INTERNATIONAL STANDARD

ISO 9012

Third edition
2008-02-15

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

Reference number
ISO 9012:2008(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9012 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 8, *Equipment for gas welding, cutting and allied processes*.

This third edition cancels and replaces the second edition (ISO 9012:1998), which has been technically revised.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 8 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

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

1 Scope

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

This International Standard 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 International Standard 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 of this International Standard 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 referenced documents are indispensable for the application 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*

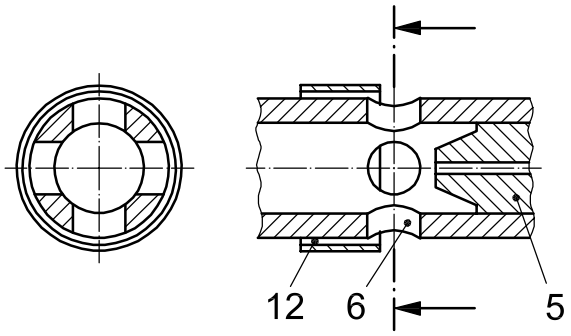
ISO 9539, *Materials for equipment used in gas welding, cutting and allied processes*

3 Terms and definitions

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

3.1
air-aspirated 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

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

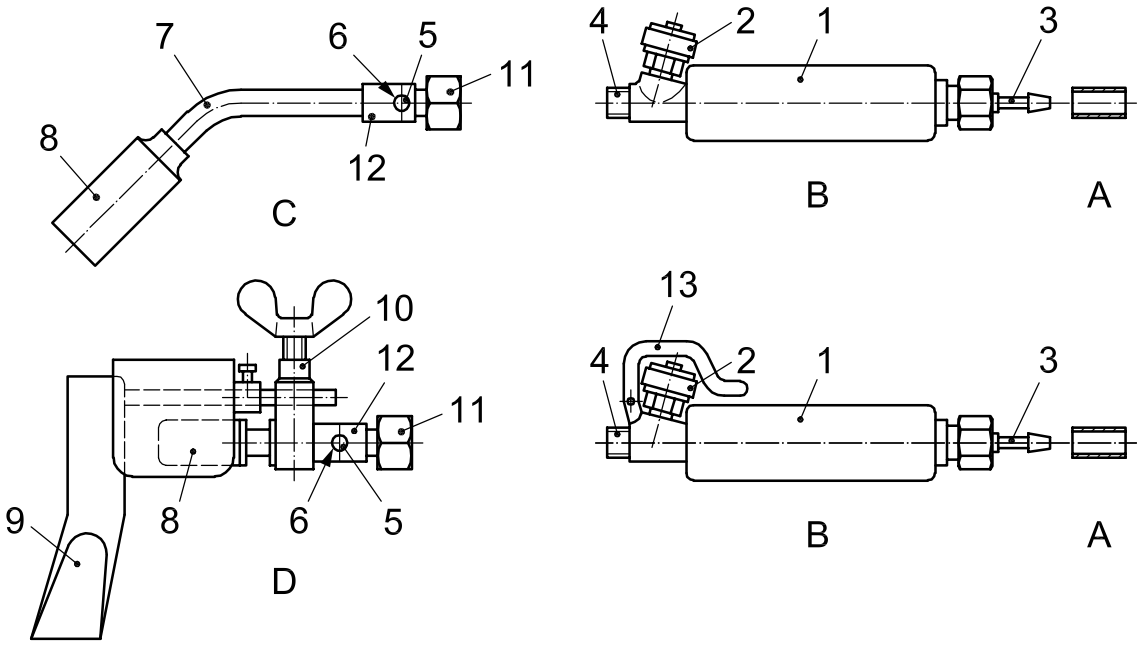
4 Main types of aspiration

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

a) attachment (see Figure 2);

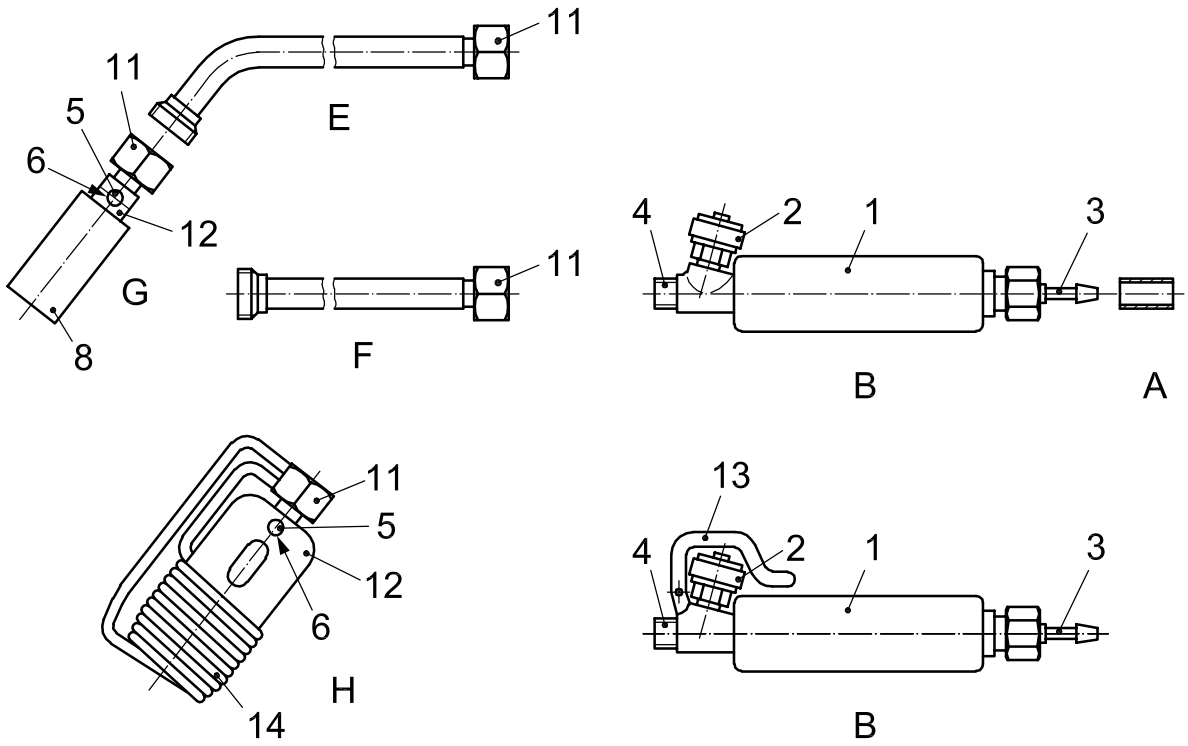
b) nozzle (see Figure 3);

c) shank (see Figure 4).



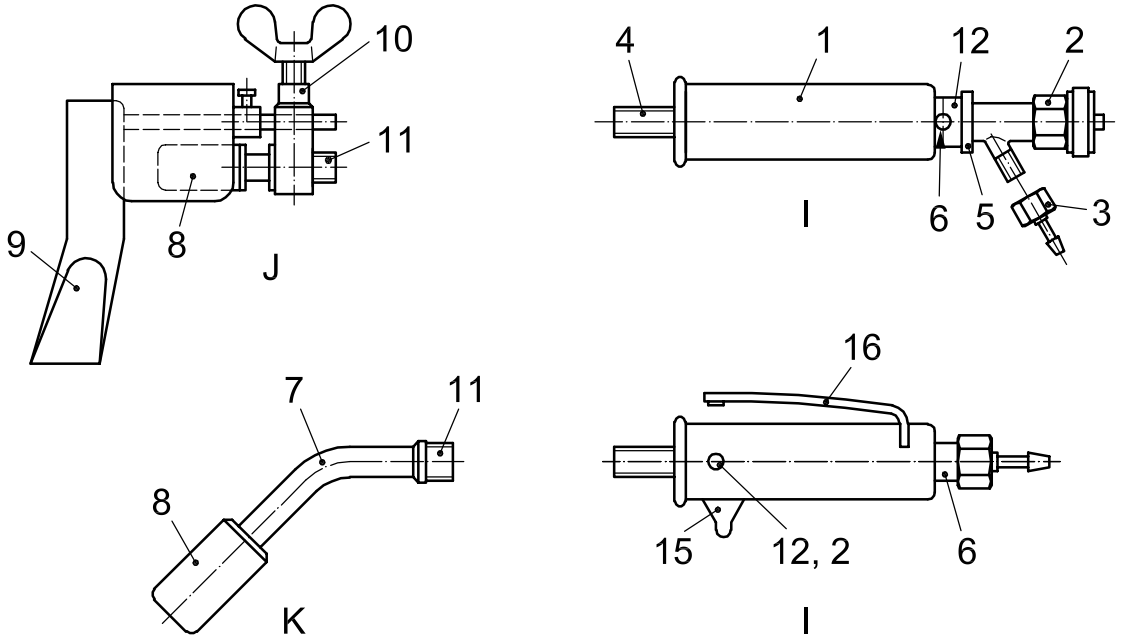
NOTE See Table 1 for the key to Figure 2.

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 — Labels 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
		12	adjustment of air inlet
		13	control of automatic flame-reducing device
		14	vaporization for system liquid-phase blowpipe
		15	ignition system
		16	on/off valve control

5 Description of components

5.1 Shank or handle (see Figures 2 and 3, assembly B, and Figure 4, assembly I)

5.1.1 General

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, assembly I).

5.1.2 Valve shank (see Figures 2 and 3, assembly B, and Figure 4, assembly I)

This type of shank is fitted with a single valve (item 2) for opening, shutting and regulating the gas-flow rate.

5.1.3 Shank with automatic flame-reducing device (see Figures 2 and 3, assembly B)

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, e.g. a knob;

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

5.1.4 Shank with pressure-control or pressure-reducing device

This type of shank is fitted with a device for the control or reduction of gas pressure.

5.1.5 Shank with ignition system

This shank is fitted with a valve or an on/off valve control for the gas and with an ignition system acting simultaneously or separately.

5.2 Attachment

5.2.1 General

The attachment is generally composed of a nozzle or burner and a tube.

5.2.2 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 lighting 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, etc.

5.2.3 Tube

The tube (item 7) connects 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, 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

This valve control stops the gas flow as soon as manual grip is released.

5.4 Device to prevent inadvertent operation

Device to prevent inadvertent 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 International Standard, 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 or fully open. 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 the 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. The inlet connection shall comply with the national standard or regulatory requirements of the country where it is used. If no national standard is in force, it is recommended that the connection comply with ISO 3253[1]. 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;

c) as for a) and b), after 5 000 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 $\pm$ 10 % at the indicated pressure.

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.

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.

7.2 General checks

Verify by inspection when the tests are not described.

7.3 Operational tests

Verify by practical use of the blowpipe 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, e.g. a bit soldering attachment, in a horizontal position in calm air.

Determine the increase in temperature of the blowpipe by means of thin-wire thermoelectric couples, selected and located so as to reduce to a minimum their 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.

Record the increases and decreases in temperature during these tests.

7.5 Gas tightness

Measure the leakage rate in accordance with ISO 9090.

7.6 Valve endurance test

The valves shall be subjected to a life-cycle test of 5 000 openings and closings at a maximum frequency of 0,25 Hz (i.e. 15 cycles per minute). The closing torque used shall be the one given by the manufacturer for the gas tightness test.

7.7 Checking gas-flow rates

With the blowpipe fed at the feeding pressure indicated by the manufacturer, check that the gas-flow rate is equal to the stated flow rate.

Take pressure readings with equipment calibrated to class 1 or better.

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

In all cases, express the results of the flow-rate measurements for the gas for which the blowpipe is designed, under standard conditions, i.e. 23 °C/0,101 3 MPa (1,013 bar), in accordance with ISO 554.

7.8 Safety against sustained backfire and blowing-off of the flame

After the blowpipe has been put in operation and the air inlet device has been set for the maximum inlet:

— progressively decrease the flow rate to 0,5 times the minimum flow rate and check that no sustained backfire occurs;

— progressively increase the flow rate up to the maximum flow rate and check that the flame does not blow off.

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

7.9 Stability in air currents

With the blowpipe in operation at its minimum service feed pressure, place it so that the flame at the nozzle outlet is vertical and submit it successively to:

— an air current perpendicular to the axis of the flame (for enclosed flame-type blowpipes, set the main axis of the air current facing the largest hole of the flame protector);

— an air current perpendicular to the axis of the air inlets of the burner.

The air current shall be produced by compressed air at a pressure of 0,05 MPa (0,5 bar) flowing through a nozzle with an inside diameter of 5 mm. This pressure shall be measured at a distance 65 mm upstream of the air nozzle outlet. The distance between the air nozzle and the blowpipe shall be 1,4 m. The main axis of the air current shall be in the same horizontal plane as the end of the blowpipe nozzle or the centre of the injection hole or the centre of the largest hole of the flame protector.

7.10 Verification of the device against inadvertent operation

The operation of the device shall be verified by inspection.

8 Marking

8.1 General

The marking shall be durable, clearly legible and unequivocal.

8.2 Marking of the shank

The shank shall carry the name or registered trade mark of the manufacturer or distributor and the code letter describing the gas used (see Clause 9).

8.3 Marking of the attachment

The attachment of the blowpipe shall carry the code identifying the gas as well as indications concerning the consumption. Furthermore, interchangeable attachments shall carry the name or registered trade mark of the manufacturer or distributor.

9 Code letters identifying the gas(es) used

The following code letters shall be used to identify the gas(es) used:

— acetylene	A
— hydrogen	H
— coal gas	C
— methane and natural gas	M
— liquefied petroleum gases (LPG) (propane/butane) in gaseous phase	P
— methyacetylene-propadiene mixtures (MPS) and other fuel gas mixtures	Y

For blowpipes, nozzles and interchangeable components capable of use with more than one fuel gas in the gaseous phase, the code letter “F” shall be used.

Operating data shall give details on fuel gas for which these components are suitable.

For liquefied petroleum gases (LPG) (propane/butane) in the liquid phase, the letter code “P+” shall be used.

10 Instructions for use

Each complete set (shank and head) shall come together with instructions for use giving the following information:

a) the permissible gases;

b) the maximum and minimum operating gas pressures and flow rates;

c) an explanation of the markings;

d) the installation of safety devices as required;

e) the equipment to be fitted on the shank including hose, type and bore size;

f) the preparation before operation (e.g. selection and assembly of elements, checking for tightness);

g) the operating instructions (e.g. the order in which the valves shall be operated);

h) the safety instructions including those ventilation requirements which are related to the equipment;

i) the necessity of having repairs made by a qualified specialist and using the original spare parts;

j) instructions for maintenance and periodical servicing.

Bibliography

[1] ISO 3253, *Gas welding equipment — Hose connections for equipment for welding, cutting and allied processes*

ICS 25.160.30

Price based on 12 pages