	15.000
	2.00000E-03	25.000
	3.20000E-03	50.000
	3.80000E-03	75.000
	4.20000E-03	100.000
10.0000	8.00000E-04	0.500
	1.10000E-03	1.000
	1.30000E-03	1.500
	1.50000E-03	2.500
	1.80000E-03	5.000
	2.10000E-03	7.500
	2.40000E-03	10.000
	2.90000E-03	15.000
	3.50000E-03	25.000
	5.70000E-03	50.000
	7.70000E-03	75.000
	10.00000E-03	100.000

RUN 13

TABLE 30 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.5000	5.00000E-04	0.500
	8.00000E-04	1.000
	1.10000E-03	1.500
12.5000	1.30000E-03	2.500
	2.30000E-03	5.000
	3.00000E-03	7.500
	3.80000E-03	10.000
	5.00000E-03	15.000
	7.60000E-03	25.000
	1.30000E-02	50.000
	1.90000E-02	75.000
	2.60000E-02	100.000
13.0000	8.00000E-04	0.500
	10.00000E-04	1.000
	1.50000E-03	1.500
	2.00000E-03	2.500
	3.20000E-03	5.000
	4.00000E-03	7.500
	4.60000E-03	10.000
	6.40000E-03	15.000
	1.30000E-02	25.000
	2.90000E-02	50.000
14.2000	10.00000E-04	0.500
	2.00000E-03	1.000
	2.50000E-03	1.500
	3.50000E-03	2.500
	6.00000E-03	5.000
	8.50000E-03	7.500
	1.10000E-02	10.000
	1.50000E-02	15.000
	2.40000E-02	25.000

TABLE 30 (CONT)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	1.20000E-03	0.500
	2.20000E-03	1.000
	2.60000E-03	1.500
	3.50000E-03	2.500
	5.70000E-03	5.000
	7.70000E-03	7.500
	9.80000E-03	10.000
	1.65000E-02	15.000
	2.15000E-02	25.000
	5.30000E-02	50.000
17.0000	4.00000E-03	0.500
	6.00000E-03	1.000
	8.00000E-03	1.500
	1.10000E-02	2.500
	2.30000E-02	5.000
	3.60000E-02	7.500
19.0000	10.00000E-03	0.500
19.0000	1.70000E-02	1.000
	2.10000E-02	1.500
20.0000	1.86000E-02	0.500

TABLE 31

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Alclad) at 500° F (960° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	9.30400E-05	1.000
	2.18560E-04	2.500
	3.10760E-04	5.000
	3.69150E-04	7.500
	4.14920E-04	10.000
	4.88520E-04	15.000
	6.01900E-04	25.000
	8.04570E-04	50.000
	9.53950E-04	75.000
	1.07457E-03	100.000
7.0000	5.20880E-04	0.500
	6.90730E-04	1.000
	7.42690E-04	1.500
	8.03400E-04	2.500
	9.55990E-04	5.000
	1.12204E-03	7.500
	1.28736E-03	10.000
	1.59847E-03	15.000
	2.13172E-03	25.000
	3.09804E-03	50.000
	3.76038E-03	75.000
	4.24825E-03	100.000
10.0000	8.23240E-04	0.500
	1.08013E-03	1.000
	1.25419E-03	1.500
	1.49831E-03	2.500
	1.87982E-03	5.000
	2.14691E-03	7.500
	2.37354E-03	10.000
	2.78460E-03	15.000
	3.57714E-03	25.000
	5.63550E-03	50.000
	7.78294E-03	75.000
	9.96362E-03	100.000

RUN 13

TABLE 31 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.5000	1.13713E-03	1.500
	1.26865E-03	2.500
	2.17487E-03	5.000
	3.07057E-03	7.500
	3.84749E-03	10.000
	5.15980E-03	15.000
13.5000	7.39802E-03	25.000
	1.29592E-02	50.000
	1.91651E-02	75.000
	2.59191E-02	100.000
13.0000	9.77010E-04	1.000
	1.51701E-03	1.500
	2.14008E-03	2.500
	2.98553E-03	5.000
	3.77115E-03	7.500
	4.69697E-03	10.000
	6.96202E-03	15.000
	1.25756E-02	25.000
	2.90746E-02	50.000
14.2000	1.03050E-03	0.500
	1.90683E-03	1.000
	2.50697E-03	1.500
	3.58339E-03	2.500
	6.08385E-03	5.000
	8.45340E-03	7.500
	1.07515E-02	10.000
	1.52305E-02	15.000
	2.39530E-02	25.000

TABLE 31 (CONT)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	3.11249E-03	2.500
	5.64618E-03	5.000
	8.11855E-03	7.500
	1.05002E-02	10.000
	1.48860E-02	15.000
	2.17622E-02	25.000
	5.29970E-02	50.000
17.0000	3.94128E-03	0.500
	6.33629E-03	1.000
	7.58576E-03	1.500
	1.11027E-02	2.500
	2.30868E-02	5.000
	3.59471E-02	7.500
19.0000	10.00000E-03	0.500
	1.70000E-02	1.000
	2.10000E-02	1.500
20.0000	1.86000E-02	0.500

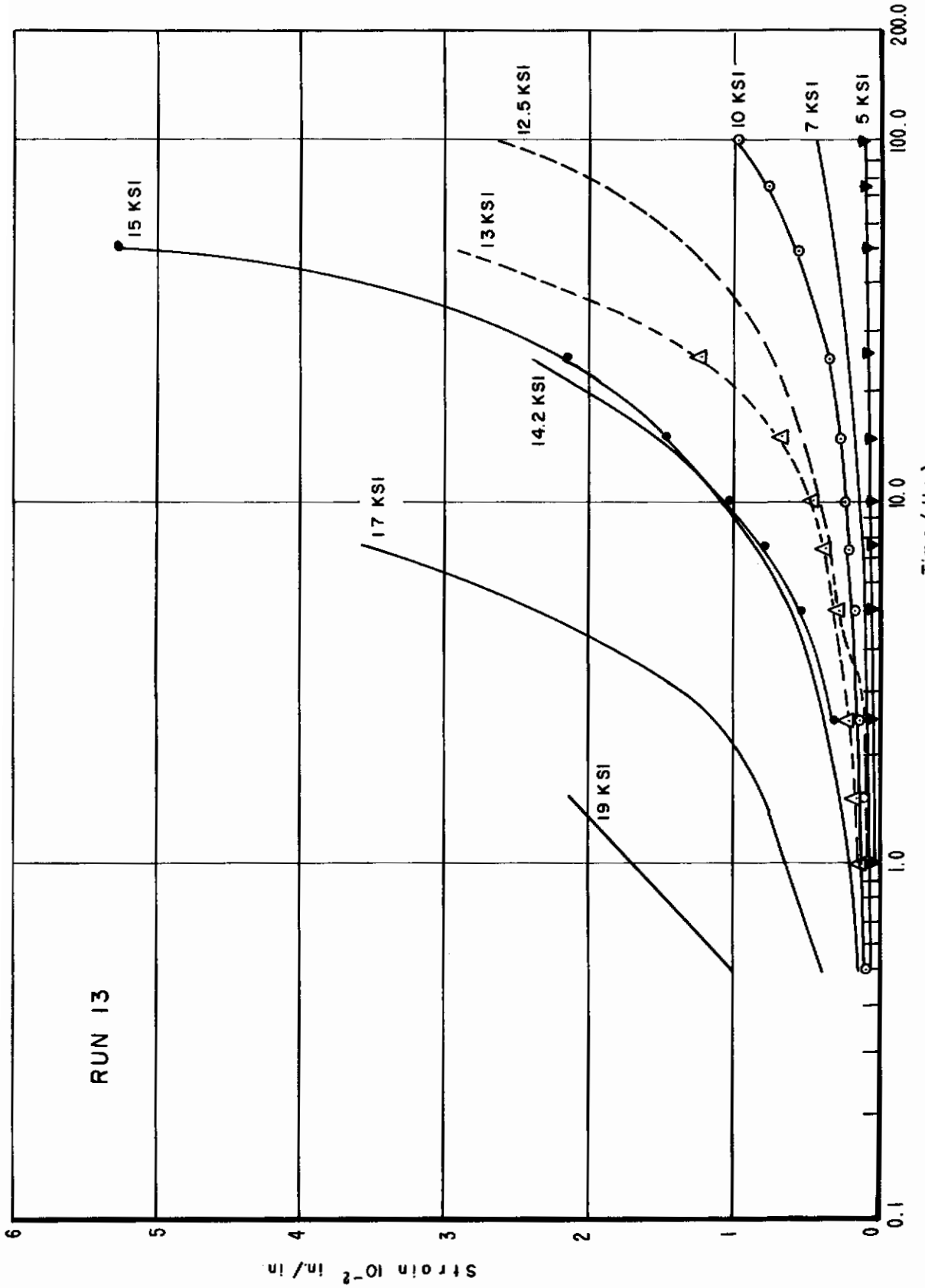


Figure 21. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Alclad) at 500°F (960°R)

TABLE 32

Alclad X-2219-T6 Sheet
Creep Deformation and Rupture Data at 500° F (960° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
10.0	-	-	.04	.8	16.6	40	100
12.5	168.1	6	.175	.83	7.5	15	36
13.0	57.4	-	.045	1.0	4.5	11	20.5
14.2	38.8	11	.15	.1	2.0	4.0	9.0
15.0	53.5	9	4.27	-	1.9	4.1	10.1
17.0	9.0	12	4.295	-	-	.75	2.17
19.0	2.3	12	.31	-	-	-	.5
20.0	.8	5	.38	-	-	-	-

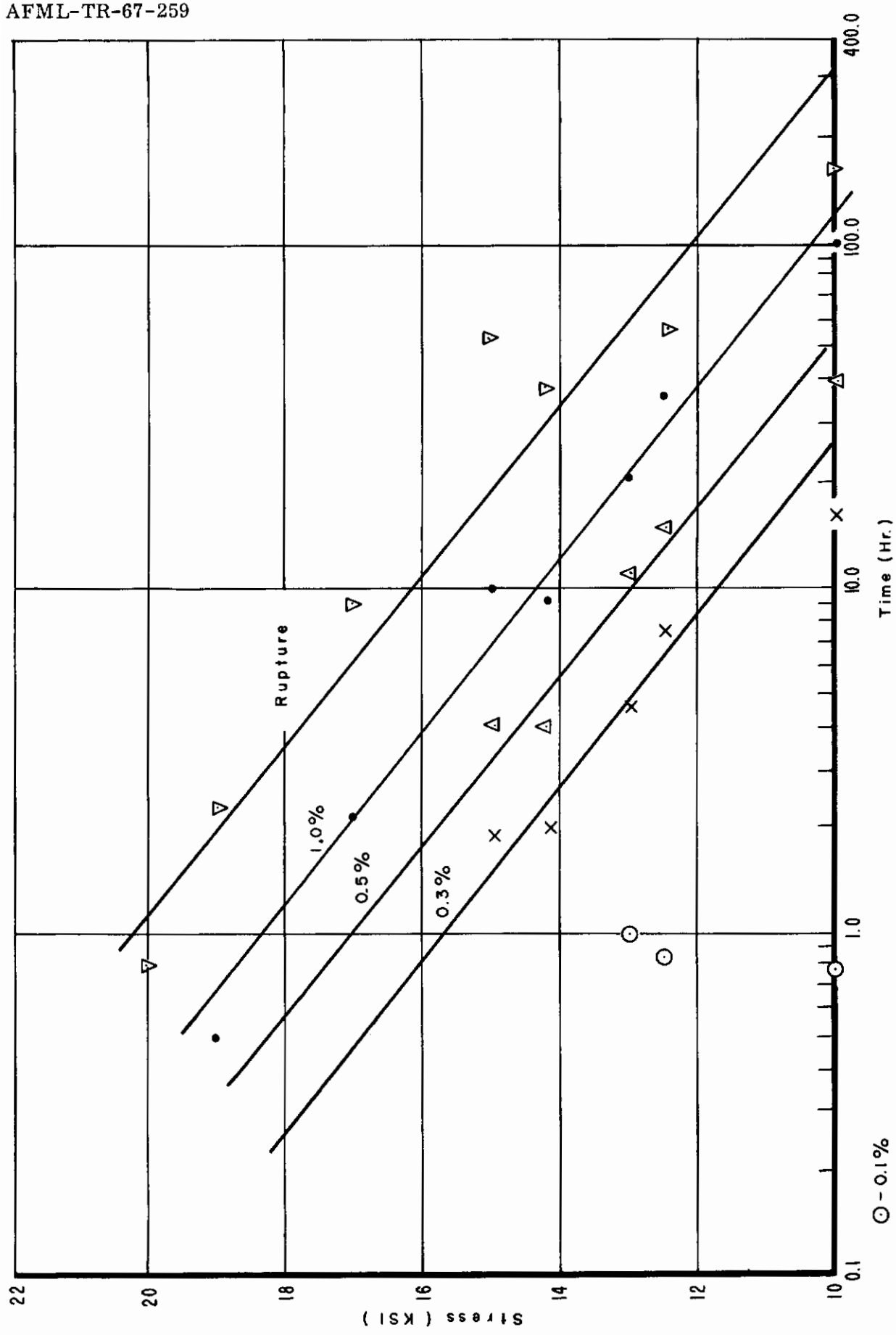


Figure 22. Creep Rupture Properties of X-2219-T6 Sheet (Alclad) at 500°F (960°R)

TABLE 33

Deformation Versus Time (Raw Data) for X-2219-T6 Sheet (Alclad) at 600° F (1060° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	4.00000E-04	0.500
	5.00000E-04	1.000
	5.50000E-04	1.500
	6.50000E-04	2.500
	9.00000E-04	5.000
	1.10000E-03	7.500
	1.20000E-03	10.000
	1.50000E-03	15.000
	2.20000E-03	25.000
	3.50000E-03	50.000
	5.00000E-03	75.000
	6.80000E-03	100.000
4.0000	2.00000E-04	0.500
	4.00000E-04	1.000
	6.00000E-04	1.500
	8.00000E-04	2.500
	1.50000E-03	5.000
	2.30000E-03	7.500
	3.30000E-03	10.000
	5.50000E-03	15.000
	1.10000E-02	25.000
	2.70000E-02	50.000
	4.50000E-02	75.000
	6.30000E-02	100.000
8.0000	1.80000E-03	0.500
	2.60000E-03	1.000
	3.50000E-03	1.500
	6.00000E-03	2.500
	1.80000E-02	5.000
	3.00000E-02	7.500

TABLE 33 (CONT)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.5000	3.00000E-03	0.500
	4.50000E-03	1.000
	6.00000E-03	1.500
	9.00000E-03	2.500
	2.40000E-02	5.000
	4.70000E-02	7.500
	7.00000E-02	10.000
10.0000	2.50000E-03	0.500
	4.00000E-03	1.000
	5.50000E-03	1.500
	9.20000E-03	2.500
10.0000	2.20000E-02	5.000
12.0000	7.50000E-03	0.500

TABLE 34

Deformation Versus Time (Fitted Data) for X-2219-T6 Sheet (Alclad) at 600° F (1060° R)

RUN 13

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	4.27150E-04	0.500
	4.60500E-04	1.000
	5.28140E-04	1.500
	6.61500E-04	2.500
2.0000	9.14560E-04	5.000
	1.09994E-03	7.500
	1.25552E-03	10.000
	1.53311E-03	15.000
	2.06789E-03	25.000
	3.51372E-03	50.000
	5.09331E-03	75.000
	6.74462E-03	100.000
4.0000	1.98090E-04	0.500
	4.20460E-04	1.000
	5.62940E-04	1.500
	8.19390E-04	2.500
	1.50353E-03	5.000
	2.32097E-03	7.500
	3.27378E-03	10.000
	5.51611E-03	15.000
	1.09326E-02	25.000
	2.71424E-02	50.000
	4.48593E-02	75.000
	6.30494E-02	100.000
8.0000	1.81796E-03	0.500
	2.60597E-03	1.000
	3.29986E-03	1.500
	6.33667E-03	2.500
	1.77325E-02	5.000
	3.01070E-02	7.500

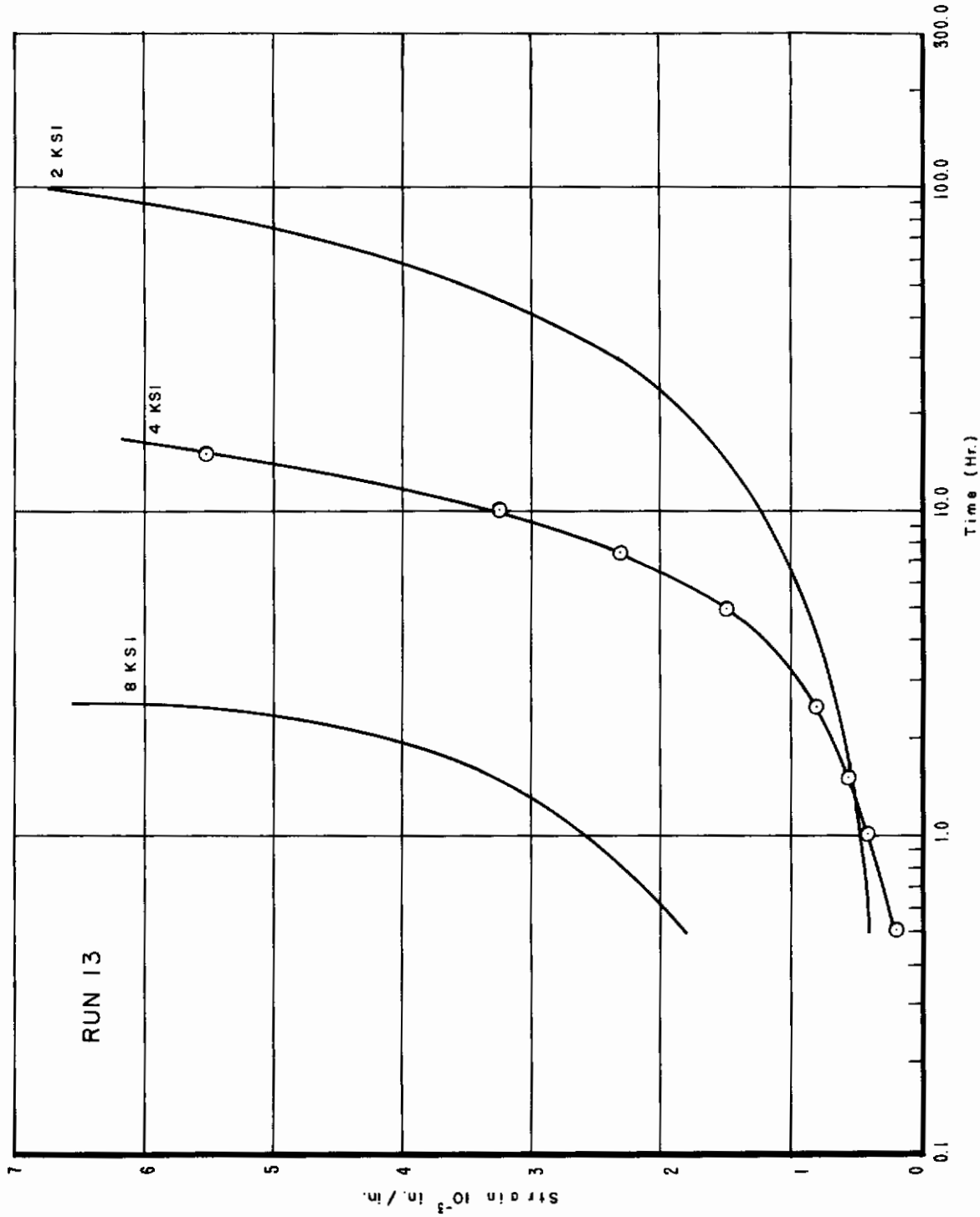


Figure 23. Creep Deformation Versus Log Time of X-2219-T6 Sheet (Alclad) at 600°F (1060°R)

TABLE 35

Alclad X-2219-T6 Sheet
Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
2.0	-	-	.08	6.25	39.5	75	-
4.0	148.0	18	.02	3.2	9.25	14	23
8.0	14.3	12	-	-	1.22	2.17	3.3
8.5	10.2	11	.125	-	.5	1.17	2.7
10.0	7.3	5	.105	-	.72	1.33	2.6
12.0	.8	7	.23	-	-	-	-

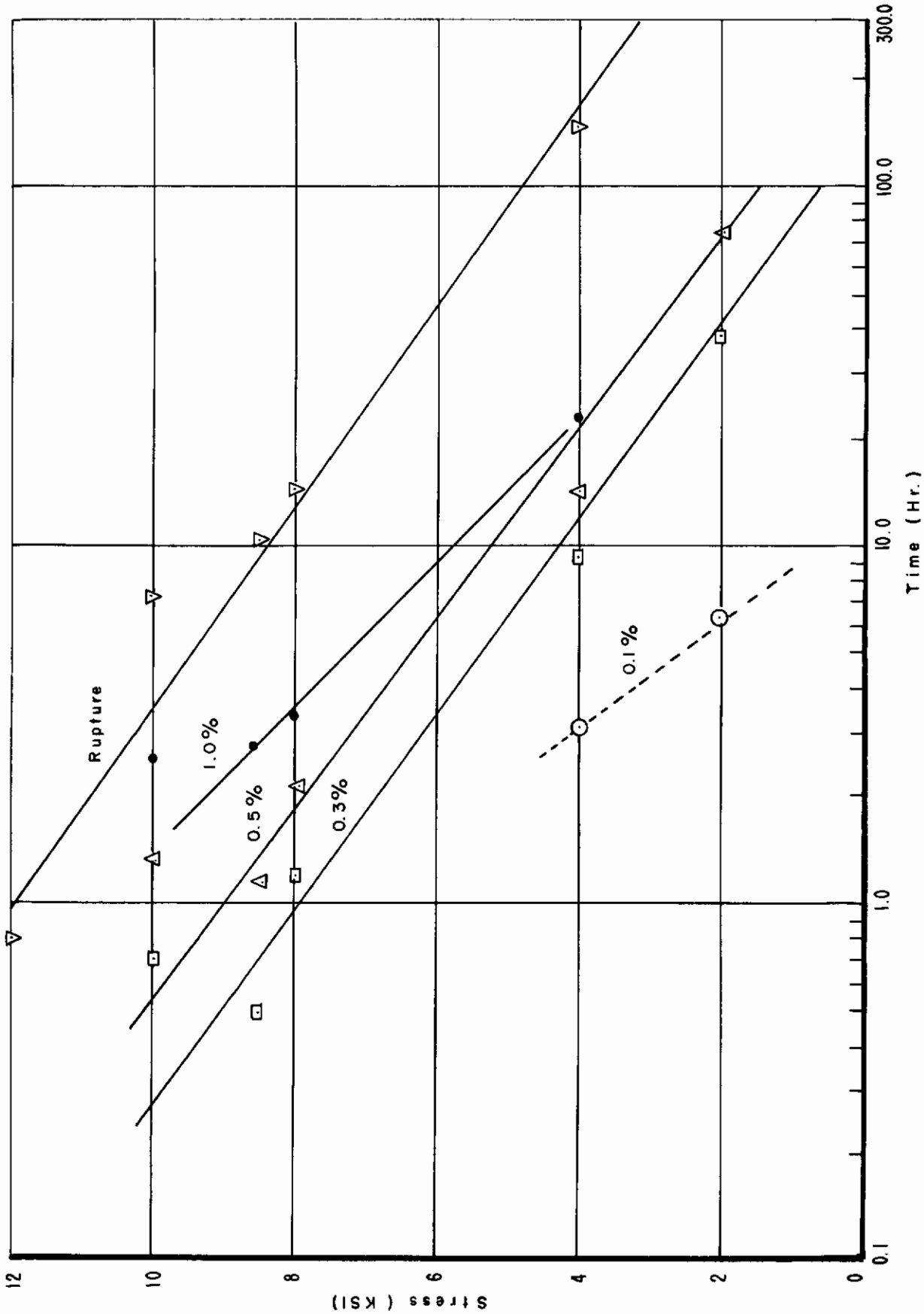


Figure 24. Creep Rupture Properties of X-2219-T6 Sheet (Alclad) at 600°F (1060°R)

TABLE 36

Minimum Creep Rate of X-2219-T6 Sheet (Alclad) at 400°, 500°, and 600° F

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
400° F (860° R)	23.0	2.21×10^{-4}
"	25.0	1.88×10^{-3}
"	28.0	1.60×10^{-2}
500° F (960° R)	10.0	7.93×10^{-5}
"	12.5	1.32×10^{-4}
"	13.0	3.14×10^{-4}
"	15.0	6.88×10^{-4}
"	17.0	2.50×10^{-3}
600° F (1060° R)	2.0	5.35×10^{-5}
"	4.0	2.56×10^{-4}
"	8.0	1.39×10^{-3}

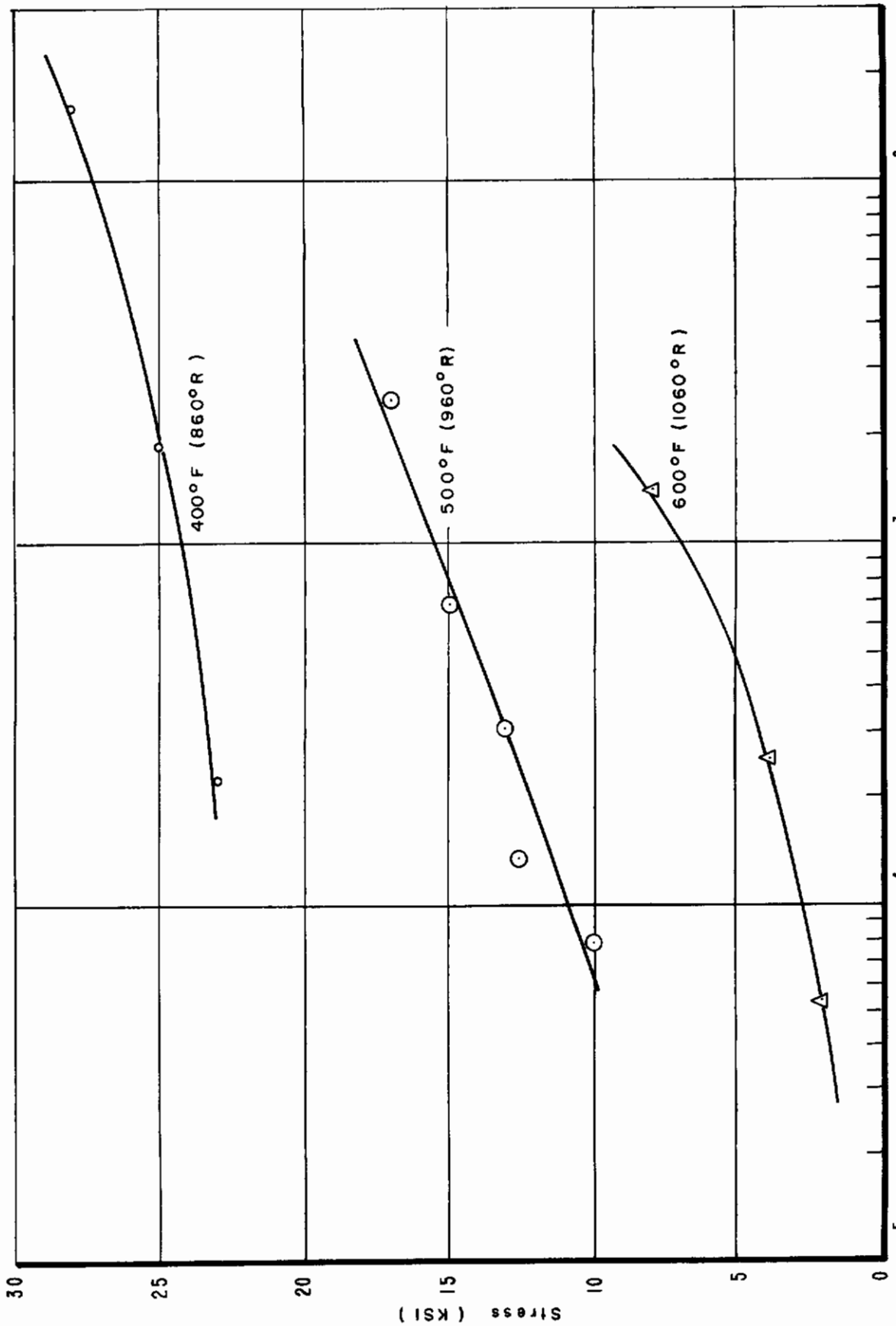


Figure 25. Minimum Creep Rate of X-2219-T6 Sheet (Alclad)

CREEP DATA FOR

DOW HK 31XA-H24

(MAGNESIUM BASED)

TABLE 37

Deformation Versus Time (Raw Data) for DOW HK 31XA-H24 at 400° F (860° R)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.5000	4.00000E-04	25.000
	5.00000E-04	50.000
	8.00000E-04	75.000
	9.00000E-04	100.000
	10.00000E-04	250.000
	1.30000E-03	500.000
	1.60000E-03	750.000
	2.50000E-03	1000.000
5.0000	1.10000E-03	50.000
	1.20000E-03	75.000
	1.30000E-03	100.000
	1.60000E-03	250.000
	1.80000E-03	500.000
	2.90000E-03	750.000
	4.20000E-03	1000.000
7.0000	1.20000E-03	25.000
	1.80000E-03	50.000
	2.20000E-03	75.000
	2.60000E-03	100.000
	3.80000E-03	250.000
	7.00000E-03	500.000
	1.10000E-02	750.000
	1.60000E-02	1000.000
12.0000	1.40000E-03	7.500
	1.60000E-03	10.000
	2.50000E-03	15.000
	2.70000E-03	25.000
	4.40000E-03	50.000
	5.50000E-03	75.000
	6.40000E-03	100.000
	1.10000E-02	150.000
	2.10000E-02	250.000
	5.10000E-02	500.000
	1.10000E-01	750.000

TABLE 37 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	1.50000E-03	7.500
	2.10000E-03	10.000
	2.80000E-03	15.000
	4.10000E-03	25.000
	7.10000E-03	50.000
	9.70000E-03	75.000
	1.20000E-02	100.000
	1.80000E-02	150.000
	3.30000E-02	250.000
	1.30000E-01	500.000
16.0000	3.50000E-03	5.000
16.0000	5.20000E-03	7.500
	7.00000E-03	10.000
	9.80000E-03	15.000
	1.40000E-02	25.000
	2.80000E-02	50.000
	4.70000E-02	75.000
	7.80000E-02	100.000
18.0000	2.50000E-03	0.500
	3.00000E-03	1.000
	3.50000E-03	1.500
	4.50000E-03	2.500
	7.00000E-03	5.000
	9.50000E-03	7.500
	1.20000E-02	10.000
	1.70000E-02	15.000
	2.80000E-02	25.000
	5.70000E-02	50.000
	10.00000E-02	75.000

TABLE 37 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
18.5000	5.50000E-03	0.500
	5.70000E-03	1.000
	5.80000E-03	1.500
	6.00000E-03	2.500
	6.90000E-03	5.000
	8.00000E-03	7.500
	9.10000E-03	10.000
	1.10000E-02	15.000
	1.60000E-02	25.000
	2.80000E-02	50.000
	6.00000E-02	75.000
	1.40000E-01	100.000
	5.30000E-03	0.500
	6.50000E-03	1.000
	7.50000E-03	1.500
	9.50000E-03	2.500
	1.50000E-02	5.000
	2.00000E-02	7.500
	2.60000E-02	10.000
	4.20000E-02	15.000

TABLE 38

Deformation Versus Time (Fitted Data) for DOW HK 31XA-H24 at 400° F (860° R)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.5000	5.18790E-04	25.000
	5.95680E-04	50.000
	6.68480E-04	75.000
	7.37190E-04	100.000
	1.06525E-03	250.000
	1.34224E-03	500.000
	1.56555E-03	750.000
	2.50679E-03	1000.000
5.0000	1.17809E-03	50.000
	1.21113E-03	75.000
	1.24506E-03	100.000
	1.47026E-03	250.000
	1.97525E-03	500.000
	2.79852E-03	750.000
	4.22166E-03	1000.000
7.0000	1.12548E-03	25.000
	1.92192E-03	50.000
	2.27269E-03	75.000
	2.49252E-03	100.000
	3.71224E-03	250.000
	6.98125E-03	500.000
	1.11983E-02	750.000
	1.58826E-02	1000.000
12.0000	1.57727E-03	7.500
	1.71851E-03	10.000
	2.00410E-03	15.000
	2.58767E-03	25.000
	4.11887E-03	50.000
	5.75332E-03	75.000
	7.49110E-03	100.000
	1.12774E-02	150.000
	2.01141E-02	250.000
	5.11851E-02	500.000
	1.09985E-01	750.000

TABLE 38 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	1.77208E-03	7.500
	2.09344E-03	10.000
	2.72672E-03	15.000
	3.95828E-03	25.000
	6.87074E-03	50.000
	9.62594E-03	75.000
	1.23246E-02	100.000
	1.79553E-02	150.000
	3.29700E-02	250.000
	1.30003E-01	500.000
16.0000	3.80351E-03	5.000
16.0000	5.26017E-03	7.500
	6.67019E-03	10.000
	9.37480E-03	15.000
	1.44937E-02	25.000
	2.78821E-02	50.000
	4.70118E-02	75.000
	7.80037E-02	100.000
18.0000	2.41525E-03	0.500
	2.92677E-03	1.000
	3.43829E-03	1.500
	4.46136E-03	2.500
	7.01931E-03	5.000
	9.57844E-03	7.500
	1.21402E-02	10.000
	1.72800E-02	15.000
	2.77183E-02	25.000
	5.70238E-02	50.000
	9.99983E-02	75.000

TABLE 38 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
18.5000	5.27106E-03	0.500
	5.48257E-03	1.000
	5.69400E-03	1.500
	6.11646E-03	2.500
	7.16870E-03	5.000
	8.21283E-03	7.500
	9.24687E-03	10.000
	1.12839E-02	15.000
	1.53075E-02	25.000
	2.83153E-02	50.000
	5.98800E-02	75.000
	1.40021E-01	100.000
	5.35545E-03	0.500
	6.42086E-03	1.000
	7.48269E-03	1.500
	9.59622E-03	2.500
	1.48433E-02	5.000
	2.01670E-02	7.500
	2.59297E-02	10.000
	4.20047E-02	15.000

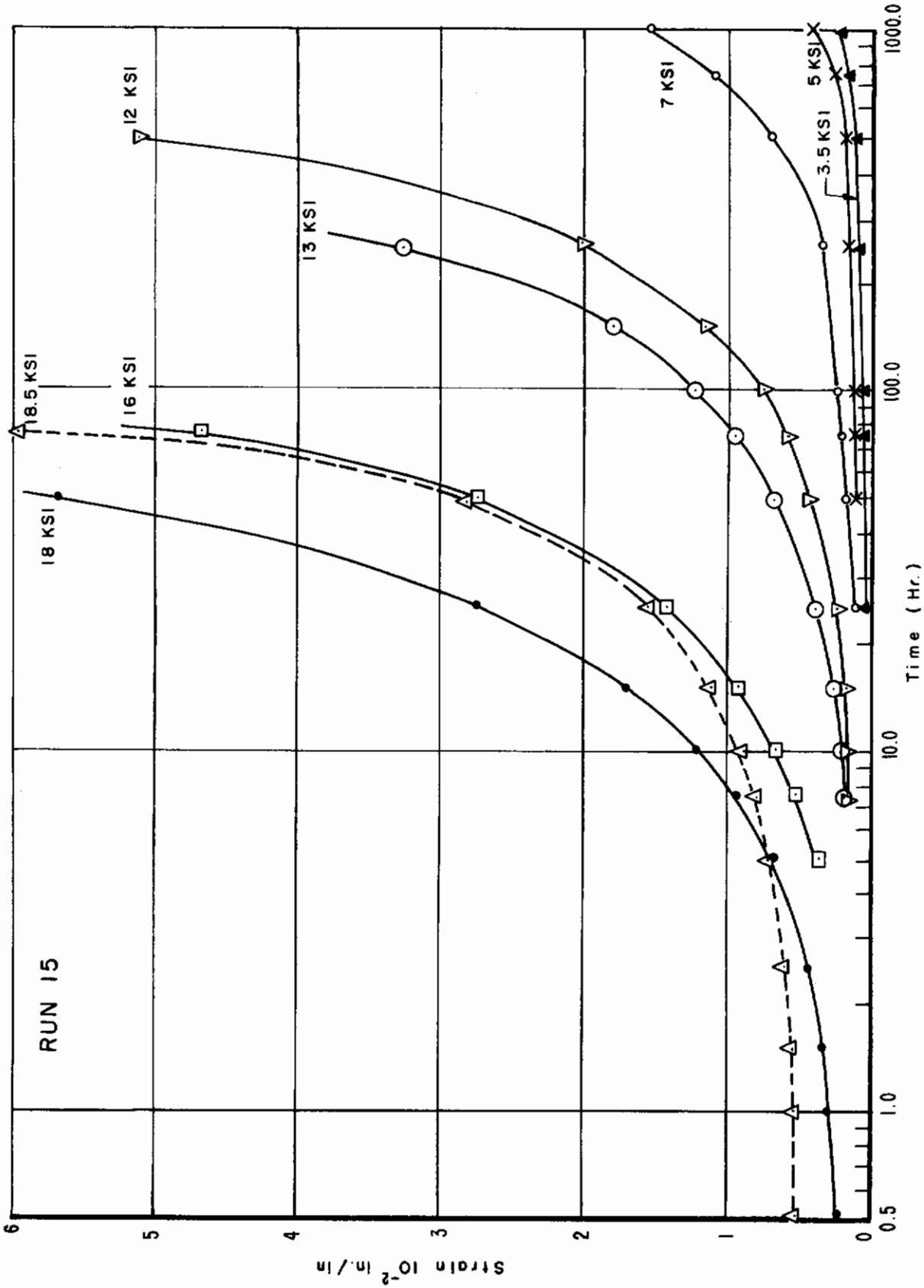


Figure 26. Creep Deformation Versus Log Time of DOW HK 31xA-H24 at 400°F (860°R)

TABLE 39

DOW HK 31XA-H24 (Mg Alloy)
Creep Deformation and Rupture Data at 400° F (860° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
12.0	1003.7	35	.23	6.6	28	64	139
13.0	573.7	29	.24	3.5	17	36	78
16.0	122.6	23	.4	1.25	3.8	5.3	15.5
18.0	78.6	22	.49	-	1.0	3.0	8.0
18.5	18.1	19	.48	-	-	-	2.8
18.5	106.7	19	.64	-	-	-	12.5
19.0	-	24	.64	-	-	-	-

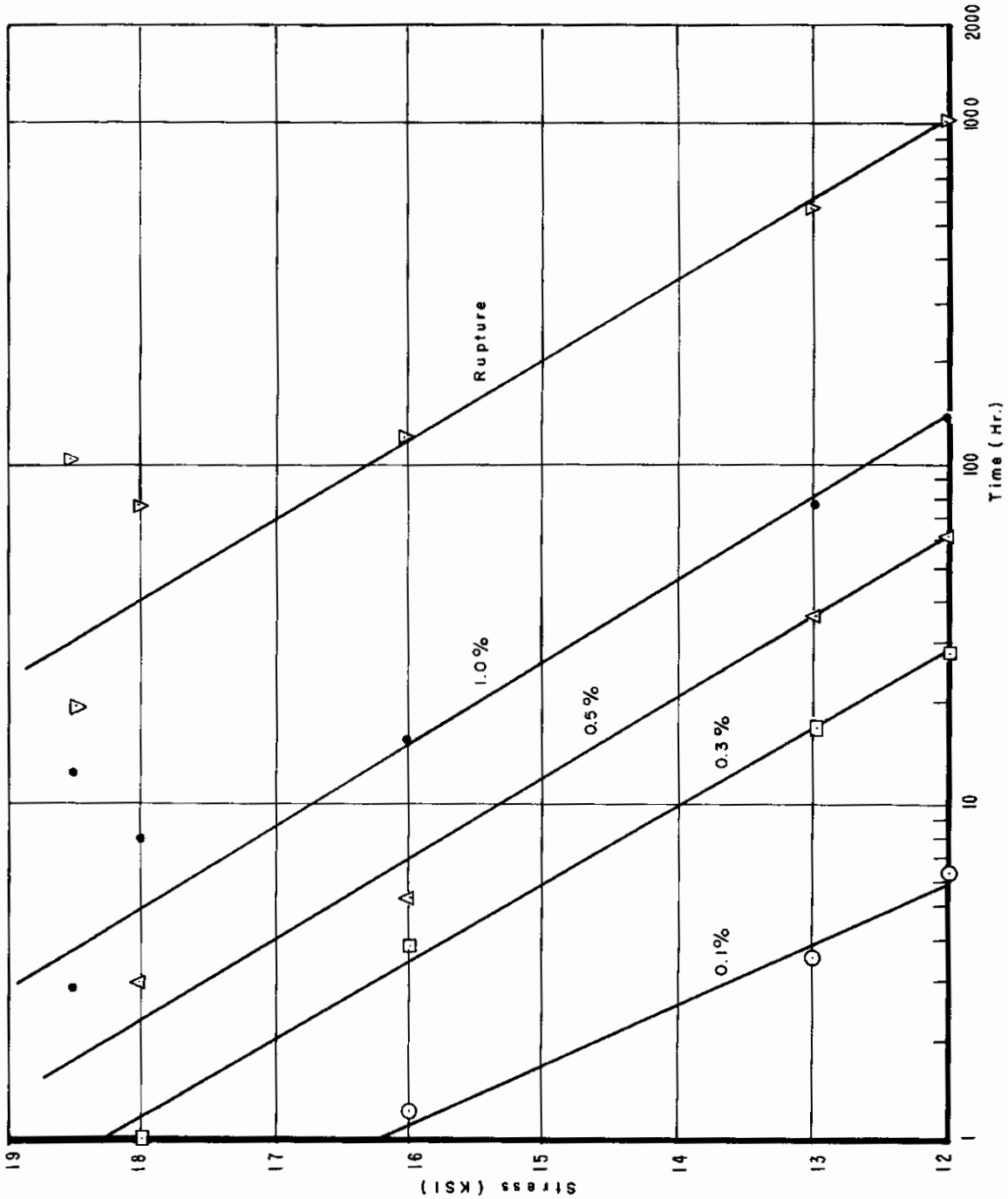


Figure 27. Creep Rupture Properties of DOW HK 31xA-H24 at 400°F (860°R)

TABLE 40

Deformation Versus Time (Raw Data) for DOW HK 31XA-H24 at 500° F (960° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.7000	10.00000E-05	50.000
	2.00000E-04	75.000
	3.00000E-04	100.000
	7.00000E-04	250.000
	1.10000E-03	500.000
	1.50000E-03	750.000
	1.80000E-03	1000.000
1.0000	3.00000E-04	75.000
1.0000	5.00000E-04	100.000
	1.30000E-03	250.000
	2.20000E-03	500.000
	2.90000E-03	750.000
	3.90000E-03	1000.000
1.3000	2.00000E-04	10.000
	5.00000E-04	25.000
	8.00000E-04	50.000
	1.10000E-03	75.000
	1.20000E-03	100.000
	2.30000E-03	250.000
	4.20000E-03	500.000
	6.10000E-03	750.000
	7.20000E-03	1000.000
3.0000	6.00000E-04	1.500
	9.00000E-04	2.500
	1.10000E-03	5.000
	2.00000E-03	7.500
	2.30000E-03	10.000
	3.80000E-03	15.000
	6.00000E-03	25.000
	10.00000E-03	50.000
	1.40000E-02	75.000
	1.80000E-02	100.000
	2.90000E-02	150.000

TABLE 40 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.90000E-02	250.000
	1.01000E-01	500.000
	1.41000E-01	750.000
	1.50000E-01	1000.000
3.2000	5.00000E-04	0.500
	9.00000E-04	1.000
	1.30000E-03	1.500
	2.20000E-03	2.500
	4.00000E-03	5.000
	5.70000E-03	7.500
	7.30000E-03	10.000
	1.02000E-02	15.000
	1.53000E-02	25.000
	2.72000E-02	50.000
	5.20000E-02	75.000
	6.50000E-02	100.000
	9.60000E-02	150.000
	1.64000E-01	250.000
3.5000	10.00000E-03	15.000
	2.30000E-02	25.000
	2.80000E-02	50.000
3.5000	3.80000E-02	75.000
	5.40000E-02	100.000
	8.80000E-02	150.000
	1.60000E-01	250.000
	5.00000E-01	500.000
4.0000	3.10000E-03	1.500
	4.50000E-03	2.500
	8.00000E-03	5.000
	10.00000E-03	7.500
	1.20000E-02	10.000
	1.70000E-02	15.000
	2.80000E-02	25.000
	6.00000E-02	50.000
	9.80000E-02	75.000
	1.42000E-01	100.000
	2.28000E-01	150.000
	6.00000E-01	250.000

TABLE 40 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.5000	1.40000E-02	5.000
	2.00000E-02	7.500
	2.60000E-02	10.000
	3.90000E-02	15.000
	6.30000E-02	25.000
	1.30000E-01	50.000
	1.90000E-01	75.000
	5.50000E-01	100.000
7.0000	4.80000E-03	1.000
	5.20000E-03	1.500
	9.80000E-03	2.500
	1.60000E-02	5.000
	2.10000E-02	7.500
	3.10000E-02	10.000
	4.60000E-02	15.000
	8.60000E-02	25.000
	5.60000E-03	1.500
	1.20000E-02	2.500
	1.60000E-02	5.000
	2.00000E-02	7.500
	3.00000E-02	10.000
	4.40000E-02	15.000
	8.40000E-02	25.000
10.0000	7.80000E-03	0.500
	1.50000E-02	1.000
	2.10000E-02	1.500
	3.40000E-02	2.500
	7.30000E-02	5.000
	1.30000E-01	7.500
10.0000	2.37000E-01	10.000
13.0000	1.60000E-02	0.500
	2.00000E-02	1.000
	4.00000E-02	1.500
	5.60000E-02	2.500
	1.84000E-01	5.000

TABLE 41

Deformation Versus Time (Fitted Data) for DOW HK 31XA-H24 at 500° F (960° R)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.7000	1.05640E-04	50.000
	2.03100E-04	75.000
	2.89660E-04	100.000
	6.87750E-04	250.000
	1.14737E-03	500.000
	1.49590E-03	750.000
	1.78440E-03	1000.000
1.0000	3.13740E-04	75.000
1.0000	4.81860E-04	100.000
	1.30636E-03	250.000
	2.19713E-03	500.000
	2.90108E-03	750.000
	3.89981E-03	1000.000
1.3000	2.09480E-04	10.000
	5.03500E-04	25.000
	7.94580E-04	50.000
	1.03239E-03	75.000
	1.25217E-03	100.000
	2.44664E-03	250.000
	4.22755E-03	500.000
	5.84617E-03	750.000
	7.34753E-03	1000.000
3.0000	5.65680E-04	1.500
	7.58770E-04	2.500
	1.24160E-03	5.000
	1.72460E-03	7.500
	2.20774E-03	10.000
	3.17451E-03	15.000
	5.10988E-03	25.000
	9.95913E-03	50.000
	1.48238E-02	75.000
	1.97040E-02	100.000
	2.95102E-02	150.000
	4.92962E-02	250.000

TABLE 41 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.90174E-02	500.000
	1.42076E-01	750.000
	1.49839E-01	1000.000
3.2000	4.51360E-04	0.500
	8.89850E-04	1.000
	1.40324E-03	1.500
	2.31683E-03	2.500
	4.09628E-03	5.000
	5.57473E-03	7.500
	6.96246E-03	10.000
	9.70837E-03	15.000
	1.54371E-02	25.000
	3.10652E-02	50.000
	4.76084E-02	75.000
	6.44496E-02	100.000
	9.81127E-02	150.000
	1.63524E-01	250.000
3.5000	9.34495E-03	15.000
	2.19021E-02	25.000
	3.25230E-02	50.000
3.5000	3.91509E-02	75.000
	4.84895E-02	100.000
	7.78011E-02	150.000
	1.69689E-01	250.000
	4.98179E-01	500.000
4.0000	2.49795E-03	1.500
	3.62785E-03	2.500
	6.47321E-03	5.000
	9.34804E-03	7.500
	1.22523E-02	10.000
	1.81493E-02	15.000
	3.02969E-02	25.000
	6.27387E-02	50.000
	9.82301E-02	75.000
	1.37132E-01	100.000
	2.29924E-01	150.000
	5.99930E-01	250.000

TABLE 41 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.5000	1.50621E-02	5.000
	1.97856E-02	7.500
	2.52059E-02	10.000
	3.77001E-02	15.000
	6.63467E-02	25.000
	1.28840E-01	50.000
	1.90351E-01	75.000
	5.49955E-01	100.000
7.0000	4.74631E-03	1.000
	6.07695E-03	1.500
	8.74885E-03	2.500
	1.55372E-02	5.000
	2.25736E-02	7.500
	2.99634E-02	10.000
	4.61597E-02	15.000
	8.59939E-02	25.000
	5.79837E-03	1.500
	1.14709E-02	2.500
	1.62702E-02	5.000
	2.13680E-02	7.500
	2.80574E-02	10.000
	4.47011E-02	15.000
	8.39338E-02	25.000
10.0000	7.78861E-03	0.500
	1.45505E-02	1.000
	2.12467E-02	1.500
	3.46370E-02	2.500
	7.22466E-02	5.000
	1.30419E-01	7.500
10.0000	2.36912E-01	10.000
13.0000	1.62186E-02	0.500
	1.97217E-02	1.000
	3.97515E-02	1.500
	5.63516E-02	2.500
	1.83913E-01	5.000

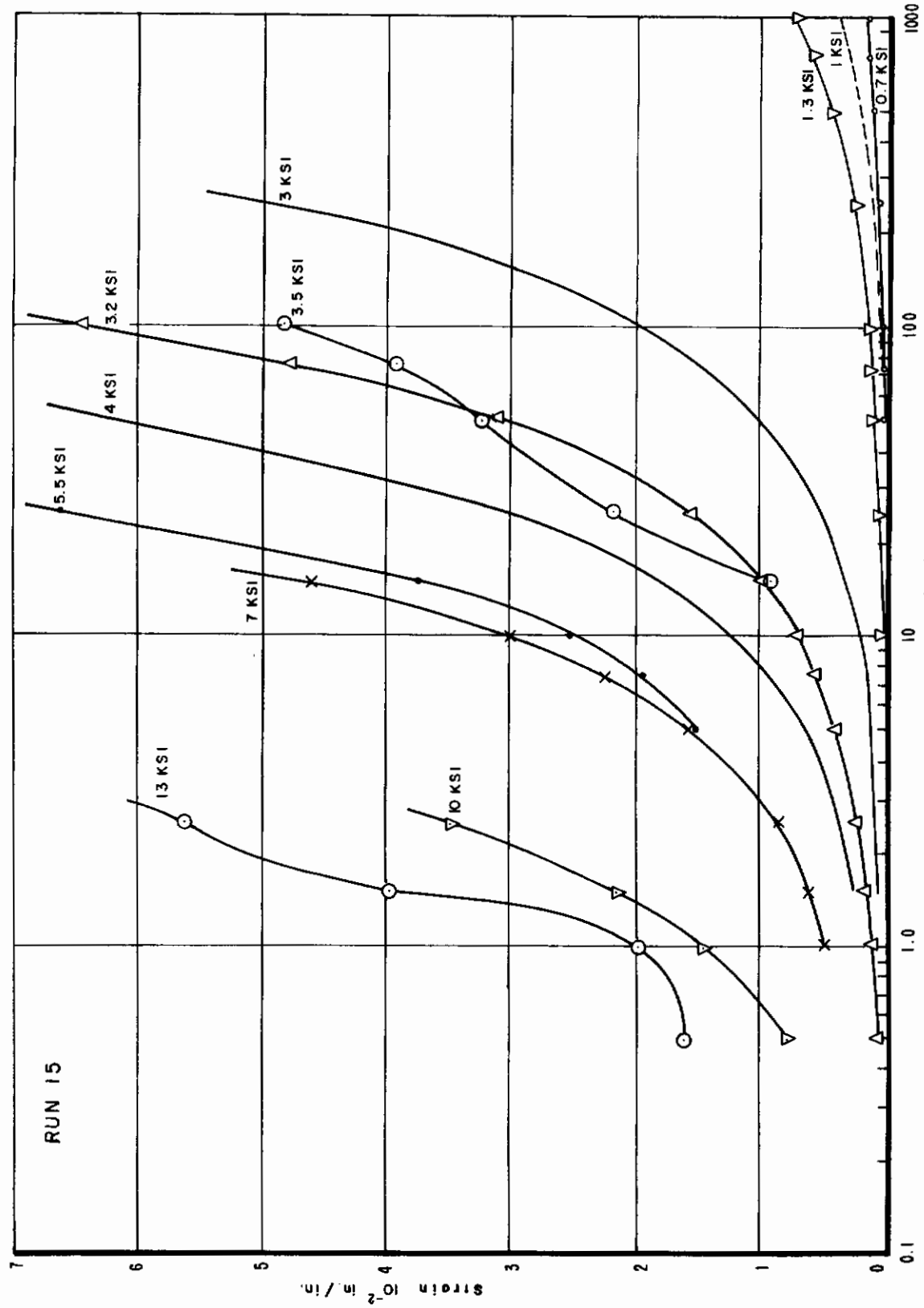


Figure 28. Creep Deformation Versus Log Time of DOW HK 31xA-H24 at 500°F (960°R)

TABLE 42

DOW HK 31XA-H24 (Mg Alloy)
Creep Deformation and Rupture Data at 500° F (960° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
3.0	$1150(R'm'v'^{1})$	33	.02	3.75	12.7	18	50
3.5	502.6	118	.09	1.5	10.3	-	25
4.0	253	82	.05	-	1.5	2.8	7.5
5.5	108.5	96	.10	-	1.0	1.7	3.8
7.0	43.3	47	.16	-	.75	1.33	2.1
7.0	43.7	56	.13	-	.7	1.25	2.5
10.0	10.6	63	.24	-	-	-	.7
13.0	5.4	29	.28	-	-	-	-

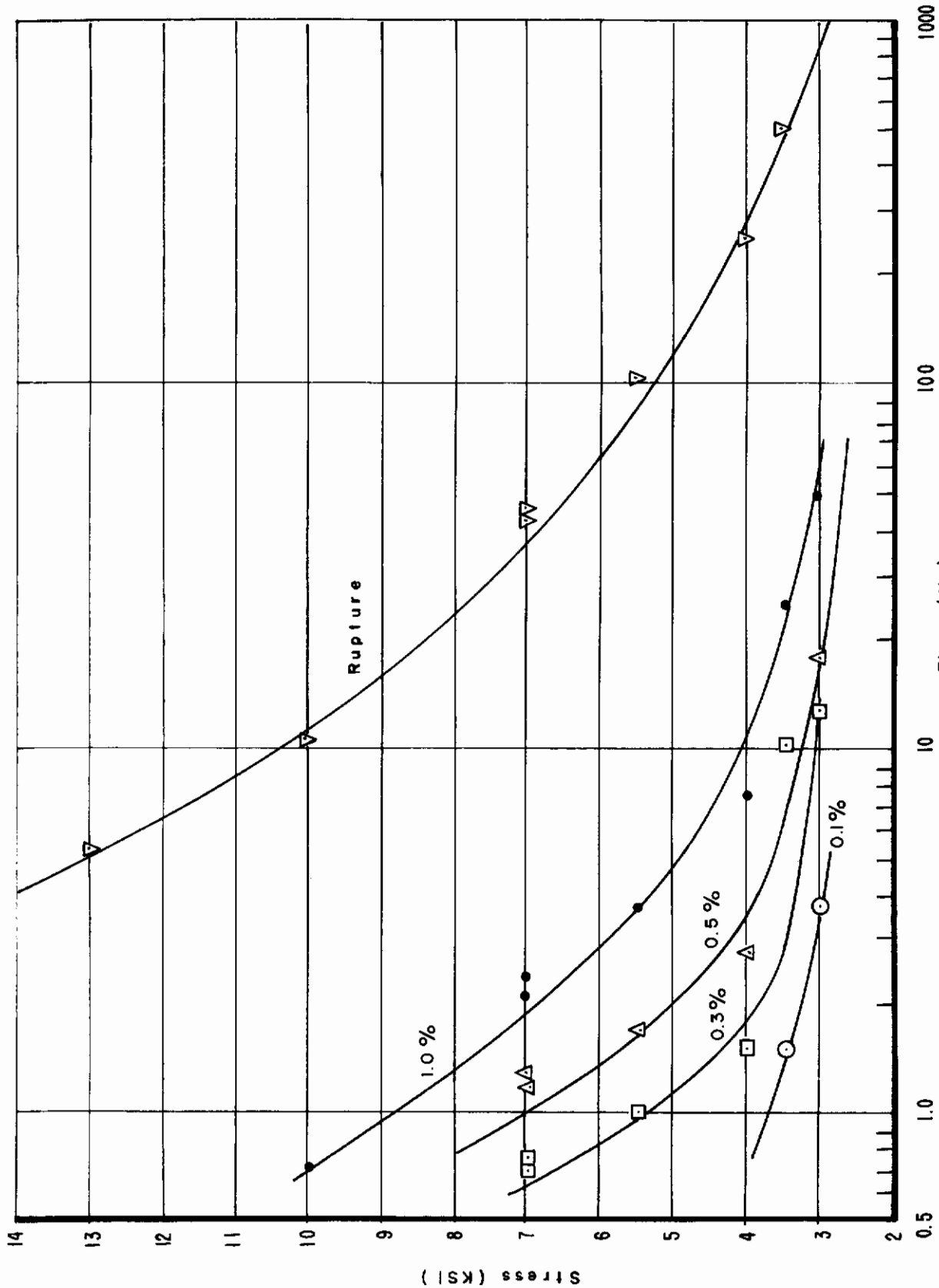


Figure 29. Creep Rupture Properties of DOW HK 31xA-H24 at 500°F (960°R)

TABLE 43

Deformation Versus Time (Raw Data) for DOW HK 31XA-H24 at 600° F (1060°R)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.1000	10.00000E-05	10.000
	2.00000E-04	25.000
	3.00000E-04	50.000
	3.50000E-04	75.000
	4.00000E-04	100.000
	6.00000E-04	250.000
	7.00000E-04	500.000
	9.00000E-04	1000.000
0.1500	2.00000E-04	10.000
	4.00000E-04	25.000
	7.00000E-04	50.000
	9.00000E-04	75.000
	10.00000E-04	100.000
	1.40000E-03	250.000
	1.50000E-03	500.000
	1.60000E-03	750.000
	1.60000E-03	1000.000
0.2000	2.00000E-04	5.000
	4.00000E-04	10.000
	9.00000E-04	25.000
	1.50000E-03	50.000
	1.80000E-03	75.000
	1.90000E-03	100.000
	2.10000E-03	250.000
	4.00000E-04	5.000
	6.00000E-04	10.000
	10.00000E-04	25.000
	1.40000E-03	50.000
	1.60000E-03	75.000
	1.80000E-03	100.000
	2.40000E-03	250.000
	2.70000E-03	500.000
	2.80000E-03	750.000
	3.00000E-03	1000.000

RUN 15

TABLE 43 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.4000	3.10000E-03	25.000
	5.10000E-03	50.000
	6.30000E-03	75.000
	6.80000E-03	100.000
	8.00000E-03	250.000
0.4000	8.40000E-03	500.000
	8.70000E-03	750.000
	9.00000E-03	1000.000
0.7500	1.60000E-02	15.000
	2.50000E-02	25.000
	5.00000E-02	50.000
	7.00000E-02	75.000
	8.90000E-02	100.000
	1.20000E-01	150.000
	1.60000E-01	250.000
	2.16000E-01	500.000
	3.60000E-01	750.000
	6.00000E-01	1000.000
1.0000	4.90000E-03	1.500
	7.20000E-03	2.500
	1.20000E-02	5.000
	1.70000E-02	7.500
	2.20000E-02	10.000
	3.40000E-02	15.000
	5.50000E-02	25.000
	1.01000E-01	50.000
	1.48000E-01	75.000
	1.90000E-01	100.000
	2.80000E-01	150.000
	6.10000E-01	250.000

TABLE 43 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.5000	4.50000E-03	0.500
	8.50000E-03	1.000
	1.10000E-02	1.500
	1.90000E-02	2.500
	3.70000E-02	5.000
	5.50000E-02	7.500
	7.30000E-02	10.000
	1.14000E-01	15.000
	2.10000E-01	25.000
	4.40000E-01	50.000
	7.00000E-01	75.000
2.0000	1.50000E-02	0.500
	3.00000E-02	1.000
	4.40000E-02	1.500
	6.90000E-02	2.500
	1.11000E-01	5.000
	1.50000E-01	7.500
	2.20000E-01	10.000
3.0000	2.90000E-02	0.500
	5.00000E-02	1.000
3.0000	8.10000E-02	1.500
	1.29000E-01	2.500
	2.70000E-01	5.000
4.5000	4.70000E-02	0.500
	10.00000E-02	1.000
	1.63000E-01	1.500
7.0000	3.00000E-01	0.500

TABLE 44

Deformation Versus Time (Fitted Data) for DOW HK 31XA-H24 at 600° F (1060° R)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.1000	9.88500E-05	10.000
	2.01660E-04	25.000
	2.95780E-04	50.000
	3.57720E-04	75.000
	4.04880E-04	100.000
	5.74200E-04	250.000
	7.23450E-04	500.000
	8.93420E-04	1000.000
0.1500	1.80850E-04	10.000
	4.45020E-04	25.000
	7.04950E-04	50.000
	8.72800E-04	75.000
	9.95010E-04	100.000
	1.36371E-03	250.000
	1.55731E-03	500.000
	1.59901E-03	750.000
	1.58129E-03	1000.000
0.2000	2.04690E-04	5.000
	3.96790E-04	10.000
	8.98500E-04	25.000
	1.49357E-03	50.000
	1.81130E-03	75.000
	1.89508E-03	100.000
	2.10004E-03	250.000
	3.99630E-04	5.000
	5.99100E-04	10.000
	1.00413E-03	25.000
	1.38808E-03	50.000
	1.63087E-03	75.000
	1.80667E-03	100.000
	2.35251E-03	250.000
	2.70587E-03	500.000
	2.86745E-03	750.000
	2.95468E-03	1000.000

TABLE 44 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.4000	3.05034E-03	25.000
	5.25992E-03	50.000
	6.22070E-03	75.000
	6.77118E-03	100.000
	7.94380E-03	250.000
0.4000	8.46308E-03	500.000
	8.73487E-03	750.000
	8.95613E-03	1000.000
0.7500	1.48109E-02	15.000
	2.54235E-02	25.000
	4.97459E-02	50.000
	7.11119E-02	75.000
	8.97708E-02	100.000
	1.19963E-01	150.000
	1.58748E-01	250.000
	2.16593E-01	500.000
	3.59809E-01	750.000
	6.00025E-01	1000.000
1.0000	5.18090E-03	1.500
	7.26347E-03	2.500
	1.24519E-02	5.000
	1.76147E-02	7.500
	2.27518E-02	10.000
	3.29491E-02	15.000
	5.30357E-02	25.000
	1.01469E-01	50.000
	1.47463E-01	75.000
	1.91468E-01	100.000
	2.79431E-01	150.000
	6.10021E-01	250.000

TABLE 44 (CONT)

RUN 15

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.5000	4.34080E-03	0.500
	8.89628E-03	1.000
	1.14767E-02	1.500
	1.78011E-02	2.500
	3.62969E-02	5.000
	5.55874E-02	7.500
	7.53102E-02	10.000
	1.16244E-01	15.000
	2.03819E-01	25.000
	4.44131E-01	50.000
	6.98582E-01	75.000
2.0000	1.51447E-02	0.500
	2.88470E-02	1.000
	4.58838E-02	1.500
	6.80344E-02	2.500
	1.10622E-01	5.000
	1.60861E-01	7.500
	2.19607E-01	10.000
3.0000	3.15629E-02	0.500
	4.55031E-02	1.000
3.0000	7.63396E-02	1.500
	1.39023E-01	2.500
	2.66572E-01	5.000
4.5000	4.70000E-02	0.500
	10.00000E-02	1.000
	1.63000E-01	1.500
7.0000	3.00000E-01	0.500

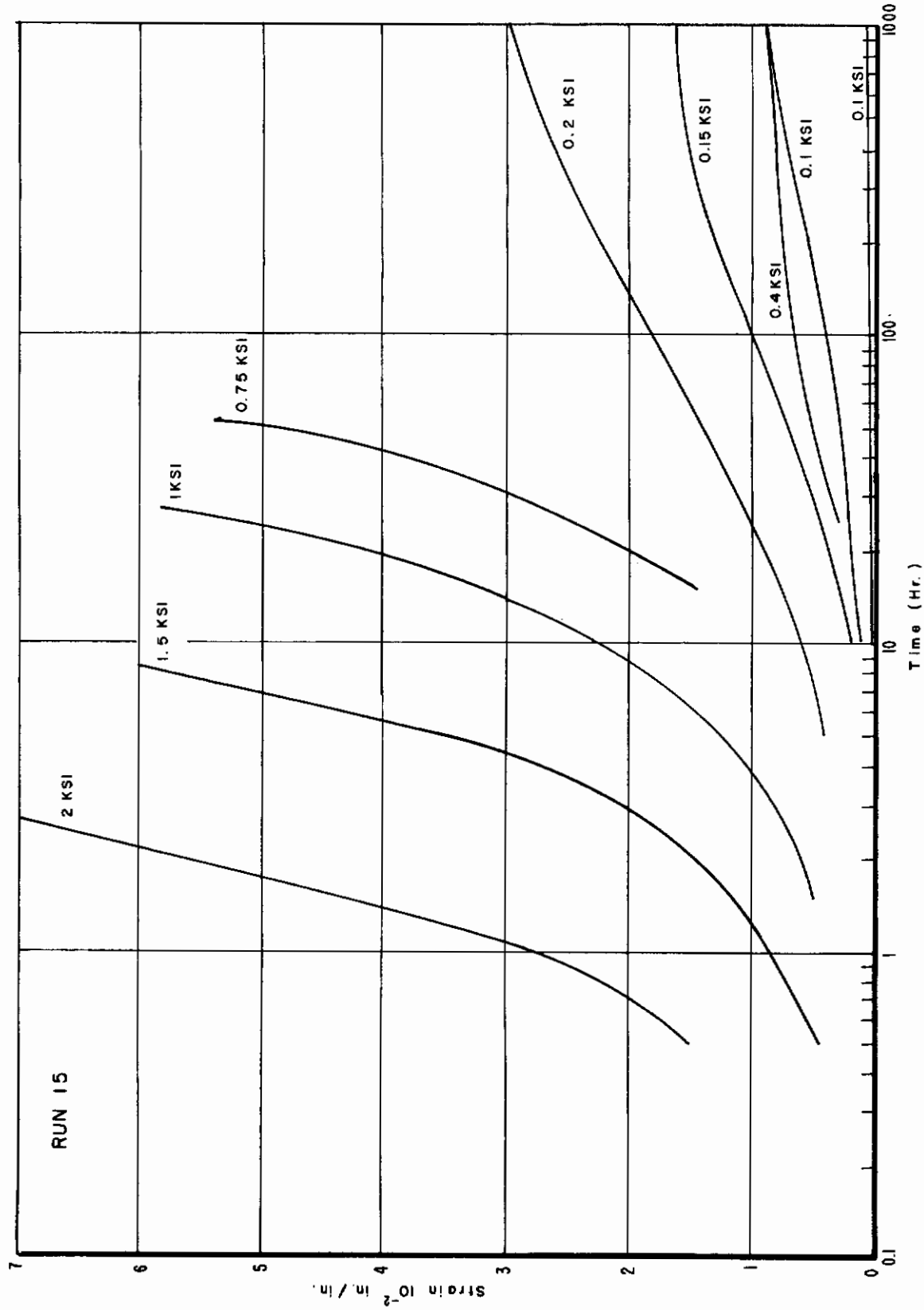


Figure 30. Creep Deformation Versus Log Time of DOW HK 31xA-H24 at 600°F (1060°R)

TABLE 45

DOW HK 31XA-H24 (Mg Alloy)
Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
.75	1431	100	.04	-	.6	1.3	7.5
1.00	279.4	80	.04	-	.9	1.5	3.5
1.50	103.6	128	.11	-	-	.56	1.3

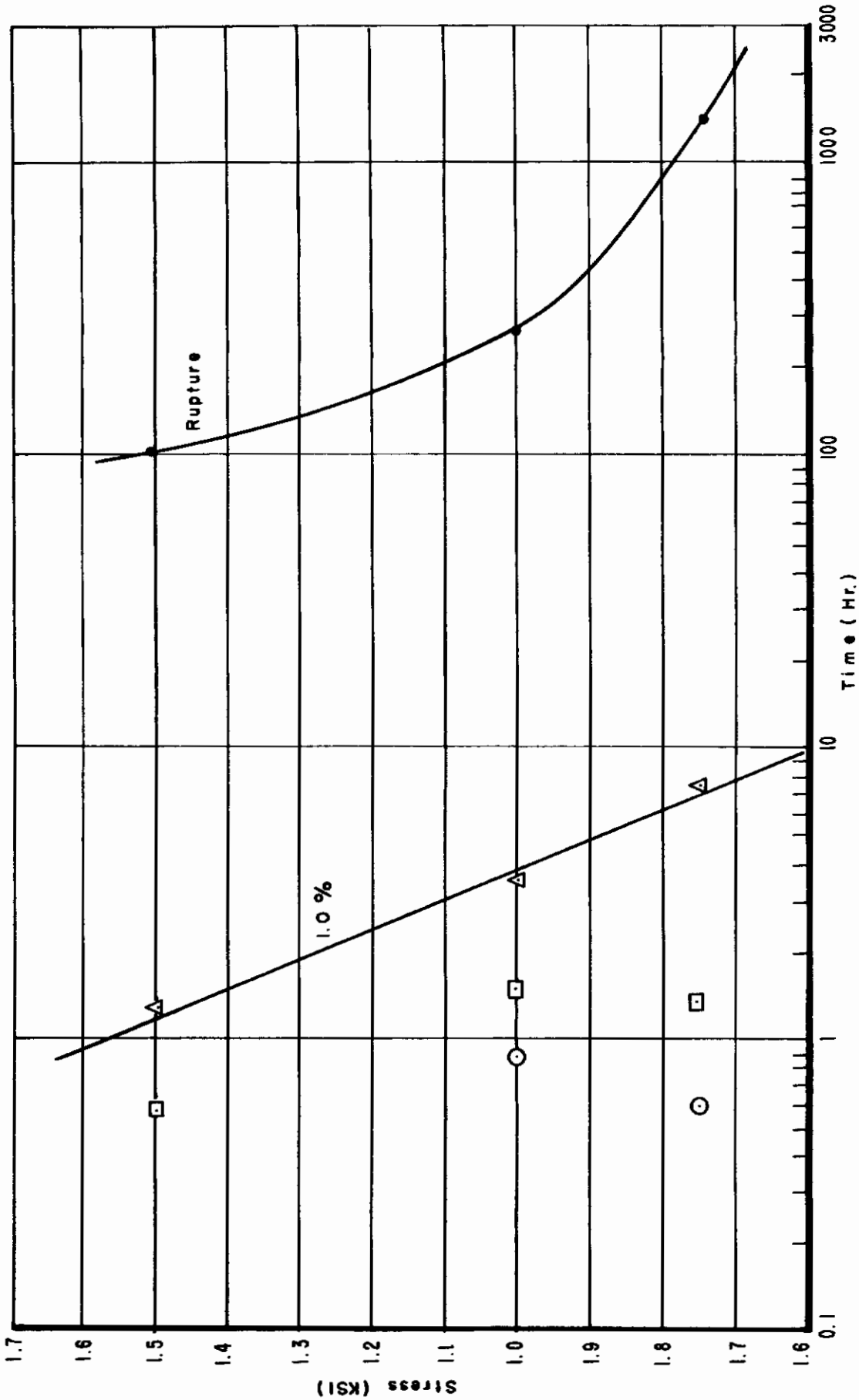


Figure 31. Creep Rupture Properties of DOW HK 31xA-H24 at 600°F (1060°R)

TABLE 46

Minimum Creep Rate for DOW HK 31XA-H24 (Mg Alloy)

Temperature (° R)	Stress (KSI)	Minimum Creep Rate (in/in/hr)
860	3.5	8.9×10^{-7}
	5	1.32×10^{-6}
	7	8.13×10^{-6}
	12	5.65×10^{-5}
	13	1.08×10^{-4}
	16	5.12×10^{-4}
	18	1.02×10^{-3}
	18.5	4.02×10^{-4}
	18.5	2.10×10^{-3}
960	1.0	2.82×10^{-6}
	3.2	5.49×10^{-4}
	3.5	2.65×10^{-4}
	4.0	1.13×10^{-3}
	5.5	1.89×10^{-3}
	7.0	1.92×10^{-3}
	10.0	1.34×10^{-2}
	13.0	7.01×10^{-3}
1060	0.15	1.67×10^{-7}
	0.75	2.31×10^{-4}
	1.0	1.76×10^{-3}
	1.5	5.16×10^{-3}
	2.0	1.7×10^{-2}
	3.0	2.79×10^{-2}
	4.5	1.06×10^{-1}

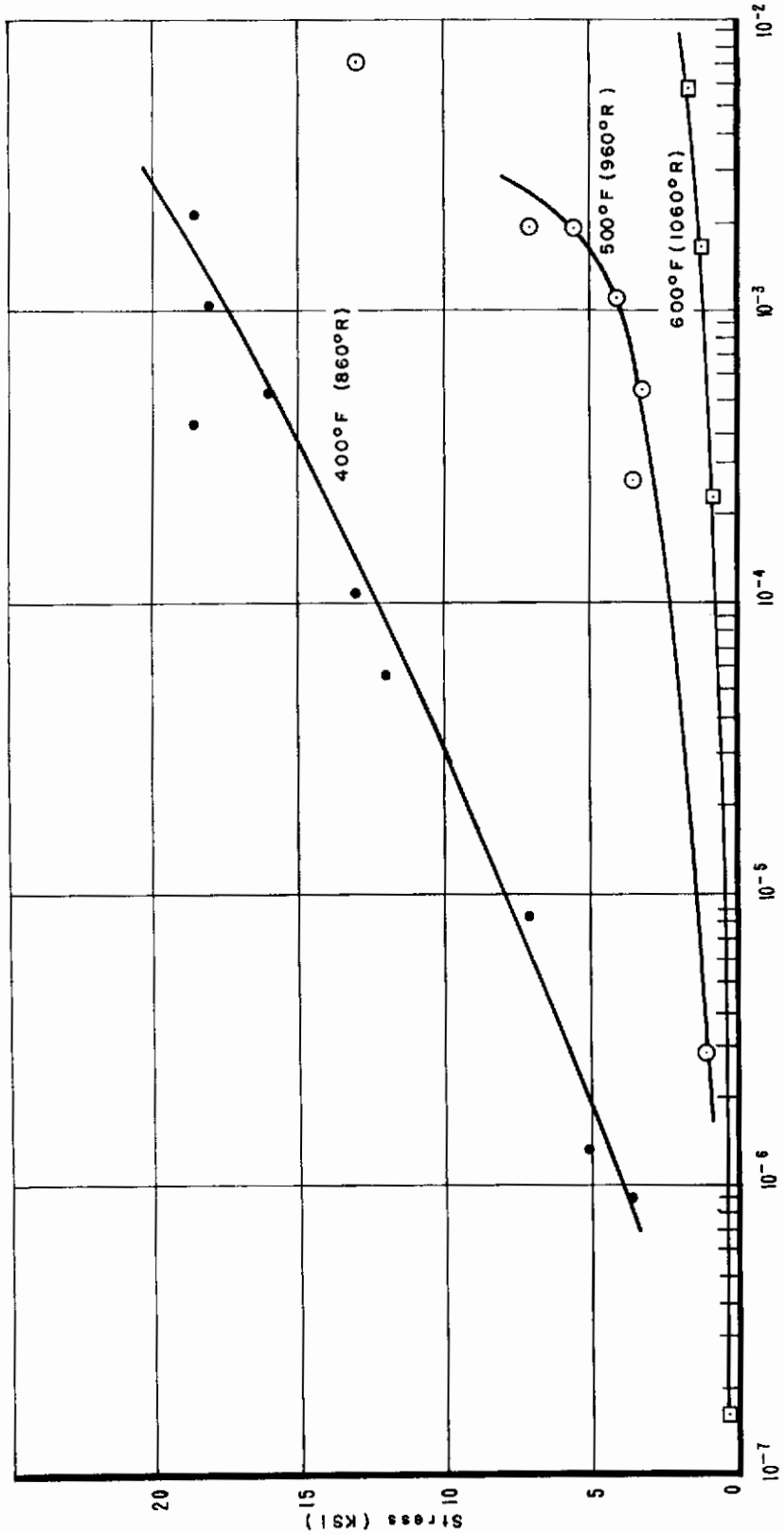


Figure 32a. Minimum Creep Rate of DOW HK 31xA-H24

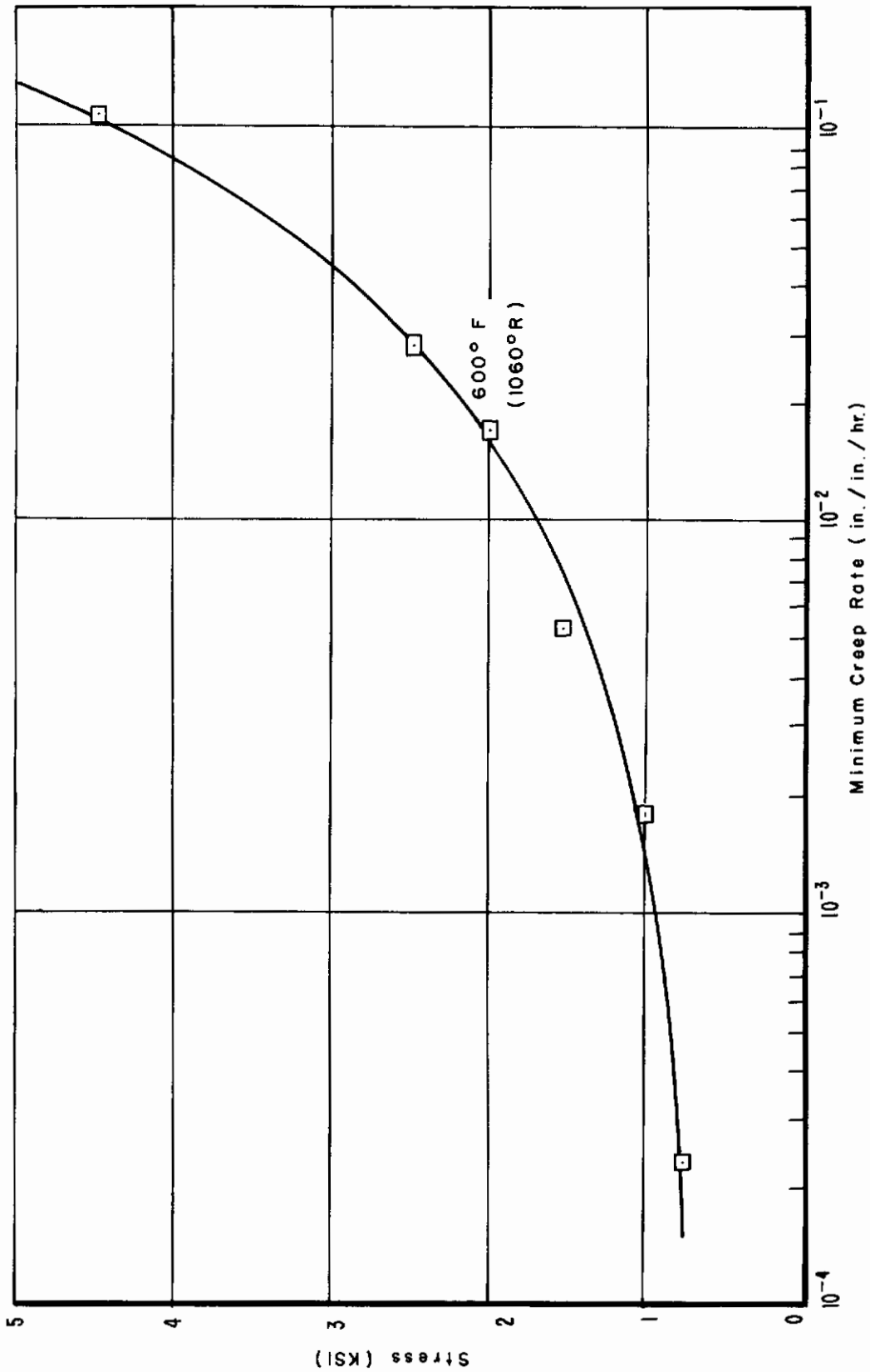


Figure 32b. Minimum Creep Rate of DOW HK 31xA-H24 at 600°F (1060°R)

CREEP DATA FOR

DOW HM-21XA-T8

(MAGNESIUM BASED)

TABLE 47

Deformation Versus Time (Raw Data) for DOW HM-21XA-T8 at 400 ° F (860° R)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	10.00000E-05	0.500
	2.00000E-04	15.000
	3.00000E-04	25.000
	5.00000E-04	50.000
	6.00000E-04	75.000
	7.00000E-04	100.000
	9.00000E-04	250.000
	1.10000E-03	500.000
	1.40000E-03	750.000
	1.60000E-03	1000.000
12.0000	4.00000E-04	7.500
	5.00000E-04	25.000
	6.00000E-04	50.000
	8.00000E-04	75.000
	10.00000E-04	100.000
	1.90000E-03	250.000
	3.50000E-03	500.000
	5.30000E-03	750.000
	7.10000E-03	1000.000
14.0000	5.00000E-04	10.000
	6.00000E-04	25.000
	8.00000E-04	50.000
	1.10000E-03	75.000
	1.40000E-03	100.000
	1.90000E-03	150.000
	2.30000E-03	200.000
	2.70000E-03	250.000
	4.40000E-03	500.000
	7.50000E-03	750.000
	1.19000E-02	1000.000

TABLE 47 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.4000	5.00000E-04	0.500
	6.00000E-04	1.000
	7.00000E-04	2.500
	9.00000E-04	5.000
	10.00000E-04	7.500
	1.10000E-03	10.000
	1.20000E-03	15.000
	1.40000E-03	25.000
	2.00000E-04	5.000
	3.00000E-04	10.000
	4.00000E-04	15.000
	6.00000E-04	25.000
	9.00000E-04	50.000
	1.10000E-03	75.000
	1.20000E-03	100.000
	2.10000E-03	150.000
	6.00000E-04	2.500
14.4000	8.00000E-04	5.000
	9.00000E-04	7.500
	10.00000E-04	10.000
	1.20000E-03	15.000
	1.30000E-03	25.000
	1.50000E-03	50.000
	1.80000E-03	75.000
	2.20000E-03	100.000
	2.80000E-03	150.000
	3.80000E-03	200.000
	5.70000E-03	250.000
	8.70000E-03	300.000

TABLE 47 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.8000	2.00000E-04	1.000
	3.00000E-04	1.500
	4.00000E-04	2.500
	5.00000E-04	5.000
	6.00000E-04	10.000
	7.00000E-04	15.000
	9.00000E-04	25.000
	1.20000E-03	50.000
	1.40000E-03	75.000
	1.50000E-03	100.000
	1.90000E-03	200.000
	2.70000E-03	250.000
15.0000	7.00000E-04	0.500
	8.00000E-04	1.000
	10.00000E-04	2.500
	1.20000E-03	5.000
	1.40000E-03	7.500
	1.50000E-03	10.000
	1.70000E-03	15.000
	2.00000E-03	25.000
	2.90000E-03	50.000
	7.00000E-04	5.000
	9.00000E-04	7.500
	10.00000E-04	10.000
	1.10000E-03	15.000
	1.20000E-03	25.000
	1.40000E-03	50.000
	1.60000E-03	75.000
	1.90000E-03	100.000
	2.80000E-03	150.000
	4.40000E-03	200.000
	6.90000E-03	250.000
15.2000	3.00000E-04	1.000
	4.00000E-04	2.500
	5.00000E-04	7.500

TABLE 47 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.2000	6.000000E-04	25.000
	10.00000E-04	50.000
	1.40000E-03	75.000
	1.60000E-03	100.000
	2.20000E-03	150.000
	3.30000E-03	200.000
	5.00000E-03	250.000
15.5000	8.000000E-04	5.000
	9.00000E-04	7.500
	10.00000E-04	10.000
	1.10000E-03	15.000
	1.30000E-03	25.000
	1.80000E-03	50.000
	2.10000E-03	75.000
	2.90000E-03	100.000
	6.80000E-03	150.000
15.7500	1.60000E-03	0.500
	1.80000E-03	1.000
	1.90000E-03	1.500
	2.00000E-03	2.500
	2.20000E-03	5.000
	2.30000E-03	7.500
	2.40000E-03	10.000
	2.60000E-03	15.000
	2.40000E-03	25.000
	4.50000E-03	50.000
16.0000	1.90000E-03	0.500
	2.20000E-03	1.000
	2.40000E-03	1.500
	2.70000E-03	2.500
	3.30000E-03	5.000
	3.80000E-03	7.500

TABLE 48

Deformation Versus Time (Fitted Data) for DOW HM-21XA-T8 at 400 ° F (860° R) RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	1.00450E-04	0.500
	1.81670E-04	15.000
	3.22230E-04	25.000
	5.08440E-04	50.000
	6.08320E-04	75.000
	6.74930E-04	100.000
	8.90170E-04	250.000
	1.13513E-03	500.000
	1.37083E-03	750.000
	1.60778E-03	1000.000
12.0000	3.96510E-04	7.500
	5.00240E-04	25.000
	6.49410E-04	50.000
	7.99750E-04	75.000
	9.51250E-04	100.000
	1.88458E-03	250.000
	3.53184E-03	500.000
	5.28403E-03	750.000
	7.10234E-03	1000.000
14.0000	5.02850E-04	10.000
	6.41150E-04	25.000
	8.69850E-04	50.000
	1.09629E-03	75.000
	1.32051E-03	100.000
	1.76240E-03	150.000
	2.19599E-03	200.000
	2.62225E-03	250.000
	4.72746E-03	500.000
	7.31795E-03	750.000
	1.19331E-02	1000.000

TABLE 48 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.4000	5.04830E-04	0.500
	5.83520E-04	1.000
	7.27540E-04	2.500
	8.84420E-04	5.000
	9.97710E-04	7.500
	1.08669E-03	10.000
	1.22092E-03	15.000
	1.39432E-03	25.000
	1.94930E-04	5.000
	3.04770E-04	10.000
	4.06900E-04	15.000
	5.88160E-04	25.000
	9.12950E-04	50.000
	1.08755E-03	75.000
	1.20505E-03	100.000
	2.09967E-03	150.000
	6.87610E-04	2.500
14.4000	6.51900E-04	5.000
	8.35980E-04	7.500
	1.02325E-03	10.000
	1.30355E-03	15.000
	1.56508E-03	25.000
	1.62432E-03	50.000
	1.63526E-03	75.000
	1.81171E-03	100.000
	2.70025E-03	150.000
	4.17269E-03	200.000
	6.07902E-03	250.000
	8.31069E-03	300.000
14.8000	2.03180E-04	1.000
	2.81510E-04	1.500
	3.80300E-04	2.500
	5.15340E-04	5.000
	6.55880E-04	10.000
	7.45650E-04	15.000
	8.76640E-04	25.000

TABLE 48 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.11928E-03	50.000
	1.32351E-03	75.000
	1.51172E-03	100.000
	2.18831E-03	200.000
	2.49863E-03	250.000
15.0000	7.07550E-04	0.500
	7.83510E-04	1.000
	1.00134E-03	2.500
	1.23174E-03	5.000
	1.38195E-03	7.500
	1.49702E-03	10.000
	1.68406E-03	15.000
	2.01557E-03	25.000
	2.89723E-03	50.000
	7.84840E-04	5.000
	8.04940E-04	7.500
	9.10510E-04	10.000
	1.11892E-03	15.000
	1.34724E-03	25.000
	1.43620E-03	50.000
	1.50928E-03	75.000
	1.76572E-03	100.000
	2.85889E-03	150.000
	4.58397E-03	200.000
	6.77958E-03	250.000
15.2000	3.35450E-04	1.000
	3.59730E-04	2.500
	4.39140E-04	7.500

TABLE 48 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.2000	6.99150E-04	25.000
	1.02691E-03	50.000
	1.31750E-03	75.000
	1.59505E-03	100.000
	2.24392E-03	150.000
	3.27978E-03	200.000
	5.00333E-03	250.000
15.5000	8.08340E-04	5.000
	8.92510E-04	7.500
	9.71120E-04	10.000
	1.11295E-03	15.000
	1.34428E-03	25.000
	1.74070E-03	50.000
	2.14280E-03	75.000
	2.88669E-03	100.000
	6.80058E-03	150.000
15.7500	1.58622E-03	0.500
	1.85834E-03	1.000
	1.87454E-03	1.500
	1.93819E-03	2.500
	2.21048E-03	5.000
	2.37997E-03	7.500
	2.44600E-03	10.000
	2.44006E-03	15.000
	2.47539E-03	25.000
	4.49076E-03	50.000
16.0000	1.89929E-03	0.500
	2.20363E-03	1.000
	2.39624E-03	1.500
	2.69986E-03	2.500
	3.30193E-03	5.000
	3.79902E-03	7.500

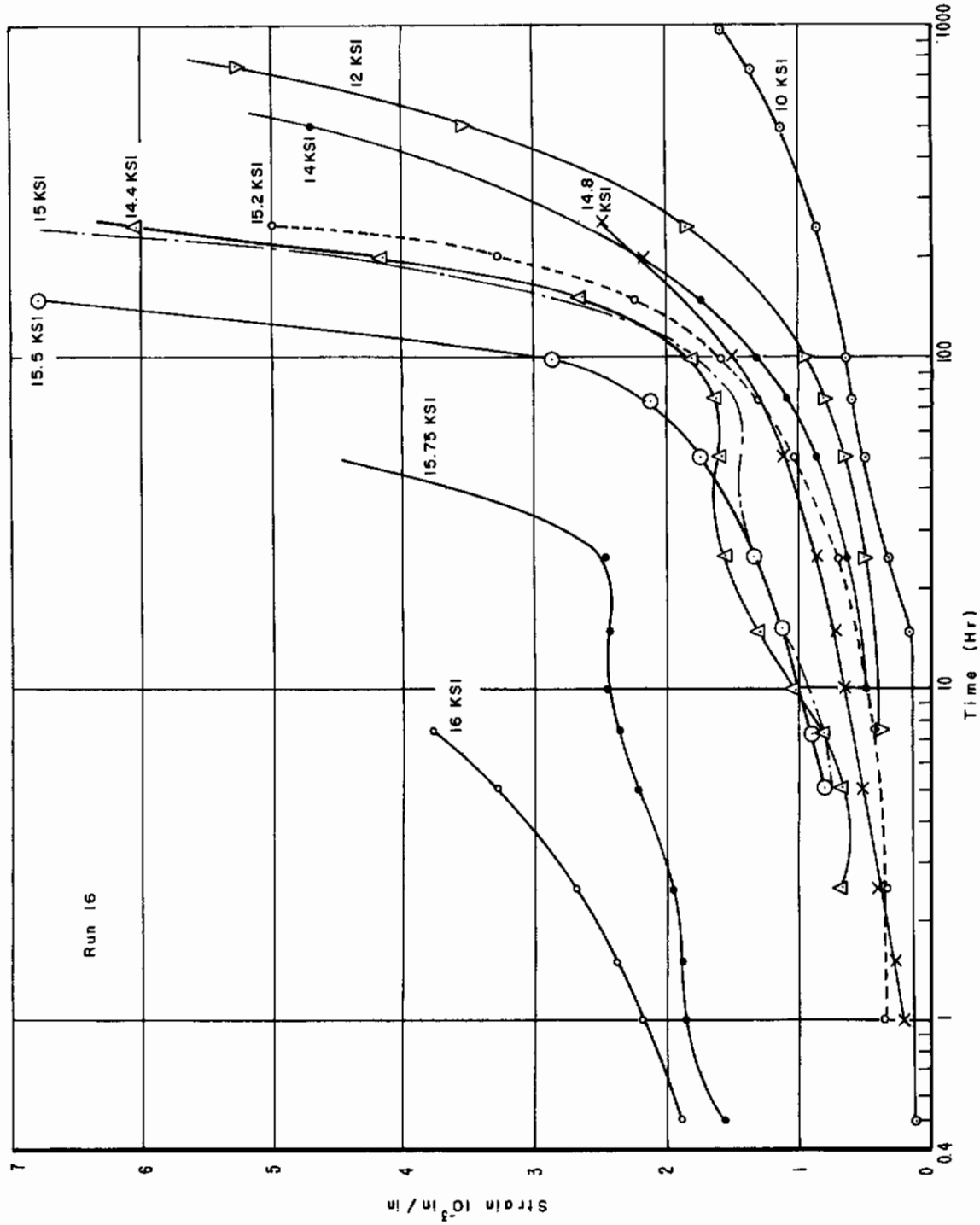


Figure 33. Creep Deformation Versus Log Time of DOW HM-21xA-T8 at 400°F (860°R)

TABLE 49

DOW HM 21XA-T8
Creep Deformation and Rupture Data at 400° F (860° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
10.0	-	-	0.12	375	-	-	-
12.0	-	-	0.18	100	200	720	-
14.0	-	1.2	0.19	67	-	535	-
14.4	359.6	9.0	0.31	10	160	234	-
15.0	377.7	6.5	0.32	10	155	208	-
15.5	203.7	8.5	0.36	10	102	125	-
16.0	13.9	10.5	0.64	-	3.75	-	-
17.0	0.2	20	4.2	-	-	-	-

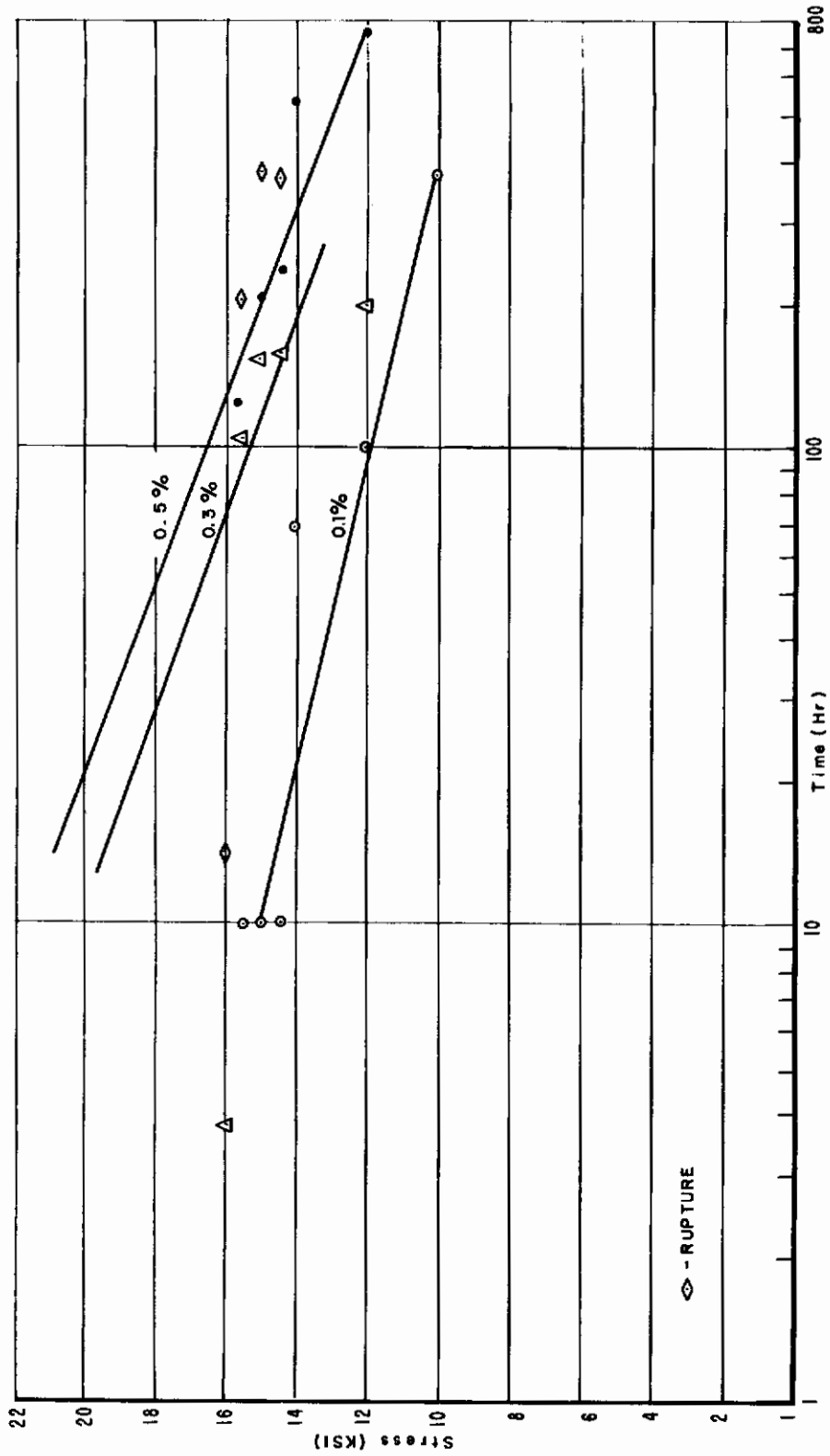


Figure 34. Creep Rupture Properties of DOW HM-21xA-T8 at 400°F (860°R)

TABLE 50

RUN 16

Deformation Versus Time (Raw Data) for DOW HM-21XA-T8 at 500° F (960° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	2.00000E-04	7.500
	3.00000E-04	15.000
	4.00000E-04	25.000
	6.00000E-04	50.000
	8.00000E-04	75.000
	9.00000E-04	100.000
	1.40000E-03	250.000
	1.70000E-03	500.000
	1.90000E-03	750.000
	2.20000E-03	1000.000
7.5000	3.00000E-04	5.000
	4.00000E-04	10.000
	5.00000E-04	25.000
7.5000	8.00000E-04	50.000
	10.00000E-04	75.000
	1.20000E-03	100.000
	1.60000E-03	250.000
	1.90000E-03	500.000
	2.30000E-03	750.000
	2.70000E-03	1000.000
9.4000	1.80000E-03	10.000
	2.10000E-03	15.000
	2.50000E-03	25.000
	3.50000E-03	50.000
	4.50000E-03	75.000
	5.70000E-03	100.000
	6.50000E-03	150.000
	7.80000E-03	200.000
	9.70000E-03	250.000
	1.55000E-02	400.000
	2.00000E-02	500.000
	4.66000E-02	750.000
	6.90000E-02	900.000

TABLE 50 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	1.70000E-03	5.000
	2.10000E-03	7.500
	2.50000E-03	10.000
	3.20000E-03	15.000
	4.20000E-03	25.000
	7.00000E-03	50.000
	9.80000E-03	75.000
	1.35000E-02	100.000
	2.61000E-02	150.000
	4.03000E-02	200.000
	5.75000E-02	250.000
	1.14000E-01	400.000
11.0000	1.50000E-03	2.500
	2.30000E-03	5.000
	3.20000E-03	7.500
	3.80000E-03	10.000
	4.70000E-03	15.000
	7.50000E-03	25.000
	1.10000E-02	50.000
	2.05000E-02	75.000
	5.12000E-02	100.000
12.0000	2.00000E-03	0.500
	2.50000E-03	1.000
	3.00000E-03	1.500
	4.50000E-03	2.500
	6.00000E-03	5.000
12.0000	8.50000E-03	7.500
	1.20000E-02	10.000
	2.15000E-02	15.000
	4.75000E-02	25.000

TABLE 50 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	2.40000E-03	0.500
	4.00000E-03	1.000
	5.50000E-03	1.500
	8.40000E-03	2.500
14.0000	1.70000E-03	0.500
	2.80000E-03	1.000
	3.70000E-03	1.500
	5.30000E-03	2.500
	1.17000E-02	5.000
	2.16000E-02	7.500

TABLE 51

Deformation Versus Time (Fitted Data) for DOW HM-21XA-T8 at 500° F (960° R)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	1.96390E-04	7.500
	2.93990E-04	15.000
	4.10980E-04	25.000
	6.26760E-04	50.000
	7.81190E-04	75.000
	9.02410E-04	100.000
	1.34584E-03	250.000
	1.72964E-03	500.000
	1.96894E-03	750.000
	2.14381E-03	1000.000
7.5000	3.26250E-04	5.000
	3.81250E-04	10.000
	5.37530E-04	25.000
7.5000	7.70150E-04	50.000
	9.70390E-04	75.000
	1.14098E-03	100.000
	1.69083E-03	250.000
	1.85297E-03	500.000
	2.31709E-03	750.000
	2.69732E-03	1000.000
9.4000	1.79999E-03	10.000
	2.10000E-03	15.000
	2.50000E-03	25.000
	3.50000E-03	50.000
	4.49999E-03	75.000
	5.70000E-03	100.000
	6.50000E-03	150.000
	7.80000E-03	200.000
	9.69999E-03	250.000
	1.55000E-02	400.000
	2.00000E-02	500.000
	4.66000E-02	750.000
	6.90000E-02	900.000

TABLE 51 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	1.73649E-03	5.000
	2.00735E-03	7.500
	2.46605E-03	10.000
	3.29610E-03	15.000
	4.40141E-03	25.000
	6.54709E-03	50.000
	9.68429E-03	75.000
	1.40689E-02	100.000
	2.58623E-02	150.000
	4.05530E-02	200.000
	5.72113E-02	250.000
	1.14066E-01	400.000
11.0000	1.63756E-03	2.500
	2.34406E-03	5.000
	3.03680E-03	7.500
	3.71039E-03	10.000
	4.98334E-03	15.000
	7.17106E-03	25.000
	1.13104E-02	50.000
	2.03475E-02	75.000
	5.12300E-02	100.000
12.0000	1.91952E-03	0.500
	2.63277E-03	1.000
	3.20661E-03	1.500
	4.10143E-03	2.500
	6.05985E-03	5.000
	8.61409E-03	7.500
12.0000	1.20491E-02	10.000
	2.13928E-02	15.000
	4.75238E-02	25.000

TABLE 51 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	2.46000E-03	0.500
	3.95428E-03	1.000
	5.44856E-03	1.500
	8.43714E-03	2.500
14.0000	1.81299E-03	0.500
	2.68543E-03	1.000
	3.57378E-03	1.500
	5.46560E-03	2.500
	1.16532E-02	5.000
	2.16090E-02	7.500

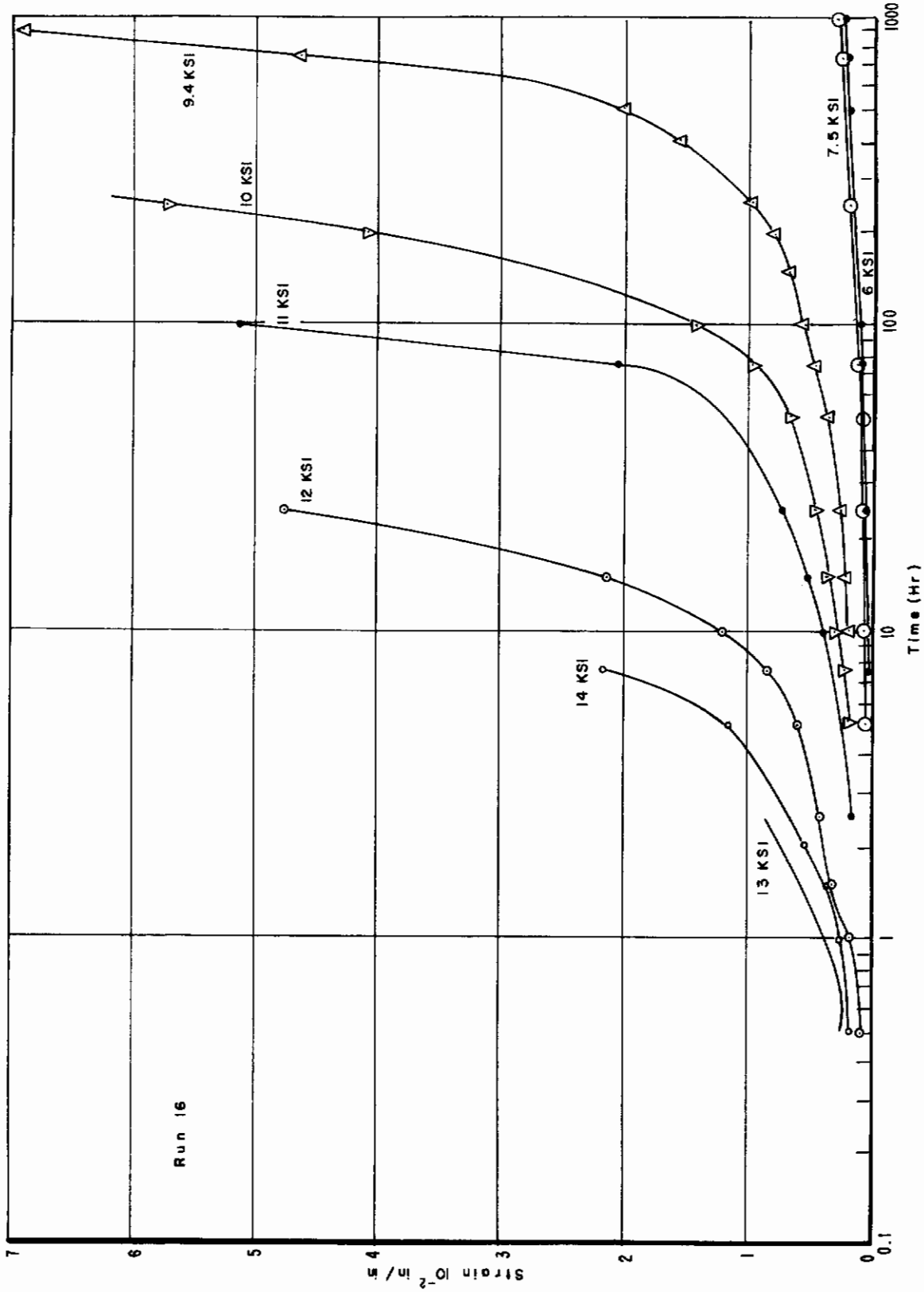


Figure 35. Creep Deformation Versus Log Time of DOW HM-21xA-T8 at 500°F (960°R)

TABLE 52

DOW HM 21XA-T8
Creep Deformation and Rupture Data at 500° F (960° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
6.0	-	-	0.12	130	-	-	-
9.4	963.8	11.0	0.12	2.0	37.5	89	254
10.0	435.2	15	0.14	1.5	13.5	32.2	76
11.0	132.0	12.5	0.26	1.5	7.1	16.2	32
12.0	31.5	8.0	0.79	-	1.5	3.3	8.6
13.0	5.6	10.0	0.44	-	0.7	1.3	-

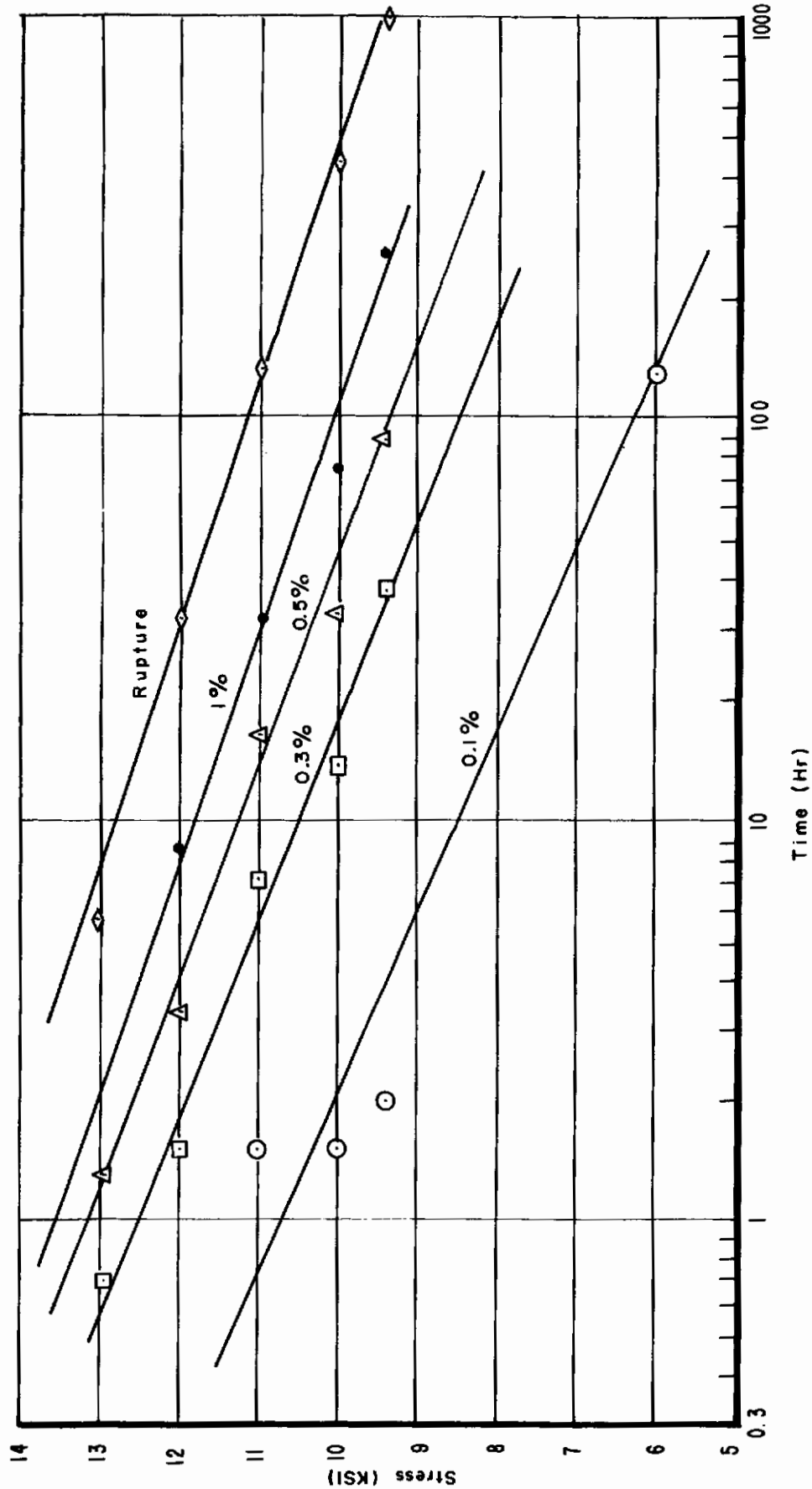


Figure 36. Creep Rupture Properties of DOW HM-21xA-T8 at 500°F (960°R)

TABLE 53

Deformation Versus Time (Raw Data) for DOW HM-21XA-T8 at 600° F (1060° R)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	3.00000E-04	5.000
	4.00000E-04	25.000
	5.00000E-04	50.000
	6.00000E-04	75.000
	7.00000E-04	250.000
	8.00000E-04	500.000
	9.00000E-04	750.000
	10.00000E-04	1000.000
3.0000	10.00000E-05	0.500
	2.00000E-04	5.000
	3.00000E-04	50.000
	4.00000E-04	75.000
	5.00000E-04	100.000
	7.00000E-04	250.000
	9.00000E-04	500.000
	1.10000E-03	750.000
	1.20000E-03	1000.000
4.0000	4.00000E-04	5.000
	5.00000E-04	7.500
	6.00000E-04	10.000
	7.00000E-04	15.000
	9.00000E-04	25.000
	10.00000E-04	50.000
	1.10000E-03	75.000
	1.20000E-03	100.000
	1.50000E-03	250.000
	2.00000E-03	500.000
	2.50000E-03	750.000
	2.90000E-03	1000.000
4.2000	5.00000E-04	0.500
	6.00000E-04	1.000
	7.00000E-04	1.500
	9.00000E-04	2.500
	10.00000E-04	5.000

TABLE 53 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.2000	1.10000E-03	7.500
	1.20000E-03	25.000
	1.30000E-03	100.000
	1.40000E-03	150.000
	1.50000E-03	250.000
	1.60000E-03	300.000
	1.90000E-03	500.000
	2.40000E-03	750.000
	2.70000E-03	950.000
4.3000	3.00000E-04	0.500
	4.00000E-04	1.500
	5.00000E-04	2.500
	6.00000E-04	5.000
	7.00000E-04	7.500
	8.00000E-04	10.000
	9.00000E-04	15.000
	10.00000E-04	25.000
	1.20000E-03	50.000
	1.40000E-03	75.000
	1.50000E-03	100.000
	1.60000E-03	150.000
	1.70000E-03	200.000
	1.90000E-03	250.000
	2.00000E-03	300.000
	2.60000E-03	500.000
	3.40000E-03	750.000
	3.00000E-04	0.500
	4.00000E-04	1.500
	5.00000E-04	2.500
	6.00000E-04	5.000
	7.00000E-04	10.000
	8.00000E-04	15.000
	10.00000E-04	25.000
	1.30000E-03	50.000
	1.50000E-03	75.100
	1.70000E-03	100.000
	1.90000E-03	150.000

TABLE 53 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.00000E-03	200.000
	2.10000E-03	250.000
	2.20000E-03	300.000
	2.90000E-03	500.000
4.4000	10.00000E-05	5.000
	2.00000E-04	25.000
	3.00000E-04	50.000
4.4000	4.00000E-04	100.000
	5.00000E-04	150.000
	7.00000E-04	200.000
	8.00000E-04	250.000
	10.00000E-04	300.000
	1.60000E-03	500.000
5.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	1.500
	5.00000E-04	2.500
	8.00000E-04	5.000
	10.00000E-04	7.500
	1.10000E-03	10.000
	1.30000E-03	15.000
	1.50000E-03	25.000
	1.90000E-03	50.000
	2.30000E-03	75.000
	2.50000E-03	100.000
	3.00000E-03	150.000
	3.30000E-03	200.000
	3.60000E-03	250.000
	4.60000E-03	500.000
	5.90000E-03	750.000
6.0000	3.20000E-03	10.000
	3.80000E-03	15.000
	5.20000E-03	25.000
	7.50000E-03	50.000
	8.80000E-03	75.000

TABLE 53 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	10.00000E-03	100.000
	1.48000E-02	150.000
	2.22000E-02	200.000
	3.30000E-02	250.000
	4.97000E-02	300.000
8.0000	1.50000E-03	0.500
	1.80000E-03	1.000
	2.30000E-03	1.500
	3.00000E-03	2.500
	4.70000E-03	5.000
	6.60000E-03	7.500
	8.40000E-03	10.000
	1.20000E-02	15.000
	1.93000E-02	25.000
	4.10000E-02	50.000
	6.25000E-02	75.000
	7.40000E-02	100.000
9.0000	5.00000E-03	0.500
9.0000	1.05000E-02	1.000
	1.55000E-02	1.500
	2.60000E-02	2.500
	5.25000E-02	5.000
	7.70000E-02	7.500
10.0000	1.40000E-02	0.500
	2.90000E-02	1.000
	4.20000E-02	1.500

TABLE 54

Deformation Versus Time (Fitted Data) for DOW HM-21XA-T8 at 600° F (1060° R)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	2.91620E-04	5.000
	4.38220E-04	25.000
	5.05330E-04	50.000
	5.47900E-04	75.000
	7.02390E-04	250.000
	8.23170E-04	500.000
	9.10200E-04	750.000
	9.81130E-04	1000.000
3.0000	1.00480E-04	0.500
	1.96640E-04	5.000
	3.25270E-04	50.000
	3.93760E-04	75.000
	4.52890E-04	100.000
	6.98470E-04	250.000
	9.34280E-04	500.000
	1.08575E-03	750.000
	1.19626E-03	1000.000
4.0000	3.79060E-04	5.000
	5.17550E-04	7.500
	6.08650E-04	10.000
	7.26370E-04	15.000
	8.57650E-04	25.000
	1.01478E-03	50.000
	1.10628E-03	75.000
	1.17788E-03	100.000
	1.51529E-03	250.000
	2.01056E-03	500.000
	2.47370E-03	750.000
	2.91218E-03	1000.000
4.2000	4.75590E-04	0.500
	6.38240E-04	1.000
	7.33420E-04	1.500
	8.52170E-04	2.500

TABLE 54 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.00234E-03	5.000
	1.07843E-03	7.500
	1.22732E-03	25.000
	1.31202E-03	100.000
	1.36825E-03	150.000
	1.51036E-03	250.000
	1.59000E-03	300.000
	1.93101E-03	500.000
	2.36826E-03	750.000
	2.71250E-03	950.000
4.3000	3.23340E-04	0.500
	3.61700E-04	1.500
	4.54920E-04	2.500
	6.23080E-04	5.000
	7.31740E-04	7.500
	8.09520E-04	10.000
	9.16960E-04	15.000
	1.04608E-03	25.000
	1.21638E-03	50.000
	1.32627E-03	75.000
	1.41830E-03	100.000
	1.58433E-03	150.000
	1.74190E-03	200.000
	1.89620E-03	250.000
	2.04857E-03	300.000
	2.64370E-03	500.000
	3.35692E-03	750.000
	3.14440E-04	0.500
	3.91350E-04	1.500
	4.62400E-04	2.500
	5.92840E-04	5.000
	7.59590E-04	10.000
	8.73100E-04	15.000
	1.03334E-03	25.000
	1.28711E-03	50.000
	1.46194E-03	75.100
	1.60062E-03	100.000
	1.82595E-03	150.000

TABLE 54 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.01221E-03	200.000
	2.17557E-03	250.000
	2.32356E-03	300.000
	2.82487E-03	500.000
4.4000	9.77900E-05	5.000
	2.16500E-04	25.000
	2.76570E-04	50.000
4.4000	3.96270E-04	100.000
	5.30760E-04	150.000
	6.75040E-04	200.000
	8.25120E-04	250.000
	9.78580E-04	300.000
	1.60333E-03	500.000
5.0000	1.99410E-04	0.500
	3.02040E-04	1.000
	3.92130E-04	1.500
	5.36710E-04	2.500
	7.84500E-04	5.000
	9.54320E-04	7.500
	1.08499E-03	10.000
	1.28312E-03	15.000
	1.55728E-03	25.000
	1.98586E-03	50.000
	2.28145E-03	75.000
	2.52086E-03	100.000
	2.91612E-03	150.000
	3.25096E-03	200.000
	3.55062E-03	250.000
	4.78858E-03	500.000
	5.81101E-03	750.000
6.0000	3.76828E-03	10.000
	4.09754E-03	15.000
	4.77546E-03	25.000
	6.58368E-03	50.000
	8.55681E-03	75.000

TABLE 54 (CONT)

RUN 16

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.07063E-02	100.000
	1.56863E-02	150.000
	2.22596E-02	200.000
	3.23398E-02	250.000
	4.99011E-02	300.000
8.0000	1.61447E-03	0.500
	1.95049E-03	1.000
	2.28781E-03	1.500
	2.96640E-03	2.500
	4.68577E-03	5.000
	6.43788E-03	7.500
	8.22273E-03	10.000
	1.18905E-02	15.000
	1.96147E-02	25.000
	4.09174E-02	50.000
	6.25129E-02	75.000
	7.39989E-02	100.000
9.0000	4.99305E-03	0.500
9.0000	1.05350E-02	1.000
	1.54655E-02	1.500
	2.59958E-02	2.500
	5.25209E-02	5.000
	7.69898E-02	7.500
10.0000	1.40000E-02	0.500
	2.90000E-02	1.000
	4.20000E-02	1.500

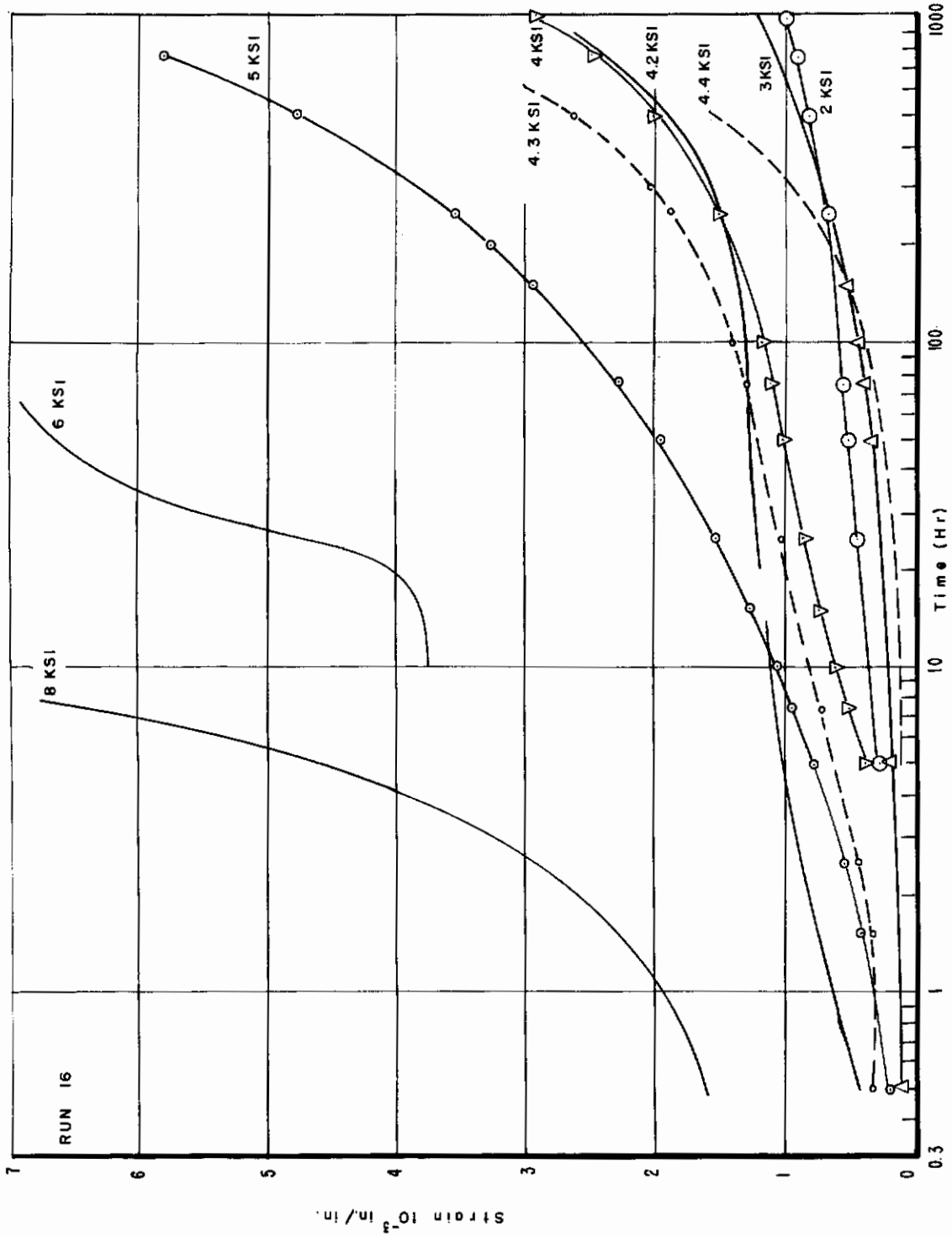


Figure 37. Creep Deformation Versus Log Time of DOW HM-21xA-T8 at 600°F (1060°R)

TABLE 55

DOW HM 21XA-T8 for
Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
2.0	-	-	0.06	1000	-	-	-
3.0	-	-	0.03	675	-	-	-
4.0	-	-	0.09	50	-	-	-
5.0	871.6	0.7	0.07	7.5	150	830	-
6.0	346.2	11.5	0.10	1.0	9	24	100
8.0	117.9	13.0	0.23	-	2.5	5.41	12.2
9.0	16.6	26.5	0.26	-	-	0.5	1.0
10.0	3.4	28.5	0.28	-	-	-	-

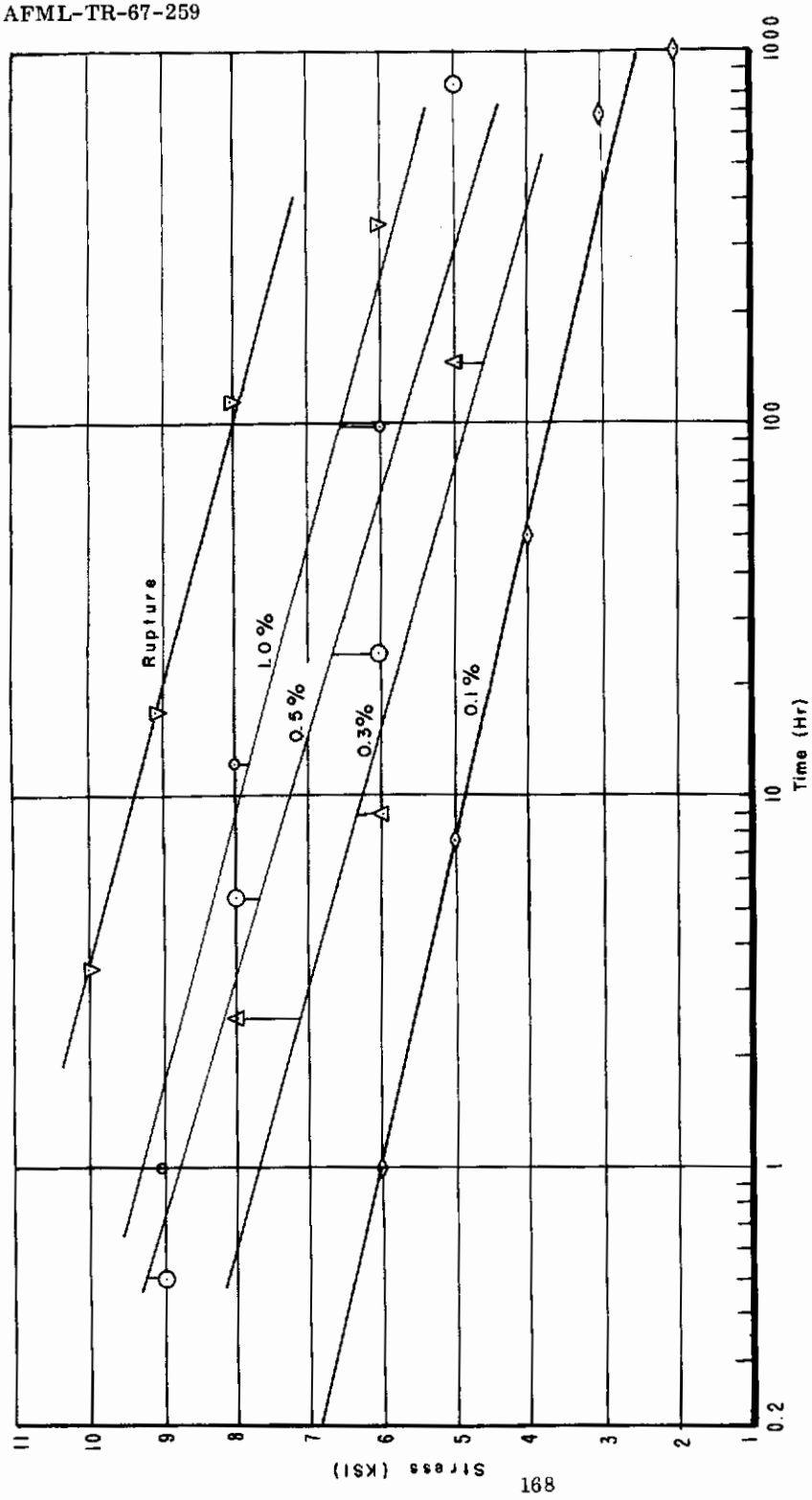


Figure 38. Creep Rupture Properties of DOW HM-21xA-T8 at 600°F (1060°R)

TABLE 56

Minimum Creep Rate for
DOW HM 21XA-T8 (Mg Alloy) at 400°, 500°, and 600° F

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
400° F (860° R)	10	9.428 x 10^{-7}
"	12	5.92743 x 10^{-6}
"	14	8.42084 x 10^{-6}
"	14.4	1.734 x 10^{-5}
"	14.4	4.7 x 10^{-6}
"	14.4	4.376 x 10^{-7}
"	15	2.9232 x 10^{-6}
"	15.2	1.1102 x 10^{-5}
"	15.5	1.58568 x 10^{-5}
"	15.75	3.533 x 10^{-6}
500° F (960° R)	7.5	6.4856 x 10^{-7}
"	9.4	1.6 x 10^{-5}
"	11	1.65575 x 10^{-4}
"	12	7.83368 x 10^{-4}
"	13	2.98856 x 10^{-3}
"	14	1.74488 x 10^{-3}
600° F (1060° R)	4.2	1.1246 x 10^{-6}
"	4.3	2.85288 x 10^{-6}
"	4.4	2.394 x 10^{-6}
"	6.0	6.5852 x 10^{-5}

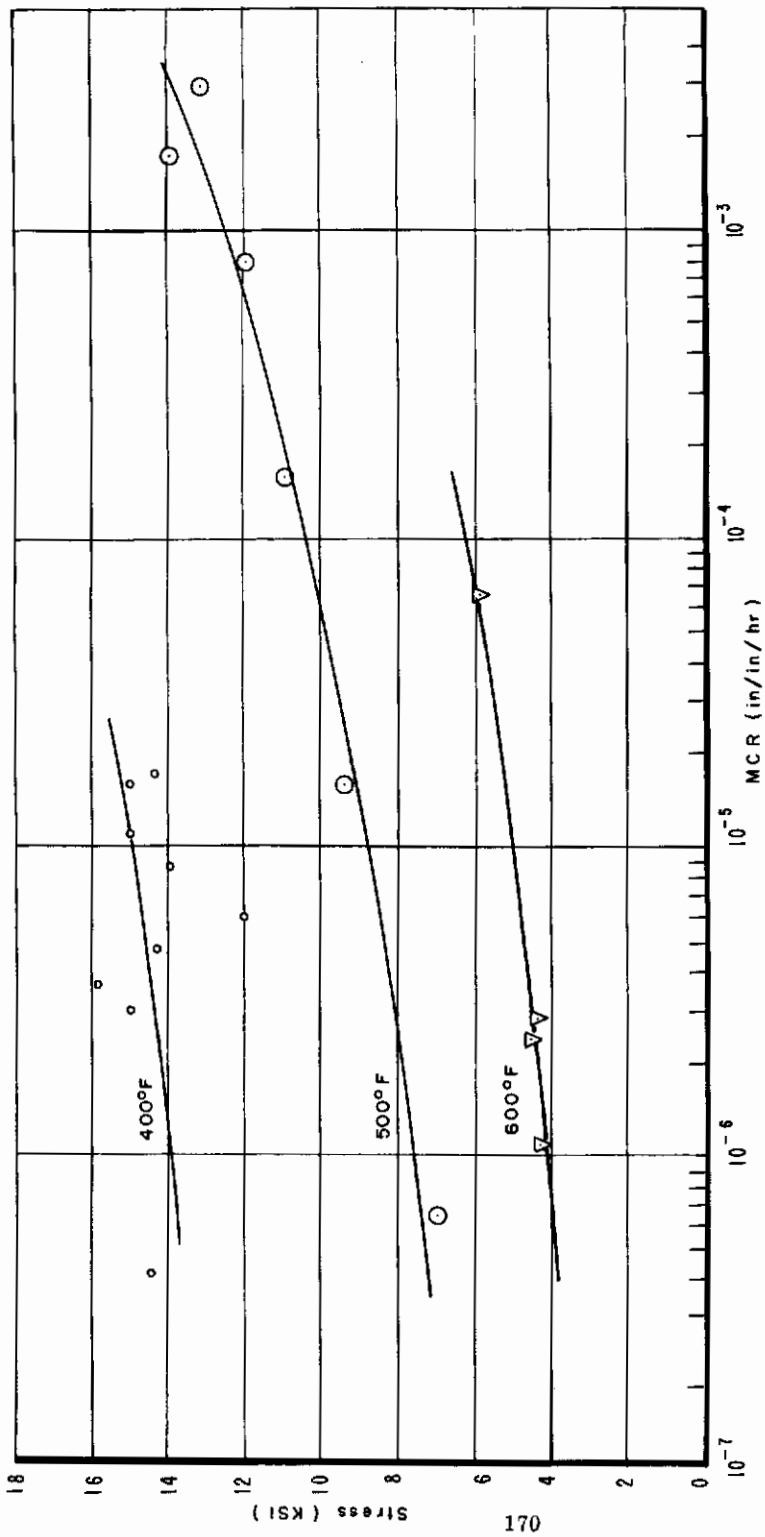


Figure 39. Minimum Creep Rate of DOW HM-21xA-T8

APPENDIX II

TITANIUM BASED ALLOYS

MATERIALS TESTED AND APPLICATIONS

6. C-130AM - This material was purchased as bar stock from Rem-Cru Titanium Inc. It was from ingot No. A-2042. No specific heat treatment was recorded; however, tensile strength values indicated that the material was in the STA condition.

7. C-110M - This material was purchased from Rem-Cru Inc. as .050-in. annealed sheet from their heat No. A 30583 B1. No specific heat treatment was recorded; however, this material is generally produced only in the annealed condition and tensile strength values appear to verify this classification.

8. TMCA-Ti-140A - This material was purchased from Titanium Metals Corporation of America as sheet stock .063 in. x 36 in. x 96 in. from their heat No. M2212. Material was in a mill annealed condition.

9. TMCA-Ti-6Al-4V - For this particular series of tests, four different lots of material were purchased of this alloy as follows. All were from Titanium Metals Corporation of America and were all in the mill annealed condition. Chemical composition was similar and within the nominal limits for this alloy.

   9a. Sheet stock .063 in. x 36 in. x 96 in. - Heat No. 4446
   9b. Sheet stock .063 in. x 36 in. x 96 in. - Heat No. 4141
   9c. Sheet stock .063 in. x 36 in. x 96 in. - Heat No. 4276
   9d. Sheet stock .040 in. x 36 in. x 48 in. - Heat No. 3076

10. MS-Ti-6Al-4V - This material was purchased from Mallory Sharon as sheet stock .063 in. x 36 in. x 96 in. from their Heat No. 24841. Material was heat treated at 1700°F for 15 minutes in an inert atmosphere - water quenched - 900°F for eight hours, then air cooled.

11. MS-Ti-6Al-4V - This material was purchased from Mallory Sharon as sheet stock .063 in. x 36 in. x 96 in. from their Heat No. 25586. Material was mill annealed.

12. MST-821 - This material was purchased from Mallory Sharon as sheet stock .064 in. x 12 in. x 20 in. from their Heat No. 23732. Material was in mill annealed condition.

13. TMCA-811 - This material was purchased from Titanium Metals Corporation of America as sheet stock .040 in. x 1 in. x 20 in. from their Heat No. M-8252. It was heat treated at 1800°F for one hour - air cooled - 1100°F for eight hours - air cooled.

14. Ti-2.5Al-16V - This material was purchased from Crucible Steel Company as sheet stock .040 in. x 18 in. x 96 in. from their Heat No. R 3923. It was heat treated at 1400°F for 15 minutes - water quenched - 960° for eight hours - air cooled.

Chemical compositions for the above alloys are given in Table 57.

TEST PROCEDURES

These nine materials were tested by three different testing laboratories under Air Force contracts as listed below.

Materials 6, 7, 8, 9, and 10

These five materals were tested by Metcut Research Associates, Inc., Cincinnati, Ohio, under contract No. AF 33(600)-32008. This contract called for all test specimens to be prepared by the Air Force Materials Laboratory Machine Shop and furnished to Metcut. Specimens were prepared in accordance with the drawings shown in Figure 4. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E-21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Lima-Hamilton Tensile Machine equipped with strain pacing instrumentation was used for all tensile tests. Standard loading rates were used with strain measured with an extensometer at all test temperatures. The resultant tensile data are presented in Tables 58 through 65.

Lever-type creep test frames were used for creep testing. Test furnaces were provided with quartz viewing parts to permit optical measurement of creep deformation using the conventional platinum-strip/microscope method. Creep data are presented in Tables 70 through 119 and Figures 41 through 75.

Materials 11, 14

These two materials were tested by Joliet Metallurgical Laboratories, Joliet, Illinois, under contract No. AF 33(616)-6224. This contract called for all test specimens to be prepared by the Air Force Materials Laboratory Machine Shop and furnished to Joliet. Specimens were prepared in accordance with the drawings shown in Figure 4. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Tinius Olsen hydraulic tensile machine (60,000-pound capacity) equipped with strain pacer instrumentations, and autographic stress-strain recorder, a load maintainer, and a six-station furnace assembly was used for all tensile tests. All tests were run at a strain rate of

.005 in./in./min. through the yield point and strain was measured with a differential transformer extensomenter. The resultant tensile data are presented in Table 66 for material 11 and Table 69 for material 14.

This laboratory uses both Arcweld and Tatnall creep machine, and either type frame was employed for specific tests as a matter of convenience. These are both counterbalanced lever system machines and have only minor differences in operations. Creep data are presented for material 11 in Tables 120 through 129 and Figures 76 through 82. Creep data are presented for material 14 in Tables 150 through 159 and Figures 97 through 103.

Materials 12, 13

These two materials were tested by New England Materials Laboratory, Inc., Medford, Massachusetts, under contract No. AF 33(616)-6202. This contract called for materials to be purchased and test specimens prepared by New England. Materials were heat treated to "optimum properties in accordance with the recommendations of its producer" and then prepared as specimens in accordance with drawings shown in Figure 40. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Tate-Emery Universal Test Machine (60,000-pound capacity) was used for all tensile tests. This machine is equipped with standard high magnification microformer extensometers for both room temperature and elevated temperature testing. A load-strain recorder and strain pacer are attached. Load accuracy of the machine is periodically checked by Baldwin-Lima-Hamilton service department and has always checked to ±.5% accuracy. Resultant tensile data are presented in Tables 67 and 68.

Creep-rupture test machines used are of the lever type with interchangeable lever arms to give different ratios. The lever arms are not counterbalanced, but are calibrated to a standard tear weight which includes the specimen adapters, pull rods, and weight pan. Lever arms have knife edges at all three contact points. Load accuracy is periodically checked with a standard load strain cell calibrated by Baldwin-Lima-Hamilton. Creep extension measurements are made using notched platinum wire techniques with a microscope reading sensitivity of .0000254 inch. Creep data are presented in Tables 130 through 149 and Figures 83 through 96.

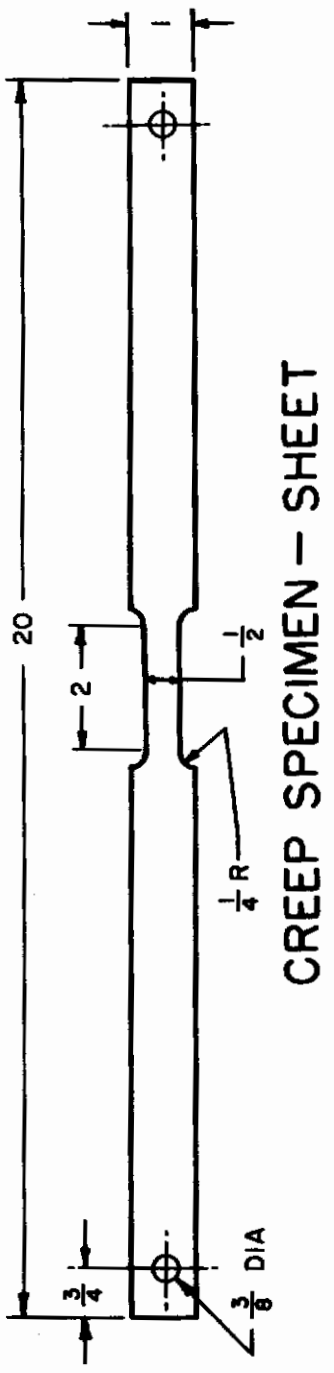
TABLE 57

Chemical Compositions for Titanium Based Alloys

Element	C-130AM (6)	C-110M * (7)	Ti-140A * (8)	Ti-6A1-4V (9a)	Ti-6A1-4V (9b)	Ti-6A1-4V (9c)	Ti-6A1-4V (9d)	Ti-6A1-4V (10)	Ti-6A1-4V (11)
Al	3.9			5.8	6.3	6.2	5.5-6.75	6.09	6.27
C	.1	0-.20	0-.10	.014	.012	.021	0-.10	.04	.04
Cb									
Cr			1.5-3.0						
Fe			1.5-3.0	0.11	.08	.09	0-.30	.18	.20
Mo			1.5-3.0						
Mn	4.3	6.5-9.0							
Ta									
Ti	Bal	Bal	Bal	Bal	Bal	Bal	Bal	Bal	Bal
Va				3.9	4.2	4.1	3.5-4.5	4.03	4.21
N_2	.012	0-.07	0-.10	.011	.009	.006	0-.050	.008	.011
H_2		0-.015	0-.012	.009	.012	.004	0-.015	35 ppm	81 ppm

Element	MST-821 (12)	TMCA-811 (13)	Ti-2.5A1-16V (14)
Al	7.67	7.8	3.1
C	.02	.022	.02
Cb		1.89	
Cr			
Fe	.19	.05	.20
Mo		1.1	
Mn			
Ta	.96		
Ti	Bal	Bal	Bal
Va		.89	16.5
N_2	.011	.009	.022
H_2	126 ppm	.013	.0127

Notes: Numbers shown below material designation (1) refer to the material numbers in the listing of "Materials Tested."
* Nominal composition - actual not known



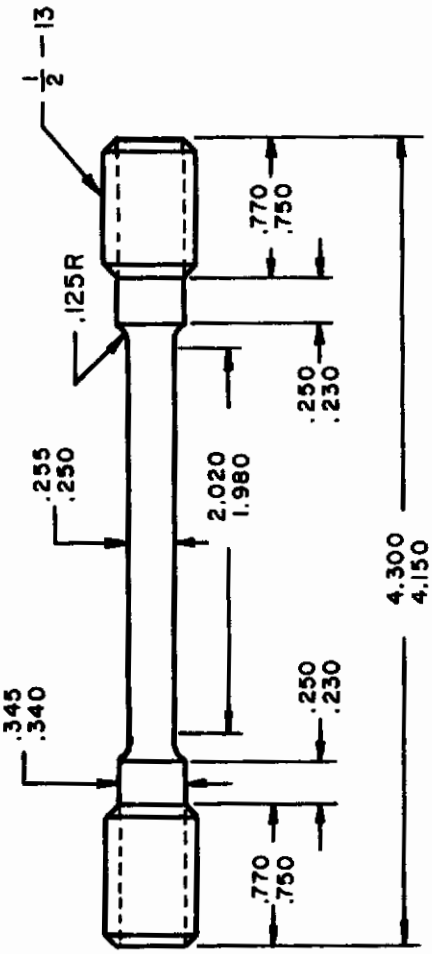


Figure 40. Specimen Drawings

TABLE 58

Tensile Test Data for C-130AM

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	161.0	142.0	16
"	163.0	142.0	14
"	159.0	141.0	14
700	127.0	96.4	17
"	127.0	97.2	20
"	135.0	103.0	15
850	112.0	94.6	32
"	111.0	94.1	28
"	113.0	94.9	25
1000	71.9	61.3	52
"	71.2	60.0	49

TABLE 59

Tensile Test Data for C-110M

R.T.	145.0	126.0	18
"	142.0	122.0	18
"	142.0	122.0	18
700	95.1	68.7	12
"	96.4	65.4	16
"	98.0	60.6	13
800	78.8	59.4	37
"	78.6	57.4	34
850	65.1	55.9	70
"	63.6	48.7	50
"	62.4	46.1	59

* To convert to °R add 460

TABLE 60

Tensile Test Data for Ti-140A

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T	134.0	118.0	21
"	134.0	118.0	22
"	128.0	120.0	**
600	92.0	64.0	19
"	93.0	65.0	20
"	92.0	66.0	19
700	84.0	60.0	21
"	85.0	60.0	22
"	85.0	60.0	22
800	68.0	51.0	31
"	70.0	53.0	41
"	70.0	54.0	47

* To convert to °R add 460

** Failed at extensometer clamp.

TABLE 61

Tensile Test Data for TMC Ti-6A1-4V Heat No. 4446

R.T.	136.0	131.0	17
"	137.0	133.0	16
"	137.0	133.0	17
600	98.5	83.7	17
"	99.1	87.0	17
"	96.0	85.3	16
800	91.1	78.5	19
"	91.0	78.9	19
"	89.2	77.4	20
1000	68.6	60.3	44
"	67.1	58.4	43
"	68.3	58.6	46

TABLE 62

Tensile Test Data for TMC Ti-6Al-4V Heat No. 4141

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	143.0	131.0	13
"	143.0	129.0	14
"	144.0	127.0	12
600	107.0	82.2	11
"	103.0	82.3	12
"	107.0	81.8	12
800	95.9	75.6	20
"	98.4	74.9	16
"	97.0	77.0	16
1000	72.3	58.4	35
"	72.1	59.8	31
"	71.1	56.5	39

TABLE 63

Tensile Test Data for TMC Ti-6Al-4V Heat No. 4276

R.T.	141.0	132.0	16
"	141.0	131.0	15
"	143.0	132.0	14
600	107.0	88.0	13
"	108.0	88.0	13
"	104.0	86.6	12
800	95.9	78.6	16
"	97.8	80.5	17
"	96.0	79.4	18
1000	71.9	60.4	38
"	69.9	59.4	40
"	69.1	59.8	47

* To convert to °R add 460

TABLE 64

Tensile Test Data for TMC Ti-6Al-4V Heat No. 3076

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	134.0	133.0	18
"	134.0	132.0	19
"	134.0	132.0	19
600	99.1	91.6	16
"	97.9	88.6	14
"	96.9	89.4	16
800	95.1	83.4	17
"	90.3	82.7	19
"	89.0	81.8	19
1000	69.7	62.6	42
"	78.2	-	47**
"	74.7	58.8	41

** Extensometer slipped

TABLE 65

Tensile Test Data for MS Ti-6Al-4V

R.T.	134.0	113.0	18
"	135.0	116.0	17
"	135.0	118.0	15
600	110.0	77.3	15***
"	106.0	76.2	12
"	106.0	74.5	13
800	100.0	72.1	20
"	97.1	70.2	24
"	99.7	71.0	21
1000	61.8	48.6	44
"	63.4	49.2	44
"	62.2	48.4	41

* To convert to °R add 460

*** Failed at Extensometer clamp

TABLE 66

Tensile Test Data for MS Ti-6Al-4V Mill Annealed

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	135.0	126.0	14.5
"	133.0	129.0	13.00
"	135.0	127.0	13.0
600	100.0	82.5	13.0
"	100.5	83.0	14.0
"	100.5	82.0	14.5
800	95.0	77.5	16.0
"	98.5	77.0	15.0
"	96.5	75.0	15.0
1000	77.5	59.5	27.5
"	77.0	59.0	29.0
"	76.5	58.0	29.0

TABLE 67

Tensile Test Data for MST-821

R.T.	135.0	127.0	14.0
"	135.0	127.0	14.2
"	136.0	127.0	14.5
"	135.0	128.0	13.4
"	134.0	125.0	13.9
800	91.4	72.1	19.9
"	90.8	72.6	20.8
"	93.0	74.3	23.1
1000	81.5	65.0	17.8
"	87.0	67.7	19.0
"	87.9	69.3	13.6
1100	80.9	60.8	24.8
"	80.3	60.8	34.6
"	77.5	58.1	30.6

* To convert to °R add 460

TABLE 68

Tensile Test Data for TMCA 811

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	139.0	139.0	1.5
"	142.0	142.0	1.0
"	137.0	135.0	1.8
"	148.5	146.0	1.1
"	143.0	142.0	1.3
800	106.5	82.4	13.4
"	106.5	82.3	15.0
"	103.0	79.5	13.3
1000	94.3	74.3	17.0
"	94.2	75.5	16.1
"	97.6	77.8	15.8
1100	87.7	66.9	20.0
"	83.4	65.5	24.5
"	82.5	65.3	23.5

TABLE 69

Tensile Test Data for Ti-2.5Al-16V

R.T.	160.0	151.0	4.0
"	159.0	150.0	3.5
"	161.5	149.0	3.5
700	145.5	126.5	4.5
"	151.0	125.0	4.0
"	147.5	126.0	2.0**
800	138.0	116.0	5.5
"	138.5	116.5	5.0
"	140.0	115.0	5.5
900	118.0	70.0	15.0
"	116.5	73.5	20.0
"	121.0	69.5	13.5

* To convert to °R add 460

** Failure at extensometer clamp

CREEP DATA FOR

C-130AM ROD

TABLE 70

Deformation Versus Time (Raw Data) for C-130AM Rod (Bare) at 700° F (1160° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	10.00000E-05	0.500
	2.00000E-04	1.500
	3.00000E-04	2.500
	6.00000E-04	5.000
	9.00000E-04	7.500
	1.10000E-03	10.000
	1.50000E-03	15.000
	2.20000E-03	25.000
	3.50000E-03	50.000
	4.30000E-03	75.000
90.0000	6.00000E-04	0.500
	8.00000E-04	1.000
	10.00000E-04	1.500
	1.30000E-03	2.500
	1.80000E-03	5.000
	2.10000E-03	7.500
	2.30000E-03	10.000
	2.50000E-03	15.000
	3.00000E-03	25.000
	3.80000E-03	50.000
	4.60000E-03	75.000
	5.40000E-03	100.000

TABLE 70 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	8.00000E-04	0.500
	1.70000E-03	1.000
	2.40000E-03	1.500
	3.20000E-03	2.500
	4.40000E-03	5.000
	5.50000E-03	7.500
	6.30000E-03	10.000
	7.60000E-03	15.000
	9.00000E-03	25.000
	1.40000E-02	50.000
	1.95000E-02	75.000
	2.40000E-02	100.000
120.0000	2.00000E-03	0.500
	2.30000E-03	1.000
	2.60000E-03	1.500
	2.80000E-03	2.500
	3.30000E-03	5.000
130.0000	10.00000E-03	0.500
	1.25000E-02	1.000
	1.40000E-02	1.500
	1.70000E-02	2.500
	2.40000E-02	5.000
	3.20000E-02	7.500
	3.80000E-02	10.000
130.0000	5.00000E-02	15.000
	7.10000E-02	25.000
	1.18000E-01	50.000

TABLE 71

Deformation Versus Time (Fitted Data) for C-130AM Rod (Bare) at 700° F (1160° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	9.68700E-05	0.500
	2.06250E-04	1.500
	3.12590E-04	2.500
	5.93140E-04	5.000
	8.58220E-04	7.500
	1.10128E-03	10.000
	1.53037E-03	15.000
	2.22658E-03	25.000
	3.45671E-03	50.000
	4.31795E-03	75.000
90.0000	5.98920E-04	0.500
	7.98050E-04	1.000
	1.00122E-03	1.500
	1.31553E-03	2.500
	1.79207E-03	5.000
	2.07607E-03	7.500
	2.27705E-03	10.000
	2.56612E-03	15.000
	2.97631E-03	25.000
	3.79911E-03	50.000
	4.59564E-03	75.000
	5.40385E-03	100.000

TABLE 71 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	8.15790E-04	0.500
	1.68438E-03	1.000
	2.32839E-03	1.500
	3.24064E-03	2.500
	4.60581E-03	5.000
	5.48098E-03	7.500
	6.16670E-03	10.000
	7.30722E-03	15.000
	9.30708E-03	25.000
	1.41644E-02	50.000
	1.91329E-02	75.000
	2.41656E-02	100.000
120.0000	1.99880E-03	0.500
	2.32679E-03	1.000
	2.54295E-03	1.500
	2.84084E-03	2.500
	3.29060E-03	5.000
130.0000	1.00963E-02	0.500
	1.22735E-02	1.000
	1.39442E-02	1.500
	1.71215E-02	2.500
	2.46014E-02	5.000
	3.14858E-02	7.500
	3.79173E-02	10.000
130.0000	4.98304E-02	15.000
	7.12907E-02	25.000
	1.17939E-01	50.000

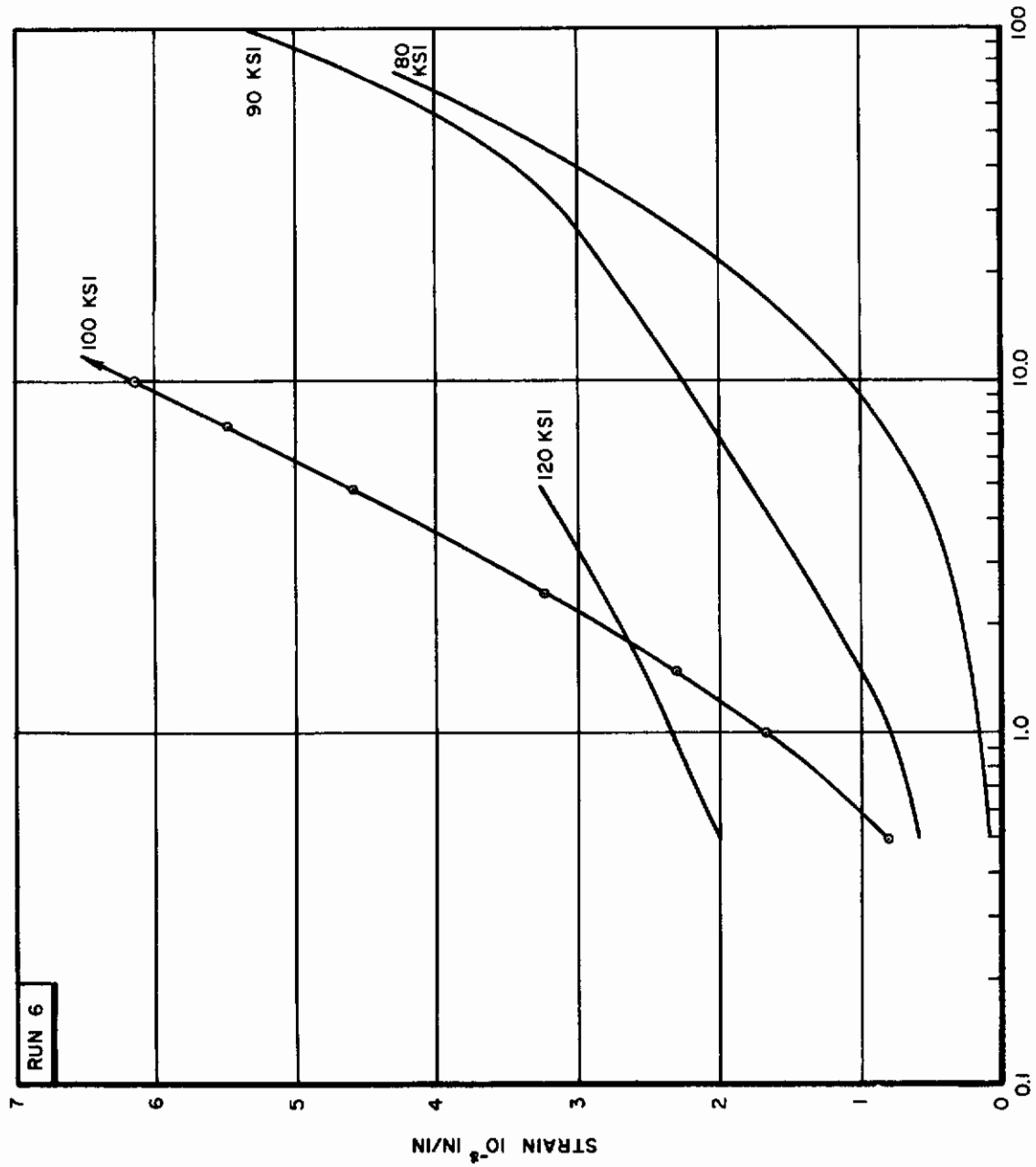


Figure 41. Creep Deformation Versus Log Time of C-130AM Rod at 700°F (1160°R)

TABLE 72

C-130AM Creep Deformation Data at 700°F (1160°R)

Stress (KSI)	Time to Reach Indicated Deformation (hours			
	0.1%	0.3%	0.5%	1.0%
80.0	9.0	37.5	-	-
90.0	1.5	25.0	87.5	-
100.0	0.5	2.3	6.4	43.5
120.0	0.2	2.6	-	-
130.0	-	-	0.1	0.5

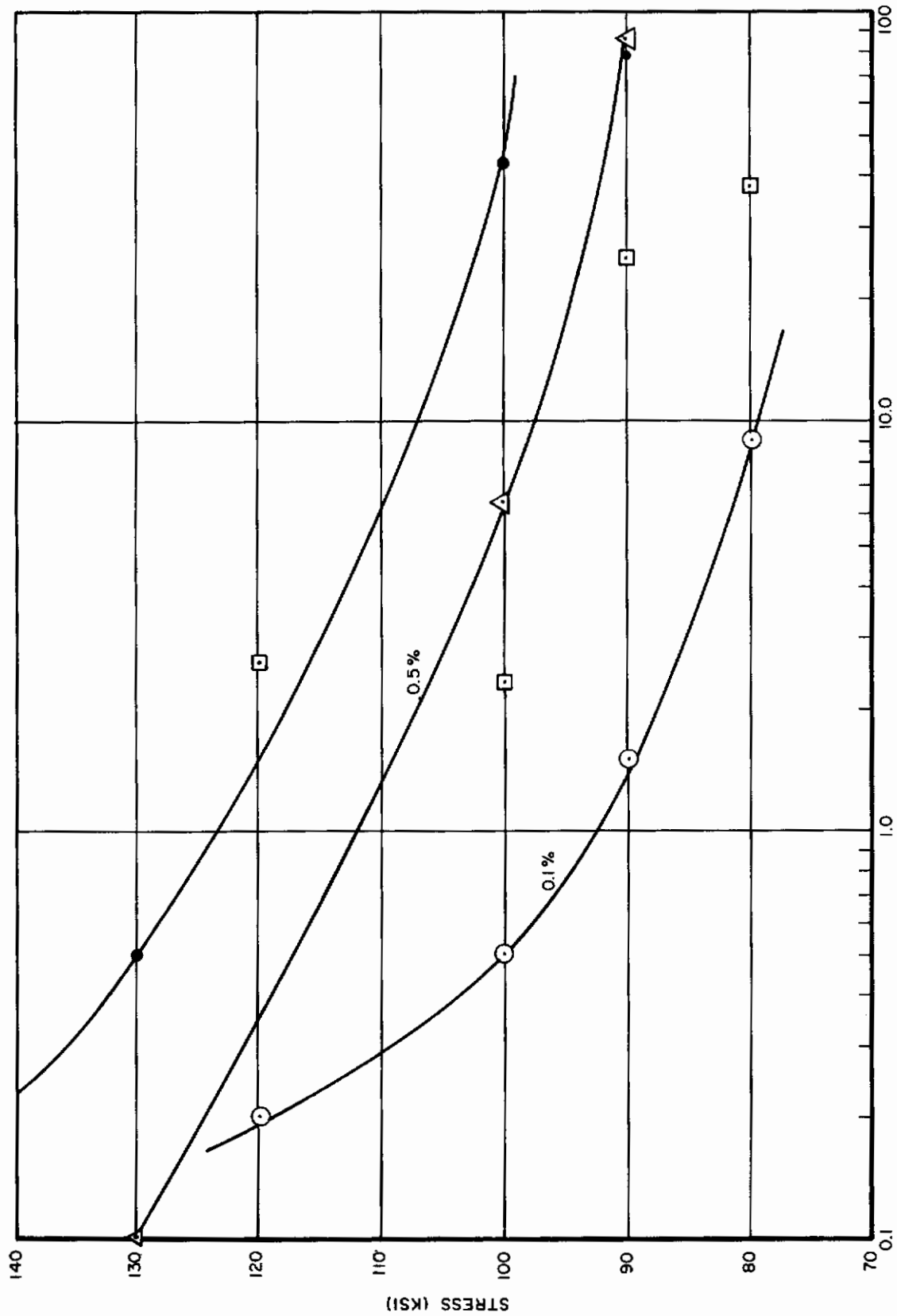


Figure 42. Creep Rupture Properties of C-130AM Rod at 700°F (1160°R)

TABLE 73

Raw Data for C-130AM at 850° F (1310° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	6.00000E-04	0.500
	9.00000E-04	1.000
	1.10000E-03	1.500
	1.40000E-03	2.500
	2.00000E-03	5.000
	2.40000E-03	7.500
	2.80000E-03	10.000
	3.30000E-03	15.000
	3.90000E-03	25.000
	5.10000E-03	50.000
45.0000	1.40000E-03	0.500
	1.57000E-03	1.000
	1.65000E-03	1.500
	1.78000E-03	2.500
68.0000	2.00000E-03	0.500
	4.00000E-03	1.000
	5.00000E-03	1.500
	8.00000E-03	2.500
	1.17000E-02	5.000
	1.42000E-02	7.500
	1.58000E-02	10.000
	2.00000E-02	15.000
	3.20000E-02	25.000
	6.30000E-02	50.000
	1.24500E-01	70.000

TABLE 73 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	3.50000E-03	0.500
	5.50000E-03	1.000
	7.00000E-03	1.500
	10.00000E-03	2.500
	1.42000E-02	5.000
	1.75000E-02	7.500
	1.97000E-02	10.000
	2.37000E-02	15.000
70.4000	10.00000E-04	0.500
	1.50000E-03	1.000
	2.50000E-03	1.500
	4.20000E-03	2.500
	1.10000E-02	5.000
100.0000	2.25000E-02	0.500
	3.15000E-02	1.000

TABLE 74

C-130AM Creep Data at 850° F (1310° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	6.18330E-04	0.500
	8.65940E-04	1.000
	1.08215E-03	1.500
	1.42861E-03	2.500
	2.02440E-03	5.000
	2.43627E-03	7.500
	2.75633E-03	10.000
	3.24852E-03	15.000
	3.94746E-03	25.000
	5.09195E-03	50.000
45.0000	1.40128E-03	0.500
	1.56327E-03	1.000
	1.65803E-03	1.500
	1.77741E-03	2.500
68.0000	1.68256E-03	0.500
	5.00190E-03	1.000
	5.17093E-03	1.500
	6.35568E-03	2.500
	1.15334E-02	5.000
	1.54678E-02	7.500
	1.79690E-02	10.000
	2.09441E-02	15.000
	2.70427E-02	25.000
	6.68792E-02	50.000
	1.22945E-01	70.000

TABLE 74 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	3.51013E-03	0.500
	5.41567E-03	1.000
	7.15667E-03	1.500
	9.86836E-03	2.500
	1.43217E-02	5.000
	1.73618E-02	7.500
	1.97765E-02	10.000
	2.36890E-02	15.000
70.4000	9.73880E-04	0.500
	1.61378E-03	1.000
	2.37210E-03	1.500
	4.24401E-03	2.500
	1.09962E-02	5.000
100.0000	2.25000E-02	0.500
	3.15000E-02	1.000

TABLE 75

C-130AM Creep Deformation Data at 850°F (1310°R)

Stress (KSI)	Time to Reach Indicated Deformation (hours)			
	0.1%	0.3%	0.5%	1.0%
30.0	1.4	12.2	47.1	-
68.0	0.2	0.7	1.5	3.0
70.0	0.1	0.4	0.9	2.5
70.4	0.5	1.9	2.9	4.7
100.0	-	-	-	0.1

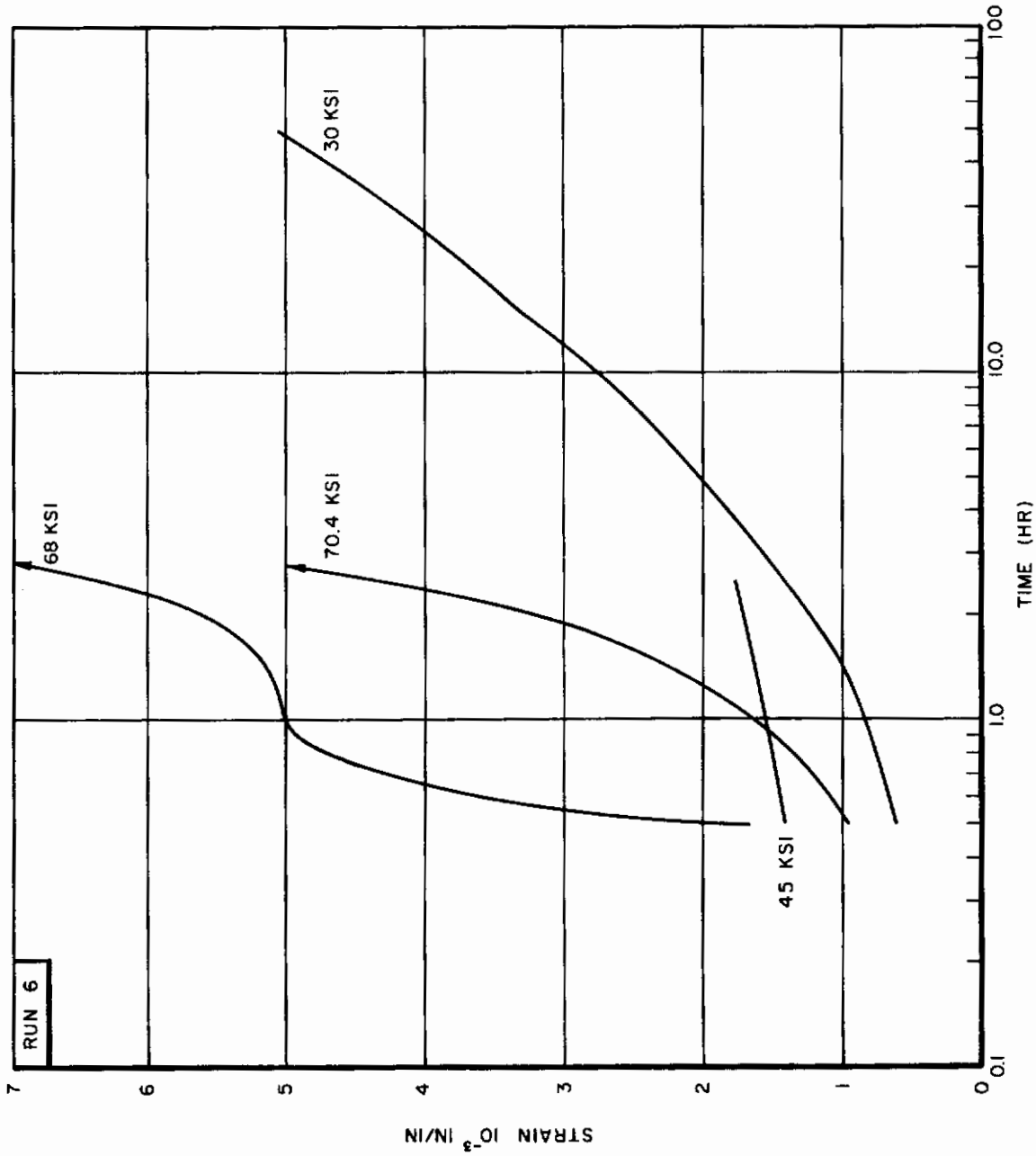


Figure 43. Creep Deformation Versus Log Time of C-130AM Rod at 850°F (1310°R)

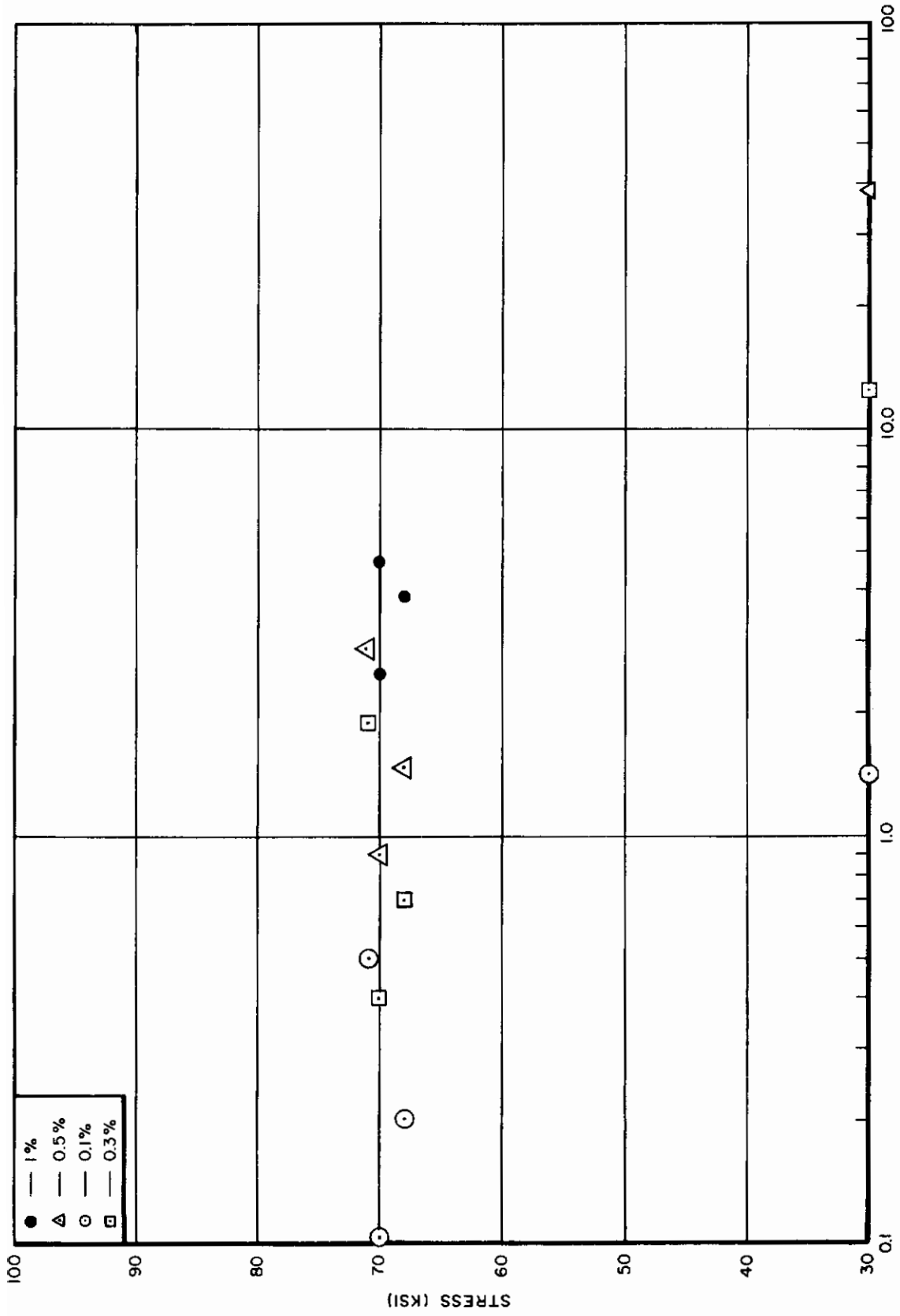


Figure 44. Creep Rupture Properties of C-130AM Rod at 850°F (1310°R)

TABLE 76

Deformation Versus Time (Raw Data) for C-130AM Rod (Bare) at 1000° F (1460° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.0000	10.00000E-05	0.500
3.0000	2.00000E-04	1.500
	3.00000E-04	2.500
	5.00000E-04	5.000
	6.00000E-04	7.500
	8.00000E-04	10.000
	10.00000E-04	15.000
	1.20000E-03	25.000
	1.60000E-03	50.000
	2.00000E-03	75.000
	2.50000E-03	100.000
5.1000	10.00000E-05	0.500
	2.00000E-04	1.000
	3.00000E-04	1.500
	5.00000E-04	2.500
	9.00000E-04	5.000
	1.10000E-03	7.500
	1.50000E-03	10.000
	1.90000E-03	15.000
	2.60000E-03	25.000
	3.60000E-03	50.000
	4.40000E-03	75.000
	5.10000E-03	100.000
15.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	5.00000E-04	1.500
	8.00000E-04	2.500
	1.40000E-03	5.000
	1.90000E-03	7.500
	2.30000E-03	10.000
	3.20000E-03	15.000
	4.70000E-03	25.000
	8.10000E-03	50.000
	1.09000E-02	75.000
	1.36000E-02	100.000

TABLE 76 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.0000	3.00000E-03	0.500
	6.00000E-03	1.000
	10.00000E-03	1.500
	1.60000E-02	2.500
	2.80000E-02	5.000
	4.00000E-02	7.500
	5.40000E-02	10.000
	8.60000E-02	15.000
	1.70000E-01	25.000
20.0000	2.00000E-03	0.500
	3.00000E-03	1.000
	4.00000E-03	1.500
20.0000	6.00000E-03	2.500
	9.00000E-03	5.000
	1.60000E-02	7.500
	2.60000E-02	10.000
	5.40000E-02	15.000
	1.52000E-01	25.000
29.0000	4.00000E-03	0.500
	8.00000E-03	1.000
	1.20000E-02	1.500
	1.90000E-02	2.500
	3.70000E-02	5.000
	5.40000E-02	7.500
40.0000	1.60000E-02	0.500
	3.60000E-02	1.000
	5.20000E-02	1.500

TABLE 77

Deformation Versus Time (Fitted Data) for C-130AM Rod (Bare) at 1000° F (1460° R)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.0000	2.13040E-04	1.500
3.0000	2.73250E-04	2.500
	4.88680E-04	5.000
	6.55500E-04	7.500
	7.80520E-04	10.000
	9.58090E-04	15.000
	1.18763E-03	25.000
	1.60352E-03	50.000
	2.02434E-03	75.000
	2.48489E-03	100.000
5.1000	1.05190E-04	0.500
	1.92390E-04	1.000
	2.97370E-04	1.500
	4.94470E-04	2.500
	8.92390E-04	5.000
	1.20331E-03	7.500
	1.46262E-03	10.000
	1.88757E-03	15.000
	2.53288E-03	25.000
	3.63837E-03	50.000
	4.43169E-03	75.000
	5.07227E-03	100.000
15.0000	3.10750E-04	1.000
	5.02740E-04	1.500
	7.91000E-04	2.500
	1.37106E-03	5.000
	1.87735E-03	7.500
	2.34379E-03	10.000
	3.20113E-03	15.000
	4.73464E-03	25.000
	8.03656E-03	50.000
	1.09364E-02	75.000
	1.35946E-02	100.000

TABLE 77 (CONT)

RUN 6

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.0000	2.95285E-03	0.500
	6.22886E-03	1.000
	9.78284E-03	1.500
	1.59429E-02	2.500
	2.81710E-02	5.000
	4.01328E-02	7.500
	5.36268E-02	10.000
	8.61898E-02	15.000
	1.69972E-01	25.000
20.0000	1.94299E-03	0.500
	3.26619E-03	1.000
	3.90125E-03	1.500
	5.49067E-03	2.500
	9.87937E-03	5.000
20.0000	1.59272E-02	7.500
	2.51535E-02	10.000
	5.45181E-02	15.000
	1.51920E-01	25.000
29.0000	3.95093E-03	0.500
	8.25153E-03	1.000
	1.17423E-02	1.500
	1.89863E-02	2.500
	3.71377E-02	5.000
	5.39312E-02	7.500
40.0000	1.60000E-02	0.500
	3.60000E-02	1.000
	5.20000E-02	1.500

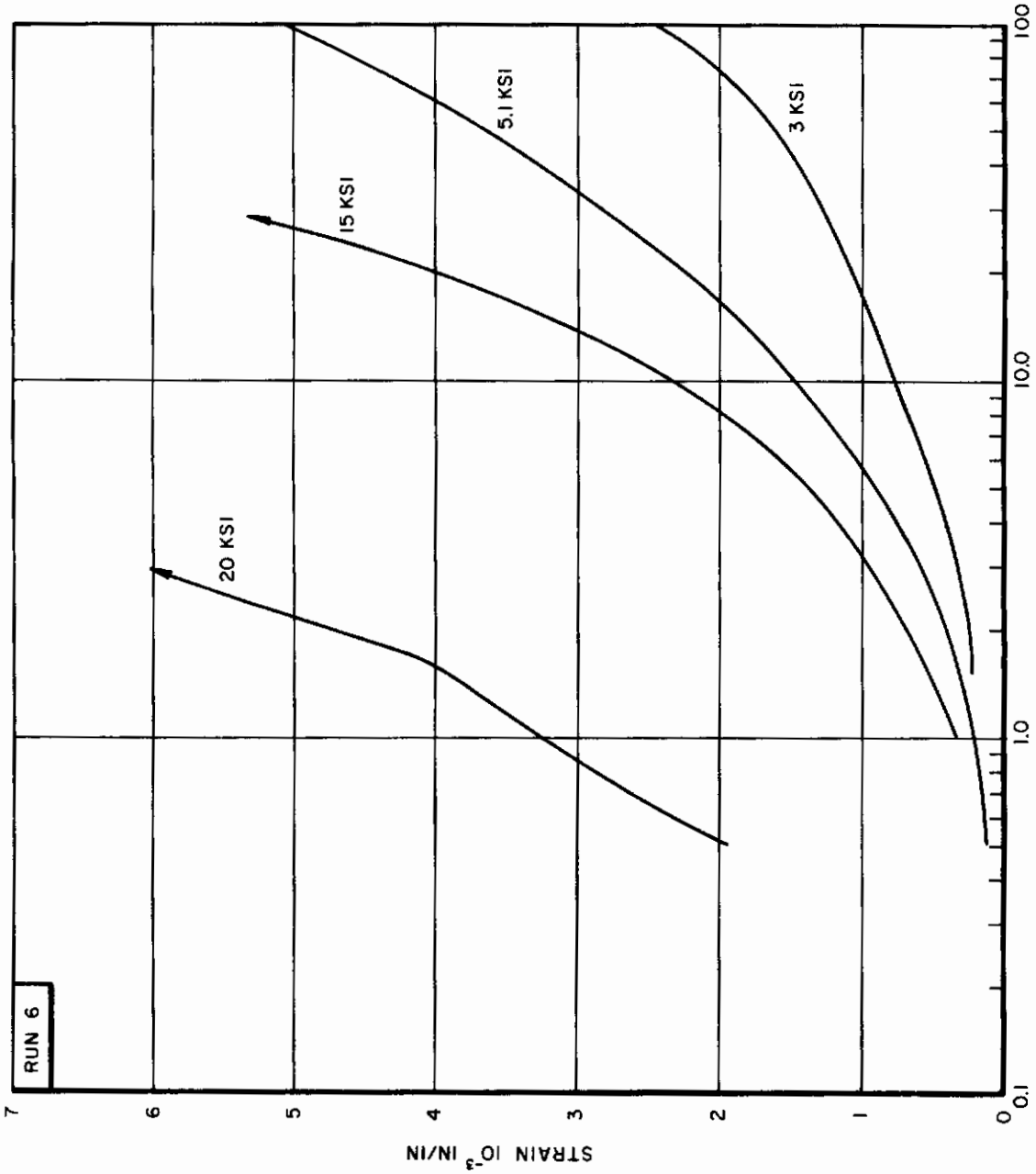


Figure 45. Creep Deformation Versus Log Time of C-130AM Rod at 1000°F (1460°R)

TABLE 78

C-130AM Creep Deformation Data at 1000°F (1460°R)

Stress (KSI)	Time to Reach Indicated Deformation (hours)			
	0.1%	0.3%	0.5%	1.0%
3.0	15.0	-	-	-
5.1	5.9	32.8	93.9	-
15.0	3.5	13.7	26.4	67.9
17.0	0.2	0.5	0.8	2.8
20.0	0.3	1.0	2.0	5.3
29.0	0.1	0.4	0.6	1.2
40.0	-	0.1	0.2	0.3

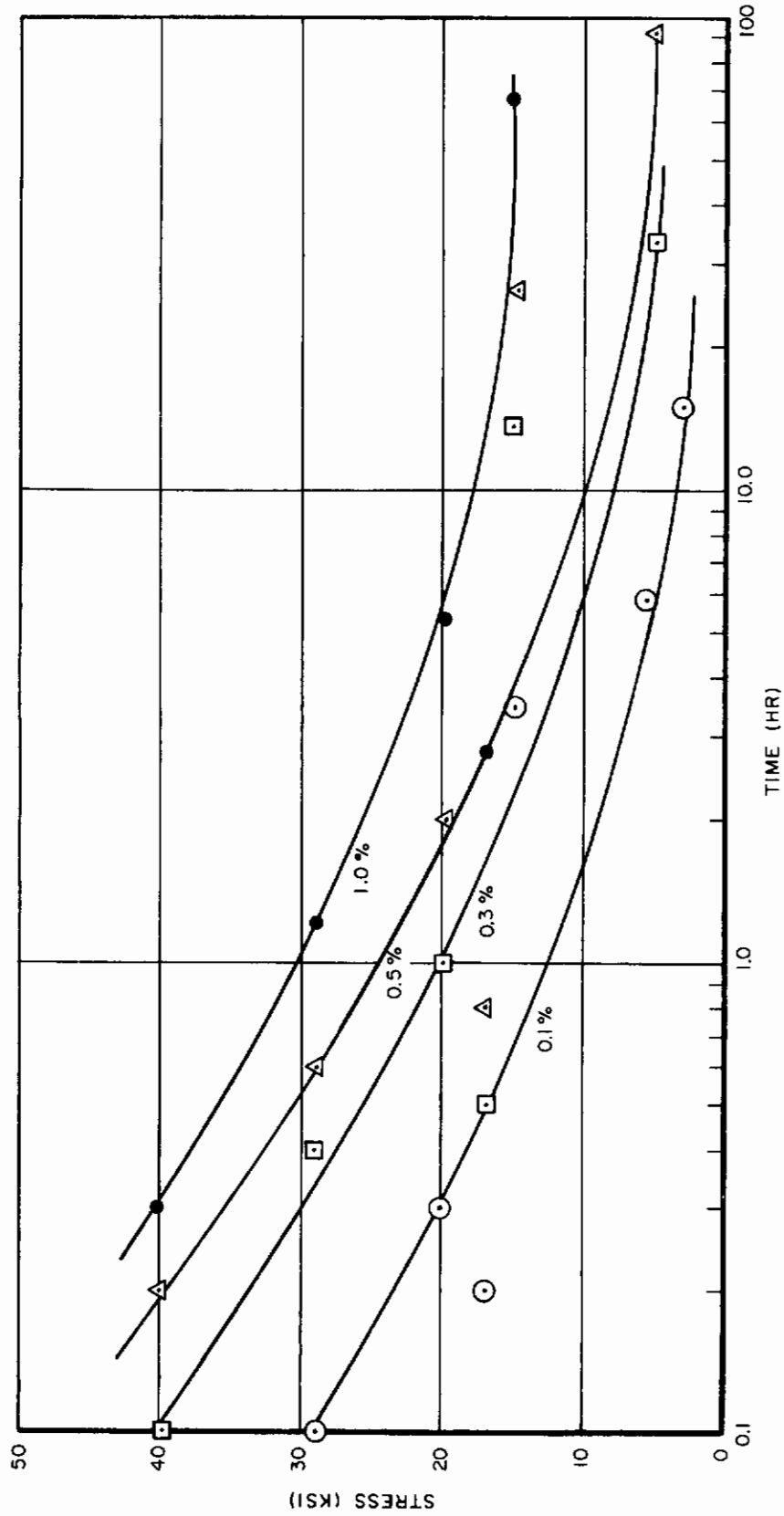


Figure 46. Creep Rupture Properties of C-130AM Rod at 1000°F (1460°R)

TABLE 79

Minimum Creep Rate for C-130AM Titanium Alloy

Temperature	Stress (KSI)	Min. Creep Rate (in/in/hr)
700°F (1160°R)	90.	3.19×10^{-5}
	100.	1.94×10^{-4}
850°F (1310°R)	68.	3.38×10^{-4}
	70.4	1.28×10^{-3}
1000°F (1460°R)	3	1.66×10^{-5}
	17	4.78×10^{-3}
	20	1.27×10^{-3}

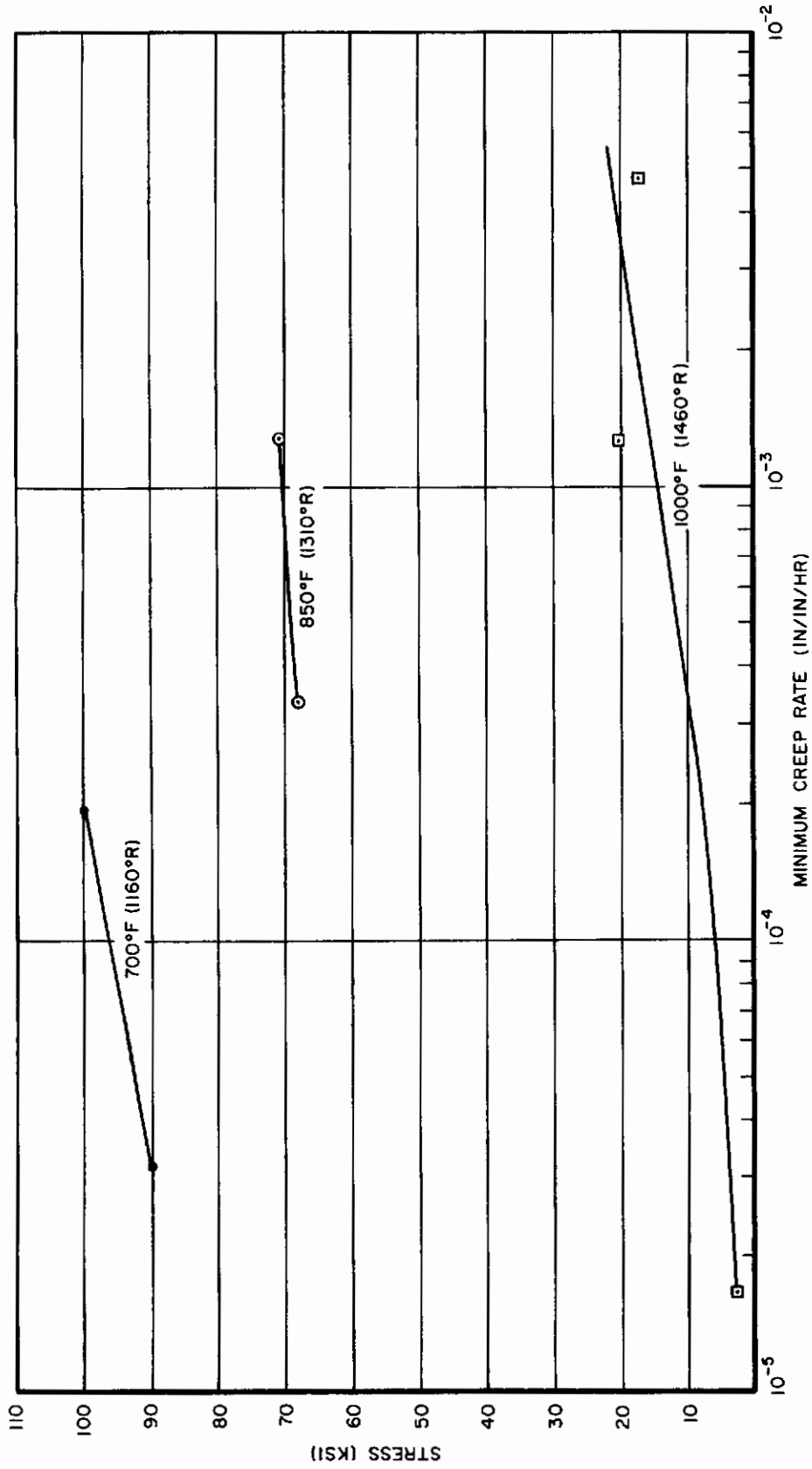


Figure 47. Minimum Creep Rate of C-130AM Rod

CREEP DATA FOR

C-110M SHEET

TABLE 80

Deformation Versus Time (Raw Data) for C-110M Sheet at 700° F (1160° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
44.0000	10.00000E-05	0.500
	1.50000E-04	1.000
	2.00000E-04	1.500
	2.50000E-04	2.500
	3.50000E-04	5.000
	4.00000E-04	7.500
	4.50000E-04	10.000
	5.50000E-04	15.000
	6.00000E-04	25.000
	7.00000E-04	50.000
	1.20000E-03	75.000
	1.60000E-03	100.000
50.0000	7.00000E-05	0.500
	10.00000E-05	1.000
	2.00000E-04	1.500
	3.00000E-04	2.500
	5.00000E-04	5.000
	7.00000E-04	7.500
	8.00000E-04	10.000
	9.50000E-04	15.000
	1.10000E-03	25.000
	1.50000E-03	50.000
	2.50000E-03	75.000
	3.50000E-03	100.000

TABLE 80 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
55.0000	2.5000CE-04	0.50C
	3.0000CE-04	1.00C
	3.5000CE-04	1.50C
	5.0000CE-04	2.50C
	8.0000CE-04	5.000
	1C.0000CE-04	7.50C
	1.2000CE-03	1C.C0C
	1.3000CE-03	15.00C
	1.7000CE-03	25.00C
	2.0000CE-03	50.00C
	3.9000CE-03	75.CCC
	6.9000CE-03	100.000
82.0000	2.0000CE-03	0.50C
	2.5000CE-03	1.CCC
	3.0000CE-C3	1.50C
	4.0000CE-03	2.50C
	6.1000CE-03	5.00C
	8.1000CE-03	7.50C
	1.1000CE-C2	10.00C
	1.6000CE-02	15.00C
	3.2000CE-02	25.00C
	1.4000E-01	50.00C
86.0000	1.9000CE-03	C.50C
86.0000	2.5000CE-C3	1.C0C
	3.5000CE-03	1.50C
	4.5000CE-03	2.50C
	6.5000CE-03	5.00C
	1.3500E-02	7.50C
	1.6500CE-02	10.00C
	2.2000CE-02	15.C0C
	3.4000CE-02	25.000
	7.6000CE-02	50.00C
	1.2100CE-01	75.C0C

TABLE 80 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
88.0000	5.00000E-03	0.500
	2.00000E-03	1.000
	2.50000E-03	1.500
	6.00000E-03	2.500
	1.12000E-02	5.000
	2.00000E-02	7.500
	2.80000E-02	10.000
	4.80000E-02	15.000
	9.20000E-02	25.000
90.0000	5.00000E-03	0.500
	6.00000E-03	1.000
	7.50000E-03	1.500
	10.00000E-03	2.500
	1.50000E-02	5.000
	2.10000E-02	7.500
	2.70000E-02	10.000
	3.85000E-02	15.000
	6.30000E-02	25.000
93.0000	10.00000E-03	0.500
	1.50000E-02	1.000
	1.80000E-02	1.500
	2.40000E-02	2.500
	3.00000E-02	5.000
	3.30000E-02	7.500
	3.70000E-02	10.000
	4.60000E-02	15.000
	6.40000E-02	25.000
94.0000	2.10000E-02	0.500
	3.50000E-02	1.000
	4.10000E-02	1.500
	5.00000E-02	2.500
	8.00000E-02	5.000
	1.40000E-01	7.500

TABLE 81

Deformation Versus Time (Fitted Data) for C-110M Sheet at 700° F (1160° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
44.0000	1.07430E-04	0.500
	1.38130E-04	1.000
	1.86950E-04	1.500
	2.64210E-04	2.500
	3.70100E-04	5.000
	4.22660E-04	7.500
	4.55240E-04	10.000
	4.99870E-04	15.000
	5.78660E-04	25.000
	8.44430E-04	50.000
	1.19371E-03	75.000
	1.59185E-03	100.000
50.0000	4.89780E-04	5.000
	7.05990E-04	7.500
	8.24240E-04	10.000
	9.39970E-04	15.000
	1.06184E-03	25.000
	1.57174E-03	50.000
	2.43438E-03	75.000
	3.52209E-03	100.000
55.0000	2.50150E-04	0.500
	3.14410E-04	1.000
	3.76630E-04	1.500
	4.95070E-04	2.500
	7.57890E-04	5.000
	9.76790E-04	7.500
	1.15632E-03	10.000
	1.41507E-03	15.000
	1.65206E-03	25.000
	2.00679E-03	50.000
	3.89861E-03	75.000
	6.90015E-03	100.000

TABLE 81 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
82.0000	2.74442E-03	1.000
	3.09899E-03	1.500
	3.83805E-03	2.500
	5.86044E-03	5.000
	8.13285E-03	7.500
	1.06571E-02	10.000
	1.64849E-02	15.000
	3.18817E-02	25.000
	1.40002E-01	50.000
86.0000	3.33606E-03	1.500
	4.64971E-03	2.500
	8.80473E-03	5.000
	1.25468E-02	7.500
	1.59144E-02	10.000
86.0000	2.22523E-02	15.000
	3.53945E-02	25.000
	7.48584E-02	50.000
	1.21406E-01	75.000
88.0000	1.95353E-03	1.000
	6.05477E-03	2.500
	1.16385E-02	5.000
	1.91818E-02	7.500
	2.81418E-02	10.000
	4.83385E-02	15.000
	9.18908E-02	25.000

TABLE 81 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	4.93399E-03	0.500
	6.26568E-03	1.000
	7.39674E-03	1.500
	9.67090E-03	2.500
	1.53588E-02	5.000
	2.10412E-02	7.500
	2.67852E-02	10.000
	3.85412E-02	15.000
	6.30062E-02	25.000
93.0000	9.92223E-03	0.500
	1.50195E-02	1.000
	1.85834E-02	1.500
	2.32714E-02	2.500
	2.96159E-02	5.000
	3.37288E-02	7.500
	3.74349E-02	10.000
	4.52554E-02	15.000
	6.41682E-02	25.000
94.0000	2.01137E-02	0.500
	3.83659E-02	1.000
	3.98821E-02	1.500
	4.57685E-02	2.500
	8.50959E-02	5.000
	1.37774E-01	7.500

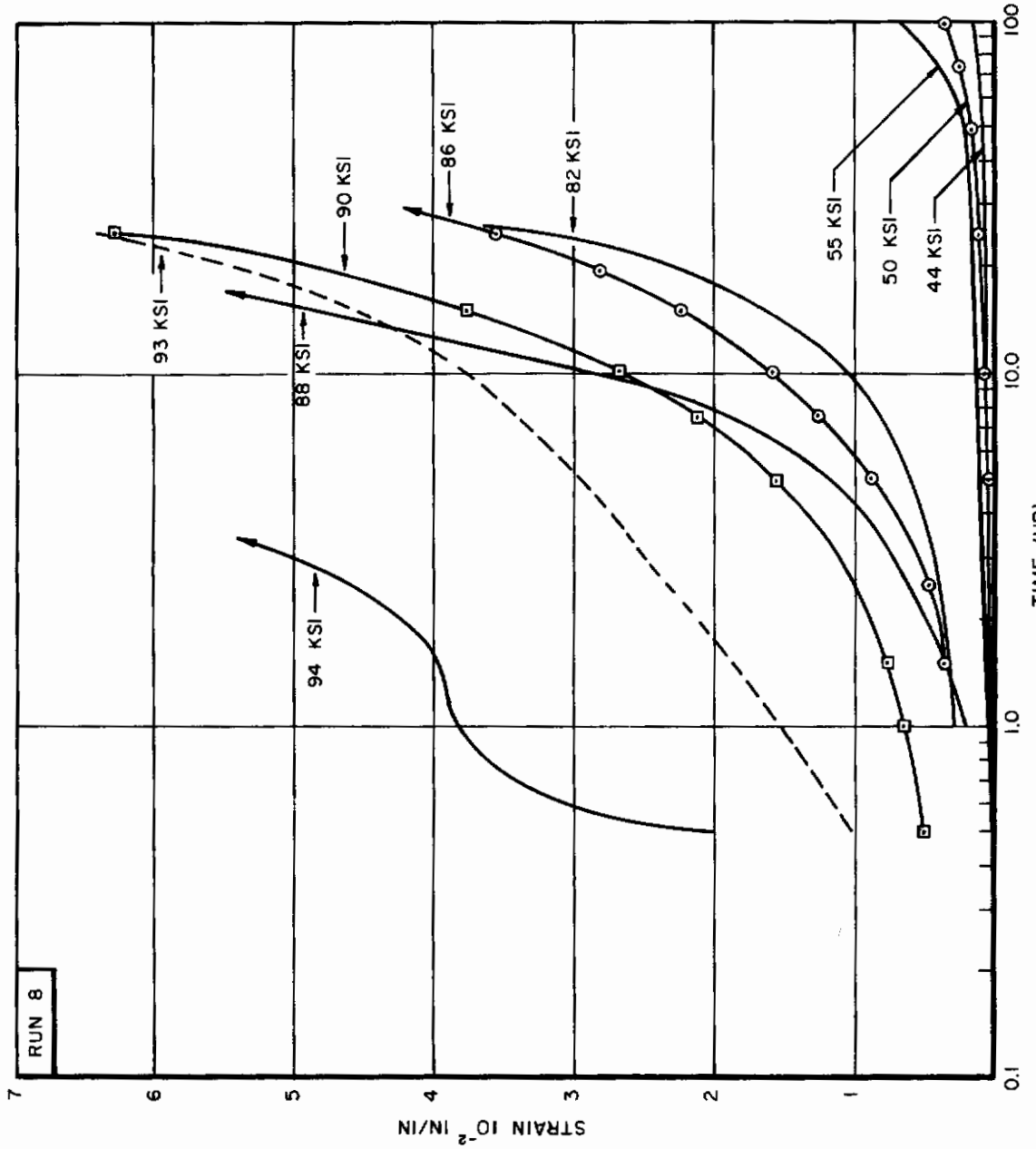


Figure 48. Creep Deformation Versus Log Time of C-110M Sheet at 700°F (1160°R)

TABLE 82

C-110M Sheet Creep Deformation and Rupture Data at 700°F (1160°R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
86.0	85.7	28	1.73	-	1.25	2.75	6.25
88.0	50	21	2.18	-	1.7	2.2	4.5
90.0	32.9	23	4.47	-	-	.5	2.5
93.0	34.9	21	3.96	-	-	-	.5
94.0	9.4	22	1.36	-	-	-	-

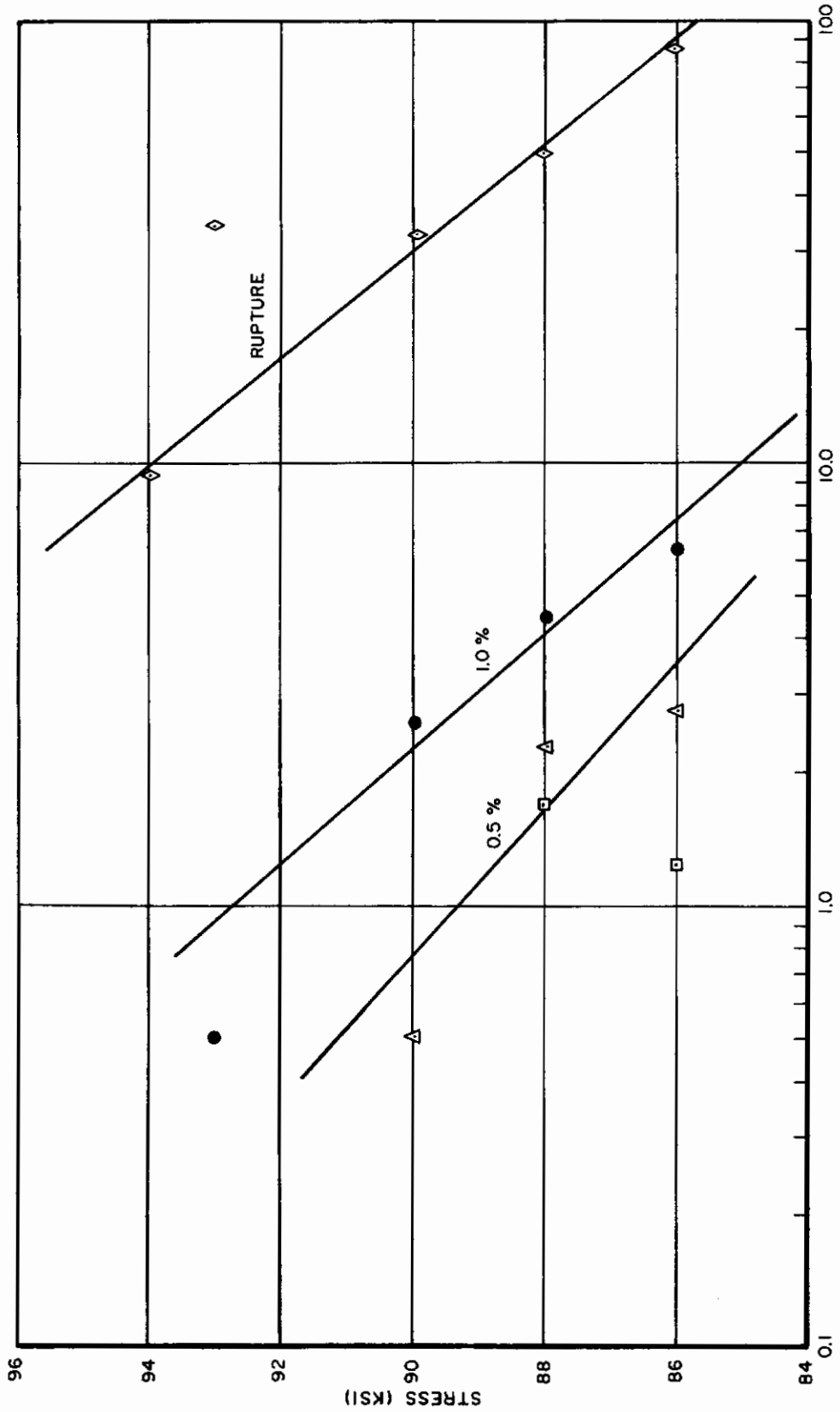


Figure 49. Creep Rupture Properties of C-110M Sheet at 700°F (1160°R)

TABLE 83

Deformation Versus Time (Raw Data) for C-110M Sheet at 800° F (1260° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.5000	5.00000E-05	0.500
	10.00000E-05	1.000
7.5000	1.20000E-04	1.500
	2.00000E-04	2.500
	3.00000E-04	5.000
	4.50000E-04	7.500
	5.70000E-04	10.000
	7.90000E-04	15.000
	1.13000E-03	25.000
	1.50000E-03	50.000
	2.00000E-03	75.000
	2.01000E-03	100.000
10.0000	5.00000E-05	0.500
	10.00000E-05	1.000
	1.20000E-04	1.500
	2.00000E-04	2.500
	3.00000E-04	5.000
	4.30000E-04	7.500
	5.50000E-04	10.000
	8.00000E-04	15.000
	1.30000E-03	25.000
	2.90000E-03	50.000
	3.90000E-03	75.000
	4.60000E-03	100.000

TABLE 83 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	2.50000E-04	0.500
	3.50000E-04	1.000
	4.00000E-04	1.500
	5.50000E-04	2.500
	8.00000E-04	5.000
	1.10000E-03	7.500
	1.35000E-03	10.000
	1.90000E-03	15.000
	2.90000E-03	25.000
	5.50000E-03	50.000
	8.80000E-03	75.000
	1.12000E-02	100.000
30.0000	7.00000E-04	0.500
	1.10000E-03	1.000
	1.70000E-03	1.500
	2.30000E-03	2.500
	3.50000E-03	5.000
	6.10000E-03	7.500
	7.50000E-03	10.000
	1.20000E-02	15.000
	2.20000E-02	25.000
	4.40000E-02	50.000
	6.20000E-02	75.000
	7.80000E-02	100.000
	1.37000E-01	175.000

TABLE 83 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.0000	1.10000E-03	0.500
	2.10000E-03	1.000
	3.20000E-03	1.500
	5.10000E-03	2.500
	1.40000E-02	5.000
	2.40000E-02	7.500
	3.20000E-02	10.000
	6.40000E-02	15.000
	1.13000E-01	25.000
45.0000	1.50000E-03	0.500
	3.10000E-03	1.000
	4.20000E-03	1.500
	6.80000E-03	2.500
	1.20000E-02	5.000
	1.60000E-02	7.500
	1.90000E-02	10.000
	2.70000E-02	15.000
	9.40000E-02	25.000
54.0000	3.10000E-03	0.500
	5.20000E-03	1.000
	9.10000E-03	1.500
	2.20000E-02	2.500
	6.50000E-02	5.000
	1.10000E-01	7.500
	1.53000E-01	10.000
63.0000	1.25000E-02	0.500
	6.20000E-02	1.000
	9.00000E-02	1.500
	1.61000E-01	2.500
70.0000	5.00000E-02	0.500

TABLE 84

Deformation Versus Time (Fitted Data) for C-110M Sheet at 800° F (1260° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.5000	4.93200E-05	0.500
	9.98400E-05	1.000
	1.28140E-04	1.500
	1.81830E-04	2.500
	3.19910E-04	5.000
	4.50830E-04	7.500
	5.70370E-04	10.000
	7.78030E-04	15.000
	1.10015E-03	25.000
	1.60290E-03	50.000
7.5000	1.88587E-03	75.000
	2.05275E-03	100.000
10.0000	1.72040E-04	2.500
	3.24700E-04	5.000
	4.49580E-04	7.500
	5.67570E-04	10.000
	7.97700E-04	15.000
	1.25117E-03	25.000
	2.35478E-03	50.000
	3.40975E-03	75.000
	4.41877E-03	100.000
15.0000	2.47960E-04	0.500
	3.37480E-04	1.000
	4.18140E-04	1.500
	5.52830E-04	2.500
	8.28930E-04	5.000
	1.08244E-03	7.500
	1.33394E-03	10.000
	1.84635E-03	15.000
	2.91345E-03	25.000
	5.70241E-03	50.000
	8.52305E-03	75.000
	1.13130E-02	100.000

TABLE 84 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
		7.500
30.0000	5.29730E-03	10.000
	7.78559E-03	15.000
	1.26705E-02	25.000
	2.20736E-02	50.000
	4.34584E-02	75.000
	6.19530E-02	100.000
	7.81387E-02	175.000
	1.36996E-01	
		0.500
40.0000	1.16830E-03	1.000
	2.10973E-03	1.500
	3.14175E-03	2.500
	5.47749E-03	5.000
	1.28996E-02	7.500
	2.25618E-02	10.000
	3.43784E-02	15.000
	6.33436E-02	25.000
	1.13022E-01	
		1.000
45.0000	3.18059E-03	1.500
	4.35545E-03	2.500
	6.63959E-03	5.000
	1.17772E-02	7.500
	1.59348E-02	

TABLE 84 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	1.93125E-02	10.000
	2.68931E-02	15.000
	9.40067E-02	25.000
54.0000	3.09275E-03	0.500
	5.25183E-03	1.000
	9.02727E-03	1.500
	2.20149E-02	2.500
	6.50628E-02	5.000
	1.09917E-01	7.500
	1.53033E-01	10.000
63.0000	1.25000E-02	0.500
	6.20000E-02	1.000
	9.00000E-02	1.500
	1.61000E-01	2.500
70.0000	5.00000E-02	0.500

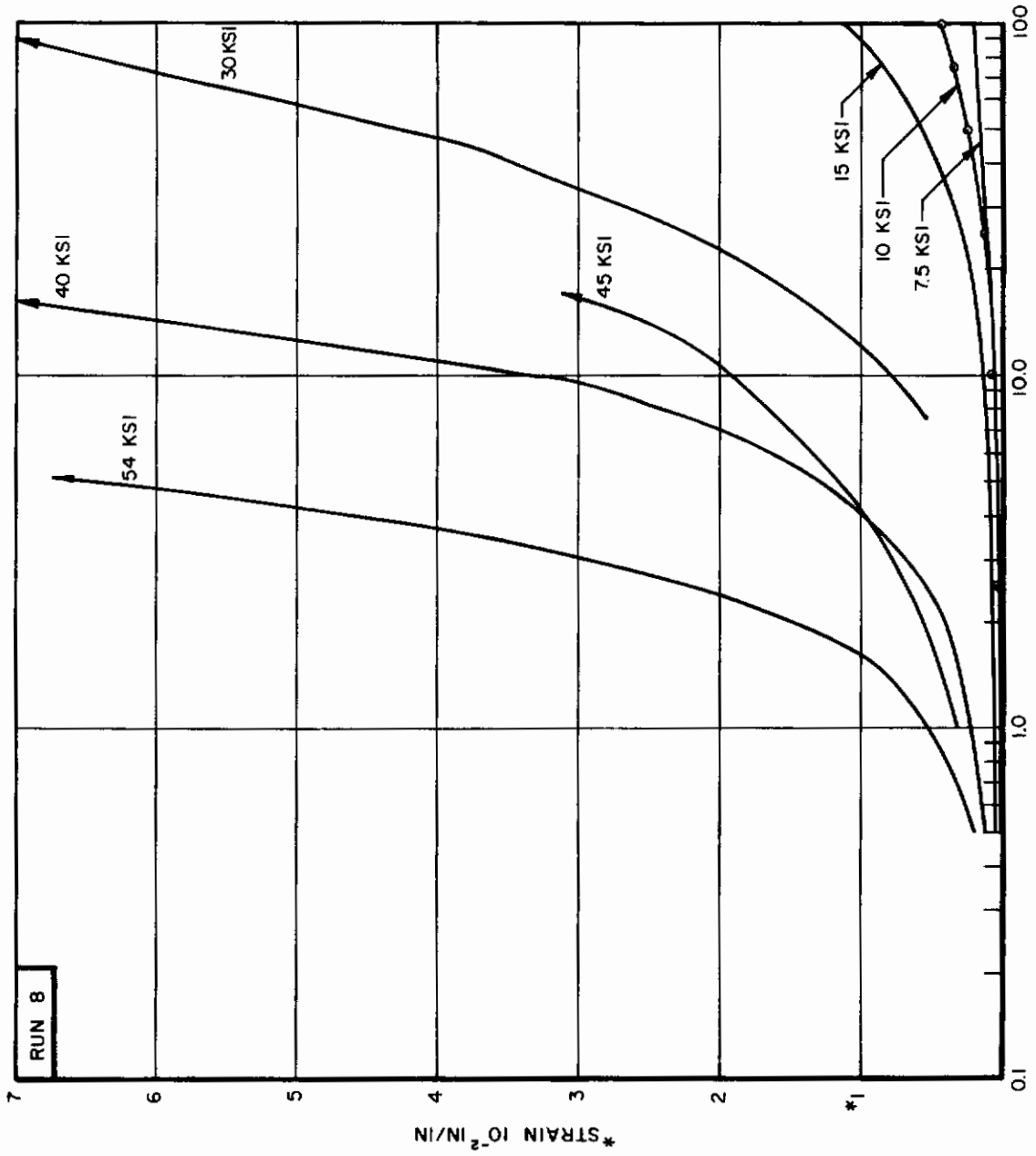


Figure 50. Creep Deformation Versus Log Time of C-110M Sheet at 800°F (1260°R)

TABLE 85

C-110M Sheet Creep Deformation and Rupture Data at 800°F (1260°R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
40.0	35.7	68	.49	-	1.4	2.5	3.6
45.0	28.2	64	.44	-	.9	1.8	4.0
54.0	10.9	50	.50	-	.5	.9	1.8
63.0	2.8	44	.76	-	-	-	-
70.0	1.0	27	.89	-	-	-	-

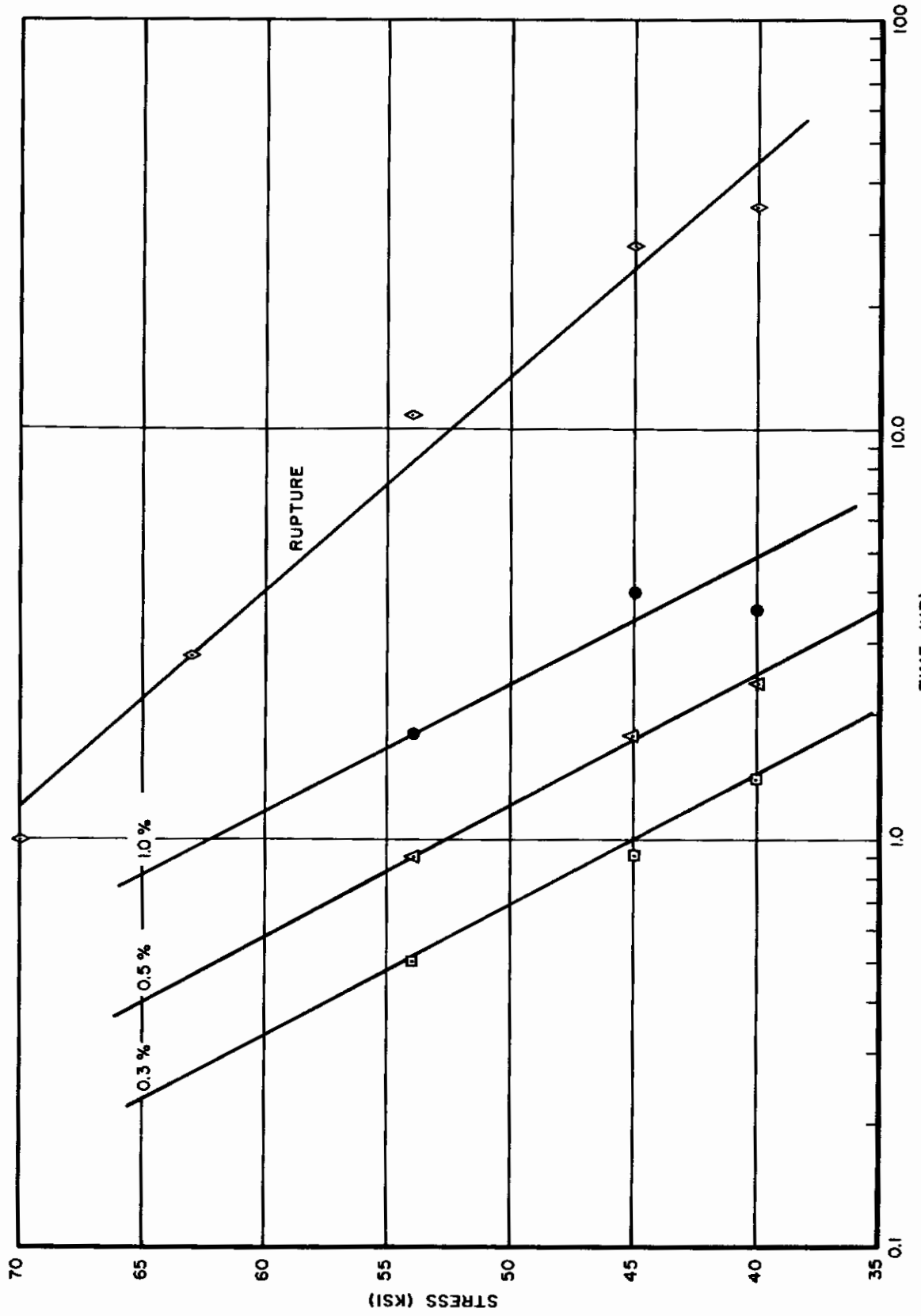


Figure 51. Creep Rupture Properties of C-110M Sheet at 800°F (1260°R)

TABLE 86

Deformation Versus Time (Raw Data) for C-110M Sheet at 850° F (1310° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	4.00000E-05	0.500
	10.00000E-05	1.000
	1.30000E-04	1.500
	1.70000E-04	2.500
	2.00000E-04	5.000
	2.30000E-04	7.500
	2.70000E-04	10.000
	3.00000E-04	15.000
	4.00000E-04	25.000
	5.00000E-04	50.000
	6.00000E-04	75.000
	6.80000E-04	100.000
7.0000	5.00000E-05	0.500
	10.00000E-05	1.000
7.0000	1.30000E-04	1.500
	2.40000E-04	2.500
	4.90000E-04	5.000
	7.20000E-04	7.500
	9.20000E-04	10.000
	1.30000E-03	15.000
	1.90000E-03	25.000
	2.70000E-03	50.000
	3.50000E-03	75.000
	3.90000E-03	100.000

TABLE 86 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	10.00000E-05	0.500
	2.50000E-04	1.000
	5.00000E-04	1.500
	9.00000E-04	2.500
	1.60000E-03	5.000
	2.30000E-03	7.500
	2.40000E-03	10.000
	2.80000E-03	15.000
	4.10000E-03	25.000
	5.90000E-03	50.000
	7.20000E-03	75.000
	8.50000E-03	100.000
21.0000	7.00000E-04	0.500
	1.20000E-03	1.000
	1.50000E-03	1.500
	2.30000E-03	2.500
	5.30000E-03	5.000
	7.40000E-03	7.500
	9.60000E-03	10.000
	1.35000E-02	15.000
	2.18000E-02	25.000
	4.12000E-02	50.000
	6.03000E-02	75.000
	8.28000E-02	100.000
	1.37000E-01	150.000
	3.11000E-01	250.000

TABLE 86 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.5000	2.20000E-03	0.500
	3.50000E-03	1.000
	5.30000E-03	1.500
	6.60000E-03	2.500
	1.40000E-02	5.000
	2.10000E-02	7.500
	3.10000E-02	10.000
	4.70000E-02	15.000
	7.90000E-02	25.000
	1.60000E-01	50.000
32.0000	5.20000E-03	0.500
32.0000	1.01000E-02	1.000
	1.50000E-02	1.500
	3.50000E-02	2.500
	5.60000E-02	5.000
	8.50000E-02	7.500
40.0000	4.20000E-03	0.500
	1.25000E-02	1.000
	2.30000E-02	1.500
	4.65000E-02	2.500
	1.64000E-01	5.000
55.0000	3.00000E-03	0.500

TABLE 87

Deformation Versus Time (Fitted Data) for C-110M Sheet at 850° F (1310° R)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	3.93700E-05	0.500
	1.03110E-04	1.000
	1.30470E-04	1.500
	1.60940E-04	2.500
	2.05110E-04	5.000
	2.37100E-04	7.500
	2.64080E-04	10.000
	3.09610E-04	15.000
	3.81680E-04	25.000
	5.09780E-04	50.000
	6.02390E-04	75.000
	6.76330E-04	100.000
7.0000	5.19100E-05	0.500
	9.42100E-05	1.000
	1.35150E-04	1.500
	2.33520E-04	2.500
	4.92190E-04	5.000
	7.27260E-04	7.500
	9.36130E-04	10.000
	1.29293E-03	15.000
	1.84867E-03	25.000
	2.78821E-03	50.000
	3.42935E-03	75.000
	3.92044E-03	100.000
10.0000	2.57280E-04	1.000
	5.11340E-04	1.500
	9.09180E-04	2.500
	1.59106E-03	5.000
	2.07283E-03	7.500
10.0000	2.45837E-03	10.000
	3.07778E-03	15.000
	4.02848E-03	25.000
	5.79666E-03	50.000
	7.23301E-03	75.000
	8.51396E-03	100.000

TABLE 87 (CONT)

RUN 8

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
21.0000	5.59977E-03	5.000
	7.58323E-03	7.500
	9.55734E-03	10.000
	1.34815E-02	15.000
	2.12624E-02	25.000
	4.07034E-02	50.000
	6.09463E-02	75.000
	8.30143E-02	100.000
	1.36717E-01	150.000
	3.11034E-01	250.000
23.5000	2.30493E-03	0.500
	3.51412E-03	1.000
	4.88545E-03	1.500
	7.51227E-03	2.500
	1.44359E-02	5.000
	2.19950E-02	7.500
	2.99398E-02	10.000
	4.63693E-02	15.000
	7.96528E-02	25.000
	1.59890E-01	50.000
32.0000	1.05770E-02	1.000
	1.75066E-02	1.500
	3.16796E-02	2.500
	6.06153E-02	5.000
	8.27215E-02	7.500
40.0000	4.07865E-03	0.500
	1.28300E-02	1.000
	2.27463E-02	1.500
	4.65456E-02	2.500
	1.63999E-01	5.000
55.0000	3.00000E-03	0.500

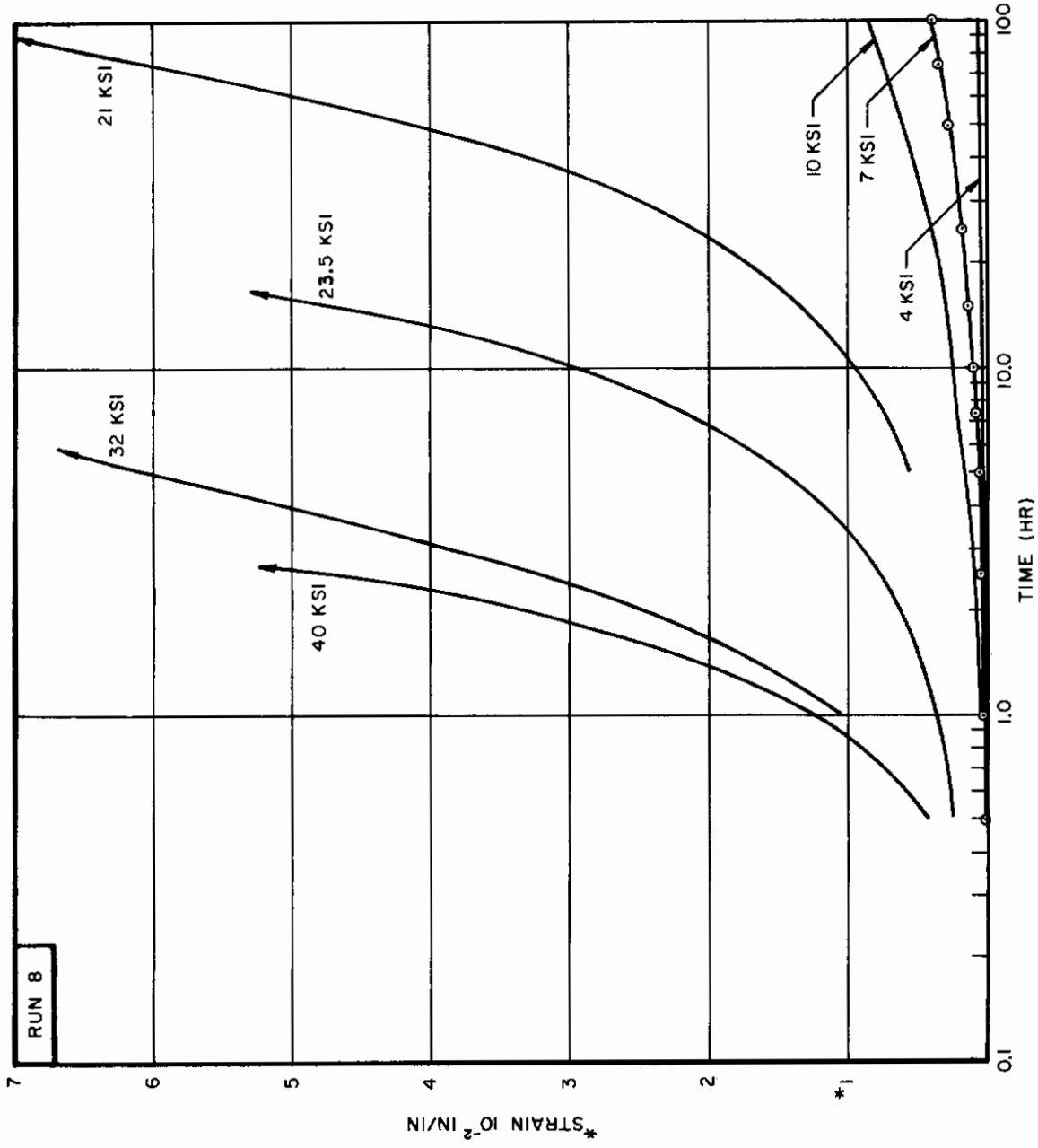


Figure 52. Creep Deformation Versus Log Time of C-110M Sheet at 850°F (1310°R)

TABLE 88

C-110M Sheet Creep Deformation and Rupture Data at 850°F (1310°R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
21.0	295.6	74	.14	.8	2.1	4.7	10
23.5	62.9	87	.25	-	1.4	2.0	3.8
32.0	9.0	64	.34	-	-	-	1.0
40.0	6.1	42	.45	-	-	.55	.8
55.0	.7	47	.75	-	.5	-	-

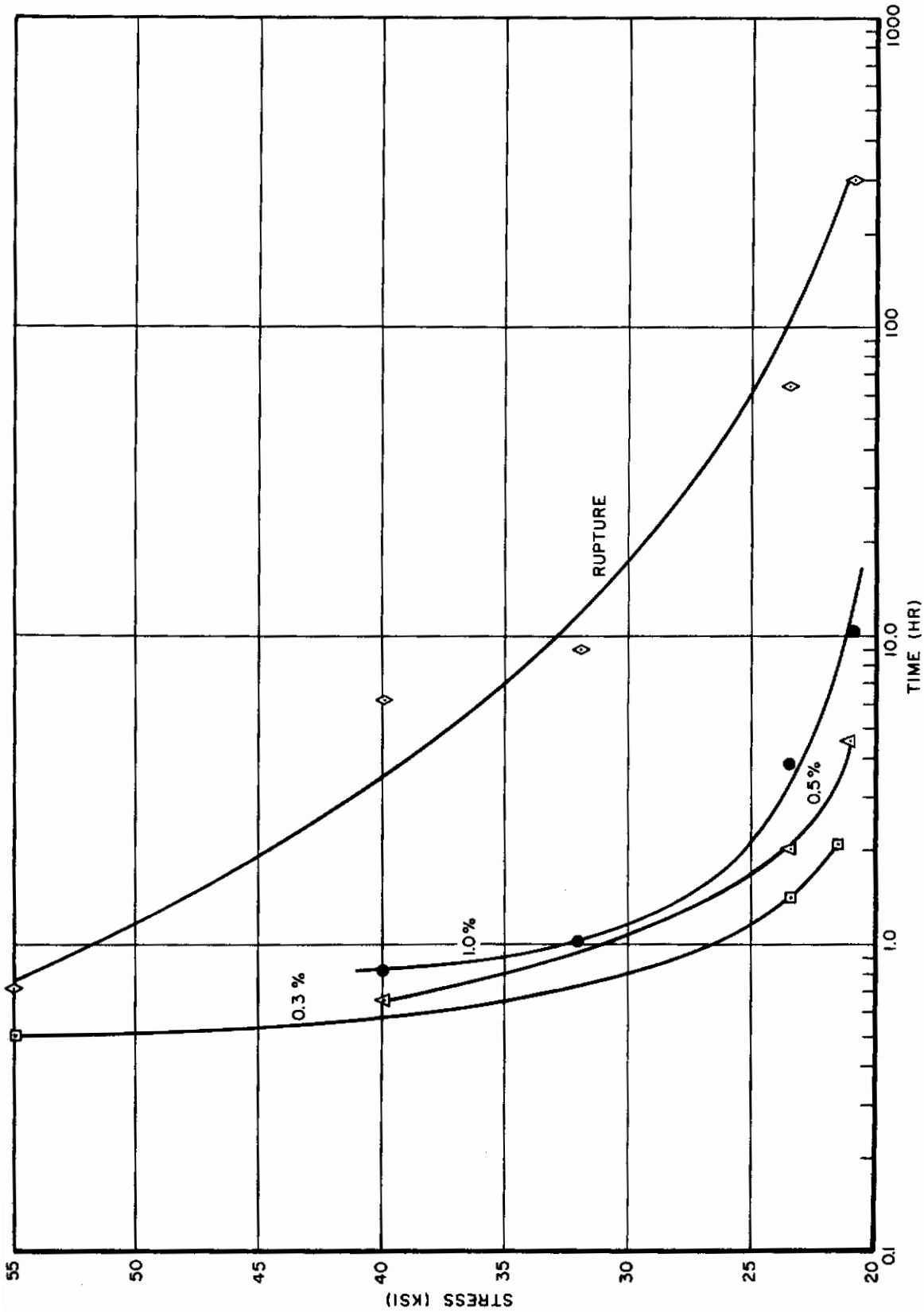


Figure 53. Creep Rupture Properties of C-110M Sheet at 850°F (1310°R)

TABLE 89

Minimum Creep Rate for C-110M Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
700° F (1160° R)	44	7.88×10^{-6}
	50	1.22×10^{-5}
	55	1.42×10^{-5}
	82	7.09×10^{-4}
	86	1.27×10^{-3}
	88	5.42×10^{-4}
	90	2.26×10^{-3}
	93	1.48×10^{-3}
	94	3.03×10^{-3}
800° F (1260° R)	15	1.01×10^{-4}
	30	6.47×10^{-4}
	40	1.88×10^{-3}
	45	1.35×10^{-3}
	54	4.32×10^{-3}
	63	5.6×10^{-2}
850° F (1310° R)	21	7.78×10^{-4}
	23.5	2.42×10^{-3}
	40	1.75×10^{-2}

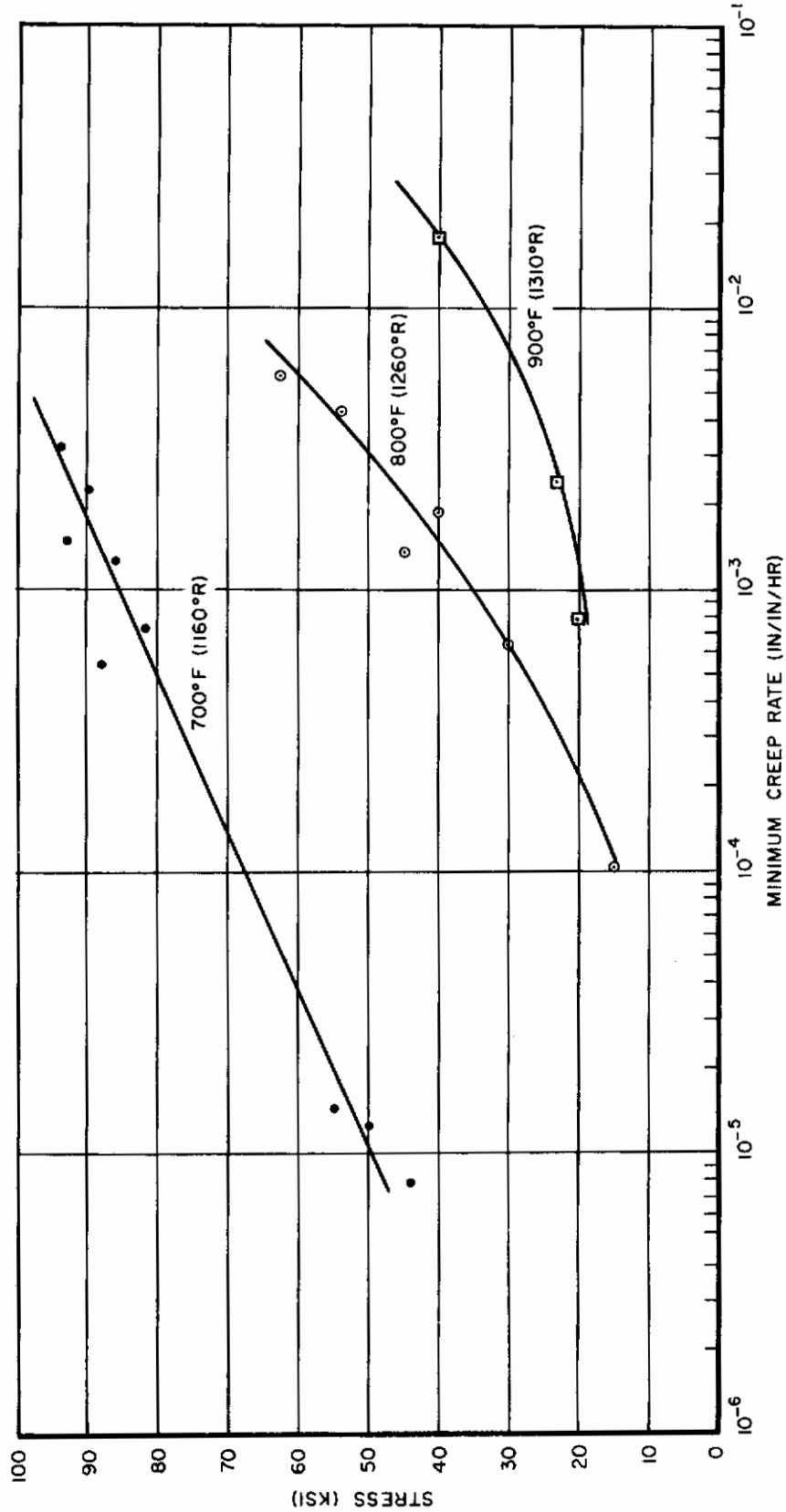


Figure 54. Minimum Creep Rate of C-110M Sheet

CREEP DATA FOR
TMCA T1-140A SHEET

TABLE 90

MCR Analysis of TMC Ti-140A Creep Data

Temperature	Stress (KSI)	Strain (in/in)	Time (hours)
600° F (1060° R)	65.0	0	0
		1.1000-03	5
		1.6000-03	10
		1.8000-03	25
		2.0000-03	50
		2.2000-03	75
		2.3000-03	100
		2.7000-03	250
		3.4000-03	500
		3.7000-03	750
		3.9000-03	1000
600° F (1060° R)	60.0	0	0
		1.2000-03	5
		1.3000-03	10
		1.4000-03	25
		1.6000-03	50
		1.8000-03	75
		1.9000-03	100
		2.2000-03	250
		2.6000-03	500
		2.7000-03	750
		3.1000-03	1000
600° F (1060° R)	50.0	0	0
		9.0000-04	5
		1.0000-03	10
		1.0000-03	25
		1.2000-03	50
		1.4000-03	75
		1.5000-03	100
		1.6000-03	250
		1.7000-03	500
		2.0000-03	750
			1000

TABLE 91

Deformation Versus Time (Fitted Data) for TMCA Ti-140A at 600° F (1060° R)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	8.96550E-04	5.000
	9.41690E-04	10.000
	1.06625E-03	25.000
	1.23973E-03	50.000
	1.37451E-03	75.000
	1.47508E-03	100.000
	1.60695E-03	250.000
	1.69914E-03	500.000
	2.10007E-03	750.000
60.0000	1.18190E-03	5.000
	1.28321E-03	10.000
	1.46602E-03	25.000
	1.64095E-03	50.000
	1.75937E-03	75.000
	1.85174E-03	100.000
	2.20561E-03	250.000
	2.56007E-03	500.000
	2.81872E-03	750.000
	3.03238E-03	1000.000
65.0000	1.18785E-03	5.000
	1.45572E-03	10.000
	1.79312E-03	25.000
	2.04809E-03	50.000
	2.20523E-03	75.000
	2.32421E-03	100.000
	2.78193E-03	250.000
	3.27161E-03	500.000
	3.65236E-03	750.000
	3.97983E-03	1000.000

TABLE 91 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
82.0000	2.56139E-03	0.500
	2.67432E-03	1.000
	2.87902E-03	1.500
	3.28159E-03	2.500
	4.08544E-03	5.000
	4.69523E-03	7.500
	5.19282E-03	10.000
	5.99145E-03	15.000
	7.17770E-03	25.000
	9.18163E-03	50.000
	1.06265E-02	75.000
	1.18085E-02	100.000
	1.37489E-02	150.000
	1.67770E-02	250.000
	2.23259E-02	500.000
	2.66202E-02	750.000
	3.02724E-02	1000.000
88.0000	9.50145E-03	0.500
88.0000	1.25668E-02	1.000
	1.43501E-02	1.500
	1.65913E-02	2.500
	1.96742E-02	5.000
	2.15627E-02	7.500
	2.29860E-02	10.000
	2.51942E-02	15.000
	2.85489E-02	25.000
	3.49982E-02	50.000
	4.04871E-02	75.000
	4.55309E-02	100.000
	5.48288E-02	150.000
	7.15161E-02	250.000
	1.07163E-01	500.000

TABLE 91 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
88.4000	1.01286E-02	0.500
	1.24861E-02	1.000
	1.41349E-02	1.500
	1.64936E-02	2.500
	2.02081E-02	5.000
	2.27155E-02	7.500
	2.47114E-02	10.000
	2.79861E-02	15.000
	3.33732E-02	25.000
	4.49454E-02	50.000
	5.57107E-02	75.000
	6.61064E-02	100.000
88.7500	1.30113E-02	0.500
	1.64959E-02	1.000
	1.88756E-02	1.500
	2.22494E-02	2.500
	2.77890E-02	5.000
	3.19692E-02	7.500
	3.56640E-02	10.000
	4.24432E-02	15.000
	5.50022E-02	25.000
89.5000	1.10318E-02	0.500
	1.58721E-02	1.000
	1.99571E-02	1.500
	2.59917E-02	2.500
	3.69956E-02	5.000
	4.65262E-02	7.500
	5.56254E-02	10.000
90.0000	2.93393E-02	0.500
	4.53663E-02	1.000
	5.47415E-02	1.500
	6.65529E-02	2.500

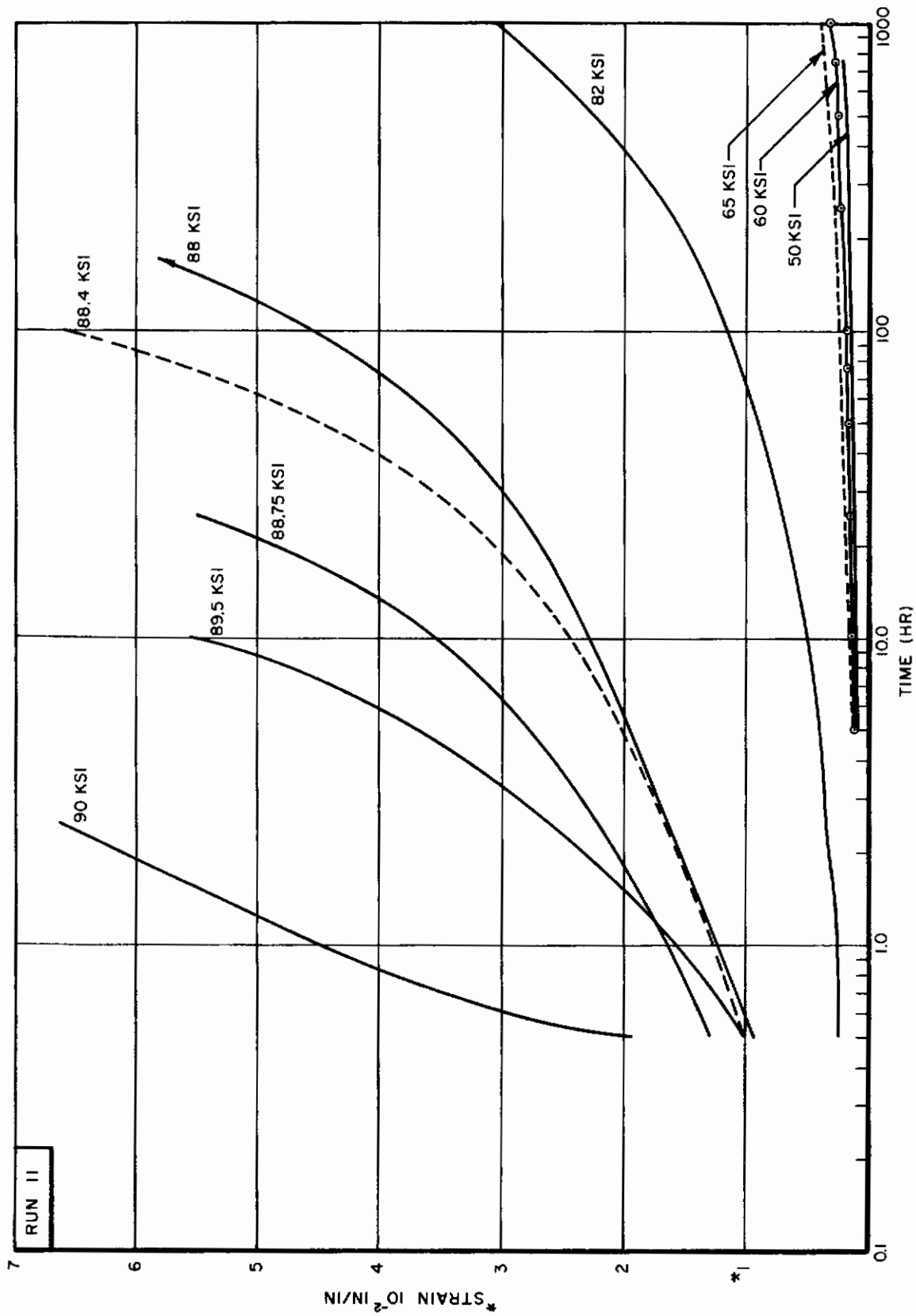


Figure 55. Creep Deformation Versus Log Time of TMCA Ti-140A Sheet at 600°F (1060°R)

TABLE 92

Ti-140A Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
50.0	-	-	0.31	10	-	-	-
60.0	-	-	0.34	-	937.5	-	-
65.0	-	-	0.74	-	375	-	-
88.0	557.5	20	0.26	-	-	-	-
88.4	145.7	19	0.30	-	-	-	-
88.75	46.4	20	0.85	-	-	-	-
89.5	15.6	25	1.8	-	-	-	-
90.0	3.6	22	2.5	-	-	-	-

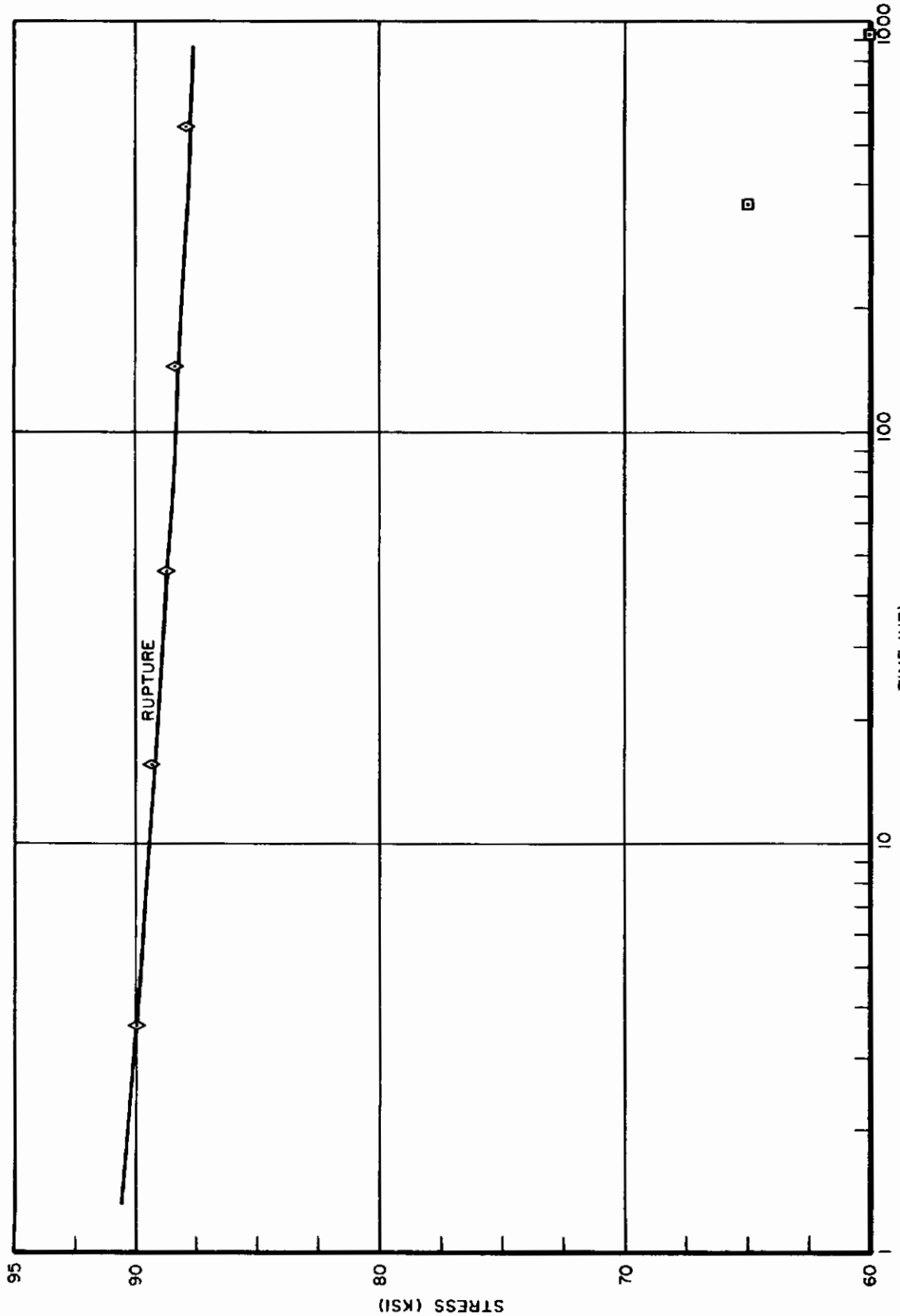


Figure 56. Creep Rupture Properties of TMCA Ti-140A Sheet at 600°F (1060°R)

TABLE 93

MCR Analysis of TMCA Ti-140A Creep Data

Temperature	Stress (KSI)	Strain (in/in)	Time (hours)
700° F (1160° R)	25.0	0	0
		4.0000-04	5
		5.0000-04	10
		1.0000-03	25
		1.1000-03	50
		1.2000-03	75
		1.3000-03	100
		1.6000-03	250
		2.4000-03	500
		2.9000-03	750
		3.1000-03	1000
700° F (1160° R)	35.0	0	0
		8.0000-04	5
		9.0000-04	10
		1.0000-03	25
		1.4000-03	50
		1.7000-03	75
		1.9000-03	100
		3.2000-03	250
		4.3000-03	500
		5.6000-03	750
		6.3000-03	1000
700° F (1160° R)	45.0	0	0
		1.5000-03	5
		1.8000-03	10
		2.2000-03	25
		3.0000-03	50
		3.5000-03	75
		3.9000-03	100
		6.3000-03	250
		1.0000-02	500
		1.3500-02	750
		1.7500-02	1000

TABLE 94

Deformation Versus Time (Fitted Data) for TMCA Ti-140A at 700° F (1160° R)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	3.89720E-04	5.000
	6.54150E-04	10.000
	9.21230E-04	25.000
	1.09588E-03	50.000
	1.20777E-03	75.000
	1.30007E-03	100.000
	1.73468E-03	250.000
	2.30500E-03	500.000
	2.78436E-03	750.000
	3.20709E-03	1000.000
35.0000	8.00720E-04	5.000
	8.70500E-04	10.000
	1.07770E-03	25.000
	1.38266E-03	50.000
	1.64919E-03	75.000
	1.88900E-03	100.000
	3.02327E-03	250.000
	4.38809E-03	500.000
	5.45701E-03	750.000
	6.36180E-03	1000.000
45.0000	1.54375E-03	5.000
	1.69424E-03	10.000
	2.28896E-03	25.000
	2.97992E-03	50.000
	3.49328E-03	75.000
	3.93399E-03	100.000
	6.22616E-03	250.000
	9.94565E-03	500.000
	1.36858E-02	750.000
	1.74012E-02	1000.000

TABLE 94 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
55.0000	2.45519E-03	7.500
	2.69739E-03	10.000
	3.18059E-03	15.000
	4.14285E-03	25.000
	6.53212E-03	50.000
	8.91466E-03	75.000
	1.13113E-02	100.000
	1.62297E-02	150.000
	2.71281E-02	250.000
	6.65345E-02	500.000
	1.22997E-01	750.000
62.0000	3.21344E-03	5.000
	3.53844E-03	7.500
	3.86369E-03	10.000
	4.51516E-03	15.000
	5.82319E-03	25.000
62.0000	9.14054E-03	50.000
	1.25627E-02	75.000
	1.61364E-02	100.000
	2.39251E-02	150.000
	4.33742E-02	250.000
	1.32007E-01	500.000
65.0000	2.42007E-03	2.500
	2.91118E-03	5.000
	3.39846E-03	7.500
	3.88215E-03	10.000
	4.83971E-03	15.000
	6.72213E-03	25.000
	1.13256E-02	50.000
	1.59713E-02	75.000
	2.08952E-02	100.000
	3.25221E-02	150.000
	6.95002E-02	250.000

TABLE 94 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	3.45638E-03	1.000
	3.78644E-03	1.500
	5.59840E-03	2.500
	9.54543E-03	5.000
	1.20279E-02	7.500
	1.37348E-02	10.000
	1.62303E-02	15.000
	2.07649E-02	25.000
	3.64554E-02	50.000
75.0000	3.99607E-03	0.500
	6.79003E-03	1.000
	8.36127E-03	1.500
	1.17966E-02	2.500
	2.05136E-02	5.000
	2.72619E-02	7.500
	3.19007E-02	10.000
	3.62797E-02	15.000
80.0000	9.60000E-03	0.500
	1.99714E-02	1.000
	3.03428E-02	1.500
	5.10857E-02	2.500

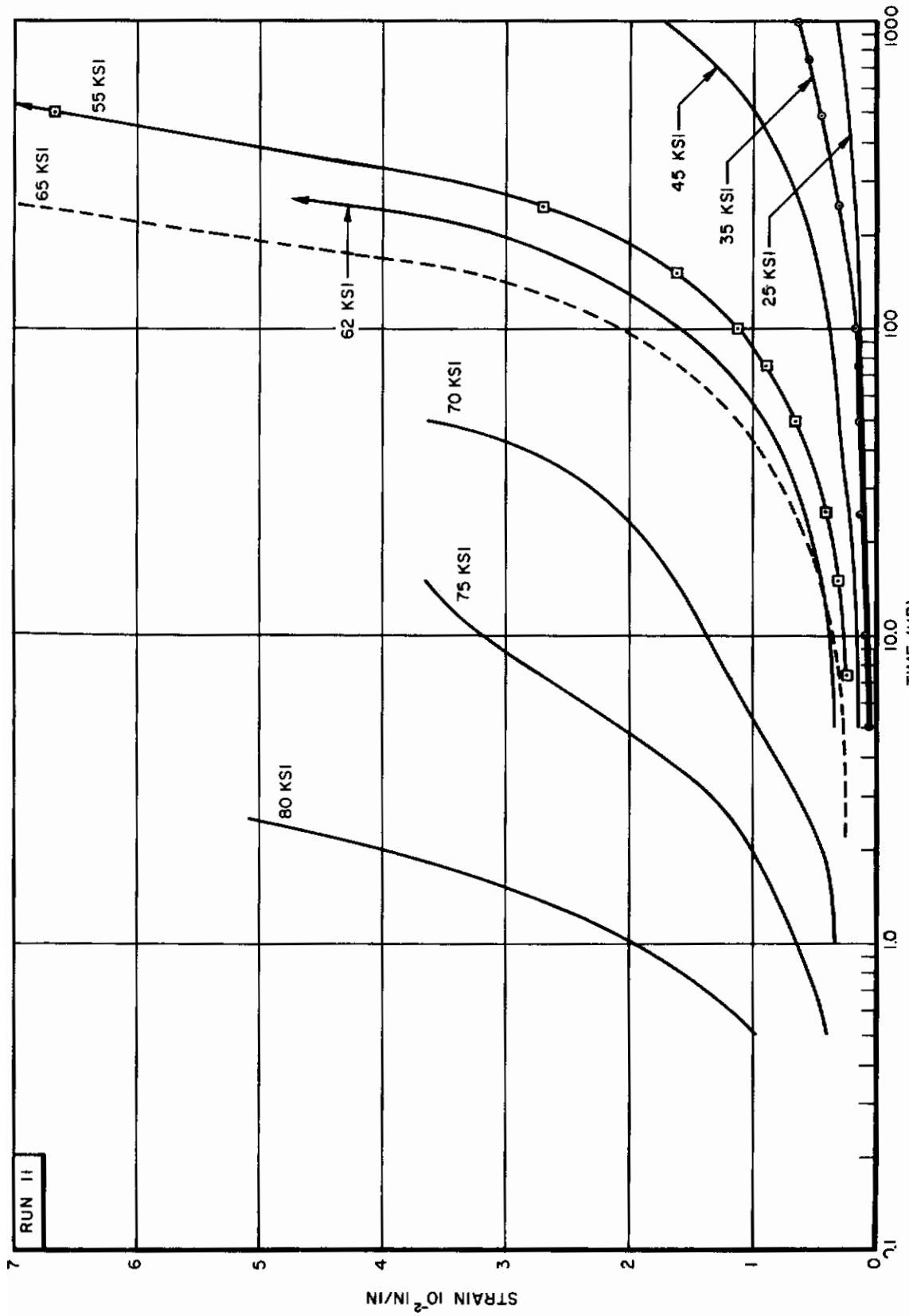


Figure 57. Creep Deformation Versus Log Time of TMCA Ti-140A Sheet at 700°F (1160°R)

TABLE 95

TMCA Ti-140A Creep Deformation and Rupture Data at 700° F (1160° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
25.0	-	-	0.19	25	875	-	-
35.0	-	-	0.20	25	250	630	-
45.0	-	-	0.34	-	50	166	500
55.0	863.1	34	0.58	0.75	14	30	75
62.0	660.1	46	0.64	0.5	5	18	56.5
65.0	371.2	23	0.73	0.6	5.4	15	47
70.0	68.7	22	1.20	-	0.9	2	5.8
75.0	25.8	22	1.7	-	-	0.7	1.9
80.0	4.5	20	3.1	-	-	-	0.5

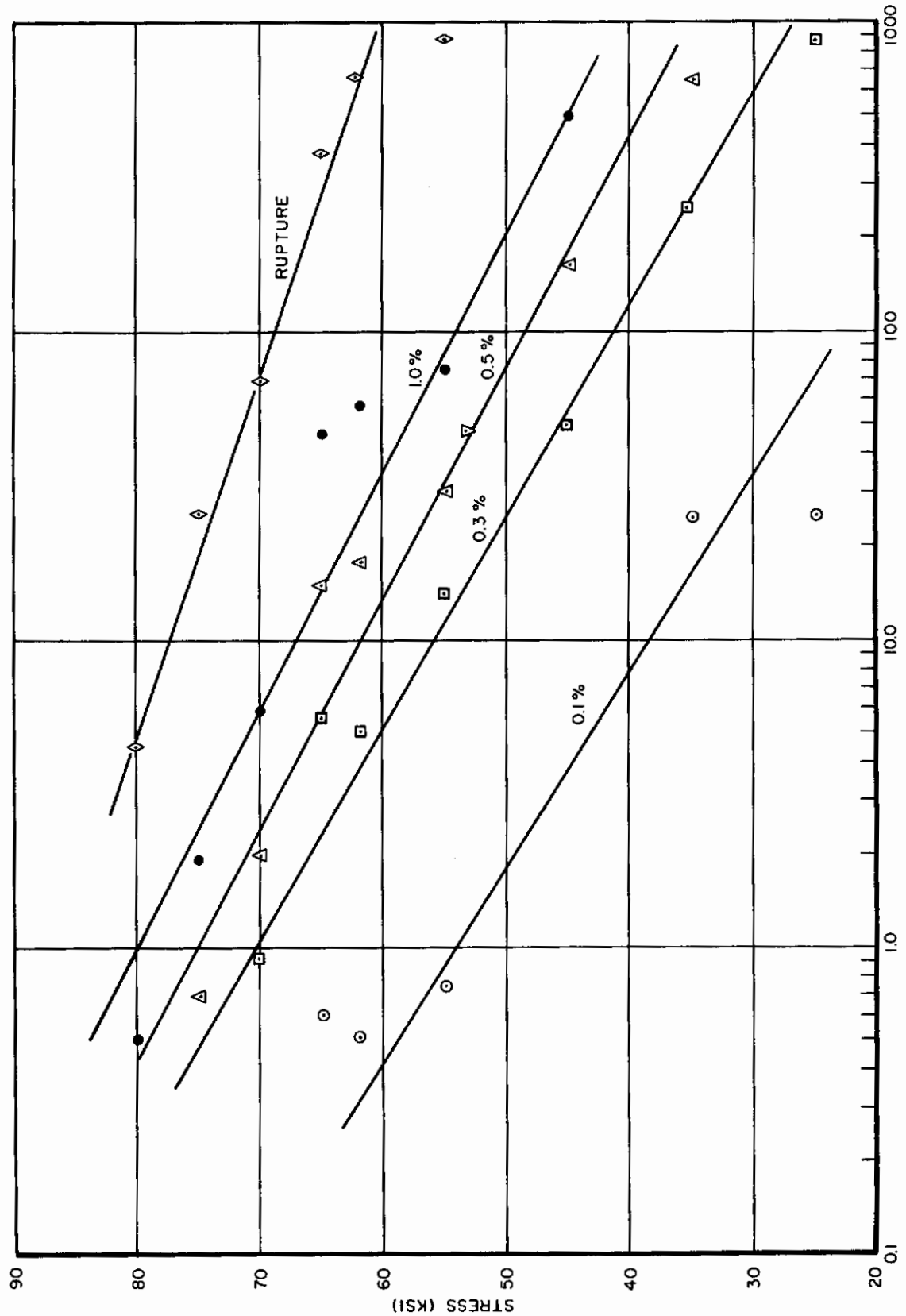


Figure 58. Creep Rupture Properties of TMCA Ti-140A Sheet at 700°F (1160°R)

TABLE 96

MCR Analysis of TMCA Ti-140A Creep Data

Temperature	Stress (KSI)	Strain (in/in)	Time (hours)
800° F (1260° R)	4.17	0	0
		5.0000-04	5
		6.0000-04	10
		7.0000-04	25
		1.0000-03	50
		1.1000-03	75
		1.2000-03	100
		1.6000-03	250
		1.8000-03	500
		2.2000-03	750
		2.6000-03	1000
800° F (1260° R)	7.5	0	0
		5.0000-04	5
		8.0000-04	10
		9.0000-04	25
		1.2000-03	50
		1.6000-03	75
		2.1000-03	100
		2.8000-03	250
		4.0000-03	500
		4.6000-03	750
		5.1000-03	1000
800° F (1260° R)	15.0	0	0
		1.0000-03	5
		1.2000-03	10
		2.1000-03	25
		3.9000-03	50
		4.5000-03	75
		5.2000-03	100
		7.8000-03	250
		1.0800-03	500
		1.3000-02	750
		1.5000-02	1000

TABLE 97

Deformation Versus Time (Fitted Data) for TMCA Ti-140A at 800° F (1260° R)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.1700	5.43040E-04	5.000
	5.89900E-04	10.000
	7.22690E-04	25.000
	9.19170E-04	50.000
	1.08682E-03	75.000
	1.22816E-03	100.000
	1.66084E-03	250.000
4.1700	1.76268E-03	500.000
	2.21410E-03	750.000
	2.59776E-03	1000.000
7.5000	7.79840E-04	10.000
	9.31040E-04	25.000
	1.27929E-03	50.000
	1.58404E-03	75.000
	1.84598E-03	100.000
	2.92215E-03	250.000
	3.94846E-03	500.000
	4.61078E-03	750.000
	5.09837E-03	1000.000
15.0000	1.16234E-03	10.000
	2.53963E-03	25.000
	3.73834E-03	50.000
	4.54842E-03	75.000
	5.19327E-03	100.000
	7.83466E-03	250.000
	1.07619E-02	500.000
	1.30380E-02	750.000
	1.49833E-02	1000.000

TABLE 97 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
29.0000	6.07680E-04	1.500
	8.16560E-04	2.500
	1.33787E-03	5.000
	1.85794E-03	7.500
	2.37675E-03	10.000
	3.41062E-03	15.000
	5.46335E-03	25.000
	1.05075E-02	50.000
	1.54268E-02	75.000
	2.02218E-02	100.000
	2.94487E-02	150.000
	4.67003E-02	250.000
	1.02004E-01	500.000
30.0000	1.20549E-03	1.000
	1.47304E-03	1.500
	2.00181E-03	2.500
	3.10975E-03	5.000
	4.04801E-03	7.500
	4.91122E-03	10.000
	6.54095E-03	15.000
	9.66773E-03	25.000
	1.72785E-02	50.000
	2.47003E-02	75.000
	3.19290E-02	100.000
	4.58270E-02	150.000
30.0000	7.17037E-02	250.000
	1.28513E-01	500.000
37.5000	1.36978E-03	0.500
	1.63421E-03	1.000
	1.89827E-03	1.500
	2.42525E-03	2.500
	3.73612E-03	5.000
	5.03761E-03	7.500
	6.32969E-03	10.000
	8.88570E-03	15.000

TABLE 97 (CONT)

RUN 11

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.38860E-02	25.000
	2.58059E-02	50.000
	3.75506E-02	75.000
	5.17878E-02	100.000
	1.22953E-01	150.000
45.0000	1.97678E-03	0.500
	3.23457E-03	1.000
	4.56116E-03	1.500
	7.16338E-03	2.500
	1.40706E-02	5.000
	2.13730E-02	7.500
	2.87744E-02	10.000
	4.33928E-02	15.000
	7.10531E-02	25.000
51.0000	4.20988E-03	0.500
	7.30654E-03	1.000
	8.20033E-03	1.500
	1.50725E-02	2.500
	4.20707E-02	5.000
	6.65800E-02	7.500
	8.51037E-02	10.000
	1.06256E-01	15.000
57.0000	7.09677E-03	0.500
	1.37368E-02	1.000
	2.27023E-02	1.500
	4.79636E-02	2.500
	1.80001E-01	5.000
65.0000	2.35000E-02	0.500
	7.10000E-02	1.000

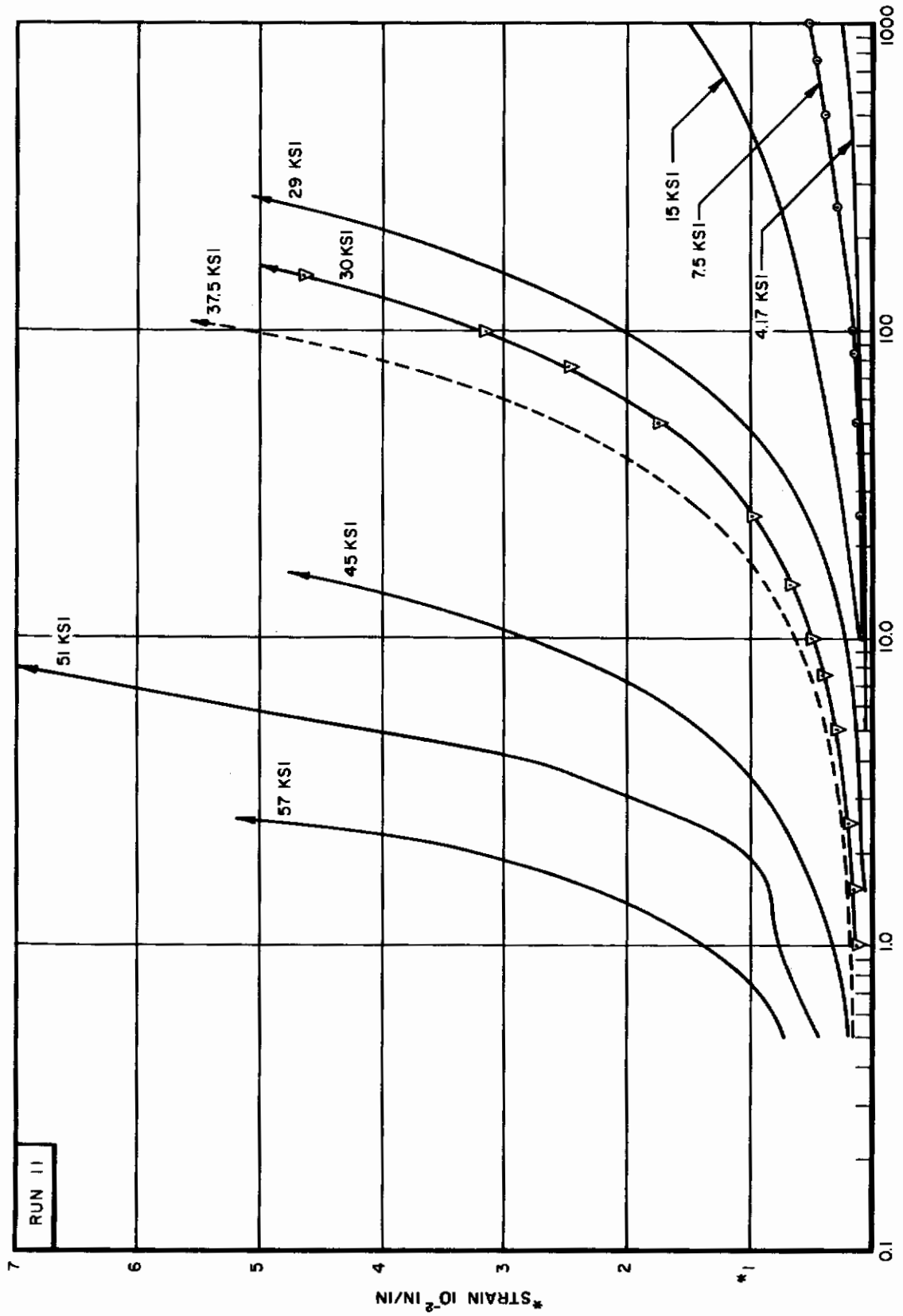


Figure 59. Creep Deformation Versus Log Time of TMCA Ti-140A Sheet at 800°F (1260°R)

TABLE 98

TMCA Ti-140A Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
4.17	-	-	.01	50	-	-	-
7.5	-	-	0.06	42	125	950	-
15.0	-	-	0.15	5	37.5	95	434
29.0	786	44	0.33	4.2	13	19	43
30.0	603.3	64	0.17	-	5.25	10.5	23
37.5	196.8	35	0.32	-	3.3	7.3	18
45.0	51.6	49	0.42	-	-	0.9	1.8
51.0	19.7	45	0.51	-	-	-	-
57.0	5.8	50	0.73	-	-	-	-

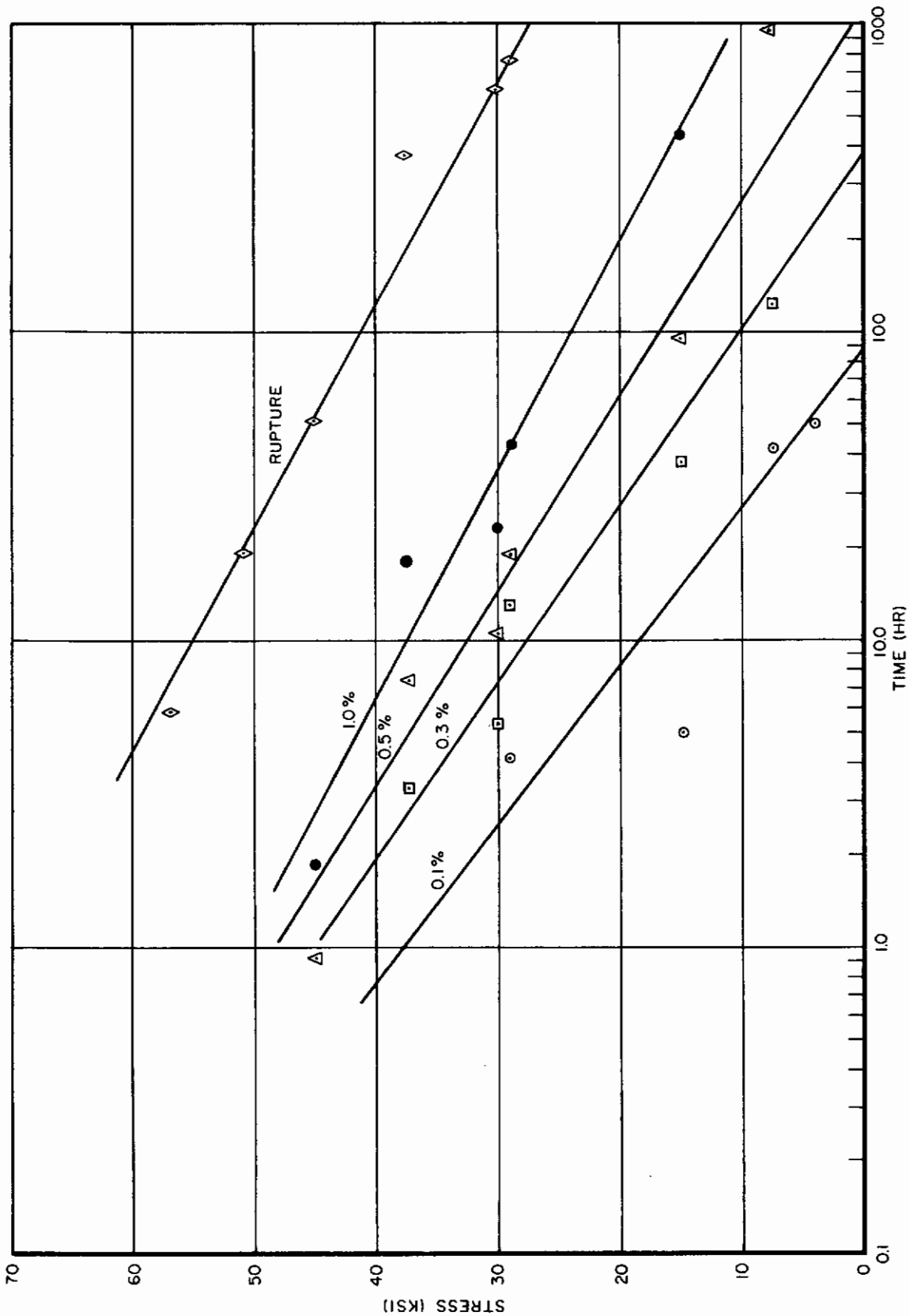


Figure 60. Creep Rupture Properties of TMCA Ti-140A Sheet at 800°F (1260°R)

TABLE 99

Minimum Creep Rate for TMCA Ti-140A

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	50	3.69×10^{-7}
700° F (1160° R)	55	9.53×10^{-5}
	62	1.3×10^{-4}
	65	1.84×10^{-4}
	70	4.53×10^{-4}
	80	2.07×10^{-2}
800° F (1260° R)	4.17	4.07×10^{-7}
	29	1.73×10^{-4}
	37.5	4.70×10^{-4}
	45	2.52×10^{-3}
	51	1.79×10^{-3}
	57	1.33×10^{-2}

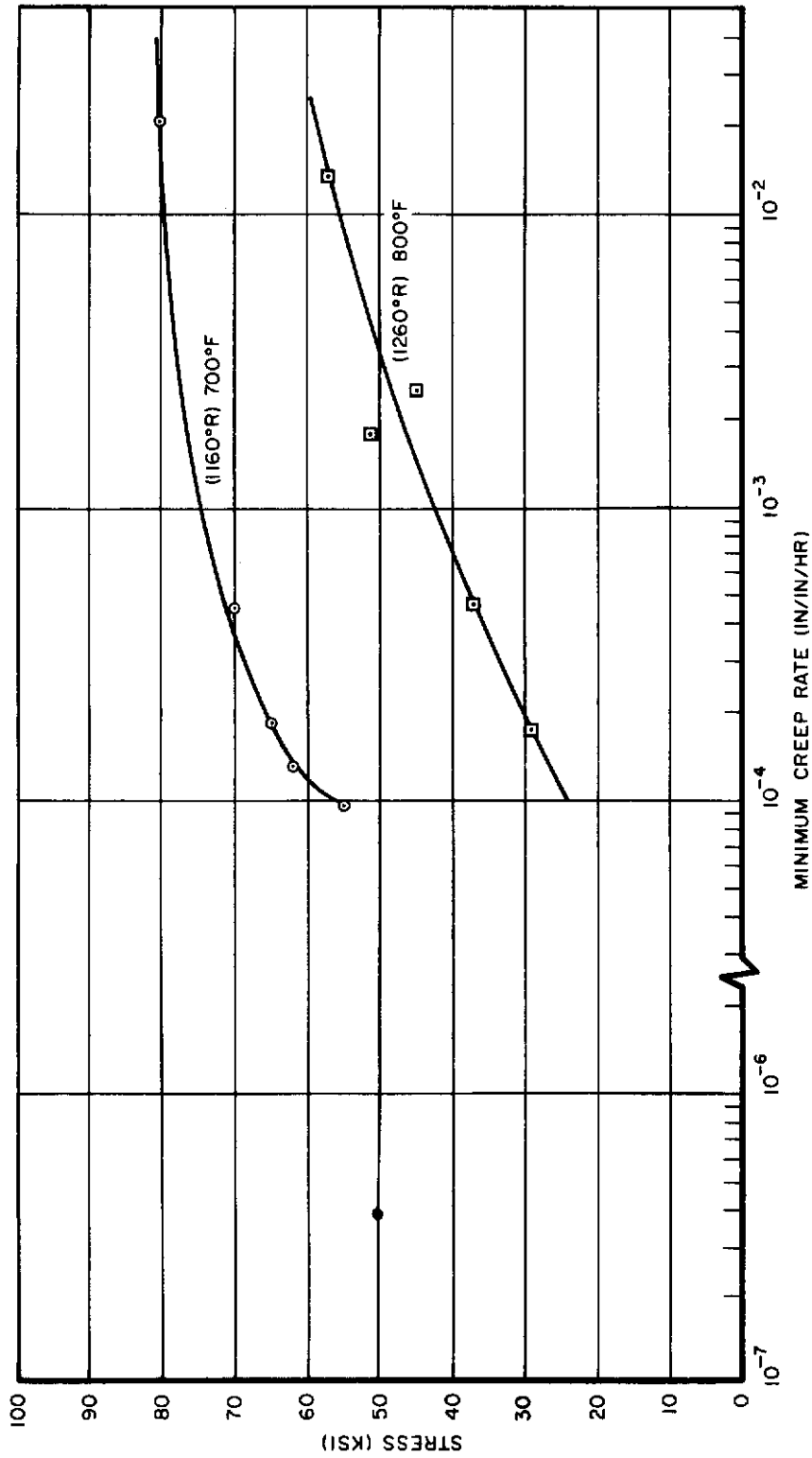


Figure 61. Minimum Creep Rate of TMCA Ti-140A Sheet

CREEP DATA FOR

TMCA Ti-6Al-4V SHEET

TABLE 100

Deformation Versus Time (Raw Data) for TMCA Ti-6Al-4V at 600° F (1060° R)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	10.00000E-05	0.500
	2.00000E-04	1.500
	3.00000E-04	5.000
	3.00000E-04	5.000
	4.00000E-04	10.000
	5.00000E-04	50.000
	6.00000E-04	75.000
	8.00000E-04	100.000
	1.20000E-03	250.000
	1.60000E-03	500.000
	1.80000E-03	750.000
	2.10000E-03	1000.000
	3.00000E-04	0.500
	4.00000E-04	1.000
	5.00000E-04	1.500
	6.00000E-04	5.000
	7.00000E-04	15.000
	8.00000E-04	25.000
	1.10000E-03	50.000
	1.20000E-03	75.000
	1.30000E-03	100.000
	1.60000E-03	250.000
	1.90000E-03	500.000
	2.10000E-03	750.000
	3.10000E-03	1000.000
	4.00000E-04	0.500
	5.00000E-04	1.000
	6.00000E-04	1.500
	7.00000E-04	2.500
	8.00000E-04	5.000
	9.00000E-04	10.000
	10.00000E-04	15.000
	1.20000E-03	25.000
	1.60000E-03	50.000
	1.70000E-03	75.000
	1.90000E-03	100.000
	2.30000E-03	250.000
	2.80000E-03	500.000
	3.10000E-03	750.000
	3.40000E-03	1000.000
	10.00000E-05	1.000
	2.00000E-04	2.500
	3.00000E-04	5.000

TABLE 100 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.000000E-04	7.500
	5.000000E-04	50.000
	6.000000E-04	100.000
85.0000	3.000000E-04	0.500
	4.000000E-04	1.000
	5.000000E-04	1.500
85.0000	6.000000E-04	2.500
	9.000000E-04	5.000
	10.000000E-04	10.000
	1.200000E-03	15.000
	1.400000E-03	25.000
	1.700000E-03	50.000
	1.900000E-03	75.000
	2.100000E-03	100.000
	2.500000E-03	250.000
	3.100000E-03	500.000
	3.700000E-03	750.000
	4.300000E-03	1000.000
90.0000	3.000000E-04	0.500
	4.000000E-04	1.000
	5.000000E-04	1.500
	6.000000E-04	2.500
	8.000000E-04	5.000
	9.000000E-04	7.500
	10.000000E-04	10.000
	1.100000E-03	15.000
	1.300000E-03	25.000
	2.000000E-03	50.000
	2.300000E-03	75.000
	2.500000E-03	100.000
	3.400000E-03	250.000
	5.000000E-03	500.000
	6.100000E-03	750.000
	6.700000E-03	1000.000
	3.000000E-04	1.500
	4.000000E-04	2.500
	6.000000E-04	5.000
	8.000000E-04	7.500
	9.000000E-04	10.000
	10.000000E-04	15.000
	1.100000E-03	25.000
	1.400000E-03	50.000
	1.600000E-03	75.000

RUN 20

TABLE 100 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.90000E-03	100.000
	3.00000E-03	250.000
	4.30000E-03	500.000
	5.20000E-03	750.000
	5.70000E-03	1000.000
92.0000	8.00000E-04	0.500
	9.00000E-04	1.000
	10.00000E-04	1.500
	1.10000E-03	2.500
	1.30000E-03	5.000
	1.40000E-03	7.500
92.0000	1.50000E-03	10.000
	1.60000E-03	15.000
	1.80000E-03	25.000
	2.10000E-03	50.000
	2.50000E-03	100.000
94.0000	10.00000E-05	0.500
	2.00000E-04	1.000
	3.00000E-04	1.500
	4.00000E-04	2.500
	6.00000E-04	5.000
	8.00000E-04	7.500
	9.00000E-04	10.000
	10.00000E-04	15.000
	1.20000E-03	25.000
	1.90000E-03	50.000
	2.40000E-03	75.000
	2.90000E-03	100.000
	4.80000E-03	250.000
	6.90000E-03	500.000
	8.70000E-03	750.000
	1.03000E-02	1000.000
	1.10000E-03	0.500
	1.20000E-03	1.000
	1.30000E-03	1.500
	1.40000E-03	2.500
	1.70000E-03	5.000
	1.90000E-03	7.500
	2.00000E-03	10.000
	2.20000E-03	15.000
	2.50000E-03	25.000
	2.80000E-03	50.000
	3.00000E-03	75.000
	3.20000E-03	100.000

RUN 20

TABLE 100 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
95.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	2.500
	5.00000E-04	5.000
	6.00000E-04	7.500
	7.00000E-04	10.000
	1.10000E-03	15.000
	1.20000E-03	25.000
	1.50000E-03	50.000
	1.90000E-03	75.000
	2.10000E-03	100.000
	3.60000E-03	250.000
	5.60000E-03	500.000
	7.00000E-03	750.000
	8.10000E-03	1000.000
95.5000	1.10000E-03	0.500
	1.20000E-03	1.000
	1.30000E-03	1.500
	1.50000E-03	2.500
	1.70000E-03	5.000
	1.90000E-03	7.500
	2.10000E-03	10.000
	2.30000E-03	15.000
	2.60000E-03	25.000
	3.10000E-03	50.000
	3.70000E-03	75.000
	4.40000E-03	100.000
	5.50000E-03	150.000
97.0000	9.00000E-04	0.500
	1.20000E-03	1.000
	1.40000E-03	1.500
	1.60000E-03	2.500
	1.90000E-03	5.000
	2.00000E-03	7.500
	2.20000E-03	10.000
	2.40000E-03	15.000
	2.80000E-03	25.000
	3.80000E-03	50.000
	4.60000E-03	75.000
	5.30000E-03	100.000
	6.20000E-03	150.000
	6.70000E-03	200.000
	7.30000E-03	250.000
	9.60000E-03	500.000
	1.15000E-02	750.000
	1.32000E-02	1000.000

TABLE 100 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
97.2000	10.00000E-04	5.000
	1.20000E-03	7.500
	1.40000E-03	10.000
	1.70000E-03	15.000
	2.30000E-03	25.000
	3.20000E-03	50.000
	4.20000E-03	75.000
	5.10000E-03	100.000
	6.80000E-03	150.000
	8.30000E-03	200.000
	9.60000E-03	250.000
	1.51000E-02	500.000
	1.97000E-02	750.000
	2.25000E-02	1000.000
97.4000	6.00000E-04	0.500
	7.00000E-04	1.000
97.4000	8.00000E-04	1.500
	10.00000E-04	2.500
	1.30000E-03	5.000
	1.60000E-03	7.500
	1.90000E-03	10.000
	2.10000E-03	15.000
	2.60000E-03	25.000
	3.40000E-03	50.000
	4.10000E-03	75.000
	4.70000E-03	100.000
	5.80000E-03	150.000
	6.60000E-03	200.000
	7.30000E-03	250.000
	9.80000E-03	500.000
	1.16000E-02	750.000
	1.34000E-02	1000.000
97.5000	1.20000E-03	0.500
	1.30000E-03	1.000
	1.40000E-03	1.500
	1.50000E-03	2.500
	1.80000E-03	5.000
	1.90000E-03	7.500
	2.10000E-03	10.000
	2.50000E-03	15.000
	3.00000E-03	25.000
	4.00000E-03	50.000
	5.00000E-03	75.000
	5.70000E-03	100.000

TABLE 100 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	6.90000E-03	150.000
	7.90000E-03	200.000
	8.70000E-03	250.000
	1.28000E-02	500.000
	1.54000E-02	750.000
	1.72000E-02	1000.000
100.0000	4.00000E-04	0.500
	6.00000E-04	1.000
	7.00000E-04	1.500
	9.00000E-04	2.500
	1.10000E-03	5.000
	1.30000E-03	7.500
	1.40000E-03	10.000
	1.60000E-03	15.000
	1.80000E-03	25.000
	2.90000E-03	50.000
	3.60000E-03	75.000
	4.20000E-03	100.000
	6.70000E-03	250.000
	9.60000E-03	500.000
	1.19000E-02	750.000
	1.34000E-02	1000.000
102.0000	9.00000E-04	0.500
	1.10000E-03	1.000
	1.30000E-03	1.500
	1.40000E-03	2.500
	1.60000E-03	5.000
	1.70000E-03	7.500
	1.90000E-03	10.000
	2.20000E-03	15.000
	2.80000E-03	25.000
	4.00000E-03	50.000
	4.90000E-03	75.000
	5.70000E-03	100.000
	7.10000E-03	150.000
	8.40000E-03	200.000
	9.40000E-03	250.000
	1.38000E-02	500.000
104.0000	1.70000E-03	0.500
	1.90000E-03	1.000
	2.00000E-03	1.500
	2.10000E-03	2.500
	2.30000E-03	5.000

TABLE 100 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.40000E-03	7.500
	2.60000E-03	10.000
	2.80000E-03	15.000
	3.40000E-03	25.000
	5.30000E-03	50.000
	6.50000E-03	75.000
	7.50000E-03	100.000
	9.10000E-03	150.000
	1.04000E-02	200.000
	1.15000E-02	250.000
	1.54000E-02	500.000
	1.86000E-02	750.000
	6.60000E-04	0.500
	7.00000E-04	1.000
	9.00000E-04	1.500
	1.10000E-03	2.500
	1.40000E-03	5.000
	1.60000E-03	7.500
	1.80000E-03	10.000
	2.30000E-03	15.000
	3.10000E-03	25.000
	4.80000E-03	50.000
	6.10000E-03	75.000
	7.20000E-03	100.000
	9.20000E-03	150.000
104.0000	1.09000E-02	200.000
	1.25000E-02	250.000
	1.82000E-02	500.000
	2.22000E-02	750.000
	2.48000E-02	1000.000
	5.00000E-04	0.500
	7.00000E-04	1.000
	8.00000E-04	1.500
105.0000	10.00000E-04	2.500
	1.30000E-03	5.000
	1.50000E-03	7.500
	1.70000E-03	10.000
	2.30000E-03	15.000
	3.20000E-03	25.000
	5.10000E-03	50.000
	6.60000E-03	75.000
	8.00000E-03	100.000
	1.04000E-02	150.000
	1.27000E-02	200.000
	1.49000E-02	250.000
	2.30000E-02	500.000

TABLE 100 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.89000E-02	750.000
	3.31000E-02	1000.000
105.5000	2.00000E-03	0.500
	2.20000E-03	1.000
	2.30000E-03	1.500
	2.60000E-03	2.500
	3.10000E-03	5.000
	3.40000E-03	7.500
	3.70000E-03	10.000
	4.10000E-03	15.000
	4.60000E-03	25.000
	6.20000E-03	50.000
	7.40000E-03	75.000
	8.40000E-03	100.000
	1.01000E-02	150.000
	1.15000E-02	200.000
	1.28000E-02	250.000
	1.82000E-02	500.000
	2.28000E-02	750.000
	2.64000E-02	1000.000
105.6500	1.10000E-03	0.500
	1.40000E-03	1.000
	1.60000E-03	1.500
	1.90000E-03	2.500
	2.40000E-03	5.000
	2.90000E-03	7.500
	3.30000E-03	10.000
	4.00000E-03	15.000
	5.10000E-03	25.000
	7.60000E-03	50.000
	9.70000E-03	75.000
	1.14000E-02	100.000
	1.39000E-02	150.000
	1.61000E-02	200.000
	1.83000E-02	250.000
	2.46000E-02	500.000
	2.92000E-02	750.000
	3.35000E-02	1000.000

TABLE 101

Deformation Versus Time (Fitted Data) for TMCA Ti-6Al-4V Sheet at 600° F (1060° R)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	8.85300E-05	0.500
	2.32930E-04	1.500
	2.94640E-04	5.000
	3.30060E-04	10.000
	5.54900E-04	50.000
	6.64510E-04	75.000
	7.58920E-04	100.000
	1.16118E-03	250.000
	1.57382E-03	500.000
	1.85787E-03	750.000
	2.07721E-03	1000.000
	3.43670E-04	0.500
	3.78070E-04	1.000
	4.23360E-04	1.500
	6.23190E-04	5.000
	8.30410E-04	15.000
	9.21790E-04	25.000
	1.04392E-03	50.000
	1.12249E-03	75.000
	1.18719E-03	100.000
	1.50689E-03	250.000
	1.98197E-03	500.000
	2.42505E-03	750.000
	2.84363E-03	1000.000
	4.16760E-04	0.500
	5.10320E-04	1.000
	5.70000E-04	1.500
	6.53710E-04	2.500
	7.88360E-04	5.000
	9.54950E-04	10.000
	1.07040E-03	15.000
	1.23759E-03	25.000
	1.50773E-03	50.000
	1.69098E-03	75.000
	1.83301E-03	100.000
	2.35541E-03	250.000
	2.82429E-03	500.000
	3.12857E-03	750.000
	3.35786E-03	1000.000
	8.93300E-05	1.000
	2.28700E-04	2.500
	3.13030E-04	5.000
	3.56030E-04	7.500
	5.25670E-04	50.000
	5.87160E-04	100.000

RUN 20

TABLE 101 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
85.0000	3.22830E-04	0.500
	3.97700E-04	1.000
	4.72666E-04	1.500
	5.98820E-04	2.500
85.0000	8.18230E-04	5.000
	1.07585E-03	10.000
	1.23543E-03	15.000
	1.43883E-03	25.000
	1.71438E-03	50.000
	1.87951E-03	75.000
	2.00352E-03	100.000
	2.50781E-03	250.000
	3.14810E-03	500.000
	3.72297E-03	750.000
	4.26324E-03	1000.000
90.0000	3.04926E-04	0.500
	4.11246E-04	1.000
	4.83366E-04	1.500
	5.89250E-04	2.500
	7.68210E-04	5.000
	8.96706E-04	7.500
	1.00075E-03	10.000
	1.16868E-03	15.000
	1.42280E-03	25.000
	1.86635E-03	50.000
	2.19525E-03	75.000
	2.46830E-03	100.000
	3.63452E-03	250.000
	4.94241E-03	500.000
	5.94851E-03	750.000
	6.79866E-03	1000.000
	3.32820E-04	1.500
	4.39910E-04	2.500
	6.00920E-04	5.000
	7.08600E-04	7.500
	7.93370E-04	10.000
	9.27820E-04	15.000
	1.12953E-03	25.000
	1.48454E-03	50.000
	1.75292E-03	75.000
	1.97943E-03	100.000
	2.98028E-03	250.000
	4.15026E-03	500.000
	5.07315E-03	750.000
	5.86415E-03	1000.000

TABLE 101 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
92.0000	7.99040E-04	0.500
	9.05570E-04	1.000
	9.90060E-04	1.500
	1.11073E-03	2.500
	1.29107E-03	5.000
	1.40424E-03	7.500
	1.48875E-03	10.000
92.0000	1.61604E-03	15.000
	1.79624E-03	25.000
	2.09704E-03	50.000
	2.50117E-03	100.000
94.0000	8.35400E-05	0.500
	2.27410E-04	1.000
	3.05650E-04	1.500
	4.10020E-04	2.500
	5.83980E-04	5.000
	7.15550E-04	7.500
	8.27700E-04	10.000
	1.01941E-03	15.000
	1.33282E-03	25.000
	1.93490E-03	50.000
	2.41583E-03	75.000
	2.83187E-03	100.000
	4.72193E-03	250.000
	6.96580E-03	500.000
	8.73922E-03	750.000
	1.02577E-02	1000.000
	1.10954E-03	0.500
	1.18493E-03	1.000
	1.27736E-03	1.500
	1.43477E-03	2.500
	1.70422E-03	5.000
	1.88290E-03	7.500
	2.01609E-03	10.000
	2.21002E-03	15.000
	2.46114E-03	25.000
	2.81139E-03	50.000
	3.02459E-03	75.000
	3.18298E-03	100.000
95.0000	1.99560E-04	0.500
	2.71800E-04	1.000
	4.16170E-04	2.500
	5.63840E-04	5.000
	6.68760E-04	7.500
	7.54000E-04	10.000

TABLE 101 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.94060E-04	15.000
	1.11638E-03	25.000
	1.54390E-03	50.000
	1.89397E-03	75.000
	2.20362E-03	100.000
	3.67013E-03	250.000
	5.48136E-03	500.000
	6.93553E-03	750.000
	8.18687E-03	1000.000
95.5000	1.10939E-03	0.500
95.5000	1.18748E-03	1.000
	1.29436E-03	1.500
	1.47292E-03	2.500
	1.76012E-03	5.000
	1.93931E-03	7.500
	2.07024E-03	10.000
	2.26544E-03	15.000
	2.55547E-03	25.000
	3.15750E-03	50.000
	3.74144E-03	75.000
	4.33007E-03	100.000
	5.51618E-03	150.000
97.0000	9.43820E-04	0.500
	1.20873E-03	1.000
	1.34832E-03	1.500
	1.52867E-03	2.500
	1.81839E-03	5.000
	2.03200E-03	7.500
	2.21132E-03	10.000
	2.51263E-03	15.000
	2.99148E-03	25.000
	3.86672E-03	50.000
	4.52856E-03	75.000
	5.07831E-03	100.000
	5.98297E-03	150.000
	6.72898E-03	200.000
	7.37427E-03	250.000
	9.81024E-03	500.000
	1.15913E-02	750.000
	1.30433E-02	1000.000
97.2000	1.11307E-03	5.000
	1.23254E-03	7.500
	1.35475E-03	10.000
	1.60310E-03	15.000

TABLE 101 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.09539E-03	25.000
	3.23924E-03	50.000
	4.26411E-03	75.000
	5.19692E-03	100.000
	6.86136E-03	150.000
	8.33245E-03	200.000
	9.66384E-03	250.000
	1.50593E-02	500.000
	1.92689E-02	750.000
	2.28150E-02	1000.000
97.4000	5.11220E-04	0.500
	7.40920E-04	1.000
	8.72460E-04	1.500
97.4000	1.05184E-03	2.500
	1.35060E-03	5.000
	1.57288E-03	7.500
	1.75955E-03	10.000
	2.07311E-03	15.000
	2.57193E-03	25.000
	3.48808E-03	50.000
	4.18541E-03	75.000
	4.76740E-03	100.000
	5.72962E-03	150.000
	6.52634E-03	200.000
	7.21724E-03	250.000
	9.83270E-03	500.000
	1.17458E-02	750.000
	1.33028E-02	1000.000
97.5000	1.14425E-03	0.500
	1.35099E-03	1.000
	1.43781E-03	1.500
	1.54503E-03	2.500
	1.74700E-03	5.000
	1.92814E-03	7.500
	2.09795E-03	10.000
	2.41088E-03	15.000
	2.95780E-03	25.000
	4.05174E-03	50.000
	4.92798E-03	75.000
	5.67703E-03	100.000
	6.94008E-03	150.000
	8.00319E-03	200.000
	8.93504E-03	250.000
	1.25268E-02	500.000
	1.52055E-02	750.000
	1.74127E-02	1000.000

TABLE 101 (CONT)

RUN 2C

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	3.51736E-04	0.500
	6.51480E-04	1.000
	7.69916E-04	1.500
	8.92390E-04	2.500
	1.07003E-03	5.000
	1.21196E-03	7.500
	1.34224E-03	10.000
	1.58200E-03	15.000
	2.00516E-03	25.000
	2.86508E-03	50.000
	3.56158E-03	75.000
	4.15972E-03	100.000
	6.76826E-03	250.000
	9.63147E-03	500.000
	1.17509E-02	750.000
	1.34861E-02	1000.000
102.0000	8.96680E-04	0.500
	1.14973E-03	1.000
	1.25237E-03	1.500
	1.37003E-03	2.500
	1.57386E-03	5.000
	1.75249E-03	7.500
	1.92045E-03	10.000
	2.23317E-03	15.000
	2.79006E-03	25.000
	3.93804E-03	50.000
	4.88492E-03	75.000
	5.71088E-03	100.000
	7.13398E-03	150.000
	8.35812E-03	200.000
	9.44887E-03	250.000
	1.37863E-02	500.000
104.0000	1.67630E-03	0.500
	1.96926E-03	1.000
	2.02362E-03	1.500
	2.05415E-03	2.500
	2.16584E-03	5.000
	2.33594E-03	7.500
	2.52717E-03	10.000
	2.92005E-03	15.000
	3.66022E-03	25.000
	5.18523E-03	50.000
	6.39344E-03	75.000
	7.40462E-03	100.000
	9.05821E-03	150.000

TABLE 101 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
104.0000	1.24047E-02	250.000
	1.78743E-02	500.000
	2.19002E-02	750.000
	2.51837E-02	1000.000
105.0000	4.17570E-04	0.500
	7.26130E-04	1.000
	8.80010E-04	1.500
	1.05344E-03	2.500
	1.31450E-03	5.000
	1.53644E-03	7.500
	1.75413E-03	10.000
	2.18635E-03	15.000
	3.02587E-03	25.000
	4.92758E-03	50.000
	6.58928E-03	75.000
	8.07405E-03	100.000
	1.06689E-02	150.000
	1.29133E-02	200.000
	1.49103E-02	250.000
	2.27328E-02	500.000
	2.85933E-02	750.000
	3.33959E-02	1000.000
	1.03996E-02	200.000
	1.15388E-02	250.000
	1.56422E-02	500.000
	1.84453E-02	750.000
	6.98350E-04	0.500
	8.08610E-04	1.000
	8.66320E-04	1.500
	9.71890E-04	2.500
	1.24776E-03	5.000
	1.52219E-03	7.500
	1.78526E-03	10.000
	2.27427E-03	15.000
	3.13131E-03	25.000
	4.84282E-03	50.000
	6.20946E-03	75.000
	7.37451E-03	100.000
	9.33199E-03	150.000
	1.09724E-02	200.000

RUN 20

TABLE 101 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
105.5000	1.98907E-03	0.500
	2.19492E-03	1.000
	2.35672E-03	1.500
	2.60598E-03	2.500
	3.04203E-03	5.000
	3.36583E-03	7.500
	3.63612E-03	10.000
	4.08969E-03	15.000
	4.81982E-03	25.000
	6.21721E-03	50.000
	7.34159E-03	75.000
	8.32201E-03	100.000
	1.00253E-02	150.000
	1.15102E-02	200.000
	1.28498E-02	250.000
	1.83208E-02	500.000
	2.26821E-02	750.000
	2.64308E-02	1000.000
105.6500	1.06040E-03	0.500
	1.46596E-03	1.000
	1.64434E-03	1.500
	1.88335E-03	2.500
	2.36885E-03	5.000
	2.81136E-03	7.500
	3.22429E-03	10.000
	3.97706E-03	15.000
	5.26717E-03	25.000
	7.76422E-03	50.000
	9.69703E-03	75.000
	1.13084E-02	100.000
	1.39499E-02	150.000
	1.61075E-02	200.000
	1.79543E-02	250.000
	2.47377E-02	500.000
	2.95041E-02	750.000
	3.32741E-02	1000.000

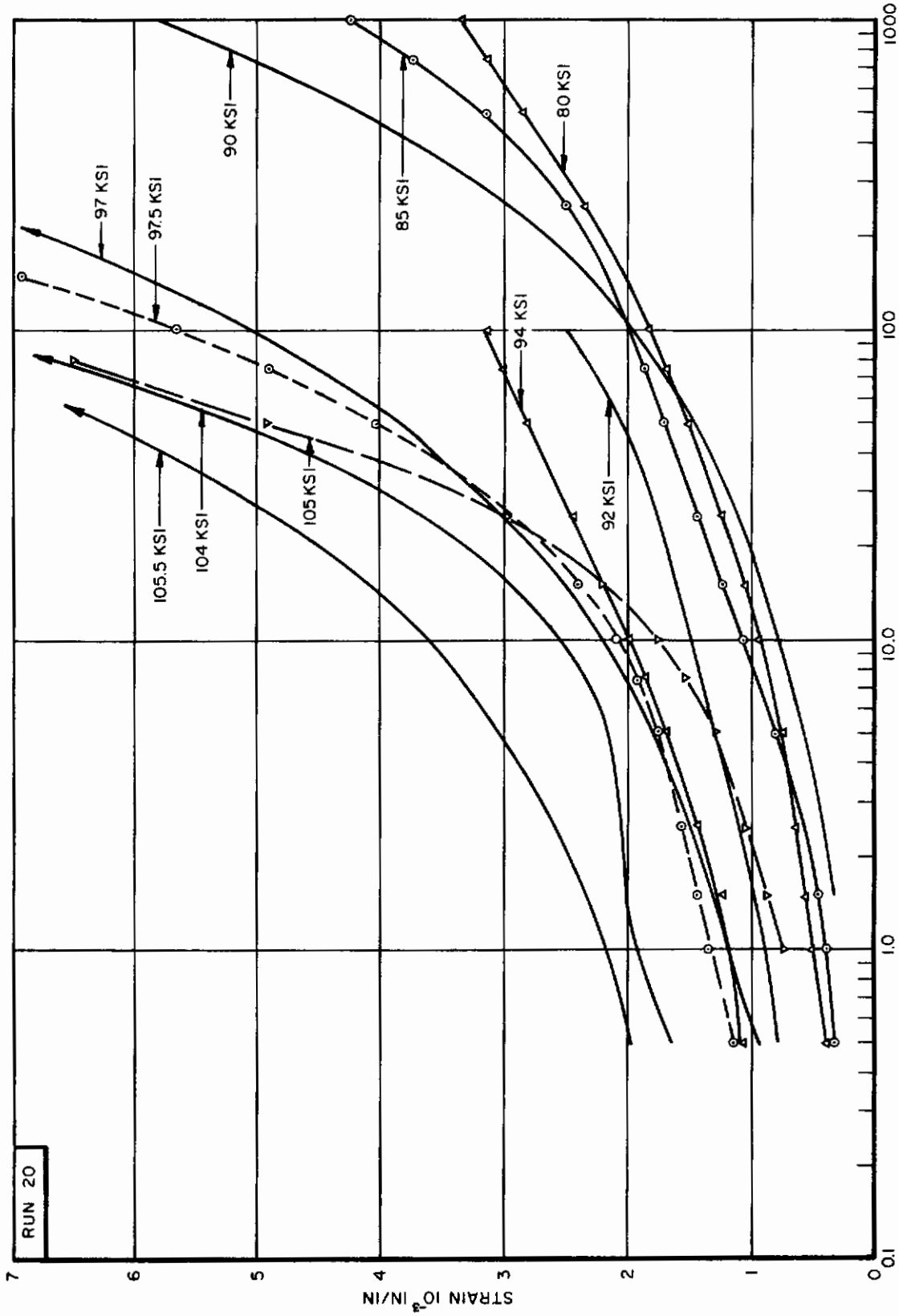


Figure 62. Creep Deformation Versus Log Time of TMCA Ti-6A1-4V Sheet at 600°F (1060°R)

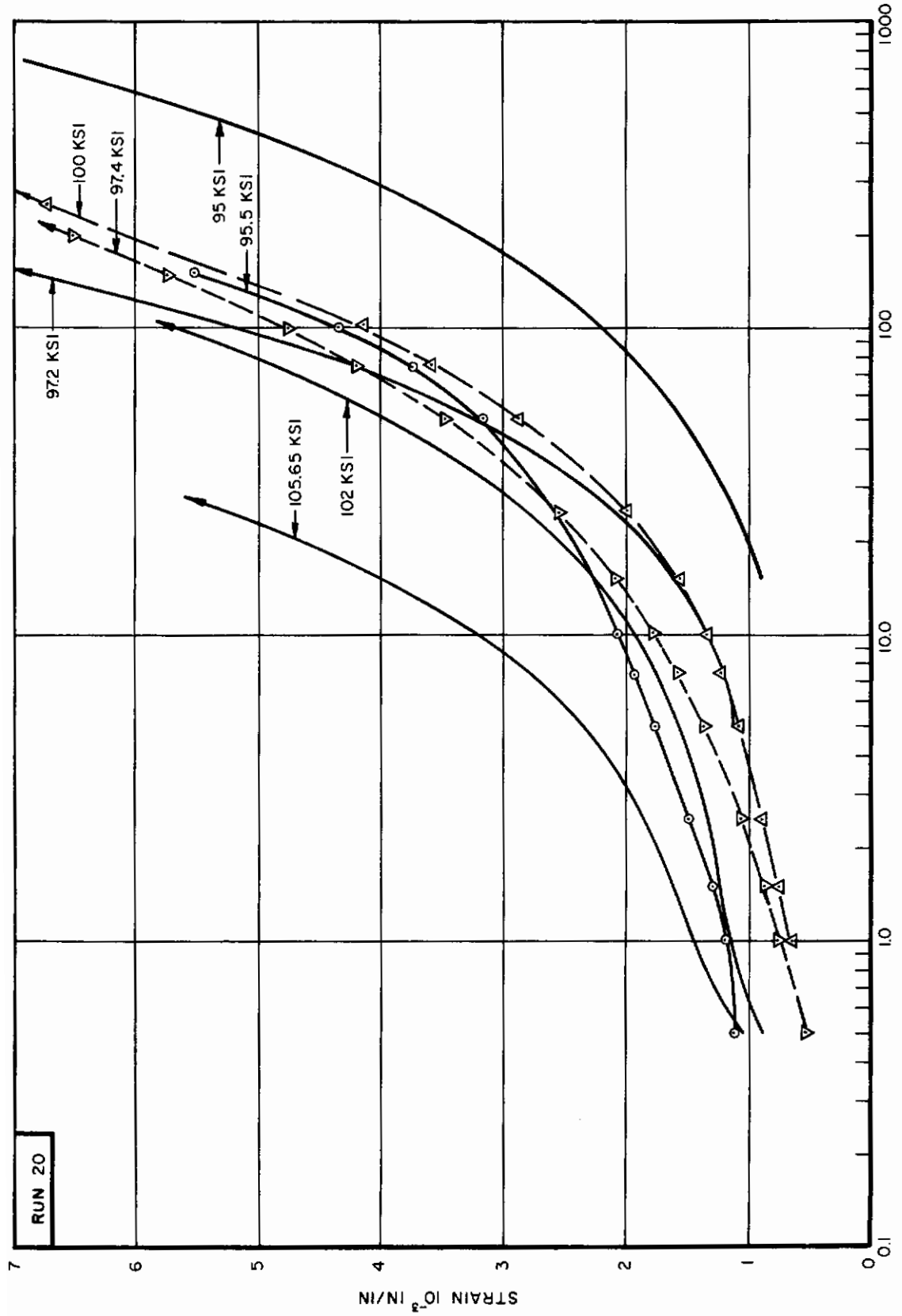


Figure 62 (CONT)

TABLE 102

TMCA Ti-6Al-4V Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
		0.1%	0.3%	0.5%	1.0%
80.0	0.54	42	975	-	-
			975	-	-
80.0	0.6	175	-	-	-
90.0	3.16	10	183	500	-
90.0	2.08	10	250	695	-
94.0	0.81	10	107	274	958
97.0	1.55	0.67	30	97	552
97.2	2.49	5.0	44.4	77	255
97.4	3.17	2.5	37.5	113.5	527.7
97.5	3.15	-	25	75	332
100.0	2.4	3.75	53.5	148	540
104.0	0.57	-	19	46	177
105.5	0.76	-	4.5	31	148
105.6	3.72	-	8.1	24.5	79

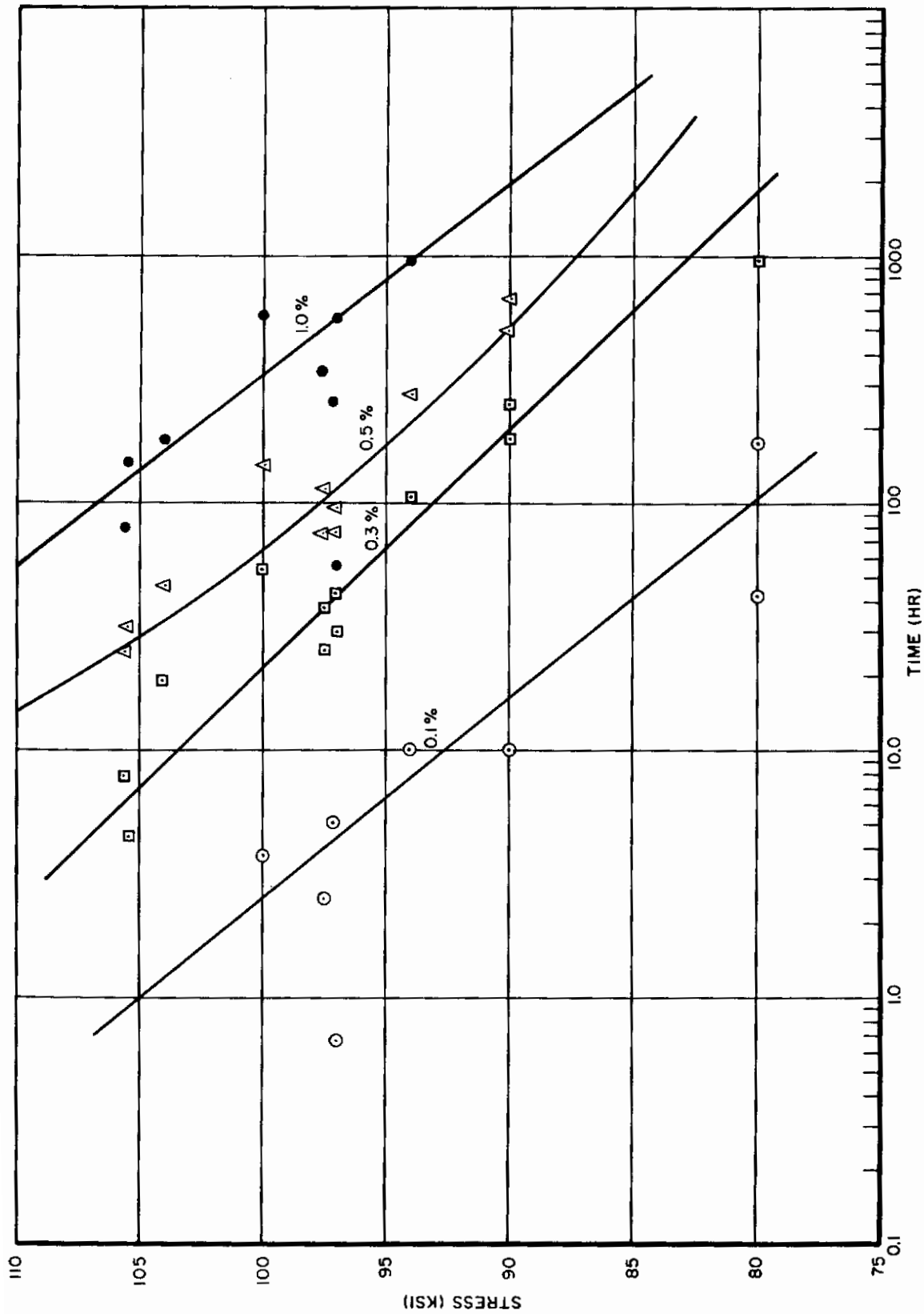


Figure 63. Creep Rupture Properties of TMCA Ti-6Al-4V Sheet at 600°F (1060°R)

TABLE 103

Deformation Versus Time (Raw Data) for TMCA Ti-6Al-4V Sheet at 800° F (1260° R) RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	10.00000E-05	2.500
	2.00000E-04	5.000
	3.00000E-04	10.000
	4.00000E-04	15.000
	5.00000E-04	25.000
	9.00000E-04	50.000
	1.10000E-03	75.000
	1.30000E-03	100.000
	2.10000E-03	250.000
	2.70000E-03	500.000
	3.20000E-03	750.000
	3.60000E-03	1000.000
	4.00000E-04	10.000
	5.00000E-04	15.000
	7.00000E-04	25.000
	1.10000E-03	50.000
	1.30000E-03	75.000
	1.50000E-03	100.000
	1.80000E-03	250.000
	2.50000E-03	500.000
	3.00000E-03	750.000
	3.40000E-03	1000.000
25.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	2.500
	5.00000E-04	5.000
	6.00000E-04	10.000
	8.00000E-04	15.000
	10.00000E-04	25.000
	1.70000E-03	50.000
	2.10000E-03	75.000
	2.40000E-03	100.000
	3.40000E-03	250.000
	4.30000E-03	500.000
	5.00000E-03	750.000
	5.60000E-03	1000.000
25.0000	3.00000E-04	0.500
	4.00000E-04	1.000
	5.00000E-04	1.500
	6.00000E-04	2.500
	8.00000E-04	5.000
	10.00000E-04	7.500
	1.10000E-03	15.000
	1.30000E-03	25.000

RUN 20

TABLE 103 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.60000E-03	50.000
	1.80000E-03	75.000
	2.10000E-03	100.000
	3.00000E-03	250.000
	3.80000E-03	500.000
	4.60000E-03	750.000
	5.40000E-03	1000.000
	2.00000E-04	5.000
	3.00000E-04	10.000
	4.00000E-04	15.000
	6.00000E-04	25.000
	8.00000E-04	50.000
	10.00000E-04	75.000
	1.20000E-03	100.000
	1.70000E-03	250.000
	2.30000E-03	500.000
	2.90000E-03	750.000
	3.30000E-03	1000.000
30.0000	3.00000E-04	0.500
	4.00000E-04	1.000
	5.00000E-04	2.500
	6.00000E-04	5.000
	7.00000E-04	7.500
	8.00000E-04	10.000
	9.00000E-04	15.000
	1.20000E-03	25.000
	1.70000E-03	50.000
	2.10000E-03	75.000
	2.40000E-03	100.000
	3.70000E-03	250.000
	5.20000E-03	500.000
	6.30000E-03	750.000
	7.40000E-03	1000.000
35.0000	2.00000E-04	5.000
	4.00000E-04	7.500
	5.00000E-04	10.000
	7.00000E-04	15.000
	10.00000E-04	25.000
	1.40000E-03	50.000
	1.70000E-03	75.000
35.0000	2.00000E-03	100.000
	3.30000E-03	250.000
	4.30000E-03	500.000

TABLE 103 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.20000E-03	750.000
	6.20000E-03	1000.000
	4.00000E-04	0.500
	5.00000E-04	1.000
	7.00000E-04	1.500
	8.00000E-04	2.500
	9.00000E-04	5.000
	10.00000E-04	7.500
	1.10000E-03	10.000
	1.30000E-03	15.000
	1.50000E-03	25.000
	2.00000E-03	50.000
	2.40000E-03	75.000
	2.70000E-03	100.000
	3.90000E-03	250.000
	5.70000E-03	500.000
	7.30000E-03	750.000
	8.80000E-03	1000.000
	6.00000E-04	5.000
	8.00000E-04	7.500
	9.00000E-04	10.000
	1.20000E-03	15.000
	1.60000E-03	25.000
	2.60000E-03	50.000
	3.20000E-03	75.000
	3.70000E-03	100.000
	5.30000E-03	250.000
	7.00000E-03	500.000
	8.70000E-03	750.000
	1.04000E-02	1000.000
40.0000	3.00000E-04	0.500
	5.00000E-04	1.000
	6.00000E-04	1.500
	8.00000E-04	2.500
	1.20000E-03	5.000
	1.50000E-03	7.500
	1.80000E-03	10.000
	2.20000E-03	15.000
	2.70000E-03	25.000
	3.40000E-03	50.000
	4.00000E-03	75.000
	4.70000E-03	100.000
45.0000	4.00000E-04	0.500
	5.00000E-04	1.000
	6.00000E-04	1.500

TABLE 103 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	7.00000E-04	2.500
	8.00000E-04	5.000
	10.00000E-04	7.500
	1.20000E-03	10.000
	1.50000E-03	15.000
	2.50000E-03	25.000
	3.20000E-03	50.000
	4.00000E-03	75.000
	4.60000E-03	100.000
	7.20000E-03	250.000
	1.04000E-02	500.000
	1.32000E-02	750.000
	1.54000E-02	1000.000
50.0000	8.00000E-04	0.500
	10.00000E-04	1.000
	1.10000E-03	1.500
	1.20000E-03	2.500
	1.60000E-03	5.000
	1.90000E-03	7.500
	2.10000E-03	10.000
	2.40000E-03	15.000
	3.10000E-03	25.000
	4.60000E-03	50.000
	6.10000E-03	75.000
	7.40000E-03	100.000
60.0000	6.00000E-04	0.500
	9.00000E-04	1.000
	1.20000E-03	1.500
	1.40000E-03	2.500
	1.60000E-03	5.000
	1.80000E-03	7.500
	2.00000E-03	10.000
	2.30000E-03	15.000
	2.80000E-03	25.000
	3.80000E-03	50.000
	4.50000E-03	75.000
	5.20000E-03	100.000
	8.00000E-03	250.000
	1.23000F-02	500.000
	1.66000E-02	750.000
	2.08000E-02	1000.000
	2.00000E-03	1.500
	2.10000E-03	2.500
	3.90000E-03	5.000
	4.70000E-03	7.500

TABLE 103 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.20000E-03	10.000
	6.00000E-03	15.000
	7.60000E-03	25.000
60.0000	1.25000E-02	50.000
	1.55000E-02	75.000
	1.90000E-02	100.000
	2.50000E-02	150.000
	3.00000E-02	200.000
	3.50000E-02	250.000
	5.20000E-02	500.000
	6.20000E-02	750.000
	7.00000E-02	1000.000
66.0000	4.60000E-03	7.500
	5.40000E-03	10.000
	6.70000E-03	15.000
	8.60000E-03	25.000
	1.25000E-02	50.000
	1.70000E-02	75.000
	2.10000E-02	100.000
	2.85000E-02	150.000
	3.60000E-02	200.000
	4.40000E-02	250.000
	8.15000E-02	500.000
	1.34500E-01	750.000
	1.94500E-01	1000.000
67.0000	5.60000E-03	5.000
	7.10000E-03	7.500
	8.20000E-03	10.000
	10.00000E-03	15.000
	1.27000E-02	25.000
	1.75000E-02	50.000
	2.25000E-02	75.000
	2.75000E-02	100.000
	3.75000E-02	150.000
	4.70000E-02	200.000
	5.65000E-02	250.000
	8.80000E-02	500.000
	9.15000E-02	750.000
	1.49000E-01	1000.000
70.0000	2.70000E-03	0.500
	3.80000E-03	1.000
	4.60000E-03	1.500
	5.90000E-03	2.500
	8.50000E-03	5.000

RUN 20

TABLE 103 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.04000E-02	7.500
	1.20000E-02	10.000
	1.49000E-02	15.000
	1.96000E-02	25.000
	3.00000E-02	50.000
	3.62000E-02	75.000
70.0000	4.20000E-02	100.000
	5.50000E-02	150.000
	6.87000E-02	200.000
	7.87000E-02	250.000
	9.20000E-03	5.000
	1.18000E-02	7.500
	1.43000E-02	10.000
	1.86000E-02	15.000
	2.65000E-02	25.000
	3.90000E-02	50.000
	4.90000E-02	75.000
	5.60000E-02	100.000
71.0000	7.90000E-02	150.000
	1.05000E-01	200.000
	1.38500E-01	250.000
	5.50000E-03	0.500
	8.00000E-03	1.000
	10.00000E-03	1.500
	1.30000E-02	2.500
	1.90000E-02	5.000
	2.37000E-02	7.500
	2.80000E-02	10.000
	3.55000E-02	15.000
	5.00000E-02	25.000
	8.70000E-02	50.000
	1.28500E-01	75.000
	5.50000E-03	0.500
	8.00000E-03	1.000
	10.00000E-03	1.500
	1.30000E-02	2.500
	1.80000E-02	5.000
	2.15000E-02	7.500
	2.45000E-02	10.000
	3.00000E-02	15.000
	4.00000E-02	25.000
	5.85000E-02	50.000
	7.10000E-02	75.000
	7.90000E-02	100.000
	8.60000E-02	150.000

TABLE 103 (CONT)

RUN : 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.85000E-02	200.000
	3.50000E-03	0.500
	4.80000E-03	1.000
	5.80000E-03	1.500
	7.50000E-03	2.500
	1.13000E-02	5.000
	1.44000E-02	7.500
	1.72000E-02	10.000
	2.22000E-02	15.000
75.0000	3.16000E-02	25.000
	5.00000E-02	50.000
	6.60000E-02	75.000
	8.70000E-02	100.000
	1.06000E-01	150.000
	1.20000E-03	1.500
	1.80000E-03	2.500
	2.80000E-03	5.000
	3.70000E-03	7.500
	4.40000E-03	10.000
	5.80000E-03	15.000
	8.10000E-03	25.000
	1.22000E-02	50.000
	1.52000E-02	75.000
	1.78000E-02	100.000
	2.27000E-02	150.000
	2.77000E-02	200.000
	3.25000E-02	250.000
	5.73000E-02	500.000
	8.20000E-02	750.000
	1.06700E-01	1000.000
75.5000	4.20000E-03	0.500
	6.00000E-03	1.000
	7.50000E-03	1.500
	1.05000E-02	2.500
	1.62000E-02	5.000
	2.10000E-02	7.500
	2.55000E-02	10.000
	3.30000E-02	15.000
	5.00000E-02	25.000
	8.00000E-02	50.000
	1.16000E-01	75.000
	1.50000E-01	100.000
76.0000	4.50000E-03	0.500
	6.50000E-03	1.000
	8.00000E-03	1.500

RUN 20

TABLE 103 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.05000E-02	2.500
	1.58000E-02	5.000
	2.05000E-02	7.500
	2.40000E-02	10.000
	3.10000E-02	15.000
	4.40000E-02	25.000
	7.70000E-02	50.000
	1.18000E-01	75.000
78.0000	1.90000E-03	0.500
	2.30000E-03	1.000
	3.00000E-03	1.500
78.0000	4.20000E-03	2.500
	6.50000E-03	5.000
	8.40000E-03	7.500
	9.50000E-03	10.000
	1.25000E-02	15.000
	2.13000E-02	25.000
	3.93000E-02	50.000
	5.65000E-02	75.000
	7.05000E-02	100.000
	2.50000E-03	0.500
	4.30000E-03	1.000
	6.00000E-03	1.500
	8.50000E-03	2.500
	1.30000E-02	5.000
	1.70000E-02	7.500
	2.05000E-02	10.000
	2.67000E-02	15.000
	3.87000E-02	25.000
	7.10000E-02	50.000
80.0000	10.00000E-03	0.500
	1.30000E-02	1.000
	1.70000E-02	1.500
	2.30000E-02	2.500
	3.30000E-02	5.000
	4.20000E-02	7.500
	4.70000E-02	10.000
	5.85000E-02	15.000
	7.40000E-02	25.000
	1.10000E-01	50.000
	1.40000E-02	0.500
	1.80000E-02	1.000
	2.10000E-02	1.500
	2.50000E-02	2.500
	3.20000E-02	5.000

RUN 20

TABLE 103 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.80000E-02	7.500
	4.20000E-02	10.000
	4.75000E-02	15.000
	6.25000E-02	25.000
	9.65000E-02	50.000
	7.00000E-03	0.500
	10.00000E-03	1.000
	1.25000E-02	1.500
	1.75000E-02	2.500
	2.82000E-02	5.000
	3.80000E-02	7.500
	4.25000E-02	10.000
	5.25000E-02	15.000
	6.75000E-02	25.000
	4.50000E-03	0.500
80.0000	7.00000E-03	1.000
	9.20000E-03	1.500
	1.27000E-02	2.500
	2.00000E-02	5.000
	2.57000E-02	7.500
	3.12000E-02	10.000
	4.05000E-02	15.000
	6.33000E-02	25.000
	1.65000E-02	7.500
	1.85000E-02	10.000
	2.30000E-02	15.000
	2.95000E-02	25.000
	4.65000E-02	50.000
81.0000	5.75000E-02	75.000
	6.65000E-02	100.000
	8.15000E-02	150.000
	1.02000E-01	200.000
	1.21500E-01	250.000
	2.13500E-01	350.000
	1.05000E-02	0.500
	1.55000E-02	1.000
	1.95000E-02	1.500
	2.90000E-02	2.500
	5.45000E-02	5.000
82.0000	8.05000E-02	7.500
	7.50000E-03	0.500
	1.30000E-02	1.000
	2.00000E-02	1.500
	3.00000E-02	2.500
83.0000	4.80000E-02	5.000

TABLE 103 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.00000E-02	7.500
	8.70000E-02	10.000
84.0000	10.00000E-03	0.500
	1.50000E-02	1.000
	2.00000E-02	1.500
	2.90000E-02	2.500
	4.60000E-02	5.000
	6.10000E-02	7.500
	7.30000E-02	10.000
	9.40000E-02	15.000
85.0000	5.00000E-03	0.500
	7.50000E-03	1.000
	10.00000E-03	1.500
	1.40000E-02	2.500
	2.00000E-02	5.000
85.0000	2.40000E-02	7.500
	2.70000E-02	10.000
	3.30000E-02	15.000
	4.80000E-02	25.000
	9.40000F-02	50.000
86.0000	2.20000E-02	0.500
	4.00000E-02	1.000
	6.10000F-02	1.500
90.0000	2.60000E-02	0.500
	3.30000E-02	1.000
	3.70000E-02	1.500
	4.40000E-02	2.500
	5.30000E-02	5.000
	6.90000E-02	7.500
	7.80000E-02	10.000
	9.70000E-02	15.000
	1.38000E-01	25.000
	3.60000E-02	0.500
	4.50000E-02	1.000
	5.20000E-02	1.500
	6.10000E-02	2.500
94.0000	3.60000E-02	0.500
	4.80000E-02	1.000
	5.80000E-02	1.500
	9.20000E-02	2.500
95.0000	3.60000E-02	0.500
	4.00000E-02	1.000

TABLE 104

RUN 20

Deformation Versus Time (Fitted Data) for TMCA Ti-6Al-4V Sheet at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	1.19660E-04	2.500
	1.71480E-04	5.000
	2.84940E-04	10.000
	3.87290E-04	15.000
	5.59610E-04	25.000
	8.78560E-04	50.000
	1.11396E-03	75.000
	1.30394E-03	100.000
	2.04244E-03	250.000
	2.74393E-03	500.000
	3.21535E-03	750.000
	3.57880E-03	1000.000
	3.38160E-04	10.000
	5.46180E-04	15.000
	7.86970E-04	25.000
	1.08950E-03	50.000
	1.26510E-03	75.000
	1.39552E-03	100.000
	1.90506E-03	250.000
	2.49112E-03	500.000
	2.97529E-03	750.000
	3.40707E-03	1000.000
25.0000	2.33020E-04	0.500
	2.70740E-04	1.000
	3.44600E-04	2.500
	4.63080E-04	5.000
	6.71040E-04	10.000
	8.45410E-04	15.000
	1.12925E-03	25.000
	1.64025E-03	50.000
	2.01011E-03	75.000
	2.30480E-03	100.000
	3.41633E-03	250.000
	4.41371E-03	500.000
	5.04634E-03	750.000
	5.51125E-03	1000.000
25.0000	2.86430E-04	0.500
	4.20080E-04	1.000
	5.05310E-04	1.500
	6.21300E-04	2.500
	7.96520E-04	5.000
	9.10320E-04	7.500
	1.12993E-03	15.000

RUN 2C

TABLE 104 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.31934E-03	25.000
	1.63362E-03	50.000
	1.86238E-03	75.000
	2.05260E-03	100.000
	2.88635E-03	250.000
	3.87128E-03	500.000
	4.66024E-03	750.000
	5.34424E-03	1000.000
	1.64760E-04	5.000
	3.30790E-04	10.000
	4.37260E-04	15.000
	5.85710E-04	25.000
	8.24570E-04	50.000
	9.93300E-04	75.000
	1.13069E-03	100.000
	1.70910E-03	250.000
	2.35993E-03	500.000
	2.86614E-03	750.000
	3.29772E-03	1000.000
30.0000	3.24426E-04	0.500
	3.70470E-04	1.000
	4.70880E-04	2.500
	6.01250E-04	5.000
	7.08340E-04	7.500
	8.01300E-04	10.000
	9.60410E-04	15.000
	1.21677E-03	25.000
	1.69212E-03	50.000
	2.05775E-03	75.000
	2.36612E-03	100.000
	3.70416E-03	250.000
	5.21276E-03	500.000
	6.36965E-03	750.000
	7.34353E-03	1000.000
35.0000	2.12950E-04	5.000
	3.78560E-04	7.500
	5.04660E-04	10.000
	6.97660E-04	15.000
	9.73420E-04	25.000
	1.42840E-03	50.000
	1.75405E-03	75.000
	2.02004E-03	100.000
35.0000	3.13473E-03	250.000
	4.36873E-03	500.000
	5.31434E-03	750.000
	6.11243F-03	1000.000

TABLE 104 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.52950E-04	0.500
	5.25150E-04	1.000
	5.94320E-04	1.500
	7.09270E-04	2.500
	9.11480E-04	5.000
	1.05250E-03	7.500
	1.16248E-03	10.000
	1.33254E-03	15.000
	1.57761E-03	25.000
	1.99541E-03	50.000
	2.31475E-03	75.000
	2.59264E-03	100.000
	3.94312E-03	250.000
	5.75757E-03	500.000
	7.32801E-03	750.000
	8.75015E-03	1000.000
	4.83300E-04	5.000
	7.74860E-04	7.500
	9.92830E-04	10.000
	1.32035E-03	15.000
	1.77793E-03	25.000
	2.51607E-03	50.000
	3.03835E-03	75.000
	3.46400E-03	100.000
	5.25736E-03	250.000
	7.27565E-03	500.000
	8.84510E-03	750.000
	1.01828E-02	1000.000
40.0000	3.43000E-04	0.500
	4.34740E-04	1.000
	5.65950E-04	1.500
	8.09680E-04	2.500
	1.25743E-03	5.000
	1.56564E-03	7.500
	1.79949E-03	10.000
	2.14805E-03	15.000
	2.62727E-03	25.000
	3.42773E-03	50.000
	4.06645E-03	75.000
	4.65452E-03	100.000
45.0000	4.64650E-04	0.500
	4.59720E-04	1.000
	5.10230E-04	1.500
	6.34290E-04	2.500

TABLE 104 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	9.18920E-04	5.000
	1.15348E-03	7.500
	1.35376E-03	10.000
	1.68941E-03	15.000
	2.21635E-03	25.000
	3.17209E-03	50.000
	3.90380E-03	75.000
	4.52415E-03	100.000
	7.28446E-03	250.000
	1.05433E-02	500.000
	1.31346E-02	750.000
	1.53679E-02	1000.000
50.0000	8.10960E-04	0.500
	9.66640E-04	1.000
	1.08597E-03	1.500
	1.27164E-03	2.500
	1.60117E-03	5.000
	1.85080E-03	7.500
	2.06494E-03	10.000
	2.44205E-03	15.000
	3.11001E-03	25.000
	4.62265E-03	50.000
	6.04901E-03	75.000
	7.42408E-03	100.000
60.0000	7.16340E-04	0.500
	8.79240E-04	1.000
	1.02878E-03	1.500
	1.27224E-03	2.500
	1.68677E-03	5.000
	1.96509E-03	7.500
	2.17622E-03	10.000
	2.49405E-03	15.000
	2.94145E-03	25.000
	3.71377E-03	50.000
	4.33772E-03	75.000
	4.90958E-03	100.000
	7.98892E-03	250.000
	1.25669E-02	500.000
	1.67306E-02	750.000
	2.05957E-02	1000.000
	1.75928E-03	1.500
	2.92660E-03	2.500
	4.11139E-03	5.000
	4.69429E-03	7.500
	5.14637E-03	10.000
	5.97700E-03	15.000
	7.64673E-03	25.000
	1.18028E-02	50.000

TABLE 104 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	1.56469E-02	75.000
	1.91387E-02	100.000
	2.52369E-02	150.000
	3.04263E-02	200.000
	3.49389E-02	250.000
	5.13728E-02	500.000
	6.22038E-02	750.000
	7.00711E-02	1000.000
66.0000	5.07945E-03	7.500
	5.53016E-03	10.000
	6.42768E-03	15.000
	8.20710E-03	25.000
	1.25654E-02	50.000
	1.67977E-02	75.000
	2.09095E-02	100.000
	2.88042E-02	150.000
	3.63342E-02	200.000
	4.36135E-02	250.000
	8.15374E-02	500.000
	1.34493E-01	750.000
	1.94501E-01	1000.000
67.0000	5.92189E-03	5.000
	6.58569E-03	7.500
	7.24660E-03	10.000
	8.55970E-03	15.000
	1.11510E-02	25.000
	1.74261E-02	50.000
	2.34108E-02	75.000
	2.91051E-02	100.000
	3.96234E-02	150.000
	4.89846E-02	200.000
	5.71978E-02	250.000
	8.24008E-02	500.000
	9.44186E-02	750.000
	1.48568E-01	1000.000
70.0000	2.90444E-03	0.500
	3.57207E-03	1.000
	4.38298E-03	1.500
	5.83601E-03	2.500
	8.57842E-03	5.000
	1.06277E-02	7.500
	1.23183E-02	10.000
	1.51199E-02	15.000
	1.96121E-02	25.000

RUN 20

TABLE 104 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.84940E-02	50.000
	3.60837E-02	75.000
	4.30478E-02	100.000
70.0000	5.58653E-02	150.000
	6.77049E-02	200.000
	7.88521E-02	250.000
	9.86827E-03	5.000
	1.09757E-02	7.500
	1.35610E-02	10.000
	1.90223E-02	15.000
	2.73981E-02	25.000
	3.93761E-02	50.000
	4.81129E-02	75.000
	5.72503E-02	100.000
	7.93061E-02	150.000
	1.06405E-01	200.000
	1.37606E-01	250.000
	5.69046E-03	0.500
	7.65201E-03	1.000
	9.76766E-03	1.500
	1.32735E-02	2.500
	1.93913E-02	5.000
	2.39161E-02	7.500
	2.78518E-02	10.000
	3.51480E-02	15.000
	4.95547E-02	25.000
	8.77977E-02	50.000
	1.28157E-01	75.000
	4.98513E-03	0.500
	8.59376E-03	1.000
	1.05793E-02	1.500
	1.30618E-02	2.500
	1.72729E-02	5.000
	2.08715E-02	7.500
	2.42255E-02	10.000
	3.03632E-02	15.000
	4.07315E-02	25.000
	5.89996E-02	50.000
	7.06313E-02	75.000
	7.82855E-02	100.000
	8.63608E-02	150.000
	8.85384E-02	200.000
	3.15067E-03	0.500
	5.21493E-03	1.000
	6.18468E-03	1.500
	7.63182E-03	2.500

TABLE 104 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.08623E-02	5.000
	1.39189E-02	7.500
	1.68207E-02	10.000
	2.22177E-02	15.000
	3.17907E-02	25.000
75.0000	5.15350E-02	50.000
	6.79522E-02	75.000
	8.24056E-02	100.000
	1.07615E-01	150.000
	1.42658E-03	1.500
	1.61806E-03	2.500
	2.56651E-03	5.000
	3.56807E-03	7.500
	4.47573E-03	10.000
	6.00657E-03	15.000
	8.30945E-03	25.000
	1.21773E-02	50.000
	1.51097E-02	75.000
	1.77377E-02	100.000
	2.27120E-02	150.000
	2.76051E-02	200.000
	3.25096E-02	250.000
	5.73379E-02	500.000
	8.21592E-02	750.000
	1.06580E-01	1000.000
75.5000	4.46703E-03	0.500
	5.58100E-03	1.000
	7.27995E-03	1.500
	1.04590E-02	2.500
	1.66445E-02	5.000
	2.14875E-02	7.500
	2.57180E-02	10.000
	3.33603E-02	15.000
	4.75238E-02	25.000
	8.18354E-02	50.000
	1.15897E-01	75.000
	1.49647E-01	100.000
76.0000	4.89800E-03	0.500
	5.91265E-03	1.000
	7.57322E-03	1.500
	1.07224E-02	2.500
	1.65228E-02	5.000
	2.06975E-02	7.500
	2.41964E-02	10.000
	3.05113E-02	15.000

RUN 2C

TABLE 104 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.30345E-02	25.000
	7.82183E-02	50.000
	1.17513E-01	75.000
78.0000	1.79491E-03	0.500
	2.45906E-03	1.000
	3.16864E-03	1.500
	4.19863E-03	2.500
78.0000	6.08427E-03	5.000
	7.86126E-03	7.500
	9.68569E-03	10.000
	1.34522E-02	15.000
	2.10964E-02	25.000
	3.93016E-02	50.000
	5.58359E-02	75.000
	7.09613E-02	100.000
	2.52771E-03	0.500
	4.28565E-03	1.000
	5.89316E-03	1.500
	8.51944E-03	2.500
	1.32760E-02	5.000
	1.69826E-02	7.500
	2.03017E-02	10.000
	2.65546E-02	15.000
	3.88970E-02	25.000
	7.09621E-02	50.000
80.0000	9.97710E-03	0.500
	1.32335E-02	1.000
	1.67373E-02	1.500
	2.27875E-02	2.500
	3.36596E-02	5.000
	4.13972E-02	7.500
	4.76127E-02	10.000
	5.77825E-02	15.000
	7.43636E-02	25.000
	1.09949E-01	50.000
	1.40495E-02	0.500
	1.79056E-02	1.000
	2.08523E-02	1.500
	2.52643E-02	2.500
	3.24124E-02	5.000
	3.73579E-02	7.500
	4.14428E-02	10.000
	4.86207E-02	15.000
	6.26424E-02	25.000
	9.65518E-02	50.000
	7.09755E-03	0.500

TABLE 104 (CONT)

RUN 2C

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.63750E-03	1.000
	1.25545E-02	1.500
	1.79566E-02	2.500
	2.85707E-02	5.000
	3.65513E-02	7.500
	4.29812E-02	10.000
	5.30624E-02	15.000
	6.72881E-02	25.000
	4.57891E-03	0.500
	6.77954E-03	1.000
80.0000	9.13587E-03	1.500
	1.30532E-02	2.500
	2.00615E-02	5.000
	2.55914E-02	7.500
	3.07151E-02	10.000
	4.10010E-02	15.000
	6.31931E-02	25.000
81.0000	1.83463E-02	7.500
	1.98979E-02	10.000
	2.29604E-02	15.000
	2.89219E-02	25.000
	4.28741E-02	50.000
	5.54741E-02	75.000
	6.67524E-02	100.000
	8.57473E-02	150.000
	1.01814E-01	200.000
	1.20037E-01	250.000
	2.13674E-01	350.000
82.0000	1.04631E-02	0.500
	1.56142E-02	1.000
	1.95308E-02	1.500
	2.87369E-02	2.500
	5.47689E-02	5.000
	8.03860E-02	7.500
83.0000	7.24725E-03	0.500
	1.39216E-02	1.000
	1.96028E-02	1.500
	2.90546E-02	2.500
	4.95203E-02	5.000
	6.87674E-02	7.500
	8.73860E-02	10.000
84.0000	1.00530E-02	0.500
	1.49054E-02	1.000
	1.99971E-02	1.500

TABLE 104 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN./IN)	TIME (HOURS)
	2.89053E-02	2.500
	4.64846E-02	5.000
	6.06412E-02	7.500
	7.29219E-02	10.000
	9.40913E-02	15.000
85.0000	5.01464E-03	0.500
	7.41901E-03	1.000
	1.00564E-02	1.500
	1.40759E-02	2.500
	1.99989E-02	5.000
	2.37817E-02	7.500
85.0000	2.69897E-02	10.000
	3.33142E-02	15.000
	4.78252E-02	25.000
	9.40243E-02	50.000
86.0000	2.20000E-02	0.500
	4.00000E-02	1.000
	6.16000E-02	1.500
90.0000	2.60115E-02	0.500
	3.30564E-02	1.000
	3.70573E-02	1.500
	4.31373E-02	2.500
	5.55850E-02	5.000
	6.67976E-02	7.500
	7.74897E-02	10.000
	9.80909E-02	15.000
	1.37774E-01	25.000
	3.52839E-02	0.500
	4.60574E-02	1.000
	5.23595E-02	1.500
	6.02992E-02	2.500
94.0000	3.02179E-02	0.500
	5.32729E-02	1.000
	6.67592E-02	1.500
	8.37500E-02	2.500
95.0000	3.60000E-02	0.500
	4.00000E-02	1.000

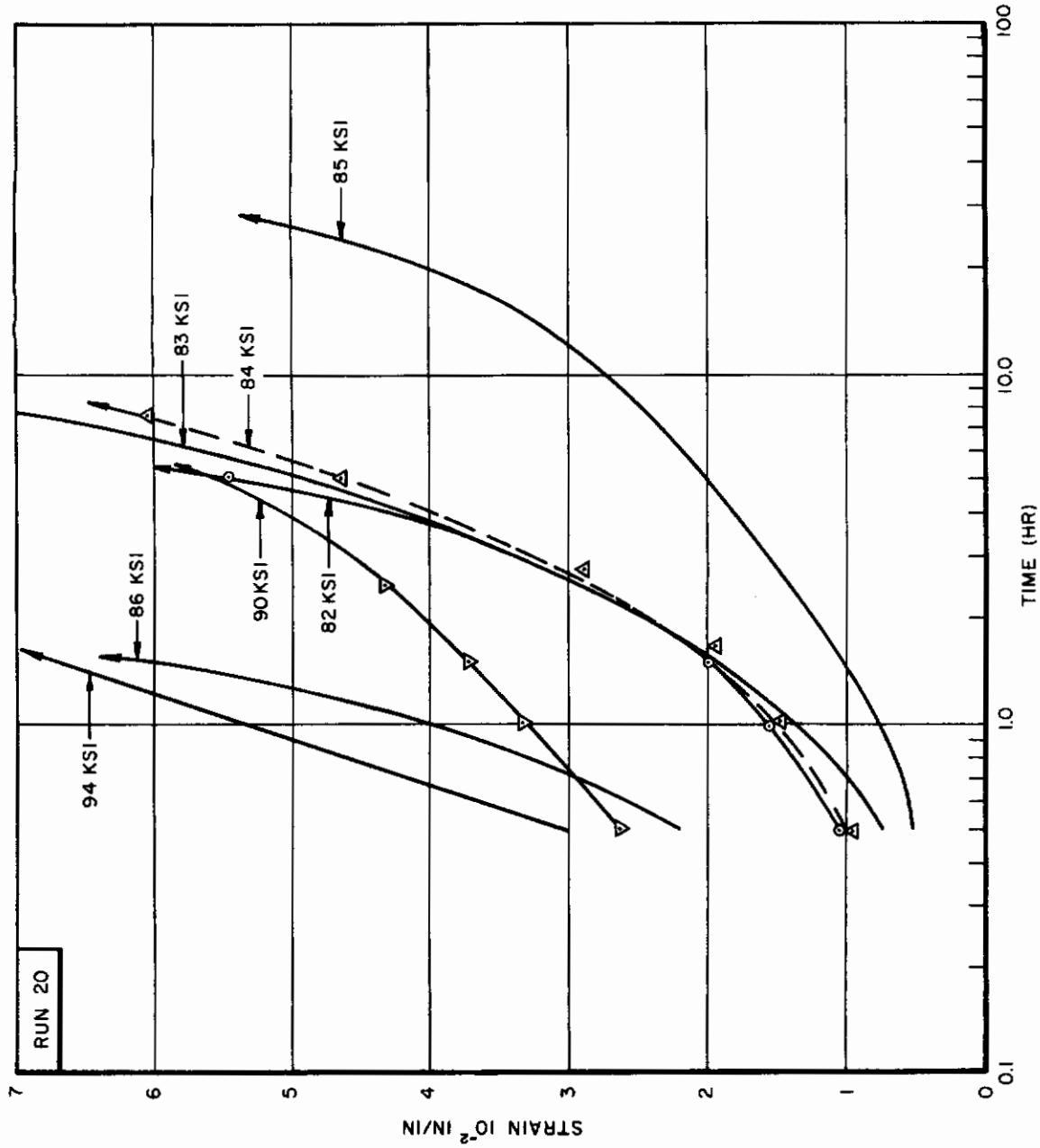


Figure 64. Creep Deformation Versus Log Time of TMCA Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 105

TMCA Ti-6Al-4V Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
20.0			0.22	44	750	-	-
25.0			0.21	75	936	-	-
25.0			0.22	25	160	750	-
35.0			0.25	25	218	693	-
35.0			0.33	11.7	67	223	938.5
40.0			0.34	3.75	36.5	-	-
45.0			0.31	7.5	43	-	-
50.0			0.40	1	23.5	56.7	-
60.0			0.5	0.5	3.1	9.0	37.5
60.0			0.45	1.17	45	93	373
67.0	1041.3	41	0.6	-	1.75	4.2	15
70.0	437.6	21.5	0.56	-	0.6	1.8	7.3
75.0	238.3	33	0.81	-	-	-	1.5
75.0	95.4	28	0.72	-	-	-	1.5
75.5	133.8	48	0.75	-	-	0.8	2.3
76.0	96.7	26.5	0.66	-	-	0.6	1.7
78.0	145.7	23	0.62	-	1.5	3.3	11
78.0	57.4	26	0.77	-	0.64	1.2	3.33
80.0	78.0	34.5	1.54	-	-	-	-
80.0	61.3	25	1.37	-	-	-	-
80.0	44.9	21	0.75	-	-	0.68	1.85
81.0	390.5	38.5	0.79	-	-	0.8	3.2
82.0	13.7	18.5	1.0	-	-	-	-
83.0	14	18.5	1.75	-	-	-	0.77
85.0	80.6	24	0.69	-	-	0.5	1.5
86.0	1.9	15.0	2.57	-	-	-	-
90.0	28.1	28.5	1.9	-	-	-	-
94.0	3.1	22.0	4.69	-	-	-	-

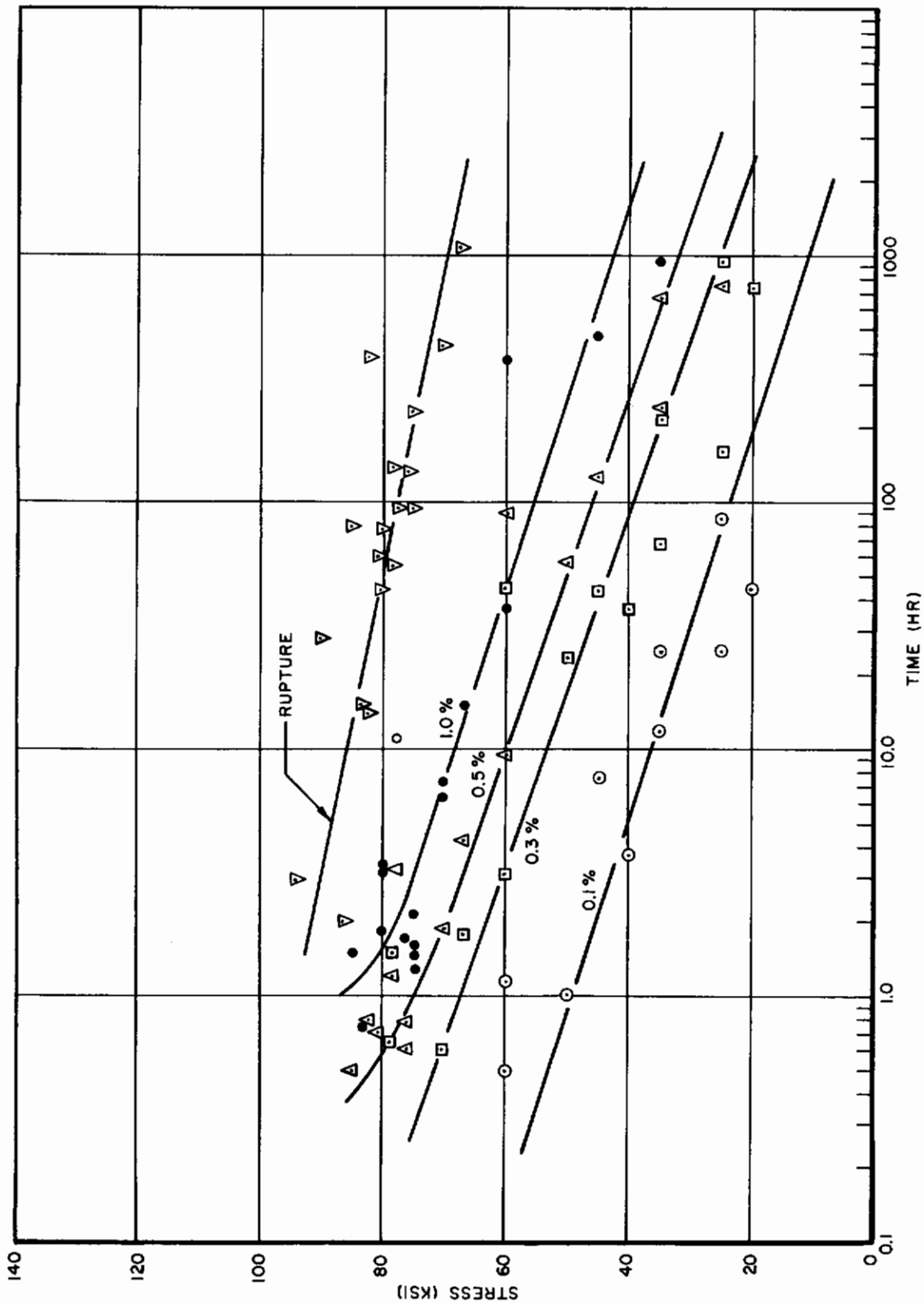


Figure 65. Creep Rupture Properties of TMCA Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 106

RUN 20

Deformation Versus Time (Raw Data) for TMCA Ti-6Al-4V Sheet at 1000° F (1460° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.0000	10.00000E-05	1.000
	2.00000E-04	2.500
	3.00000E-04	7.500
	4.00000E-04	15.000
	5.00000E-04	25.000
	9.00000E-04	50.000
	1.20000E-03	75.000
	1.40000E-03	100.000
	2.00000E-03	250.000
	2.30000E-03	500.000
	2.40000E-03	750.000
	2.60000E-03	1000.000
1.2000	10.00000E-05	10.000
	2.00000E-04	25.000
	3.00000E-04	50.000
	4.00000E-04	100.000
	9.00000E-04	250.000
1.2000	1.70000E-03	500.000
	2.50000E-03	750.000
	3.10000E-03	1000.000
	2.00000E-04	2.500
	3.00000E-04	7.500
	4.00000E-04	25.000
	5.00000E-04	50.000
	7.00000E-04	75.000
	8.00000E-04	100.000
	1.60000E-03	250.000
	2.50000E-03	500.000
	3.20000E-03	750.000
	3.60000E-03	1000.000
1.5000	10.00000E-05	2.500
	2.00000E-04	7.500
	3.00000E-04	15.000
	5.00000E-04	25.000
	1.20000E-03	50.000
	1.70000E-03	75.000
	2.30000E-03	100.000
	5.20000E-03	250.000
	9.20000E-03	500.000
	1.24000E-02	750.000
	1.55000E-02	1000.000
	10.00000E-05	0.500
	2.00000E-04	2.500

TABLE 106 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.00000E-04	7.500
	4.00000E-04	15.000
	5.00000E-04	25.000
	7.00000E-04	50.000
	9.00000E-04	75.000
	10.00000E-04	100.000
	1.60000E-03	250.000
	2.30000E-03	500.000
	2.90000E-03	750.000
	3.50000E-03	1000.000
	10.00000E-05	75.000
	3.00000E-04	100.000
	8.00000E-04	250.000
	1.60000E-03	500.000
	2.50000E-03	750.000
	3.30000E-03	1000.000
2.0000	10.00000E-05	2.500
	2.00000E-04	5.000
	3.00000E-04	10.000
	4.00000E-04	25.000
	5.00000E-04	50.000
	7.00000E-04	75.000
2.0000	8.00000E-04	100.000
	1.70000E-03	250.000
	3.20000E-03	500.000
	4.50000E-03	750.000
	5.80000E-03	1000.000
	2.00000E-04	2.500
	3.00000E-04	7.500
	4.00000E-04	15.000
	5.00000E-04	25.000
	9.00000E-04	50.000
	1.10000E-03	75.000
	1.40000E-03	100.000
	2.60000E-03	250.000
	4.30000E-03	500.000
	5.80000E-03	750.000
	7.30000E-03	1000.000
	4.00000E-04	5.000
	6.00000E-04	7.500
	9.00000E-04	10.000
	10.00000E-04	15.000
	1.10000E-03	25.000
	1.50000E-03	50.000
	1.80000E-03	75.000
	2.10000E-03	100.000
	3.00000E-03	250.000

TABLE 106 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.10000E-03	500.000
	5.00000E-03	750.000
	6.00000E-03	1000.000
4.0000	10.00000E-05	0.500
	2.00000E-04	1.000
	3.00000E-04	1.500
	4.00000E-04	2.500
	6.00000E-04	5.000
	8.00000E-04	7.500
	9.00000E-04	10.000
	1.10000E-03	15.000
	1.50000E-03	25.000
	2.50000E-03	50.000
	3.40000E-03	75.000
	4.40000E-03	100.000
5.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	1.500
	6.00000E-04	2.500
	9.00000E-04	5.000
	10.00000E-04	7.500
	1.30000E-03	10.000
	1.70000E-03	15.000
	2.20000E-03	25.000
	3.60000E-03	50.000
	4.50000E-03	75.000
	5.40000E-03	100.000
	1.08000E-02	250.000
	1.98000E-02	500.000
	2.78000E-02	750.000
	3.66000E-02	1000.000
7.5000	2.00000E-04	0.500
	3.00000E-04	1.000
	5.00000E-04	1.500
	7.00000E-04	2.500
	1.20000E-03	5.000
	1.80000E-03	7.500
	2.10000E-03	10.000
	2.90000E-03	15.000
	4.30000E-03	25.000
	7.90000E-03	50.000
	1.10000E-02	75.000
	1.38000E-02	100.000

RUN 20

TABLE 106 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	10.00000E-04	1.000
	1.30000E-03	1.500
	1.50000E-03	2.500
	2.00000E-03	5.000
	2.50000E-03	7.500
	3.00000E-03	10.000
	4.00000E-03	15.000
	6.30000E-03	25.000
	1.15000E-02	50.000
	1.63000E-02	75.000
	2.00000E-02	100.000
	2.80000E-02	150.000
	3.50000E-02	200.000
	4.30000E-02	250.000
	6.60000E-02	400.000
	8.50000E-02	500.000
	1.73000E-01	750.000
	2.84000E-01	1000.000
	5.00000E-04	5.000
	6.00000E-04	7.500
	8.00000E-04	10.000
	10.00000E-04	15.000
	1.70000E-03	25.000
	3.00000E-03	50.000
	4.00000E-03	75.000
	5.00000E-03	100.000
	7.05000E-03	150.000
	9.00000E-03	200.000
10.0000	1.10000E-02	250.000
	2.10000E-02	500.000
	3.15000E-02	750.000
	4.10000E-02	1000.000
12.0000	2.10000E-03	5.000
	2.70000E-03	7.500
	3.30000E-03	10.000
	4.40000E-03	15.000
	6.30000E-03	25.000
	1.05000E-02	50.000
	1.55000E-02	75.000
	2.05000E-02	100.000
	3.15000E-02	150.000
	4.30000E-02	200.000
	5.65000E-02	250.000
	1.45500E-01	500.000
	2.36300E-01	650.000
	3.10000E-03	5.000
	4.10000E-03	7.500

TABLE 106 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.80000E-03	10.000
	6.00000E-03	15.000
	9.00000E-03	25.000
	1.60000E-02	50.000
	2.15000E-02	75.000
	2.70000E-02	100.000
	3.95000E-02	150.000
	5.50000E-02	200.000
	7.45000E-02	250.000
	1.51000E-01	400.000
	2.38000E-01	500.000
12.5000	1.00000E-04	1.500
	1.50000E-03	2.500
	2.50000E-03	5.000
	3.30000E-03	7.500
	3.80000E-03	10.000
	5.20000E-03	15.000
	7.80000E-03	25.000
	1.35000E-02	50.000
	2.00000E-02	75.000
	2.75000E-02	100.000
	4.15000E-02	150.000
	5.75000E-02	200.000
	1.09000E-01	250.000
	1.28500E-01	400.000
15.0000	1.00000E-04	0.500
	1.30000E-03	1.000
	1.70000E-03	1.500
	2.40000E-03	2.500
	4.00000E-03	5.000
	5.30000E-03	7.500
	6.70000E-03	10.000
	8.90000E-03	15.000
	1.27000E-02	25.000
	2.35000E-02	50.000
	3.50000E-02	75.000
	4.60000E-02	100.000
	7.00000E-02	150.000
	1.01000E-01	200.000
	1.35000E-01	250.000
	2.12500E-01	400.000
	2.00000E-03	1.500
	3.00000E-03	2.500
	4.50000E-03	5.000
	6.30000E-03	7.500
	7.70000E-03	10.000

TABLE 106 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.16000E-02	15.000
	1.65000E-02	25.000
	2.90000E-02	50.000
	4.30000E-02	75.000
	5.60000E-02	100.000
	8.45000E-02	150.000
	1.24000E-01	200.000
	1.73000E-01	250.000
16.0000	1.20000E-03	0.500
	1.80000E-03	1.000
	2.40000E-03	1.500
	3.20000E-03	2.500
	5.00000E-03	5.000
	6.50000E-03	7.500
	7.80000E-03	10.000
	10.00000E-03	15.000
	1.70000E-02	25.000
	3.10000E-02	50.000
	4.50000E-02	75.000
	5.90000E-02	100.000
	8.05000E-02	150.000
	9.20000E-02	200.000
	1.03000E-01	250.000
	1.16500E-01	300.000
20.0000	2.00000E-03	0.500
	2.70000E-03	1.000
	3.30000E-03	1.500
	4.40000E-03	2.500
	7.00000E-03	5.000
	9.40000E-03	7.500
20.0000	1.25000E-02	10.000
	1.65000E-02	15.000
	2.45000E-02	25.000
	4.20000E-02	50.000
	5.53000E-02	75.000
	6.68000E-02	100.000
	7.75000E-02	150.000
	1.50000E-03	1.000
	2.50000E-03	1.500
	3.50000E-03	2.500
	6.00000E-03	5.000
	9.00000E-03	7.500
	1.15000E-02	10.000
	1.67000E-02	15.000
	2.72000E-02	25.000
	5.60000E-02	50.000

RUN 20

TABLE 106 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.50000E-02	75.000
	1.27000E-01	100.000
	9.50000E-03	7.500
	1.20000E-02	10.000
	1.64000E-02	15.000
	2.50000E-02	25.000
	4.00000E-02	50.000
	8.25000E-02	75.000
	1.49000E-01	100.000
	1.72000E-01	150.000
25.0000	2.00000E-03	0.500
	3.30000E-03	1.000
	5.20000E-03	1.500
	8.00000E-03	2.500
	1.32000E-02	5.000
	1.88000E-02	7.500
	2.45000E-02	10.000
	3.73000E-02	15.000
	6.37000E-02	25.000
30.0000	3.00000E-03	0.500
	5.70000E-03	1.000
	8.00000E-03	1.500
	1.30000E-02	2.500
	2.35000E-02	5.000
	3.35000E-02	7.500
	4.24000E-02	10.000
33.0000	1.80000E-02	0.500
	4.00000E-02	1.000
	8.80000E-02	1.500
	2.12000E-01	2.500
34.0000	3.00000E-03	0.500
34.0000	6.00000E-03	1.000
	9.00000E-03	1.500
	1.30000E-02	2.500
	2.40000E-02	5.000
	3.60000E-02	7.500
	4.90000E-02	10.000
	7.70000E-02	15.000
	1.44000E-01	25.000
35.0000	5.00000E-03	0.500
	7.50000E-03	1.000
	1.05000E-02	1.500
	1.55000E-02	2.500

RUN 20

TABLE 106 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.70000E-02	5.000
	4.80000E-02	7.500
40.0000	3.00000E-03	0.500
	5.00000E-03	1.000
	7.50000E-03	1.500
	1.20000E-02	2.500
	2.70000E-02	5.000
	4.75000E-02	7.500
	7.20000E-02	10.000
	1.30000E-01	15.000
42.0000	7.00000E-03	0.500
	10.00000E-03	1.000
	1.40000E-02	1.500
	1.90000E-02	2.500
	3.50000E-02	5.000
	5.40000E-02	7.500
	7.70000E-02	10.000
	1.28000E-01	15.000
43.5000	9.00000E-03	0.500
	1.40000E-02	1.000
	2.20000E-02	1.500
	4.00000E-02	2.500
	1.41000E-01	5.000
50.0000	1.50000E-02	0.500
	2.50000E-02	1.000
	4.00000E-02	1.500
	7.80000E-02	2.500
	10.00000E-03	0.500
	1.50000E-02	1.000
	2.10000E-02	1.500
	3.30000E-02	2.500
	6.20000E-02	5.000
	1.02000E-01	7.500

TABLE 106 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	1.20000E-02	0.500
	2.50000E-02	1.000
	4.20000E-02	1.500
	8.10000E-02	2.500
55.0000	4.90000E-02	0.500
	1.30000E-01	1.000
60.0000	3.20000E-02	0.500
	5.70000E-02	1.000
	10.00000E-02	1.500
	4.16000E-02	0.500
	1.54000E-01	1.500
	6.20000E-02	0.500
	1.06000E-01	1.000

TABLE 107

RUN 20

Deformation Versus Time (Fitted Data) for TMCA Ti-6Al-4V Sheet at 1000° F (1460° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.0000	1.14080E-04	1.000
	1.73360E-04	2.500
	2.78510E-04	7.500
	4.25880E-04	15.000
	5.94670E-04	25.000
	9.15360E-04	50.000
	1.14958E-03	75.000
	1.33284E-03	100.000
	1.95673E-03	250.000
	2.35834E-03	500.000
	2.49394E-03	750.000
	2.51482E-03	1000.000
1.2000	1.07320E-04	10.000
	1.95620E-04	25.000
	2.73620E-04	50.000
	4.23690E-04	100.000
	9.11470E-04	250.000
	1.70883E-03	500.000
1.2000	2.44722E-03	750.000
	3.13221E-03	1000.000
	1.93230E-04	2.500
	3.22300E-04	7.500
	3.74030E-04	25.000
	5.11470E-04	50.000
	6.69400E-04	75.000
	8.25890E-04	100.000
	1.61298E-03	250.000
	2.51402E-03	500.000
	3.14695E-03	750.000
	3.62971E-03	1000.000
1.5000	8.69300E-05	2.500
	1.85600E-04	7.500
	3.32390E-04	15.000
	5.49190E-04	25.000
	1.12351E-03	50.000
	1.69516E-03	75.000
	2.24919E-03	100.000
	5.19928E-03	250.000
	9.18554E-03	500.000
	1.25118E-02	750.000
	1.54273E-02	1000.000
	1.07870E-04	0.500
	1.74460E-04	2.500

RUN 20

TABLE 107 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.00300E-04	7.500
	4.16000E-04	15.000
	5.24300E-04	25.000
	7.16620E-04	50.000
	8.64480E-04	75.000
	9.91560E-04	100.000
	1.58088E-03	250.000
	2.31992E-03	500.000
	2.93176E-03	750.000
	3.47181E-03	1000.000
	1.19160E-04	75.000
	2.70540E-04	100.000
	8.13760E-04	250.000
	1.60869E-03	500.000
	2.45201E-03	750.000
	3.32363E-03	1000.000
2.0000	1.02910E-04	2.500
	2.02800E-04	5.000
	2.87820E-04	10.000
	3.96770E-04	25.000
	5.30300E-04	50.000
	6.67650E-04	75.000
	8.11000E-04	100.000
2.0000	1.71172E-03	250.000
	3.17043E-03	500.000
	4.52636E-03	750.000
	5.79220E-03	1000.000
	2.39280E-04	2.500
	3.04040E-04	7.500
	3.99660E-04	15.000
	5.24380E-04	25.000
	8.22740E-04	50.000
	1.10297E-03	75.000
	1.36639E-03	100.000
	2.66488E-03	250.000
	4.26465E-03	500.000
	5.81302E-03	750.000
	7.29795E-03	1000.000
	4.38910E-04	5.000
	6.38350E-04	7.500
	7.77830E-04	10.000
	9.72810E-04	15.000
	1.22076E-03	25.000
	1.58390E-03	50.000
	1.83086E-03	75.000
	2.03324E-03	100.000
	2.94317E-03	250.000

TABLE 107 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.09868E-03	500.000
	5.07770E-03	750.000
	5.95581E-03	1000.000
4.0000	1.01250E-04	0.500
	2.02510E-04	1.000
	2.85170E-04	1.500
	4.11350E-04	2.500
	6.21090E-04	5.000
	7.70260E-04	7.500
	8.94930E-04	10.000
	1.11333E-03	15.000
	1.51014E-03	25.000
	2.47034E-03	50.000
	3.43099E-03	75.000
	4.38860E-03	100.000
5.0000	2.36370E-04	0.500
	3.38220E-04	1.000
	3.88400E-04	1.500
	4.96570E-04	2.500
	7.95200E-04	5.000
	1.07016E-03	7.500
	1.31173E-03	10.000
	1.71771E-03	15.000
	2.34748E-03	25.000
5.0000	3.51147E-03	50.000
	4.49014E-03	75.000
	5.41414E-03	100.000
	1.07850E-02	250.000
	1.96086E-02	500.000
	2.81669E-02	750.000
	3.64216E-02	1000.000
7.5000	1.74020E-04	0.500
	3.59120E-04	1.000
	4.85410E-04	1.500
	7.08340E-04	2.500
	1.21228E-03	5.000
	1.67406E-03	7.500
	2.10879E-03	10.000
	2.92537E-03	15.000
	4.43246E-03	25.000
	7.83017E-03	50.000
	1.09360E-02	75.000
	1.38539E-02	100.000

RUN 20

TABLE 107 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	9.65850E-04	1.000
	1.08311E-03	1.500
	1.31700E-03	2.500
	1.89792E-03	5.000
	2.47348E-03	7.500
	3.04374E-03	10.000
	4.16857E-03	15.000
	6.35721E-03	25.000
	1.14951E-02	50.000
	1.62041E-02	75.000
	2.05446E-02	100.000
	2.83541E-02	150.000
	3.53989E-02	200.000
	4.21435E-02	250.000
	6.49737E-02	400.000
	8.62019E-02	500.000
	1.72747E-01	750.000
	2.84031E-01	1000.000
	5.60320E-04	5.000
	6.83870E-04	7.500
	8.06950E-04	10.000
	1.05173E-03	15.000
	1.53590E-03	25.000
	2.71639E-03	50.000
	3.85757E-03	75.000
	4.96366E-03	100.000
	7.08718E-03	150.000
	9.11928E-03	200.000
	1.10904E-02	250.000
10.0000	2.08862E-02	500.000
	3.15448E-02	750.000
	4.09928E-02	1000.000
12.0000	2.41565E-03	5.000
	2.85005E-03	7.500
	3.28675E-03	10.000
	4.16703E-03	15.000
	5.95514E-03	25.000
	1.05863E-02	50.000
	1.54477E-02	75.000
	2.05409E-02	100.000
	3.14362E-02	150.000
	4.33200E-02	200.000
	5.62847E-02	250.000
	1.45512E-01	500.000
	2.36298E-01	650.000
	3.64342E-03	5.000
	4.27336E-03	7.500

TABLE 107 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.90171E-03	10.000
	6.15410E-03	15.000
	8.64430E-03	25.000
	1.48219E-02	50.000
	2.10108E-02	75.000
	2.73108E-02	100.000
	4.06474E-02	150.000
	5.56556E-02	200.000
	7.32054E-02	250.000
	1.51290E-01	400.000
	2.37941E-01	500.000
12.5000	1.07201E-03	1.500
	1.81682E-03	2.500
	2.59242E-03	5.000
	3.01286E-03	7.500
	3.38262E-03	10.000
	4.19201E-03	15.000
	6.26223E-03	25.000
	1.32187E-02	50.000
	2.14158E-02	75.000
	3.01472E-02	100.000
	4.81919E-02	150.000
	6.63567E-02	200.000
	8.43374E-02	250.000
	1.36407E-01	400.000
15.0000	1.00871E-03	0.500
	1.16192E-03	1.000
	1.60523E-03	1.500
	2.52227E-03	2.500
15.0000	4.32622E-03	5.000
	5.64856E-03	7.500
	6.73829E-03	10.000
	8.63973E-03	15.000
	1.22731E-02	25.000
	2.24887E-02	50.000
	3.42312E-02	75.000
	4.69251E-02	100.000
	7.38440E-02	150.000
	1.01713E-01	200.000
	1.29897E-01	250.000
	2.13977E-01	400.000
	2.39561E-03	1.500
	3.01896E-03	2.500
	4.56660E-03	5.000
	6.09896E-03	7.500
	7.61613E-03	10.000

RUN 20

TABLE 107 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.06054E-02	15.000
	1.64095E-02	25.000
	3.00328E-02	50.000
	4.28328E-02	75.000
	5.55844E-02	100.000
	8.47114E-02	150.000
	1.23939E-01	200.000
	1.73008E-01	250.000
16.0000	1.31752E-03	0.500
	1.66563E-03	1.000
	2.01312E-03	1.500
	2.70621E-03	2.500
	4.42804E-03	5.000
	6.13425E-03	7.500
	7.82483E-03	10.000
	1.11591E-02	15.000
	1.76404E-02	25.000
	3.27505E-02	50.000
	4.63028E-02	75.000
	5.83115E-02	100.000
	7.78854E-02	150.000
	9.23803E-02	200.000
	1.04157E-01	250.000
	1.18120E-01	300.000
20.0000	2.21635E-03	0.500
	2.75815E-03	1.000
	3.29629E-03	1.500
	4.36167E-03	2.500
	6.96261E-03	5.000
	9.47677E-03	7.500
	1.19072E-02	10.000
	1.65292E-02	15.000
	2.49036E-02	25.000
	4.18767E-02	50.000
	5.52989E-02	75.000
	6.68134E-02	100.000
	7.74989E-02	150.000
	1.66181E-03	1.000
	2.20866E-03	1.500
	3.30234E-03	2.500
	6.03653E-03	5.000
	8.77067E-03	7.500
	1.15047E-02	10.000
	1.69721E-02	15.000
	2.79030E-02	25.000
	5.53717E-02	50.000

TABLE 107 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.51932E-02	75.000
	1.26975E-01	100.000
	1.14038E-02	7.500
	1.27870E-02	10.000
	1.55914E-02	15.000
	2.15557E-02	25.000
	4.27539E-02	50.000
	8.34770E-02	75.000
	1.48356E-01	100.000
	1.72036E-01	150.000
25.0000	1.89471E-03	0.500
	3.67927E-03	1.000
	5.08765E-03	1.500
	7.61003E-03	2.500
	1.33318E-02	5.000
	1.89410E-02	7.500
	2.47172E-02	10.000
	3.69554E-02	15.000
	6.37826E-02	25.000
30.0000	3.05315E-03	0.500
	5.50078E-03	1.000
	8.16140E-03	1.500
	1.29810E-02	2.500
	2.36038E-02	5.000
	3.33180E-02	7.500
	4.24818E-02	10.000
33.0000	1.80000E-02	0.500
	4.00000E-02	1.000
	8.80000E-02	1.500
	2.12000E-01	2.500
34.0000	3.07163E-03	0.500
34.0000	5.94831E-03	1.000
	8.67032E-03	1.500
	1.33813E-02	2.500
	2.42109E-02	5.000
	3.58037E-02	7.500
	4.85988E-02	10.000
	7.73919E-02	15.000
	1.43923E-01	25.000

RUN 20

TABLE 107 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
35.0000	4.63399E-03	0.500
	8.88545E-03	1.000
	1.00519E-02	1.500
	1.37374E-02	2.500
	2.91143E-02	5.000
	4.70770E-02	7.500
40.0000	3.00088E-03	0.500
	5.03366E-03	1.000
	7.39712E-03	1.500
	1.21055E-02	2.500
	2.69864E-02	5.000
	4.73942E-02	7.500
	7.21037E-02	10.000
	1.29979E-01	15.000
42.0000	6.94426E-03	0.500
	1.03648E-02	1.000
	1.34797E-02	1.500
	1.92348E-02	2.500
	3.49082E-02	5.000
	5.42636E-02	7.500
	7.67461E-02	10.000
	1.28058E-01	15.000

TABLE 107 (CONT)

RUN 20

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
43.5000	9.86491E-03	0.500
	1.37220E-02	1.000
	2.02526E-02	1.500
	4.13344E-02	2.500
	1.40826E-01	5.000
50.0000	1.56096E-02	0.500
	2.92530E-02	1.000
	3.43872E-02	1.500
	7.87502E-02	2.500
	9.54352E-03	0.500
	1.67058E-02	1.000
	2.05074E-02	1.500
	3.07271E-02	2.500
	6.46857E-02	5.000
	1.00830E-01	7.500
50.0000	1.20000E-02	0.500
	2.50000E-02	1.000
	4.20000E-02	1.500
	8.10000E-02	2.500
55.0000	4.90000E-02	0.500
	1.30000E-01	1.000
60.0000	3.20000E-02	0.500
	5.70000E-02	1.000
	10.00000E-02	1.500
	4.16000E-02	0.500
	1.54000E-01	1.500
	6.20000E-02	0.500
	1.06000E-01	1.000

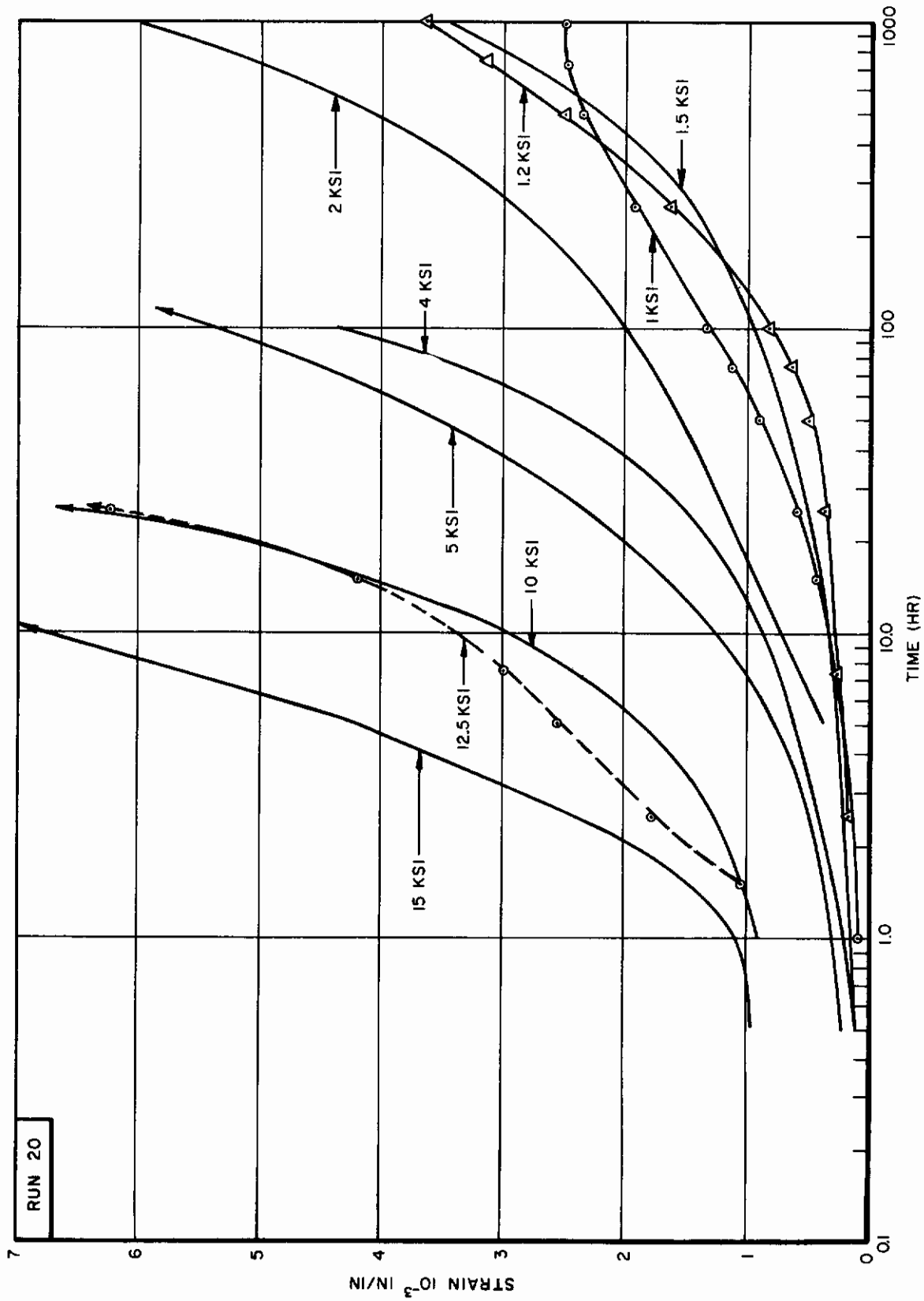


Figure 66. Creep Deformation Versus Log Time of TMCA Ti-6Al-4V Sheet at 1000°F (1460°R)

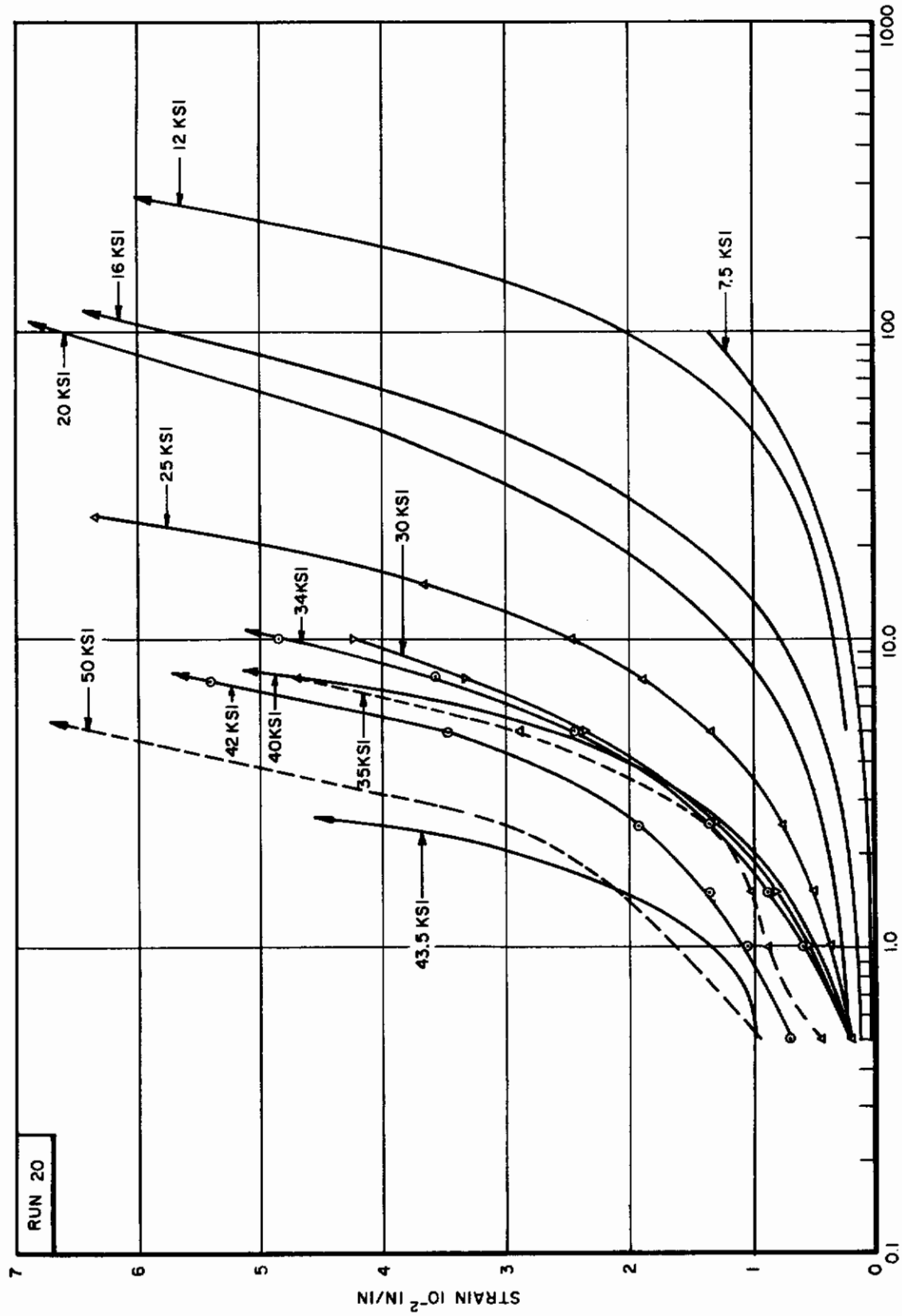


Figure 66. (CONTD)

TABLE 108

TMCA Ti-6Al-4V Creep Deformation and Rupture Data at 1000° F (1460° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
1.0			0.04	58.3	-	-	-
1.2			0.01	138	675	-	-
1.5			0.03	100	791	-	-
1.5			0.04	43	135	235	562.5
2.0			0.12	37.5	315	620	-
2.0			-	15	250	750	-
4.0			0.04	12.5	63	-	-
5.0			0.13	7.5	39	89	240
7.5			0.10	4	15.7	30	57.5
10.0	1413.7	140	0.09	1.0	10	19	46
12.0	981	123	0.12	2.0	8.75	18.6	48
12.5	855.6	119	0.12	1.5	4	14	38
15.0	565.9	147.5	0.17	0.5	3.4	7	18
16.0	335	87	0.11	-	2.25	5	15
20.0	235.8	88	0.26	-	1.25	3.3	8
20.0	196.5	62.5	0.22	0.6	2.9	3.4	8
25.0	109.6	124	0.31	-	0.9	1.45	3.5
30.0	40.3	76	0.39	-	0.5	0.7	1.9
34.0	32.2	57	0.38	-	0.5	-	1.75
40.0	24.3	64	0.41	-	-	-	-
42.0	17.1	85.3	0.26	-	-	-	1
43.5	8.4	53	0.60	-	-	-	0.6
50.0	12.5	60	0.61	-	-	-	-
50.0	10.6	45.5	0.65	-	-	-	0.5
55.0	1.5	37.5	0.92	-	-	-	-
60.0	1.9	40.5	0.86	-	-	-	-
60.0	1.8	45	0.82	-	-	-	-

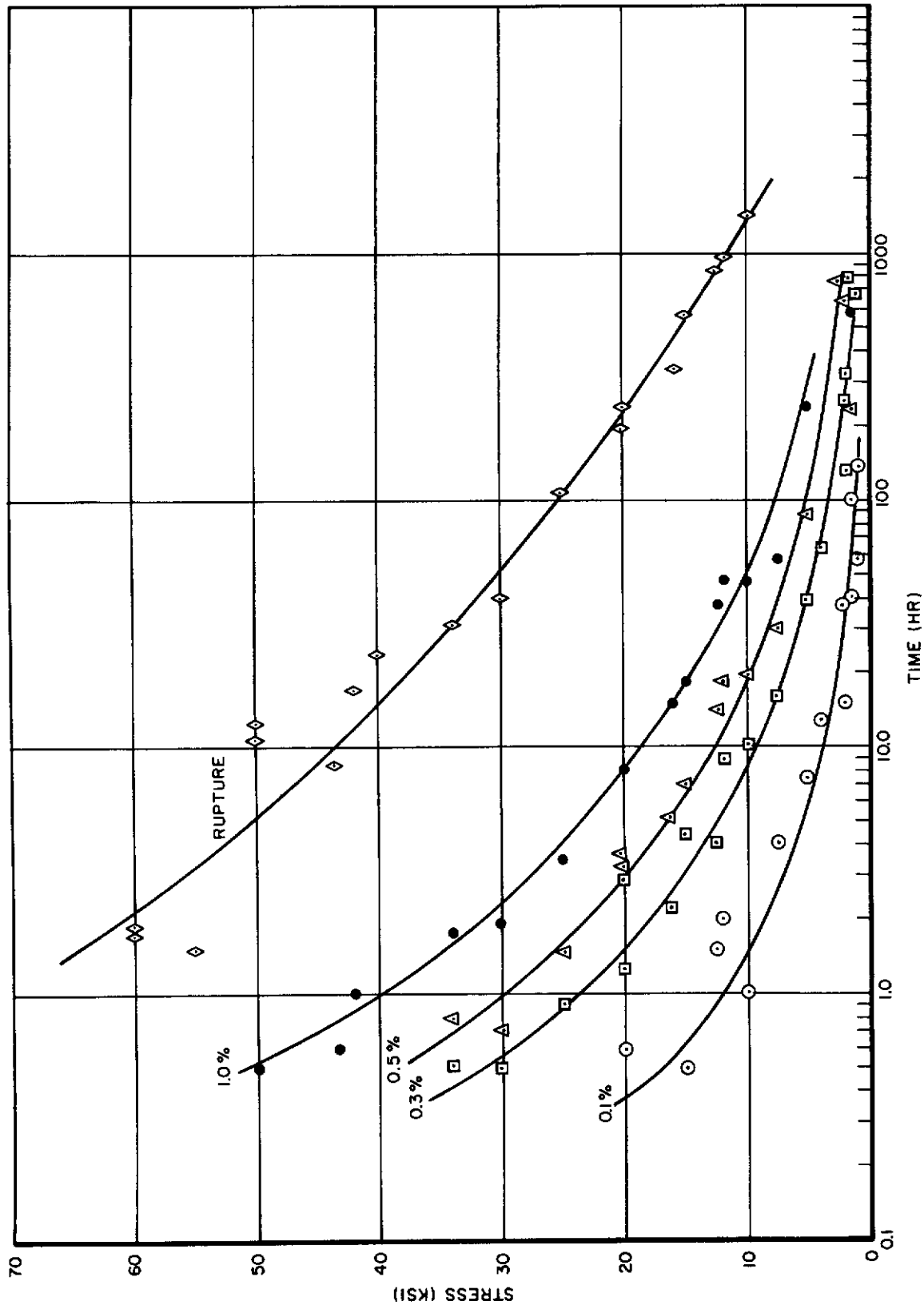


Figure 67. Creep Rupture Properties of TMCA Ti-6Al-4V Sheet at 1000°F (1460°R)

TABLE 109

Minimum Creep Rate for TMCA Ti-6Al-4V Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	80	1.136×10^{-6}
	80	1.67×10^{-6}
	80	9.17×10^{-7}
	80	3.4×10^{-6}
	94	6.07×10^{-6}
	95.5	2.33×10^{-5}
	104	1.121×10^{-5}
800° F (1260° R)	20	1.45×10^{-6}
	25	1.86×10^{-6}
	25	2.73×10^{-6}
	35	1.78×10^{-6}
	35	5.688×10^{-6}
	60	1.55×10^{-5}
	66	1.46×10^{-4}
	67	4.8×10^{-5}
	71	3.49×10^{-4}
	75	1.44×10^{-3}
	75	4.35×10^{-5}
	75	5.04×10^{-4}
	76	1.25×10^{-3}
	78	6.05×10^{-4}
	78	1.23×10^{-3}
	80	1.42×10^{-3}
	80	3.45×10^{-3}
	80	1.42×10^{-3}
	80	2.05×10^{-3}
	81	3.21×10^{-4}
	82	7.83×10^{-3}
	85	1.26×10^{-3}
	86	3.6×10^{-2}
	90	3.97×10^{-3}

TABLE 109 (CONT)

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1000° F (1460° R)	1.2	2.74×10^{-6}
	1.5	1.66×10^{-5}
	1.5	2.16×10^{-6}
	1.5	3.18×10^{-6}
	2.0	5.94×10^{-6}
	10.0	1.35×10^{-4}
	12.0	1.74×10^{-4}
	12.0	2.47×10^{-4}
	12.5	1.48×10^{-4}
	15.0	3.06×10^{-4}
	15.0	5.1×10^{-4}
	16.0	2.35×10^{-4}
	20.0	2.13×10^{-4}
	20.0	1.09×10^{-3}
	25.0	2.243×10^{-3}
	33	4.4×10^{-3}
	34	4.33×10^{-3}
	35	2.33×10^{-3}
	40	4.06×10^{-3}
	42	5.75×10^{-3}
	43.5	7.71×10^{-3}
	50	1.027×10^{-3}
	50	7.60×10^{-3}
	50	2.6×10^{-2}

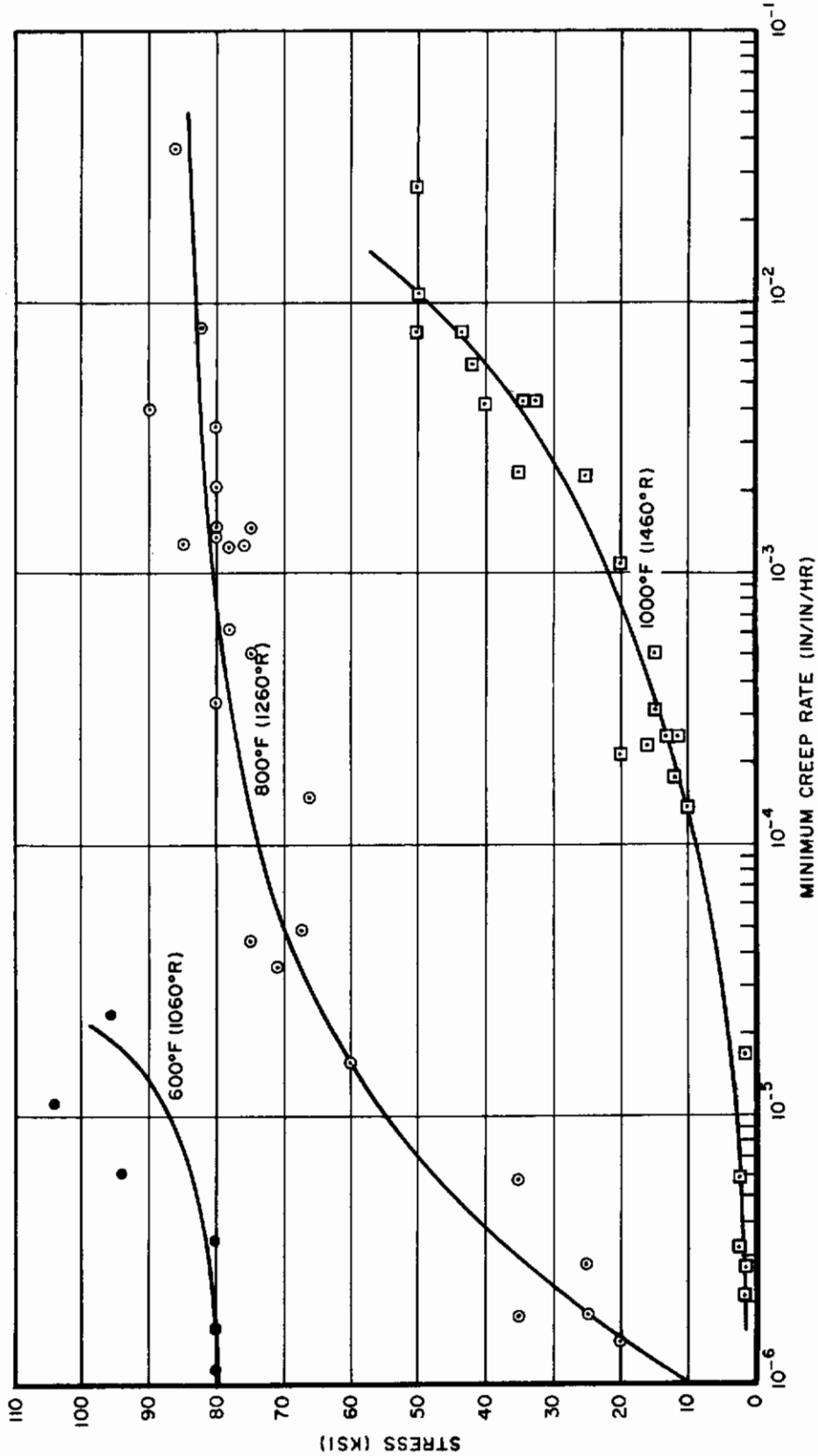


Figure 68. Minimum Creep Rate of TMCA Ti-6Al-4V Sheet

CREEP DATA FOR

MS Ti-6Al-4V SHEET

TABLE 110

Deformation Versus Time (Raw Data) for MS Ti-6A-4V Sheet at 600° F (1060° R)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	2.00000E-04	0.500
	3.00000E-04	1.500
	4.00000E-04	5.000
	5.00000E-04	7.500
	6.00000E-04	10.000
	7.00000E-04	15.000
	8.00000E-04	25.000
	10.00000E-04	50.000
	1.20000E-03	75.000
	1.40000E-03	100.000
	1.90000E-03	250.000
	2.10000E-03	500.000
	2.20000E-03	750.000
	2.40000E-03	1000.000
70.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	1.500
	6.00000E-04	2.500
	8.00000E-04	5.000
	10.00000E-04	7.500
	1.10000E-03	10.000
	1.30000E-03	15.000
	1.70000E-03	25.000
	2.30000E-03	50.000
	2.70000E-03	75.000
	3.10000E-03	100.000
	4.20000E-03	250.000
	5.00000E-03	500.000
	5.60000E-03	750.000
	6.10000E-03	1000.000
85.0000	5.00000E-04	0.500
	8.00000E-04	1.000
	1.30000E-03	1.500
	1.70000E-03	2.500
	2.50000E-03	5.000
	3.00000E-03	7.500
	3.60000E-03	10.000
	4.40000E-03	15.000
	5.70000E-03	25.000
	8.50000E-03	50.000
	10.00000E-03	75.000
	1.10000E-02	100.000
	1.33000E-02	250.000
	1.65000E-02	500.000
	1.85000E-02	750.000
	1.85000E-02	1000.000

TABLE 110 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
106.0000	1.50000E-03	0.500
106.0000	2.50000E-03	1.000
	3.50000E-03	1.500
	4.50000E-03	2.500
	7.00000E-03	5.000
	8.80000E-03	7.500
	1.07000E-02	10.000
	1.38000E-02	15.000
	1.85000E-02	25.000
	2.37000E-02	50.000
	2.70000E-02	75.000
	2.95000E-02	100.000
	3.30000E-02	150.000
	3.57000E-02	200.000
	3.78000E-02	250.000
	4.40000E-02	500.000
	4.65000E-02	750.000
	4.87000E-02	1000.000
107.0000	2.00000E-03	0.500
	3.50000E-03	1.000
	5.00000E-03	1.500
	7.50000E-03	2.500
	1.30000E-02	5.000
	1.67000E-02	7.500
	1.95000E-02	10.000
	2.40000E-02	15.000
	2.90000E-02	25.000
	3.37000E-02	50.000
	3.83000E-02	75.000
	4.15000E-02	100.000
	4.67000E-02	150.000
	5.00000E-02	200.000
	5.23000E-02	250.000
	5.95000E-02	500.000
	6.55000E-02	750.000
	6.85000E-02	1000.000
107.5000	3.00000E-03	0.500
	5.00000E-03	1.000
	7.50000E-03	1.500
	1.20000E-02	2.500
	2.10000E-02	5.000
	2.70000E-02	7.500
	3.05000E-02	10.000
	3.50000E-02	15.000
	4.10000E-02	25.000

RUN 21

TABLE 110 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
107.5000	4.95000E-02	50.000
	5.50000E-02	75.000
	5.87000E-02	100.000
	6.40000E-02	150.000
	6.75000E-02	200.000
	7.05000E-02	250.000
	8.00000E-02	500.000
	9.70000E-02	750.000
	1.12000E-01	1000.000
	1.23000E-01	1250.000
	1.42000E-01	1500.000

TABLE 111

RUN 21

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Sheet at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	2.06570E-04	0.500
	2.80340E-04	1.500
	4.30560E-04	5.000
	5.02820E-04	7.500
	5.62570E-04	10.000
	6.60410E-04	15.000
	8.09010E-04	25.000
	1.05961E-03	50.000
	1.23189E-03	75.000
	1.36413E-03	100.000
	1.81623E-03	250.000
	2.13578E-03	500.000
	2.27767E-03	750.000
	2.34206E-03	1000.000
70.0000	1.93370E-04	0.500
	3.26100E-04	1.000
	4.15030E-04	1.500
	5.49320E-04	2.500
	7.89050E-04	5.000
	9.68690E-04	7.500
	1.11677E-03	10.000
	1.35726E-03	15.000
	1.71705E-03	25.000
	2.31185E-03	50.000
	2.71700E-03	75.000
	3.02912E-03	100.000
	4.14431E-03	250.000
	5.07910E-03	500.000
	5.64304E-03	750.000
	6.04287E-03	1000.000
85.0000	1.31612E-03	1.500
	1.60112E-03	2.500
	2.40158E-03	5.000
	3.08649E-03	7.500
	3.66648E-03	10.000
	4.61123E-03	15.000
	6.00006E-03	25.000
	8.19369E-03	50.000
	9.60929E-03	75.000
	1.06568E-02	100.000
	1.40968E-02	250.000
	1.65992E-02	500.000
	1.79161E-02	750.000
	1.87449E-02	1000.000

TABLE 111 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
106.0000	2.74094E-03	1.000
	3.15212E-03	1.500
	4.36030E-03	2.500
106.0000	7.13440E-03	5.000
	9.30345E-03	7.500
	1.10611E-02	10.000
	1.38146E-02	15.000
	1.76799E-02	25.000
	2.34653E-02	50.000
	2.70411E-02	75.000
	2.96237E-02	100.000
	3.32794E-02	150.000
	3.58524E-02	200.000
	3.78183E-02	250.000
	4.36217E-02	500.000
	4.66922E-02	750.000
	4.86709E-02	1000.000
107.0000	1.88457E-03	0.500
	3.35891E-03	1.000
	5.11377E-03	1.500
	8.09577E-03	2.500
	1.32294E-02	5.000
	1.66691E-02	7.500
	1.92549E-02	10.000
	2.30555E-02	15.000
	2.80291E-02	25.000
	3.49811E-02	50.000
	3.91208E-02	75.000
	4.20905E-02	100.000
	4.63378E-02	150.000
	4.94137E-02	200.000
	5.18495E-02	250.000
	5.98430E-02	500.000
	6.49707E-02	750.000
	6.89012E-02	1000.000
107.5000	7.99181E-03	1.500
	1.22205E-02	2.500
	2.01979E-02	5.000
	2.56884E-02	7.500
	2.97767E-02	10.000
	3.56013E-02	15.000
	4.26878E-02	25.000
	5.12423E-02	50.000
	5.55937E-02	75.000

RUN 21

TABLE 111 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
107.5000	5.84877E-02	100.000
	6.25966E-02	150.000
	6.58450E-02	200.000
	6.87876E-02	250.000
	8.27579E-02	500.000
	9.69269E-02	750.000
	1.11274E-01	1000.000
	1.25629E-01	1250.000
	1.39893E-01	1500.000

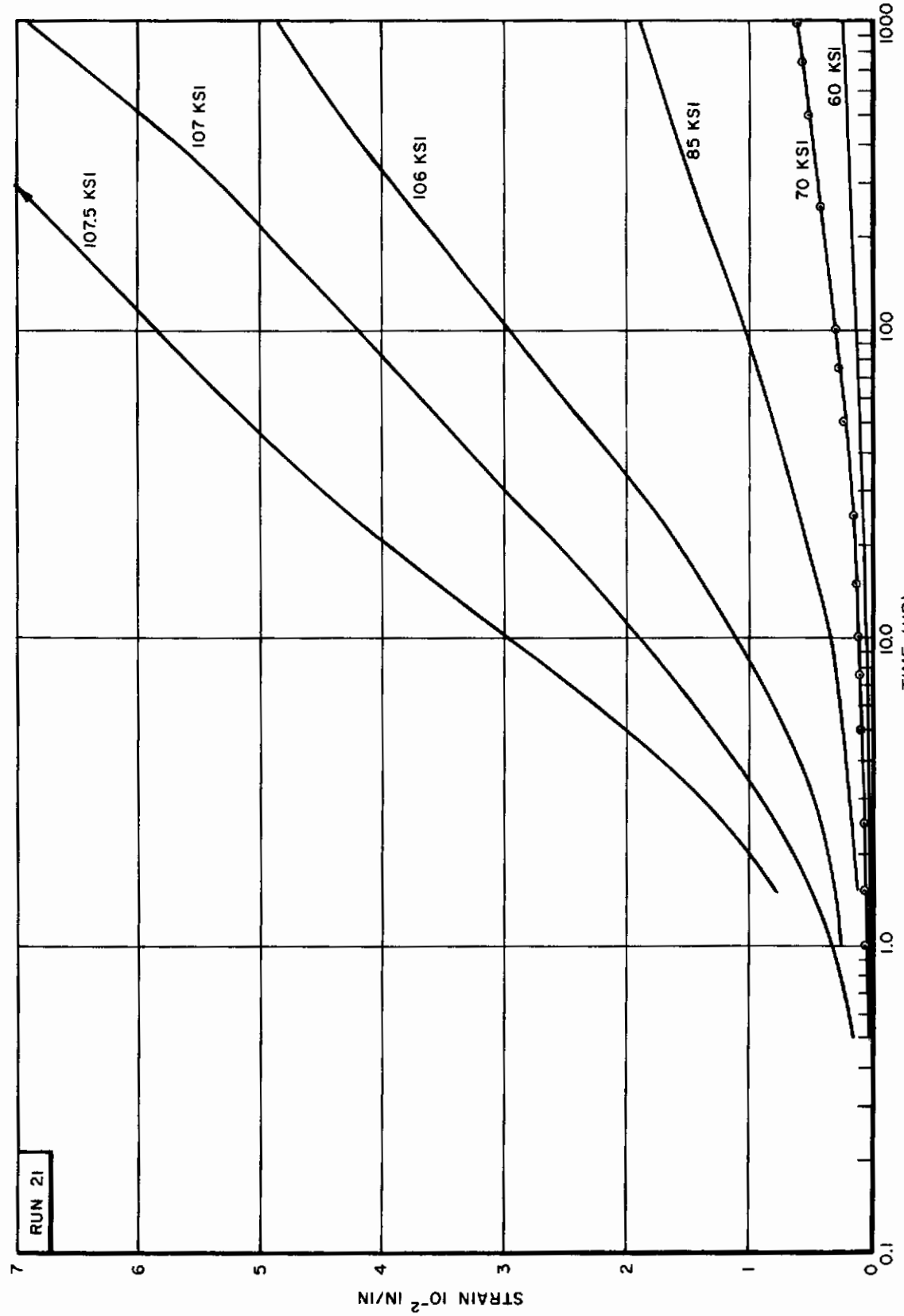


Figure 69. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 600°F (1060°R)

TABLE 112

MS Ti-6Al-4V Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
60.0	-	-	.40	50	-	-	-
70.0	-	-	.48	7.5	93	500	-
85.0	-	-	1.86	1.2	7.5	20	75
106.0	-	5.1	5.73	-	1.25	3.0	9.7
107.0	-	7.2	5.5	-	0.9	1.5	3.75
107.5	-	26.0	11.88	-	0.5	1.0	3.5

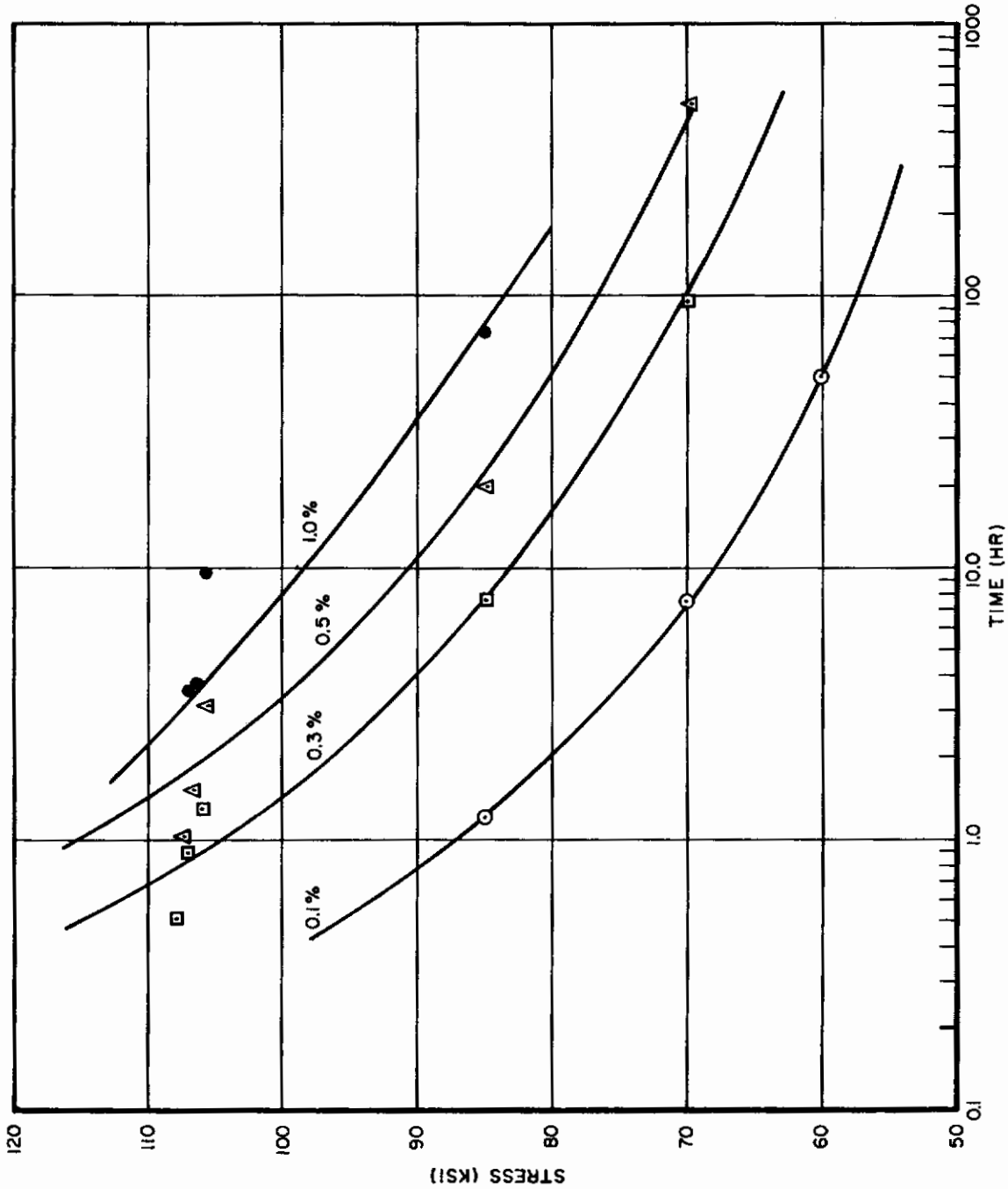


Figure 70. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 600°F (1060°R)

TABLE 113

RUN 21

Deformation Versus Time (Raw Data) for MS Ti-6Al-4V Sheet at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
18.0000	10.00000E-05	0.500
	2.00000E-04	1.500
	3.00000E-04	2.500
	4.00000E-04	5.000
	5.00000E-04	10.000
	7.00000E-04	15.000
	9.00000E-04	25.000
	1.10000E-03	50.000
	1.30000E-03	75.000
	1.40000E-03	100.000
	1.90000E-03	250.000
	2.40000E-03	500.000
	3.10000E-03	750.000
	3.90000E-03	1000.000
20.0000	2.00000E-04	0.500
	3.00000E-04	1.500
	4.00000E-04	5.000
	5.00000E-04	7.500
	6.00000E-04	10.000
	7.00000E-04	15.000
	1.10000E-03	25.000
	1.70000E-03	50.000
	2.00000E-03	75.000
	2.20000E-03	100.000
	3.00000E-03	250.000
	3.70000E-03	500.000
	4.20000E-03	750.000
	4.70000E-03	1000.000
25.0000	2.00000E-04	1.000
	3.00000E-04	1.500
	4.00000E-04	2.500
	6.00000E-04	5.000
	7.00000E-04	7.500
	8.00000E-04	10.000
	10.00000E-04	15.000
	1.20000E-03	25.000
	1.70000E-03	50.000
	2.10000E-03	75.000
	2.30000E-03	100.000
	3.10000E-03	250.000
25.0000	4.00000E-03	500.000
	4.60000E-03	750.000
	5.60000E-03	1000.000

TABLE 113 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	10.00000E-04	0.500
	1.50000E-03	1.000
	2.20000E-03	1.500
	2.80000E-03	2.500
	3.80000E-03	5.000
	4.80000E-03	7.500
	5.70000E-03	10.000
	7.20000E-03	15.000
	9.80000E-03	25.000
	1.50000E-02	50.000
	1.90000E-02	75.000
	2.20000E-02	100.000
	2.90000E-02	150.000
	3.50000E-02	200.000
	4.10000E-02	250.000
	7.20000E-02	500.000
	9.50000E-02	750.000
	9.80000E-02	950.000
60.0000	10.00000E-04	0.500
	1.50000E-03	1.000
	2.00000E-03	1.500
	3.50000E-03	2.500
	5.50000E-03	5.000
	7.00000E-03	7.500
	8.50000E-03	10.000
	10.00000E-03	15.000
	1.25000E-02	25.000
	2.00000E-02	50.000
	2.60000E-02	75.000
	3.10000E-02	100.000
	4.00000E-02	150.000
	4.80000E-02	200.000
	5.60000E-02	250.000
	1.04000E-01	500.000
	1.88000E-01	750.000
64.0000	2.00000E-03	0.500
	3.00000E-03	1.000
	4.00000E-03	1.500
	5.50000E-03	2.500
	8.50000E-03	5.000
	1.05000E-02	7.500
	1.20000E-02	10.000
	1.40000E-02	15.000
	1.80000E-02	25.000

TABLE 113 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
64.0000	3.00000E-02	50.000
	3.80000E-02	75.000
	4.40000E-02	100.000
	6.10000E-02	150.000
	7.70000E-02	200.000
	9.20000E-02	250.000
	1.60000E-01	500.000
70.0000	4.00000E-03	0.500
	6.00000E-03	1.000
	8.00000E-03	1.500
	1.15000E-02	2.500
	1.70000E-02	5.000
	2.15000E-02	7.500
	2.50000E-02	10.000
	3.10000E-02	15.000
	3.90000E-02	25.000
	5.65000E-02	50.000
	7.45000E-02	75.000
	9.20000E-02	100.000
	1.25000E-01	150.000
	1.63000E-01	200.000
75.0000	6.00000E-03	0.500
	1.10000E-02	1.000
	1.30000E-02	1.500
	1.75000E-02	2.500
	2.50000E-02	5.000
	3.10000E-02	7.500
	3.60000E-02	10.000
	4.50000E-02	15.000
	6.00000E-02	25.000
	9.90000E-02	50.000
	1.47000E-01	75.000
80.0000	10.00000E-03	0.500
	1.50000E-02	1.000
	1.75000E-02	1.500
	2.25000E-02	2.500
	3.30000E-02	5.000
	4.15000E-02	7.500
	4.90000E-02	10.000
	6.20000E-02	15.000
	8.55000E-02	25.000

RUN 21

TABLE 113 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.45000E-02	0.500
	3.60000E-02	1.000
	4.60000E-02	1.500
	6.00000E-02	2.500
	7.65000E-02	5.000
90.0000	9.25000E-02	7.500
	1.08000E-01	10.000
	1.39300E-01	15.000

TABLE 114

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Sheet at 800° F (1260° R)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
18.0000	3.31850E-04	5.000
	5.76270E-04	10.000
	7.22130E-04	15.000
	8.98670E-04	25.000
	1.12221E-03	50.000
	1.25284E-03	75.000
	1.35347E-03	100.000
	1.81805E-03	250.000
	2.51028E-03	500.000
	3.17346E-03	750.000
	3.81181E-03	1000.000
20.0000	4.23600E-04	5.000
	4.65200E-04	7.500
	5.60250E-04	10.000
	7.65580E-04	15.000
	1.10818E-03	25.000
	1.65252E-03	50.000
	1.98607E-03	75.000
	2.22374E-03	100.000
	2.99852E-03	250.000
	3.69305E-03	500.000
	4.22063E-03	750.000
	4.68794E-03	1000.000
25.0000	4.32150E-04	2.500
	5.42820E-04	5.000
	6.81510E-04	7.500
	8.06670E-04	10.000
	1.01324E-03	15.000
	1.31071E-03	25.000
	1.75779E-03	50.000
	2.03857E-03	75.000
	2.24944E-03	100.000
	3.05806E-03	250.000
	3.98230E-03	500.000
	4.76947E-03	750.000
	5.49404E-03	1000.000

TABLE 114 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	2.30074E-03	1.500
	2.96248E-03	2.500
	3.97784E-03	5.000
	4.73531E-03	7.500
	5.40765E-03	10.000
	6.64312E-03	15.000
	8.91270E-03	25.000
	1.39974E-02	50.000
58.0000	1.85467E-02	75.000
	2.27195E-02	100.000
	3.02537E-02	150.000
	3.70034E-02	200.000
	4.31789E-02	250.000
	6.87473E-02	500.000
	8.91845E-02	750.000
	1.03352E-01	950.000
60.0000	9.99930E-03	10.000
	1.10994E-02	15.000
	1.32871E-02	25.000
	1.86838E-02	50.000
	2.39768E-02	75.000
	2.91663E-02	100.000
	3.92370E-02	150.000
	4.89072E-02	200.000
	5.82058E-02	250.000
	1.03387E-01	500.000
	1.88050E-01	750.000
64.0000	2.02312E-03	0.500
	3.03680E-03	1.000
	3.97573E-03	1.500
	5.52058E-03	2.500
	8.26745E-03	5.000
	1.02562E-02	7.500
	1.18813E-02	10.000
	1.45817E-02	15.000
	1.90242E-02	25.000
	2.84333E-02	50.000
	3.70881E-02	75.000
	4.54140E-02	100.000
	6.14394E-02	150.000
	7.68271E-02	200.000
	9.16895E-02	250.000
	1.60041E-01	500.000

TABLE 114 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	4.30173E-03	0.500
	5.74400E-03	1.000
	7.67080E-03	1.500
	1.11844E-02	2.500
	1.75336E-02	5.000
	2.18999E-02	7.500
	2.52782E-02	10.000
	3.05789E-02	15.000
	3.88690E-02	25.000
	5.66255E-02	50.000
	7.39650E-02	75.000
	9.14639E-02	100.000
70.0000	1.26780E-01	150.000
	1.62104E-01	200.000
75.0000	6.55010E-03	0.500
	9.71756E-03	1.000
	1.29380E-02	1.500
	1.79873E-02	2.500
	2.60331E-02	5.000
	3.14333E-02	7.500
	3.58655E-02	10.000
	4.37643E-02	15.000
	5.91433E-02	25.000
	1.00902E-01	50.000
	1.46166E-01	75.000
80.0000	1.01989E-02	0.500
	1.43782E-02	1.000
	1.77002E-02	1.500
	2.29347E-02	2.500
	3.29555E-02	5.000
	4.12992E-02	7.500
	4.88095E-02	10.000
	6.22876E-02	15.000
	8.54358E-02	25.000
90.0000	1.44771E-02	0.500
	3.58973E-02	1.000
	4.66132E-02	1.500
	5.90340E-02	2.500
	7.72975E-02	5.000
	9.24340E-02	7.500
	1.07616E-01	10.000
	1.39431E-01	15.000

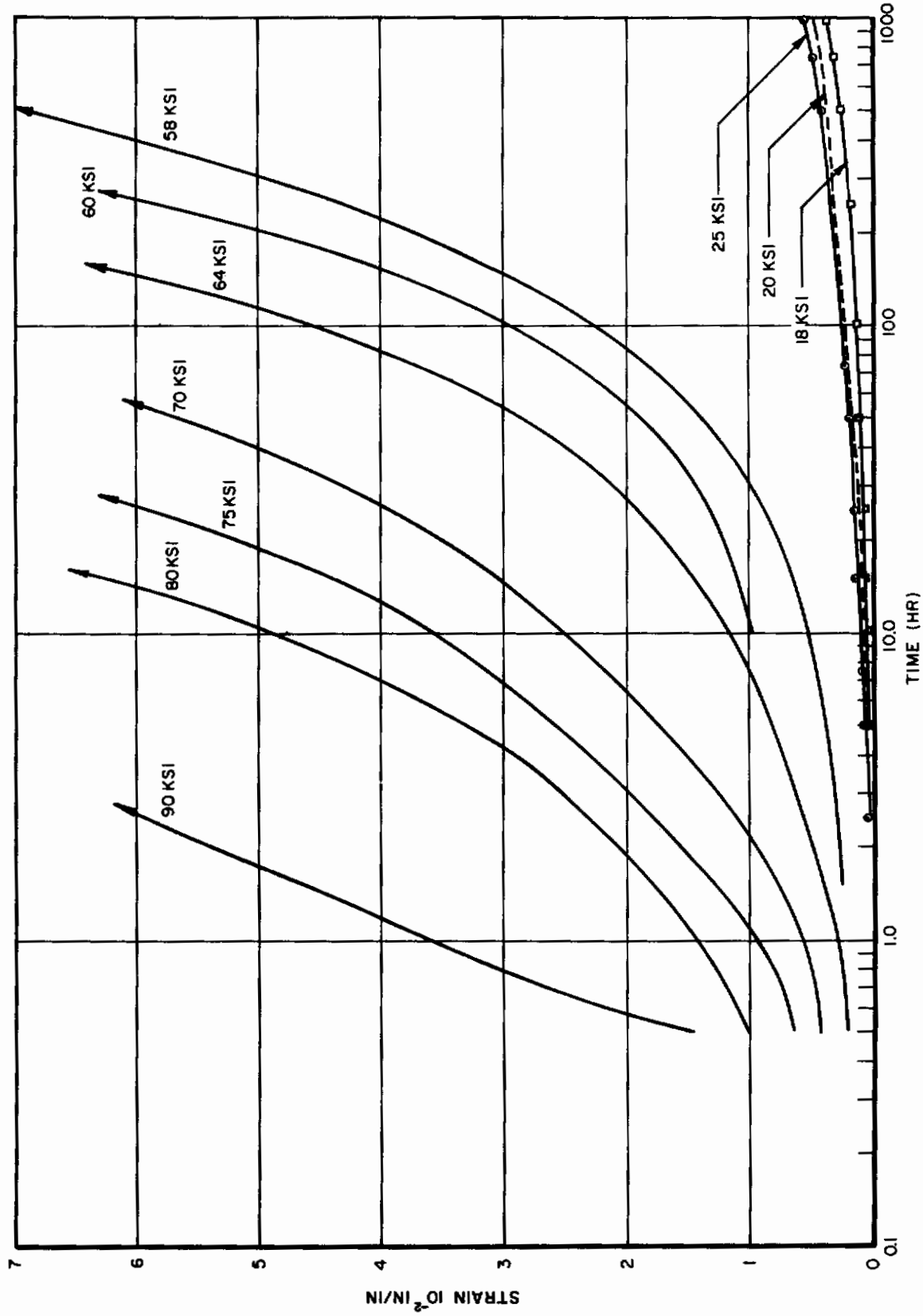


Figure 71. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 115

MS Ti-6Al-4V Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
18.0	-	-	.12	37.5	716	-	-
20.0	-	-	2.72	22.5	250	-	-
25.0	-	-	0.07	15	140	850	-
58.0	1003	29.5	.49	0.5	3	8.1	25.5
60.0	812.5	35.0	.48	0.5	1.8	4.4	15
64.0	547.9	41.5	.64	-	1.0	2.2	9.4
70.0	228.5	37.5	.78	-	-	0.75	2.1
75.0	100.8	40.5	1.08	-	-	-	0.9
80.0	64.0	34.0	-	-	-	-	0.5
90.0	24.6	30.5	2.36	-	-	-	-

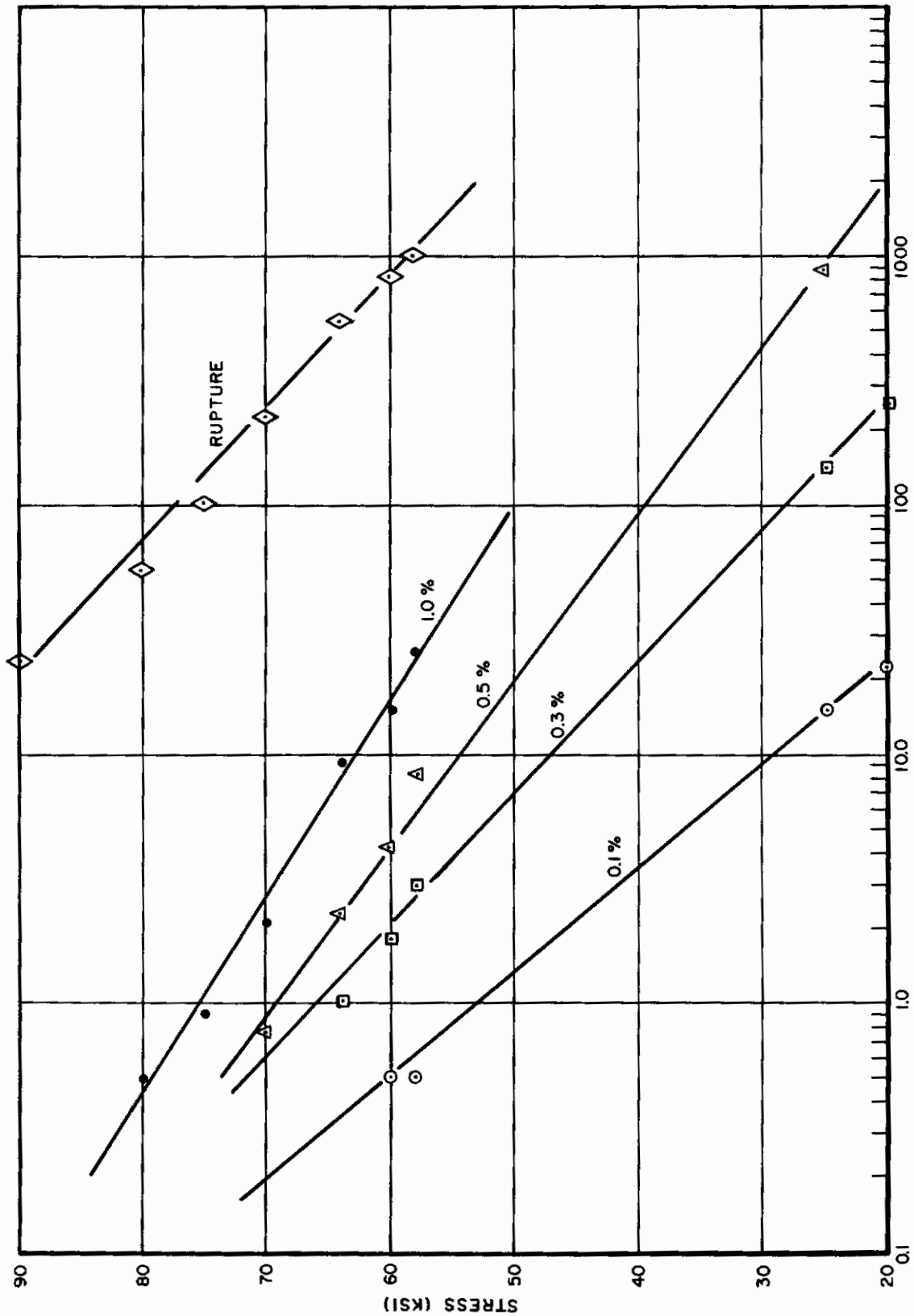


Figure 72. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 116

Deformation Versus Time (Raw Data) for MS Ti-6Al-4V Sheet at 1000° F (1460° R)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.5000	10.00000E-05	25.000
	2.00000E-04	50.000
	3.00000E-04	100.000
	6.00000E-04	250.000
	1.10000E-03	500.000
	1.70000E-03	750.000
	2.70000E-03	1000.000
0.8000	10.00000E-05	5.000
	2.00000E-04	10.000
	3.00000E-04	15.000
	4.00000E-04	25.000
	6.00000E-04	50.000
	8.00000E-04	75.000
	9.00000E-04	100.000
	1.50000E-03	250.000
	2.80000E-03	500.000
	4.00000E-03	750.000
	4.80000E-03	1000.000
1.5000	10.00000E-05	2.500
	2.00000E-04	7.500
	3.00000E-04	15.000
	5.00000E-04	25.000
	9.00000E-04	50.000
	1.30000E-03	75.000
	1.70000E-03	100.000
	3.50000E-03	250.000
	6.30000E-03	500.000
	8.90000E-03	750.000
	1.13000E-02	1000.000
1.9000	10.00000E-05	0.500
	2.00000E-04	1.000
	3.00000E-04	1.500
	5.00000E-04	2.500
	7.00000E-04	5.000
	9.00000E-04	7.500
	10.00000E-04	10.000
	1.20000E-03	15.000
	1.50000E-03	25.000
	2.20000E-03	50.000
	2.70000E-03	75.000
	3.20000E-03	100.000
	5.60000E-03	250.000
	9.00000E-03	500.000

RUN 21

TABLE 116 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.9000	1.22000E-02	750.000
	1.55000E-02	1000.000
7.5000	3.00000E-04	0.500
	5.00000E-04	1.000
	7.00000E-04	1.500
	10.00000E-04	2.500
	1.70000E-03	5.000
	2.30000E-03	7.500
	2.80000E-03	10.000
	3.70000E-03	15.000
	5.00000E-03	25.000
	9.00000E-03	50.000
	1.35000E-02	75.000
	1.80000E-02	100.000
	2.85000E-02	150.000
	3.95000E-02	200.000
	5.20000E-02	250.000
	1.18000E-01	500.000
	2.01000E-01	750.000
	3.00000E-01	1000.000
	3.45000E-01	1100.000
10.0000	7.00000E-04	0.500
	10.00000E-04	1.000
	1.40000E-03	1.500
	2.00000E-03	2.500
	2.80000E-03	5.000
	3.70000E-03	7.500
	4.40000E-03	10.000
	6.10000E-03	15.000
	9.20000E-03	25.000
	1.60000E-02	50.000
	2.60000E-02	75.000
	3.50000E-02	100.000
	5.80000E-02	150.000
	7.90000E-02	200.000
	1.05000E-01	250.000
	2.74000E-01	500.000
	5.64000E-01	750.000
15.0000	1.50000E-03	0.500
	2.20000E-03	1.000
	3.00000E-03	1.500
	4.20000E-03	2.500
	6.50000E-03	5.000

TABLE 116 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	8.50000E-03	7.500
	10.00000E-03	10.000
	1.30000E-02	15.000
	2.00000E-02	25.000
	4.20000E-02	50.000
	6.40000E-02	75.000
	8.60000E-02	100.000
	1.62000E-01	150.000
	3.22000E-01	200.000
20.0000	10.00000E-04	0.500
	2.00000E-03	1.000
	3.00000E-03	1.500
	4.50000E-03	2.500
	8.50000E-03	5.000
	1.25000E-02	7.500
	1.65000E-02	10.000
	2.37000E-02	15.000
	3.90000E-02	25.000
	7.80000E-02	50.000
35.0000	2.50000E-03	0.500
	4.00000E-03	1.000
	6.00000E-03	1.500
	10.00000E-03	2.500
	2.00000E-02	5.000
	3.00000E-02	7.500
	4.00000E-02	10.000
	6.50000E-02	15.000
50.0000	4.00000E-02	0.500
	1.30000E-01	1.000

TABLE 117

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Sheet at 1000° F (1460° R)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.5000	1.92330E-04	50.000
	3.06250E-04	100.000
	6.08850E-04	250.000
	1.08493E-03	500.000
	1.71016E-03	750.000
	2.69745E-03	1000.000
0.8000	2.08610E-04	10.000
	2.97340E-04	15.000
	4.12720E-04	25.000
	5.97920E-04	50.000
	7.43960E-04	75.000
	8.78450E-04	100.000
	1.62583E-03	250.000
	2.78499E-03	500.000
	3.86612E-03	750.000
0.8000	4.88402E-03	1000.000
1.5000	1.99130E-04	7.500
	3.02820E-04	15.000
	4.90950E-04	25.000
	9.24940E-04	50.000
	1.30647E-03	75.000
	1.65825E-03	100.000
	3.52510E-03	250.000
	6.30284E-03	500.000
	8.87768E-03	750.000
	1.13117E-02	1000.000
1.9000	3.29580E-04	1.500
	6.50680E-04	5.000
	8.38180E-04	7.500
	9.92090E-04	10.000
	1.23708E-03	15.000
	1.59645E-03	25.000
	2.21874E-03	50.000
	2.70931E-03	75.000
	3.15136E-03	100.000
	5.50224E-03	250.000
	9.04102E-03	500.000
	1.23219E-02	750.000
	1.54113E-02	1000.000

RUN 21

TABLE 117 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.5000	1.70364E-03	5.000
	2.11116E-03	7.500
	2.52077E-03	10.000
	3.34625E-03	15.000
	5.02212E-03	25.000
	9.35563E-03	50.000
	1.38913E-02	75.000
	1.86252E-02	100.000
	2.86713E-02	150.000
	3.94630E-02	200.000
	5.09705E-02	250.000
	1.18378E-01	500.000
	2.00996E-01	750.000
	2.99870E-01	1000.000
	3.45074E-01	1100.000
10.0000	1.97741E-03	2.500
	2.72904E-03	5.000
	3.48654E-03	7.500
	4.24992E-03	10.000
	5.79432E-03	15.000
	8.95371E-03	25.000
	1.72639E-02	50.000
	2.61622E-02	75.000
	3.56489E-02	100.000
	5.63904E-02	150.000
	7.95023E-02	200.000
	1.05021E-01	250.000
	2.74023E-01	500.000
	5.63998E-01	750.000
15.0000	4.59331E-03	2.500
	6.31966E-03	5.000
	8.06541E-03	7.500
	9.83055E-03	10.000
	1.34190E-02	15.000
	2.08292E-02	25.000
	4.07404E-02	50.000
	6.28701E-02	75.000
	8.81904E-02	100.000
	1.61237E-01	150.000
	3.22105E-01	200.000

TABLE 117 (CONT)

RUN 21

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	1.01893E-03	0.500
	1.99870E-03	1.000
	2.88070E-03	1.500
	4.59657E-03	2.500
	8.63925E-03	5.000
	1.24847E-02	7.500
	1.62613E-02	10.000
	2.37919E-02	15.000
	3.90410E-02	25.000
	7.79867E-02	50.000
35.0000	2.55669E-03	0.500
	3.77138E-03	1.000
	6.07055E-03	1.500
	1.03275E-02	2.500
	1.97358E-02	5.000
	2.96360E-02	7.500
	4.05415E-02	10.000
	6.48605E-02	15.000
50.0000	4.00000E-02	0.500
	1.30000E-01	1.000

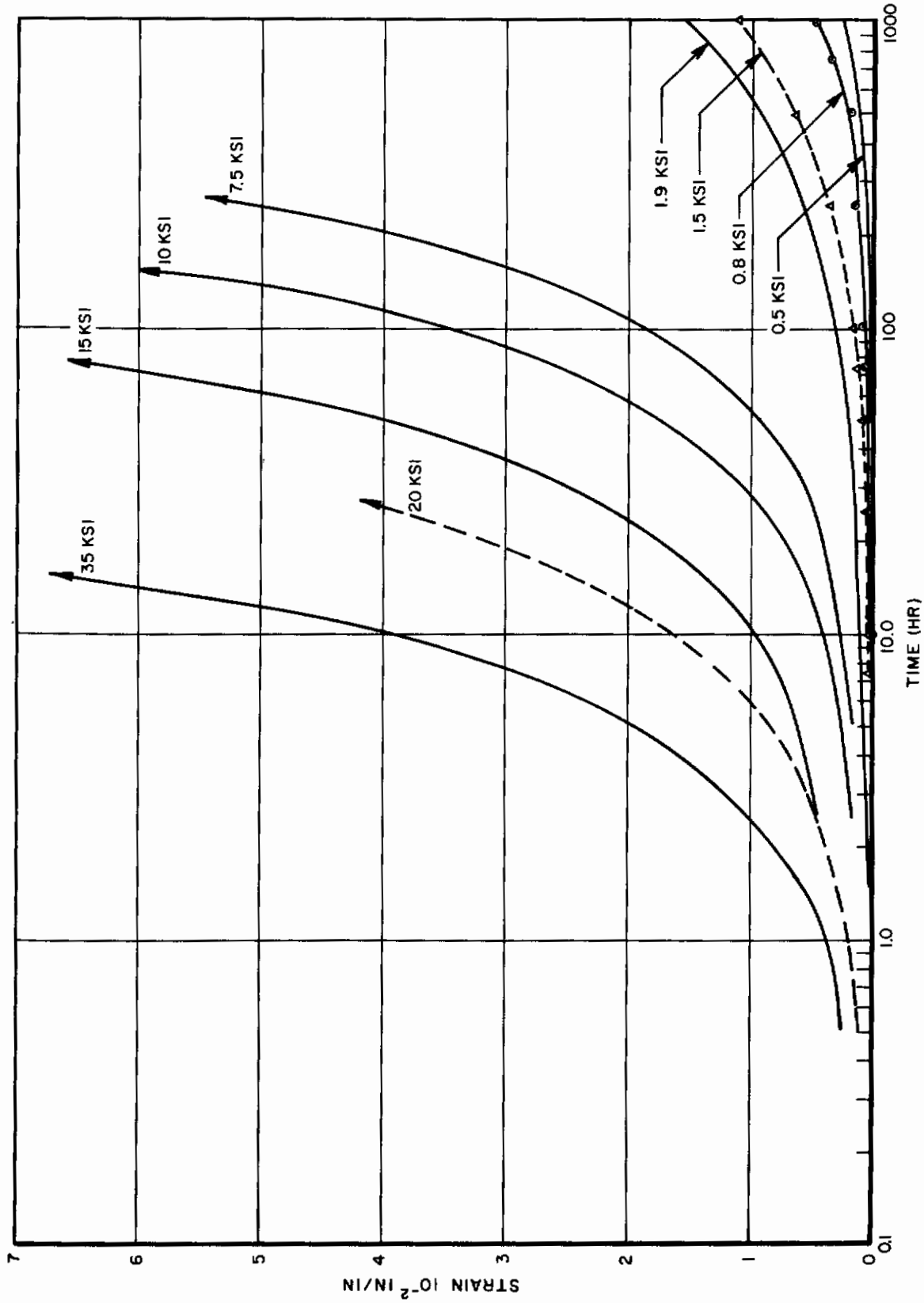


Figure 73. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 1000°F (1460°R)

TABLE 118

MS Ti-6Al-4V Creep Deformation and Rupture Data at 1000° F (1460° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
0.5	-	-	0.02	450	-	-	-
0.8	-	-	0.04	125	541	-	-
1.5	-	-	0.07	56	200	370	870
1.9	-	-	0.23	10	90	212	283
7.5	-	-	0.08	2.5	11.5	25	62
10.0	812.7	161	0.19	1.0	6.3	11.2	29
15.0	251.7	111.5	0.13	-	1.5	3.3	10
20.0	125.5	94	0.26	-	1.5	2.8	5.9
35.0	19.0	67.5	0.05	-	0.63	1.25	2.5
50.0	1.2	26.0	0.97	-	-	-	-

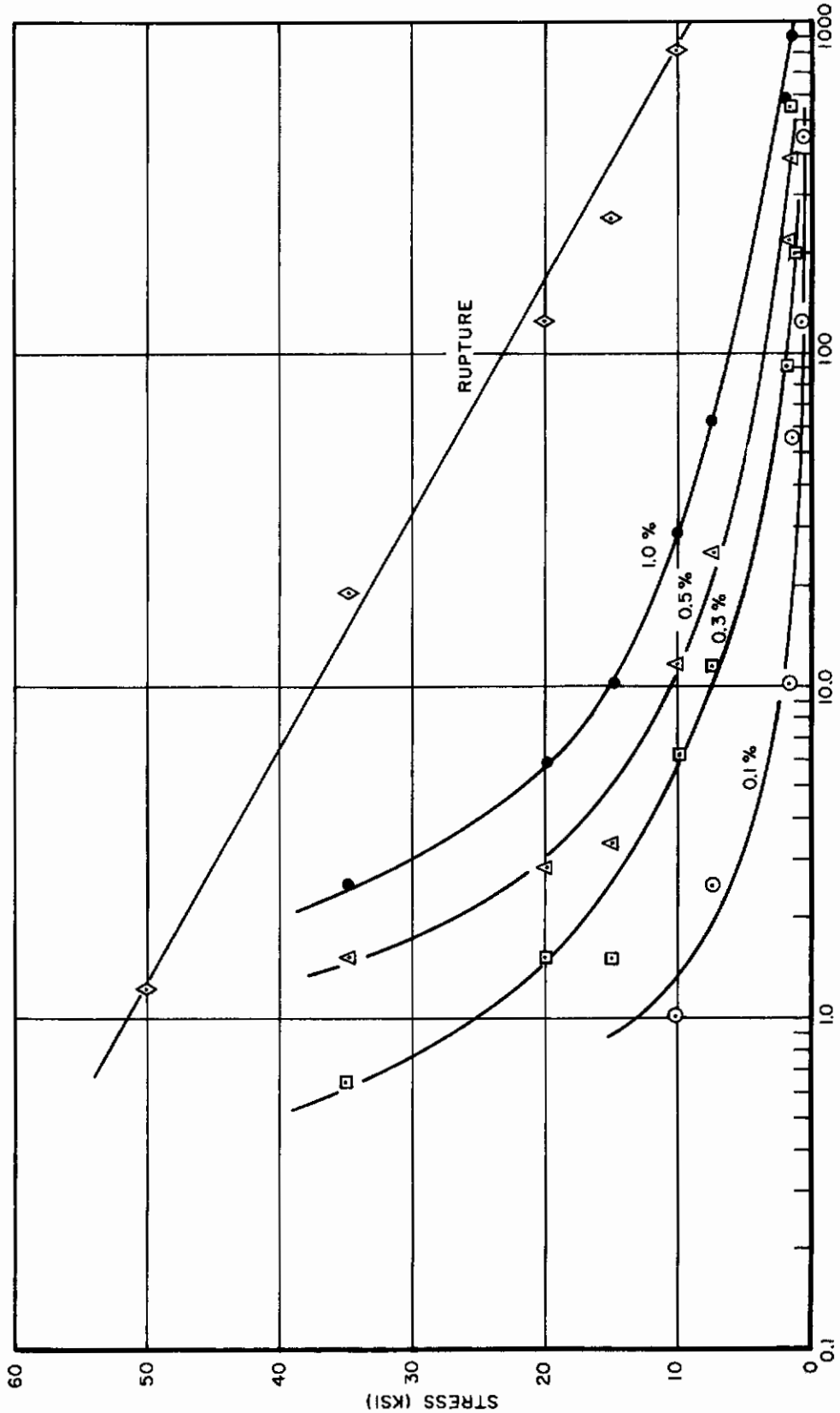


Figure 74. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 1000°F (1460°R)

TABLE 119

Minimum Creep Rate for MS Ti-6Al-4V

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	107.5	5.668×10^{-5}
800° F (1260° R)	60.0	1.807×10^{-4}
	70.0	6.94×10^{-4}
	75	1.538×10^{-3}
	90	6.05×10^{-3}
1000° F (1460° R)	7.5	1.63×10^{-4}
	10.0	3.01×10^{-4}
	15.0	6.91×10^{-4}
	20	1.506×10^{-3}
	35	2.429×10^{-3}

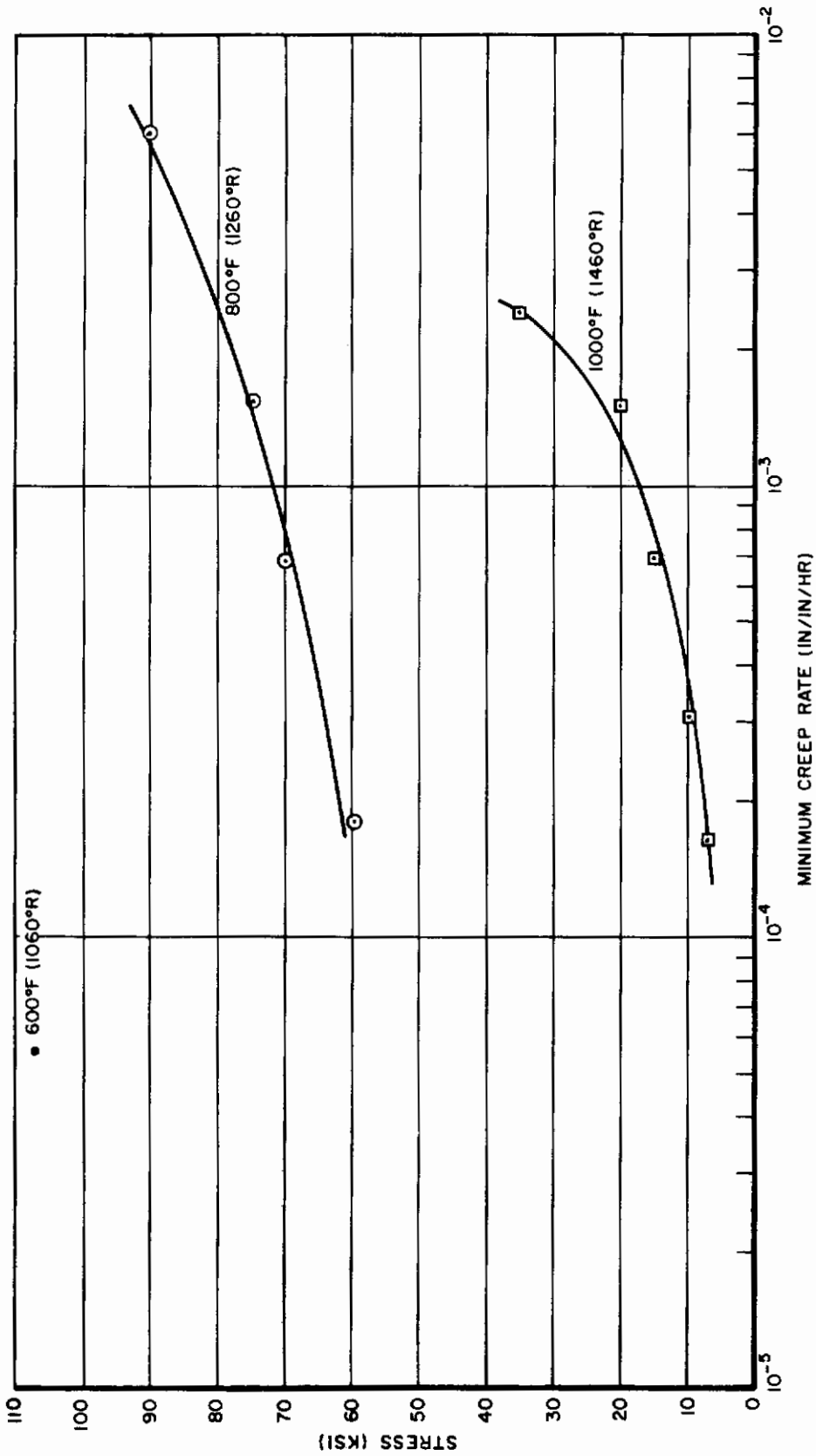


Figure 75. Minimum Creep Rate of MS Ti-6Al-4V Sheet

CREEP DATA FOR

MS Ti-6Al-4V SHEET

ANNEALED

TABLE 120

Deformation Versus Time (Raw Data) for MS Ti-6Al-4V Mill Annealed Sheet at 600° F (1060° R) RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	3.80000E-04	19.700
	6.90000E-04	45.200
	9.40000E-04	70.100
	9.90000E-04	93.000
	1.25000E-03	164.900
	1.35000E-03	213.800
	1.46000E-03	287.300
	1.52000E-03	359.900
	1.64000E-03	429.300
	1.68000E-03	477.300
	1.71000E-03	528.600
	1.82000E-03	597.400
	1.87000E-03	646.600
	1.90000E-03	721.500
	2.03000E-03	789.600
	2.06000E-03	820.400
	2.10000E-03	861.900
	2.16000E-03	933.400
	2.22000E-03	980.800
	2.29000E-03	1052.800
	2.35000E-03	1105.700
67.0000	4.80000E-04	19.800
	8.70000E-04	43.200
	1.17000E-03	66.500
	1.41000E-03	91.000
	1.56000E-03	115.300
	1.72000E-03	163.800
	1.77000E-03	186.800
	1.90000E-03	260.100
	1.98000E-03	306.200
	2.03000E-03	331.200
	2.11000E-03	378.900
	2.16000E-03	427.000
	2.29000E-03	470.700
	2.32000E-03	498.400
	2.36000E-03	546.400
	2.42000E-03	570.000
	2.46000E-03	594.300
	2.55000E-03	643.100
	2.63000E-03	691.000
	2.72000E-03	719.000
	2.75000E-03	769.200
	2.84000E-03	818.400
	2.89000E-03	865.500
	3.02000E-03	919.600
	3.07000E-03	943.000

RUN 25

TABLE 120 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
69.0000	7.40000E-04	18.500
69.0000	1.39000E-03	44.100
	1.74000E-03	69.000
	1.92000E-03	92.000
	2.06000E-03	115.700
	2.20000E-03	140.100
	2.28000E-03	163.700
	2.42000E-03	191.100
	2.50000E-03	212.700
	2.55000E-03	236.100
	2.63000E-03	260.000
	2.69000E-03	286.200
	2.85000E-03	332.200
	2.91000E-03	358.800
	3.18000E-03	452.200
	3.23000E-03	476.200
	3.36000E-03	527.500
	3.48000E-03	571.800
	3.67000E-03	645.600
	3.70000E-03	693.500
	3.88000E-03	740.600
	4.09000E-03	788.500
	4.16000E-03	836.300
	4.24000E-03	860.800
	4.39000E-03	908.000
	4.51000E-03	956.200
	4.57000E-03	979.700
	4.74000E-03	1051.700
	4.81000E-03	1076.500
	4.88000E-03	1100.400
	5.04000E-03	1148.400
72.0000	3.30000E-04	2.500
	1.62000E-03	19.000
	1.84000E-03	26.700
	2.23000E-03	43.500
	2.28000E-03	50.400
	2.47000E-03	66.100
	2.66000E-03	91.500
	2.88000E-03	115.300
	2.92000E-03	122.600
	3.08000E-03	139.000
	3.27000E-03	162.700
	3.49000E-03	186.800
	3.65000E-03	211.100
	3.86000E-03	234.700
	4.34000E-03	283.000

TABLE 120 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
72.0000	4.55000E-03	306.800
	4.73000E-03	331.300
	4.91000E-03	355.100
	5.19000E-03	379.300
	5.32000E-03	402.300
	5.80000E-03	451.400
	5.86000E-03	475.200
	6.49000E-02	546.900
	7.11000E-03	619.200
	7.62000E-03	667.300
	7.98000E-03	716.100
	8.27000E-03	740.900
	8.53000E-03	786.800
	8.76000E-02	812.500
	9.35000E-03	861.800
	9.49000E-03	886.200
	9.72000E-03	912.600
	9.91000E-03	937.100
	1.01800E-02	962.500
78.0000	3.70000E-04	0.500
	6.00000E-04	0.900
	6.30000E-04	1.600
	7.40000E-04	2.200
	5.13000E-03	18.300
	5.91000E-03	21.300
	6.81000E-03	26.000
	8.61000E-03	42.500
	8.77000E-03	47.700
	8.83000E-03	49.800
	9.39000E-03	65.400
	9.80000E-03	90.600
	1.03800E-02	114.300
	1.60000E-03	2.300
	2.87000E-03	4.500
	4.89000E-03	6.300
	7.53000E-03	17.800
	7.84000E-03	20.300
	8.06000E-03	21.800
	8.32000E-03	24.200
	9.22000E-03	41.700
	9.54000E-03	48.900
	1.00900E-02	65.600
	1.05500E-02	91.200
82.0000	7.10000E-04	0.200
	8.60000E-04	0.500
	9.70000E-04	1.100

RUN 25

TABLE 120 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
		1.600
82.0000	1.12000E-03	2.300
	1.41000E-03	3.100
	1.89000E-03	4.100
	2.61000E-03	5.500
	3.73000E-03	8.900
	5.68000E-03	19.400
	8.35000E-03	28.300
	9.12000E-03	45.700
	1.08900E-02	49.600
	1.12100E-02	
		0.050
91.0000	2.60000E-04	0.100
	4.90000E-04	0.200
	10.00000E-04	0.500
	2.21000E-03	0.700
	3.35000E-03	0.900
	3.98000E-03	1.200
	5.01000E-03	1.300
	5.29000E-03	1.500
	6.09000E-03	2.000
	7.51000E-03	2.400
	8.18000E-03	2.700
	8.57000E-03	3.100
	9.14000E-03	3.400
	9.49000E-03	3.700
	9.72000E-03	4.400
	1.02900E-02	
		0.100
95.0000	7.20000E-04	0.200
	1.54000E-03	0.300
	2.30000E-03	0.400
	2.92000E-03	0.500
	3.92000E-03	0.600
	4.70000E-03	0.800
	6.11000E-03	0.900
	6.55000E-03	1.100
	7.67000E-03	1.200
	8.20000E-03	1.300
	8.52000E-03	1.450
	9.34000E-03	1.600
	9.87000E-03	1.700
	1.01900E-02	1.800
	1.05500E-02	

TABLE 120 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	3.20000E-04	0.017
	7.10000E-04	0.033
	1.48000E-03	0.067
	1.99000E-03	0.100
	2.65000E-03	0.133
	3.51000E-03	0.167
	4.03000E-03	0.200
	4.97000E-03	0.250
	6.00000E-03	0.300
	6.95000E-03	0.350
	7.63000E-03	0.400
	8.29000E-03	0.450
100.0000	8.91000E-03	0.500
	9.55000E-03	0.550
	1.00900E-02	0.600

TABLE 121

RUN 25

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Mill Annealed Sheet at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	3.57220E-04	19.700
	7.47030E-04	45.200
	9.17250E-04	70.100
	1.01874E-03	93.000
	1.21917E-03	164.900
	1.31477E-03	213.800
	1.43381E-03	287.300
	1.53589E-03	359.900
	1.62505E-03	429.300
	1.68339E-03	477.300
	1.74344E-03	528.600
	1.82094E-03	597.400
	1.87462E-03	646.600
	1.95400E-03	721.500
	2.02407E-03	789.600
	2.05518E-03	820.400
	2.09658E-03	861.900
	2.16661E-03	933.400
	2.21222E-03	980.800
	2.26034E-03	1052.800
	2.32957E-03	1105.700
67.0000	8.55570E-04	43.200
	1.20665E-03	66.500
	1.40944E-03	91.000
	1.53876E-03	115.300
	1.70485E-03	163.800
	1.76278E-03	186.800
	1.91103E-03	260.100
	1.99142E-03	306.200
	2.03329E-03	331.200
	2.11155E-03	378.900
	2.18964E-03	427.000
	2.26056E-03	470.700
	2.30569E-03	498.400
	2.38433E-03	546.400
	2.42325E-03	570.000
	2.46350E-03	594.300
	2.54490E-03	643.100
	2.62552E-03	691.000
	2.67296E-03	719.000
	2.75856E-03	769.200
	2.84307E-03	818.400
	2.92451E-03	865.500
	3.01860E-03	919.600
	3.05947E-03	943.000

RUN 25

TABLE 121 (CONT)

STRESS (PSI)	STRAIN (IN/IN)	TIME (HOURS)
69.0000	7.05540E-04	18.500
	1.44415E-03	44.100
	1.75480E-03	69.000
69.0000	1.93617E-03	92.000
	2.07541E-03	115.700
	2.19163E-03	140.100
	2.28859E-03	163.700
	2.38936E-03	191.100
	2.46290E-03	212.700
	2.53854E-03	236.100
	2.61767E-03	260.000
	2.69130E-03	286.200
	2.82484E-03	332.200
	2.90024E-03	358.800
	3.02799E-03	404.600
	3.15982E-03	452.200
	3.22425E-03	476.200
	3.36321E-03	527.500
	3.48244E-03	571.800
	3.67983E-03	645.600
	3.80728E-03	693.500
	3.93213E-03	740.600
	4.05867E-03	788.500
	4.18451E-03	836.300
	4.24885E-03	860.800
	4.37250E-03	908.000
	4.49835E-03	956.200
	4.55955E-03	979.700
	4.74644E-03	1051.700
	4.81059E-03	1076.500
	4.87231E-03	1100.400
	4.99593E-03	1148.400
72.0000	1.62446E-03	19.000
	1.85909E-03	26.700
	2.17541E-03	43.500
	2.26996E-03	50.400
	2.45039E-03	66.100
	2.69316E-03	91.500
	2.89868E-03	115.300
	2.95986E-03	122.600
	3.09577E-03	139.000
	3.29045E-03	162.700
	3.48821E-03	186.800
	3.68842E-03	211.100
	3.88401E-03	234.700
	4.28819E-03	283.000

TABLE 121 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.48913E-03	306.800
	4.69705E-03	331.300
	4.89993E-03	355.100
	5.10699E-03	379.300
	5.30441E-03	402.300
	5.72740E-03	451.400
72.0000	5.93299E-03	475.200
	6.55355E-03	546.900
	7.17972E-03	619.200
	7.52586E-03	667.300
	8.01730E-03	716.100
	8.23110E-03	740.900
	8.62604E-03	786.800
	8.84668E-03	812.500
	9.26885E-03	861.800
	9.47724E-03	886.200
	9.70227E-03	912.600
	9.91068E-03	937.100
	1.01263E-02	962.500
	6.19970E-04	0.900
78.0000	5.93350E-04	1.600
	7.40920E-04	2.200
	5.31770E-03	18.300
	5.85768E-03	21.300
	6.58218E-03	26.000
	8.32993E-03	42.500
	8.70443E-03	47.700
	8.83801E-03	49.800
	9.57714E-03	65.400
	1.01131E-02	90.600
	1.01536E-02	114.300
	3.06571E-03	4.500
	4.56407E-03	6.300
	7.67420E-03	17.800
	7.94577E-03	20.300
	8.08534E-03	21.800
	8.28134E-03	24.200
	9.20259E-03	41.700
	9.46473E-03	48.900
	9.97762E-03	65.600
	1.06485E-02	91.200
	1.17432E-03	1.600
82.0000	1.28517E-03	2.300
	1.87943E-03	3.100
	2.71651E-03	4.100

TABLE 121 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.77017E-03	5.500
	5.60935E-03	8.900
	8.21043E-03	19.400
	9.27694E-03	28.300
	1.08558E-02	45.700
	1.12069E-02	49.600
91.0000	2.60910E-04	0.050
	4.85380E-04	0.100
91.0000	1.00520E-03	0.200
	2.28430E-03	0.500
	3.16313E-03	0.700
	3.99332E-03	0.900
	5.10640E-03	1.200
	5.44105E-03	1.300
	6.05878E-03	1.500
	7.33696E-03	2.000
	8.13371E-03	2.400
	8.62551E-03	2.700
	9.16507E-03	3.100
	9.49619E-03	3.400
	9.77374E-03	3.700
	1.02503E-02	4.400
95.0000	7.21400E-04	0.100
	1.53080E-03	0.200
	2.25722E-03	0.300
	3.07053E-03	0.400
	3.87634E-03	0.500
	4.63870E-03	0.600
	6.00494E-03	0.800
	6.61253E-03	0.900
	7.69080E-03	1.100
	8.18624E-03	1.200
	8.64163E-03	1.300
	9.27188E-03	1.450
	9.84662E-03	1.600
	1.02027E-02	1.700
	1.05395E-02	1.800

TABLE 121 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	3.09060E-04	0.017
	7.71960E-04	0.033
	1.33867E-03	0.067
	2.03641E-03	0.100
	2.75897E-03	0.133
	3.46387E-03	0.167
	4.13921E-03	0.200
	5.08755E-03	0.250
	5.96640E-03	0.300
	6.78272E-03	0.350
	7.54444E-03	0.400
	8.25854E-03	0.450
	8.93092E-03	0.500
	9.56654E-03	0.550
	1.01695E-02	0.600

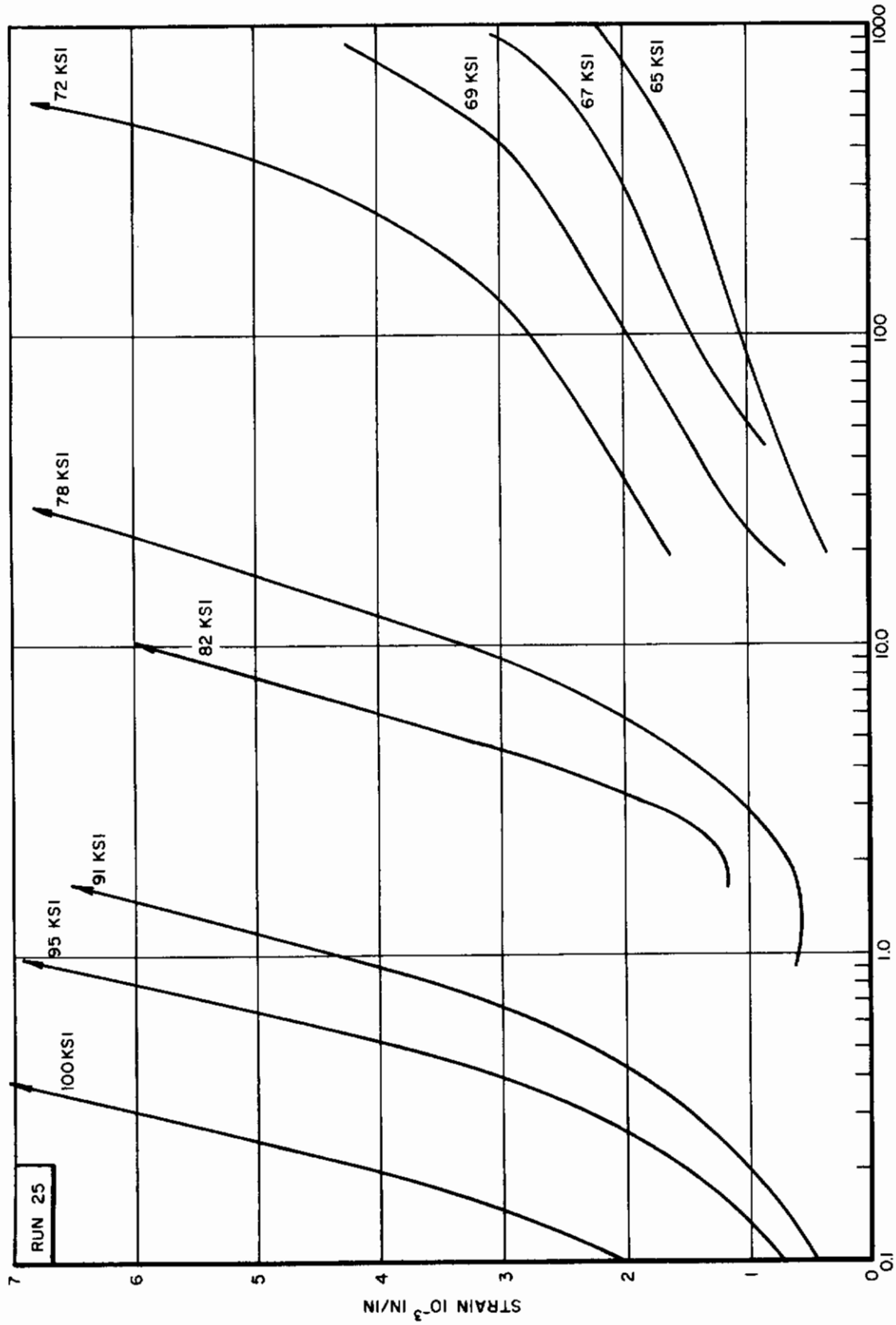


Figure 76. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 600°F (1060°R)

TABLE 122

Annealed MS Ti-6Al-4V Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
67.0	-	-	0.46	-	915	-	-
69.0	-	-	0.49	-	395	1130	-
72.0	-	-	.52	-	130	360	950
78.0	-	-	.71	-	4.5	90	63.5
78.0	-	-	.70	-	9.5	17	97.0
82.0	-	-	2.0	-	4.1	7.5	37.0
91.0	-	-	2.4	-	0.65	1.2	4.1
95.0	-	5.0	3.3	-	0.4	0.65	1.65
100.0	-	7.5	-	-	0.15	0.25	0.6

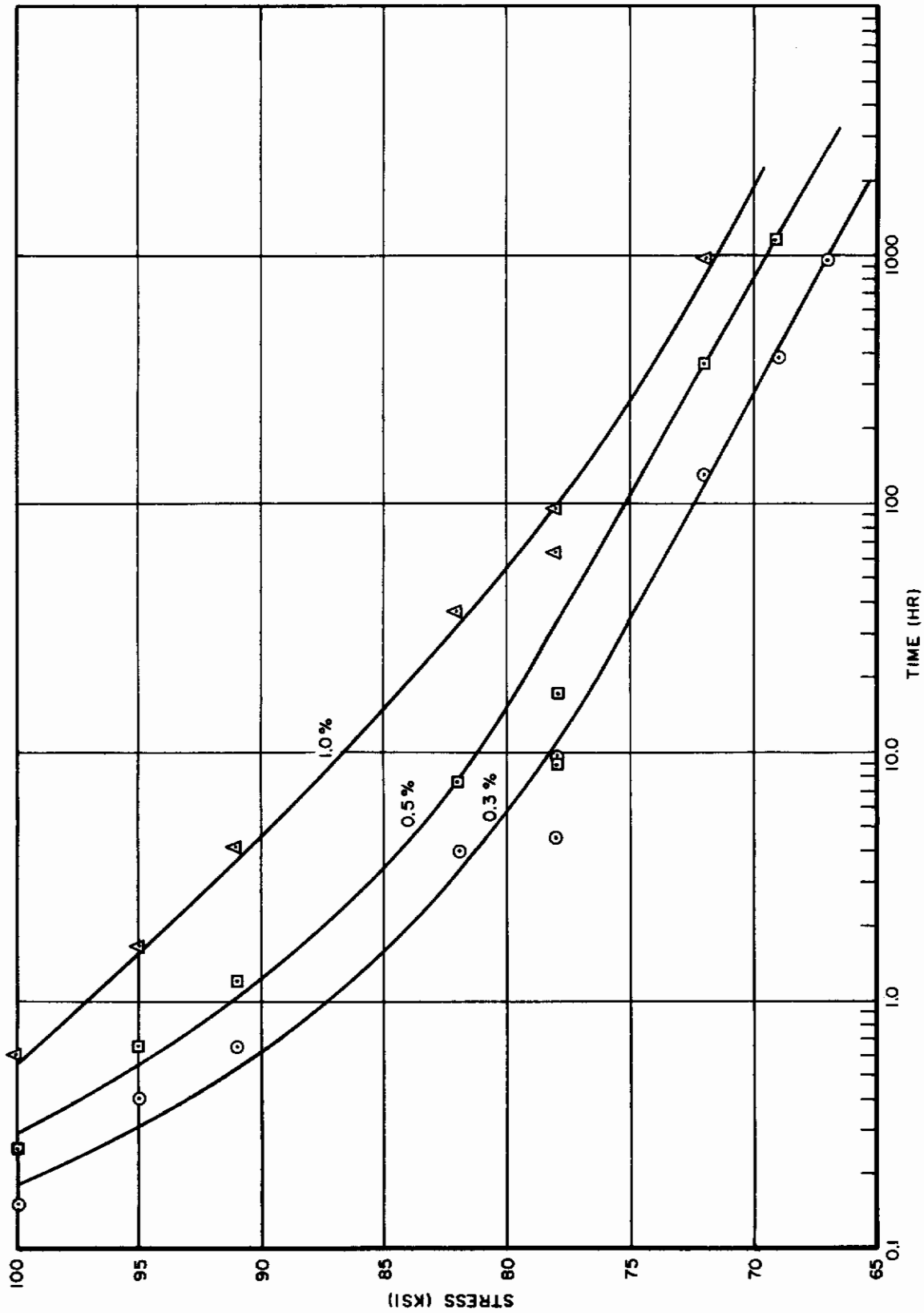


Figure 77. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 600°F (1060°R)

TABLE 123

Deformation Versus Time (Raw Data) for MS Ti-6Al-4V Mill Annealed Sheet 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)	RUN 25
19.0000	5.90000E-04	19.600	
	6.80000E-04	25.300	
	1.03000E-03	42.500	
	1.37000E-03	66.100	
	1.49000E-03	90.300	
	1.71000E-03	114.800	
	1.85000E-03	162.000	
	1.92000E-03	186.200	
	1.96000E-03	210.200	
	2.02000E-03	233.600	
	2.09000E-03	305.700	
	2.12000E-03	330.300	
	2.19000E-03	378.500	
	2.19000E-03	426.200	
	2.33000E-03	470.200	
	2.35000E-03	497.700	
	2.45000E-03	521.700	
	2.52000E-03	593.600	
	2.54000E-03	642.600	
	2.73000E-03	717.700	
	2.73000E-03	766.100	
	2.82000E-03	815.000	
	2.89000E-03	866.700	
	2.95000E-03	916.200	
	3.01000E-03	940.500	
	3.05000E-03	949.700	
30.0000	7.20000E-04	18.700	
	1.59000E-03	43.900	
	1.90000E-03	67.100	
	2.21000E-03	91.500	
	2.35000E-03	115.400	
	2.59000E-03	139.300	
	2.75000E-03	163.500	
	2.82000E-03	187.200	
	3.09000E-03	235.000	
	3.22000E-03	259.300	
	3.37000E-03	283.700	
	3.43000E-03	307.800	
	3.51000E-03	331.200	
	3.56000E-03	354.400	
	3.73000E-03	403.900	
	3.94000E-03	451.100	
	4.05000E-03	499.000	
	4.29000E-03	571.700	
	4.42000E-03	595.300	

TABLE 123 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	4.45000E-03	619.600
	4.64000E-03	692.900
	4.85000E-03	738.500
	4.96000E-03	788.800
	5.02000E-03	812.100
	5.17000E-03	837.500
37.0000	9.90000E-04	18.200
	2.07000E-03	42.000
	2.69000E-03	66.000
	3.10000E-03	90.200
	3.47000E-03	113.800
	4.05000E-03	161.600
	4.19000E-03	185.900
	4.46000E-03	210.300
	4.52000E-03	234.900
	4.69000E-03	257.900
	4.90000E-03	281.000
	5.14000E-03	330.500
	5.30000E-03	361.000
	5.55000E-03	401.500
	5.74000E-03	450.300
	6.09000E-03	498.300
	6.39000E-03	546.300
	6.75000E-03	619.500
	7.04000E-03	665.100
	7.38000E-03	715.300
	7.49000E-03	741.400
	7.62000E-03	788.500
	8.03000E-03	836.800
	8.31000E-03	908.400
	8.56000E-03	957.200
	8.90000E-03	1004.100
	9.29000E-03	1053.600
	9.51000E-03	1099.400
	9.87000E-03	1148.300
	1.00800E-02	1196.200
40.5000	2.17000E-03	17.200
	2.39000E-03	24.200
	2.75000E-03	39.300
	3.32000E-03	65.000
	3.70000E-03	89.900
	4.09000E-03	112.800
	4.58000E-03	136.700
	4.92000E-03	161.100
	5.24000E-03	184.600
	5.56000E-03	212.000
	5.75000E-03	233.600
	5.96000E-03	256.800

RUN 25

TABLE 123 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.5000	6.50000E-03	307.100
	6.70000E-03	329.400
	6.85000E-03	353.100
	7.08000E-03	379.800
	7.27000E-03	401.000
	7.86000E-03	449.100
	8.05000E-03	473.100
	8.27000E-03	497.100
	8.73000E-03	548.400
	9.00000E-03	568.100
	9.25000E-03	592.600
	9.61000E-03	641.100
	9.72000E-03	666.400
	9.90000E-03	688.700
	1.01500E-02	714.400
	1.05500E-02	741.000
45.0000	6.20000E-04	0.300
	8.70000E-04	1.500
	1.95000E-03	4.600
	3.00000E-03	18.500
	3.17000E-03	26.200
	3.82000E-03	42.700
	4.09000E-03	50.300
	4.53000E-03	67.200
	4.65000E-03	74.100
	4.88000E-03	89.900
	5.32000E-03	115.200
	5.92000E-03	139.000
	6.19000E-03	162.600
	6.76000E-03	186.400
	7.01000E-03	210.600
	7.45000E-03	234.800
	7.75000E-03	258.500
	8.63000E-03	306.600
	9.09000E-03	330.600
	9.24000E-03	355.000
	9.65000E-03	378.900
	9.82000E-03	386.100
	9.91000E-03	403.000
	1.00400E-02	410.000
	1.02100E-02	426.000
	1.10600E-02	475.200
58.0000	9.00000E-04	0.700
	1.88000E-03	2.500
	3.02000E-03	5.100
	5.29000E-03	18.300
	5.87000E-03	22.500
	5.98000E-03	24.800

TABLE 123 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	8.10000E-03	42.700
	8.88000E-03	49.500
	1.09100E-02	66.600
66.0000	9.60000E-04	0.100
	1.79000E-03	0.300
	2.61000E-03	0.500
	2.87000E-03	0.600
	2.99000E-03	0.650
	3.04000E-03	0.700
	3.62000E-03	0.900
	4.08000E-03	1.100
	4.93000E-03	1.500
	5.00000E-03	1.550
	6.35000E-03	2.700
	7.27000E-03	3.500
	7.60000E-03	3.800
	7.89000E-03	4.400
	8.41000E-03	5.100
	9.30000E-03	6.500
	9.65000E-03	7.200
	9.92000E-03	7.500
	9.95000E-03	7.600
	1.00100E-02	7.700
	1.01000E-02	7.900
71.5000	1.53000E-03	0.050
	2.25000E-03	0.100
	2.78000E-03	0.150
	3.32000E-03	0.200
	4.20000E-03	0.300
	4.97000E-03	0.400
	5.52000E-03	0.500
	6.20000E-03	0.600
	6.72000E-03	0.700
	7.63000E-03	0.900
	8.44000E-03	1.100
	9.08000E-03	1.300
	9.66000E-03	1.500
	9.90000E-03	1.600
	1.00500E-02	1.650
	1.02300E-02	1.700
75.0000	1.07000E-03	0.017
	1.87000E-03	0.033
	2.43000E-03	0.050
	2.75000E-03	0.067
	3.17000E-03	0.083
	3.63000E-03	0.100
	4.21000E-03	0.133

TABLE 123 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	4.70000E-03	0.167
	4.99000E-03	0.183
	5.32000E-03	0.200
	6.52000E-03	0.300
	7.57000E-03	0.400
	8.74000E-03	0.500
	9.68000E-03	0.600
	9.84000E-03	0.617
	9.94000E-03	0.633
	1.00800E-02	0.650
	1.02000E-02	0.667
	1.03500E-02	0.683
80.0000	8.40000E-04	0.008
	1.92000E-03	0.017
	2.29000E-03	0.025
	2.83000E-03	0.033
	3.34000E-03	0.042
	3.87000E-03	0.050
	4.72000E-03	0.067
	5.02000E-03	0.083
	5.59000E-03	0.100
	6.23000E-03	0.117
	6.87000E-03	0.133
	7.15000E-03	0.150
	7.28000E-03	0.167
	7.73000E-03	0.183
	8.32000E-03	0.200
	8.82000E-03	0.217
	9.25000E-03	0.233
	9.47000E-03	0.250
	9.91000E-03	0.267
	1.03000E-02	0.283
	1.06700E-02	0.300
84.0000	2.87000E-03	0.017
	4.45000E-03	0.033
	5.34000E-03	0.050
	6.60000E-03	0.067
	7.84000E-03	0.083
	8.81000E-03	0.100
	9.82000E-03	0.117
	1.10900E-02	0.133

TABLE 123 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	2.75000E-03	0.004
	4.13000E-03	0.008
	5.22000E-03	0.012
	5.97000E-03	0.017
	6.69000E-03	0.021
	7.32000E-03	0.025
90.0000	8.19000E-03	0.029
	9.88000E-03	0.051
	1.07700E-02	0.046
	1.18300E-02	0.054

TABLE 124

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Mill Annealed Sheet at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)	RUN 25
17.0000	6.34040E-04	25.300	
	1.09053E-03	42.500	
	1.38306E-03	66.100	
19.0000	1.55769E-03	90.300	
	1.67117E-03	114.800	
	1.81800E-03	162.000	
	1.87515E-03	186.200	
	1.92530E-03	210.200	
	1.96995E-03	233.600	
	2.09234E-03	305.700	
	2.13102E-03	330.300	
	2.20427E-03	378.500	
	2.27465E-03	426.200	
	2.33840E-03	470.200	
	2.37785E-03	497.700	
	2.41210E-03	521.700	
	2.51395E-03	593.600	
	2.58289E-03	642.600	
	2.68803E-03	717.700	
	2.75551E-03	766.100	
	2.82348E-03	815.000	
	2.89515E-03	866.700	
	2.96357E-03	916.200	
	2.99709E-03	940.500	
	3.00376E-03	949.700	
30.0000	7.19310E-04	18.700	
	1.56438E-03	43.900	
	1.93715E-03	67.100	
	2.20281E-03	91.500	
	2.40385E-03	115.400	
	2.57183E-03	139.300	
	2.72051E-03	163.500	
	2.85175E-03	187.200	
	3.08751E-03	235.000	
	3.19685E-03	259.300	
	3.30137E-03	283.700	
	3.40032E-03	307.800	
	3.49297E-03	331.200	
	3.58195E-03	354.400	
	3.76385E-03	403.900	
	3.92903E-03	451.100	
	4.09000E-03	499.000	
	4.32386E-03	571.700	

TABLE 124 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.39747E-03	595.300
	4.47221E-03	619.600
	4.69184E-03	692.900
	4.82453E-03	738.500
	4.96779E-03	788.800
	5.03313E-03	812.100
	5.10367E-03	837.500
37.0000	9.03180E-04	18.200
37.0000	2.17956E-03	42.000
	2.77526E-03	66.000
	3.16487E-03	90.200
	3.45376E-03	113.800
	3.91087E-03	161.600
	4.10854E-03	185.900
	4.29352E-03	210.300
	4.47033E-03	234.900
	4.62915E-03	257.900
	4.78386E-03	281.000
	5.10358E-03	330.500
	5.29470E-03	361.000
	5.54340E-03	401.500
	5.83718E-03	450.300
	6.12125E-03	498.300
	6.40142E-03	546.300
	6.82255E-03	619.500
	7.08169E-03	665.100
	7.36447E-03	715.300
	7.51053E-03	741.400
	7.77254E-03	788.500
	8.03022E-03	836.800
	8.43106E-03	908.400
	8.69585E-03	957.200
	8.94867E-03	1004.100
	9.21380E-03	1053.600
	9.45759E-03	1099.400
	9.71632E-03	1148.300
	9.96823E-03	1196.200
40.5000	2.10344E-03	17.200
	2.38123E-03	24.200
	2.82858E-03	39.300
	3.38440E-03	65.000
	3.81587E-03	89.900
	4.16511E-03	112.800
	4.49928E-03	136.700
	4.81822E-03	161.100

TABLE 124 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.5000	5.10961E-03	184.600
	5.43424E-03	212.000
	5.68084E-03	233.600
	5.93805E-03	256.800
	6.47341E-03	307.100
	6.70253E-03	329.400
	6.94128E-03	353.100
	7.20496E-03	379.800
	7.41068E-03	401.000
	7.86667E-03	449.100
	8.08914E-03	473.100
	8.30853E-03	497.100
	8.76803E-03	548.400
	8.94132E-03	568.100
	9.15453E-03	592.600
	9.56960E-03	641.100
	9.78266E-03	666.400
	9.96859E-03	688.700
	1.01808E-02	714.400
	1.03982E-02	741.000
45.0000	9.07990E-04	1.500
	1.85464E-03	4.600
	3.01012E-03	18.500
	3.32620E-03	26.200
	3.83544E-03	42.700
	4.03317E-03	50.300
	4.43094E-03	67.200
	4.58212E-03	74.100
	4.91184E-03	89.900
	5.40635E-03	115.200
	5.84585E-03	139.000
	6.26388E-03	162.600
	6.67135E-03	186.400
	7.07368E-03	210.600
	7.46569E-03	234.800
	7.84084E-03	258.500
	8.57923E-03	306.600
	8.93752E-03	330.600
	9.29558E-03	355.000
	9.64069E-03	378.900
	9.74362E-03	386.100
	9.98344E-03	403.000
	1.00820E-02	410.000
	1.03059E-02	426.000
	1.09817E-02	475.200

RUN 25

TABLE 124 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	8.56690E-04	0.700
	2.03921E-03	2.500
	2.91651E-03	5.100
	5.21614E-03	18.300
	5.77179E-03	22.500
	6.06395E-03	24.800
	8.18580E-03	42.700
	8.95225E-03	49.500
	1.08276E-02	66.600
66.0000	9.59550E-04	0.100
	1.80583E-03	0.300
	2.54203E-03	0.500
	2.84873E-03	0.600
	2.99262E-03	0.650
66.0000	3.13122E-03	0.700
	3.64151E-03	0.900
	4.09391E-03	1.100
	4.66446E-03	1.500
	4.95030E-03	1.550
	6.48813E-03	2.700
	7.24565E-03	3.500
	7.49151E-03	3.800
	7.94099E-03	4.400
	8.41603E-03	5.100
	9.28405E-03	6.500
	9.70207E-03	7.200
	9.88083E-03	7.500
	9.94048E-03	7.600
	1.00002E-02	7.700
	1.01199E-02	7.900
71.5000	1.52889E-03	0.050
	2.25322E-03	0.100
	2.79705E-03	0.150
	3.29599E-03	0.200
	4.18229E-03	0.300
	4.94299E-03	0.400
	5.60559E-03	0.500
	6.19156E-03	0.600
	6.71665E-03	0.700
	7.62729E-03	0.900
	8.39956E-03	1.100
	9.07065E-03	1.300
	9.66443E-03	1.500
	9.93762E-03	1.600
	1.00690E-02	1.650
	1.01972E-02	1.700

RUN 25

TABLE 124 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	1.07738E-03	0.017
	1.84056E-03	0.033
	2.39354E-03	0.050
	2.84064E-03	0.067
	3.22645E-03	0.083
	3.57227E-03	0.100
	4.18572E-03	0.133
	4.73027E-03	0.167
	4.98413E-03	0.183
	5.22813E-03	0.200
	6.54120E-03	0.300
	7.67966E-03	0.400
	8.70298E-03	0.500
	9.64140E-03	0.600
	9.79095E-03	0.617
	9.93872E-03	0.633
75.0000	1.00848E-02	0.650
	1.02292E-02	0.667
	1.03720E-02	0.683
80.0000	8.71480E-04	0.008
	1.73014E-03	0.017
	2.42359E-03	0.025
	2.96704E-03	0.033
	3.41979E-03	0.042
	3.81488E-03	0.050
	4.49889E-03	0.067
	5.09664E-03	0.083
	5.64100E-03	0.100
	6.14850E-03	0.117
	6.62847E-03	0.133
	7.08669E-03	0.150
	7.52699E-03	0.167
	7.95209E-03	0.183
	8.36397E-03	0.200
	8.76413E-03	0.217
	9.15379E-03	0.233
	9.53390E-03	0.250
	9.90526E-03	0.267
	1.02685E-02	0.283
	1.06243E-02	0.300

TABLE 124 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
84.0000	2.87557E-03	0.017
	4.39190E-03	0.033
	5.46936E-03	0.050
	6.57579E-03	0.067
	7.70410E-03	0.083
	8.83113E-03	0.100
	9.94229E-03	0.117
	1.10297E-02	0.133
90.0000	2.75254E-03	0.004
	4.15748E-03	0.008
	5.10626E-03	0.012
	5.95812E-03	0.017
	6.75606E-03	0.021
	7.51108E-03	0.025
	8.22851E-03	0.029
	9.56536E-03	0.037
	1.07908E-02	0.046
	1.19234E-02	0.054

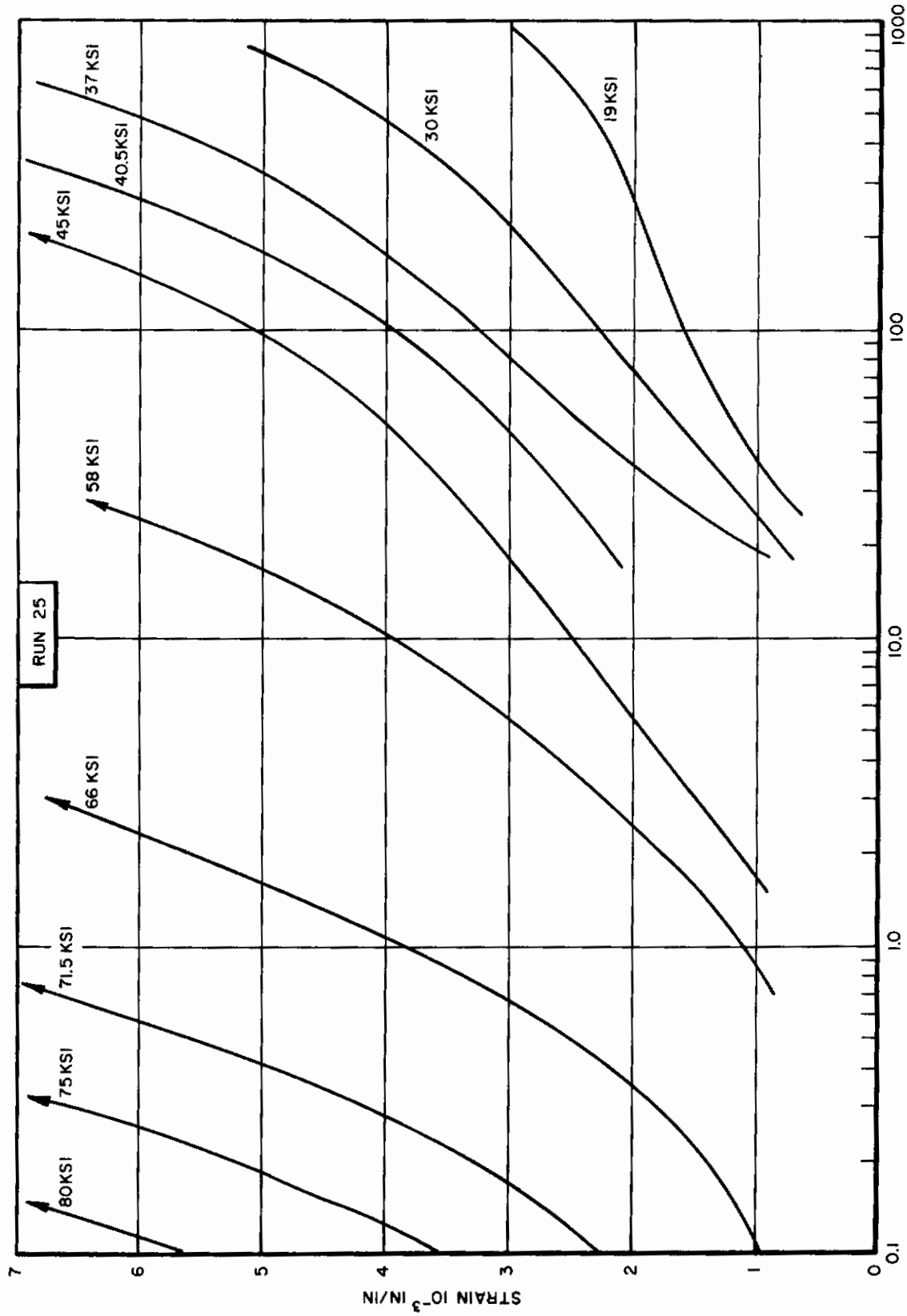


Figure 78. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 125

Annealed Ti-6Al-4V Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
19.0	-	-	0.16		940	-	-
30.0	-	-	.25		195	800	-
33.0	-	-	.27		-	-	-
37.0	-	-	.29		85	310	1200
40.5	-	-	.32		50	165	680
45.0	-	-	.35		21	91	405
58.0	-	-	.47		5.0	16.6	58.5
66.0	1026.2	42.5	.52		0.65	1.55	7.7
71.5	462.5	37.5	.63		0.16	0.4	1.65
75.0	244.5	35.5	.84		.075	0.18	0.65
80.0	88.0	34.0	1.2		.033	.075	0.27
84.0	27.3	35.0	2.2		.017	.042	0.12
90.0	7.8	26.0	-		.005	.011	0.042

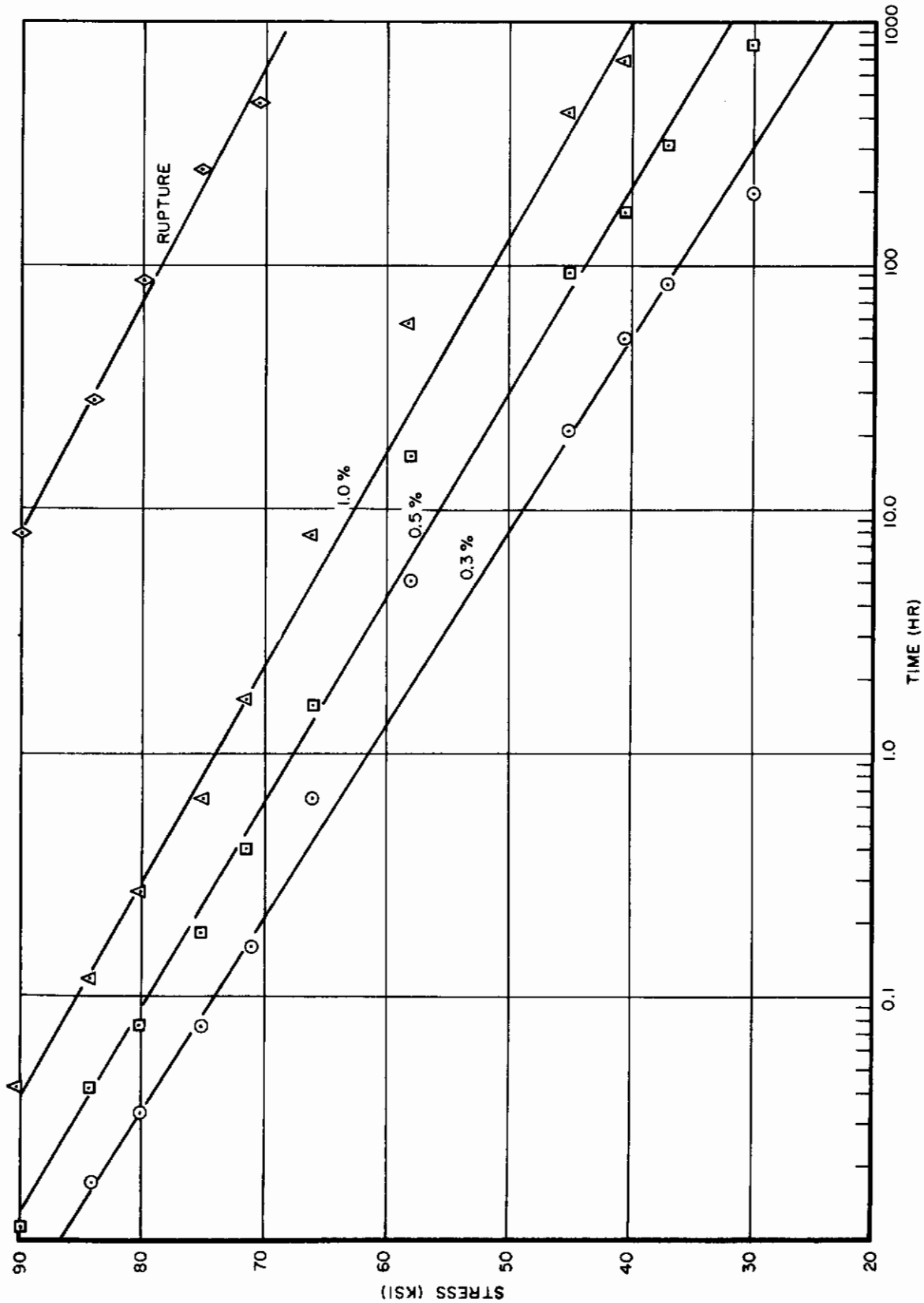


Figure 79. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 800°F (1260°R)

TABLE 126

Deformation Versus Time (Raw Data) for MS Ti-6Al-4V Mill Annealed Sheet at 1000° F (1460° R)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.9000	4.30000E-04	68.300
	5.00000E-05	3.800
	1.20000E-04	19.600
	4.30000E-04	68.300
	6.10000E-04	92.100
	1.05000E-03	165.600
	1.17000E-03	235.700
	1.25000E-03	260.500
	1.39000E-03	308.500
	1.42000E-03	351.900
	1.56000E-03	404.600
	1.71000E-03	455.000
	1.77000E-03	500.300
	1.82000E-03	549.200
	2.10000E-03	621.400
	2.32000E-03	670.500
	2.41000E-03	740.400
	2.57000E-03	790.100
	2.69000E-03	863.600
	2.90000E-03	932.700
	3.05000E-03	1004.100
1.5000	8.00000E-05	2.800
	1.40000E-04	4.300
	3.10000E-04	21.100
	4.30000E-04	28.600
	7.00000E-04	47.300
	1.01000E-03	69.800
	1.44000E-03	117.700
	1.64000E-03	142.400
	1.82000E-03	165.700
	2.16000E-03	217.000
	2.21000E-03	236.300
	2.48000E-03	286.000
	2.53000E-03	309.600
	2.66000E-03	335.000
	2.75000E-03	382.900
	3.02000E-03	430.000
	3.26000E-03	478.300
	3.45000E-03	549.600
	3.80000E-03	621.300
	3.93000E-03	645.700
	4.06000E-03	695.300
	4.29000E-03	740.700
	4.33000E-03	766.200

RUN 25

TABLE 126 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.5000	4.42000E-03	789.900
	4.52000E-03	820.700
	4.70000E-03	845.100
	4.84000E-03	870.000
	4.91000E-03	895.300
	5.03000E-03	920.700
2.2000	1.40000E-04	2.400
	1.80000E-04	5.600
	6.90000E-04	23.300
	1.05000E-03	46.800
	1.47000E-03	70.400
	2.02000E-03	94.700
	2.76000E-03	142.600
	3.25000E-03	194.000
	3.47000E-03	213.400
	4.11000E-03	263.000
	4.34000E-03	312.000
	4.93000E-03	359.900
	5.30000E-03	407.000
	5.62000E-03	455.300
	6.39000E-03	526.700
	6.96000E-03	598.400
	7.29000E-03	622.700
	7.55000E-03	672.300
	8.01000E-03	717.800
	8.17000E-03	743.200
	8.40000E-03	766.700
	8.72000E-03	790.800
	8.92000E-03	814.600
	9.07000E-03	838.800
	9.31000E-03	863.300
	9.41000E-03	882.300
	9.76000E-03	910.100
	9.91000E-03	934.200
	1.02200E-02	968.200
2.5000	4.00000E-05	1.100
	6.00000E-04	17.600
	7.30000E-04	25.000
	1.21000E-03	40.500
	1.65000E-03	65.800
	2.18000E-03	90.400
	2.63000E-03	113.600
	3.00000E-03	137.600
	3.41000E-03	162.000

TABLE 126 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.84000E-03	186.100
	4.30000E-03	213.000
	4.65000E-03	234.400
	5.38000E-03	281.900
2.5000	5.69000E-03	307.200
	5.92000E-03	330.100
	6.11000E-03	353.900
	6.65000E-03	402.000
	7.41000E-03	450.000
	7.82000E-03	498.100
	7.93000E-03	521.000
	8.36000E-03	549.300
	8.46000E-03	568.900
	8.68000E-03	594.000
	9.47000E-03	667.400
	9.69000E-03	689.800
	9.89000E-03	715.200
	1.01800E-02	742.300
	1.04100E-02	762.100
5.0000	3.10000E-04	1.000
	5.20000E-04	3.100
	6.70000E-04	4.900
	1.42000E-03	17.000
	1.64000E-03	21.200
	1.81000E-03	23.400
	2.63000E-03	41.400
	2.91000E-03	48.100
	3.70000E-03	65.400
	4.66000E-03	89.000
	5.03000E-03	96.300
	5.61000E-03	112.200
	6.83000E-03	137.000
	7.79000E-03	161.700
	8.26000E-03	167.800
	8.90000E-03	185.200
	1.09600E-02	232.700
11.0000	7.80000E-04	0.500
	1.22000E-03	1.000
	1.52000E-03	1.600
	1.71000E-03	2.000
	1.99000E-03	3.000
	2.37000E-03	4.000
	2.60000E-03	4.900
	2.72000E-03	5.500
	2.85000E-03	6.200

TABLE 126 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.99000E-03	6.600
	3.05000E-03	7.100
	6.16000E-03	23.200
	6.58000E-03	25.400
	7.07000E-03	27.700
	7.45000E-03	29.700
	1.01200E-02	43.600
11.0000	1.01900E-02	44.000
22.0000	7.00000E-04	0.100
	1.07000E-03	0.200
	1.28000E-03	0.300
	1.77000E-03	0.500
	2.12000E-03	0.700
	2.40000E-03	0.900
	2.62000E-03	1.100
	2.90000E-03	1.300
	3.00000E-03	1.350
	3.82000E-03	2.000
	4.27000E-03	2.500
	4.73000E-03	3.000
	4.94000E-03	3.200
	5.06000E-03	3.300
	5.15000E-03	3.400
	5.54000E-03	4.000
	6.03000E-03	4.500
	6.49000E-03	5.000
	6.70000E-03	5.400
	7.48000E-03	6.200
	8.25000E-03	7.000
	8.71000E-03	7.500
	9.17000E-03	8.100
	9.66000E-03	8.600
	9.91000E-03	9.000
	1.00300E-02	9.100
30.0000	7.90000E-04	0.050
	1.18000E-03	0.100
	1.67000E-03	0.200
	2.11000E-03	0.300
	2.50000E-03	0.400
	2.78000E-03	0.500
	3.00000E-03	0.570
	3.20000E-03	0.600
	3.46000E-03	0.700
	3.92000E-03	0.900
	4.26000E-03	1.000

TABLE 126 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.41000E-03	1.100
	4.68000E-03	1.200
	4.83000E-03	1.300
	5.11000E-03	1.400
	5.81000E-03	1.700
	6.33000E-03	2.000
	7.06000E-03	2.300
	7.53000E-03	2.600
	8.67000E-03	3.100
	9.32000E-03	3.400
30.0000	9.62000E-03	3.500
	9.85000E-03	3.600
	1.00700E-02	3.700
40.0000	6.50000E-04	0.017
	6.50000E-04	0.017
	1.03000E-03	0.033
	1.38000E-03	0.050
	1.68000E-03	0.067
	1.86000E-03	0.083
	2.05000E-03	0.100
	2.44000E-03	0.133
	2.59000E-03	0.150
	2.82000E-03	0.167
	2.98000E-03	0.183
	3.15000E-03	0.200
	3.56000E-03	0.233
	3.82000E-03	0.267
	4.10000E-03	0.300
	4.41000E-03	0.333
	4.69000E-03	0.367
	4.99000E-03	0.400
	5.13000E-03	0.417
	6.14000E-03	0.517
	6.95000E-03	0.617
	7.83000E-03	0.700
	8.88000E-03	0.800
	9.35000E-03	0.850
	9.81000E-03	0.900
	1.01600E-02	0.933
50.0000	1.09000E-03	0.017
	2.02000E-03	0.033
	2.67000E-03	0.050
	3.01000E-03	0.058
	3.40000E-03	0.067
	4.01000E-03	0.083

TABLE 126 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.54000E-03	0.100
	5.21000E-03	0.117
	5.96000E-03	0.133
	6.49000E-03	0.150
	7.05000E-03	0.167
	7.76000E-03	0.183
	8.73000E-03	0.217
	9.84000E-03	0.250
	1.04500E-02	0.267
	1.09600E-02	0.283
60.0000	1.83000E-03	0.004
	2.97000E-03	0.008
60.0000	4.42000E-03	0.012
	5.84000E-03	0.017
	6.98000E-03	0.021
	7.94000E-03	0.025
	9.15000E-03	0.029
	1.00800E-02	0.033
	1.12100E-02	0.037

INSUFFICIENT DATA, 1 POINT

FIT UNSATISFACTORY - RAW DATA SUBSTITUTED FOR FITTED DATA

POLYNOMIAL FIT OF A CURVE AT STRESS 65.00 AND TEMPERATURE 1060.

TABLE 127

Deformation Versus Time (Fitted Data) for MS Ti-6Al-4V Mill Annealed Sheet at 1000° F (1460° R)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.9000	1.23340E-04	19.600
	4.64460E-04	68.300
	6.06570E-04	92.100
	9.60280E-04	165.600
0.9000	1.20375E-03	235.700
	1.27378E-03	260.500
	1.39225E-03	308.500
	1.48576E-03	351.900
	1.59024E-03	404.600
	1.68827E-03	455.000
	1.77997E-03	500.300
	1.88670E-03	549.200
	2.06405E-03	621.400
	2.19880E-03	670.500
	2.40612E-03	740.400
	2.55815E-03	790.100
	2.77169E-03	863.600
	2.93119E-03	932.700
	3.00995E-03	1004.100
1.5000	7.60710E-04	47.300
	9.90950E-04	69.800
	1.42238E-03	117.700
	1.61684E-03	142.400
	1.78481E-03	165.700
	2.10849E-03	217.000
	2.21608E-03	236.300
	2.46433E-03	286.000
	2.57023E-03	309.600
	2.67742E-03	335.000
	2.86518E-03	382.900
	3.03829E-03	430.000
	3.21124E-03	478.300
	3.47046E-03	549.600
	3.74717E-03	621.300
	3.84612E-03	645.700
	4.05455E-03	695.300
	4.25208E-03	740.700
	4.36455E-03	766.200
	4.46912E-03	789.900
	4.60359E-03	820.700
	4.70758E-03	845.100
	4.80991E-03	870.000
	4.90829E-03	895.300
	4.99950E-03	920.700

TABLE 127 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.2000	6.351408E-04	23.300
	1.126278E-03	46.800
	1.531038E-03	70.400
	1.920515E-03	94.700
	2.614866E-03	142.600
	3.266955E-03	194.000
	3.491866E-03	213.400
	4.093266E-03	263.000
2.2000	4.498748E-03	312.000
	4.929478E-03	359.900
	5.331648E-03	407.000
	5.732428E-03	455.300
	6.321628E-03	526.700
	6.927608E-03	596.400
	7.138468E-03	622.700
	7.578398E-03	672.300
	7.992138E-03	717.800
	8.226228E-03	743.200
	8.443878E-03	766.700
	8.667218E-03	790.800
	8.886818E-03	814.600
	9.107778E-03	838.800
	9.327498E-03	863.300
	9.493958E-03	882.300
	9.729158E-03	910.100
	9.922688E-03	934.200
	1.017448E-02	968.200
2.5000	5.942408E-04	17.600
	7.661208E-04	25.000
	1.127118E-03	40.500
	1.685858E-03	65.800
	2.188708E-03	90.400
	2.631358E-03	113.600
	3.062138E-03	137.600
	3.476118E-03	162.000
	3.864638E-03	186.100
	4.277658E-03	213.000
	4.592558E-03	234.400
	5.254318E-03	281.900
	5.588558E-03	307.200
	5.881488E-03	330.100
	6.177098E-03	353.900
	6.749858E-03	402.000
	7.292438E-03	450.000
	7.810918E-03	498.100

TABLE 127 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.04979E-03	521.000
	8.33047E-03	549.300
	8.53440E-03	568.900
	8.78081E-03	594.000
	9.47466E-03	667.400
	9.67912E-03	689.800
	9.90715E-03	715.200
	1.01462E-02	742.300
	1.03182E-02	762.100
5.0000	3.18000E-04	1.000
	4.95230E-04	3.100
5.0000	6.70980E-04	4.900
	1.46385E-03	17.000
	1.67604E-03	21.200
	1.78242E-03	23.400
	2.60013E-03	41.400
	2.89509E-03	48.100
	3.65251E-03	65.400
	4.68667E-03	89.000
	5.00728E-03	96.300
	5.70645E-03	112.200
	6.79780E-03	137.000
	7.88333E-03	161.700
	8.15095E-03	167.800
	8.91290E-03	185.200
	9.95102E-03	209.000
	1.09792E-02	232.700
11.0000	7.84460E-04	0.500
	1.20334E-03	1.000
	1.52814E-03	1.600
	1.70005E-03	2.000
	2.05129E-03	3.000
	2.34005E-03	4.000
	2.57017E-03	4.900
	2.71336E-03	5.500
	2.87294E-03	6.200
	2.96129E-03	6.600
	3.06936E-03	7.100
	6.18453E-03	23.200
	6.60378E-03	25.400
	7.04347E-03	27.700
	7.42700E-03	29.700
	1.01193E-02	43.600
	1.01974E-02	44.000

RUN 25

TABLE 127 (CONT)

STRESS (PSI)	STRAIN (IN/IN)	TIME (HOURS)
22.0000	7.00620E-04	0.100
	1.05573E-03	0.200
	1.32161E-03	0.300
	1.73232E-03	0.500
	2.08101E-03	0.700
	2.39460E-03	0.900
	2.68169E-03	1.100
	2.94743E-03	1.300
	3.01100E-03	1.350
	3.75880E-03	2.000
	4.26526E-03	2.500
	4.73635E-03	3.000
	4.91809E-03	3.200
	5.00787E-03	3.300
	5.09701E-03	3.400
22.0000	5.62172E-03	4.000
	6.05064E-03	4.500
	6.47635E-03	5.000
	6.81650E-03	5.400
	7.49977E-03	6.200
	8.19121E-03	7.000
	8.62893E-03	7.500
	9.16060E-03	8.100
	9.60933E-03	8.600
	9.97212E-03	9.000
	1.00633E-02	9.100
30.0000	7.85350E-04	0.050
	1.20192E-03	0.100
	1.64220E-03	0.200
	2.08610E-03	0.300
	2.46538E-03	0.400
	2.83888E-03	0.500
	3.06385E-03	0.570
	3.15552E-03	0.600
	3.44400E-03	0.700
	3.96306E-03	0.900
	4.20278E-03	1.000
	4.43362E-03	1.100
	4.65784E-03	1.200
	4.87716E-03	1.300
	5.09291E-03	1.400
	5.42792E-03	1.700
	6.35667E-03	2.000
	6.98787E-03	2.300
	7.62575E-03	2.600
	8.70839E-03	3.100
	9.37044E-03	3.400

TABLE 127 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.59317E-03	3.500
	9.81692E-03	3.600
	1.00416E-02	3.700
40.0000	6.69670E-04	0.017
	9.63910E-04	0.033
	1.36616E-03	0.050
	1.67421E-03	0.067
	1.91913E-03	0.083
	2.12665E-03	0.100
	2.48433E-03	0.133
	2.64874E-03	0.150
	2.80856E-03	0.167
	2.96580E-03	0.183
	3.12173E-03	0.200
	3.43249E-03	0.233
	3.74421E-03	0.267
40.0000	4.05801E-03	0.300
	4.37409E-03	0.333
	4.69220E-03	0.367
	5.01198E-03	0.400
	5.17235E-03	0.417
	6.13827E-03	0.517
	7.10397E-03	0.617
	7.90376E-03	0.700
	8.85391E-03	0.800
	9.32427E-03	0.850
	9.79117E-03	0.900
	1.01004E-02	0.933
50.0000	1.08265E-03	0.017
	2.04463E-03	0.033
	2.69256E-03	0.050
	3.01075E-03	0.058
	3.33061E-03	0.067
	3.97398E-03	0.083
	4.61657E-03	0.100
	5.25267E-03	0.117
	5.87863E-03	0.133
	6.49237E-03	0.150
	7.09283E-03	0.167
	7.67960E-03	0.183
	8.81223E-03	0.217
	9.89239E-03	0.250
	1.04139E-02	0.267
	1.09236E-02	0.283

TABLE 127 (CONT)

RUN 25

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	1.41818E-03	0.004
	3.03391E-03	0.008
	4.40395E-03	0.012
	5.71610E-03	0.017
	6.94253E-03	0.021
	8.66603E-03	0.025
	9.15518E-03	0.029
	1.01589E-02	0.033
	1.11050E-02	0.037

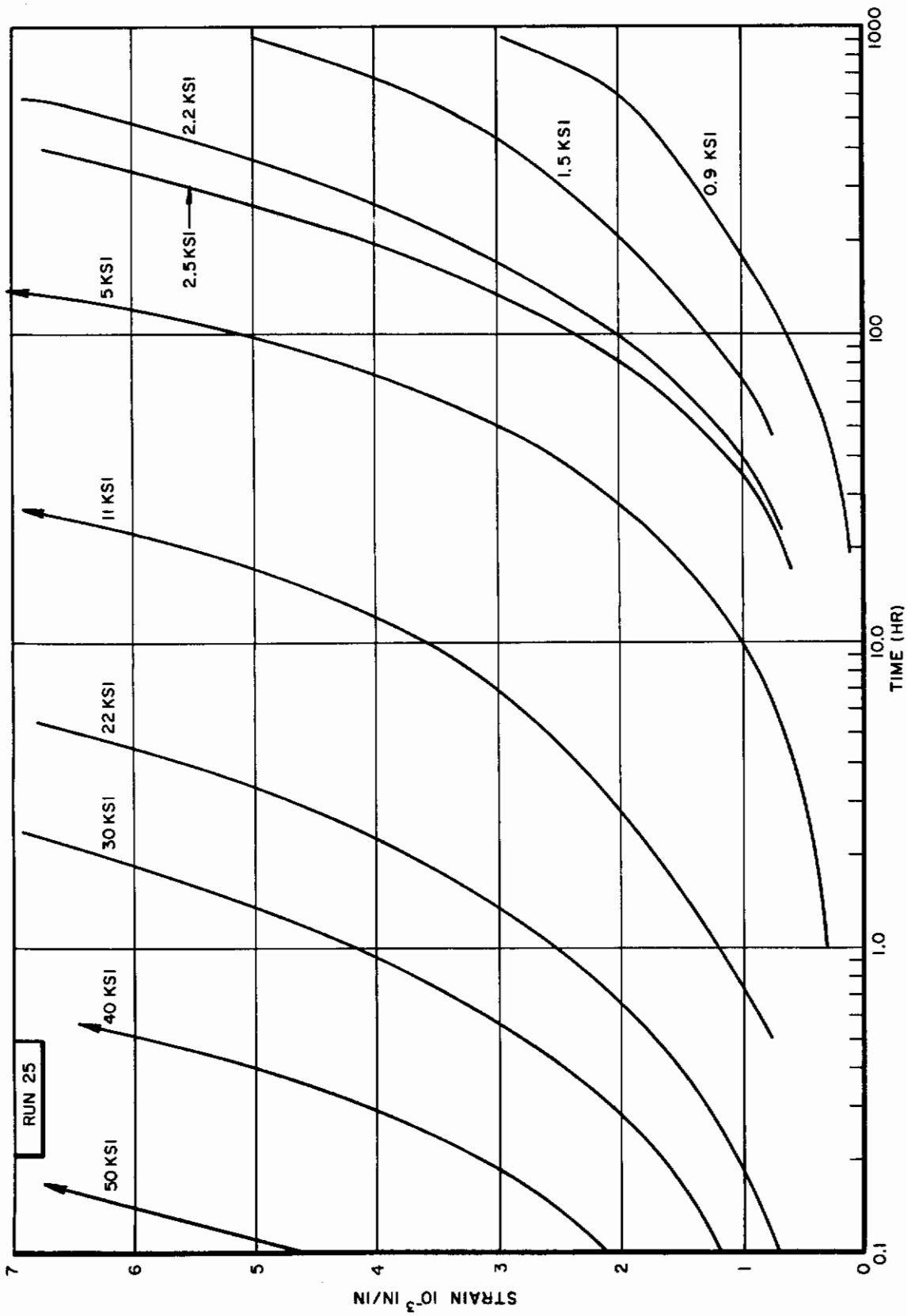


Figure 80. Creep Deformation Versus Log Time of MS Ti-6Al-4V Sheet at 1000°F (1460°R)

TABLE 128

Annealed Ti-6Al-4V Creep Deformation and Rupture Data at 1000° F (1460° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
0.9	-	-	-	-	980	-	-
1.5	-	-	0.01	-	425	920	-
2.2	-	-	0.02	-	170	375	940
2.5	-	-	.03	-	125	252	720
5.0	-	-	.07	-	50	96	210
11.0	1413.7	48.0	.12	-	6.9	17.2	43.1
22.0	-	67.5	.25	-	1.35	3.35	9.1
30.0	-	51.5	.34	-	0.55	1.35	3.7
40.0	21.2	61.0	.48	-	0.18	0.4	0.9
50.0	4.5	50.5	.63	-	.058	0.11	0.25
60.0	1.1	40	.87	-	0.005	0.0083	0.033

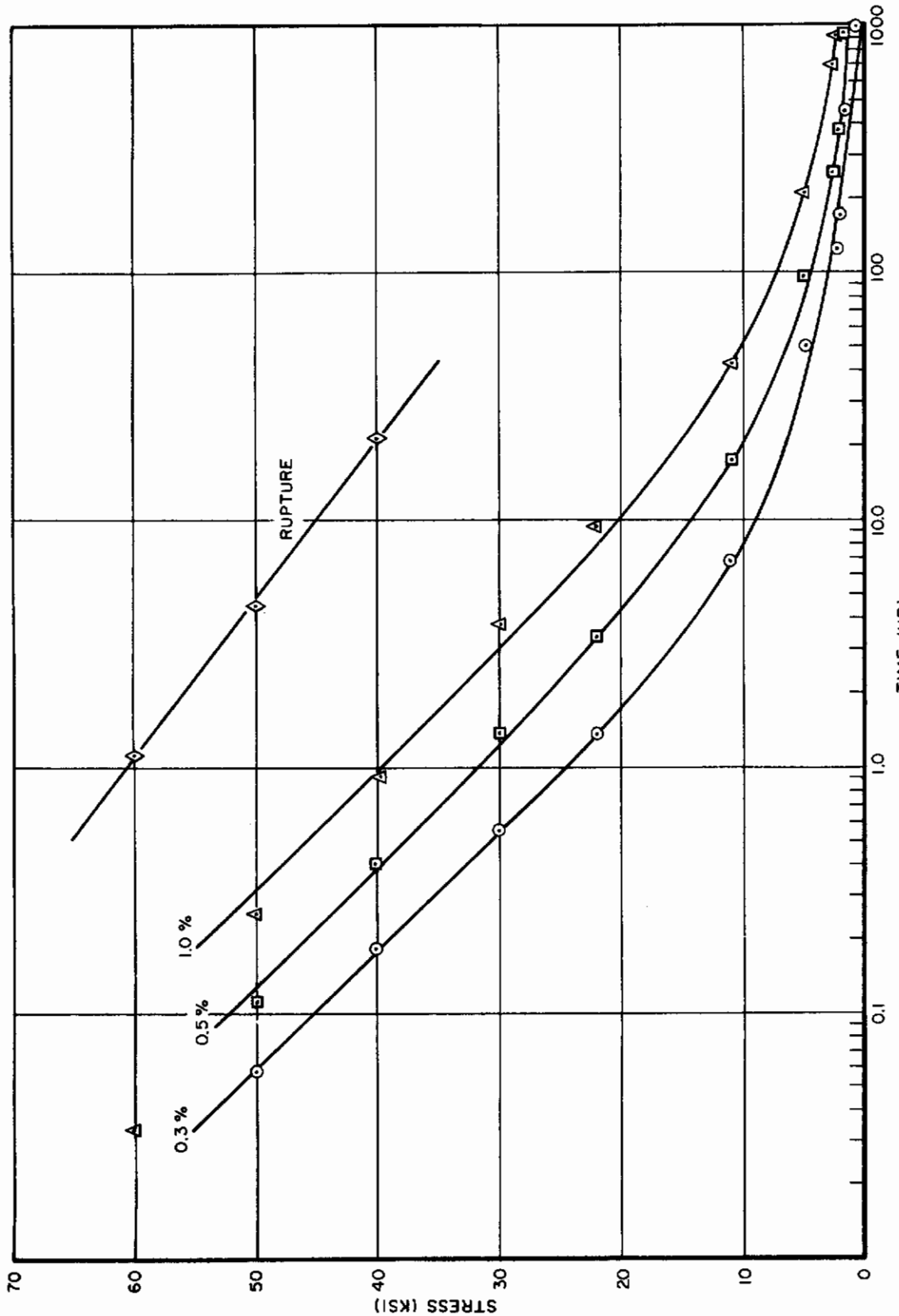


Figure 81. Creep Rupture Properties of MS Ti-6Al-4V Sheet at 1000°F (1460°R)

TABLE 129

Minimum Creep Rate for MS Ti-6Al-4V

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	67	1.62×10^{-6}
	72	8.2×10^{-6}
	78	1.71×10^{-6}
800° F (1260° R)	66	5.95×10^{-4}
	84	6.46×10^{-2}
1000° F (1460° R)	1.5	3.58×10^{-6}
	11.0	1.90×10^{-4}
	22.0	8.5×10^{-4}
	30	2.096×10^{-3}

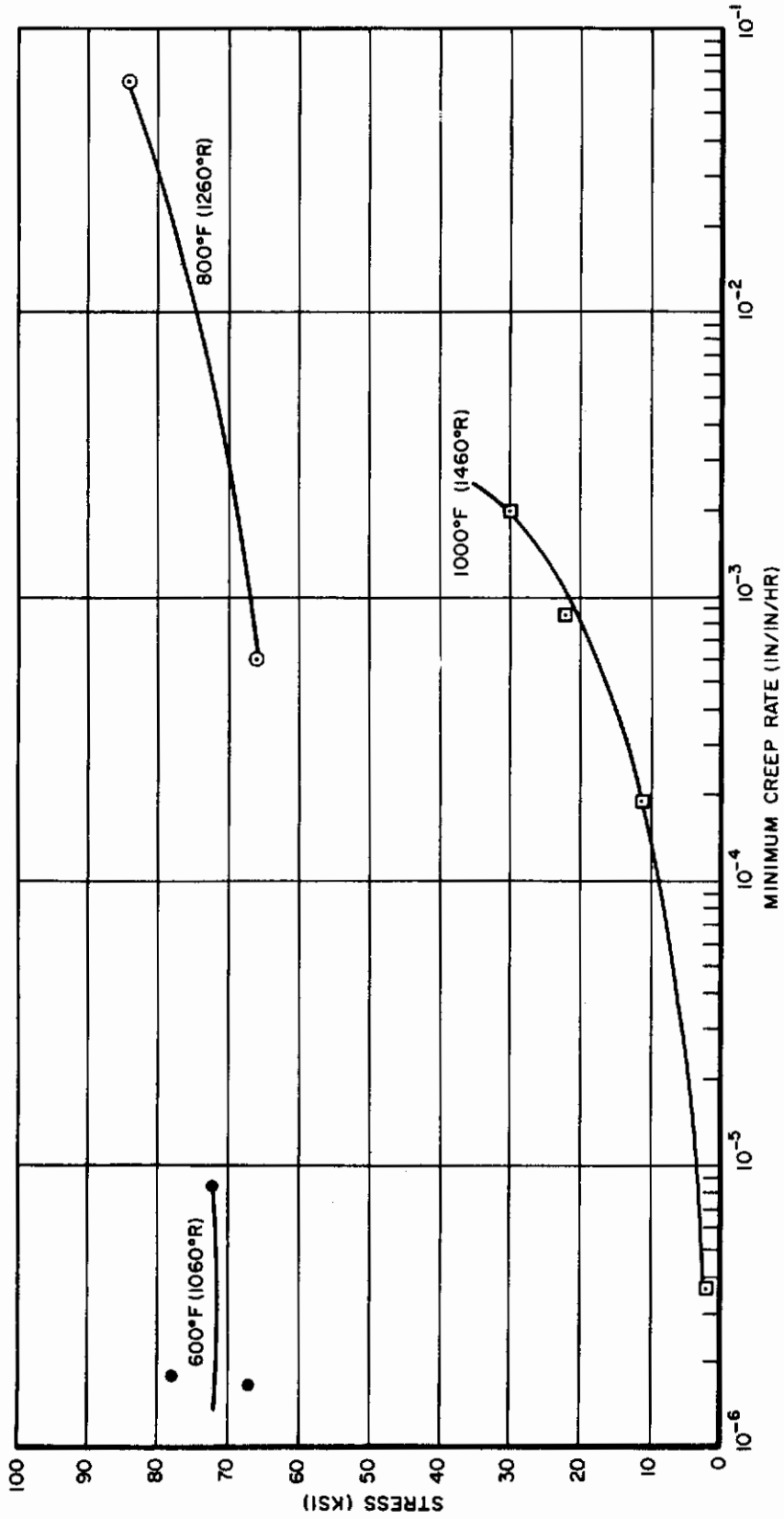


Figure 82. Minimum Creep Rate of MS Ti-6Al-4V Sheet

CREEP DATA FOR

MST-821 SHEET

TABLE 130

Deformation Versus Time (Raw Data) for MST-821 Sheet at 800° F (1260° R)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	2.00000E-04	1.200
	4.10000E-04	2.700
	5.20000E-04	7.300
	6.60000E-04	8.600
	6.70000E-04	10.700
	7.20000E-04	11.900
	7.40000E-04	20.600
	8.60000E-04	25.900
	8.20000E-04	29.000
	9.90000E-04	32.200
	9.60000E-04	44.500
	1.08000E-03	53.300
	1.07000E-03	68.400
	9.80000E-04	79.700
	1.13000E-03	92.200
	1.23000E-03	119.100
	1.33000E-03	141.600
	1.66000E-03	152.000
	1.33000E-03	167.300
	1.57000E-03	179.800
	1.37000E-03	189.000
	1.34000E-03	239.000
	1.15000E-03	261.400
	1.32000E-03	307.500
	1.77000E-03	357.500
	1.73000E-03	405.300
	1.76000E-03	429.800
	1.76000E-03	525.800
	1.99000E-03	597.900
	1.89000E-03	669.400
	1.99000E-03	717.200
	2.14000E-03	791.000
	1.98000E-03	861.500
	2.05000E-03	958.800
	2.05000E-03	1039.800
55.0000	2.10000E-04	2.100
	2.80000E-04	3.100
	3.40000E-04	4.200
	8.50000E-04	27.900
	1.05000E-03	52.200
	1.28000E-03	103.400
	1.52000E-03	152.000
	1.56000E-03	191.000
	1.64000E-03	212.000

RUN 22

TABLE 130 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
55.0000	1.76000E-03	238.600
	1.82000E-03	271.700
	1.89000E-03	308.800
	1.96000E-03	334.200
	2.10000E-03	427.300
	2.31000E-03	575.200
	2.45000E-03	717.700
	2.69000E-03	910.700
	2.79000E-03	1016.500
	2.90000E-03	1302.900
	3.15000E-03	1437.000
60.0000	1.70000E-04	0.500
	4.20000E-04	2.200
	5.60000E-04	3.700
	6.10000E-04	5.100
	6.50000E-04	6.100
	9.40000E-04	7.200
	1.02000E-03	8.900
	1.05000E-03	10.300
	1.08000E-03	18.400
	1.19000E-03	23.600
	1.48000E-03	31.000
	1.51000E-03	43.100
	1.67000E-03	54.800
	1.69000E-03	58.000
	1.75000E-03	66.800
	1.83000E-03	90.900
	1.91000E-03	101.300
	1.94000E-03	114.800
	2.27000E-03	141.300
	1.85000E-03	163.300
	2.12000E-03	174.500
	2.27000E-03	186.700
	2.32000E-03	201.900
	2.30000E-03	211.400
	2.36000E-03	261.400
	2.29000E-03	329.900
	2.20000E-03	352.900
	2.56000E-03	379.800
	2.77000E-03	403.300
	2.79000E-03	427.800
	3.08000E-03	510.900
	3.43000E-03	644.900
	3.36000E-03	702.100
63.0000	5.60000E-04	2.100
	9.00000E-04	4.900

TABLE 130 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
63.0000	1.49000E-03	16.900
	1.74000E-03	28.300
	1.77000E-03	44.100
	2.11000E-03	73.800
	2.31000E-03	90.600
	2.57000E-03	114.300
	2.77000E-03	161.700
	2.87000E-03	207.700
	2.93000E-03	260.200
	3.07000E-03	305.600
	3.19000E-03	330.200
	3.83000E-03	402.300
	3.85000E-03	497.900
	4.04000E-03	521.700
	4.25000E-03	593.400
	4.59000E-03	643.200
	4.89000E-03	810.200
	5.08000E-03	965.800
	5.02000E-03	1002.800
	5.47000E-03	1133.700
68.0000	7.30000E-04	0.800
	8.20000E-04	2.800
	1.65000E-03	13.600
	1.96000E-03	26.200
	2.32000E-03	38.500
	2.53000E-03	50.600
	2.75000E-03	74.600
	3.05000E-03	97.800
	3.11000E-03	143.500
	3.17000E-03	160.100
	3.17000E-03	183.600
	3.41000E-03	321.600
	3.47000E-03	350.500
	3.74000E-03	423.200
	3.90000E-03	518.400
	4.11000E-03	613.500
	4.25000E-03	712.400
	4.42000E-03	832.100
70.0000	3.40000E-04	1.400
	6.30000E-04	2.400
	8.70000E-04	3.900
	1.50000E-03	12.800
	1.58000E-03	24.200
	2.02000E-03	40.100
	2.63000E-03	89.100
	2.67000E-03	134.600

TABLE 130 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	2.83000E-03	180.400
	2.86000E-03	205.700
	2.94000E-03	229.300
	3.24000E-03	326.300
	3.39000E-03	397.000
	3.62000E-03	469.200
	3.76000E-03	541.600
	4.00000E-03	637.800
	4.03000E-03	686.200
	4.11000E-03	805.200
	4.08000E-03	877.800
	4.26000E-03	949.000
	4.35000E-03	1007.300
	4.58000E-03	1095.300
72.5000	6.90000E-04	0.400
	7.90000E-04	1.200
	1.35000E-03	2.600
	1.48000E-03	3.700
	1.68000E-03	5.400
	1.88000E-03	7.400
	2.78000E-03	17.500
	3.27000E-03	28.700
	3.51000E-03	44.000
	3.86000E-03	74.300
	4.29000E-03	103.200
	4.28000E-03	126.600
	4.58000E-03	150.800
	4.74000E-03	174.900
	4.78000E-03	198.400
	4.94000E-03	243.600
	5.02000E-03	294.600
	5.26000E-03	359.600
	5.48000E-03	451.500
	6.00000E-03	630.300
74.0000	3.80000E-04	0.400
	8.20000E-04	2.000
	1.51000E-03	6.000
	1.70000E-03	10.000
	2.42000E-03	26.400
	2.55000E-03	33.900
	2.96000E-03	56.900
	3.19000E-03	71.400
	3.25000E-03	82.000
	3.47000E-03	93.600
	3.57000E-03	143.300
	3.77000E-03	189.900

TABLE 130 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.29000E-03	237.800
	4.44000E-03	285.100
	4.74000E-03	360.800
	5.08000E-03	405.000
	5.57000E-03	513.800
	5.78000E-03	623.100
	6.56000E-03	746.700
	6.84000E-03	862.700
	7.47000E-03	1005.500
	8.04000E-03	1102.000
	8.65000E-03	1159.800
75.0000	9.80000E-04	3.400
	1.42000E-03	5.300
	1.62000E-03	6.300
	1.75000E-03	8.400
	2.51000E-03	20.100
	2.45000E-03	31.300
	2.75000E-03	67.400
	2.98000E-03	140.200
	3.48000E-03	222.100
	3.66000E-03	259.300
	4.03000E-03	356.200
	4.53000E-03	499.500
	4.77000E-03	584.200
	5.09000E-03	667.000
	5.14000E-03	715.000
	5.15000E-03	752.000
	5.59000E-03	847.200
76.0000	8.90000E-04	2.600
	1.22000E-03	3.700
	1.29000E-03	5.100
	1.45000E-03	6.100
	1.83000E-03	18.600
	2.01000E-03	29.600
	2.29000E-03	43.500
	2.85000E-03	90.900
	2.52000E-03	115.600
77.0000	1.30000E-03	2.700
	1.57000E-03	3.300
	1.65000E-03	5.300
	1.68000E-03	6.300
	1.79000E-03	7.400
	1.96000E-03	8.300
	2.05000E-03	9.300
	2.71000E-03	18.900
	2.82000E-03	21.800
	3.37000E-03	46.000
	3.81000E-03	68.900

RUN 22

TABLE 131

Deformation Versus Time (Fitted Data) for MST-821 Sheet at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	2.02560E-04	1.200
	3.91580E-04	2.700
	5.92530E-04	7.300
	6.24460E-04	8.600
	6.67130E-04	10.700
	6.88040E-04	11.900
	7.99090E-04	20.600
	8.47820E-04	25.900
	8.72580E-04	29.000
	8.95970E-04	32.200
	9.71470E-04	44.500
	1.01595E-03	53.300
	1.08062E-03	68.400
	1.12225E-03	79.700
	1.16345E-03	92.200
	1.23966E-03	119.100
	1.29413E-03	141.600
	1.31716E-03	152.000
	1.34902E-03	167.300
	1.37348E-03	179.800
	1.39070E-03	189.000
	1.47474E-03	239.000
	1.50819E-03	261.400
	1.57085E-03	307.500
	1.63133E-03	357.500
	1.68349E-03	405.300
	1.70845E-03	429.800
	1.79698E-03	525.800
	1.85572E-03	597.900
	1.90885E-03	669.400
	1.94199E-03	717.200
	1.98996E-03	791.000
	2.03267E-03	861.500
	2.08736E-03	958.800
	2.12969E-03	1039.800
55.0000	2.15270E-04	2.100
	2.90280E-04	3.100
	3.37440E-04	4.200
	8.26140E-04	27.900
	1.04386E-03	52.200
	1.32193E-03	103.400
	1.50142E-03	152.000
	1.61703E-03	191.000
	1.67236E-03	212.000

TABLE 131 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
55.0000	1.73756E-03	238.800
	1.81091E-03	271.700
	1.88650E-03	308.800
	1.93468E-03	334.200
	2.09235E-03	427.300
	2.30058E-03	575.200
	2.46970E-03	717.700
	2.66681E-03	910.700
	2.76354E-03	1016.500
	2.99675E-03	1302.900
	3.09481E-03	1437.000
60.0000	1.85780E-04	0.500
	3.81830E-04	2.200
	5.50370E-04	3.700
	6.73550E-04	5.100
	7.47000E-04	6.100
	8.17270E-04	7.200
	9.09350E-04	8.900
	9.73720E-04	10.300
	1.22890E-03	18.400
	1.33471E-03	23.600
	1.44619E-03	31.000
	1.57388E-03	43.100
	1.66252E-03	54.800
	1.66305E-03	58.000
	1.73368E-03	66.800
	1.84388E-03	90.900
	1.88350E-03	101.300
	1.93056E-03	114.800
	2.01361E-03	141.300
	2.07681E-03	163.300
	2.10772E-03	174.500
	2.14069E-03	186.700
	2.18098E-03	201.900
	2.20582E-03	211.400
	2.33378E-03	261.400
	2.50561E-03	329.900
	2.56299E-03	352.900
	2.63005E-03	379.800
	2.68862E-03	403.300
	2.74970E-03	427.800
	2.95705E-03	510.900
	3.29188E-03	644.900
	3.43477E-03	702.100
63.0000	5.35560E-04	2.100
	9.50730E-04	4.900

TABLE 131 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
63.0000	1.47354E-03	16.900
	1.68295E-03	28.300
	1.87656E-03	44.100
	2.13653E-03	73.800
	2.25619E-03	90.600
	2.40641E-03	114.300
	2.66606E-03	161.700
	2.88522E-03	207.700
	3.10948E-03	260.200
	3.28715E-03	305.600
	3.37837E-03	330.200
	3.62908E-03	402.300
	3.93124E-03	497.900
	4.00211E-03	521.700
	4.20681E-03	593.400
	4.34211E-03	643.200
	4.76225E-03	810.200
	5.11668E-03	965.800
	5.19666E-03	1002.800
	5.46827E-03	1133.700
68.0000	7.51710E-04	0.800
	7.55320E-04	2.800
	1.65516E-03	13.600
	2.10127E-03	26.200
	2.34916E-03	38.500
	2.51480E-03	50.600
	2.73413E-03	74.600
	2.87740E-03	97.800
	3.07255E-03	143.500
	3.12815E-03	160.100
	3.19869E-03	183.600
	3.52064E-03	321.600
	3.57847E-03	350.500
	3.71742E-03	423.200
	3.89053E-03	518.400
	4.05762E-03	613.500
	4.22751E-03	712.400
	4.42943E-03	832.100
70.0000	3.54130E-04	1.400
	6.19350E-04	2.400
	8.57040E-04	3.900
	1.43594E-03	12.800
	1.74838E-03	24.200
	2.00180E-03	40.100
	2.42697E-03	89.100
	2.66806E-03	134.600

RUN 22

TABLE 131 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	2.85295E-03	180.400
	2.94045E-03	205.700
	3.01537E-03	229.300
	3.27685E-03	326.300
	3.43628E-03	397.000
	3.58149E-03	469.200
	3.71388E-03	541.600
	3.87432E-03	637.800
	3.94969E-03	686.200
	4.12286E-03	805.200
	4.22145E-03	877.800
	4.31381E-03	949.000
	4.38661E-03	1007.300
	4.49225E-03	1095.300
72.5000	6.96940E-04	0.400
	8.17070E-04	1.200
	1.21741E-03	2.600
	1.45998E-03	3.700
	1.74921E-03	5.400
	2.00692E-03	7.400
	2.74758E-03	17.500
	3.17381E-03	28.700
	3.53227E-03	44.000
	3.95709E-03	74.300
	4.21803E-03	103.200
	4.38040E-03	126.600
	4.52086E-03	150.800
	4.64195E-03	174.900
	4.74709E-03	198.400
	4.92432E-03	243.600
	5.09756E-03	294.600
	5.29196E-03	359.600
	5.53474E-03	451.500
	5.94475E-03	630.300
74.0000	4.00100E-04	0.400
	7.54800E-04	2.000
	1.45779E-03	6.000
	1.82065E-03	10.000
	2.48183E-03	26.400
	2.64128E-03	33.900
	2.96499E-03	56.900
	3.10994E-03	71.400
	3.20156E-03	82.000
	3.29265E-03	93.600
	3.62372E-03	143.300
	3.89241E-03	189.900

RUN 22

TABLE 131 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.14982E-03	237.800
	4.39338E-03	285.100
	4.76944E-03	360.800
	4.98338E-03	405.000
	5.49676E-03	513.800
	5.99710E-03	623.100
	6.54735E-03	746.700
	7.05059E-03	862.700
	7.65438E-03	1005.500
	8.05341E-03	1102.000
	8.28916E-03	1159.800
75.0000	1.02407E-03	3.400
	1.42910E-03	5.300
	1.57106E-03	6.300
	1.78831E-03	8.400
	2.31300E-03	20.100
	2.51587E-03	31.300
	2.81864E-03	67.400
	3.15440E-03	140.200
	3.46880E-03	222.100
	3.60583E-03	259.300
	3.95413E-03	356.200
	4.45237E-03	499.500
	4.73868E-03	584.200
	5.01313E-03	667.000
	5.16987E-03	715.000
	5.28955E-03	752.000
	5.59308E-03	847.200
76.0000	8.85520E-04	2.600
	1.20360E-03	3.700
	1.35831E-03	5.100
	1.41114E-03	6.100
	1.74300E-03	18.600
	2.05276E-03	29.600
	2.37083E-03	43.500
	2.72803E-03	90.900
	2.58812E-03	115.600
77.0000	1.36838E-03	2.700
	1.43413E-03	3.300
	1.65493E-03	5.300
	1.75769E-03	6.300
	1.86350E-03	7.400
	1.94468E-03	8.300
	2.02962E-03	9.300
	2.64156E-03	18.900
	2.77656E-03	21.800
	3.47039E-03	46.000
	3.76851E-03	68.900

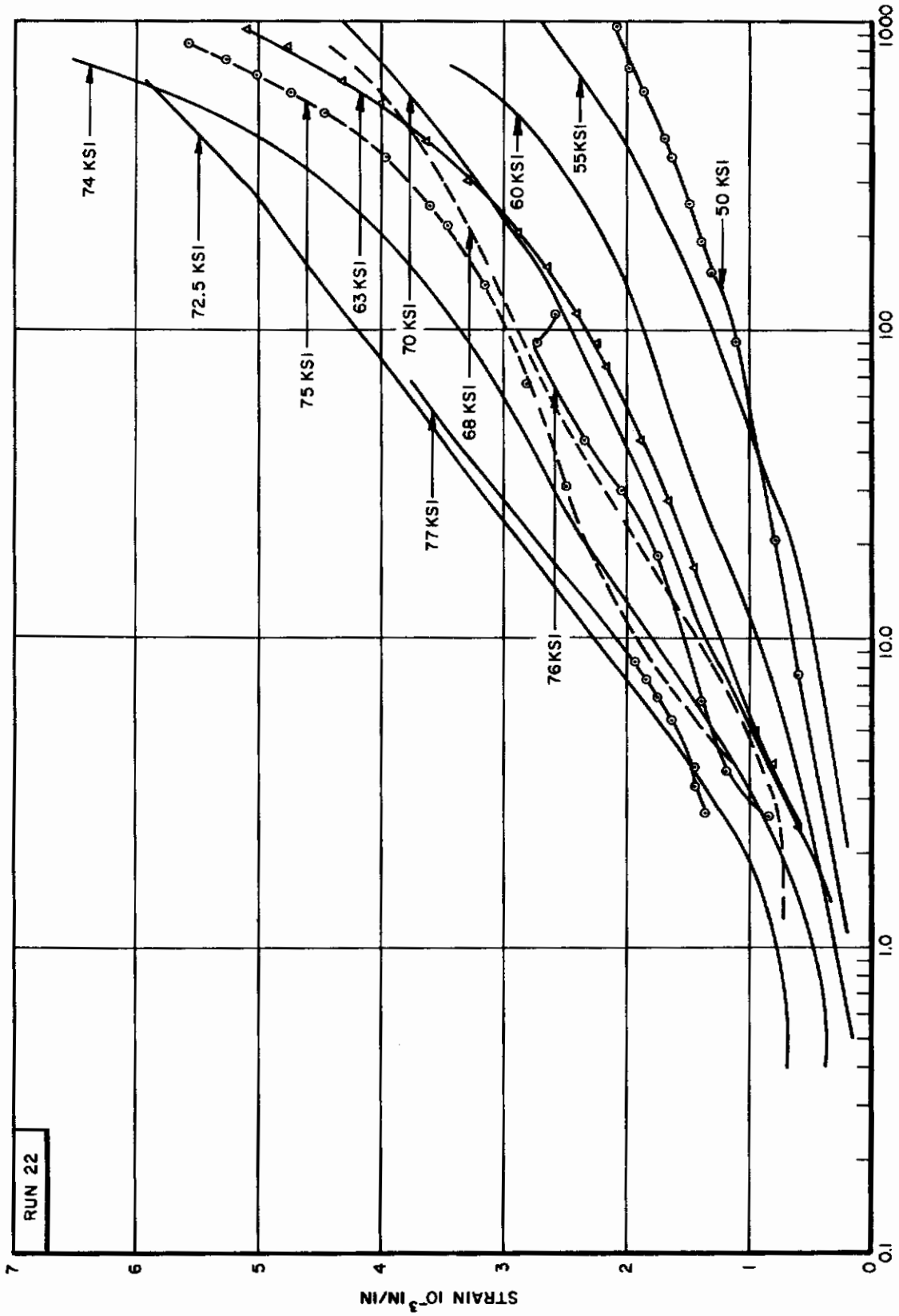


Figure 83. Creep Deformation Versus Log Time of MST-821 Sheet at 800°F (1260°R)

TABLE 132

MST-821 Creep Deformation Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
50.0	-	-	-	47	-	-	-
55.0	-	-	-	45	1300	-	-
60.0	-	-	-	10	500	-	-
63.0	-	-	-	1.0	112.0	670	-
68.0	-	-	-	-	22.5	550	-
70.0	-	-	-	1.70	120	1050	-
72.0	-	-	-	-	3.3	45	-
74.0	-	-	-	-	1.7	69	1100
75.0	-	-	-	-	-	.42	780
76.0	-	-	-	-	-	-	39

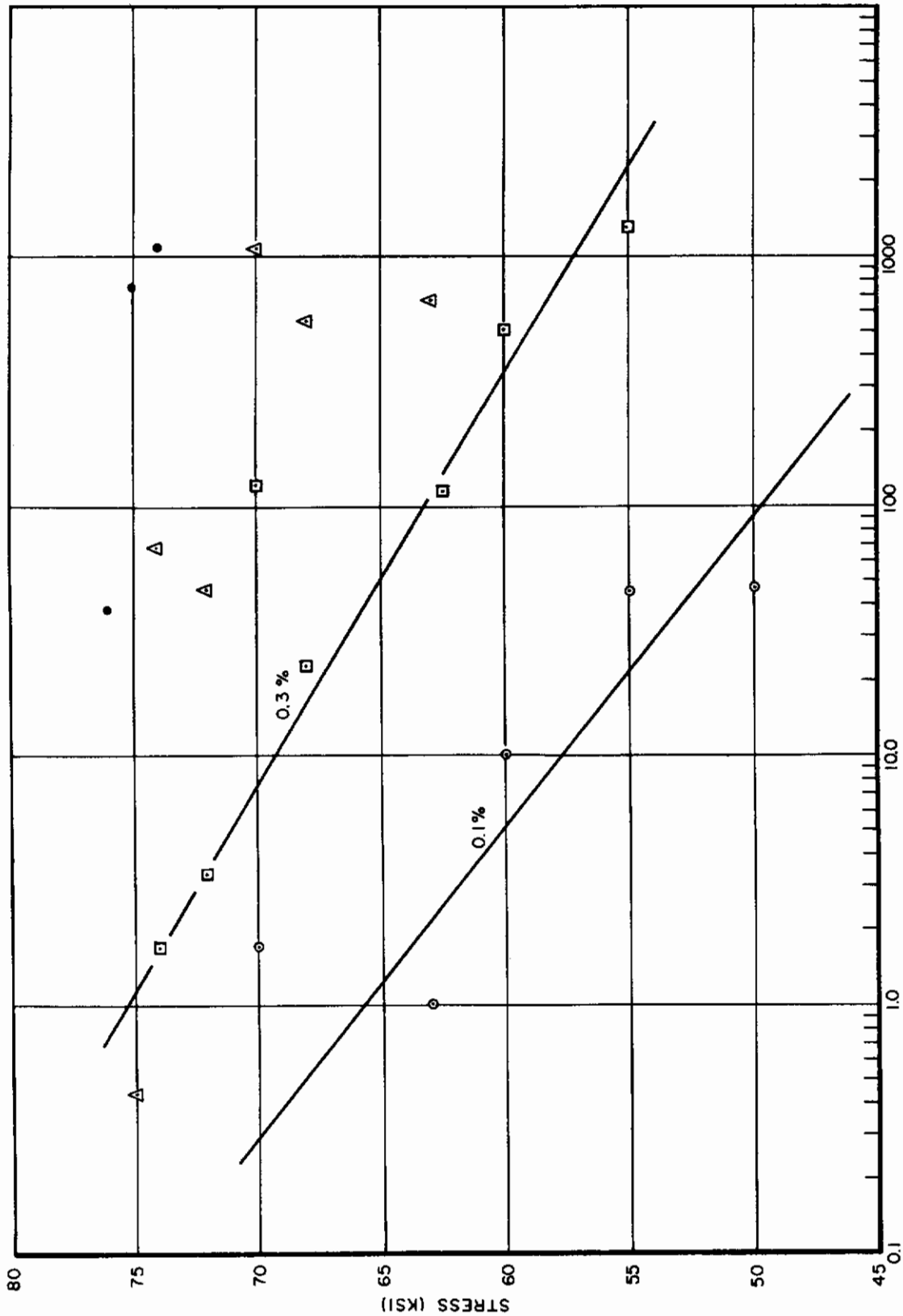


Figure 84. Creep Rupture Properties of MST-821 Sheet at 800°F (1260°R)

TABLE 133

RUN 22

Deformation Versus Time (Raw Data) for MST-821 Sheet at 1000° F (1460° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	1.20000E-04	2.900
	2.00000E-04	4.000
	2.30000E-04	5.000
	2.80000E-04	9.100
	5.70000E-04	25.000
	6.40000E-04	43.500
	7.30000E-04	66.800
	8.10000E-04	76.000
	7.50000E-04	89.500
	8.20000E-04	101.500
7.0000	8.80000E-04	115.900
	1.08000E-03	125.100
	9.00000E-04	137.800
	9.80000E-04	151.300
	1.07000E-03	163.300
	1.16000E-03	174.100
	1.20000E-03	187.500
	1.26000E-03	211.200
	1.40000E-03	259.100
	1.48000E-03	331.300
	1.45000E-03	354.600
	1.55000E-03	380.400
	1.62000E-03	460.600
	1.72000E-03	499.300
	1.73000E-03	572.700
	1.98000E-03	629.600
	2.04000E-03	738.700
	2.49000E-03	964.400
	2.97000E-03	1107.700
	3.20000E-03	1326.800
	3.34000E-03	1551.900
	3.59000E-03	1697.500
8.0000	4.00000E-05	0.800
	1.50000E-04	5.600
	3.00000E-04	32.000
	4.30000E-04	92.000
	5.10000E-04	113.800
	5.70000E-04	137.300
	8.00000E-04	173.600
	8.50000E-04	221.700
	9.80000E-04	318.800
	1.23000E-03	403.400
	1.48000E-03	486.200
	1.76000E-03	620.000

TABLE 133 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.04000E-03	702.000
	2.25000E-03	824.500
	2.67000E-03	992.000
	2.75000E-03	1147.100
	3.04000E-03	1267.600
9.0000	3.20000E-04	10.400
	5.30000E-04	46.900
	7.50000E-04	149.700
	9.00000E-04	188.200
	10.00000E-04	236.700
	1.05000E-03	259.100
	1.19000E-03	293.500
	1.21000E-03	344.400
	1.37000E-03	379.500
9.0000	1.48000E-03	462.000
	1.51000E-03	535.300
	1.65000E-03	572.700
	1.77000E-03	595.100
	1.79000E-03	629.900
	1.95000E-03	703.500
	2.05000E-03	776.800
	2.20000E-03	824.900
	2.22000E-03	884.200
	2.36000E-03	932.700
	2.40000E-03	966.600
	2.45000E-03	1039.900
	2.51000E-03	1149.400
	2.72000E-03	1205.000
	2.93000E-03	1370.800
	2.96000E-03	1459.800
	3.10000E-03	1518.800
10.0000	1.20000E-04	3.300
	1.90000E-04	4.200
	2.70000E-04	21.200
	2.70000E-04	24.500
	3.10000E-04	28.000
	3.40000E-04	45.700
	5.60000E-04	51.700
	5.30000E-04	69.500
	6.10000E-04	76.400
	5.90000E-04	96.000
	7.30000E-04	103.700
	4.80000E-04	115.900
	4.90000E-04	127.400
	5.60000E-04	139.800

TABLE 133 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	5.20000E-04	152.400
	6.80000E-04	164.300
	7.70000E-04	176.100
	7.80000E-04	188.300
	8.10000E-04	200.000
	7.80000E-04	212.100
	9.80000E-04	223.600
	9.00000E-04	263.200
	1.21000E-03	295.400
	1.17000E-03	308.100
	1.33000E-03	323.700
	1.40000E-03	382.800
	1.48000E-03	405.700
	1.44000E-03	412.900
	1.84000E-03	451.400
	1.99000E-03	475.400
	1.96000E-03	501.300
	1.98000E-03	549.300
	2.22000E-03	599.600
	2.40000E-03	647.200
	2.65000E-03	693.900
	2.86000E-03	766.800
	2.51000E-03	813.300
	2.72000E-03	885.000
	2.77000E-03	932.500
	3.39000E-03	1005.400
	3.42000E-03	1102.800
	3.51000E-03	1125.100
12.5000	10.00000E-05	1.100
	3.50000E-04	14.000
	5.20000E-04	26.200
	8.90000E-04	110.800
	1.04000E-03	123.500
	9.60000E-04	135.500
	1.11000E-03	158.500
	1.24000E-03	183.000
	1.27000E-03	207.100
	1.34000E-03	230.600
	1.71000E-03	278.800
	1.84000E-03	328.000
	1.94000E-03	379.900
	2.07000E-03	398.600
	2.09000E-03	447.200
	2.27000E-03	519.000
	2.71000E-03	614.600
	2.84000E-03	711.000
	3.18000E-03	832.000
	3.59000E-03	952.000

RUN 22

TABLE 133 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	8.10000E-04	41.600
	1.25000E-03	115.600
	1.59000E-03	138.500
	1.72000E-03	152.000
	1.65000E-03	173.800
	1.69000E-03	198.700
	2.17000E-03	283.800
	2.27000E-03	319.900
	2.29000E-03	367.800
	2.44000E-03	391.000
	2.26000E-03	404.300
	2.71000E-03	451.700
	2.69000E-03	501.900
	2.81000E-03	524.000
	3.01000E-03	592.700
	3.38000E-03	676.800
	3.67000E-03	706.000
	3.48000E-03	740.100
13.0000	3.62000E-03	811.100
	3.94000E-03	892.600
	4.13000E-03	979.000
	4.52000E-03	1011.900
	4.86000E-03	1147.600
	5.20000E-03	1206.900
15.0000	1.80000E-04	0.400
	2.60000E-04	2.000
	4.20000E-04	17.100
	5.00000E-04	25.000
	8.70000E-04	47.000
	9.50000E-04	64.300
	1.17000E-03	76.600
	1.12000E-03	87.300
	1.26000E-03	103.500
	1.36000E-03	114.200
	1.32000E-03	125.800
	1.49000E-03	137.700
	1.59000E-03	151.000
	1.61000E-03	162.100
	1.83000E-03	172.600
	1.87000E-03	186.600
	2.22000E-03	211.800
	2.22000E-03	245.300
	2.34000E-03	260.200
	2.37000E-03	283.100
	2.55000E-03	307.500
	2.80000E-03	331.400
	2.91000E-03	355.400

TABLE 133 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.04000E-03	379.200
	3.06000E-03	401.800
	3.41000E-03	412.800
	3.46000E-03	426.100
	3.55000E-03	436.400
	3.55000E-03	450.700
	3.70000E-03	460.500
	3.73000E-03	473.900
	3.81000E-03	497.700
	4.02000E-03	522.400
	4.17000E-03	547.400
	4.16000E-03	569.800
	4.23000E-03	593.900
	4.34000E-03	618.500
	4.63000E-03	666.000
	5.03000E-03	737.900
	5.29000E-03	811.800
17.0000	2.80000E-04	1.500
	6.30000E-04	3.800
17.0000	9.60000E-04	8.000
	1.09000E-03	30.700
	1.28000E-03	42.500
	1.52000E-03	65.900
	1.64000E-03	90.300
	1.82000E-03	103.500
	2.01000E-03	123.800
	2.34000E-03	149.500
	2.55000E-03	172.800
	2.71000E-03	199.400
	2.89000E-03	235.500
	3.46000E-03	261.400
	3.40000E-03	306.700
	3.66000E-03	342.900
	3.82000E-03	379.200
	4.29000E-03	450.300
	4.58000E-03	509.500
	5.06000E-03	567.900
	5.31000E-03	631.500
	6.00000E-03	740.300
20.0000	1.60000E-04	1.100
	2.50000E-04	2.000
	3.60000E-04	3.700
	3.90000E-04	4.700
	8.60000E-04	30.800
	1.19000E-03	49.100
	1.21000E-03	71.000

TABLE 133 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.49000E-03	109.800
	1.97000E-03	130.100
	1.98000E-03	155.500
	2.17000E-03	169.300
	2.37000E-03	190.800
	2.67000E-03	220.400
	2.69000E-03	237.900
	2.96000E-03	260.800
	3.06000E-03	311.200
	3.56000E-03	360.100
	3.96000E-03	433.700
	4.17000E-03	481.100
	4.33000E-03	529.000
	4.60000E-03	599.600
	4.97000E-03	647.500
	5.34000E-03	721.000
	5.64000E-03	792.000
	5.97000E-03	828.100
21.0000	6.50000E-04	2.900
	6.90000E-04	5.000
	7.10000E-04	6.500
21.0000	9.20000E-04	7.600
	7.20000E-04	16.700
	1.07000E-03	23.400
	1.18000E-03	31.900
	1.24000E-03	43.300
	1.57000E-03	54.900
	1.70000E-03	68.500
	2.33000E-03	91.600
	2.72000E-03	117.700
	3.50000E-03	164.800
	4.10000E-03	211.200
	4.78000E-03	260.100
	5.48000E-03	305.800
	6.52000E-03	378.700
	7.37000E-03	450.400
	7.95000E-03	501.500
	8.73000E-03	572.600
	9.45000E-03	643.000
	10.00000E-03	699.800
22.5000	3.40000E-04	3.900
	6.80000E-04	18.000
	1.05000E-03	29.400
	1.28000E-03	42.200
	1.85000E-03	66.200
	2.12000E-03	89.500

RUN 22

TABLE 133 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.40000E-03	100.800
	2.76000E-03	138.200
	3.06000E-03	162.200
	3.40000E-03	185.400
	4.08000E-03	233.200
	4.77000E-03	286.900
	5.42000E-03	339.400
	6.13000E-03	401.600
	6.74000E-03	459.600
	7.33000E-03	509.700
	7.99000E-03	571.900
	8.84000E-03	641.700
	9.34000E-03	678.000
	1.00200E-02	739.200
	1.05100E-02	771.300
	1.10800E-02	820.900
25.0000	5.60000E-04	4.300
	6.40000E-04	5.400
	7.30000E-04	6.300
	1.03000E-03	7.800
	1.07000E-03	8.500
	1.15000E-03	17.600
	1.43000E-03	30.600
25.0000	1.68000E-03	41.700
	1.83000E-03	54.000
	2.34000E-03	66.500
	2.61000E-03	91.500
	3.05000E-03	113.700
	3.21000E-03	127.000
	3.80000E-03	150.200
	4.01000E-03	174.500
	4.45000E-03	198.000
	4.94000E-03	222.400
	4.92000E-03	235.700
	5.32000E-03	259.900
	5.58000E-03	295.300
	6.45000E-03	343.400
	6.53000E-03	360.800
	7.08000E-03	380.400
	7.29000E-03	402.600
	7.47000E-03	427.600
	8.04000E-03	460.200
	8.19000E-03	476.800
	8.36000E-03	485.000
	8.54000E-03	500.000
	9.54000E-03	557.600
	1.04700E-02	616.800
	1.12200E-02	670.000

TABLE 133 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
27.5000	3.10000E-04	1.300
	8.30000E-04	5.600
	1.01000E-03	8.500
	1.32000E-03	19.300
	1.94000E-03	31.200
	2.33000E-03	42.100
	3.05000E-03	55.200
	3.54000E-03	66.200
	4.21000E-03	81.600
	4.56000E-03	92.400
	5.49000E-03	115.300
	6.50000E-03	137.100
	7.23000E-03	151.900
	7.44000E-03	160.600
	7.98000E-03	173.400
	9.02000E-03	196.900
	9.38000E-03	209.000
	1.04400E-02	232.800
30.0000	3.60000E-04	0.500
	1.14000E-03	7.500
	1.63000E-03	18.400
	2.25000E-03	26.000
	3.21000E-03	40.800
30.0000	4.84000E-03	66.600
	6.50000E-03	89.400
	6.91000E-03	99.900
	7.51000E-03	113.000
	8.31000E-03	124.200
	9.02000E-03	138.500
	9.46000E-03	146.000
	1.03900E-02	162.900
	1.08000E-02	170.400
	1.15500E-02	191.600
35.0000	8.50000E-04	2.100
	1.06000E-03	3.100
	1.09000E-03	4.200
	1.29000E-03	5.200
	1.39000E-03	6.200
	1.55000E-03	7.100
	1.73000E-03	8.100
	2.76000E-03	17.200
	5.10000E-03	32.000
	6.90000E-03	42.700
	1.37200E-02	68.100
	1.51200E-02	90.000
	1.78500E-02	102.100

RUN 22

TABLE 133 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.0000	9.60000E-04	0.500
	1.28000E-03	1.400
	1.41000E-03	2.500
	1.73000E-03	3.500
	2.15000E-03	5.600
	4.40000E-03	16.800
	6.16000E-03	23.500
	8.94000E-03	29.400
	1.11000E-02	39.500
	1.56000E-02	51.200
50.0000	8.80000E-04	0.300
	9.50000E-04	0.900
	1.32000E-03	2.200
	2.10000E-03	3.600
	2.72000E-03	5.200
	3.42000E-03	6.500
	4.70000E-03	8.200
	5.99000E-03	9.800
	8.85000E-03	11.700
	10.00000E-03	12.500
55.0000	8.70000E-04	0.400
	1.95000E-03	1.000
	3.00000E-03	2.000
55.0000	4.64000E-03	3.200
	6.05000E-03	4.200
	8.22000E-03	5.500
	8.96000E-03	6.000
	1.12500E-02	7.100

TABLE 134

RUN 22

Deformation Versus Time (Fitted Data) for MST-821 Sheet at 1000° F (1460° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS
7.0000	1.02270E-04	2.900
	1.71790E-04	4.000
	2.19580E-04	5.000
	3.45420E-04	9.100
	5.51030E-04	25.000
	6.67200E-04	43.500
	7.67120E-04	66.800
	8.00240E-04	76.000
	8.45030E-04	89.500
	8.82050E-04	101.500
7.0000	9.23940E-04	115.900
	9.49550E-04	125.100
	9.83740E-04	137.800
	1.01883E-03	151.300
	1.04912E-03	163.300
	1.07576E-03	174.100
	1.10810E-03	187.500
	1.16365E-03	211.200
	1.27088E-03	259.100
	1.42322E-03	331.300
	1.47054E-03	354.600
	1.52206E-03	380.400
	1.67714E-03	460.600
	1.74959E-03	499.300
	1.88338E-03	572.700
	1.98420E-03	629.600
	2.17140E-03	738.700
	2.53759E-03	964.400
	2.75801E-03	1107.700
	3.08019E-03	1326.800
	3.39538E-03	1551.900
	3.59190E-03	1697.500
8.0000	3.59500E-05	0.800
	1.66130E-04	5.600
	2.76130E-04	32.000
	4.56090E-04	92.000
	5.19980E-04	113.800
	5.87930E-04	137.300
	6.90900E-04	173.600
	8.23590E-04	221.700
	1.07924E-03	318.800
	1.29023E-03	403.400
	1.48765E-03	486.200
	1.79052E-03	620.000

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.96765E-03	702.000
	2.22193E-03	824.500
	2.55237E-03	992.000
	2.84320E-03	1147.100
	3.06046E-03	1267.600
9.0000	3.28670E-04	10.400
	4.95250E-04	46.900
	7.91950E-04	149.700
	8.90400E-04	188.200
	1.00808E-03	236.700
	1.06037E-03	259.100
	1.13844E-03	293.500
	1.24950E-03	344.400
	1.32333E-03	379.500
9.0000	1.48919E-03	462.000
	1.62875E-03	535.300
	1.69748E-03	572.700
	1.73791E-03	595.100
	1.79970E-03	629.900
	1.92653E-03	703.500
	2.04816E-03	776.800
	2.12567E-03	824.900
	2.21891E-03	884.200
	2.29340E-03	932.700
	2.34458E-03	966.600
	2.45289E-03	1039.900
	2.60916E-03	1149.400
	2.68620E-03	1205.000
	2.90763E-03	1370.800
	3.02183E-03	1459.800
	3.09591E-03	1518.800
10.0000	1.54580E-04	3.300
	1.75450E-04	4.200
	2.85750E-04	21.200
	2.96620E-04	24.500
	3.07680E-04	28.000
	3.61820E-04	45.700
	3.80310E-04	51.700
	4.36250E-04	69.500
	4.58360E-04	76.400
	5.22130E-04	96.000
	5.47490E-04	103.700
	5.87920E-04	115.900
	6.26220E-04	127.400
	6.67670E-04	139.800
	7.09880E-04	152.400
	7.49760E-04	164.300

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.89310E-04	176.100
	8.30150E-04	188.300
	8.69250E-04	200.000
	9.09610E-04	212.100
	9.47870E-04	223.600
	1.07875E-03	263.200
	1.18405E-03	295.400
	1.22527E-03	308.100
	1.27567E-03	323.700
	1.46412E-03	382.800
	1.53609E-03	405.700
	1.55859E-03	412.900
	1.67795E-03	451.400
	1.75154E-03	475.400
	1.83026E-03	501.300
	1.97428E-03	549.300
10.0000	2.12271E-03	599.600
	2.26092E-03	647.200
	2.39446E-03	693.900
	2.59911E-03	766.800
	2.72731E-03	813.300
	2.92166E-03	885.000
	3.04829E-03	932.500
	3.23950E-03	1005.400
	3.48943E-03	1102.800
	3.54581E-03	1125.100
12.5000	9.97400E-05	1.100
	3.74670E-04	14.000
	4.73680E-04	26.200
	9.22100E-04	110.800
	9.78770E-04	123.500
	1.03099E-03	135.500
	1.12797E-03	158.500
	1.22744E-03	183.000
	1.32199E-03	207.100
	1.41148E-03	230.600
	1.58782E-03	278.800
	1.75938E-03	328.000
	1.93266E-03	379.900
	1.99338E-03	398.600
	2.14742E-03	447.200
	2.36609E-03	519.000
	2.64321E-03	614.600
	2.90898E-03	711.000
	3.22631E-03	832.000
	3.52585E-03	952.000

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
13.0000	9.21710E-04	41.600
	1.34218E-03	115.600
	1.45916E-03	138.500
	1.52548E-03	152.000
	1.62866E-03	173.600
	1.74093E-03	198.700
	2.08551E-03	283.800
	2.21636E-03	319.900
	2.37891E-03	367.800
	2.45385E-03	391.000
	2.49586E-03	404.300
	2.64093E-03	451.700
	2.78866E-03	501.900
	2.85246E-03	524.000
	3.04878E-03	592.700
	3.29138E-03	676.800
	3.37766E-03	706.000
	3.48040E-03	740.100
13.0000	3.70261E-03	811.100
	3.97369E-03	892.600
	4.28043E-03	979.000
	4.40201E-03	1011.900
	4.92164E-03	1147.600
	5.15067E-03	1206.900
15.0000	1.82960E-04	0.400
	2.43080E-04	2.000
	4.76870E-04	17.100
	5.61650E-04	25.000
	7.73190E-04	47.000
	9.26830E-04	64.300
	1.03173E-03	76.600
	1.12061E-03	87.300
	1.25159E-03	103.500
	1.33600E-03	114.200
	1.42583E-03	125.800
	1.51629E-03	137.700
	1.61555E-03	151.000
	1.69700E-03	162.100
	1.77296E-03	172.600
	1.87268E-03	186.600
	2.04806E-03	211.800
	2.27389E-03	245.300
	2.37189E-03	260.200
	2.51982E-03	283.100
	2.67413E-03	307.500
	2.82218E-03	331.400
	2.96800E-03	355.400

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.10997E-03	379.200
	3.24251E-03	401.800
	3.30625E-03	412.800
	3.38267E-03	426.100
	3.44139E-03	436.400
	3.52225E-03	450.700
	3.57722E-03	460.500
	3.65185E-03	473.900
	3.78287E-03	497.700
	3.91687E-03	522.400
	4.05055E-03	547.400
	4.16873E-03	569.800
	4.29429E-03	593.900
	4.42082E-03	618.500
	4.66070E-03	666.000
	5.01355E-03	737.900
	5.36455E-03	811.800
17.0000	2.72300E-04	1.500
	6.85160E-04	3.800
17.0000	8.71110E-04	8.000
	1.15242E-03	30.700
	1.27044E-03	42.500
	1.50117E-03	65.900
	1.73472E-03	90.300
	1.85739E-03	103.500
	2.04082E-03	123.800
	2.26425E-03	149.500
	2.45884E-03	172.800
	2.67247E-03	199.400
	2.94930E-03	235.500
	3.13954E-03	261.400
	3.45742E-03	306.700
	3.69933E-03	342.900
	3.93234E-03	379.200
	4.36445E-03	450.300
	4.70299E-03	509.500
	5.02069E-03	567.900
	5.35053E-03	631.500
	5.88126E-03	740.300
20.0000	1.68320E-04	1.100
	2.55000E-04	2.000
	3.47290E-04	3.700
	3.85460E-04	4.700
	8.55650E-04	30.800
	1.07919E-03	49.100
	1.31463E-03	71.000

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.68331E-03	109.800
	1.85964E-03	130.100
	2.06848E-03	155.500
	2.17732E-03	169.300
	2.34131E-03	190.800
	2.55740E-03	220.400
	2.68057E-03	237.900
	2.83717E-03	260.800
	3.16597E-03	311.200
	3.46737E-03	360.100
	3.89442E-03	433.700
	4.15525E-03	481.100
	4.40916E-03	529.000
	4.76791E-03	599.600
	5.00201E-03	647.500
	5.34839E-03	721.000
	5.66986E-03	792.000
	5.82884E-03	828.100
21.0000	6.96550E-04	2.900
	7.14860E-04	5.000
	7.29660E-04	6.500
21.0000	7.41660E-04	7.600
	8.68660E-04	16.700
	9.80090E-04	23.400
	1.13087E-03	31.900
	1.33989E-03	43.300
	1.55449E-03	54.900
	1.80454E-03	68.500
	2.22050E-03	91.600
	2.67433E-03	117.700
	3.45033E-03	164.800
	4.16675E-03	211.200
	4.87813E-03	260.100
	5.50852E-03	305.800
	6.45624E-03	378.700
	7.33027E-03	450.400
	7.92339E-03	501.500
	8.71302E-03	572.600
	9.45906E-03	643.000
	1.00380E-02	699.800
22.5000	3.41780E-04	3.900
	6.83970E-04	18.000
	1.01934E-03	29.400
	1.32599E-03	42.200
	1.78654E-03	66.200
	2.15983E-03	89.500

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.32638E-03	100.800
	2.84007E-03	138.200
	3.15163E-03	162.200
	3.44524E-03	185.400
	4.03653E-03	233.200
	4.68920E-03	286.900
	5.32146E-03	339.400
	6.06647E-03	401.600
	6.75855E-03	459.600
	7.35465E-03	509.700
	8.09260E-03	571.900
	8.91777E-03	641.700
	9.34561E-03	678.000
	1.00648E-02	739.200
	1.04409E-02	771.300
	1.10204E-02	820.900
25.0000	5.80240E-04	4.300
	6.90860E-04	5.400
	7.65450E-04	6.300
	8.68630E-04	7.800
	9.10170E-04	8.500
	1.27115E-03	17.600
	1.58691E-03	30.600
25.0000	1.80352E-03	41.700
	2.02221E-03	54.000
	2.23343E-03	66.500
	2.64051E-03	91.500
	2.99355E-03	113.700
	3.20283E-03	127.000
	3.56490E-03	150.200
	3.94069E-03	174.500
	4.30106E-03	198.000
	4.67218E-03	222.400
	4.87320E-03	235.700
	5.23665E-03	259.900
	5.76302E-03	295.300
	6.46836E-03	343.400
	6.72076E-03	360.800
	7.00336E-03	380.400
	7.32128E-03	402.600
	7.67659E-03	427.600
	8.13569E-03	460.200
	8.36767E-03	476.800
	8.48183E-03	485.000
	8.68990E-03	500.000
	9.48018E-03	557.600
	1.02785E-02	616.800
	1.09846E-02	670.000

RUN 22

TABLE 134 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
27.5000	3.17190E-04	1.300
	8.14740E-04	5.600
	9.65770E-04	8.500
	1.42498E-03	19.300
	1.92678E-03	31.200
	2.39793E-03	42.100
	2.97191E-03	55.200
	3.45597E-03	66.200
	4.13227E-03	81.600
	4.60380E-03	92.400
	5.59267E-03	115.300
	6.51786E-03	137.100
	7.13643E-03	151.900
	7.49640E-03	160.600
	8.02117E-03	173.400
	8.96978E-03	196.900
	9.45093E-03	209.000
	1.03834E-02	232.800
30.0000	3.60300E-04	0.500
	1.12910E-03	7.500
	1.69184E-03	18.400
	2.18865E-03	26.000
	3.20014E-03	40.800
	4.91298E-03	66.600
	6.32447E-03	89.400
	6.94264E-03	99.900
	7.68794E-03	113.000
	8.30389E-03	124.200
	9.06406E-03	138.500
	9.45177E-03	146.000
	1.02998E-02	162.900
	1.06655E-02	170.400
	1.16669E-02	191.600
35.0000	8.43790E-04	2.100
	9.71140E-04	3.100
	1.11312E-03	4.200
	1.24394E-03	5.200
	1.37641E-03	6.200
	1.49705E-03	7.100
	1.63266E-03	8.100
	2.94267E-03	17.200
	5.36197E-03	32.000
	7.32046E-03	42.700
	1.24129E-02	68.100
	1.63091E-02	90.000
	1.74047E-02	102.100

TABLE 134 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.0000	9.52700E-04	0.500
	1.27348E-03	1.400
	1.51169E-03	2.500
	1.68630E-03	3.500
	2.03915E-03	5.600
	4.54765E-03	16.800
	6.44246E-03	23.500
	8.24951E-03	29.400
	1.15289E-02	39.500
	1.54982E-02	51.200
50.0000	8.32370E-04	0.300
	9.96240E-04	0.900
	1.41466E-03	2.200
	1.96334E-03	3.600
	2.72267E-03	5.200
	3.46131E-03	6.500
	4.65230E-03	8.200
	6.13058E-03	9.800
	8.65491E-03	11.700
	1.01016E-02	12.500
55.0000	8.72570E-04	0.400
	1.92668E-03	1.000
	3.07953E-03	2.000
55.0000	4.55258E-03	3.200
	6.02455E-03	4.200
	8.20494E-03	5.500
	9.10490E-03	6.000
	1.11742E-02	7.100

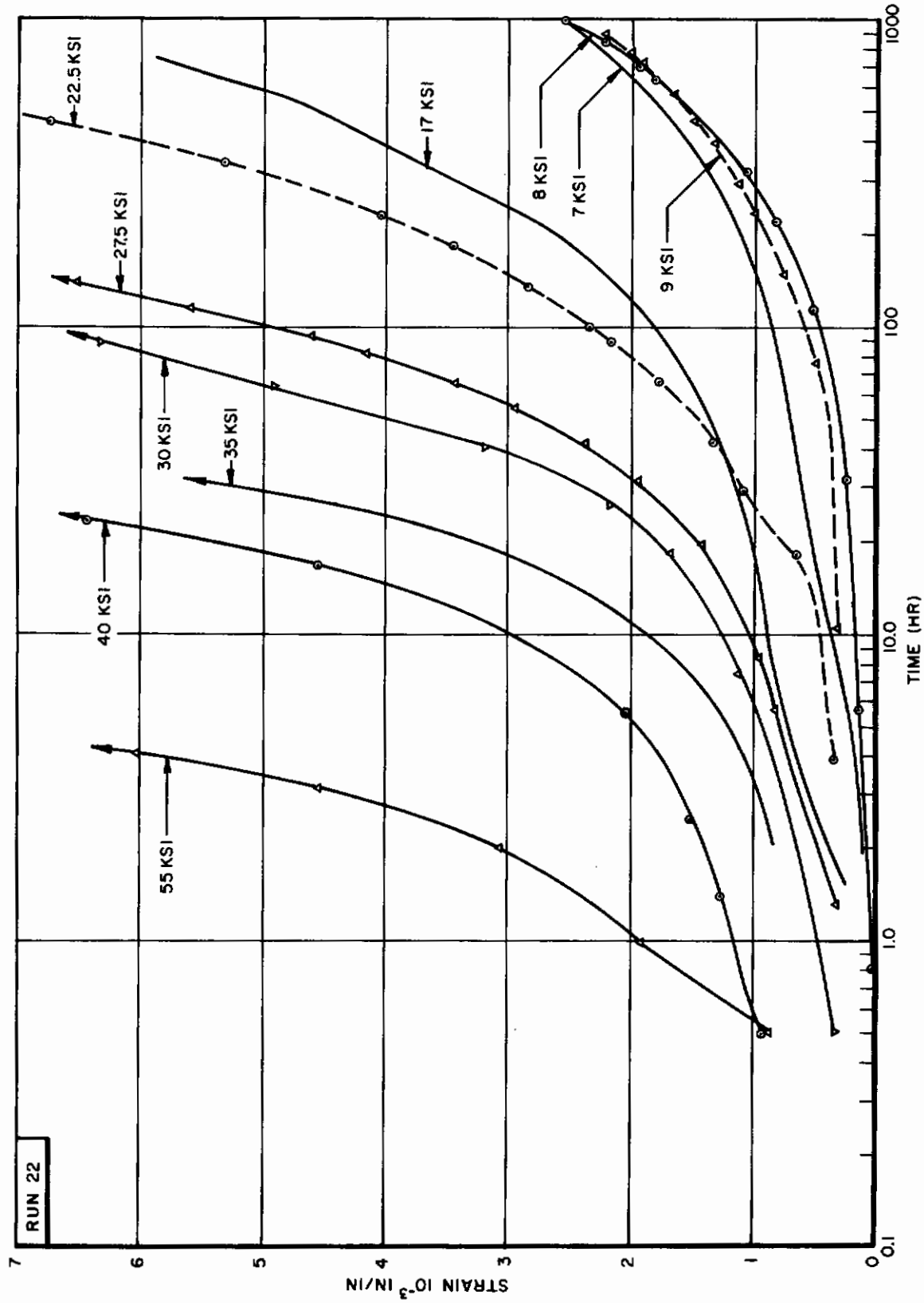


Figure 85. Creep Deformation Versus Log Time of MST-821 Sheet at 1000°F (1460°R)

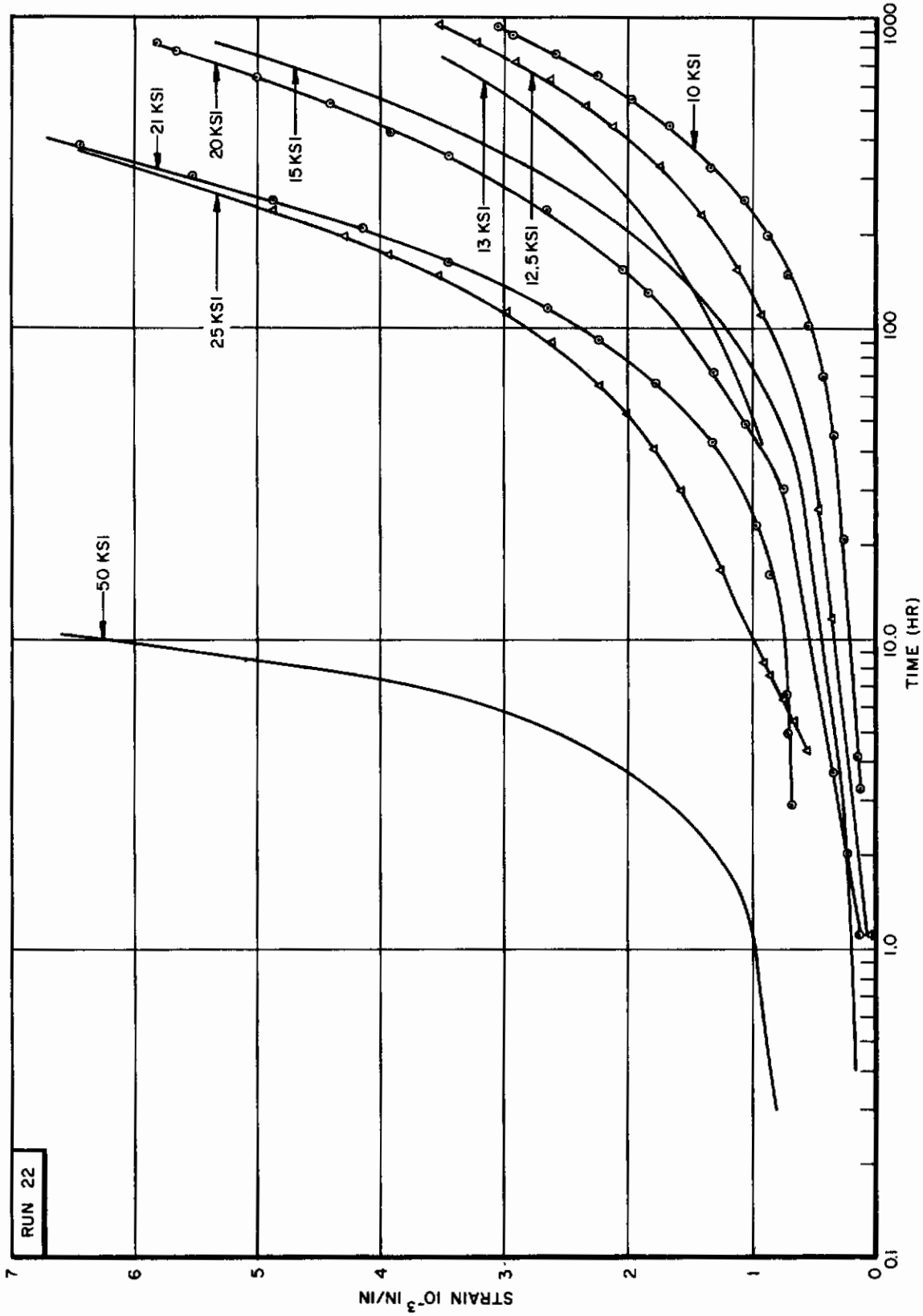


Figure 85 (CONT)

TABLE 135

MST-821 Creep Deformation Data at 1000° F (1460° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
7.0	-	-	-	155	1290	-	-
8.0	-	-	-	310	1200	-	-
9.0	-	-	-	225	1500	-	-
10.0	-	-	-	220	910	-	-
12.5	-	-	-	135	750	-	-
13.0	-	-	-	60	590	1180	-
15.0	-	-	-	67	355	700	-
17.0	-	-	-	25	240	560	-
20.0	-	-	-	42	300	660	-
21.0	-	-	-	25	135	275	700
22.5	-	-	-	16.8	151	315	130
25.0	-	-	-	9.0	101	239	590
27.5	-	-	-	13.1	55	101	225
30.0	-	-	-	6.2	33.5	66	159
35.0	-	-	-	3.4	17.1	30	62
40.0	-	-	-	1.05	9.0	17.1	35.0
50.0	-	-	-	1.15	5.8	8.6	12.5
55.0	-	-	-	0.1	1.35	2.85	6.1

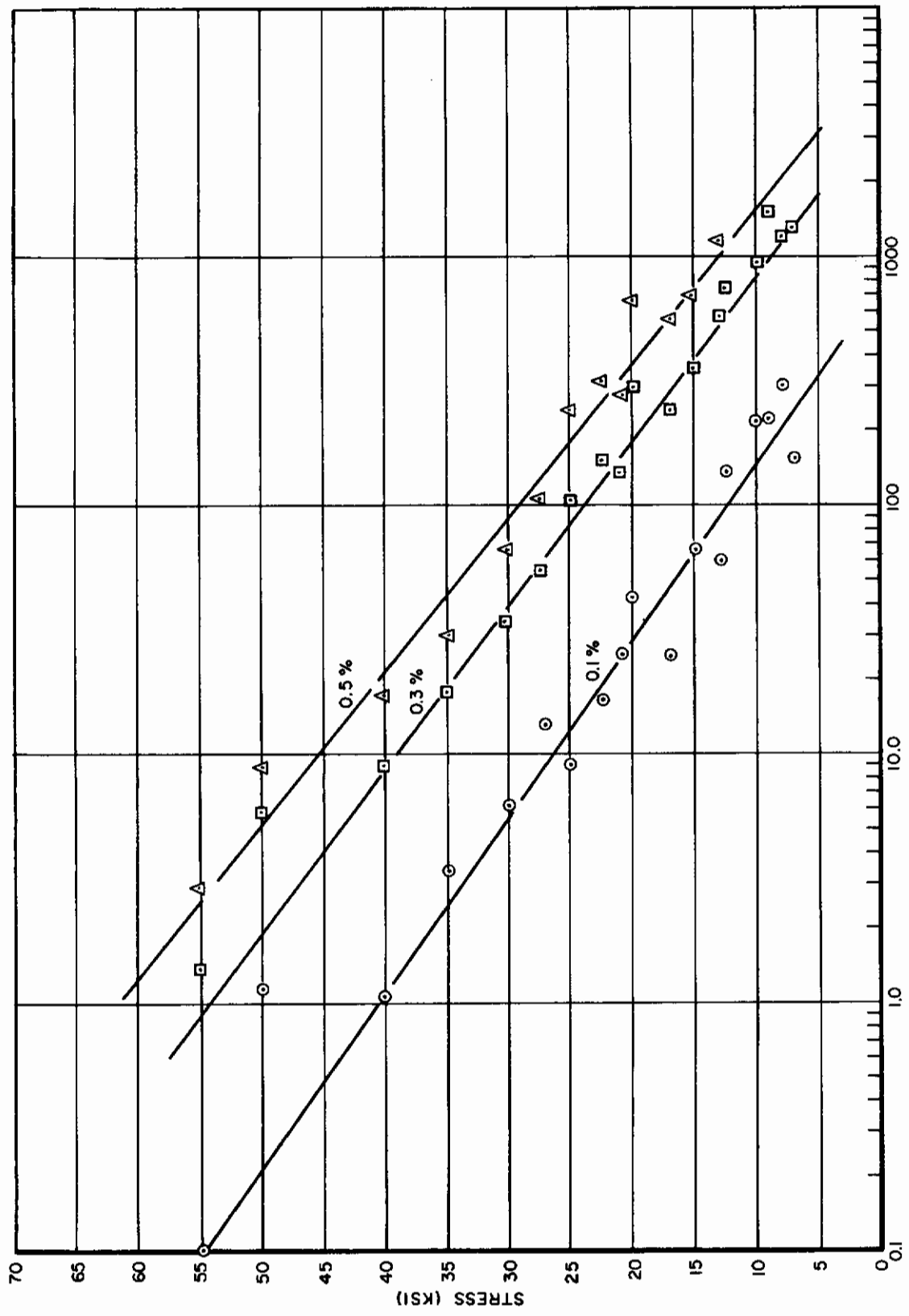


Figure 86. Creep Rupture Properties of MST-821 Sheet at 1000°F (1460°R)

TABLE 136

RUN 22

Deformation Versus Time (Raw Data) for MST-821 Sheet at 1100° F (1560° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.0000	3.40000E-04	3.000
	5.00000E-04	23.700
	4.80000E-04	38.600
	5.10000E-04	62.900
	5.50000E-04	84.500
	7.90000E-04	131.400
	1.03000E-03	154.400
	1.29000E-03	170.900
	1.01000E-03	193.000
	1.25000E-03	204.800
	1.39000E-03	229.300
	1.33000E-03	253.700
	1.59000E-03	279.000
	1.61000E-03	312.400
	1.73000E-03	327.300
	1.95000E-03	374.700
	2.56000E-03	422.600
	2.14000E-03	468.900
	2.26000E-03	517.800
	2.39000E-03	541.100
	2.56000E-03	564.800
	2.74000E-03	636.900
	2.79000E-03	685.600
	3.02000E-03	732.300
	3.22000E-03	805.100
	3.48000E-03	878.900
	3.69000E-03	973.300
	4.25000E-03	1140.400
	4.82000E-03	1291.800
	5.38000E-03	1509.500
4.0000	5.80000E-04	37.100
	8.70000E-04	89.800
	1.18000E-03	130.000
	1.39000E-03	143.000
	1.58000E-03	166.500
	1.77000E-03	191.000
	2.06000E-03	216.600
	2.07000E-03	241.700
	2.30000E-03	257.800
	2.39000E-03	278.000
	2.71000E-03	308.200
	2.62000E-03	325.400
	2.83000E-03	348.300

RUN 22

TABLE 136 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	3.10000E-03	372.500
	3.38000E-03	420.000
	3.45000E-03	444.500
	3.75000E-03	477.900
	3.93000E-03	501.200
	4.08000E-03	529.600
	4.48000E-03	587.500
	4.65000E-03	612.900
	5.14000E-03	669.500
	5.18000E-03	716.700
	5.21000E-03	751.900
	5.74000E-03	780.700
	6.18000E-03	838.900
5.0000	3.70000E-04	4.300
	3.20000E-04	6.100
	4.20000E-04	7.300
	4.70000E-04	8.400
	4.10000E-04	19.400
	4.30000E-04	25.600
	5.20000E-04	28.400
	6.20000E-04	32.200
	5.20000E-04	42.100
	5.50000E-04	45.100
	8.30000E-04	49.000
	9.10000E-04	68.300
	1.06000E-03	91.500
	1.12000E-03	104.000
	1.17000E-03	115.200
	1.17000E-03	138.200
	1.36000E-03	146.300
	1.38000E-03	163.200
	1.51000E-03	172.800
	1.42000E-03	186.900
	1.51000E-03	200.200
	1.52000E-03	210.900
	1.76000E-03	258.300
	1.87000E-03	291.700
	2.28000E-03	342.700
	2.43000E-03	378.000
	2.67000E-03	424.900
	2.87000E-03	484.100
	2.95000E-03	509.500
	3.24000E-03	546.100
	3.29000E-03	593.800
	3.38000E-03	628.900
	3.57000E-03	677.600
	3.94000E-03	739.200

RUN 22

TABLE 136 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	4.36000E-03	860.000
	4.75000E-03	939.800
	4.94000E-03	979.700
	5.26000E-03	1073.100
5.5000	5.30000E-04	16.200
	6.40000E-04	28.500
	7.90000E-04	43.100
	1.22000E-03	70.400
	1.44000E-03	88.400
	1.57000E-03	100.600
	1.85000E-03	139.000
	2.38000E-03	173.200
	2.65000E-03	210.800
	3.20000E-03	270.000
	3.94000E-03	321.600
	4.28000E-03	366.900
	5.04000E-03	431.000
	5.39000E-03	501.000
	5.98000E-03	560.600
	7.06000E-03	659.500
	9.07000E-03	861.600
	1.01100E-02	959.200
6.0000	3.40000E-04	3.000
	3.10000E-04	4.400
	3.50000E-04	5.500
	3.90000E-04	8.200
	4.60000E-04	9.800
	5.60000E-04	17.700
	7.60000E-04	26.100
	8.40000E-04	29.000
	9.10000E-04	30.300
	8.40000E-04	32.500
	9.30000E-04	42.500
	1.20000E-03	54.000
	1.19000E-03	66.200
	1.45000E-03	75.100
	1.60000E-03	90.200
	1.77000E-03	113.900
	2.02000E-03	140.700
	2.26000E-03	163.100
	2.50000E-03	173.800
	2.65000E-03	186.000
	2.67000E-03	201.500
	2.92000E-03	210.800
	3.00000E-03	221.500
	3.30000E-03	236.200

TABLE 136 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	3.32000E-03	247.000
	3.36000E-03	260.700
	3.71000E-03	283.000
	3.81000E-03	311.900
	4.01000E-03	329.300
	4.14000E-03	353.300
	4.38000E-03	382.200
	4.72000E-03	402.700
	4.94000E-03	427.200
	5.15000E-03	451.600
	5.87000E-03	509.600
	5.90000E-03	548.000
	6.85000E-03	596.400
	6.99000E-03	677.300
	7.25000E-03	715.300
	7.56000E-03	762.800
	8.00000E-03	812.700
	8.30000E-03	859.000
	8.85000E-03	918.500
	9.40000E-03	980.500
	9.83000E-03	1031.800
	10.00000E-03	1061.600
	1.01900E-02	1085.600
7.0000	4.00000E-04	2.900
	4.50000E-04	5.500
	7.90000E-04	16.800
	9.90000E-04	30.800
	1.73000E-03	77.900
	2.08000E-03	104.100
	2.70000E-03	159.600
	2.85000E-03	174.300
	3.35000E-03	196.000
	3.73000E-03	219.400
	3.91000E-03	255.300
	4.28000E-03	267.500
	4.80000E-03	327.400
	5.84000E-03	412.100
	6.79000E-03	480.000
	7.94000E-03	580.600
	9.51000E-03	713.600
	1.06400E-02	835.900
	3.90000E-04	8.400
	5.00000E-04	21.900
	1.03000E-03	80.100
	1.08000E-03	94.600
	1.26000E-03	118.300
	1.55000E-03	142.400
	1.92000E-03	190.500

RUN 22

TABLE 136 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	2.05000E-03	214.800
	2.22000E-03	250.800
	2.39000E-03	262.100
	3.10000E-03	363.100
	3.36000E-03	406.000
	3.52000E-03	454.000
	4.16000E-03	501.800
	4.44000E-03	535.800
	4.87000E-03	599.900
	5.28000E-03	648.200
	5.51000E-03	704.600
	5.85000E-03	754.300
	6.20000E-03	815.500
	6.68000E-03	838.000
	6.95000E-03	897.300
8.0000	3.60000E-04	3.600
	5.20000E-04	4.800
	5.70000E-04	5.400
	8.30000E-04	16.800
	1.04000E-03	22.100
	1.38000E-03	29.500
	1.46000E-03	38.900
	1.99000E-03	63.600
	2.67000E-03	88.600
	2.98000E-03	113.500
	3.47000E-03	139.300
	4.13000E-03	161.200
	4.89000E-03	208.500
	5.59000E-03	258.900
	6.56000E-03	305.200
	7.06000E-03	327.700
	7.99000E-03	379.100
	9.14000E-03	448.000
	1.03200E-02	508.600
9.0000	4.40000E-04	5.600
	5.80000E-04	6.900
	6.00000E-04	9.200
	1.16000E-03	20.500
	1.47000E-03	33.000
	1.88000E-03	44.600
	2.08000E-03	55.100
	2.46000E-03	70.300
	3.25000E-03	100.900
	3.81000E-03	129.600
	5.05000E-03	177.400
	6.17000E-03	224.600

TABLE 136 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.65000E-03	286.800
	9.26000E-03	345.600
	10.00000E-03	404.100
	1.16200E-02	464.400
9.5000	3.30000E-04	0.900
	5.20000E-04	1.800
9.5000	6.20000E-04	2.900
	7.10000E-04	3.700
	7.50000E-04	5.000
	8.10000E-04	6.100
	1.30000E-03	18.600
	1.74000E-03	29.200
	2.08000E-03	42.500
	2.49000E-03	53.900
	2.78000E-03	66.300
	3.32000E-03	77.000
	3.50000E-03	92.300
	4.17000E-03	112.300
	4.97000E-03	136.600
	5.88000E-03	164.300
	6.69000E-03	185.700
	7.07000E-03	210.000
	7.50000E-03	221.400
	8.35000E-03	245.000
	9.09000E-03	271.700
	9.98000E-03	307.300
	1.05400E-02	331.100
	1.14800E-02	365.100
10.0000	9.90000E-04	0.600
	1.55000E-03	1.700
	1.91000E-03	4.200
	1.95000E-03	5.100
	2.51000E-03	16.600
	3.11000E-03	26.300
	3.22000E-03	31.500
	3.89000E-03	41.100
	4.36000E-03	51.300
	4.87000E-03	64.500
	4.95000E-03	76.100
	5.76000E-03	92.200
	7.27000E-03	118.200
	8.89000E-03	160.500
	9.45000E-03	185.600
	10.00000E-03	195.800
	1.04000E-02	208.700

RUN 22

TABLE 136 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS).
12.0000	4.20000E-04	0.600
	1.05000E-03	6.700
	1.51000E-03	15.400
	2.29000E-03	29.400
	2.97000E-03	39.900
	3.74000E-03	52.300
	4.41000E-03	64.300
	5.28000E-03	77.400
	5.66000E-03	88.600
12.0000	6.22000E-03	94.900
	6.85000E-03	113.600
	8.03000E-03	135.900
	9.26000E-03	160.300
	9.70000E-03	171.000
	1.01000E-02	160.000
14.0000	4.20000E-04	1.300
	8.00000E-04	2.600
	1.36000E-03	5.000
	1.26000E-03	5.900
	1.42000E-03	8.700
	1.95000E-03	18.900
	2.92000E-03	29.800
	3.92000E-03	43.400
	4.60000E-03	54.600
	5.44000E-03	67.200
	6.11000E-03	78.400
	6.71000E-03	89.400
	8.29000E-03	114.100
	9.82000E-03	139.000
	1.15000E-02	163.700
15.0000	1.10000E-04	0.300
	4.60000E-04	1.400
	8.30000E-04	3.000
	9.30000E-04	4.600
	1.26000E-03	6.000
	1.47000E-03	8.300
	2.68000E-03	19.500
	3.94000E-03	32.100
	5.04000E-03	43.700
	6.39000E-03	54.300
	7.80000E-03	69.300
	1.10000E-02	100.100
	1.38200E-02	128.700

TABLE 136 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	1.75000E-03	6.100
	2.10000E-03	7.300
	2.51000E-03	8.400
	2.78000E-03	9.700
	2.96000E-03	10.400
	5.67000E-03	20.900
	7.35000E-03	27.000
	9.12000E-03	34.500
	1.34200E-02	43.100
	1.70200E-02	67.700
25.0000	9.50000E-04	2.200
	1.01000E-03	3.200
25.0000	1.30000E-03	4.200
	1.56000E-03	5.400
	1.83000E-03	6.200
	2.15000E-03	8.300
	4.66000E-03	19.200
	5.92000E-03	25.600
	7.77000E-03	32.700
	1.01000E-02	42.900
	1.44100E-02	56.800
30.0000	1.43000E-03	1.000
	3.19000E-03	2.900
	4.58000E-03	3.900
	6.60000E-03	5.100
	10.00000E-03	6.800
35.0000	1.29000E-03	0.600
	9.12000E-03	2.900
	1.54500E-02	4.000
	2.45000E-02	5.600
	2.96000E-02	6.400

TABLE 137

RUN 22

Deformation Versus Time (Fitted Data) for MST-821 Sheet at 1100° F (1560° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
3.0000	2.59020E-04	3.000
	3.74290E-04	23.700
	4.55160E-04	38.600
	5.83420E-04	62.900
	6.93760E-04	84.500
	9.22080E-04	131.400
	1.02873E-03	154.400
	1.10321E-03	170.900
	1.20039E-03	193.000
	1.25112E-03	204.800
	1.35399E-03	229.300
	1.45329E-03	253.700
	1.55310E-03	279.000
	1.68033E-03	312.400
	1.73552E-03	327.300
	1.90526E-03	374.700
	2.06875E-03	422.600
	2.22033E-03	468.900
	2.37480E-03	517.800
	2.44673E-03	541.100
	2.51898E-03	564.800
	2.73453E-03	636.900
	2.87784E-03	685.600
	3.01463E-03	732.300
	3.22851E-03	805.100
	3.44831E-03	878.900
	3.73663E-03	973.300
	4.26903E-03	1140.400
	4.76188E-03	1291.800
	5.39628E-03	1509.500
4.0000	5.53560E-04	37.100
	9.54600E-04	89.800
	1.26702E-03	130.000
	1.36766E-03	143.000
	1.54851E-03	166.500
	1.73528E-03	191.000
	1.92830E-03	216.600
	2.11528E-03	241.700
	2.23403E-03	257.800
	2.38170E-03	278.000
	2.59976E-03	308.200
	2.72253E-03	325.400
	2.88442E-03	348.300

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	3.05359E-03	372.500
	3.38018E-03	420.000
	3.54591E-03	444.500
	3.76900E-03	477.900
	3.92275E-03	501.200
	4.10814E-03	529.600
	4.47957E-03	587.500
	4.63987E-03	612.900
	4.99164E-03	669.500
	5.27950E-03	716.700
	5.49112E-03	751.900
	5.66239E-03	780.700
	6.00359E-03	838.900
5.0000	4.06700E-04	4.300
	3.72010E-04	6.100
	3.64310E-04	7.300
	3.63190E-04	8.400
	4.45080E-04	19.400
	5.04290E-04	25.600
	5.30390E-04	28.400
	5.64830E-04	32.200
	6.48960E-04	42.100
	6.72970E-04	45.100
	7.03280E-04	49.000
	8.40840E-04	68.300
	9.87210E-04	91.500
	1.06042E-03	104.000
	1.12358E-03	115.200
	1.24782E-03	138.200
	1.29018E-03	146.300
	1.37676E-03	163.200
	1.42500E-03	172.800
	1.49483E-03	186.900
	1.55973E-03	200.200
	1.61136E-03	210.900
	1.83506E-03	258.300
	1.98894E-03	291.700
	2.21960E-03	342.700
	2.37686E-03	378.000
	2.58335E-03	424.900
	2.84065E-03	484.100
	2.95004E-03	509.500
	3.10672E-03	546.100
	3.30935E-03	593.800
	3.45738E-03	628.900
	3.66139E-03	677.600
	3.91725E-03	739.200
	4.41241E-03	860.000
	4.73506E-03	939.800

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	4.89516E-03	979.700
	5.26676E-03	1073.100
5.5000	5.09970E-04	16.200
	6.63610E-04	28.500
	8.43180E-04	43.100
	1.17119E-03	70.400
	1.38221E-03	88.400
	1.52297E-03	100.600
	1.95481E-03	139.000
	2.32628E-03	173.200
	2.72203E-03	210.800
	3.32237E-03	270.000
	3.82750E-03	321.600
	4.26064E-03	366.900
	4.86283E-03	431.000
	5.51424E-03	501.000
	6.07048E-03	560.600
	7.01074E-03	659.500
	9.05782E-03	861.600
	1.01171E-02	959.200
6.0000	3.04590E-04	3.000
	3.35470E-04	4.400
	3.61660E-04	5.500
	4.24020E-04	8.200
	4.58620E-04	9.800
	6.08450E-04	17.700
	7.44530E-04	26.100
	7.88230E-04	29.000
	8.07420E-04	30.300
	8.39380E-04	32.500
	9.78360E-04	42.500
	1.12915E-03	54.000
	1.28216E-03	66.200
	1.39047E-03	75.100
	1.56939E-03	90.200
	1.84079E-03	113.900
	2.13718E-03	140.700
	2.37811E-03	163.100
	2.49130E-03	173.800
	2.61901E-03	186.000
	2.77932E-03	201.500
	2.87452E-03	210.800
	2.98318E-03	221.500
	3.13103E-03	236.200
	3.23863E-03	247.000
	3.37396E-03	260.700
	3.59156E-03	283.000
	3.86896E-03	311.900

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	4.03363E-03	329.300
	4.25804E-03	353.300
	4.52433E-03	382.200
	4.71075E-03	402.700
	4.93101E-03	427.200
	5.14774E-03	451.600
	5.65311E-03	509.600
	5.98063E-03	548.000
	6.38607E-03	596.400
	7.04688E-03	677.300
	7.35054E-03	715.300
	7.72452E-03	762.800
	8.11106E-03	812.700
	8.46422E-03	859.000
	8.91078E-03	918.500
	9.36788E-03	980.500
	9.74012E-03	1031.800
	9.95398E-03	1061.600
	1.01250E-02	1085.600
7.0000	3.90070E-04	2.900
	4.72580E-04	5.500
	7.60530E-04	16.800
	1.01382E-03	30.800
	1.69915E-03	77.900
	2.05366E-03	104.100
	2.78603E-03	159.600
	2.97712E-03	174.300
	3.25732E-03	196.000
	3.55707E-03	219.400
	4.01231E-03	255.300
	4.16577E-03	267.500
	4.91033E-03	327.400
	5.93903E-03	412.100
	6.74448E-03	480.000
	7.90872E-03	580.600
	9.39920E-03	713.600
	1.07257E-02	835.900
	3.53030E-04	8.400
	5.45140E-04	21.900
	1.03088E-03	80.100
	1.13630E-03	94.600
	1.30701E-03	118.300
	1.48033E-03	142.400
	1.82793E-03	190.500
	2.00459E-03	214.800
	2.26740E-03	250.800
	2.35010E-03	262.100
	3.09140E-03	363.100
	3.40634E-03	406.000

RUN 22

TABLE 137 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	3.75805E-03	454.000
	4.10722E-03	501.800
	4.35478E-03	535.800
	4.81937E-03	599.900
	5.16742E-03	648.200
	5.57145E-03	704.600
	5.92529E-03	754.300
	6.35807E-03	815.500
	6.51636E-03	838.000
	6.93141E-03	897.300
8.0000	3.69360E-04	3.600
	4.76610E-04	4.800
	5.20690E-04	5.400
	9.86880E-04	16.800
	1.11967E-03	22.100
	1.29293E-03	29.500
	1.49737E-03	38.900
	2.00637E-03	63.600
	2.50857E-03	88.600
	3.00324E-03	113.500
	3.51093E-03	139.300
	3.93793E-03	161.200
	4.84722E-03	208.500
	5.79613E-03	258.900
	6.64986E-03	305.200
	7.05869E-03	327.700
	7.97834E-03	379.100
	9.18151E-03	448.000
	1.02136E-02	508.600
9.0000	4.33560E-04	5.600
	5.36400E-04	6.900
	6.80800E-04	9.200
	1.13520E-03	20.500
	1.50038E-03	33.000
	1.80757E-03	44.600
	2.07613E-03	55.100
	2.45796E-03	70.300
	3.21577E-03	100.900
	3.91873E-03	129.600
	5.07402E-03	177.400
	6.19446E-03	224.600
	7.63895E-03	286.800
	8.97145E-03	345.600
	1.02667E-02	404.100
	1.15718E-02	464.400
9.5000	3.32000E-04	0.900
	5.02940E-04	1.800

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
9.5000	6.26080E-04	2.900
	6.92350E-04	3.700
	7.78370E-04	5.000
	8.38810E-04	6.100
	1.31378E-03	18.600
	1.65683E-03	29.200
	2.08024E-03	42.500
	2.44234E-03	53.900
	2.83556E-03	66.300
	3.17388E-03	77.000
	3.65525E-03	92.300
	4.27902E-03	112.300
	5.02720E-03	136.600
	5.86606E-03	164.300
	6.50373E-03	185.700
	7.21697E-03	210.000
	7.54768E-03	221.400
	8.22461E-03	245.000
	8.97839E-03	271.700
	9.96441E-03	307.300
	1.06121E-02	331.100
	1.15222E-02	365.100
10.0000	9.83390E-04	0.600
	1.53108E-03	1.700
	1.92286E-03	4.200
	1.99509E-03	5.100
	2.57346E-03	16.600
	3.02507E-03	26.300
	3.26966E-03	31.500
	3.72101E-03	41.100
	4.19559E-03	51.300
	4.79738E-03	64.500
	5.31282E-03	76.100
	6.00680E-03	92.200
	7.07711E-03	118.200
	8.70053E-03	160.500
	9.60454E-03	185.600
	9.96077E-03	195.800
	1.04028E-02	208.700
12.0000	4.37540E-04	0.600
	9.74300E-04	6.700
	1.51619E-03	15.400
	2.38274E-03	29.400
	3.01500E-03	39.900
	3.73867E-03	52.300
	4.41607E-03	64.300
	5.13186E-03	77.400
	5.72592E-03	88.600

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.0000	6.05337E-03	94.900
	6.99928E-03	113.600
	8.08173E-03	135.900
	9.21682E-03	160.300
	9.70011E-03	171.000
	1.01003E-02	180.000
14.0000	4.51890E-04	1.300
	7.63540E-04	2.600
	1.08278E-03	5.000
	1.17365E-03	5.900
	1.41754E-03	8.700
	2.15663E-03	18.900
	2.89509E-03	29.800
	3.80288E-03	43.400
	4.54380E-03	54.600
	5.36980E-03	67.200
	6.09674E-03	78.400
	6.80367E-03	89.400
	8.36504E-03	114.100
	9.90292E-03	139.000
	1.13940E-02	163.700
15.0000	1.07830E-04	0.300
	4.71840E-04	1.400
	7.89030E-04	3.000
	1.02286E-03	4.600
	1.20018E-03	6.000
	1.46613E-03	8.300
	2.64786E-03	19.500
	3.95536E-03	32.100
	5.16379E-03	43.700
	6.26805E-03	54.300
	7.82419E-03	69.300
	1.09758E-02	100.100
	1.38369E-02	128.700
20.0000	1.90747E-03	6.100
	2.17420E-03	7.300
	2.41984E-03	8.400
	2.71205E-03	9.700
	2.87045E-03	10.400
	5.42306E-03	20.900
	7.17431E-03	27.000
	9.72930E-03	34.500
	1.31687E-02	43.100
	1.70270E-02	67.700

TABLE 137 (CONT)

RUN 22

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	8.75480E-04	2.200
	1.09362E-03	3.200
25.0000	1.31192E-03	4.200
	1.57411E-03	5.400
	1.74904E-03	6.200
	2.20874E-03	8.300
	4.60863E-03	19.200
	6.03528E-03	25.600
	7.65399E-03	32.700
	1.01440E-02	42.900
	1.44052E-02	56.800
30.0000	1.46586E-03	1.000
	2.91164E-03	2.900
	4.72701E-03	3.900
	6.90153E-03	5.100
	9.79395E-03	6.800
35.0000	1.31214E-03	0.600
	8.80805E-03	2.900
	1.57370E-02	4.000
	2.49463E-02	5.600
	2.91565E-02	6.400

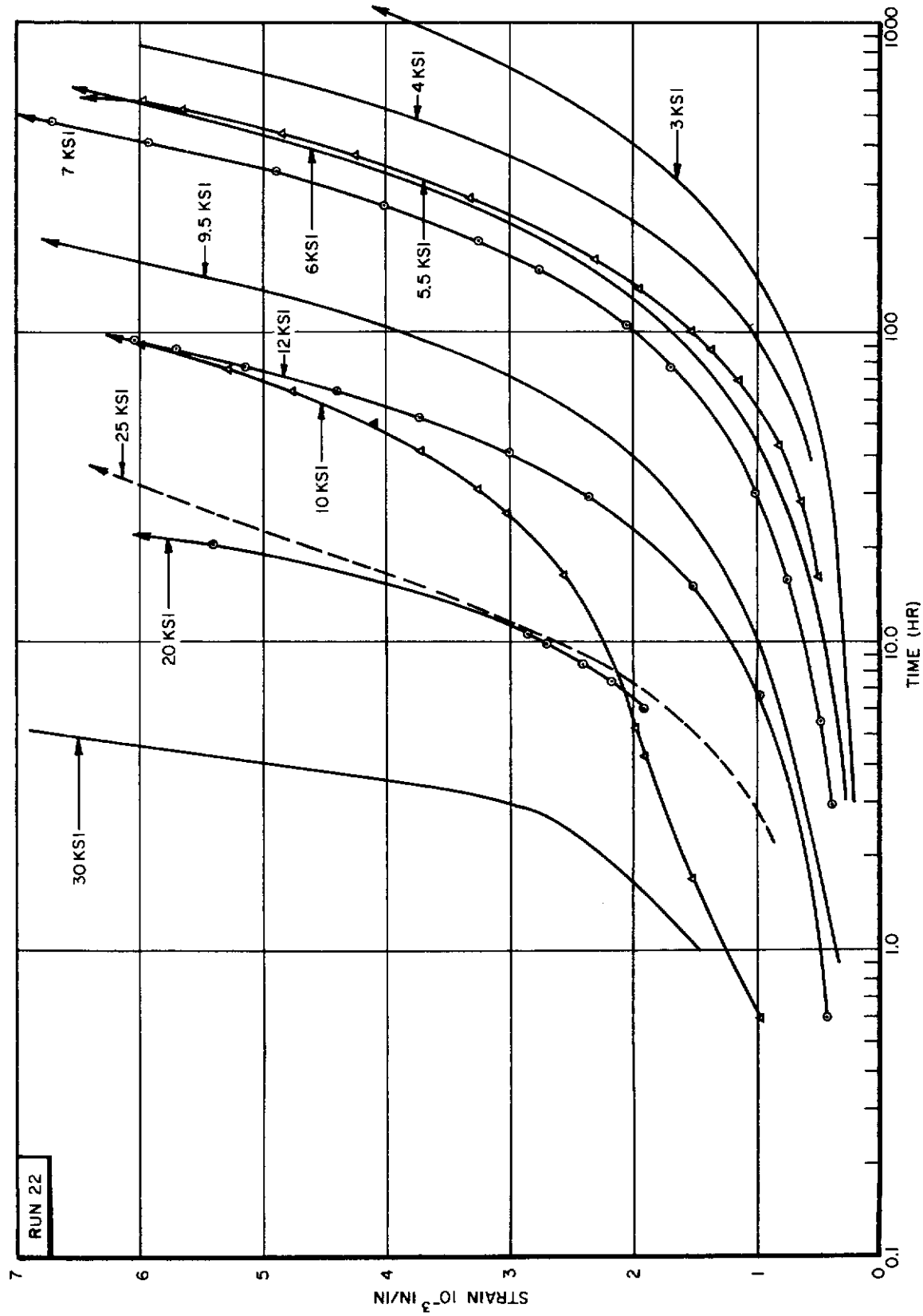


Figure 87. Creep Deformation Versus Log Time of MST-821 Sheet at 1100°F (1560°R)

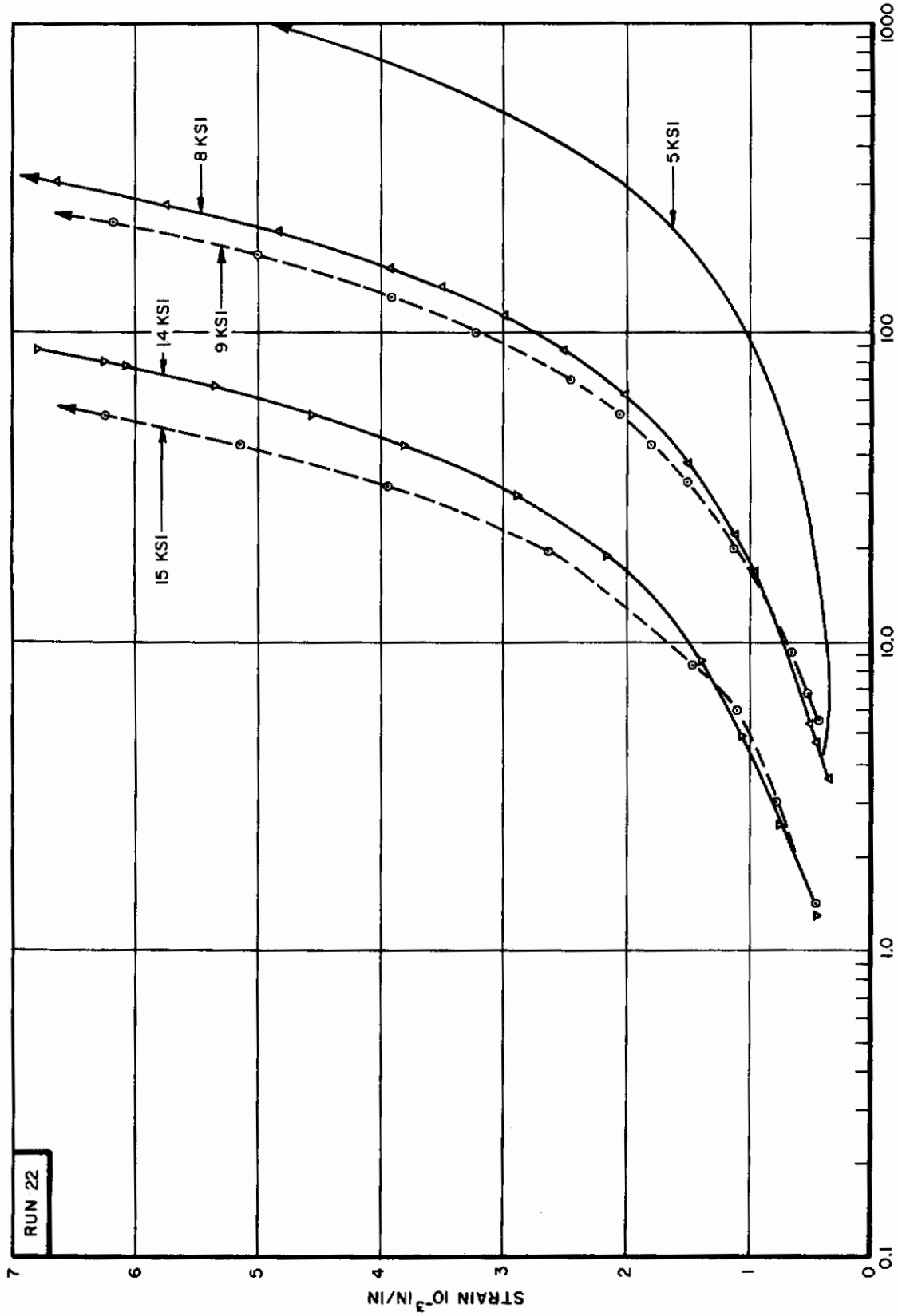


Figure 87 (CONT)

TABLE 138

MST-821 Creep Deformation Data at 1100° F (1560° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
3.0	-	-	-	150	730	1400	-
4.0	-	-	-	82	375	660	-
5.0	-	-	-	93	530	1000	-
5.5	-	-	-	60	245	450	950
6.0	-	-	-	40	222	950	1050
7.0	-	-	-	35	170	325	780
7.0	-	-	-	84	350	630	-
8.0	-	-	-	21.5	114	225	500
9.0	-	-	-	23	94	175	400
9.5	-	-	-	11.5	68	135	315
10.0	-	-	-	0.65	24	70	200
12.0	-	-	-	7.9	41	78	180
14.0	-	-	-	5.3	31	62	140
15.0	-	-	-	3.3	21	40	90
20.0	-	-	-	2.5	9.8	18	37
25.0	-	-	-	1.6	11.9	21	42
30.0	-	-	-	0.4	2.8	4.3	6.8
35.0	-	-	-	0.4	1.1	1.7	3.9

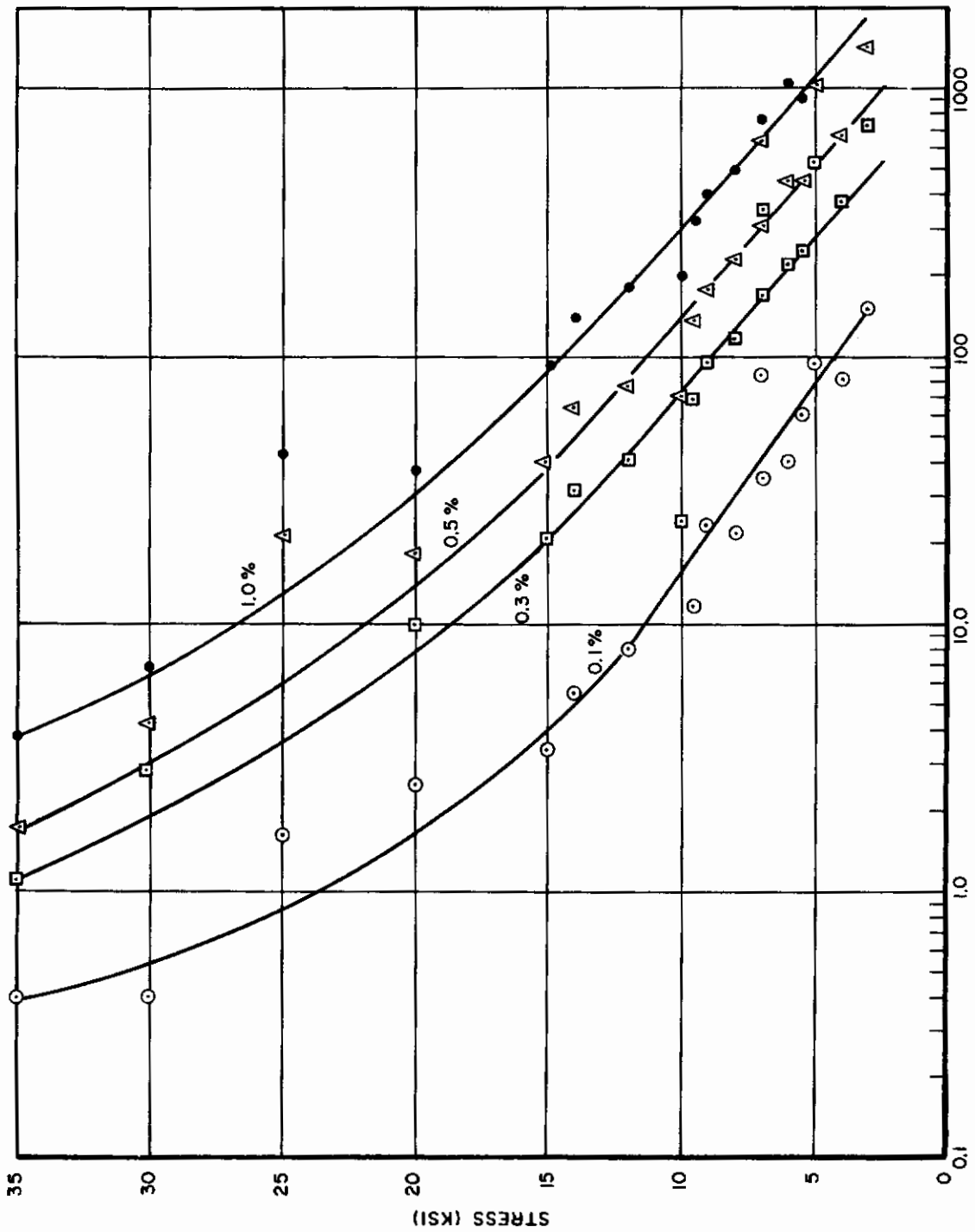


Figure 88. Creep Rupture Properties of MST-821 Sheet at 1100°F (1560°R)

TABLE 139

Minimum Creep Rate for MST-821 Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
800° F (1260° R)	60.0	2.492×10^{-6}
	76.0	7.536×10^{-6}
1000° F (1460° R)	13.0	2.858×10^{-6}
	21	8.71×10^{-6}
	40	1.68×10^{-4}
	50	2.73×10^{-4}
	55	1.15×10^{-3}
1100° F (1560° R)	5.5	9.31×10^{-6}
	7.0	1.085×10^{-6}
	25	2.18×10^{-4}
	30	7.6×10^{-4}
	35	3.26×10^{-3}

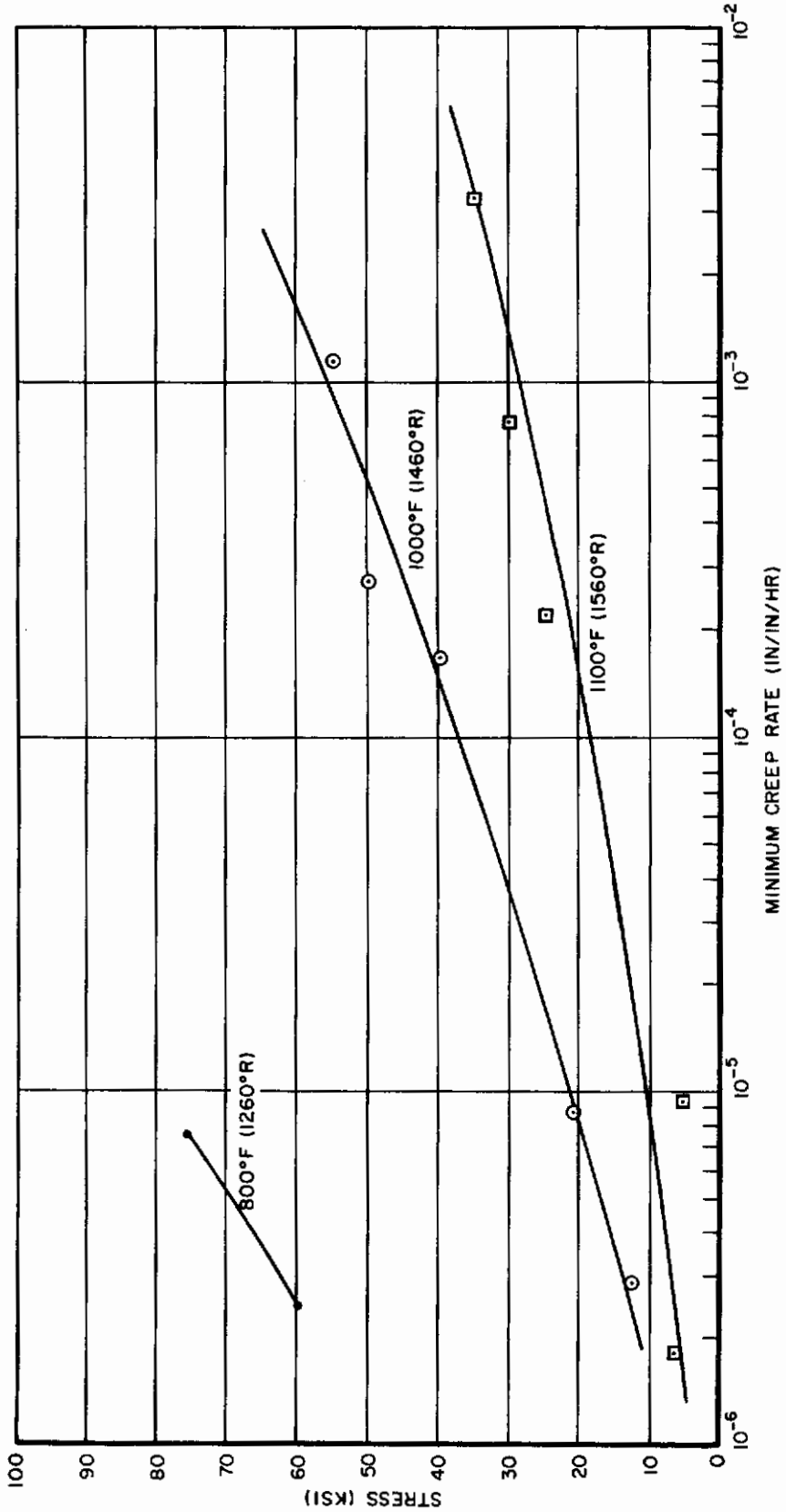


Figure 89. Minimum Creep Rate of MST-821 Sheet

CREEP DATA FOR

TMCA-811 SHEET

TABLE 140

Deformation Versus Time (Raw Data) for TMCA-811 Sheet at 800° F (1260° R) RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	5.90000E-04	17.300
	9.60000E-04	65.500
	1.19000E-03	93.600
	1.43000E-03	142.000
	1.53000E-03	162.000
	1.59000E-03	174.600
	1.65000E-03	196.500
	1.80000E-03	234.100
	1.86000E-03	281.800
	1.97000E-03	329.800
	2.18000E-03	379.000
	2.27000E-03	449.500
	2.40000E-03	497.900
	2.55000E-03	569.900
	2.74000E-03	690.100
	2.83000E-03	762.000
	2.98000E-03	857.800
	3.12000E-03	979.400
70.0000	1.30000E-04	0.900
	2.00000E-04	2.400
	2.10000E-04	3.200
	4.50000E-04	8.400
	4.90000E-04	9.700
	6.30000E-04	19.300
	8.10000E-04	26.600
	1.01000E-03	33.400
	9.90000E-04	43.100
	1.61000E-03	92.100
	1.82000E-03	104.700
	1.59000E-03	115.900
	1.86000E-03	139.000
	1.90000E-03	148.700
	1.99000E-03	163.300
	2.03000E-03	173.200
	2.18000E-03	187.400

TABLE 140 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.14000E-03	200.900
	2.21000E-03	211.200
	2.50000E-03	235.900
	2.48000E-03	258.200
	2.62000E-03	268.600
	2.53000E-03	281.900
	2.64000E-03	292.500
	2.75000E-03	319.600
	2.79000E-03	343.700
	3.02000E-03	367.500
	3.08000E-03	403.600
	3.20000E-03	425.700
	3.40000E-03	510.300
	3.52000E-03	546.800
70.0000	3.71000E-03	594.200
	3.83000E-03	630.500
	4.03000E-03	702.700
	4.22000E-03	775.600
	4.54000E-03	882.800
	4.77000E-03	980.000
	4.90000E-03	1048.700
	5.24000E-03	1130.100
74.0000	1.20000E-04	0.400
	7.10000E-04	3.100
	9.80000E-04	4.100
	9.50000E-04	5.100
	10.00000E-04	7.700
	1.38000E-03	29.900
	1.78000E-03	31.800
	1.83000E-03	43.000
	2.41000E-03	67.400
	2.56000E-03	91.100
	3.20000E-03	125.400
	3.42000E-03	149.000
	3.59000E-03	173.200
	3.92000E-03	198.000
	4.00000E-03	208.700

TABLE 140 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.30000E-03	283.700
	4.54000E-03	308.200
	5.35000E-03	378.900
	5.81000E-03	428.400
	6.84000E-03	549.300
	7.17000E-03	598.800
	7.41000E-03	693.100
	8.03000E-03	799.100
	8.59000E-03	859.500
	9.04000E-03	1003.200
	9.85000E-03	1147.600
75.0000	2.50000E-04	0.500
	3.60000E-04	1.100
	5.50000E-04	2.700
	6.50000E-04	3.600
	6.70000E-04	4.800
	6.70000E-04	5.800
	9.70000E-04	8.700
	1.11000E-03	10.000
	1.37000E-03	19.700
	1.47000E-03	27.000
	1.61000E-03	30.200
	1.65000E-03	33.800
	1.75000E-03	43.500
	1.85000E-03	46.600
75.0000	1.95000E-03	50.700
	2.27000E-03	69.500
	2.96000E-03	105.100
	3.04000E-03	116.400
	3.41000E-03	139.500
	3.58000E-03	149.300
	3.68000E-03	163.800
	4.00000E-03	201.400
	4.16000E-03	211.700
	4.80000E-03	269.000
	5.75000E-03	368.000
	6.79000E-03	461.300
	7.44000E-03	572.400

TABLE 140 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.77000E-03	629.600
	8.64000E-03	740.600
	9.26000E-03	908.300
	1.02200E-02	980.300
	1.04600E-02	1073.800
77.5000	5.70000E-04	1.400
	7.50000E-04	2.500
	1.02000E-03	5.100
	2.04000E-03	23.400
	2.26000E-03	29.400
	2.57000E-03	41.100
	3.07000E-03	51.100
	3.36000E-03	64.200
	3.87000E-03	76.500
	4.14000E-03	88.500
	5.06000E-03	113.200
	5.58000E-03	138.100
	6.07000E-03	160.600
	6.56000E-03	184.700
	6.97000E-03	207.600
	7.59000E-03	233.700
	8.60000E-03	282.000
	9.32000E-03	327.600
	9.95000E-03	355.300
80.0000	1.91000E-03	24.100
	2.69000E-03	40.400
	3.40000E-03	66.300
	4.22000E-03	89.300
	4.54000E-03	100.700
	4.65000E-03	113.400
	5.06000E-03	121.100
	5.42000E-03	138.500
	5.69000E-03	146.800
	6.06000E-03	161.900
	6.32000E-03	172.200

TABLE 140 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	6.52000E-03	186.200
	6.75000E-03	198.500
	6.95000E-03	210.400
	7.36000E-03	234.700
	7.67000E-03	267.900
	7.97000E-03	269.200
	8.08000E-03	282.000
	9.00000E-03	306.400
	9.58000E-03	368.100
	10.00000E-03	400.300
85.0000	7.80000E-04	0.600
	1.06000E-03	1.300
	1.42000E-03	2.400
	1.84000E-03	3.400
	2.09000E-03	4.400
	2.21000E-03	5.400
	2.70000E-03	6.400
	2.80000E-03	7.400
	3.33000E-03	8.400
	4.93000E-03	17.300
	6.17000E-03	30.000
	7.74000E-03	41.600
	8.79000E-03	55.200
	9.84000E-03	65.700

TABLE 141

RUN 23

Deformation Versus Time (Fitted Data) for TMCA-811 Sheet at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	5.79070E-04	17.300
	1.01361E-03	65.500
	1.18589E-03	93.600
	1.42233E-03	142.000
	1.50555E-03	162.000
	1.55474E-03	174.600
	1.63521E-03	196.500
	1.76105E-03	234.100
	1.90324E-03	281.800
	2.03126E-03	329.800
	2.15030E-03	379.000
	2.30411E-03	449.500
	2.40054E-03	497.900
	2.53285E-03	569.900
	2.73031E-03	690.100
	2.83729E-03	762.000
	2.96946E-03	857.800
	3.12316E-03	979.400
70.0000	1.43890E-04	0.900
	1.74210E-04	2.400
	2.12400E-04	3.200
	4.25960E-04	8.400
	4.68410E-04	9.700
	7.08770E-04	19.300
	8.43150E-04	26.600
	9.48150E-04	33.400
	1.07634E-03	43.100
	1.54146E-03	92.100
	1.63548E-03	104.700
	1.71391E-03	115.900
	1.86359E-03	139.000
	1.92247E-03	148.700
	2.00745E-03	163.300
	2.06287E-03	173.200
	2.13963E-03	187.400
	2.20995E-03	200.900

TABLE 141 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.26203E-03	211.200
	2.38208E-03	235.900
	2.48533E-03	258.200
	2.53204E-03	268.600
	2.59052E-03	281.900
	2.63621E-03	292.500
	2.74961E-03	319.600
	2.84677E-03	343.700
	2.93969E-03	367.500
	3.07555E-03	403.600
	3.15602E-03	425.700
	3.44805E-03	510.300
	3.56733E-03	546.800
70.0000	3.71711E-03	594.200
	3.82829E-03	630.500
	4.04143E-03	702.700
	4.24715E-03	775.600
	4.53500E-03	882.800
	4.78314E-03	980.000
	4.95213E-03	1048.700
	5.14629E-03	1130.100
74.0000	1.24230E-04	0.400
	7.76340E-04	3.100
	8.58130E-04	4.100
	9.22670E-04	5.100
	1.04972E-03	7.700
	1.63087E-03	29.900
	1.66851E-03	31.800
	1.87536E-03	43.000
	2.26826E-03	67.400
	2.60375E-03	91.100
	3.03839E-03	125.400
	3.31219E-03	149.000
	3.57645E-03	173.200
	3.83288E-03	198.000
	3.93961E-03	208.700
	4.63390E-03	283.700
	4.84378E-03	308.200

TABLE 141 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.41293E-03	378.900
	5.78438E-03	428.400
	6.61879E-03	549.300
	6.93596E-03	598.800
	7.50829E-03	693.100
	8.10940E-03	799.100
	8.43491E-03	859.500
	9.16733E-03	1003.200
	9.85289E-03	1147.600
75.0000	2.26740E-04	0.500
	3.71990E-04	1.100
	5.72410E-04	2.700
	6.46070E-04	3.600
	7.25930E-04	4.800
	7.82630E-04	5.800
	9.18500E-04	8.700
	9.70780E-04	10.000
	1.28388E-03	19.700
	1.47455E-03	27.000
	1.55138E-03	30.200
	1.63409E-03	33.800
	1.84164E-03	43.500
	1.90417E-03	46.600
75.0000	1.98454E-03	50.700
	2.32594E-03	69.500
	2.88941E-03	105.100
	3.05235E-03	116.400
	3.36764E-03	139.500
	3.49518E-03	149.300
	3.67800E-03	163.800
	4.12422E-03	201.400
	4.24040E-03	211.700
	4.84844E-03	269.000
	5.78205E-03	368.000
	6.56527E-03	461.300
	7.40977E-03	572.400
	7.81500E-03	629.600

TABLE 141 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.55498E-03	740.600
	9.57898E-03	908.300
	9.99021E-03	980.300
	1.05027E-02	1073.800
77.5000	5.69410E-04	1.400
	7.57050E-04	2.500
	1.01519E-03	5.100
	1.98628E-03	23.400
	2.23559E-03	29.400
	2.68247E-03	41.100
	3.03471E-03	51.100
	3.46568E-03	64.200
	3.84561E-03	76.500
	4.19757E-03	88.500
	4.87544E-03	113.200
	5.50851E-03	138.100
	6.04611E-03	160.600
	6.59204E-03	184.700
	7.08644E-03	207.600
	7.62510E-03	233.700
	8.56339E-03	282.000
	9.39159E-03	327.600
	9.87170E-03	355.300
80.0000	1.92817E-03	24.100
	2.60934E-03	40.400
	3.50691E-03	66.300
	4.19160E-03	89.300
	4.50356E-03	100.700
	4.83391E-03	113.400
	5.02644E-03	121.100
	5.44267E-03	138.500
	5.63298E-03	146.800
	5.96718E-03	161.900
	6.18702E-03	172.200

TABLE 141 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS
80.0000	6.47634E-03	186.200
	6.72226E-03	198.500
	6.95346E-03	210.400
	7.40700E-03	234.700
	7.99152E-03	267.900
	8.01366E-03	269.200
	8.22899E-03	282.000
	8.62647E-03	306.400
	9.56597E-03	368.100
	1.00245E-02	400.300
85.0000	8.17120E-04	0.600
	9.76120E-04	1.300
	1.41480E-03	2.400
	1.78517E-03	3.400
	2.11531E-03	4.400
	2.41175E-03	5.400
	2.68116E-03	6.400
	2.92876E-03	7.400
	3.15855E-03	8.400
	4.74670E-03	17.300
	6.38088E-03	30.000
	7.60868E-03	41.600
	8.88383E-03	55.200
	9.79114E-03	65.700

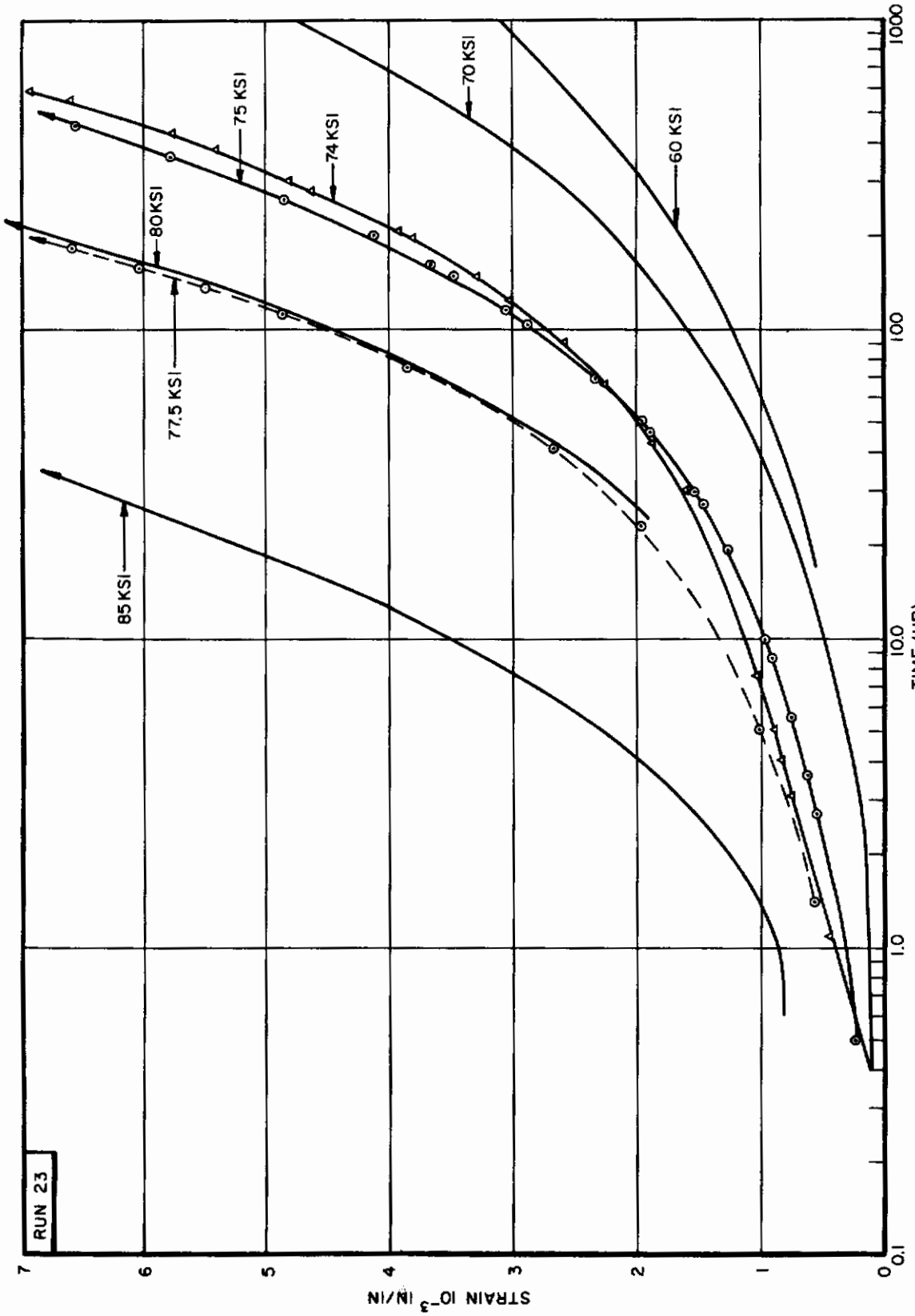


Figure 90. Creep Deformation Versus Log Time of TMCA-811 Sheet at 800°F (1260°R)

TABLE 142

TMCA-811 Creep Deformation Data at 800° F (1260° R)

Stress (KSI)	Time to Reach Indicated Deformation (hours)			
	0.1%	0.3%	0.5%	1.0%
60.0	40	770	-	-
70.0	39	380	1100	-
74.0	8	110	320	1130
75.0	5	93	270	960
78.0	2.4	41	109	340
80.0	1.6	37	100	370
85.0	-	-	-	36

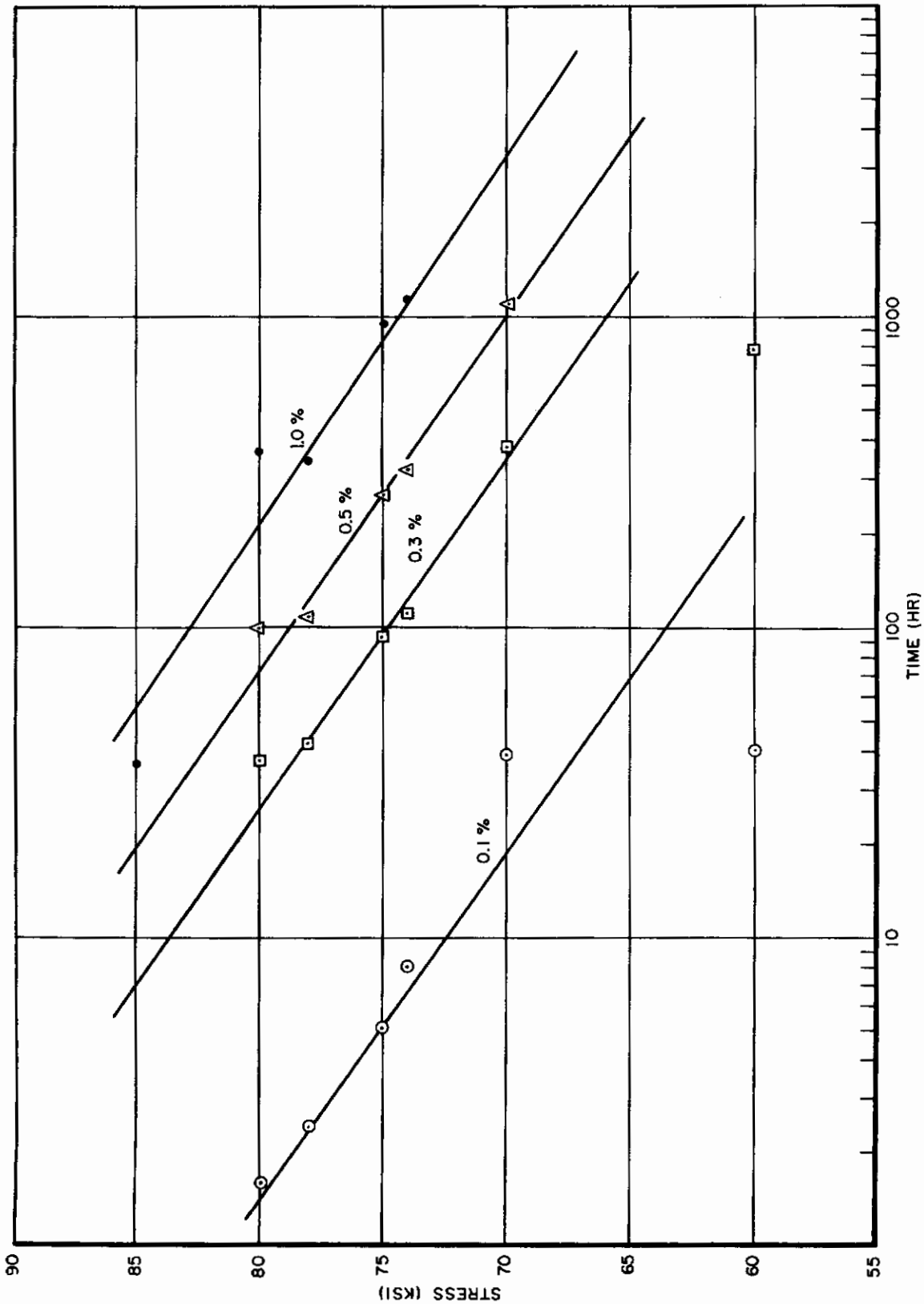


Figure 91. Creep Rupture Properties of TMCA-811 Sheet at 800°F (1260°R)

TABLE 143

Deformation Versus Time (Raw Data) for TMCA-811 Sheet at 1000° F (1460° R) RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	2.50000E-04	18.500
	2.60000E-04	39.000
	5.10000E-04	91.800
	6.00000E-04	139.100
	6.50000E-04	149.100
	7.50000E-04	236.100
	8.60000E-04	306.300
	8.90000E-04	356.100
	1.03000E-03	450.500
	1.04000E-03	498.600
	1.13000E-03	644.300
19.0000	2.50000E-04	0.400
	3.10000E-04	1.000
	6.20000E-04	4.900
	8.40000E-04	16.100
	1.20000E-03	40.700
	1.49000E-03	63.000
	1.83000E-03	100.500
	1.98000E-03	122.800
	2.11000E-03	159.600
	2.41000E-03	209.700
	2.76000E-03	268.100
	3.41000E-03	339.300
19.0000	3.69000E-03	401.000
	3.97000E-03	472.800
	4.23000E-03	520.100
	4.52000E-03	581.100
	4.86000E-03	640.500
	5.45000E-03	746.500
	5.70000E-04	6.700
	7.90000E-04	20.200
	8.70000E-04	23.400
	1.13000E-03	44.800
	1.50000E-03	90.000
	1.74000E-03	115.100
	1.96000E-03	160.300

TABLE 143 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.64000E-03	258.700
	2.74000E-03	306.600
	3.04000E-03	366.000
	3.27000E-03	425.600
	3.40000E-03	522.500
	4.13000E-03	677.400
	4.40000E-03	786.300
	4.82000E-03	929.800
	5.04000E-03	1015.600
22.5000	3.00000E-04	0.500
	6.20000E-04	6.100
	9.20000E-04	26.700
	1.18000E-03	51.300
	1.22000E-03	65.000
	1.37000E-03	77.200
	1.44000E-03	89.200
	1.90000E-03	161.300
	2.19000E-03	198.400
	2.52000E-03	281.700
	2.96000E-03	377.500
	3.10000E-03	400.400
	3.35000E-03	449.900
	3.60000E-03	497.800
	3.78000E-03	545.700
	4.00000E-03	593.900
	4.13000E-03	618.500
	4.63000E-03	701.400
	4.94000E-03	774.900
	5.58000E-03	869.600
	5.70000E-03	941.000
25.0000	2.50000E-04	0.300
	3.30000E-04	2.300
	4.50000E-04	4.500
	7.90000E-04	8.500
	1.19000E-03	29.600

TABLE 143 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
		RUN 23
25.0000	1.38000E-03	42.900
	1.68000E-03	65.900
	1.85000E-03	91.300
	1.94000E-03	116.000
	2.04000E-03	140.400
	2.65000E-03	187.400
	3.30000E-03	220.500
	3.13000E-03	272.400
	3.84000E-03	330.600
	4.36000E-03	450.200
	5.25000E-03	606.400
	5.76000E-03	699.600
	6.16000E-03	775.200
	6.83000E-03	846.000
	7.23000E-03	930.700
	8.07000E-03	1050.300
	8.66000E-03	1167.400
	9.27000E-03	1207.400
	1.04200E-02	1350.100
27.5000	7.30000E-04	8.000
	7.80000E-04	8.900
	1.21000E-03	18.300
	1.74000E-03	32.200
	1.89000E-03	42.600
	2.61000E-03	66.200
	2.86000E-03	90.200
	3.26000E-03	105.500
	3.38000E-03	116.300
	3.73000E-03	139.100
	4.01000E-03	160.900
	4.62000E-03	197.300
	5.02000E-03	220.600
	5.14000E-03	232.400
	5.34000E-03	247.300
	5.99000E-03	283.600
	6.87000E-03	340.700
	8.17000E-03	435.400
	9.17000E-03	509.800
	1.01400E-02	581.400
	1.12700E-02	650.300

TABLE 143 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
28.0000	2.56000E-03	66.600
	3.26000E-03	113.800
	3.56000E-03	138.100
	3.89000E-03	160.300
	4.30000E-03	186.900
	4.77000E-03	212.100
	5.17000E-03	235.000
	5.68000E-03	261.200
	6.56000E-03	308.400
	7.25000E-03	354.300
	8.18000E-03	404.100
	9.04000E-03	462.300
	1.01000E-02	498.000
30.0000	9.60000E-04	7.400
	1.65000E-03	17.200
	3.00000E-03	42.400
	4.89000E-03	90.900
	5.69000E-03	104.600
	6.04000E-03	113.300
	6.50000E-03	126.400
	7.04000E-03	137.900
	7.36000E-03	148.200
	8.29000E-03	161.200
	9.58000E-03	197.400
	1.09000E-02	235.200
	1.19500E-02	259.300
32.5000	1.05000E-03	2.200
	1.19000E-03	3.300
	1.44000E-03	4.500
	1.56000E-03	5.600
	1.61000E-03	7.100
	2.36000E-03	18.400
	3.55000E-03	43.200
	4.29000E-03	53.000
	4.73000E-03	66.800
	5.45000E-03	79.600

TABLE 143 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.96000E-03	90.900
	7.24000E-03	115.400
	8.24000E-03	139.200
	1.00100E-02	173.100
	1.16500E-02	211.000
35.0000	1.85000E-03	7.300
	2.63000E-03	17.200
	3.28000E-03	29.300
	3.36000E-03	32.500
	4.07000E-03	43.000
	4.54000E-03	52.800
35.0000	5.33000E-03	65.600
	6.92000E-03	101.900
	8.20000E-03	163.000
	9.38000E-03	186.800
	1.03000E-02	211.100
37.5000	7.60000E-04	0.900
	1.43000E-03	4.000
	1.59000E-03	4.900
	1.93000E-03	5.900
	2.09000E-03	6.900
	3.24000E-03	17.800
	4.50000E-03	30.700
	5.22000E-03	40.400
	6.45000E-03	53.700
	1.00700E-02	90.500
	1.26000E-02	115.300
	1.52000E-02	137.600
	1.70000E-02	152.100

TABLE 143 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
40.0000	5.90000E-04	0.500
	7.70000E-04	1.100
	1.46000E-03	3.100
	1.57000E-03	4.000
	2.02000E-03	6.000
	2.24000E-03	7.000
	3.30000E-03	17.300
	4.81000E-03	27.900
	5.70000E-03	42.000
	7.00000E-03	52.700
	8.40000E-03	65.500
	1.03200E-02	76.700
	1.17000E-02	87.800
	1.50900E-02	112.300
45.0000	7.20000E-04	0.400
	1.35000E-03	1.400
	2.51000E-03	3.500
	2.80000E-03	7.400
	5.15000E-03	17.200
	6.03000E-03	21.300
	6.72000E-03	23.900
	8.27000E-03	31.700
	1.02000E-02	41.500
50.0000	7.10000E-04	0.600
	1.75000E-03	1.500
	2.93000E-03	3.400
	8.42000E-03	15.200
	1.13200E-02	21.600
50.0000	1.36500E-02	25.800
	1.44000E-02	27.500

TABLE 144

Deformation Versus Time (Fitted Data) for TMCA-811 Sheet at 1000° F (1460° R)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	2.33150E-04	18.500
	3.05150E-04	39.000
	4.80450E-04	91.800
	5.98700E-04	139.100
	6.20260E-04	149.100
	7.73290E-04	236.100
	8.65600E-04	306.300
	9.19860E-04	356.100
	1.00446E-03	450.500
	1.04047E-03	498.600
	1.12857E-03	644.300
19.0000	2.55700E-04	0.400
	3.07690E-04	1.000
	5.79830E-04	4.900
	9.03990E-04	16.100
	1.23993E-03	40.700
	1.45222E-03	63.000
	1.75217E-03	100.500
	1.91444E-03	122.800
	2.16752E-03	159.600
	2.49266E-03	209.700
	2.85240E-03	268.100
	3.27054E-03	339.300
	3.61863E-03	401.000
	4.00992E-03	472.800
	4.26067E-03	520.100
	4.57668E-03	581.100
	4.87720E-03	640.500
	5.39771E-03	746.500
	5.52030E-04	6.700
	8.22550E-04	20.200
	8.69570E-04	23.400
	1.12645E-03	44.800
	1.52699E-03	90.000
	1.71022E-03	115.100
	2.00051E-03	160.300

TABLE 144 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
19.0000	2.52608E-03	258.700
	2.74806E-03	306.600
	3.00200E-03	366.000
	3.23791E-03	425.600
	3.59004E-03	522.500
	4.09259E-03	677.400
	4.41252E-03	786.300
	4.80198E-03	929.800
	5.02042E-03	1015.600
22.5000	3.08560E-04	0.500
	5.67630E-04	6.100
	9.69730E-04	26.700
	1.19446E-03	51.300
	1.29177E-03	65.000
	1.37112E-03	77.200
	1.44502E-03	89.200
	1.85193E-03	161.300
	2.05136E-03	198.400
	2.49041E-03	281.700
	2.98625E-03	377.500
	3.10358E-03	400.400
	3.35570E-03	449.900
	3.59772E-03	497.800
	3.83785E-03	545.700
	4.07760E-03	593.900
	4.19923E-03	618.500
	4.60552E-03	701.400
	4.96122E-03	774.900
	5.41339E-03	869.600
	5.74989E-03	941.000
25.0000	2.68110E-04	0.300
	2.82500E-04	2.300
	4.74760E-04	4.500
	7.22300E-04	8.500
	1.29950E-03	29.600
	1.48327E-03	42.900
	1.71382E-03	65.900

TABLE 144 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	1.91735E-03	91.300
	2.09479E-03	116.000
	2.26124E-03	140.400
	2.57191E-03	187.400
	2.78794E-03	220.500
	3.12591E-03	272.400
	3.50548E-03	330.600
	4.28780E-03	450.200
	5.30899E-03	606.400
	5.91518E-03	699.600
	6.40427E-03	775.200
	6.85982E-03	846.000
	7.40135E-03	930.700
	8.15918E-03	1050.300
	8.89309E-03	1167.400
	9.14192E-03	1207.400
	1.00219E-02	1350.100
27.5000	6.83490E-04	8.000
	7.62880E-04	8.900
	1.29930E-03	18.300
	1.74730E-03	32.200
	1.99834E-03	42.600
	2.47397E-03	66.200
	2.90260E-03	90.200
	3.16269E-03	105.500
	3.34247E-03	116.300
	3.71473E-03	139.100
	4.06390E-03	160.900
	4.63638E-03	197.300
	4.99734E-03	220.600
	5.17873E-03	232.400
	5.40651E-03	247.300
	5.95595E-03	283.600
	6.80581E-03	340.700
	8.18041E-03	435.400
	9.23266E-03	509.800
	1.02242E-02	581.400
	1.11602E-02	650.300

RUN 23

TABLE 144 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
28.0000	2.36290E-04	0.500
	5.20510E-04	2.400
	6.65080E-04	3.500
	7.84700E-04	4.600
	9.50060E-04	6.500
	1.64173E-03	23.600
	1.78325E-03	29.900
	2.01235E-03	42.100
28.0000	2.41117E-03	66.600
	3.15571E-03	113.800
	3.54993E-03	138.100
	3.91755E-03	160.300
	4.36623E-03	186.900
	4.79812E-03	212.100
	5.19526E-03	235.000
	5.65398E-03	261.200
	6.48895E-03	308.400
	7.30783E-03	354.300
	8.20035E-03	404.100
	9.24519E-03	462.300
	9.88574E-03	498.000
30.0000	9.50240E-04	7.400
	1.69532E-03	17.200
	2.89569E-03	42.400
	5.04164E-03	90.900
	5.63743E-03	104.600
	6.01287E-03	113.300
	6.57363E-03	126.400
	7.06121E-03	137.900
	7.49407E-03	148.200
	8.03518E-03	161.200
	9.51135E-03	197.400
	1.10060E-02	235.200
	1.19352E-02	259.300

TABLE 144 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
32.5000	1.03529E-03	2.200
	1.24108E-03	3.300
	1.40224E-03	4.500
	1.51994E-03	5.600
	1.65415E-03	7.100
	2.36151E-03	18.400
	3.63050E-03	43.200
	4.12023E-03	53.000
	4.80652E-03	66.800
	5.43962E-03	79.600
	5.99539E-03	90.900
	7.18877E-03	115.400
	8.33140E-03	139.200
	9.92914E-03	173.100
	1.16742E-02	211.000
35.0000	1.85053E-03	7.300
	2.55113E-03	17.200
	3.32154E-03	29.300
	3.50904E-03	32.500
	4.08599E-03	43.000
	4.58068E-03	52.800
35.0000	5.17704E-03	65.600
	6.65169E-03	101.900
	8.68975E-03	163.000
	9.38629E-03	186.800
	1.00563E-02	211.100
37.5000	7.59710E-04	0.900
	1.44444E-03	4.000
	1.65150E-03	4.900
	1.85718E-03	5.900
	2.04086E-03	6.900
	3.34684E-03	17.800
	4.43943E-03	30.700
	5.24540E-03	40.400
	6.40814E-03	53.700
	1.00163E-02	90.500

TABLE 144 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.27013E-02	115.300
	1.52366E-02	137.600
	1.69321E-02	152.100
40.0000	6.17300E-04	0.500
	7.21410E-04	1.100
	1.39363E-03	3.100
	1.63688E-03	4.000
	2.06550E-03	6.000
	2.23909E-03	7.000
	3.43440E-03	17.300
	4.43085E-03	27.900
	5.86509E-03	42.000
	7.07217E-03	52.700
	8.63680E-03	65.500
	1.00965E-02	76.700
	1.16123E-02	87.800
	1.51479E-02	112.300
45.0000	7.06140E-04	0.400
	1.46298E-03	1.400
	2.21832E-03	3.500
	3.07672E-03	7.400
	5.15238E-03	17.200
	6.03314E-03	21.300
	6.59033E-03	23.900
	8.24377E-03	31.700
	1.02662E-02	41.500
50.0000	6.78550E-04	0.600
	1.82248E-03	1.500
	2.89092E-03	3.400
	8.34238E-03	15.200
	1.14976E-02	21.600
50.0000	1.35597E-02	25.800
	1.43883E-02	27.500

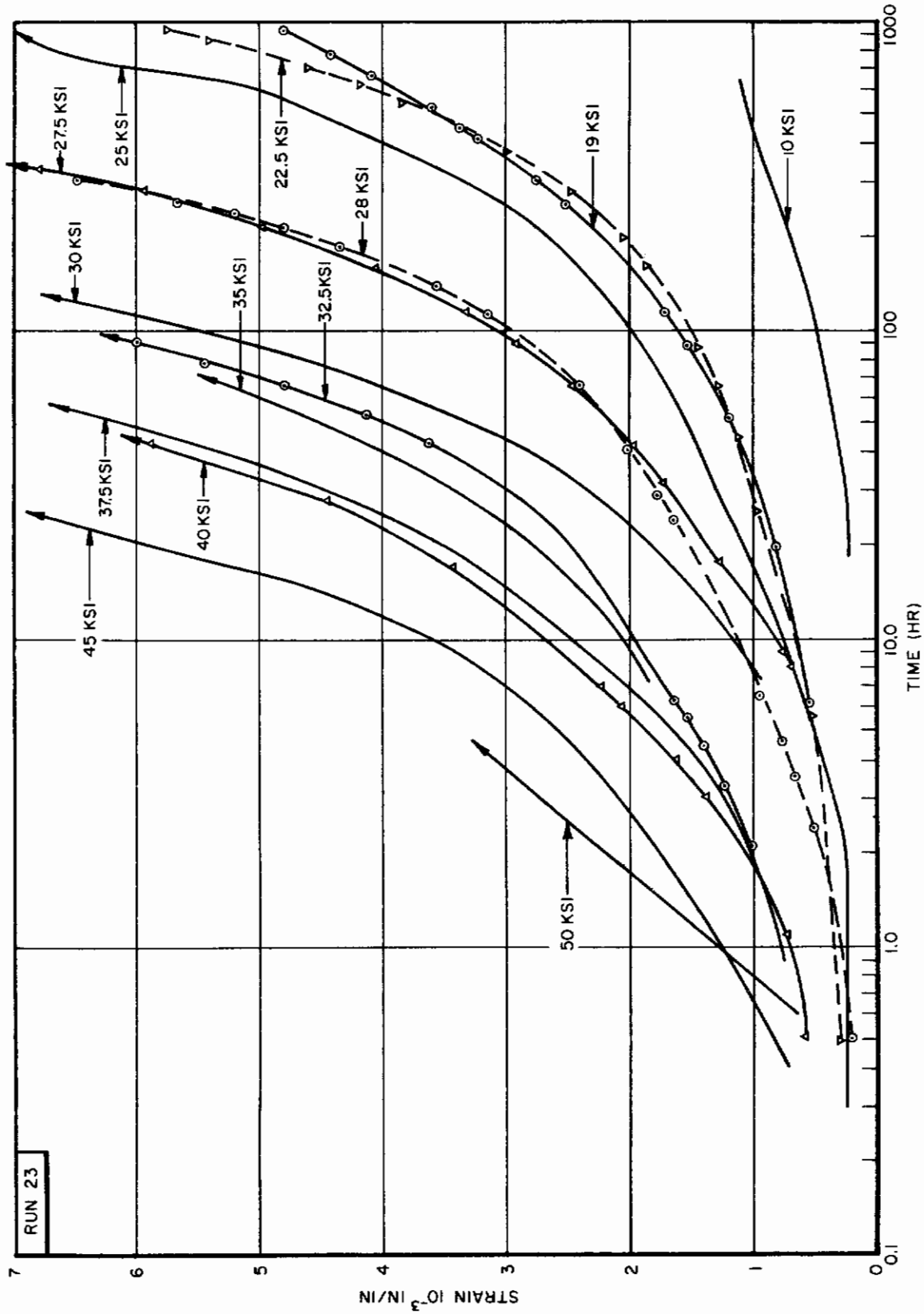


Figure 92. Creep Deformation Versus Log Time of TMCA-811 Sheet at 800°F (1260°R)

TABLE 145

TMCA-811 Creep Deformation Data at 1000° F (1460° R)

Stress (KSI)	Time to Reach Indicated Deformation (hours)			
	0.1%	0.3%	0.5%	1.0%
10.0	425	-	-	-
19.0	33	370	970	-
19.0	28.5	295	660	-
22.5	35	370	780	-
25.0	20.5	270	590	1310
27.0	13	97	220	580
28.0	8	100	225	490
30.0	7.6	43	88	210
32.5	1.9	32	73	170
35.0	1.3	23	65	200
37.5	1.95	16	35	86
40.0	1.8	15.5	33.5	76
45.0	0.82	7	16	40
50.0	0.8	3.6	7.6	19

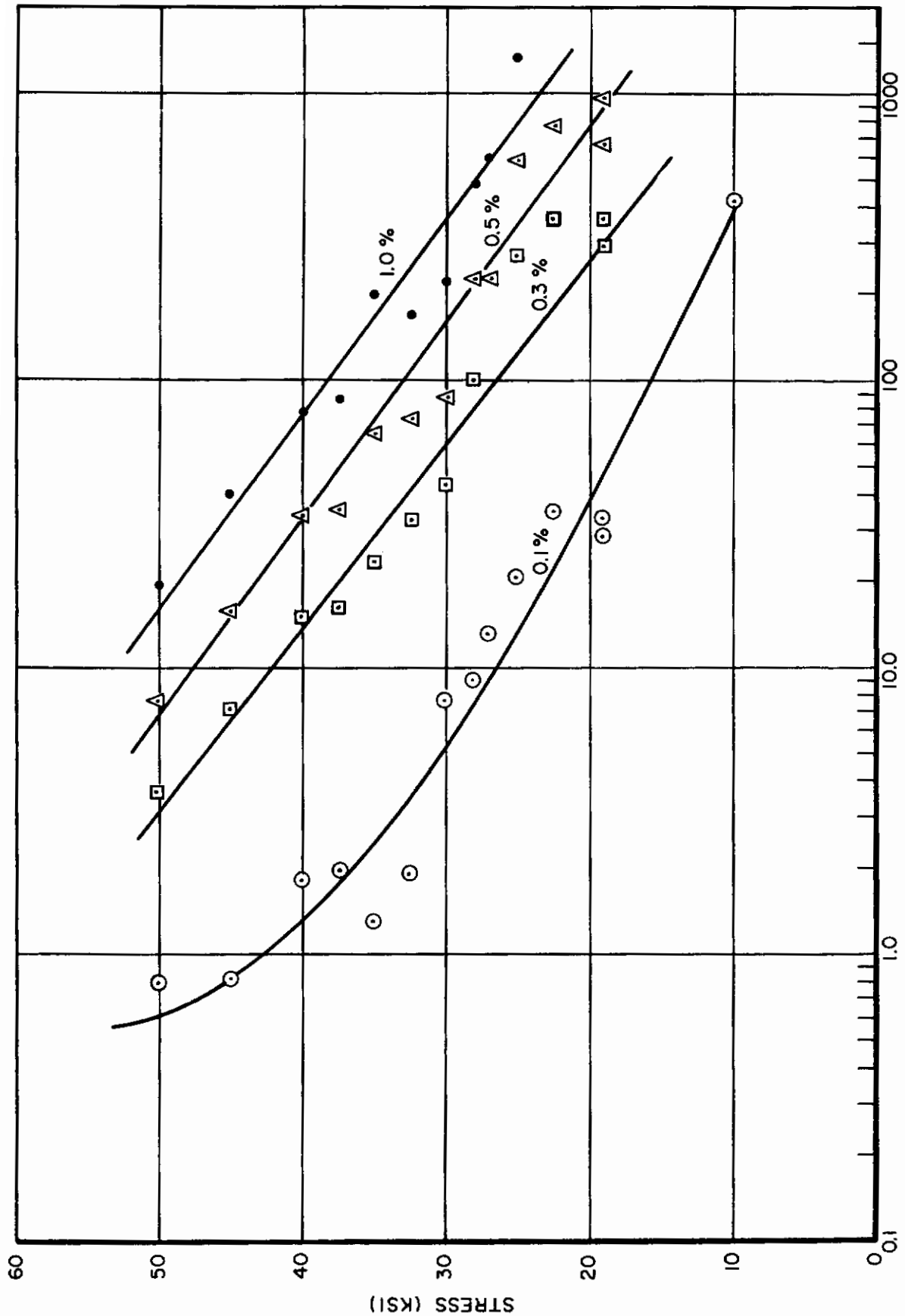


Figure 93. Creep Rupture Properties of TMCA-811 Sheet at 1000°F (1460°R)

TABLE 146

Deformation Versus Time (Raw Data) for TMCA-811 Sheet at 1100° F (1560° R)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	1.80000E-04	11.300
	2.00000E-04	39.100
	2.60000E-04	75.200
	4.30000E-04	172.700
	5.90000E-04	302.200
	9.10000E-04	400.000
	1.28000E-03	496.500
	1.63000E-03	592.100
	2.18000E-03	699.100
	2.42000E-03	748.600
	2.62000E-03	856.100
	3.05000E-03	977.300
4.0000	2.40000E-04	1.700
	4.40000E-04	19.900
	5.20000E-04	46.200
	6.00000E-04	69.000
	6.80000E-04	91.100
	7.40000E-04	139.100
	8.60000E-04	163.400
	9.10000E-04	186.900
	1.01000E-03	211.100
	1.06000E-03	259.000
	1.21000E-03	306.800
	1.38000E-03	378.300
	1.67000E-03	509.900
	1.94000E-03	591.700
	2.00000E-03	651.400
	2.32000E-03	820.300
	2.68000E-03	940.600
	3.08000E-03	1098.100
4.4000	6.60000E-04	67.100
	7.10000E-04	89.100
	6.70000E-04	99.000
	7.20000E-04	113.300

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.90000E-04	124.200
4.4000	1.02000E-03	137.000
	1.08000E-03	148.000
	9.90000E-04	161.800
	1.04000E-03	174.500
	1.04000E-03	185.400
	1.17000E-03	197.000
	1.26000E-03	209.300
	1.28000E-03	215.900
	1.44000E-03	234.900
	1.42000E-03	257.300
	1.43000E-03	267.100
	1.49000E-03	281.200
	1.67000E-03	293.800
	1.64000E-03	306.300
	1.64000E-03	329.000
	1.88000E-03	353.300
	2.06000E-03	377.200
	2.00000E-03	402.500
	1.99000E-03	426.300
	2.29000E-03	459.500
	2.31000E-03	473.300
	2.58000E-03	521.400
	2.72000E-03	546.700
	2.78000E-03	571.200
	2.73000E-03	593.700
	3.04000E-03	651.000
	3.05000E-03	665.300
	3.19000E-03	703.400
	3.26000E-03	713.300
	3.31000E-03	738.100
	3.40000E-03	760.300
	3.59000E-03	794.700
	3.63000E-03	821.800
	3.79000E-03	845.900
	3.86000E-03	869.800
	3.98000E-03	880.900
	4.03000E-03	905.800
	4.03000E-03	927.900

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.31000E-03	962.800
	4.45000E-03	986.900
	4.56000E-03	1012.600
	4.70000E-03	1096.400
	4.86000E-03	1132.800
	5.14000E-03	1180.200
	2.70000E-04	4.900
	3.30000E-04	5.700
	2.50000E-04	7.800
	3.70000E-04	16.900
	4.90000E-04	29.800
	4.80000E-04	41.100
5.0000	2.60000E-04	5.700
	3.20000E-04	9.300
	3.90000E-04	19.000
	4.80000E-04	32.100
	6.80000E-04	43.000
	8.50000E-04	58.400
	9.40000E-04	69.200
	1.38000E-03	150.200
	1.80000E-03	236.500
5.0000	2.15000E-03	281.800
	2.66000E-03	366.000
	3.29000E-03	462.800
	3.42000E-03	510.500
	3.68000E-03	558.100
	4.09000E-03	603.200
	4.30000E-03	631.000
	4.63000E-03	644.000
	4.67000E-03	679.800
	4.79000E-03	701.900
	4.99000E-03	737.600
	5.14000E-03	761.700
	5.37000E-03	835.400

RUN 23

TABLE 146 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.0000	6.00000E-04	10.400
	7.70000E-04	19.100
	8.10000E-04	30.000
	1.25000E-03	44.700
	1.39000E-03	54.300
	1.49000E-03	68.200
	1.62000E-03	75.200
	1.76000E-03	94.100
	1.99000E-03	120.100
	2.04000E-03	126.800
	2.17000E-03	139.900
	2.31000E-03	151.800
	2.46000E-03	173.700
	2.66000E-03	187.700
	2.68000E-03	197.400
	3.08000E-03	235.900
	3.71000E-03	285.000
	4.08000E-03	332.000
	4.48000E-03	380.700
	5.11000E-03	452.100
	5.80000E-03	548.800
	6.47000E-03	620.800
	7.14000E-03	691.700
	8.02000E-03	787.900
	8.66000E-03	870.300
	9.52000E-03	957.600
	1.04000E-02	1100.400
	1.11900E-02	1157.800
7.0000	5.90000E-04	9.400
	6.50000E-04	11.300
	7.70000E-04	29.400
	1.03000E-03	44.200
	1.17000E-03	68.200
	1.42000E-03	93.100
	1.82000E-03	127.500
	2.31000E-03	173.500
	2.68000E-03	199.000
	2.85000E-03	237.200

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	3.19000E-03	261.500
	3.55000E-03	308.900
	3.78000E-03	320.800
	4.05000E-03	369.600
	4.55000E-03	405.200
	4.90000E-03	464.600
	5.21000E-03	510.900
	5.53000E-03	549.600
	6.15000E-03	620.700
	6.58000E-03	655.300
	7.04000E-03	729.200
	7.70000E-03	788.900
	8.42000E-03	861.200
	9.05000E-03	956.900
	9.41000E-03	1004.600
	9.62000E-03	1028.700
	9.95000E-03	1065.600
	1.02900E-02	1101.600
	8.70000E-04	29.000
	1.34000E-03	67.300
	1.60000E-03	91.400
	1.92000E-03	125.900
	2.24000E-03	150.800
	2.53000E-03	174.100
	2.72000E-03	199.800
	3.04000E-03	235.300
	3.34000E-03	258.400
	3.92000E-03	294.400
	4.31000E-03	354.400
	5.21000E-03	426.700
	6.09000E-03	510.900
	7.01000E-03	596.700
	7.97000E-03	677.200
	8.47000E-03	738.100
	9.22000E-03	796.500
	9.95000E-03	868.700
	1.08000E-02	965.700

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.0000	1.70000E-04	0.400
	3.30000E-04	3.600
	3.90000E-04	5.100
	4.60000E-04	7.300
	6.00000E-04	20.600
	8.60000E-04	43.200
	1.28000E-03	78.600
	1.37000E-03	92.400
	1.65000E-03	116.700
	2.08000E-03	152.200
	2.35000E-03	187.000
	2.88000E-03	234.400
	3.23000E-03	284.200
	3.69000E-03	330.400
	4.39000E-03	388.500
	4.71000E-03	425.900
	5.44000E-03	510.600
	6.20000E-03	594.600
	6.73000E-03	654.000
	7.62000E-03	747.300
	8.40000E-03	819.500
	9.27000E-03	914.400
	9.85000E-03	988.800
	1.07000E-02	1099.800
	1.03000E-03	9.400
	7.60000E-04	18.800
	1.08000E-03	30.600
	1.31000E-03	43.400
	1.56000E-03	53.600
	1.65000E-03	66.900
	2.05000E-03	80.500
	1.90000E-03	91.900
	1.99000E-03	105.400
	2.20000E-03	117.000
	2.29000E-03	141.500
	2.90000E-03	165.000
	3.08000E-03	177.400
	3.18000E-03	188.300
	3.44000E-03	210.300

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.0000	3.57000E-03	222.600
	3.88000E-03	247.800
	4.05000E-03	273.400
	4.24000E-03	284.600
	4.30000E-03	307.900
	5.10000E-03	331.500
	5.77000E-03	392.700
	5.84000E-03	415.700
	6.31000E-03	440.000
	6.33000E-03	451.200
	6.57000E-03	476.400
	6.76000E-03	497.500
	7.26000E-03	533.200
	7.47000E-03	557.300
	7.90000E-03	583.800
	8.00000E-03	607.600
	8.07000E-03	619.400
	8.19000E-03	647.800
	8.65000E-03	667.200
	9.20000E-03	700.600
8.0000	9.40000E-03	726.300
	9.81000E-03	749.600
	1.03000E-02	787.500
	1.03900E-02	812.300
	1.07000E-02	847.100
9.0000	4.30000E-04	2.100
	6.60000E-04	3.600
	7.00000E-04	4.800
	6.90000E-04	5.900
	7.40000E-04	7.000
	8.30000E-04	8.200
	1.23000E-03	18.700
	1.50000E-03	29.500
	1.91000E-03	41.900
	2.06000E-03	55.100
	2.70000E-03	91.800
	2.99000E-03	115.500

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.37000E-03	127.300
	3.58000E-03	139.000
	3.96000E-03	151.900
	4.16000E-03	163.100
	4.78000E-03	185.400
	5.18000E-03	211.900
	6.47000E-03	260.200
	7.01000E-03	286.100
	7.70000E-03	319.300
	8.55000E-03	355.500
	9.73000E-03	403.900
	1.12100E-02	473.900
10.0000	3.30000E-04	1.500
	6.50000E-04	5.500
	8.00000E-04	7.800
	1.41000E-03	19.600
	1.77000E-03	29.000
	2.28000E-03	43.400
	2.49000E-03	53.900
	2.91000E-03	67.100
	3.47000E-03	74.000
	4.18000E-03	93.500
	4.25000E-03	115.200
	4.44000E-03	126.000
	4.84000E-03	140.200
	5.11000E-03	151.000
	5.51000E-03	164.300
	5.60000E-03	173.000
	6.12000E-03	187.600
	6.18000E-03	196.800
	6.70000E-03	211.100
	6.80000E-03	222.000
	7.28000E-03	234.800
	7.44000E-03	241.500
	7.92000E-03	261.100
	8.40000E-03	283.200
	9.05000E-03	307.100

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	9.60000E-03	330.900
	1.04000E-02	364.800
12.5000	5.50000E-04	8.100
	1.09000E-03	22.200
	1.25000E-03	30.000
	1.61000E-03	44.300
	1.76000E-03	56.700
	2.36000E-03	79.700
	3.13000E-03	103.500
	3.36000E-03	113.000
	4.04000E-03	137.700
	4.63000E-03	161.100
	5.86000E-03	197.400
	6.13000E-03	214.400
	6.36000E-03	226.400
	6.72000E-03	235.300
	7.18000E-03	245.100
	7.37000E-03	260.400
	7.59000E-03	270.400
	7.94000E-03	283.200
	8.49000E-03	309.000
	9.10000E-03	331.400
	9.65000E-03	342.300
	1.01000E-02	366.400
	1.02900E-02	380.500
	1.06400E-02	388.400
	1.09400E-02	404.900
14.0000	3.20000E-04	0.400
	6.50000E-04	1.700
	8.60000E-04	2.700
	9.40000E-04	3.800
	1.16000E-03	7.400
	1.47000E-03	16.300
	2.18000E-03	28.000
	2.54000E-03	40.300
	3.56000E-03	54.700

TABLE 146 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.0000	3.74000E-03	64.200
	4.17000E-03	76.200
	4.56000E-03	91.000
	5.93000E-03	118.400
	6.46000E-03	136.200
	6.85000E-03	148.300
	7.56000E-03	173.600
	8.45000E-03	197.000
	9.40000E-03	220.800
	1.00400E-02	242.900
	1.06000E-02	258.100
	1.15800E-02	288.700
16.0000	5.20000E-04	1.600
	6.30000E-04	2.600
	8.70000E-04	3.700
	9.50000E-04	4.800
	1.05000E-03	5.500
	1.24000E-03	7.000
	1.26000E-03	8.000
	1.33000E-03	8.800
	1.37000E-03	10.200
	2.09000E-03	17.500
	2.26000E-03	27.900
	3.95000E-03	41.100
	4.23000E-03	48.000
	5.09000E-03	67.600
	6.11000E-03	89.200
	6.64000E-03	100.100
	7.91000E-03	113.800
	8.49000E-03	124.800
	9.47000E-03	138.300
	9.81000E-03	147.000
	1.11100E-02	161.600
20.0000	4.60000E-04	1.500
	7.00000E-04	2.500
	9.60000E-04	3.600
	1.09000E-03	4.400

RUN 23

TABLE 146 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.51000E-03	8.600
	2.12000E-03	17.500
	2.89000E-03	28.800
	3.76000E-03	41.900
	4.49000E-03	54.700
	5.27000E-03	66.100
	5.88000E-03	78.600
	6.64000E-03	91.100
	8.01000E-03	115.900
	9.32000E-03	138.900
	9.65000E-03	153.000
	1.13000E-02	174.100
	1.27400E-02	199.000
25.0000	4.50000E-04	0.600
	7.10000E-04	1.400
	1.09000E-03	2.500
25.0000	1.42000E-03	3.800
	1.68000E-03	4.400
	1.99000E-03	4.700
	2.17000E-03	7.100
	3.93000E-03	17.800
	5.81000E-03	28.700
	7.32000E-03	42.800
	9.71000E-03	54.400
	1.13100E-02	66.100
	1.53500E-02	90.000
30.0000	6.70000E-04	0.400
	1.17000E-03	1.100
	2.26000E-03	2.400
	2.49000E-03	3.100
	2.89000E-03	4.100
	3.89000E-03	5.100
	4.87000E-03	6.100
	5.32000E-03	7.500
	5.94000E-03	9.000
	1.06000E-02	17.300
	1.82000E-02	30.200

TABLE 147

Deformation Versus Time (Fitted Data) for TMCA-811 Sheet at 1100° F (1560° R)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	1.76370E-04	11.300
	2.32850E-04	39.100
	2.31570E-04	75.200
	3.46870E-04	172.700
	6.72940E-04	302.200
	9.82420E-04	400.000
	1.31623E-03	496.500
	1.66395E-03	592.100
	2.06555E-03	699.100
	2.25427E-03	748.600
	2.66818E-03	856.100
	3.13877E-03	977.300
4.0000	2.31430E-04	1.700
	4.55040E-04	19.900
	5.42690E-04	46.200
	6.02840E-04	69.000
	6.58650E-04	91.100
	7.78590E-04	139.100
	8.39370E-04	163.400
	8.98230E-04	186.900
	9.58870E-04	211.100
	1.07872E-03	259.000
	1.19781E-03	306.800
	1.37445E-03	378.300
	1.69366E-03	509.900
	1.88784E-03	591.700
	2.02749E-03	651.400
	2.41335E-03	820.300
	2.68029E-03	940.600
	3.02059E-03	1098.100
4.4000	5.84780E-04	67.100
	6.90010E-04	89.100
	7.36770E-04	99.000
	8.03680E-04	113.300
	8.54190E-04	124.200

RUN 23

TABLE 147 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.4000	9.13000E-04	137.000
	9.63110E-04	148.000
	1.02542E-03	161.800
	1.08224E-03	174.500
	1.13063E-03	185.400
	1.18174E-03	197.000
	1.23554E-03	209.300
	1.26424E-03	215.900
	1.34623E-03	234.900
	1.44176E-03	257.300
	1.48319E-03	267.100
	1.54244E-03	281.200
	1.59504E-03	293.800
	1.64693E-03	306.300
	1.74041E-03	329.000
	1.83955E-03	353.300
	1.93621E-03	377.200
	2.03775E-03	402.500
	2.13263E-03	426.300
	2.26416E-03	459.500
	2.31861E-03	473.300
	2.50763E-03	521.400
	2.60676E-03	546.700
	2.70268E-03	571.200
	2.79076E-03	593.700
	3.01544E-03	651.000
	3.07166E-03	665.300
	3.22182E-03	703.400
	3.26094E-03	713.300
	3.35915E-03	738.100
	3.44729E-03	760.300
	3.58436E-03	794.700
	3.69272E-03	821.800
	3.78931E-03	845.900
	3.88527E-03	869.800
	3.92988E-03	880.900
	4.03000E-03	905.800
	4.11885E-03	927.900
	4.25895E-03	962.800
	4.35536E-03	986.900

RUN 23

TABLE 147 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.45768E-03	1012.600
	4.78511E-03	1096.400
	4.92264E-03	1132.800
	5.09528E-03	1180.200
5.0000	2.17000E-04	5.700
	3.21600E-04	9.300
	4.62500E-04	19.000
	5.70880E-04	32.100
	6.43390E-04	43.000
	7.38600E-04	58.400
	8.04010E-04	69.200
	1.30413E-03	150.200
	1.85378E-03	236.500
	2.14352E-03	281.800
	2.67880E-03	366.000
	3.28494E-03	462.800
	3.57924E-03	510.500
	3.86987E-03	558.100
	4.14240E-03	603.200
5.0000	4.30901E-03	631.000
	4.38657E-03	644.000
	4.59897E-03	679.800
	4.72923E-03	701.900
	4.93830E-03	737.600
	5.07850E-03	761.700
	5.50266E-03	835.400
6.0000	7.20460E-04	10.400
	8.27480E-04	19.100
	9.59800E-04	30.000
	1.13519E-03	44.700
	1.24790E-03	54.300
	1.40859E-03	68.200
	1.48844E-03	75.200
	1.70052E-03	94.100
	1.98434E-03	120.100
	2.05607E-03	126.800
	2.19471E-03	139.900

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.31888E-03	151.800
	2.54323E-03	173.700
	2.68396E-03	187.700
	2.78030E-03	197.400
	3.15406E-03	235.900
	3.61320E-03	285.000
	4.03786E-03	332.000
	4.46621E-03	380.700
	5.07991E-03	452.100
	5.89878E-03	548.800
	6.50895E-03	620.800
	7.11539E-03	691.700
	7.94990E-03	787.900
	8.67230E-03	870.300
	9.43486E-03	957.600
	1.06233E-02	1100.400
	1.10553E-02	1157.800
7.0000	5.70630E-04	9.400
	5.92960E-04	11.300
	8.02960E-04	29.400
	9.71130E-04	44.200
	1.23741E-03	68.200
	1.50572E-03	93.100
	1.86413E-03	127.500
	2.32352E-03	173.500
	2.56951E-03	199.000
	2.92800E-03	237.200
	3.15053E-03	261.500
	3.57427E-03	308.900
	3.67881E-03	320.800
	4.10135E-03	369.600
	4.40464E-03	405.200
	4.90478E-03	464.600
	5.29198E-03	510.900
	5.61529E-03	549.600
	6.21134E-03	620.700
	6.50319E-03	655.300
	7.13142E-03	729.200

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	7.64324E-03	788.900
	8.26507E-03	861.200
	9.07961E-03	956.900
	9.47479E-03	1004.600
	9.66986E-03	1028.700
	9.96068E-03	1065.600
	1.02330E-02	1101.600
	8.95640E-04	29.000
	1.31477E-03	67.300
	1.57745E-03	91.400
	1.95213E-03	125.900
	2.22160E-03	150.800
	2.47307E-03	174.100
	2.74976E-03	199.800
	3.13092E-03	235.300
	3.37842E-03	258.400
	3.76355E-03	294.400
	4.40483E-03	354.400
	5.17900E-03	426.700
	6.08651E-03	510.900
	7.02044E-03	596.700
	7.90247E-03	677.200
	8.56716E-03	738.100
	9.19344E-03	796.500
	9.93331E-03	868.700
	1.08054E-02	965.700
8.0000	1.75380E-04	0.400
	3.34790E-04	3.600
	3.77960E-04	5.100
	4.32260E-04	7.300
	6.54910E-04	20.600
	9.14460E-04	43.200
	1.27031E-03	78.600
	1.40601E-03	92.400
	1.64457E-03	116.700
	1.99372E-03	152.200
	[illegible]	187.000

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.0000	2.80428E-03	234.400
	3.29421E-03	284.200
	3.74651E-03	330.400
	4.31126E-03	388.500
	4.67205E-03	425.900
	5.48048E-03	510.600
	6.26987E-03	594.600
	6.82057E-03	654.000
	7.67317E-03	747.300
	8.32281E-03	819.500
	9.16371E-03	914.400
	9.81306E-03	988.800
	1.07664E-02	1099.800
	1.12417E-03	30.600
	1.32820E-03	43.400
	1.47092E-03	53.600
	1.64497E-03	66.900
	1.81597E-03	80.500
	1.95659E-03	91.900
	2.12147E-03	105.400
	2.26240E-03	117.000
	2.55915E-03	141.500
	2.84347E-03	165.000
	2.99349E-03	177.400
	3.12536E-03	188.300
	3.39148E-03	210.300
	3.54021E-03	222.600
	3.84466E-03	247.800
	4.15344E-03	273.400
	4.28831E-03	284.600
	4.56839E-03	307.900
	4.85130E-03	331.500
	5.58062E-03	392.700
	5.85291E-03	415.700
	6.13944E-03	440.000
	6.27110E-03	451.200
	6.56637E-03	476.400
	6.81256E-03	497.500
	7.22690E-03	533.200

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.50504E-03	557.300
	7.80939E-03	583.800
	8.08142E-03	607.600
	8.21583E-03	619.400
	8.53806E-03	647.800
	8.75717E-03	667.200
	9.13246E-03	700.600
	9.41959E-03	726.300
	9.67868E-03	749.600
	1.00977E-02	787.500
	1.03702E-02	812.300
	1.07504E-02	847.100
9.0000	3.62590E-04	2.100
	5.91800E-04	3.600
9.0000	7.11430E-04	4.800
	7.95510E-04	5.900
	8.63960E-04	7.000
	9.26390E-04	8.200
	1.25214E-03	18.700
	1.46912E-03	29.500
	1.69571E-03	41.900
	1.93840E-03	55.100
	2.65642E-03	91.800
	3.15011E-03	115.500
	3.40240E-03	127.300
	3.65595E-03	139.000
	3.93882E-03	151.900
	4.18677E-03	163.100
	4.68569E-03	185.400
	5.28522E-03	211.900
	6.38884E-03	260.200
	6.98346E-03	286.100
	7.74632E-03	319.300
	8.57724E-03	355.500
	9.68432E-03	403.900

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	3.51860E-04	1.500
	5.78780E-04	5.500
	7.75140E-04	7.800
	1.47564E-03	19.600
	1.85677E-03	29.000
	2.33311E-03	43.400
	2.64270E-03	53.900
	3.00981E-03	67.100
	3.19573E-03	74.000
	3.70818E-03	93.500
	4.26528E-03	115.200
	4.53947E-03	126.000
	4.89782E-03	140.200
	5.16903E-03	151.000
	5.50169E-03	164.300
	5.71858E-03	173.000
	6.08140E-03	187.600
	6.30932E-03	196.800
	6.66253E-03	211.100
	6.93094E-03	222.000
	7.24522E-03	234.800
	7.40935E-03	241.500
	7.88794E-03	261.100
	8.42488E-03	283.200
	9.00229E-03	307.100
	9.57393E-03	330.900
	1.03823E-02	364.800
12.5000	5.95470E-04	8.100
	9.95500E-04	22.200
	1.18954E-03	30.000
	1.55096E-03	44.300
	1.87314E-03	56.700
	2.48624E-03	79.700
	3.13195E-03	103.500
	3.39106E-03	113.000
	4.06524E-03	137.700
	4.70205E-03	161.100
	5.68196E-03	197.400

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.5000	6.13662E-03	214.400
	6.45573E-03	226.400
	6.69141E-03	235.300
	6.94992E-03	245.100
	7.35135E-03	260.400
	7.61230E-03	270.400
	7.94467E-03	283.200
	8.60894E-03	309.000
	9.17958E-03	331.400
	9.45524E-03	342.300
	1.00601E-02	366.400
	1.04110E-02	380.500
	1.06067E-02	388.400
	1.10133E-02	404.900
14.0000	3.27770E-04	0.400
	6.74820E-04	1.700
	8.03670E-04	2.700
	9.08550E-04	3.800
	1.15792E-03	7.400
	1.61927E-03	16.300
	2.15273E-03	28.000
	2.68487E-03	40.300
	3.28662E-03	54.700
	3.67389E-03	64.200
	4.15356E-03	76.200
	4.73206E-03	91.000
	5.76947E-03	118.400
	6.42269E-03	136.200
	6.85833E-03	148.300
	7.74910E-03	173.600
	8.55083E-03	197.000
	9.34649E-03	220.800
	1.00689E-02	242.900
	1.05573E-02	258.100
	1.15210E-02	288.700
16.0000	5.59340E-04	1.600
	6.28330E-04	2.600
	7.76280E-04	3.700

TABLE 147 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
16.0000	9.28530E-04	4.800
	1.02048E-03	5.500
	1.20140E-03	7.000
	1.31064E-03	8.000
	1.39236E-03	8.800
	1.52515E-03	10.200
	2.08648E-03	17.500
	2.72952E-03	27.900
	3.48514E-03	41.100
	3.87838E-03	48.000
	5.01724E-03	67.600
	6.31613E-03	89.200
	6.98675E-03	100.100
	7.84128E-03	113.800
	8.53518E-03	124.800
	9.39445E-03	138.300
	9.95188E-03	147.000
	1.08925E-02	161.600
20.0000	4.25700E-04	1.500
	7.30720E-04	2.500
	9.52180E-04	3.600
	1.07724E-03	4.400
	1.53527E-03	8.600
	2.19594E-03	17.500
	2.91324E-03	28.800
	3.70755E-03	41.900
	4.47002E-03	54.700
	5.14201E-03	66.100
	5.87215E-03	78.600
	6.59546E-03	91.100
	8.01028E-03	115.900
	9.29848E-03	138.900
	1.00770E-02	153.000
	1.12266E-02	174.100
	1.25601E-02	199.000

TABLE 147 (CONT)

RUN 23

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
25.0000	4.54380E-04	0.600
	6.92350E-04	1.400
	1.11128E-03	2.500
	1.52424E-03	3.800
	1.68804E-03	4.400
	1.76490E-03	4.700
	2.29346E-03	7.100
	3.99082E-03	17.800
	5.55857E-03	28.700
	7.66724E-03	42.800
	9.48117E-03	54.400
	1.13681E-02	66.100
	1.53454E-02	90.000
30.0000	6.83520E-04	0.400
	1.12337E-03	1.100
	2.12923E-03	2.400
	2.61796E-03	3.100
	3.26523E-03	4.100
	3.87204E-03	5.100
	4.45342E-03	6.100
	5.24236E-03	7.500
	6.07116E-03	9.000
	1.06613E-02	17.300
	1.81803E-02	30.200

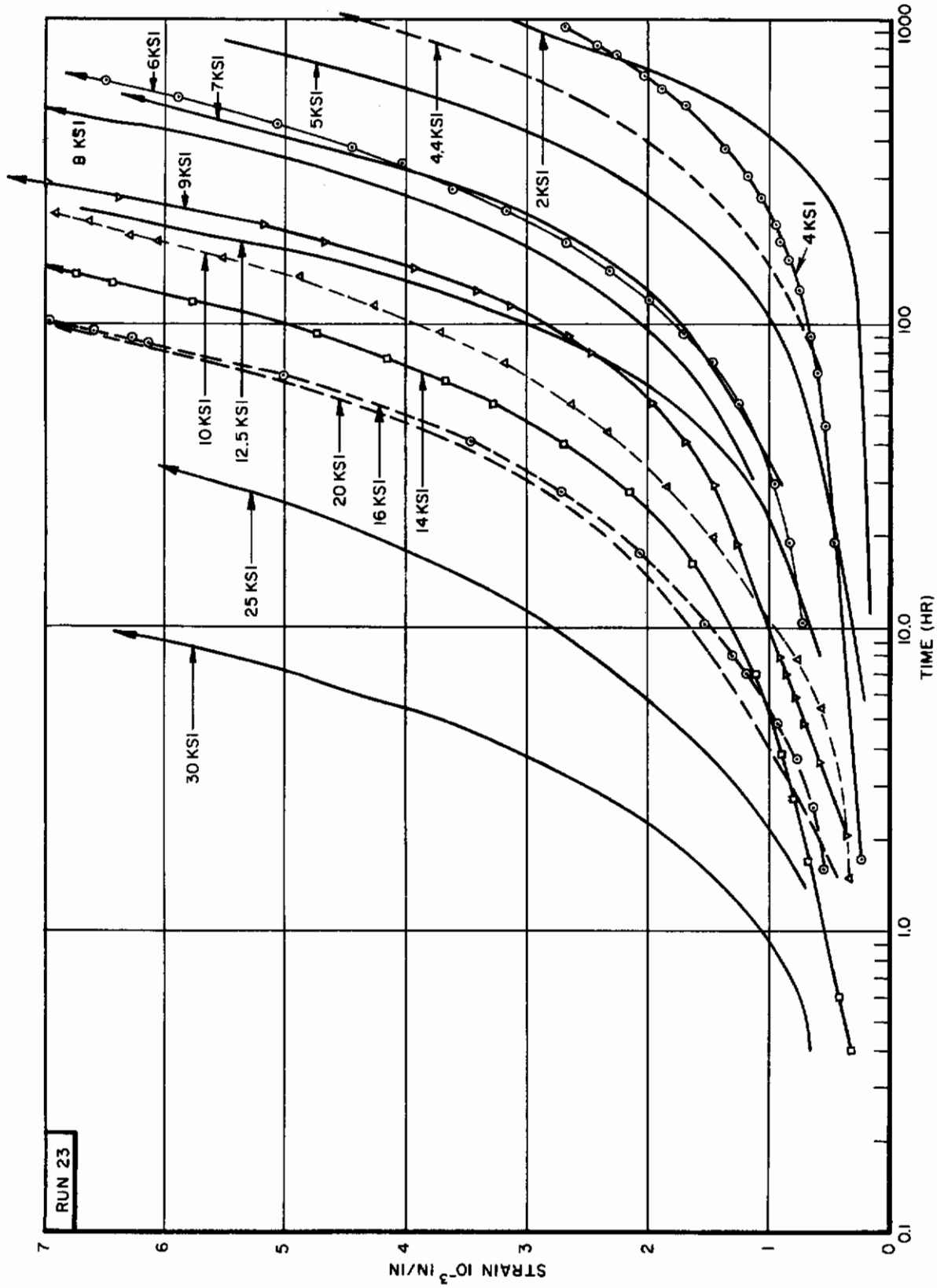


Figure 94. Creep Deformation Versus Log Time of TMCA-811 Sheet at 1100°F (1560°R)

TABLE 148

TMCA-811 Creep Deformation Data at 1100° F (1560° R)

Stress (KSI)	Time to Reach Indicated Deformation (hours)			
	0.1%	0.3%	0.5%	1.0%
2.0	390	980	-	-
4.0	225	1050	-	-
4.5	160	660	1140	-
5.0	83.8	420	870	-
6.0	39	217	440	1025
7.0	48	245	470	1100
7.0	38	230	410	895
8.0	56	245	450	1000
8.0	35	175	340	770
9.0	14.5	104	200	420
10.0	11.8	70.5	145	345
12.5	24	94	169	370
14.0	5.7	45	98	240
16.0	5.6	38	66	150
20.0	4.9	30	64	155
25.0	2.3	12.4	24.5	58
30.0	.74	3.7	7.1	16.4

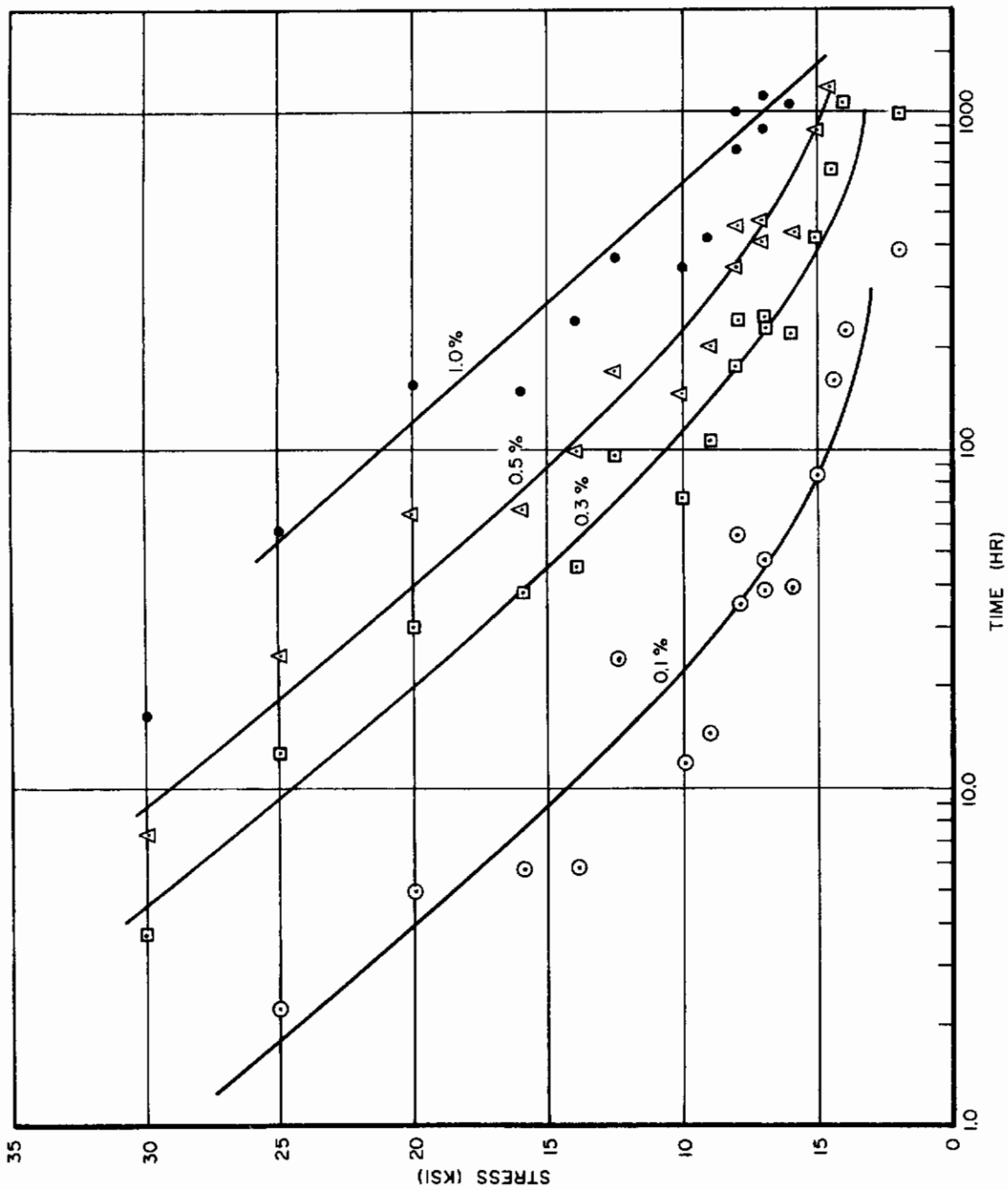


Figure 95. Creep Rupture Properties of TMCA-811 Sheet at 1100°F (1560°R)

TABLE 149

Minimum Creep Rate for TMCA-811

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1000° F (1460° R)	28.0	1.577×10^{-5}
	37.5	8.309×10^{-5}
	40.0	9.4×10^{-5}
	50	4.62×10^{-4}
1100° F (1560° R)	2.0	1.18×10^{-6}
	7.0	7.56×10^{-6}
	8.0	8.588×10^{-6}
	9.0	1.83×10^{-5}
	16.0	5.7×10^{-5}
	25.0	1.44×10^{-4}
	30.0	5.525×10^{-4}

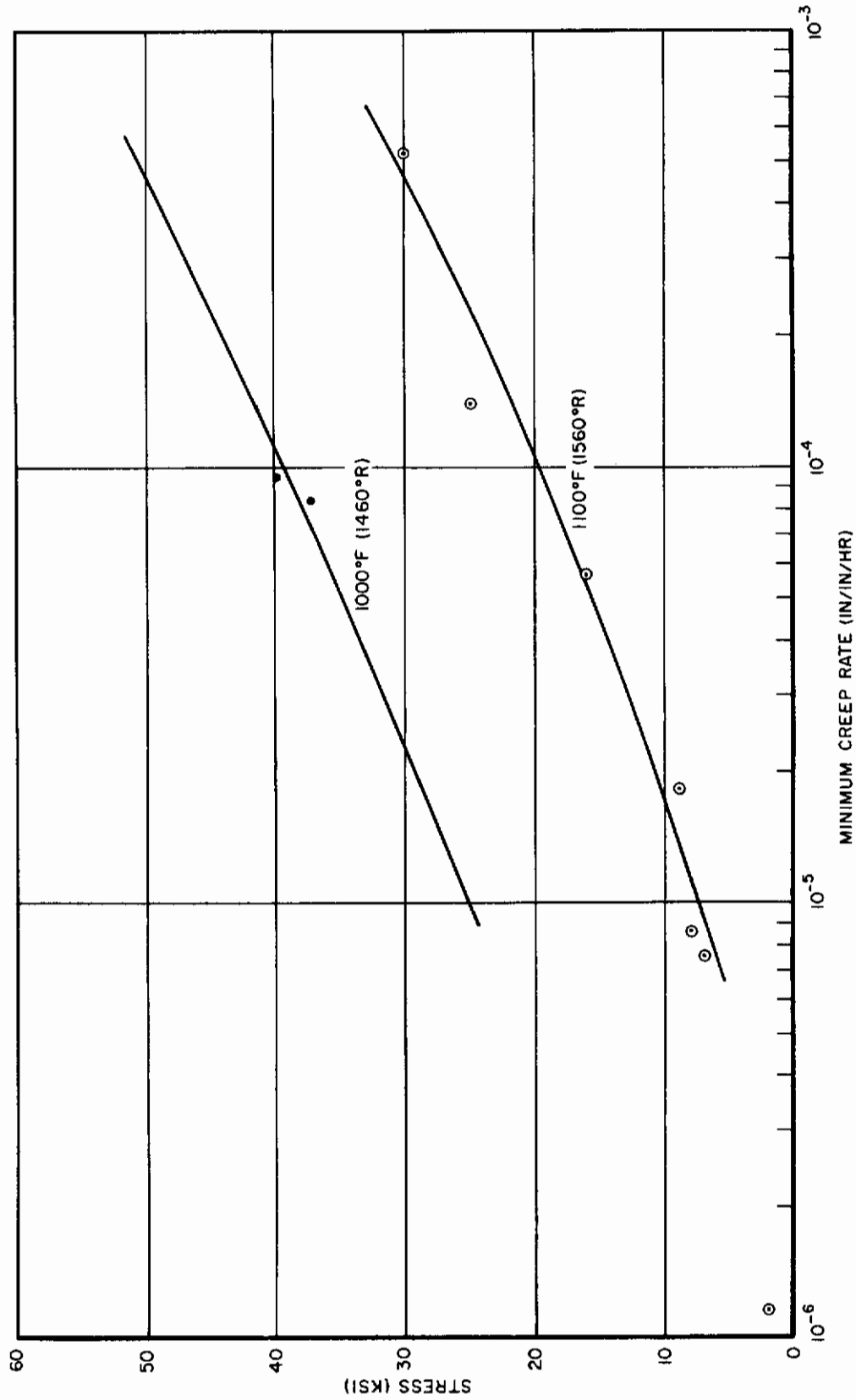


Figure 96. Minimum Creep Rate of TMCA-811 Sheet

CREEP DATA FOR

Ti-2.5Al-16V SHEET

TABLE 150

RUN 24

Deformation Versus Time for Ti-2.5-Al-16V Sheet at 700° F (1160° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	6.00000E-04	22.400
	1.21000E-03	67.900
	1.37000E-03	91.500
	1.50000E-03	139.500
	1.56000E-03	189.300
	1.71000E-03	236.200
	1.83000E-03	308.000
	1.87000E-03	331.800
	1.90000E-03	354.400
	2.02000E-03	379.500
	2.11000E-03	476.900
	2.30000E-03	572.000
	2.40000E-03	646.100
	2.57000E-03	739.900
	2.79000E-03	837.100
	2.96000E-03	935.500
	3.02000E-03	981.000
21.0000	1.10000E-04	0.700
	8.60000E-04	23.200
	1.57000E-03	68.700
	1.70000E-03	92.400
	1.87000E-03	140.400
	2.18000E-03	190.100
	2.47000E-03	237.000
	2.54000E-03	284.800
	2.60000E-03	332.400
	2.75000E-03	355.000
	2.82000E-03	380.300
	2.97000E-03	428.400
	3.00000E-03	452.600
	3.17000E-03	500.600
	3.36000E-03	572.700
	3.41000E-03	598.000
	3.52000E-03	642.200
	3.80000E-03	736.100
	3.92000E-03	832.500

TABLE 150 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.26000E-03	888.000
	4.52000E-03	978.600
	4.61000E-03	1003.100
	4.75000E-03	1050.600
	4.98000E-03	1099.500
	5.13000E-03	1150.600
35.0000	9.80000E-04	4.900
	2.06000E-03	21.600
	2.49000E-03	28.900
	2.94000E-03	45.800
	3.31000E-03	53.000
	3.56000E-03	69.400
35.0000	4.27000E-03	96.800
	4.59000E-03	121.200
	4.89000E-03	142.300
	5.01000E-03	165.400
	5.25000E-03	189.600
	5.75000E-03	237.600
	5.99000E-03	266.900
	6.13000E-03	309.800
	6.59000E-03	381.000
	6.97000E-03	439.900
	7.06000E-03	477.200
	7.43000E-03	549.000
	7.73000E-03	606.300
	7.81000E-03	645.500
	8.12000E-03	691.800
	8.39000E-03	739.500
	8.50000E-03	789.100
	8.83000E-03	834.300
	9.01000E-03	882.900
	9.36000E-03	943.700
	9.64000E-03	991.600
	9.82000E-03	1040.500
	1.02000E-02	1087.700

TABLE 150 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
41.0000	4.50000E-04	1.400
	7.80000E-04	3.700
	2.90000E-03	26.200
	3.42000E-03	51.300
	4.36000E-03	71.700
	5.04000E-03	95.400
	5.72000E-03	143.400
	6.13000E-03	168.000
	6.47000E-03	193.100
	6.93000E-03	240.000
	7.30000E-03	287.900
	7.50000E-03	311.800
	7.83000E-03	335.600
	8.00000E-03	358.200
	8.21000E-03	383.400
	8.41000E-03	408.000
	8.86000E-03	455.700
	9.31000E-03	503.700
	9.92000E-03	575.800
	1.02900E-02	624.300
	1.06100E-02	649.900
50.0000	6.10000E-04	1.900
	8.90000E-04	3.300
	2.57000E-03	18.500
	3.23000E-03	25.700
50.0000	4.48000E-03	42.700
	5.52000E-03	66.600
	6.43000E-03	93.800
	7.37000E-03	120.200
	7.84000E-03	138.500
	8.70000E-03	162.200
	8.98000E-03	168.500
	9.51000E-03	186.500
	1.04800E-02	212.000

TABLE 150 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
80.0000	4.70000E-04	0.100
	7.50000E-04	0.200
	1.15000E-03	0.500
	1.73000E-03	0.900
	2.37000E-03	1.600
	3.10000E-03	2.500
	4.02000E-03	3.800
	4.62000E-03	5.100
	5.01000E-03	6.700
	9.42000E-03	20.100
	1.02100E-02	22.700
	1.05500E-02	24.000
93.0000	5.50000E-04	0.100
	8.40000E-04	0.200
	1.30000E-03	0.400
	1.80000E-03	0.700
	2.36000E-03	1.000
	2.64000E-03	1.200
	2.87000E-03	1.400
	3.20000E-03	1.700
	3.50000E-03	2.000
	3.88000E-03	2.400
	4.65000E-03	3.200
	5.39000E-03	4.000
	6.00000E-03	4.900
	6.53000E-03	5.700
	7.58000E-03	7.100
	1.18000E-02	17.300
	1.25800E-02	19.400
100.0000	6.20000E-04	0.100
	1.21000E-03	0.200
	1.75000E-03	0.400
	2.62000E-03	0.700
	3.00000E-03	0.850
	3.68000E-03	1.100
	3.94000E-03	1.250
	4.31000E-03	1.400
	4.68000E-03	1.600

TABLE 150 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	5.08000E-03	1.850
	6.11000E-03	2.400
	7.31000E-03	3.350
	7.93000E-03	4.000
	8.32000E-03	4.600
	8.87000E-03	5.100
	9.46000E-03	5.900
	1.01700E-02	6.600
110.0000	8.90000E-04	0.100
	1.39000E-03	0.200
	1.90000E-03	0.300
	2.21000E-03	0.400
	2.63000E-03	0.500
	3.05000E-03	0.600
	3.24000E-03	0.700
	3.98000E-03	0.900
	4.39000E-03	1.100
	4.69000E-03	1.200
	5.39000E-03	1.500
	6.01000E-03	1.900
	6.65000E-03	2.000
	7.32000E-03	2.300
	7.65000E-03	2.500
	8.89000E-03	3.000
	9.80000E-03	3.400
	1.07700E-02	3.800
122.0000	1.19000E-03	0.050
	1.93000E-03	0.100
	2.46000E-03	0.150
	3.04000E-03	0.200
	3.80000E-03	0.300
	4.49000E-03	0.400
	5.13000E-03	0.500
	6.14000E-03	0.700
	7.29000E-03	0.900
	8.18000E-03	1.100
	9.09000E-03	1.300
	9.46000E-03	1.400
	9.83000E-03	1.500
	1.02000E-02	1.600
	1.05100E-02	1.700

TABLE 151

Deformation Versus Time for Ti-2.5-Al-16V Sheet at 700° F (1160° R) RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	5.99250E-04	22.400
	1.22486E-03	67.900
	1.34346E-03	91.500
	1.49532E-03	139.500
	1.60752E-03	189.300
	1.69870E-03	236.200
	1.82887E-03	308.000
	1.87106E-03	331.800
	1.91094E-03	354.400
	1.95514E-03	379.500
	2.12670E-03	476.900
	2.29517E-03	572.000
	2.42713E-03	646.100
	2.59481E-03	739.900
	2.76896E-03	837.100
	2.94530E-03	935.500
	3.02677E-03	981.000
21.0000	1.11280E-04	0.700
	8.31050E-04	23.200
	1.57133E-03	68.700
	1.74697E-03	92.400
	1.99176E-03	140.400
	2.18318E-03	190.100
	2.34132E-03	237.000
	2.49242E-03	284.800
	2.63792E-03	332.400
	2.70602E-03	355.000
	2.78179E-03	380.300
	2.92493E-03	428.400
	2.99668E-03	452.600
	3.13864E-03	500.600
	3.35144E-03	572.700
	3.42604E-03	598.000
	3.55630E-03	642.200
	3.83276E-03	736.100
	4.11605E-03	832.500
	4.27882E-03	888.000
	4.54386E-03	978.600
	4.61538E-03	1003.100
	4.75381E-03	1050.600
	4.89601E-03	1099.500
	5.04423E-03	1150.600

TABLE 151 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
35.0000	1.93893E-03	21.600
	2.42849E-03	28.900
	3.14916E-03	45.800
	3.36628E-03	53.000
	3.75707E-03	69.400
	4.23069E-03	96.800
35.0000	4.55335E-03	121.200
	4.78940E-03	142.300
	5.01787E-03	165.400
	5.23361E-03	189.600
	5.61378E-03	237.600
	5.82431E-03	266.900
	6.11223E-03	309.800
	6.55257E-03	381.000
	6.89200E-03	439.900
	7.09824E-03	477.200
	7.48023E-03	549.000
	7.77342E-03	606.300
	7.96899E-03	645.500
	8.19539E-03	691.800
	8.42394E-03	739.500
	8.65706E-03	789.100
	8.86583E-03	834.300
	9.08672E-03	882.900
	9.35827E-03	943.700
	9.56874E-03	991.600
	9.78067E-03	1040.500
	9.98259E-03	1087.700
41.0000	4.60180E-04	1.400
	7.64580E-04	3.700
	2.77372E-03	26.200
	3.75986E-03	51.300
	4.30796E-03	71.700
	4.81486E-03	95.400
	5.62341E-03	143.400
	5.97271E-03	168.000
	6.30018E-03	193.100
	6.85614E-03	240.000
	7.37077E-03	287.900
	7.61263E-03	311.800
	7.84543E-03	335.600
	8.06000E-03	358.200
	8.29265E-03	383.400
	8.51379E-03	408.000
	8.92796E-03	455.700
	9.32810E-03	503.700

TABLE 151 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.90329E-03	575.800
	1.02755E-02	624.300
	1.04678E-02	649.900
50.0000	5.63790E-04	1.900
	9.36020E-04	3.300
	2.68638E-03	18.500
	3.20662E-03	25.700
	4.21206E-03	42.700
50.0000	5.36115E-03	66.600
	6.47395E-03	93.800
	7.43432E-03	120.200
	8.05116E-03	138.500
	8.80418E-03	162.200
	8.99691E-03	168.500
	9.53260E-03	186.500
	1.02580E-02	212.000
80.0000	4.65460E-04	0.100
	7.66400E-04	0.200
	1.13522E-03	0.500
	1.68197E-03	0.900
	2.44849E-03	1.600
	3.16174E-03	2.500
	3.91676E-03	3.800
	4.51346E-03	5.100
	5.14214E-03	6.700
	9.40318E-03	20.100
	1.01872E-02	22.700
	1.05780E-02	24.000
93.0000	5.55130E-04	0.100
	8.17030E-04	0.200
	1.32018E-03	0.400
	1.86976E-03	0.700
	2.31662E-03	1.000
	2.58450E-03	1.200
	2.83584E-03	1.400
	3.18900E-03	1.700
	3.51942E-03	2.000
	3.93166E-03	2.400
	4.68053E-03	3.200
	5.35159E-03	4.000
	6.03485E-03	4.900
	6.59080E-03	5.700
	7.47054E-03	7.100
	1.18760E-02	17.300
	1.25265E-02	19.400

TABLE 151 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
100.0000	6.18490E-04	0.100
	1.22784E-03	0.200
	1.71527E-03	0.400
	2.59569E-03	0.700
	3.01499E-03	0.850
	3.65148E-03	1.100
	3.99708E-03	1.250
	4.31837E-03	1.400
	4.71356E-03	1.600
	5.16223E-03	1.850
100.0000	6.01352E-03	2.400
	7.19631E-03	3.350
	7.87608E-03	4.000
	8.44362E-03	4.600
	8.88428E-03	5.100
	9.54406E-03	5.900
	1.00871E-02	6.600
110.0000	8.88510E-04	0.100
	1.41185E-03	0.200
	1.83227E-03	0.300
	2.25907E-03	0.400
	2.65147E-03	0.500
	3.00499E-03	0.600
	3.32556E-03	0.700
	3.89629E-03	0.900
	4.40937E-03	1.100
	4.65348E-03	1.200
	5.36120E-03	1.500
	6.28597E-03	1.900
	6.51728E-03	2.000
	7.21458E-03	2.300
	7.68282E-03	2.500
	8.86439E-03	3.000
	9.81750E-03	3.400
	1.07733E-02	3.800

TABLE 151 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
122.0000	1.18873E-03	0.050
	1.92890E-03	0.100
	2.50469E-03	0.150
	2.98338E-03	0.200
	3.79111E-03	0.300
	4.48865E-03	0.400
	5.11937E-03	0.500
	6.24908E-03	0.700
	7.25672E-03	0.900
	8.17621E-03	1.100
	9.02710E-03	1.300
	9.43101E-03	1.400
	9.82226E-03	1.500
	1.02019E-02	1.600
	1.05708E-02	1.700

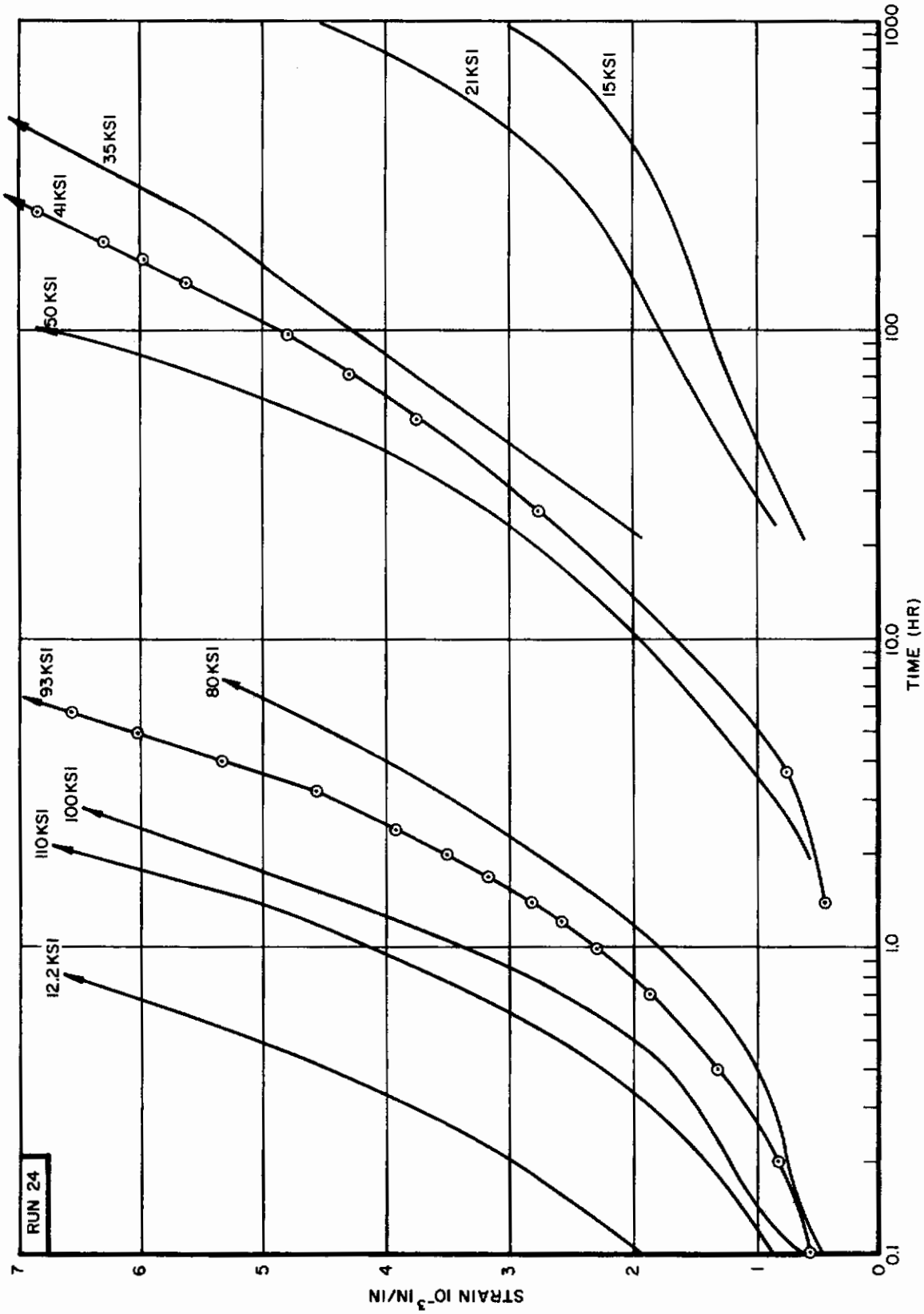


Figure 97. Creep Deformation Versus Log Time of Ti-2.5-Al-16V Sheet at 700°F (1160°R)

TABLE 152

Ti-2.5Al-16V Creep Deformation and Rupture Data at 700° F (1160° R)

Stress (KSI)	Time to Rupture (hours	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
15.0	-	-	0.16	-	980	-	-
21.0	-	-	0.19	-	465	1120	-
35.0	-	-	0.27	-	93	150	1060
41.0	-	-	0.34	-	26	94	590
50.0	-	-	0.42	-	22.5	54.5	200
80.0	-	-	0.67	-	2.2	6.6	22.2
93.0	1105.9	19.0	0.74	-	1.5	3.6	12.2
100.0	526.7	26.0	0.81	-	0.85	1.8	6.5
110.0	221.3	17.0	0.92	-	0.6	1.35	3.5
122.0	69.9	19.5	1.0	-	0.2	0.5	1.55
126.0	32.2	18.0		-	-	-	-

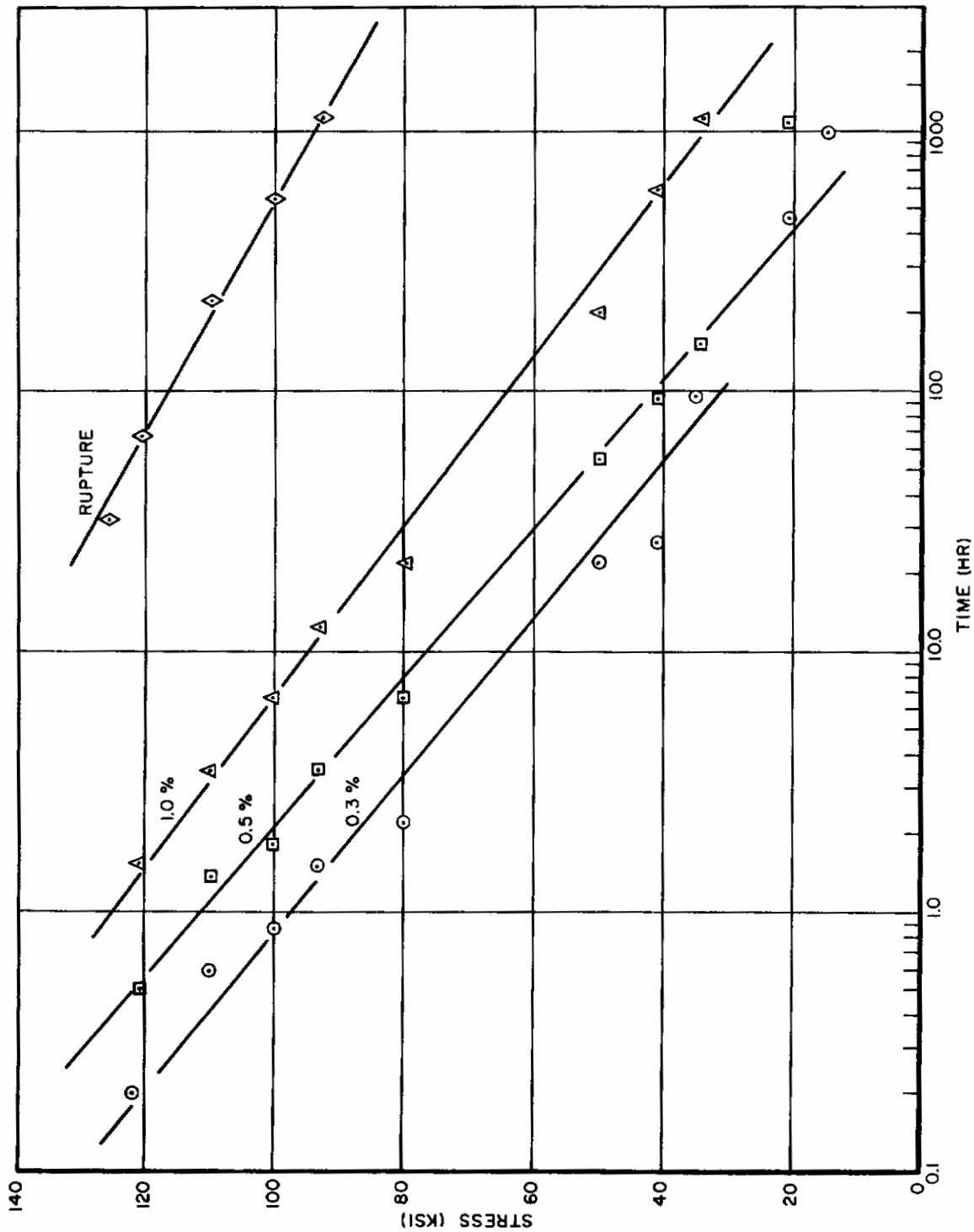


Figure 98. Creep Rupture Properties of Ti-2.5-Al-16V Sheet at 700°F (1160°R)

TABLE 153

Deformation Versus Time (Raw Data) for Ti-2.5-Al-16V Sheet at 800° F (1260° R)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	1.30000E-04	1.400
	6.10000E-04	25.900
	1.03000E-03	66.600
	1.34000E-03	115.100
	1.52000E-03	140.600
	1.63000E-03	188.500
5.0000	1.78000E-03	283.000
	1.86000E-03	330.700
	2.01000E-03	403.100
	2.19000E-03	474.400
	2.23000E-03	523.300
	2.30000E-03	571.700
	2.41000E-03	618.900
	2.50000E-03	666.800
	2.54000E-03	739.000
	2.74000E-03	834.800
	2.83000E-03	889.000
	2.90000E-03	906.700
	2.99000E-03	977.700
	3.11000E-03	1029.800
8.0000	6.10000E-04	18.800
	1.13000E-03	44.400
	1.52000E-03	67.400
	1.95000E-03	92.400
	2.39000E-03	138.200
	2.68000E-03	186.800
	2.81000E-03	234.600
	3.04000E-03	306.900
	3.20000E-03	378.200
	3.40000E-03	427.000
	3.47000E-03	475.500
	3.60000E-03	522.700
	3.82000E-03	570.600
	4.01000E-03	642.700
	4.15000E-03	690.400
	4.29000E-03	738.700
	4.56000E-03	810.300
	4.77000E-03	881.600
	4.81000E-03	933.600
	4.98000E-03	978.600
	5.09000E-03	1002.200

TABLE 153 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	3.30000E-04	4.100
	8.50000E-04	21.400
	1.41000E-03	45.500
	1.91000E-03	69.700
	2.15000E-03	95.000
	2.66000E-03	141.800
	2.86000E-03	189.700
	3.00000E-03	213.700
	3.08000E-03	237.300
	3.14000E-03	259.900
	3.25000E-03	285.400
	3.43000E-03	309.600
	3.64000E-03	357.500
10.0000	3.76000E-03	405.700
	3.85000E-03	436.900
	3.99000E-03	477.600
	4.33000E-03	551.600
	4.39000E-03	599.600
	4.85000E-03	694.000
	4.96000E-03	741.800
	5.05000E-03	768.300
	5.13000E-03	813.700
14.5000	1.05000E-03	3.100
	2.20000E-03	20.600
	2.35000E-03	26.700
	2.99000E-03	45.500
	4.11000E-03	91.700
	4.55000E-03	115.700
	4.97000E-03	141.200
	5.08000E-03	147.200
	5.57000E-03	188.100
	6.19000E-03	260.000
	6.37000E-03	287.400
	6.54000E-03	356.000
	6.82000E-03	380.400
	7.09000E-03	428.600
	7.47000E-03	475.900
	7.68000E-03	523.700
	8.09000E-03	596.100
	8.27000E-03	643.800
	8.44000E-03	691.900
	8.75000E-03	764.000
	8.87000E-03	813.400
	9.43000E-03	886.900
	9.68000E-03	931.600
	9.83000E-03	979.400
	1.00400E-02	1003.500

TABLE 153 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	9.70000E-04	0.800
	1.48000E-03	2.100
	2.04000E-03	3.800
	2.27000E-03	5.000
	4.06000E-03	21.100
	4.27000E-03	24.000
	4.55000E-03	26.500
	4.66000E-03	27.900
	5.67000E-03	49.000
	6.62000E-03	73.200
	7.13000E-03	94.100
	7.67000E-03	117.800
	8.22000E-03	142.200
	8.83000E-03	166.200
20.0000	9.29000E-03	190.400
	9.89000E-03	215.700
	1.05000E-02	242.400
40.0000	6.20000E-04	0.200
	1.06000E-03	0.400
	1.57000E-03	0.600
	2.07000E-03	0.900
	2.56000E-03	1.300
	2.88000E-03	1.600
	3.15000E-03	1.900
	3.34000E-03	2.200
	3.79000E-03	2.800
	4.01000E-03	3.200
	4.50000E-03	4.000
	5.03000E-03	4.800
	1.11200E-02	17.400
	1.31700E-02	21.400
44.0000	6.20000E-04	0.100
	1.08000E-03	0.200
	1.99000E-03	0.600
	2.38000E-03	0.800
	2.85000E-03	1.100
	3.25000E-03	1.300
	3.48000E-03	1.600
	3.73000E-03	1.800
	4.03000E-03	2.100
	4.23000E-03	2.300
	4.41000E-03	2.500
	4.80000E-03	3.000
	5.31000E-03	3.700

TABLE 153 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.65000E-03	4.400
	6.19000E-03	5.300
	1.42200E-02	19.300
50.0000	7.90000E-04	0.100
	1.27000E-03	0.200
	1.61000E-03	0.300
	2.21000E-03	0.500
	2.73000E-03	0.700
	3.05000E-03	0.800
	3.73000E-03	1.100
	4.03000E-03	1.300
	4.45000E-03	1.500
	4.84000E-03	1.800
	5.03000E-03	2.000
	5.72000E-03	2.500
	6.13000E-03	3.000
	6.70000E-03	3.400
50.0000	7.45000E-03	4.100
	8.22000E-03	5.000
	8.99000E-03	6.000
	9.86000E-03	7.100
	1.70500E-02	19.700
60.0000	1.15000E-03	0.100
	1.83000E-03	0.200
	2.31000E-03	0.300
	2.71000E-03	0.400
	3.14000E-03	0.500
	3.76000E-03	0.600
	3.91000E-03	0.700
	4.41000E-03	0.800
	4.58000E-03	0.900
	4.83000E-03	1.000
	5.37000E-03	1.100
	5.65000E-03	1.200
	6.15000E-03	1.400
	6.55000E-03	1.650
	7.33000E-03	2.000
	7.62000E-03	2.200
	8.48000E-03	2.600
	9.17000E-03	2.900
	9.57000E-03	3.200
	9.76000E-03	3.300
	9.88000E-03	3.400
	1.01800E-02	3.500

RUN 24

TABLE 153 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	9.50000E-04	0.050
	1.58000E-03	0.100
	2.22000E-03	0.150
	2.55000E-03	0.200
	3.28000E-03	0.300
	4.07000E-03	0.400
	4.63000E-03	0.500
	5.05000E-03	0.600
	6.37000E-03	0.900
	7.73000E-03	1.200
	8.65000E-03	1.400
	9.47000E-03	1.600
	1.16300E-02	2.100
80.0000	8.00000E-04	0.017
	1.46000E-03	0.033
	2.05000E-03	0.050
	2.51000E-03	0.067
	3.10000E-03	0.100
	4.11000E-03	0.200
	4.87000E-03	0.300
80.0000	5.77000E-03	0.400
	6.97000E-03	0.600
	8.17000E-03	0.800
	9.01000E-03	0.900
	9.71000E-03	1.000
	1.04500E-02	1.100

TABLE 154

Deformation Versus Time (Fitted Data) for Ti-2.5-Al-16V Sheet at 800° F (1260° R)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	1.30710E-04	1.400
	5.91740E-04	25.900
	1.08036E-03	66.600
	1.34643E-03	115.100
	1.44145E-03	140.600
	1.58286E-03	188.500
	1.79724E-03	283.000
5.0000	1.89081E-03	330.700
	2.02421E-03	403.100
	2.14989E-03	474.400
	2.23421E-03	523.300
	2.31670E-03	571.700
	2.39649E-03	618.900
	2.47698E-03	666.800
	2.59767E-03	739.000
	2.75701E-03	834.800
	2.84685E-03	889.000
	2.87616E-03	906.700
	2.99352E-03	977.700
	3.07949E-03	1029.800
8.0000	1.06336E-03	44.400
	1.63234E-03	67.400
	1.98233E-03	92.400
	2.35397E-03	138.200
	2.60138E-03	186.800
	2.78752E-03	234.600
	3.02578E-03	306.900
	3.24072E-03	378.200
	3.38360E-03	427.000
	3.52439E-03	475.500
	3.66111E-03	522.700
	3.80003E-03	570.600
	4.00996E-03	642.700
	4.14953E-03	690.400
	4.29141E-03	738.700
	4.50272E-03	810.300
	4.71418E-03	881.600
	4.86894E-03	933.600
	5.00317E-03	978.600
	5.07367E-03	1002.200
10.0000	7.99720E-04	21.400
	1.52645E-03	45.500
	1.90565E-03	69.700

RUN 24

TABLE 154 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	2.17769E-03	95.000
	2.54222E-03	141.800
	2.83009E-03	189.700
	2.95690E-03	213.700
	3.07392E-03	237.300
	3.18035E-03	259.900
	3.29509E-03	285.400
	3.39968E-03	309.600
	3.59681E-03	357.500
	3.78479E-03	405.700
	3.90205E-03	436.900
	4.05066E-03	477.600
	4.31042E-03	551.600
	4.47293E-03	599.600
	4.78137E-03	694.000
	4.93270E-03	741.800
	5.01537E-03	768.300
	5.15509E-03	813.700
14.5000	9.53560E-04	3.100
	2.29369E-03	20.600
	2.54551E-03	26.700
	3.13686E-03	45.500
	4.09596E-03	91.700
	4.46822E-03	115.700
	4.81155E-03	141.200
	4.88628E-03	147.200
	5.34890E-03	188.100
	6.02230E-03	260.000
	6.24634E-03	287.400
	6.75151E-03	356.000
	6.91563E-03	380.400
	7.22054E-03	428.600
	7.49856E-03	475.900
	7.76164E-03	523.700
	8.13159E-03	596.100
	8.35943E-03	643.800
	8.57821E-03	691.900
	8.88818E-03	764.000
	9.08960E-03	813.400
	9.37493E-03	886.900
	9.54092E-03	931.600
	9.71273E-03	979.400
	9.79728E-03	1003.500

TABLE 154 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	9.19360E-04	0.800
	1.53763E-03	2.100
	2.04576E-03	3.800
	2.31449E-03	5.000
	4.11920E-03	21.100
	4.32005E-03	24.000
	4.48024E-03	26.500
	4.56551E-03	27.900
	5.60412E-03	49.000
	6.49218E-03	73.200
	7.12965E-03	94.100
	7.76469E-03	117.800
	8.35170E-03	142.200
	8.88102E-03	166.200
	9.37773E-03	190.400
	9.86534E-03	215.700
	1.03513E-02	242.400
40.0000	6.12450E-04	0.200
	1.09711E-03	0.400
	1.54377E-03	0.600
	2.05322E-03	0.900
	2.55994E-03	1.300
	2.86655E-03	1.600
	3.13393E-03	1.900
	3.37382E-03	2.200
	3.79828E-03	2.800
	4.05347E-03	3.200
	4.52233E-03	4.000
	4.95639E-03	4.800
	1.11421E-02	17.400
	1.31566E-02	21.400
44.0000	6.20310E-04	0.100
	1.07960E-03	0.200
	1.99179E-03	0.600
	2.37899E-03	0.800
	2.87572E-03	1.100
	3.16039E-03	1.300
	3.53356E-03	1.600
	3.75386E-03	1.800
	4.05129E-03	2.100
	4.23186E-03	2.300
	4.40095E-03	2.500
	4.78469E-03	3.000
	5.25738E-03	3.700
	5.68420E-03	4.400
	6.19571E-03	5.300
	1.42196E-02	19.300

RUN 24

TABLE 154 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	8.00100E-04	0.100
	1.22739E-03	0.200
	1.61531E-03	0.300
	2.26666E-03	0.500
	2.80003E-03	0.700
	3.03587E-03	0.800
	3.65749E-03	1.100
	4.01930E-03	1.300
	4.35054E-03	1.500
	4.80343E-03	1.800
	5.08220E-03	2.000
	5.71826E-03	2.500
	6.28930E-03	3.000
	6.71142E-03	3.400
	7.39406E-03	4.100
	8.19351E-03	5.000
	9.00680E-03	6.000
	9.83416E-03	7.100
	1.70541E-02	19.700
60.0000	1.14910E-03	0.100
	1.84047E-03	0.200
	2.27933E-03	0.300
	2.73953E-03	0.400
	3.18753E-03	0.500
	3.60727E-03	0.600
	3.99524E-03	0.700
	4.35294E-03	0.800
	4.68359E-03	0.900
	4.99076E-03	1.000
	5.27778E-03	1.100
	5.54769E-03	1.200
	6.04614E-03	1.400
	6.61180E-03	1.650
	7.33501E-03	2.000
	7.72584E-03	2.200
	8.48078E-03	2.600
	9.03528E-03	2.900
	9.58704E-03	3.200
	9.77112E-03	3.300
	9.95547E-03	3.400
	1.01402E-02	3.500

RUN 24

TABEL 154 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
70.0000	9.60600E-04	0.050
	1.55084E-03	0.100
	2.15696E-03	0.150
	2.64233E-03	0.200
	3.39437E-03	0.300
	3.99851E-03	0.400
	4.53271E-03	0.500
	5.03007E-03	0.600
	6.42414E-03	0.900
	7.75736E-03	1.200
	8.62966E-03	1.400
	9.49213E-03	1.600
	1.16103E-02	2.100
80.0000	8.08820E-04	0.017
	1.42746E-03	0.033
	2.05812E-03	0.050
	2.51462E-03	0.067
	3.12485E-03	0.100
	4.14602E-03	0.200
	4.89224E-03	0.300
	5.59466E-03	0.400
	6.98019E-03	0.600
	8.35110E-03	0.800
	9.02765E-03	0.900
80.0000	9.69671E-03	1.000
	1.03575E-02	1.100

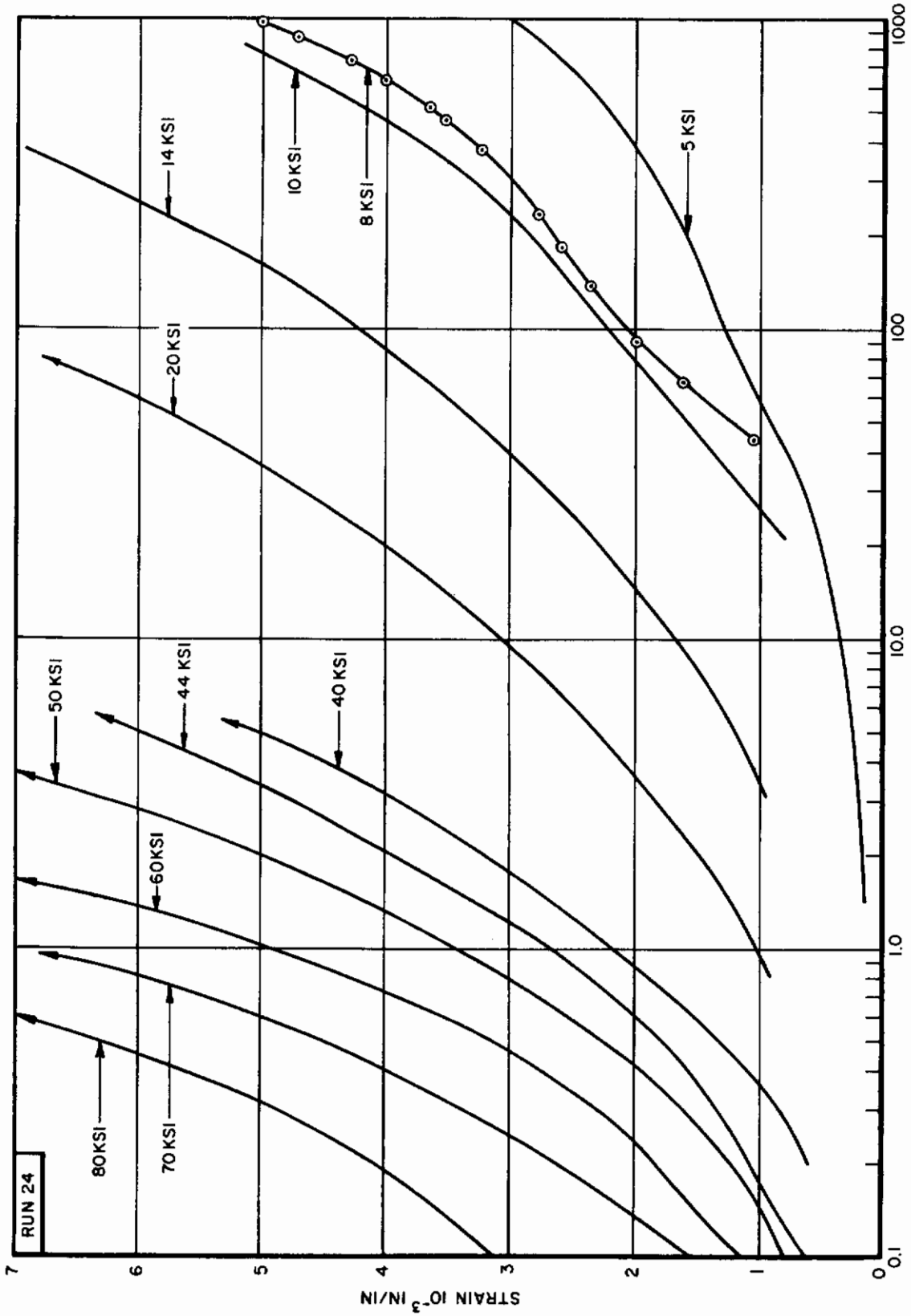


Figure 99. Creep Deformation Versus Log Time of Ti-2.5-Al-16V Sheet at 800°F (1260°R)

TABLE 155

Ti-2.5Al-16V Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
5.0	-	-	0.04	-	990	-	-
8.0	-	-	0.06	-	300	980	-
10.0	-	-	0.08	-	220	770	-
14.0	-	-	0.14	-	45.5	140	995
20.0	-	-	0.20	-	10.5	32	223
40.0	2134.0	41	-	-	-	-	-
40.0	-	-	0.36	-	1.7	4.8	15.1
44.0	1342.5	38	0.41	-	1.2	3.3	12.0
50.0	561.1	49.0	-	-	-	-	-
50.0	-	-	0.50	-	0.8	2.0	7.4
60.0	228.4	30.5	0.58	-	0.45	0.95	3.4
70.0	70.2	29.5	0.67	-	0.25	0.6	1.7
80.0	25.7	27	0.79	-	0.1	0.3	1.0

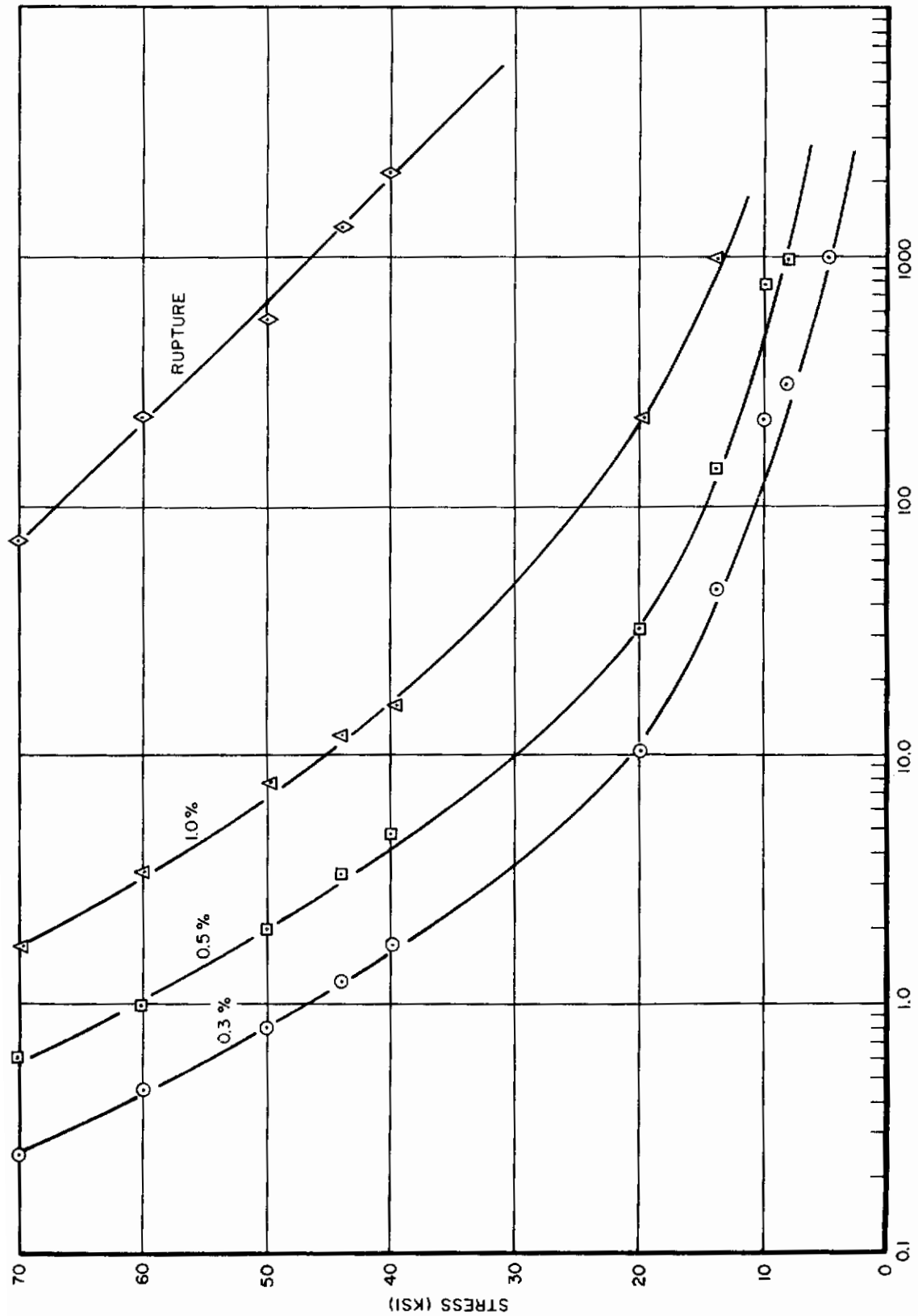


Figure 100. Creep Rupture Properties of Ti-2.5-Al-16V Sheet at 800°F (1260°R)

TABLE 156

RUN 24

Deformation Versus Time (Raw Data) for Ti-2.5-Al-16V Sheet at 900° F (1360° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.9000	1.10000E-04	2.000
	3.80000E-04	18.700
	1.04000E-03	66.700
	1.34000E-03	93.900
	1.45000E-03	118.300
	1.62000E-03	138.800
	1.85000E-03	234.700
	1.97000E-03	306.800
	2.04000E-03	377.900
	2.28000E-03	429.900
	2.31000E-03	474.600
	2.39000E-03	546.400
	2.59000E-03	603.500
	2.61000E-03	642.600
	2.72000E-03	685.800
	2.76000E-03	730.200
	2.79000E-03	773.800
	2.90000E-03	822.500
	2.93000E-03	867.100
	3.03000E-03	912.900
	3.05000E-03	919.400
2.0000	2.90000E-04	3.000
	8.20000E-04	20.600
	1.21000E-03	45.500
	1.61000E-03	91.500
	2.29000E-03	187.700
	2.66000E-03	260.000
	2.90000E-03	331.300
	3.07000E-03	380.400
	3.23000E-03	428.500
	3.40000E-03	475.800
	3.44000E-03	523.700
	3.67000E-03	595.900
	3.82000E-03	643.700
	4.07000E-03	691.900
	4.29000E-03	763.800
	4.54000E-03	834.900
	4.88000E-03	886.900
	4.91000E-03	931.700
	5.01000E-03	955.100
	5.10000E-03	979.100
4.0000	1.70000E-04	1.000

TABLE 156 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	3.60000E-04	3.400
	1.42000E-03	19.900
	2.21000E-03	44.800
	3.11000E-03	92.400
	3.38000E-03	115.900
	3.66000E-03	140.000
	4.19000E-03	188.100
	4.43000E-03	217.300
	4.66000E-03	260.200
	5.15000E-03	331.400
	5.50000E-03	383.300
	5.73000E-03	427.700
	6.35000E-03	499.500
	6.68000E-03	556.800
	6.95000E-03	596.000
	7.28000E-03	643.700
	7.67000E-03	690.100
	7.86000E-03	735.500
	8.21000E-03	784.300
	8.49000E-03	829.000
	9.00000E-03	902.700
	9.48000E-03	950.200
	9.73000E-03	1000.900
	1.00200E-02	1051.600
8.0000	2.90000E-04	2.100
	5.90000E-04	3.000
	8.60000E-04	4.300
	1.19000E-03	5.700
	1.81000E-03	20.500
	3.10000E-03	27.200
	3.84000E-03	43.200
	4.69000E-03	66.600
	5.97000E-03	92.800
	6.98000E-03	116.600
	7.86000E-03	140.800
	9.07000E-03	165.800
	1.00800E-02	189.000
10.0000	4.80000E-04	0.400
	7.70000E-04	1.200
	1.23000E-03	2.300
	1.69000E-03	3.800
	2.01000E-03	4.900
	3.57000E-03	19.200
	3.90000E-03	26.100

TABLE 156 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	5.19000E-03	44.000
	5.34000E-03	46.900
	5.30000E-03	50.100
	6.73000E-03	68.900
	8.19000E-03	92.200
	9.51000E-03	115.000
	1.13200E-02	139.000
15.0000	1.39000E-03	1.100
	2.33000E-03	2.600
	2.90000E-03	4.600
	3.07000E-03	5.200
	3.41000E-03	7.000
	5.51000E-03	21.200
	6.70000E-03	28.800
	9.16000E-03	45.600
	9.69000E-03	50.200
	1.02300E-02	52.800
	1.33100E-02	73.900
20.0000	1.15000E-03	0.200
	1.34000E-03	0.300
	1.63000E-03	0.400
	1.70000E-03	0.600
	1.86000E-03	0.700
	2.04000E-03	0.800
	2.47000E-03	1.100
	2.80000E-03	1.300
	3.18000E-03	1.600
	3.38000E-03	1.800
	3.81000E-03	2.300
	3.95000E-03	2.500
	4.10000E-03	2.700
	4.41000E-03	3.100
	4.59000E-03	3.600
	4.91000E-03	4.200
	5.30000E-03	5.000
	1.21800E-02	18.900
	1.24900E-02	19.600
30.0000	8.80000E-04	0.050
	1.40000E-03	0.100
	2.24000E-03	0.200
	2.86000E-03	0.300
	3.42000E-03	0.400
	3.92000E-03	0.500

TABLE 156 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	4.28000E-03	0.600
	4.71000E-03	0.700
	5.03000E-03	0.800
	5.48000E-03	0.900
	5.79000E-03	1.000
	6.06000E-03	1.100
	6.42000E-03	1.200
	6.68000E-03	1.300
	7.39000E-03	1.500
	7.93000E-03	1.700
	8.81000E-03	1.900
	9.40000E-03	2.100
	1.00300E-02	2.300
	1.07100E-02	2.500
40.0000	5.50000E-04	0.008
	9.60000E-04	0.017
	1.52000E-03	0.033
	1.93000E-03	0.050
	2.51000E-03	0.083
	2.85000E-03	0.100
	3.14000E-03	0.117
	3.53000E-03	0.133
	3.67000E-03	0.150
	4.01000E-03	0.167
	4.46000E-03	0.200
	4.85000E-03	0.233
	5.06000E-03	0.250
	5.65000E-03	0.300
	6.26000E-03	0.350
	6.78000E-03	0.400
	7.25000E-03	0.450
	7.75000E-03	0.500
	8.71000E-03	0.600
	9.14000E-03	0.650
	9.71000E-03	0.700
	10.00000E-03	0.750
	1.04600E-02	0.800

TABLE 156 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	7.60000E-04	0.008
	1.22000E-03	0.017
	1.98000E-03	0.033
	2.68000E-03	0.050
	3.00000E-03	0.058
	3.84000E-03	0.083
	4.38000E-03	0.100
	4.82000E-03	0.117
	5.38000E-03	0.133
	5.93000E-03	0.150
	6.40000E-03	0.167
	7.08000E-03	0.200
	7.89000E-03	0.233
	8.72000E-03	0.267
	9.38000E-03	0.300
	9.68000E-03	0.317
	1.00500E-02	0.333
	1.04300E-02	0.350

TABLE 157

Deformation Versus Time (Fitted Data) for Ti-2.5-Al-16V Sheet at 900° F (1360° R)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.9000	1.10910E-04	2.000
	3.65980E-04	18.700
	1.11729E-03	66.700
	1.31743E-03	93.900
	1.44883E-03	118.300
	1.53840E-03	138.800
	1.83525E-03	234.700
	1.99886E-03	306.800
	2.13974E-03	377.900
	2.23565E-03	429.900
	2.31504E-03	474.600
	2.43858E-03	546.400
	2.53443E-03	603.500
	2.59921E-03	642.600
	2.67016E-03	685.800
	2.74254E-03	730.200
	2.81319E-03	773.800
	2.89169E-03	822.500
	2.96328E-03	867.100
	3.03654E-03	912.900
	3.04691E-03	919.400
2.0000	2.62740E-04	3.000
	8.73930E-04	20.600
	1.22567E-03	45.500
	1.61717E-03	91.500
	2.17895E-03	187.700
	2.52249E-03	260.000
	2.82887E-03	331.300
	3.02691E-03	380.400
	3.21293E-03	428.500
	3.38938E-03	475.800
	3.56244E-03	523.700
	3.81407E-03	595.900
	3.97534E-03	643.700
	4.13415E-03	691.900
	4.36466E-03	763.800
	4.58588E-03	834.900
	4.74386E-03	886.900
	4.87757E-03	931.700
	4.94659E-03	955.100
	5.01681E-03	979.100

TABLE 157 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	1.36463E-03	19.900
	2.31005E-03	44.800
	3.12866E-03	92.400
	3.39878E-03	115.900
4.0000	3.63913E-03	140.000
	4.06013E-03	188.100
	4.29453E-03	217.300
	4.62303E-03	260.200
	5.14466E-03	331.400
	5.51438E-03	383.300
	5.82629E-03	427.700
	6.32464E-03	499.500
	6.71823E-03	556.800
	6.98572E-03	596.000
	7.30947E-03	643.700
	7.62270E-03	690.100
	7.92761E-03	735.500
	8.25371E-03	784.300
	8.55095E-03	829.000
	9.03803E-03	902.700
	9.35002E-03	950.200
	9.68137E-03	1000.900
	1.00110E-02	1051.600
8.0000	2.71130E-04	2.100
	5.58510E-04	3.000
	9.09810E-04	4.300
	1.21137E-03	5.700
	3.06333E-03	27.200
	3.80595E-03	43.200
	4.79939E-03	66.600
	5.90397E-03	92.800
	6.91958E-03	116.600
	7.96353E-03	140.800
	9.05027E-03	165.800
	1.00631E-02	189.000
10.0000	4.87060E-04	0.400
	7.38530E-04	1.200
	1.24606E-03	2.300
	1.72883E-03	3.800
	1.98774E-03	4.900
	3.51671E-03	19.200
	3.97846E-03	26.100
	5.09331E-03	44.000

TABLE 157 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.27284E-03	46.900
	5.47150E-03	50.100
	6.65444E-03	68.900
	8.15651E-03	92.200
	9.65320E-03	115.000
	1.12448E-02	139.000
15.0000	1.39365E-03	1.100
	2.31379E-03	2.600
15.0000	2.92376E-03	4.600
	3.05989E-03	5.200
	3.41057E-03	7.000
	5.54001E-03	21.200
	6.64514E-03	28.800
	9.12284E-03	45.600
	9.80433E-03	50.200
	1.01894E-02	52.800
	1.32966E-02	73.900
20.0000	1.15776E-03	0.200
	1.62571E-03	0.600
	1.85096E-03	0.700
	2.05680E-03	0.800
	2.56846E-03	1.100
	2.84131E-03	1.300
	3.18141E-03	1.600
	3.37521E-03	1.800
	3.78539E-03	2.300
	3.92900E-03	2.500
	4.06448E-03	2.700
	4.31706E-03	3.100
	4.60899E-03	3.600
	4.93771E-03	4.200
	5.35522E-03	5.000
	1.21642E-02	18.900
	1.25003E-02	19.600
30.0000	8.78710E-04	0.050
	1.40936E-03	0.100
	2.20757E-03	0.200
	2.88349E-03	0.300
	3.43502E-03	0.400
	3.90317E-03	0.500
	4.31827E-03	0.600
	4.69965E-03	0.700
	5.05953E-03	0.800
	5.40575E-03	0.900

TABLE 157 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.74341E-03	1.000
	6.07584E-03	1.100
	6.40531E-03	1.200
	6.73331E-03	1.300
	7.38858E-03	1.500
	8.04622E-03	1.700
	8.70800E-03	1.900
	9.37434E-03	2.100
	1.00450E-02	2.300
	1.07194E-02	2.500
40.0000	5.57100E-04	0.008
40.0000	9.43790E-04	0.017
	1.50591E-03	0.033
	1.92458E-03	0.050
	2.59920E-03	0.083
	2.89497E-03	0.100
	3.17349E-03	0.117
	3.43855E-03	0.133
	3.69261E-03	0.150
	3.93739E-03	0.167
	4.40372E-03	0.200
	4.84448E-03	0.233
	5.05672E-03	0.250
	5.66576E-03	0.300
	6.23944E-03	0.350
	6.78359E-03	0.400
	7.30246E-03	0.450
	7.79927E-03	0.500
	8.73646E-03	0.600
	9.18061E-03	0.650
	9.61048E-03	0.700
	1.00273E-02	0.750
	1.04320E-02	0.800
50.0000	7.60200E-04	0.008
	1.21815E-03	0.017
	1.99204E-03	0.033
	2.66597E-03	0.050
	2.97958E-03	0.058
	3.85324E-03	0.083
	4.39152E-03	0.100
	4.90162E-03	0.117
	5.38763E-03	0.133
	5.85270E-03	0.150
	6.29926E-03	0.167

TABLE 157 (CONT)

RUN 24

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	7.14443E-03	0.200
	7.93530E-03	0.233
	8.68062E-03	0.267
	9.38695E-03	0.300
	9.72713E-03	0.317
	1.00594E-02	0.333
	1.03842E-02	0.350

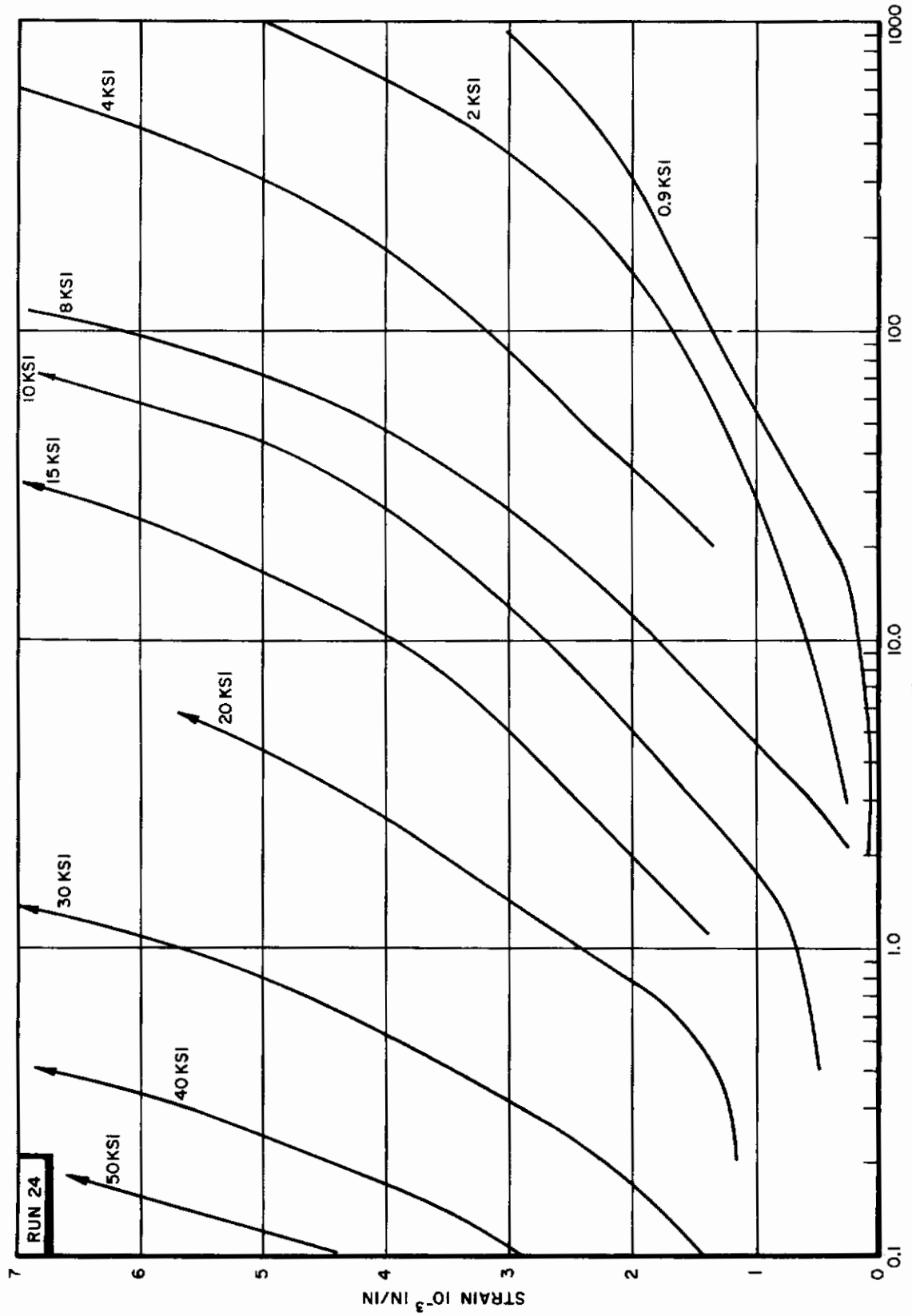


Figure 101. Creep Deformation Versus Log Time of Ti-2.5-Al-16V Sheet at 900°F (1360°R)

TABLE 158

Ti-2.5Al-16V Creep Deformation and Rupture Data at 900° F (1360° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
0.9	-	-	0.01	-	905	-	-
2.0	-	-	0.03	-	375	955	-
4.0	-	-	0.04	-	80	310	1050
8.0	-	-	0.08	-	25.5	72	188
10.0	-	-	0.1	-	13.0	42	120
15.0	1059.9	31.5	0.16	-	4.9	18	51.5
20.0	493.7	61.0	0.22	-	1.5	4.4	14.5
26.0	200.3	53.5	-	-	-	-	-
30.0	-	43.0	0.35	-	0.3	0.8	2.3
40.0	-	46.5	0.46	-	0.11	0.25	0.75
50.0	6.7	49.0	0.55	-	0.06	0.12	0.33

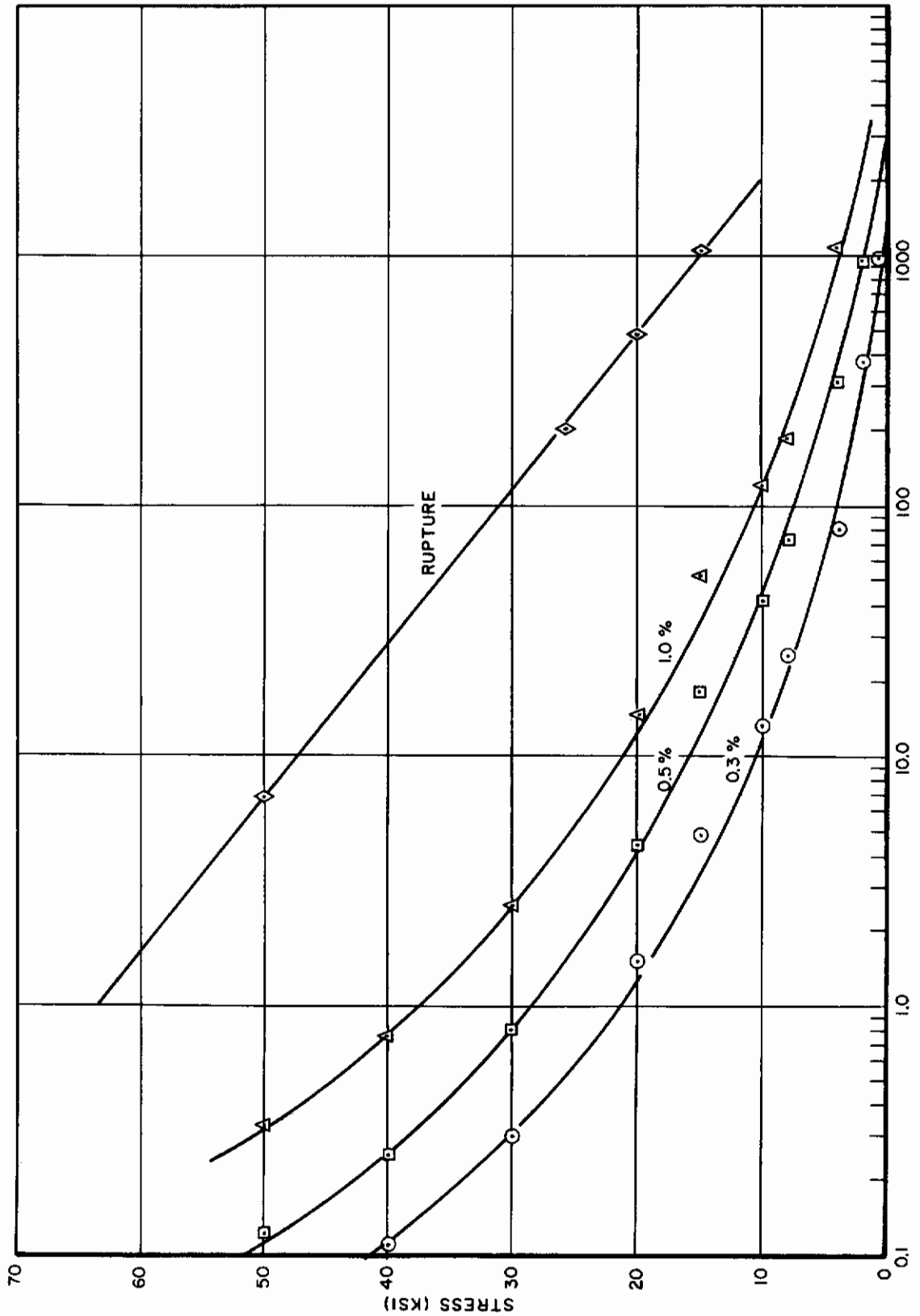


Figure 102. Creep Rupture Properties of Ti-2.5-Al-16V Sheet at 800°F (1260°R)

TABLE 159

Minimum Creep Rate for Ti-2.5Al-16V

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
700° F (1160° R)	15	1.76×10^{-6}
	110	2.31×10^{-3}
800° F (1260° R)	8.0	2.896×10^{-6}
	40	4.91×10^{-4}
	44.0	5.683×10^{-4}
	60	1.84×10^{-3}
900° F (1360° R)	8.0	2.96×10^{-6}
	10	6.19×10^{-5}
	15	1.45×10^{-4}
	30	3.276×10^{-3}

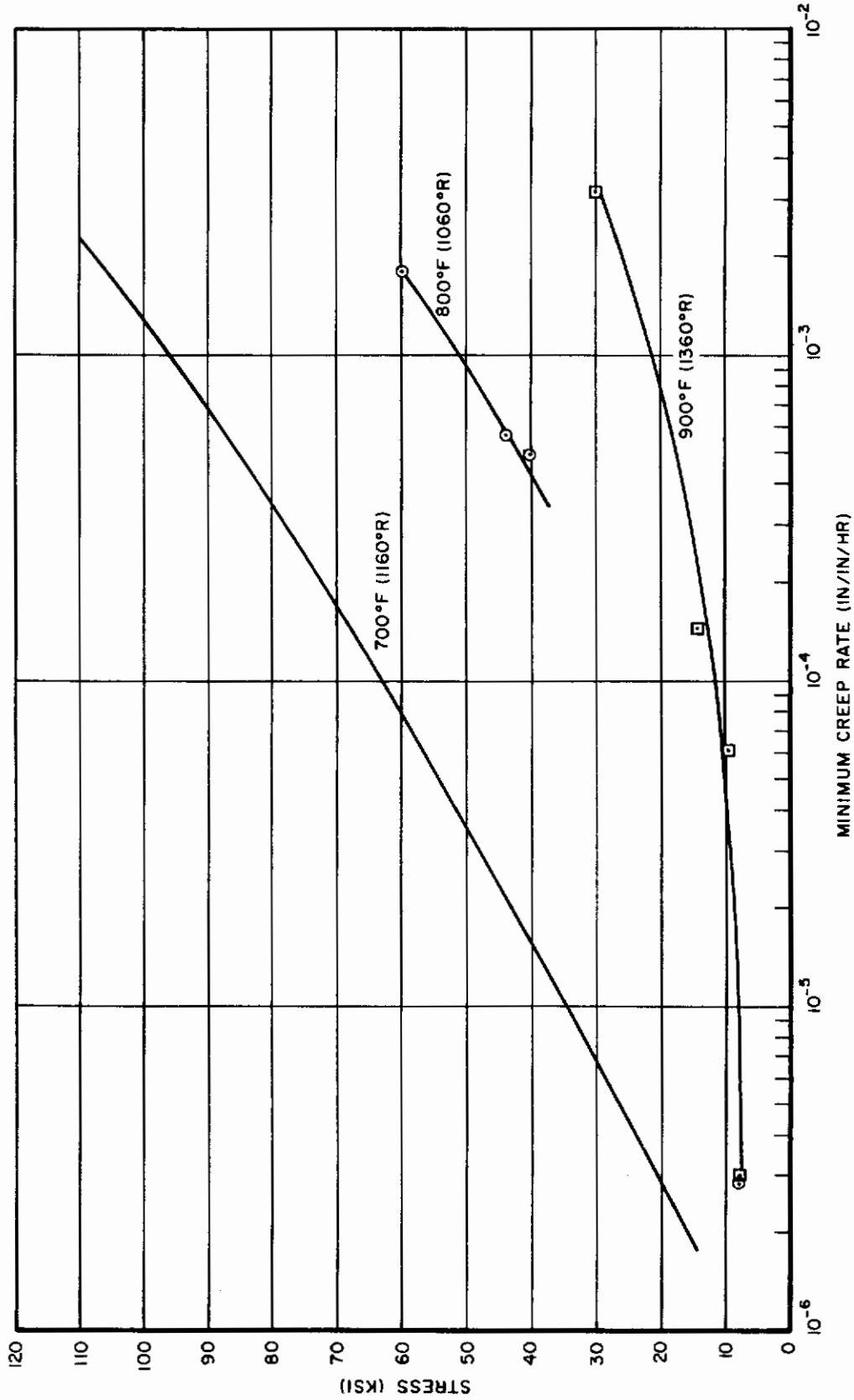


Figure 103. Minimum Creep Rate of Ti-2.5-Al-16V Sheet

APPENDIX III

IRON BASED ALLOYS

MATERIALS TESTED AND APPLICATIONS

15. 422 SS - This material was purchased from Crucible Steel Co. in sheet stock .060 in. x 24 in. x 60 in. Material was received in mill annealed condition. After specimens had been prepared they were further heat treated as follows. Solution treated at 1900°F for 15 minutes - cooled rapidly as possible in dissociated ammonia atmosphere -825°F for 4 hours - air cooled.

16. 422 SS - This material was purchased from Crucible Steel Co. in sheet stock .064 in. thick. Material was heat treated at 1900°F for 4 minutes - air cooled - 1000°F for 2 hours - air cooled.

17. PH 15-7 - This material was purchased from Armco Steel Co. as sheet stock from their Heat No. 56251. Sheet was received in mill annealed condition and then further heat treated at 1750°F for 10 minutes - air cooled to 1000°F and held for 8 hours - 950°F for 1 hour - air cooled.

18. V57 C - This material was purchased from General Electric Co., Aircraft Gas Turbine Division, as completed for bar test specimens. Material was from Heat No. 21897, and all specimens were processed from 25/32 in. bar stock. These specimens were heat treated at 1650°F for 4 hours - oil quenched - 1350°F for 16 hours - air cooled.

19. V57 C - This material is identical to material 18 above except for heat treatment. These specimens were heat treated at 1800°F for 2 hours - oil quenched - 1350°F for 16 hours - air cooled.

20. AM-350 - This material was purchased from Allegheny-Ludlum as sheet stock. The material was heat treated at 1750°F for 1/2 hour - air cooled to 100°F and held for 2 hours - 750°F for 2 hours - air cooled.

21. 321 SS - This material was purchased from Allegheny-Ludlum as sheet stock .062 in. x 24 in. x 96 in. It was in mill annealed condition.

Chemical compositions for the above alloys are given in Table 160.

TEST PROCEDURES

These seven materials were tested by three different testing laboratories under Air Force contracts as listed below.

Materials 15, 21

These two materials were tested by Metcut Research Associates, Inc., Cincinnati, Ohio, under contract No. AF 33(600)-36430. Specimens were prepared by shearing sheet stock so that the rolling direction was longitudinal and then manufactured in accordance with Metcut Drawings shown in Figure 4. Specimens were machined using the Metcut "stress free" grinding techniques. These procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Lima-Hamilton Tensile Machine equipped with strain pacing instrumentation was used for all tensile tests. Standard loading rates were used with strain measured with an extensometer at all test temperatures. The resultant tensile data are presented in Tables 161 and 165.

Lever-type creep test frames were used for creep testing. Test furnaces were provided with quartz viewing ports to permit optical measurement of creep deformation using the conventional platinum-strip/microscope method.

Creep data are presented for material 15 in Tables 116 through 175 and Figures 105 through 111.

Creep data are presented for material 21 in Tables 229 through 238 and Figures 151 through 157.

Material 16

This material was tested by New England Materials Laboratory, Inc., Medford, Massachusetts, under contract No. AF 33(616)-6200. This contract called for materials to be purchased and test specimens prepared by New England. Materials were heat treated to "optimum properties in accordance with the recommendations of its producer" and then prepared as specimens in accordance with drawings shown in Figure 40. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Tate-Emery Universal Test Machine (60,000 pound capacity) was used for all tensile tests. This machine is equipped with standard high magnification microformer extensometers for both room temperature and elevated temperature testing. A load-strain recorder and strain pacer are attached. Load accuracy of the machine is periodically checked by Baldwin-Lima-Hamilton service department and has always checked to ±.5% accuracy. Resultant tensile data are presented in Table 162.

Creep-rupture test machines used are of the lever type with interchangeable lever arms to give different ratios. The lever arms are not counterbalanced, but are calibrated to a standard tear weight which includes the specimen adapters, pull rods, and weight pan. Lever arms have knife edges at all three contact points. Load accuracy is periodically checked with a standard load strain cell calibrated by Baldwin-Lima-Hamilton. Creep extension measurements are made using notched platinum wire techniques with a microscope reading sensitivity of 0.0000254 inch. Creep data are presented in Tables 176 through 185 and Figures 112 through 120.

Materials 17, 20

These two materials were tested by Metcut Research Associates, Inc., Cincinnati, Ohio under contract No. AF 33(600)-32008. This contract called for all test specimens to be prepared by the Air Force Materials Laboratory Machine Shop and furnished to Metcut. Specimens were prepared in accordance with the drawings shown in Figure 104. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Lima-Hamilton Tensile Machine equipped with strain pacing instrumentation was used for all tensile tests. Standard loading rates were used with strain measured with an extensometer at all test temperatures. The resultant tensile data are presented in Tables 163 and 164.

Lever-type creep test frames were used for creep testing. Test furnaces were provided with quartz viewing ports to permit optical measurement of creep deformation using the conventional platinum-strip/microscope method.

Creep data are presented for material 17 in Tables 186 through 195 and Figures 121 through 127.

Creep data are presented for material 20 in Tables 222 through 228 and Figures 146 through 149.

Materials 18, 19

These materials were tested by Joliet Metallurgical Laboratories, Joliet, Illinois, under contract No. AF 33(600)-36462. In this test, specimens were prepared by G.E. and sent directly to Joliet. Specimen drawings are not available. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tension Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

Tensile tests were not conducted on this material.

Creep tests were conducted on Tatnall counterbalanced lever-type machines using platinum-strip extensometer techniques. Creep data are presented in Tables 196 through 221 and Figures 128 through 145.

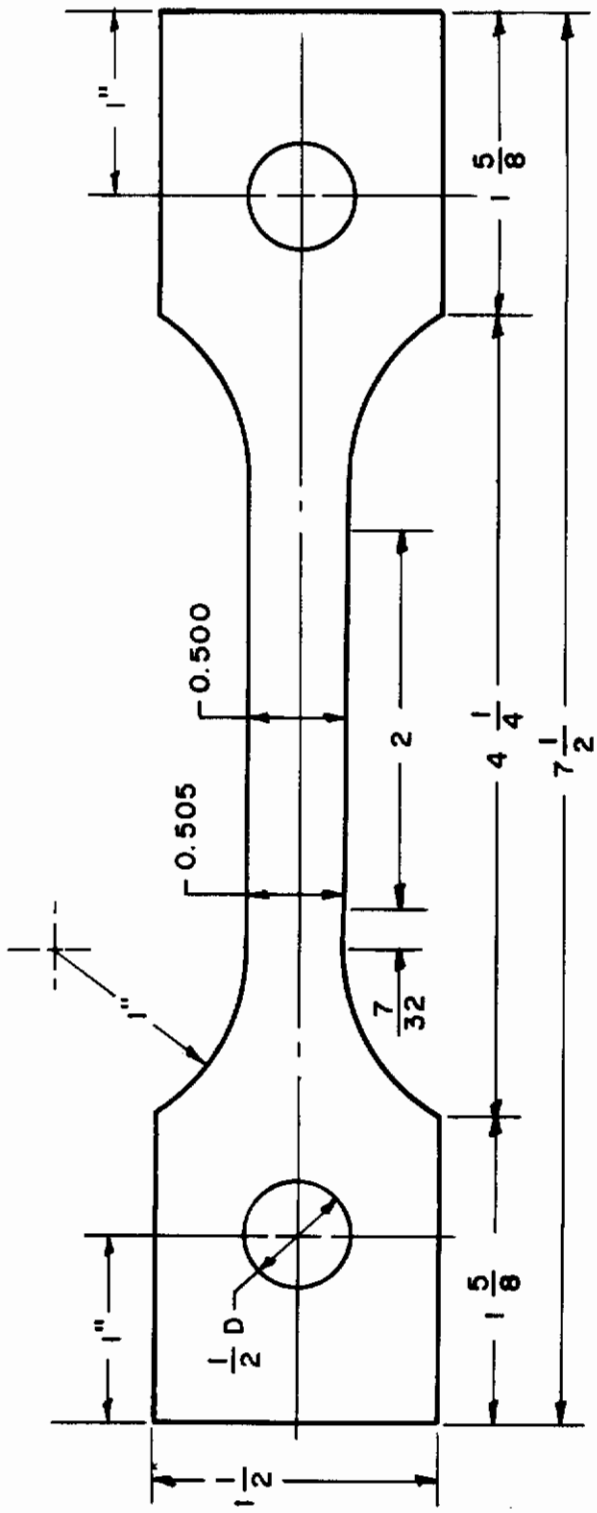


Figure 104. Specimen Drawing

TABLE 160

Chemical Composition for Iron Based Alloys

Element	422 ss (15)	422 SS (16)	PH 15-7 (17)	V57C (18)	V57C (19)	AM 350 (20)	321 SS (21)
Al			1.26	.20	.20		
C	.22	.23	.07	.055	.055	.088	.055
Cr	11.71	12.48	15.05	15.69	15.69	16.53	17.97
Fe	Bal	Bal	Bal	Bal	Bal	Bal	Bal
Mn	.68	.58	.69	.015	.015	.58	1.44
Mo	.94	.96	2.30	1.36	1.36	2.76	10.7
Ni	.69	.66	7.16	25.48	25.48	4.18	.013
P	.019	.021	.019				
S		.013	.017	.66	.66		.42
Si	.36	.35	.20			.27	.52
Ti				3.30	3.30		.21
Va	.26	.29		.25	.25		
W	.93						

Note: Numbers shown below material designation refer to the material number in the listing of "Materials Tested."

TABLE 161

Tensile Test Data for 422 Stainless Steel

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	231.0	191.0	8
"	233.0	193.0	8
"	236.0	194.0	7
"	233.0	191.0	8
"	229.0	187.0	8
600	230.0	159.0	6
"	229.0	164.0	7
"	228.0	166.0	8
800	218.0	155.0	9
"	218.0	157.0	10
"	220.0	159.0	10
900	202.0	146.0	8
"	201.0	147.0	8
"	202.0	143.0	10

*To convert to ° R add 460°

TABLE 162

Tensile Test Data 422 Stainless Steel Crucible

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	221.0	163.5	7.0
"	234.0	166.0	7.5
"	238.0	160.0	8.0
"	240.0	162.0	7.2
"	225.0	155.0	7.5
600	178.5	145.0	5.0
"	177.8	156.0	5.6
"	177.3	162.0	9.7
800	177.0	147.0	5.0
"	178.0	144.0	5.0
"	176.0	151.0	5.0
900	176.0	136.0	5.0
"	178.0	133.0	6.2
"	173.0	141.0	6.2

*To convert to ° R add 460°

TABLE 163

Tensile Test Data for PH 15-7 Mo

Test Temperature (° F)***	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	230.0	162.0	6
"	231.0	177.0	6
"	232.0	183.0	7
600	200.0	133.0	6
"	201.0	132.0	5
"	200.0	132.0	5
800	172.0	114.0	9
"	175.0	114.0	8
"	170.0	102.0	10
1000	120.0	56.8	12
"	118.0	45.3	15
"	122.0	49.2	9

***To convert to ° R add 460°

TABLE 164

Tensile Test Data - AM-350

Test Temperature (° F)***	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	187.0	155.0	12.5
"	191.0	155.0	11.5
"	194.0	156.0	11.5
600	*	125.0	*
"	189.0	133.0	6.5
"	194.0	130.2	9.0
800	177.0	119.0	11
"	180.0	120.0	13
"	181.0	116.0	13
1000	104.0	77.0	10**
"	106.0	90.0	18
"	97.0	79.0	18

*Adapter failed
**Failed at extensometer clamp
***To convert to ° R add 460°

TABLE 165

Tensile Test Data for 321 Stainless Steel

Test Temperature (° F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	93.2	39.0	51
"	91.5	38.3	52
"	91.5	37.7	53
"	91.5	37.7	51
"	90.3	37.3	54
1000	60.0	25.4	30
"	60.3	24.8	30
"	60.4	26.4	28
1200	46.4	23.2	42
"	47.6	24.8	41
"	46.3	24.4	42
1350	30.6	22.4	41
"	31.9	22.7	44
"	31.6	21.9	39

*To convert to ° R add 460°

CREEP DATA

422 STAINLESS STEEL

TABLE 166

RUN 3

Deformation Versus Time (Raw Data) for 422 Stainless Steel at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
120.0000	2.75000E-04	41.900
	4.10000E-04	124.200
	5.50000E-04	476.200
	6.90000E-04	793.300
	8.45000E-04	979.300
	1.07000E-03	1147.100
	1.35500E-03	1178.700
160.0000	2.20000E-04	1.000
	6.20000E-04	14.700
	7.00000E-04	122.000
	9.20000E-04	485.200
	10.00000E-04	599.500
	1.21500E-03	816.600
	1.80000E-03	839.700
190.0000	3.00000E-04	0.100
	3.30000E-04	0.200
	3.50000E-04	0.300
	3.70000E-04	0.400
	4.00000E-04	0.600
	4.30000E-04	1.000
	4.50000E-04	2.500
	5.00000E-04	4.600
	6.00000E-04	14.200
	7.00000E-04	96.900
	8.50000E-04	205.400
	9.50000E-04	482.800
	10.00000E-04	605.200
	1.07500E-03	628.000
220.0000	5.50000E-04	0.100
	7.75000E-04	0.200
	9.50000E-04	0.400
	10.00000E-04	1.000
	1.25000E-03	24.200
	1.50000E-03	54.200
	1.60000E-03	935.000
230.0000	5.00000E-04	0.300
	7.50000E-04	0.500
	9.25000E-04	24.500
	10.00000E-04	48.800
	1.25000E-03	183.200
	1.35000E-03	577.100

TABLE 167

Deformation Versus Time (Fitted Data) for 422 Stainless Steel at 600° F (1060° R)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
120.0000	2.99390E-04	41.900
	3.72580E-04	124.200
	5.77870E-04	476.200
	6.69640E-04	793.300
	8.28360E-04	979.300
	1.17468E-03	1147.100
	1.27247E-03	1178.700
160.0000	2.06370E-04	1.000
	6.81360E-04	14.700
	5.73690E-04	122.000
	9.82730E-04	485.200
	1.13881E-03	599.500
	1.43080E-03	816.600
	1.46125E-03	839.700
190.0000	2.99860E-04	0.100
	3.33160E-04	0.200
	3.53620E-04	0.300
	3.68630E-04	0.400
	3.90470E-04	0.600
	4.18960E-04	1.000
	4.71950E-04	2.500
	5.08000E-04	4.600
	5.76750E-04	14.200
	7.26720E-04	96.900
	8.19270E-04	205.400
	9.73950E-04	482.800
	1.02716E-03	605.200
	1.03647E-03	628.000
220.0000	5.86730E-04	0.100
	7.50970E-04	0.200
	8.89410E-04	0.400
	1.03808E-03	1.000
	1.34841E-03	24.200
	1.40063E-03	54.200
	1.61076E-03	935.000
230.0000	5.63480E-04	0.300
	6.66570E-04	0.500
	9.77190E-04	24.500
	1.01884E-03	48.800
	1.15999E-03	183.200
	1.38891E-03	577.100

TABLE 168

422 Stainless Steel Creep Deformation Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
120.0	-	0.11	0.49	1100	-	-	-
160.0	-	0.10	0.78	1060	-	-	-
190.0	-	0.11	1.14	530	-	-	-
220.0	-	0.16	2.13	1.0	-	-	-
230.0	-	0.15	3.95	29	-	-	-

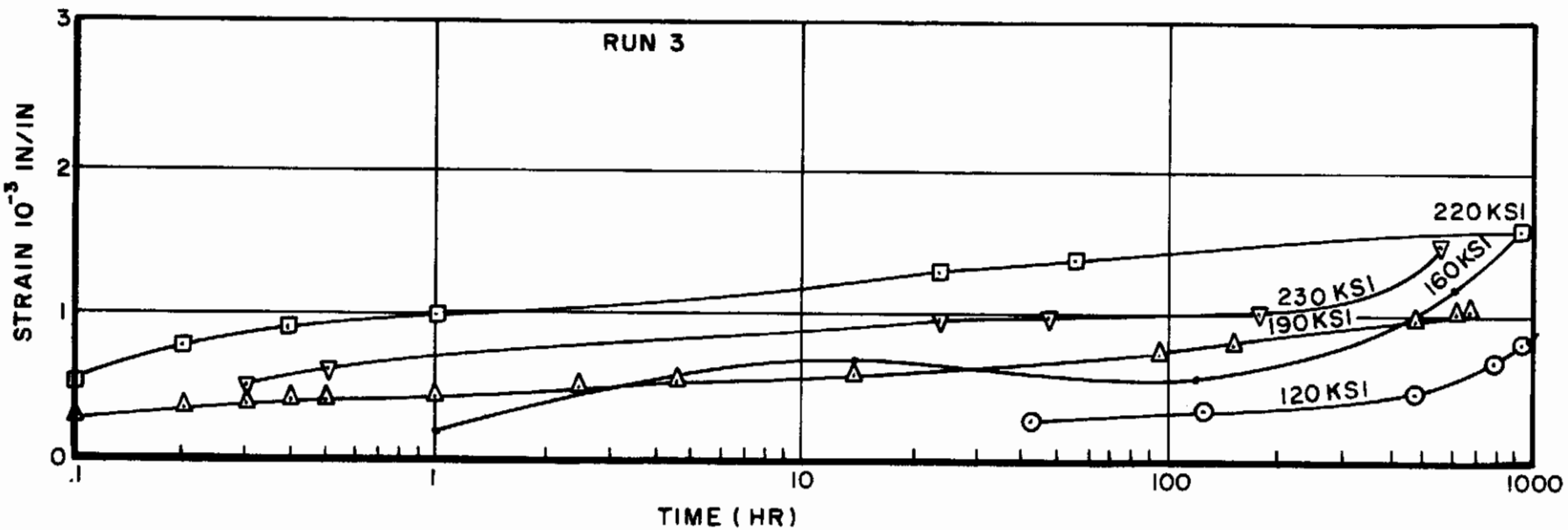


Figure 105. Creep Deformation Versus Log Time of 422 Stainless Steel at 600°F (1060°R)

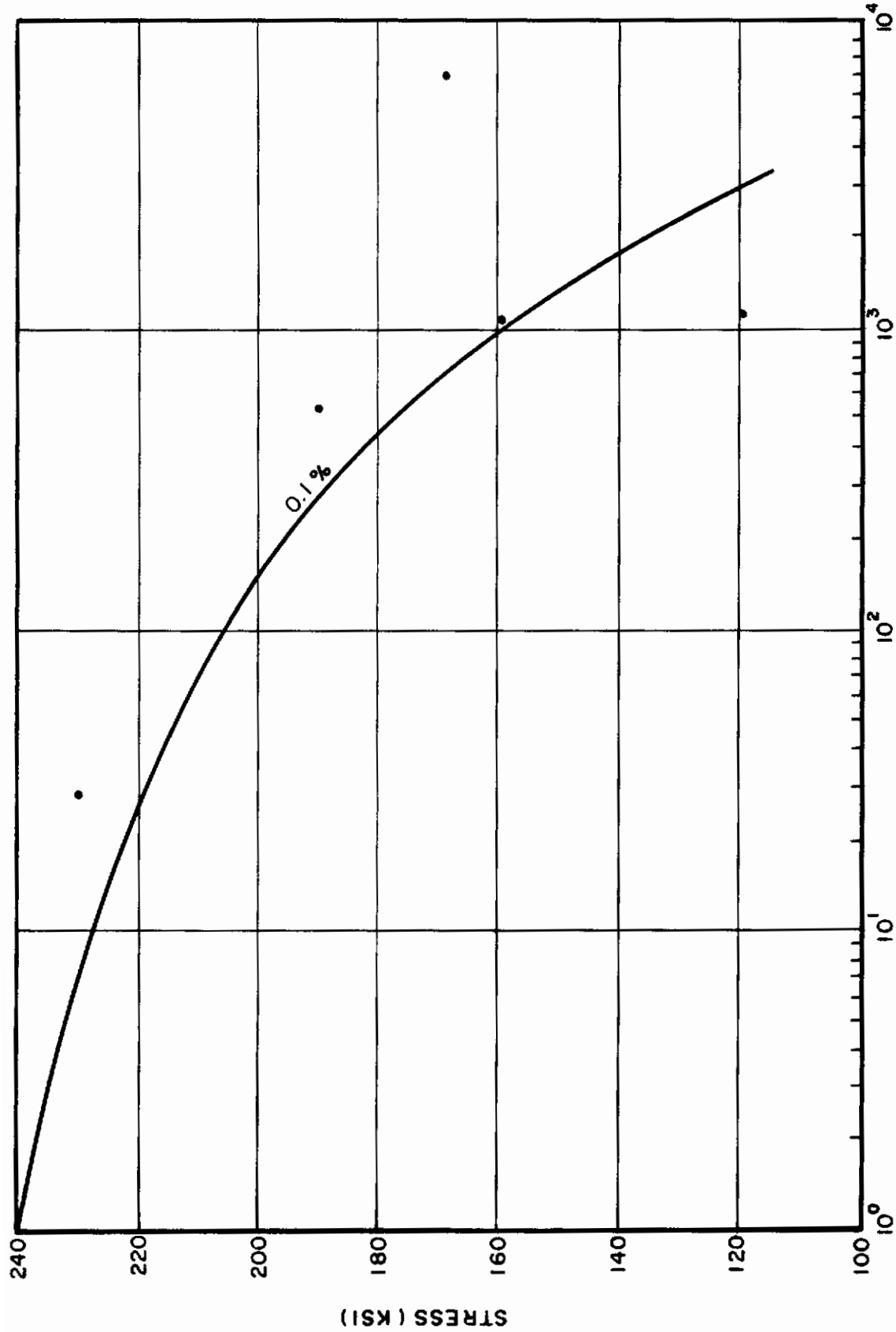


Figure 106. Creep Rupture Properties of 422 Stainless Steel at 600°F (1060°R)

TABLE 169

Deformation Versus Time (Raw Data) for 422 Stainless Steel at 800° F (1260° R)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	7.00000E-05	0.100
	1.30000E-04	0.400
	1.90000E-04	5.500
	2.10000E-04	13.900
50.0000	3.30000E-04	28.200
	4.30000E-04	220.900
	5.20000E-04	927.200
	5.40000E-04	1022.400
65.0000	5.00000E-05	0.200
	7.00000E-05	0.300
	10.00000E-05	2.100
	1.50000E-04	4.300
	2.00000E-04	13.200
	3.00000E-04	53.000
	4.50000E-04	108.000
	5.00000E-04	242.700
	6.00000E-04	465.700
80.0000	7.50000E-05	0.100
	9.00000E-05	0.200
	1.20000E-04	0.800
	1.60000E-04	3.900
	2.50000E-04	54.300
	4.70000E-04	168.500
	5.90000E-04	338.600
	7.30000E-04	384.300
	8.80000E-04	551.200
	1.01000E-03	720.100
100.0000	10.00000E-05	0.100
	2.00000E-04	0.200
	2.25000E-04	0.300
	3.25000E-04	0.500
	4.00000E-04	2.400
	6.00000E-04	15.000
	8.50000E-04	62.500
	1.10000E-03	181.600
	1.15000E-03	391.000
120.0000	1.50000E-04	0.100
	3.50000E-04	2.000
	6.00000E-04	7.600
	9.50000E-04	31.700
	10.00000E-04	80.500
	1.20000E-03	149.500

RUN 3

TABLE 169 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.40000E-03	334.700
	1.70000E-03	847.800
	2.00000E-03	992.400
140.0000	1.25000E-04	0.100
	1.75000E-04	0.200
	2.75000E-04	0.300
	3.00000E-04	0.500
140.0000	4.00000E-04	1.000
	7.50000E-04	8.700
	10.00000E-04	31.200
	1.35000E-03	82.000
	1.55000E-03	143.500
	2.00000E-03	369.100
	2.55000E-03	602.100
	2.80000E-03	938.600
	3.00000E-03	1175.600
	3.10000E-03	1200.300
150.0000	6.50000E-04	0.200
	7.50000E-04	0.300
	8.00000E-04	0.500
	9.00000E-04	1.100
	10.00000E-04	2.400
	1.50000E-03	12.500
	2.15000E-03	61.100
	3.10000E-03	372.900
	4.20000E-03	538.700
	4.80000E-03	781.100
	5.30000E-03	873.000
	5.60000E-03	924.300
151.0000	2.75000E-04	0.100
	3.75000E-04	0.200
	4.25000E-04	0.400
	5.50000E-04	1.000
	7.00000E-04	2.000
	1.15000E-03	13.500
	1.60000E-03	78.200
	1.90000E-03	147.700
	2.20000E-03	267.800
	3.20000E-03	677.300
	4.30000E-03	1109.500
	4.67500E-03	1227.400

TABLE 169 (CONT)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
180.0000	5.25000E-04	0.100
	6.50000E-04	0.200
	7.25000E-04	0.300
	8.25000E-04	0.500
	9.00000E-04	1.000
	1.25000E-03	4.300
	1.60000E-03	7.600
	2.60000E-03	70.900
	3.60000E-03	199.600
	4.40000E-03	360.000
	4.80000E-03	458.400
	5.30000E-03	529.700
200.0000	6.50000E-04	0.100
200.0000	9.00000E-04	0.200
	10.00000E-04	0.300
	1.30000E-03	1.000
	1.70000E-03	5.600
	2.25000E-03	14.200
	3.55000E-03	61.300
	4.20000E-03	101.000
	5.40000E-03	158.000
	6.10000E-03	204.900
	6.55000E-03	224.200
210.0000	1.20000E-03	0.100
	1.35000E-03	0.200
	1.40000E-03	0.300
	1.60000E-03	0.500
	2.15000E-03	0.700
	2.30000E-03	1.300
	3.00000E-03	10.300
	4.30000E-03	25.800
	5.85000E-03	72.700
	6.90000E-03	105.000
	7.80000E-03	129.600
	8.70000E-03	153.700
	9.20000E-03	164.700
	1.07000E-02	193.900

TABLE 169 (CONT)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
212.0000	4.30000E-04	0.100
	5.50000E-04	0.300
	9.00000E-04	0.500
	1.35000E-03	1.000
	2.10000E-03	5.300
	2.90000E-03	9.000
	4.70000E-03	21.600
	6.80000E-03	32.300
	7.20000E-03	33.500
	8.60000E-03	38.600
	9.00000E-03	40.700
	1.20000E-02	48.000

TABLE 170

Deformation Versus Time (Fitted Data) for 422 Stainless Steel at 800° F (1260° R)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	7.42500E-05	0.100
	1.19270E-04	0.400
	1.98670E-04	5.500
	2.42870E-04	13.900
50.0000	2.85580E-04	28.200
	4.41100E-04	220.900
	5.27620E-04	927.200
	5.30620E-04	1022.400
65.0000	5.28500E-05	0.200
	6.50900E-05	0.300
	1.12130E-04	2.100
	1.36670E-04	4.300
	1.98040E-04	13.200
	3.26740E-04	53.000
	4.13820E-04	108.000
	5.19400E-04	242.700
	5.95250E-04	465.700
80.0000	7.27800E-05	0.100
	9.20700E-05	0.200
	1.23450E-04	0.800
	1.54030E-04	3.900
	2.61990E-04	54.300
	4.40010E-04	168.500
	6.50260E-04	338.600
	7.00060E-04	384.300
	8.65840E-04	551.200
	1.01448E-03	720.100
100.0000	9.27200E-05	0.100
	2.03880E-04	0.200
	2.51600E-04	0.300
	2.98810E-04	0.500
	4.03970E-04	2.400
	5.92390E-04	15.000
	8.66260E-04	62.500
	1.08586E-03	181.600
	1.15448E-03	391.000
120.0000	1.49990E-04	0.100
	3.49000E-04	2.000
	6.08620E-04	7.600
	9.08870E-04	31.700
	1.07241E-03	80.500

RUN 3

TABLE 170 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.17563E-03	149.500
	1.35762E-03	334.700
	1.80253E-03	847.800
	1.92529E-03	992.400
140.0000	1.20310E-04	0.100
	1.95100E-04	0.200
	2.45240E-04	0.300
	3.12380E-04	0.500
140.0000	4.07640E-04	1.000
	7.39150E-04	8.700
	1.01440E-03	31.200
	1.31953E-03	82.000
	1.55511E-03	143.500
	2.08691E-03	369.100
	2.44445E-03	602.100
	2.82662E-03	938.600
	3.04362E-03	1175.600
	3.06449E-03	1200.300
150.0000	7.30570E-04	0.200
	7.00410E-04	0.300
	7.23930E-04	0.500
	8.63250E-04	1.100
	1.07997E-03	2.400
	1.58764E-03	12.500
	1.99520E-03	61.100
	3.31031E-03	372.900
	3.99221E-03	538.700
	4.95474E-03	781.100
	5.30844E-03	873.000
	5.50327E-03	924.300
151.0000	3.18170E-04	0.100
	3.23380E-04	0.200
	3.95820E-04	0.400
	5.63280E-04	1.000
	7.23430E-04	2.000
	1.18494E-03	13.500
	1.59149E-03	78.200
	1.82854E-03	147.700
	2.19239E-03	267.800
	3.29853E-03	677.300
	4.33266E-03	1109.500
	4.59737E-03	1227.400

TABLE 170 (CONT)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
180.0000	5.56700E-04	0.100
	6.21070E-04	0.200
	6.90100E-04	0.300
	7.97240E-04	0.500
	9.62570E-04	1.000
	1.34109E-03	4.300
	1.50543E-03	7.600
	2.57054E-03	70.900
	3.60155E-03	199.600
	4.46498E-03	360.000
	4.89245E-03	458.400
	5.17124E-03	529.700
200.0000	6.68810E-04	0.100
200.0000	8.79050E-04	0.200
	9.90690E-04	0.300
	1.29121E-03	1.000
	1.78223E-03	5.600
	2.18763E-03	14.200
	3.47130E-03	61.300
	4.30793E-03	101.000
	5.37016E-03	156.000
	6.16857E-03	204.900
	6.48238E-03	224.200
210.0000	1.17757E-03	0.100
	1.34243E-03	0.200
	1.50044E-03	0.300
	1.73707E-03	0.500
	1.90839E-03	0.700
	2.24233E-03	1.300
	3.35047E-03	10.300
	3.98174E-03	25.800
	5.71726E-03	72.700
	6.96479E-03	105.000
	7.92579E-03	129.600
	8.86869E-03	153.700
	9.29840E-03	164.700
	1.04346E-02	193.900
212.0000	4.34660E-04	0.100
	4.77100E-04	0.300
	1.04886E-03	0.500
	1.24173E-03	1.000
	2.22182E-03	5.300
	2.87569E-03	9.000
	4.56354E-03	21.600
	6.83257E-03	32.300
	7.14751E-03	33.500
	8.61481E-03	38.600
	9.27707E-03	40.700
	1.18222E-02	48.000

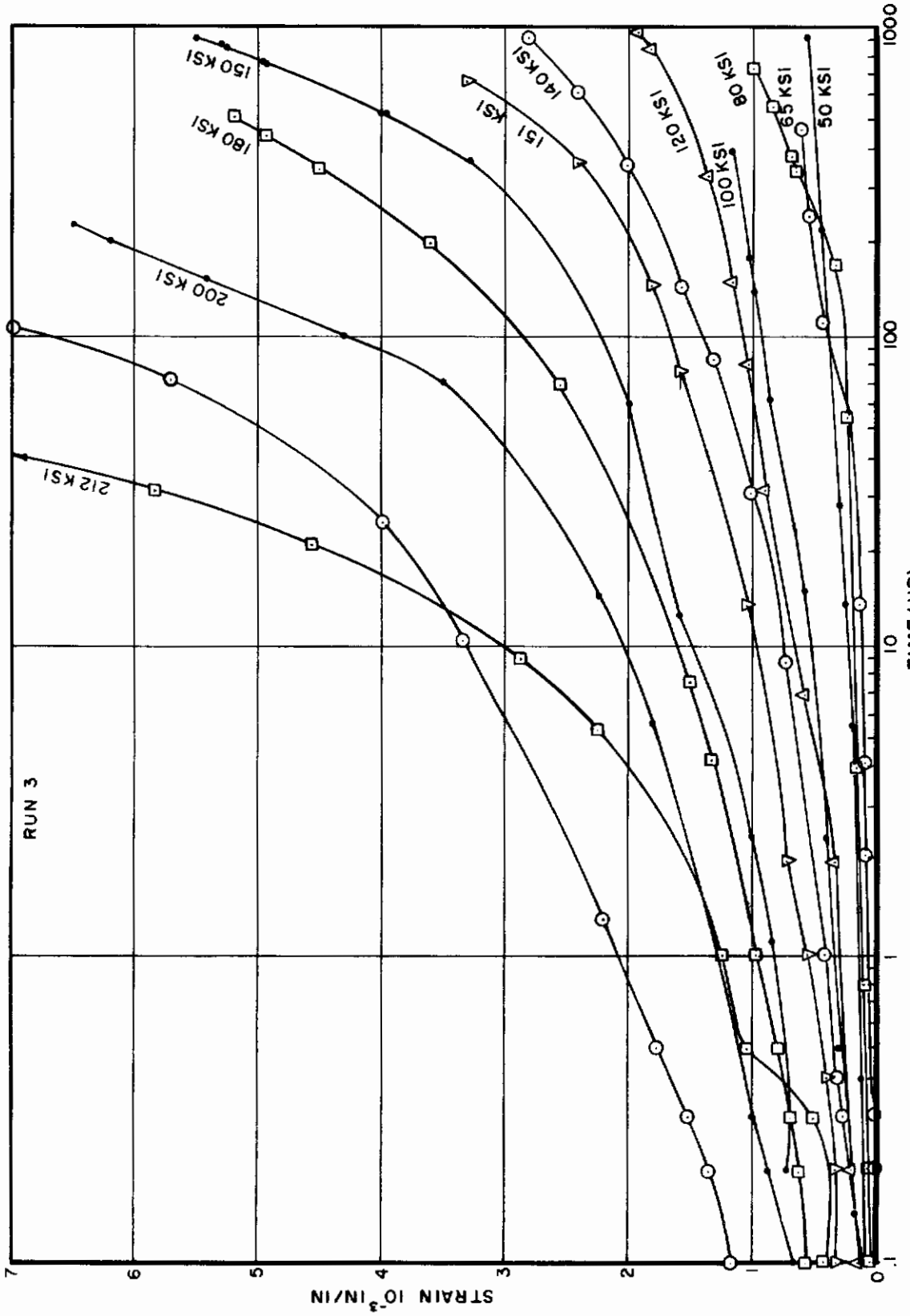


Figure 107. Creep Deformation Versus Log Time of 422 Stainless Steel at 800°F (1260°R)

TABLE 171

422 Stainless Steel Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
80.0	-	0.10	0.34	1020	-	-	-
100.0	-	0.11	0.41	293	-	-	-
120.0	-	0.20	0.53	85	-	-	-
140.0	-	0.30	0.68	33	1180	-	-
151.0	1216.9	2.75	0.81	0.13	605	-	-
180.0	533.2	3.25	1.16	2.0	142	485	-
200.0	252.7	3.13	1.63	0.3	40	145	-
210.0	218.4	5.12	1.97	-	9	52	184
212.0	56.8	6.25	4.82	0.6	10.6	23.2	43.6

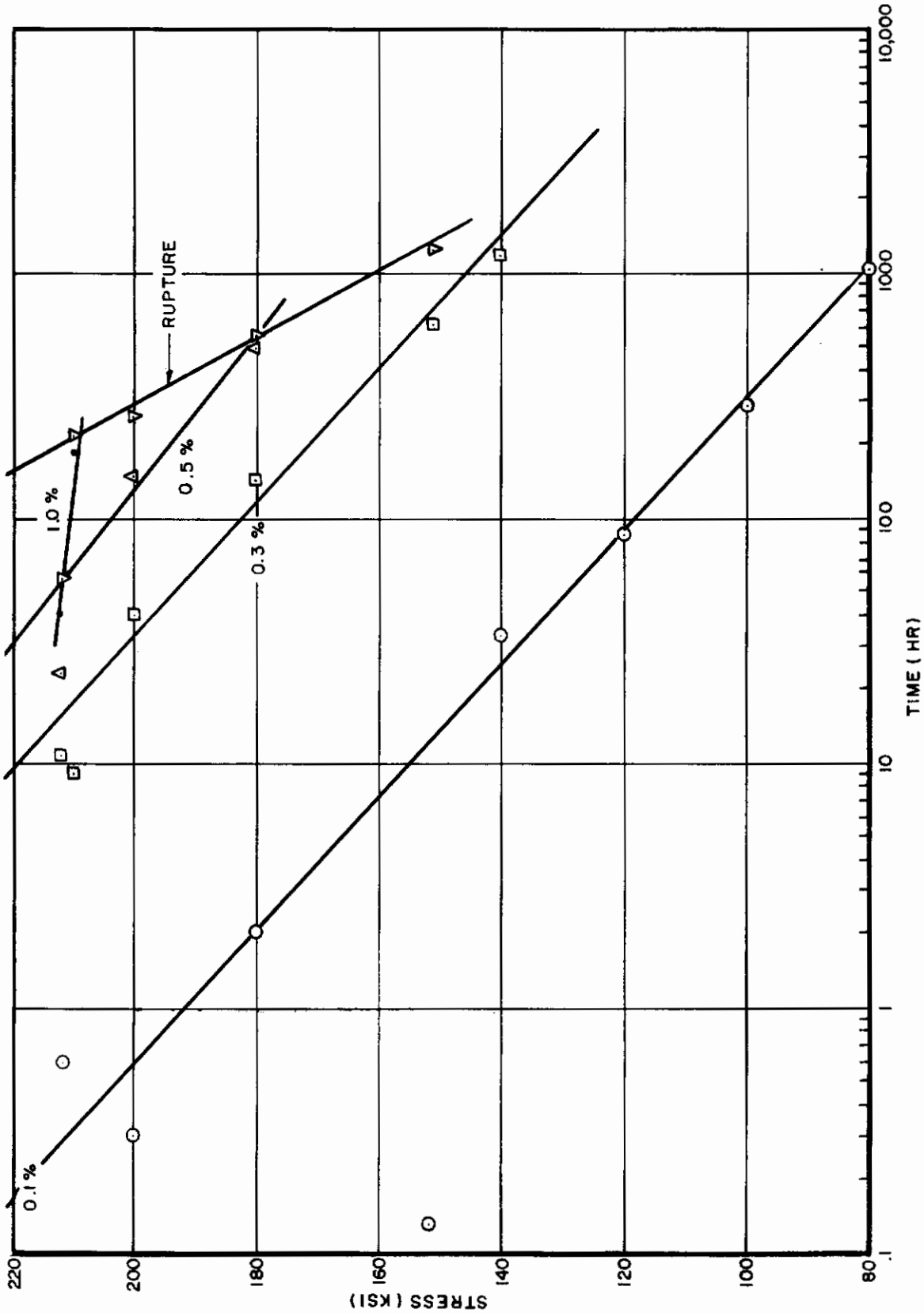


Figure 108. Creep Rupture Properties of 422 Stainless Steel at 800°F (1260°R)

TABLE 172

Deformation Versus Time (Raw Data) for 422 Stainless Steel at 900° F (1360° R)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	9.00000E-05	0.100
	10.00000E-05	0.400
	1.50000E-04	2.000
	2.15000E-04	92.400
	3.00000E-04	164.700
	4.70000E-04	885.100
	5.00000E-04	931.100
	6.30000E-04	1173.300
10.0000	1.35000E-04	0.200
	1.40000E-04	0.300
10.0000	1.77500E-04	2.200
	2.47500E-04	8.400
	3.80000E-04	31.300
	5.85000E-04	138.700
	8.45000E-04	434.300
	1.24500E-03	623.500
	1.65500E-03	960.700
22.0000	2.00000E-04	0.400
	3.00000E-04	1.000
	4.50000E-04	2.200
	5.00000E-04	50.800
	7.50000E-04	98.900
	2.00000E-03	638.500
	2.47000E-03	1361.700
40.0000	4.00000E-04	12.200
	9.00000E-04	50.900
	1.10000E-03	85.000
	1.40000E-03	106.700
	2.12500E-03	147.600
	2.70000E-03	301.300
	3.85000E-03	1086.700
	4.10000E-03	1319.600
50.0000	2.00000E-04	0.600
	3.00000E-04	3.200
	5.00000E-04	27.800
	10.00000E-04	58.200
	2.60000E-03	177.800
	3.40000E-03	273.700
	4.10000E-03	440.900
	5.00000E-03	843.600
	5.40000E-03	1099.200

RUN 3

TABLE 172 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
57.0000	1.50000E-04	1.000
	5.00000E-04	16.900
	7.00000E-04	33.100
	1.40000E-03	71.200
	2.25000E-03	120.200
	3.10000E-03	175.900
	4.75000E-03	407.300
	6.02500E-03	789.600
	6.97000E-03	1367.800
	7.05000E-03	1512.100
63.0000	3.70000E-04	2.300
	6.00000E-04	10.200
	1.10000E-03	49.200
	2.05000E-03	99.800
63.0000	3.22000E-03	166.900
	5.90000E-03	456.400
	7.75000E-03	912.700
	9.10000E-03	1533.800
	1.10000E-02	2253.300
90.0000	8.00000E-05	0.100
	1.30000E-04	0.200
	2.30000E-04	0.300
	3.50000E-04	1.000
	4.50000E-04	1.300
	7.00000E-04	4.900
	1.10000E-03	13.400
	3.10000E-03	60.500
	4.75000E-03	100.200
	6.10000E-03	131.900
	8.77500E-03	204.200
	1.29500E-02	360.700
150.0000	6.00000E-04	0.100
	8.00000E-04	0.200
	1.10000E-03	0.300
	1.20000E-03	0.500
	1.55000E-03	1.000
	2.70000E-03	4.800
	5.55000E-03	14.500
	2.13500E-02	29.700

TABLE 172 (CONT)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
170.0000	1.35000E-03	0.100
	1.55000E-03	0.200
	1.75000E-03	0.300
	1.90000E-03	0.400
	2.00000E-03	0.500
	2.35000E-03	1.000
	3.75000E-03	3.700
	5.05000E-03	5.500
	6.50000E-03	7.200
	8.70000E-03	9.200
	1.52000E-02	12.200
	1.93000E-02	13.200
185.0000	7.00000E-04	0.100
	1.05000E-03	0.200
	1.20000E-03	0.300
	1.45000E-03	0.400
	1.55000E-03	0.500
	2.15000E-03	1.000
	3.10000E-03	2.100
	7.85000E-03	5.700
	1.11500E-02	6.800
185.0000	1.61000E-02	7.600
	1.82500E-02	7.800

TABLE 173

RUN 3

Deformation Versus Time (Fitted Data) for 422 Stainless Steel at 900°F (1360°R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	9.23400E-05	0.100
	9.38600E-05	0.400
	1.54140E-04	2.000
	2.41230E-04	92.400
	2.59670E-04	164.700
	5.02430E-04	885.100
	5.17380E-04	931.100
	5.93920E-04	1173.300
10.0000	1.46750E-04	0.200
	1.29430E-04	0.300
10.0000	1.60900E-04	2.200
	2.67360E-04	8.400
	3.90780E-04	31.300
	5.44490E-04	138.700
	9.20630E-04	434.300
	1.18449E-03	623.500
	1.66511E-03	960.700
22.0000	2.14730E-04	0.400
	3.29370E-04	1.000
	3.66170E-04	2.200
	5.84510E-04	50.800
	7.70250E-04	98.900
	1.83623E-03	638.500
	2.56871E-03	1361.700
40.0000	4.02060E-04	12.200
	8.09220E-04	50.900
	1.27330E-03	85.000
	1.51347E-03	106.700
	1.88108E-03	147.600
	2.72904E-03	301.300
	3.93645E-03	1086.700
	4.03041E-03	1319.600
50.0000	2.01750E-04	0.600
	2.95550E-04	3.200
	4.76540E-04	27.800
	1.06242E-03	58.200
	2.58587E-03	177.800
	3.31783E-03	273.700
	4.13679E-03	440.900
	5.08323E-03	843.600
	5.33999E-03	1099.200

TABLE 173 (CONT)

RUN 3

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
57.0000	1.52880E-04	1.000
	4.44240E-04	16.900
	7.44370E-04	33.100
	1.48887E-03	71.200
	2.26834E-03	120.200
	2.96175E-03	175.900
	4.73702E-03	407.300
	6.11548E-03	789.600
	6.94388E-03	1367.800
	7.03803E-03	1512.100
63.0000	3.80580E-04	2.300
	5.29920E-04	10.200
	1.23555E-03	49.200
	2.07548E-03	99.800
63.0000	3.06526E-03	166.900
	5.97363E-03	456.400
	7.72537E-03	912.700
	9.10448E-03	1533.800
	1.09997E-02	2253.300
90.0000	9.04600E-05	0.100
	1.28770E-04	0.200
	1.89090E-04	0.300
	4.09310E-04	1.000
	4.52280E-04	1.300
	6.53830E-04	4.900
	1.01531E-03	13.400
	3.20403E-03	60.500
	4.86762E-03	100.200
	6.07987E-03	131.900
	8.55859E-03	204.200
	1.30381E-02	360.700
150.0000	6.01920E-04	0.100
	7.92380E-04	0.200
	1.08280E-03	0.300
	1.25015E-03	0.500
	1.48791E-03	1.000
	2.70655E-03	4.800
	5.55156E-03	14.500
	2.13493E-02	29.700

RUN 3

TABLE 173 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
170.0000	1.36563E-03	0.100
	1.43099E-03	0.200
	1.88682E-03	0.300
	1.96763E-03	0.400
	1.95549E-03	0.500
	2.21246E-03	1.000
	4.13501E-03	3.700
	4.79595E-03	5.500
	6.11898E-03	7.200
	8.93196E-03	9.200
	1.58148E-02	12.200
	1.87843E-02	13.200
185.0000	6.93170E-04	0.100
	1.11986E-03	0.200
	1.22341E-03	0.300
	1.30097E-03	0.400
	1.44923E-03	0.500
	2.45182E-03	1.000
	2.97092E-03	2.100
	7.34663E-03	5.700
	1.20004E-02	6.800
185.0000	1.63857E-02	7.600
	1.76078E-02	7.800

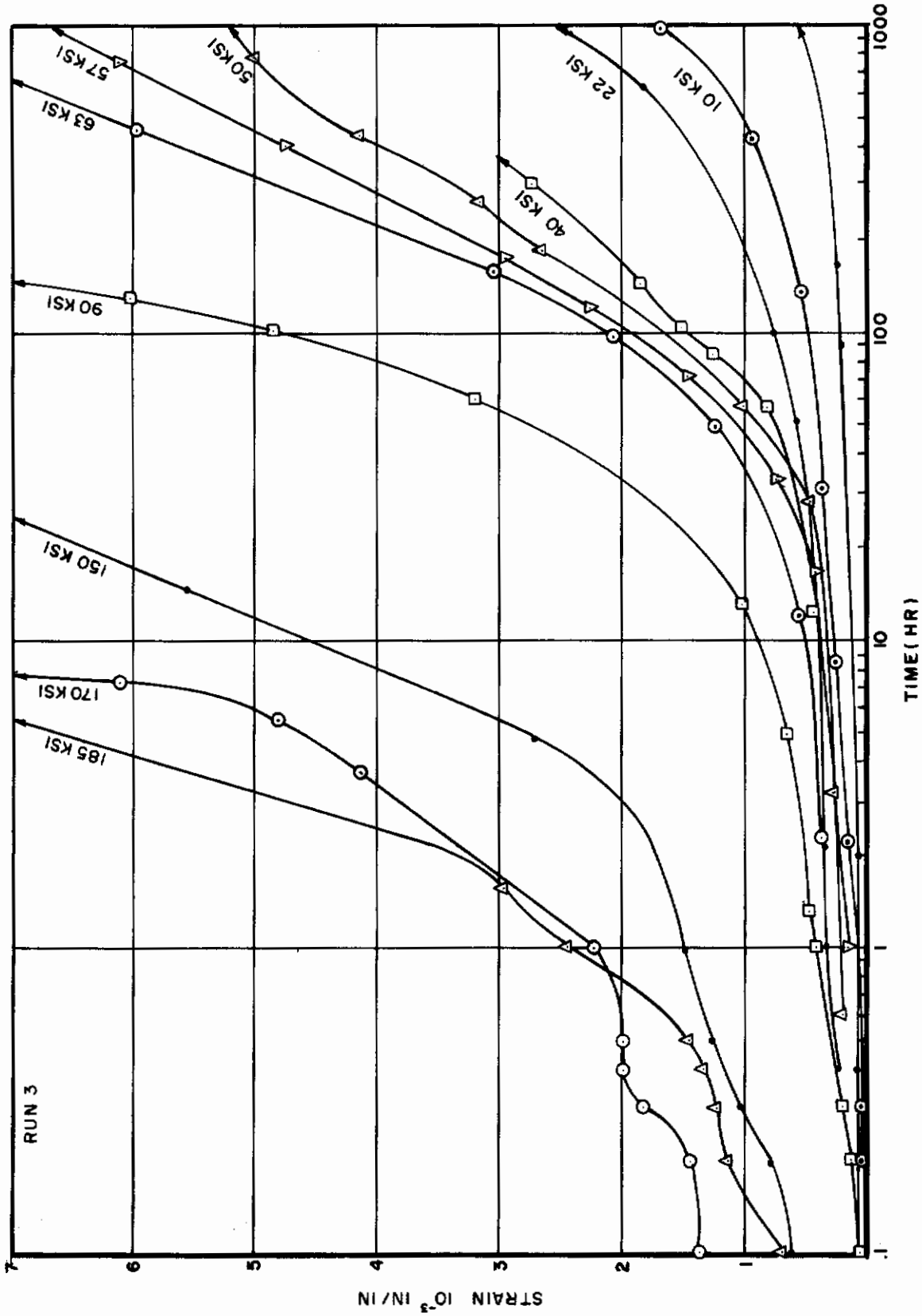


Figure 109. Creep Deformation Versus Log Time of 422 Stainless Steel at 900°F (1360°R)

TABLE 174

422 Stainless Steel Creep Deformation and Rupture Data at 900° F (1360° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
10.0	-	0.13	0.03	650	-	-	-
22.0	-	0.25	0.06	154	-	-	-
40.0	-	0.41	0.15	65	467	-	-
50.0	-	0.54	0.18	58	237	830	-
57.0	-	0.71	0.23	47	182	445	-
63.0	-	-	0.25	33	156	316	-
90.0	-	1.30	0.39	10	56	104	244
150.0	29.8	4.75	0.95	0.2	4.0	12	33
170.0	14.3	5.50	1.29	-	2.7	5.3	10.7
185.0	8.0	5.00	1.84	0.3	2.1	3.9	6.4

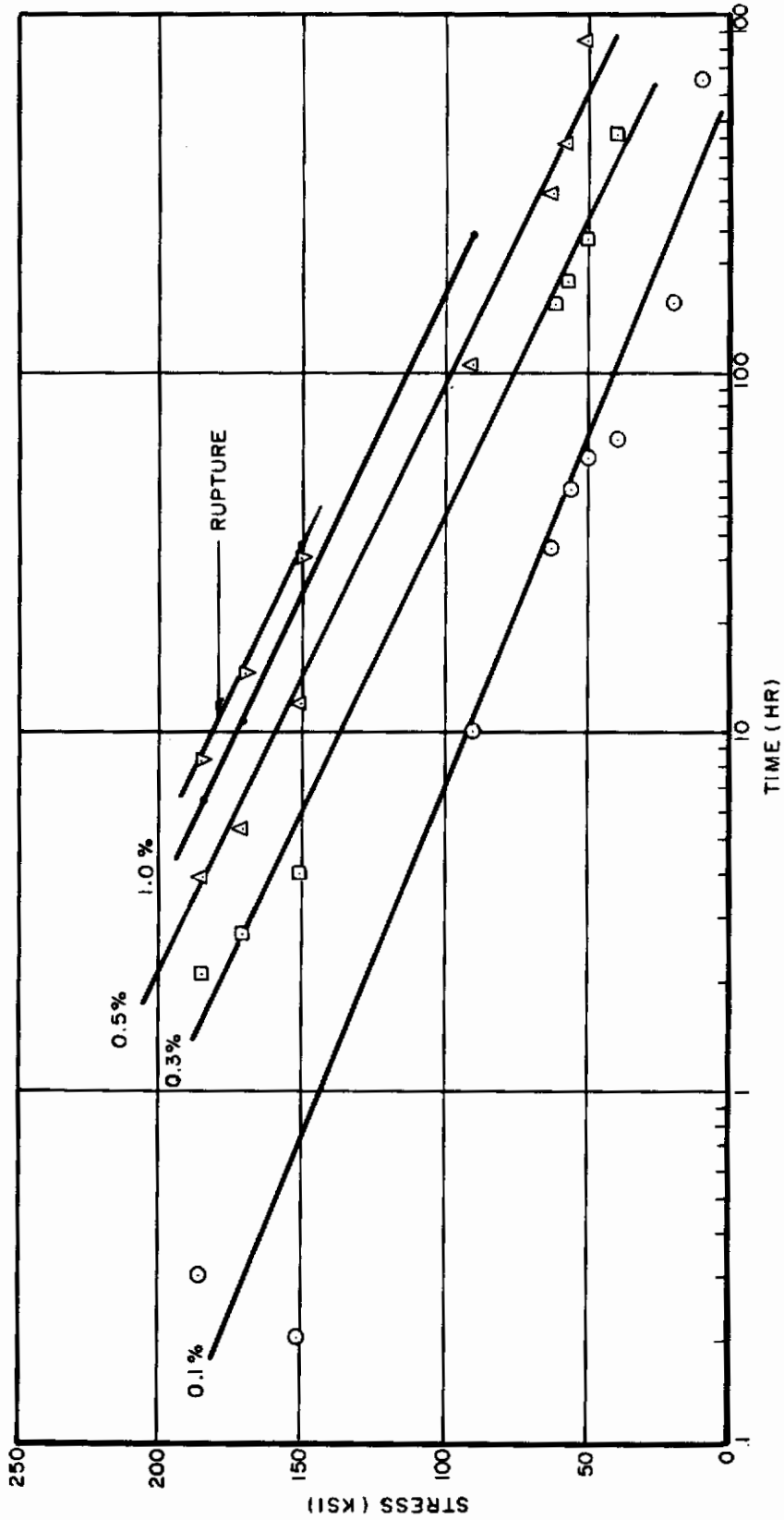


Figure 110. Creep Rupture Properties of 422 Stainless Steel at 900°F (1360°R)

TABLE 175

Minimum Creep Rate for 422 Stainless Steel

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	120	2.89×10^{-7}
"	160	1.13×10^{-6}
800° F (1260° R)	210	3.7×10^{-5}
"	212	1.34×10^{-4}
900° F (1360° R)	5	2.55×10^{-7}
"	10	1.27×10^{-6}
"	63	2.22×10^{-6}
"	150	2.93×10^{-4}
"	170	3.67×10^{-4}
"	185	4.72×10^{-4}

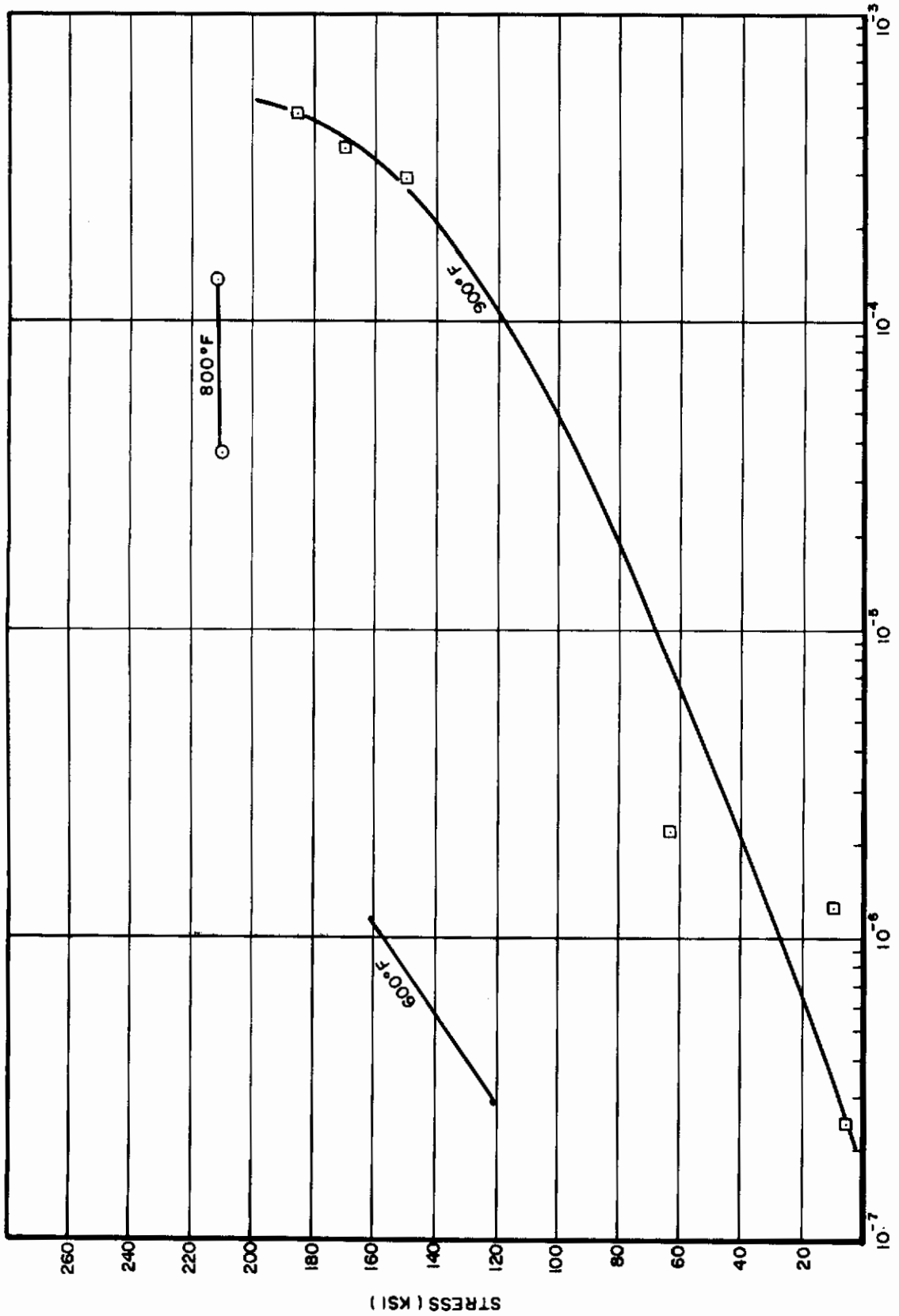


Figure 111. Minimum Creep Rate of 422 Stainless Steel

CREEP DATA

CRUCIBLE 422 STAINLESS STEEL

TABLE 176

RUN 19

Deformation Versus Time (Raw Data) for Crucible 422 Stainless Steel at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
140.0000	3.40000E-04	0.400
	4.80000E-04	1.000
	5.10000E-04	2.000
	5.90000E-04	18.400
	6.00000E-04	26.200
	6.90000E-04	49.900
	6.30000E-04	72.500
	7.40000E-04	90.600
	7.30000E-04	162.500
	8.00000E-04	234.700
	8.80000E-04	330.600
	9.40000E-04	410.100
	9.80000E-04	506.000
	8.60000E-04	618.400
	9.50000E-04	818.100
	8.90000E-04	1028.200
150.0000	4.60000E-04	1.200
	6.30000E-04	19.100
	7.40000E-04	26.400
	7.90000E-04	43.300
	7.80000E-04	49.200
	8.00000E-04	67.200
	7.10000E-04	74.600
	7.60000E-04	139.500
	8.80000E-04	188.500
	8.80000E-04	235.800
	9.00000E-04	314.400
	9.40000E-04	403.600
	9.30000E-04	506.700
	9.90000E-04	594.900
	1.47000E-03	794.600
	1.40000E-03	1007.400
160.0000	2.40000E-04	0.500
	2.70000E-04	1.000
	2.40000E-04	2.000
	3.40000E-04	19.300
	5.00000E-04	43.500
	7.10000E-04	97.300
	7.20000E-04	115.600
	7.30000E-04	186.100
	7.60000E-04	209.100
	8.60000E-04	297.300
	3.40000E-04	0.500
	3.30000E-04	1.000

TABLE 176 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
160.0000	3.70000E-04	2.000
	3.90000E-04	3.000
	4.30000E-04	4.200
	5.70000E-04	20.500
	8.40000E-04	49.500
	8.20000E-04	68.400
	8.40000E-04	72.600
	9.20000E-04	92.300
	9.60000E-04	99.400
	9.80000E-04	117.900
	9.40000E-04	141.400
	10.00000E-04	188.400
	9.70000E-04	220.200
	9.90000E-04	284.900
	1.07000E-03	358.200
	1.07000E-03	403.300
170.0000	2.70000E-04	1.300
	4.50000E-04	18.400
	6.80000E-04	25.700
	6.20000E-04	43.100
	7.10000E-04	66.600
	7.20000E-04	96.900
	6.90000E-04	143.100
	7.60000E-04	169.800
	7.30000E-04	210.300
	7.90000E-04	265.500
	7.90000E-04	315.800
	8.10000E-04	378.300
	7.60000E-04	452.700
	7.90000E-04	522.400
	8.70000E-04	601.300
	8.40000E-04	715.200
180.0000	2.90000E-04	0.500
	6.20000E-04	1.000
	7.60000E-04	2.000
	7.90000E-04	3.100
	9.00000E-04	4.100
	9.10000E-04	20.400
	1.06000E-03	27.300
	1.08000E-03	44.500
	1.04000E-03	51.700
	1.10000E-03	68.500
	1.08000E-03	80.500
	1.19000E-03	93.800

TABLE 176 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.19000E-03	123.900
	1.15000E-03	171.300
	1.31000E-03	238.900
	1.18000E-03	284.500
	1.19000E-03	380.500
	1.27000E-03	478.000
182.5000	3.50000E-04	0.400
182.5000	4.20000E-04	1.000
	5.70000E-04	2.000
	6.50000E-04	25.800
	6.50000E-04	40.000
	6.50000E-04	93.400
	8.10000E-04	169.900
	8.00000E-04	211.200
	8.60000E-04	261.600
	8.40000E-04	307.100
	8.60000E-04	409.800
	9.10000E-04	505.700
	9.80000E-04	595.200
	8.80000E-04	698.100
	9.30000E-04	811.000
	9.20000E-04	906.800
	9.80000E-04	1002.700

TABLE 177

Deformation Versus Time (Fitted Data) for Crucible 422 Stainless Steel at 600° F (1060° R)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
140.0000	3.37230E-04	0.400
	4.76050E-04	1.000
	5.25710E-04	2.000
	5.80090E-04	18.400
	5.96980E-04	26.200
	6.44330E-04	49.900
	6.82040E-04	72.500
	7.07790E-04	90.600
	7.83340E-04	162.500
	8.32520E-04	234.700
	8.74620E-04	330.600
	8.96890E-04	410.100
	9.13720E-04	506.000
	9.23710E-04	618.400
	9.24480E-04	818.100
	9.10450E-04	1028.200
150.0000	4.45490E-04	1.200
	7.10130E-04	19.100
	7.29500E-04	26.400
	7.51550E-04	43.300
	7.55940E-04	49.200
	7.65260E-04	67.200
	7.68180E-04	74.600
	7.91170E-04	139.500
	8.12510E-04	188.500
	8.37190E-04	235.800
	8.85400E-04	314.400
	9.48040E-04	403.600
	1.02753E-03	506.700
	1.09962E-03	594.900
	1.27128E-03	794.600
	1.46111E-03	1007.400
160.0000	2.49240E-04	0.500
	2.51290E-04	1.000
	2.45650E-04	2.000
	3.61060E-04	19.300
	4.97180E-04	43.500
	6.64410E-04	97.300
	6.99410E-04	115.600
	7.81950E-04	186.100
	7.96980E-04	209.100
	8.22780E-04	297.300
	3.57010E-04	0.500

TABLE 177 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
160.0000	3.62760E-04	1.000
	3.74150E-04	2.000
	3.85390E-04	3.000
	3.98690E-04	4.200
	5.60050E-04	20.500
	7.67560E-04	49.500
	8.56960E-04	68.400
	8.72680E-04	72.600
	9.29210E-04	92.300
	9.43470E-04	99.400
	9.68320E-04	117.900
	9.80380E-04	141.400
	9.72180E-04	188.400
	9.65200E-04	220.200
	9.93490E-04	284.900
	1.07528E-03	358.200
	1.06711E-03	403.300
170.0000	2.61860E-04	1.300
	5.50990E-04	18.400
	5.84070E-04	25.700
	6.32490E-04	43.100
	6.70330E-04	66.600
	7.00680E-04	96.900
	7.30080E-04	143.100
	7.42340E-04	169.800
	7.57180E-04	210.300
	7.72830E-04	265.500
	7.84210E-04	315.800
	7.95900E-04	378.300
	8.07460E-04	452.700
	8.16720E-04	522.400
	8.25910E-04	601.300
	8.37480E-04	715.200
180.0000	3.02330E-04	0.500
	5.91460E-04	1.000
	7.64200E-04	2.000
	8.31450E-04	3.100
	8.62780E-04	4.100
	9.79840E-04	20.400
	1.00365E-03	27.300
	1.05071E-03	44.500
	1.06689E-03	51.700
	1.09893E-03	68.500
	1.11796E-03	80.500
	1.13612E-03	93.800

RUN 19

TABLE 177 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.16852E-03	123.900
	1.20254E-03	171.300
	1.22884E-03	238.900
	1.23716E-03	284.500
	1.23917E-03	380.500
	1.22736E-03	478.000
182.5000	3.32710E-04	0.400
182.5000	4.69270E-04	1.000
	5.38070E-04	2.000
	6.31140E-04	25.800
	6.49560E-04	40.000
	7.10440E-04	93.400
	7.74790E-04	169.900
	8.01450E-04	211.200
	8.28450E-04	261.600
	8.48720E-04	307.100
	8.83710E-04	409.800
	9.06560E-04	505.700
	9.21690E-04	595.200
	9.33480E-04	698.100
	9.41110E-04	811.000
	9.44150E-04	906.800
	9.44640E-04	1002.700

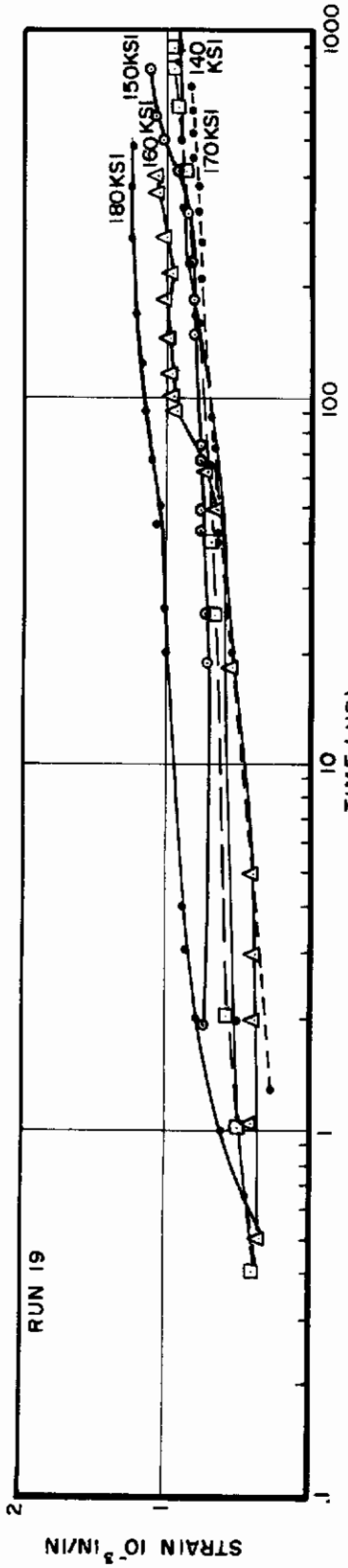


Figure 112. Creep Deformation Versus Log Time of Crucible 422 Stainless Steel at 600°F (1060°R)

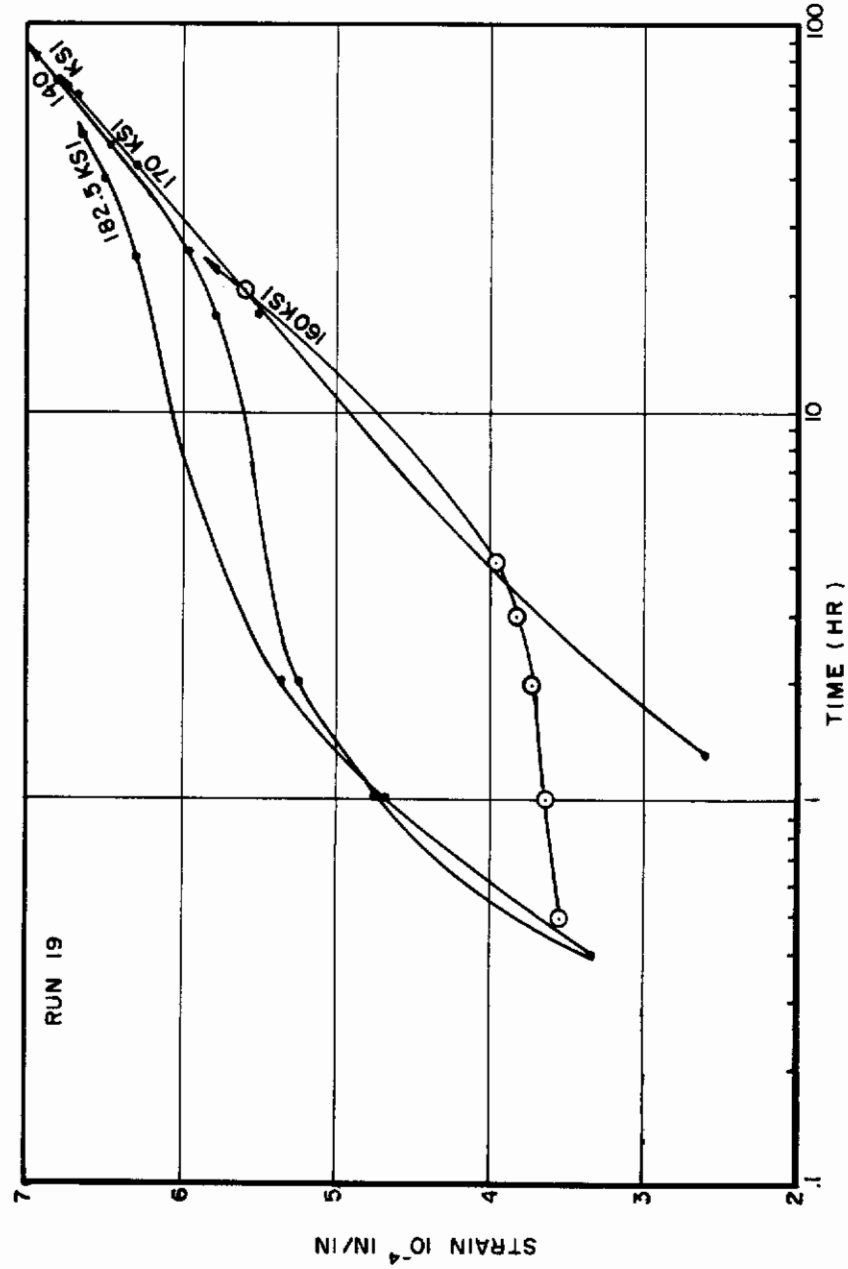


Figure 113. Creep Deformation Versus Log Time of Crucible 422 Stainless Steel at 600°F (1060°R)

TABLE 178

Crucible 422 Stainless Steel Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
140.0	-	0.259	-	-	-	-	-
150.0	-	0.390	-	-	3.0	-	-
160.0	-	0.417	-	-	-	-	-
160.0	-	0.422	-	-	-	-	-
170.0	-	0.660	-	-	-	-	-
180.0	-	0.838	-	-	-	-	-
182.0	-	0.785	-	-	-	-	-
185.0	-	0.961	-	-	-	-	-
190.0	-	1.160	-	-	-	-	-
192.5	-	1.000	-	-	-	-	-

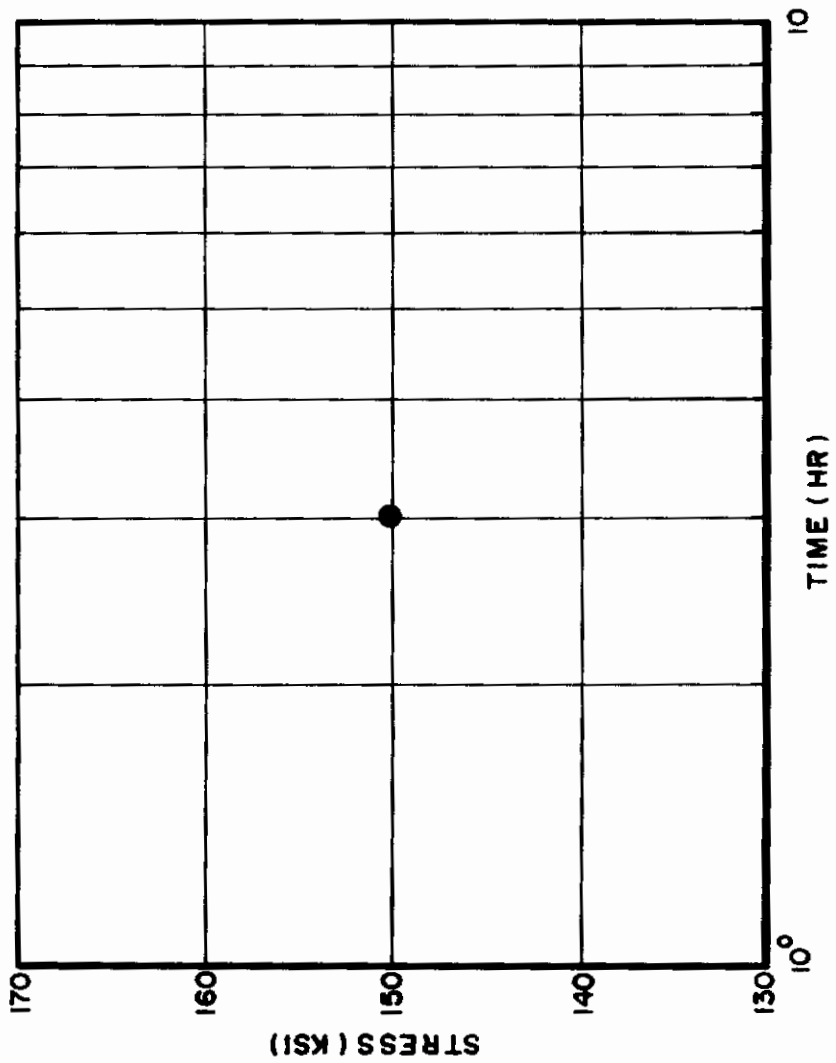


Figure 114. Creep Rupture Properties of Crucible 422 Stainless Steel at 600°F (1060°R)

TABLE 179

Deformation Versus Time (Raw Data) for Crucible 422 Stainless Steel at 800° F (1260° R)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
98.8000	2.50000E-04	0.400
	3.20000E-04	1.000
	3.60000E-04	2.100
	3.90000E-04	3.000
	4.10000E-04	5.000
	5.70000E-04	21.700
	5.80000E-04	28.700
	6.40000E-04	45.600
	7.00000E-04	69.700
	7.20000E-04	94.100
	7.30000E-04	122.200
	8.50000E-04	165.600
	8.80000E-04	215.500
	9.40000E-04	263.000
	1.02000E-03	313.800
	1.04000E-03	365.200
	1.13000E-03	501.600
	1.21000E-03	602.600
	1.24000E-03	725.000
100.0000	4.50000E-04	0.400
	5.50000E-04	1.000
	6.50000E-04	2.000
	9.60000E-04	19.300
	1.06000E-03	43.300
	1.19000E-03	74.700
	1.26000E-03	91.800
	1.36000E-03	119.600
	1.34000E-03	143.100
	1.43000E-03	170.400
	1.50000E-03	213.000
	1.60000E-03	266.600
	1.71000E-03	331.100
100.0000	1.85000E-03	403.800
	2.02000E-03	530.700
	2.10000E-03	650.700
	2.23000E-03	771.200
	2.30000E-03	931.700
	2.34000E-03	1004.400
105.0000	8.00000E-05	0.400
	1.40000E-04	1.100
	2.00000E-04	2.000
	2.70000E-04	3.300
	5.30000E-04	22.000
	6.30000E-04	29.400

TABLE 179 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.30000E-04	52.000
	9.30000E-04	117.900
	9.30000E-04	149.000
	1.03000E-03	190.200
	1.12000E-03	245.200
	1.26000E-03	310.100
	1.35000E-03	382.400
	1.49000E-03	478.100
	1.67000E-03	598.000
	1.85000E-03	670.200
	2.08000E-03	764.400
	2.16000E-03	869.500
	2.40000E-03	1007.500
110.0000	3.70000E-04	0.400
	5.40000E-04	1.000
	6.40000E-04	2.100
	6.80000E-04	2.800
	1.03000E-03	20.000
	1.08000E-03	26.500
	1.23000E-03	42.900
	1.24000E-03	50.400
	1.34000E-03	69.800
	1.47000E-03	89.000
	1.54000E-03	115.800
	1.68000E-03	163.000
	1.70000E-03	187.000
	1.76000E-03	211.000
	1.86000E-03	259.500
	2.04000E-03	306.800
	2.14000E-03	360.900
	2.41000E-03	450.800
	2.51000E-03	554.000
	2.70000E-03	643.000
	2.86000E-03	698.500
	3.06000E-03	794.400
	3.20000E-03	866.400
110.0000	3.37000E-03	930.800
	3.40000E-03	1002.800
115.0000	1.90000E-04	0.400
	3.10000E-04	1.400
	3.70000E-04	2.000
	7.60000E-04	19.100
	8.60000E-04	26.100
	1.15000E-03	43.300
	1.10000E-03	50.200

TABLE 179 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.13000E-03	67.200
	1.36000E-03	114.900
	1.48000E-03	146.000
	1.60000E-03	187.100
	1.77000E-03	218.000
	1.83000E-03	283.000
	1.98000E-03	362.100
	2.19000E-03	458.400
	2.29000E-03	530.500
	2.70000E-03	667.000
120.0000	3.40000E-04	0.400
	9.80000E-04	16.900
	1.15000E-03	23.400
	1.21000E-03	42.900
	1.33000E-03	67.100
	1.66000E-03	119.400
	1.67000E-03	167.800
	1.92000E-03	209.000
	2.06000E-03	287.600
	2.17000E-03	336.000
	2.37000E-03	448.800
	2.53000E-03	520.600
	2.73000E-03	600.100
	2.96000E-03	715.500
	3.04000E-03	808.700
	3.17000E-03	905.400
	3.31000E-03	1000.700
125.0000	2.90000E-04	0.400
	5.10000E-04	1.200
	9.30000E-04	18.000
	1.19000E-03	42.100
	1.24000E-03	48.700
	1.28000E-03	68.100
	1.30000E-03	92.300
	1.50000E-03	114.100
	1.59000E-03	137.900
	1.92000E-03	168.900
	1.90000E-03	210.200
130.0000	6.30000E-04	0.500
	7.60000E-04	1.100
	9.10000E-04	2.000
	9.40000E-04	3.200
	1.11000E-03	4.000
	1.43000E-03	20.800
	1.43000E-03	27.500
	1.54000E-03	46.900

TABLE 179 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.63000E-03	71.000
	1.89000E-03	99.500
	1.98000E-03	123.300
	2.16000E-03	164.800
	2.25000E-03	196.000
	2.43000E-03	237.900
	2.45000E-03	260.600
	2.55000E-03	308.800
	2.57000E-03	380.400
	2.75000E-03	436.000
	2.71000E-03	507.800
	2.94000E-03	572.400
	3.21000E-03	676.200
	3.27000E-03	719.500
135.0000	4.60000E-04	0.400
	5.50000E-04	0.900
	7.00000E-04	2.000
	7.90000E-04	3.000
	9.30000E-04	5.000
	1.46000E-03	29.000
	1.64000E-03	45.900
	1.78000E-03	52.900
	1.92000E-03	72.500
	2.02000E-03	96.600
	2.02000E-03	118.200
	2.10000E-03	125.200
	2.17000E-03	165.900
	2.56000E-03	208.100
	2.64000E-03	239.900
	2.94000E-03	316.300
	3.20000E-03	405.700
	3.28000E-03	460.900
	3.65000E-03	556.800
	3.91000E-03	629.100
	4.13000E-03	700.900
	4.60000E-03	789.900
140.0000	7.80000E-04	0.700
	1.38000E-03	14.000
	1.52000E-03	24.500
	1.70000E-03	41.600

TABLE 179 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
140.0000	1.93000E-03	65.600
	1.93000E-03	72.300
	2.11000E-03	95.800
	2.12000E-03	115.700
	2.19000E-03	141.800
	2.16000E-03	160.800
	2.29000E-03	191.800
	2.51000E-03	215.700
	2.61000E-03	233.200
	2.82000E-03	264.300
	2.97000E-03	291.200
	3.22000E-03	344.300
	3.31000E-03	409.000
	3.81000E-03	504.200
150.0000	5.60000E-04	0.400
	6.70000E-04	1.100
	1.27000E-03	18.600
	1.59000E-03	25.400
	1.81000E-03	49.200
	2.19000E-03	73.300
	2.35000E-03	90.600
	2.54000E-03	113.800
	2.86000E-03	161.400
	3.04000E-03	185.200
	3.37000E-03	210.400
	3.52000E-03	257.100
	3.96000E-03	310.100
	4.18000E-03	360.000
	4.53000E-03	401.200

TABLE 180

Deformation Versus Time (Fitted Data) for Crucible 422 Stainless Steel at 800° F (1260° R) RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
98.8000	2.50110E-04	0.400
	3.13360E-04	1.000
	3.64790E-04	2.100
	3.89750E-04	3.000
	4.26340E-04	5.000
	5.47880E-04	21.700
	5.76320E-04	28.700
	6.29540E-04	45.600
	6.86750E-04	69.700
	7.33270E-04	94.100
	7.78590E-04	122.200
	8.37800E-04	165.600
	8.95520E-04	215.500
	9.43600E-04	263.000
	9.89720E-04	313.800
	1.03216E-03	365.200
	1.13014E-03	501.600
	1.19297E-03	602.600
	1.26132E-03	725.000
100.0000	4.37080E-04	0.400
	5.72060E-04	1.000
	6.53550E-04	2.000
	9.22200E-04	19.300
	1.06638E-03	43.300
	1.19324E-03	74.700
	1.24899E-03	91.800
	1.32775E-03	119.600
	1.38618E-03	143.100
	1.44726E-03	170.400
	1.53181E-03	213.000
	1.62479E-03	266.600
	1.72272E-03	331.100
100.0000	1.82002E-03	403.800
	1.96686E-03	530.700
	2.08689E-03	650.700
	2.19430E-03	771.200
	2.32222E-03	931.700
	2.37563E-03	1004.400
105.0000	8.67300E-05	0.400
	1.27020E-04	1.100
	1.97390E-04	2.000
	2.72430E-04	3.300
	5.84580E-04	22.000
	6.28870E-04	29.400

TABLE 180 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.16816E-04	52.000
	8.74910E-04	117.900
	9.37480E-04	149.000
	1.01680E-03	190.200
	1.11929E-03	245.200
	1.23720E-03	310.100
	1.36573E-03	382.400
	1.53203E-03	478.100
	1.73490E-03	598.000
	1.85433E-03	670.200
	2.00728E-03	764.400
	2.17433E-03	869.500
	2.38828E-03	1007.500
110.0000	3.86520E-04	0.400
	5.09800E-04	1.000
	6.33900E-04	2.100
	6.85690E-04	2.800
	1.05871E-03	20.000
	1.11499E-03	26.500
	1.21842E-03	42.900
	1.25629E-03	50.400
	1.34068E-03	69.800
	1.41290E-03	89.000
	1.50330E-03	115.800
	1.64606E-03	163.000
	1.71358E-03	187.000
	1.77868E-03	211.000
	1.90451E-03	259.500
	2.02146E-03	306.800
	2.14976E-03	360.900
	2.35281E-03	450.800
	2.57356E-03	554.000
	2.75540E-03	643.000
	2.86537E-03	698.500
	3.04996E-03	794.400
	3.18449E-03	866.400
110.0000	3.30214E-03	930.800
	3.43093E-03	1002.800
115.0000	2.02820E-04	0.400
	2.97980E-04	1.400
	3.46290E-04	2.000
	8.21350E-04	19.100
	9.03150E-04	26.100
	1.04423E-03	43.300
	1.08808E-03	50.200
	1.17950E-03	67.200

TABLE 180 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.37284E-03	114.900
	1.47482E-03	146.000
	1.59483E-03	187.100
	1.67779E-03	218.000
	1.83893E-03	283.000
	2.01866E-03	362.100
	2.22147E-03	458.400
	2.36499E-03	530.500
	2.62220E-03	667.000
120.0000	3.38880E-04	0.400
	1.02069E-03	16.900
	1.08848E-03	23.400
	1.23322E-03	42.900
	1.36404E-03	67.100
	1.57936E-03	119.400
	1.74064E-03	167.800
	1.86183E-03	209.000
	2.06660E-03	287.600
	2.18035E-03	336.000
	2.42008E-03	448.800
	2.55866E-03	520.600
	2.70232E-03	600.100
	2.89616E-03	715.500
	3.04233E-03	808.700
	3.18588E-03	905.400
	3.32042E-03	1000.700
125.0000	2.93970E-04	0.400
	5.00700E-04	1.200
	9.73540E-04	18.000
	1.14297E-03	42.100
	1.18032E-03	48.700
	1.28325E-03	68.100
	1.40475E-03	92.300
	1.51110E-03	114.100
	1.62518E-03	137.900
	1.77141E-03	168.900
	1.96276E-03	210.200
130.0000	6.52620E-04	0.500
	7.76810E-04	1.100
	8.81630E-04	2.000
	9.70520E-04	3.200
	1.01475E-03	4.000
	1.38866E-03	20.800
	1.46307E-03	27.500
	1.61980E-03	46.900
	1.75930E-03	71.000

RUN 19

TABLE 180 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.88856E-03	99.500
	1.97998E-03	123.300
	2.11772E-03	164.800
	2.20908E-03	196.000
	2.32048E-03	237.900
	2.37666E-03	260.600
	2.48837E-03	308.800
	2.63964E-03	380.400
	2.74795E-03	436.000
	2.87866E-03	507.800
	2.98913E-03	572.400
	3.15533E-03	676.200
	3.22120E-03	719.500
135.0000	4.79100E-04	0.400
	5.21810E-04	0.900
	6.81770E-04	2.000
	7.92880E-04	3.000
	9.49810E-04	5.000
	1.52317E-03	29.000
	1.67742E-03	45.900
	1.72795E-03	52.900
	1.84909E-03	72.500
	1.97562E-03	96.600
	2.07807E-03	118.200
	2.10985E-03	125.200
	2.28553E-03	165.900
	2.45701E-03	208.100
	2.58160E-03	239.900
	2.86978E-03	316.300
	3.19245E-03	405.700
	3.38559E-03	460.900
	3.71189E-03	556.800
	3.95108E-03	629.100
	4.18345E-03	700.900
	4.46499E-03	789.900
140.0000	7.79890E-04	0.700
	1.36444E-03	14.000
	1.55997E-03	24.500
	1.72792E-03	41.600
	1.87318E-03	65.600
	1.90685E-03	72.300
	2.01559E-03	95.800
	2.10240E-03	115.700
	2.21419E-03	141.800
	2.29544E-03	160.800

TABLE 180 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
140.0000	2.42890E-03	191.800
	2.53280E-03	215.700
	2.60947E-03	233.200
	2.74683E-03	264.300
	2.86663E-03	291.200
	3.10524E-03	344.300
	3.39842E-03	409.000
	3.83177E-03	504.200
150.0000	5.69180E-04	0.400
	6.49850E-04	1.100
	1.36950E-03	18.600
	1.50366E-03	25.400
	1.85677E-03	49.200
	2.13408E-03	73.300
	2.30879E-03	90.600
	2.52298E-03	113.800
	2.91581E-03	161.400
	3.09595E-03	185.200
	3.27793E-03	210.400
	3.59616E-03	257.100
	3.93391E-03	310.100
	4.23410E-03	360.000
	4.47126E-03	401.200

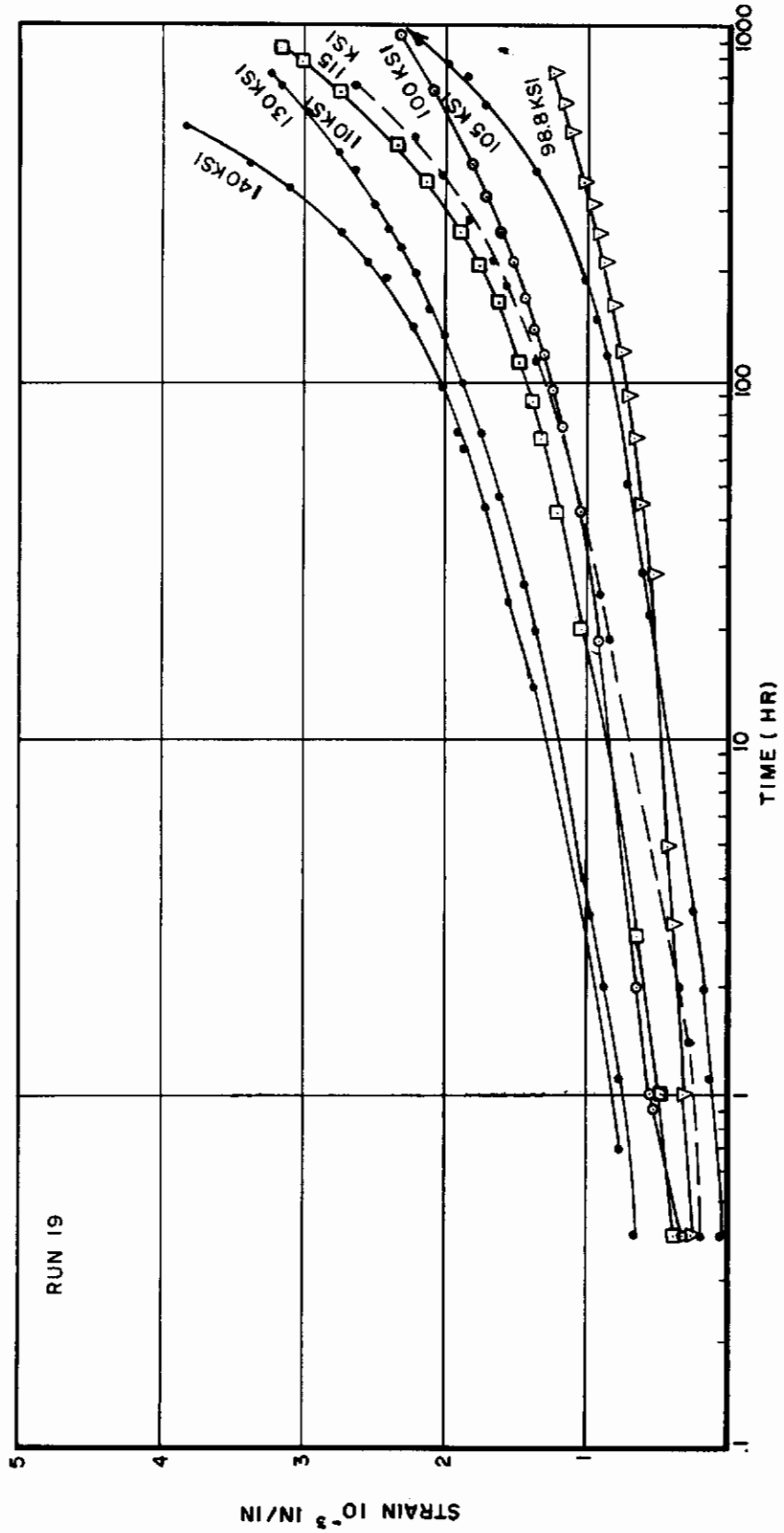


Figure 115. Creep Deformation Versus Log Time of Crucible 422 Stainless Steel at 800°F (1260°R)

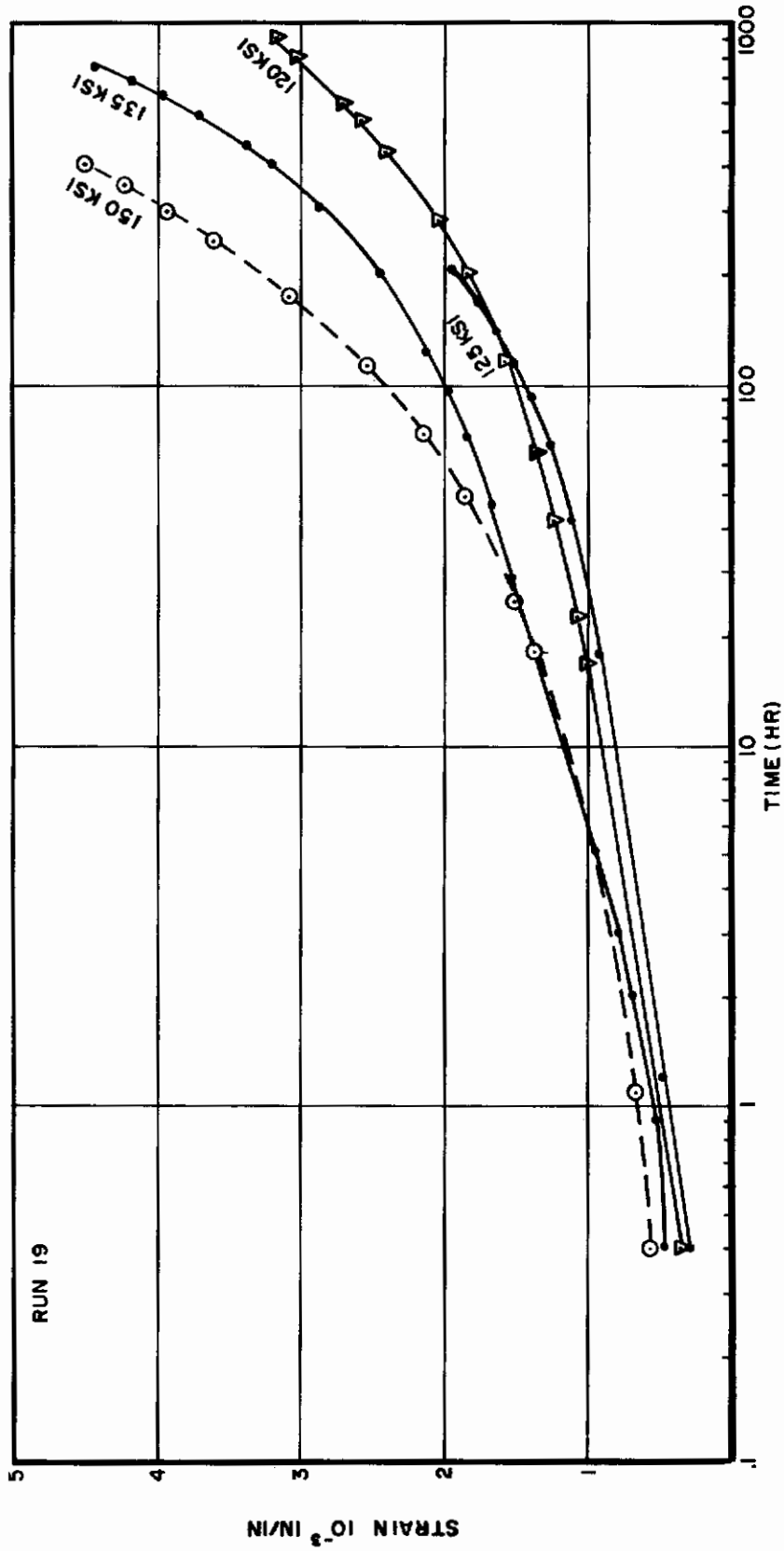


Figure 116. Creep Deformation Versus Log Time of Crucible 422 Stainless Steel at 800°F (1260°R)

TABLE 181

Crucible 422 Stainless Steel Creep Deformation and Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
98.8	-			320	-	-	-
100.0	-			28	-	-	-
105.0	-			15	1000	-	-
110.0	-			.4	440	-	-
115.0	-			-	350	-	-
120.0	-			-	110	-	-
125.0	214.8			-	35	-	-
130.0	-			-	9	690	-
135.0	794.5			-	6	400	-
140.0	506.9			-	-	24	-
150.0	404.0			-	-	2.2	-

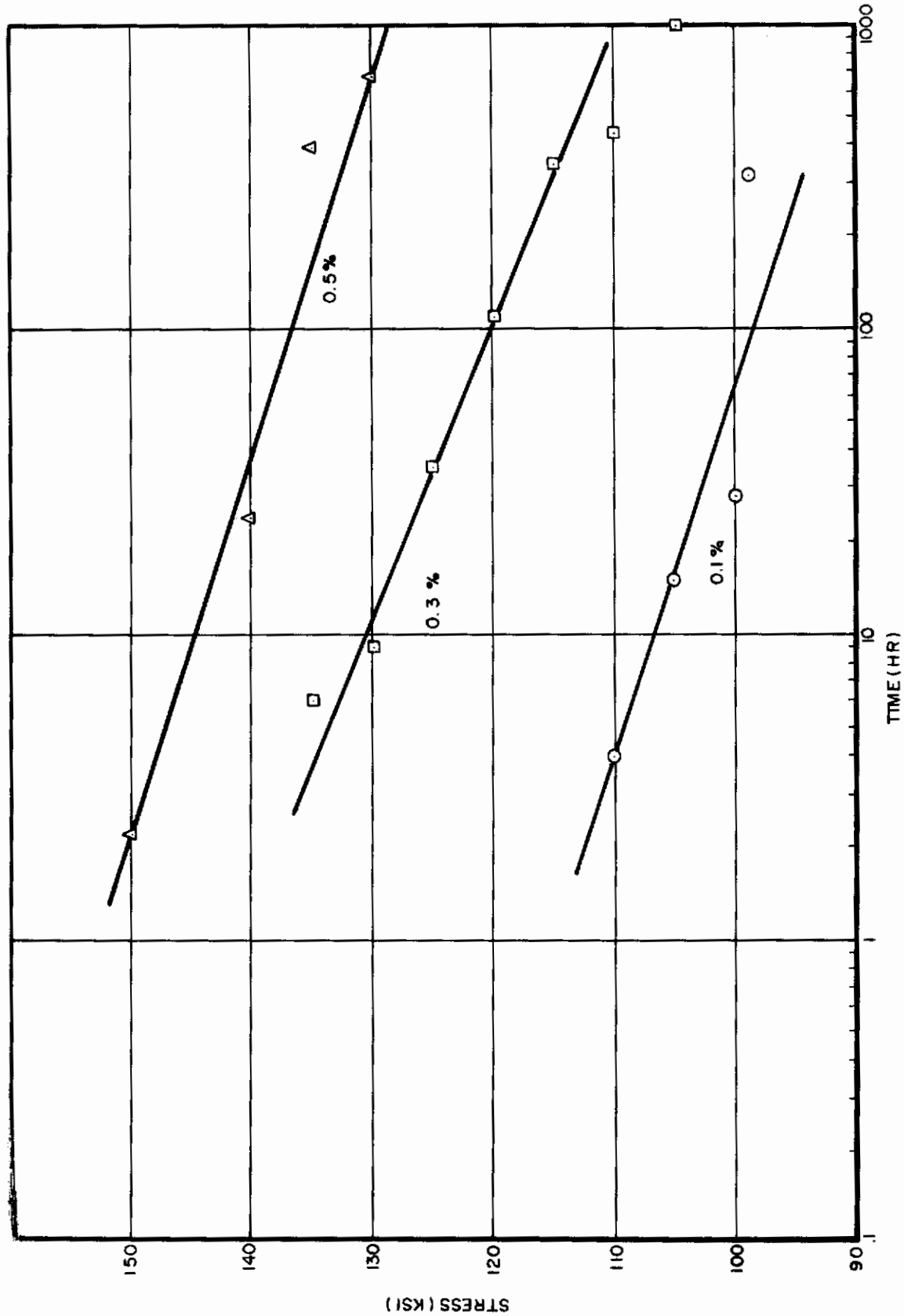


Figure 117. Creep Rupture Properties of Crucible 422 Stainless Steel at 800°F (1260°R)

TABLE 182

Deformation Versus Time (Raw Data) for Crucible 422 Stainless Steel at 900° F (1360° R)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	2.40000E-04	0.400
	3.60000E-04	1.000
	1.25000E-03	17.200
	1.72000E-03	25.000
	2.63000E-03	71.300
	3.12000E-03	96.400
	3.41000E-03	113.100
	3.61000E-03	137.100
	3.89000E-03	161.500
	4.32000E-03	209.400
	4.65000E-03	240.800
	4.86000E-03	264.700
	5.29000E-03	309.300
	5.54000E-03	353.400
	5.90000E-03	401.600
	6.23000E-03	477.300
	6.86000E-03	552.400
	7.17000E-03	617.100
	7.39000E-03	696.800
60.0000	7.52000E-03	816.900
	7.65000E-03	906.200
	7.90000E-03	1001.300
65.0000	2.40000E-04	0.400
	1.17000E-03	18.400
	1.34000E-03	25.700
	1.69000E-03	42.600
	1.83000E-03	48.500
	2.35000E-03	66.600
	2.54000E-03	73.900
	2.82000E-03	89.900
	3.28000E-03	114.200
	3.62000E-03	139.000
	3.96000E-03	162.700
	4.31000E-03	193.600
	4.71000E-03	235.100
	5.19000E-03	286.400
	5.56000E-03	330.900
	6.13000E-03	410.000
	6.66000E-03	506.000
	7.03000E-03	594.300
	7.30000E-03	667.300
	7.71000E-03	760.700
	7.99000E-03	883.300
	8.14000E-03	957.200
	8.35000E-03	1026.500

TABLE 182 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	3.00000E-04	0.400
	5.00000E-04	1.000
	6.40000E-04	2.000
	1.37000E-03	19.300
	1.78000E-03	26.200
	2.62000E-03	45.800
	3.57000E-03	70.200
	4.26000E-03	91.400
	4.49000E-03	98.700
	4.85000E-03	116.800
	5.53000E-03	139.300
	5.70000E-03	146.600
	6.48000E-03	163.900
77.5000	3.80000E-04	0.400
	4.70000E-04	1.000
	5.80000E-04	2.100
	6.60000E-04	3.200
	7.30000E-04	4.300
	7.90000E-04	5.300
	1.65000E-03	22.300
	1.94000E-03	29.300
77.5000	2.81000E-03	48.500
	3.73000E-03	72.000
	4.54000E-03	94.100
	4.88000E-03	100.800
	5.38000E-03	118.000
	6.51000E-03	142.000
	6.90000E-03	166.100
	7.74000E-03	195.900
	8.70000E-03	241.100
	9.17000E-03	269.200
	9.91000E-03	310.000
85.0000	4.20000E-04	0.400
	5.40000E-04	1.100
	1.76000E-03	17.200
	2.27000E-03	23.900
	3.27000E-03	41.200
	3.71000E-03	48.000
	4.10000E-03	65.200
	4.50000E-03	72.100
	5.52000E-03	90.000
	6.66000E-03	115.600
	7.65000E-03	139.100
	8.83000E-03	168.000
	9.84000E-03	216.400

RUN 19

TABLE 182 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
95.0000	3.00000E-04	0.400
	5.90000E-04	1.000
	9.40000E-04	3.000
	10.00000E-04	4.000
	1.17000E-03	5.100
	1.28000E-03	6.100
	2.62000E-03	22.600
	3.16000E-03	29.400
	4.41000E-03	46.700
	4.88000E-03	53.800
	6.14000E-03	70.900
100.0000	5.40000E-04	0.400
	7.90000E-04	1.000
	8.00000E-04	2.000
	2.21000E-03	19.300
	2.84000E-03	26.300
	4.26000E-03	42.900
	4.81000E-03	49.700
	6.55000E-03	69.700
	8.60000E-03	95.800
	1.00200E-02	114.800
110.0000	6.30000E-04	0.500
110.0000	7.20000E-04	1.000
	2.69000E-03	18.000
	3.55000E-03	25.300

TABLE 183

Deformation Versus Time (Fitted Data) for Crucible 422 Stainless Steel at 900° F (1360° R)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	2.59990E-04	0.400
	3.62880E-04	1.000
	1.23575E-03	17.200
	1.53328E-03	25.000
	2.70145E-03	71.300
	3.13643E-03	96.400
	3.38562E-03	113.100
	3.70328E-03	137.100
	3.98888E-03	161.500
	4.47069E-03	209.400
	4.74461E-03	240.800
	4.93601E-03	264.700
	5.26129E-03	309.300
	5.54993E-03	353.400
	5.83564E-03	401.600
	6.23524E-03	477.300
	6.58562E-03	552.400
	6.85863E-03	617.100
	7.16536E-03	696.800
60.0000	7.57843E-03	816.900
	7.85489E-03	906.200
	8.12597E-03	1001.300
65.0000	2.40660E-04	0.400
	1.13171E-03	18.400
	1.32643E-03	25.700
	1.77166E-03	42.600
	1.91776E-03	48.500
	2.33229E-03	66.600
	2.48612E-03	73.900
	2.79993E-03	89.900
	3.22455E-03	114.200
	3.60608E-03	139.000
	3.93172E-03	162.700
	4.31041E-03	193.600
	4.75446E-03	235.100
	5.22486E-03	286.400
	5.57865E-03	330.900
	6.11361E-03	410.000
	6.64319E-03	506.000
	7.04559E-03	594.300
	7.33131E-03	667.300
	7.64762E-03	760.700
	7.99609E-03	883.300
	8.17650E-03	957.200
	8.32870E-03	1026.500

TABLE 183 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	3.05880E-04	0.400
	4.99930E-04	1.000
	6.19460E-04	2.000
	1.45014E-03	19.300
	1.76179E-03	26.200
	2.58528E-03	45.800
	3.49698E-03	70.200
	4.21003E-03	91.400
	4.44170E-03	98.700
	4.99011E-03	116.800
	5.62722E-03	139.300
	5.82469E-03	146.600
	6.27673E-03	163.900
77.5000	3.45660E-04	0.400
	5.28640E-04	1.000
	6.14430E-04	2.100
	6.51310E-04	3.200
	6.85230E-04	4.300
	7.19270E-04	5.300
	1.55794E-03	22.300
	1.92215E-03	29.300
77.5000	2.85263E-03	48.500
	3.85392E-03	72.000
	4.68394E-03	94.100
	4.91801E-03	100.800
	5.48699E-03	118.000
	6.21488E-03	142.000
	6.88177E-03	166.100
	7.63391E-03	195.900
	8.65258E-03	241.100
	9.22569E-03	269.200
	9.99097E-03	310.000
85.0000	4.14080E-04	0.400
	5.53520E-04	1.100
	1.78375E-03	17.200
	2.19750E-03	23.900
	3.18538E-03	41.200
	3.54688E-03	48.000
	4.40668E-03	65.200
	4.73259E-03	72.100
	5.53563E-03	90.000
	6.59575E-03	115.600
	7.49545E-03	139.100
	8.52466E-03	168.000
	1.00981E-02	216.400

TABLE 183 (CONT)

RUN 19

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
95.0000	3.03750E-04	0.400
	5.79420E-04	1.000
	9.26350E-04	3.000
	1.04599E-03	4.000
	1.16396E-03	5.100
	1.26358E-03	6.100
	2.62262E-03	22.600
	3.13748E-03	29.400
	4.40810E-03	46.700
	4.91755E-03	53.800
	6.12117E-03	70.900
100.0000	5.56300E-04	0.400
	7.32820E-04	1.000
	8.49590E-04	2.000
	2.20136E-03	19.300
	2.81536E-03	26.300
	4.26895E-03	42.900
	4.85327E-03	49.700
	6.52248E-03	69.700
	8.59173E-03	95.800
	1.00281E-02	114.800
110.0000	6.45060E-04	0.500
110.0000	7.03590E-04	1.000
	2.69344E-03	18.000
	3.54790E-03	25.300

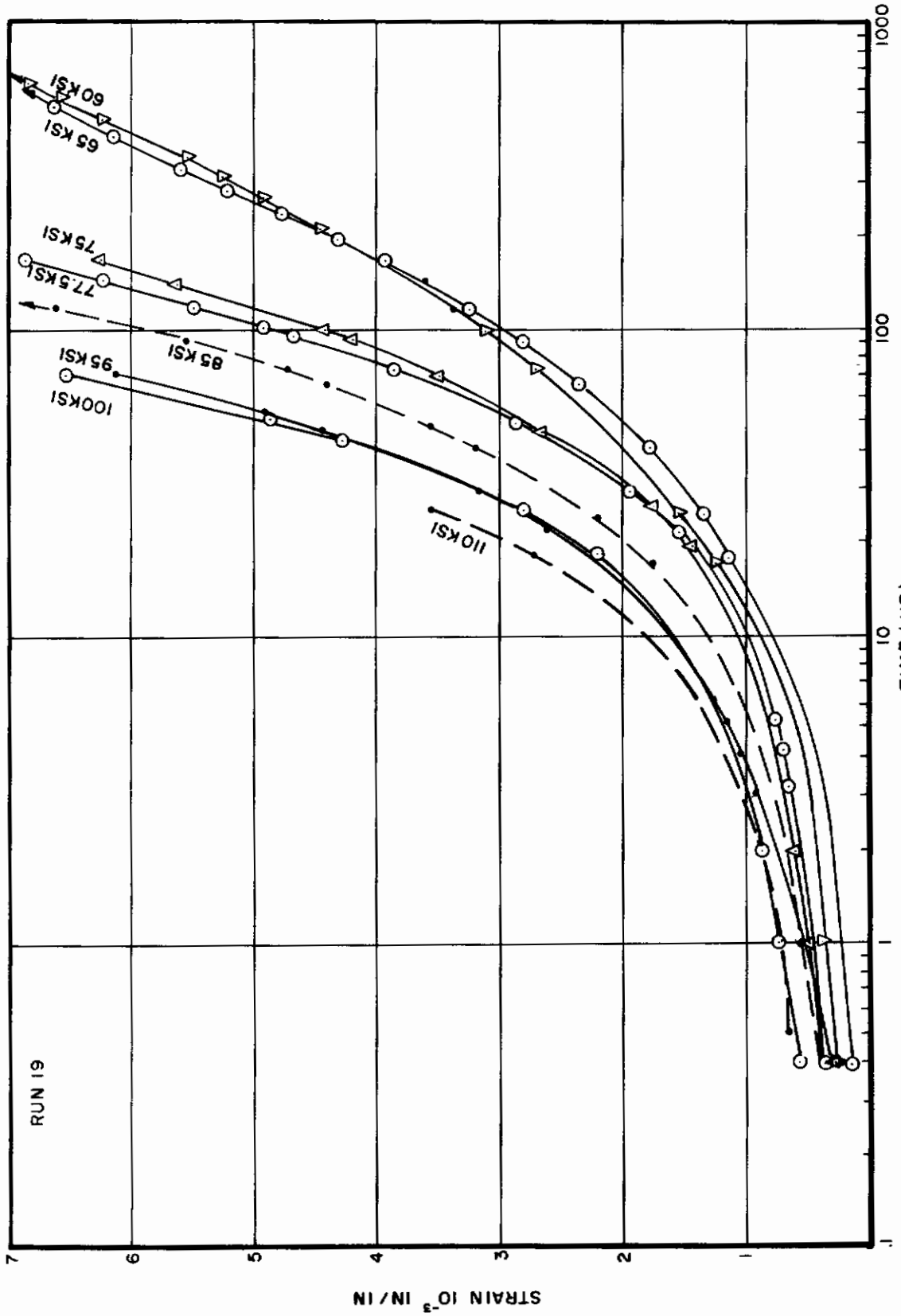


Figure 118. Creep Deformation Versus Log Time of Crucible Stainless Steel at 900°F (1360°R)

TABLE 184

Crucible 422 Stainless Steel Creep Deformation and Rupture Data at 900° F (1360° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
60.0	-	.790		10	90	280	-
65.0	-	.878		4.4	79	220	-
75.0	171.1	-		1.7	45	104	-
77.5	-	1.023		3.7	46	95	300
80.0	47.2	-		-	-	-	-
85.0	-	-		1.3	31	75	184
90.0	134.2	-		2.8	28	58	139
95.0	79.3	-		.7	21	48	-
100.0	-	-		-	16.5	43	103
120.0	39.1	-		-	9.5	27	-
130.0	32.1	-		-	-	-	-
140.0	9.7	-		-	-	-	-

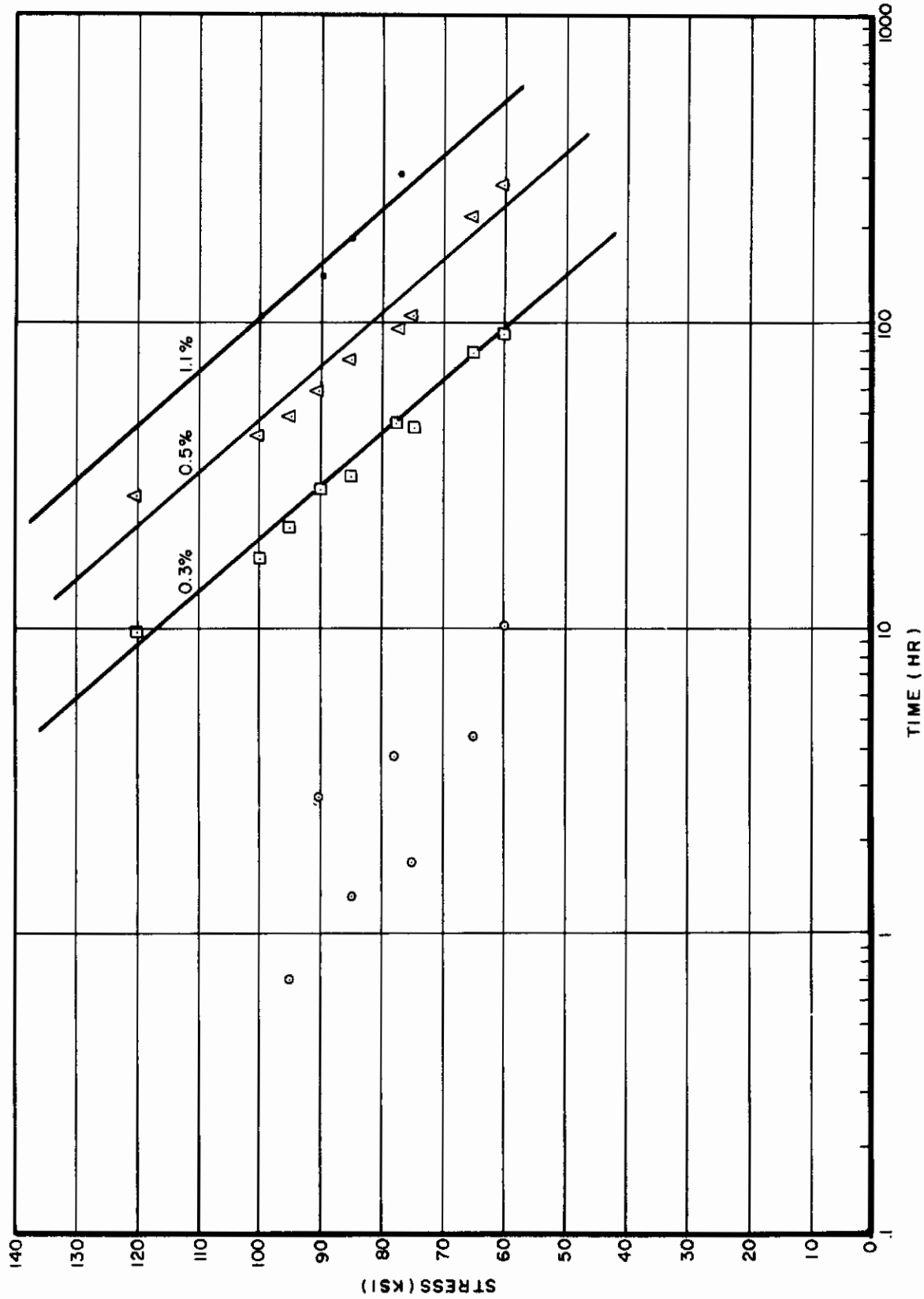


Figure 119. Creep Rupture Properties of Crucible 422 Stainless Steel at 900°F (1360°R)

TABLE 185

Minimum Creep Rate for Crucible 422 Stainless Steel

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
600° F (1060° R)	140	3.85578×10^{-9}
	150	3.542×10^{-7}
	150	2.925×10^{-7}
	160	4.37×10^{-7}
	180	2.093×10^{-8}
800° F (1260° R)	140	4.276×10^{-6}

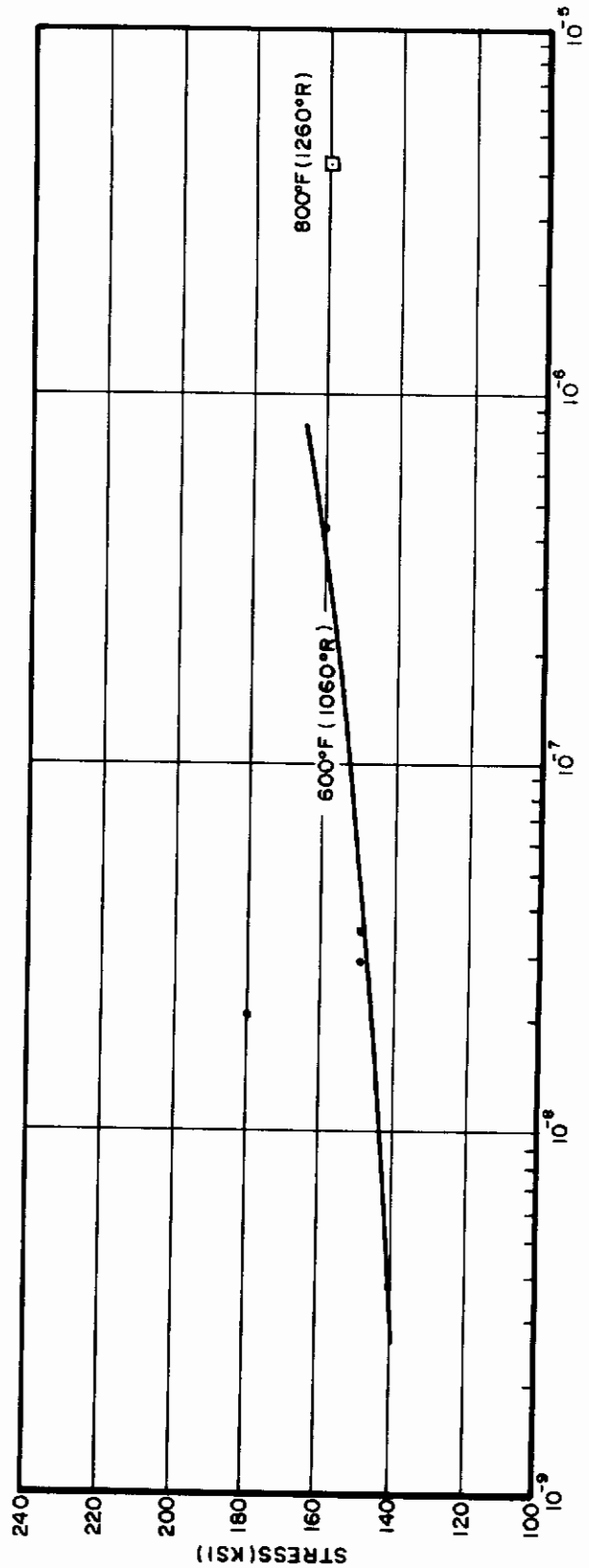


Figure 120. Minimum Creep Rate of Crucible 422 Stainless Steel

CREEP DATA

PH 15-7-Mo

TABLE 186

RUN 7

Deformation Versus Time (Raw Data) for PH-15-7Mo at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
160.0000	2.00000E-04	5.000
	3.00000E-04	10.000
	4.00000E-04	15.000
	5.00000E-04	25.000
	8.00000E-04	50.000
	10.00000E-04	75.000
	1.20000E-03	100.000
	1.40000E-03	250.000
	1.50000E-03	500.000
	1.60000E-03	750.000
	1.70000E-03	1000.000
180.0000	1.30000E-03	0.500
	1.50000E-03	1.000
	1.70000E-03	1.500
	1.80000E-03	2.500
	2.10000E-03	5.000
	2.30000E-03	7.500
	2.40000E-03	10.000
	2.50000E-03	15.000
	2.60000E-03	25.000
	2.70000E-03	50.000
	2.80000E-03	75.000
	2.90000E-03	100.000
	3.00000E-03	500.000
	3.20000E-03	750.000
	3.30000E-03	1000.000
190.0000	2.50000E-03	0.500
	3.00000E-03	1.000
	3.30000E-03	1.500
	3.70000E-03	2.500
	4.40000E-03	5.000
	4.50000E-03	7.500
	4.80000E-03	10.000
	5.20000E-03	15.000
	5.40000E-03	25.000
	5.80000E-03	50.000
	6.20000E-03	75.000
	6.80000E-03	100.000
	8.10000E-03	250.000
	8.70000E-03	500.000

RUN 7

TABLE 186 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
197.0000	5.00000E-03	0.500
	6.00000E-03	1.000
	6.70000E-03	1.500
	7.70000E-03	2.500
	9.30000E-03	5.000
	1.04000E-02	7.500
	1.10000E-02	10.000
197.0000	1.22000E-02	15.000
	1.35000E-02	25.000
	1.56000E-02	50.000
	1.73000E-02	75.000
	1.78000E-02	100.000
	1.94000E-02	150.000
	2.07000E-02	200.000
	2.17000E-02	250.000
	2.51000E-02	500.000
	2.72000E-02	750.000
	2.85000E-02	1000.000
198.0000	5.50000E-03	0.500
	6.70000E-03	1.000
	7.80000E-03	1.500
	8.70000E-03	2.500
	1.02000E-02	5.000
	1.10000E-02	7.500
	1.16000E-02	10.000
	1.29000E-02	15.000
	1.52000E-02	25.000
	1.83000E-02	50.000
	2.03000E-02	75.000
	2.12000E-02	100.000
	2.36000E-02	150.000
	2.47000E-02	200.000
	2.55000E-02	250.000
	2.71000E-02	500.000
	2.86000E-02	750.000
	3.03000E-02	1000.000
199.0000	4.50000E-03	0.500
	6.80000E-03	1.000
	8.50000E-03	1.500
	1.05000E-02	2.500
	1.25000E-02	5.000
	1.45000E-02	7.500
	1.55000E-02	10.000
	1.75000E-02	15.000

TABLE 186 (CONT)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.02000E-02	25.000
	2.45000E-02	50.000
	2.72000E-02	75.000
	2.95000E-02	100.000
	3.30000E-02	150.000
	3.57000E-02	200.000
	3.78000E-02	250.000
	4.61000E-02	500.000
	5.21000E-02	750.000
	5.49000E-02	900.000
200.0000	6.00000E-03	0.500
200.0000	6.80000E-03	1.000
	8.50000E-03	1.500
	9.50000E-03	2.500
	1.10000E-02	5.000
	1.20000E-02	7.500
	1.28000E-02	10.000
	1.45000E-02	15.000
	1.63000E-02	25.000
	1.95000E-02	50.000
	2.13000E-02	75.000
	2.26000E-02	100.000
	2.47000E-02	150.000
	2.63000E-02	200.000
	2.75000E-02	250.000
	3.03000E-02	400.000
201.0000	6.50000E-03	0.500
	8.50000E-03	1.000
	9.50000E-03	1.500
	1.05000E-02	2.500
	1.17000E-02	5.000
	1.28000E-02	7.500
	1.32000E-02	10.000
	1.43000E-02	15.000
	1.56000E-02	25.000
	1.78000E-02	50.000
	1.94000E-02	75.000
	2.07000E-02	100.000
	2.27000E-02	150.000
	2.42000E-02	200.000

TABLE 187

RUN 7

Deformation Versus Time (Fitted Data) for PH-15-7Mo at 600° F (1060° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
160.0000	4.77560E-04	25.000
	8.54920E-04	50.000
	1.02796E-03	75.000
	1.13214E-03	100.000
	1.38415E-03	250.000
	1.52899E-03	500.000
	1.61369E-03	750.000
	1.68058E-03	1000.000
180.0000	1.22411E-03	0.500
	1.53804E-03	1.000
	1.70692E-03	1.500
	1.90418E-03	2.500
	2.14425E-03	5.000
	2.27006E-03	7.500
	2.35286E-03	10.000
	2.46063E-03	15.000
	2.58215E-03	25.000
	2.72395E-03	50.000
	2.79654E-03	75.000
	2.84451E-03	100.000
	3.10574E-03	500.000
	3.18842E-03	750.000
	3.25758E-03	1000.000
190.0000	2.39949E-03	0.500
	3.01687E-03	1.000
	3.38318E-03	1.500
	3.82020E-03	2.500
	4.33599E-03	5.000
	4.59543E-03	7.500
	4.76708E-03	10.000
	5.00551E-03	15.000
	5.33336E-03	25.000
	5.91129E-03	50.000
	6.35474E-03	75.000
	6.71986E-03	100.000
	8.03192E-03	250.000
	8.72504E-03	500.000
197.0000	4.90621E-03	0.500
	6.04516E-03	1.000
	6.78650E-03	1.500
	7.79947E-03	2.500
	9.31612E-03	5.000

RUN 7

TABLE 187 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
197.0000	1.02809E-02	7.500
	1.10015E-02	10.000
	1.20701E-02	15.000
	1.35105E-02	25.000
	1.56517E-02	50.000
	1.70180E-02	75.000
	1.80451E-02	100.000
	1.95838E-02	150.000
	2.07469E-02	200.000
	2.16942E-02	250.000
	2.49239E-02	500.000
	2.70462E-02	750.000
	2.86734E-02	1000.000
198.0000	5.95684E-03	0.500
	6.65233E-03	1.000
	7.26116E-03	1.500
	8.24013E-03	2.500
	9.94236E-03	5.000
	1.11321E-02	7.500
	1.20590E-02	10.000
	1.34751E-02	15.000
	1.54239E-02	25.000
	1.83010E-02	50.000
	2.00645E-02	75.000
	2.13300E-02	100.000
	2.31039E-02	150.000
	2.43335E-02	200.000
	2.52576E-02	250.000
	2.78489E-02	500.000
	2.90689E-02	750.000
	2.97485E-02	1000.000
199.0000	4.59609E-03	0.500
	6.89394E-03	1.000
	8.29925E-03	1.500
	1.01382E-02	2.500
	1.27907E-02	5.000
	1.44577E-02	7.500
	1.57089E-02	10.000
	1.75922E-02	15.000
	2.02151E-02	25.000
	2.43613E-02	50.000
	2.71872E-02	75.000
	2.94090E-02	100.000
	3.28921E-02	150.000
	3.56440E-02	200.000

RUN 7

TABLE 187 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.79565E-02	250.000
	4.62665E-02	500.000
	5.20283E-02	750.000
	5.48628E-02	900.000
200.0000	5.90531E-03	0.500
	7.28929E-03	1.000
	8.13159E-03	1.500
200.0000	9.26617E-03	2.500
	1.10029E-02	5.000
	1.21561E-02	7.500
	1.30464E-02	10.000
	1.44118E-02	15.000
	1.63283E-02	25.000
	1.92900E-02	50.000
	2.12098E-02	75.000
	2.26492E-02	100.000
	2.47735E-02	150.000
	2.63375E-02	200.000
	2.75756E-02	250.000
	3.02263E-02	400.000
201.0000	6.59387E-03	0.500
	8.40211E-03	1.000
	9.37179E-03	1.500
	1.05046E-02	2.500
	1.19202E-02	5.000
	1.27277E-02	7.500
	1.33180E-02	10.000
	1.42129E-02	15.000
	1.55210E-02	25.000
	1.77845E-02	50.000
	1.94241E-02	75.000
	2.07261E-02	100.000
	2.27140E-02	150.000
	2.41790E-02	200.000

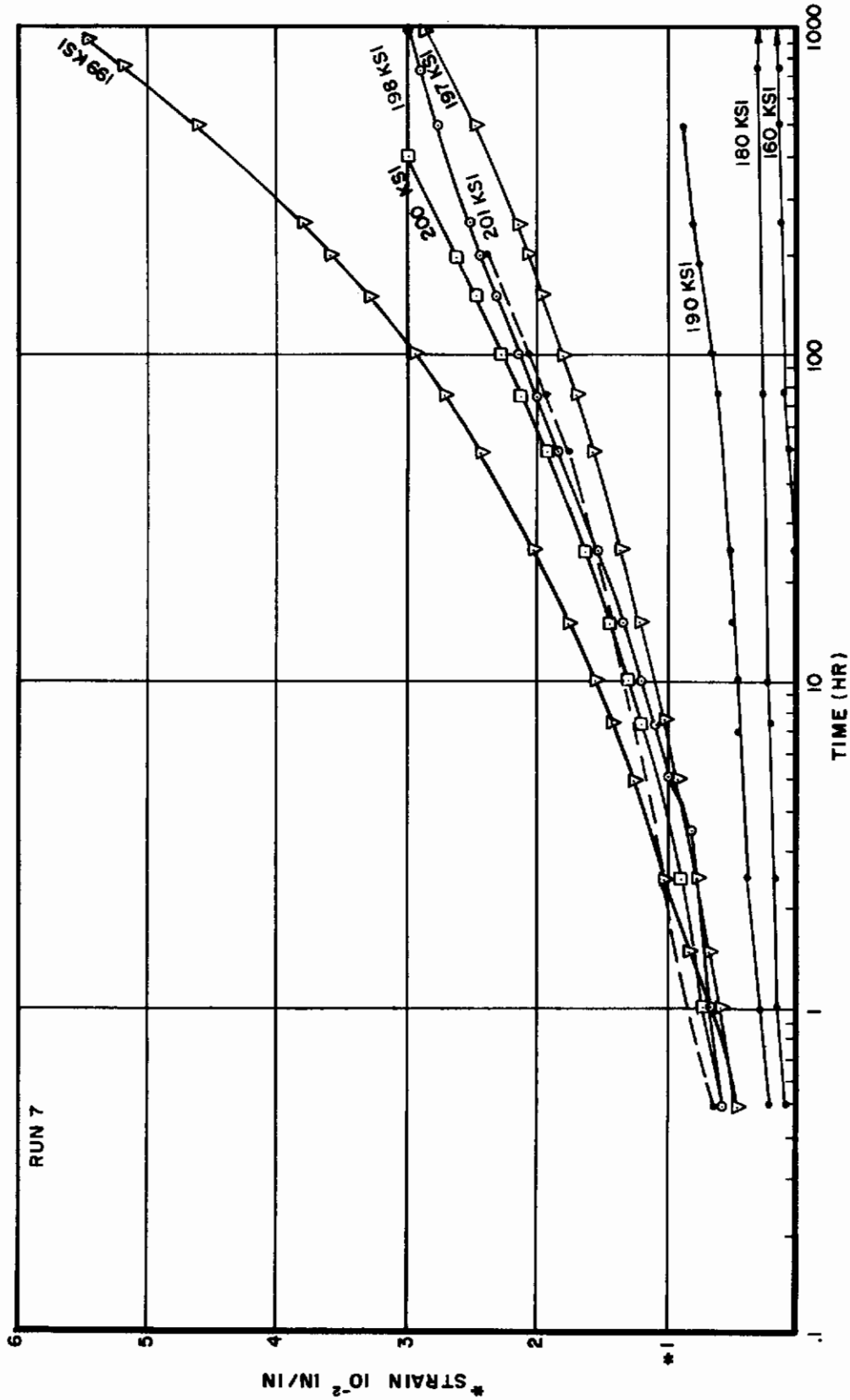


Figure 121. Creep Deformation Versus Log Time of PH-15-7Mo at 600°F (1060°R)

TABLE 188

PH-15-7Mo Creep Deformation and Rupture Data at 600° F (1060° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
197.0	1005.5	2.85	2.08	-	-	.5	6.6
198.0	1028.6	3.0	1.88	-	-	-	4.3
199.0	944.5	5.6	1.87	-	-	.61	2.25
200.0	483.9	3.2	2.85	-	-	-	3.3
201.0	221.0	2.47	2.92	-	-	-	2.0

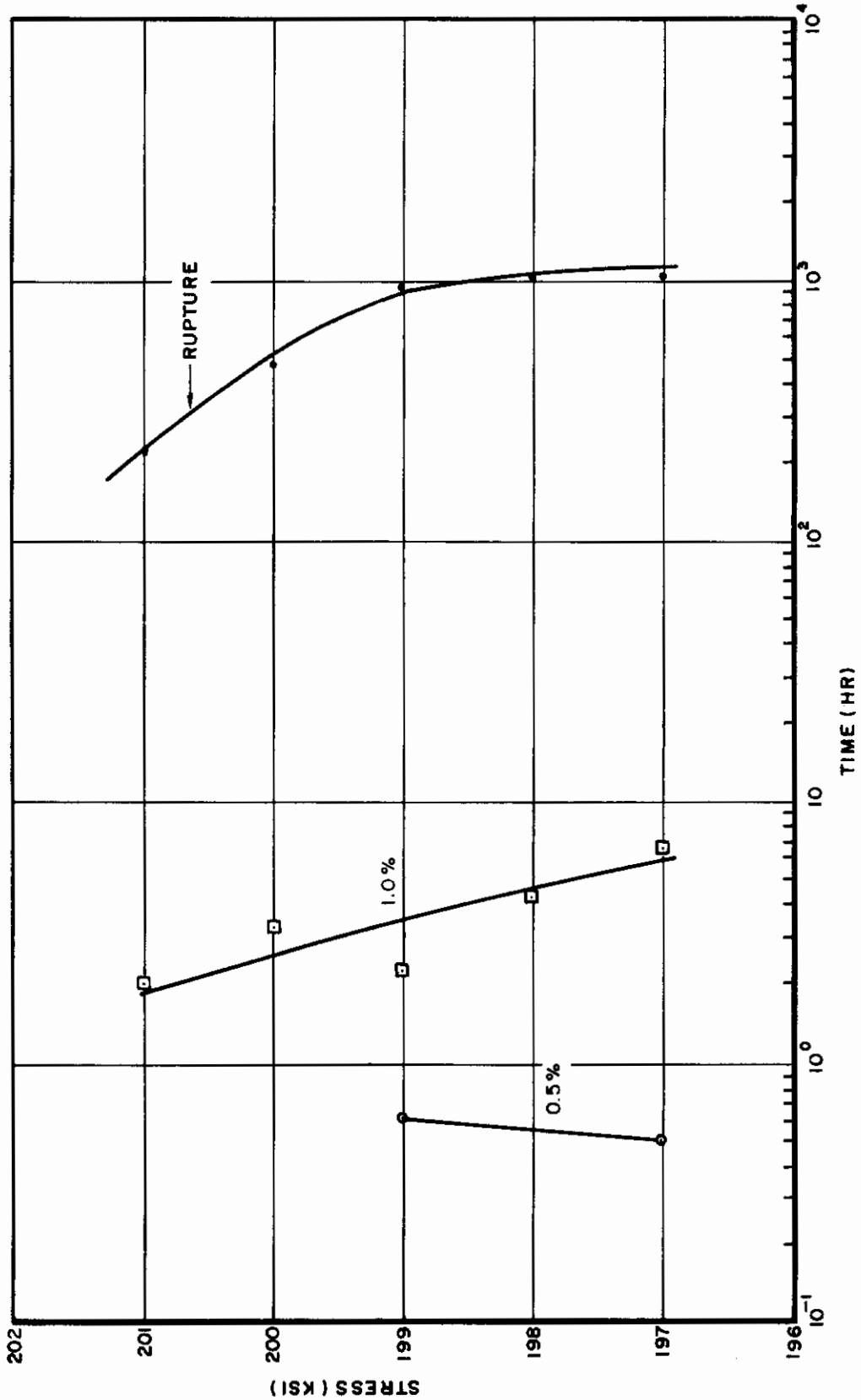


Figure 122. Creep Rupture Properties of PH-15-7Mo at 600°F (1060°R)

TABLE 189

RUN 7

Deformation Versus Time (Raw Data) for PH-15-7Mo at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
120.0000	5.00000E-04	0.500
	6.00000E-04	1.000
	7.00000E-04	1.500
	8.00000E-04	2.500
	10.00000E-04	10.000
	1.10000E-03	15.000
	1.20000E-03	25.000
	1.30000E-03	50.000
	1.40000E-03	75.000
	1.40000E-03	250.000
	1.40000E-03	1000.000
130.0000	9.00000E-04	0.500
	10.00000E-04	5.000
	1.10000E-03	15.000
	1.20000E-03	25.000
	1.40000E-03	50.000
	1.50000E-03	75.000
	1.60000E-03	100.000
130.0000	1.80000E-03	250.000
	1.90000E-03	500.000
	2.00000E-03	750.000
	2.10000E-03	1000.000
160.0000	2.20000E-03	0.500
	2.50000E-03	1.000
	2.80000E-03	1.500
	3.30000E-03	2.500
	4.00000E-03	5.000
	4.30000E-03	7.500
	4.70000E-03	10.000
	4.80000E-03	25.000
	4.90000E-03	75.000
	5.00000E-03	100.000
	5.30000E-03	250.000
	5.50000E-03	500.000
	5.80000E-03	750.000
	6.10000E-03	1000.000

TABLE 189 (CONT)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
169.0000	7.00000E-03	0.500
	8.0000CE-03	1.000
	9.3000CE-03	1.500
	1.1500CE-02	2.500
	1.5200CE-02	5.000
	1.75000E-02	7.500
	1.9200CE-02	10.000
	2.17000E-02	15.000
	2.5300CE-02	25.000
	3.1500CE-02	50.000
	5.7000CE-02	75.000
169.2000	9.00000E-03	0.500
	1.2300CE-02	1.000
	1.45000E-02	1.500
	1.7000CE-03	2.500
	2.03000E-02	5.000
	2.2200CE-02	7.500
	2.3500CE-02	10.000
	2.5300CE-02	15.000
	2.72000E-02	25.000
	2.9700CE-02	50.000
	3.0800CE-02	75.000
	3.1300CE-02	100.000
169.5000	1.25000E-02	0.500
	1.55000E-02	1.000
	1.8000CE-02	1.500
	2.1500CE-02	2.500
	3.6500CE-02	5.000
170.0000	1.15000E-02	0.500
	1.9500CE-02	1.000
	2.45000E-02	1.500
	3.80000E-02	2.500
170.4000	1.55000E-02	0.500
	1.93000E-02	1.000
	3.1500CE-02	1.500

TABLE 190

RUN 7

Deformation Versus Time (Fitted Data) for PH-15-7Mo at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
120.0000	5.07320E-04	0.500
	6.13110E-04	1.000
	6.80760E-04	1.500
	7.71730E-04	2.500
	1.03643E-03	10.000
	1.11231E-03	15.000
	1.20166E-03	25.000
	1.30481E-03	50.000
	1.35212E-03	75.000
	1.42318E-03	250.000
	1.39654E-03	1000.000
130.0000	9.05710E-04	0.500
	9.58380E-04	5.000
	1.13384E-03	15.000
	1.23885E-03	25.000
	1.39657E-03	50.000
	1.49351E-03	75.000
	1.56309E-03	100.000
	1.78117E-03	250.000
	1.93511E-03	500.000
130.0000	2.01871E-03	750.000
	2.07501E-03	1000.000
160.0000	2.06450E-03	0.500
	2.61652E-03	1.000
	2.94046E-03	1.500
	3.34771E-03	2.500
	3.88330E-03	5.000
	4.17480E-03	7.500
	4.36592E-03	10.000
	4.84996E-03	25.000
	5.11821E-03	75.000
	5.13793E-03	100.000
	5.17775E-03	250.000
	5.40449E-03	500.000
	5.76349E-03	750.000
	6.18572E-03	1000.000

TABLE 190 (CONT)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
169.0000	1.21875E-02	2.500
	1.47829E-02	5.000
	1.70300E-02	7.500
	1.89591E-02	10.000
	2.19849E-02	15.000
	2.55576E-02	25.000
	3.13699E-02	50.000
	5.70279E-02	75.000
169.2000	8.94424E-03	0.500
	1.24145E-02	1.000
	1.44543E-02	1.500
	1.69910E-02	2.500
	2.03236E-02	5.000
	2.21960E-02	7.500
	2.34834E-02	10.000
	2.52299E-02	15.000
	2.72863E-02	25.000
	2.96895E-02	50.000
	3.07691E-02	75.000
	3.13180E-02	100.000
169.5000	1.30617E-02	0.500
	1.43636E-02	1.000
	1.73404E-02	1.500
	2.34184E-02	2.500
	3.58158E-02	5.000
170.0000	1.20000E-02	0.500
	1.85000E-02	1.000
	2.50000E-02	1.500
	3.80000E-02	2.500
170.4000	1.55000E-02	0.500
	1.93000E-02	1.000
	3.15000E-02	1.500

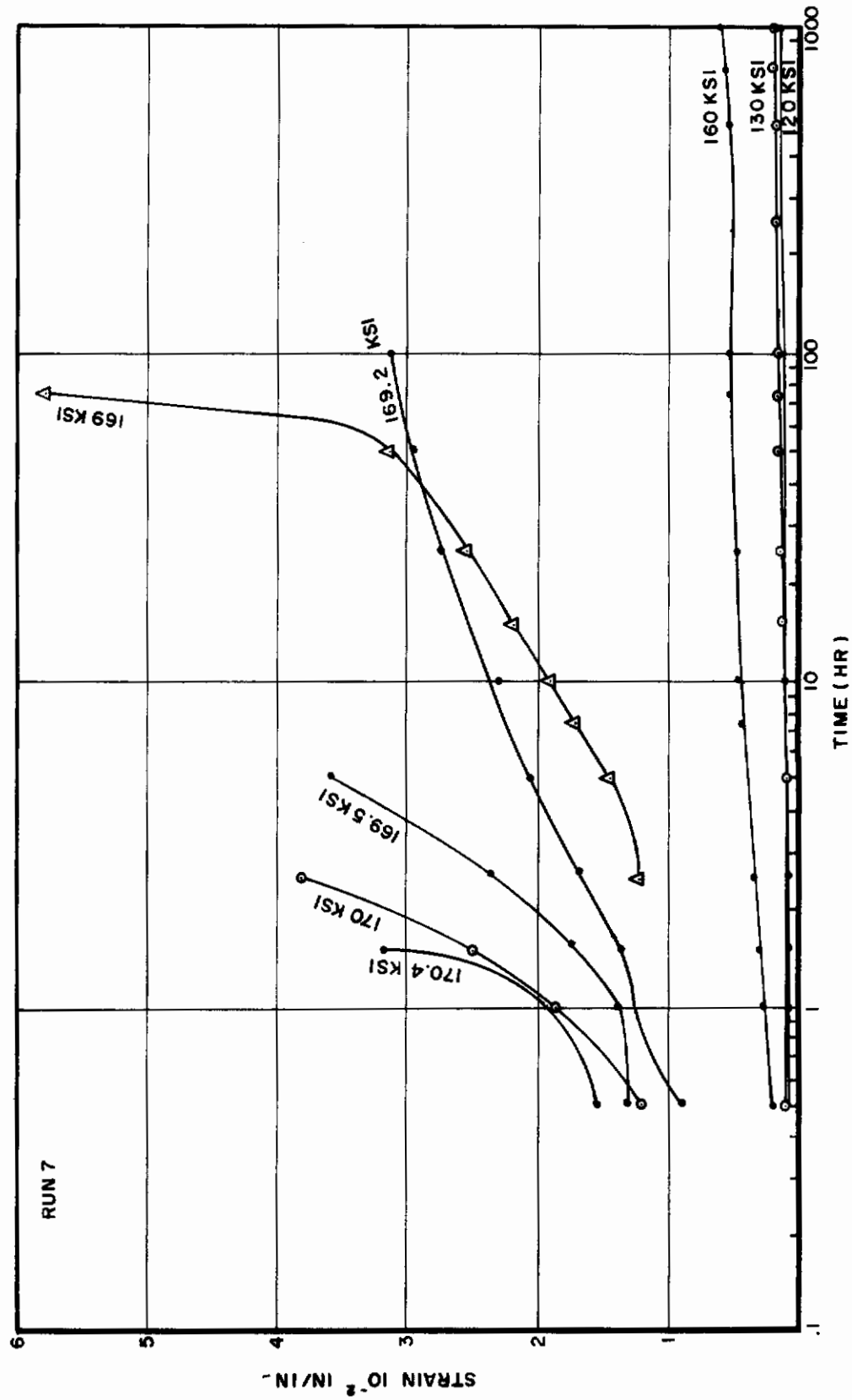


Figure 123. Creep Deformation Versus Log Time of PH-15-7Mo at 800°F (1260°R)

TABLE 191

PH-15-7Mo Creep Rupture Data at 800° F (1260° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
169.0	82.7	6.5	1.03				
169.2	144.4	6.0	1.30				
169.5	8.7	6.0	1.58				
170.0	3.3	13.5	1.43				
170.4	2.4	10.5	1.73				

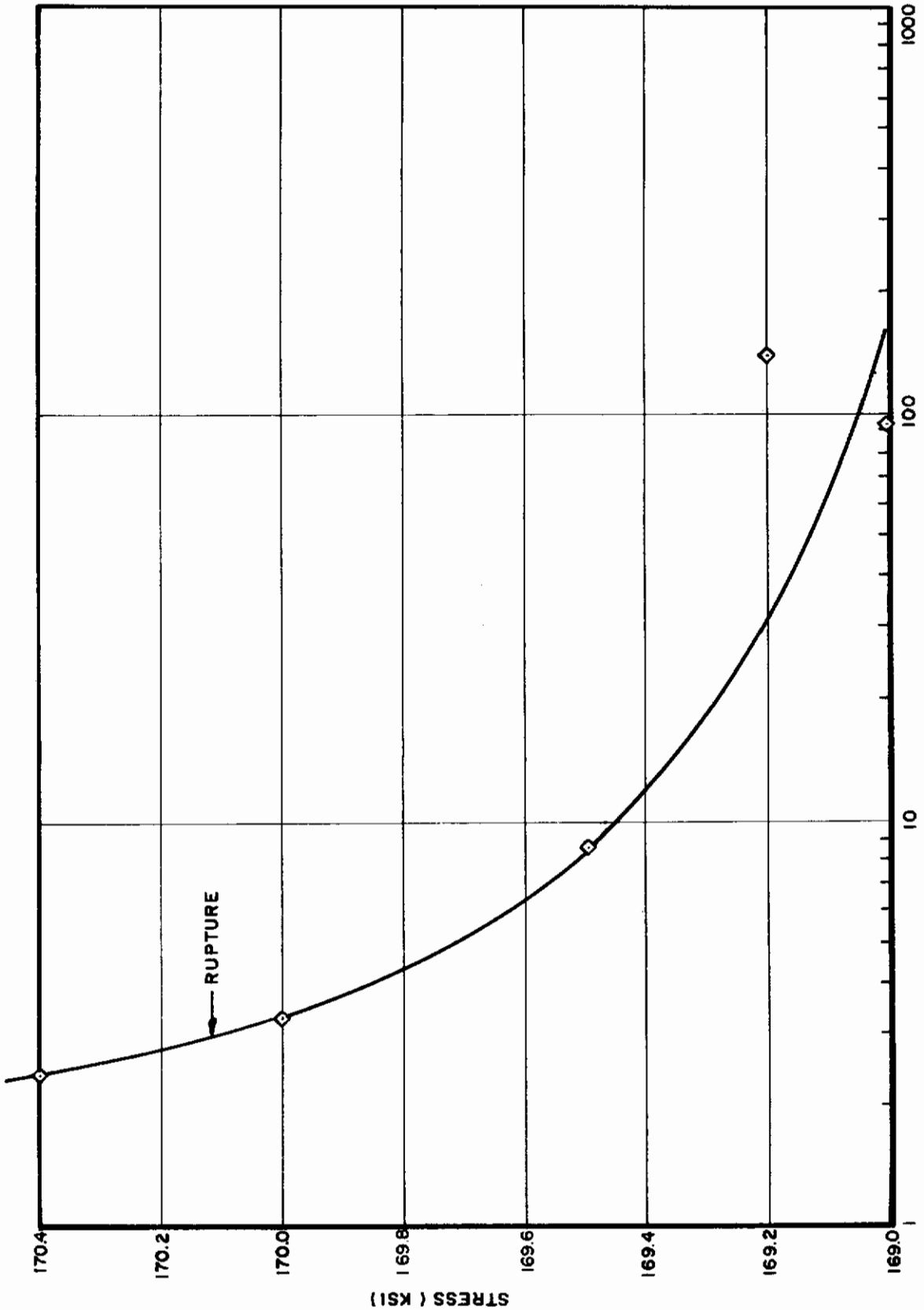


Figure 124. Creep Rupture Properties of PH-15-7Mo at 800°F (1260°R)

TABLE 192

Deformation Versus Time (Raw Data) for PH-15-7Mo at 1000° F (1460° R)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	10.00000E-05	5.000
	2.00000E-04	25.000
	3.00000E-04	50.000
	4.00000E-04	75.000
	5.00000E-04	100.000
	6.00000E-04	250.000
	7.00000E-04	500.000
	9.00000E-04	750.000
	10.00000E-04	1000.000
20.0000	10.00000E-05	0.500
	2.00000E-04	1.000
	3.00000E-04	2.500
	4.00000E-04	5.000
	5.00000E-04	10.000
	6.00000E-04	15.000
	7.00000E-04	25.000
	10.00000E-04	50.000
	1.30000E-03	75.000
	1.50000E-03	100.000
	2.20000E-03	250.000
	2.60000E-03	500.000
	3.00000E-03	750.000
	3.40000E-03	1000.000
30.0000	2.00000E-04	0.500
	3.00000E-04	1.000
	4.00000E-04	1.500
	5.00000E-04	2.500
	6.00000E-04	5.000
	8.00000E-04	7.500
	10.00000E-04	10.000
	1.30000E-03	15.000
	1.70000E-03	25.000
	2.30000E-03	50.000
	2.80000E-03	75.000
	3.20000E-03	100.000
	4.50000E-03	250.000
	5.20000E-03	500.000
	6.00000E-03	750.000
	6.50000E-03	1000.000

TABLE 192 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
48.0000	1C.0000E-04	0.500
	1.3000E-03	1.000
	1.6000E-03	1.500
	1.9000E-03	2.500
	2.4000E-03	5.000
	2.9000E-03	7.500
	3.2000E-03	10.000
	3.9000E-03	15.000
	5.0000E-03	25.000
	7.9000E-03	50.000
	1C.0000E-03	75.000
	1.1700E-02	100.000
	1.4200E-02	150.000
	1.5900E-02	200.000
	1.7600E-02	250.000
	2.5200E-02	500.000
	3.6500E-02	750.000
	6.2500E-02	1000.000
50.0000	9.0000E-04	0.500
	1.2000E-03	1.000
	1.4000E-03	1.500
	1.8000E-03	2.500
	2.5000E-03	5.000
	3.1000E-03	7.500
	3.6000E-03	10.000
	4.5000E-03	15.000
	6.3000E-03	25.000
	1.0500E-02	50.000
	1.2700E-02	75.000
	1.4500E-02	100.000
	1.7000E-02	150.000
	1.9000E-02	200.000
	2.1500E-02	250.000
	2.7200E-02	500.000
	8.7000E-02	750.000
52.0000	7.0000E-04	0.500
	1C.0000E-04	1.000
	1.3000E-03	1.500
	1.7000E-03	2.500
	2.3000E-03	5.000
	2.8000E-03	7.500
	3.2000E-03	10.000
	4.0000E-03	15.000
	5.3000E-03	25.000
	9.5000E-03	50.000

TABLE 192 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
52.0000	1.22000E-02	75.000
	1.48000E-02	100.000
	1.87000E-02	150.000
	2.17000E-02	200.000
	2.45000E-02	250.000
	4.43000E-02	500.000
	5.80000E-02	600.000
58.0000	1.10000E-03	0.500
	1.50000E-03	1.000
	1.70000E-03	1.500
	2.10000E-03	2.500
	2.80000E-03	5.000
	3.60000E-03	7.500
	4.50000E-03	10.000
	6.00000E-03	15.000
	8.80000E-03	25.000
	1.40000E-02	50.000
	1.80000E-02	75.000
	2.10000E-02	100.000
	2.62000E-02	150.000
	3.05000E-02	200.000
	3.45000E-02	250.000
	6.90000E-02	450.000
64.0000	4.00000E-03	0.500
	5.00000E-03	1.000
	7.50000E-03	1.500
	9.00000E-03	2.500
	1.10000E-02	5.000
	1.30000E-02	7.500
	1.40000E-02	10.000
	1.75000E-02	15.000
	3.00000E-02	25.000
	5.15000E-02	50.000
70.0000	3.00000E-03	0.500
	3.50000E-03	1.000
	5.00000E-03	1.500
	7.00000E-03	2.500
	1.10000E-02	5.000
	1.85000E-02	7.500
	2.80000E-02	10.000
	5.30000E-02	15.000
	1.35000E-01	25.000

TABLE 192 (CONT)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.00000E-03	0.500
80.0000	1.30000E-02	1.000
	1.75000E-02	1.500
	2.90000E-02	2.500
	6.40000E-02	5.000
93.0000	1.52000E-01	0.500

TABLE 193

RUN 7

Deformation Versus Time (Fitted Data) for PH-15-7Mo at 1000° F (1460° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	2.11940E-04	25.000
	3.11110E-04	50.000
	3.94520E-04	75.000
	4.63630E-04	100.000
	6.56080E-04	250.000
	6.73580E-04	500.000
	9.09360E-04	750.000
	9.98550E-04	1000.000
20.0000	1.03000E-04	0.500
	2.03020E-04	1.000
	2.95560E-04	2.500
	3.75470E-04	5.000
	4.95750E-04	10.000
	5.94800E-04	15.000
	7.57430E-04	25.000
	1.05531E-03	50.000
	1.27379E-03	75.000
	1.44885E-03	100.000
	2.11074E-03	250.000
	2.69800E-03	500.000
	3.06284E-03	750.000
	3.32538E-03	1000.000
30.0000	3.96850E-04	1.500
	4.52870E-04	2.500
	6.55000E-04	5.000
	8.40370E-04	7.500
	1.00181E-03	10.000
	1.27115E-03	15.000
	1.67913E-03	25.000
	2.35112E-03	50.000
	2.80404E-03	75.000
	3.15030E-03	100.000
	4.37294E-03	250.000
	5.38824E-03	500.000
	6.00043E-03	750.000
	6.43569E-03	1000.000
48.0000	1.89999E-03	2.500
	2.40000E-03	5.000
	2.90000E-03	7.500
	3.19999E-03	10.000
	3.90000E-03	15.000
	5.00000E-03	25.000
	7.90000E-03	50.000

RUN 7

TABLE 193 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
48.0000	10.00000E-03	75.000
	1.17000E-02	100.000
	1.42000E-02	150.000
	1.59000E-02	200.000
	1.76000E-02	250.000
	2.52000E-02	500.000
	3.65000E-02	750.000
	6.25000E-02	1000.000
50.0000	2.91283E-03	5.000
	3.33192E-03	7.500
	3.74430E-03	10.000
	4.54916E-03	15.000
	6.08082E-03	25.000
	9.47551E-03	50.000
	1.22942E-02	75.000
	1.45928E-02	100.000
	1.78533E-02	150.000
	1.97059E-02	200.000
	2.06032E-02	250.000
	2.72603E-02	500.000
	8.69956E-02	750.000
52.0000	1.81806E-03	2.500
	2.26537E-03	5.000
	2.70563E-03	7.500
	3.13891E-03	10.000
	3.98493E-03	15.000
	5.59697E-03	25.000
	9.19116E-03	50.000
	1.22279E-02	75.000
	1.47877E-02	100.000
	1.87907E-02	150.000
	2.18037E-02	200.000
	2.43790E-02	250.000
	4.43150E-02	500.000
	5.79950E-02	600.000
58.0000	2.63190E-03	2.500
	3.22320E-03	5.000
	3.80848E-03	7.500
	4.38774E-03	10.000
	5.52822E-03	15.000
	7.73700E-03	25.000
	1.28380E-02	50.000
	1.73384E-02	75.000

TABLE 193 (CONT)

RUN 7

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	2.12418E-02	100.000
	2.73034E-02	150.000
	3.12455E-02	200.000
	3.36472E-02	250.000
	6.90178E-02	450.000
64.0000	3.79813E-03	0.500
	6.53980E-03	1.000
	7.51964E-03	1.500
	8.56354E-03	2.500
	1.05330E-02	5.000
	1.25616E-02	7.500
	1.46952E-02	10.000
	1.91574E-02	15.000
	2.84213E-02	25.000
	5.17892E-02	50.000
70.0000	2.95535E-03	0.500
	3.75714E-03	1.000
	4.74676E-03	1.500
	6.85949E-03	2.500
	1.19142E-02	5.000
	1.82833E-02	7.500
	2.72190E-02	10.000
	5.35306E-02	15.000
	1.34915E-01	25.000
80.0000	8.10082E-03	0.500
	1.27153E-02	1.000
	1.77289E-02	1.500
	2.89537E-02	2.500
	6.40014E-02	5.000
93.0000	1.52000E-01	0.500

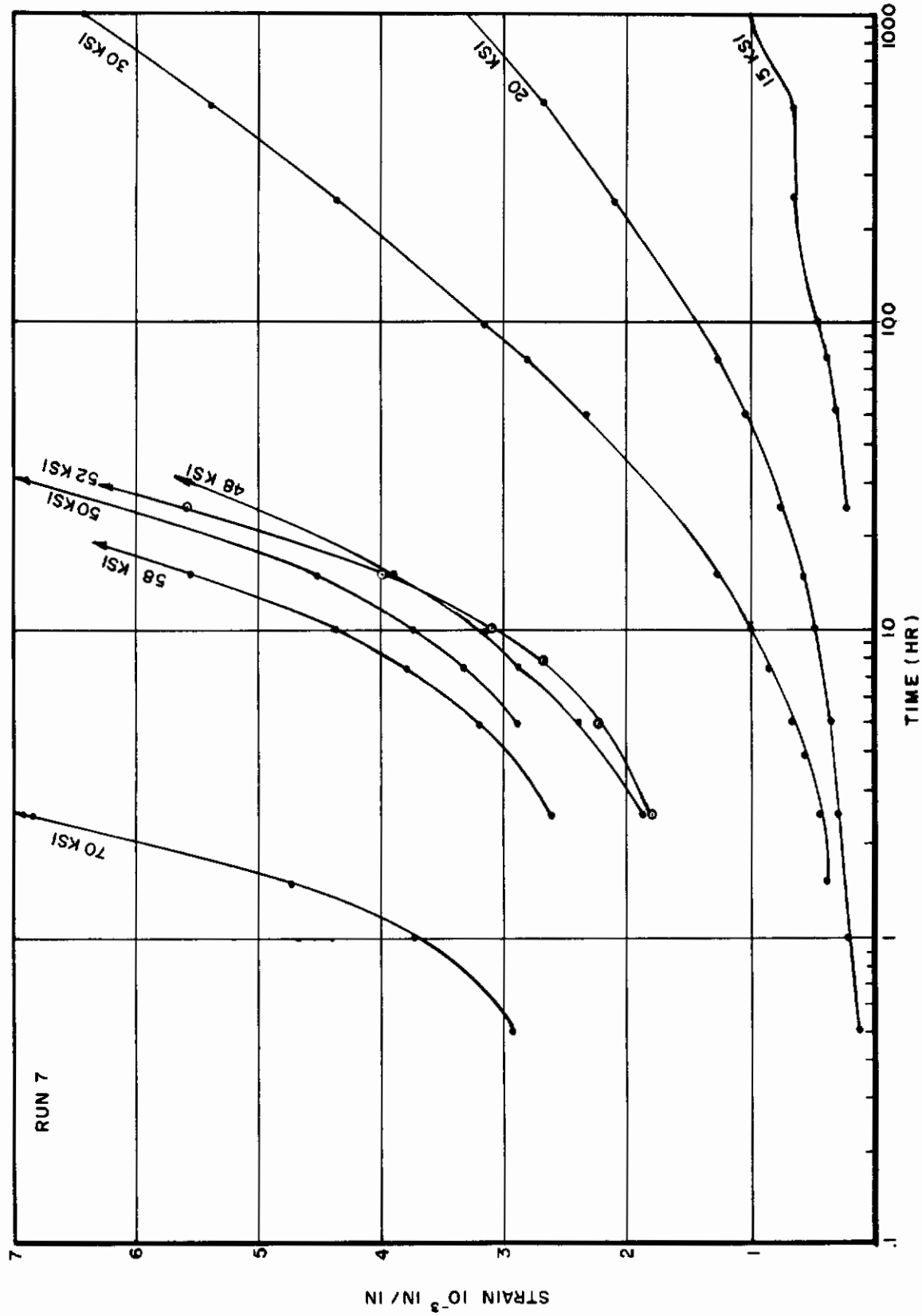


Figure 125. Creep Deformation Versus Log Time of PH-15-7Mo at 1000°F (1460°R)

TABLE 194

PH-15-7Mo Creep Deformation and Rupture Data at 1000° F (1460° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
15.0	-	-	0.04	1000	-	-	-
20.0	-	-	0.07	50	750	-	-
30.0	-	-	0.16	10	87.5	368.5	-
48.0	1118.6	20.5	0.29	0.5	9.1	25	75
50.0	804.9	17	0.23	.91	7	18	48
52.0	699.1	23.5	0.26	1.0	8.75	23	59
58.0	524.3	22.5	0.29	-	5.6	12.1	30.5
64.0	88.6	20.5	0.31	-	-	1.0	3.75
70.0	26.4	27.5	0.43	-	0.5	1.5	4.4
80.0	10.9	21.5	0.63	-	-	-	0.7

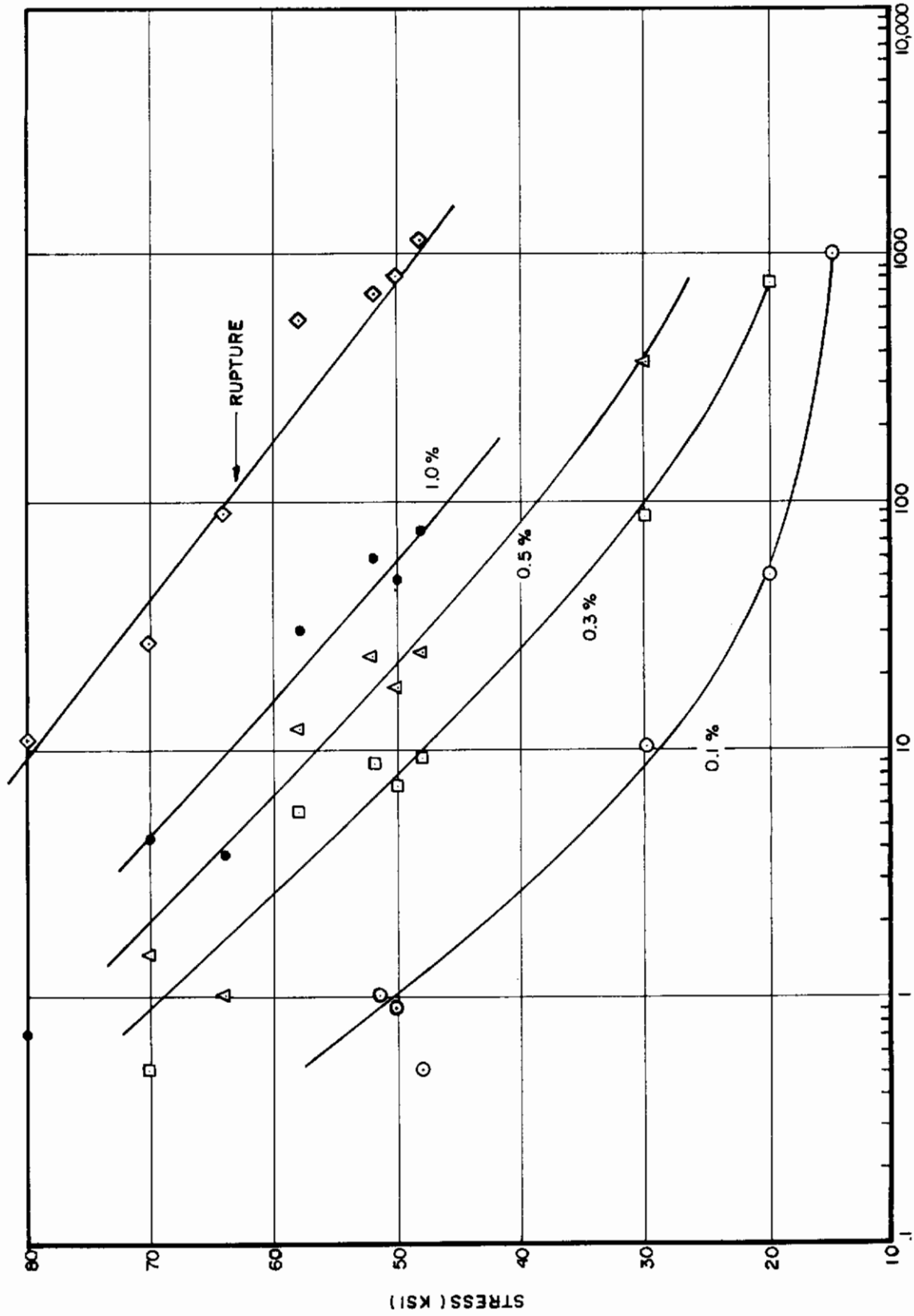


Figure 126. Creep Rupture Properties of PH-15-7Mo at 1000°F (1460°R)

TABLE 195

Minimum Creep Rate for PH-15-7Mo

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
800° F (1260° R)	120	4.06×10^{-7}
	160	2.65×10^{-7}
	169	2.32×10^{-4}
	169.5	2.6×10^{-3}
1000° F (1460° R)	15	7×10^{-8}
	48	3.04×10^{-5}
	50	1.79×10^{-5}
	52	5.15×10^{-5}
	58	4.8×10^{-5}
	64	7.88×10^{-4}
	70	1.60×10^{-3}
	80	9.23×10^{-3}

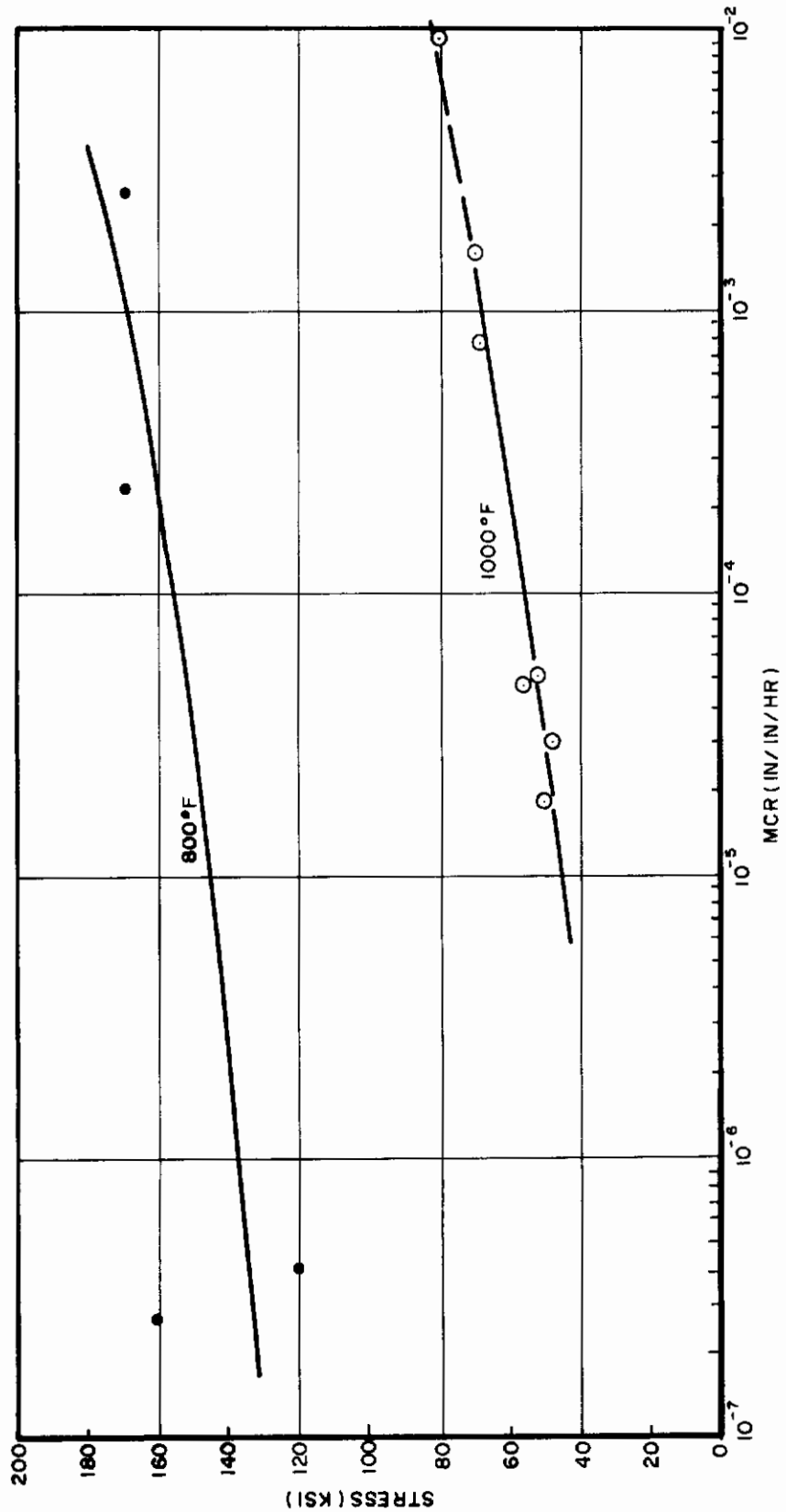


Figure 127. Minimum Creep Rate of PH-15-7Mo

CREEP DATA

SUPER A-286 (V57C)

(1ST HEAT TREAT)

TABLE.196

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1050° F (1510° R) RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	5.10000E-04	3.900
	7.50000E-04	10.700
	1.02000E-03	17.100
	1.47000E-03	28.000
	1.65000E-03	38.000
	1.95000E-03	48.000
	1.98000E-03	50.000
	2.61000E-03	71.700
	3.15000E-03	95.200
	3.81000E-03	118.000
	4.56000E-03	142.300
	4.80000E-03	149.000
	4.80000E-03	155.000
	4.92000E-03	157.000
	5.04000E-03	157.500
	6.09000E-03	186.800
	6.39000E-03	192.200
	8.25000E-03	233.300
	8.49000E-03	240.600
	9.78000E-03	264.800
	9.87000E-03	268.800
	9.96000E-03	269.400
	1.00200E-02	270.400
	7.80000E-04	31.000
	9.00000E-04	40.200
	1.02000E-03	48.100
	1.26000E-03	64.100
	1.41000E-03	70.700
	1.95000E-03	112.400
	1.98000E-03	112.800
	2.13000E-03	119.100
	2.40000E-03	137.200
	2.97000E-03	160.800
	3.48000E-03	184.500
	3.99000E-03	200.700
	4.44000E-03	213.000
	4.80000E-03	225.000
	4.98000E-03	228.000
	5.82000E-03	256.500
	6.66000E-03	281.500
	7.62000E-03	305.000
	8.55000E-03	328.500
	9.78000E-03	352.700
	1.00500E-02	358.800

RUN 9

TABLE 196 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.02900E-02	360.000
	9.00000E-04	9.000
	9.00000E-04	13.500
	9.30000E-04	15.000
	9.90000E-04	15.300
	1.23000E-03	23.600
	1.50000E-03	40.500
	1.50000E-03	48.100
	1.68000E-03	64.700
	1.86000E-03	70.600
	1.92000E-03	79.600
	1.95000E-03	80.000
	2.04000E-03	80.200
	2.43000E-03	112.300
	2.85000E-03	136.600
	3.12000E-03	160.400
	3.51000E-03	184.400
	4.08000E-03	208.300
	4.50000E-03	215.300
	4.98000E-03	233.500
	5.07000E-03	234.000
	6.27000E-03	281.000
	7.41000E-03	304.400
	8.19000E-03	327.400
	9.21000E-03	354.300
	9.88000E-03	381.000
	9.96000E-03	381.700

TABLE 197

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1050° F (1510° R)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	5.24000E-04	3.900
	6.90220E-04	10.700
	1.04675E-03	17.100
	1.47711E-03	28.000
	1.75226E-03	38.000
	1.97992E-03	48.000
	2.02301E-03	50.000
	2.49060E-03	71.700
	3.06090E-03	95.200
	3.70745E-03	118.000
	4.49765E-03	142.300
	4.73271E-03	149.000
	4.94915E-03	155.000
	5.02251E-03	157.000
	5.04094E-03	157.500
	6.18289E-03	186.800
	6.40576E-03	192.200
	8.21178E-03	233.300
	8.55090E-03	240.600
	9.70962E-03	264.800
	9.90593E-03	268.800
	9.93550E-03	269.400
	9.98482E-03	270.400
	8.26140E-04	31.000
	9.22270E-04	40.200
	1.01187E-03	48.100
	1.21329E-03	64.100
	1.30416E-03	70.700
	1.98365E-03	112.400
	1.99105E-03	112.800
	2.10983E-03	119.100
	2.47444E-03	137.200
	3.00225E-03	160.800
	3.59295E-03	184.500
	4.03250E-03	200.700
	4.38610E-03	213.000
	4.74802E-03	225.000
	4.84116E-03	228.000
	5.78088E-03	256.500
	6.69143E-03	281.500
	7.62731E-03	305.000
	8.64834E-03	328.500
	9.79880E-03	352.700
	1.01061E-02	358.800

TABLE 197 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.01674E-02	360.000
	8.71690E-04	9.000
	9.58000E-04	13.500
	9.86070E-04	15.000
	9.91640E-04	15.300
	1.14063E-03	23.600
	1.41705E-03	40.500
	1.53176E-03	48.100
	1.76746E-03	64.700
	1.84774E-03	70.600
	1.96813E-03	79.600
	1.97344E-03	80.000
	1.97610E-03	80.200
	2.40665E-03	112.300
	2.76311E-03	136.600
	3.16459E-03	160.400
	3.64199E-03	184.400
	4.20436E-03	208.300
	4.38680E-03	215.300
	4.89949E-03	233.500
	4.91435E-03	234.000
	6.47699E-03	281.000
	7.34437E-03	304.400
	8.20801E-03	327.400
	9.15789E-03	354.300
	9.92268E-03	381.000
	9.93901E-03	381.700

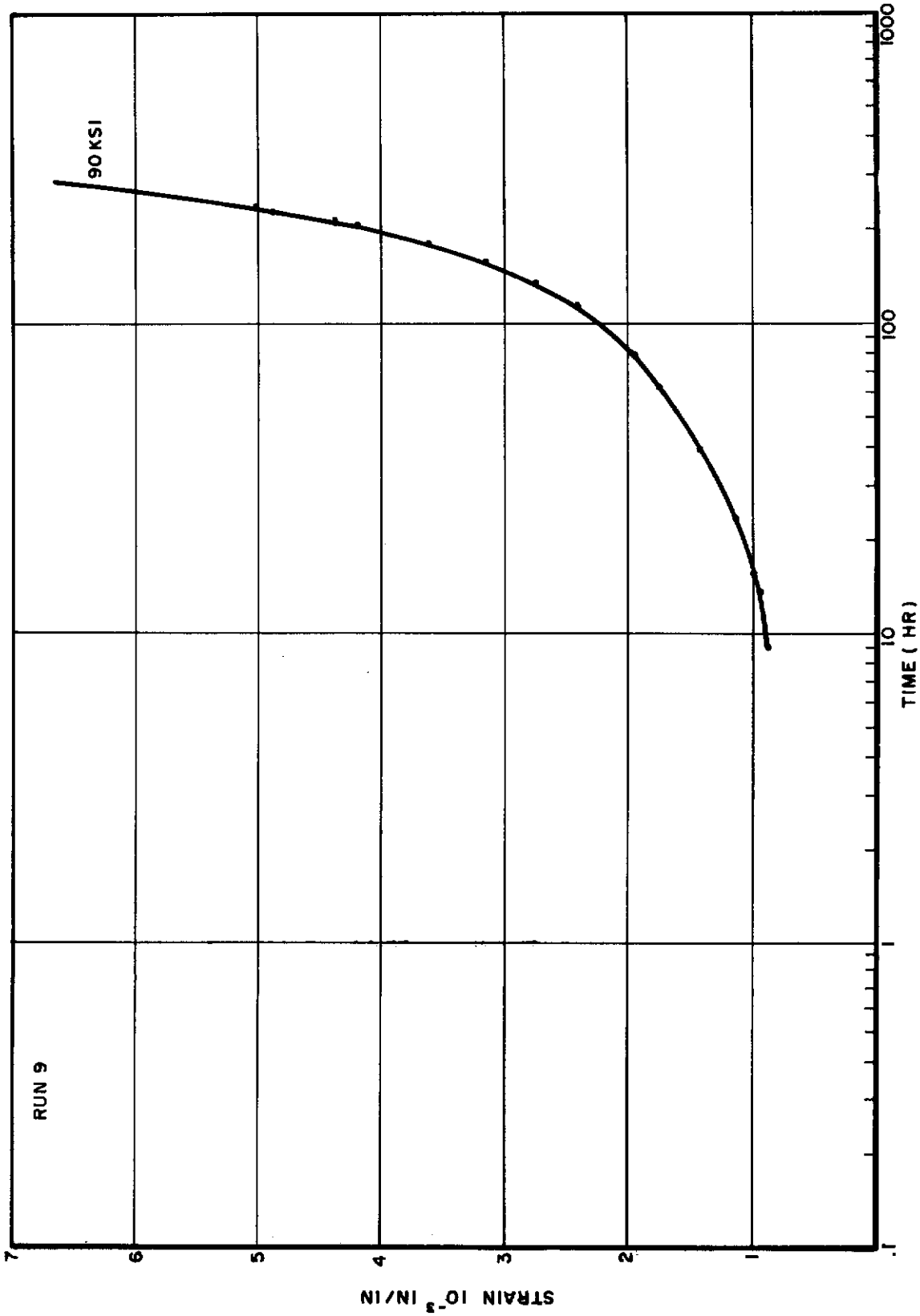


Figure 128. Creep Deformation Versus Log Time of Super A-286 (V57C) Heat Treated at 1800°F at 1050°F (1510°R)

TABLE 198

Creep Deformation and Rupture Data for Super A-286 [(V57C) Heat Treated at 1650° F] at 1050° F (1510° R); (1st Heat Treat)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
90.0	1008.4	-	-	16.0	524	686	-
90.0	1125.8	-	-	21.3	482.6	653	-
90.0	1507.8	-	-	19.8	585	859	1116

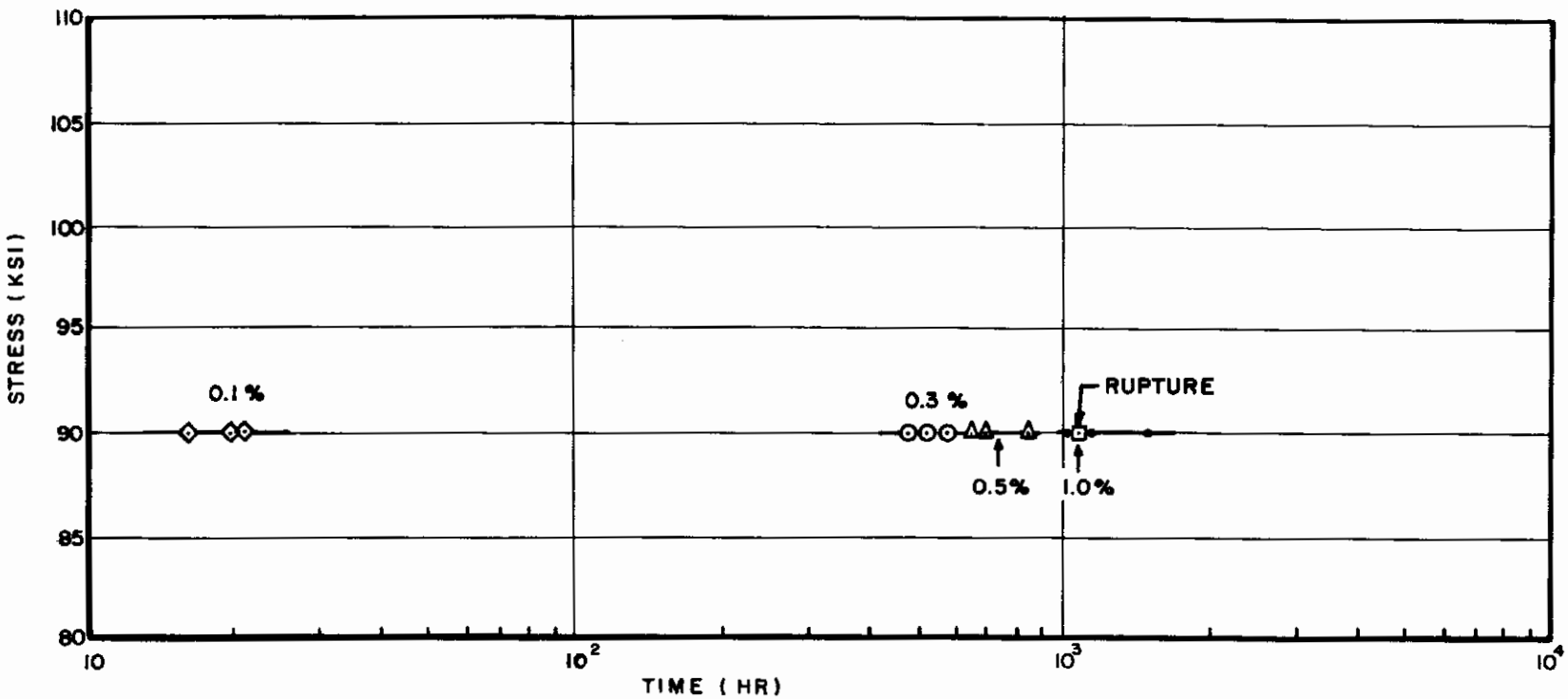


Figure 129. Creep Rupture Properties of Super A-286 [(V57C Heat Treated at 1800°F] at 1050°F (1510°R)

TABLE 199

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1200° F (1660° R)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	6.60000E-04	8.500
	9.90000E-04	13.800
	1.20000E-03	16.500
	1.62000E-03	23.700
	1.89000E-03	25.700
	1.98000E-03	26.700
	3.39000E-03	40.500
	4.35000E-03	48.100
	4.68000E-03	50.100
	4.89000E-03	50.500
	5.01000E-03	50.900
	5.04000E-03	51.800
	7.80000E-03	64.800
	9.27000E-03	70.700
	9.93000E-03	72.700
	1.01400E-02	73.000
	1.59000E-03	13.500
	1.83000E-03	16.500
	2.01000E-03	18.000
	2.76000E-03	24.200
	3.81000E-03	30.200
	3.93000E-03	31.000
	4.41000E-03	33.000
	4.65000E-03	34.000
	4.95000E-03	34.500
	5.10000E-03	35.000
	5.52000E-03	39.100
	5.82000E-03	41.000
	6.60000E-03	44.000
	7.14000E-03	47.000
	8.55000E-03	53.500
	9.39000E-03	57.500
	9.78000E-03	59.000
	9.93000E-03	60.000
	9.99000E-03	60.100
	1.02000E-02	61.000
	8.10000E-04	7.000
	1.08000E-03	9.000
	1.35000E-03	11.000
	1.77000E-03	15.000
	1.77000E-03	15.500
	2.04000E-03	16.000
	2.40000E-03	19.000
	2.55000E-03	21.000
	3.87000E-03	29.000

TABLE 199 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	4.26000E-03	33.900
	4.80000E-03	36.000
	5.04000E-03	36.500
	5.10000E-03	37.000
	6.18000E-03	42.000
	7.17000E-03	47.000
	8.37000E-03	52.000
	9.18000E-03	55.000
	9.54000E-03	56.000
	9.60000E-03	56.500
	9.96000E-03	57.000
	1.00200E-02	57.500
	1.34400E-02	66.000
85.0000	4.80000E-04	0.100
	5.10000E-04	0.250
	9.30000E-04	0.500
	1.05000E-03	0.600
	1.65000E-03	1.000
	1.86000E-03	1.200
	1.98000E-03	1.400
	2.16000E-03	1.500
	3.00000E-03	2.000
	3.66000E-03	2.500
	4.68000E-03	3.000
	4.89000E-03	3.100
	4.95000E-03	3.200
	5.91000E-03	3.500
	7.17000E-03	4.000
	9.06000E-03	4.500
	9.45000E-03	4.700
	9.90000E-03	4.800
	1.06200E-02	5.000
90.0000	1.47000E-03	0.100
	1.47000E-03	0.200
	1.65000E-03	0.300
	2.10000E-03	0.400
	2.67000E-03	0.500
	3.42000E-03	0.700
	4.68000E-03	0.900
	4.98000E-03	1.000
	6.06000E-03	1.200
	6.93000E-03	1.400
	8.10000E-03	1.600
	9.15000E-03	1.800
	1.02300E-02	2.000

TABLE 199 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.00000E-04	0.100
	1.89000E-03	0.250
	2.70000E-03	0.400
	3.45000E-03	0.500
	4.65000E-03	0.750
	5.12000E-03	0.900
	5.79000E-03	1.000
	7.14000E-03	1.200
	8.34000E-03	1.500
	9.69000E-03	1.700
	1.05000E-02	1.800
	1.13700E-02	2.000

TABLE 200

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1200° F (1660° R) RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	6.97600E-04	8.500
	9.82460E-04	13.800
	1.15144E-03	16.500
	1.68182E-03	23.700
	1.85014E-03	25.700
	1.93781E-03	26.700
	3.40650E-03	40.500
	4.45910E-03	48.100
	4.77227E-03	50.100
	4.83694E-03	50.500
	4.90232E-03	50.900
	5.05205E-03	51.800
	7.71736E-03	64.800
	9.34378E-03	70.700
	9.97487E-03	72.700
	1.00735E-02	73.000
	1.49707E-03	13.500
	1.85007E-03	16.500
	2.04084E-03	18.000
	2.92511E-03	24.200
	3.91514E-03	30.200
	4.05609E-03	31.000
	4.41686E-03	33.000
	4.60153E-03	34.000
	4.69489E-03	34.500
	4.78892E-03	35.000
	5.58298E-03	39.100
	5.96336E-03	41.000
65.0000	6.57695E-03	44.000
	7.20304E-03	47.000
	8.58231E-03	53.500
	9.43042E-03	57.500
	9.74531E-03	59.000
	9.95374E-03	60.000
	9.97452E-03	60.100
	1.01608E-02	61.000
	8.56820E-04	7.000
	1.08091E-03	9.000
	1.31240E-03	11.000
	1.79774E-03	15.000
	1.86053E-03	15.500
	1.92379E-03	16.000
	2.31349E-03	19.000
	2.58315E-03	21.000

RUN 9

TABLE 200 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.74784E-03	29.000
	4.54068E-03	33.900
	4.90316E-03	36.000
	4.99174E-03	36.500
	5.08124E-03	37.000
	6.03323E-03	42.000
	7.11344E-03	47.000
	8.36818E-03	52.000
	9.23043E-03	55.000
	9.53969E-03	56.000
	9.69882E-03	56.500
	9.86105E-03	57.000
	1.00265E-02	57.500
	1.34351E-02	66.000
85.0000	4.78290E-04	0.100
	5.26140E-04	0.250
	8.79860E-04	0.500
	1.06448E-03	0.600
	1.64363E-03	1.000
	1.86947E-03	1.200
	2.08599E-03	1.400
	2.19630E-03	1.500
	2.82182E-03	2.000
	3.62989E-03	2.500
	4.64713E-03	3.000
	4.87559E-03	3.100
	5.11218E-03	3.200
	5.86960E-03	3.500
	7.28279E-03	4.000
	8.86930E-03	4.500
	9.54852E-03	4.700
	9.89716E-03	4.800
	1.06118E-02	5.000

TABLE 200 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.47984E-03	0.100
	1.40147E-03	0.200
	1.73514E-03	0.300
	2.14379E-03	0.400
	2.58433E-03	0.500
	3.52068E-03	0.700
	4.50370E-03	0.900
	5.00674E-03	1.000
	6.02811E-03	1.200
	7.06262E-03	1.400
	8.10404E-03	1.60C
	9.14802E-03	1.800
	1.01915E-02	2.000
	9.01210E-04	0.100
	1.86333E-03	0.250
	2.82488E-03	0.400
	3.33736E-03	0.500
	4.55181E-03	0.750
	5.30656E-03	0.900
	5.82648E-03	1.000
	6.90174E-03	1.200
	8.57746E-03	1.500
	9.71798E-03	1.700
	1.02914E-02	1.800
	1.14398E-02	2.000

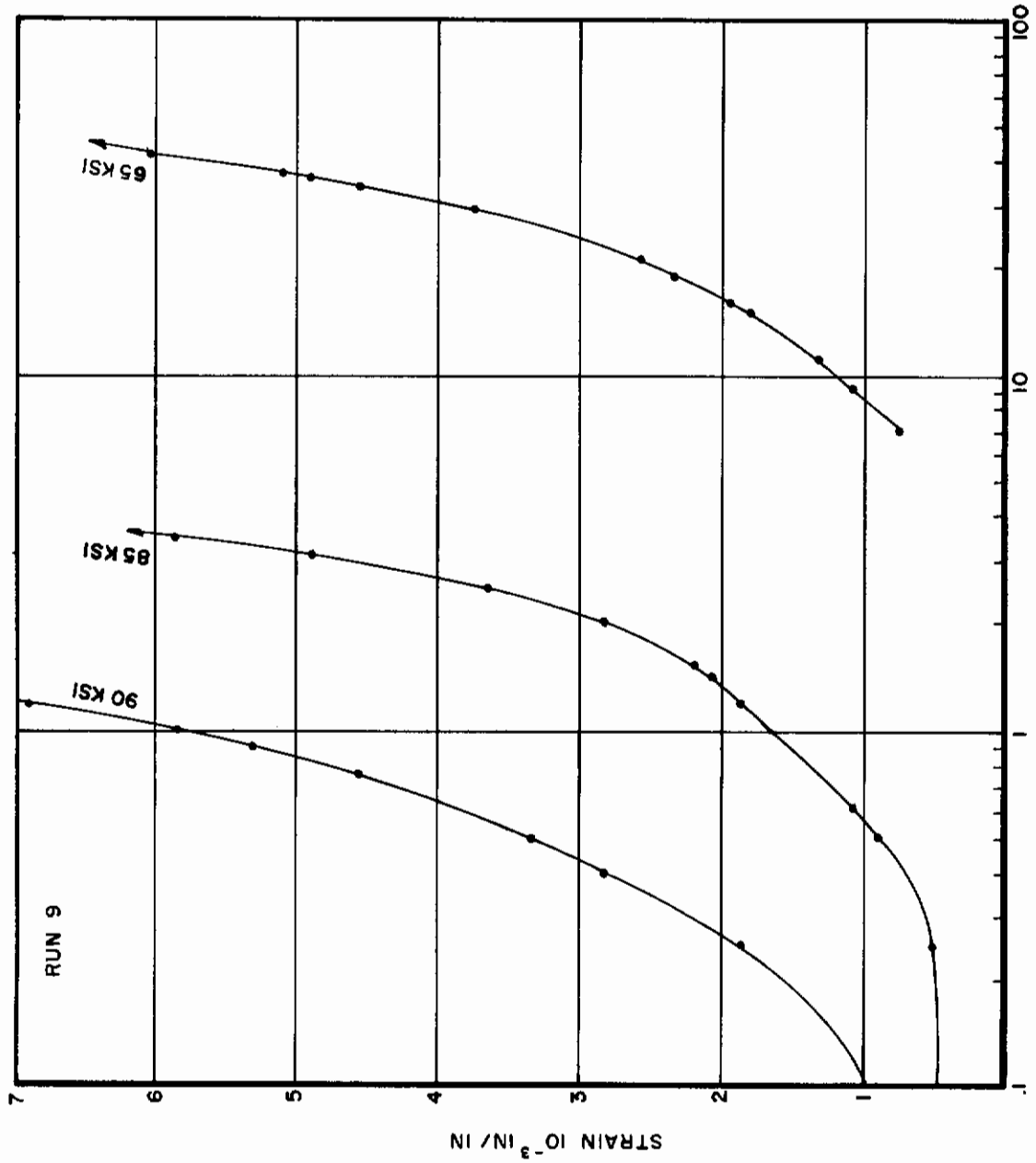


Figure 130. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1800°F] at 1200°F (1660°R)

TABLE 201

Creep Deformation and Rupture Data at 1200° F (1660° R) for Super A-286 (V57C)
(1st Heat Treat)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
65.0	179.7			7.7	25.0	36.4	57.3
65.0	171.4			-	25.9	34.8	60.1
65.0	203.6			13.9	36	50.9	72.8
85.0	16.5			.57	2.0	3.2	4.8
90.0	7.7			-	.62	1.0	2.0
90.0	10.0			.1	.45	.9	1.75

Heat Treat: 1650° F - 4 hours - oil quench
1350° F - 16 hours - air cool

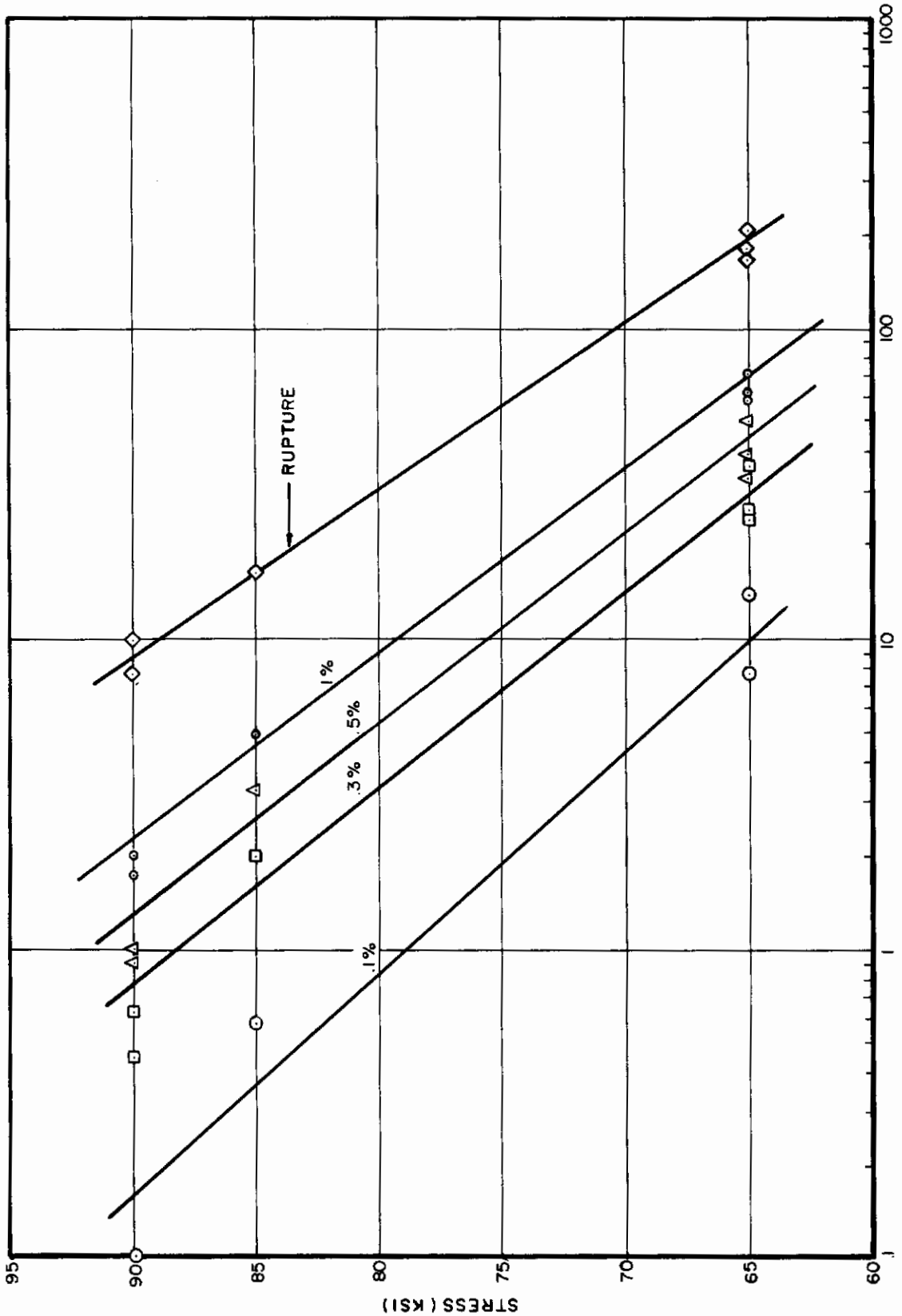


Figure 131. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1800°F] at 1300°F (1760°R)

TABLE 202

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1300° F (1760° R)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	6.60000E-04	0.100
	1.29000E-03	0.200
	1.62000E-03	0.300
	2.07000E-03	0.400
	2.79000E-03	0.500
	3.36000E-03	0.600
	3.84000E-03	0.700
	3.99000E-03	0.800
	4.35000E-03	0.900
	5.04000E-03	1.000
	5.34000E-03	1.100
	6.24000E-03	1.200
	6.84000E-03	1.300
	7.38000E-03	1.400
	7.95000E-03	1.500
	8.73000E-03	1.600
	9.45000E-03	1.700
	1.01400E-02	1.800
	2.70000E-04	0.100
	8.40000E-04	0.200
	1.38000E-03	0.300
	1.86000E-03	0.400
	2.40000E-03	0.500
	2.94000E-03	0.600
65.0000	3.48000E-03	0.700
	3.87000E-03	0.800
	4.47000E-03	0.900
	5.13000E-03	1.000
	6.00000E-03	1.100
	6.66000E-03	1.200
	7.59000E-03	1.300
	8.40000E-03	1.400
	9.30000E-03	1.500
	1.05600E-02	1.600
	1.08000E-03	0.150
	1.95000E-03	0.300
	3.00000E-03	0.500
	3.96000E-03	0.700
	4.98000E-03	0.900
	5.64000E-03	1.000
	6.75000E-03	1.250
	8.40000E-03	1.500
	9.99000E-03	1.750
	1.17600E-02	2.000

TABLE 203

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1300° F (1760° R) RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	6.31930E-04	0.100
	1.21289E-03	0.200
	1.75162E-03	0.300
	2.25385E-03	0.400
	2.72734E-03	0.500
	3.18144E-03	0.600
	3.62672E-03	0.700
	4.07445E-03	0.800
	4.53596E-03	0.900
	5.02192E-03	1.000
	5.54156E-03	1.100
	6.10173E-03	1.200
	6.70591E-03	1.300
	7.35316E-03	1.400
	8.03685E-03	1.500
	8.74344E-03	1.600
	9.45107E-03	1.700
	1.01281E-02	1.800
	2.66660E-04	0.100
	8.44680E-04	0.200
	1.38043E-03	0.300
	1.88966E-03	0.400
	2.38764E-03	0.500
	2.88898E-03	0.600
65.0000	3.40743E-03	0.700
	3.95580E-03	0.800
	4.54571E-03	0.900
	5.18747E-03	1.000
	5.88991E-03	1.100
	6.66020E-03	1.200
	7.50370E-03	1.300
	8.42376E-03	1.400
	9.42165E-03	1.500
	1.04962E-02	1.600
	1.09075E-03	0.150
	1.92906E-03	0.300
	2.99197E-03	0.500
	4.00877E-03	0.700
	5.01027E-03	0.900
	5.51801E-03	1.000
	6.85313E-03	1.250
	8.34204E-03	1.500
	1.00085E-02	1.750
	1.17574E-02	2.000

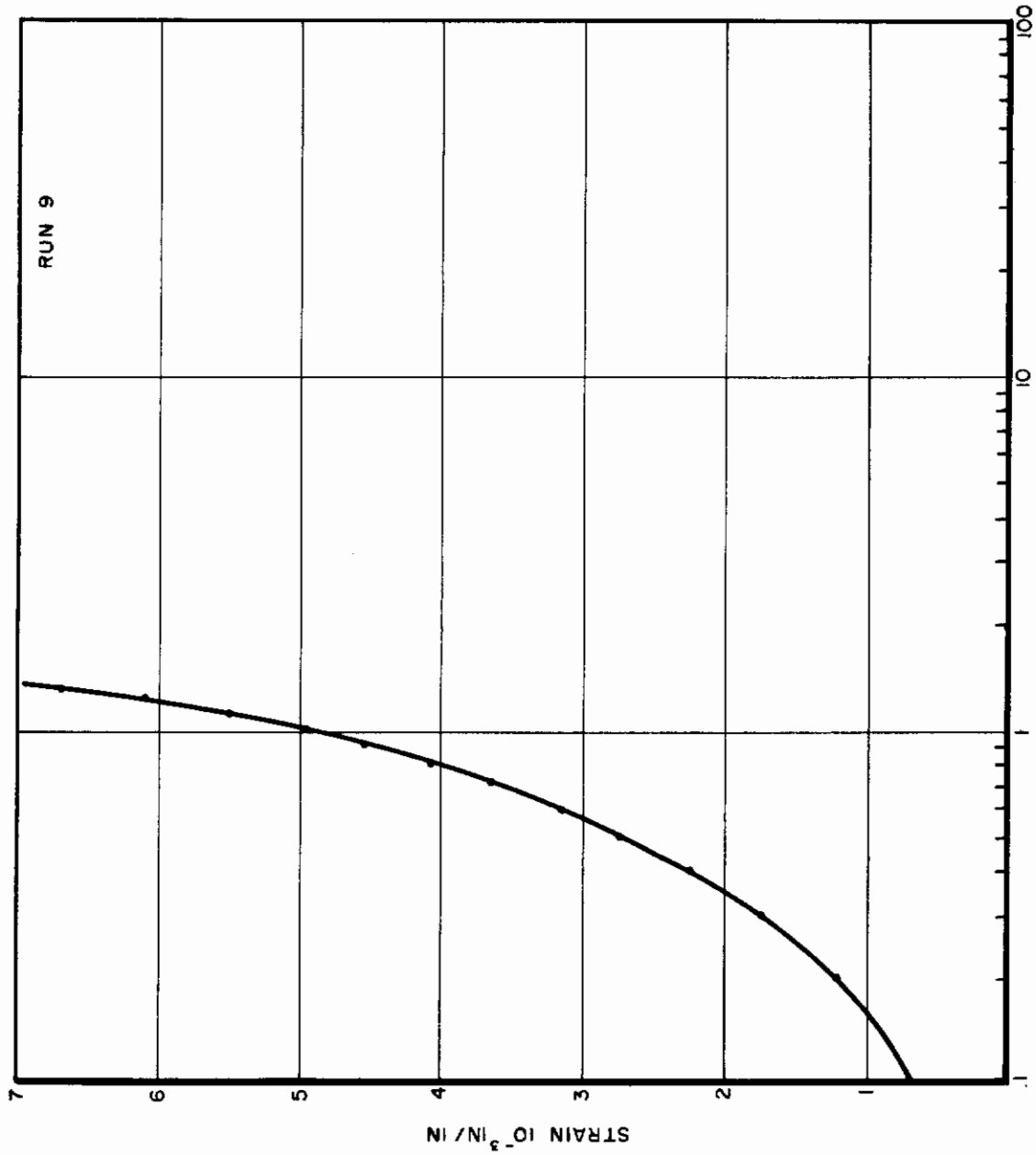


Figure 132. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1800°F] at 1300°F (1760°R)

TABLE 204

Creep Deformation and Rupture Data at 1300° F (1760° R) for Super A-286

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
65.0	11.0		-	-	.5	.91	1.75
65.0	7.8		.233	.233	.61	.98	1.56
65.0	10.2		.15	.15	.54	.99	1.78

Heat Treatment: 1650° F - 4 hours - oil quench
1350° F - 16 hours - air cool

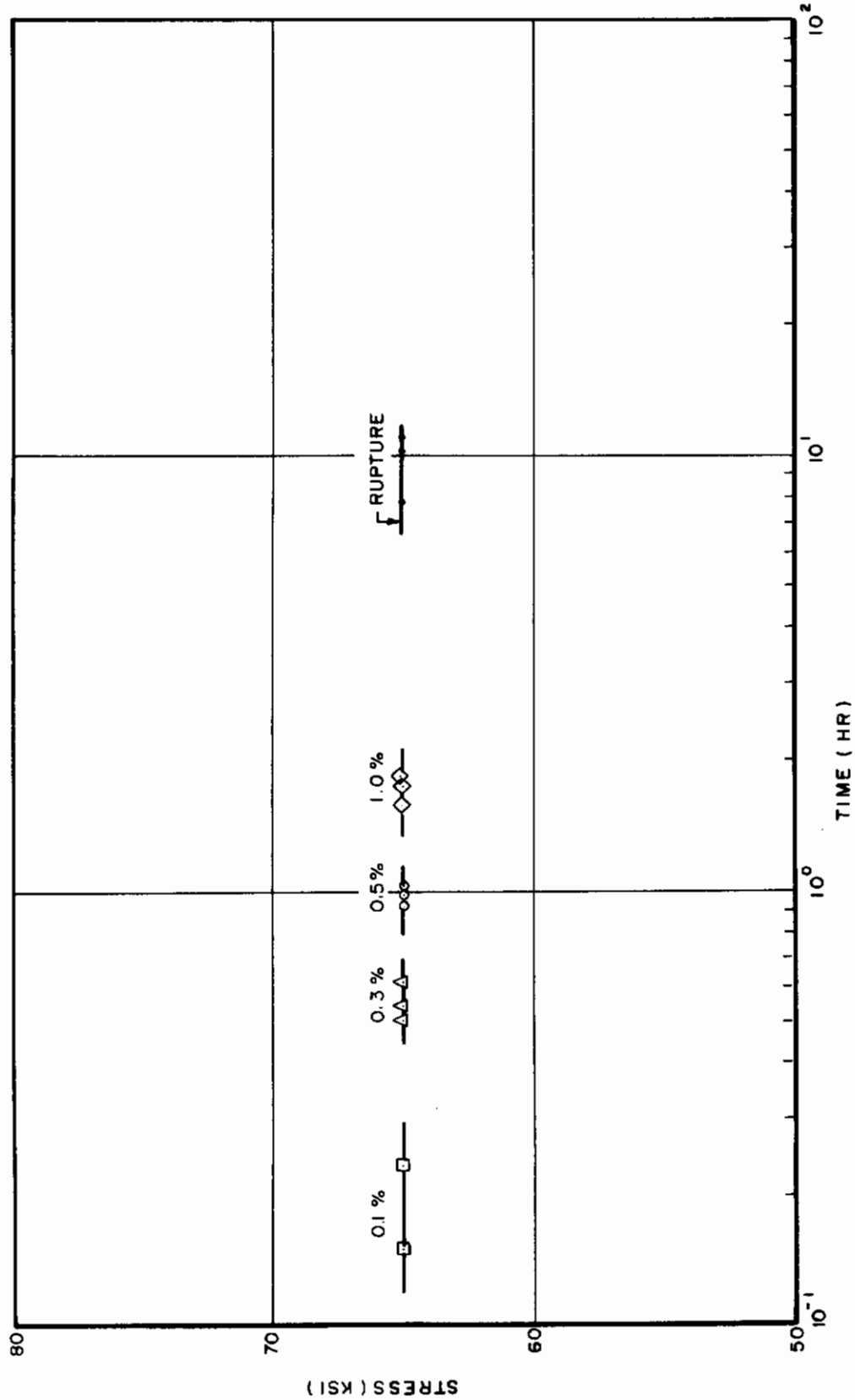


Figure 133. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1800°F] at 1300°F (1760°R)

TABLE 205

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1350° F (1810° R)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	1.20000E-04	0.200
	3.60000E-04	0.300
	6.00000E-04	0.500
	8.10000E-04	0.700
	1.08000E-03	0.900
	1.80000E-03	1.400
	1.89000E-03	1.600
	1.95000E-03	1.800
	2.34000E-03	2.000
	3.06000E-03	2.500
	3.93000E-03	3.000
	4.98000E-03	3.500
	5.10000E-03	3.600
	5.70000E-03	4.000
	6.81000E-03	4.500
	7.80000E-03	5.000
	9.00000E-03	5.500
	9.93000E-03	5.800
	1.01700E-02	6.000
	1.08000E-03	0.250
	1.41000E-03	0.500
	1.68000E-03	0.750
	1.95000E-03	1.000
	2.01000E-03	1.100
	2.46000E-03	1.500
	2.97000E-03	2.000
	3.78000E-03	2.500
	4.32000E-03	3.000
	4.80000E-03	3.500

TABLE 205 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	4.95000E-03	3.600
	5.52000E-03	4.000
	6.18000E-03	4.500
	6.99000E-03	5.000
	8.01000E-03	5.500
	8.70000E-03	6.000
	9.69000E-03	6.400
	9.90000E-03	6.600
	1.07700E-02	7.000
	1.23000E-03	1.000
	1.50000E-03	1.200
	1.77000E-03	1.400
	1.83000E-03	1.600
	2.04000E-03	1.800
	2.37000E-03	2.000
	3.78000E-03	3.000
	4.26000E-03	3.200
	4.95000E-03	3.500
	5.82000E-03	4.000
	6.60000E-03	4.300
	7.26000E-03	4.600
	8.07000E-03	4.900
	8.82000E-03	5.200
	9.24000E-03	5.400
	9.69000E-03	5.600
	1.03200E-02	5.800
	1.09800E-02	6.000

RUN 9

TABLE 206

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1800° F at 1350° F (1810° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	1.21250E-04	0.200
	3.55850E-04	0.300
	5.97550E-04	0.500
	8.35380E-04	0.700
	1.06582E-03	0.900
	1.63252E-03	1.400
	1.87039E-03	1.600
	2.12020E-03	1.800
	2.38372E-03	2.000
	3.10697E-03	2.500
	3.92136E-03	3.000
	4.81930E-03	3.500
	5.00804E-03	3.600
	5.79084E-03	4.000
	6.82611E-03	4.500
	7.91616E-03	5.000
	9.05313E-03	5.500
	9.75499E-03	5.800
	1.02303E-02	6.000
	1.07671E-03	0.250
	1.44241E-03	0.500
	1.62937E-03	0.750
	1.91121E-03	1.000
	2.03209E-03	1.100
	2.51243E-03	1.500
	3.08316E-03	2.000
	3.64356E-03	2.500
	4.22413E-03	3.000
	4.84521E-03	3.500

TABLE 206 (CONT)

RUN 9

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	4.97542E-03	3.600
	5.51826E-03	4.000
	6.24891E-03	4.500
	7.03919E-03	5.000
	7.88897E-03	5.500
	8.79688E-03	6.000
	9.56365E-03	6.400
	9.96010E-03	6.600
	1.07783E-02	7.000
	1.26577E-03	1.000
	1.47775E-03	1.200
	1.67629E-03	1.400
	1.88013E-03	1.600
	2.09916E-03	1.800
	2.33833E-03	2.000
	3.87048E-03	3.000
	4.24004E-03	3.200
	4.82862E-03	3.500
	5.89114E-03	4.000
	6.57161E-03	4.300
	7.28030E-03	4.600
	8.01430E-03	4.900
	8.77101E-03	5.200
	9.28696E-03	5.400
	9.81133E-03	5.600
	1.03436E-02	5.800
	1.08831E-02	6.000

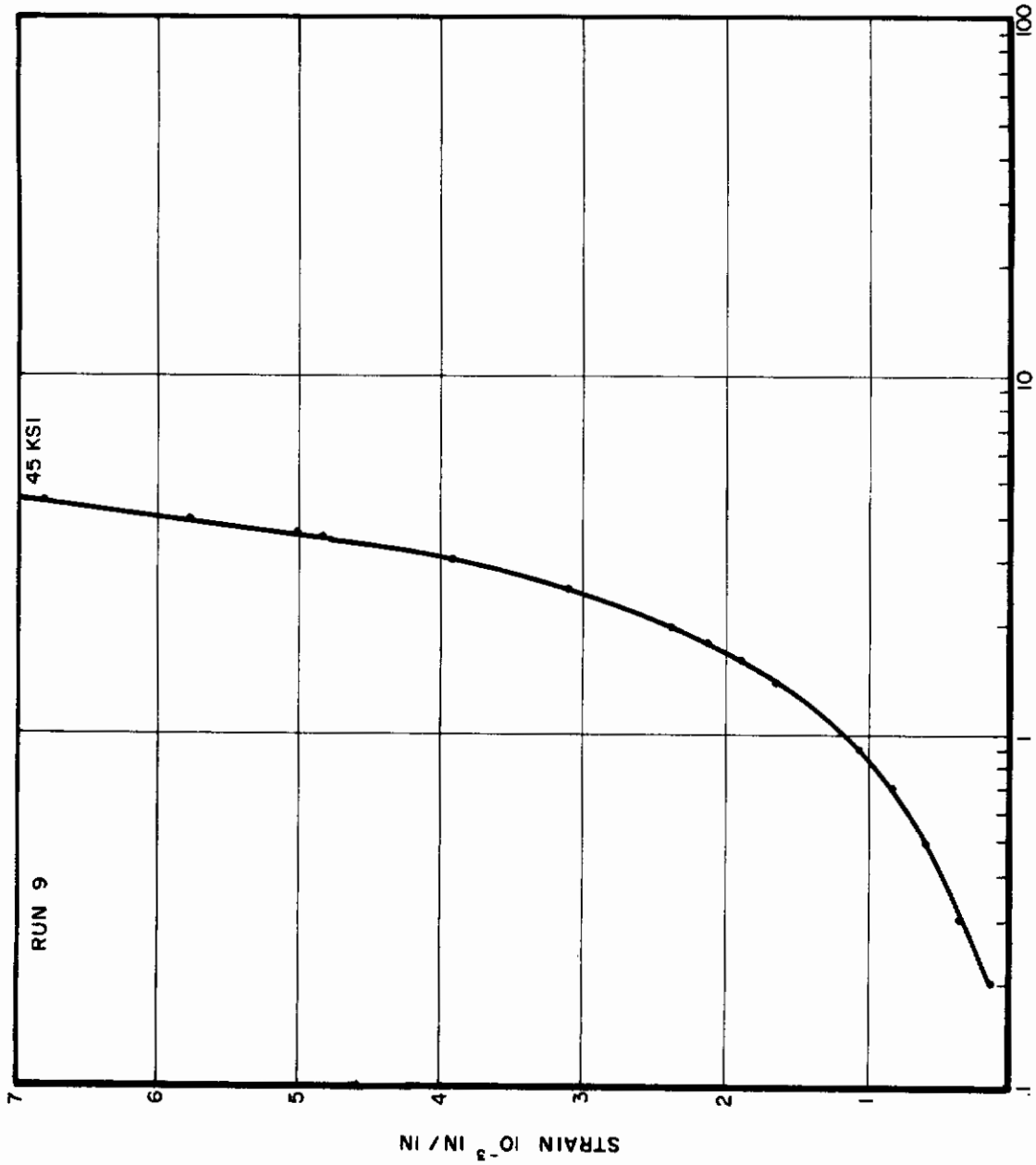


Figure 134. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1800°F] at 1350°F (1810°R)

TABLE 207

Creep Deformation and Rupture Data at 1350° F (1810° R) for Super A-286

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
45.0	29.9			-	2.4	3.56	5.7
45.0	34.7			-	2.02	3.6	6.6
45.0	33.8			.733	2.5	3.52	5.86

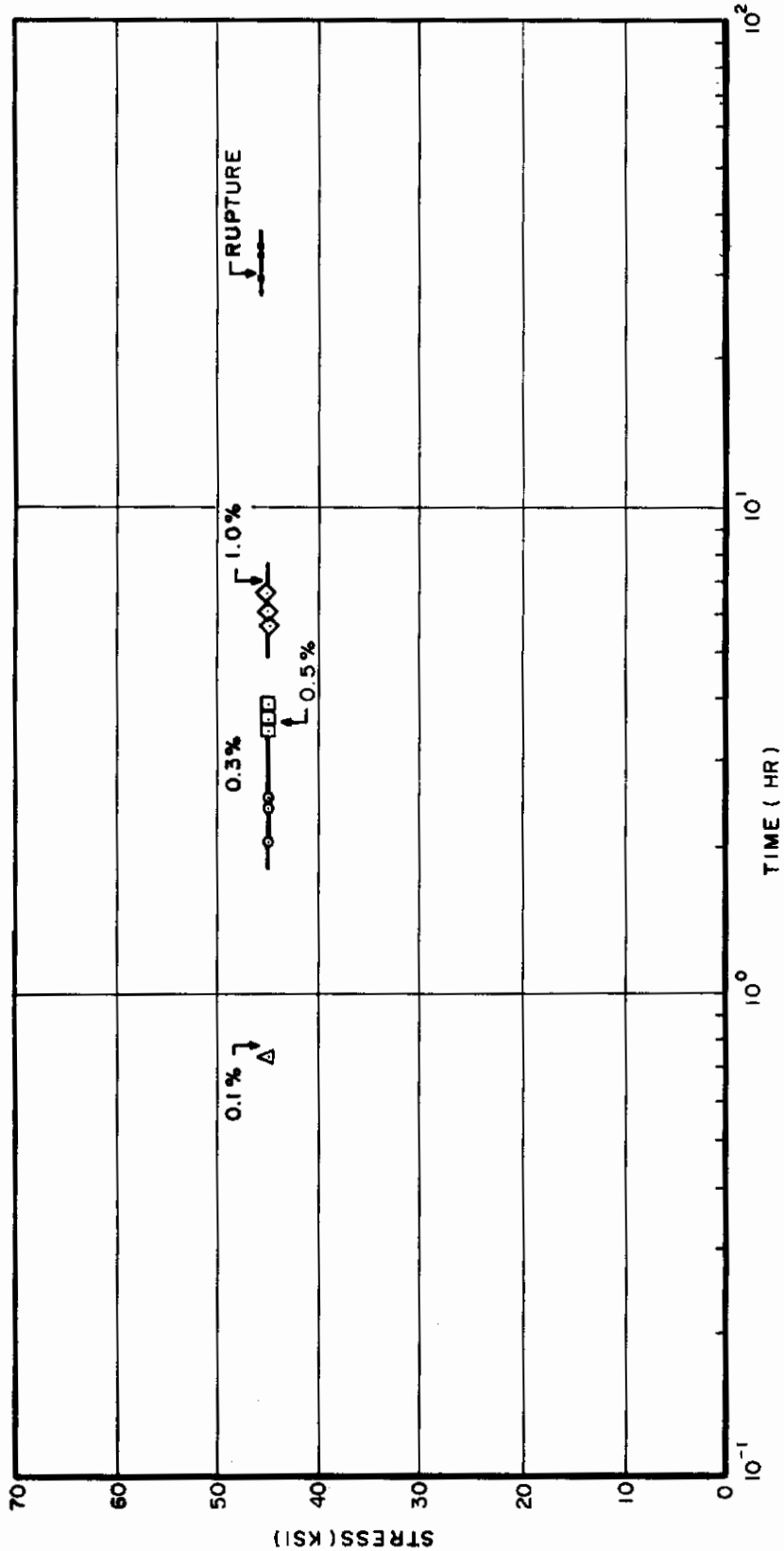


Figure 135. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1800°F] at 1350°F (1810°R)

TABLE 208

Minimum Creep Rate for Super A-286 [(V57C) Heat Treated at 1800° F] at 1050° F (1510° R)

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1050° F (1510° R)	90	2.15×10^{-5}
	90	1.04×10^{-5}
	90	1.33×10^{-5}
1200° F (1660° R)	65	5.37×10^{-5}
	65	1.18×10^{-4}
	65	1.12×10^{-4}
	65	3.19×10^{-4}
	90	3.34×10^{-3}
	90	4.86×10^{-3}
1300° F (1760° R)	65	4.45×10^{-3}
	65	4.98×10^{-3}
	65	5.01×10^{-3}
1350° F (1810° R)	45	1.15×10^{-3}
	45	7.48×10^{-4}
	45	9.93×10^{-4}

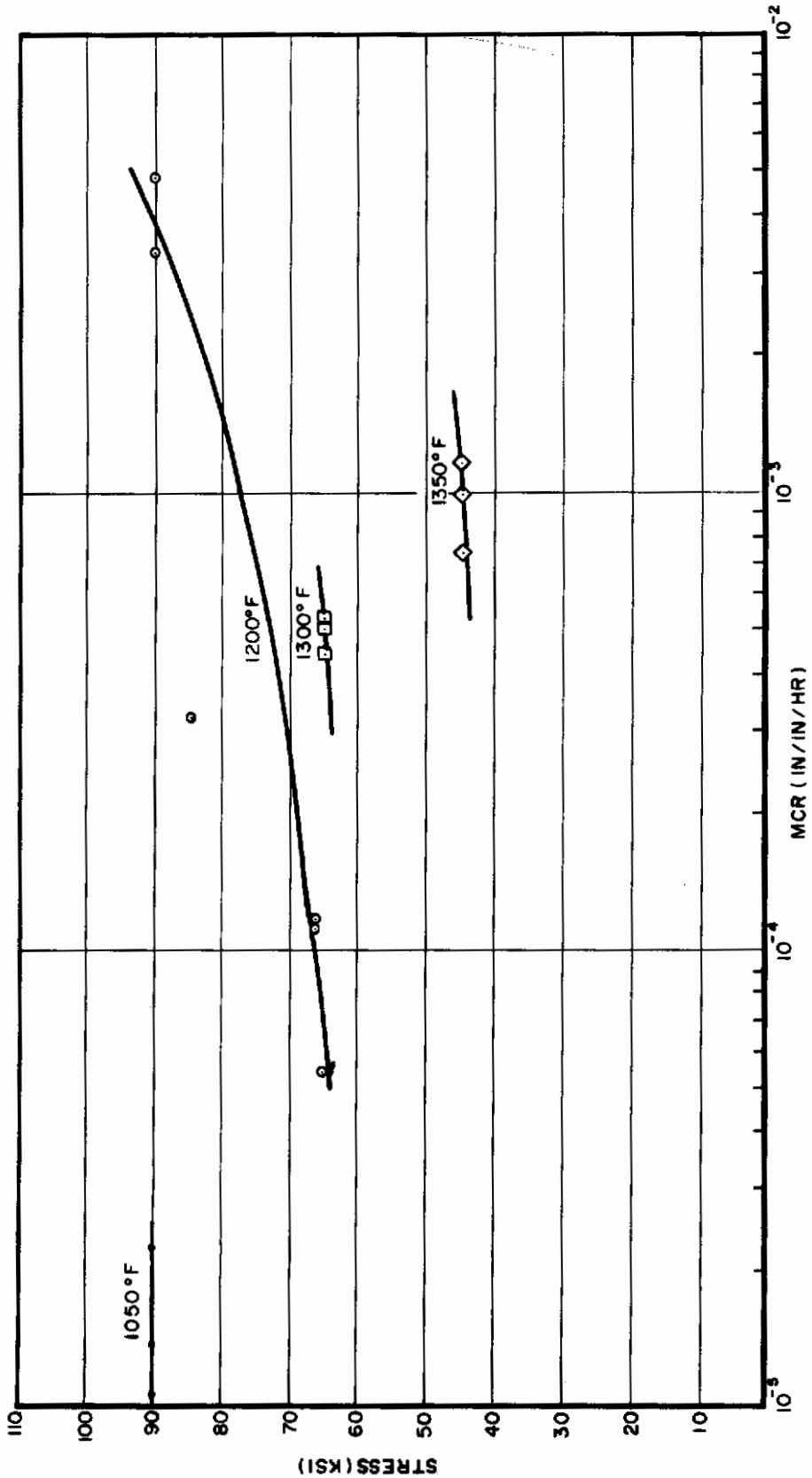


Figure 136. Minimum Creep Rate of Super A-286 [(V57C) Heat Treated at 1800°F]

CREEP DATA

SUPER A-286 (V57C)

(2ND HEAT TREAT)

TABLE 209

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1050° F (1510° R)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.05000E-03	16.500
	1.05000E-03	24.300
	1.14000E-03	40.400
	1.20000E-03	47.000
	1.26000E-03	88.600
	1.38000E-03	120.300
	1.62000E-03	160.800
	1.78000E-03	210.400
	1.86000E-03	257.800
	2.01000E-03	281.000
	2.40000E-03	336.200
	2.58000E-03	382.500
	2.61000E-03	424.600
	2.82000E-03	473.500
	2.94000E-03	520.900
	3.30000E-03	545.300
	4.17000E-03	600.100
	4.80000E-03	669.100
	4.92000E-03	683.500
	4.98000E-03	685.000
	5.70000E-03	719.500
	6.15000E-03	760.700
	6.57000E-03	808.500
	7.98000E-03	839.900
	8.52000E-03	881.000
	9.06000E-03	928.800
	9.96000E-03	959.500
	9.99000E-03	960.000
	9.60000E-04	18.900
	1.08000E-03	25.400
	1.17000E-03	67.100
	1.30000E-03	91.900
	1.35000E-03	121.800
	1.56000E-03	146.400
	1.68000E-03	188.900
	1.83000E-03	242.500
	1.92000E-03	265.000
	1.92000E-03	266.000
	2.04000E-03	266.500
	2.35000E-03	314.700
	2.49000E-03	361.000
	2.70000E-03	403.000
	2.76000E-03	441.000
	3.00000E-03	482.600
	3.42000E-03	523.700

TABLE 209 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.99000E-03	575.000
	4.62000E-03	626.000
	4.95000E-03	647.600
	5.34000E-03	701.100
	5.52000E-03	746.400
90.0000	6.90000E-03	818.400
	7.80000E-03	859.400
	9.06000E-03	907.200
	9.96000E-03	939.200
	9.96000E-03	940.000
	1.02000E-03	20.000
	1.14000E-03	41.200
	1.23000E-03	73.500
	1.32000E-03	96.600
	1.38000E-03	119.300
	1.47000E-03	162.300
	1.53000E-03	192.400
	1.68000E-03	215.600
	1.80000E-03	240.200
	1.92000E-03	282.600
	1.95000E-03	302.500
	1.98000E-03	305.000
	1.98000E-03	305.500
	2.16000E-03	330.000
	2.31000E-03	377.000
	2.31000E-03	408.500
	2.64000E-03	449.300
	2.73000E-03	496.500
	2.76000E-03	526.700
	2.87000E-03	552.600
	3.03000E-03	593.200
	3.15000E-03	617.400
	3.39000E-03	670.300
	3.57000E-03	717.600
	3.99000E-03	768.100
	4.72000E-03	832.900
	4.72000E-03	840.200
	4.92000E-03	857.000
	5.04000E-03	860.000
	5.43000E-03	888.600
	5.76000E-03	912.100
	6.60000E-03	958.200
	7.23000E-03	990.200
	8.01000E-03	1025.300
	8.64000E-03	1056.400
	9.24000E-03	1080.400
	1.01100E-02	1121.000
	1.01700E-02	1122.500

TABLE 210

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1050° F (1510° R) RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
90.0000	1.15110E-03	16.500
	1.16218E-03	24.300
	1.18716E-03	40.400
	1.19823E-03	47.000
	1.27903E-03	88.600
	1.35345E-03	120.300
	1.46479E-03	160.800
	1.62643E-03	210.400
	1.80764E-03	257.800
	1.90622E-03	281.000
	2.16817E-03	336.200
	2.41962E-03	382.500
	2.67565E-03	424.600
	3.00915E-03	473.500
	3.37373E-03	520.900
	3.57897E-03	545.300
	4.08868E-03	600.100
	4.84089E-03	669.100
	5.01556E-03	683.500
	5.03413E-03	685.000
	5.48218E-03	719.500
	6.07359E-03	760.700
	6.84631E-03	808.500
	7.41062E-03	839.900
	8.22532E-03	881.000
	9.29406E-03	928.800
	1.00570E-02	959.500
	1.00700E-02	960.000
	1.02807E-03	18.900
	1.04786E-03	25.400
	1.18160E-03	67.100
	1.26670E-03	91.900
	1.37484E-03	121.800
	1.46835E-03	146.400
	1.63964E-03	188.900
	1.87359E-03	242.500
	1.97794E-03	265.000
	1.98266E-03	266.000
	1.98502E-03	266.500
	2.22199E-03	314.700
	2.46748E-03	361.000
	2.70714E-03	403.000
	2.93992E-03	441.000
	3.21499E-03	482.600
	3.51139E-03	523.700
	3.92354E-03	575.000

RUN 10

TABLE 210 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.39169E-03	626.000
	4.61137E-03	647.600
	5.22283E-03	701.100
	5.83166E-03	746.400
90.0000	7.02430E-03	818.400
	7.86009E-03	859.400
	9.01546E-03	907.200
	9.91786E-03	939.200
	9.94189E-03	940.000
	1.09739E-03	20.000
	1.15950E-03	41.200
	1.25434E-03	73.500
	1.32240E-03	96.600
	1.38953E-03	119.300
	1.51764E-03	162.300
	1.60824E-03	192.400
	1.67873E-03	215.600
	1.75421E-03	240.200
	1.88644E-03	282.600
	1.94965E-03	302.500
	1.95765E-03	305.000
	1.95925E-03	305.500
	2.03840E-03	330.000
	2.19472E-03	377.000
	2.30354E-03	408.500
	2.45067E-03	449.300
	2.63195E-03	496.500
	2.76425E-03	528.700
	2.86797E-03	552.600
	3.05714E-03	593.200
	3.17904E-03	617.400
	3.47497E-03	670.300
	3.78214E-03	717.600
	4.16716E-03	768.100
	4.47320E-03	832.900
	4.85096E-03	840.200
	5.03822E-03	857.000
	5.07292E-03	860.000
	5.42447E-03	888.600
	5.74362E-03	912.100
	6.46063E-03	958.200
	7.03954E-03	990.200
	7.76313E-03	1025.300
	8.49189E-03	1056.400
	9.11713E-03	1080.400
	1.03147E-02	1121.000
	1.03625E-02	1122.500

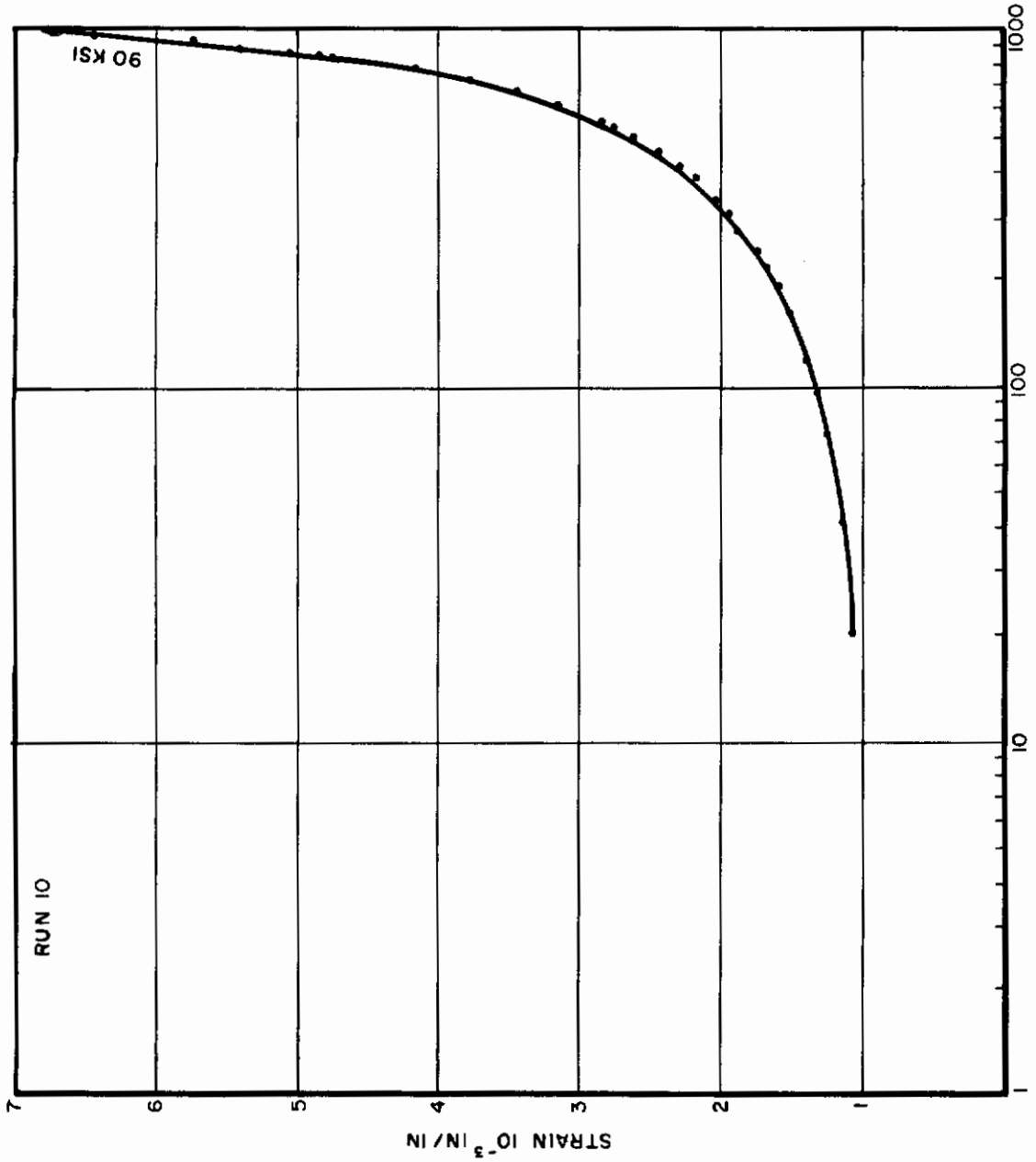


Figure 137. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1650°F] at 1050°F (1510°R)

TABLE 211

Creep Deformation for Super A-286 [(V57C) Heat Treated at 1650° F] at 1050° F (1510° R)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
90.0	512.4			16.8	90.0	157.3	270
90.0	727.0			47.1	162	255	357.5
90.0	761.1			16.0	150	233.9	-

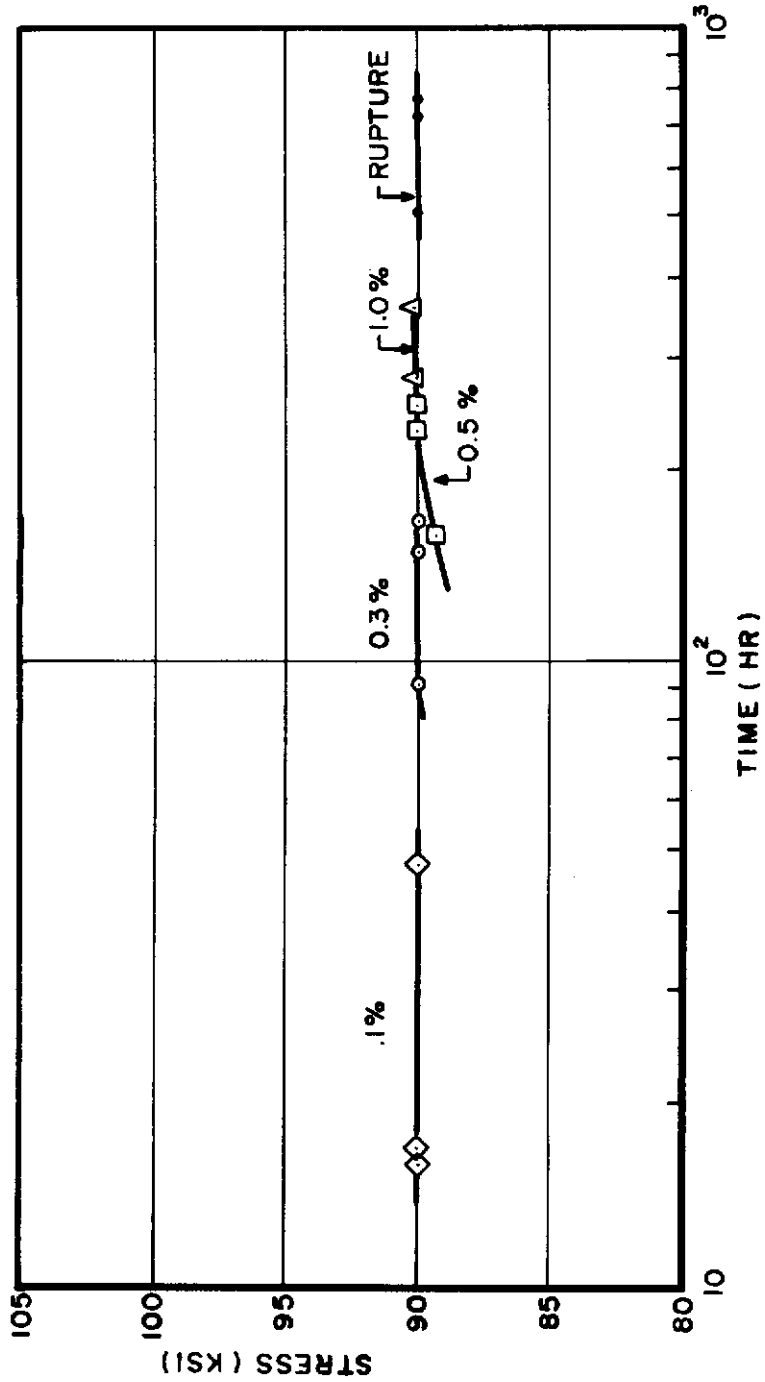


Figure 138. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1650°F] at 1050°F (1510°R)

TABLE 212

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1200° F (1660° R) RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	6.00000E-04	9.200
	1.02000E-03	16.000
	1.47000E-03	22.000
	1.74000E-03	28.000
	1.80000E-03	31.000
	1.89000E-03	32.000
65.0000	2.01000E-03	32.500
	2.46000E-03	43.800
	9.93000E-03	98.000
	9.99000E-03	98.100
	9.00000E-04	24.600
	9.90000E-04	25.000
	1.47000E-03	36.600
	1.80000E-03	48.700
	1.86000E-03	51.000
	1.92000E-03	51.500
	1.98000E-03	51.800
	2.82000E-03	72.500
	3.15000E-03	77.500
	3.96000E-03	93.800
	4.65000E-03	105.000
	4.83000E-03	107.000
	5.01000E-03	108.000
	6.96000E-03	125.900
	9.00000E-03	141.500
	9.21000E-03	143.000
	9.81000E-03	148.000
	9.90000E-03	149.000
	1.00500E-02	149.500
85.0000	4.80000E-04	0.100
	7.50000E-04	0.300
	9.40000E-04	0.400
	1.20000E-03	0.500
	1.65000E-03	0.800
	1.77000E-03	0.900
	1.92000E-03	1.000
	2.04000E-03	1.100
	2.49000E-03	1.400
	2.58000E-03	1.500
	3.42000E-03	2.000
	4.35000E-03	2.500
	4.74000E-03	2.800
	5.04000E-03	3.000
	6.03000E-03	3.500
	7.20000E-03	4.000

TABLE 212 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.64000E-03	4.500
	9.84000E-03	4.900
	1.00800E-02	5.000
90.0000	2.40000E-04	0.100
	8.70000E-04	0.300
	1.53000E-03	0.500
	2.04000E-03	0.700
	2.64000E-03	0.900
	3.06000E-03	1.000
90.0000	3.90000E-03	1.300
	4.41000E-03	1.500
	5.01000E-03	1.700
	6.06000E-03	2.000
	7.50000E-03	2.500
	9.00000E-03	3.000
	9.42000E-03	3.100
	1.01100E-02	3.300
	9.60000E-04	0.150
	1.50000E-03	0.250
	2.10000E-03	0.350
	2.73000E-03	0.500
	3.78000E-03	0.750
	5.04000E-03	1.000
	6.60000E-03	1.200
	7.80000E-03	1.500
	8.58000E-03	1.700
	1.14000E-02	2.000
	1.55700E-02	2.500

TABLE 213

RUN 10

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1200° F (1660° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	5.90820E-04	9.200
	1.06061E-03	16.000
	1.41666E-03	22.000
	1.72900E-03	28.000
	1.87306E-03	31.000
	1.91978E-03	32.000
65.0000	1.94294E-03	32.500
	2.45701E-03	43.800
	9.94401E-03	98.000
	9.97608E-03	98.100
	8.98470E-04	24.600
	9.38570E-04	25.000
	1.57800E-03	36.600
	1.85135E-03	46.700
	1.90051E-03	51.000
	1.91157E-03	51.500
	1.91826E-03	51.800
	2.60589E-03	72.500
	2.85503E-03	77.500
	3.91086E-03	93.800
	4.64541E-03	105.000
	5.02929E-03	107.000
	5.12311E-03	106.000
	7.00339E-03	125.900
	8.92691E-03	141.500
	9.12461E-03	143.000
	9.79886E-03	148.000
	9.93649E-03	149.000
	1.00056E-02	149.500
85.0000	4.76880E-04	0.100
	8.08720E-04	0.300
	9.22750E-04	0.400
	1.09435E-03	0.500
	1.63575E-03	0.800
	1.79868E-03	0.900
	1.95249E-03	1.000
	2.09899E-03	1.100
	2.51330E-03	1.400
	2.64839E-03	1.500
	3.35068E-03	2.000
	4.15056E-03	2.500
	4.69144E-03	2.800

TABLE 213 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.07881E-03	3.000
	6.14060E-03	3.500
	7.33078E-03	4.000
	8.64036E-03	4.500
	9.76719E-03	4.900
	1.00592E-02	5.000
90.0000	2.41350E-04	0.100
	6.59800E-04	0.300
	1.51711E-03	0.500
	2.10581E-03	0.700
	2.68181E-03	0.900
	2.97107E-03	1.000
90.0000	3.85170E-03	1.300
	4.45015E-03	1.500
	5.05649E-03	1.700
	5.97756E-03	2.000
	7.53227E-03	2.500
	9.09742E-03	3.000
	9.41066E-03	3.100
	1.00368E-02	3.300
	9.48190E-04	0.150
	1.58862E-03	0.250
	1.96458E-03	0.350
	2.71457E-03	0.500
	3.97675E-03	0.750
	5.16123E-03	1.000
	6.13654E-03	1.200
	7.77352E-03	1.500
	9.02736E-03	1.700
	1.11903E-02	2.000
	1.55782E-02	2.500

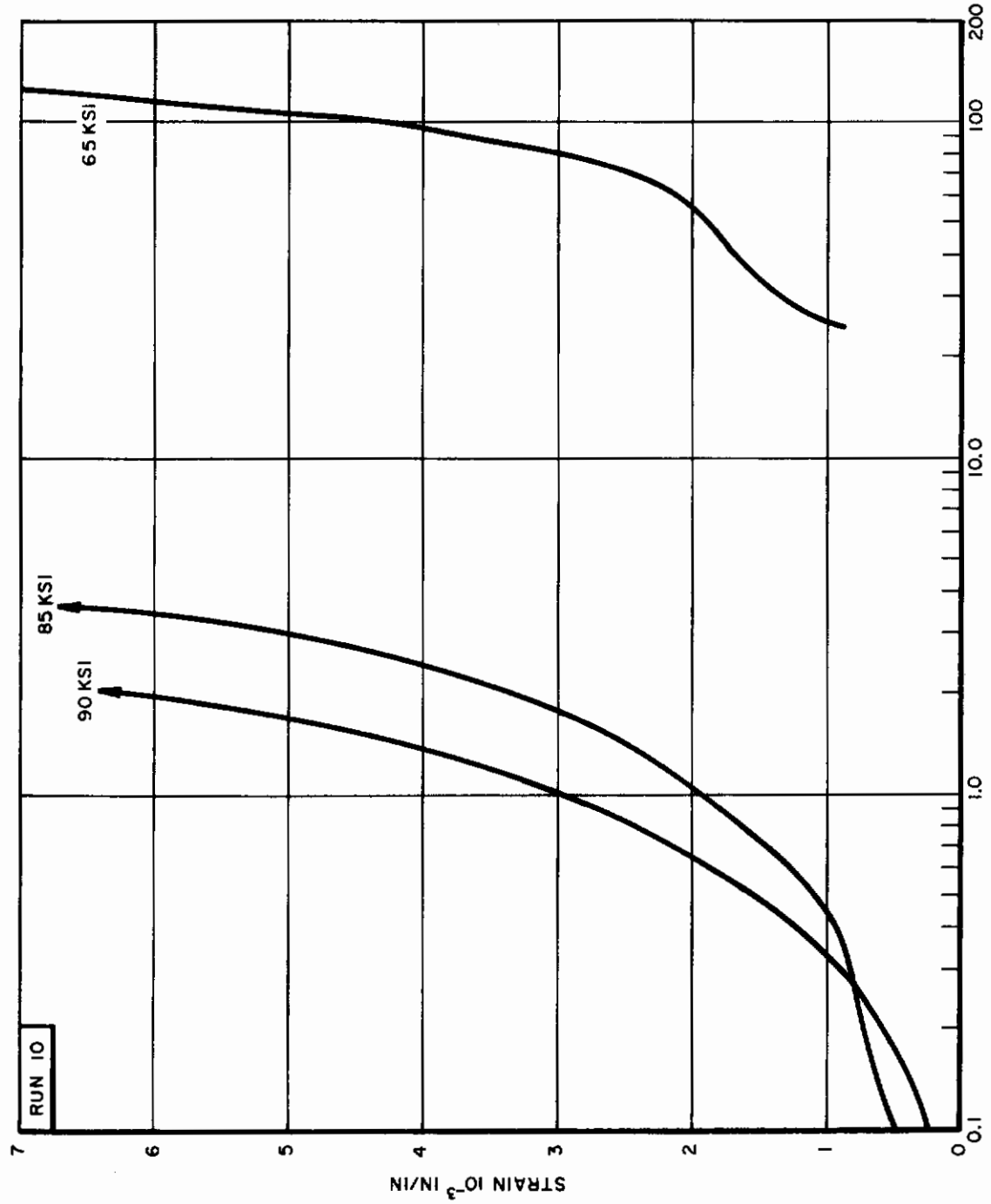


Figure 139. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1650°F] at 1200°F (1660°R)

TABLE 215

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1300° F (1760° R)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	8.70000E-04	3.000
	1.17000E-03	3.500
	1.38000E-03	4.000
	1.62000E-03	4.500
	1.80000E-03	5.000
	2.04000E-03	5.200
	2.07000E-03	5.500
	2.28000E-03	6.000
	3.00000E-03	8.000
	4.08000E-03	10.000
	4.56000E-03	11.000
	4.80000E-03	11.500
	5.04000E-03	11.800
	5.10000E-03	12.000
	6.39000E-03	14.000
	8.16000E-03	16.000
	9.60000E-03	18.000
	1.01400E-02	18.500
65.0000	4.50000E-04	0.100
	8.10000E-04	0.200
	1.23000E-03	0.300
	1.62000E-03	0.400
	2.19000E-03	0.500
	2.91000E-03	0.700
	3.60000E-03	0.900
	4.35000E-03	1.100
	4.98000E-03	1.300
	6.03000E-03	1.500
	8.82000E-03	2.000

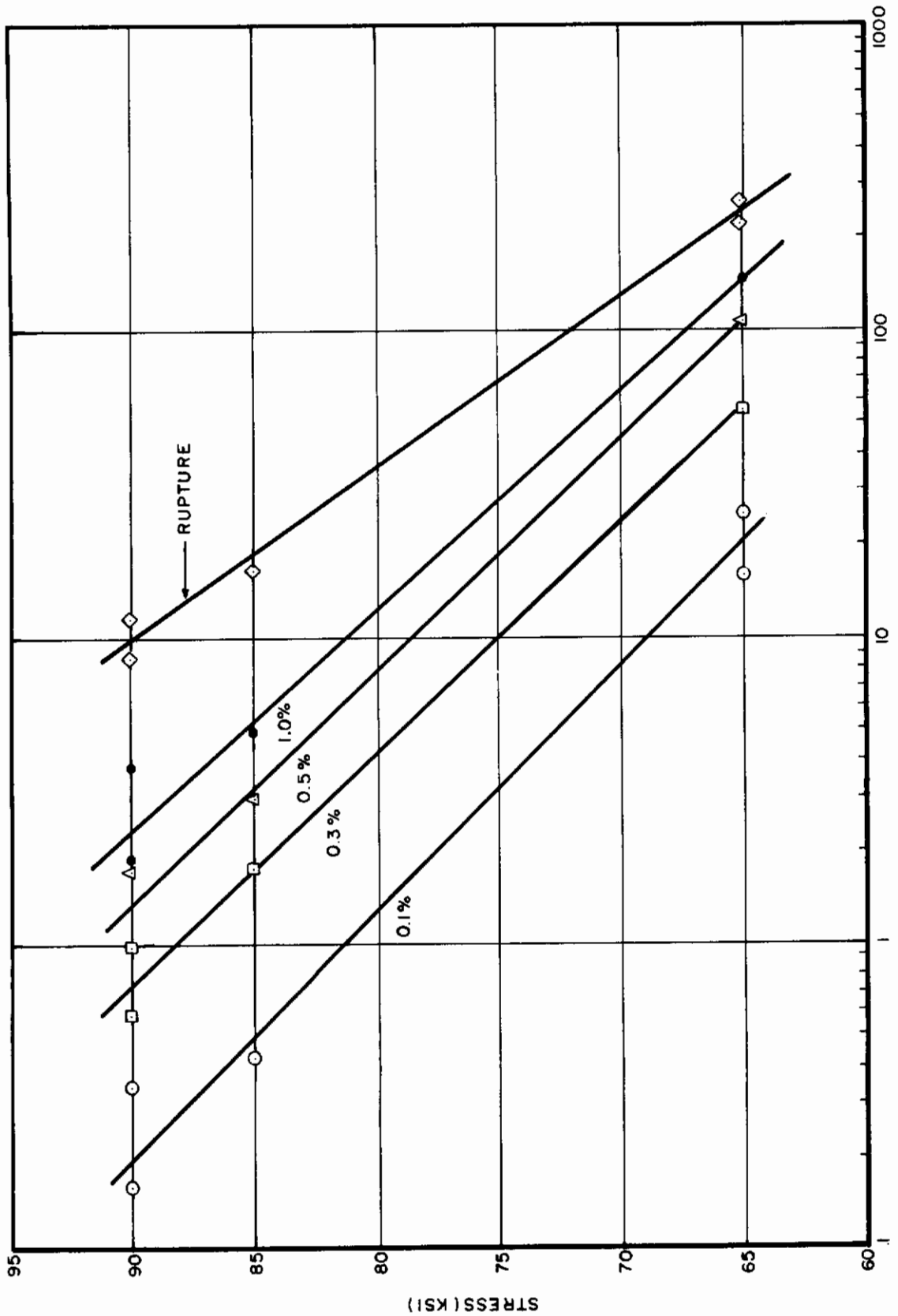


Figure 140. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1650°F] at 1200°F (1660°R)

TABLE 214

Creep Deformation and Rupture Data at 1200° F (1660° R) for Super A-286
(2nd Heat Treat)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
65.0	263.4			25.2	53	108	149.3
65.0	220.3			15.6			
85.0	16.7			.425	1.76	3.0	4.97
90.0	8.6			.16	.58	.98	1.85
90.0	11.9			.34	.98	1.7	3.27

TABLE 215 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	9.39000E-03	2.100
	1.01700E-02	2.200
	1.30500E-02	2.500
	4.80000E-04	0.400
	9.90000E-04	0.600
	1.05000E-03	0.800
	1.23000E-03	1.000
	1.50000E-03	1.200
	1.68000E-03	1.500
	1.95000E-03	1.700
	2.28000E-03	1.900
	2.34000E-03	2.000
	2.94000E-03	2.500
	3.75000E-03	3.000
	4.14000E-03	3.500
	4.47000E-03	4.000
	4.95000E-03	4.500
	5.49000E-03	5.000
	6.69000E-03	6.000
	8.16000E-03	7.000
	8.97000E-03	7.500
	9.87000E-03	8.000
	9.99000E-03	8.100

TABLE 216

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1300° F (1760° R)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
60.0000	8.33150E-04	3.000
	1.17114E-03	3.500
	1.43892E-03	4.000
	1.66443E-03	4.500
	1.86581E-03	5.000
	1.94246E-03	5.200
	2.05513E-03	5.500
	2.24056E-03	6.000
	3.03195E-03	8.000
	3.99211E-03	10.000
	4.54672E-03	11.000
	4.64250E-03	11.500
	5.02589E-03	11.800
	5.15049E-03	12.000
	6.49726E-03	14.000
	8.01270E-03	16.000
	9.67599E-03	18.000
	1.01126E-02	18.500
65.0000	4.08640E-04	0.100
	8.40940E-04	0.200
	1.26176E-03	0.300
	1.67147E-03	0.400
	2.07074E-03	0.500
	2.84261E-03	0.700
	3.59143E-03	0.900
	4.33967E-03	1.100
	5.11867E-03	1.300
	5.96829E-03	1.500
	8.72260E-03	2.000

TABLE 216 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	9.43513E-03	2.100
	1.02171E-02	2.200
	1.30381E-02	2.500
	4.79410E-04	0.400
	9.84270E-04	0.600
	1.08684E-03	0.800
	1.20627E-03	1.000
	1.38857E-03	1.200
	1.74195E-03	1.500
	2.00161E-03	1.700
	2.26456E-03	1.900
	2.39466E-03	2.000
	3.01167E-03	2.500
	3.56355E-03	3.000
	4.06527E-03	3.500
	4.54311E-03	4.000
	5.02319E-03	4.500
	5.52800E-03	5.000
	6.68081E-03	6.000
	8.10415E-03	7.000
	8.93690E-03	7.500
	9.85684E-03	8.000
	1.00516E-02	8.100

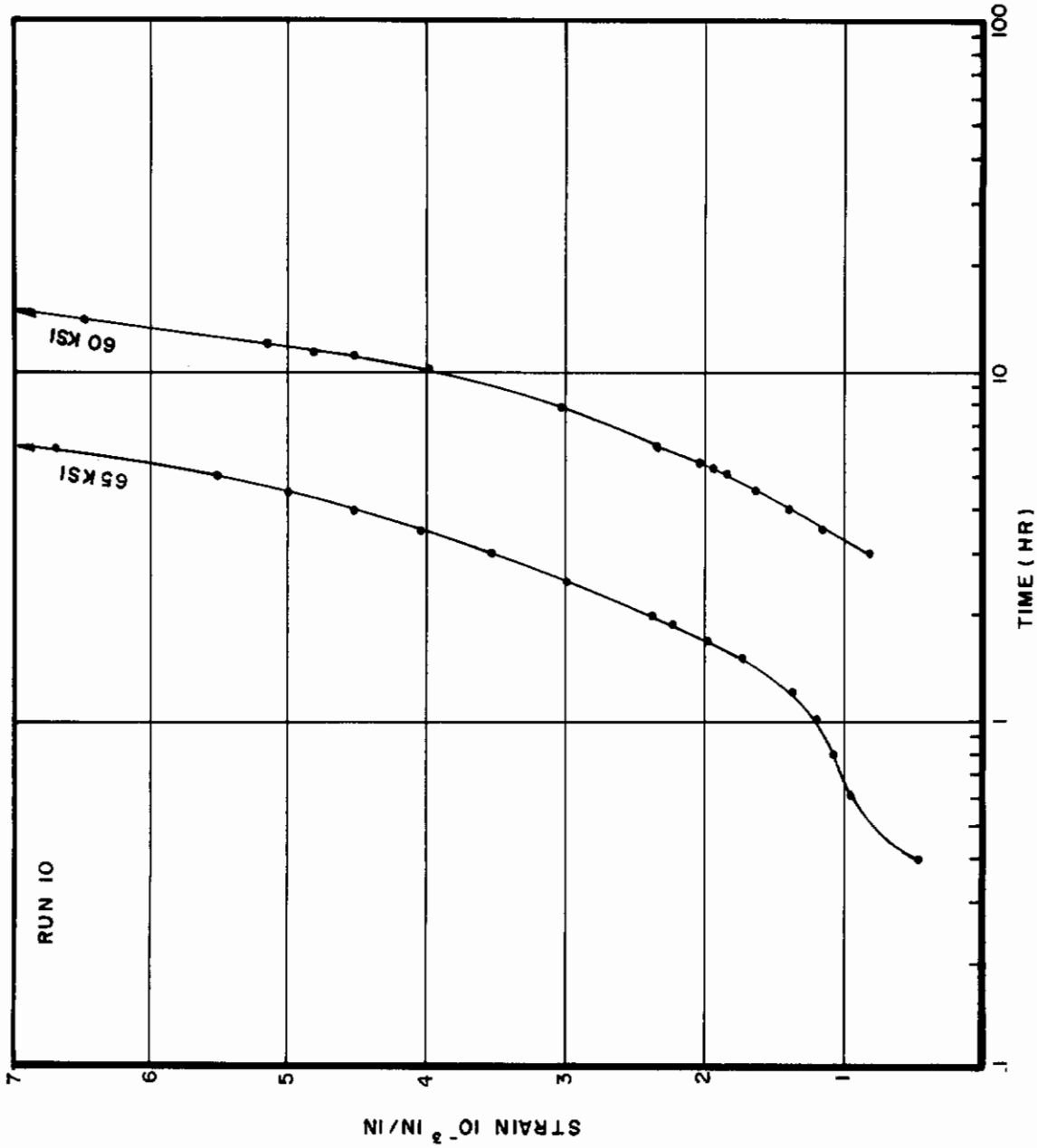


Figure 141. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1650°F] at 1300°F (1760°R)

TABLE 217

Creep Deformation and Rupture Data at 1300°F (1760°R) for Super A-286
(2nd Heat Treat)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
60.0	59.8			3.3	8.0	11.75	18.4
65.0	31.9			.63	2.55	4.57	8.1
65.0	19.9			.25	.73	1.3	2.12

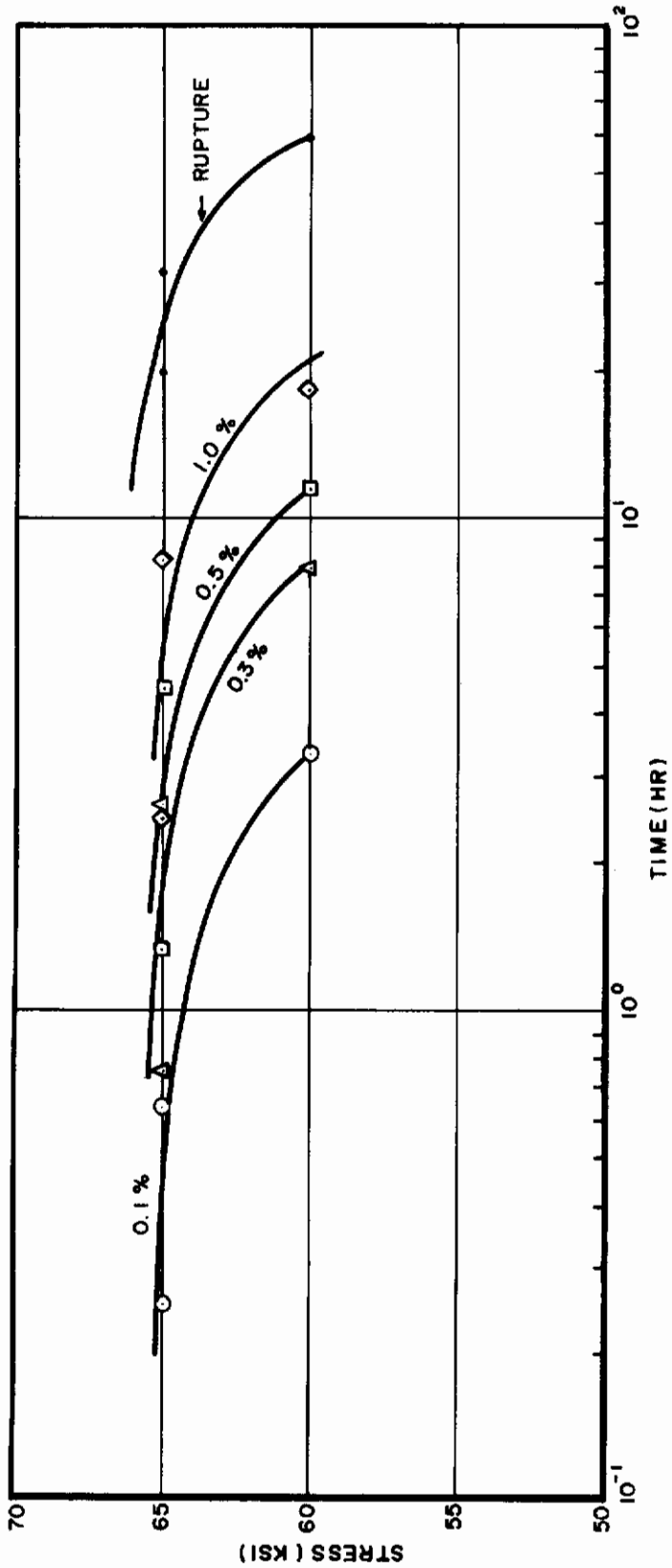


Figure 142. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1650°F] at 1300°F (1760°R)

TABLE 218

RUN 10

Deformation Versus Time (Raw Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1350° F (1810° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	5.40000E-04	2.000
	7.20000E-04	3.000
	8.70000E-04	4.000
	9.90000E-04	4.500
	1.08000E-03	5.000
	1.23000E-03	6.000
	1.38000E-03	9.000
	1.80000E-03	12.000
	1.86000E-03	13.000
	1.95000E-03	14.000
	2.01000E-03	14.300
	2.49000E-03	20.000
	2.79000E-03	23.000
	3.81000E-03	29.000
	4.32000E-03	35.000
	4.98000E-03	41.000
	5.79000E-03	47.000
	7.80000E-03	60.000
	9.69000E-03	66.500
	1.00500E-02	67.000
	1.02000E-03	2.500
	1.20000E-03	5.000
	1.53000E-03	10.000
	1.86000E-03	17.000
	1.95000E-03	19.000
	2.04000E-03	19.200

TABLE 218 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	2.46000E-03	25.000
	3.27000E-03	35.000
	4.02000E-03	43.000
	4.59000E-03	48.000
	4.86000E-03	50.000
	4.98000E-03	51.000
	6.81000E-03	60.000
	7.65000E-03	65.000
	9.00000E-03	73.000
	9.69000E-03	75.000
	9.96000E-03	77.000
	7.20000E-04	0.600
	9.90000E-04	0.700
	1.14000E-03	0.800
	1.26000E-03	1.000
	1.26000E-03	1.500
	1.80000E-03	2.000
	1.80000E-03	2.200
	1.86000E-03	2.400
	1.92000E-03	2.600
	1.95000E-03	2.700
	2.28000E-03	3.000
	2.97000E-03	4.000
	3.21000E-03	4.500
	3.66000E-03	5.000
	4.02000E-03	6.000
	4.77000E-03	7.000
	5.04000E-03	7.100
	5.76000E-03	8.000
	6.18000E-03	9.000
	6.81000E-03	10.000
	7.42000E-03	11.000
	8.10000E-03	12.000
	9.39000E-03	14.000
	9.66000E-03	14.500
	1.00800E-02	15.000

RUN 10

TABLE 219

Deformation Versus Time (Fitted Data) for Super A-286 (V57C) Heat Treated at 1650° F at 1350° F (1810° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	5.76330E-04	2.000
	7.03730E-04	3.000
	8.63920E-04	4.000
	9.44440E-04	4.500
	1.02278E-03	5.000
	1.17029E-03	6.000
	1.53928E-03	9.000
	1.83400E-03	12.000
	1.92360E-03	13.000
	2.01097E-03	14.000
	2.03690E-03	14.300
	2.53196E-03	20.000
	2.81175E-03	23.000
	3.44056E-03	29.000
	4.17415E-03	35.000
	5.01373E-03	41.000
	5.95395E-03	47.000
	8.29995E-03	60.000
	9.61222E-03	66.500
	9.71662E-03	67.000
	1.03583E-03	2.500
	1.14942E-03	5.000
	1.56421E-03	10.000
	1.92092E-03	17.000
	2.01430E-03	19.000
	2.02390E-03	19.200

TABLE 219 (CONT)

RUN 10

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	2.33991E-03	25.000
	3.13172E-03	35.000
	4.02118E-03	43.000
	4.68943E-03	48.000
	4.97973E-03	50.000
	5.12966E-03	51.000
	6.61490E-03	60.000
	7.53881E-03	65.000
	9.14941E-03	73.000
	9.57576E-03	75.000
	1.00111E-02	77.000
	8.23140E-04	0.600
	9.50240E-04	0.700
	1.04324E-03	0.800
	1.17814E-03	1.000
	1.42881E-03	1.500
	1.67812E-03	2.000
	1.78442E-03	2.200
	1.89453E-03	2.400
	2.00817E-03	2.600
	2.06619E-03	2.700
	2.24454E-03	3.000
	2.87312E-03	4.000
	3.19998E-03	4.500
	3.53149E-03	5.000
	4.20154E-03	6.000
	4.87356E-03	7.000
	4.94064E-03	7.100
	5.54223E-03	8.000
	6.20462E-03	9.000
	6.85912E-03	10.000
	7.50490E-03	11.000
	8.14159E-03	12.000
	9.38744E-03	14.000
	9.69325E-03	14.500
	9.99685E-03	15.000

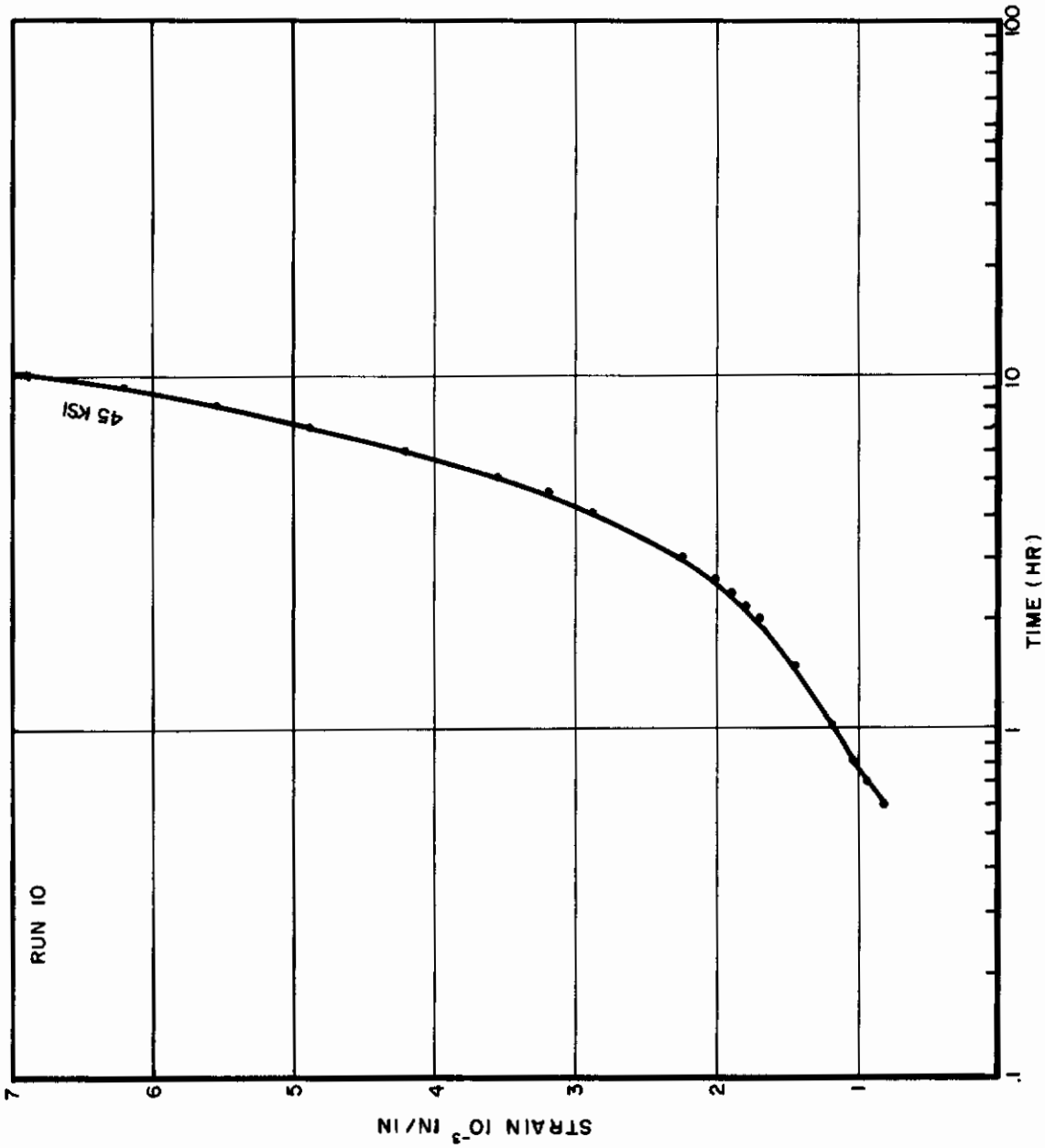


Figure 143. Creep Deformation Versus Log Time of Super A-286 [(V57C) Heat Treated at 1650°F] at 1350°F (1810°R)

TABLE 220

Creep Deformation and Rupture Data at 1350°F (1810°R) for Super A-286
(2nd Heat Treat)

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
45.0	152.8			2.46	32.6	51.1	-
45.0	146.5			4.57	24.2	41.2	66.95
45.0	51.5			.71	4.14	7.08	14.9

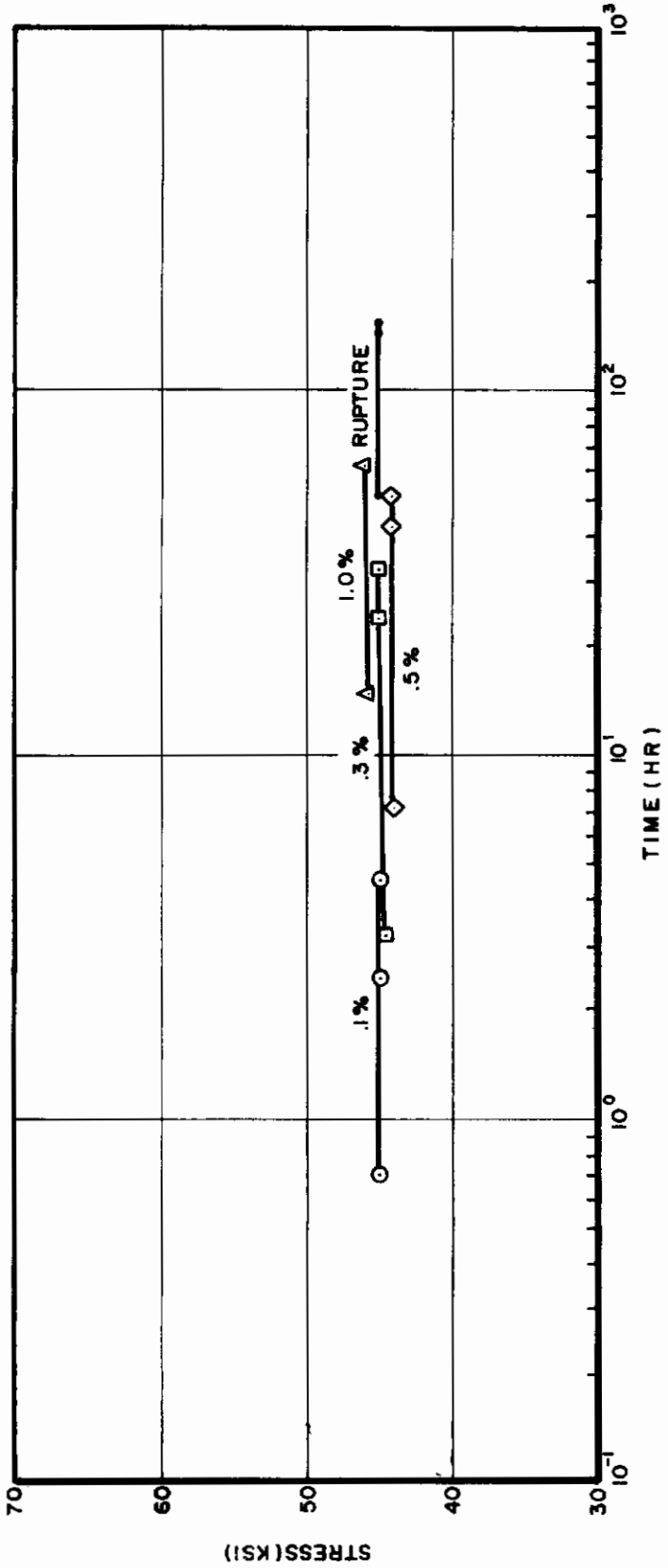


Figure 144. Creep Rupture Properties of Super A-286 [(V57C) Heat Treated at 1650°F] at 1350°F (1810°R)

TABLE 221

Minimum Creep Rate for Super A-286 [(V57C) Heat Treated at 1650°F]

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/Hr)
1150°F (1510°R)	90	1.42×10^{-6}
	90	3.04×10^{-6}
	90	2.93×10^{-6}
1200°F (1660°R)	65	4.53×10^{-5}
	65	2.14×10^{-5}
	85	1.14×10^{-3}
	90	2.88×10^{-3}
	90	3.76×10^{-3}
1300°F (1760°R)	60	3.71×10^{-4}
	65	3.74×10^{-3}
	65	5.13×10^{-4}
	45	8.64×10^{-5}
	45	4.54×10^{-5}
	45	4.99×10^{-4}

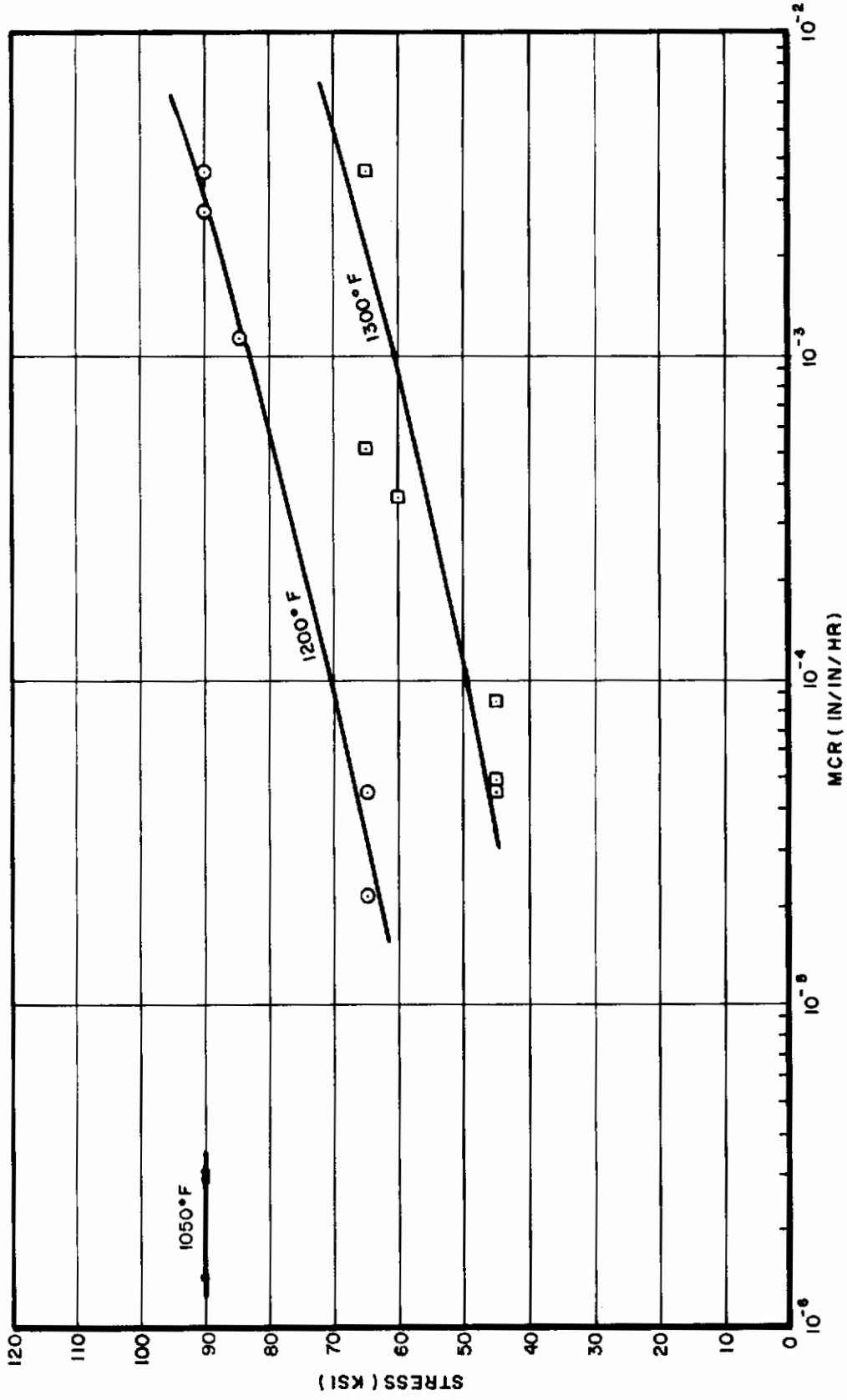


Figure 145. Minimum Creep Rate of Super A-286 [(V57C) Heat Treated at 1650°F]

CREEP DATA

AM-350

TABLE 222

Deformation Versus Time (Raw Data) for AM-350 at 800° F (1260° R)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
135.0000	4.00000E-04	5.000
	6.00000E-04	10.000
	9.00000E-04	25.000
	1.10000E-03	50.000
	1.40000E-03	75.000
	1.70000E-03	100.000
	2.30000E-03	250.000
	2.80000E-03	500.000
	3.30000E-03	750.000
	3.90000E-03	1000.000
150.0000	7.00000E-04	5.000
	8.00000E-04	10.000
	9.00000E-04	25.000
	1.40000E-03	75.000
	1.90000E-03	100.000
	3.20000E-03	250.000
	3.80000E-03	500.000
	4.70000E-03	750.000
	5.70000E-03	1000.000
165.0000	1.10000E-03	0.500
	1.20000E-03	1.000
	1.30000E-03	1.500
	1.40000E-03	2.500
	1.50000E-03	5.000
	1.60000E-03	7.500
	2.00000E-03	10.000
	2.30000E-03	15.000
	3.20000E-03	25.000
	4.80000E-03	50.000
	6.00000E-03	75.000
	7.00000E-03	100.000
	9.00000E-03	150.000
	1.20000E-02	250.000
168.0000	1.40000E-03	1.000
	2.00000E-03	2.500
	2.30000E-03	5.000
	2.40000E-03	7.500
	2.60000E-03	10.000
	2.80000E-03	15.000
	3.00000E-03	25.000
	4.40000E-03	50.000

RUN 17

TABLE 222 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.40000E-03	75.000
	6.00000E-03	100.000
	7.10000E-03	150.000
	7.80000E-03	250.000
	1.10000E-03	0.500
170.0000	1.50000E-03	2.500
170.0000	2.00000E-03	5.000
	2.30000E-03	7.500
	2.50000E-03	10.000
	3.00000E-03	15.000
	3.70000E-03	25.000
	5.30000E-03	50.000
	6.50000E-03	75.000
	7.40000E-03	100.000
	9.20000E-03	150.000
	1.10000E-02	250.000
	1.90000E-02	500.000
	1.70000E-03	1.500
	1.80000E-03	2.500
	2.00000E-03	5.000
	2.30000E-03	7.500
	2.80000E-03	10.000
	3.00000E-03	15.000
	4.30000E-03	25.000
	6.20000E-03	50.000
	7.40000E-03	75.000
	8.20000E-03	100.000
	9.90000E-03	150.000
	1.25000E-02	250.000
	3.60000E-02	500.000

TABLE 222 (CONT)

RUN 17

172.0000	10.00000E-04	0.500
	1.10000E-03	1.000
	1.30000E-03	1.500
	1.40000E-03	2.500
	1.50000E-03	5.000
	1.80000E-03	7.500
	2.00000E-03	10.000
	3.00000E-03	15.000
	3.60000E-03	25.000
	5.70000E-03	50.000
	7.30000E-03	75.000
	8.30000E-03	100.000
	1.30000E-02	150.000
	4.00000E-04	1.000
	5.00000E-04	1.500
	5.00000E-04	2.500
	6.00000E-04	5.000
	7.00000E-04	7.500
	8.00000E-04	10.000
	10.00000E-04	15.000
	1.90000E-03	25.000
	2.90000E-03	50.000
	3.80000E-03	75.000
	4.30000E-03	100.000
172.0000	4.90000E-03	150.000
	6.60000E-03	250.000
	1.05000E-02	500.000

TABLE 223

RUN 17

Deformation Versus Time (Fitted Data) for AM-350 at 800° F (1260° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
135.0000	3.97700E-04	5.000
	5.89360E-04	10.000
	8.96240E-04	25.000
	1.18849E-03	50.000
	1.39267E-03	75.000
	1.55616E-03	100.000
	2.21167E-03	250.000
	2.89391E-03	500.000
	3.39498E-03	750.000
	3.80698E-03	1000.000
150.0000	7.14120E-04	5.000
	7.39890E-04	10.000
	9.47690E-04	25.000
	1.56862E-03	75.000
	1.81603E-03	100.000
	2.89047E-03	250.000
	4.03795E-03	500.000
	4.86258E-03	750.000
	5.52261E-03	1000.000
165.0000	1.10411E-03	0.500
	1.23136E-03	1.000
	1.26972E-03	1.500
	1.32862E-03	2.500
	1.51449E-03	5.000
	1.72726E-03	7.500
	1.94384E-03	10.000
	2.36420E-03	15.000
	3.13004E-03	25.000
	4.71010E-03	50.000
	5.99712E-03	75.000
	7.10602E-03	100.000
	8.98845E-03	150.000
	1.19846E-02	250.000
168.0000	1.35284E-03	1.000
	2.14890E-03	2.500
	2.28877E-03	5.000
	2.36054E-03	7.500
	2.45517E-03	10.000
	2.69499E-03	15.000
	3.23363E-03	25.000
	4.43675E-03	50.000

TABLE 223 (CONT)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	5.35027E-03	75.000
	6.04337E-03	100.000
	6.98564E-03	150.000
	7.84919E-03	250.000
170.0000	1.14412E-03	0.500
170.0000	1.36004E-03	2.500
	1.91825E-03	5.000
	2.34407E-03	7.500
	2.68295E-03	10.000
	3.20858E-03	15.000
	3.96029E-03	25.000
	5.23813E-03	50.000
	6.23809E-03	75.000
	7.13561E-03	100.000
	8.79154E-03	150.000
	1.18452E-02	250.000
	1.87666E-02	500.000
	1.85895E-03	1.500
	1.94398E-03	2.500
	2.15498E-03	5.000
	2.36367E-03	7.500
	2.57008E-03	10.000
	2.97600E-03	15.000
	3.76032E-03	25.000
	5.56056E-03	50.000
	7.13174E-03	75.000
	8.47509E-03	100.000
	1.04944E-02	150.000
	1.22857E-02	250.000
	3.60029E-02	500.000

RUN 17

TABLE 223 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
172.0000	1.06010E-03	0.500
	1.12040E-03	1.000
	1.18044E-03	1.500
	1.29971E-03	2.500
	1.59326E-03	5.000
	1.88018E-03	7.500
	2.16047E-03	10.000
	2.70119E-03	15.000
	3.70321E-03	25.000
	5.75184E-03	50.000
	7.21158E-03	75.000
	8.33975E-03	100.000
	1.29978E-02	150.000
	4.34210E-04	1.000
	4.61240E-04	1.500
	5.15040E-04	2.500
	6.48040E-04	5.000
	7.78890E-04	7.500
	9.07640E-04	10.000
	1.15885E-03	15.000
	1.63676E-03	25.000
	2.69587E-03	50.000
	3.57702E-03	75.000
	4.30001E-03	100.000
172.0000	5.35067E-03	150.000
	6.42504E-03	250.000
	1.05107E-02	500.000

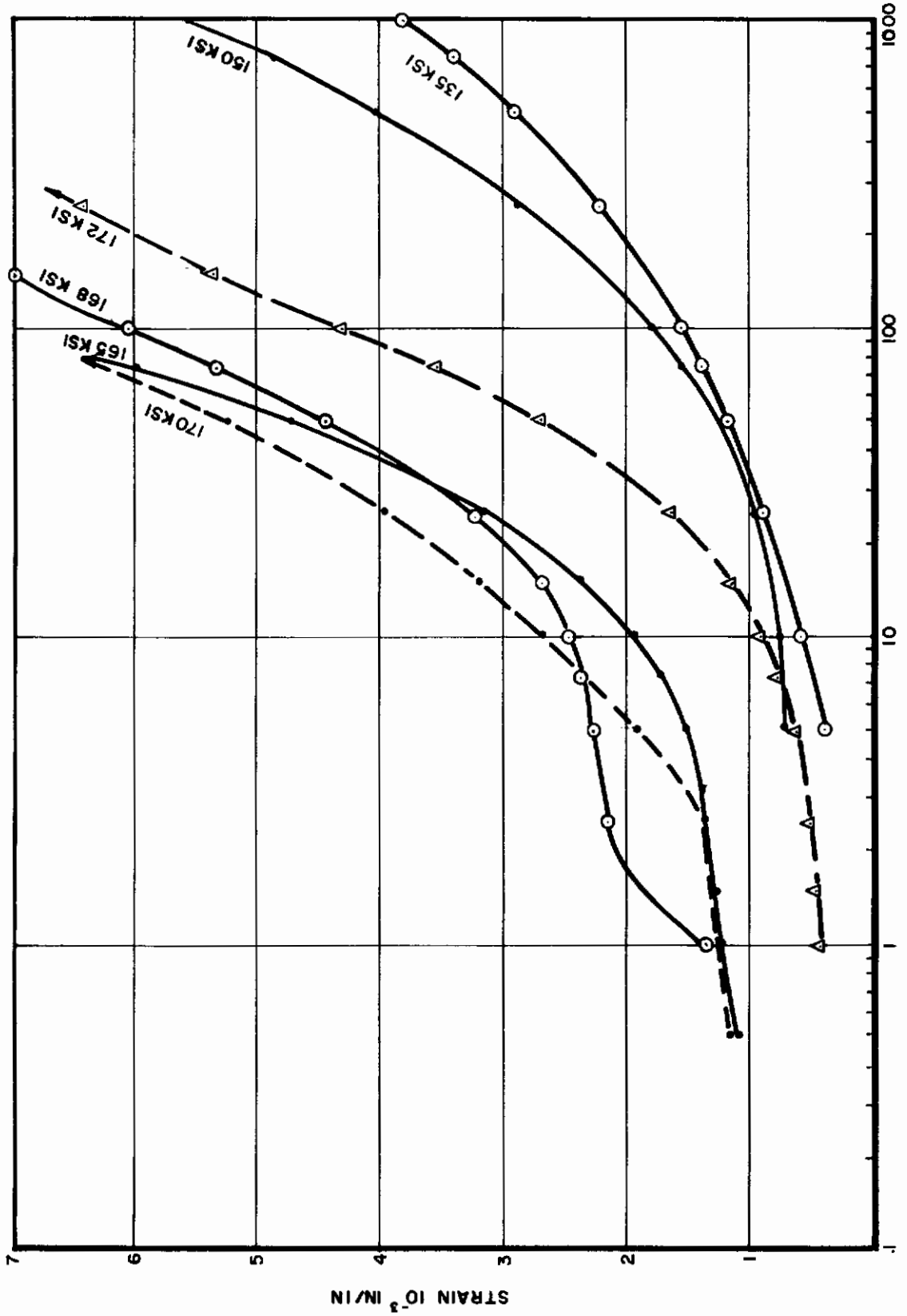


Figure 146. Creep Deformation Versus Log Time of AM-350 at 800°F (1260°R)

TABLE 224

Creep Deformation and Rupture Data at 800°F (1260°R) for AM-350

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
135.0	-	-	0.82	37.5	600	-	-
150.0	-	-	1.4	37.5	240	825	-
165.0	419.5	8	2.3	-	23	54	183
168.0	-	-	2.5	-	25	60	-
170.0	573.5	7	2.2	-	15	47	200
170.0	524.6	13	3.5	-	15	34	150
172.0	388.7	8	1.4	.5	15	41.5	114

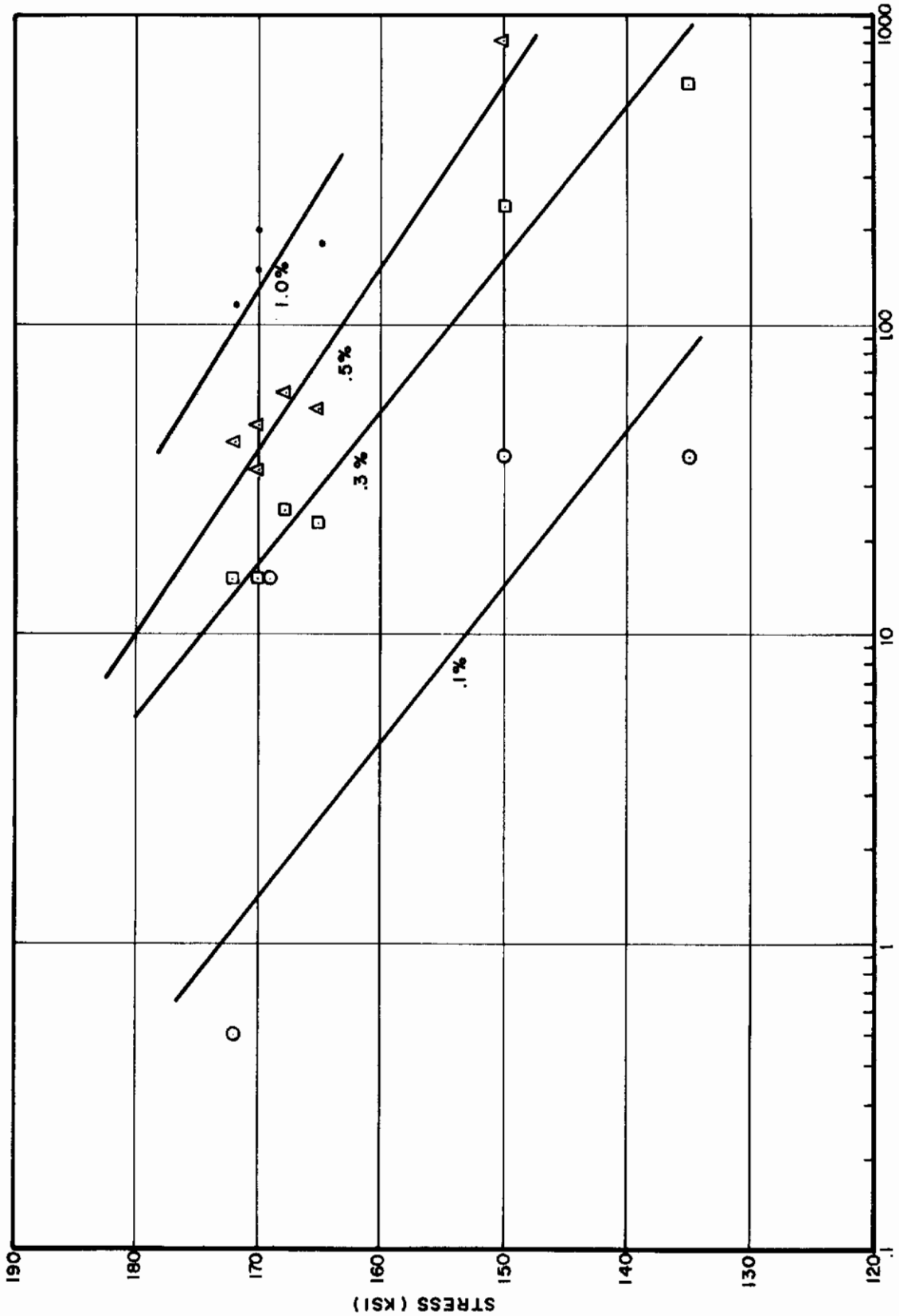


Figure 147. Creep Rupture Properties of AM-350 at 800°F (1260°R)

TABLE 225

Deformation Versus Time (Raw Data) for AM-350 at 1000° F (1460° R)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	6.00000E-04	5.000
	9.00000E-04	10.000
	1.20000E-03	25.000
	1.50000E-03	50.000
	1.60000E-03	75.000
	2.20000E-03	250.000
	2.60000E-03	500.000
	3.10000E-03	750.000
	3.50000E-03	1000.000
30.0000	1.60000E-03	10.000
	3.40000E-03	25.000
	4.40000E-03	50.000
	5.50000E-03	75.000
	6.80000E-03	100.000
	7.10000E-03	250.000
	7.70000E-03	500.000
	8.10000E-03	750.000
	8.20000E-03	1000.000
45.0000	2.00000E-03	5.000
	3.00000E-03	10.000
	5.30000E-03	25.000
	7.30000E-03	50.000
	8.30000E-03	75.000
	9.00000E-03	100.000
	1.25000E-02	250.000
	1.65000E-02	500.000
	1.95000E-02	750.000
	2.20000E-02	1000.000
57.5000	1.80000E-03	1.000
	2.00000E-03	1.500
	2.60000E-03	2.500
	3.40000E-03	5.000
	4.00000E-03	7.500
	4.80000E-03	10.000
	6.40000E-03	15.000
	9.00000E-03	25.000
	1.40000E-02	50.000
	1.80000E-02	75.000
	2.10000E-02	100.000
	2.50000E-02	150.000
	3.20000E-02	250.000
	5.20000E-02	500.000
	9.50000E-02	750.000

TABLE 225 (CONT)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
63.0000	2.40000E-03	0.500
	3.30000E-03	1.000
	3.60000E-03	1.500
	4.90000E-03	2.500
	6.40000E-03	5.000
	9.10000E-03	7.500
	10.00000E-03	10.000
	1.30000E-02	15.000
	1.90000E-02	25.000
	3.00000E-02	50.000
	4.10000E-02	75.000
	4.70000E-02	100.000
	6.40000E-02	150.000
65.0000	2.20000E-03	1.500
	3.00000E-03	2.500
	6.40000E-03	5.000
	9.00000E-03	7.500
	1.20000E-02	10.000
	1.70000E-02	15.000
	2.50000E-02	25.000
	4.20000E-02	50.000
	5.70000E-02	75.000
	7.80000E-02	100.000
67.0000	4.30000E-03	0.500
	5.00000E-03	1.000
	5.50000E-03	1.500
	7.00000E-03	2.500
	9.00000E-03	5.000
	1.30000E-02	7.500
	1.50000E-02	10.000
	1.80000E-02	15.000
	2.50000E-02	25.000
	3.85000E-02	50.000
	5.30000E-02	75.000
	7.00000E-02	100.000

TABLE 225 (CONT)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
68.5000	3.00000E-03	0.500
	3.50000E-03	1.000
	4.90000E-03	1.500
	7.00000E-03	2.500
	10.00000E-03	5.000
	1.50000E-02	7.500
	2.00000E-02	10.000
	3.10000E-02	15.000
	4.90000E-02	25.000
	9.90000E-02	50.000
70.0000	3.50000E-03	0.500
70.0000	5.10000E-03	1.000
	7.00000E-03	1.500
	9.00000E-03	2.500
	1.50000E-02	5.000
	2.20000E-02	7.500
	2.80000E-02	10.000
	4.10000E-02	15.000
	6.90000E-02	25.000
75.0000	6.00000E-03	0.500
	10.00000E-03	1.000
	1.40000E-02	1.500
	2.00000E-02	2.500
	4.10000E-02	5.000
77.0000	3.00000E-03	0.500
	5.00000E-03	1.000
	7.00000E-03	1.500
	9.50000E-03	2.500
	2.20000E-02	5.000
	4.30000E-02	7.500
	7.30000E-02	10.000
80.0000	1.25000E-02	0.500
	1.75000E-02	1.000
	2.20000E-02	1.500
	3.00000E-02	2.500
	5.00000E-02	5.000
	7.30000E-02	7.500

TABLE 226

Deformation Versus Time (Fitted Data) for AM-350 at 1000° F (1460° R) RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	6.14740E-04	5.000
	8.67530E-04	10.000
	1.22283E-03	25.000
	1.48215E-03	50.000
	1.63077E-03	75.000
	2.15112E-03	250.000
	2.64797E-03	500.000
	3.08659E-03	750.000
	3.49625E-03	1000.000
30.0000	1.48094E-03	10.000
	3.49367E-03	25.000
	4.86507E-03	50.000
	5.58475E-03	75.000
	6.05164E-03	100.000
	7.25801E-03	250.000
	7.85120E-03	500.000
	8.06253E-03	750.000
	8.15213E-03	1000.000
45.0000	1.88998E-03	5.000
	3.20383E-03	10.000
	5.29568E-03	25.000
	7.09226E-03	50.000
	8.24936E-03	75.000
	9.13893E-03	100.000
	1.26171E-02	250.000
	1.64175E-02	500.000
	1.94319E-02	750.000
	2.20634E-02	1000.000
57.5000	1.79999E-03	1.000
	2.00000E-03	1.500
	2.60000E-03	2.500
	3.40000E-03	5.000
	3.99999E-03	7.500
	4.80000E-03	10.000
	6.40000E-03	15.000
	9.00000E-03	25.000
	1.40000E-02	50.000
	1.80000E-02	75.000
	2.10000E-02	100.000
	2.50000E-02	150.000
	3.20000E-02	250.000
	5.20000E-02	500.000
	9.50000E-02	750.000

TABLE 226 (CONT)

RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
63.0000	2.40888E-03	0.500
	3.24260E-03	1.000
	3.76736E-03	1.500
	4.66968E-03	2.500
	6.69968E-03	5.000
	8.54222E-03	7.500
	1.02477E-02	10.000
	1.33626E-02	15.000
	1.88265E-02	25.000
	3.01600E-02	50.000
	3.97595E-02	75.000
	4.83565E-02	100.000
	6.36568E-02	150.000
65.0000	2.05845E-03	1.500
	3.29089E-03	2.500
	6.26417E-03	5.000
	9.08952E-03	7.500
	1.17746E-02	10.000
	1.67546E-02	15.000
	2.53669E-02	25.000
	4.18561E-02	50.000
	5.70493E-02	75.000
	7.79925E-02	100.000
67.0000	4.46954E-03	0.500
	5.07049E-03	1.000
	5.66206E-03	1.500
	6.81759E-03	2.500
	9.55162E-03	5.000
	1.20780E-02	7.500
	1.44134E-02	10.000
	1.85775E-02	15.000
	2.53263E-02	25.000
	3.82552E-02	50.000
	5.30930E-02	75.000
	6.99852E-02	100.000

TABLE 226 (CONT) RUN 17

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
68.5000	2.97481E-03	0.500
	3.78358E-03	1.000
	4.70138E-03	1.500
	6.43104E-03	2.500
	1.07507E-02	5.000
	1.52994E-02	7.500
	2.00287E-02	10.000
	2.97945E-02	15.000
	4.97445E-02	25.000
	9.88913E-02	50.000
70.0000	3.48013E-03	0.500
70.0000	5.30843E-03	1.000
	6.63266E-03	1.500
	9.14141E-03	2.500
	1.53369E-02	5.000
	2.15898E-02	7.500
	2.79743E-02	10.000
	4.11759E-02	15.000
	6.89603E-02	25.000
75.0000	6.42213E-03	0.500
	9.79009E-03	1.000
	1.32744E-02	1.500
	2.05919E-02	2.500
	4.09215E-02	5.000
77.0000	3.03385E-03	0.500
	4.80012E-03	1.000
	7.18635E-03	1.500
	9.66590E-03	2.500
	2.13988E-02	5.000
	4.36671E-02	7.500
	7.27478E-02	10.000
80.0000	1.23274E-02	0.500
	1.81889E-02	1.000
	2.16822E-02	1.500
	2.92885E-02	2.500
	5.09188E-02	5.000
	7.25942E-02	7.500

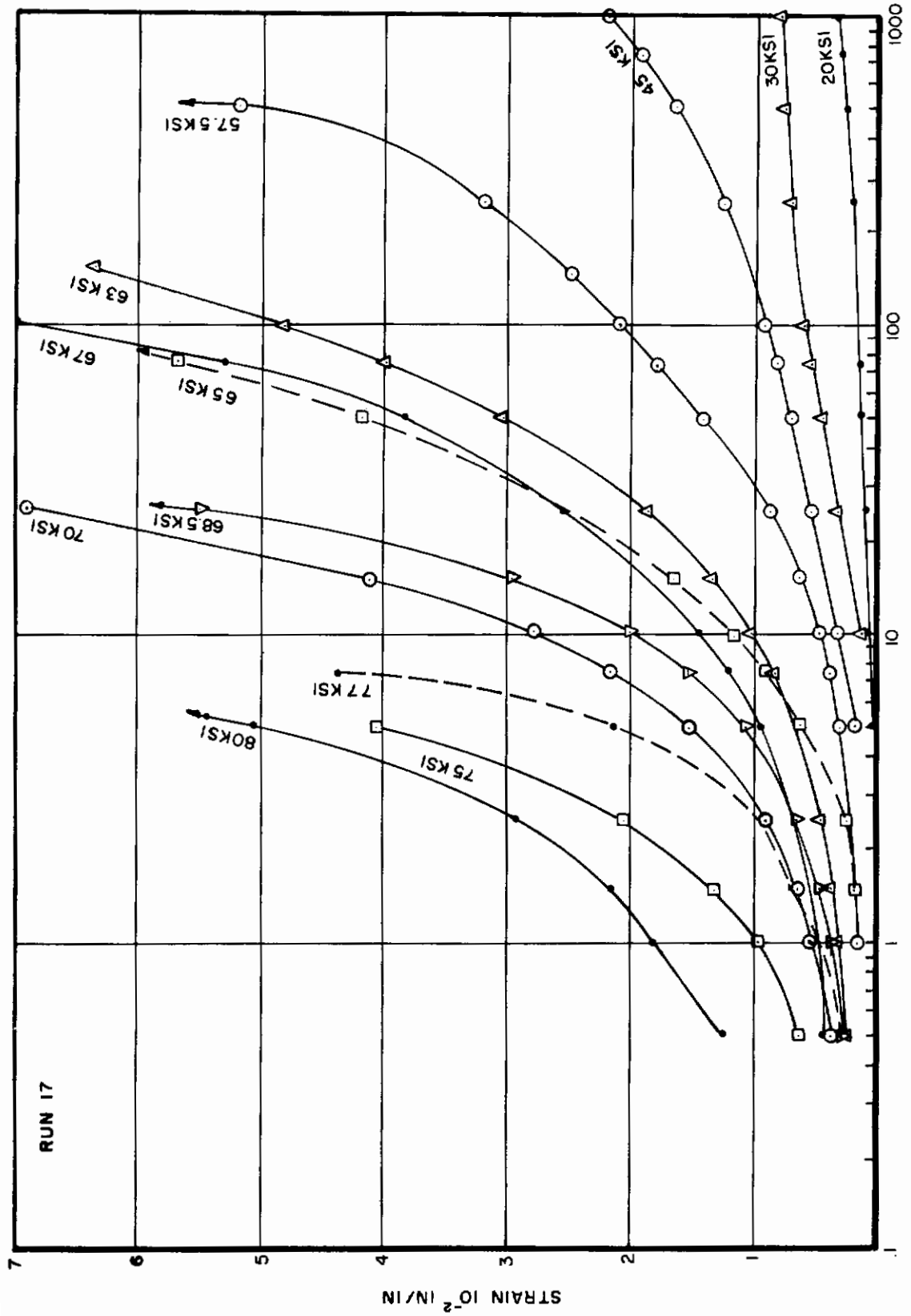


Figure 148. Creep Deformation Versus Log Time of AM-350 at 1000°F (1460°R)

TABLE 227

Creep Deformation and Rupture Data at 1000°F (1460°R) for AM-350

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
20.0	-	-	0.02	20	700	-	-
30.0	-	-	0.16	6	22	64	-
45.0	-	-	0.69	-	10	23	143
57.5	851.9	28	0.35	-	3.75	10.4	30
63.0	221.4	19	0.33	-	0.83	4.9	10
65.0	126.3	18.5	0.25	0.5	2.5	3.9	8.3
68.5	38.9	23	0.25	-	0.5	1.55	5
70.0	39.4	19	0.50	-	-	0.95	2.9
75.0	7.5	17	0.63	-	-	-	1.0
77.0	12.8	22	0.60	-	0.5	1.0	2.5
80.0	8.8	16	0.49	-	-	-	-

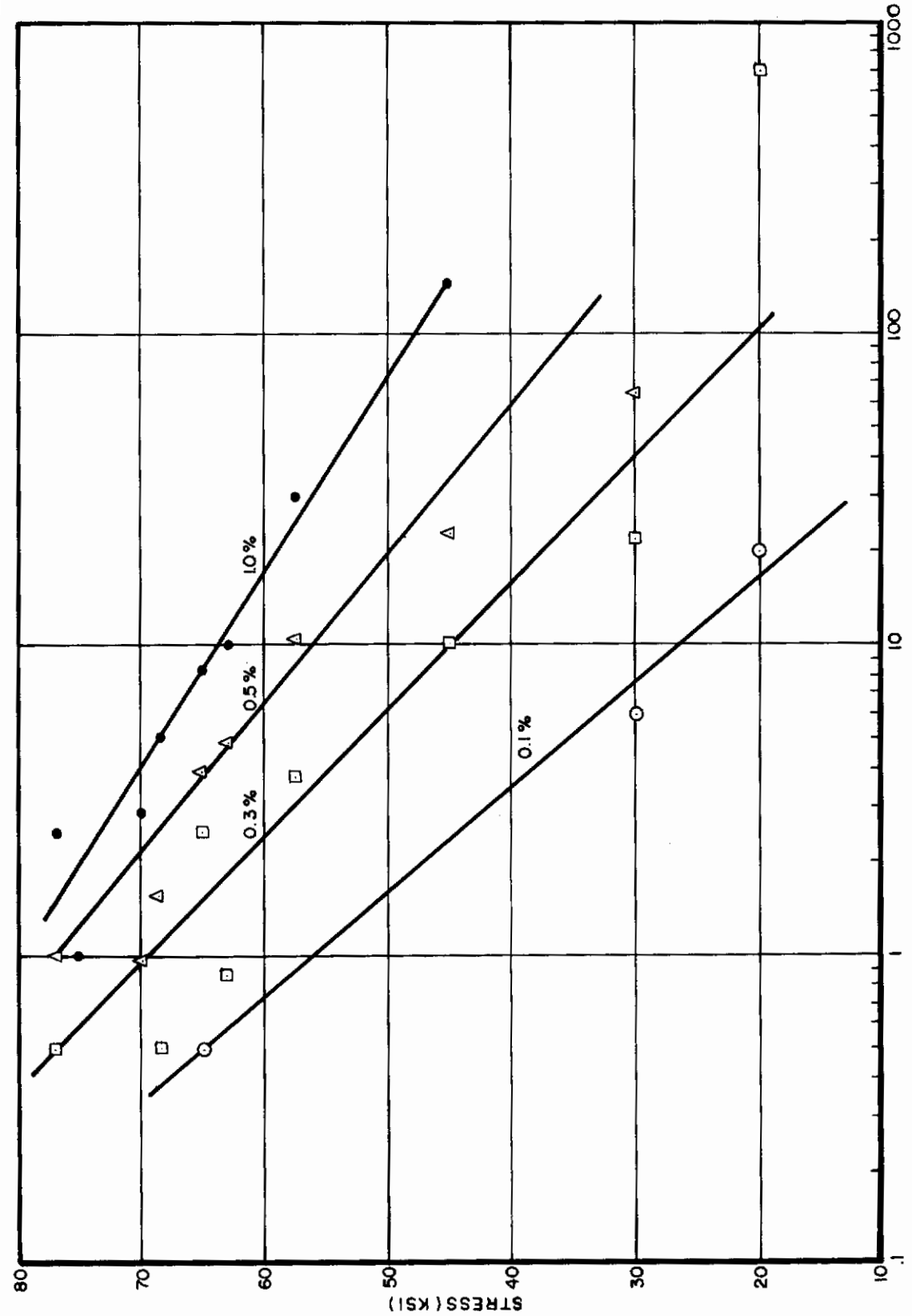


Figure 149. Creep Rupture Properties of AM-350 at 1000°F (1460°R)

TABLE 228

Minimum Creep Rate for AM-350

	Stress (KSI)	Minimum Creep Rate (in/in/hr)
800°F (1260°R)	168	8.64×10^{-6}
	170	1.791×10^{-5}
	172	4.513×10^{-5}
	172	1.674×10^{-5}
1000°F (1460°R)	57.5	7×10^{-5}
	65	6.07×10^{-4}
	67	5.172×10^{-3}
	68.5	1.618×10^{-3}
	70	2.478×10^{-3}
	75	6.736×10^{-3}
	77	2.480×10^{-3}
	80	6.986×10^{-3}

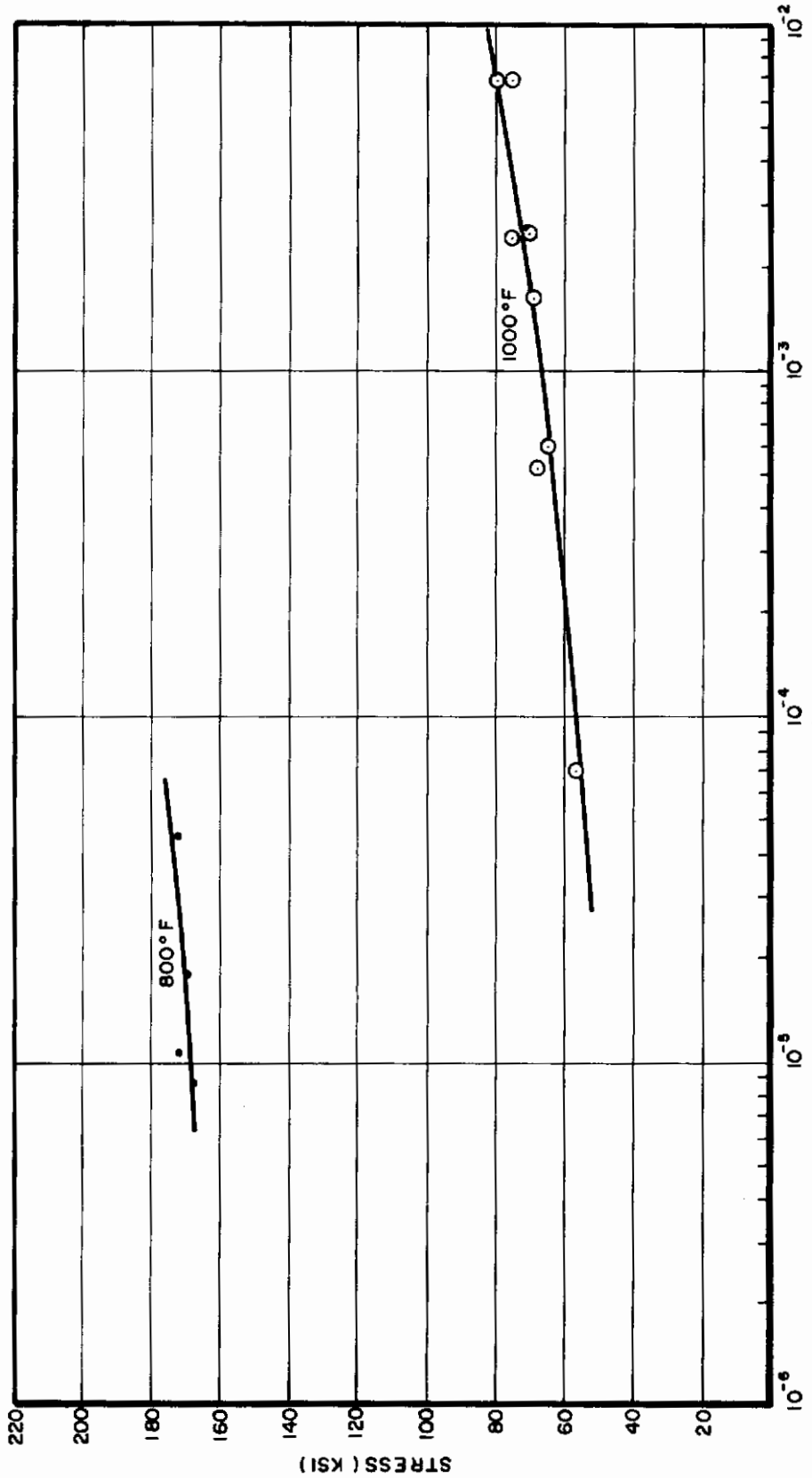


Figure 150. Minimum Creep Rate of AM-350

CREEP DATA

321 STAINLESS STEEL

TABLE 229

Deformation Versus Time (Raw Data) for 321 Stainless Steel at 1000° F (1460° R) RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.0000	1.50000E-04	1.000
	3.00000E-04	3.000
	3.50000E-04	28.200
	4.50000E-04	64.800
	6.00000E-04	147.500
	8.00000E-04	173.100
	10.00000E-04	232.800
	1.20000E-03	290.300
	1.35000E-03	370.800
	1.40000E-03	448.600
	1.50000E-03	594.200
20.0000	5.20000E-05	0.200
	1.25000E-04	0.400
	1.50000E-04	0.500
	2.50000E-04	2.000
	3.00000E-04	6.400
	4.50000E-04	24.700
	6.50000E-04	143.900
21.0000	5.00000E-05	0.500
	1.50000E-04	1.500
	2.50000E-04	4.000
	3.00000E-04	38.000
	3.50000E-04	155.100
	4.00000E-04	244.100
	5.00000E-04	372.900
	6.50000E-04	421.700
	7.50000E-04	502.100
	10.00000E-04	532.800
	1.35000E-03	683.700
	1.50000E-03	785.200
	2.00000E-03	972.500
	2.40000E-03	1091.500
25.0000	3.50000E-04	0.200
	5.00000E-04	2.600
	7.00000E-04	6.500
	9.00000E-04	19.600
	10.00000E-04	119.800
	1.60000E-03	252.800
	1.70000E-03	263.700
	2.15000E-03	336.400
	3.15000E-03	527.400
	4.15000E-03	664.200

TABLE 229 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	6.40000E-03	840.700
	8.10000E-03	992.600
	1.02500E-02	1128.200
28.0000	4.50000E-04	0.100
28.0000	5.00000E-04	0.200
	7.00000E-04	0.500
	7.50000E-04	6.100
	9.00000E-04	10.700
	1.30000E-03	85.200
	1.65000E-03	217.000
	2.40000E-03	331.600
	3.55000E-03	401.600
	4.95000E-03	469.200
	6.75000E-03	555.600
	7.25000E-03	570.400
	7.85000E-03	590.600
	9.95000E-03	686.200
	1.15000E-02	751.800
	1.24500E-02	775.400
	1.31500E-02	799.600
	1.50000E-04	23.300
	1.15000E-03	217.000
	2.05000E-03	331.600
	3.25000E-03	401.600
	4.45000E-03	469.200
	6.25000E-03	555.600
	7.10000E-03	570.400
	7.05000E-03	590.600
	9.20000E-03	686.200
	1.11500E-02	751.800
	1.15500E-02	775.400
	1.23500E-02	799.600
33.0000	5.00000E-04	0.100
	6.00000E-04	0.400
	8.00000E-04	2.600
	1.10000E-03	6.100
	1.25000E-03	84.600
	2.50000E-04	1.100
	5.00000E-04	6.900
	5.50000E-04	35.400
	1.10000E-03	131.700
	2.30000E-03	176.700

TABLE 229 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
35.0000	5.00000E-04	1.300
	8.00000E-04	2.400
	9.00000E-04	5.600
	1.20000E-03	17.400
	1.45000E-03	27.400
	1.50000E-03	59.600
	1.55000E-03	118.300
	1.95000E-03	131.200
	2.20000E-03	154.700
	3.55000E-03	203.400
35.0000	5.40000E-03	250.200
	8.45000E-03	298.100
	1.14500E-02	346.300
	1.76500E-02	436.400
	1.88000E-02	466.100
	2.23000E-02	514.700
	2.44000E-02	538.400
	2.79500E-02	586.000
	3.34000E-02	658.100
	4.10000E-02	732.800
	4.97500E-02	833.000
	5.66500E-02	859.500
37.0000	2.00000E-04	0.200
	3.50000E-04	0.600
	6.50000E-04	8.000
	1.10000E-03	28.400
	1.60000E-03	71.800
	2.60000E-03	124.700
	4.10000E-03	163.300
	5.10000E-03	183.600
	8.70000E-03	238.400
	1.24500E-02	286.000
	5.00000E-04	4.900
	10.00000E-04	7.300
	1.60000E-03	91.100
	2.00000E-03	140.300
	3.10000E-03	206.900
	4.50000E-03	232.500
	8.30000E-03	310.600
	1.75000E-02	409.200
41.0000	4.00000E-04	0.300
	5.50000E-04	0.400
	6.50000E-04	0.500
	8.50000E-04	1.600
	10.00000E-04	2.300
	1.70000E-03	23.400

TABLE 229 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.45000E-03	35.600
	5.40000E-03	86.800
	7.00000E-03	109.600
	1.03500E-02	143.100
	1.45250E-02	176.000
	1.78500E-02	199.100
42.0000	5.50000E-04	6.600
	8.50000E-04	19.000
	2.50000E-03	71.300
	3.98000E-03	92.400
	1.81000E-02	211.900
42.0000	2.29500E-02	240.200
	2.43300E-02	260.500
	2.47300E-02	280.500
	2.80800E-02	284.600
44.0000	10.00000E-05	0.200
	2.00000E-04	0.300
	4.00000E-04	1.000
	6.00000E-04	2.400
	1.30000E-03	9.700
	1.75000E-03	19.000
	3.15000E-03	42.700
	4.65000E-03	58.200
	8.05000E-03	82.000
	1.21500E-02	106.000
	1.50000E-02	123.300
	1.68000E-02	130.500
45.0000	2.50000E-04	0.200
	3.50000E-04	0.500
	5.50000E-04	1.800
	1.65000E-03	13.500
	2.20000E-03	18.200
	3.80000E-03	43.300
	4.50000E-03	53.000
	10.00000E-03	85.900
	1.15500E-02	117.500
	1.85000E-02	124.700
	1.20000E-03	0.500
	1.65000E-03	0.800
	1.80000E-03	1.600
	2.66000E-03	3.000
	3.65000E-03	8.500
	6.65000E-03	37.000
	1.50500E-02	73.600

TABLE 229 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.12000E-02	132.000
	4.54000E-02	168.700
	9.01000E-02	227.700
48.0000	7.00000E-04	0.900
	10.00000E-04	2.000
	1.60000E-03	4.100
	3.30000E-03	17.900
	5.45000E-03	42.300
	1.06000E-02	66.000
	2.28000E-02	111.600
	3.24500E-02	138.000
	7.70000E-02	183.900
50.0000	9.50000E-04	1.000
50.0000	1.30000E-03	3.800
	1.70000E-03	8.200
	3.00000E-03	35.400
	4.90000E-03	39.200
	8.10000E-03	68.100
	1.32000E-02	84.800
	2.77500E-02	119.900
	3.83500E-02	136.800
	6.16500E-02	156.800
53.0000	10.00000E-04	1.000
	2.70000E-03	6.600
	3.85000E-03	8.900
	4.55000E-03	12.200
	6.35000E-03	16.200
	9.05000E-03	22.000
	1.96000E-02	34.500
	2.90000E-02	41.200
55.0000	5.00000E-04	0.100
	1.10000E-03	0.200
	1.60000E-03	0.400
	3.05000E-03	1.400
	5.90000E-03	4.200
	1.49500E-02	15.500
	2.46000E-02	29.200
	3.27500E-02	39.200
	3.97000E-02	46.700
58.0000	2.10000E-03	6.400
	2.80000E-03	9.000
	5.40000E-03	15.700

TABLE 229 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	6.90000E-03	18.300
	1.49000E-02	26.700
	4.14000E-02	36.200
	7.94500E-02	42.700
59.0000	5.00000E-04	0.100
	2.40000E-03	0.300
	4.60000E-03	1.600
	6.35000E-03	3.200
	7.70000E-03	4.600
	1.38500E-02	10.700
	1.83500E-02	13.500
	2.22000E-02	15.900
	4.08000E-02	25.500
60.0000	7.50000E-04	0.200
	1.05000E-03	0.300
	1.35000E-03	0.400
60.0000	1.70000E-03	0.500
	2.05000E-03	0.600
	2.75000E-03	0.800
	3.85000E-03	1.200
	5.35000E-03	1.700
	1.12500E-02	3.500
	2.83500E-02	7.100
	3.58500E-02	9.300
	4.13500E-02	13.100
60.5000	7.50000E-04	0.300
	8.00000E-04	0.400
	1.30000E-03	0.500
	3.15000E-03	1.000
	5.00000E-03	1.600
	6.35000E-03	2.000
	8.25000E-03	2.600
	9.85000E-03	3.100
	1.08000E-02	3.400
	1.37600E-02	4.100
	1.54500E-02	4.700
	1.76000E-02	5.300
	2.20000E-02	6.300
	2.72500E-02	7.500
	5.39500E-02	13.100

TABLE 230

Deformation Versus Time (Fitted Data) for 321 Stainless Steel at 1000° F (1460° R) RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.0000	1.29500E-04	1.000
	3.41620E-04	3.000
	3.09210E-04	28.200
	4.08850E-04	64.800
	7.29990E-04	147.500
	8.17950E-04	173.100
	9.96170E-04	232.800
	1.13625E-03	290.300
	1.29020E-03	370.800
	1.40194E-03	448.600
	1.53833E-03	594.200
20.0000	4.87000E-05	0.200
	1.31830E-04	0.400
	1.51210E-04	0.500
	2.36750E-04	2.000
	3.12920E-04	6.400
	4.44900E-04	24.700
	6.50660E-04	143.900
21.0000	5.77000E-05	0.500
	1.41210E-04	1.500
	2.37470E-04	4.000
	3.48370E-04	38.000
	2.87280E-04	155.100
	3.63160E-04	244.100
	5.70350E-04	372.900
	6.67210E-04	421.700
	8.41330E-04	502.100
	9.11620E-04	532.800
	1.27873E-03	683.700
	1.54001E-03	785.200
	2.04009E-03	972.500
	2.36528E-03	1091.500
25.0000	3.97830E-04	0.200
	3.98440E-04	2.600
	6.06430E-04	6.500
	1.09062E-03	19.600
	1.20595E-03	119.800
	1.41145E-03	252.800
	1.45538E-03	263.700
	1.82844E-03	336.400
	3.28673E-03	527.400
	4.60197E-03	664.200

TABLE 230 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	6.49859E-03	840.700
	8.24950E-03	992.600
	9.87516E-03	1128.200
28.0000	4.36860E-04	0.100
28.0000	5.18720E-04	0.200
	7.06180E-04	0.500
	6.57550E-04	6.100
	1.07052E-03	10.700
	1.39915E-03	85.200
	1.31106E-03	217.000
	2.54532E-03	331.600
	3.68385E-03	401.600
	4.98025E-03	469.200
	6.85263E-03	555.600
	7.19337E-03	570.400
	7.66668E-03	590.600
	1.00203E-02	686.200
	1.17263E-02	751.800
	1.23551E-02	775.400
	1.30074E-02	799.600
	1.78620E-04	23.300
	9.73040E-04	217.000
	2.24252E-03	331.600
	3.30114E-03	401.600
	4.51547E-03	469.200
	6.31404E-03	555.600
	6.64642E-03	570.400
	7.11001E-03	590.600
	9.42542E-03	686.200
	1.10725E-02	751.800
	1.16620E-02	775.400
	1.22587E-02	799.600
33.0000	4.65930E-04	0.100
	6.48230E-04	0.400
	8.80970E-04	2.600
	9.81890E-04	6.100
	1.27297E-03	84.600
	2.21800E-04	1.100
	5.41830E-04	6.900
	5.28030E-04	35.400
	1.12059E-03	131.700
	2.27562E-03	176.700

TABLE 230 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
35.0000	4.99990E-04	1.300
	8.00000E-04	2.400
	8.99990E-04	5.600
	1.20000E-03	17.400
	1.44999E-03	27.400
	1.50000E-03	59.600
	1.55000E-03	118.300
	1.95000E-03	131.200
	2.19999E-03	154.700
	3.54999E-03	203.400
35.0000	5.39999E-03	250.200
	8.44999E-03	298.100
	1.14500E-02	346.300
	1.76500E-02	436.400
	1.88000E-02	466.100
	2.23000E-02	514.700
	2.44000E-02	538.400
	2.79500E-02	586.000
	3.34000E-02	658.100
	4.10000E-02	732.800
	4.97500E-02	833.000
	5.65500E-02	859.500
37.0000	1.93760E-04	0.200
	3.66810E-04	0.600
	5.80640E-04	8.000
	1.26887E-03	28.400
	1.26025E-03	71.800
	2.49961E-03	124.700
	4.19453E-03	163.300
	5.28941E-03	183.600
	8.78200E-03	238.400
	1.23035E-02	286.000
	7.31160E-04	4.900
	7.67700E-04	7.300
	1.56187E-03	91.100
	2.02724E-03	140.300
	3.35154E-03	206.900
	4.20158E-03	232.500
	8.36634E-03	310.600
	1.74926E-02	409.200
41.0000	3.54040E-04	0.300
	5.74930E-04	0.400
	7.00700E-04	0.500
	8.50300E-04	1.600

TABLE 230 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.84170E-04	2.300
	1.98901E-03	23.400
	2.26203E-03	35.600
	5.07734E-03	86.800
	7.09613E-03	109.600
	1.06436E-02	143.100
	1.46237E-02	176.000
	1.76383E-02	199.100
42.0000	6.40710E-04	6.600
	7.10260E-04	19.000
	2.55092E-03	71.300
	3.99506E-03	92.400
	1.83291E-02	211.900
42.0000	2.22215E-02	240.200
	2.46242E-02	260.500
	2.63725E-02	280.500
	2.66256E-02	284.600
44.0000	1.17530E-04	0.200
	1.69410E-04	0.300
	4.26260E-04	1.000
	5.81940E-04	2.400
	1.32709E-03	9.700
	1.70790E-03	19.000
	3.13951E-03	42.700
	4.73963E-03	58.200
	8.00394E-03	82.000
	1.20225E-02	106.000
	1.52520E-02	123.300
	1.66623E-02	130.500
45.0000	2.73420E-04	0.200
	3.04620E-04	0.500
	4.39320E-04	1.800
	1.61394E-03	13.500
	2.06674E-03	18.200
	4.31203E-03	43.300
	5.12174E-03	53.000
	8.16437E-03	85.900
	1.42564E-02	117.500
	1.67974E-02	124.700
	1.75617E-03	0.500
	1.79690E-03	0.800
	1.90604E-03	1.600
	2.09886E-03	3.000

TABLE 230 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.87870E-03	8.500
	7.49092E-03	37.000
	1.48471E-02	73.600
	3.08016E-02	132.000
	4.57095E-02	168.700
	9.00641E-02	227.700
48.0000	7.87560E-04	0.900
	9.34940E-04	2.000
	1.21646E-03	4.100
	3.08328E-03	17.900
	6.58062E-03	42.300
	1.04969E-02	66.000
	2.16517E-02	111.600
	3.32304E-02	138.000
	7.69181E-02	183.900
50.0000	9.73980E-04	1.000
50.0000	1.17614E-03	3.800
	1.49714E-03	8.200
	3.81406E-03	35.400
	4.21845E-03	39.200
	8.48729E-03	68.100
	1.24003E-02	84.800
	2.70859E-02	119.900
	3.93969E-02	136.800
	6.13384E-02	156.800
53.0000	1.11693E-03	1.000
	2.71817E-03	6.600
	3.47792E-03	8.900
	4.68029E-03	12.200
	6.34090E-03	16.200
	9.26898E-03	22.000
	1.94408E-02	34.500
	2.90560E-02	41.200
55.0000	4.65530E-04	0.100
	1.18303E-03	0.200
	1.58915E-03	0.400
	2.86219E-03	1.400
	6.20484E-03	4.200
	1.46017E-02	15.500
	2.47674E-02	29.200
	3.29819E-02	39.200
	3.94941E-02	46.700

TABLE 230 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
58.0000	1.99162E-03	6.400
	2.95383E-03	9.000
	5.46224E-03	15.700
	6.74392E-03	18.300
	1.49606E-02	26.700
	4.13860E-02	36.200
	7.94518E-02	42.700
59.0000	5.00430E-04	0.100
	2.39811E-03	0.300
	4.59933E-03	1.600
	6.42867E-03	3.200
	7.56002E-03	4.600
	1.40720E-02	10.700
	1.81978E-02	13.500
	2.21748E-02	15.900
	4.08187E-02	25.500
60.0000	7.48570E-04	0.200
	1.04485E-03	0.300
	1.34392E-03	0.400
60.0000	1.64580E-03	0.500
	1.95047E-03	0.600
	2.56822E-03	0.800
	3.83725E-03	1.200
	5.48641E-03	1.700
	1.19953E-02	3.500
	2.72283E-02	7.100
	3.65067E-02	9.300
	4.12941E-02	13.100
60.5000	7.38640E-04	0.300
	8.62050E-04	0.400
	1.23034E-03	0.500
	3.15343E-03	1.000
	5.08369E-03	1.600
	6.31937E-03	2.000
	8.21148E-03	2.600
	9.85532E-03	3.100
	1.08753E-02	3.400
	1.33551E-02	4.100
	1.55880E-02	4.700
	1.79136E-02	5.300
	2.19768E-02	6.300
	2.71244E-02	7.500
	5.39623E-02	13.100

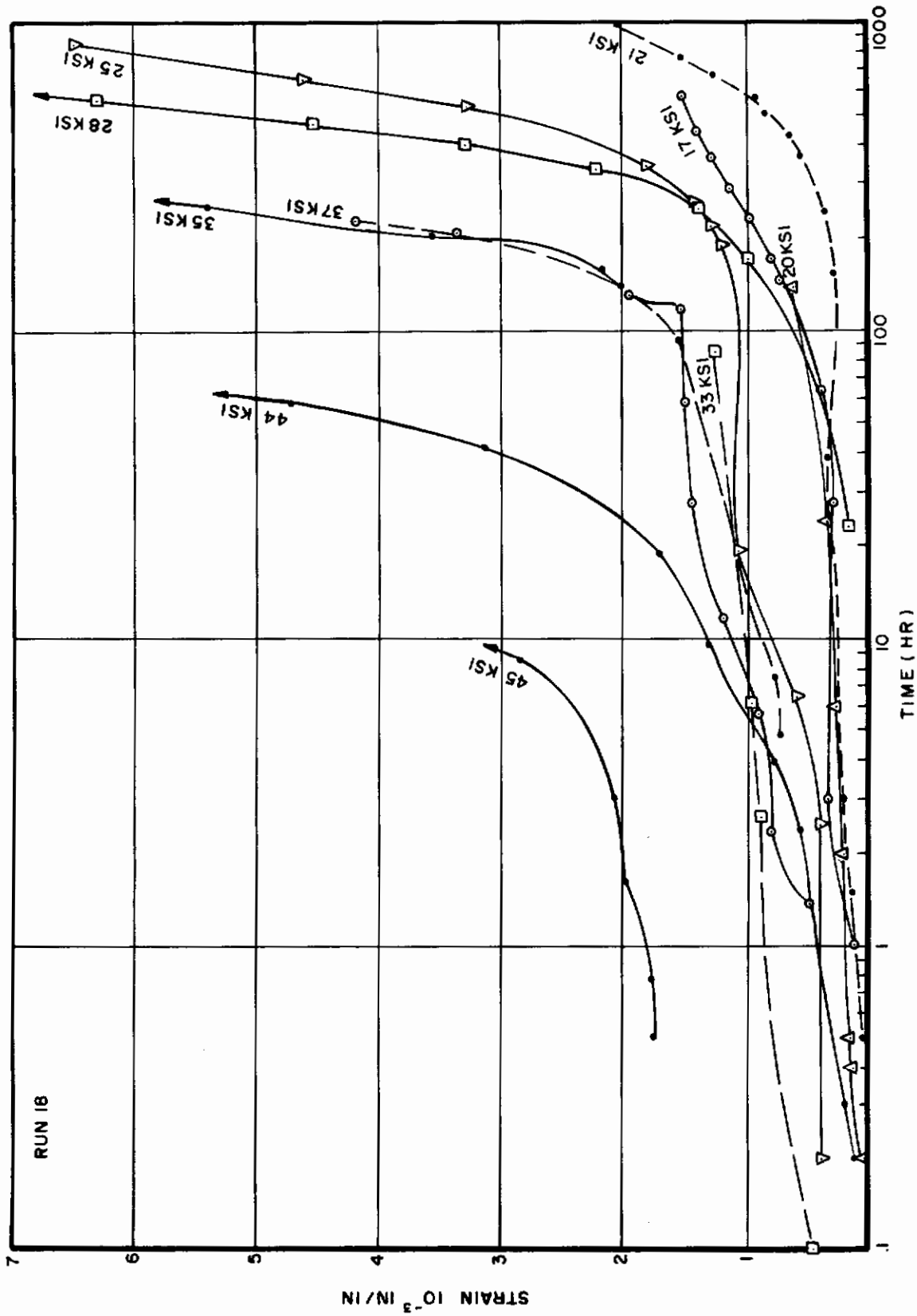


Figure 151. Creep Deformation Versus Log Time of 321 Stainless Steel at 1000°F (1460°R)

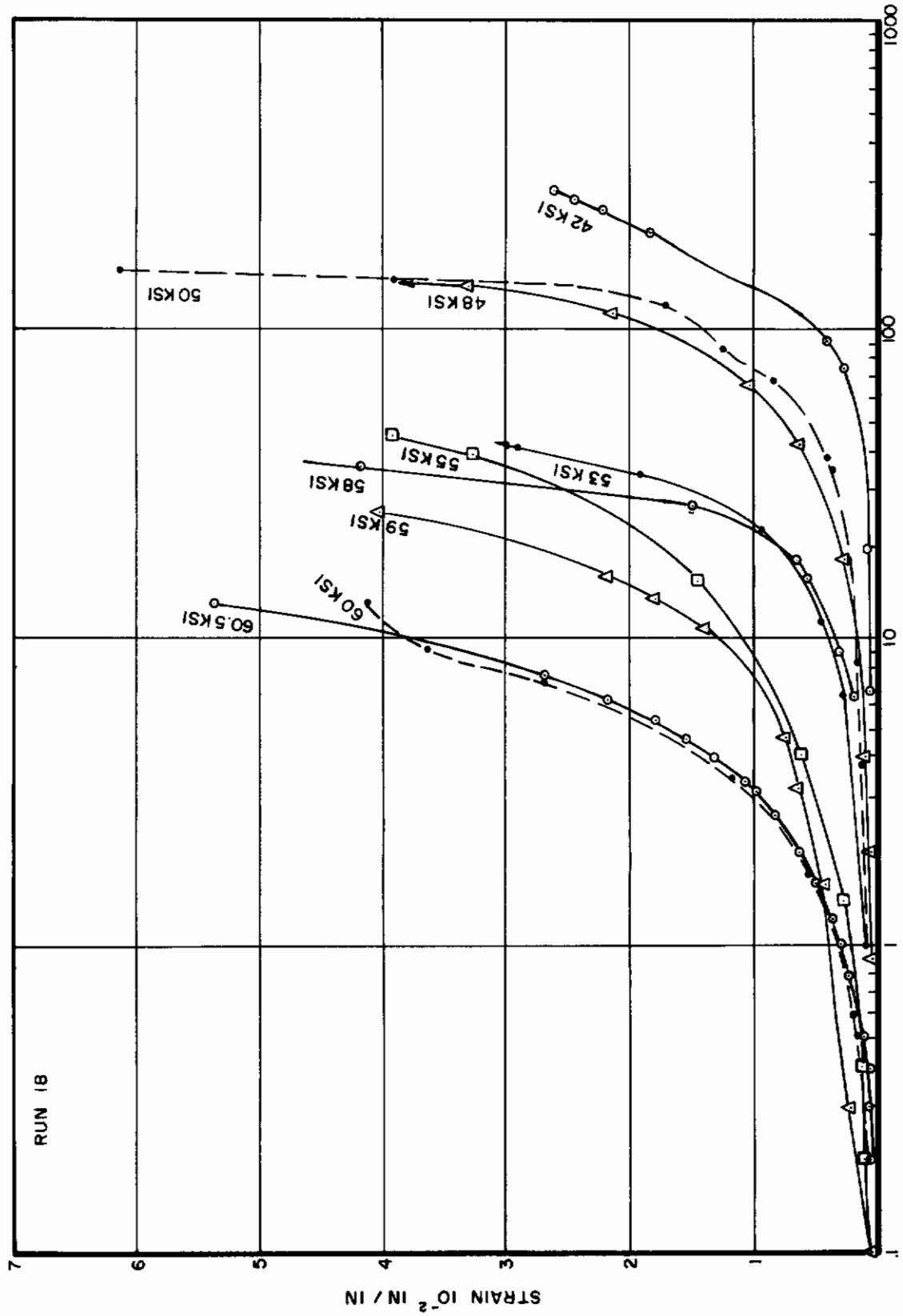


Figure 151. (CONT)

TABLE 231

Creep Deformation and Rupture Data at 1000°F (1460°R) for 321 Stainless Steel

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
17.0		0.13	0.08	325	-	-	-
17.0		0.12	0.08	740	-	-	-
20.0		0.62	0.10	371	765	998	-
21.0		0.23	0.10	613	-	-	-
22.0		0.18	0.11	285	-	-	-
25.0		1.05	0.24	120	545	738	1120
28.0		1.28	0.82	180	375	475	695
30.0		2.71	0.75	100	317	412	608
33.0		0.14	2.1	108	-	-	-
35.0		5.67	2.3	8.0	183	232	325
37.0		1.57	2.9	17.5	205	294	345
37.0		1.25	3.3	25	140	181	256
40.0		7.26	3.7	17.1	113	156	214
41.0		1.79	4.1	6.5	60.6	90	140
42.0		3.3	4.2	25	82	108	147
44.0		1.7	6.0	5.8	41.3	60.7	93
45.0	238	18.5	4.7	0.3	7.0	27.0	52
45.0		1.9	5.8	5.3	34.1	57	91
48.0		7.7	6.5	2.0	13.5	40	64
53.0		4.0	9.2	1.0	7.7	13	23.8
55.0	66.5	18.5	11.8	0.2	1.4	3.4	9.2
59.0	35.7	30.5	15.9	0.4	1.5	2.6	5.0
60.0	15.8	15.8	19.0	0.3	1.0	1.7	3.4
60.5	17.1	17.1	27.0	0.4	1.0	1.6	3.1

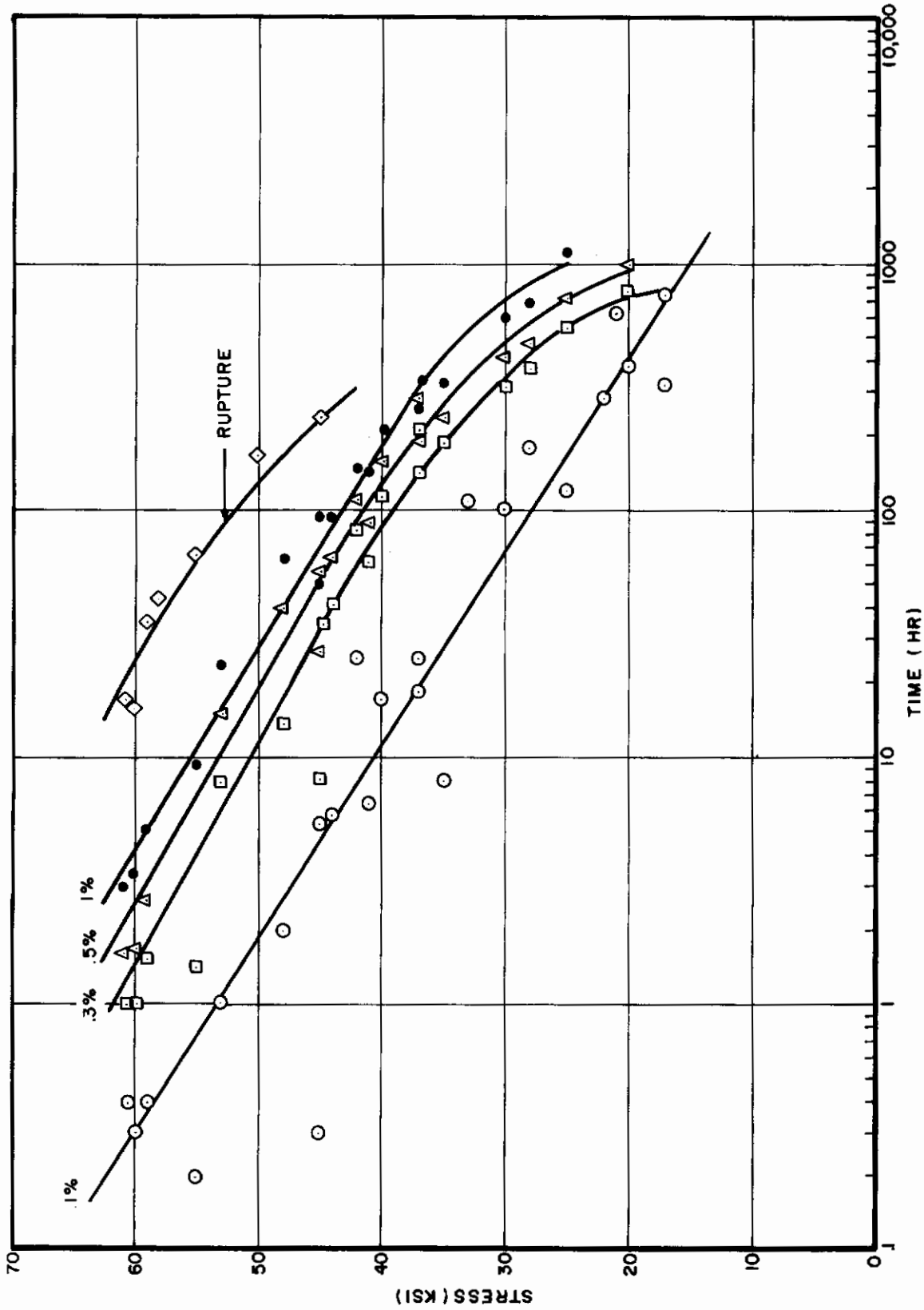


Figure 152. Creep Rupture Properties of 321 Stainless Steel at 1000°F (1460°R)

TABLE 232

Deformation Versus Time (Raw Data) for 321 Stainless Steel at 1200° F (1660° R) RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.7500	4.00000E-05	0.300
	6.00000E-05	0.500
	2.25000E-04	25.400
	3.00000E-04	73.100
	4.50000E-04	145.500
	5.70000E-04	193.800
	6.50000E-04	1040.000
1.0000	1.50000E-05	0.400
	4.70000E-04	22.800
	5.80000E-04	42.300
	9.75000E-04	136.300
	1.17000E-03	359.300
	1.69500E-03	502.500
	1.83500E-03	773.800
1.5000	1.20000E-04	42.600
	2.20000E-04	54.100
	3.30000E-04	94.600
	4.35000E-04	132.400
	5.10000E-04	253.400
	6.10000E-04	356.900
	7.45000E-04	534.500
	8.60000E-04	659.400
1.5000	9.35000E-04	948.900
	1.23500E-03	1069.200
	1.70500E-03	1086.900
3.0000	1.50000E-04	172.500
	2.00000E-04	191.100
	2.50000E-04	285.200
	3.50000E-04	310.700
	5.00000E-04	357.400
	1.80000E-03	485.200
	2.60000E-03	622.600
	3.80000E-03	910.900
	4.45000E-03	1174.100
	4.95000E-03	1286.500
5.0000	2.50000E-04	12.500
	4.00000E-04	27.100
	6.00000E-04	100.200
	1.05000E-03	156.400
	1.60000E-03	259.200
	4.25000E-03	402.800

RUN 18

TABLE 232 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.15000E-03	540.400
	1.01000E-02	706.700
	1.16000E-02	803.700
	1.32500E-02	898.900
	1.47500E-02	1009.600
8.0000	4.50000E-04	117.700
	9.00000E-04	190.800
	1.85000E-03	250.000
	3.80000E-03	297.600
	7.30000E-03	353.200
	1.58500E-02	465.300
	2.67000E-02	524.300
	3.28500E-02	634.100
	4.89000E-02	819.300
	5.40000E-02	887.000
	5.88000E-02	933.000
9.0000	1.30000E-04	1.700
	2.50000E-04	18.100
	3.00000E-04	28.200
	5.50000E-04	58.100
	7.00000E-04	72.000
	1.10000E-03	99.500
	1.55000E-03	131.900
	2.00000E-03	154.700
	2.80000E-03	194.900
	3.15000E-03	202.400
	3.75000E-03	219.500
10.0000	2.30000E-04	26.000
	1.02600E-03	43.300
	1.47000E-03	67.500
	2.52000E-03	102.200
	4.26000E-03	131.800
	6.84000E-03	163.800
	9.80000E-03	192.800
	1.22000E-02	211.500
	1.41300E-02	227.900
	1.50750E-02	231.000
	4.50000E-04	2.000
	8.50000E-04	4.600
	1.15000E-03	58.600
	3.25000E-03	143.600
	4.25000E-03	166.900
	5.70000E-03	190.800
	1.16500E-02	249.900
	1.92500E-02	298.400

TABLE 232 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
11.0000	6.00000E-04	51.000
	1.40000E-03	90.700
	2.45000E-03	108.500
	5.65000E-03	174.500
	1.55500E-02	224.200
	2.76500E-02	305.100
	5.91000E-02	434.400
	7.14500E-02	470.100
	9.60000E-02	540.600
	1.47900E-01	661.200
	1.74400E-01	711.400
11.5000	1.20000E-04	0.300
	1.40000E-04	0.400
	2.00000E-04	1.800
	4.90000E-04	3.400
	9.35000E-04	25.800
	1.56000E-03	41.000
	3.20000E-03	64.400
	5.40000E-03	97.400
	8.50000E-03	120.800
	1.32000E-02	144.900
	2.16000E-02	177.500
	3.20000E-02	207.900
	4.43800E-02	224.700
13.0000	3.00000E-04	5.000
	5.50000E-04	22.900
	9.00000E-04	46.700
	2.40000E-03	85.800
	6.65000E-03	129.900
13.0000	1.66000E-02	177.800
	2.70500E-02	209.200
	8.03000E-02	321.200
	1.26300E-01	377.300
	1.76400E-01	442.000
	2.56550E-01	490.000
14.0000	6.00000E-04	18.900
	1.75000E-03	51.000
	4.25000E-03	85.500
	1.05500E-02	120.900
	3.18000E-02	187.700
	6.29000E-02	237.300
	1.03900E-01	288.900

TABLE 232 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.64350E-01	340.000
	2.37500E-01	379.200
15.0000	1.50000E-04	1.000
	3.00000E-04	2.600
	6.50000E-04	12.100
	1.75000E-03	29.200
	3.50000E-03	45.500
	8.10000E-03	69.400
	1.26500E-02	85.200
	2.28000E-02	110.600
	3.97500E-02	137.200
	6.75000E-02	168.000
	1.50000E-04	0.900
	1.90000E-03	35.300
	4.65000E-03	58.800
	9.30000E-03	82.600
	1.68000E-02	107.500
	4.17000E-02	154.000
16.0000	5.00000E-04	3.700
	8.50000E-04	9.700
	1.60000E-03	25.300
	4.85000E-03	51.800
	6.20000E-03	61.100
	2.21500E-02	105.100
	6.36500E-02	167.300
	1.06350E-01	187.600
	1.52550E-01	213.500
	1.94300E-01	229.200
	2.52000E-01	248.900
17.0000	4.00000E-04	0.300
	4.50000E-04	6.400
	8.00000E-04	10.400
	1.05000E-03	14.200
17.0000	2.75000E-03	35.600
	4.30000E-03	47.300
	7.40000E-03	62.600
	1.47000E-02	83.800
	2.74000E-02	107.700
	5.94800E-02	155.500
	9.26000E-02	206.400
18.0000	3.50000E-04	0.700
	5.00000E-04	2.500

TABLE 232 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.00000E-04	5.900
	1.25000E-03	10.300
	6.50000E-03	39.800
	9.65000E-03	49.000
	1.79000E-02	64.300
	3.49500E-02	85.100
	6.68000E-02	108.100
	1.25000E-01	130.200
	1.53500E-01	139.100
19.0000	3.00000E-04	0.300
	5.00000E-04	0.400
	8.00000E-04	0.500
	10.00000E-04	1.000
	2.05000E-03	2.900
	3.85000E-03	5.600
	6.20000E-03	9.500
	9.20000E-03	14.000
	1.97500E-02	28.100
	3.05000E-02	37.300
	4.20000E-02	66.800
	6.80000E-02	85.600
20.0000	2.00000E-04	0.100
	4.50000E-04	0.300
	5.00000E-04	0.400
	7.00000E-04	1.000
	1.50000E-03	3.000
	2.50000E-03	5.300
	4.70000E-03	8.800
	6.75000E-03	12.000
	8.50000E-03	14.800
	1.14000E-02	18.600
	1.62000E-02	24.400
21.0000	4.00000E-04	0.300
	4.50000E-04	0.400
	5.00000E-04	0.500
	6.50000E-04	1.000
	1.60000E-03	4.700
21.0000	2.20000E-03	6.600
	6.45000E-03	16.500
	8.25000E-03	19.200
	1.10000E-02	22.200
	2.00000E-02	30.300
	3.43000E-02	40.100

TABLE 232 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.71000E-02	46.500
	7.17500E-02	54.600
	1.03400E-01	61.200
	1.27000E-01	64.700
	1.46700E-01	67.100
23.0000	1.35000E-03	0.400
	1.80000E-03	0.600
	1.90000E-03	0.700
	3.95000E-03	1.600
	5.20000E-03	2.500
	1.00500E-02	6.000
	2.66500E-02	16.900
	3.16500E-02	21.500
	6.65000E-02	35.600
25.0000	5.50000E-03	0.700
	7.30000E-03	1.100
	8.85000E-03	1.600
	2.39500E-02	9.900
	2.54500E-02	10.600
	3.94000E-02	16.700
	4.45000E-02	18.600
	4.91000E-02	19.900
	6.41000E-02	23.700
	9.94000E-02	29.600
	1.48800E-01	34.300
29.0000	5.30000E-03	0.100
	6.65000E-03	0.200
	8.55000E-03	0.400
	1.02500E-02	0.600
	1.26500E-02	1.000
	1.40500E-02	1.400
	1.63000E-02	1.900
	4.68500E-02	10.200
	5.10000E-02	11.000
	9.99000E-02	16.900
35.0000	8.23000E-03	0.100
	1.22000E-02	0.200
	1.69000E-02	0.400
	1.79000E-02	0.500
	2.30500E-02	1.000
35.0000	2.99000E-02	1.500
	3.64000E-02	2.000
	4.28000E-02	2.500
	5.79500E-02	3.000
	6.24000E-02	4.100

TABLE 233

Deformation Versus Time (Fitted Data) for 321 Stainless Steel at 1200° F (1660° R) RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.7500	3.14200E-05	0.300
	7.18800E-05	0.500
	1.98730E-04	25.400
	3.40710E-04	73.100
	4.63620E-04	145.500
	5.16560E-04	193.800
	6.54300E-04	1040.000
1.0000	1.42700E-05	0.400
	4.78620E-04	22.800
	5.87740E-04	42.300
	9.06390E-04	136.300
	1.34569E-03	359.300
	1.54904E-03	502.500
	1.85823E-03	773.800
1.5000	1.07140E-04	42.600
	2.05450E-04	54.100
	3.77250E-04	94.600
	4.41610E-04	132.400
	5.17190E-04	253.400
	5.69060E-04	356.900
	7.01460E-04	534.500
	8.27000E-04	659.400
1.5000	1.19382E-03	948.900
	1.36915E-03	1069.200
	1.39583E-03	1086.900
3.0000	1.50000E-04	172.500
	2.00000E-04	191.100
	2.50000E-04	285.200
	3.50000E-04	310.700
	4.99990E-04	357.400
	1.79999E-03	485.200
	2.60000E-03	622.600
	3.80000E-03	910.900
	4.44999E-03	1174.100
	4.94999E-03	1286.500
5.0000	3.42410E-04	12.500
	3.06110E-04	27.100
	4.05540E-04	100.200
	8.94710E-04	156.400
	2.21419E-03	259.200
	4.47106E-03	402.800

TABLE 233 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	6.82109E-03	540.400
	9.75328E-03	706.700
	1.14792E-02	803.700
	1.31737E-02	898.900
	1.51385E-02	1009.600
8.0000	4.49990E-04	117.700
	8.99990E-04	190.800
	1.84999E-03	250.000
	3.80000E-03	297.600
	7.30000E-03	353.200
	1.58500E-02	465.300
	2.67000E-02	524.300
	3.28500E-02	634.100
	4.89000E-02	819.300
	5.40000E-02	887.000
	5.88000E-02	933.000
9.0000	1.17460E-04	1.700
	2.32220E-04	18.100
	3.11580E-04	28.200
	5.85440E-04	58.100
	7.32980E-04	72.000
	1.06548E-03	99.500
	1.53968E-03	131.900
	1.94614E-03	154.700
	2.89969E-03	194.900
	3.12620E-03	202.400
	3.72309E-03	219.500
10.0000	1.78620E-04	26.000
	1.15363E-03	43.300
	1.43868E-03	67.500
	2.43117E-03	102.200
	4.17678E-03	131.800
	6.89433E-03	163.800
	9.97355E-03	192.800
	1.22195E-02	211.500
	1.43352E-02	227.900
	1.47493E-02	231.000
	4.77080E-04	2.000
	7.99550E-04	4.600
	1.31129E-03	58.600
	2.71690E-03	143.600
	4.27177E-03	166.900
	6.25096E-03	190.800
	1.24692E-02	249.900
	1.86481E-02	298.400

TABLE 233 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
11.0000	5.48210E-04	51.000
	1.35874E-03	90.700
	2.16674E-03	108.500
	7.45286E-03	174.500
	1.37014E-02	224.200
	2.77945E-02	305.100
	6.00115E-02	434.400
	7.10305E-02	470.100
	9.56863E-02	540.600
	1.48038E-01	661.200
	1.74361E-01	711.400
11.5000	1.31740E-04	0.300
	1.35710E-04	0.400
	1.91270E-04	1.800
	2.54820E-04	3.400
	1.17601E-03	25.800
	1.87717E-03	41.000
	3.18614E-03	64.400
	5.81425E-03	97.400
	8.55489E-03	120.800
	1.25530E-02	144.900
	2.09083E-02	177.500
	3.35769E-02	207.900
	4.36013E-02	224.700
13.0000	3.00000E-04	5.000
	5.49990E-04	22.900
	8.99990E-04	46.700
	2.40000E-03	85.800
	6.64999E-03	129.900
13.0000	1.66000E-02	177.800
	2.70500E-02	209.200
	8.03000E-02	321.200
	1.26300E-01	377.300
	1.76400E-01	442.000
	2.56550E-01	490.000
14.0000	6.00000E-04	18.900
	1.75000E-03	51.000
	4.25000E-03	85.500
	1.05500E-02	120.900
	3.18000E-02	187.700
	6.29000E-02	237.300
	1.03900E-01	288.900
	1.64350E-01	340.000
	2.37500E-01	379.200

TABLE 233 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	1.84330E-04	1.000
	2.42690E-04	2.600
	6.50940E-04	12.100
	1.78167E-03	29.200
	3.57024E-03	45.500
	8.01288E-03	69.400
	1.25070E-02	85.200
	2.30689E-02	110.600
	3.96068E-02	137.200
	6.75245E-02	168.000
	1.30390E-04	0.900
	1.97477E-03	35.300
	4.61228E-03	58.800
	9.21796E-03	82.600
	1.68769E-02	107.500
	4.16877E-02	154.000
16.0000	6.86450E-04	3.700
	9.62040E-04	9.700
	1.83325E-03	25.300
	4.47872E-03	51.800
	5.97264E-03	61.100
	1.96867E-02	105.100
	7.14289E-02	167.300
	1.01335E-01	187.600
	1.52650E-01	213.500
	1.92423E-01	229.200
	2.53382E-01	248.900
17.0000	3.96090E-04	0.300
	3.00240E-04	6.400
	1.09798E-03	10.400
	1.25796E-03	14.200
17.0000	1.85896E-03	35.600
	3.73105E-03	47.300
	7.85132E-03	62.600
	1.60700E-02	83.800
	2.79498E-02	107.700
	5.72601E-02	155.500
	9.35553E-02	206.400
18.0000	3.15920E-04	0.700
	4.92360E-04	2.500
	8.31980E-04	5.900
	1.29681E-03	10.300
	6.64213E-03	39.800

TABLE 233 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	9.74247E-03	49.000
	1.73550E-02	64.300
	3.46835E-02	85.100
	6.82298E-02	108.100
	1.23186E-01	130.200
	1.54424E-01	139.100
19.0000	3.00000E-04	0.300
	4.99990E-04	0.400
	8.00000E-04	0.500
	9.99990E-04	1.000
	2.05000E-03	2.900
	3.85000E-03	5.600
	6.19999E-03	9.500
	9.20000E-03	14.000
	1.97500E-02	28.100
	3.05000E-02	37.300
	4.20000E-02	66.800
	6.80000E-02	85.600
20.0000	2.00310E-04	0.100
	4.85290E-04	0.300
	4.69600E-04	0.400
	6.56290E-04	1.000
	1.54147E-03	3.000
	2.61012E-03	5.300
	4.55896E-03	8.800
	6.63197E-03	12.000
	8.61382E-03	14.800
	1.14856E-02	18.600
	1.61465E-02	24.400
21.0000	5.00820E-04	0.300
	3.80630E-04	0.400
	4.05190E-04	0.500
	7.00140E-04	1.000
	1.74673E-03	4.700
21.0000	2.05825E-03	6.600
	6.32707E-03	16.500
	8.37599E-03	19.200
	1.10410E-02	22.200
	1.99643E-02	30.300
	3.43000E-02	40.100
	4.71000E-02	46.500
	7.17500E-02	54.600
	1.03400E-01	61.200
	1.27000E-01	64.700
	1.46700E-01	67.100

TABLE 233 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	1.49114E-03	0.400
	1.82439E-03	0.600
	1.99097E-03	0.700
	3.48856E-03	1.600
	4.98104E-03	2.500
	1.06836E-02	6.000
	2.62285E-02	16.900
	3.18676E-02	21.500
	6.64941E-02	35.600
25.0000	6.18574E-03	0.700
	6.97407E-03	1.100
	7.96856E-03	1.600
	2.59165E-02	9.900
	2.65079E-02	10.600
	3.67724E-02	16.700
	4.26437E-02	18.600
	4.74942E-02	19.900
	6.55985E-02	23.700
	1.04948E-01	29.600
	1.45346E-01	34.300
29.0000	5.31043E-03	0.100
	6.57963E-03	0.200
	8.77194E-03	0.400
	1.00964E-02	0.600
	1.24196E-02	1.000
	1.43540E-02	1.400
	1.62361E-02	1.900
	4.63967E-02	10.200
	5.14726E-02	11.000
	9.98625E-02	16.900
35.0000	8.25694E-03	0.100
	1.19782E-02	0.200
	1.70242E-02	0.400
	1.85580E-02	0.500
	2.22664E-02	1.000
35.0000	2.84979E-02	1.500
	3.73386E-02	2.000
	4.65276E-02	2.500
	5.44155E-02	3.000
	6.28672E-02	4.100

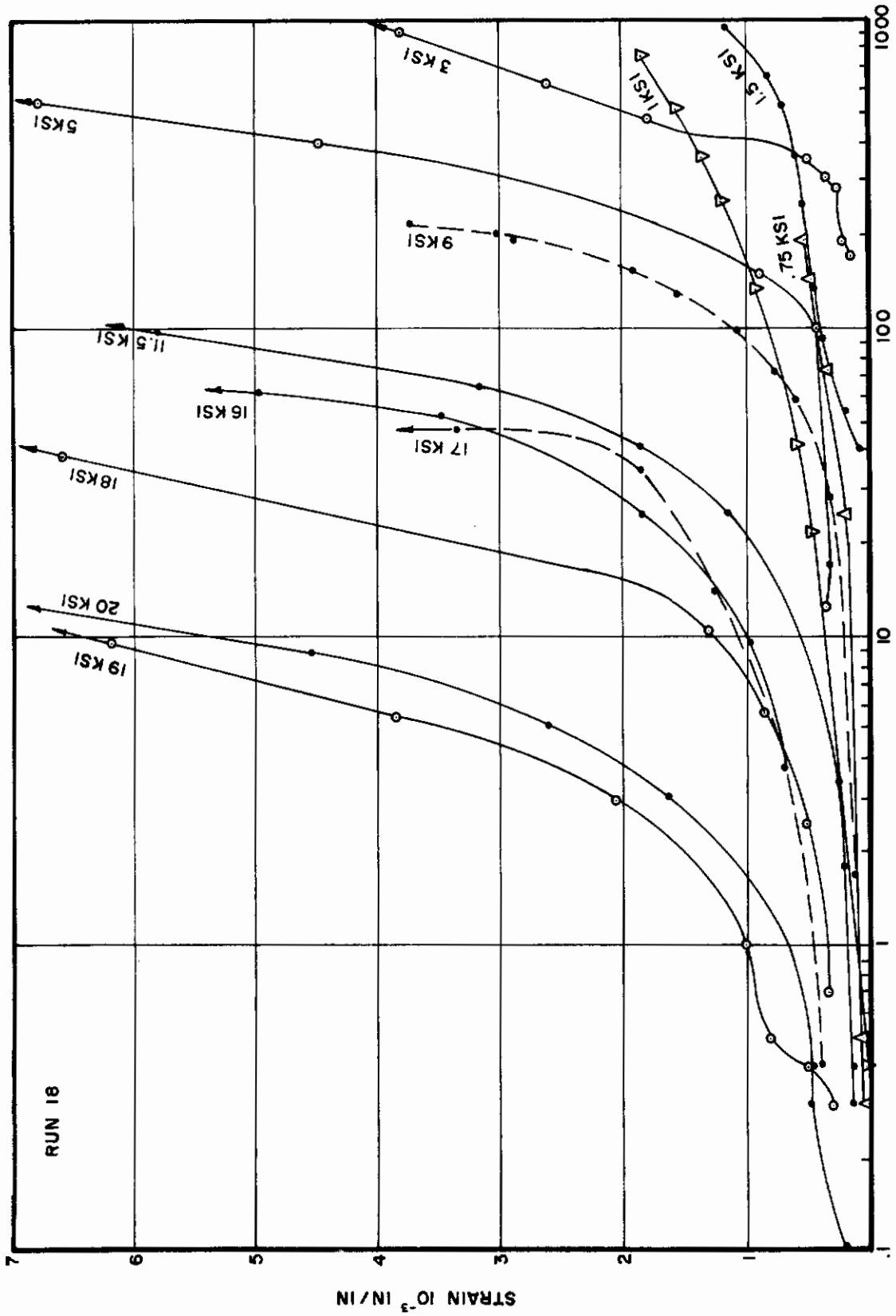


Figure 153. Creep Deformation Versus Log Time of 321 Stainless Steel at 1200°F (1660°R)

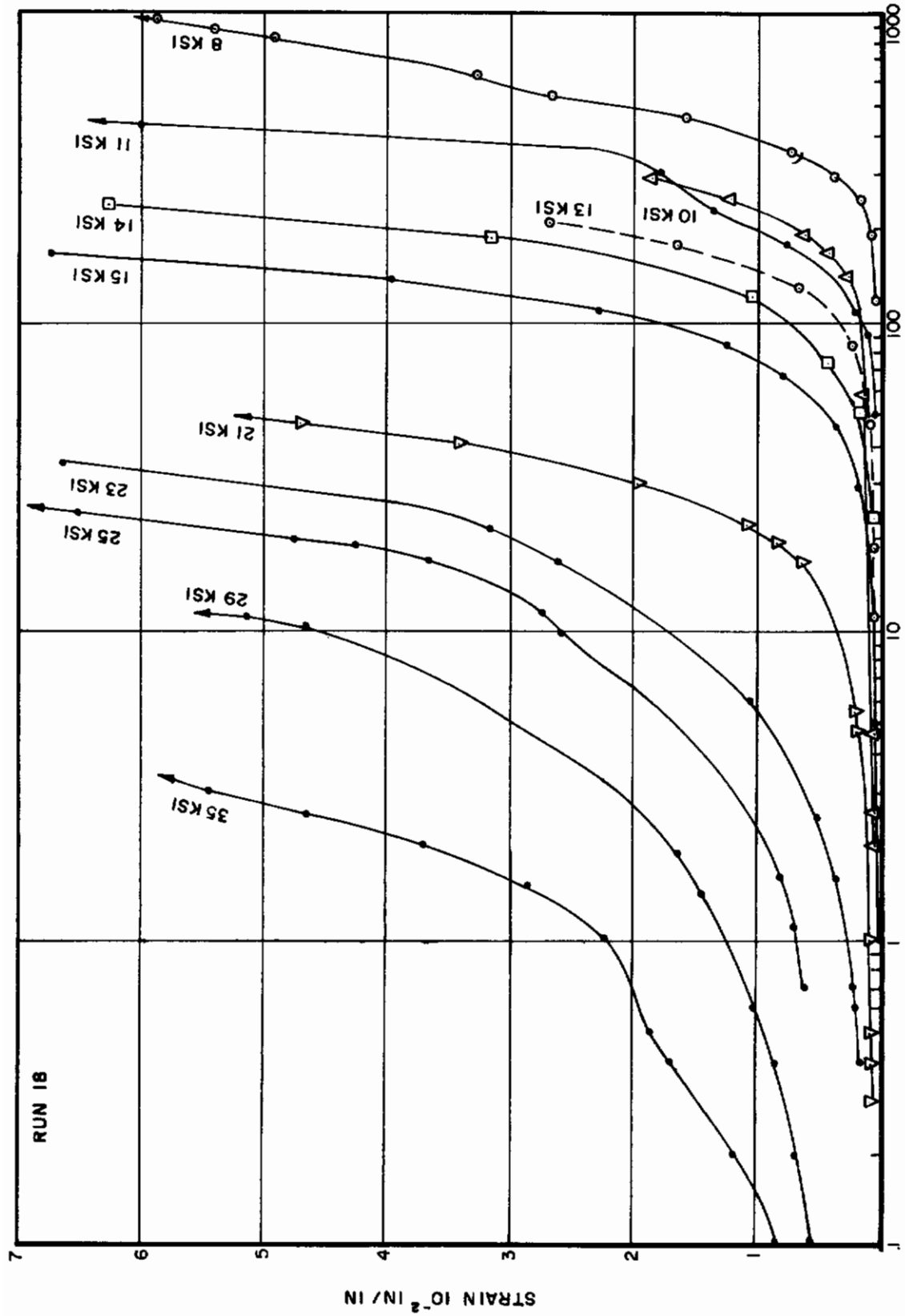


Figure 153 (CONT)

TABLE 234

Creep Deformation and Rupture Data at 1200°F (1660°R) for 321 Stainless Steel

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
1.0		0.17	0.01	200	-	-	-
3.0		0.49	.02	350	732	-	-
5.0		1.47	.03	188	327	435	705
8.0		5.88	.04	198	280	322	397
9.0		2.78	.05	64	115	146	198
9.0		0.38	.05	96	199	-	-
10.0		1.92	.05	52	138	183	238
10.0		1.51	.05	41	112	142	195
11.0		17.44	.06	76	134	163	210
11.5		4.44	.06	26	70	92	131
12.0		1.45	.06	48	94	118	153
13.0	498	32.5	.07	50	95	118	152
14.0	393	29.5	.08	36	76	89	118
15.0	-	8.44	.09	23	48	62	84
15.0	-	6.75	.09	18	42	55	74
16.0	252.6	35.0	.10	12	42	56	76
17.0	208.2	25.0	.11	15	37	51	71
18.0	150.3	22.5	.11	12	27	35	50
19.0	100.9	30.5	.12	1.0	4.2	7.4	15.2
20.0	-	1.6	.14	1.7	6.2	9.3	16.2
21.0	67.3	17.00	.15	2.2	9.5	14.3	21
23.0	41.1	19.5	.19	0.3	1.3	2.3	6.0
25.0	37.0	25.5	.41	0.1	0.3	0.6	2.2
29.0	18.1	19.0	1.23	-	-	0.1	0.2
35.0	5.0	12.0	3.75	-	-	-	-
40.0	0.9	40.5	3.92	-	-	-	-

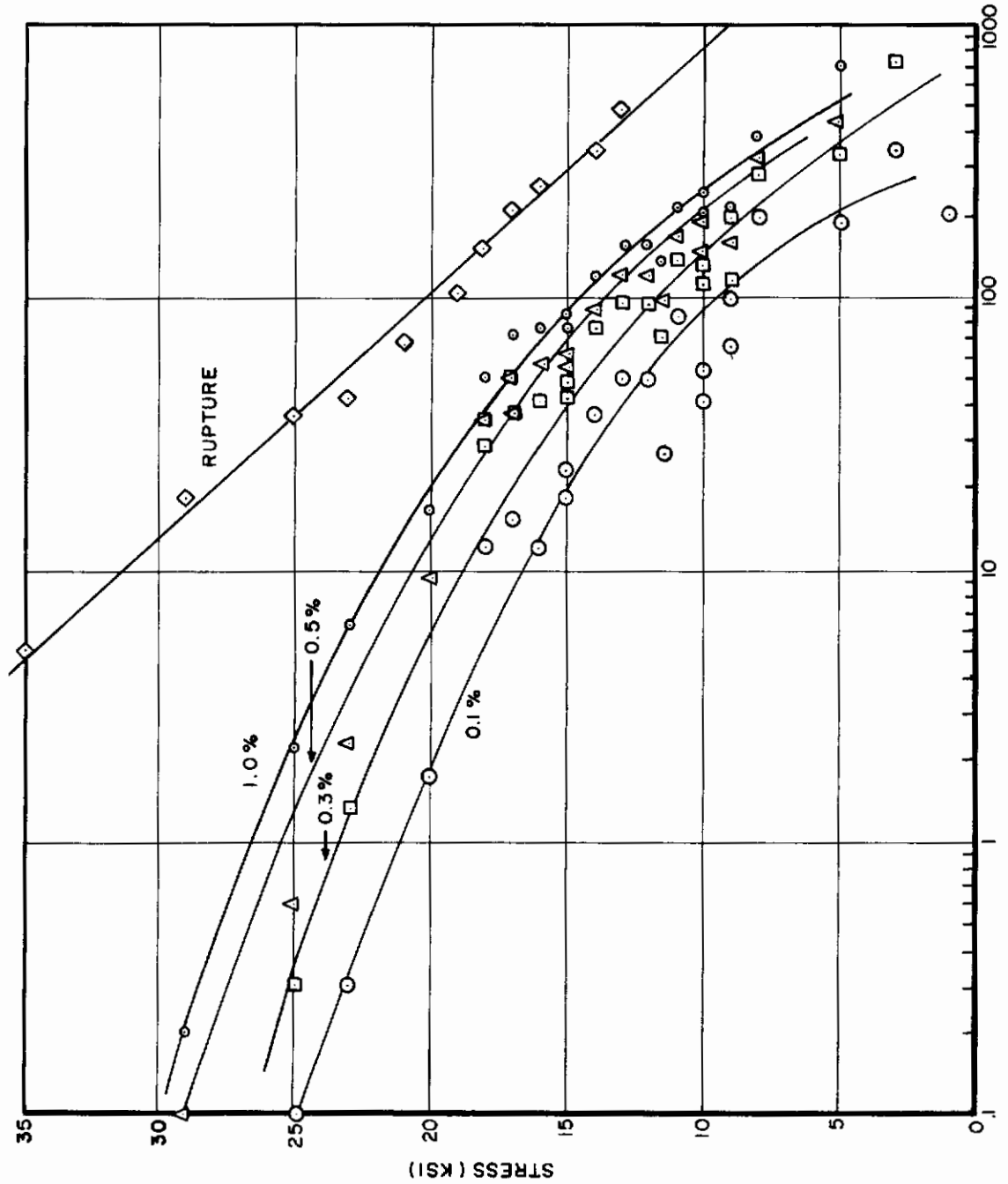


Figure 154. Creep Rupture Properties of 321 Stainless Steel at 1200°F (1660°R)

TABLE 235

RUN 18

Deformation Versus Time (Raw Data) for 321 Stainless Steel at 1350° F (1810° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.8000	3.00000E-04	43.800
	7.50000E-04	115.600
	1.20000E-03	163.500
	1.35000E-03	237.000
	1.90000E-03	499.700
	2.50000E-03	764.700
1.0000	5.50000E-04	42.100
	8.50000E-04	114.900
	10.00000E-04	152.300
	1.50000E-03	301.200
	1.75000E-03	426.800
	2.20000E-03	470.000
	2.25000E-03	517.600
	2.30000E-03	560.300
	2.50000E-03	715.000
	2.60000E-03	776.800
	2.70000E-03	872.500
	2.80000E-03	992.000
	3.00000E-03	1051.500
1.2000	2.45000E-03	0.100
	2.60000E-03	0.400
	2.65000E-03	1.100
	2.75000E-03	4.300
	2.80000E-03	9.600
	3.05000E-03	36.800
	3.60000E-03	107.900
	4.30000E-03	155.700
	4.60000E-03	204.100
	4.70000E-03	359.500
1.3000	5.00000E-05	6.000
	10.00000E-05	9.400
	2.00000E-04	15.900
	9.50000E-04	74.100
	1.60000E-03	134.800
	2.50000E-03	242.100
	3.00000E-03	364.500
	3.50000E-03	493.200
	4.00000E-03	820.400
	4.80000E-03	1199.000
	4.20000E-04	18.000
	8.20000E-04	44.600

TABLE 235 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.3000	1.30000E-03	74.300
	2.59000E-03	107.100
	4.20000E-03	940.400
	4.56000E-03	973.000
1.5000	1.10000E-03	54.700
	1.78000E-03	81.000
	2.70000E-03	148.800
	4.18000E-03	248.700
	5.47500E-03	374.900
	7.60000E-03	540.600
	9.18000E-03	639.200
	9.22000E-03	698.400
	1.01800E-02	747.500
1.7000	10.00000E-05	0.100
	2.00000E-04	2.100
	1.30000E-03	37.600
	1.90000E-03	65.200
	2.50000E-04	14.900
	3.50000E-04	25.500
	6.00000E-04	37.500
	9.00000E-04	49.900
	1.50000E-03	72.700
	2.00000E-03	105.500
	3.50000E-03	229.400
	5.15000E-03	541.700
	5.62500E-03	841.300
1.8000	2.50000E-04	2.100
	3.50000E-04	5.700
	4.50000E-04	11.100
	5.50000E-04	14.200
	6.50000E-04	19.200
	10.00000E-04	32.800
	1.85000E-03	67.800
	2.55000E-03	87.800
	4.00000E-03	187.100
	7.20000E-03	420.100
	8.40000E-03	627.400
	9.55000E-03	756.700
	10.00000E-03	1123.600
2.0000	9.40000E-04	1.900
	1.04500E-03	9.800
	1.56000E-03	33.400
	1.70000E-03	52.000

TABLE 235 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.01000E-03	73.200
	2.40000E-03	81.400
	3.15500E-03	143.100
2.0000	3.66500E-03	167.900
2.3000	3.00000E-04	0.100
	4.00000E-04	0.200
	5.50000E-04	1.000
	6.50000E-04	3.300
	1.20000E-03	20.700
	3.00000E-03	75.500
	6.40000E-03	126.000
	7.35000E-03	161.800
	9.00000E-03	215.300
	1.09000E-02	269.800
	1.17000E-02	287.700
2.5000	2.50000E-04	10.700
	1.75000E-03	32.200
	2.20000E-03	42.700
	3.85000E-03	62.700
	5.05000E-03	82.000
	8.90000E-03	130.800
	1.18500E-02	177.400
	1.53500E-02	216.800
	1.80000E-02	251.800
	2.03000E-02	275.900
3.0000	10.00000E-04	0.300
	1.50000E-03	0.400
	2.00000E-03	1.000
	3.45000E-03	25.700
	4.10000E-03	38.900
	2.12500E-02	200.500
	2.93000E-02	296.400
	3.14000E-02	346.600
4.0000	2.00000E-04	1.700
	1.70000E-03	12.600
	2.10000E-03	13.600
	3.85000E-03	21.500
	1.07500E-02	46.300
	1.79000E-02	70.500
	3.31000E-02	118.400
	4.34500E-02	166.500
	4.37500E-02	167.400

TABLE 235 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.8000	3.00000E-04	0.700
	7.50000E-04	1.400
	1.55000E-03	6.600
	6.00000E-03	17.100
	1.40000E-02	36.600
	2.57500E-02	63.400
4.8000	5.37500E-02	118.300
	8.32000E-02	161.300
	1.14150E-01	200.600
	1.43350E-01	227.900
	1.72250E-01	258.400
	2.29350E-01	306.300
	2.63200E-01	330.600
5.4000	5.50000E-04	6.800
	2.10000E-03	12.600
	2.90000E-03	17.400
	5.50000E-03	22.000
	1.37500E-02	36.800
	3.09000E-02	61.000
	5.58000E-02	89.700
	1.32850E-01	155.000
	1.74700E-01	181.000
	2.11050E-01	200.100
	2.23500E-01	205.800
	2.32250E-01	209.700
	3.11050E-01	239.700
	3.65800E-01	253.400
6.0000	6.00000E-04	1.700
	2.65000E-03	11.600
	3.35000E-03	13.500
	1.60000E-02	31.300
	3.21000E-02	50.100
	4.08500E-02	59.600
	6.53000E-02	83.700
	9.65000E-02	107.700
	1.13750E-01	119.100
	1.80900E-01	155.600
	2.30750E-01	175.600

TABLE 235 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
6.5000	3.50000E-04	1.300
	7.50000E-04	2.700
	3.15000E-03	8.900
	7.50000E-03	14.500
	1.85000E-02	24.700
	3.42000E-02	36.900
	6.51500E-02	57.000
	7.14000E-02	60.500
	1.23800E-01	84.700
	1.81950E-01	104.400
	2.01200E-01	109.600
7.0000	4.50000E-04	2.400
	6.50000E-04	3.200
	9.50000E-04	5.000
7.0000	2.03500E-02	28.000
	2.64000E-02	33.900
	5.40000E-02	51.700
	6.36000E-02	57.200
	8.90000E-02	67.100
	1.16000E-01	77.800
10.0000	7.00000E-04	0.300
	8.50000E-04	0.400
	1.65000E-03	0.500
	2.30000E-03	1.000
	8.50000E-03	2.100
	2.45000E-02	8.000
	3.59000E-02	16.900
	4.49000E-02	23.300
	5.15000E-02	24.300
	1.08800E-01	30.900

TABLE 235 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	3.95000E-03	0.400
	4.60000E-03	0.500
	1.14000E-02	1.000
	1.80000E-02	1.500
	2.69000E-02	2.000
	4.87000E-02	3.100
	7.02000E-02	4.100
	9.31500E-02	4.900
	1.39100E-01	6.500
	1.46650E-01	6.600
	1.64300E-01	6.900
	2.18850E-01	7.100
19.0000	1.70000E-03	0.100
	3.90000E-03	0.200
	6.70000E-03	0.300
	8.75000E-03	0.400
	1.17500E-02	0.500
	1.43500E-02	0.600
	1.72000E-02	0.700
	3.26000E-02	1.300
	4.51000E-02	1.800
	5.89500E-02	2.200
	8.16000E-02	2.700
	1.20600E-01	3.300
	1.85900E-01	4.400

TABLE 236

Deformation Versus Time (Fitted Data) for 321 Stainless Steel at 1350° F (1810° R) RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
0.8000	2.99420E-04	43.800
	8.35030E-04	115.600
	1.06926E-03	163.500
	1.34823E-03	237.000
	2.00518E-03	499.700
	2.44286E-03	764.700
1.0000	5.59690E-04	42.100
	8.13610E-04	114.900
	9.90190E-04	152.300
	1.57746E-03	301.200
	1.94298E-03	426.800
	2.04885E-03	470.000
	2.15602E-03	517.600
	2.24470E-03	560.300
	2.51768E-03	715.000
	2.60944E-03	776.800
	2.73599E-03	872.500
	2.87177E-03	992.000
	2.93156E-03	1051.500
1.2000	2.46257E-03	0.100
	2.52993E-03	0.400
	2.73969E-03	1.100
	2.76662E-03	4.300
	2.72208E-03	9.600
	3.02000E-03	36.800
	3.85009E-03	107.900
	4.20227E-03	155.700
	4.44473E-03	204.100
	4.76196E-03	359.500
1.3000	5.46300E-05	6.000
	1.03850E-04	9.400
	1.96600E-04	15.900
	9.50030E-04	74.100
	1.59935E-03	134.800
	2.45606E-03	242.100
	3.07780E-03	364.500
	3.45740E-03	493.200
	4.00456E-03	820.400
	4.79969E-03	1199.000
	3.71250E-04	18.000
	9.51770E-04	44.600

TABLE 236 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
1.3000	1.56780E-03	74.300
	2.20873E-03	107.100
	4.61935E-03	940.400
	4.17107E-03	973.000
1.5000	1.23175E-03	54.700
	1.64167E-03	81.000
	2.65434E-03	148.800
	4.05835E-03	248.700
	5.71126E-03	374.900
	7.72221E-03	540.600
	8.84996E-03	639.200
	9.50607E-03	698.400
	1.00393E-02	747.500
1.7000	1.12240E-04	0.100
	1.86640E-04	2.100
	1.30162E-03	37.600
	1.89947E-03	65.200
	2.39520E-04	14.900
	3.59670E-04	25.500
	6.20950E-04	37.500
	9.09220E-04	49.900
	1.40609E-03	72.700
	2.01443E-03	105.500
	3.53093E-03	229.400
	5.13657E-03	541.700
	5.62818E-03	841.300
1.8000	2.25720E-04	2.100
	3.24730E-04	5.700
	4.71440E-04	11.100
	5.54700E-04	14.200
	6.87500E-04	19.200
	1.03967E-03	32.800
	1.88714E-03	67.800
	2.33519E-03	87.800
	4.21406E-03	187.100
	7.00460E-03	420.100
	8.58904E-03	627.400
	9.46330E-03	756.700
	1.00030E-02	1123.600
2.0000	9.29950E-04	1.900
	1.08770E-03	9.800
	1.45948E-03	33.400
	1.76961E-03	52.000
	2.12311E-03	73.200
	2.25836E-03	81.400
	3.23680E-03	143.100

TABLE 236 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	3.60996E-03	167.900
2.3000	3.16990E-04	0.100
	3.76050E-04	0.200
	5.14980E-04	1.000
	7.61100E-04	3.300
	9.88210E-04	20.700
	3.51930E-03	75.500
	5.84164E-03	126.000
	7.31362E-03	161.800
	9.26952E-03	215.300
	1.10116E-02	269.800
	1.15371E-02	287.700
2.5000	2.17640E-04	10.700
	1.77236E-03	32.200
	2.41017E-03	42.700
	3.68761E-03	62.700
	5.00683E-03	82.000
	8.60269E-03	130.800
	1.22255E-02	177.400
	1.53519E-02	216.800
	1.81485E-02	251.800
	2.00768E-02	275.900
3.0000	1.04764E-03	0.300
	1.38470E-03	0.400
	2.10997E-03	1.000
	2.96649E-03	25.700
	4.60076E-03	38.900
	2.13833E-02	200.500
	2.86011E-02	296.400
	3.19060E-02	346.600
4.0000	1.81930E-04	1.700
	2.01739E-03	12.600
	2.09545E-03	13.600
	3.36891E-03	21.500
	1.06719E-02	46.300
	1.85718E-02	70.500
	3.24637E-02	118.400
	4.36225E-02	166.500
	4.38074E-02	167.400
4.8000	2.06910E-04	0.700
	4.49460E-04	1.400
	2.27297E-03	6.600
	6.07807E-03	17.100
	1.36317E-02	36.600
	2.52164E-02	63.400

TABLE 236 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.8000	5.43483E-02	118.300
	8.33354E-02	161.300
	1.15339E-01	200.600
	1.40918E-01	227.900
	1.72868E-01	258.400
	2.30270E-01	306.300
	2.62666E-01	330.600
5.4000	1.90110E-04	6.800
	1.94775E-03	12.600
	3.69462E-03	17.400
	5.60814E-03	22.000
	1.32609E-02	36.800
	3.01524E-02	61.000
	5.60059E-02	89.700
	1.34061E-01	155.000
	1.74598E-01	181.000
	2.10501E-01	200.100
	2.22607E-01	205.800
	2.31333E-01	209.700
	3.14103E-01	239.700
	3.64246E-01	253.400
6.0000	6.84590E-04	1.700
	1.30891E-03	11.600
	4.00604E-03	13.500
	1.84436E-02	31.300
	3.02768E-02	50.100
	3.78645E-02	59.600
	6.34040E-02	83.700
	9.72433E-02	107.700
	1.15872E-01	119.100
	1.84624E-01	155.600
	2.27189E-01	175.600
6.5000	3.50000E-04	1.300
	7.50000E-04	2.700
	3.14999E-03	8.900
	7.49999E-03	14.500
	1.85000E-02	24.700
	3.42000E-02	36.900
	6.51500E-02	57.000
	7.14000E-02	60.500
	1.23800E-01	84.700
	1.81950E-01	104.400
	2.01200E-01	109.600
7.0000	4.49990E-04	2.400
	6.50000E-04	3.200
	9.49990E-04	5.000

TABLE 236 (CONT)

RUN 18

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.0000	2.03500E-02	28.000
	2.64000E-02	33.900
	5.40000E-02	51.700
	6.36000E-02	57.200
	8.90000E-02	67.100
	1.16000E-01	77.800
10.0000	5.57940E-04	0.300
	9.35710E-04	0.400
	1.31319E-03	0.500
	3.19376E-03	1.000
	7.25854E-03	2.100
	2.49203E-02	8.000
	3.54286E-02	16.900
	4.63735E-02	23.300
	5.02912E-02	24.300
	1.08826E-01	30.900
15.0000	5.31166E-03	0.400
	5.41959E-03	0.500
	8.84680E-03	1.000
	1.64761E-02	1.500
	2.71646E-02	2.000
	5.43836E-02	3.100
	7.41417E-02	4.100
	8.45880E-02	4.900
	1.37869E-01	6.500
	1.46377E-01	6.600
	1.79067E-01	6.900
	2.08052E-01	7.100
19.0000	1.66515E-03	0.100
	4.37873E-03	0.200
	5.58237E-03	0.300
	8.97488E-03	0.400
	1.23661E-02	0.500
	1.52606E-02	0.600
	1.76940E-02	0.700
	3.01466E-02	1.300
	4.48023E-02	1.800
	6.04659E-02	2.200
	8.42393E-02	2.700
	1.17438E-01	3.300
	1.86537E-01	4.400

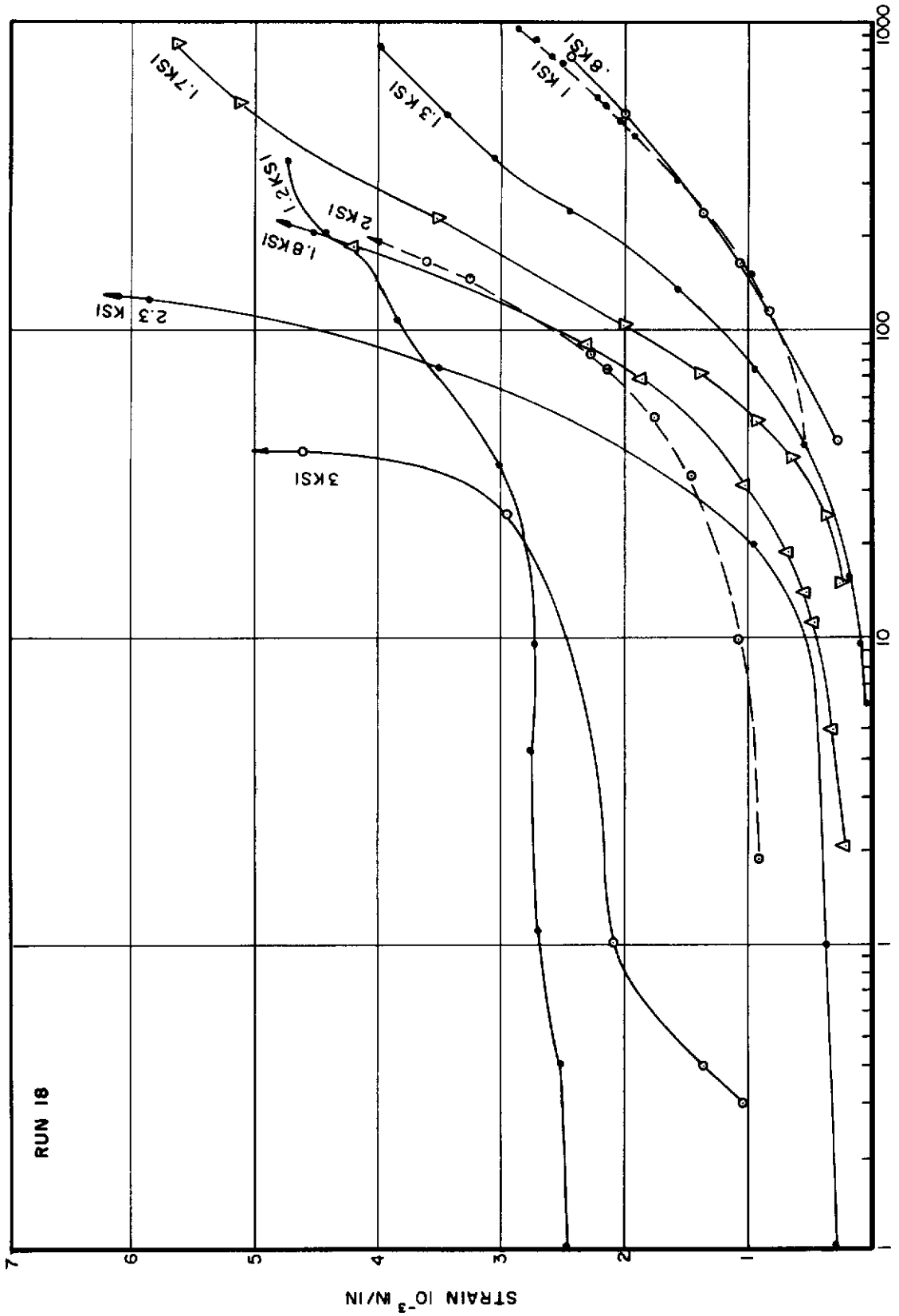


Figure 155. Creep Deformation Versus Log Time of 321 Stainless Steel at 1350°F (1810°R)

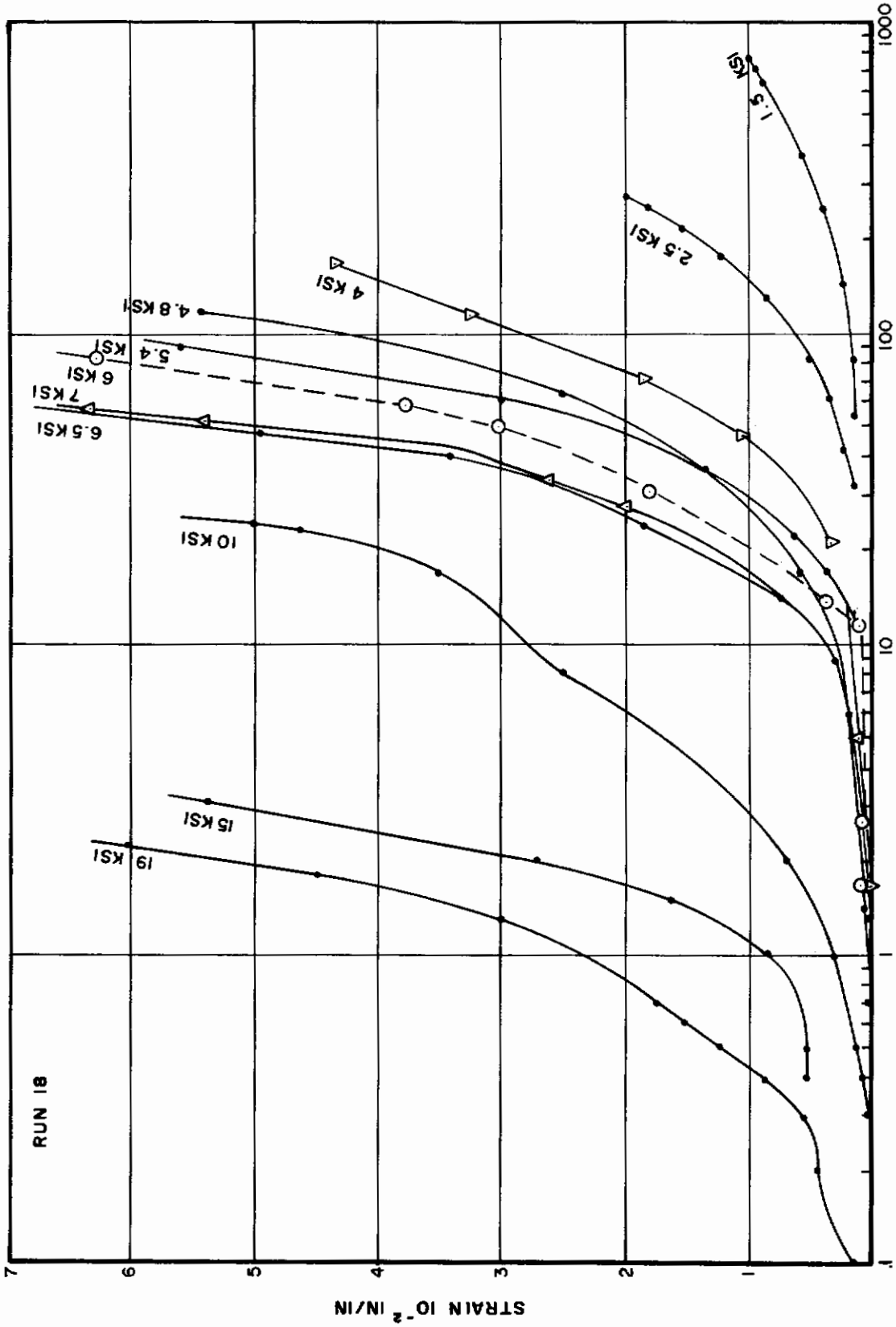


Figure 155 (CONT)

TABLE 237

Creep Deformation and Rupture Data at 1350°F (1810°R) for 321 Stainless Steel

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
0.8		0.23	0.01	247	-	-	-
1.0		0.30	0.01	175	1173	-	-
1.2		0.33	0.01	99	1108	-	-
1.3		0.47	0.01	76	358	-	-
1.3		0.45	0.01	53	273	-	-
1.5		1.1	0.01	48	170	315	754
1.7		0.56	0.01	53	173	530	-
1.8		1.01	0.02	34	120	260	1100
2.0		1.6	0.02	40	105	165	310
2.0		0.35	0.02	30	125	-	-
2.3		1.17	0.02	24	69	108	236
2.5		2.03	0.02	22.5	50	53	147
3.0		3.14	0.03	12	29.5	45	84
4.0		4.38	0.03	7.5	20	26.5	44
4.8	361.2	56.5	0.03	6.5	17	22	33
5.4	262.2	50.1	0.04	9.4	17.5	21	30
6.0	221.6	49.0	0.05	8.5	12	15.5	23.5
7.5	143.0	53.5	0.05	4.5	9.8	11.7	17
7.0	123.9	54.0	0.05	2.2	7.5	10.7	17.2
9.2	-	12.8	0.07	2.2	5	7	12
10.0	45.0	45.0	0.08	0.2	1	1.5	3
15.0	9.2	46.5	0.11	0.2	0.3	0.5	0.9
19.0	5.0	50.0	0.15	0.1	0.1	0.2	0.4

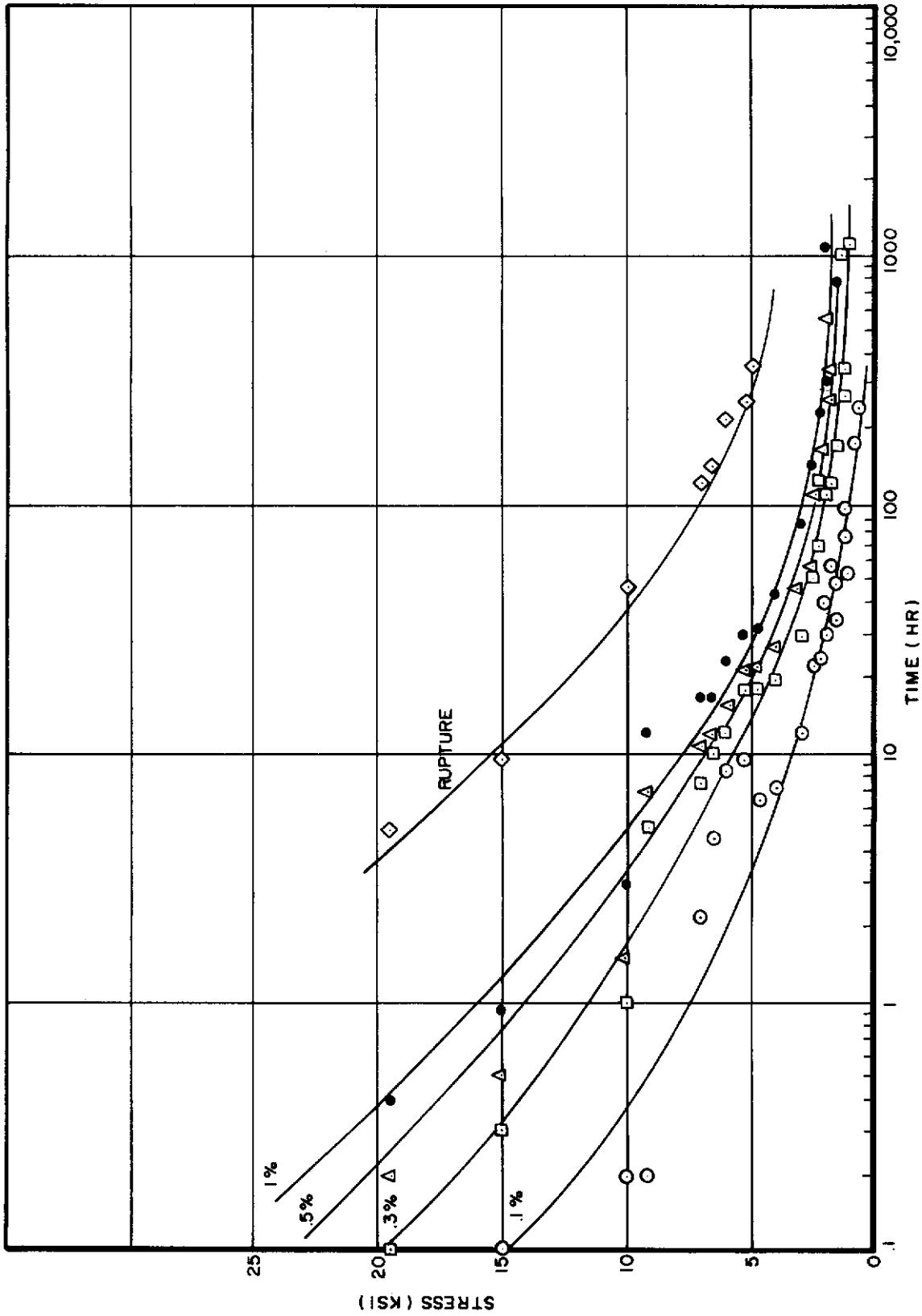


Figure 156. Creep Rupture Properties of 321 Stainless Steel at 1350°F (1810°R)

TABLE 238

Minimum Creep Rate for 321 Stainless Steel

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hour)
1000°F (1460°R)	21.0	8.526×10^{-7}
	25.0	2.54×10^{-7}
	28.0	1.077×10^{-5}
	28.0	4.1×10^{-6}
	33.0	3.708×10^{-6}
	33.0	6.153×10^{-6}
	35.0	8.518×10^{-7}
	37.0	2.343×10^{-5}
	37.0	9.460×10^{-6}
	41.0	2.238×10^{-5}
	42.0	5.6089×10^{-6}
	44.0	4.095×10^{-5}
	45.0	8.348×10^{-5}
	45.0	1.3576×10^{-4}
	48.0	1.3398×10^{-4}
	50.0	7.22×10^{-5}
	53.0	2.859×10^{-4}
	55.0	7.420×10^{-4}
	58.0	3.701×10^{-4}
	59.0	8.081×10^{-4}
	60.5	1.234×10^{-3}
1200°F (1660°R)	1.5	5.012×10^{-7}
	3.0	5.314×10^{-7}
	5.0	1.36×10^{-6}
	8.0	6.156×10^{-6}
	9.0	6.998×10^{-6}
	10.0	1.779×10^{-5}
	10.0	9.476×10^{-6}
	11.0	2.042×10^{-5}
	11.5	3.969×10^{-5}
	13.0	1.397×10^{-5}
	14.0	3.583×10^{-5}
	15.0	3.647×10^{-5}

TABLE 238 (CONT)

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hour)
	15.0	5.3616×10^{-5}
	16.0	4.593×10^{-5}
	17.0	2.808×10^{-5}
	18.0	9.802×10^{-5}
	19.0	3.898×10^{-4}
	20.0	3.111×10^{-4}
	21.0	1.6396×10^{-4}
	23.0	1.226×10^{-3}
	25.0	8.448×10^{-4}
	29.0	3.634×10^{-3}
	35.0	7.417×10^{-3}
1350°F (1810°R)	1.3	1.6723×10^{-6}
	1.3	2.893×10^{-6}
	1.7	2.166×10^{-5}
	2.3	1.305×10^{-5}
	2.5	6.074×10^{-5}
	3.0	3.467×10^{-5}
	4.0	7.8×10^{-5}
	4.8	3.465×10^{-4}
	5.4	3.03×10^{-4}
	6.0	6.306×10^{-5}
	6.5	2.857×10^{-4}
	7.0	1.6667×10^{-4}
	10.0	1.1807×10^{-3}
	15.0	1.079×10^{-3}
	19.0	1.2036×10^{-2}

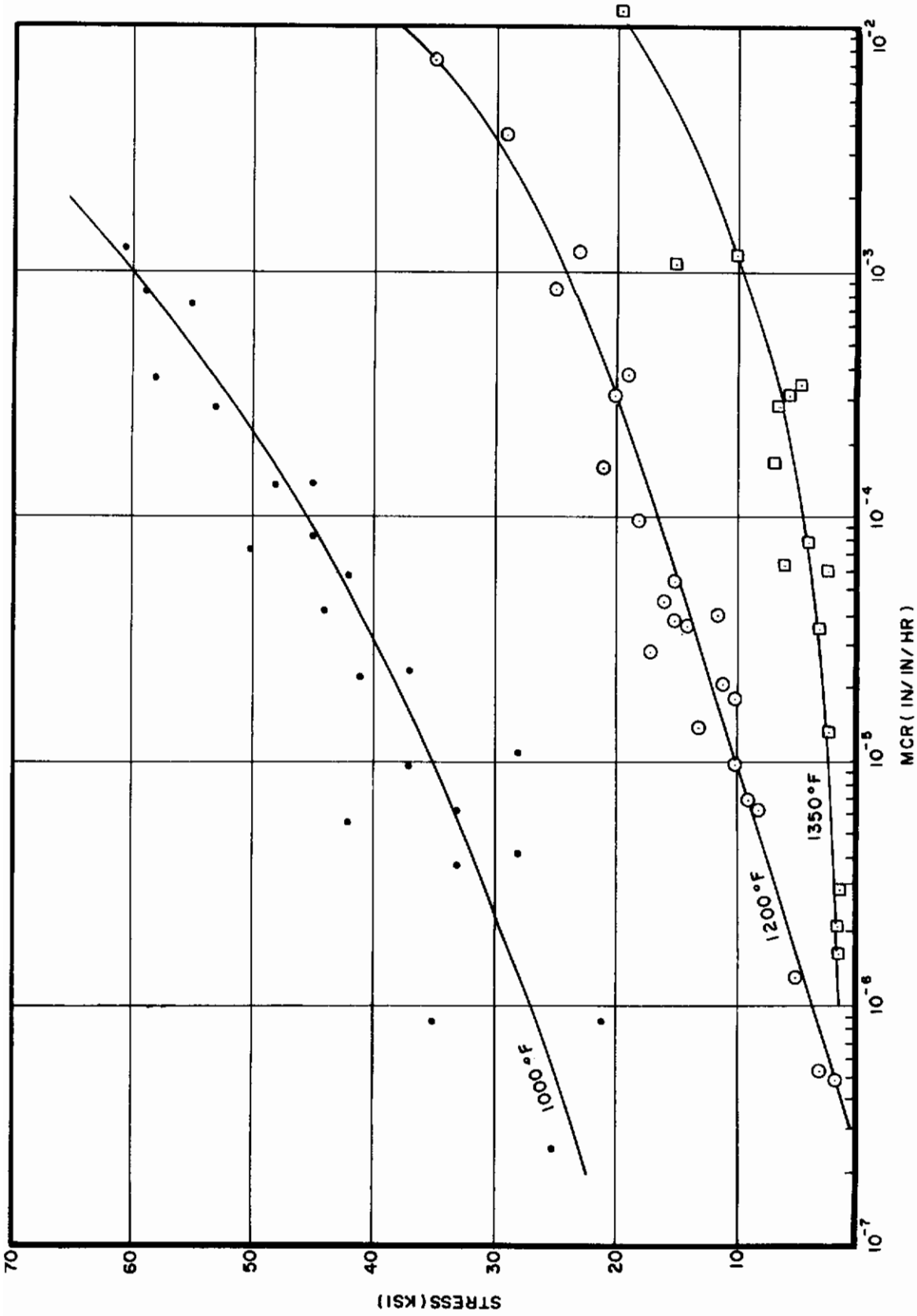


Figure 157. Minimum Creep Rate of 321 Stainless Steel

APPENDIX IV

NICKEL BASED ALLOYS

MATERIALS TESTED AND APPLICATIONS

22. Nimonic 90 - This material was purchased by W-PAFB from Huntington Alloy Division of International Nickel Co. from their heat No. HT-714-C. It was in sheet form 0.05 in. x 36 in. x 110 in. and was in mill annealed condition. Before testing it was further heat treated at 1350°F for 16 hours and then air cooled.

23. Nimonic 90 - This material was identical to 22.

24. HMR-235 - This material was purchased from Haynes-Stellite Company as sheet stock .063 in. x 36 in. x 60 in. in mill annealed condition. Before testing it was further heat treated by solution treating it at 2050°F for 30 minutes, then air cooling it.

Chemical compositions for the above alloys are given in Table 239.

TEST PROCEDURES

Materials 22, 23, 24

These three materials were tested by Metcut Research Associates, Inc., Cincinnati, Ohio, under contract No. AF 33(600)-36430. Specimens were prepared for material 22 by shearing sheet stock so that the rolling direction was transverse to the test load. Specimens were prepared for materials 23 and 24 by shearing sheet stock so that the rolling direction was longitudinal. Specimens were manufactured in accordance with Metcut Drawings shown in Figures 4 and 104 and were machined using the Metcut "stress free" grinding technique. Test procedures were carried out in accordance with the provisions of:

Federal Specification QQ-M-151a,

"Metals, General Specifications for Inspection of."

ASTM Designation: E21-43,

"Recommended Practice for Short-Term Elevated Temperature Tensile Tests of Metallic Materials."

ASTM Designation: E22-41,

"Recommended Practice for Conducting Long-Term High Temperature Tension Tests of Metallic Materials."

A Baldwin-Lima-Hamilton Tensile Machine equipped with strain pacing instrumentation was used for all tensile tests. Standard loading rates were used with strain measured with an extensometer at all test temperatures. The resultant tensile data are presented in Tables 240 through 242.

Lever-type creep test frames were used for creep testing. Test furnaces were provided with quartz viewing ports to permit optical measurement of creep deformation using the conventional platinum-strip/microscope method. Creep data are presented in Tables 243 through 272 and Figures 165 through 178.

TABLE 239

Chemical Compositions for Nickel Based Alloys

Elements	Nimonic 90 (22)	Nimonic 90 (23)	HMR-235 (24)
Al	1.58	1.58	1.99
C	.007	.007	.12
Co	17.04	17.04	.23
Cr	20.55	20.55	15.06
Cu	.04	.04	
Fe	.39	.39	9.85
Mn	.49	.49	.02
Mo			5.62
Ni	Bal	Bal	Bal
S	.007	.007	
Si	.22	.22	.16
Ti	2.81	2.81	2.51

Note: Numbers shown below material designation refer to the material number in the listing of "Materials Tested."

TABLE 240

Tensile Test Data for Nimonic 90 (Transverse)

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R. T.	183.0	124.0	27
R. T.	178.0	122.0	26
R. T.	180.0	122.0	26
R. T.	175.0	119.0	28
R. T.	179.0	121.0	27
1350	111.0	96.8	5
1350	111.0	95.2	5
1350	112.0	95.8	7
1500	87.4	80.7	6
1500	88.2	76.5	3
1500	92.0	84.0	4
1650	58.6	54.3	9
1650	54.9	49.6	7
1650	55.4	51.2	6

* To convert to °R add 460

TABLE 241

Tensile Test Data for Nimonic 90 (Longitudinal)

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	177.0	120.0	28
"	178.0	121.0	28
"	179.0	120.0	26
"	177.0	120.0	28
"	172.0	116.0	29
1350	110.0	98.0	5
1350	109.0	94.9	5
1350	111.0	96.3	6
1500	92.8	86.0	4
1500	89.8	82.4	4
1500	92.0	84.4	5
1650	57.4	52.8	7
1650	53.4	48.6	8
1650	55.6	51.4	8

* To convert to °R add 460

TABLE 242

Tensile Test Data for Hastelloy R-235

Test Temperature (°F)*	Ultimate Tensile Strength (KSI)	Yield Strength (0.2% offset) (KSI)	Elongation (% in 2 inches)
R.T.	159.0	98.8	21
R.T.	158.0	94.0	23
R.T.	156.0	92.1	25
R.T.	157.0	94.3	23
R.T.	156.0	91.0	27
1350	112.0	95.5	4
1350	110.0	93.8	5
1350	102.0	90.3	3
1500	90.0	83.3	13
1500	92.8	82.1	9
1500	90.7	81.8	8
1600	65.1	59.7	12
1600	68.7	62.7	12
1600	68.8	60.9	11

* To convert to °R add 460

CREEP DATA

HMR-235 SHEET

TABLE 243

Deformation Versus Time (Raw Data) for HMR-235 Sheet at 1350° F (1810 ° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
32.0000	2.00000E-05	0.200
	5.00000E-05	0.300
	7.00000E-05	1.200
	10.00000E-05	9.000
	1.50000E-04	97.400
	2.50000E-04	271.800
	4.50000E-04	645.400
	5.00000E-04	1105.500
35.0000	10.00000E-05	0.300
	2.00000E-04	0.500
	3.00000E-04	344.700
	4.00000E-04	474.300
	5.00000E-04	687.700
	6.00000E-04	815.900
	7.00000E-04	977.000
	7.50000E-04	1114.400
37.0000	10.00000E-05	0.100
	2.00000E-04	0.400
	3.00000E-04	9.000
	4.00000E-04	98.500
	5.00000E-04	162.900
	6.00000E-04	202.500
	7.50000E-04	332.600
	8.50000E-04	467.400
	9.00000E-04	658.400
	10.00000E-04	739.000
	1.20000E-03	1002.900
	1.25000E-04	0.200
	1.75000E-04	1.600
	2.00000E-04	3.700
	3.00000E-04	51.200
	4.00000E-04	289.900
	5.00000E-04	435.500
	6.00000E-04	585.500
40.0000	1.50000E-04	0.100
	2.00000E-04	0.500
	3.50000E-04	28.700
	4.00000E-04	43.500
	5.00000E-04	108.800
	6.00000E-04	197.800
	6.50000E-04	269.400

RUN 5

TABLE 243 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
42.5000	3.50000E-04	67.800
	4.25000E-04	91.900
	5.50000E-04	164.900
	6.00000E-04	189.300
	7.50000E-04	234.800
42.5000	8.50000E-04	331.200
	1.20000E-03	427.600
	2.00000E-03	675.400
	2.90000E-03	907.500
	3.80000E-03	1066.000
	4.80000E-03	1243.600
	5.30000E-03	1285.800
45.0000	3.50000E-04	10.300
	4.50000E-04	19.100
	5.00000E-04	46.000
	6.50000E-04	91.600
	7.00000E-04	114.000
	8.50000E-04	162.100
	1.30000E-03	271.700
	1.85000E-03	378.700
	2.40000E-03	579.200
	3.30000E-03	723.200
	4.50000E-03	914.100
	5.80000E-03	1059.000
46.0000	10.00000E-05	8.200
	2.00000E-04	15.600
	3.00000E-04	23.900
	4.00000E-04	59.400
	5.00000E-04	87.400
	6.00000E-04	127.400
	7.50000E-04	152.600
	10.00000E-04	184.400
	1.25000E-03	264.400
	1.30000E-03	265.900
47.0000	2.00000E-04	27.000
	3.50000E-04	57.000
	4.00000E-04	74.400
	5.00000E-04	120.600
	6.00000E-04	137.400
	8.00000E-04	159.800
	9.00000E-04	179.300
	10.00000E-04	225.400
	2.00000E-03	294.900
	2.40000E-03	424.600

TABLE 243 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.90000E-03	610.300
	5.90000E-03	705.700
	8.45000E-03	938.300
	9.20000E-03	954.200
49.0000	5.00000E-05	0.200
	10.00000E-05	0.300
	3.00000E-04	8.500
49.0000	4.00000E-04	33.100
	5.50000E-04	67.000
	7.00000E-04	97.200
	10.00000E-04	103.000
50.0000	3.00000E-04	39.800
	4.00000E-04	54.700
	6.00000E-04	78.000
	7.00000E-04	96.400
	1.20000E-03	140.700
	1.70000E-03	199.400
	2.55000E-03	255.200
	3.50000E-03	308.200
	4.00000E-03	343.000
	4.80000E-03	361.400
	10.00000E-05	0.200
	3.00000E-04	12.900
	4.00000E-04	35.600
	5.00000E-04	59.900
	6.00000E-04	118.200
	7.00000E-04	133.500
	8.00000E-04	165.500
	9.00000E-04	174.200
	1.05000E-03	195.200
	1.35000E-03	1.000
	1.50000E-03	2.300
	2.15000E-03	102.900
	3.15000E-03	196.300
	4.40000E-03	308.100
	7.00000E-03	401.000
	9.60000E-03	524.700
	1.21000E-02	606.700
	1.34000E-02	668.200
	1.60500E-02	750.600
55.0000	2.00000E-04	1.000
	3.00000E-04	11.700
	4.00000E-04	17.500
	6.00000E-04	27.200
	7.00000E-04	51.000

TABLE 243 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	10.00000E-04	67.000
	1.20000E-03	85.000
	2.20000E-03	129.100
	3.10000E-03	153.900
	4.20000E-03	186.500
	7.40000E-03	266.100
	4.50000E-04	21.700
	7.50000E-04	53.300
	10.00000E-04	92.200
	2.00000E-03	148.600
55.0000	3.40000E-03	221.100
	6.00000E-03	299.500
	7.10000E-03	331.700
	1.28000E-02	435.800
	1.71000E-02	491.800
	1.80000E-02	505.000
	6.00000E-04	23.400
60.0000	1.55000E-03	37.000
	3.00000E-03	61.700
	6.60000E-03	76.400
	7.50000E-03	82.200
	1.03000E-02	96.400
	1.26000E-02	108.500
	1.76500E-02	131.000
	2.50000E-04	0.400
	3.50000E-04	1.400
65.0000	4.00000E-04	2.300
	9.00000E-04	12.700
	2.30000E-03	23.900
	5.05000E-03	31.600
	1.69500E-02	44.700
	2.00000E-04	0.200
	2.50000E-04	0.400
	3.00000E-04	0.500
	4.50000E-04	1.000
70.0000	7.00000E-04	1.500
	1.15000E-03	2.200
	2.40000E-03	4.000
	4.25000E-03	5.700
	6.30000E-03	7.000
	2.35000E-02	9.100
	3.86000E-02	20.600

TABLE 243 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	2.00000E-04	0.200
	2.50000E-04	0.300
	3.00000E-04	0.500
	6.50000E-04	1.400
	7.50000E-04	2.500
	4.70000E-03	9.000
	4.95000E-03	16.200
79.0000	2.50000E-04	0.100
	5.00000E-04	0.200
	8.00000E-04	0.300
	1.15000E-03	0.400
	1.45000E-03	0.500
	3.65000E-03	1.000
79.0000	6.30000E-03	1.500
	9.90000E-03	2.000
	1.81000E-02	3.000
	3.07000E-02	4.500
	4.10000E-02	5.500
	5.21000E-02	6.500
	5.86000E-02	7.000
80.0000	1.50000E-04	0.100
	2.00000E-04	0.200
	3.50000E-04	0.400
	4.00000E-04	0.500

TABLE 244

Deformation Versus Time (Fitted Data) for HMR-235 Sheet at 1350° F (1810° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
32.0000	2.00000E-05	0.200
	4.53700E-05	0.300
	8.37400E-05	1.200
	8.18500E-05	9.000
	1.61030E-04	97.400
	2.69160E-04	271.800
	4.08570E-04	645.400
	5.20240E-04	1105.500
35.0000	1.02300E-04	0.300
	1.97270E-04	0.500
	3.11240E-04	344.700
	3.85170E-04	474.300
	5.13430E-04	687.700
	5.90400E-04	815.900
	6.85470E-04	977.000
	7.64700E-04	1114.400
37.0000	9.82700E-05	0.100
	2.04620E-04	0.400
	2.88160E-04	9.000
	4.34700E-04	98.500
	5.22240E-04	162.900
	5.70070E-04	202.500
	7.05660E-04	332.600
	8.22930E-04	467.400
	9.63890E-04	658.400
	1.01704E-03	739.000
	1.17239E-03	1002.900
	1.26410E-04	0.200
	1.60160E-04	1.600
	2.19350E-04	3.700
	2.87270E-04	51.200
	4.12280E-04	289.900
	5.02320E-04	435.500
	5.92190E-04	585.500
40.0000	1.50020E-04	0.100
	1.99910E-04	0.500
	3.53960E-04	28.700
	3.93440E-04	43.500
	5.04790E-04	108.800
	5.96920E-04	197.800
	6.50920E-04	269.400

TABLE 244 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
42.5000	2.94350E-04	67.800
	4.59069E-04	91.900
	6.26820E-04	164.900
	6.53100E-04	189.300
	7.01710E-04	234.800
42.5000	8.48970E-04	331.200
	1.07454E-03	427.600
	1.95246E-03	675.400
	3.03914E-03	907.500
	3.87576E-03	1066.000
	4.67670E-03	1243.600
	5.12237E-03	1285.800
45.0000	3.61990E-04	10.300
	3.94190E-04	19.100
	4.92370E-04	46.000
	6.58020E-04	91.600
	7.39090E-04	114.000
	9.12730E-04	162.100
	1.30913E-03	271.700
	1.70558E-03	378.700
	2.52717E-03	579.200
	3.24643E-03	723.200
	4.50158E-03	914.100
	5.60167E-03	1059.000
46.0000	9.76500E-05	8.200
	2.19550E-04	15.600
	2.74860E-04	23.900
	3.98290E-04	59.400
	4.97310E-04	87.400
	6.57630E-04	127.400
	7.66610E-04	152.600
	9.09820E-04	184.400
	1.28554E-03	264.400
	1.29271E-03	265.900
47.0000	1.63670E-04	27.000
	3.09360E-04	57.000
	3.92790E-04	74.400
	6.13600E-04	120.600
	6.94570E-04	137.400
	8.03930E-04	159.800
	9.00940E-04	179.300
	1.13986E-03	225.400
	1.53670E-03	294.900
	2.45500E-03	424.600

TABLE 244 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.31666E-03	610.300
	5.53230E-03	705.700
	8.75749E-03	938.300
	8.95359E-03	954.200
47.0000	5.48800E-05	0.200
	9.31800E-05	0.300
	3.14960E-04	8.500
47.0000	3.54740E-04	33.100
	5.67620E-04	67.000
	8.24350E-04	97.200
	8.70250E-04	103.000
50.0000	2.52110E-04	39.800
	4.61930E-04	54.700
	6.27380E-04	78.000
	7.32860E-04	96.400
	1.05978E-03	140.700
	1.72408E-03	199.400
	2.56959E-03	255.200
	3.52187E-03	308.200
	4.20982E-03	343.000
	4.59053E-03	361.400
	9.64600E-05	0.200
	3.36650E-04	12.900
	3.74200E-04	35.600
	4.38480E-04	59.900
	6.53260E-04	118.200
	7.16840E-04	133.500
	8.54690E-04	165.500
	8.92980E-04	174.200
	9.86420E-04	195.200
	1.36063E-03	1.000
	1.48393E-03	2.300
	2.23310E-03	102.900
	2.91921E-03	196.300
	4.73595E-03	308.100
	6.71868E-03	401.000
	9.75361E-03	524.700
	1.19285E-02	606.700
	1.36197E-02	668.200
	1.59465E-02	750.600
55.0000	1.99400E-04	1.000
	2.97050E-04	11.700
	4.32470E-04	17.500
	5.51070E-04	27.200

TABLE 244 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	7.45650E-04	51.000
	9.34590E-04	67.000
	1.22952E-03	85.000
	2.28196E-03	129.100
	3.03955E-03	153.900
	4.17353E-03	186.500
	7.41503E-03	266.100
	5.13320E-04	21.700
	6.83560E-04	53.300
	1.04611E-03	92.200
	1.67300E-03	148.600
55.0000	3.47286E-03	221.100
	5.94646E-03	299.500
	7.22295E-03	331.700
	1.27485E-02	435.800
	1.69630E-02	491.800
	1.81301E-02	505.000
60.0000	7.16370E-04	23.400
	1.19758E-03	37.000
	3.71093E-03	61.700
	6.12830E-03	76.400
	7.24172E-03	82.200
	1.02505E-02	96.400
	1.29778E-02	108.500
	1.75736E-02	131.000
65.0000	2.81050E-04	0.400
	3.34330E-04	1.400
	3.80590E-04	2.300
	8.98320E-04	12.700
	2.31674E-03	23.900
	5.03708E-03	31.600
	1.69519E-02	44.700
70.0000	2.00000E-04	0.200
	2.50000E-04	0.400
	3.00000E-04	0.500
	4.49990E-04	1.000
	7.00000E-04	1.500
	1.15000E-03	2.200
	2.40000E-03	4.000
	4.25000E-03	5.700
	6.29990E-03	7.000
	2.35000E-02	9.100
	3.86000E-02	20.600

TABLE 244 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
75.0000	2.331305-04	0.200
	2.581905-04	0.300
	3.085405-04	0.500
	5.432105-04	1.400
	8.658005-04	2.500
	4.697395-03	9.000
	4.350955-03	16.200
77.5000	2.574405-04	0.100
	5.019605-04	0.200
	7.824505-04	0.300
	1.097685-03	0.400
	1.446425-03	0.500
	3.650385-03	1.000
79.0000	6.913615-03	1.500
	9.897475-03	2.000
	1.775085-02	3.000
	3.107505-02	4.500
	4.083035-02	5.500
	5.204145-02	6.500
	5.865505-02	7.000
80.0000	1.282105-04	0.100
	2.385405-04	0.200
	3.488605-04	0.400
	3.843805-04	0.500

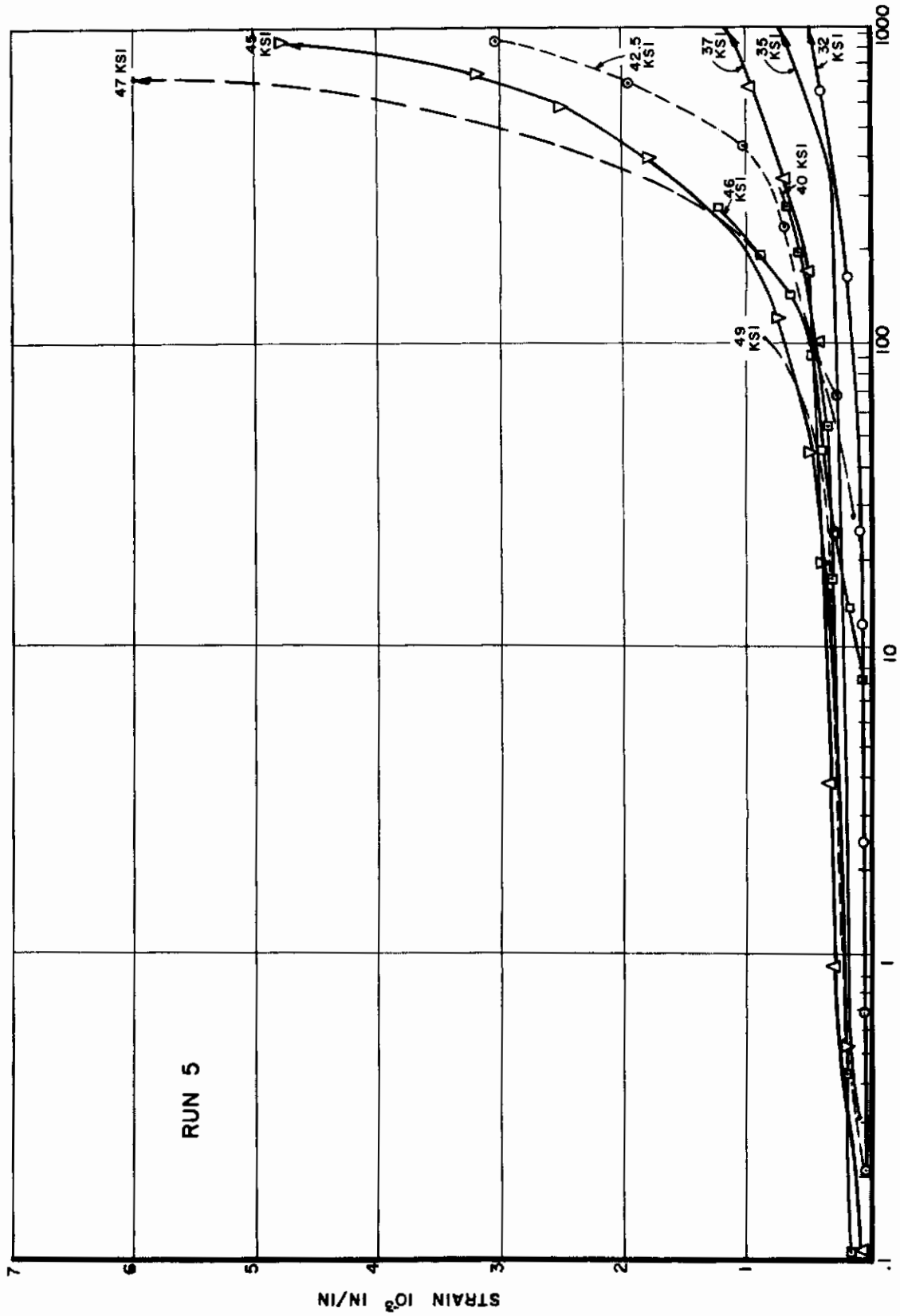


Figure 158. Creep Deformation Versus Log Time of HMR-235 at 1350°F (1810°R)

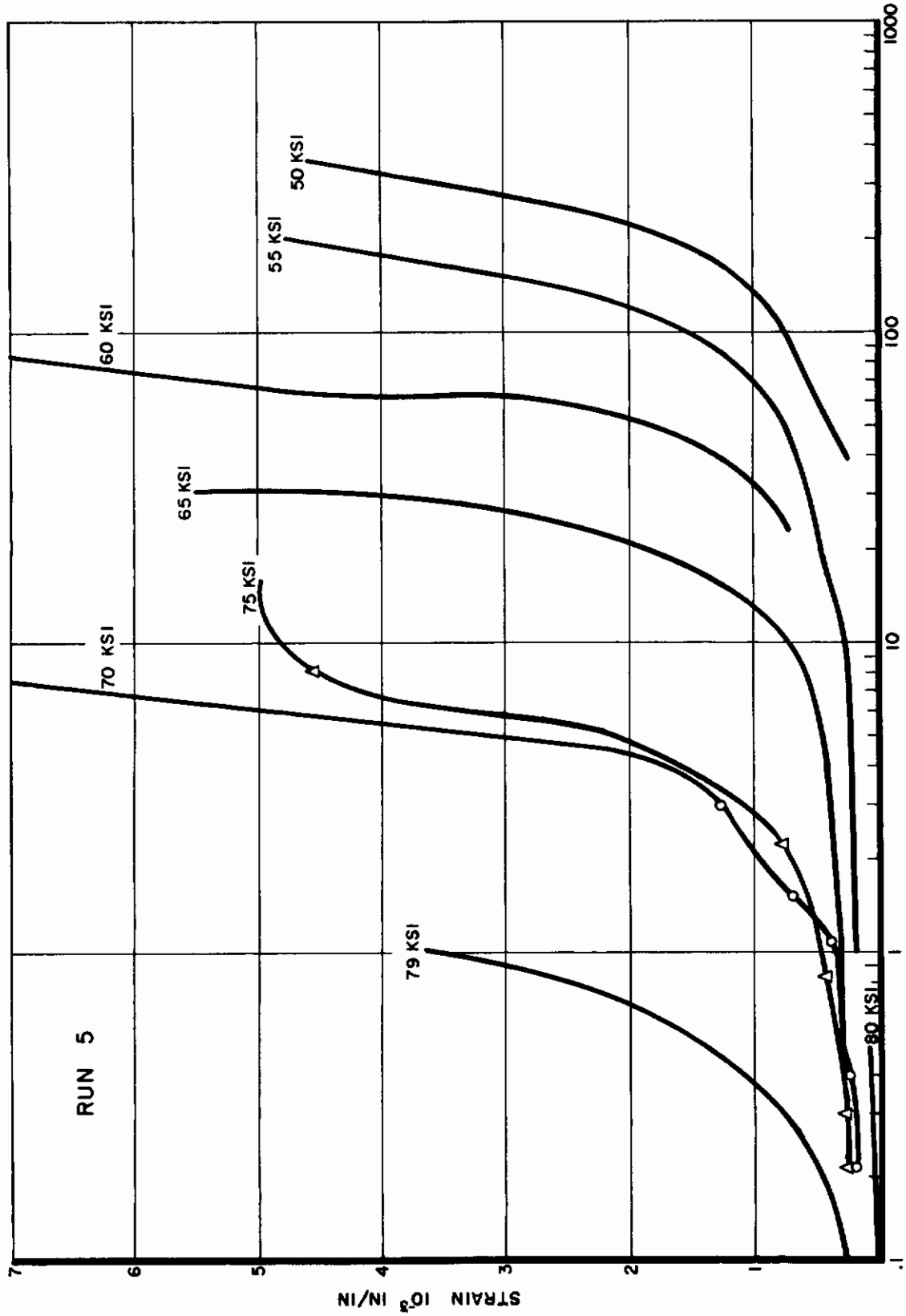


Figure 158 (CONT)

TABLE 245

Creep Deformation and Rupture Data at 1350°F (1810°R) for HMR-235 Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
37.0	-	0.12	0.20	840	-	-	-
42.5	-	0.53	0.23	375	940	1265	-
45.0	-	0.58	0.24	251	690	965	-
46.0	-	0.13	0.24	213	-	-	-
47.0	966.4	1.75	0.25	230	515	718	966
50.0	-	1.60	0.27	-	182	304	526
50.0	-	0.48	0.27	123	290	370	-
55.0	-	1.80	0.28	88	198	273	390
55.0	-	2.5	0.28	70	155	206	302
60.0	-	1.76	0.32	30	51	67	95
65.0	48.7	3.0	0.34	13.8	27.5	32.5	38.7
70.0	20.9	5.5	0.39	1.9	4.6	6.2	7.4
75.0	21.2	2.25	0.42	3.1	7.2	9.4	12.6
79.0	7.2	7.5	0.45	0.3	0.9	1.3	2.0
80.0	0.8	1.5	0.46	-	-	-	-

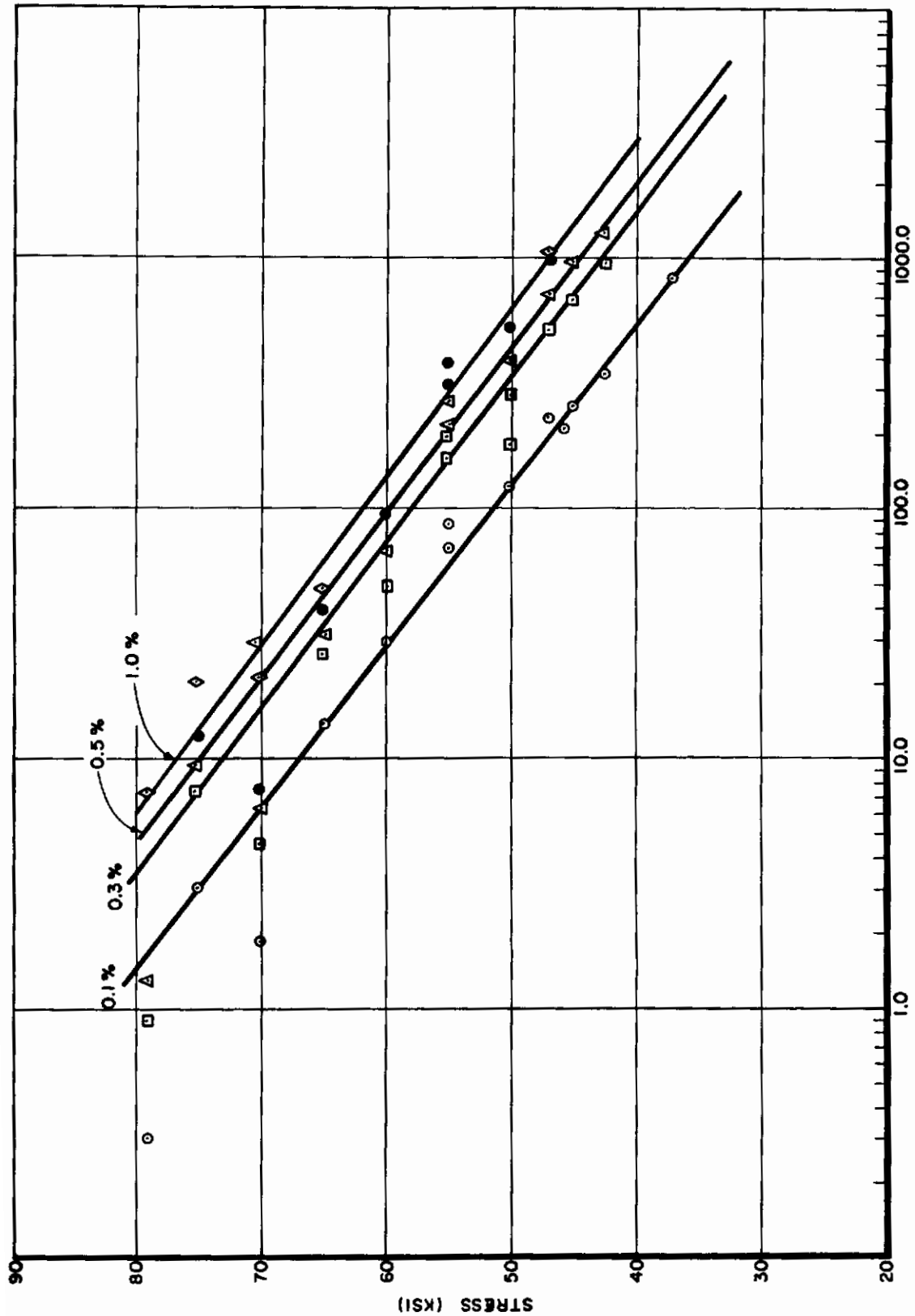


Figure 159. Creep Rupture Properties of HMR-235 at 1350°F (1810°R)

TABLE 246

Deformation Versus Time (Raw Data) for HMR-235 Sheet at 1500° F (1960° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.5000	10.00000E-05	0.500
	2.00000E-04	9.600
	3.00000E-04	171.300
	4.50000E-04	532.100
	8.00000E-04	706.800
	10.00000E-04	1066.800
	1.55000E-03	1495.500
18.5000	2.60000E-04	72.200
	6.50000E-04	168.000
	9.80000E-04	852.700
	1.22000E-03	976.000
	2.14000E-03	1289.200
	3.33000E-03	1611.500
21.0000	5.00000E-05	0.300
	10.00000E-05	3.800
	2.50000E-04	16.600
	3.50000E-04	41.700
	6.50000E-04	71.800
	2.00000E-04	101.900
	5.00000E-04	193.000
	9.00000E-04	290.900
	1.35000E-03	474.900
	2.10000E-03	690.000
	2.50000E-03	777.400
	3.75000E-03	856.700
	4.15000E-03	993.400
	5.25000E-03	1073.100
23.0000	2.50000E-04	1.000
	3.75000E-04	53.100
	4.50000E-04	100.100
	7.50000E-04	196.400
	1.20000E-03	304.200
	2.20000E-03	452.900
	3.85000E-03	619.700

TABLE 246 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	5.10000E-03	704.400
	7.00000E-03	821.300
	9.90000E-03	941.600
	1.22500E-02	1011.900
	1.30000E-02	1028.600
25.0000	4.00000E-04	39.700
	8.50000E-04	158.400
	1.20000E-03	279.300
	2.60000E-03	400.100
	3.95000E-03	496.100
	6.90000E-03	626.300
	8.95000E-03	696.700
	1.10000E-02	745.400
	1.34000E-02	793.100
28.0000	3.50000E-04	5.400
	5.50000E-04	14.900
	8.00000E-04	26.700
	10.00000E-04	77.500
	2.10000E-03	158.400
	3.40000E-03	239.000
	5.40000E-03	311.200
	7.50000E-03	360.300
	1.15500E-02	431.100
	1.59000E-02	479.100
	2.38500E-02	534.700
	2.68000E-02	550.800
32.0000	5.00000E-04	10.600
	6.00000E-04	28.800
	1.50000E-03	54.900
	2.80000E-03	86.300
	5.70000E-03	132.600
	8.10000E-03	157.600
	1.09000E-02	181.200
	1.34000E-02	197.600
	2.50000E-02	244.600
	3.34500E-02	262.400
35.0000	1.50000E-04	0.100
	2.00000E-04	0.200
	2.50000E-04	0.300
	3.00000E-04	0.400
	7.50000E-04	2.900
	1.15000E-03	18.000
	1.27000E-03	45.900

TABLE 246 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
45.0000	2.50000E-04	0.200
	3.50000E-04	0.400
45.0000	5.50000E-04	1.000
	8.25000E-04	2.100
	1.27500E-03	3.800
	2.40000E-03	6.800
	4.35000E-03	9.500
	5.75000E-03	12.700
	1.65000E-02	23.000
	2.54500E-02	30.900
	3.49000E-02	32.000
	4.50000E-02	34.100
50.0000	4.50000E-04	0.200
	5.50000E-04	0.300
	8.00000E-04	0.400
	9.00000E-04	0.500
	1.40000E-03	1.000
	2.15000E-03	1.600
	3.75000E-03	2.900
	4.70000E-03	3.300
	6.20000E-03	4.100
	7.10000E-03	4.700
	1.04000E-02	6.000
	1.95500E-02	9.000
	3.17000E-02	11.700
60.0000	1.30000E-03	0.200
	2.10000E-03	0.300
	3.15000E-03	0.400
	4.15000E-03	0.500
	1.07000E-02	0.800
	1.49500E-02	1.300
	2.33000E-02	1.600
	4.08000E-02	2.300
	5.16500E-02	2.600
	6.66000E-02	2.900

TABLE 247

Deformation Versus Time (Fitted Data) for HMR-235 Sheet at 1500° F (1960° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.5000	9.98700E-05	0.500
	2.00780E-04	9.600
	2.92930E-04	171.300
	5.02700E-04	532.100
	6.65550E-04	706.800
	1.04904E-03	1066.800
	1.54280E-03	1495.500
18.5000	2.60000E-04	72.200
	6.50000E-04	168.000
	9.80000E-04	852.700
	1.22000E-03	976.000
	2.13999E-03	1289.200
	3.33000E-03	1611.500
21.0000	4.99900E-05	0.300
	9.99900E-05	3.800
	2.50000E-04	16.600
	3.50000E-04	41.700
	6.50000E-04	71.800
	2.00000E-04	101.900
	4.99990E-04	193.000
	8.99990E-04	290.900
	1.34999E-03	474.900
	2.10000E-03	690.000
	2.50000E-03	777.400
	3.75000E-03	856.700
	4.15000E-03	993.400
	5.25000E-03	1073.100
23.0000	1.97540E-04	1.000
	3.47280E-04	53.100
	4.67630E-04	100.100
	8.10600E-04	196.400
	1.26995E-03	304.200
	2.18021E-03	452.900
	3.72098E-03	619.700

RUN 5

TABLE 247 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	4.94814E-03	704.400
	7.05762E-03	821.300
	1.00453E-02	941.600
	1.22975E-02	1011.900
	1.28341E-02	1028.600
25.0000	3.86130E-04	39.700
	7.73870E-04	158.400
	1.41601E-03	279.300
	2.51544E-03	400.100
	3.88802E-03	496.100
	6.80404E-03	626.300
	9.08653E-03	696.700
	1.10473E-02	745.400
	1.33326E-02	793.100
28.0000	4.13850E-04	5.400
	5.07860E-04	14.900
	6.25230E-04	26.700
	1.14990E-03	77.500
	2.13455E-03	158.400
	3.49915E-03	239.000
	5.37290E-03	311.200
	7.27446E-03	360.300
	1.15564E-02	431.100
	1.60788E-02	479.100
	2.36372E-02	534.700
	2.67497E-02	550.800
32.0000	5.30860E-04	10.600
	6.35040E-04	28.800
	1.33590E-03	54.900
	2.62343E-03	86.300
	5.92878E-03	132.600
	8.11340E-03	157.600
	1.07770E-02	181.200
	1.32045E-02	197.600
	2.53094E-02	244.600
	3.32914E-02	262.400

TABLE 247 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
35.0000	1.50400E-04	0.100
	1.78070E-04	0.200
	2.51990E-04	0.300
	2.99690E-04	0.400
	7.49710E-04	2.900
	1.15018E-03	18.000
	1.26993E-03	45.900
40.0000	2.00000E-04	0.200
	3.50000E-04	0.400
45.0000	5.49990E-04	1.000
	8.25000E-04	2.100
	1.27500E-03	3.800
	2.40000E-03	6.800
	4.35000E-03	9.500
	5.74999E-03	12.700
	1.65000E-02	23.000
	2.54500E-02	30.900
	3.49000E-02	32.000
	4.56000E-02	34.100
50.0000	4.59130E-04	0.200
	5.15280E-04	0.300
	7.97080E-04	0.400
	9.56890E-04	0.500
	1.33638E-03	1.000
	2.05824E-03	1.600
	4.01842E-03	2.900
	4.66429E-03	3.300
	6.05442E-03	4.100
	7.21475E-03	4.700
	1.01754E-02	6.000
	1.97360E-02	9.000
	3.16352E-02	11.700
60.0000	1.31671E-03	0.200
	2.02988E-03	0.300
	3.01096E-03	0.400
	4.67487E-03	0.500
	9.62106E-03	0.800
	1.67395E-02	1.300
	2.17936E-02	1.600
	4.07100E-02	2.300
	5.23832E-02	2.600
	6.62201E-02	2.900

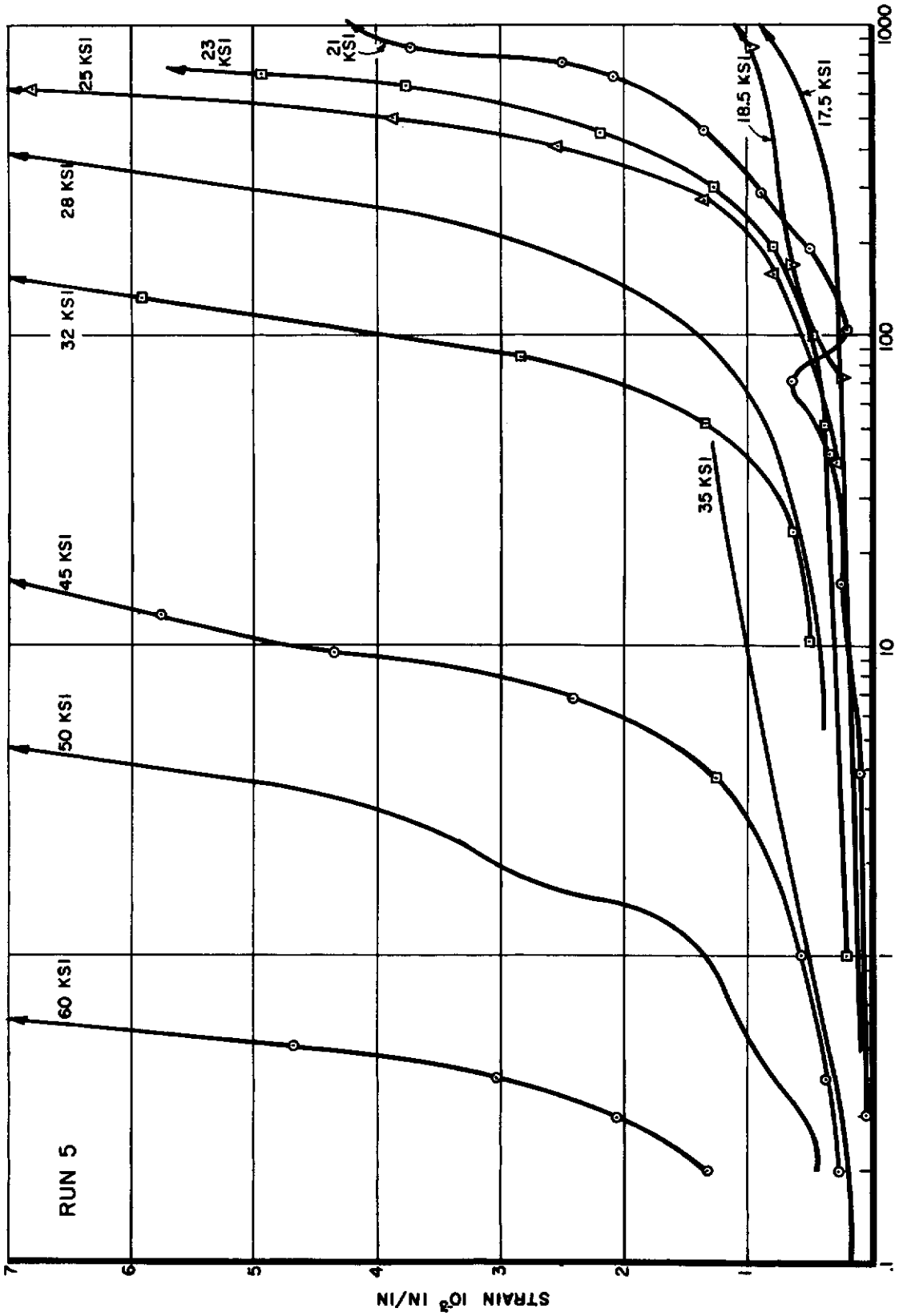


Figure 160. Creep Deformation Versus Log Time of HMR-235 at 1500°F (1960°R)

TABLE 248

Creep Deformation and Rupture Data at 1500°F (1960°R) for HMR-235 Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
17.5			0.08	915	-	-	-
21.0		0.53	0.10	360	850	1040	-
23.0		1.3	0.11	254	542	698	946
25.0		1.34	0.12	198	432	553	720
28.0		2.68	0.13	71	220	298	406
30.0	346.2	5.5	0.14	63	128	176	241
32.0	294.1	7.0	0.15	42	92	123	172
35.0	146.5	2.5	0.18	11.8	50.8	72	100
45.0	35.1	7.5	0.21	2.2	6.8	11.2	17.3
50.0	14.7	5.6	0.24	0.7	2.3	3.5	5.9
60.0	3.0	8.5	0.28	0.4	0.5	0.6	0.0
70.0	0.5	11.0	0.34	-	-	-	-

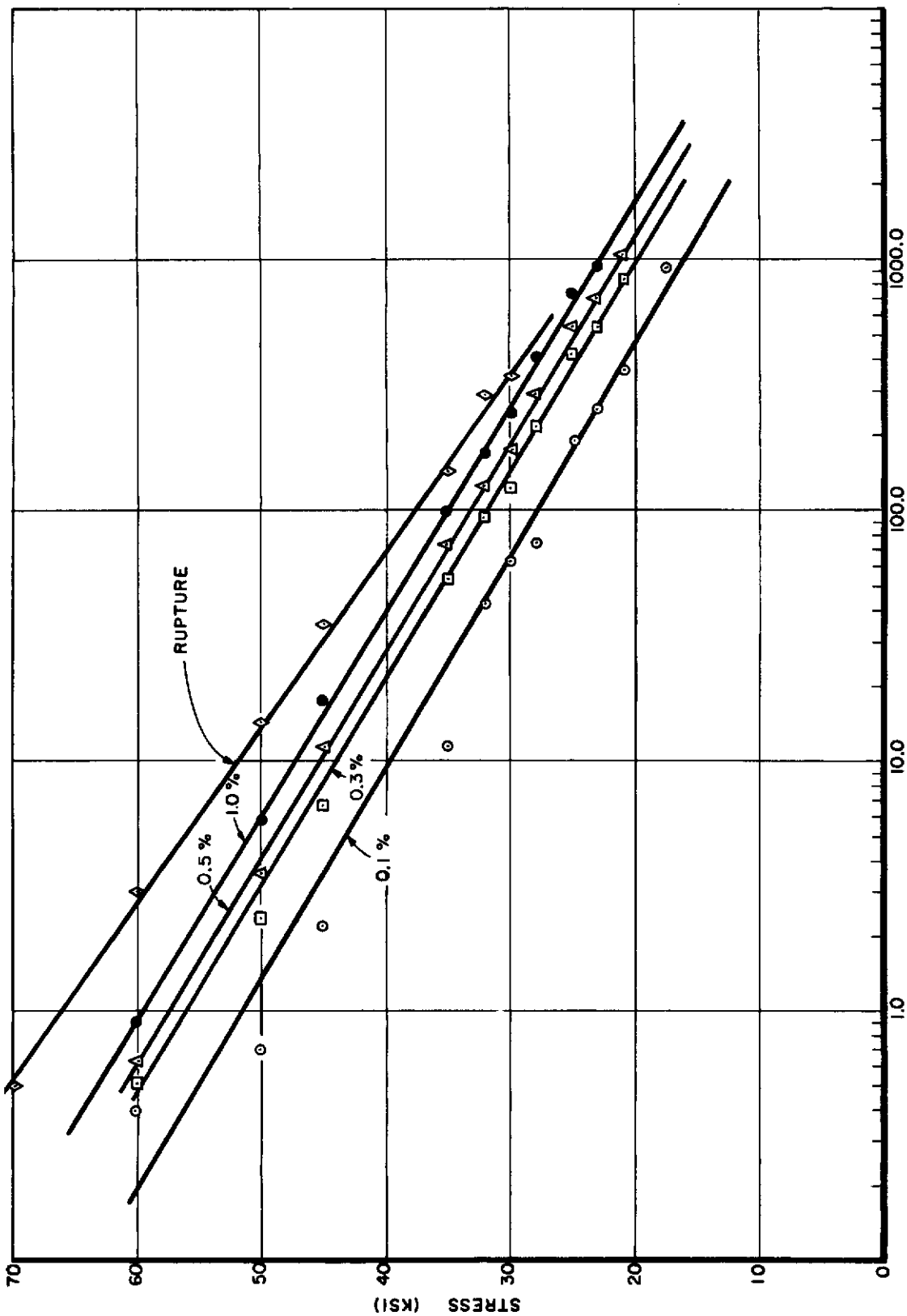


Figure 161. Creep Rupture Properties of HMR-235 at 1500°F (1960°R)

TABLE 249

Deformation Versus Time (Raw Data) for HMR-235 Sheet at 1600° F (2060° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.0000	10.00000E-05	0.200
	3.50000E-04	172.900
	4.00000E-04	189.800
	7.50000E-04	228.500
	10.00000E-04	342.000
	1.40000E-03	429.800
	2.75000E-03	509.100
	5.15000E-03	607.100
	1.06000E-02	678.200
	1.72000E-02	757.300
	4.50000E-04	48.600
	6.50000E-04	121.400
	9.00000E-04	296.900
	1.40000E-03	384.300
12.0000	1.80000E-03	512.200
	2.40000E-03	625.800
	3.40000E-03	727.700
	4.30000E-03	834.200
12.5000	3.00000E-04	78.300
	4.50000E-04	289.600
	7.00000E-04	429.900
	1.10000E-03	561.800
	1.90000E-03	728.500
	2.60000E-03	802.700
	3.90000E-03	934.700
	5.20000E-03	1049.500
	6.10000E-03	1130.300
	7.50000E-03	1182.000
13.5000	6.00000E-04	39.300
	8.00000E-04	136.300
	10.00000E-04	167.500
	1.20000E-03	289.100
	2.30000E-03	448.700
	3.40000E-03	565.900
	4.20000E-03	614.000
	6.20000E-03	736.200
	8.70000E-03	831.800
	1.22000E-02	922.000

RUN 5

TABLE 249 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.0000	4.00000E-04	53.900
	5.00000E-04	86.000
	7.50000E-04	180.900
	10.00000E-04	229.500
	1.60000E-03	324.800
	2.60000E-03	421.200
	3.50000E-03	493.500
	5.00000E-03	572.800
	6.90000E-03	634.900
	8.40000E-03	683.900
	1.27500E-02	773.100
	1.58000E-02	821.100
	2.00500E-02	870.900
	3.15000E-02	972.600
	3.65500E-02	1005.300
15.0000	6.00000E-04	40.200
	8.00000E-04	103.800
	10.00000E-04	142.300
	1.60000E-03	199.000
	2.00000E-03	256.300
	3.20000E-03	352.000
	4.80000E-03	415.100
15.0000	6.20000E-03	472.100
	8.50000E-03	525.200
	1.12000E-02	574.800
	1.52000E-02	623.200
17.5000	1.20000E-03	89.000
	1.50000E-03	112.100
	2.00000E-03	145.700
	3.10000E-03	192.300
	3.65000E-03	202.300
	4.80000E-03	226.300
	6.00000E-03	244.900
	7.40000E-03	265.500
	1.27000E-02	313.700
	2.85000E-02	384.200
	5.98000E-02	448.900
	7.79000E-02	471.500
20.0000	10.00000E-05	0.200
	2.00000E-04	0.300
	2.50000E-04	5.500
	4.00000E-04	11.400
	7.50000E-04	20.400
	10.00000E-04	38.600
	3.00000E-03	87.300

RUN 5

TABLE 249 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.40000E-03	103.400
	7.90000E-03	127.600
	1.50000E-02	151.900
	2.82000E-02	174.800
	4.67000E-02	191.000
	8.24000E-02	206.900
25.0000	8.00000E-04	1.000
	9.50000E-04	11.700
	1.20000E-03	14.900
	2.70000E-03	25.900
	7.05000E-03	39.700
	1.75000E-02	56.800
	2.15000E-02	62.200
30.0000	7.00000E-04	0.200
	1.05000E-03	0.400
	1.97500E-03	1.000
	3.70000E-03	2.100
	4.90000E-03	2.900
	6.30000E-03	3.600
	7.40000E-03	4.300
	8.27500E-03	4.800
	9.60000E-03	5.400
	1.12750E-02	6.300

TABLE 249 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	1.54500E-02	7.700
	2.41500E-02	11.200
	2.71000E-02	12.000
	3.59000E-02	14.200
	4.12000E-02	15.200
	3.50000E-04	0.400
	4.00000E-04	0.500
	5.00000E-04	1.000
	1.60000E-03	3.100
	1.15000E-02	12.800
	3.03500E-02	20.400
	4.67500E-02	27.000
35.0000	1.50000E-04	0.200
	2.00000E-04	0.300
	2.50000E-04	0.500
	1.40000E-03	2.100
	2.90000E-03	3.000
	6.05000E-03	4.700
	1.02500E-02	6.500
	1.45500E-02	7.800
	2.42500E-02	9.900
40.0000	1.90000E-03	0.100
	6.85000E-03	0.200
	1.29000E-02	0.400
	1.59000E-02	0.500
	3.08000E-02	1.000
	8.30000E-02	1.900
	9.90000E-02	2.100

TABLE 250

Deformation Versus Time (Fitted Data) for HMR-235 Sheet at 1600° F (2060° R)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
12.0000	4.63870E-04	172.900
	4.91090E-04	189.800
	5.36730E-04	228.500
	8.63750E-04	342.000
	1.46359E-03	429.800
	2.65911E-03	509.100
	5.78405E-03	607.100
	9.93036E-03	676.200
	1.73874E-02	757.300
	4.86600E-04	48.600
	5.87920E-04	121.400
	9.90090E-04	296.900
	1.28096E-03	384.300
	1.83851E-03	512.200
12.0000	2.50183E-03	625.800
	3.27808E-03	727.700
	4.33598E-03	834.200
12.5000	2.38720E-04	78.300
	4.49110E-04	289.600
	7.05700E-04	429.900
	1.12432E-03	561.800
	1.99056E-03	728.500
	2.52737E-03	802.700
	3.76388E-03	934.700
	5.18449E-03	1049.500
	6.41048E-03	1130.300
	7.30533E-03	1182.000
13.5000	6.40410E-04	39.300
	7.94930E-04	136.300
	8.72750E-04	167.500
	1.31764E-03	289.100
	2.30771E-03	446.700
	3.45145E-03	565.900
	4.06963E-03	614.000
	6.21926E-03	736.200
	8.74940E-03	831.800
	1.21768E-02	922.000

TABLE 250 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
14.0000	4.08140E-04	53.900
	4.71520E-04	86.000
	7.75670E-04	180.900
	1.00486E-03	229.500
	1.62847E-03	324.800
	2.57111E-03	421.200
	3.41940E-03	483.500
	5.12145E-03	572.800
	6.78401E-03	634.900
	8.47724E-03	683.900
	1.27439E-02	773.100
	1.58756E-02	821.100
	1.99304E-02	870.900
	3.15666E-02	972.600
	3.65214E-02	1005.300
15.0000	5.90960E-04	40.200
	8.22780E-04	103.800
	1.04342E-03	142.300
	1.47279E-03	199.000
	2.03656E-03	256.300
	3.35263E-03	352.000
	4.62939E-03	415.100
	6.26448E-03	472.100
16.0000	8.43149E-03	525.200
	1.12865E-02	574.800
	1.51690E-02	623.200
17.5000	9.65480E-04	89.000
	1.44977E-03	112.100
	2.17821E-03	145.700
	3.44715E-03	192.300
	3.79141E-03	202.300
	4.78493E-03	226.300
	5.77240E-03	244.900
	7.17134E-03	265.500
	1.23410E-02	313.700
	2.84906E-02	384.200
	6.03309E-02	448.900
	7.75460E-02	471.500

TABLE 250 (CONT)

RUN 5

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	9.99900E-05	0.200
	2.00000E-04	0.300
	2.50000E-04	5.500
	4.00000E-04	11.400
	7.50000E-04	20.400
	9.99990E-04	38.600
	3.00000E-03	87.300
	4.39999E-03	103.400
	7.90000E-03	127.600
	1.50000E-02	151.900
	2.82000E-02	174.800
	4.67000E-02	191.000
	8.24000E-02	206.900
25.0000	7.41760E-04	1.000
	1.02573E-03	11.700
	1.24763E-03	14.900
	2.73471E-03	25.900
	6.78678E-03	39.700
	1.81353E-02	58.800
	2.10280E-02	62.200
30.0000	7.32680E-04	0.200
	1.01694E-03	0.400
	1.89823E-03	1.000
	3.62495E-03	2.100
	4.97119E-03	2.900
	6.21203E-03	3.600
	7.51225E-03	4.300
	8.47800E-03	4.800
	9.67869E-03	5.400
	1.15689E-02	6.300
	1.47419E-02	7.700

TABLE 250 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	2.43607E-02	11.200
	2.70539E-02	12.000
	3.00106E-02	14.200
	4.11139E-02	15.200
	3.26450E-04	0.400
	3.66960E-04	0.500
	5.75860E-04	1.000
	1.57946E-03	3.100
	1.15032E-02	12.800
	3.03492E-02	20.400
	4.67500E-02	27.000
35.0000	1.55880E-04	0.200
	1.77610E-04	0.300
	2.39480E-04	0.500
	1.53300E-03	2.100
	2.79253E-03	3.000
	5.98214E-03	4.700
	1.03947E-02	6.500
	1.44650E-02	7.800
	2.42596E-02	9.900
40.0000	1.93705E-03	0.100
	6.65532E-03	0.200
	1.35070E-02	0.400
	1.55048E-02	0.500
	3.05777E-02	1.000
	8.37219E-02	1.900
	9.84464E-02	2.100

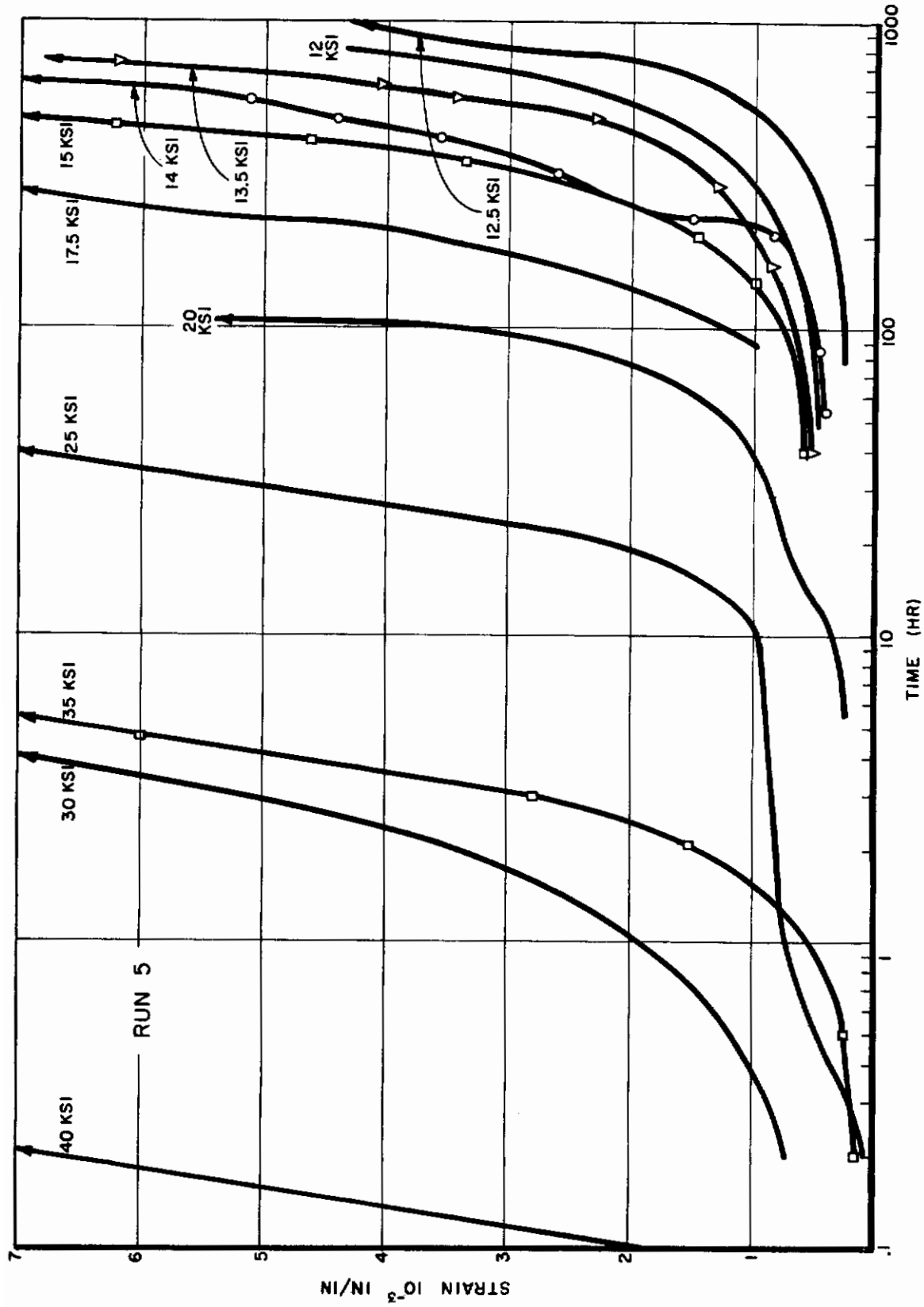


Figure 162. Creep Deformation Versus Log Time of HMR-235 at 1600°F (2060°R)

TABLE 251

Creep Deformation and Rupture Data at 1600°F (2060°R) for HMR-235 Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
11.0		0.32	0.05	855	1355	-	-
12.0		2.02	0.05	350	529	607	673
12.5		0.75	0.05	510	836	1046	-
13.5		0.56	0.06	200	383	449	-
13.5		1.22	0.06	200	535	670	872
14.0		3.57	0.06	233	450	570	719
15.0		1.5	0.06	146	344	432	552
17.5	524.9	1.5	0.065	77	178	230	288
20.0	210.9	8.2	0.7	38	84	108	134
25.0	74.2	7.0	0.10	11.7	27.5	34.5	46.3
30.0	21.2	12.5	0.13	0.4	1.5	2.7	5.7
30.0	27.4	13.3	0.13	2.0	5.4	8.1	11.8
35.0	12.9	8.0	0.15	1.4	3.3	4.6	6.3
40.0	2.3	14.0	0.17	-	0.1	0.2	0.5
50.0	0.2	21.5	0.22	-	-	-	-

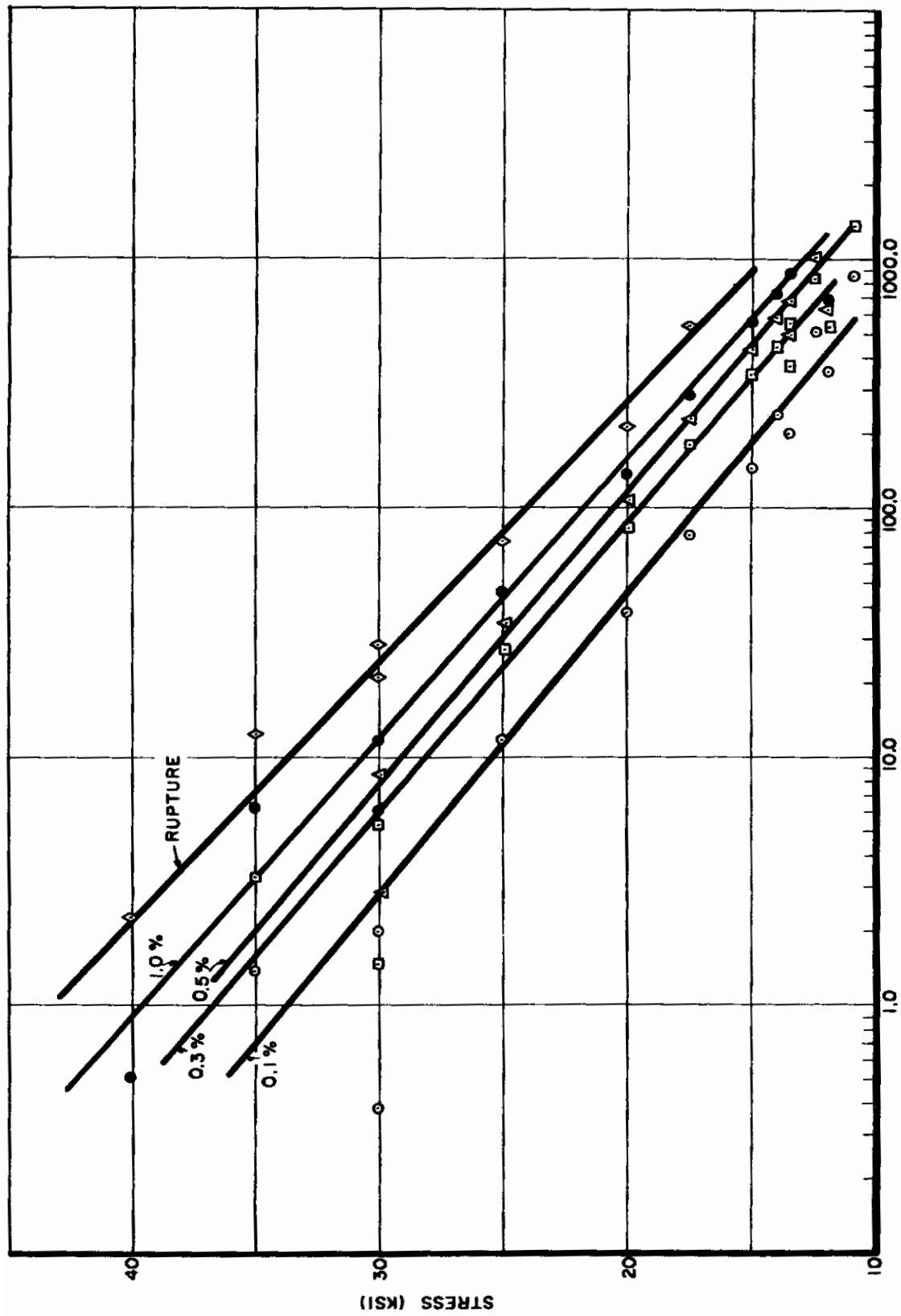


Figure 163. Creep Rupture Properties of HMR-235 at 1600°F (2060°R)

TABLE 252

Minimum Creep Rate for HMR-235 Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1350°F (1810°R)	35	3.31×10^{-7}
	37	5.89×10^{-7}
	37	5.24×10^{-7}
	42.5	1.07×10^{-6}
	45	3.61×10^{-6}
	46	3.48×10^{-6}
	47	4.78×10^{-6}
	49	1.62×10^{-6}
	50	7.35×10^{-6}
	55	8.18×10^{-6}
	55	5.39×10^{-6}
	60	3.54×10^{-5}
	65	4.98×10^{-5}
	70	2.5×10^{-4}
	79	2.45×10^{-3}
1500°F (1960°R)	17.5	5.7×10^{-7}
	18.5	4.82×10^{-7}
	21	2.45×10^{-6}
	23	2.87×10^{-6}
	25	3.27×10^{-6}
	28	9.90×10^{-6}
	32	5.72×10^{-6}
	45	2.5×10^{-4}
	50	5.62×10^{-4}
	60	7.13×10^{-3}

TABLE 252 (CONT)

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1600°F (2060°R)	12	1.61×10^{-6}
	12	1.39×10^{-6}
	12.5	7.59×10^{-6}
	13.5	1.59×10^{-6}
	14	1.97×10^{-6}
	15	3.64×10^{-6}
	17.5	2.01×10^{-5}
	20	9.62×10^{-6}
	25	2.65×10^{-5}
	30	1.42×10^{-3}
	30	4.05×10^{-4}
	35	2.17×10^{-4}

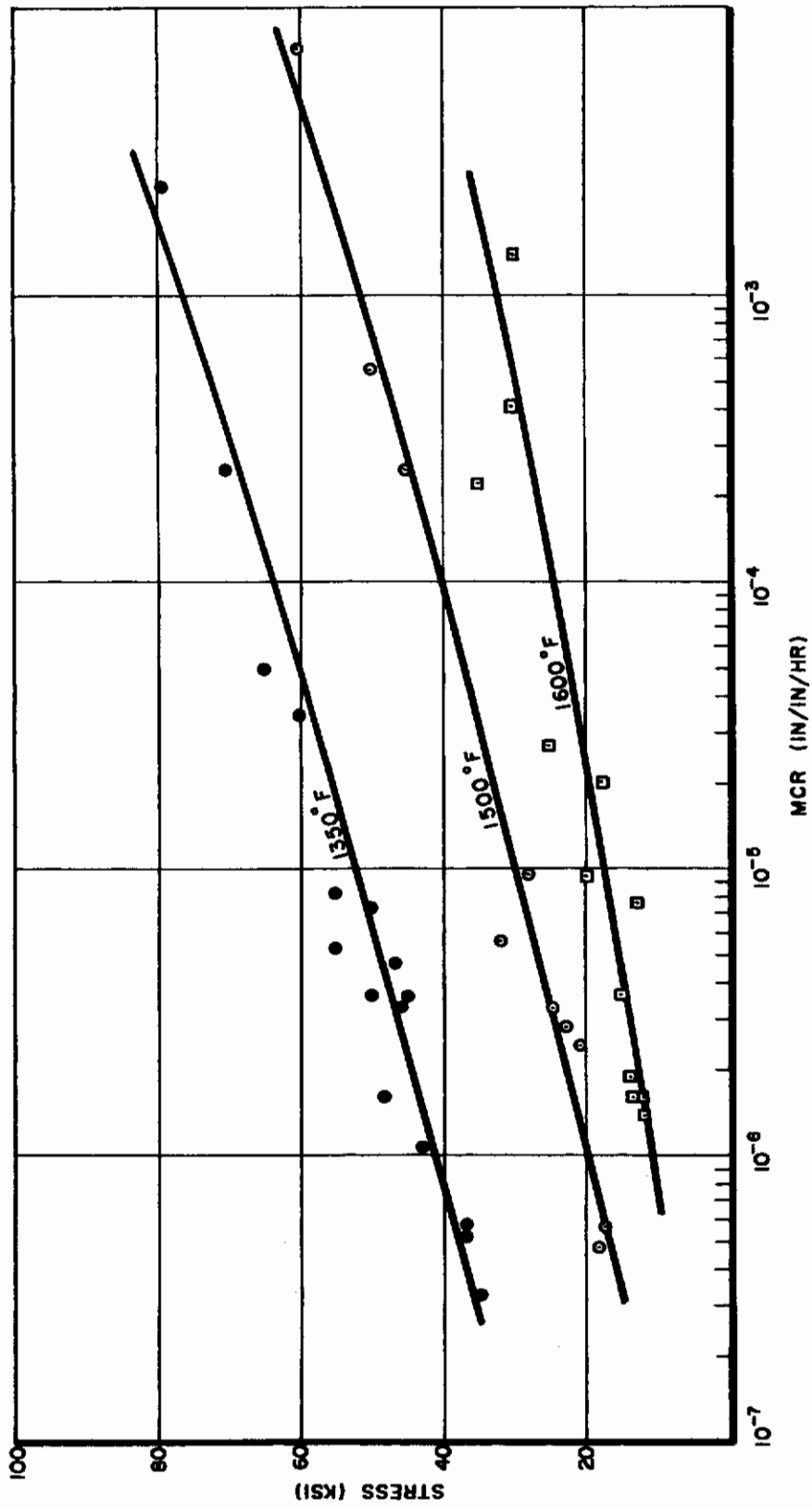


Figure 164. Minimum Creep Rate for HMR-235

CREEP DATA

NIMONIC 90 LONGITUDINAL

(SHEET)

TABLE 253

Deformation Versus Time (Raw Data) for Nimonic 90 Longitudinal Sheet at 1350° F (1810° R) RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	1.80000E-04	10.000
	2.56000E-04	20.000
	3.00000E-04	30.000
	3.80000E-04	40.000
	4.30000E-04	50.000
	5.00000E-04	65.000
	6.50000E-04	100.000
	9.50000E-04	200.000
	1.20000E-03	300.000
	1.45000E-03	400.000
	1.72000E-03	500.000
	1.90000E-03	600.000
	2.05000E-03	700.000
	2.26000E-03	800.000
	2.35000E-03	900.000
10.0000	1.50000E-04	7.000
	2.00000E-04	30.100
	2.50000E-04	48.600
	3.00000E-04	136.000
	4.00000E-04	168.000
	4.50000E-04	222.800
	5.00000E-04	471.700
	5.50000E-04	770.400
	6.00000E-04	973.600
15.0000	10.00000E-05	91.100
	1.50000E-04	118.900
	2.00000E-04	151.300
	2.50000E-04	204.800
	3.00000E-04	343.900
	3.50000E-04	359.300
	4.50000E-04	407.100
	6.00000E-04	468.800
	4.00000E-04	386.200
	5.00000E-04	404.900
	7.00000E-04	492.100
	8.50000E-04	507.700
	9.00000E-04	572.300
	10.00000E-04	740.600
	1.10000E-03	897.600
	1.20000E-03	930.200
	1.25000E-03	1017.700
	1.45000E-03	1067.400

RUN 4

TABLE 253 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.5000	4.00000E-04	70.800
	4.50000E-04	158.000
	5.50000E-04	206.500
	6.00000E-04	424.400
	1.10000E-03	488.400
17.5000	1.30000E-03	680.100
	1.55000E-03	742.300
	1.80000E-03	908.300
	1.90000E-03	990.500
	2.10000E-03	1045.900
	2.45000E-03	1101.500
20.0000	5.00000E-05	0.200
	10.00000E-05	9.400
	1.50000E-04	57.400
	2.00000E-04	98.200
	2.50000E-04	399.900
	3.50000E-04	483.000
22.5000	2.00000E-04	1.100
	2.50000E-04	2.700
	4.00000E-04	22.900
	4.50000E-04	39.000
	5.00000E-04	45.400
	5.50000E-04	55.100
	6.50000E-04	62.700
	7.25000E-04	85.700
	8.00000E-04	115.400
	9.50000E-04	144.000
	1.20000E-03	174.000
	1.30000E-03	205.800
	1.50000E-03	238.900
	1.95000E-03	311.300
	2.60000E-03	391.700
	3.15000E-03	453.700
	3.25000E-03	481.600
25.0000	3.50000E-04	0.400
	7.00000E-04	33.800
	10.00000E-04	83.000
	1.45000E-03	135.500
	2.10000E-03	177.600
	2.30000E-03	189.500
	2.35000E-03	213.800
	2.65000E-03	356.600
	2.75000E-03	394.000

TABLE 253 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.50000E-03	460.800
	4.65000E-03	513.700
	5.05000E-03	537.100
	7.15000E-03	588.300
	7.30000E-03	597.600
33.0000	8.00000E-04	0.500
	8.80000E-04	5.300
	9.80000E-04	7.600
33.0000	1.03000E-03	21.400
	1.23000E-03	30.500
	1.37000E-03	39.900
	1.67000E-03	54.200
	1.96000E-03	64.600
	2.16000E-03	77.900
	2.30000E-03	101.700
	2.70000E-03	125.900
	3.38000E-03	135.700
	3.53000E-03	159.800
	4.42000E-03	174.200
	5.88000E-03	210.200
	6.17000E-03	221.900
	7.15000E-03	234.400
	7.45000E-03	240.400
35.0000	3.00000E-04	2.000
	3.50000E-04	5.200
	6.00000E-04	9.800
	9.50000E-04	12.200
	1.25000E-03	53.500
	1.85000E-03	64.000
	2.35000E-03	88.100
	2.90000E-03	102.200
	3.95000E-03	125.700
	4.50000E-03	136.300
	4.90000E-03	149.400
40.0000	2.50000E-04	0.100
	3.00000E-04	0.200
	3.50000E-04	0.300
	5.00000E-04	0.400
	6.50000E-04	2.000
	8.00000E-04	3.900
	8.50000E-04	11.100
	1.30000E-03	20.500
	1.60000E-03	29.900

RUN 4

TABLE 253 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.10000E-03	44.900
	2.60000E-03	55.100
	4.50000E-03	79.400
	5.80000E-03	93.200
42.0000	10.00000E-05	0.100
	1.50000E-04	0.300
	2.00000E-04	0.400
	6.50000E-04	2.200
	8.00000E-04	4.800
	9.50000E-04	6.400
	1.15000E-03	17.200
	1.70000E-03	27.700
42.0000	2.70000E-03	40.900
	3.85000E-03	51.800
	5.11000E-03	65.800
	7.35000E-03	75.200
45.0000	1.50000E-04	0.100
	2.00000E-04	0.200
	3.00000E-04	0.400
	4.50000E-04	1.100
	7.00000E-04	2.200
	8.00000E-04	3.300
	10.00000E-04	5.000
	1.10000E-03	10.300
	1.65000E-03	14.200
	1.80000E-03	18.400
	2.25000E-03	27.400
	2.70000E-03	29.200
	4.30000E-03	40.800
	6.00000E-03	52.400

TABLE 253 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	2.00000E-04	0.100
	4.00000E-04	0.200
	4.00000E-04	0.300
	4.50000E-04	0.400
	5.00000E-04	0.500
	5.50000E-04	1.000
	7.00000E-04	1.400
	7.00000E-04	2.000
	9.00000E-04	3.900
	1.20000E-03	6.100
	1.20000E-03	7.100
	1.20000E-03	8.700
	1.40000E-03	10.400
	1.60000E-03	12.600
	1.90000E-03	14.800
	2.30000E-03	22.200
55.0000	2.00000E-04	0.100
	2.50000E-04	0.200
	3.50000E-04	0.300
	3.50000E-04	0.400
	5.00000E-04	0.500
	7.00000E-04	1.500
	7.00000E-04	2.200
	1.02500E-03	3.700
	1.62500E-03	5.400
	1.72500E-03	8.200
	2.02500E-03	10.700
	2.70000E-03	15.200
	3.10000E-03	17.100

TABLE 253 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
55.0000	3.80000E-03	21.000
	5.15000E-03	25.200
60.0000	3.50000E-04	0.100
	5.00000E-04	0.200
	5.00000E-04	0.300
	6.50000E-04	0.600
	8.00000E-04	1.100
	1.10000E-03	2.000
	1.15000E-03	3.100
	1.70000E-03	4.400
	2.00000E-03	5.400
75.0000	3.50000E-04	0.100
	5.00000E-04	0.200
	6.50000E-04	0.300
	7.50000E-04	0.400
	1.55000E-03	1.100
	2.35000E-03	1.900
	2.45000E-03	1.900
	2.75000E-03	2.100
	2.75000E-03	2.100
80.0000	3.50000E-04	0.100
	6.00000E-04	0.200
	8.00000E-04	0.300
	1.05000E-03	0.400
	1.15000E-03	0.500
	2.05000E-03	1.000
	2.10000E-03	1.000
	3.00000E-03	1.500
	3.10000E-03	1.500
	4.35000E-03	2.000

TABLE 254

RUN 4

Deformation Versus Time (Fitted Data) for Nimonic 90 Longitudinal Sheet at 1350° F (1810° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
5.0000	1.79720E-04	10.000
	2.54010E-04	20.000
	3.15900E-04	30.000
	3.70990E-04	40.000
	4.21580E-04	50.000
	4.71410E-04	65.000
	6.35360E-04	100.000
	9.66980E-04	200.000
	1.23603E-03	300.000
	1.46918E-03	400.000
	1.67792E-03	500.000
	1.86877E-03	600.000
	2.04550E-03	700.000
	2.21084E-03	800.000
	2.36670E-03	900.000
10.0000	1.50550E-04	7.000
	2.00250E-04	30.100
	2.40410E-04	48.600
	3.53130E-04	136.000
	3.79150E-04	168.000
	4.14580E-04	222.800
	5.08250E-04	471.700
	5.64680E-04	770.400
	5.88980E-04	973.600
15.0000	1.06540E-04	91.100
	1.49910E-04	118.900
	1.92270E-04	151.300
	2.43380E-04	204.800
	3.31140E-04	343.900
	3.46770E-04	359.300
	4.21130E-04	407.100
	6.08820E-04	468.800
	4.15060E-04	386.200
	4.87010E-04	404.900
	7.49600E-04	492.100
	7.85030E-04	507.700
	8.99940E-04	572.300
	1.03135E-03	740.600
	1.10943E-03	897.600
	1.14263E-03	930.200
	1.29427E-03	1017.700
	1.43556E-03	1067.400

TABLE 254 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
17.5000	4.03170E-04	70.800
	4.66250E-04	158.000
	4.95670E-04	206.500
	7.66860E-04	424.400
	8.80590E-04	486.400
17.5000	1.27854E-03	680.100
	1.42124E-03	742.300
	1.82428E-03	908.300
	2.03305E-03	990.500
	2.17640E-03	1045.900
	2.32210E-03	1101.500
20.0000	4.98200E-05	0.200
	1.01450E-04	9.400
	1.55900E-04	57.400
	1.84070E-04	98.200
	2.94570E-04	399.900
	3.14160E-04	483.000
22.5000	2.24970E-04	1.100
	2.05730E-04	2.700
	4.17910E-04	22.900
	4.98150E-04	39.000
	5.24040E-04	45.400
	5.61440E-04	55.100
	5.90490E-04	62.700
	6.32400E-04	85.700
	8.15540E-04	115.400
	9.59760E-04	144.000
	1.12583E-03	174.000
	1.31565E-03	205.800
	1.52560E-03	238.900
	2.01812E-03	311.300
	2.60250E-03	391.700
	3.07109E-03	453.700
	3.28568E-03	481.600
25.0000	2.08384E-03	0.400
	1.29806E-02	33.800
	3.20525E-02	83.000
	4.68386E-02	135.500
	5.64968E-02	177.600
	5.89791E-02	189.500
	6.37739E-02	213.800
	8.67761E-02	356.600
	9.17866E-02	394.000
	1.00016E-01	460.800

TABLE 254 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.05992E-01	513.700
	1.08505E-01	537.100
	1.13759E-01	588.300
	1.14680E-01	597.600
33.0000	7.78910E-04	0.500
	8.68050E-04	5.300
	9.09690E-04	7.600
33.0000	1.14692E-03	21.400
	1.29399E-03	30.500
	1.44036E-03	39.900
	1.65728E-03	54.200
	1.81454E-03	64.600
	2.02036E-03	77.900
	2.42077E-03	101.700
	2.90272E-03	125.900
	3.12835E-03	135.700
	3.78063E-03	159.800
	4.24968E-03	174.200
	5.75069E-03	210.200
	6.35788E-03	221.900
	7.08126E-03	234.400
	7.45779E-03	240.400
35.0000	2.84470E-04	2.000
	3.91920E-04	5.200
	6.89720E-04	9.800
	8.01760E-04	12.200
	1.49036E-03	53.500
	1.70249E-03	64.000
	2.37662E-03	86.100
	2.38204E-03	102.200
	3.57916E-03	125.700
	4.36400E-03	136.300
	5.04917E-03	149.400
40.0000	2.48470E-04	0.100
	3.39610E-04	0.200
	3.80080E-04	0.300
	4.03290E-04	0.400
	6.66970E-04	2.000
	8.43050E-04	3.900
	1.01250E-03	11.100
	1.15000E-03	20.500
	1.42770E-03	29.900
	2.13622E-03	44.900

TABLE 254 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.75907E-03	55.100
	4.55312E-03	79.400
	5.70840E-03	93.200
42.0000	1.03830E-04	0.100
	1.60680E-04	0.300
	1.83970E-04	0.400
	2.08270E-04	2.200
	9.13020E-04	4.800
	9.85820E-04	6.400
	1.14669E-03	17.200
	1.58648E-03	27.700
42.0000	2.63178E-03	40.900
	3.81003E-03	51.800
	5.62770E-03	65.800
	6.99491E-03	75.200
	1.50190E-04	0.100
	2.26900E-04	0.200
	2.71010E-04	0.400
	4.13320E-04	1.100
	6.75430E-04	2.200
	8.59150E-04	3.300
	1.03139E-03	9.000
	1.27580E-03	10.300
	1.43681E-03	14.200
	1.67287E-03	18.400
	2.43220E-03	27.400
	2.62258E-03	29.200
	4.10250E-03	40.800
	5.92970E-03	52.400
50.0000	1.99470E-04	0.100
	3.96760E-04	0.200
	4.21810E-04	0.300
	4.44410E-04	0.400
	4.69890E-04	0.500
	5.88840E-04	1.000
	6.58450E-04	1.400
	7.35980E-04	2.000
	9.11470E-04	3.900
	1.09340E-03	6.100
	1.17627E-03	7.100
	1.30907E-03	8.700
	1.44917E-03	10.400
	1.62677E-03	12.600
	1.79835E-03	14.800
	2.31984E-03	22.200

RUN 4

TABLE 254 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
50.0000	2.03980E-04	0.100
	2.23910E-04	0.200
	3.61780E-04	0.300
	4.08350E-04	0.400
	4.19390E-04	0.500
	5.80430E-04	1.500
	7.91330E-04	2.200
	1.16727E-03	3.700
	1.44822E-03	5.400
	1.76622E-03	8.200
	2.03932E-03	10.700
	2.68624E-03	15.200
	3.03966E-03	17.100
55.0000	3.92130E-03	21.000
	5.69459E-03	25.200
60.0000	3.49920E-04	0.100
	4.39930E-04	0.200
	5.02340E-04	0.300
	6.36720E-04	0.600
	8.36720E-04	1.100
	1.02646E-03	2.000
	1.24427E-03	3.100
	1.62776E-03	4.400
	2.02585E-03	5.400
75.0000	3.52900E-04	0.100
	4.86710E-04	0.200
	6.47660E-04	0.300
	7.76250E-04	0.400
	1.50748E-03	1.100
	2.45471E-03	1.900
	2.45471E-03	1.900
	2.70978E-03	2.100
	2.70978E-03	2.100
80.0000	3.54090E-04	0.100
	5.15130E-04	0.200
	8.31390E-04	0.400
	1.02517E-03	0.400
	1.19063E-03	0.500
	2.03505E-03	1.000
	2.03505E-03	1.000
	3.09268E-03	1.500
	3.09268E-03	1.500
	4.31813E-03	2.000

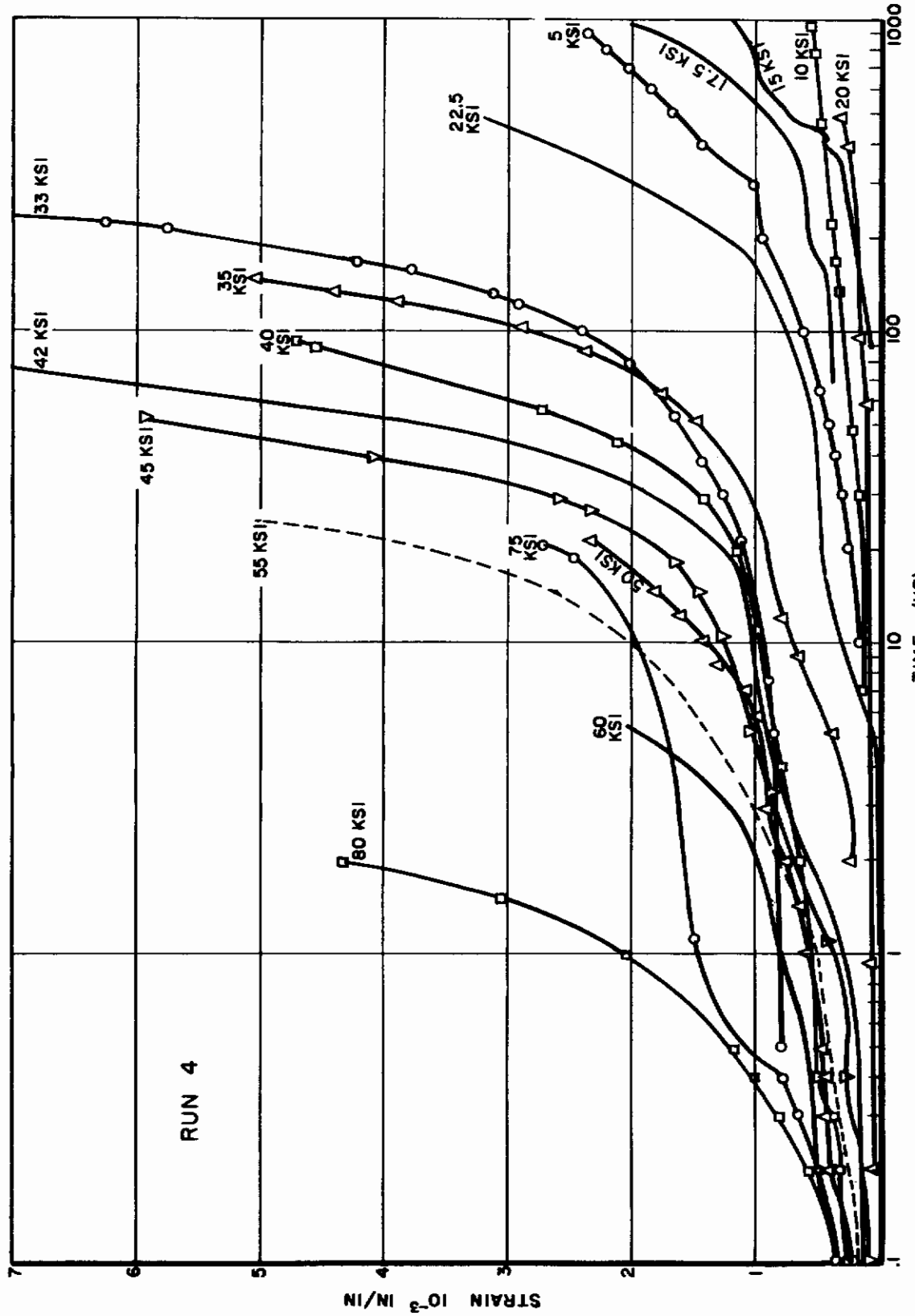


Figure 165. Creep Deformation Versus Log Time of Nimonic 90 Longitudinal Sheet at 1350°F (1810°R)

TABLE 255

Creep Deformation and Rupture Data at 1350°F, (1810°R) for Nimonic 90 Longitudinal Sheet

Stress (KSI)	Time to Rupture (hour)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
15.0	-	0.13	0.07	845	-	-	-
17.5	-	0.24	0.08	455	-	-	-
20.0	-	0.07	0.10	80	-	-	-
20.0	1402.6	3.5	0.10	265	755	985	-
22.5	-	0.33	0.10	137	445	-	-
25.0	597.6	0.73	0.12	96	327	513	-
33.0	242.9	2.2	0.14	18	140	195	-
35.0	160.7	1.5	0.16	33	102	148	-
40.0	98.1	2.0	0.19	14.1	63.5	-	-
42.0	75.2	1.5	0.20	9.	43.8	64.4	-
45.0	53.0	1.5	0.21	5.5	32.5	46.8	-
50.0	38.3	1.63	0.23	5	35	-	-
55.0	31.9	2.5	0.25	3	14	25	-
60.0	8.2	2.0	0.28	1.7	-	-	-
75.0	2.2	2.5	0.35	0.5	2	-	-
80.0	2.0	3.25	0.37	0.4	1.5	-	-

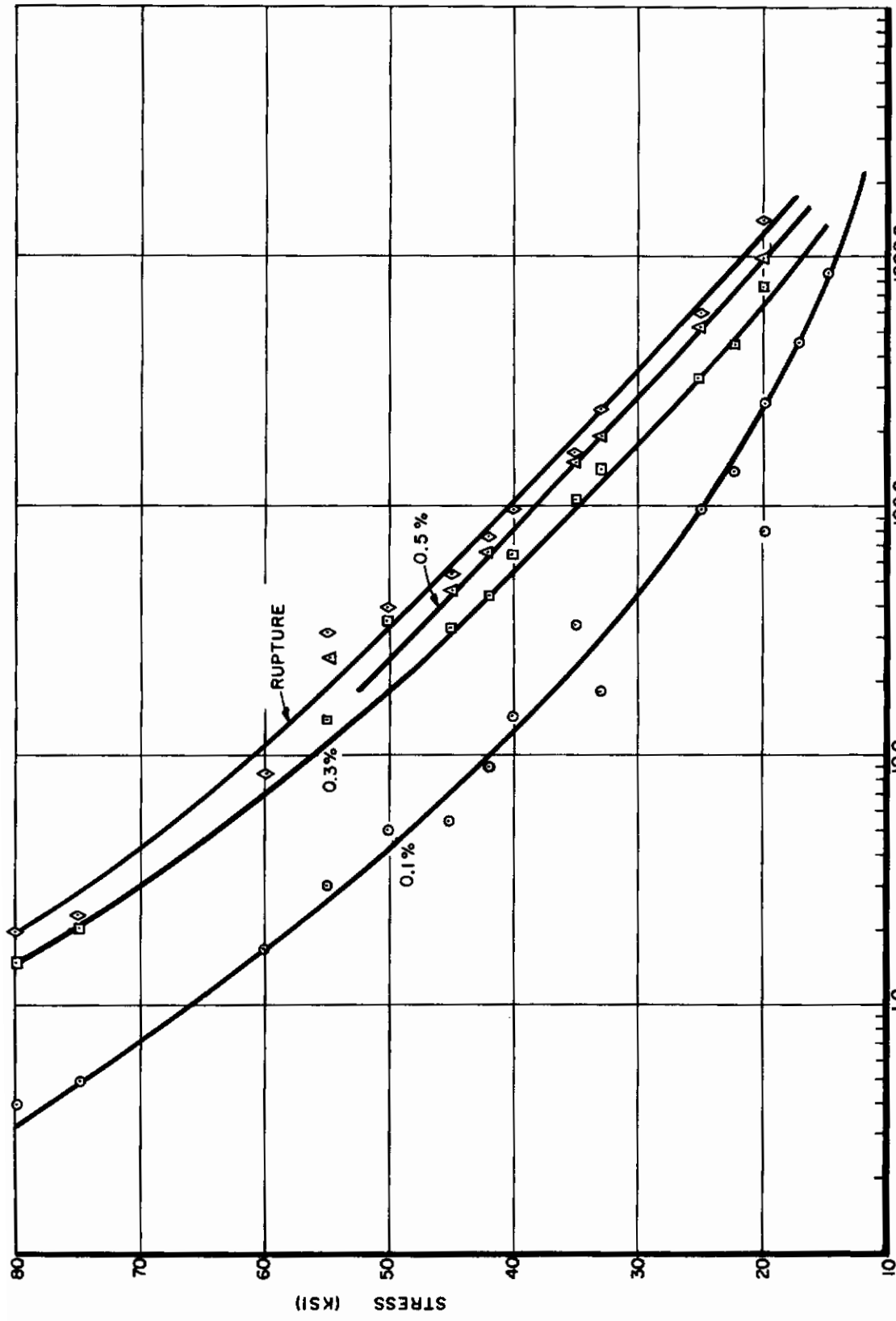


Figure 166. Creep Rupture Properties of Nimonic 90 Longitudinal Sheet at 1350°F (1810°R)

TABLE 256

RUN 4

Deformation Versus Time (Raw Data) for Nimonic 90 Longitudinal Sheet at 1500° F (1960° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.5000	1.50000E-04	20.000
	1.75000E-04	100.000
	2.10000E-04	200.000
	2.50000E-04	300.000
	2.90000E-04	400.000
	3.20000E-04	500.000
	3.70000E-04	600.000
	4.00000E-04	700.000
	4.50000E-04	800.000
	4.80000E-04	900.000
	5.00000E-04	955.000
8.0000	10.00000E-05	124.300
	2.00000E-04	165.400
	5.00000E-04	269.200
	7.00000E-04	373.900
8.0000	8.00000E-04	405.200
	10.00000E-04	509.100
	1.40000E-03	556.200
	1.60000E-03	646.600
	1.80000E-03	693.400
	2.00000E-03	709.200
	2.50000E-03	821.600
	3.20000E-03	882.600
	4.00000E-03	1019.300
	5.10000E-03	1104.400
	6.30000E-03	1205.100
	8.75000E-03	1325.400
	10.00000E-03	1369.900
	1.11000E-02	1419.800
9.0000	4.00000E-04	75.800
	7.50000E-04	118.800
	8.00000E-04	125.800
	9.00000E-04	140.900
	9.50000E-04	175.400
	1.15000E-03	198.400
	1.30000E-03	207.100
	1.50000E-03	246.800
	1.75000E-03	293.900
	2.10000E-03	326.400
	2.30000E-03	351.100
	2.70000E-03	384.200
	2.90000E-03	422.700
	3.50000E-03	470.500

TABLE 256 (CONT)

RUN 4

STRESS (PSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.60000E-03	549.800
	5.65000E-03	607.000
	6.50000E-03	653.700
	7.60000E-03	707.700
	9.55000E-03	766.900
	1.65000E-02	916.400
	2.42000E-02	999.000
	2.77500E-02	1023.700
10.0000	1.50000E-04	1.300
	3.00000E-04	25.200
	4.00000E-04	61.300
	6.50000E-04	133.200
	10.00000E-04	181.000
	1.70000E-03	337.300
	2.85000E-03	409.200
	3.95000E-03	504.500
	5.65000E-03	564.800
	7.70000E-03	629.700
	9.15000E-03	672.100
	1.12000E-02	719.800
13.0000	3.00000E-04	3.000
	5.00000E-04	18.200
	1.20000E-03	96.500
	2.00000E-03	145.900
	3.40000E-03	205.500
	5.00000E-03	253.900
	7.50000E-03	313.200
	9.10000E-03	348.300
	1.25000E-02	393.000
	1.32500E-02	404.400
16.0000	1.05000E-03	43.900
	1.70000E-03	66.200
	2.55000E-03	92.400
	4.35000E-03	127.300
	6.25000E-03	163.500
	8.10000E-03	180.500
	1.06500E-02	198.300
	1.25000E-02	204.100
18.0000	7.95000E-03	78.400
	1.67500E-02	85.200
	2.12000E-02	94.100
	2.46000E-02	100.400
	2.76500E-02	108.000

TABLE 256 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	4.50000E-04	1.000
	5.80000E-04	3.400
	7.30000E-04	8.300
	1.30000E-03	23.900
	2.10000E-03	40.800
	2.95000E-03	55.700
	4.30000E-03	70.800
	5.70000E-03	84.700
	7.85000E-03	98.300
	1.07500E-02	112.200
	1.36500E-02	120.900
25.0000	1.50000E-04	1.100
	2.50000E-04	2.200
	5.00000E-04	3.300
	6.50000E-04	5.700
	1.15000E-03	7.400
	2.90000E-03	16.800
	6.60000E-03	28.300
32.0000	3.00000E-04	0.200
	4.00000E-04	0.400
	6.00000E-04	0.500
	7.00000E-04	1.000
32.0000	10.00000E-04	2.600
	1.90000E-03	4.100
	2.20000E-03	5.500
	2.40000E-03	7.600
	3.00000E-03	9.200
33.0000	2.50000E-05	0.100
	1.75000E-04	0.300
	2.75000E-04	0.400
	4.25000E-04	1.100
	1.08000E-03	4.100
	1.60000E-03	5.800
	3.28000E-03	8.200
37.0000	2.50000E-04	0.100
	5.00000E-04	0.200
	6.00000E-04	0.300
	8.00000E-04	0.500
	1.15000E-03	1.000
	1.40000E-03	1.500
	2.57500E-03	3.000
	3.47500E-03	4.100
	5.57500E-03	5.200
	6.67500E-03	5.800
	7.27500E-03	6.000
	8.95000E-03	6.300

TABLE 257

RUN 4

Deformation Versus Time (Fitted Data) for Nimonic 90 Longitudinal Sheet at 1500° F (1960° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.5000	1.49970E-04	20.000
	1.75110E-04	100.000
	2.10520E-04	200.000
	2.48570E-04	300.000
	2.87570E-04	400.000
	3.26790E-04	500.000
	3.65880E-04	600.000
	4.04680E-04	700.000
	4.43090E-04	800.000
	4.81050E-04	900.000
	5.01740E-04	955.000
8.0000	9.66300E-05	124.300
	1.92340E-04	165.400
	4.45210E-04	269.200
	7.24320E-04	373.900
8.0000	8.14110E-04	405.200
	1.13973E-03	509.100
	1.30439E-03	556.200
	1.65901E-03	646.600
	1.86691E-03	693.400
	1.94149E-03	709.200
	2.54959E-03	821.600
	2.94936E-03	882.600
	4.09249E-03	1019.300
	5.03499E-03	1104.400
	6.46401E-03	1205.100
	8.76766E-03	1325.400
	9.82846E-03	1369.900
	1.11792E-02	1419.800
9.0000	3.27480E-04	75.800
	6.53200E-04	118.800
	7.06280E-04	125.800
	8.20850E-04	140.900
	1.08320E-03	175.400
	1.25876E-03	198.400
	1.32537E-03	207.100
	1.63125E-03	246.800
	2.00053E-03	293.900
	2.26185E-03	326.400
	2.46561E-03	351.100
	2.74815E-03	384.200
	3.09538E-03	422.700

TABLE 257 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	3.56610E-03	470.500
	4.49906E-03	549.800
	5.35580E-03	607.000
	6.22471E-03	653.700
	7.49006E-03	707.700
	9.31065E-03	766.900
	1.71054E-02	916.400
	2.44796E-02	999.000
	2.72828E-02	1023.700
10.0000	1.41960E-04	1.300
	2.71670E-04	25.200
	4.40550E-04	61.300
	7.21110E-04	133.200
	9.02500E-04	181.000
	1.82430E-03	337.300
	2.60291E-03	409.200
	4.19350E-03	504.500
	5.61921E-03	564.800
	7.59395E-03	629.700
	9.16398E-03	672.100
	1.12243E-02	719.800
13.0000	3.55390E-04	3.000
	4.26930E-04	18.200
	1.19806E-03	96.500
	2.03599E-03	145.900
	3.43588E-03	205.500
	4.94106E-03	253.900
	7.39273E-03	313.200
	9.28327E-03	348.300
	1.23694E-02	393.000
	1.33113E-02	404.400
16.0000	9.41350E-04	43.900
	1.76222E-03	66.200
	2.76134E-03	92.400
	4.11707E-03	127.300
	6.27372E-03	163.500
	8.07739E-03	180.500
	1.09830E-02	198.300
	1.22339E-02	204.100
18.0000	8.63174E-03	78.400
	1.52985E-02	85.200
	2.18769E-02	94.100
	2.50621E-02	100.400
	2.72813E-02	108.000

TABLE 257 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
20.0000	4.49993E-04	1.000
	5.39020E-04	3.400
	7.24790E-04	8.300
	1.34487E-03	23.900
	2.13194E-03	40.800
	3.00849E-03	55.700
	4.19035E-03	70.800
	5.69946E-03	84.700
	7.79348E-03	98.300
	1.09063E-02	112.200
	1.35703E-02	120.900
25.0000	1.47780E-04	1.100
	2.77330E-04	2.200
	4.34990E-04	3.300
	7.58800E-04	5.700
	9.98280E-04	7.400
	2.91719E-03	16.800
	6.59668E-03	28.300
32.0000	3.13770E-04	0.200
	3.68150E-04	0.400
	5.61330E-04	0.500
	7.39400E-04	1.000
32.0000	1.11001E-03	2.600
	1.70663E-03	4.100
	2.16396E-03	5.500
	2.63763E-03	7.600
	2.87909E-03	9.200
33.0000	2.81200E-05	0.100
	1.51010E-04	0.300
	2.90900E-04	0.400
	4.49750E-04	1.100
	9.47740E-04	4.100
	1.77196E-03	5.800
	3.22051E-03	8.200
37.0000	2.38140E-04	0.100
	5.75250E-04	0.200
	5.22110E-04	0.300
	7.63760E-04	0.500
	1.30452E-03	1.000
	1.48873E-03	1.500
	2.20264E-03	3.000
	3.57025E-03	4.100
	5.65530E-03	5.200
	7.05418E-03	5.800
	7.55712E-03	6.000
	8.34367E-03	6.300

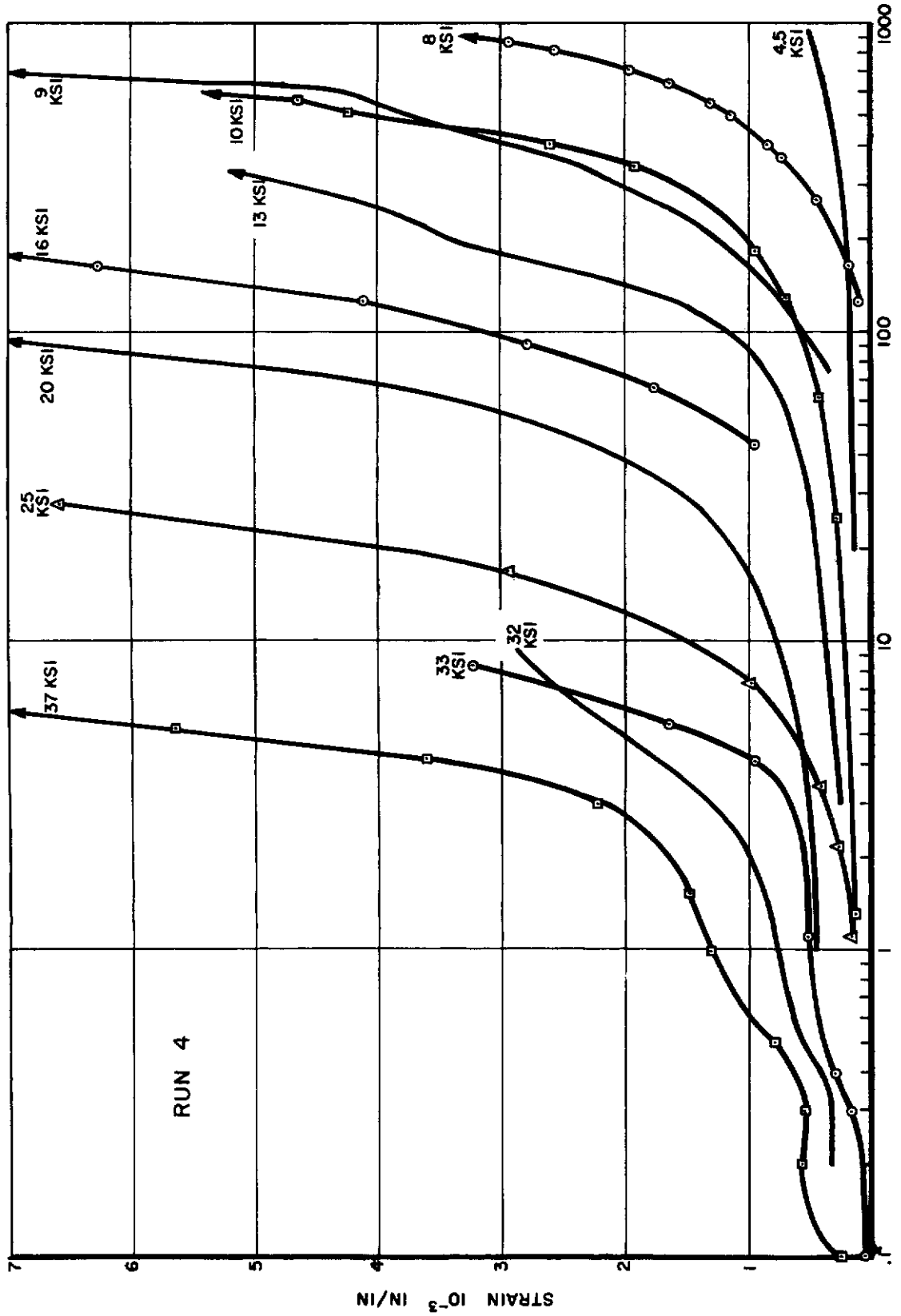


Figure 167. Creep Deformation Versus Log Time of Nimonic 90 Longitudinal Sheet at 1500°F (1960°R)

TABLE 258

Creep Deformation and Rupture Data at 1500°F (1960°R) for Nimonic 90 Longitudinal Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
8.0		1.11	0.04	467	890	1090	1378
9.0		2.78	0.05	175	428	565	784
10.0	921.1	5.0	0.05	175	445	539	692
13.0	427.8	3.1	0.06	61	203	258	360
16.0	-	1.25	0.08	32	108	148	192
18.0	122.5	3.0	0.09	32	61	71	81
20.0	126.6	4.0	0.10	15.8	56.6	80	108
25.0	32.2	1.3	0.12	7.7	17	23.6	-
32.0	14.5	-	0.15	1.6	9.4	-	-
33.0	9.6	3.0	0.16	3.9	8.2	-	-
37.0	6.4	3.0	0.18	0.8	3.6	5.2	-

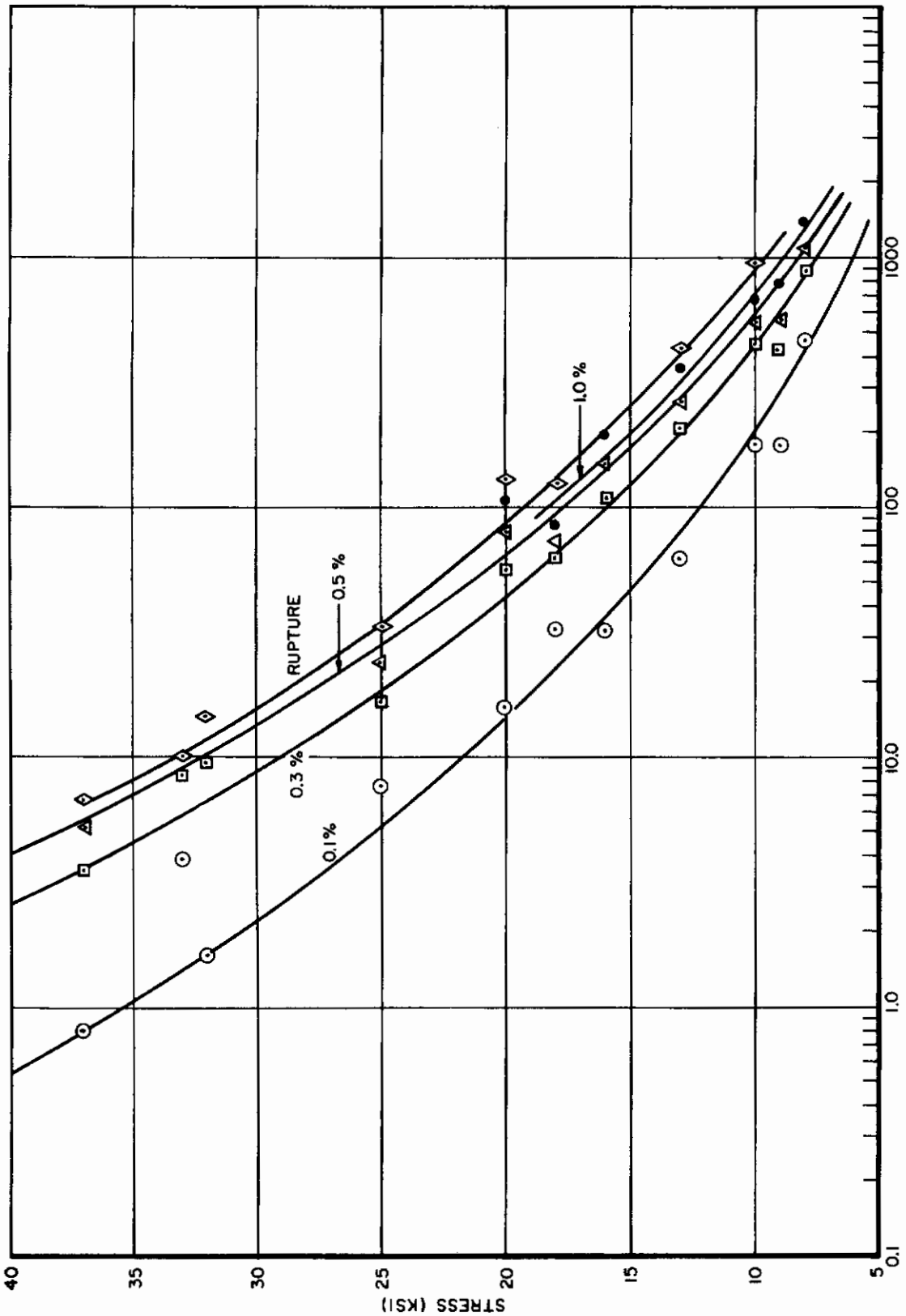


Figure 168. Creep Rupture Properties of Nimonic 90 Longitudinal Sheet at 1500°F (1960°R)

TABLE 259

Deformation Versus Time (Raw Data) for Nimonic 90 Longitudinal Sheet at 1650° F (2110° R) RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.5000	2.65000E-04	8.400
	3.90000E-04	32.500
	4.40000E-04	200.100
	5.55000E-04	265.000
	6.90000E-04	314.000
	7.80000E-04	338.000
	1.09000E-03	481.200
	1.13000E-03	697.800
3.0000	3.00000E-04	7.500
	4.00000E-04	32.200
	5.00000E-04	63.400
	6.00000E-04	100.100
	7.00000E-04	175.400
	8.00000E-04	281.900
	9.00000E-04	319.100
	1.25000E-03	415.200
	1.80000E-03	469.600
	2.00000E-03	551.100
	3.10000E-03	662.400
	4.60000E-03	784.300
	6.12500E-03	880.700
	7.65000E-03	967.600
4.0000	8.00000E-04	64.600
	9.00000E-04	105.300
	1.20000E-03	128.700
	1.60000E-03	159.900
	2.00000E-03	184.300
	3.55000E-03	256.700
	6.65000E-03	345.600
	9.00000E-03	399.300
	1.21000E-02	448.300
	1.49800E-02	492.500
8.0000	2.00000E-04	0.300
	4.00000E-04	0.500
	1.10000E-03	18.200
	2.35000E-03	50.500
	3.45000E-03	62.700
	4.90000E-03	78.900
	6.45000E-03	91.800
	8.30000E-03	103.300
	1.19000E-02	119.000
	1.26000E-02	122.000

RUN 4

TABLE 259 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	3.00000E-04	1.000
	6.00000E-04	9.500
	1.65000E-03	20.400
	3.00000E-03	34.000
	5.05000E-03	44.100
	9.00000E-03	57.700
	1.58000E-02	70.700
12.0000	4.50000E-04	0.500
	8.50000E-04	2.300
	9.50000E-04	5.900
	2.30000E-03	17.400
	4.10000E-03	25.200
	5.50000E-03	47.900
15.0000	1.50000E-04	0.100
	4.00000E-04	0.500
	8.00000E-04	1.500
	1.20000E-03	2.600
	2.40000E-03	5.800
	6.50000E-03	12.500
	9.15000E-03	14.400
	1.38500E-02	17.500
20.0000	4.00000E-04	0.100
	6.00000E-04	0.200
	7.50000E-04	0.300
	8.50000E-04	0.400
20.0000	1.45000E-03	1.000
	2.10000E-03	2.000
	1.65000E-02	8.800

TABLE 260

Deformation Versus Time (Fitted Data) for Nimonic 90 Longitudinal Sheet at 1650° F (2110° R) RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.5000	2.83380E-04	6.400
	3.42300E-04	32.500
	5.14810E-04	200.100
	5.99470E-04	265.000
	6.66940E-04	314.000
	7.00770E-04	338.000
	9.09190E-04	481.200
	1.23312E-03	697.800
3.0000	3.31100E-04	7.500
	4.02080E-04	32.200
	4.79330E-04	63.400
	5.56480E-04	100.100
	6.88910E-04	175.400
	8.86190E-04	281.900
	9.76030E-04	319.100
	1.30121E-03	415.200
	1.56353E-03	469.600
	2.08841E-03	551.100
	3.09809E-03	662.400
	4.61954E-03	784.300
	6.11626E-03	880.700
	7.64875E-03	967.600
4.0000	7.58600E-04	64.600
	9.87550E-04	105.300
	1.19958E-03	128.700
	1.58031E-03	159.900
	1.96068E-03	184.300
	3.55660E-03	256.700
	6.60875E-03	345.600
	9.13756E-03	399.300
	1.19713E-02	448.300
	1.50190E-02	492.500
8.0000	1.98660E-04	0.300
	4.01940E-04	0.500
	1.08406E-03	18.200
	2.36535E-03	50.500
	3.21227E-03	62.700
	4.74752E-03	78.900
	6.53823E-03	91.800
	8.53787E-03	103.300
	1.18329E-02	119.000
	1.25317E-02	122.000

TABLE 260 (CONT)

RUN 4

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	3.01600E-04	1.000
	5.66990E-04	9.500
	1.76947E-03	20.400
	2.87084E-03	34.000
	4.88307E-03	44.100
	9.43904E-03	57.700
	1.56095E-02	70.700
12.0000	4.78010E-04	0.500
	6.89910E-04	2.300
	1.12517E-03	5.900
	2.64650E-03	17.400
	3.54031E-03	25.200
	5.67009E-03	47.900
15.0000	1.50460E-04	0.100
	4.10390E-04	0.500
	7.08860E-04	1.500
	1.34136E-03	2.600
	2.20983E-03	5.800
	6.68213E-03	12.500
	9.04077E-03	14.400
	1.38451E-02	17.500
20.0000	4.24700E-04	0.100
	4.02540E-04	0.200
	7.88480E-04	0.300
	9.79040E-04	0.400
20.0000	1.31989E-03	1.000
	2.15942E-03	2.000
	1.64959E-02	8.800

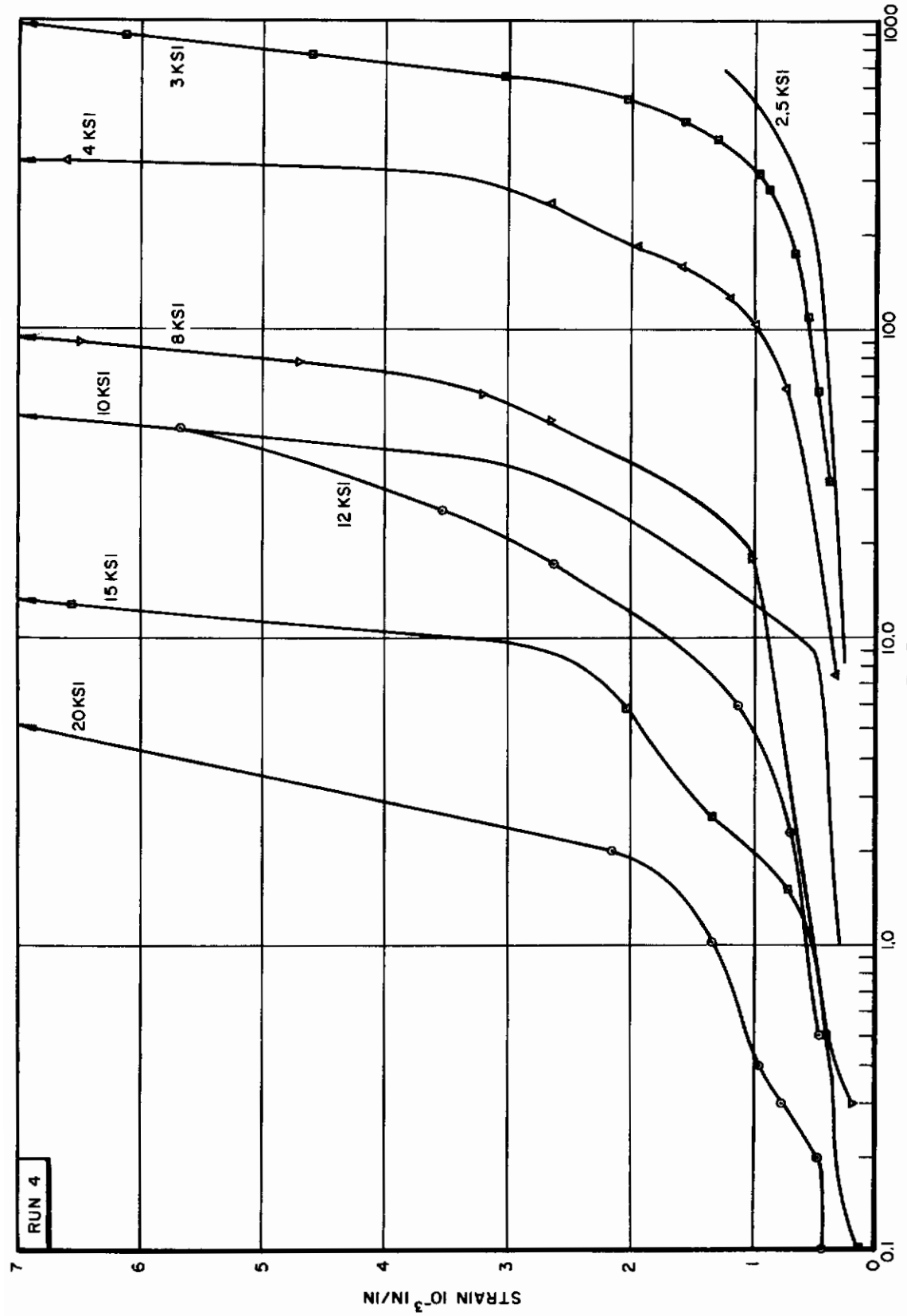


Figure 169. Creep Deformation Versus Log Time of Nimonic 90 Longitudinal Sheet at 1650°F (2110°R)

TABLE 261

Creep Deformation and Rupture Data at 1650°F (2110°R) for Nimonic 90 Longitudinal Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
2.0	-	0.125	0.01	580	-	-	-
3.0	-	0.23	0.02	342	670	823	1049
4.0	-	1.50	0.03	106	236	303	113
8.0	-	1.26	0.05	23	57	78	110
10.0	83.5	4.5	0.06	13	34	44.3	59.3
12.0	48.4	4.0	0.07	5	15	20.3	-
15.0	19.6	3.25	0.09	1.8	7.3	10.3	15.1
20.0	8.8	6.5	0.12	0.5	3	4.5	6.7

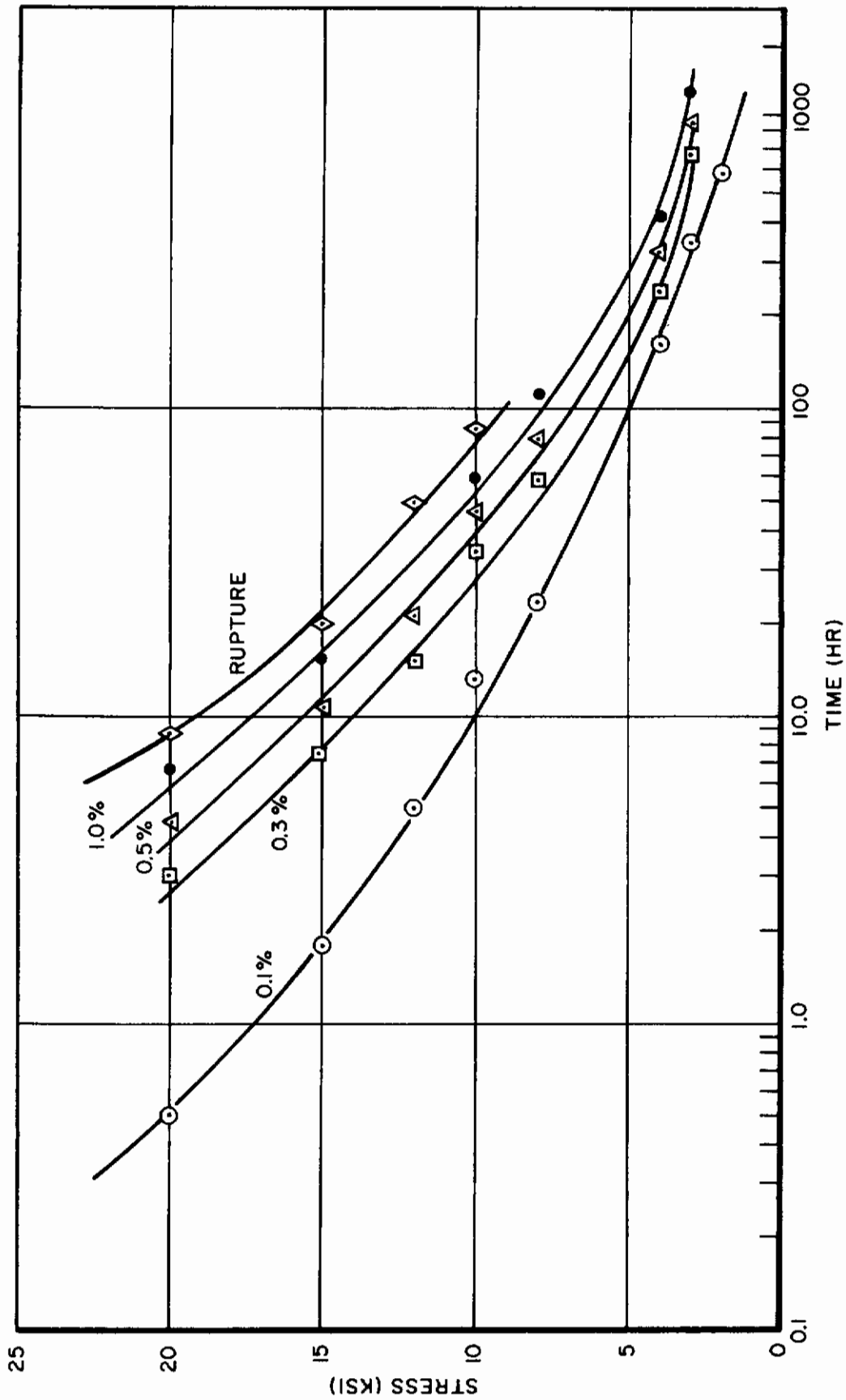


Figure 170. Creep Rupture Properties of Nimonic 90 Longitudinal Sheet at 1650°F (2110°R)

TABLE 262

Minimum Creep Rate for Nimonic 90 Longitudinal Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1350°F (1810°R)	15	6.31×10^{-7}
	15	4.97×10^{-7}
	17.5	6.07×10^{-7}
	22.5	3.82×10^{-6}
	33	1.51×10^{-5}
	35	1.67×10^{-5}
	40	1.46×10^{-5}
	42	1.49×10^{-5}
	45	4.13×10^{-5}
	55	1.09×10^{-4}
	60	2.41×10^{-5}
	80	0
1500°F (1960°R)	4.5	3.14×10^{-7}
	8	2.33×10^{-6}
	9	7.57×10^{-6}
	10	3.79×10^{-6}
	13	4.71×10^{-6}
	16	3.68×10^{-5}
	20	3.75×10^{-5}
	25	1.78×10^{-4}
	33	1.66×10^{-4}
	37	3.68×10^{-4}
1650°F (2110°R)	2.5	1.039×10^{-6}
	3	1.76×10^{-6}
	4	5.63×10^{-6}
	8	3.85×10^{-5}
	10	3.12×10^{-5}
	15	2.71×10^{-4}
	20	5.68×10^{-4}

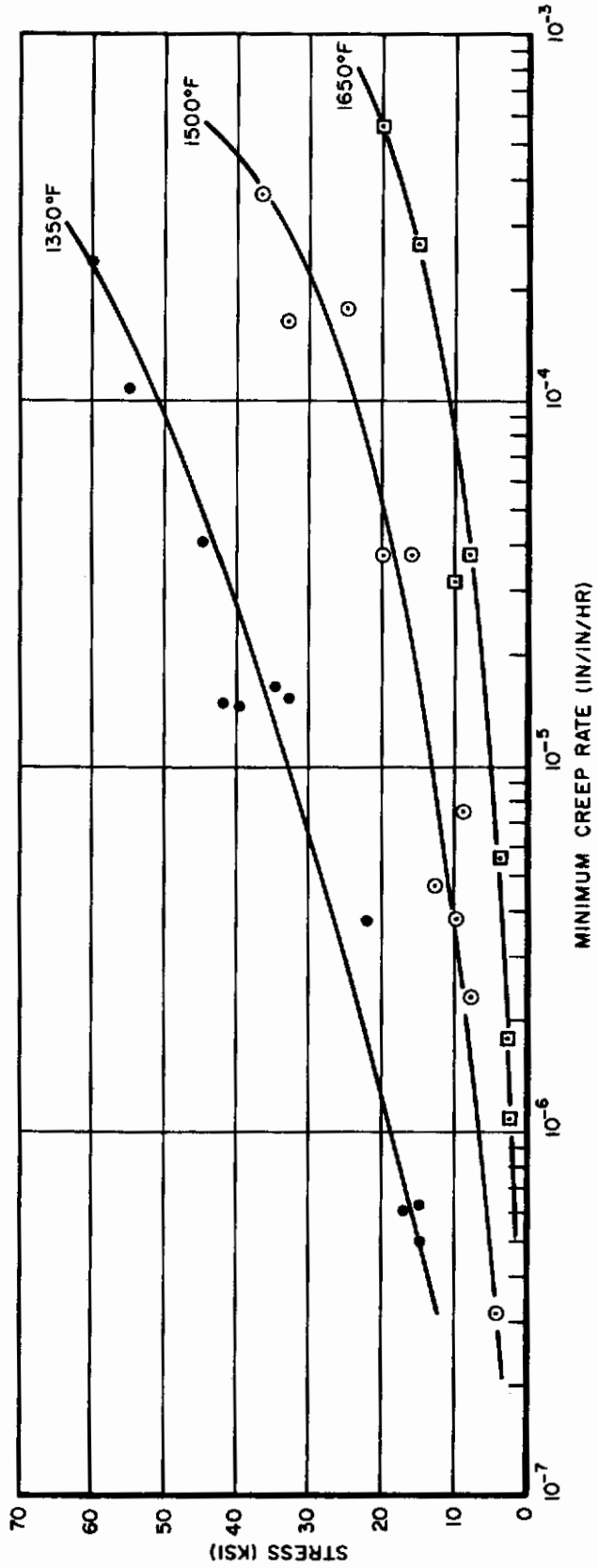


Figure 171. Minimum Creep Rate of Nimonic 90 Longitudinal Sheet

CREEP DATA

NIMONIC 90 TRANSVERSE

(SHEET)

TABLE 263

Deformation Versus Time (Raw Data) for Nimonic 90 Transverse Sheet at 1350° F (1810° R)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	5.00000E-05	0.100
	10.00000E-05	0.200
	2.00000E-04	0.500
	3.50000E-04	120.300
	5.00000E-04	158.800
	6.00000E-04	377.000
	7.00000E-04	630.600
	8.00000E-04	897.200
	9.00000E-04	1095.200
	10.00000E-04	1184.600
	1.05000E-03	1400.100
17.0000	5.00000E-05	0.300
	1.50000E-04	17.700
	3.00000E-04	42.400
	4.00000E-04	90.800
	4.50000E-04	146.600
	5.00000E-04	226.000
	6.00000E-04	314.000
18.0000	5.00000E-05	1.000
	10.00000E-05	55.300
	1.50000E-04	65.900
	2.00000E-04	77.200
	2.50000E-04	97.100
	3.00000E-04	167.300
	4.00000E-04	352.100
	5.00000E-04	368.700
	6.00000E-04	526.500
	8.00000E-04	632.900
	10.00000E-04	736.000
	1.20000E-03	896.900
	1.40000E-03	969.200
22.0000	10.00000E-05	46.700
	1.50000E-04	112.100
	2.00000E-04	144.700
	2.50000E-04	190.600
	3.00000E-04	222.200
	3.50000E-04	287.900
	4.00000E-04	304.800
	1.05000E-03	481.200
	1.85000E-03	711.200
	2.20000E-03	817.000
	3.00000E-03	1005.000

TABLE 263 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	2.00000E-04	0.900
	3.00000E-04	16.400
	5.00000E-04	52.000
	8.00000E-04	85.200
23.0000	1.10000E-03	131.900
	1.50000E-03	365.100
	2.50000E-03	587.500
	3.00000E-03	693.300
	3.70000E-03	884.800
	4.20000E-03	939.700
	5.40000E-03	1097.900
	6.65000E-03	1212.000
24.0000	2.50000E-04	55.300
	3.00000E-04	77.200
	4.00000E-04	104.000
	5.00000E-04	136.100
	6.00000E-04	160.600
	7.00000E-04	201.100
	8.00000E-04	255.900
	1.10000E-03	351.800
	1.80000E-03	504.000
	2.00000E-03	578.400
	2.80000E-03	736.000
	3.55000E-03	879.300
	4.40000E-03	999.300
	5.50000E-03	1095.500
	5.70000E-03	1112.300
25.0000	10.00000E-05	0.100
	2.00000E-04	0.200
	3.00000E-04	0.300
	4.00000E-04	0.500
	5.50000E-04	1.000
	6.50000E-04	1.600
	7.00000E-04	2.500
	8.00000E-04	33.200
	9.00000E-04	87.500
	1.10000E-03	111.100
	1.60000E-03	218.500
	2.00000E-03	280.200
	3.00000E-03	519.800
	3.50000E-03	608.600
	6.50000E-04	0.500
	8.00000E-04	2.200
	10.00000E-04	31.200
	2.05000E-03	144.700

TABLE 263 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	2.85000E-03	350.800
	3.50000E-03	379.500
	5.00000E-03	474.800
	6.00000E-03	531.000
	7.95000E-03	609.100
30.0000	3.00000E-04	1.200
30.0000	4.00000E-04	13.400
	8.50000E-04	73.900
	1.40000E-03	120.700
	1.65000E-03	153.600
	2.20000E-03	183.300
	2.65000E-03	228.000
	2.95000E-03	241.400
	3.35000E-03	252.100
	3.50000E-03	266.300
	3.90000E-03	275.600
	4.05000E-03	289.800
	4.80000E-03	313.400
	5.90000E-03	337.300
	6.45000E-03	348.900
	7.45000E-03	361.400
40.0000	2.00000E-04	0.100
	3.75000E-04	0.200
	4.25000E-04	0.300
	4.75000E-04	0.400
	8.00000E-04	1.100
	1.45000E-03	3.500
	2.05000E-03	4.900
	3.10000E-03	95.000
	4.30000E-03	118.600
	6.00000E-03	142.300
	6.50000E-03	149.400
45.0000	3.00000E-04	15.800
	5.00000E-04	18.200
	8.00000E-04	22.500
	9.00000E-04	27.900
	1.35000E-03	41.300
	2.35000E-03	54.500
	3.10000E-03	73.300
	4.50000E-03	86.200
	6.00000E-03	102.200

TABLE 263 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
47.0000	1.50000E-04	0.100
	3.00000E-04	0.200
	4.00000E-04	0.500
	1.25000E-03	17.000
	1.75000E-03	26.900
	2.10000E-03	33.400
	2.55000E-03	42.300
	3.00000E-03	50.200
	3.45000E-03	55.800
	4.55000E-03	67.100
	5.65000E-03	73.800
50.0000	3.80000E-04	0.100
50.0000	4.30000E-04	0.200
	4.50000E-04	0.300
	5.80000E-04	1.000
	8.00000E-04	2.600
	1.10000E-03	7.100
	1.30000E-03	10.100
	1.85000E-03	23.600
	2.75000E-03	39.900
	3.45000E-03	48.000
	4.50000E-03	59.000
	7.80000E-03	79.900
55.0000	2.00000E-04	0.200
	2.75000E-04	0.300
	3.75000E-04	0.500
	4.00000E-04	1.300
	8.00000E-04	2.500
	9.00000E-04	5.000
	1.67500E-03	8.300
	1.80000E-03	11.800
	2.25000E-03	15.200
	2.90000E-03	22.700
	3.10000E-03	23.600
60.0000	2.00000E-04	0.200
	2.50000E-04	0.400
	3.50000E-04	0.500
	4.75000E-04	1.100
	1.17500E-03	3.800
	1.37500E-03	5.700
	1.45000E-03	7.400
	2.20000E-03	9.800
	3.52500E-03	12.500
	4.67500E-03	16.900

TABLE 263 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	5.00000E-05	0.100
	3.00000E-04	0.200
	4.00000E-04	0.300
	5.00000E-04	0.500
	6.00000E-04	0.800
	8.00000E-04	1.100
	9.00000E-04	1.500
	1.30000E-03	2.100
	1.25000E-04	0.100
	2.25000E-04	0.200
	3.75000E-04	0.300
	4.25000E-04	0.400
	8.50000E-04	1.100
	1.30000E-03	1.900
70.0000	2.00000E-04	0.100
70.0000	3.00000E-04	0.200
	4.00000E-04	0.300
	5.50000E-04	0.400
	9.50000E-04	1.000
	1.65000E-03	2.000
	3.00000E-04	0.100
	3.50000E-04	0.200
	4.50000E-04	0.300
	5.00000E-04	0.400
	6.50000E-04	0.500
	8.00000E-04	1.000
	10.00000E-04	1.000
	1.65000E-03	2.000
	1.70000E-03	2.000
	1.95000E-03	2.400
	2.55000E-03	3.200

TABLE 264

Deformation Versus Time (Fitted Data) for Nimonic 90 Transverse Sheet at 1350° F (1810° R)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
15.0000	4.37800E-05	0.100
	1.15540E-04	0.200
	1.88770E-04	0.500
	4.11760E-04	120.300
	4.39060E-04	158.800
	5.75580E-04	377.000
	7.10930E-04	630.600
	8.36860E-04	897.200
	9.22700E-04	1095.200
	9.59730E-04	1184.600
	1.04525E-03	1400.100
17.0000	4.96300E-05	0.300
	1.62640E-04	17.700
	2.79170E-04	42.400
	3.90880E-04	90.800
	4.63070E-04	146.600
	5.28050E-04	226.000
	5.76530E-04	314.000
18.0000	4.98100E-05	1.000
	1.11710E-04	55.300
	1.54550E-04	65.900
	1.89420E-04	77.200
	2.33080E-04	97.100
	3.09070E-04	167.300
	4.40840E-04	352.100
	4.56010E-04	368.700
	6.34880E-04	526.500
	7.86830E-04	632.900
	9.53620E-04	736.000
	1.24476E-03	896.900
	1.38562E-03	969.200
22.0000	1.07040E-04	46.700
	1.49760E-04	112.100
	1.72760E-04	144.700
	2.27400E-04	190.600
	2.79160E-04	222.200
	4.17260E-04	287.900
	4.58380E-04	304.800
	9.82450E-04	481.200
	1.81935E-03	711.200
	2.23533E-03	817.000
	3.00123E-03	1005.000

TABLE 264 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
23.0000	2.34220E-04	0.900
	3.29520E-04	16.400
	5.34760E-04	52.000
	7.10280E-04	85.200
23.0000	9.33970E-04	131.900
	1.77340E-03	365.100
	2.45089E-03	587.500
	2.84109E-03	693.300
	3.80478E-03	884.800
	4.16238E-03	939.700
	5.44283E-03	1097.900
	6.62301E-03	1212.000
24.0000	2.45660E-04	55.300
	3.09740E-04	77.200
	3.89250E-04	104.000
	4.86050E-04	136.100
	5.61070E-04	160.600
	6.87290E-04	201.100
	8.62500E-04	255.900
	1.18200E-03	351.800
	1.72933E-03	504.000
	2.02142E-03	578.400
	2.72878E-03	736.000
	3.55402E-03	879.300
	4.48368E-03	999.300
	5.47781E-03	1095.500
	5.68134E-03	1112.300
25.0000	8.14400E-05	0.100
	2.23040E-04	0.200
	3.05730E-04	0.300
	4.10600E-04	0.500
	5.47370E-04	1.000
	6.29250E-04	1.600
	6.93310E-04	2.500
	7.92880E-04	33.200
	9.70340E-04	87.500
	1.07631E-03	111.100
	1.60923E-03	218.500
	1.92070E-03	280.200
	3.07064E-03	519.800
	3.46909E-03	605.600
	6.74140E-04	0.500
	7.01560E-04	2.200
	1.11374E-03	31.200

RUN 2

TABLE 264 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.98685E-03	144.700
	3.06045E-03	350.800
	3.37332E-03	379.500
	4.88704E-03	474.800
	6.09168E-03	531.000
	7.33484E-03	609.100
30.0000	3.25260E-04	1.200
30.0000	3.77410E-04	13.400
	8.39050E-04	73.900
	1.34966E-03	120.700
	1.75128E-03	153.600
	2.13718E-03	183.300
	2.78895E-03	228.000
	3.01571E-03	241.400
	3.21354E-03	252.100
	3.50586E-03	266.300
	3.72022E-03	275.600
	4.09143E-03	289.800
	4.86207E-03	313.400
	5.91259E-03	337.300
	6.55191E-03	348.900
	7.35787E-03	361.400
40.0000	1.83730E-04	0.100
	4.13380E-04	0.200
	4.40130E-04	0.300
	4.51810E-04	0.400
	7.30360E-04	1.100
	1.64279E-03	3.500
	1.91179E-03	4.900
	3.05831E-03	95.000
	4.38298E-03	118.600
	5.97194E-03	142.300
	6.48778E-03	149.400
45.0000	3.05230E-04	15.800
	4.98660E-04	18.200
	7.43990E-04	22.500
	9.64220E-04	27.900
	1.45445E-03	41.300
	2.08493E-03	54.500
	3.33785E-03	73.300
	4.42305E-03	86.200
	5.98764E-03	102.200

TABLE 264 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
47.0000	1.55970E-04	0.100
	2.80160E-04	0.200
	3.96290E-04	0.500
	1.39116E-03	17.000
	1.66729E-03	26.900
	1.95094E-03	33.400
	2.48303E-03	42.300
	3.08354E-03	50.200
	3.57436E-03	55.800
	4.70799E-03	67.100
	5.45928E-03	73.800
50.0000	3.88960E-04	0.100
50.0000	4.50830E-04	0.200
	4.41450E-04	0.300
	4.75620E-04	1.000
	8.45420E-04	2.600
	1.24994E-03	7.100
	1.31199E-03	10.100
	1.61386E-03	23.600
	2.69888E-03	39.900
	3.48961E-03	48.000
	4.76441E-03	59.000
	7.65898E-03	79.900
55.0000	2.07690E-04	0.200
	2.77330E-04	0.300
	3.37880E-04	0.500
	4.69800E-04	1.300
	6.62040E-04	2.500
	1.04271E-03	5.000
	1.48538E-03	8.300
	1.89799E-03	11.800
	2.25856E-03	15.200
	2.95786E-03	22.700
	3.03499E-03	23.600
60.0000	2.00670E-04	0.200
	2.73750E-04	0.400
	3.03920E-04	0.500
	5.20110E-04	1.100
	1.01512E-03	3.800
	1.33598E-03	5.700
	1.70004E-03	7.400
	2.33287E-03	9.800
	3.18097E-03	12.500
	4.78810E-03	16.900

RUN 2

TABLE 264 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
65.0000	5.09000E-05	0.100
	2.96010E-04	0.200
	4.01260E-04	0.300
	5.04650E-04	0.500
	6.18330E-04	0.800
	7.45560E-04	1.100
	9.44640E-04	1.500
	1.28864E-03	2.100
	1.17770E-04	0.100
	2.59350E-04	0.200
	3.45090E-04	0.300
	4.19230E-04	0.400
	8.64860E-04	1.100
	1.29367E-03	1.900
70.0000	1.92500E-04	0.100
70.0000	3.23950E-04	0.200
	4.15500E-04	0.300
	5.00870E-04	0.400
	9.74480E-04	1.000
	1.64269E-03	2.000
	3.00820E-04	0.100
	3.42150E-04	0.200
	4.56840E-04	0.300
	5.36540E-04	0.400
	6.00230E-04	0.500
	9.10940E-04	1.000
	9.10940E-04	1.000
	1.66257E-03	2.000
	1.66257E-03	2.000
	1.96860E-03	2.400
	2.54777E-03	3.200

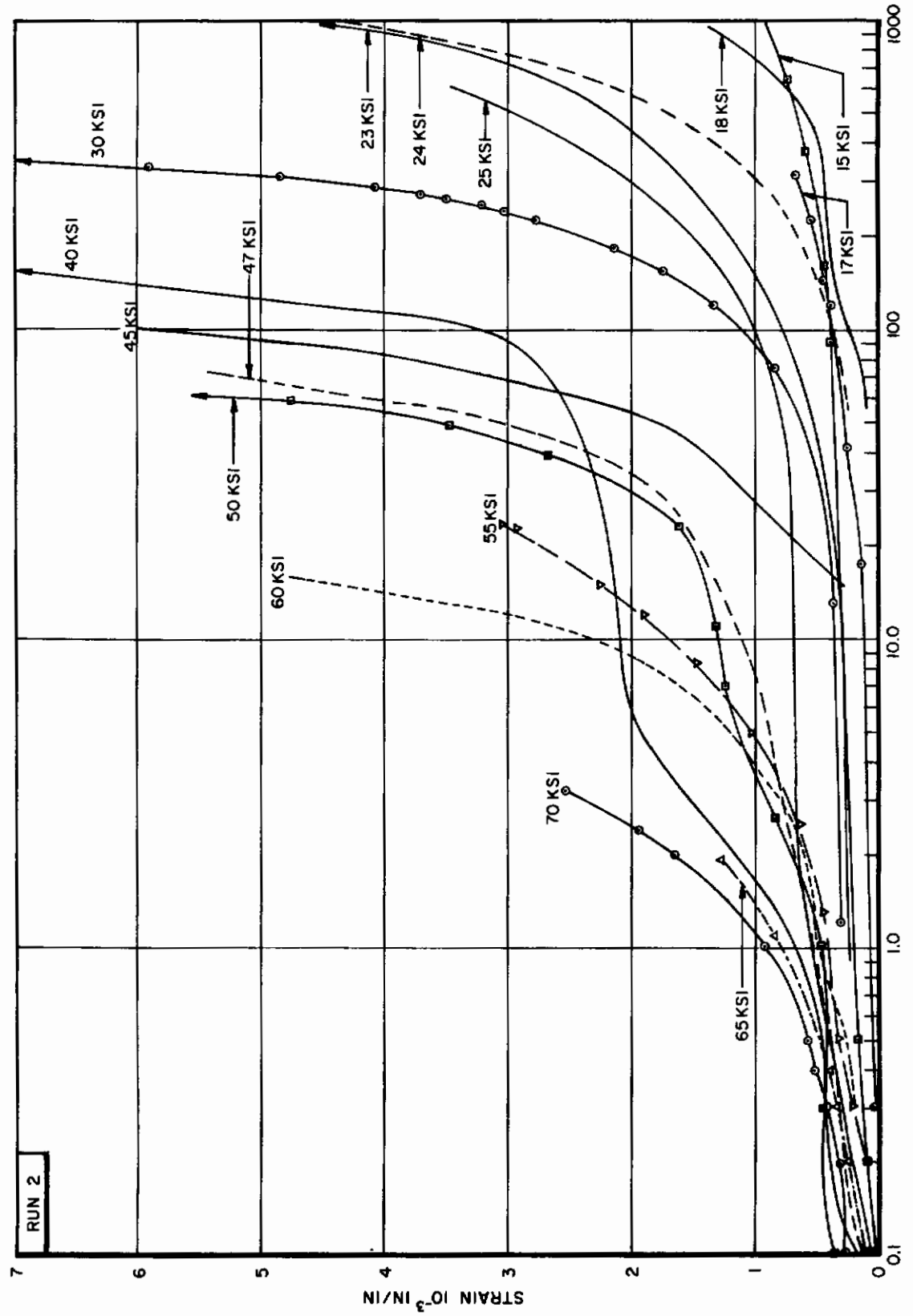


Figure 172. Creep Deformation Versus Log Time of Nimonic 90 Transverse Sheet at 1350°F (1810°R)

TABLE 265

Creep Deformation and Rupture Data at 1350°F (1810°R) for Nimonic 90 Transverse Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
15.0	-	0.105	0.06	1280	-	-	-
17.0	-	0.052	0.07	-	-	-	-
18.0	-	0.13	0.08	795	-	-	-
20.0	-	0.185	0.09	410	-	-	-
22.0	-	0.32	0.10	470	998	-	-
23.0	-	0.66	0.10	178	735	1070	-
24.0	-	0.59	0.11	320	790	1055	-
25.0	610.9	2.0	0.11	117	348	478	-
25.0	-	0.35	0.11	115	571	-	-
30.0	363.4	2.0	0.13	80	244	317	-
35.0	187.8	1.0	0.15	48	143	184	-
40.0	151.8	2.0	0.18	5.9	90	131	-
45.0	109.1	2.5	0.20	27.9	68	93	-
47.0	77.0	1.25	0.21	12	51	71	-
50.0	90.1	3.0	0.22	4.8	41.5	62	-
55.0	33.1	2.0	0.24	4.8	22.7	-	-
60.0	19.1	1.0	0.27	3.3	11.8	17.7	-
65.0	2.9	1.0	0.29	1.4	-	-	-
65.0	2.2	3.0	0.29	1.7	-	-	-
70.0	2.0	1.75	0.31	1.1	-	-	-
70.0	4.1	1.25	0.31	1.1	-	-	-

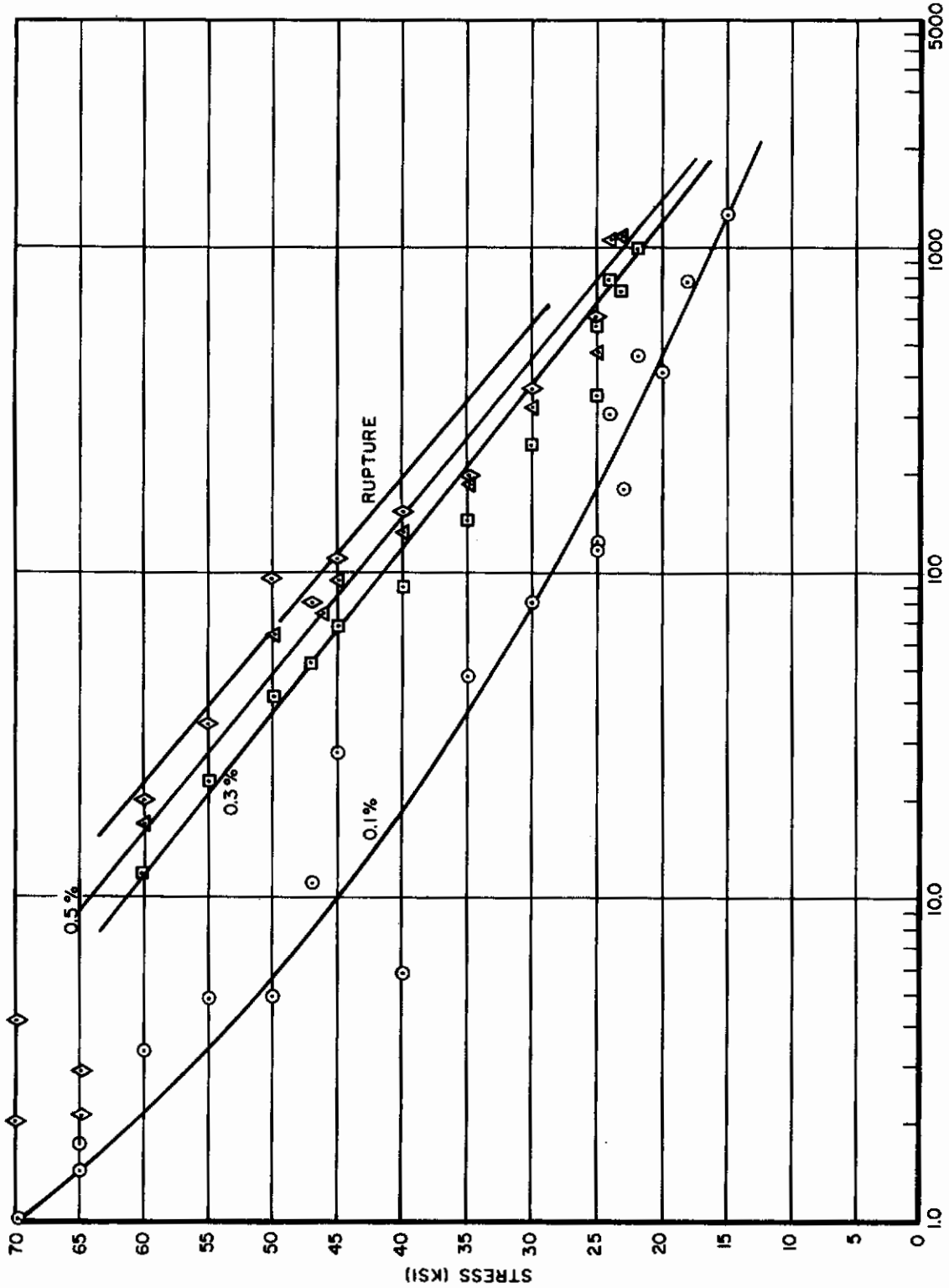


Figure 173. Creep Rupture Properties of Nimonic 90 Transverse Sheet at 1350°F (1810°R)

TABLE 266

Deformation Versus Time (Raw Data) for Nimonic 90 Transverse Sheet at 1500° F (1960° R)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.5000	10.00000E-05	14.000
	2.00000E-04	76.600
	3.00000E-04	173.300
	4.00000E-04	293.400
	6.00000E-04	555.700
	7.00000E-04	605.000
	8.00000E-04	731.100
	9.00000E-04	772.500
	10.00000E-04	820.300
	1.10000E-03	836.800
	1.20000E-03	899.800
	1.40000E-03	973.600
	1.70000E-03	1086.300
	2.20000E-03	1172.000
	3.10000E-03	1325.100
	3.50000E-03	1401.300
9.0000	3.00000E-04	3.600
	5.50000E-04	14.900
	7.00000E-04	16.200
	9.00000E-04	94.300
	1.10000E-03	144.400
	1.50000E-03	240.600
	2.50000E-03	451.200
	3.45000E-03	464.400
	5.65000E-03	577.000
	7.70000E-03	648.600
	9.00000E-03	678.900
	1.12500E-02	720.300
	1.42500E-02	760.900
	1.77000E-02	788.600
	1.96000E-02	800.100
	2.28000E-02	816.300
9.0000	2.70500E-02	831.700

TABLE 266 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
10.0000	3.00000E-04	42.200
	4.50000E-04	80.600
	6.00000E-04	140.500
	8.50000E-04	158.200
	10.00000E-04	331.100
	2.15000E-03	429.400
	3.50000E-03	584.600
	4.00000E-03	667.000
	5.30000E-03	715.500
	6.00000E-03	765.600
	7.05000E-03	806.500
	8.80000E-03	879.900
	10.00000E-03	909.000
	1.77500E-02	1048.000
	2.16000E-02	1075.900
	2.72500E-02	1110.200
12.0000	3.00000E-04	4.700
	5.00000E-04	9.500
	7.50000E-04	31.200
	1.05000E-03	174.600
	1.30000E-03	210.700
	1.50000E-03	223.100
	2.10000E-03	258.100
	3.50000E-03	306.100
	4.50000E-03	353.700
	6.20000E-03	398.100
15.0000	10.00000E-04	19.800
	1.85000E-03	52.800
	1.95000E-03	101.200
	2.50000E-03	125.700
	3.80000E-03	186.500
	5.40000E-03	240.700
	6.30000E-03	270.300
	7.60000E-03	294.400
	9.90000E-03	329.100
	1.51500E-02	376.700
	1.65500E-02	384.000
16.0000	6.00000E-04	5.800
	7.00000E-04	8.300
	8.50000E-04	32.700
	1.40000E-03	40.900
	1.55000E-03	65.500
	1.80000E-03	70.900
	2.35000E-03	95.400
	3.15000E-03	120.000

TABLE 266 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
16.0000	4.20000E-03	143.800
	6.80000E-03	168.600
	7.40000E-03	190.900
	8.30000E-03	201.600
	1.01000E-02	216.700
17.5000	4.00000E-04	7.100
	7.50000E-04	16.000
	1.55000E-03	39.600
	1.95000E-03	54.600
	2.55000E-03	60.900
	3.30000E-03	78.800
	4.40000E-03	95.100
	6.65000E-03	117.600
	9.05000E-03	132.800
	9.90000E-03	136.200
20.0000	2.00000E-04	0.400
	3.00000E-04	0.500
	5.00000E-04	2.300
	1.25000E-03	25.500
	1.85000E-03	37.800
	2.15000E-03	44.000
	3.20000E-03	56.000
	4.30000E-03	65.000
	2.50000E-04	0.500
	1.15000E-03	3.600
	1.60000E-03	14.700
	1.85000E-03	22.600
	2.30000E-03	35.100
	3.30000E-03	49.100
	4.25000E-03	59.400
	6.15000E-03	72.200
	8.05000E-03	84.200
25.0000	2.00000E-04	0.200
	3.00000E-04	0.500
	4.00000E-04	3.000
	1.30000E-03	14.200
	1.80000E-03	21.300
	2.55000E-03	29.100
	3.50000E-03	37.600
	8.85000E-03	60.700
	8.50000E-04	1.500
	1.10000E-03	10.400
	1.80000E-03	17.700
	2.15000E-03	25.100
	4.50000E-03	32.700

TABLE 266 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	3.00000E-04	0.300
30.0000	4.00000E-04	0.500
	6.00000E-04	1.100
	1.02500E-03	2.700
	1.32500E-03	3.200
	1.40000E-03	4.400
	1.47500E-03	5.600
	2.60000E-03	10.400
	2.90000E-03	11.900
	5.40000E-03	16.700
	6.10000E-03	17.500
35.0000	2.00000E-04	0.100
	3.00000E-04	0.300
	3.50000E-04	0.400
	5.00000E-04	0.500
	6.00000E-04	1.000
	1.05000E-03	2.200
	1.30000E-03	3.200
	1.25000E-03	4.000
	1.80000E-03	5.100
	2.05000E-03	5.600
	2.40500E-03	6.600
	2.75000E-03	7.200
36.0000	5.00000E-04	0.100
	6.50000E-04	0.200
	8.50000E-04	0.300
	10.00000E-04	0.500
	1.05000E-03	1.100
	1.55000E-03	2.900
	2.25000E-03	5.100
	5.25000E-03	9.200
	5.85000E-03	9.700
38.0000	1.95000E-03	0.100
	2.15000E-03	0.200
	2.25000E-03	0.300
	2.35000E-03	0.400
	2.40000E-03	0.500
	2.60000E-03	1.000
	2.80000E-03	1.500
	2.95000E-03	2.000
	3.40000E-03	3.000
	4.30000E-03	5.000
	5.10000E-03	6.000
	7.10000E-03	8.100

TABLE 267

Deformation Versus Time (Fitted Data) for Nimonic 90 Transverse Sheet at 1500° F (1960° R)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
7.5000	1.00420E-04	14.000
	1.92520E-04	76.600
	3.04400E-04	173.300
	4.08970E-04	293.400
	6.16480E-04	555.700
	6.67470E-04	605.000
	8.36650E-04	731.100
	9.07560E-04	772.500
	1.00081E-03	820.300
	1.03604E-03	836.800
	1.18624E-03	899.800
	1.39663E-03	973.600
	1.79889E-03	1086.300
	2.17769E-03	1172.000
	3.02843E-03	1325.100
	3.54073E-03	1401.300
9.0000	2.70500E-02	831.700
9.0000	3.00000E-04	3.600
	5.49990E-04	14.900
	7.00000E-04	16.200
	8.99990E-04	94.300
	1.10000E-03	144.400
	1.50000E-03	240.600
	2.50000E-03	451.200
	3.45000E-03	464.400
	5.65000E-03	577.000
	7.70000E-03	648.600
	9.00000E-03	678.900
	1.12500E-02	720.300
	1.42500E-02	760.900
	1.77000E-02	788.600
	1.96000E-02	800.100
	2.28000E-02	816.300
10.0000	3.00000E-04	42.200
	4.49990E-04	80.600
	6.00000E-04	140.500
	8.50000E-04	158.200
	9.99990E-04	331.100
	2.15000E-03	429.400
	3.50000E-03	584.600
	3.99999E-03	667.000
	5.29999E-03	715.500
	6.00000E-03	765.600
	7.04999E-03	806.500
	8.79999E-03	879.900
	10.00000E-03	909.000

RUN 2

TABLE 267 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.77500E-02	1048.000
	2.16000E-02	1075.900
	2.72500E-02	1110.200
12.0000	3.26690E-04	4.700
	4.37270E-04	9.500
	8.15180E-04	31.200
	8.76560E-04	174.600
	1.38279E-03	210.700
	1.59431E-03	223.100
	2.28126E-03	256.100
	3.40808E-03	306.100
	4.69720E-03	353.700
	6.02467E-03	398.100
15.0000	1.16590E-03	19.800
	1.48040E-03	52.800
	2.15264E-03	101.200
	2.56799E-03	125.700
	3.79645E-03	186.500
	5.26556E-03	240.700
	6.37402E-03	270.300
	7.55445E-03	294.400
	9.93114E-03	329.100
	1.52920E-02	376.700
	1.64194E-02	384.000
16.0000	6.84330E-04	5.800
	7.00910E-04	8.300
	9.62060E-04	32.700
	1.09031E-03	40.900
	1.59793E-03	65.500
	1.73426E-03	70.900
	2.46859E-03	95.400
	3.40821E-03	120.000
16.0000	4.53657E-03	143.800
	5.99243E-03	168.600
	7.61541E-03	190.900
	8.52713E-03	201.600
	9.99420E-03	216.700
17.5000	4.27490E-04	7.100
	7.04770E-04	16.000
	1.52934E-03	39.600
	2.13069E-03	54.600
	2.40702E-03	60.900
	3.30882E-03	78.800

RUN 2

TABLE 267 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	4.38003E-03	95.100
	6.64769E-03	117.600
	9.12651E-03	132.800
	9.83760E-03	136.200
20.0000	1.97340E-04	0.400
	2.64610E-04	0.500
	5.80120E-04	2.300
	1.07467E-03	25.500
	1.84686E-03	37.800
	2.31671E-03	44.000
	3.32589E-03	56.000
	4.14377E-03	65.000
	2.53510E-04	0.500
	1.12328E-03	3.600
	1.72126E-03	14.700
	1.77056E-03	22.600
	2.20649E-03	35.100
	3.28042E-03	49.100
	4.40680E-03	59.400
	6.12864E-03	72.200
	8.00899E-03	84.200
25.0000	1.98810E-04	0.200
	3.04010E-04	0.500
	3.85460E-04	3.000
	1.40852E-03	14.200
	1.68874E-03	21.300
	2.42017E-03	29.100
	3.67849E-03	37.600
	8.81575E-03	60.700
	8.28850E-04	1.500
	1.24820E-03	10.400
	1.46784E-03	17.700
	2.45433E-03	25.100
	4.30153E-03	32.700
30.0000	3.25550E-04	0.300

TABLE 267 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
30.0000	3.99170E-04	0.500
	6.04280E-04	1.100
	1.05145E-03	2.700
	1.16675E-03	3.200
	1.40867E-03	4.400
	1.61714E-03	5.600
	2.50684E-03	10.400
	2.93674E-03	11.900
	5.43296E-03	16.700
	6.07544E-03	17.500
35.0000	1.99650E-04	0.100
	3.10300E-04	0.300
	3.73970E-04	0.400
	4.30800E-04	0.500
	6.67500E-04	1.000
	1.00432E-03	2.200
	1.21704E-03	3.200
	1.41738E-03	4.000
	1.77396E-03	5.100
	1.97135E-03	5.600
	2.43411E-03	6.600
	2.75457E-03	7.200
36.0000	4.97840E-04	0.100
	6.75480E-04	0.200
	8.28470E-04	0.300
	9.58330E-04	0.500
	1.12940E-03	1.100
	1.48237E-03	2.900
	2.27358E-03	5.100
	5.30589E-03	9.200
	5.79861E-03	9.700
38.0000	1.95116E-03	0.100
	2.13660E-03	0.200
	2.27976E-03	0.300
	2.34315E-03	0.400
	2.38537E-03	0.500
	2.59435E-03	1.000
	2.80280E-03	1.500
	2.98792E-03	2.000
	3.34614E-03	3.000
	4.34884E-03	5.000
	5.07229E-03	6.000
	7.10158E-03	8.100

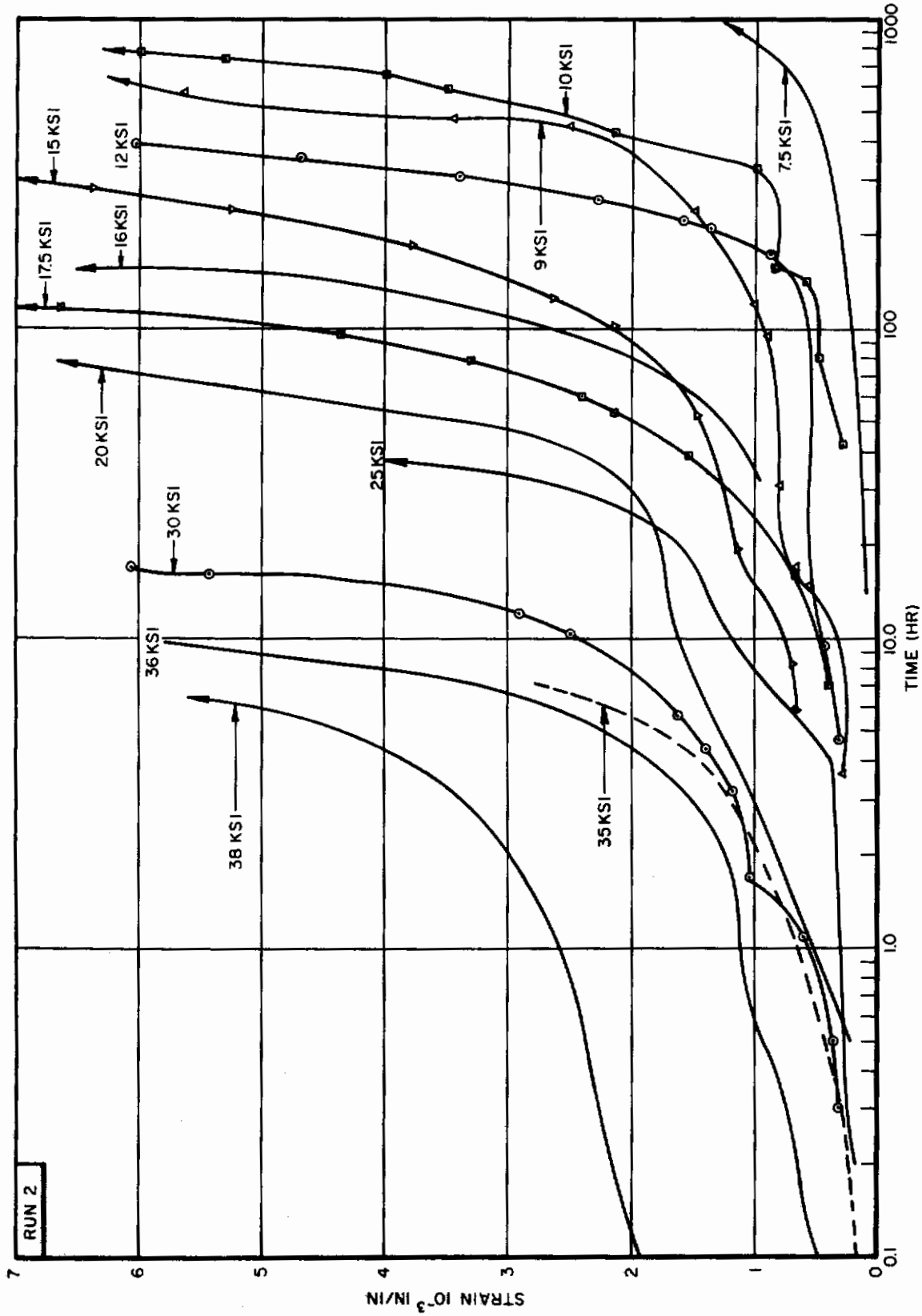


Figure 174. Creep Deformation Versus Log Time of Nimonic 90 Transverse Sheet at 1500°F (1960°R)

TABLE 268

Creep Deformation and Rupture Data at 1500°F (1960°R) for Nimonic 90 Transverse Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%m	1.0%
7.5	-	0.35	0.04	823	1330	-	-
8.0	-	0.53	0.04	522	906	1123	-
9.0	846.8	4.0	0.05	185	435	565	-
10.0	-	3.12	0.05	320	588	708	695
12.0	572.3	3.5	0.06	92	275	372	952
15.0	-	1.56	0.06	18	150	232	488
16.0	-	1.16	0.07	27	114	160	329
17.5	140.4	2.5	0.09	28	74	102	218
20.0	-	0.43	0.10	19.8	54	-	138
20.0	86.7	2.0	0.10	-	44	65.3	-
25.0	65.3	1.50	0.13	10.2	33.8	47.4	-
25.0	39.0	2.0	0.13	6	28.7	34	-
30.0	19.1	1.0	0.15	2.6	12.0	16	-
35.0	13.9	1.0	0.18	2.1	7.5	13	-
36.0	11.0	1.75	0.18	0.5	6.5	9.0	-
38.0	9.5	1.5	0.18	-	2.0	5.9	-

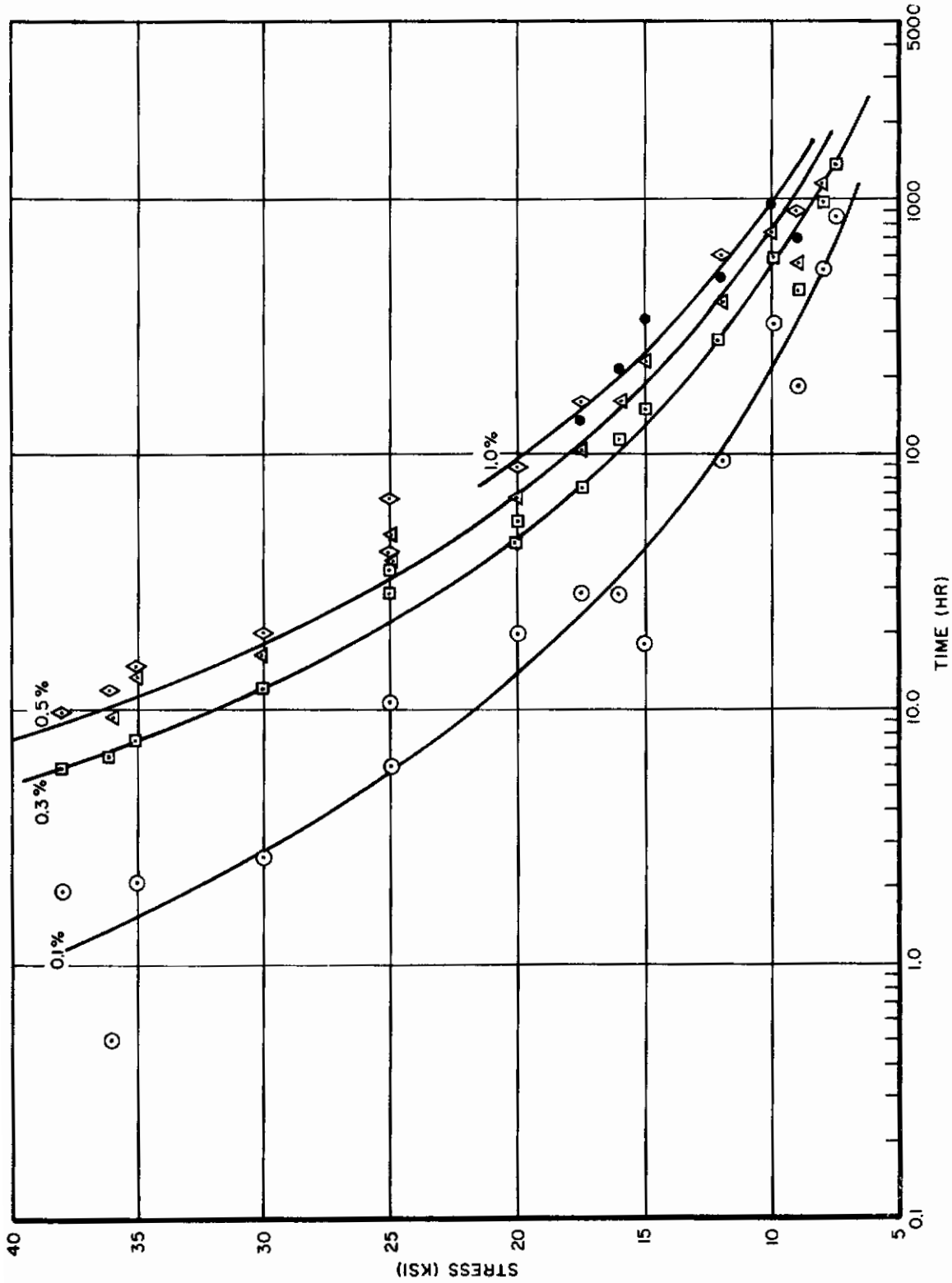


Figure 175. Creep Rupture Properties of Nimonic 90 Transverse Sheet at 1500°F (1960°R)

TABLE 269

Deformation Versus Time (Raw Data) for Nimonic 90 Transverse Sheet at 1650° F (2110° R)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	5.00000E-05	0.400
	10.00000E-05	1.800
	1.50000E-04	21.300
2.0000	2.00000E-04	45.400
	2.50000E-04	93.500
	3.50000E-04	107.700
	4.00000E-04	163.400
	5.00000E-04	235.100
	6.00000E-04	501.000
	7.00000E-04	627.300
	8.00000E-04	779.700
	9.00000E-04	834.600
	10.00000E-04	1036.600
3.0000	2.00000E-04	25.900
	2.50000E-04	49.100
	3.00000E-04	69.900
	3.50000E-04	88.900
	4.00000E-04	105.900
	4.50000E-04	117.600
	5.50000E-04	129.100
	6.00000E-04	145.200
	6.50000E-04	177.800
	7.00000E-04	200.000
	9.00000E-04	279.400
	1.10000E-03	296.500
	1.20000E-03	361.800
	1.30000E-03	391.400
	2.00000E-03	433.100
	2.20000E-03	448.600
	2.80000E-03	474.400
3.5000	5.00000E-05	3.000
	1.50000E-04	20.600
	3.00000E-04	58.600
	4.00000E-04	83.800
	5.00000E-04	195.800
	8.00000E-04	259.700
	10.00000E-04	402.800
	1.40000E-03	484.500
	1.95000E-03	532.300
	2.00000E-03	554.500
	3.20000E-03	747.300
	2.00000E-04	27.400
	4.00000E-04	75.800
	6.25000E-04	124.600

TABLE 269 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	8.50000E-04	202.400
	1.10000E-03	334.500
	2.10000E-03	484.300
	3.20000E-03	559.200
	5.80000E-03	750.300
	7.20000E-03	818.500
	1.26500E-02	1009.600
4.0000	3.00000E-04	34.000
	4.00000E-04	63.300
	5.00000E-04	82.300
	6.00000E-04	145.700
	7.00000E-04	161.900
	9.00000E-04	210.300
	1.25000E-03	245.400
	1.40000E-03	298.800
	1.80000E-03	346.600
	2.10000E-03	360.500
	3.40000E-03	465.200
	5.90000E-03	554.500
	7.10000E-03	648.600
	9.00000E-03	705.800
	1.08000E-02	762.000
5.0000	3.50000E-04	37.500
	5.00000E-04	64.600
	6.50000E-04	103.600
	7.50000E-04	119.800
	9.00000E-04	124.400
	1.25000E-03	160.300
	1.40000E-03	172.100
	1.60000E-03	183.600
	2.00000E-03	213.600
	4.85000E-03	296.100
	5.90000E-03	325.600
	9.35000E-03	374.600
	10.00000E-03	397.300
6.5000	2.50000E-04	0.400
	3.50000E-04	1.500
	4.00000E-04	5.500
	5.00000E-04	12.900
	1.35000E-03	23.600
	1.55000E-03	47.400
	2.20000E-03	61.900
	3.10000E-03	74.500
	5.10000E-03	103.200
	8.00000E-03	127.400

TABLE 269 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
	1.02500E-02	143.200
	1.37000E-02	158.900
	1.86000E-02	171.600
	2.53000E-02	183.000
	3.57500E-02	193.500
8.0000	3.45000E-03	68.200
	5.40000E-03	91.800
	1.07000E-02	116.000
	1.50500E-02	130.800
8.0000	3.16000E-02	152.900
	3.25000E-02	163.100
10.0000	6.00000E-04	14.900
	1.90000E-03	23.300
	2.70000E-03	32.400
	4.30000E-03	47.500
	8.20000E-03	60.400
	1.29000E-02	69.900
	1.63000E-02	74.200
	1.88000E-02	76.900
	2.20500E-02	79.200
15.0000	3.00000E-04	2.400
	8.00000E-04	3.500
	2.50000E-03	11.200
	2.55000E-03	11.700
	4.25000E-03	14.300
	5.15000E-03	15.500
	8.15000E-03	20.200
	1.05000E-02	22.400
20.0000	3.50000E-04	0.300
	4.00000E-04	0.400
	5.50000E-04	0.500
	7.50000E-04	1.100
	8.00000E-04	2.000
	2.35000E-03	3.400
	3.25000E-03	4.900
	6.80000E-03	7.300
	8.80000E-03	8.200

TABLE 270

Deformation Versus Time (Fitted Data) for Nimonic 90 Transverse Sheet at 1650° F (2110° R) RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
2.0000	5.32000E-05	0.400
	9.07700E-05	1.800
	1.61330E-04	21.300
2.0000	2.10830E-04	45.400
	2.85740E-04	93.500
	3.04720E-04	107.700
	3.71200E-04	163.400
	4.44500E-04	235.100
	6.57470E-04	501.000
	7.40680E-04	627.300
	8.31800E-04	779.700
	8.62640E-04	834.600
	9.68930E-04	1036.600
3.0000	1.97980E-04	25.900
	2.46260E-04	49.100
	3.02970E-04	69.900
	3.62810E-04	88.900
	4.20730E-04	105.900
	4.62040E-04	117.600
	5.03200E-04	129.100
	5.60840E-04	145.200
	6.73330E-04	177.800
	7.43700E-04	200.000
	9.46070E-04	279.400
	9.85620E-04	296.500
	1.20857E-03	361.800
	1.40731E-03	391.400
	1.90867E-03	433.100
	2.19248E-03	448.600
	2.82734E-03	474.400
3.5000	4.35800E-05	3.000
	1.44340E-04	20.600
	3.14840E-04	58.600
	3.97870E-04	83.800
	5.89650E-04	195.800
	6.60230E-04	259.700
	1.03769E-03	402.800
	1.49485E-03	484.500
	1.84349E-03	532.300
	2.01993E-03	554.500
	3.20283E-03	747.300

TABLE 270 (CONT)

RUN 2

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
4.0000	3.45780E-04	34.000
	4.05090E-04	63.300
	4.46270E-04	82.300
	6.19650E-04	145.700
	6.76900E-04	161.900
	8.90890E-04	210.300
	1.09371E-03	245.400
	1.49319E-03	298.800
	1.95555E-03	346.600
4.0000	2.11000E-03	360.500
	3.58260E-03	465.200
	5.28398E-03	554.500
	7.50647E-03	648.600
	9.05110E-03	705.800
	1.06888E-02	762.000
5.0000	4.10680E-04	37.500
	4.69070E-04	64.600
	6.42590E-04	103.600
	7.57930E-04	119.800
	7.96240E-04	124.400
	1.19287E-03	160.300
	1.36553E-03	172.100
	1.55628E-03	183.600
	2.16745E-03	213.600
	4.82654E-03	296.100
	6.16322E-03	325.600
	8.84586E-03	374.600
	1.02754E-02	397.300
6.5000	2.50000E-04	0.400
	3.50000E-04	1.500
	4.00000E-04	5.500
	4.99990E-04	12.900
	1.34999E-03	23.600
	1.55000E-03	47.400
	2.19999E-03	61.900
	3.09999E-03	74.500
	5.10000E-03	103.200
	7.99999E-03	127.400
	1.02500E-02	143.200
	1.37000E-02	158.900
	1.86000E-02	171.600
	2.53000E-02	183.000
	3.57500E-02	193.500

RUN 2

TABLE 270 (CONT)

STRESS (KSI)	STRAIN (IN/IN)	TIME (HOURS)
8.0000	3.23135E-03	68.200
	5.41788E-03	91.800
	1.09787L-02	116.000
	1.64112E-02	130.800
	2.19114E-02	152.900
	3.47494E-02	163.100
10.0000	6.01070E-04	14.900
	1.86462E-03	23.300
	2.75075E-03	32.400
	4.35635E-03	47.500
	7.79825E-03	60.400
	1.30344E-02	69.900
10.0000	1.65105E-02	74.200
	1.91229E-02	76.900
	2.16382E-02	79.200
15.0000	3.44810E-04	2.400
	7.22180E-04	3.500
	2.53727E-03	11.200
	2.75934E-03	11.700
	4.13661E-03	14.300
	4.88898E-03	15.500
	8.43609E-03	20.200
	1.03747E-02	22.400
20.0000	3.50000E-04	0.300
	4.00000E-04	0.400
	5.49990E-04	0.500
	7.50000E-04	1.100
	8.00000E-04	2.000
	2.35000E-03	3.400
	3.25000E-03	4.900
	6.80000E-03	7.300
	8.19999E-03	8.200

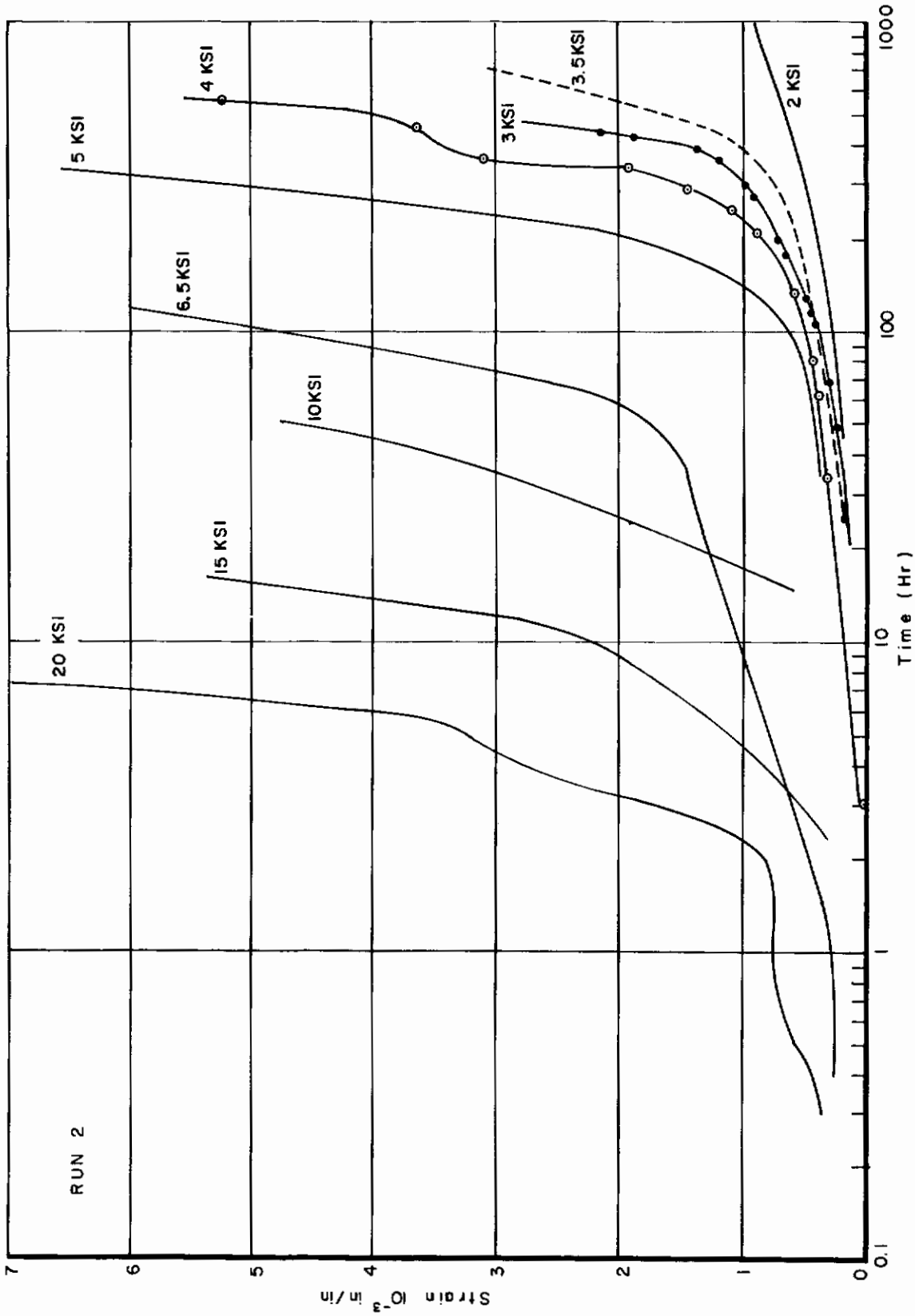


Figure 176. Creep Deformation Versus Log Time of Nimonic 90 Transverse Sheet at 1650°F (2110°R)

TABLE 271

Creep Deformation and Rupture Data at 1650°F (2110°R) for Nimonic 90 Transverse Sheet

Stress (KSI)	Time to Rupture (hours)	Elongation (% in 2 inches)	Loading Deformation (%)	Time to Reach Indicated Deformation (hours)			
				0.1%	0.3%	0.5%	1.0%
2.0	-	0.10	0.02	1200	-	-	-
3.0	-	0.215	0.02	288	-	-	-
4.0	-	1.08	0.03	235	445	559	730
5.0	-	1.15	0.04	145	255	309	394
6.5	218.7	10.3	0.05	30	78	105	143
8.0	164.6	8.0	0.05	18	65	87	114
10.0	83.6	3.5	0.07	10	36	44.6	63
15.0	29.0	3.5	0.10	6	12.1	15.3	22
20.0	10.3	3.0	0.13	1	4.6	6.4	8.6

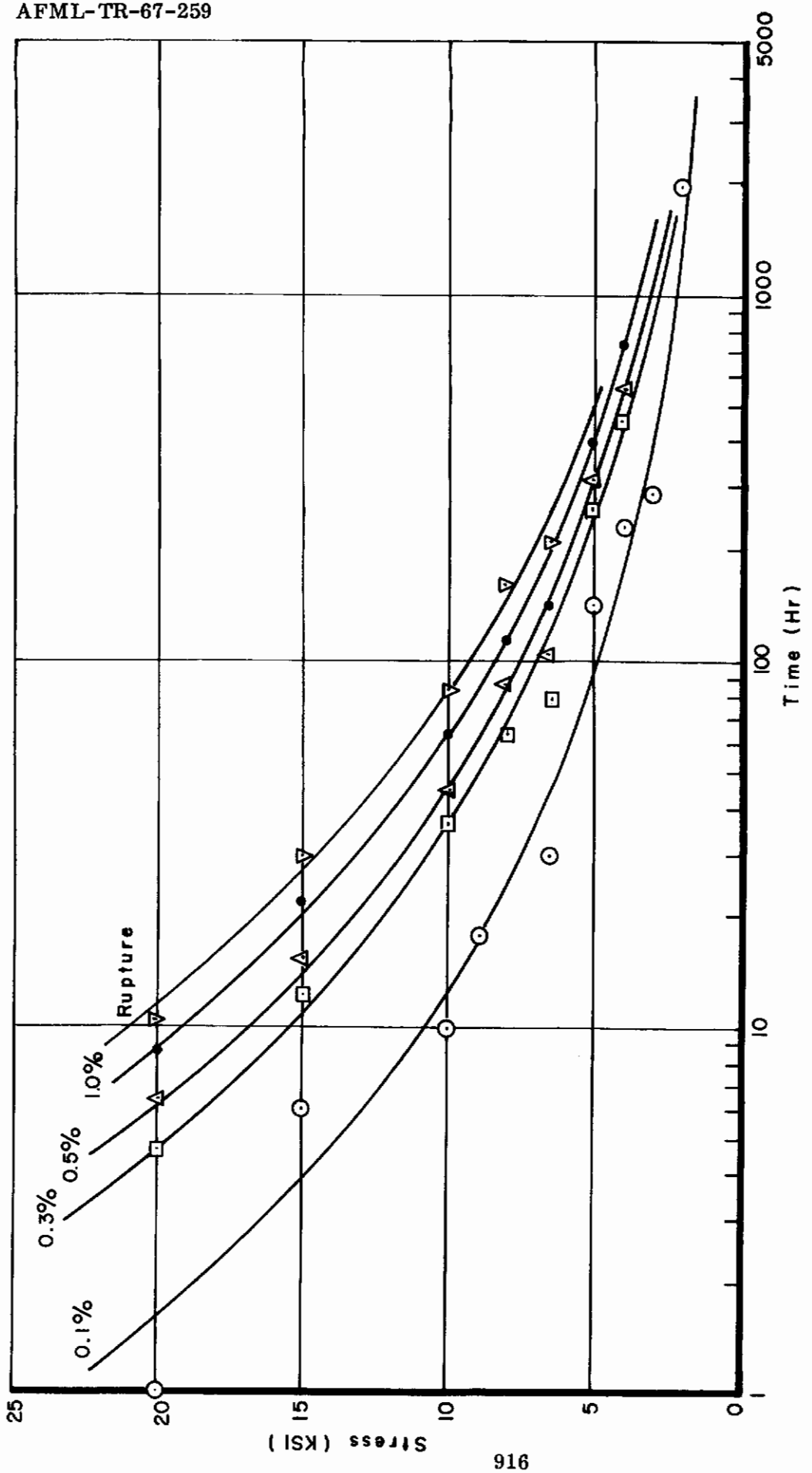


Figure 177. Creep Rupture Properties of Nimonic 90 Transverse Sheet at 1650°F (2110°R)

TABLE 272

Minimum Creep Rate for Nimonic 90 Transverse Sheet

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1350°F (1810°R)	18	7.13×10^{-7}
	22	6.53×10^{-7}
	23	3.05×10^{-6}
	24	2.93×10^{-6}
	25	3.24×10^{-6}
	25	5.21×10^{-6}
	30	4.27×10^{-6}
	40	1.27×10^{-5}
	45	2.63×10^{-5}
	47	2.79×10^{-5}
	50	2.07×10^{-5}
	60	1.69×10^{-4}
	65	3.79×10^{-4}
	70	6.68×10^{-4}
1500°F (1960°R)	7.5	7.91×10^{-7}
	9	2.56×10^{-6}
	10	8.67×10^{-7}
	12	4.28×10^{-7}
	15	9.53×10^{-6}
	16	6.63×10^{-6}
	17.5	3.12×10^{-5}
	20	2.13×10^{-5}
	20	6.24×10^{-6}
	25	3.26×10^{-5}
	25	3.01×10^{-5}
	30	1.74×10^{-4}
	35	2.13×10^{-4}
	36	1.96×10^{-4}
	38	3.58×10^{-4}

TABLE 272 (CONT)

Temperature	Stress (KSI)	Minimum Creep Rate (in/in/hr)
1650°F (2110°R)	3	2.08×10^{-6}
	3.5	1.1×10^{-6}
	4	2.02×10^{-6}
	5	2.15×10^{-6}
	6.5	8.4×10^{-6}
	8	9.26×10^{-5}
	10	9.74×10^{-5}
	15	2.36×10^{-4}
	20	5.56×10^{-5}

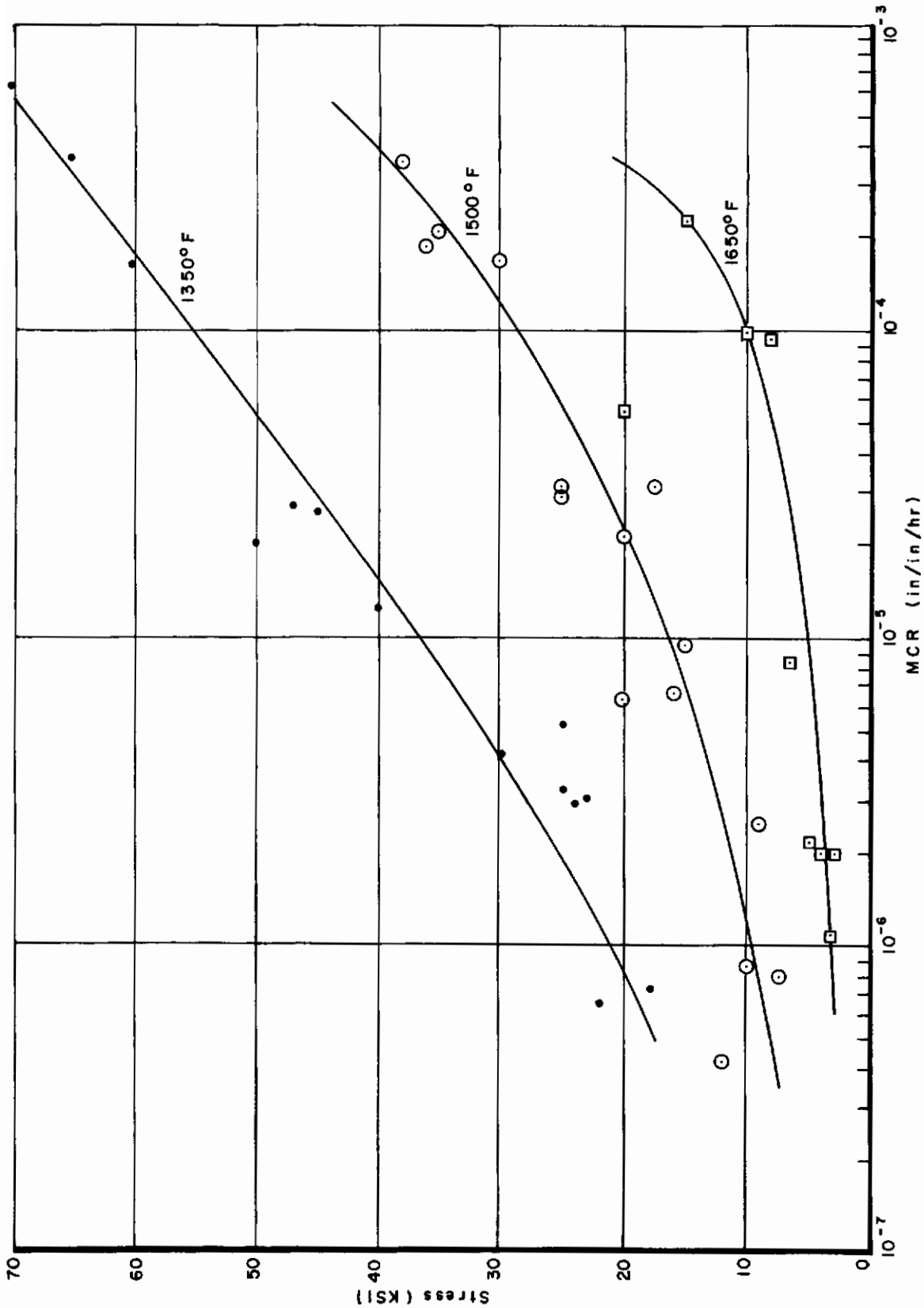


Figure 178. Minimum Creep Rate of Nimonic 90 Transverse Sheet

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4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

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A program was conducted to determine the feasibility and possible advantage of processing conventional creep data through the use of computer program technology and to make generally available previously unpublished creep data. Computer programs were developed to fit data, make necessary calculations, tabulate results, and plot finished curves ready for design use. Raw creep data on 24 materials conducted over several years were processed and are presented in the normal format of tensile and creep data.

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14. KEY WORDS	LINK A		LINK B		LINK C	
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