
**Terminal units for medical gas pipeline
systems —**

Part 1:
Terminal units for use with compressed
medical gases and vacuum

Prises murales pour réseaux de distribution de gaz médicaux —

Partie 1: Prises murales pour les gaz médicaux comprimés et le vide



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 9170-1 was prepared by Technical Committee ISO/TC 121, *Anaesthetic and respiratory equipment*, Subcommittee SC 6, *Medical gas systems*.

This first edition, together with ISO 9170-2, cancels and replaces the first edition of ISO 9170 (ISO 9170:1994), which has been technically revised.

ISO 9170 consists of the following parts, under the general title *Terminal units for medical gas pipeline systems*:

- *Part 1: Terminal units for use with compressed medical gases and vacuum*
- *Part 2: Terminal units for anaesthetic gas scavenging systems*

Annex A of this part of ISO 9170 is for information only.

Introduction

Terminal units are the points on a medical gas pipeline system where the operator makes connections and disconnections for the supply of specified medical gases to anaesthetic machines, lung ventilators or other items of medical equipment. A wrong connection can create a hazard to the patient or operator. It is important that terminal units and their components are designed, manufactured, installed and maintained in such a way as to meet the basic requirements specified in this part of ISO 9170.

This part of ISO 9170 pays particular attention to:

- suitability of materials;
- gas-specificity;
- cleanliness;
- testing;
- identification;
- information supplied.

This part of ISO 9170 specifies the provision of information for the installation and subsequent testing of terminal units prior to use. Testing of terminal units prior to use is critical to patient safety, and it is essential that terminal units are not used until full testing in accordance with ISO 7396-1 has been completed.

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Terminal units for medical gas pipeline systems —

Part 1:

Terminal units for use with compressed medical gases and vacuum

1 Scope

This part of ISO 9170 specifies requirements for terminal units intended for use in medical gas pipeline systems in accordance with ISO 7396-1, for use with the following services:

- oxygen;
- nitrous oxide;
- air for breathing;
- carbon dioxide;
- oxygen/nitrous oxide mixture [50 %/50 % (by volume)];
- air for driving surgical tools;
- nitrogen for driving surgical tools;
- vacuum.

It is intended especially to ensure the gas-specific assembly of terminal units and to prevent their interchange between different gases.

This part of ISO 9170 specifies requirements for terminal units for supply and disposal of nitrogen or air for driving surgical tools.

This part of ISO 9170 specifies requirements for probes intended to be connected to the gas-specific connection point which is part of the terminal unit.

This part of ISO 9170 does not specify the dimensions of probes and of the gas-specific connection points of the terminal units.

This part of ISO 9170 does not specify the dimensions of NIST connectors, which are defined in ISO 5359.

This part of ISO 9170 does not specify the requirements for terminal units for anaesthetic gas scavenging systems (AGSS), which are defined in ISO 9170-2.

NOTE 1 The requirements of this part of ISO 9170 may be used as guidelines for terminal units for other medical gases. These medical gases will be considered for inclusion in this part of ISO 9170 when they come into general use.

NOTE 2 Throughout this part of ISO 9170, clauses for which a rationale is provided in annex A are indicated by a boldface capital **R**.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 9170. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 9170 are encouraged to investigate the possibility of applying the most recent edition of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 32:1977, *Gas cylinders for medical use — Marking for identification of content.*

ISO 5359, *Low-pressure hose assemblies for use with medical gases*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method.*

ISO 7396-1, *Medical gas pipeline systems — Part 1: Pipelines for compressed medical gases and vacuum.*

ISO 14971-1, *Medical devices — Risk management — Part 1: Application of risk analysis.*

ISO 15001, *Anaesthetic and respiratory equipment — Compatibility with oxygen.*

3 Terms and definitions

For the purposes of this part of ISO 9170, the following terms and definitions apply.

A diagram of a typical terminal unit and probe, with an example of terminology, is shown in Figure 1.

3.1 diameter-index safety system connector DISS connector

range of male and female components intended to maintain gas-specificity by allocation of a set of different diameters to the mating connectors for each particular gas

3.2 gas-specific

having characteristics which prevent interchangeability and thereby allow assignment to one gas or vacuum service only

3.3 gas-specific connection point

that part of the socket which is the receptor for a gas-specific probe

3.4 gas-specific connectors

connectors which are either NIST (non-interchangeable screw-threaded) or DISS (diameter-index safety system) or non-interchangeable quick connectors of terminal units

3.5 low-pressure hose assembly

assembly, consisting of a flexible hose with permanently attached gas-specific inlet and outlet connectors, which is designed to conduct a medical gas at pressures less than 1 400 kPa

3.6 medical gas

any gas or mixture of gases intended to be administered to patients for therapeutic, diagnostic or prophylactic purposes, or for surgical tool application(s)

3.7**medical gas pipeline system**

central supply system consisting of control equipment, a pipeline distribution system and terminal units at the points where medical gases or vacuum may be required

3.8**medical gas supply system**

medical gas pipeline system or any other installation having no permanent pipeline system but employing a medical gas supply source complete with pressure regulators

3.9**nominal distribution pressure**

pressure which the pipeline distribution system is designed to deliver at the terminal unit

NOTE Unless otherwise specified, pressures in this part of ISO 9170 are expressed as gauge pressures (i.e. atmospheric pressure is defined as 0).

3.10**non-interchangeable screw-threaded connector****NIST connector**

range of male and female components intended to maintain gas-specificity by the allocation of a set of different diameters and a left- or right-hand screw thread to the mating components for each particular gas

3.11**probe**

gas-specific male component designed for acceptance by and retention in the socket

3.12**quick connector**

pair of non-threaded gas-specific components which can be easily and rapidly joined together by a single action of one or both hands without the use of tools

3.13**single-fault condition**

condition in which a single means for protection against a safety hazard in equipment is defective or a single external abnormal condition is present

3.14**socket**

that female part of a terminal unit which is either integral or attached to the base block by a gas-specific interface and which contains the gas-specific connection point

3.15**terminal unit**

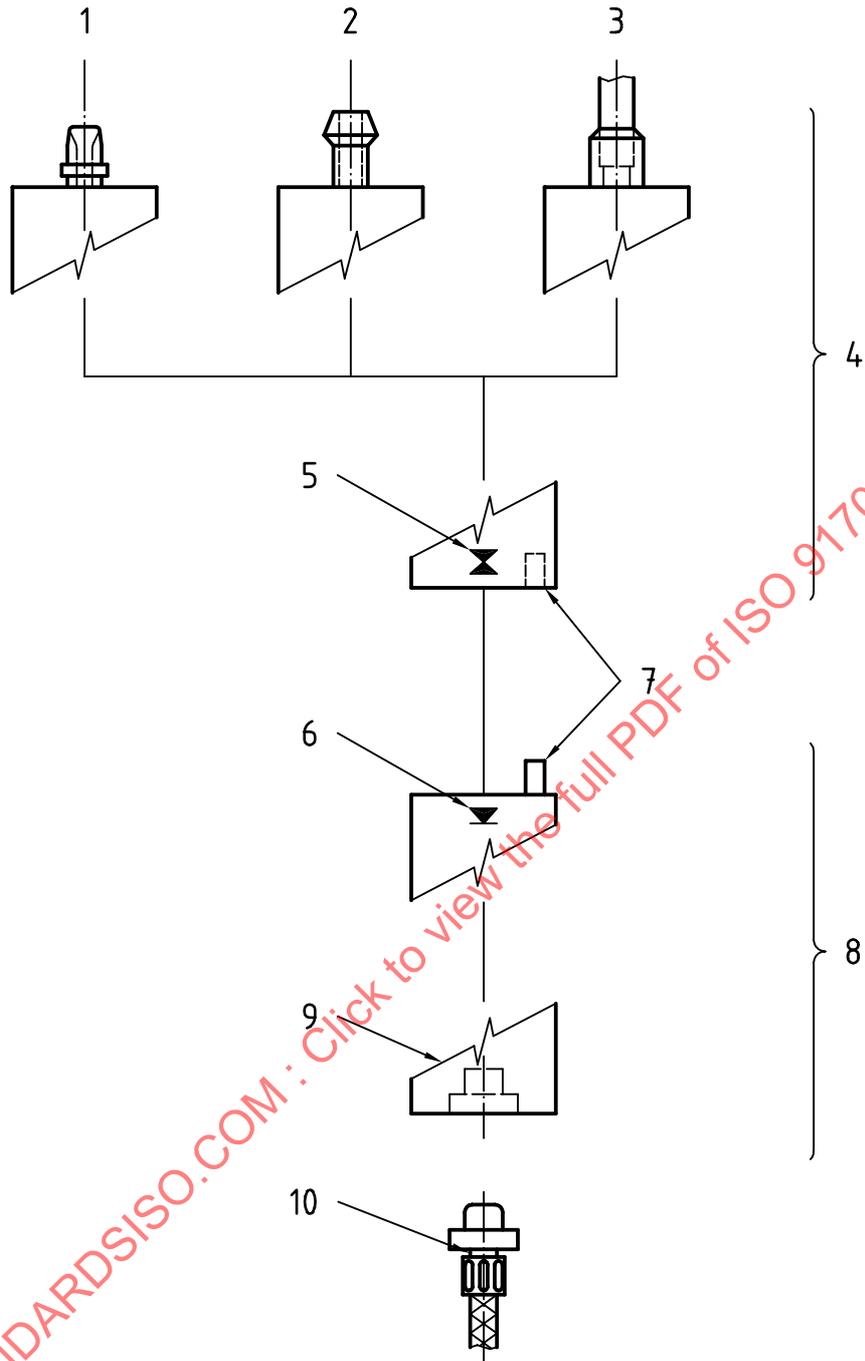
outlet assembly (inlet for vacuum) in a medical gas supply system at which the operator makes connections and disconnections

3.16**terminal unit base block**

that part of a terminal unit which is attached to the pipeline distribution system

3.17**terminal unit check valve**

valve which remains closed until opened by insertion of an appropriate probe and which then permits flow in either direction



Key

- 1 NIST or DISS body
- 2 Hose insert
- 3 Point for brazed connection
- 4 Base block
- 5 Maintenance valve
- 6 Check valve
- 7 Gas-specific interface
- 8 Socket
- 9 Gas-specific connection point
- 10 Probe

Figure 1 — Diagram showing typical components of a terminal unit and probe

3.18**terminal unit maintenance valve**

valve which permits maintenance of the terminal unit without shutting down the pipeline system to other terminal units

3.19**terminal unit for supply and disposal of nitrogen or air for driving surgical tools**

combination of an outlet assembly (for supply) and an inlet assembly (for disposal) which are connected to a medical gas supply system and to an anaesthetic gas disposal system respectively and at which the operator makes connections and disconnections by means of a combined probe

4 General requirements**4.1 Safety**

Terminal units shall, when transported, stored, installed, operated in normal use and maintained according to the instructions of the manufacturer, cause no safety hazard which could be foreseen using risk analysis procedures in accordance with ISO 14971-1 and which is related to their intended application, in normal condition and in single-fault condition.

4.2 R Alternative construction

Terminal units and components, or parts thereof, which use materials or have forms of construction different from those detailed in clause 4 of this part of ISO 9170 shall be accepted if it can be demonstrated that an equivalent degree of safety is obtained. Such evidence shall be provided by the manufacturer.

4.3 Materials

4.3.1 The materials in contact with the gas shall be corrosion-resistant and compatible with oxygen and the other medical gases and their mixtures in the temperature range specified in 4.3.2.

NOTE 1 Corrosion resistance includes resistance against moisture and surrounding materials.

NOTE 2 Compatibility with oxygen involves both combustibility and ease of ignition. Materials which burn in air will burn violently in pure oxygen. Many materials which do not burn in air will do so in pure oxygen, particularly under pressure. Similarly, materials which can be ignited in air have lower ignition energies in oxygen. Many such materials may be ignited by adiabatic compression produced when oxygen at high pressure is rapidly introduced into a system initially at low pressure. For further information, see ISO 15001.

4.3.2 The materials shall permit the terminal units and their components to meet the requirements of 4.4 in the temperature range of $-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$.

4.3.3 Terminal units shall be capable of meeting the requirements of 4.4 after being packed, transported and stored as specified by the manufacturer.

4.3.4 R Evidence of conformity with the requirements of 4.3.1, 4.3.2 and 4.3.3 shall be provided by the manufacturer.

4.4 Design requirements**4.4.1 Medical gas supply pressure**

4.4.1.1 The terminal units for oxygen, nitrous oxide, air for breathing, carbon dioxide and oxygen/nitrous oxide mixture [50 %/50 % (by volume)] shall operate and meet the requirements of this part of ISO 9170 for a medical gas supply having a pressure range from 320 kPa to 600 kPa.

4.4.1.2 R The terminal units for oxygen, nitrous oxide, air for breathing, carbon dioxide and oxygen/nitrous oxide mixture [50 %/50 % (by volume)] shall not create a hazard to the patient or operator at an inlet pressure of 1 000 kPa. Evidence shall be provided by the manufacturer.

4.4.1.3 The terminal units for oxygen, nitrous oxide, air for breathing, carbon dioxide and oxygen/nitrous oxide mixture [50 %/50 % (by volume)] shall meet the requirements of 4.4.1.1 following exposure to an inlet pressure of 1 000 kPa for 10 min.

4.4.1.4 The terminal units for nitrogen or air for driving surgical tools shall operate and meet the requirements of this part of ISO 9170 for a medical gas supply having a pressure range from 640 kPa to 1 200 kPa.

4.4.1.5 R The terminal units for nitrogen or air for driving surgical tools shall not create a hazard to the patient or operator at an inlet pressure of 2 000 kPa. Evidence shall be provided by the manufacturer.

4.4.1.6 The terminal units for nitrogen or air for driving surgical tools shall meet the requirements of 4.4.1.4 following exposure to an inlet pressure of 2 000 kPa for 10 min.

4.4.1.7 The terminal units for vacuum shall operate and meet the requirements of this part of ISO 9170 for a vacuum supply having a minimum pressure of 90 kPa subatmospheric.

4.4.2 Terminal units for different pressures

Terminal units for the same gas at different nominal distribution pressures (e.g. air for driving surgical tools and air for breathing) shall have gas-specific connection points for each pressure.

4.4.3 Incomplete assembly

If any gas-specific component is removed from the terminal unit, the gas-specificity of the terminal unit shall be maintained, or the terminal unit shall be rendered inoperable. If the terminal unit can be dismantled, it shall not be possible to reassemble the components in such a way that the fully-assembled terminal unit is no longer gas-specific.

4.4.4 Gas-specific connection point

Each terminal unit shall include a gas-specific connection point which shall accept the appropriate gas-specific probe only. This connection point shall be included in a socket.

4.4.5 Terminal unit check valve

Each terminal unit shall include a check valve which shall open the gas supply when the probe is connected and which shall shut off automatically when the probe is disconnected. The check valve shall be a component or assembly separate from the maintenance valve specified in 4.4.6.

4.4.6 Terminal unit maintenance valve

Except for vacuum services, each terminal unit shall be equipped with a maintenance valve, which may be manual or automatic. The maintenance valve shall be a separate component or assembly from the check valve specified in 4.4.5.

4.4.7 Connection of terminal units to the pipeline (see also 7.2)

4.4.7.1 Except for connection to a disposal system for nitrogen or air for driving surgical tools, the base block of a terminal unit shall be designed and manufactured for either permanent (e.g. by brazing or welding) or gas-specific (e.g. by means of a NIST or DISS body) connection to a pipeline distribution system. The connection shall comply with ISO 7396-1.

4.4.7.2 Connection to a low-pressure hose shall be either by direct ferruling onto a hose insert or by means of a NIST or DISS body and shall comply with ISO 5359. (See Figure 1.)

4.4.8 Socket

The attachment of a socket to its base block for a particular service shall be gas-specific.

4.4.9 Compliance

Compliance with 4.4.2 to 4.4.8 shall be tested by visual inspection and/or measurement.

4.4.10 Endurance (connection/release)

4.4.10.1 Socket

The socket shall retain gas-specificity and meet the requirements given in 4.4.11 to 4.4.17 after testing in accordance with 5.2.1.

4.4.10.2 Probe

The probe shall retain gas-specificity and meet the requirements given in 4.4.11 to 4.4.17 after testing in accordance with 5.2.2.

4.4.11 R Pressure drop

The pressure drop across the terminal unit and its probe, measured at the test pressures and with the test flows given in Table 1 shall not exceed the values given in Table 1.

For terminal units for supply and disposal of nitrogen or air for driving surgical tools, the pressure drop across the outlet assembly shall not exceed the value given in Table 1; the pressure drop across the inlet assembly shall not exceed 25 kPa with a back pressure not exceeding 15 kPa.

The test for pressure drop is given in 5.3.

Table 1 — Requirements for flow and pressure drop across terminal units with probe inserted

Terminal unit nominal distribution pressure kPa	Test pressure kPa	Test flow l/min	Maximum pressure drop across a terminal unit kPa
350 to 500	320	60	15
350 to 500	320	200	70
700 to 1000	640	300	70
Vacuum	60 ^a	40	15

^a Subatmospheric pressure.

4.4.12 Connection force and torque

The force and the torque required to insert the probe into the terminal unit shall be:

- a) an axial force not exceeding 100 N and/or
- b) a torque not exceeding 1 N·m.

The test for connection force and torque is given in 5.4.

4.4.13 Disconnection force and torque

4.4.13.1 The force and the torque required to release the locking mechanism shall be:

- a) a push and pull of not more than 110 N and not less than 20 N and/or
- b) a torque of not more than 1 N·m and not less than 0,1 N·m.

4.4.13.2 When all locking provisions have been released, according to the manufacturer's instructions, disconnection of the probe from the terminal unit shall require a force of not more than 100 N. The test for disconnection force and torque is given in 5.5.

NOTE Danger to personnel can occur as a result of the rapid expulsion of probes from terminal units. The design should prevent this from occurring.

4.4.14 Mechanical strength

The terminal unit shall withstand the application of a steady axial tensile force of not less than 500 N.

The test for mechanical strength is given in 5.6.

4.4.15 Leakage

4.4.15.1 The leakage from a terminal unit with and without the probe inserted shall not exceed 0,296 ml/min (which is equivalent to 0,03 kPa·l/min).

The test for leakage is given in 5.7.1 and 5.7.2.

4.4.15.2 The leakage from a terminal unit with the probe inserted and with a side force applied shall not exceed 0,296 ml/min (which is equivalent to 0,03 kPa l/min) .

The test for leakage is given in 5.7.3.

4.4.16 Gas-specificity

The terminal unit shall only accept the probe for the medical gas for which it is intended.

The test for gas-specificity is given in 5.8.

4.4.17 Effective connection of probes

A tactile or audible indication of locking shall be perceived on retention of the gas-specific probe.

The test for effective connection of probes is given in 5.9.

4.5 Constructional requirements

4.5.1 R Cleaning

Terminal units for all services shall be cleaned to meet the requirements of ISO 15001. Evidence shall be provided by the manufacturer.

4.5.2 R Lubricants

If lubricants are used, they shall be compatible with oxygen, the other medical gases and their mixtures in the temperature range specified in 4.3.2. Evidence shall be provided by the manufacturer.

5 Test methods

5.1 General

5.1.1 Ambient conditions

Except where otherwise stated, tests shall be carried out at $23\text{ °C} \pm 2\text{ °C}$.

5.1.2 Test gas

Tests shall be carried out with clean, oil-free, dry air or nitrogen. Tests shall be carried out with dry gas with a maximum moisture content corresponding to a dew point of $-48\text{ }^{\circ}\text{C}$ at atmospheric pressure.

5.1.3 Reference conditions

Flowrates shall be corrected to $23\text{ }^{\circ}\text{C}$ and $101,3\text{ kPa}$.

5.2 Test for endurance

5.2.1 Socket

Fix the terminal unit to a horizontal or vertical surface, as appropriate, using the procedure recommended by the manufacturer. Apply a test pressure at the inlet to the base block of the terminal unit. Use a test pressure of $1\ 200\text{ kPa}$ for terminal units for nitrogen or air for driving surgical tools, a test pressure of 600 kPa for all other terminal units for compressed gases or a test pressure of 60 kPa subatmospheric for vacuum. Using a test probe made of corrosion-resistant steel of minimum chromium content of 17% and a surface Brinell hardness of $210\text{ HB }1/30$ (in accordance with ISO 6506-1), connect and release the probe $10\ 000$ times at a frequency of not more than 10 operations per min, changing the seals every $1\ 000$ operations or according to the manufacturer's instructions, whichever is the greater interval.

Test the socket for compliance with 4.4.11 to 4.4.17.

5.2.2 Probe

Fix a terminal unit complying with this part of ISO 9170 to a horizontal or vertical surface, as appropriate, using the procedure recommended by the manufacturer.

Apply a test pressure at the inlet to the base block of the terminal unit. Use a test pressure of $1\ 200\text{ kPa}$ for terminal units for nitrogen or air for driving surgical tools, a test pressure of 600 kPa for all other terminal units for compressed gases or a test pressure of 60 kPa subatmospheric for vacuum. Connect and release the probe $10\ 000$ times at a frequency of not more than 10 operations per minute, with the seals being changed every $1\ 000$ operations or according to the manufacturer's instructions, whichever is the greater interval.

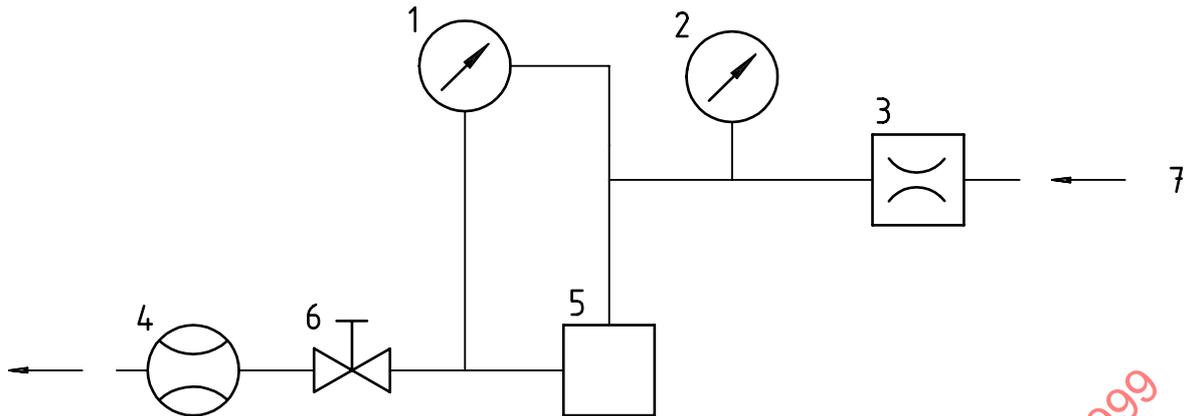
Test the probe for compliance with 4.4.11 to 4.4.17.

5.3 Test for pressure drop

Using an apparatus of typical configuration shown in Figure 2 for terminal units for compressed medical gases, Figure 3 for terminal units for vacuum or Figure 4 for terminal units for supply and disposal of nitrogen or air for driving surgical tools, set the test pressure and flow at the inlet of the terminal unit to the appropriate values given in Table 1 and in 4.4.11.

Measure the pressure drop across the terminal unit with the probe inserted.

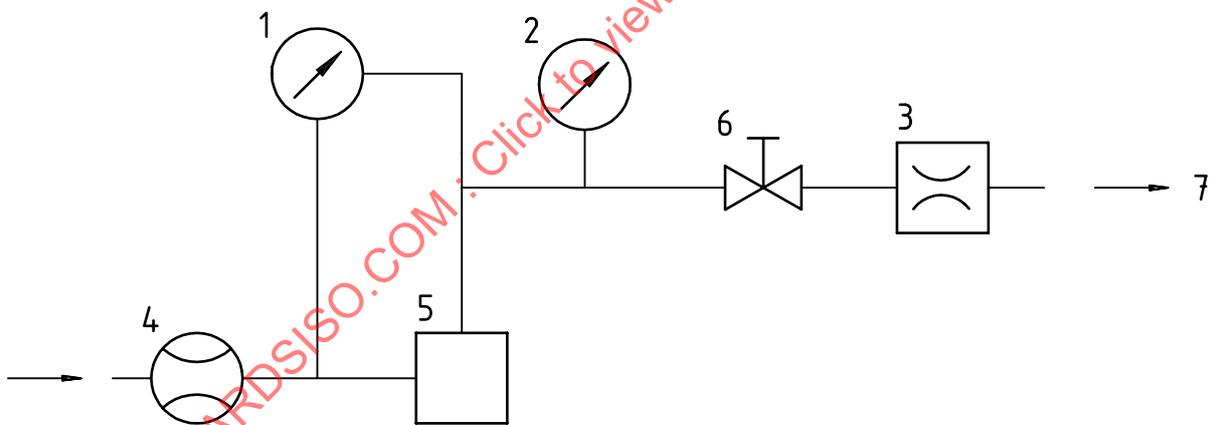
For terminal units for the supply and disposal of nitrogen or air for driving surgical tools, measure the pressure drops across the outlet and inlet assemblies simultaneously.



Key

- 1 Pressure-differential measuring device
- 2 Pressure gauge
- 3 Pressure regulator
- 4 Flowmeter
- 5 Terminal unit with probe inserted
- 6 Flow control valve
- 7 Pressure supply

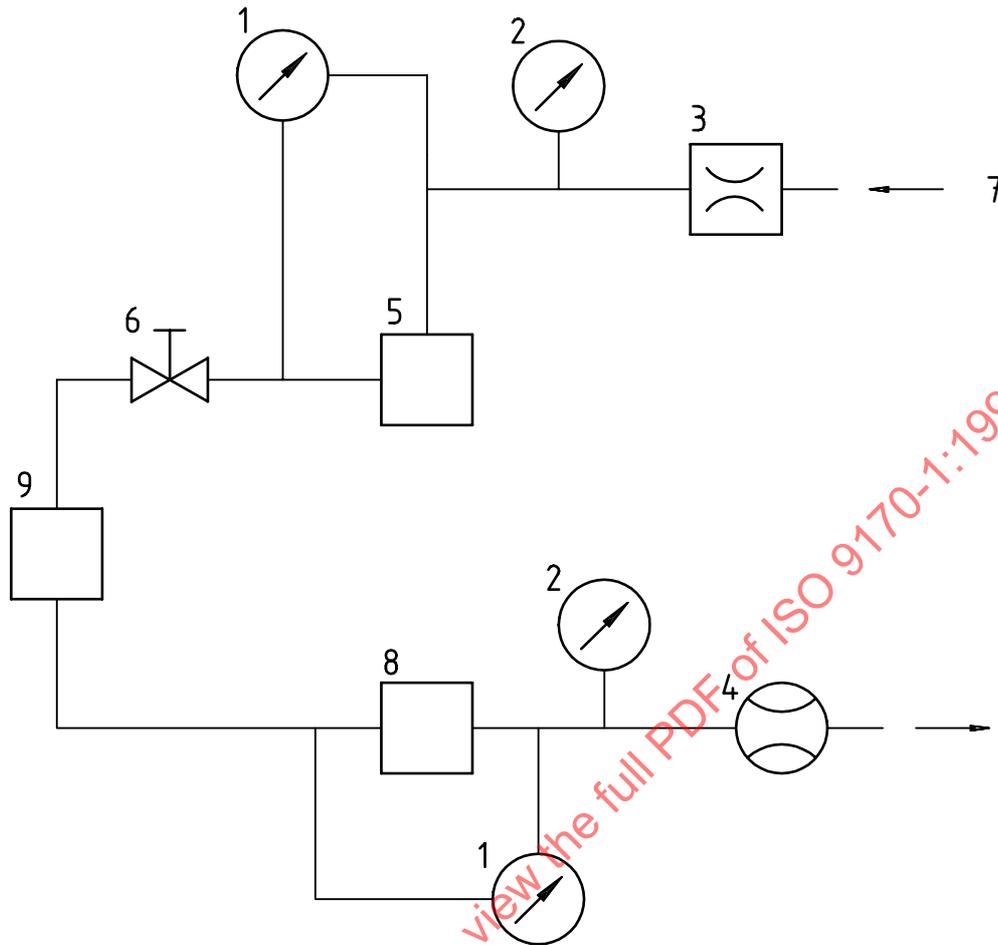
Figure 2 — Typical apparatus for measuring pressure drop across terminal units for compressed medical gases



Key

- 1 Pressure-differential measuring device
- 2 Pressure gauge
- 3 Vacuum regulator
- 4 Flowmeter
- 5 Terminal unit with probe inserted
- 6 Flow control valve
- 7 Vacuum supply

Figure 3 — Typical apparatus for measuring pressure drop across terminal units for vacuum



Key

- 1 Pressure-differential measuring device
- 2 Pressure gauge
- 3 Pressure regulator
- 4 Flowmeter
- 5 Inlet assembly of terminal unit with probe inserted
- 6 Flow control valve
- 7 Pressure supply
- 8 Outlet assembly of terminal unit with probe inserted
- 9 Connection between supply and disposal sides of probe

Figure 4 — Typical apparatus for measuring pressure drop across terminal units for supply and disposal of nitrogen or air for driving surgical tools

5.4 Test for connection force and torque

Adapt a probe to accommodate a suitable measuring device.

Fix the terminal unit to a horizontal or vertical surface, as appropriate, using the procedure recommended by the manufacturer.

Apply a test pressure at the inlet to the base block of the terminal unit. Use a test pressure of 1 200 kPa for terminal units for nitrogen or air for driving surgical tools, a test pressure of 600 kPa for all other terminal units for compressed gases or a test pressure of 60 kPa subatmospheric for vacuum.

In accordance with the manufacturer's instructions, insert the adapted probe into the terminal unit and record the force and/or torque required to insert and engage the probe fully.

5.5 Test for disconnection force and torque

Adapt a probe to accommodate a suitable measuring device.

Fix the terminal unit to a horizontal or vertical surface, as appropriate, using the procedure recommended by the manufacturer.

Apply a test pressure at the inlet to the base block of the terminal unit. Use a test pressure of 640 kPa for terminal units for nitrogen or air for driving surgical tools, a test pressure of 320 kPa for all other terminal units for compressed gases or a test pressure of 40 kPa subatmospheric for vacuum.

Insert the adapted probe into the terminal unit in accordance with the manufacturer's instructions and ensure that it is fully engaged.

Release the locking mechanisms and disconnect the probe in accordance with the manufacturer's instructions and record the force and/or torque required to release each locking mechanism. If the recommended disconnection method involves applying, for example, compressive force to the probe to reduce the effort required to disengage the locking mechanism, measure each separate force/torque involved.

5.6 Test for mechanical strength

Adapt a blanked probe in order to apply tensile force.

Fix the terminal unit to a suitable surface using the procedure recommended by the manufacturer.

Apply a test pressure at the inlet to the base block of the terminal unit. Use a test pressure of 1 200 kPa for terminal units for nitrogen or air for driving surgical tools, a test pressure of 600 kPa for all other terminal units for compressed gases or a test pressure of 60 kPa subatmospheric for vacuum.

Insert the adapted probe.

Apply a tensile force of 500 N and hold it for 1 min.

Remove the tensile force, check that the terminal unit is completely functional and the leakage is according to 4.4.15.

Dismantle the terminal unit and check that no damage or distortion has occurred to either the terminal unit components or the probe.

5.7 Test for leakage

5.7.1 Fix the terminal unit to a horizontal or vertical surface, as appropriate, using the procedure recommended by the manufacturer.

Apply a test pressure at the inlet of the base block of the terminal unit. Use the following test pressures:

- a) 320 kPa and 600 kPa for terminal units for compressed medical gases;
- b) 640 kPa and 1 200 kPa for terminal units for nitrogen or air for driving surgical tools;
- c) 60 kPa subatmospheric for terminal units for vacuum.

Measure the leakage under the conditions of maximum and minimum test pressure.

5.7.2 Keep the terminal unit pressurized as described in 5.7.1 and insert a gas-specific blanked probe. Measure the leakage under the conditions of maximum and minimum test pressures.

5.7.3 Apply a force of 20 N perpendicular to the long axis of the probe, 50 mm from the outermost surface of the terminal unit. Measure the leakage whilst the force is applied to the probe under the conditions of maximum and minimum test pressures.

5.8 Test for gas-specificity

Carry out the test by attempting to connect all gas-specific test probes in turn to the gas-specific connection point of each socket.

5.9 Test for effective connection of probes

Carry out the test by inserting the gas-specific probe and checking that a tactile or audible indication of locking is perceived.

5.10 Test for durability of markings and colour coding

Rub markings and colour coding by hand, without undue pressure, first for 15 s with a cloth rag soaked with distilled water, then for 15 s with a cloth rag soaked with methylated spirit and then for 15 s with a cloth rag soaked with isopropanol. Carry out this test at ambient temperature.

6 Marking, colour coding and packaging

6.1 Marking

6.1.1 Terminal units, probes and their gas-specific components shall be durably and legibly marked with the symbol of the relevant gas in accordance with Table 2. The test for the durability of markings is given in 5.10.

NOTE In addition to the symbol, the name of the gas may be used.

6.1.2 The height of the lettering shall be at least 2,5 mm.

6.1.3 Terminal units and probes shall be marked with the manufacturer's name or identification mark and, if applicable, with additional means to ensure traceability such as type, batch or serial number or year of manufacture.

Table 2 — Symbols and colour coding for medical gases

Medical gas or mixture	Symbol	Colour coding ^{a,b}
Oxygen	O ₂	White
Nitrous oxide	N ₂ O	Blue
Air for breathing	Air ^c	Black-white
Air for driving surgical tools	Air - 800	Black-white
Air for driving surgical tools (with disposal)	Air motor	Black-white
Nitrogen for driving surgical tools	N ₂ - 800	Black
Carbon dioxide	CO ₂	Grey
Mixture oxygen/nitrous oxide [50 %/50 % (by volume)]	O ₂ /N ₂ O	White-blue
Vacuum	Vac ^c	Yellow

^a According to ISO 32, except vacuum.
^b An example of yellow is given by NCS 0060Y in SS 01 91 02.
^c National languages may be used for air and vacuum.

6.2 Colour coding

6.2.1 If colour coding is used, it shall be in accordance with Table 2 or the appropriate national standard.

6.2.2 Colour coding shall be durable.

The test for the durability of colour coding is given in 5.10.