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Gas welding equipment — Acetylene manifold systems for welding, cutting and allied processes — General requirements

Matériel de soudage aux gaz — Centrales de détente pour la distribution d'acétylène pour le soudage, le coupage et les techniques connexes — Exigences générales

[Revision of first edition (ISO 14114:1999)]

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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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 14114 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 12, and by Technical Committee CEN/TC 121, *Welding* in collaboration.

Introduction

Requests for official interpretations of any aspect of this standard should be directed to the Secretariat of ISO/TC 44/SC 8 via your national standards body, a complete listing which can be found at www.iso.org.

Gas welding equipment — Acetylene manifold systems for welding, cutting and allied processes — General requirements

1 Scope

This standard applies to acetylene cylinder manifold systems extending from the cylinder valve or the bundle outlet connections to the outlet connection of the main shut-off valve. It specifies requirements for design, materials and testing of cylinder manifold systems for the supply of acetylene for use in welding, cutting and allied processes.

This standard applies to acetylene cylinder manifold systems in which acetylene single cylinders or acetylene bundles are coupled for collective gas withdrawal. The national regulations regarding limitation of the amount of single cylinders / bundles shall be considered.

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 5175:1987, *Equipment used in gas welding, cutting and allied processes — Safety devices for fuel gases and oxygen or compressed air — General specifications, requirements and* tests

ISO 7291:2010, *Gas welding equipment - Pressure regulators for manifold systems used in welding, cutting and allied processes up to 30 MPa (300 bar)*

ISO 9090:1990, *Gas tightness of equipment for gas welding and allied processes*

ISO 9539:2010, *Materials for equipment used in gas welding, cutting and allied processes*

ISO 14113:2009, *Gas welding equipment —Rubber and plastics hose and hose assemblies for use with industrial gases up to 450 bar (45 MPa)*

ISO 15296:2004, *Gas welding equipment — Vocabulary — Terms used for gas welding equipment*

ISO 15615:2010, *Safety requirements in high-pressure devices*

ISO 10961:2010, *Gas cylinders - Cylinder bundles - Design, manufacture, testing and inspection*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15296 and the following apply.

3.1
acetylene manifold systems
assembly of devices generally linking one or more gas sources coupled to a user pipeline system, delivering a regulated pressure under specified safe conditions

NOTE 1 to entry A manifold includes for example components like collectors, safety devices, and pressure regulators.

3.2
acetylene cylinder bundles (packs)
assembly of cylinders fastened together, interconnected by a manifold for collective filling and gas withdrawal, and intended to be transported as a single unit

3.3
pressures
high pressure: > 1,5 bar (0,15 MPa) up to 25 bar (2,5 MPa)

Low pressure: ≤ 1,5 bar (0,15 MPa)

NOTE 1 to entry All pressures are given as gauge pressures.

3.4
manifold high pressure pipework
pipework system extending from the outlet connection of acetylene cylinders or bundles at full charging pressure to the inlet of the pressure regulator, including as required hose assemblies or coiled metal pipes, piping and high pressure valves

3.5
flame arrestor
device which arrests a flame front

[ISO 15296:2004, 2.4.3]

3.6
low pressure valves

3.6.1
temperature sensitive cut-off valve
device which stops the gas flow when a predetermined temperature is reached

[ISO 15296:2004, 2.4.5]

3.6.2
pressure sensitive cut-off valve
device which interrupts the gas flow in the event of a back pressure wave from the downstream side

[ISO 15296:2004, 2.4.7]

3.6.3
main shut-off valve
main valve downstream of the system

3.7
high pressure valves

3.7.1
quick-acting shut-off device
safety device which prevents the continued withdrawal of acetylene and/or gaseous products of decomposition from the manifold system if an acetylene decomposition or a flashback occurs

3.7.1.1
manual quick acting shut-off valve
device which allows rapid manual interruption of the gas flow

[ISO 15296:2004, 2.4.9]

3.7.1.2
automatic quick acting shut-off device
self-acting device which closes quickly. e.g. when triggered by acetylene decomposition in the high pressure manifold pipework

[ISO 15296:2004, 2.4.10]

3.7.2
high pressure stop valve
device to prevent, when closed, the flow of gas on the high pressure side

3.8
pressure limiting device
device which limits the pressure downstream of the manifold regulator in the event of regulator failure or malfunction

NOTE 1 to entry Examples of such devices are: (a) relief valve, (b) pressure actuated shut-off valves, (c) manual or automatic systems to cut the flow, (d) pressure actuated venting device.

3.9
non-return valve
device which prevents passage of gas in the direction opposite to normal flow

[ISO 15296:2004, 2.4.2]

3.10
purge valve
device which enable a pipework system to reach atmospheric pressure or eliminate undesirable gases or residues by flushing

3.11
change-over unit
device in a two sided system allowing switching the supply of gas from the system to either of its bank of cylinders or bundles without interrupting supply

NOTE 1 to entry The switching action may be manually or automatically actuated

3.12
three way valve
device which allows gas flow from one side of the high pressure manifold to enter the regulator while isolating flow from the second side

3.13
pressure regulators for manifold systems
device for regulating a generally variable inlet pressure to as constant as possible an outlet pressure when controlling the output of a manifold of cylinders

[ISO 7291:2010, 3.1]

3.14
decomposition arrestor
device which stops acetylene decomposition

3.15
high pressure filter
device to retain particles with a size of 100 µm or greater

4 Design and materials

4.1 Requirements for the manifold system and its components

Acetylene cylinder manifold systems shall be equipped with the following system components:

a) high pressure non-return valve according to ISO 15615 to provide non-return flows and to prevent air and moisture contamination, located immediately downstream of the cylinder or bundle outlet. Alternatively a combination of purge valve and non return valve can be used;

b) high pressure pipework or coiled metal pipe with pipe wall thicknesses determined according to the methods in ISO 10961 to connect the cylinder or bundle outlet to the manifold inlet valve, including high pressure hoses according to ISO 14113;

c) manual (only possible for systems up to 2x8 cylinders) or automatic shut-off valves according to ISO 15615 upstream of the manifold regulator;

d) for a two side system, a three way valve or a change over unit can be used instead of the two high pressure stop valves;

e) pressure regulators for manifold systems according to ISO 7291 or for change over units;

f) pressure limiting device according to ISO 5175 down stream of the manifold regulator. Any vented gas shall be piped to a safe location. The pressure limiting device shall be sized in such a way that the low pressure side of the manifold does not exceed two times the working pressure in any case.

g) low-pressure pipework downstream of the pressure regulator;

h) Safety devices according to ISO 5175 for the low pressure output of the manifold system, including as appropriate single or combination devices for non-return flow, flame arresting, temperature or pressure sensitive flow cut-off valve. In the case of a pipework with inner diameter ≥ 25 mm at the low pressure side of the system, as an alternative to the above mentioned safety devices, a decomposition arrestor (see 5.3) with a temperature or pressure sensitive cut-off can be installed, if the downstream system is already protected with non-return valves.

Annex A gives examples for the configuration of the system components. Manifold systems having configurations different from those detailed in Annex A may be presumed to be in compliance with the safety objectives of this Standard if it can be demonstrated that an equivalent degree of safety is obtained.

4.2 Materials of construction

The materials shall be resistant to acetylene, acetone and dimethylformamide (DMF) as well as to the mechanical, chemical and thermal loads which occur under operating conditions in accordance with ISO 9539 and ISO 14113.

4.3 High pressure flexible hoses

High-pressure flexible hoses shall be in accordance with ISO 14113.

5 Tests

5.1 Strength test

All high-pressure and low-pressure manifold components shall be tested for their resistance to the pressures likely to be encountered in acetylene service.

For the high-pressure part, all components shall withstand an hydraulic test of 315 bar (31.5 MPa) for five minutes unless individual standards covering them require higher pressures. After pressurisation there shall be no visible permanent deformation. Additionally, high pressure pipework design minimum wall thicknesses should allow for acetylene decomposition overpressures.

For the low-pressure part., components shall withstand a pneumatic test of minimum 24 bar (2,4 MPa).

NOTE Design recommendations for high pressure pipework are given in documents such as IGC 123/04 or equivalent.

System components which have been pressure tested according to other standards for acetylene service shall be removed or otherwise protected before the strength test, e.g. pressure gauges, relief valves, regulators.

5.2 External gas tightness test

The manifold system shall be tested for leaks at commissioning on site by the installer. No visible leakage shall be detected when tested as specified below.

Two tightness tests shall be performed on the high-pressure part:

a) a test at low-pressure at 1 bar (0,1 MPa);

b) a test at high-pressure at least at 18 bar (1,8 MPa).

The low-pressure part [between the regulator outlet and the outlet connection of valve 17 (see annex A)] shall be tested at the maximum outlet pressure of the regulator.

5.3 Decomposition arrestor

The decomposition arrestor shall stop acetylene decomposition, when tested in accordance with Annex C.

When the decomposition arrestor is subjected to acetylene decomposition there shall be no visible permanent deformation or part ejection” The flame detector shall not detect a flame.

6 Marking

The following information shall be clearly and permanently marked on a plate permanently fixed to the manifold system:

a) Number of this standard;

b) Name or trademark of the manufacturer or distributor;

c) Type of gas “Acetylene”;

d) Maximum regulated pressure [bar] [MPa];

e) Maximum flow of the system at 15°C [m^3/h];

f) Minimum and maximum operation temperature (– 20 °C/+ 60 °C);

g) The year and month of manufacturing/installation.