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Gas welding equipment — Air-aspirated hand blowpipes — Specifications and tests

Équipement de soudage aux gaz — Chalumeaux manuels aéro-gaz à air aspiré — Spécifications et essais

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Foreword

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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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 9012:2008), which has been technically revised.

The main changes are as follows:

— entries 3.4 and 3.5 added;

— in Clause 4, the “types of aspiration” in Figures 2 to 4 rearranged and Table 1 revised;

— in 5.1.3, text revised and NOTES 1 and 2 added;

— in 6.5, ISO/TR 28821 referred to instead of the withdrawn ISO 3253;

— in 6.6, NOTES 1 and 2 added because there are cases where airtightness cannot be obtained even if the adjustment of air inlet (item 12) is set to the closed position;

— in 6.9, requirements added;

— in 7.1, the accuracy of gas pressure and flow rate measuring equipment from 7.7 added;

— in 7.6, the number of cycles for the life cycle test changed from 5 000 cycles to 1 500 cycles;

— in the Bibliography, ISO/TR 28821 referred to instead of the withdrawn ISO 3253.

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 — Air-aspirated hand blowpipes — Specifications and tests

1 Scope

This document specifies requirements and test methods for air-aspirated hand blowpipes.

This document applies to blowpipes for brazing, soldering, heating, fusion and other allied thermal processes which use a fuel gas and aspirated air (injector-type blowpipes) and are intended for manual use.

This document is applicable to:

— air-aspirated hand blowpipes which are fed with a fuel gas in the gaseous phase, at a controlled pressure by a regulator, through a gas supply hose;

— air-aspirated hand blowpipes which are fed with a liquefied fuel gas in the gaseous phase at the container pressure, through a gas supply hose;

— so-called liquid-phase blowpipes which are fed with a fuel gas in the liquid phase, and where thermal evaporation takes place within the blowpipe.

It does not apply to blowpipes in which the fuel gas leaves the injector in the liquid phase, or to so-called "cartridge" blowpipes where the gas supply is fixed directly onto the blowpipe and possibly constitutes the shank.

NOTE Figures 1 to 4 are given for guidance only, to facilitate the explanation of the terms. They do not specify the construction details, which are left to the discretion of the manufacturer.

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

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*

3 Terms and definitions

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

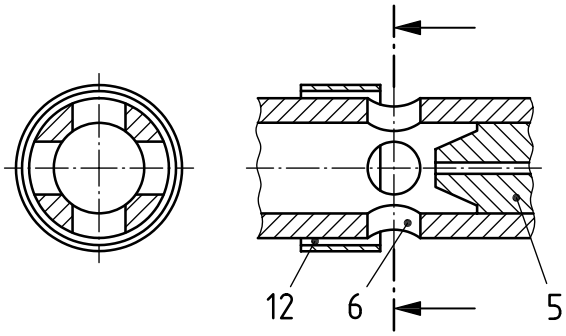
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
air-aspirated hand blowpipe
blowpipe in which the fuel gas leaves the injector in the gaseous phase, being subsequently mixed in the mixing zone with a sufficient quantity of air, aspirated from the ambient atmosphere, to produce a technically usable flame

Note 1 to entry: See Figure 1.



NOTE See Table 1 for the key to Figure 1.

Figure 1 — Schematic drawing of the mixing zone

3.2
sustained backfire
penetration of the flame into the blowpipe, with continued burning upstream of the part intended for this purpose, i.e. within:

— the blowpipe nozzle, behind the grid or flame-supporting devices;

— the tube;

— the blowpipe shank

3.3
blowing-off of the flame
detachment of the flame from the blowpipe nozzle, possibly causing the flame to be extinguished

3.4
maximum flow rate
flow rate of fuel gas of the blowpipe obtained by fully opening the valve at the maximum inlet pressure given by the manufacturer

3.5
minimum flow rate
flow rate of the proper fuel gas flow range at the minimum inlet pressure given by the manufacturer

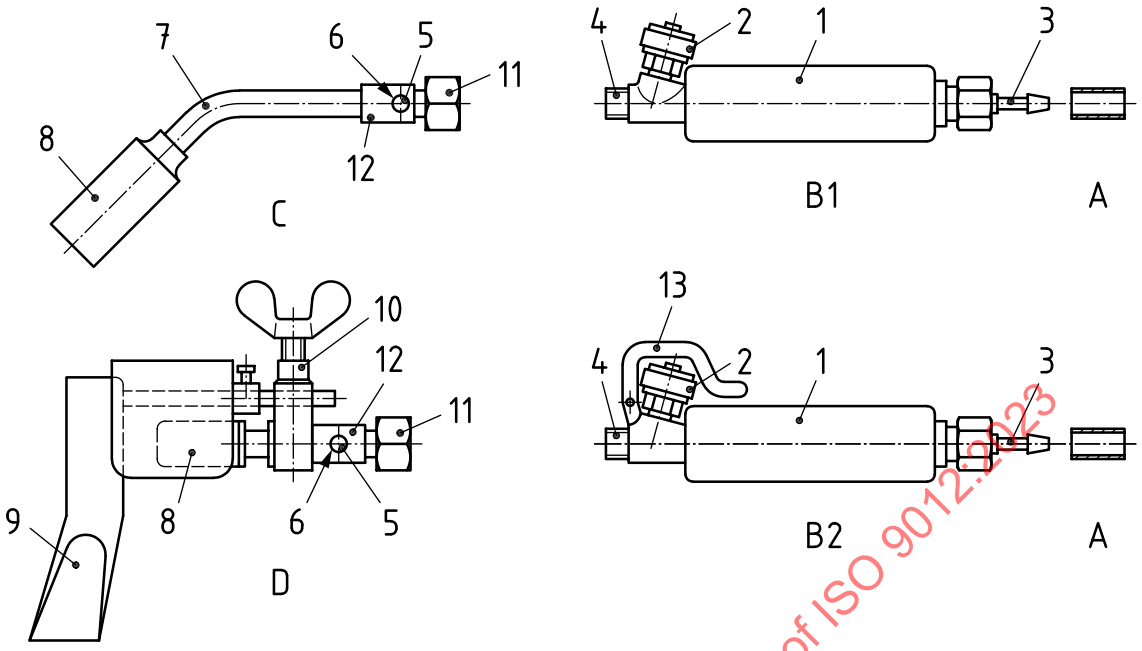
4 Main types of aspiration

Depending on the location of the mixing zone, a distinction is made between blowpipes with air aspiration in the:

a) attachment (see Figure 2);

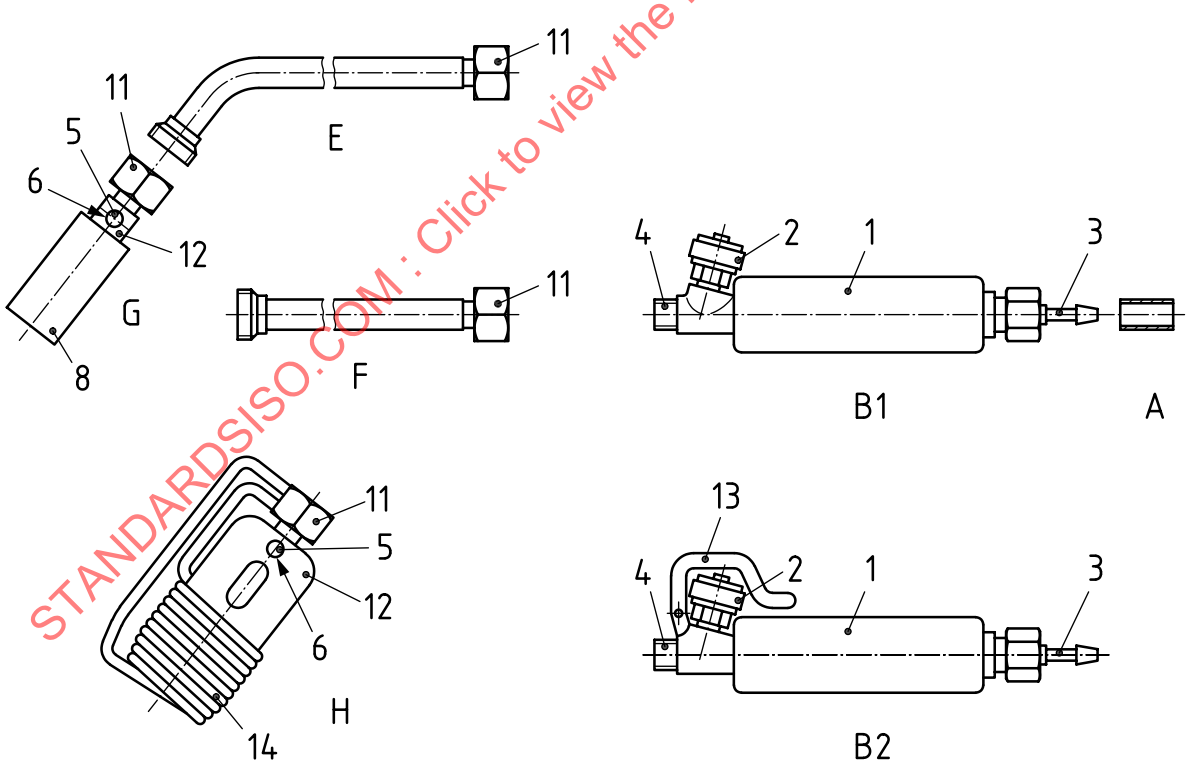
b) nozzle (see Figure 3);

c) shank (see Figure 4).



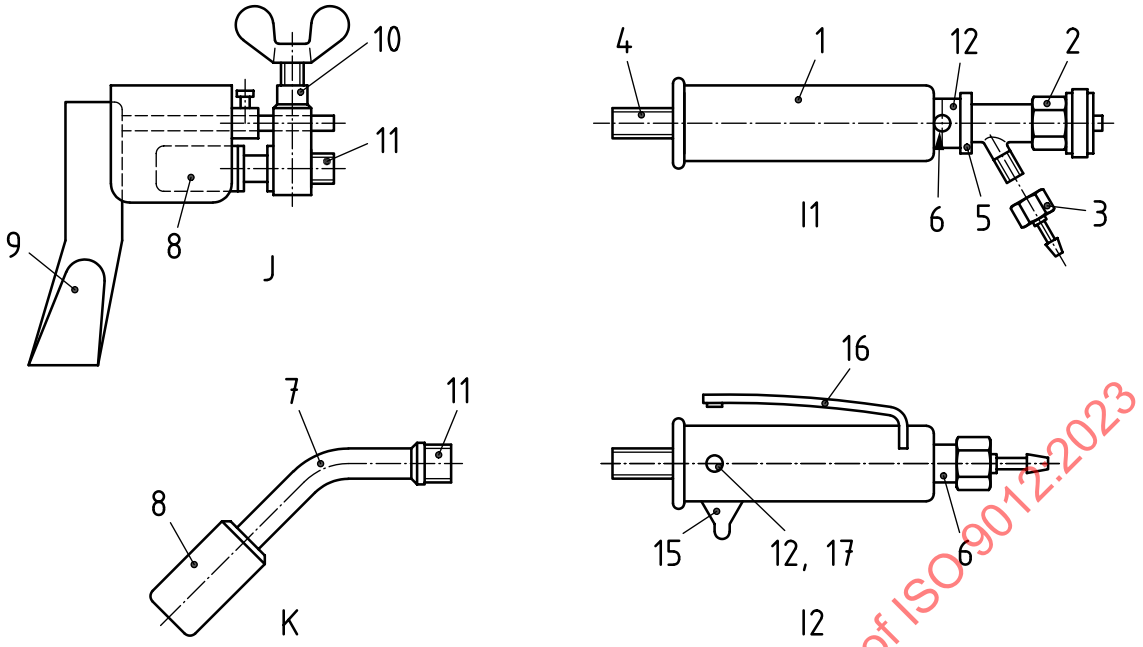
NOTE See Table 1 for the key to Figure 2.

Figure 2 — Examples of blowpipes with air aspiration in the attachment



NOTE See Table 1 for the key to Figure 3.

Figure 3 — Examples of blowpipes with air aspiration in the nozzle



NOTE See Table 1 for the key to Figure 4.

Figure 4 — Examples of blowpipes with air aspiration in the shank

Table 1 — Key for Figures 1 to 4

Assemblies		Items	
A	hose	1	handle
B	shank	2	valve
C	attachment with air aspiration	3	hose connection
D	soldering attachment with air aspiration with a copper bit	4	head connection
E	bent tube	5	injector
F	straight tube	6	air inlet
G	blowpipe nozzle with air aspiration	7	tube (may include air inlet)
H	liquid-phase nozzle with air aspiration	8	blowpipe nozzle
I	injector-type shank	9	soldering bit
J	attachment for bit soldering	10	bit support
K	attachment (without injector)	11	connection
B1	shank without control of automatic flame-reducing device	12	adjustment of air inlet
B2	shank with control of automatic flame-reducing device	13	control of automatic flame-reducing device
I1	shank without on/off valve control	14	vaporization for system liquid-phase blowpipe
I2	shank with on/off valve control	15	ignition system
		16	on/off valve control
		17	fixed orifice (I2)

5 Apparatus

5.1 Shank or handle (see Figures 2 and 3, assemblies B1 and B2 and Figure 4, assemblies I1 and I2). The shank is used for holding the attachment. It includes the system for fitting the hose and the gas control device(s). It may also include the injector (see Figure 4, assemblies I1 and I2).

5.1.1 Valve shank (see Figures 2 and 3, assemblies B1 and B2 and Figure 4, assembly I1). This type of shank is fitted with a single valve (item 2) for opening, shutting and regulating the gas-flow rate.

5.1.2 Shank with automatic flame-reducing device (see Figures 2 and 3, assembly B2). This type of shank is fitted with two separate control devices:

— a valve (item 2) which controls the gas-flow rate under normal working conditions, for example a knob;

— an automatic flame-reducing device (item 13) operated by a simple release mechanism, for example a trigger.

5.1.3 Shank with pressure-control or pressure-reducing device (see Figure 4, assembly I2). This type of shank is equipped with an unillustrated device for controlling or regulating gas pressure or an external pressure regulator not shown.

NOTE 1 If a pressure-regulating device (fixed or adjustable pressure control device) is incorporated in the shank in Figure 4, assembly I2, it is possible to perform constant or variable flame control and on/off operation by combining with on/off valve control (item 16).

NOTE 2 If no pressure-regulating device (fixed or adjustable pressure control) is incorporated in the shank in Figure 4, assembly I2, it is possible to perform variable flame control and on/off operation by combining external pressure regulator and on/off valve control (item 16).

5.1.4 Shank with ignition system (see Figure 4, assembly I2). This shank is fitted with a valve or an on/off valve control for the gas and with an ignition system (item 15) acting simultaneously or separately.

5.2 Attachment, generally composed of a nozzle or a burner and a tube.

5.2.1 Nozzle or burner (see Figures 2, 3 and 4, assemblies G, H and item 8). The shape of the nozzle depends on the work to be performed, for example:

— brazing or soldering;

— heating;

— paint removal;

— drying;

— bit soldering.

The nozzle may include the injector (see Figure 3, item 5) as well as the supports and automatic igniting devices of the blowpipe. In liquid-phase blowpipes, the nozzle also incorporates the vaporization device (see Figure 3, item 14).

NOTE Figures 2, 3 and 4 show only limited examples of blowpipes nozzles. The nozzles come in a great variety of shapes, particularly in the case of multiflame blowpipes for circumferential heating.

5.2.2 Tube (item 7), connecting the blowpipe nozzle to the shank. It may be of various lengths and shapes depending on the application for which it is designed. It may incorporate the injector (see Figure 2, C, item 5).

Not all blowpipes have a tube.

The tube may be permanently fitted to the blowpipe nozzle (see Figure 2, assemblies C and D, and Figure 4, assemblies J and K) or may act as a connecting tube between the nozzle and the shank (see Figure 3, assemblies E and F).

5.3 Self-closing on/off valve control, which stops the gas flow as soon as manual grip is released (see Figure 4, item 16).

5.4 Device to prevent inadvertent operation of gas flow or ignition.

6 Requirements

6.1 General

The type of blowpipe shall correspond to the intended use and to the nature of the gas.

For the design details not imposed by this document, the manufacturer shall give primary consideration to the safety requirements.

6.2 Materials

Materials used for the construction of these blowpipes shall conform to the requirements of ISO 9539.

6.3 Valves

It shall not be possible to bypass closed on/off valve(s).

Valves and valve elements shall remain fixed in position when valves are operated. At any setting the valve shall be designed in such a way that the setting cannot change without the intention of the user. Furthermore, it shall not be possible to disassemble any of the various external valve elements without the use of a tool.

The blowpipe shall be designed or equipped with a device to prevent the gas from flowing in the event of an inadvertent operation of the control device (see Figures 2 and 3, item 13, and Figure 4, item 16), if fitted.

6.4 Shank

The shank shall comprise at least the gas supply shut-off valve.

Shanks fitted with a synchronized ignition system shall be designed or equipped with a device to prevent inadvertent operations.

During normal usage, the shank and the devices that it includes shall not reach excessive temperatures. When the tests specified in 7.4 are carried out, the increase in the temperature of the shank and associated devices shall not exceed the values indicated in Table 2.

Table 2 — Valves

Component	Maximum temperature rise K
Handles, knobs, levers and similar components which, in normal use, are held continuously	30
Handles, knobs, levers and similar components which, in normal use, are held only for short periods of time	35

6.5 Hose connection

The hose connection shall be detachable or integral to the shank. For the inlet connection, national standards or regulatory requirements of the country where it is used can apply. If no national standard is in force, refer to ISO/TR 28821. The threaded nipple, the hose-coupling nipple and the floating nut shall be compatible with the maximum gas-flow rate and the intended service conditions.

If an integral hose connection is used, the exterior profile of the nipple is left to the choice of the manufacturer.

NOTE Integral hose connections are not permitted in certain countries.

6.6 Gas tightness

The gas passages, connections, valve seats and glands shall be gas tight to the atmosphere at 1,5 times the maximum gas pressure specified by the manufacturer. The test pressure shall be at least 0,25 MPa (2,5 bar).

The maximum total admissible leakage rate measured in accordance with 7.5 shall not exceed 8 cm^3/h under the following test conditions:

a) with the valve(s) closed at a torque specified by the manufacturer;

b) with the valve(s) half open and the outlet from the shank and/or the downstream orifices closed;

NOTE 1 The air inlet (item 6 in Figure 1 to Figure 4) was completely closed by the adjustment of the air inlet (item 12 in Figure 1 to Figure 4).

NOTE 2 If the airtightness of the air inlet (item 6 in Figure 1 to Figure 4) cannot be secured even if the adjustment of air inlet (item 12 in Figure 1 to Figure 4) is positioned in the completely closed position, alternative test methods can be considered, such as ignoring leaks from this part or replacing with completely sealed air inlet and/or adjustment (item 6 and/or item 12) for the test.

c) as for a) and b), after 1 500 open-close cycles of the valve(s) under the test conditions given in 7.6.

6.7 Gas-flow rate

The gas-flow rates and the corresponding pressure shall be stated by the manufacturer in the instructions for use. It shall be possible to obtain the gas-flow rates with a tolerance of ± 10 % at the indicated pressure. The test shall be conducted in accordance with 7.7.

6.8 Safety against sustained backfiring and blowing-off of the flame

There shall be no sustained backfire or flame blow-off when the blowpipe and its attachments are tested in accordance with 7.8.

6.9 Flame adjustment

The range of attachments shall be sufficient to allow the adjustment of the flame to suit any job for which the blowpipe is intended.

The flame of the blowpipe shall be able to be adjusted continuously and normally with a flow range between 50 % of the minimum flow rate and the maximum flow rate.

6.10 Stability in air currents

For blowpipes with a gas-flow rate greater than 150 l/h, at the maximum gas-flow rate and at maximum aeration adjustment, the flame shall not be extinguished when the blowpipe is tested according to 7.9.

6.11 Ignition

It shall be possible to ignite the gas at the ignition gas-flow rate(s) specified by the manufacturer, in accordance with the manufacturer's instructions.

7 Tests

7.1 General

The various tests described in 7.2 to 7.10 are type tests.

The tests shall be carried out using all the gases for which the blowpipes are designed and at an ambient temperature of (20 ± 5) °C, unless otherwise stated in the tests. Hydrogen and acetylene gases used for the tests shall have a minimum purity, as a volume fraction, of 98 %.

Except where specified in the manufacturer's instructions for igniting the blowpipe or using attachments, set any user-adjustable aeration controls to give maximum aeration during the test.

Pressure readings shall be taken with equipment calibrated to class 1 or better.

The flow-rate-measuring system shall have an accuracy of not less than ± 3 %.

7.2 General checks

General checks shall be verified by inspection when tests are not described.

7.3 Operational tests

The blowpipe shall be verified by practical use that it conforms to the requirements of 6.9 and 6.11.

7.4 Shank-overheating tests

Suspend the blowpipe, equipped with the device that is likely to produce the highest overheating of the shank, for example a bit-soldering attachment, in a horizontal position in calm air.

The increase in temperature of the blowpipe shall be determined by means of thin-wire thermoelectric couples. The thin-wire thermoelectric couples shall be selected and located so that they have only the smallest possible influence on the temperature of the area to be tested. In the determination of the temperature rise of handles, knobs, levers and similar components, all parts that are handled in normal use shall be considered.

Submit the blowpipe thus equipped to the two operating tests:

a) at its maximum flow rate;

b) at 50 % of its minimum flow rate.

Continue each of these tests until the temperature rise per minute is less than 0,2 K, with a minimum test period of 30 min, then interrupt the operation.

The increases and decreases in temperature during these tests shall be recorded.