

## Introduction

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In the June and August 1971 issues of *Materials Research and Standards*, a forum was provided by the American Society for Testing and Materials (ASTM), in conjunction with the Cryogenic Society of America (CSA), so that cryogenic standards could be established. Nine papers describing the progress being made on solving problems in the cryogenic region, aimed essentially at work being conducted by Committee F-7, were published.

We have come a long way since the first attempt in 1967 in development procedures, and now this book describes the efforts being made, not only in support of the aerospace, but also in support of nondefense industries. ASTM and CSA are becoming the focal points for standards as they now impact on the entire cryogenic industry.

The need for standards is perfectly clear as the nation begins to solve the pollution and energy crises. The base for developing these necessary standards was provided by ASTM in their charter for Committee F-7. This has been expanded as described by the papers on "Cryogenics" in *Materials Research & Standards*.

Because of the favorable reaction to the special issues on cryogenics, it was decided to have a joint ASTM-CSA seminar at the Seventy-fifth Annual Meeting of ASTM held in June 1972 in Los Angeles, Calif. The papers in this special technical publication (STP) were prepared not only to show the state of the art, which pointed out the lack of standards, but also emphasized the need for immediate action to develop usable enforceable standards.

This STP lucidly shows the problems in the food industry, which is now a major facet of cryogenics, stressing the need for standards with strict controls necessary for food handlers and processors. The controls now existing are inadequate but Appleman et al point out the urgency for closer cooperation between ASTM, the U. S. Department of Agriculture, and those industries providing cryogenic food processing equipment. Similarly, the impact of lack of standards on the shipment and use of liquefied natural gas (LNG) in motor vehicle systems, including regulations now in effect by the California State Highway Department, are described by R. K. Johnson. ASTM however, should not limit itself to LNG problems as compressed

natural gas (CNG) is also an energy source for motor vehicles. This work is associated with air pollution controls.

Sometimes it is easy to overlook the implications of standards on design consideration and equipment. Some aspects of these problems have been provided by Leonard and McCarthy to give a complete picture showing how fluid standards impact on equipment and equipment testing.

As standards are developed, the sensitivity and reaction intensity of propellant or combustible combinations such as liquid oxygen (LOX)-LNG will be very valuable. The latest available information on these phenomena have been provided by Blackstone et al, with details of tests and analytical procedures. As a guide to Committee F-7, the current Air Force specifications for cryogenic propellants and pressurizing gases with details of the current assay procedures have been provided. These specifications described by Forbes have been used for procurement but with help and "massaging" by Committee F-7 can be modified to become ASTM standards. Also, in support of Committee F-7, a complete bibliography of the thermodynamic and transport properties of cryogenic fluids by V. J. Johnson has been included. It is a survey article that shows where information on these properties can be found for helium, hydrogen, argon, nitrogen, oxygen, fluorine, and methane.

Thus, this book will become a reference or source document for all ASTM members since many ASTM committees will be required to interface with the cryogenic industry as the energy and pollution control problems are resolved. It should also be of benefit to industry, to many government agencies, and to academe since these problems affect our way of life and possibly our survival.

For example, unless man can prevent deterioration of the ozone layer in the stratosphere, we are in trouble from ultraviolet (UV) radiation. With a 50 percent reduction in ozone, a tenfold increase in UV will result and what this can do to our ecology—to plants and animals, including man, may be catastrophic. Therefore it is hoped this volume will provide the impetus for the immediate preparation of ASTM standards and that through the membership of the Cryogenic Society of America, including its Helium Division and other supporting agencies, the cryogenic problems requiring standards will soon be resolved.

In conclusion, this STP clearly shows that ASTM is on the move in cryogenics. We have launched a long-term growth pattern for the support of the cryogenic's industry.

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