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Anaesthetic and respiratory equipment — Dimensions of non-interchangeable screw-threaded (NIST) low-pressure connectors for medical gases

Matériel respiratoire et anesthésique — Raccords basse pression à tête filetée non interchangeables (NIST) pour gaz médicaux

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 121, *Anaesthetic and respiratory equipment*, Subcommittee SC 1, *Breathing attachments and anaesthetic machines*.

This is the first edition of this International Standard that contains the requirements for non-interchangeable screw threaded (NIST) connectors for use with medical gases previously included in ISO 5359:2008 and ISO 5359:2008/Amd.1:2011.

Introduction

This International Standard has been prepared in response to the need for a safe method of connecting medical equipment intended to administer medical gases to patients or power medical devices. Medical gases are stored in cylinders or cryogenic vessels, or can be produced on site; several medical devices (e.g. pressure regulators, hose assemblies, flow-metering devices, lung ventilators, anaesthetic workstations) can be fitted between the source of supply and the medical device. At each interface gas-specific connectors are needed to ensure that the intended medical gas is administered to the patient.

While the desirability of achieving agreement on a single International Standard for screw-threaded connectors has never been in doubt, the present pattern of usage has made such agreement impossible.

Nevertheless, fears that proliferation of individual national standards or practices will eventually result in potentially dangerous cross-connection between components for different gases have led to the choice of several different connector systems, all of which are intended to be incompatible with each other.

This International Standard specifies the dimensions and the allocation of non-interchangeable screw threaded (NIST) connectors for use with medical gases.

This International Standard does not specify the dimensions and the allocation of

— diameter index safety system (DISS) connectors specified in CGA V-5[9],

— sleeve indexed system (SIS) connectors specified in AS 2896[7], and

— quick connectors designed for terminal units specified in ISO 9170-1[5].

Anaesthetic and respiratory equipment — Dimensions of non-interchangeable screw-threaded (NIST) low-pressure connectors for medical gases

1 Scope

1.1 This International Standard specifies the dimensions, the allocation and marking of non-interchangeable screw-threaded (NIST) connectors intended to be used at operating pressures up to 1 400 kPa, and for vacuum systems at pressures not greater than 60 kPa absolute.

1.2 This International Standard specifies NIST connectors intended for use with the following medical gases:

— oxygen;

— nitrous oxide;

— medical air;

— helium;

— carbon dioxide;

— xenon;

— specified mixtures of the gases listed above;

— oxygen-enriched air;

— air for driving surgical tools;

— nitrogen for driving surgical tools;

and for use with vacuum.

NOTE Low-pressure hose assemblies for medical gases and vacuum are specified in ISO 5359[3].

1.3 The information to be supplied by the manufacturer is excluded from the scope of this International Standard because information about the use of NIST connectors is supplied by the manufacturer of each medical device to which the connectors are permanently fitted.

NOTE Environmental aspects are dealt with in each International Standard concerning medical devices fitted with NIST connectors.

2 Terms and definitions

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

2.1
gas-specific
having characteristics which prevent connections between different gas services

[SOURCE: ISO 7396-1:2007, 3.14]

2.2
medical gas
any gas or mixture of gases intended for administration to patients for anaesthetic, therapeutic, diagnostic or prophylactic purposes, or for surgical tool applications

[SOURCE: ISO 4135:2001, 1.1.1]

2.3
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

[SOURCE: ISO 9170-1:2008, 3.10]

3 Dimensions and allocation of NIST connectors

The dimensions of the NIST body, nipple and nut shall comply with Figures 1, 2, 3 and 4 and Tables 2, 3 and 4.

Allocation of NIST connectors shall comply with Table 1.

Compliance shall be verified by measurement and visual inspection.

Table 1 — NIST connector allocation — Right-hand thread

Connector reference	Gas
A1	Medical air/oxygen mixture
A2	Oxygen/nitrous oxide mixture [O_2 = 50 % (volume fraction)]
A3	Medical air
A4	Nitrous oxide
A5	Nitrous oxide/oxygen mixtures [N_2O < 80 % (volume fraction)]
A6	Air for driving surgical tools
A7	Not allocated
A8	Oxygen
A9	Not allocated
A10	Vacuum
B11	Carbon dioxide
B12	Oxygen-enriched air
B13	Oxygen/carbon dioxide mixture [CO_2 ≤ 7 % (volume fraction)]
B14	Helium/oxygen mixture [He ≤ 80 % (volume fraction)]
B15	Helium/oxygen mixture [O_2 < 20 % (volume fraction)]
B16	Xenon
B17	Special gas mixture
B18	Nitrogen for driving surgical tools
C19	Carbon dioxide/oxygen mixture [CO_2 > 7 % (volume fraction)]
C20	Helium
C21	Medical air/helium/carbon monoxide [CO < 1 % (volume fraction)]
C22	Not allocated
C23	Not allocated
C24	Not allocated
NOTE Left-hand threads have not been allocated.	

Table 2 — Indexing diameters including tolerances for NIST body (see Figure 1)

Dimensions in millimetres

Connector reference	Dimension *B*	Dimension *C*	Dimension *D*
A1	8	12,5 $^{+0,043}_{0}$	17
A2	8,5		16,5
A3	9 $^{+0,09}_{0}$		16
A4	9,5		15,5
A5	10		15 $^{+0,11}_{0}$
A6	10,5		14,5
A7	11 $^{+0,11}_{0}$		1
A8	11,5		13,5
A9	12		13
A10	12,5 $^{+0,043}_{0}$		12,5 $^{+0,043}_{0}$
B11	7,5		14,5
B12	8		14
B13	8,5 $^{+0,09}_{0}$		13,5 $^{+0,11}_{0}$
B14	9		13
B15	9,5	11 $^{+0,043}_{0}$	12,5
B16	10		12
B17	10,5 $^{+0,11}_{0}$		11,5
B18	11 $^{+0,043}_{0}$		11 $^{+0,043}_{0}$
C19	7,5	10 $^{+0,043}_{0}$	12,5
C20	8 $^{+0,09}_{0}$		12 $^{+0,11}_{0}$
C21	8,5		11,5
C22	9		11
C23	9,5		10,5
C24	10 $^{+0,043}_{0}$		10 $^{+0,043}_{0}$

Table 3 — Indexing diameters including tolerances for NIST nipple (see Figure 2)

Dimensions in millimetres

Connector reference	Dimension *E*	Dimension *F*	Dimension *G*	Dimension *H*	Dimension *I*
A1	17		8		
A2	16,5		8,5 $^{-0,04}_{-0,13}$		
A3	16		9		
A4	15,5		9,5		
A5	15		10		
A6	14,5	12,5 $^{-0,05}_{-0,16}$	10,5	8,5 $^{0}_{-0,10}$	3,3 $^{0}_{-0,20}$
A7	14		11		
A8	13,5		11,5 $^{-0,05}_{-0,16}$		
A9	13		12		
A10	12,5		12,5		
B11	14,5 $^{-0,05}_{-0,16}$		7,5		
B12	14		8		
B13	13,5		8,5		
B14	13	11 $^{-0,05}_{-0,16}$	9	8,3 $^{0}_{-0,10}$	
B15	12,5		9,5 $^{-0,04}_{-0,13}$		
B16	12		10		
B17	11,5		10,5		
B18	11		11 $^{-0,05}_{-0,16}$		2,5 $^{0}_{-0,20}$
C19	12,5		7,5		
C20	12		8		
C21	11,5	10 $^{-0,04}_{-0,13}$	8,5 $^{-0,04}_{-0,13}$	7,3 $^{0}_{-0,10}$	
C22	11		9		
C23	10,5		9,5		
C24	10		10		