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**Infusion equipment for medical use —  
Part 1:  
Infusion glass bottles**

*Matériel de perfusion à usage médical —  
Partie 1: Flacons en verre pour perfusion*



Reference number  
ISO 8536-1:2011(E)

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## Foreword

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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 8536-1 was prepared by Technical Committee ISO/TC 76, *Transfusion, infusion and injection, and blood processing equipment for medical and pharmaceutical use*.

This fourth edition cancels and replaces the third edition (ISO 8536-1:2006), of which it constitutes a minor revision.

The principle changes to the third edition are the updating of normative references to ISO 4802-1 and ISO 4802-2, and the addition of a note at the start of Clause 8.

ISO 8536 consists of the following parts, under the general title *Infusion equipment for medical use*:

- *Part 1: Infusion glass bottles*
- *Part 2: Closures for infusion bottles*
- *Part 3: Aluminium caps for infusion bottles*
- *Part 4: Infusion sets for single use, gravity feed*
- *Part 5: Burette infusion sets for single use, gravity feed*
- *Part 6: Freeze drying closures for infusion bottles*
- *Part 7: Caps made of aluminium-plastics combinations for infusion bottles*
- *Part 8: Infusion equipment for use with pressure infusion apparatus*
- *Part 9: Fluid lines for use with pressure infusion equipment*
- *Part 10: Accessories for fluid lines for use with pressure infusion equipment*
- *Part 11: Infusion filters for use with pressure infusion equipment*
- *Part 12: Check valves*

## Introduction

Infusion bottles are suitable primary packaging materials for the storage of infusion solutions until they are administered to the patient. Due to the direct contact between infusion solution and the primary container components and in view of the extended storage periods, it is essential to avoid possible interactions in order to guarantee the patient's safety. Adequate means to achieve this goal include the proper selection of the primary packaging materials, the choice of suitable package design and the availability of specific criteria and methods for testing of individual container systems.

# Infusion equipment for medical use —

## Part 1: Infusion glass bottles

### 1 Scope

This part of ISO 8536 specifies the dimensions, performance and requirements of infusion glass bottles necessary to ensure functional interchangeability. It is applicable only to infusion bottles for single use.

### 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 719:1985, *Glass — Hydrolytic resistance of glass grains at 98 °C — Method of test and classification*

ISO 720:1985, *Glass — Hydrolytic resistance of glass grains at 121 °C — Method of test and classification*

ISO 4802-1:2010, *Glassware — Hydrolytic resistance of the interior surfaces of glass containers — Part 1: Determination by titration method and classification*

ISO 4802-2:2010, *Glassware — Hydrolytic resistance of the interior surfaces of glass containers — Part 2: Determination by flame spectrometry and classification*

ISO 7458, *Glass containers — Internal pressure resistance — Test methods*

ISO 7459, *Glass containers — Thermal shock resistance and thermal shock endurance — Test methods*

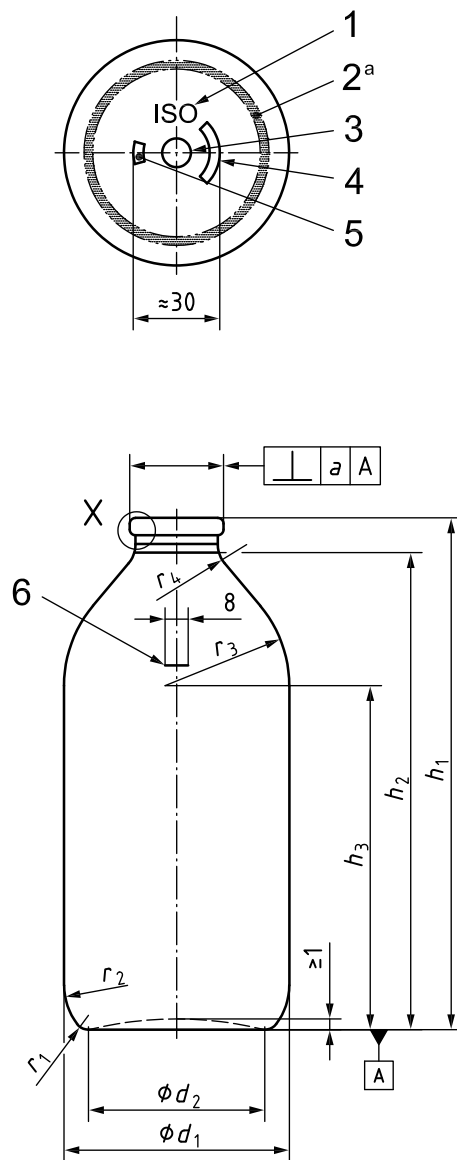
### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4802-1 and ISO 4802-2 apply.

## 4 Dimensions

The dimensions of the infusion glass bottle shall meet the requirements of Figure 1 and Tables 1, 2 and 3.

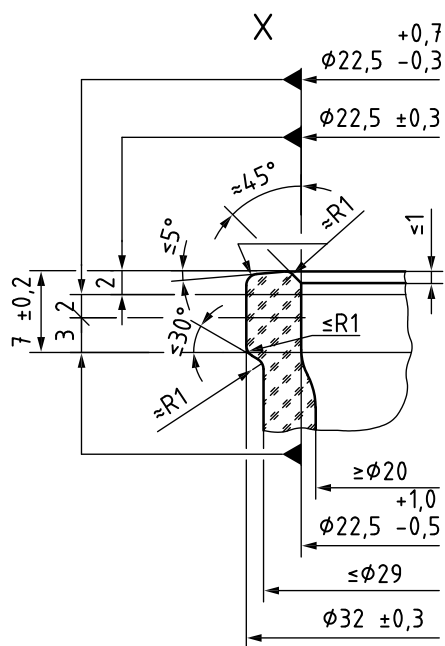
Dimensions in millimetres



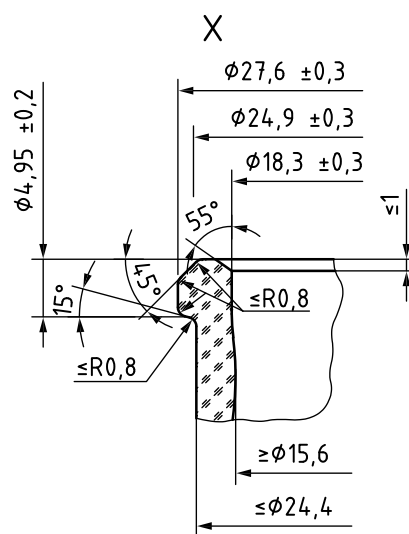
a) General description

Figure 1 — Infusion glass bottle, showing three typical neck finishes (continued)

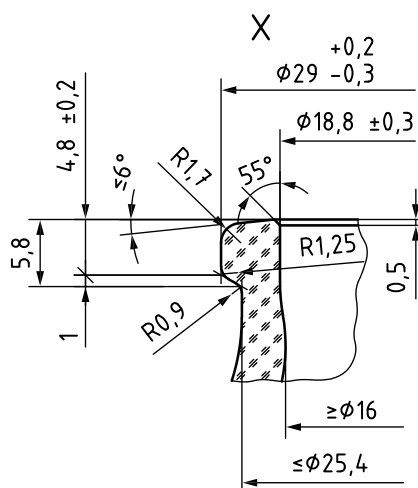
Dimensions in millimetres



b) Model A: Infusion bottle with 32 mm neck finish



c) Model B: Infusion bottle with 28 mm neck finish



d) Model C: Infusion bottle with 29 mm neck finish

**Key**

- 1 ISO logo (optional)
- 2 bottom surface
- 3 designation of hydrolytic resistance container class (see 9.1)
- 4 manufacturer's code/designation of mould
- 5 manufacturer's trade mark
- 6 graduation mark

NOTE The marks (optional) or other markings in accordance with the view from below can be placed on the bottom or at the bottom radius,  $r_2$ , of the infusion bottle. The drawing represents a typical example.

a Bottom surface may be granular.

**Figure 1 — Infusion glass bottle, showing three typical neck finishes**

**Table 1 — Dimensions and capacity of infusion glass bottles with 32 mm neck finish (model A)**

Dimensions in millimetres

Nominal capacity ml	Approximate brimful capacity		$a^a$	$d_1$		$d_2$	$h_1$		$h_2$	$h_3$	$r_1$	$r_2$	$r_3$	$r_4$
	ml	tol.		tol.	tol.									
50	68	±5	1	46	±0,8	37	68	±0,7	58	36,5	2	12	20,5	8
100	128	±5	1,3	49	±0,8	39	104	±0,8	94	68,5	3	12	25	8
125	147	±5	1,3	54,4	±0,8	38,9	98	±0,8	88	63	4,5	20	17	12
250	297	±8	1,6	68	±1	48,9	125	±1	114,5	78	7	32	28	12
500	584	±8	1,9	86	±1,2	61,5	147	±1	137	93,4	8	32	27	12
1 000	1 120	±15	3	95	±1,5	69,6	225	±1,3	215	148	8,5	55	52	22

<sup>a</sup> The tolerance  $a$  of the perpendicularity (defined as in ISO 1101) is a limit for the deviation of the plumb-line through the centre of the bottom part and the axis of the bottle at the upper edge of the flange.

**Table 2 — Dimensions and capacity of infusion glass bottles with 28 mm neck finish (model B)**

Dimensions in millimetres

Nominal capacity ml	Approximate brimful capacity		$a^a$	$d_1$		$d_2$	$h_1$		$h_2$	$h_3$	$r_1$	$r_2$	$r_3$	$r_4$
	ml	tol.		tol.	tol.									
50	68	±5	1	46	±0,8	37	68,7	±0,7	60,5	37	2	12	20	8
100	128	±5	1,3	49	±0,8	39	104,7	±0,8	96,5	69	3	12	25	8
125	147	±5	1,3	54,4	±0,8	38,9	98,7	±0,8	90,5	62,5	4,5	20	17	8
250	300	±8	1,6	68	±1	48,9	125	±1	117,5	78	7	32	28	12
500	584	±8	1,9	86	±1,2	61,5	147,7	±1	139,5	93,4	8	32	27	13
1 000	1 120	±15	3	95	±1,5	69,6	225	±1,3	216,8	148	8,5	55	52	15

<sup>a</sup> The tolerance  $a$  of the perpendicularity (defined as in ISO 1101) is a limit for the deviation of the plumb-line through the centre of the bottom part and the axis of the bottle at the upper edge of the flange.

**Table 3 — Dimensions and capacity of infusion glass bottles with 29 mm neck finish (model C)**

Dimensions in millimetres

Nominal capacity ml	Approximate brimful capacity		$a^a$	$d_1$		$d_2$	$h_1$		$h_2$	$h_3$	$r_1$	$r_2$	$r_3$	$r_4$
	ml	tol.		tol.	tol.									
50	68	±5	1	46	±0,8	37	68	±0,7	60,4	37,5	2	12	20,5	8
100	128	±5	1,3	49	±0,8	39	104	±0,8	96,4	68,5	3	12	25	8
125	147	±5	1,3	54,4	±0,8	38,9	98,7	±0,8	91,1	63,7	4,5	20	17	10
250	300	±8	1,6	68	±1	48,9	125	±1	117,4	78	7	32	28	10
500	572	±8	1,9	86	±1,2	61,5	147	±1	139,4	93,4	8	32	27	12
1 000	1 120	±15	3	95	±1,5	69,6	224,1	±1,3	216,8	147,4	8,5	55	52	15

<sup>a</sup> The tolerance  $a$  of the perpendicularity (defined as in ISO 1101) is a limit for the deviation of the plumb-line through the centre of the bottom part and the axis of the bottle at the upper edge of the flange.



## 5 Designation

### 5.1 General

An infusion glass bottle for medical use complying with the requirements laid down in this part of ISO 8536 is designated using the descriptor "Infusion bottle" followed by, in the order given, a reference to this part of ISO 8536, the model of the infusion bottle, the nominal capacity, the colour and the hydrolytic resistance container class (see 8.1).

EXAMPLE 1 An infusion bottle (model A) with a nominal capacity of 500 ml, made of colourless glass (cl) of hydrolytic resistance container class HC 2 complying with the requirements laid down in this part of ISO 8536 is designated as follows:

**Infusion bottle ISO 8536-1 – A – 500 – cl – HC 2**

EXAMPLE 2 An infusion bottle (model C) with a nominal capacity of 500 ml, made of colourless glass (cl) of hydrolytic resistance container class HC 2 complying with the requirements laid down in this part of ISO 8536 is designated as follows:

**Infusion bottle ISO 8536-1 – C – 500 – cl – HC 2**

### 5.2 Location of designation marks

The designation marks on the bottom, as specified in Figure 1 a), may also be fixed at the body of the bottle but not at the cylindrical part. The manufacturer's code can also be placed at the shoulder of the bottle. If marked at the lower bottom radius,  $r_2$ , or at the shoulder,  $r_3$ , the diameter at these places should not exceed the diameter,  $d_1$ , of the bottle. The designation of hydrolytic resistance container class is abbreviated as given in 9.1.

## 6 Material

Infusion bottles shall be constructed from

- a) colourless (cl) or amber (br) borosilicate glass (see ISO 4802-1:2010, 3.6, and ISO 4802-2:2010, 3.6), or
- b) soda-lime-silica glass (see ISO 4802-1:2010, 3.7, and ISO 4802-2:2010, 3.7) of the following hydrolytic resistance grain class:
  - ISO 720 – HGA 1;
  - ISO 719 – HGB 3 or ISO 720 – HGA 2.

A change in the composition of the glass material or of the colouring oxides shall be notified to the user at least nine months in advance.

## 7 Performance

The performance requirements of infusion bottles, such as seal or bubbles, sealing surface, etc., shall comply with existing quality standards, e.g. defect evaluation lists and shall be agreed upon between manufacturer and user.

## 8 Requirements

NOTE Other test methods might be required by national or regional regulations.

## 8.1 Hydrolytic resistance

When tested in accordance with ISO 4802-1 or ISO 4802-2, the hydrolytic resistance of the internal surface of the bottles shall comply with the requirements for one of the following hydrolytic resistance container classes:

- ISO 4802 – HC 1;
- ISO 4802 – HC 2;
- ISO 4802 – HC 3.

## 8.2 Internal pressure resistance

Infusion bottles shall withstand an internal test pressure of 600 kPa (6 bar), when tested in accordance with ISO 7458.

## 8.3 Thermal shock resistance

Infusion bottles shall withstand a thermal shock when subjected to a temperature difference,  $\Delta T$ , of 42 °C in the case of soda-lime-silica glass and of 60 °C in the case of borosilicate glass, in accordance with the thermal shock resistance test specified in ISO 7459.

## 8.4 Annealing quality

The infusion bottles shall be annealed so that the maximum residual stress does not produce an optical retardation exceeding 40 nm per millimetre of glass thickness, when the bottles are viewed in a strain viewer.

# 9 Marking

9.1 The bottle shall be permanently marked with the information specified in Figure 1 a).

The hydrolytic resistance container class shall be designated as follows:

- hydrolytic resistance container class ISO 4802 – HC 1: I
- hydrolytic resistance container class ISO 4802 – HC 2: II
- hydrolytic resistance container class ISO 4802 – HC 3: III

9.2 The number of pieces and the standard designation, together with the name or the symbol of the manufacturer of the infusion bottle, shall be shown on the package. Further declarations may be included at the discretion of the manufacturer or by agreement between user and manufacturer.

9.3 The marking HC 3 may be omitted by the manufacturer. In this case, infusion bottles not bearing any hydrolytic resistance container class number are deemed to belong to the hydrolytic container class HC 3.

## Bibliography

- [1] ISO 1101, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

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