INTERNATIONAL STANDARD

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Space systems — Oxygen safety —

Part 2: Selection of metallic materials for oxygen systems and components

Systèmes spatiaux — Sécurité des systèmes d'oxygène —

Partie 2: Sélection des matériaux métalliques pour les systèmes d'oxygène et leurs composants

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 22538-2 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

ISO 22538 consists of the following parts, under the general title *Space systems — Oxygen safety*:

— *Part 1: Design of oxygen systems and components*

— *Part 2: Selection of metallic materials for oxygen systems and components*

— *Part 3: Selection of non-metallic materials for oxygen systems and components*

— *Part 4: Hazards analyses for oxygen systems and components*

The following parts are under preparation:

— *Part 5: Operational and emergency procedures*

— *Part 6: Facility planning and implementation*

Introduction

Metallic materials, although used extensively, are flammable in oxygen. The ignitability of metallic materials varies considerably, but the risk associated with the flammability of metallic materials can be minimized through proper selection combined with proper design. When selecting metallic materials for high-pressure oxygen systems, the susceptibility to ignition of the metal and the possible ignition sources in the system are given equal consideration with the structural requirements.

Mechanical or particle impact is a credible ignition source in high-pressure oxygen systems. Other mechanisms for ignition of metallic materials are considered, although test data may not exist. Ignition of metallic materials by burning contaminants has not been studied experimentally, but the use of incompatible oils and greases (especially hydrocarbon greases) is one of the more common causes of oxygen-system fires. Improper component design or installation can result in a fire when metallic materials with insufficient mechanical strength are chosen for the given application.

Space systems — Oxygen safety —

Part 2: Selection of metallic materials for oxygen systems and components

1 Scope

This part of ISO 22538 describes a process for the selection of metallic materials for oxygen systems and their components. This part of ISO 22538 applies equally to ground support equipment, launch vehicles and spacecraft.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4589 (all parts), *Plastics — Determination of burning behaviour by oxygen index*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
direct oxygen service
service in which materials and components are in direct contact with oxygen during normal operations

3.1.2
indirect oxygen service
service in which materials and components are not normally in direct contact with oxygen but might be as a result of a malfunction, operator error or process disturbance

3.1.3
oxygen-enriched atmosphere
mixture (gas or liquid) that contains more than 25 volume percent oxygen

3.2 Abbreviated terms

AIT auto-ignition temperature

GOX gaseous oxygen

LOX liquid oxygen