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Air-aspirated hand blowpipes — Specifications

Chalumeaux manuels aéro-gaz à air aspiré — Spécifications

Reference number
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Foreword

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International Standard ISO 9012 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Air-aspirated hand blowpipes — Specifications

1 Scope and field of application

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 related thermal processes, which use a fuel gas and aspirated air (injector-type blowpipes), and are intended for manual use.

It applies in particular to :

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

— so-called liquid-phase blowpipes which are fed with a gas in the liquid phase, at the container pressure, 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 — The drawings shown in this International Standard are given for information 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 References

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

ISO 3253, *Hose connections for equipment for welding, cutting and related processes.*

ISO 9090, *Gas tightness of equipment for gas welding and allied processes.* [1)]

ISO 9539, *Materials for equipment used in gas welding, cutting and allied processes.* [1)]

3 Definitions

3.1 air-aspirated blowpipe : A 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.

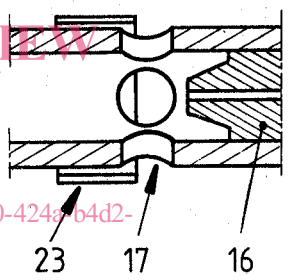

Figure 1 — Schematic drawing of the mixing zone

3.2 sustained backfire : The 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;

— within the tube;

— within the blowpipe shank.

3.3 blowing off of the flame : The detachment of the flame from the blowpipe nozzle. This may cause the flame to be extinguished.

1) At present at the stage of draft.

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 head (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).

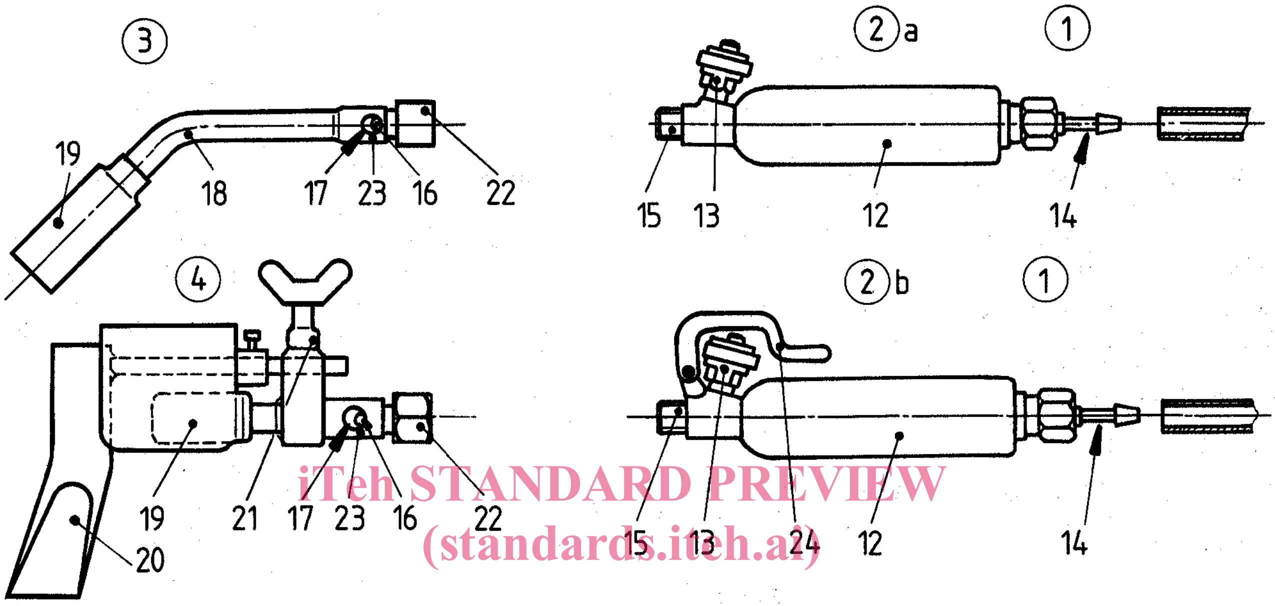

Figure 2 — Examples of blowpipes with air aspiration in the attachment

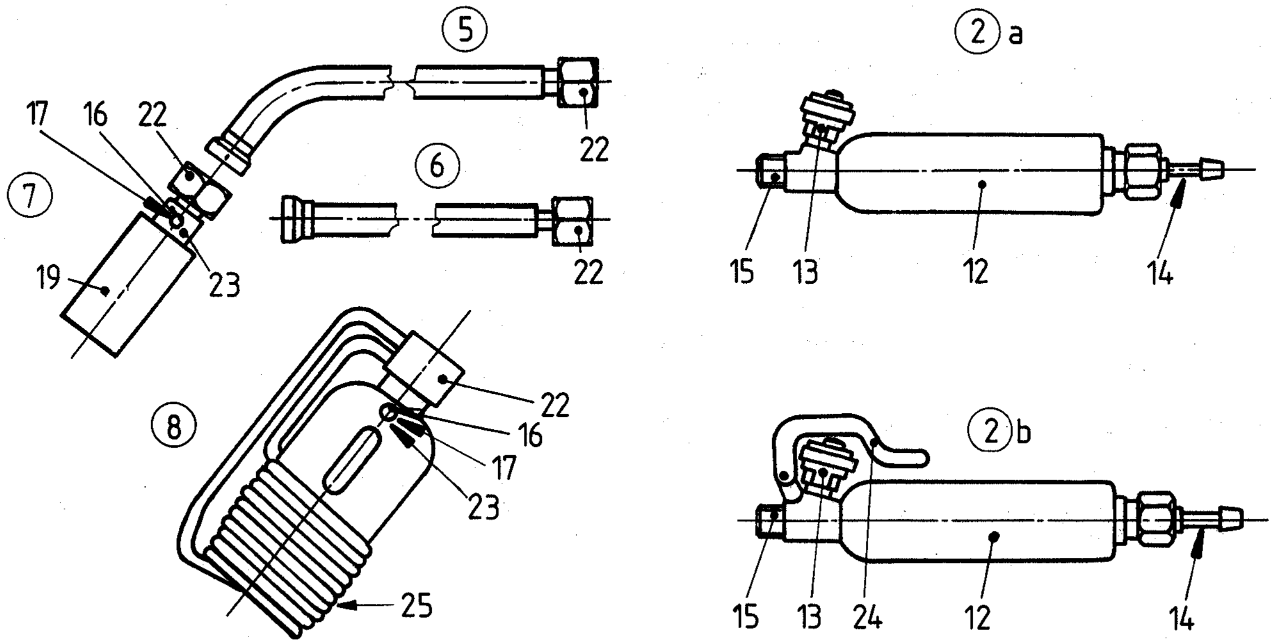

Figure 3 — Examples of blowpipes with air aspiration in the nozzle

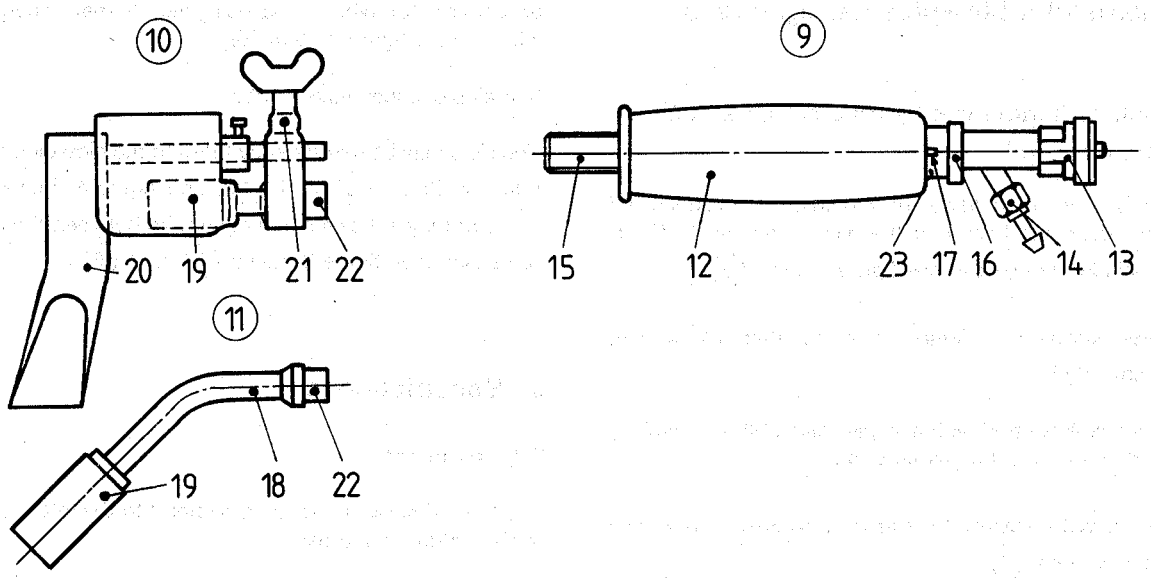

Figure 4 — Examples of blowpipes with air aspiration in the shank

Terminology for figures 1 to 4

Element		Item	
(1)	Hose	12	Handle
(2)	Shank	13	Valve
(3)	Attachment with air aspiration	14	Hose connection
(4)	Soldering attachment with air aspiration with a copper bit	15	Head connection
(5)	Bent tube	16	Injector
(6)	Straight tube	17	Air inlet
(7)	Blowpipe nozzle with air aspiration	18	Tube (may include air inlet)
(8)	Liquid-phase nozzle with air aspiration	19	Blowpipe nozzle
(9)	Injector-type shank	20	Soldering bit
(10)	Attachment for bit soldering	21	Bit support
(11)	Attachment (without injector)	22	Connection
		23	Adjustment of air inlet
		24	Control of automatic flame reduction (can be positioned at the end of the shank)
		25	Vaporization system for liquid-phase blowpipe

5 Elements of a blowpipe (see figures 2, 3 and 4)

5.1 Shank or handle (see figures 2 and 3, item (2), and figure 4, item (9))

The shank is used for holding the blowpipe. It includes the systems for fitting the hose and the gas control device(s). It may also include the injector (see figure 4, item (9)).

5.1.1 Valve shank (see figures 2 and 3, item (2) a, and figure 4, item (9))

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

5.1.2 Shank with automatic flame-reducing device (see figures 2 and 3, item (2) b)

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

— a valve (13) which controls the gas flow rate under normal working conditions (e.g. a knob);

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

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, items (7) (8) and 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 (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, items (3) and (4), and figure 4, items (10) and (11)) or may act as a connecting tube between the nozzle and the shank (see figure 3, items (5) and (6)).

6 Specifications

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 with the requirements of ISO 9539.

6.3 Valves

It shall not be possible to bypass the 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 incorporate 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 24), if fitted.

6.4 Shank

The shank shall comprise at least the gas supply shut-off valve and the hose coupling nipple.

Furthermore, 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 temperature of the shank and associated devices shall not exceed the values indicated in the table.

6.5 Hose connections

The connecting nipples may be either fixed permanently to the shank or 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 conformance with ISO 3253, and shall be chosen from the series 1/8, 1/4, 3/8 and 1/2 in. 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.

Table

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

6.6 Gas tightness

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

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;

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 pressures shall be stated by the manufacturer in the instructions for use. It shall be possible to obtain the gas flow rates at the indicated pressures.

6.8 Safety against sustained backfiring and blowing off of the flame

Within the adjustment range of the blowpipe, and for the pressures and corresponding flow rates specified by the manufacturer, there shall be no sustained backfiring of the combustible gas in the mixer and no blowing off of the flame.

Conformity with this requirement shall be assessed by using the test specified in 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 Switching back to pilot flame

Aspirated blowpipes using a liquefied gas, and liable to produce a flame with a length[1] exceeding 150 mm shall be fitted with a device for

— either reducing the flame length ($L \leqslant 150$ mm, + 10 %),

— or extinguishing the flame.

This device shall be effective when the blowpipe is deposited on any surface.

For liquid-gas blowpipes with integral pilot flames, the pilot flame shall be adjustable according to the size of the attachment and devices shall be provided to ensure that when the blowpipe is deposited correctly on any surface, the pilot flame is not directed towards that surface.

6.11 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 combustion, the flame shall not be extinguished when the blowpipe is tested according to 7.8.

1) This length corresponds to the distance from the end of the mixing outlet nozzle to the visible limit of the blue flame cone.

7 Tests

The various tests described in 7.1 to 7.8 are type tests.

7.1 General checks

Verify by visual inspection that the blowpipe conforms with the requirements of 6.5 and clauses 8 and 9.

7.2 Operational tests

Verify by practical use of the blowpipe that it conforms with the requirements of 6.9 and 6.10.

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 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

Submit the valves to 5 000 open-close cycles at a maximum frequency of 0,25 Hz (i.e. 15 cycles per minute). One open-close cycle corresponds to the following sequence : valve closed — valve open — valve closed.

The minimum closing torque shall be equal to 0,15 N·m.

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 with equipment calibrated to class 1 or better.

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

The test may be made either with the gas for which the flow rate is indicated or with oil-free air or nitrogen.

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/1,013 bar (0,101 3 MPa), 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 times the minimum flow rate and check that no sustained backfire occurs;

— progressively increase the flow rate up to 1,3 times 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 ± 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 0,5 bar (0,05 MPa) 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.

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.

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 or a symbol of magnitude. Furthermore, interchangeable attachments shall carry the name or registered trade mark of the manufacturer or distributor.

9 Codes

9.1 Code letters identifying the gas(es) used

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

— acetylene	A
— hydrogen	H
— town gas	C
— methane and natural gas	M
— liquefied petroleum gases (LPG) (propane/butane)	P

If the blowpipe can be used with several gases, all corresponding code letters shall be marked.

9.2 Colour code

If a colour code is used, red shall be used to identify combustible gases. This colour shall be clearly visible on the valve or valve component.

10 Instructions for use

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

a) the permissible gases;

b) the 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;

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;

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