INTERNATIONAL STANDARD

# ISO 7228

Third edition
1993-10-15

# Tracheal tube connectors

*Raccords de tubes trachéaux*

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Reference number
ISO 7228:1993(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 7228 was prepared by Technical Committee ISO/TC 121, *Anaesthetic and respiratory equipment*, Sub-Committee SC 2, *Tracheal tubes and other equipment*.

This third edition cancels and replaces the second edition (ISO 7228:1985), and introduces revised requirements for the internal cross-sectional area of connectors. Requirements concerning the female 22 mm conical connector are no longer given.

Annex A of this International Standard is for information only.

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## Introduction

This International Standard is one of a series concerned with the safety and performance of anaesthetic and respiratory equipment; its main purpose is to specify the essential dimensions of tracheal tube connectors without unnecessarily restricting details of design.

Tracheal tube connectors are required to incorporate 15 mm-sized male conical connectors in accordance with ISO 5356-1, in order to mate with the coaxial 22 mm male/15 mm female conical connector of the patient connection port of the breathing system of an anaesthetic machine or ventilator. The designated size of each tracheal tube connector is required to be not less than that of the tracheal tube with which it is designed to fit, thereby avoiding unnecessary restriction of the gas flow and minimizing the risk of inadvertent disconnection.

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# Tracheal tube connectors

## 1 Scope

This International Standard specifies basic requirements for tracheal tube connectors, including size designation.

Recommendations for materials are given in annex A.

## 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 5356-1:1987, *Anaesthetic and respiratory equipment — Conical connectors — Part 1: Cones and sockets.*

ISO 5361-2:1993, *Tracheal tubes — Part 2: Oro-tracheal and naso-tracheal tubes of Magill type (plain and cuffed).*

ISO 5361-3:1984, *Tracheal tubes — Part 3: Murphy type.*

ISO 5361-4:1987, *Tracheal tubes — Part 4: Cole type.*

## 3 Definitions

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

**3.1 tracheal tube connector:** Tubular component that fits directly into the tracheal tube. [ISO 4135:—[1)], definition 6.7.13]

**3.2 patient end:** End of the component nearest to the patient which is inserted into the tracheal tube.

**3.3 machine end:** End of the tracheal tube connector intended to mate with the breathing system of an anaesthetic machine or ventilator. [Adapted from ISO 4135:—[1)], definition 6.8.1 (2)]

## 4 Size designation

The nominal size of the connector shall be designated by its inside diameter in accordance with table 1.

## 5 Size range

The size range shall be from 2 mm to 11 mm in accordance with table 1.

## 6 Design

### 6.1 General

**6.1.1** A suction port, if provided, shall be designed so that its closure does not obstruct or narrow the lumen of the connector.

The connector may be straight, curved or angled. If curved or angled, the connector may incorporate a suction port.

**6.1.2** Basic dimensions shall be in accordance with table 1.

NOTE 1 Figures 1 and 2 illustrate tracheal tube connectors for the purpose of defining basic dimensions but the illustrated designs do not otherwise form a part of this specification.

1) ISO 4135:—, *Anaesthesiology — Vocabulary.* [To be published. (Revision of ISO 4135:1979)].

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**6.1.3** The cross-sectional area of the lumen throughout a straight connector shall be not less than that derived from the minimum inside diameter specified in ISO 5361 for the corresponding tracheal tube into which the connector is intended to fit.

The minimum inside diameter of a curved or angled connector shall be not less than 80 % of the designated size and the corresponding cross-sectional area shall not be reduced by more than 10 %.

## 6.2 Machine end

The machine end of the connector shall be a male 15 mm conical connector complying with the requirements specified in ISO 5356-1. The inside diameter of the (conical) machine end shall be not less than that of the patient end (i.e. not less than the size of the connector). Any transition in the inside diameter shall be tapered to give an adequate lead in for smooth passage of a suction catheter.

## 6.3 Patient end

The basic dimensions of the patient end (see figures 1 and 2) of the connector shall be in accordance with table 1.

It is intended that the opening of the patient end should be right-angled to the long axis of the patient end of the connector.

# 7 Marking

The connector shall be clearly marked with the designated size (nominal inside diameter) in accordance with clause 4.

**Table 1 — Tracheal tube connectors — Size range and basic dimensions of patient end**

Dimensions in millimetres

| **Size** (see clause 4) | **Inside diameter** $d$ | **Straight connectors** (see figure 1, dimension $l_1$) | **Curved connectors** (see figure 2, dimension $l_2$) |
|---|---|---|---|
| 2,0 | 2,0 ± 0,15 | 11 ± 2 | — |
| 2,5 | 2,5 ± 0,15 | 11 ± 2 | — |
| 3,0 | 3,0 ± 0,15 | 11 ± 2 | — |
| 3,5 | 3,5 ± 0,15 | 13 ± 2 | — |
| 4,0 | 4,0 ± 0,15 | 13 ± 2 | — |
| 4,5 | 4,5 ± 0,15 | 14 ± 2 | — |
| 5,0 | 5,0 ± 0,15 | 14 ± 2 | — |
| 5,5 | 5,5 ± 0,15 | 15 ± 2 | 10 ± 2 |
| 6,0 | 6,0 ± 0,15 | 15 ± 2 | 10 ± 2 |
| 6,5 | 6,5 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 7,0 | 7,0 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 7,5 | 7,5 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 8,0 | 8,0 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 8,5 | 8,5 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 9,0 | 9,0 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 9,5 | 9,5 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 10,0 | 10,0 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 10,5 | 10,5 ± 0,15 | 18 ± 2 | 10 ± 2 |
| 11,0 | 11,0 ± 0,15 | 18 ± 2 | 10 ± 2 |

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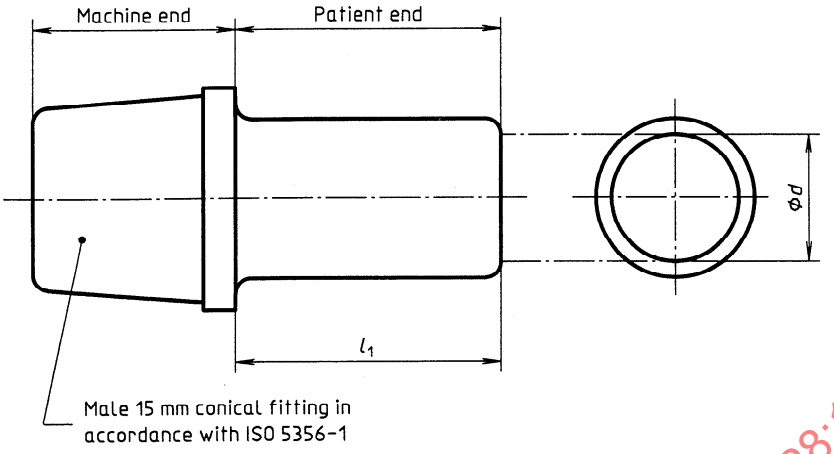


**Figure 1 — Straight tracheal tube connector**

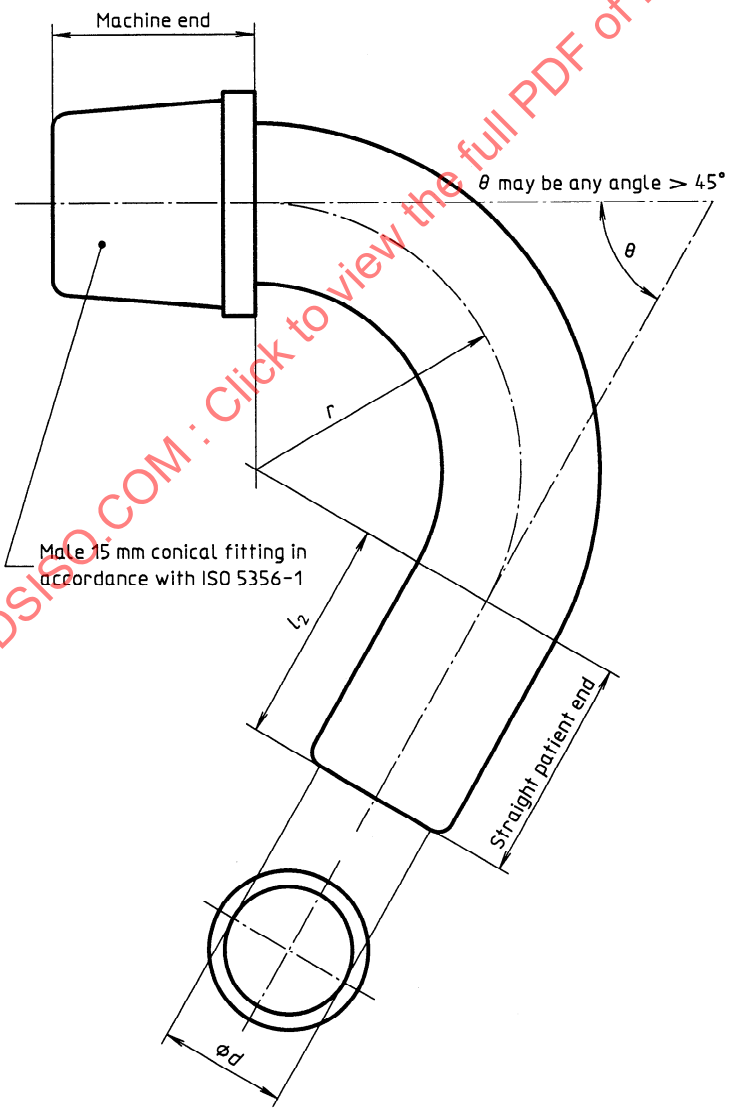


**Figure 2 — Example of a curved tracheal tube connector**

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# Annex A
(informative)

# Guidance on materials and design

## A.1 Materials

**A.1.1** The connector should be made of material which is resistant to the action of anaesthetic gases and vapours.

**A.1.2** Unless designated for single use, the connector should be resistant to deterioration by normal methods of cleaning, disinfection and sterilization as recommended by the manufacturer or supplier. It is desirable that any connector not designated for single use should withstand accepted methods of steam sterilization.

## A.2 Design

**A.2.1** The connector should be light in mass but should be of sufficient strength to resist deformation under normal conditions of use.

**A.2.2** The connector should be designed to have minimal dead space and to give minimal resistance to gaseous flow. The lumen should be smooth and free from ridges.

**A.2.3** Tracheal tube connectors may be provided with lugs, flats, or other means to facilitate connection and disconnection, provided that any protrusions are well-rounded.

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