

## RESUME OF PARACHUTE REQUIREMENTS

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We are moving very rapidly into a new era in parachute applications and have a host of new problems to solve. In this work, we need and solicit the assistance of the best technical brains to furnish the fibers, the finishes and the constructions.

A new body of data on parachute textiles has been brought into being in the past three years and we think this symposium can be the means of presenting it effectively to the industry and to the parachute designers. Work will continue in acquiring further data on the properties of textiles important to parachutes so that everyone connected with them can make better use of the materials we have at hand.

Many people have contributed to the excellent work done during the change-over from the traditional silk to the then new nylon fiber for personnel parachutes. The soundness of the developments made hurriedly under the press of war requirements is attested to by subsequent thorough investigations and by the complete suitability of many of the materials designed several years ago which are still in use today. The growth of the cargo parachute as a war tool made another major impact on the industry. New materials, especially cords and webbings, were needed and were provided by an aggressive and versatile industry. We have now entered a new and even more challenging era in parachute use, an era in which parachutes will be directly involved in the tactical and strategic aircraft, missiles and weapons. The chutes used for deceleration of near sonic and supersonic aircraft, chutes used in the recovery and in the operation of guided missiles, and chutes used for instrument recovery from upper air research missiles are imposing new demands for which present materials are marginal. The principal problems are those incident to all supersonic flights, resistance to higher temperatures brought about by operation of the power plant, air friction and fiber on fiber friction at high speeds. Data which were fairly satisfactory for speeds of 400 miles per hour and pressure differentials of 20 inches of water are hopelessly inadequate when we encounter speeds over 1000 miles per hour and pressures of 1700 inches of water. Data on fiber performance at room temperature are certainly inadequate for predicting performance at 350° F. Friction damage to chutes during opening is a maintenance problem and an annoyance for cargo and personnel chutes. It can spell the difference between recovery and loss of research missiles or upper air instruments costing hundreds of thousands of dollars at the enormous speeds being attained even today. As we look to the future, we must see that increasing temperatures will soon make our present fibers useless for highly critical parachutes.

# Contrails

There is much to be learned of performance of fibers, of friction damage and its antidote, of air flow under all conditions and many other facets of parachute materials. But the most overriding need is for a new textile fiber having adequate strength at temperatures above the fusing point of today's synthetics. For a solution to that problem, we must look to the great chemical companies for new fibers or to the glass companies for new finishes and methods of handling glass fibers.

Investigations of the problems of modern parachutes have brought out the need for certain changes in specifications used for procurements of our fabrics. One change recently made in Specification MIL-C-7020 requires that tear strength be maintained after an oven aging test. In addition, 50,000 yards of nylon twill were recently purchased having a silicone oil finish. We have samples of the fabric in the laboratory for further tests and we expect that this finish will be made standard for Air Force purchased parachute cloth. As we reach higher speeds, we have strong indications that control of air permeability becomes more critical. We now have a contract with an instrument designer to provide a practical permeability device capable of measuring air flow at 20 inches of water. If, after our tests are complete, the device is found to be suitable, we expect to ask that certain fabrics be tested routinely at this pressure.