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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 31481-2015

Guidance for gas/materials compatibility of cryogenic vessels

深冷容器用材料与气体的相容性判定导则

(English Translation)

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4.1 Pairs of materials evaluation oxygen conditions

Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules.

This standard uses the translation method identical with ISO 21010:2014 "cryogenic gas container and material compatibility." this standard and ISO 21010:2014 in comparison, made the following editorial changes.

Units --- The standard pressure value by bar in terms of MPa;

--- Appendix A, supplemented with "oxygen conditions commonly used in metal materials shown in Table A.1," the key words, Table A.1 selected by the flag "x" to "sqrt", and gives Remarks at the table;

--- According to the test report given in Appendix B sample contents of the table, adjust the test report Table B.1;

--- Figure B.2, the key 2 (pressure natural temperature value) corresponding to the dotted line extends to the Z axis;

--- By the original standard error, the C.4 in 11 to 9 members and an inner diameter 14mm outer diameter 14mm modifications; Figure C.1, the member no. 9 (connecting pipe) clear outer diameter of 14mm, an inner diameter of 11mm, delete key 11 and its associated content.

This standard by the National Standardization Technical Committee of the boiler pressure vessel (SAC/TC262) and focal points.

This standard was drafted. Shanghai Gas Industry Association, East China University of Technology, China Special Equipment Inspection and Research Institute, the National Petroleum refining Drilling of Quality Supervision and Inspection Center, Air Liquide (China) Investment Co., Ltd., Hangzhou specialty materials Fujitec Co., Ltd., Jiangsu special Equipment Safety Supervision Inspection Institute branch in Zhangjiagang, Changzhou

Braun Cryogenic Equipment Co., Ltd., CIMC Enric Holdings Investment (Shenzhen) Co.,
Division Shanghai Institute of Special Equipment Inspection, Shanghai Huayi Group
Equipment Engineering Co., Ltd., Nantong CIMC Tank Equipment System Co., Ltd. made.

1 Scope

This standard specifies the cryogenic gas container material compatibility requirements, but not included in the conditions of low temperature mechanical performance requirements.

This standard specifies the general principles of material and gas compatibility determination, pure oxygen or oxygen-enriched material and environmental compatibility as well as the specific requirements Cryogenic container and its ancillary equipment Compatibility Test methods for metallic and non-metallic materials with oxygen.

This standard applies to refrigerated liquefied gases media environment, and materials may come into contact with the refrigerated liquefied gas.

2 Normative references

The following documents for the application of this document is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document.

ISO 10297:1999 Cylinders refillable cylinder valve technical requirements and type testing
(Transportable gas cylinders-Cylinder valves-Specification and type testing) ISO 23208
cryogenic containers cryogenic conditions cleaning requirements
(Cryogenic vessels-Cleanliness for cryogenic service)

3 Compatibility than, material in addition to oxygen gas

Cryogenic container application temperature range from ambient up to the lowest possible temperature. When not involved in oxygen conditions, generally at room temperature to consider the compatibility of corrosion and hydrogen embrittlement, etc., in cryogenic conditions generally can be ignored.

Cryogenic material in the container with gas other than oxygen compatibility, refer to ISO 11114-1 and ISO 11114-2.

4.1.1 General requirements

The choice of material pure oxygen or oxygen-enriched environment, should be based on the material and lead to oxygen reacts conditions. In the absence of light energy Source, most of the materials in contact with oxygen and combustion reaction does not occur. When the energy input and conversion to heat faster than the rate of energy dissipation when the accumulated heat continued to increase, it will cause the material to ignite and burn.

Therefore, whether the material is ignited and burned it depends on the following two Elements.

--- Minimum ignition temperature of the material;

--- To make the temperature of the material rises the temperature of the ignition energy source.

Making the whole system design should address the above two factors, the following specific factors key consideration.

--- Material properties include. improving the combustible factors and so potentially devastating consequences of the condition occurs (reaction heat);

--- Materials which conditions. pressure, temperature, gas flow rate, concentration of oxygen and oxygen state (gaseous or liquid), and by ISO 23208 Surface contamination defined;

--- Potential ignition source. friction, the heat of compression quality impact-generated heat, the heat generated by particle impact, static electricity, electric arc, resonance, internal