



**International
Standard**

ISO 11872

**Gas welding equipment —
Decomposition blockers for high-
pressure acetylene**

*Matériel de soudage aux gaz — Bloqueurs de décomposition pour
l'acétylène haute pression*

**First edition
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 8, *Equipment for gas welding, cutting and allied processes*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Gas welding equipment — Decomposition blockers for high-pressure acetylene

1 Scope

This document establishes the general specifications, requirements and tests for decomposition blockers located on the high-pressure side in battery vehicles and gas containers as defined in EN 13807 or in acetylene bundles as defined in ISO 10961.

NOTE 1 The terms “upstream” and “downstream” refer to the normal direction of gas flow in the decomposition blocker. 1 bar = 0,1 MPa = 10^5 Pa; 1 Pa = 1 N/m². All pressures are expressed in gauge pressures.

NOTE 2 This document can be used as a guideline for decomposition blocker for filling centre application.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 9090, *Gas tightness of equipment for gas welding and allied processes*

ISO 9539, *Gas welding equipment — Materials for equipment used in gas welding, cutting and allied processes*

ISO 10225, *Gas welding equipment — Marking for equipment used for gas welding, cutting and allied processes*

ISO 15615, *Gas welding equipment — Acetylene manifold systems for welding, cutting and allied processes — Safety requirements in high-pressure devices*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

asymmetric decomposition blocker for high-pressure acetylene

safety device that stops acetylene decomposition at a pressure of $\leq 2,5$ MPa (25 bar) from one side

Note 1 to entry: The decomposition blocker for high-pressure acetylene may optionally comprise other safety elements such as non-return valve or automatic quick-acting shut-off device (see ISO 15615).

3.2

symmetric decomposition blocker for high-pressure acetylene

safety device that stops acetylene decomposition at a pressure of $\leq 2,5$ MPa (25 bar) from two sides

Note 1 to entry: The decomposition blocker for high-pressure acetylene may optionally comprise other safety elements such as non-return valve or automatic quick-acting shut-off device (see ISO 15615).

4 Design

All components within the decomposition blocker shall be designed to have the same electrostatic potential as the body of the decomposition blocker during operation. All metal components in contact with gas shall be electrically continuous to prevent static electricity discharges. This may be checked with a regular multimeter or similar.

5 Requirements

5.1 Materials

Materials used for the decomposition blocker shall be in accordance with ISO 9539.

5.2 External gas tightness

The general requirements on external gas tightness shall be in accordance with ISO 9090 at all times, before and after the tests.

5.3 Pressure resistance

The body of the decomposition blocker shall withstand a hydraulic pressure of 31,5 MPa (315 bar) for a period of 5 min in accordance with ISO 15615. Small leakages are allowed provided this pressure can be reached. After the decomposition blocker has been tested, there shall be no visible permanent deformation of the decomposition blocker. See [6.6](#) for test details.

5.4 Acetylene decomposition

For asymmetric decomposition blockers three samples shall stop acetylene decomposition when tested according to [6.5](#).

For symmetric decomposition blockers six samples shall be tested: three samples shall stop acetylene decomposition from one side and three samples shall stop acetylene decomposition from the other side when tested according to [6.5](#).

After the test there shall be no fire and/or soot detected by the flame/soot detectors or pipe 3c in [Figure 1](#) may be disassembled and checked for soot. No visible deformation of the decomposition blocker shall be observed. No escape of gas shall occur during the test. Destruction of inner parts is allowed.

6 Type tests

6.1 General

The type test methods of [Clause 6](#) shall be applied to the number of samples according to [Table 1](#). Tests shall be carried out on new samples.

Table 1 — Test sequence for decomposition blockers

	Test sample no.	Tests (in test order)			
		1. External gas tightness	2. Acetylene decomposition	3. External gas tightness after decomposition	4. Pressure resistance
Asymmetric decomposition blocker for high-pressure acetylene	1	X	X	X	
	2	X	X	X	
	3	X	X	X	
	4				X
Symmetric decomposition blocker for high-pressure acetylene	1	X	X	X	
	2	X	X	X	
	3	X	X	X	
	4	X	X	X	
	5	X	X	X	
	6	X	X	X	
	7				X

6.2 Reference values and accuracy of instruments

The accuracy of the pressure measuring instrument shall be within ± 3 % of the measured value. For this purpose, the maximum measuring range (full scale) and class of the pressure measuring instrument to be used shall be selected appropriately.

All pressures shall be given in megapascals and in bar: xx MPa (yy bar).

If the temperature at the test assembly is outside the range of $20\text{ °C} \pm 5\text{ °C}$, the pressure shall be corrected in accordance with the ideal gas law. Consequently, the test shall be carried out at low temperatures with a lower initial pressure and at high temperatures with a higher initial pressure. The minimum temperature shall be 5 °C .

6.3 Test gases

The decomposition test shall be carried out with an acetylene supply source of purity of at least 99,5 %. All other tests shall be carried out with oil-free nitrogen or air.

6.4 External gas tightness

Conformity with the requirements of [5.2](#) shall be checked on 3 test samples.

6.5 Acetylene decomposition test

6.5.1 General

The decomposition blocker shall be installed in the test assembly so that the decomposition is initiated on the side designed for it. Where there is intention for protection from acetylene decomposition on both sides, the test shall be carried out for both orientations.

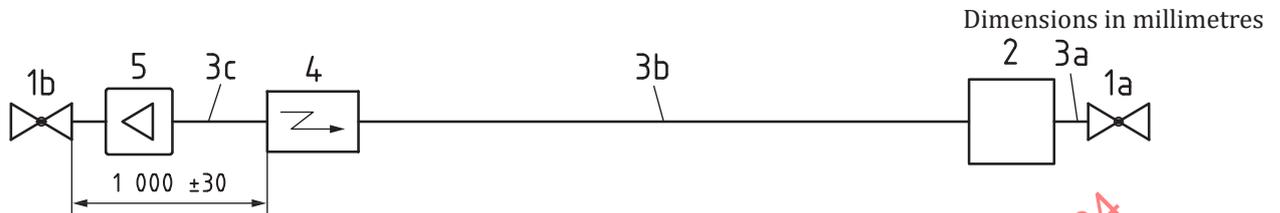
6.5.2 Test conditions

The decomposition blockers shall be tested using a test set-up as shown in [Figure 1](#):

- for samples with an inner diameter of connection up to 10 mm, the internal diameters of the tubes (keys 3a, 3b and 3c of [Figure 1](#)) shall be $10\text{ mm} \pm 0,5\text{ mm}$;

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- for samples with an inner diameter of connection larger than 10 mm, the internal diameters of the tubes (keys 3a, 3b and 3c of [Figure 1](#)) shall be equal to or larger than the inner diameter of connection, but not larger than 1,2 times the inner diameter of connection;
- industrial acetylene, static gas phase;
- ignition by fusible metal wire, ignition energy less than 100 J.



Key

- 1a, 1b valves
- 2 ignition unit
- 3a steel tube between key 1a and key 2, $l = 100 \text{ mm} \pm 3 \text{ mm}$
- 3b steel tube between key 2 and key 4, $l = 5\,000 \text{ mm} \pm 150 \text{ mm}$
- 3c steel tube(s) between key 4 and key 1b, $l = 1\,000 \text{ mm} \pm 30 \text{ mm}$
- 4 test sample
- 5 flame/soot detector

Figure 1 — Example of an acetylene decomposition test set-up with an asymmetric decomposition blocker without additional safety functions

6.5.3 Test procedure and test precautions

Where other safety elements (see [3.1](#), Note 1 to entry and [3.2](#), Note 1 to entry) are installed in the decomposition blocker, the influence of these safety elements shall be considered when filling and evacuating the system. In this case filling and evacuation can be reversed.

The test procedure is as follows:

- the whole test assembly shall be leak-tested with nitrogen at 2,5 MPa (25 bar) by any means (for example gas leakage detector, leak detector spray or similar) — requirement: technically leak-tight;
- the system shall be evacuated down to at least 1 000 Pa (0,01 bar) absolute or the whole system shall be purged at least 3 times with acetylene (test gas);
- the whole system shall be filled with acetylene to a pressure of 2,5 MPa (25 bar);
- the test assembly shall be isolated from the acetylene gas supply in order to prevent a flashback;
- all personnel shall be evacuated from the area of the test to a safe location;
- the ignition circuit shall be operated and it shall be checked whether a detonation has occurred (soot in the tube);
- it shall be checked whether a flame has been detected on the flame or soot detector. As an alternative to key item 5 flame/soot detector, tube 3c may be disassembled and checked for soot (see requirement of [5.4](#)).

All precautions shall be taken to protect personnel from the effect of fire and explosion.

6.6 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 purpose.

7 Manufacturer's instructions

When distributed, the decomposition blocker shall be accompanied by the manufacturer's instructions, which shall contain, as a minimum, the following information:

- a) the function of the decomposition blocker;
- b) operational data and nameplate rating (maximum operating pressure, gas flow characteristics);
- c) type of gas: acetylene;
- d) instructions for installation of the decomposition blocker;
- e) procedures to be carried out prior to commissioning;
- f) safety instructions, in particular replacement of the device if some incident is noticed;
- g) instructions in the event of malfunction;
- h) recommendations concerning inspection, testing, maintenance and lifetime (including the competence requested for the responsible personnel);
- i) maximum nominal tube size to be connected.

8 Marking

All marking shall be legible and durable before and after the following procedure. Markings shall be rubbed by hand, without undue pressure, first for 15 s with a cloth soaked with distilled water, then for 15 s with a cloth soaked with petroleum spirit.

The following information shall be included:

- a) the number of this document, i.e. ISO 11872;
- b) the name or trade mark of the manufacturer and/or distributor;
- c) the model or code number given in the manufacturer's instructions;
- d) an arrow indicating the direction of normal gas flow;
- e) for asymmetric decomposition blockers the direction from which acetylene decomposition is intended to be blocked shall be clearly marked by a flash symbol pointing towards the side where the decomposition is expected;
- f) symmetric decomposition blockers shall be marked with a double arrow;
- g) acetylene or its abbreviation, A, in accordance with ISO 10225;
- h) the maximum operating pressure $p_{\max} = 2,5 \text{ MPa}$ (25 bar);
- i) the kind of device; if the full name of the safety device cannot be marked, the following abbreviations shall be used: DB in a square box, as given in [Figure 2](#):