BRITISH STANDARD

BS EN
730-2:2002

Gas welding equipment — Safety devices —

Part 2: Not incorporating a flame (flashback) arrestor

The European Standard EN 730-2:2002 has the status of a British Standard

ICS 25.160.30

National foreword

This British Standard is the official English language version of EN 730-2:2002. Together with BS EN 730-1:2002 it supersedes BS EN 730:1995 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee WEE/18, Gas welding appliances, 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 or European 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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 13 November 2002

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 14, an inside back cover and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 40733 0

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 730-2

October 2002

ICS 25.160.30

English version

Gas welding equipment - Safety devices - Part 2: Not incorporating a flame (flashback) arrestor

Matériel de soudage aux gaz - Dispositifs de sécurité - Partie 2: Sans arrêt de flamme

Gasschweißgeräte - Sicherheitseinrichtungen - Teil 2: Ohne integrierte 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
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 730-2:2002 E

Contents

Foreword

This document EN 730-2:2002 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 730-1 supersedes EN 730:1995.

Annexes A and B 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.

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 which do not incorporate 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 incorporate a flame arrestor which are covered by EN 730-1.

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 730-1:2002, *Gas welding equipment — Safety devices — Part 1: 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).*

EN ISO 2503, *Gas welding equipment — Pressure regulators for gas cylinders used in welding, cutting and allied processes up to 300 bar (ISO 2503:1998).*

EN ISO 7291, *Gas welding equipment - Pressure regulators for manifold systems used in welding, cutting and allied processes up to 300 bar (ISO 7291:1999).*

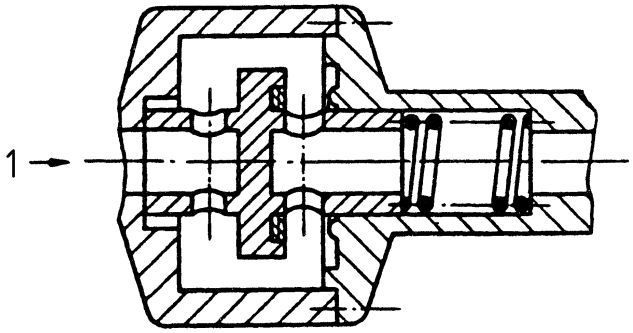
ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications.*

3 Terms and definitions

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

3.1
excess flow cut-off valve
device which stops the gas flow in the event of flow exceeding a predetermined 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.



Key

1 Normal direction of gas flow

Figure 1 — Excess flow cut-off valve (example)

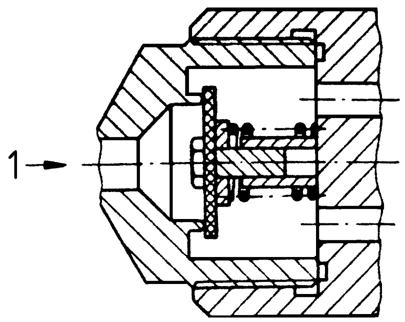
3.2
maximum operating pressure
maximum pressure to which the equipment may be subjected in service

3.3
multifunctional safety device
device which incorporates two or more of the safety functions

EXAMPLE Non-return valve and excess flow 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.



Key

1 Normal direction of gas flow

Figure 2 — Non-return valve (example)

3.5
pressure relief valve
device which automatically vents gas when the pressure exceeds some predetermined 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.

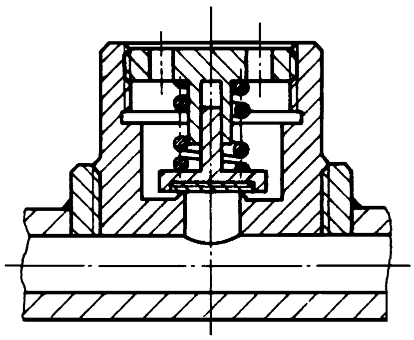


Figure 3 — Pressure relief valve (example)

3.6
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 Connections

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

A summary of the requirements and test sequence for each device is given in Table 1.

Table 1 — Summary of requirements and test sequence for safety devices

Safety device function(s)	Require-ments (Clause No)	Tests (in test order) (Clause No)	Number of devices required for each test	Total number of devices required
Non-return valve	5.2.1 5.2.2 5.3 5.4	6.4 External gas tightness 6.5 Pressure resistance 6.6 Reverse flow 6.9 Internal leakage	5 1 [a] 5 5	6
Pressure relief valve	5.2.1 5.3 5.5	6.4 External gas tightness 6.5 Pressure resistance 6.7 Relief pressure and flow	5 1 [a] 5	6
Excess flow cut-off valve	5.2.1 5.2.2 5.3 5.6	6.4 External gas tightness 6.5 Pressure resistance 6.8 Excess flow cut-off 6.9 Internal leakage	5 1 [a] 5 5	6
[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 cm^3/h for devices with a connection internal bore (diameter) less than 11 mm or 0,41 d^2 for larger diameters (for tests see 6.6 and/or 6.9).

NOTE The value 0,41 d^2 is the flow in cm^3/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 bar[1]).

---

1) 1 bar = 0,1 MPa = 10^5 Pa
1 Pa = 1 N/m^2
All pressures are gauge pressure.

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 Non-return valve

Non-return valve shall not allow the reverse flow of gases when tested in accordance with 6.6.

5.5 Pressure relief valves

The opening pressure of the pressure relief valve shall be between 1,3 and 2 times the maximum operating pressure specified by the manufacturer and the valve shall close at a pressure between 1 and 2 times this pressure. They shall be leak-proof to the requirements of 5.2.1 at all pressures up to and including the maximum operating pressure. They shall be checked in accordance with 6.7.

The manufacturer shall state the flow capacity to atmosphere as measured at twice the operating pressure.

If a pressure relief valve is incorporated in a regulator, it shall be in accordance with EN ISO 2503 or EN ISO 7291 as applicable and does not belong anymore to the scope of this standard.

5.6 Excess flow cut-off valves

Excess flow cut-off devices shall stop the gas flow when the flow reaches between 1,1 and 2 times the nominal flow rate specified by the manufacture when tested in accordance with 6.8.

5.7 Flashback resistance

Safety devices used in applications where flashback may occur shall conform to the requirements of this standard after exposure to flame arrestor test performed according to EN 730-1:2002, 6.7, where the flame arrestor is replaced by the safety device to be tested.

6 Methods for type testing

6.1 General

The test methods in this section are not intended as production inspection tests, but are to be applied to sample devices to be tested for compliance with this standard. Tests shall be carried out on new devices with all safety functions operational as designed.

Third party conformity testing is not a requirement of this standard. See annex B for information relating to third party conformity testing if required.

6.2 Accuracy of pressure and flow measurements

The allowable total error of the measured values are as follows:

— flow ± 10 %;

— pressure ± 3 %.

All flows and pressures shall be expressed in standard atmospheric conditions in accordance with ISO 554. All pressure values are given as gauge pressure, expressed in bars.

6.3 Test gases

Unless otherwise stated, tests shall be carried out at ambient pressure conditions and at (20 ± 5) °C with air or nitrogen free from oil and grease.

Air is considered as oil-free if it comprises:

– less than 5×10^{-6} of oil vapour; and

– less than 1 mg/m^3 of suspended droplets.

In all cases, tests shall be carried out with dry gas with a maximum moisture content corresponding to a dew point of 0 °C.

Safety devices for hydrogen shall be tested with hydrogen or helium for the gas tightness test only.

6.4 Gas tightness test

Conformity with the requirements of 5.2.1 shall be checked on five samples in accordance with EN 29090.

6.5 Pressure resistance test

Conformity with the requirements of 5.3 shall be checked by means of a hydraulic pressure test on one sample. No other tests shall be carried out on the sample either before or after this test nor shall the sample tested be used for any other purposes.

6.6 Non-return valve test

6.6.1 General

Conformity with the requirements of 5.4 shall be checked on five samples as follows. Before proceeding with this test, pass the test gas through the device in the normal direction of flow for 5 s to operate the valve. Connect the downstream side of the device under test to a gas source, with the upstream side at atmospheric pressure and connected to a leak detection device. Proceed to pressurise in the reverse direction according to 6.6.2. For the tests, the samples shall be installed in the most disadvantageous position (gravity acting to open the valve).

6.6.2 Tests with reverse flow of gas

Pressurize the device in the reverse direction as follows:

a) increase the back-pressure at a rate of 6 mbar/min up to 30 mbar;

b) increase the back-pressure within 1 s from 0 to maximum operating pressure.

The maximum reverse flow during the period of reverse pressure application and for 1 min afterwards shall meet the requirements of 5.2.2.

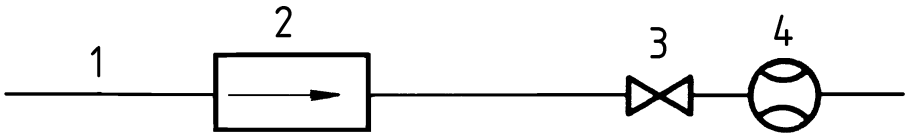
6.7 Pressure relief valves

The requirements specified in 5.5 shall be checked on five samples by progressively increasing and then decreasing pressure. Measure the flow through the device when the upstream pressure is equal to twice the maximum operating pressure.

6.8 Excess flow cut-off valve

This test shall be carried out using the actual gas the device is designed to operate on. If it is designed for use with more than one gas it shall be tested for each gas.

For each gas, the requirements specified in 5.6 shall be checked on five samples as follows. Connect the device to a pipeline at the maximum operating pressure specified by the manufacturer, see Figure 4. Progressively increase the flow rate in the normal direction by opening valve "A" until the device operates. After the device has operated (cut-off the flow) the device shall be tested in accordance with 6.9 to test for internal leakage.



Key

1 p_{max}
2 Sample
3 Valve “A”
4 Flow meter

Figure 4 — Test equipment excess flow cut-off valve

6.9 Internal leakage test for cut-off valves

With the device under test in the tripped condition, connect the upstream side to a gas source at the maximum operating pressure, with the downstream side open to atmosphere. Check that internal leaks at the device outlet meet the requirement of 5.2.2.

7 Manufacturer’s instructions

When distributed, the safety device shall be accompanied by the manufacturer’s instructions which shall contain, as a minimum, the following information:

a) the function of the safety device;

b) operational and performance data (maximum working pressure, gas flow characteristics, see annex A);

c) permissible types of gas;

d) an explanation of the abbreviations marked on the device;

e) instruction for installation of equipment (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 to ensure that the overall pressure drop due to the combination is as low as possible.);

f) procedures to be carried out prior to operation;

g) procedures for safe operation;

h) instructions in case of malfunction;

i) recommendations for inspection, testing and maintenance:

8 Marking

All marking shall be legible and durable, the following information shall be included:

a) the number of this European Standard: EN 730-2;

b) the name or trade mark of manufacturer and/or distributor;

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

d) the direction of normal gas flow (arrow);

e) the name of gas or its abbreviation;

f) the maximum operating pressure, p_{max}, expressed in bar;

g) the nominal flow rate and gas, only for excess flow cut-off valve (see 5.6);

h) indication of the safety functions incorporated in the device as shown below.

Abbreviations for the safety functions shall be marked as follows:

— non return valve NV

— pressure relief valve RV

— excess flow cut-off valve EV

The appropriate letters shall be enclosed in a square as in the following example:

– non-return valve

– non-return valve +
– excess flow cut-off valve

If abbreviations for the gases are used they shall be as follows:

— acetylene A

— coal or town gas C

— compressed air D

— ethylene E

— hydrogen H

— methane or natural gas M

— oxygen O

— propane or other LPG fuels P

— methylacetylene-propadiene-mixtures Y

If, in addition, a colour coding is used, red shall be used for fuel gases, blue for oxygen, black for compressed air.

Annex A
(informative)

Gas flow measurement

A.1 General

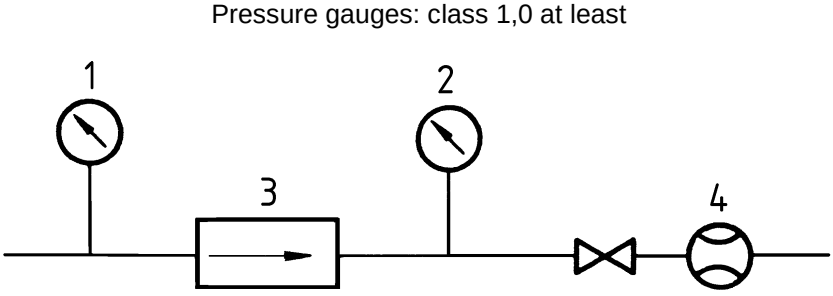
The gas flow characteristics for each safety device (single or multifunction), can be measured by means of a performance test using the circuit shown in Figure A.1. The results can be reported graphically, a typical example is shown in Figure A.2.

A.2 Procedure

With the device discharging directly into the atmosphere, the upstream pressure should progressively be increased to the maximum operating pressure, p_{max}, and the gas flow rate should be measured at different intermediate pressures.

The same test should be repeated with upstream pressures equal to 0,25 p_{max}, 0,5 p_{max} and 0,75 p_{max}, and the gas flow rate for different pressure drops Δp should be measured.

The average of the results obtained from 5 samples should be considered to be the nominal value. The flow rates of the 5 samples should not diverge by more than ±10 %.



Key

1 Inlet pressure p_1
2 Outlet pressure p_2
3 Sample
4 Flow meter

Pressure drop, $\Delta p = p_1 - p_2$

Figure A.1 — Typical example of circuit for gas flow measurement

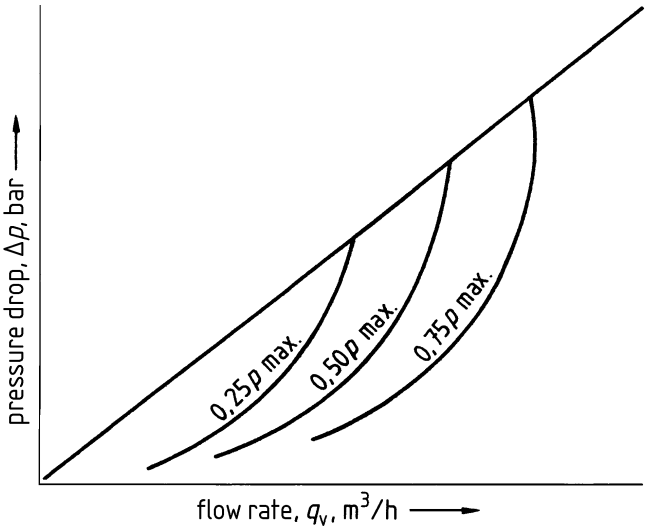


Figure A.2 — Typical example of gas flow characteristics

Annex B
(informative)

Third party testing information

B.1 General

Third party testing is not a requirement of this standard.

Third party testing is used when either the manufacturer or user want independent verification of the product.

The following information is given for guidance only but can vary according to the third party involved.

B.2 Samples and documentation

For third part conformity testing the following samples and documents are recommended:

a) sufficient samples to enable the device to be tested. See Table 1;

b) two copies of all detail drawings;

c) three copies of the general drawing with a list of spare parts;

d) a statement by the manufacturer indicating the nature of the materials and their compatibility.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL