

Cryogenic vessels — Gas/materials compatibility

ICS 23.020.40

National foreword

This British Standard reproduces verbatim ISO 21010:2004 and implements it as the UK national standard.

The UK participation in its preparation was entrusted to Technical Committee PVE/18, Cryogenic vessels, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Summary of pages

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Foreword

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ISO 21010 was prepared by Technical Committee ISO/TC 220, *Cryogenic vessels*.

Cryogenic vessels — Gas/materials compatibility

1 Scope

This International Standard specifies gas/materials compatibility requirements (such as chemical resistance) for cryogenic vessels but it does not cover mechanical properties (e.g. for low temperature applications).

It gives general guidance for compatibility with gases and detailed compatibility requirements for oxygen and oxygen-enriched atmospheres. This International Standard also defines the testing methods for establishing oxygen compatibility of materials (metallic and non-metallic) to be used for cryogenic vessels and associated equipment.

This International Standard focuses on materials that are normally with or could be in contact with cryogenic fluids.

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 10297:1999, *Gas cylinders — Refillable gas cylinder valves — Specification and type testing*

ISO 23208, *Cryogenic vessels — Cleanliness for cryogenic service*

3 Compatibility of materials with gases other than oxygen

Cryogenic vessels are used in a range of temperatures from very low temperature to ambient temperature. On excluding oxygen, compatibility problems such as corrosion and hydrogen embrittlement normally occur at ambient temperature and become negligible at cryogenic temperatures.

In the case of gases other than oxygen, ISO 11114-1 and ISO 11114-2 may be used as a guide for cryogenic vessels.

4 General requirements for oxygen service

4.1 Evaluation of materials for oxygen service

4.1.1 General

The selection of a material for use with oxygen and/or in an oxygen-enriched atmosphere is primarily a matter of understanding the circumstances that cause oxygen to react with the material. Most materials in contact with oxygen will not ignite without a source of ignition energy. When an energy input rate, as converted to heat, is greater than the rate of heat dissipation, and the resulting heat increase is continued for sufficient time, ignition and combustion will occur. Thus, two things shall be considered: