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Gas welding equipment – Safety devices – Part 1: Incorporating a flame (flashback) arrestor

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Denna standard tillsammans med SS-EN 730-2, utgåva 1, ersätter SS-EN 730, utgåva 1.

The European Standard EN 730-1:2002 has the status of a Swedish Standard. This document contains the official English version of EN 730-1:2002.

This standard together with SS-EN 730-2, edition 1, supersedes the Swedish Standard SS-EN 730, edition 1.

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English version

Gas welding equipment - Safety devices - Part 1: Incorporating a flame (flashback) arrestor

Matériel de soudage aux gaz - Dispositifs de sécurité -
Partie 1: Avec arrêt de flamme

Gasschweißgeräte - Sicherheitseinrichtungen - Teil 1: Mit
integrierter Flammensperre

This European Standard was approved by CEN on 8 August 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document EN 730-1:2002 has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by April 2003.

This European Standard "*Gas welding equipment – Safety devices*" consists of the following Parts:

- *Part 1: Incorporating a flame (flashback) arrestor.*
- *Part 2: Not incorporating a flame (flashback) arrestor.*

This Part and EN 730-2 supersedes EN 730:1995.

Annexes A, B and C are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

EN 730-1:2002 (E)

1 Scope

This Part of this European Standard specifies the general requirements and tests for safety devices for fuel gases and oxygen or compressed air incorporating a flame (flashback) arrestor used downstream of manifold, cylinder and (or) pipeline outlet regulators, and upstream of blowpipes for welding, cutting and allied processes.

This standard does not specify the location of these devices in the gas system.

This standard does not include requirements for safety devices which do not incorporate a flame arrestor which are covered by EN 730-2.

This standard does not cover the use of safety devices incorporating flame arrestors for applications with premixed oxy/fuel or air/fuel gas supply systems, for example downstream of gas mixers or a generator to produce hydrogen/oxygen mixture by electrolytic decomposition of water.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 560, *Gas welding equipment — Hose connections for equipment for welding, cutting and allied processes.*

EN 561, *Gas welding equipment — Quick-action coupling with shut-off valves for welding, cutting and allied processes.*

EN 730-2, *Gas welding equipment — Safety devices — Part 2: Not incorporating a flame (flashback) arrestor.*

EN 29090, *Gas tightness of equipment for gas welding and allied processes (ISO 9090:1989).*

EN 29539, *Materials for equipment used in gas welding, cutting and allied processes (ISO 9539:1988).*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications.*

3 Terms and definitions

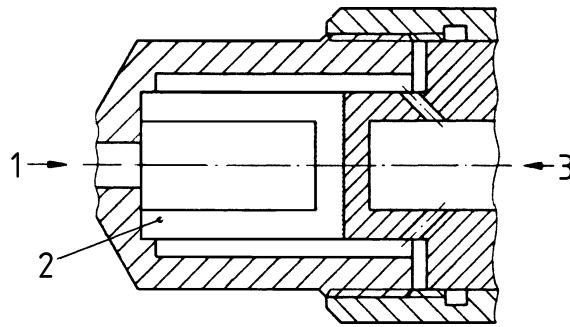
For the purposes of this European Standard, the following terms and definitions apply.

3.1

flame arrestor

device which quenches a flame front

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



Key

- 1 Normal direction of gas flow
- 2 E.g. sintered metal element
- 3 Flame

Figure 1 — Flame arrester (example)

3.2

maximum operating pressure

maximum pressure to which the equipment may be subjected in service

3.3

multifunctional safety device

device which incorporates two or more of the safety functions

EXAMPLE Flame arrester with non-return valve and cut-off valve.

NOTE

The temperature sensitive cut-off valve is normally used in combination with a flame arrester as its purpose is to cut-off the gas flow before the temperature at the flame arrester reaches a point where flame transmission across the flame arrester takes place. It is normal for pressure and or temperature cut-off valves only to be used in combination with flame arrestors. Due to the burning characteristics of hydrogen it is recommended all flame arrestors for hydrogen incorporate a temperature sensitive cut-off valve.

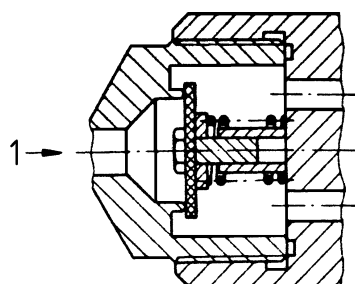
3.4

non-return valve

device which prevents passage of gas in the direction opposite to 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.

EN 730-1:2002 (E)



Key

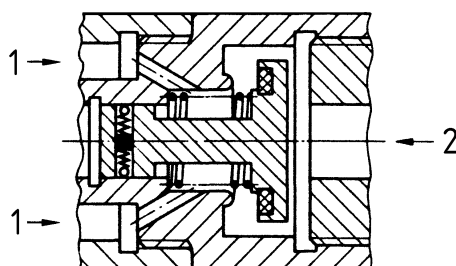
1 Normal direction of gas flow

Figure 2 — Non-return valve (example)

3.5 pressure-sensitive cut-off valve

device which stops the gas flow in the event of a back-pressure wave from the downstream side

EXAMPLE Valve is held open, e.g. by a spring; it is actuated by a pressure wave from down-stream and is then automatically held closed by a special device.



Key

1 Normal direction of gas flow

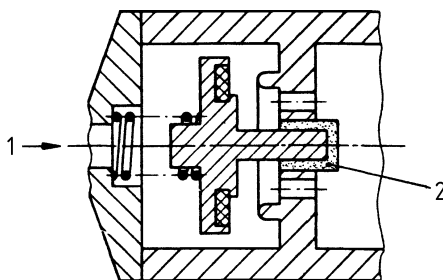
2 Back-pressure wave

Figure 3 — Pressure-sensitive cut-off valve (example)

3.6 temperature-sensitive cut-off valve

device which stops the gas flow when a predetermined temperature is exceeded

EXAMPLE Valve is held open, e.g. by a fusible metal, and actuated by sustained temperature rise.



Key

- 1 Normal direction of gas flow
- 2 E.g. fusible metal

Figure 4 — Temperature-sensitive cut-off valve (example)

3.7

safety device

device for welding equipment which averts risk in case of misuse or malfunction of the down-stream gas welding equipment

4 Design and materials

4.1 Connection

Threaded connections up to G1 shall be in accordance with EN 560. Quick release connections shall be in accordance with EN 561.

4.2 Materials

Materials used for safety devices shall conform to the requirements laid down in EN 29539.

5 Requirements

5.1 General

Requirements for each safety device vary depending upon the device and combination of functions in the device. A summary of the requirements and test sequence is given in Table 1.

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Table 1 — Summary of requirements and test sequence for the most commonly available safety devices

Safety device function(s)	Requirements (Clause No)	Tests (in test order) (Clause No)	Number of devices required for each test	Total number of devices required
Flame arrestor	5.2.1 5.3 5.4	6.4 External gas tightness 6.5 Pressure resistance 6.7 Flashback resistance	5 1 ^a 5	6
Flame arrestor + non-return valve	5.2.1 5.2.2 5.3 5.5	6.4 External gas tightness 6.5 Pressure resistance 6.6 Reverse flow 6.7 Flashback resistance 6.6 Reverse flow	5 1 ^a 5 5 5	6
Flame arrestor + temperature sensitive cut-off valve	5.2.1 5.2.2 5.3 5.6	6.4 External gas tightness 6.5 Pressure resistance 6.7 Flashback resistance 6.8 Temperature cut-off 6.10 Internal leakage	5 1 ^a 5 1 ^a 5	7
Flame arrestor + non-return valve + temperature-sensitive cut-off valve	5.2.1 5.2.2 5.3 5.5 5.6	6.4 External gas tightness 6.5 Pressure resistance 6.6 Reverse flow 6.7 Flashback resistance 6.6 Reverse flow 6.8 Temperature cut-off 6.10 Internal leakage	5 1 ^a 5 5 5 1 ^a 5	7
Flame arrestor + non-return valve + pressure-sensitive cut-off valve	5.2.1 5.2.2 5.3 5.5 5.7	6.4 External gas tightness 6.5 Pressure resistance 6.6 Reverse flow 6.9 Pressure cut-off 6.10 Internal leakage 6.7 Flashback resistance 6.6 Reverse flow 6.9 Pressure cut-off 6.10 Internal leakage	5 1 ^a 5 5 5 5 5 5 5	6
Flame arrestor + non-return valve + temperature-sensitive cut-off valve + pressure-sensitive cut-off valve	5.2.1 5.2.2 5.3 5.5 5.6 5.7	6.4 External gas tightness 6.5 Pressure resistance 6.6 Reverse flow 6.9 Pressure cut-off 6.10 Internal leakage 6.7 Flashback resistance 6.6 Reverse flow 6.9 Pressure cut-off 6.10 Internal leakage 6.8 Temperature cut-off 6.10 Internal leakage	5 1 ^a 5 5 5 5 5 5 5 1 ^a 5	7

^a Use a new device for this test. Do not use for any other test.

NOTE In the following sub-clauses, the terms “upstream” and “downstream” refer to the normal direction of gas flow in the device.

5.2 Gas tightness

5.2.1 External gas tightness

The general requirements on external gas tightness and the test procedures shall be in accordance with EN 29090.

5.2.2 Internal gas tightness

Where internal gas tightness is required in this standard the leakage rate shall not exceed 50 cm³/h for devices with a connection internal bore (diameter) less than 11 mm or 0,41 d^2 for larger diameters (see 6.6 and/or 6.10 for tests).

NOTE The value 0,41 d^2 is the flow in cm³/h where d is the internal bore (diameter) in mm of the largest connection of the device.

5.3 Pressure resistance

The housings of the safety devices shall resist a pressure equal to ten times the maximum operating pressure, with the test pressure in all cases not less than 60 bar¹⁾.

When the device is tested in accordance with 6.5, no permanent deformation of the pressure retaining components shall occur after a test duration of at least 5 min.

5.4 Flame arrestor

Flame arrestors shall quench flashbacks when tested in accordance with 6.7.

5.5 Flame arrestor with non-return valve

Flame arrestor with non-return valve shall quench flashbacks when tested in accordance with 6.7 and shall not allow the reverse flow of gases when tested in accordance with 6.6 both before and after the flashback test 6.7.

5.6 Flame arrestor with temperature sensitive cut-off valve

Flame arrestor with temperature-sensitive cut-off valve shall quench flashbacks when tested in accordance with 6.7 and shall stop the gas flow before the upstream gas is ignited when tested in accordance with 6.8.

It shall not be possible to reset the temperature sensitive cut off valve.

If the temperature-sensitive cut-off valve operates before the fifth flashback in test 6.7 and the flame is not transmitted upstream the unit shall be considered to meet the flashback test requirement, but test 6.8 shall still be carried out on a new unit.

5.7 Flame arrestor with pressure-sensitive cut-off valve

Flame arrestor with pressure-sensitive cut-off valve shall quench flashbacks when tested in accordance with 6.7 and the pressure-sensitive cut-off function shall activate at each flashback. The pressure-sensitive cut-off valve shall remain closed until it is manually reset.

The pressure-sensitive cut-off valve shall be reset after each flashback during test 6.7.

¹⁾ 1 bar = 0,1 MPa = 10⁵ Pa
1 Pa = 1 N/m²
All pressures are gauge pressure.