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NASA TECH BRIEF

Lewis Research Center



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Liquid and Gaseous Oxygen Safety Review

Oxygen in both liquid and gaseous form is used extensively in the space program. Safe practices in the handling and use of oxygen are of prime concern. NASA's Aerospace Safety Research and Data Institute, located at the NASA Lewis Research Center, collects, evaluates and organizes safety-related information on space program materials for use by NASA and others. As a part of this program, a detailed study has been prepared of Air Products and Chemicals, Inc. and Air Products, Ltd. corporate practices in the design and use of equipment in oxygen service.

This study includes liquid and gaseous oxygen safety information covering:

1. **Material Compatibility.** Materials used in oxygen systems, whether in direct contact with oxygen or exposed to oxygen-rich air as a result of leaks or accidents, are listed, and allowable oxygen environments are specified for each material. Methods and tests used to evaluate compatibility of materials are described. Design criteria, cleaning procedures and quality control methods are covered.

2. **Operational Hazards.** Guidelines, codes, regulations and special procedures employed in design, fabrication, installation, testing and operation for protection against hazards involved with production, transportation, storage and use of oxygen are presented.

3. **Maintenance Programs.** Practices employed to minimize both accident probabilities and the consequences of accidents and incidents are described.

4. **Systems Emergencies.** Practices employed to handle emergencies are described in detail. Training, warning, and protection of personnel and equipment are discussed.

5. **Accident/Incident Investigations and Reports.** Accidents involving oxygen which have occurred in the industry in general and in the company in particular are reviewed.

The study also lists extensive references.

Areas needing further research and development are noted.

Notes:

1. This review was made by Air Products and Chemicals, Inc. of their corporate practices and those of Air Products, Ltd. for NASA's information and reference use. Publication of this review by NASA does not constitute endorsement, approval or recommendation of these practices by NASA.

2. This review has been published as:
NASA CR-120922 (N73-14718), Liquid and Gaseous Oxygen Safety Review

Copies may be obtained at cost from:
Aerospace Research Applications Center
Indiana University
400 East Seventh Street
Bloomington, Indiana 47401
Telephone: 812-337-7833
Reference: B73-10310

3. Specific technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B73-10310

4. The following related handbooks on oxygen are also available at cost from the Aerospace Research Applications Center (address above):

NASA SP-3071 (N73-13952), ASRDI Oxygen Technology Survey, Volume I: Thermophysical Properties

NASA SP-3072 (N73-15155), ASRDI Oxygen Technology Survey, Volume II: Cleaning Requirements, Procedures, and Verification Techniques

Source: Abraham Lapin
Air Products & Chemicals, Inc.
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