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

Part 1:

**Terminal units for use with compressed
medical gases and vacuum**

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Prises murales pour systèmes de distribution de gaz médicaux —
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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 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 9170-1 was prepared by Technical Committee ISO/TC 121, *Anaesthetic and respiratory equipment*, Subcommittee SC 6, *Medical gas systems*.

This second edition cancels and replaces the first edition (ISO 9170-1:1999) 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*

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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 be 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.

Annex A contains rationale statements for some of the requirements of this part of ISO 9170. The clauses and subclauses marked with an asterisk (*) after their number have corresponding rationale contained in Annex A, included to provide additional insight into the reasoning that led to the requirements and recommendations that have been incorporated in this document. It is considered that knowledge of the reasons for the requirements will not only facilitate the proper application of this part of ISO 9170, but will expedite any subsequent revisions.

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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

1.1 This part of ISO 9170 applies to:

a) terminal units intended for use in medical gas pipeline systems in accordance with ISO 7396-1, for use with the following medical gases:

— oxygen;

— nitrous oxide;

— medical air;

— carbon dioxide;

— oxygen/nitrous oxide mixture [50 %/50 % (by volume)];

b) terminal units intended for use in medical gas pipeline systems in accordance with ISO 7396-1, for use with the following gases and services:

— oxygen-enriched air;

— air for driving surgical tools;

— nitrogen for driving surgical tools;

— vacuum.

NOTE 1 Different names or symbols are used for air for driving surgical tools, such as instrument air, surgical air, air motor, air-700 and air-800.

NOTE 2 The requirements of this part of ISO 9170 can be used as guidelines for terminal units for other gases. These other gases will be considered for inclusion in this part of ISO 9170 when they come into general use.

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

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

1.3 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.

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

NOTE Certain regional or national standards specifying dimensions of probes and gas-specific connection points are given in the Bibliography.

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

1.6 This part of ISO 9170 does not specify the dimensions of DISS connectors, which are defined in CGA V-5¹⁾ [12].

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

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

ISO 5359:—²⁾, *Low-pressure hose assemblies for use with medical gases*

ISO 6506-1:2005, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 7396-1:2007, *Medical gas pipeline systems — Part 1: Pipeline systems for compressed medical gases and vacuum*

ISO 11114-3:1997, *Transportable gas cylinders — Compatibility of cylinder and valve materials with gas contents — Part 3: Autogenous ignition test in oxygen atmosphere*

ISO 14971:2007, *Medical devices — Application of risk management to medical devices*

ISO 15001:2003, *Anaesthetic and respiratory equipment — Compatibility with oxygen*

3 Terms and definitions

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

NOTE 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

any of a 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 connections between different gas services

1) CGA = Compressed Gas Association.

2) To be published. (Revision of ISO 5359:2000)

3.3**gas-specific connection point**

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

3.4**gas-specific connector**

connector with dimensional characteristics that prevent connections between different gas services

NOTE Examples of gas-specific connectors are quick connectors, screw-threaded connectors, diameter-index safety system (DISS) connectors or non-interchangeable screw-threaded (NIST) connectors.

3.5**low-pressure hose assembly**

assembly that consists of a flexible hose with permanently attached gas-specific inlet and outlet connectors, and 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**

complete system which comprises a supply system, a monitoring and alarm system and a pipeline distribution system with terminal units at the points where medical gases or vacuum may be required

3.8**medical gas supply system**

either

- a) a medical gas pipeline system or [ISO 9170-1:2008](https://standards.iteh.ai/catalog/standards/sist/90a2a7cf-680d-4edb-8039-b3e54cbfb29/iso-9170-1-2008)
- b) an installation having no permanent pipeline system but employing a medical gas supply source complete with pressure regulator(s)

3.9**nominal distribution pressure**

pressure which the medical gas pipeline system is intended to deliver at the terminal units

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

female part of a terminal unit which is either integral or attached to the terminal unit 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

3.18

terminal unit maintenance valve

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

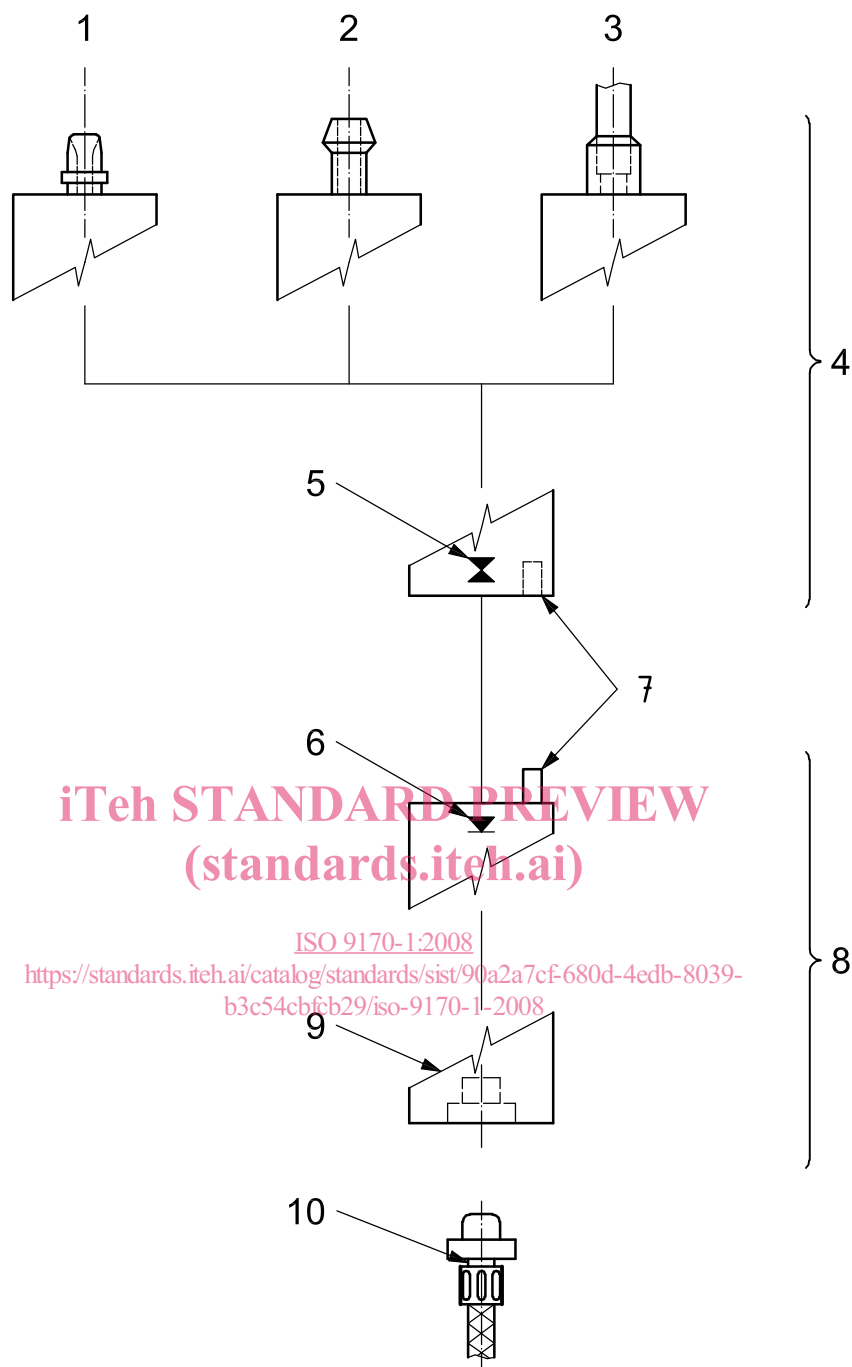
3.19

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 pipeline system and to a gas disposal system respectively and at which the operator makes connections and disconnections by means of a combined probe

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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 — Typical components of a terminal unit and probe