INTERNATIONAL STANDARD

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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

Reference number
ISO 9012:1998(E)

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.

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.

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

This second edition cancels and replaces the first edition (ISO 9012:1988) which has been technically revised.

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

1 Scope

This International Standard specifies the 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 on to the blowpipe and possibly constitutes the shank.

NOTE The drawings shown in this International Standard are given for information only, to facilitate 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 standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All Standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 554:1976, *Standard atmospheres for conditioning and/or testing – Specifications.*

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

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

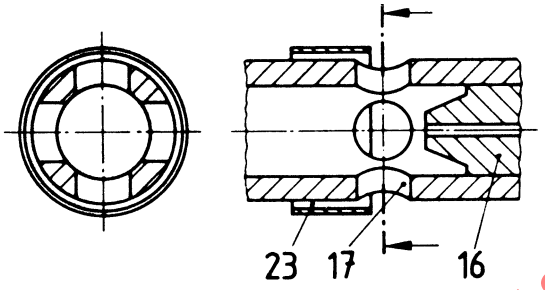
ISO 9539:1988, *Materials for equipment used in gas welding, cutting and allied processes.*

1) To be published. (Revision of ISO 3253:1975)

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1
air-aspirated blowpipe
blowpipe in which the fuel gas leaves the injector in the gaseous phase. The fuel gas is then mixed in the mixing zone (see figure 1) with a sufficient quantity of air, aspirated from the ambient atmosphere, to produce a technically usable flame



Key — see table 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 flamesupporting devices;

— within the tube;

— within the blowpipe shank

3.3
blowing off of the flame
detachment of the flame from the blowpipe nozzle which may cause the flame to be extinguished

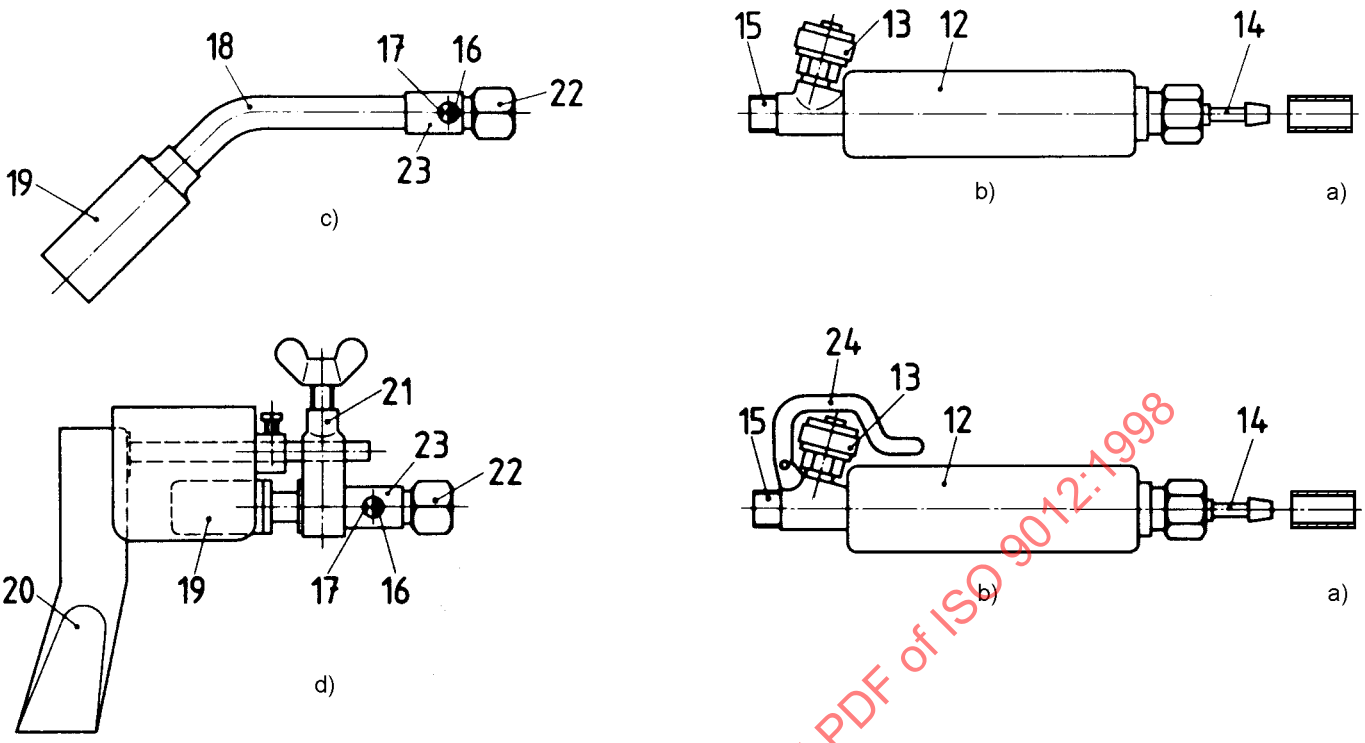
4 Main types of aspiration

Depending on the location of the mixing zone, a distinction is made between:

a) blowpipes with air aspiration in the attachment (see figure 2);

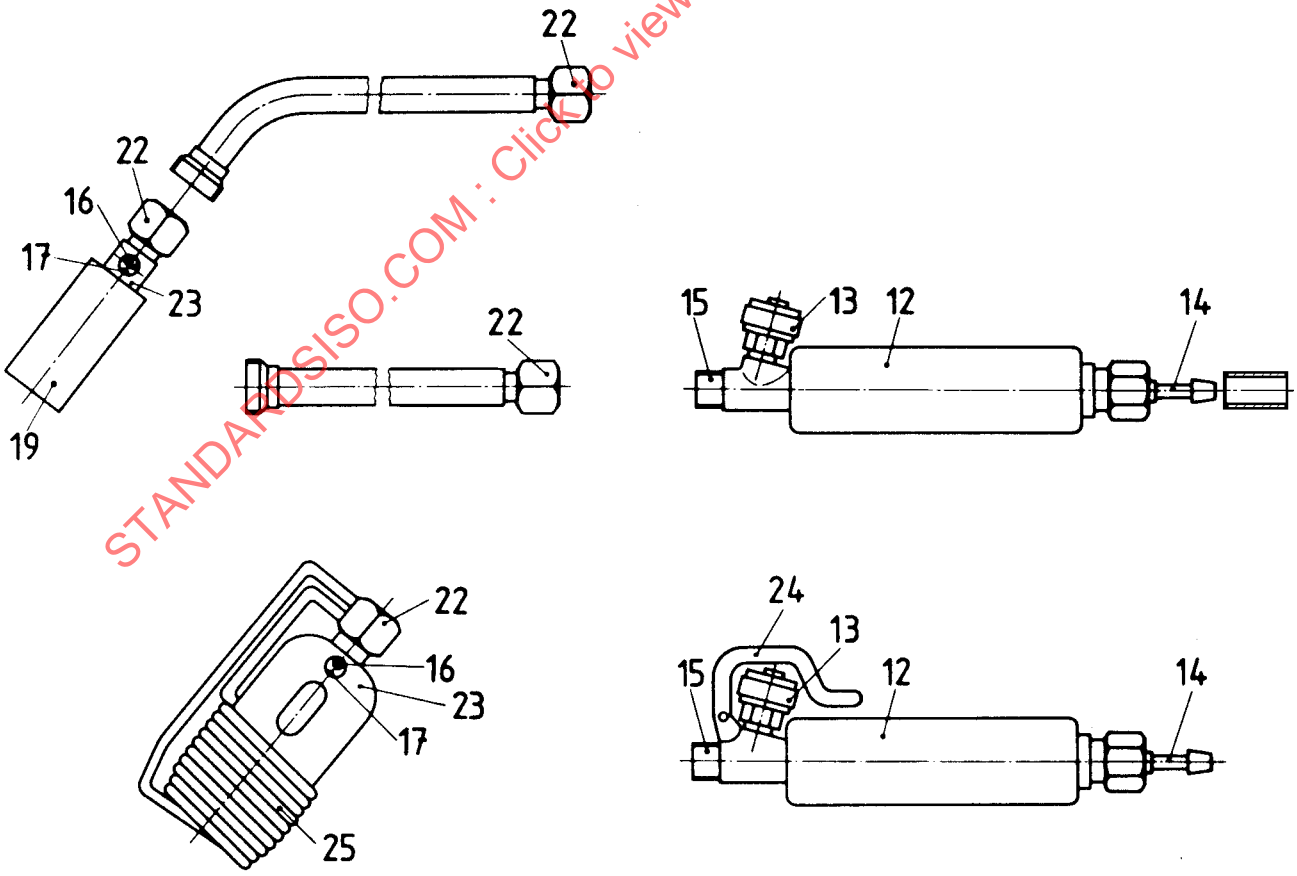
b) blowpipes with air aspiration in the nozzle (see figure 3);

c) blowpipes with air aspiration in the shank (see figure 4).



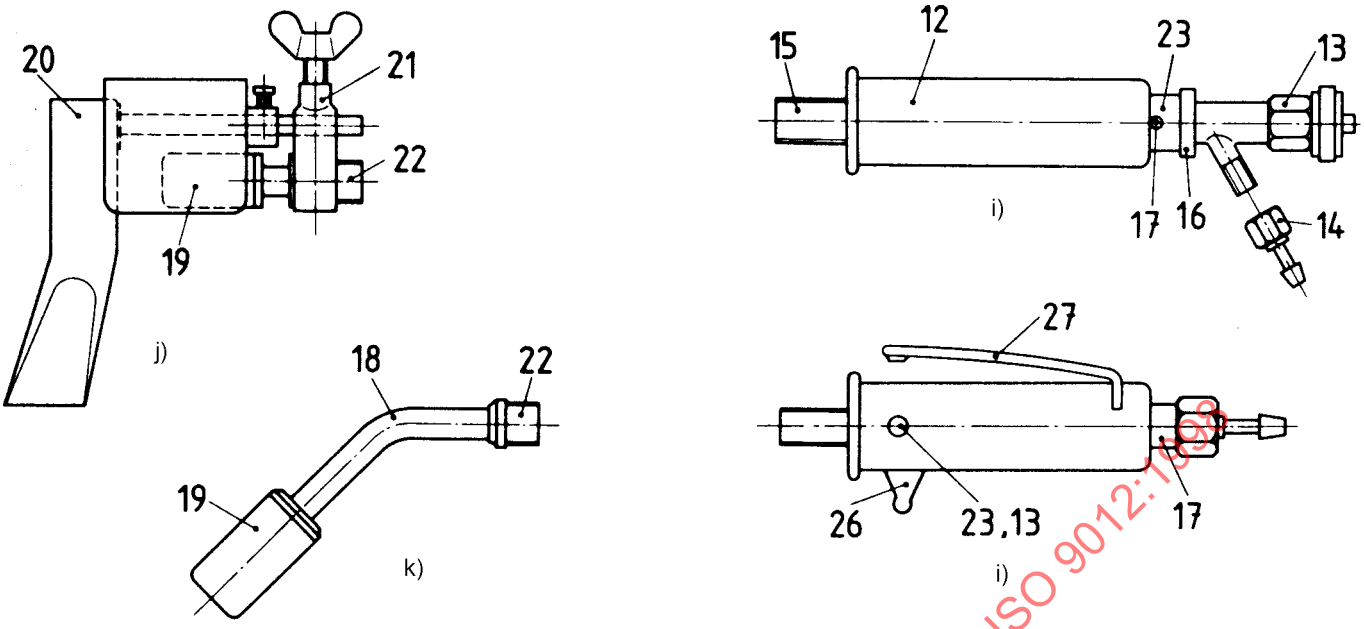
Key — see table 1

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



Key — see table 1

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



Key — see table 1

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

Table 1 — Terminology for figures 1 to 4

Elements		Items	
Key	Term	Key	Term
a)	hose	12	handle
b)	shank	13	valve
c)	attachment with air aspiration	14	hose connection
d)	soldering attachment with air aspiration with a copper bit	15	head connection
e)	bent tube	16	injector
f)	straight tube	17	air inlet
g)	blowpipe nozzle with air aspiration	18	tube (may include air inlet)
h)	liquid-phase nozzle with air aspiration	19	blowpipe nozzle
i)	injector-type shank	20	soldering bit
j)	attachment for bit soldering	21	bit support
k)	attachment (without injector)	22	connection
		23	adjustment of air inlet
		24	control of automatic flame reducing-device
		25	vaporization for system liquid-phase blowpipe
		26	ignition system
		27	on/off valve control

5 Description of components

5.1 Shank or handle

See figures 2 and 3, element b), and figure 4, element i).

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, element i)].

5.1.1 Valve shank

See figures 2 and 3, element b), and figure 4, element i).

This type of shank is fitted with a single valve (item 13) for opening, shutting and regulating the gas flow rate.

5.1.2 Shank with automatic flame-reducing device

See figures 2 and 3, element b).

This type of shank is fitted with two separate control devices which are:

— a valve (item 13) which controls the gas flowrate under normal working conditions, e.g. via a knob;

— an automatic flame-reducing device (item 24) operated by a simple release mechanism, e.g. a trigger.

5.1.3 Shank with pressure control or reducing-device

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

5.1.4 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

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

5.2.1 Nozzle or burner

See figures 2, 3 and 4, elements g), h) and item 19.

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 16) 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 25).

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

5.2.2 Tube

The tube (item 18) 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 16).

Not all blowpipes have a tube.

The tube may be permanently fitted to the blowpipe nozzle (see figure 2, elements c) and d), and figure 4, elements j) and k) or may act as a connecting tube between the nozzle and the shank (see figure 3, elements 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 correspont to the intended use and to the nature of the gas.

For 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 with 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 inadvertent operation of the control device (see figures 2 and 3, item 24 and figure 4, item 27), 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 operation.

During normal usage, the shank and the devices that it includes shall not reach excessive temperatures. When the tests specified in 7.3 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
Handles, knobs, levers and similar components which, in normal use, are held continuously	30 K
Handles, knobs, levers and similar components which, in normal use, are held only for short periods of time	35 K

6.5 Hose connections

The connecting nipples may be either fixed permanently to the shank or be detachable. The exterior profile of the nipples is left to the choice of the manufacturer. If a threaded connection is used, it shall be in accordance with ISO 3253. 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.

6.6 Gas tightness

The gas passages, connections, valve seats and glands shall be gas tight to the atmosphere at 1,5 × 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 7.4 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 7.5.

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.

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 7.7.

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 7.8.

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

The various tests described in 7.1 to 7.9 are type tests.

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

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.

7.1 General checks

Verify by inspection when the tests are not described.

7.2 Operational tests

Verify by practical use of the blowpipe that it conforms with the requirements of 6.9 and 6.11.

7.3 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.

7.4 Gas tightness

Measure the leakage rate in accordance with ISO 9090.

7.5 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.

7.6 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 using equipment calibrated to class 1 or better.

The flow–rate measuring system shall have an accuracy of not less than ± 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/0,1 013 MPa (1,013 bar), in accordance with ISO 554.

7.7 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 × the minimum flow–rate and check that no sustained backfire occurs;

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

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

7.8 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);

— to 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.

7.9 Verification of the device against inadvertent operation

The operation of the device shall be verified by inspection.

8 Marking

The marking shall be durable, clearly legible and unequivocal.

8.1 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).

8.2 Marking of the attachment

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