TC 44

International Standard ISO 5175/1

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Gas welding and cutting equipment and allied processes — Safety devices for fuel gases and oxygen or compressed air — Part 1: General specifications and requirements

Équipement de soudage aux gaz, de coupage et procédés connexes — Dispositifs de sécurité pour les gaz combustibles et l'oxygène ou l'air comprimé — Partie 1: Spécifications et exigences générales

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 5175/1 was developed by Technical Committee ISO/TC 44, *Welding and allied processes*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Austria	Egypt, Arab Rep. of	Korea, Rep. of
Belgium	Finland	Mexico
Brazil	France	Netherlands
Bulgaria	Germany, F.R.	Norway
Canada	India	Poland
China	Ireland	South Africa, Rep. of
Czechoslovakia	Italy	Sweden
Denmark	Japan	Switzerland

The member bodies of the following countries expressed disapproval of the document on technical grounds:

Australia	United Kingdom
New Zealand	USA

Printed in Switzerland

Gas welding and cutting equipment and allied processes — Safety devices for fuel gases and oxygen or compressed air — Part 1: General specifications and requirements

1 Scope and field of application

ISO 5175/1 gives the general specification and requirements of safety devices for fuel gases and oxygen or compressed air used downstream of cylinder or pipeline outlet regulators and of pipeline outlet valves, and upstream of blowpipes for welding, cutting and allied processes.

It does not specify test requirements, which are specified in ISO 5175/2 (at present in preparation), or location and combination of these devices in the gas system.

2 References

ISO 48, *Vulcanized rubbers — Determination of hardness (Hardness between 30 and 85 IRHD).*

ISO 175, *Plastics — Determination of the effects of liquid chemicals, including water.*

ISO 2503, *Welding — Regulators for gas cylinders used in welding, cutting and allied processes.*[1)]

ISO 2928, *Rubber hoses for liquefied petroleum gases (LPG).*

ISO 3253, *Hose connections for equipment for welding, cutting and related processes.*

ISO 3821, *Welding — Flexible hoses for gas welding and allied processes.*

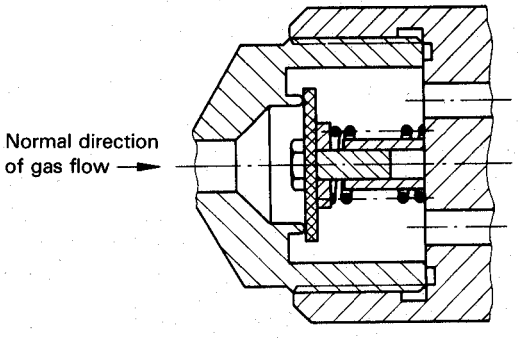
3 Definitions and functions

3.1 safety device: A device which, when correctly used and placed, prevents the damage resulting from misuse or malfunction of the blowpipe or associated equipment.

3.2 non-return valve: A device which prevents passage of gas in the direction opposite to normal flow.

Example:

Valve is held open by energy in gas stream and closes when downstream pressure is approximately equal to or greater than that in normal direction of flow.

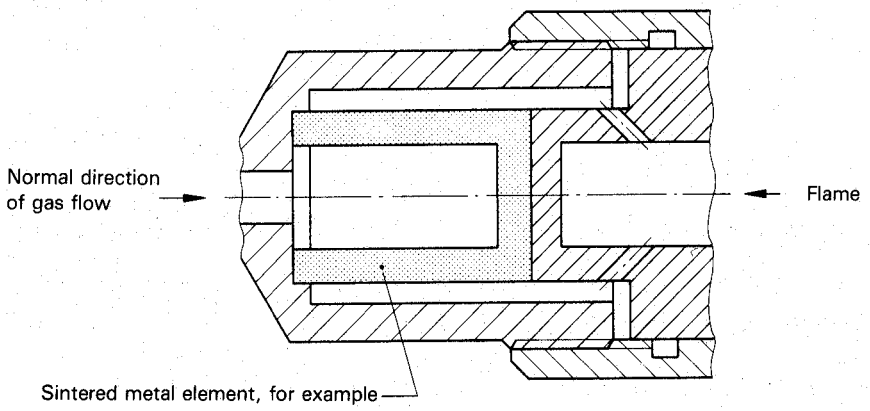


3.3 flame arrestor: A device which quenches a flame front (flashback or decomposition). Depending on design, devices are effective in one or both directions.

Example:

The good thermal conductivity, low porosity and small pore size (larger surface) of sintered metal elements lead to flame quenching.

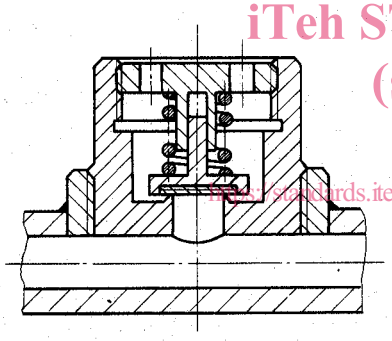
1) At present at the stage of draft. (Revision of ISO 2503-1972.)



3.4 pressure-relief valve: A device which automatically vents gas to the atmosphere when the pressure exceeds some pre-determined value and seals again when the pressure returns to within specified limits of that value.

Example:

Valve is held closed by a spring; it opens when force caused by internal pressure rise exceeds the spring load.

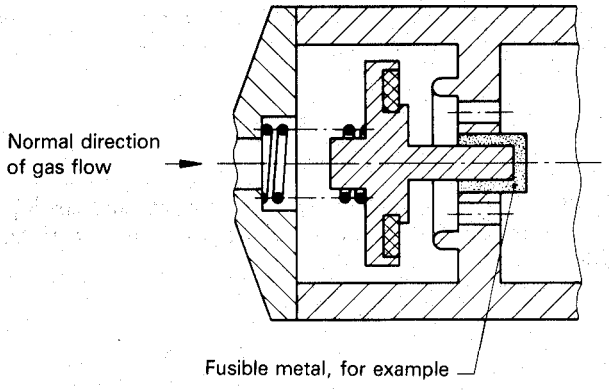


3.5 Cut-off valve

3.5.1 cut-off valve (temperature sensitive): A device which stops the gas supply when a pre-determined temperature is reached.

Example:

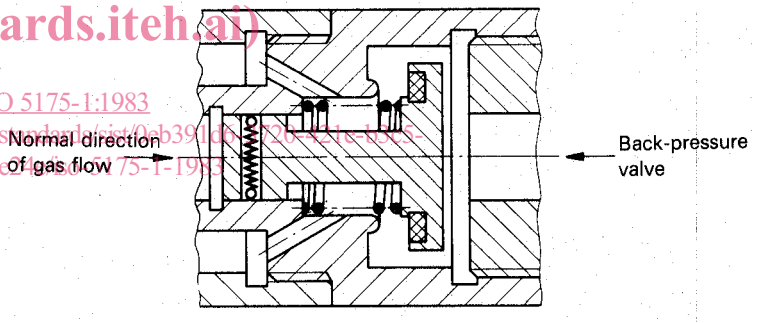
Valve is held open, for example by a fusible metal, and actuated by sustained temperature rise.



3.5.2 cut-off valve (pressure sensitive): A device which closes in the event of a back-pressure wave from the downstream side of the cut-off valve.

Example:

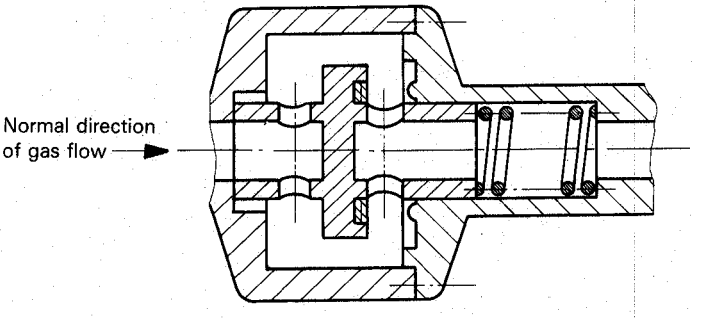
Valve is held open mechanically and actuated by a pressure valve from downstream.



3.5.3 cut-off valve (excess flow): A device which closes in the event of flow exceeding a pre-determined value.

Example:

Valve is held open by a spring. It closes when the force caused by the dynamic pressure becomes greater than the force of the spring. A resetting device is necessary.



4 Installation

The method of installing these devices (types selected, order of installation, etc.) varies with operating conditions. It is essential to follow the manufacturer's instructions regarding installation and operation and to ensure that the overall pressure drop due to the combination is as low as possible. It is not necessary to install each one of the devices in order to ensure safety.

NOTE — It is possible to incorporate many of the functions described in clause 3 into one piece of equipment.

5 Design and materials

5.1 Design

The construction shall be suitable for the purpose intended, and allow regular maintenance and routine inspection (see clause 6).

The design of connections shall prevent interchangeability between the fuel gas and oxygen or compressed air, in accordance with ISO 3253.

5.2 Materials

Materials liable to come in contact with the gases shall be adequately resistant to the chemical, mechanical and thermal action of these gases under operating conditions.

5.2.1 Metallic materials

5.2.1.1 Application of acetylene and gases of similar chemical properties

The copper content of materials liable to come in contact with such gases shall not exceed 70 % (m/m).

Flame arresting elements shall be manufactured from copper-free materials.

Where silver or copper solders or brazing alloys are used in construction, the filler metal joint shall not exceed 0,3 mm thickness; the silver content shall not exceed 43 % (m/m) and the copper content shall not exceed 21 % (m/m).

Excessive solder shall be avoided; capillary joints shall be used.

5.2.1.2 Oxygen application

All components in contact with oxygen shall be free of oil and grease. Springs and other moving parts liable to come in contact with oxygen shall be of rustproof materials.

5.2.2 Nonmetallic and synthetic materials

5.2.2.1 Resistance to solvents

Synthetic materials (seals, lubricants) liable to come in contact with acetylene shall be adequately resistant to the solvents acetone and dimethylformamid (DMF).

Adequate resistance implies that the material shall fulfil the following conditions: After storage for 168 h (7 days) in an atmosphere saturated with solvent vapour at 23 °C the change in weight (resistance to swelling) shall not exceed 15 % and the change in hardness shall not exceed ± 15 IRHD.[1)]

5.2.2.2 Resistance to propane

Synthetic materials (seals, lubricants) liable to come in contact with propane shall be adequately resistant to propane corresponding to ISO 175.

Requirements on adequate resistance are in preparation.

5.2.2.3 Lubricants for oxygen

Only lubricants suitable for use in oxygen at the given pressure and temperature shall be used.

6 Marking

All marking shall be legible and durable.

a) name or trademark of manufacturer or distributor;

b) model or code number relating to the manufacturer's installation instructions;

c) direction of normal gas flow (arrow);

d) name of gas or type of gas code and colour code;

e) maximum working pressure p_{max};

f) maximum flow-rate, only for excess flow cut-off valve.

Adequate resistance implies that the material should fulfil the following conditions: After storage for 168 h (7 days) in an atmosphere saturated with solvent vapour at 23 °C the change in weight (resistance to swelling) should not exceed 15 % and the change in hardness should not exceed ± 15 IRHD-units.[1)]

acetylene:	A
coal or town gas:	C
methane or natural gas:	M
propane or other LPG fuels:	P
hydrogen:	H
oxygen:	O
compressed air:	D

1) See ISO 48.

7 Maintenance and repair

7.1 General

The device shall not be altered in any way or under any circumstances by the user; all maintenance and repair work shall be carried out using components supplied by the original manufacturer.

7.2 Maintenance

The inspection and maintenance operations required to be carried out by the user shall be specified by the manufacturer.

Where dust filters have to be removed for cleaning, the design shall be such that safety features are not interfered with or damaged during the operation.

7.3 Repair

Where repair is necessary, for example in case the temperature-sensitive cut-off valve has to be actuated, the user shall return the device to the manufacturer or his authorized agent. When the repair is completed, the unit shall be retested by the repairer to the original manufacturer's specification.