IS 3101 (1995): Aluminium collapsible tubes [MTD 32: Metal Containers]

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(Reaffirmed 2001)

भारतीय मानक

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(दूसरा पुनरीक्षण)

Indian Standard

ALUMINIUM COLLAPSIBLE TUBES — SPECIFICATION

(Second Revision)

UDC 621·798·166 : (669·71)

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Price Group 3

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Metal Containers Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1965 and revised in 1979. While reviewing the standard, the committee decided to revise it to align with the present practice being followed by the Indian industry.

Aluminium collapsible tubes are suitable for a wide range of liquids, semi-liquids, pastes and formulations containing soluble constituents. Though aluminium collapsible tubes are available with many types of nozzles, this standard covers tubes with short screwed nozzles only.

In this revision, the following changes have been made:

a) Dimensions of the collapsible tubes have been modified,

b) Collapsibility requirements have been modified, and

c) Requirements for lacquer porosity test have been modified.

Under the provisions of the standards of *Weights and Measures* (*Packaging Commodity*) *Rules* 1977, the collapsible tubes are to be filled in with fixed mass of the product packed. With the variation in the specific gravity of different items and different formulations of the same product, it has not been possible to specify the length of the tubes in Table 1. The length shall be calculated on the basis of the volume calculated for different mass of the product packed and shall be specified by the filler in his purchase order.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ALUMINIUM COLLAPSIBLE TUBES — SPECIFICATION

(Second Revision)

1 SCOPE

This standard specifies dimensional requirements and tests for aluminium collapsible tubes with short screw nozzles and plastic caps, with both Butress and *V*-Threads.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
737 : 1986	Specification for wrought aluminium and aluminium alloys, sheet and strip for general engineering purposes (*third revision*)
1394 : 1984	Glossary of terms relating to metal containers (*third revision*)
7182 : 1973	Methods of tests for aluminium collapsible tubes

3 TERMINOLOGY

3.1 For the purpose of this standard the definitions given in IS 1394 : 1984 shall apply.

3.2 The nomenclature of the collapsible tubes and the nozzles is given in the figures in Tables 1, 2 and 3.

4 MATERIAL

4.1 The tubes shall be manufactured from aluminium of grade 19500 as per IS 737 : 1986.

4.2 Caps

The caps may be made from moulding grade low density or high density polyethylene, polypropylene, polyvinyl chloride, polystyrene or any other thermosetting plastic like phenol-formaldehyde. The moulding additives or pigments shall not be toxic and shall be compatible with the product packed.

4.3 Wad

The wad may be manufactured from pulp board, faced pulp board, cork, faced cork, rubber, PVC or any other suitable material. The wad thickness shall be such as to provide effective sealing and the diameter shall be such that it is retained by the cap when assembled. The wad or wad facing shall be compatible with the product packed and shall be non-toxic when used for tubes for packing any food products.

5 SIZES AND DIMENSIONS

5.1 The dimensions and shoulder angles of collapsible tubes shall be in accordance with Table 1.

5.1.1 The wall thickness shall be checked at a distance of about 10 mm from the open end of the tube by a round anvil micrometer. The reading shall be taken at the centre of the tube on four diametrically opposite points and the average of the four readings shall be taken.

5.1.2 The length of the tube shall be as agreed to between the purchaser and the supplier. A tolerance of $\pm$ 0·8 mm shall be permissible for tubes up to and including 150 mm length and $\pm$1·6 mm for tubes above 150 mm length.

5.2 Nozzles

The collapsible tubes shall be having nozzles of designation given against their respective sizes in Table 1 with *V*-threads or Butress threads as desired by the purchaser. The nozzle may be open or close ended (*see* figure in Table 2) as per the requirements of the purchaser.

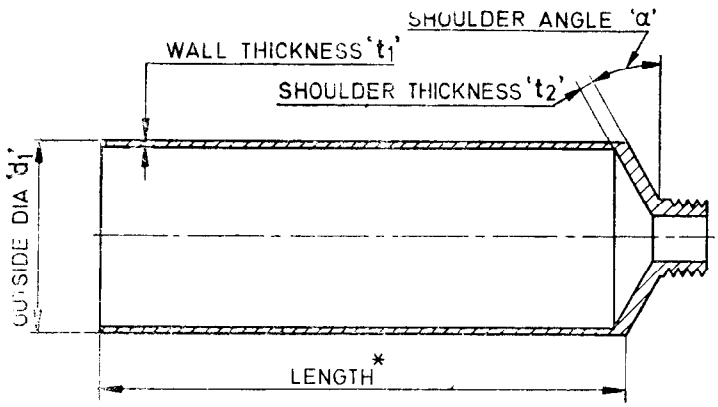
5.2.1 *Nozzle Designation*

It is common practice to designate all nozzles and cap sizes except those of Butress threaded nozzles and caps by a number which is 10 times the major diameter of the thread in mm. For example a nozzle with major thread diameter of 9·5 mm shall be designated by number 95. The respective cap fitting on this nozzle shall also be designated with the same number. In case of Butress thread nozzles and caps the numbers are followed by B.

Table 1 Dimensions for Collapsible Tubes

(*Foreword, clauses* 3.2, 5.1 *and* 5.2)

All dimensions in millimetres.



d_1	t_1		t_2	Nozzle No.	Shoulder Angle
	Max	*Min*			α
(1)	(2)	(3)	(4)	(5)	(6)
12·7 ± 0·1	0·12	0·10		58	30°
13·5 ± 0·1	0·12	0·10		58	30°
16 ± 0·1	0·13	0·10	0·5 ± 0·1	58, 82, 80B, 97	30°
19 ± 0·1	0·14	0·11		97	30°
22 ± 0·1	0·14	0·11	0·6 ± 0·1	58, 97, 95B	30°
25 ± 0·1	0·14	0·11	0·6 ± 0·1	58, 97, 115B	30°
28 ± 0·1	0·15	0·11		97, 104, 115, 115B	30°
30 ± 0·1	0·15	0·11		104, 115, 115B, 141B	30°
32 ± 0·1	0·15	0·11		104, 115, 141, 115B	30°
35 ± 0·1	0·15	0·11		104, 115B, 141B	30°
38 ± 0·1	0·15	0·12	0·7 ± 0·1	141B	30°
40 ± 0·15	0·15	0·12		115, 141B	30°
45 ± 0·15	0·17	0·14		141	30°
57 ± 0·15	0·18	0·14	0·8 ± 0·1	141	30°

*Length shall be as agreed to between the purchaser and the supplier (*see* **5.1.2**).

5.2.2 The dimensional requirements of the nozzle threads and the nozzles having *V*-threads or Butress threads shall be as given in Tables 2 and 3 respectively.

5.3 Caps

The internal dimensions of plastic moulded caps for use with nozzles specified in **5.2** shall be in accordance with Tables 4 and 5.

5.3.1 The engagement of the cap shall be at least 7/8 to 1 thread on the cap.

6 TESTS

6.1 Collapsibility or Degree of Annealing

When the tubes are tested in accordance with the method prescribed in **2** of IS 7182 : 1973, readings shall be within the values specified below:

Tube Dia mm	*Collapsibility Reading*, mm	
	Min	*Max*
12·7	7	10
13·5	7	10
16	2	4
19	5	8
22	6	10
25	11	15
28	14	17
30	16	20
32	18	22
35	21	25
38	23	27
40	24	28
45	30	35

NOTES

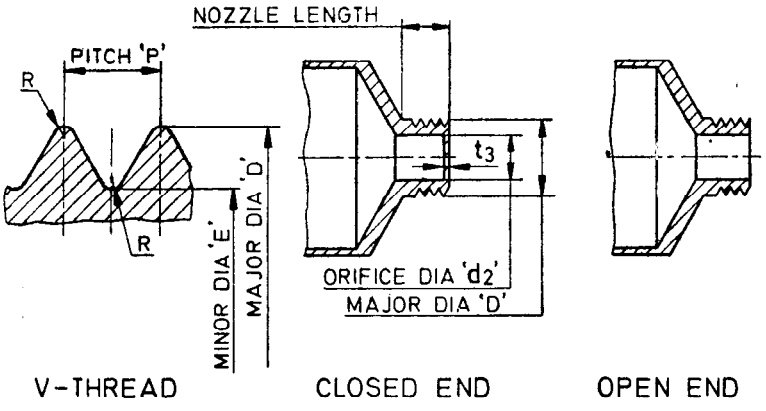
1 This test is not applicable to tubes of diameter greater than 45 mm.

2 For 12·7 and 13·5 mm dia tubes the test requires supplementary base plate (*see* Fig. 1 of IS 7182 : 1973).

Table 2 Dimensions of Screwed Nozzles with V-Threads

(*Clauses* 3.2, 5.2 *and* 5.2.2)

All dimensions in millimetres.

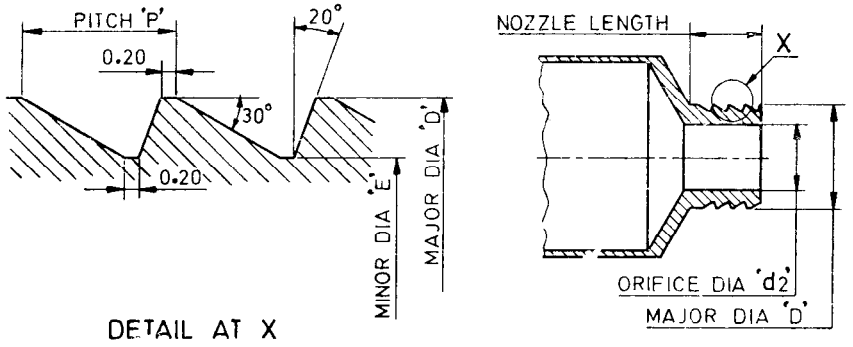


Nozzle No.	Pitch $P \pm 0{\cdot}05$	Major Dia 'D'		Minor Dia 'E'		Nozzle Length ± 0·25	Orifice Dia $d_2 \pm 0{\cdot}25$	Diaphragm Thickness t_3 for Closed Nozzle
		Max	*Min*	*Max*	*Min*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
58	1·00	5·80	5·60	4·92	4·72	5·0	4·00	
68	1·00/1·25	6·80	6·60	5·59	5·39	5·0	4·00	$^{+0}_{-}$
82	1·25	8·20	8·00	7·12	6·92	5·2	4·75	$0{\cdot}15^{-}_{-0{\cdot}05}$
97	1·25	9·70	9·45	8·52	8·32	6·0	5·70	(Common for
104	1·25	10·60	10·40	9·00	8·80	6·5	6·85	all tube
115	1·25	11·50	11·37	9·85	9·65	6·0	6·00	with closed
141	1·25	13·20	13·00	11·50	11·30	7·0	7·40	nozzles)

Table 3 Dimensions of Short Screwed Nozzles with Butress Thread

(*Clauses* 3.2 *and* 5.2.2)

All dimensions in millimetres.

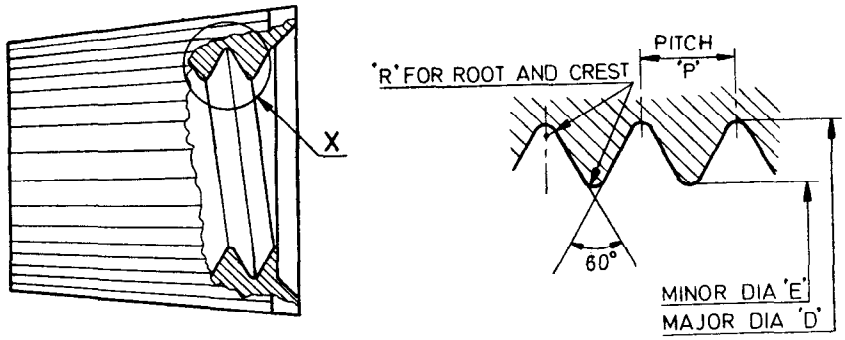


Nozzle No.	Pitch $P \pm 0{\cdot}05$	Major Dia 'D'		Minor Dia 'E'		Nozzle Length ± 0·25	Orifice Dia d_2 ± 0·25
		Max	*Min*	*Max*	*Min*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
80 B	1·810	7·77	7·57	6·45	6·25	7·8	5·00
95 B	1·810	9·70	9·45	8·52	8·32	8·5	6·90
115 B	2·180	11·20	11·00	9·58	9·35	9·5	7·50
141 B	2·180	14·10	13·90	12·48	12·25	9·6	8·0, 9·0

Table 4 Internal Dimensions of Plastic Caps with V-Threads

(*Clause* 5.3)

All dimensions in millimetres.

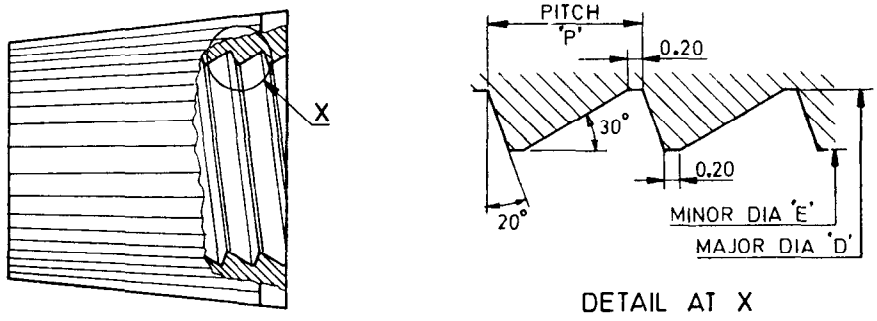


Nozzle No.	Pitch $P \pm 0.05$	Major Diameter 'D'		Minor Diameter 'E'	
		Max	*Min*	*Max*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)
58	1·00	6·00	5·80	5·12	4·92
68	1·00/1·25	7·00	6·80	5·79	5·59
82	1·25	8·40	8·20	7·52	7·12
97	1·25	9·85	9·65	8·72	8·52
104	1·25	10·60	10·50	9·40	9·30
115	1·25	11·70	11·50	10·05	9·85
141	1·25	14·35	14·15	12·60	12·40

Table 5 Internal Dimensions of Plastic Caps with Butress Thread

(*Clause* 5.3)

All dimensions in millimetres.



Nozzle No.	Pitch P	Depth of Thread	Major Diameter 'D'		Minor Diameter 'E'	
			Max	*Min*	*Max*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
80/B	1·810	0·66	8·13	7·82	6·80	6·50
95/B	1·810	0·66	9·96	9·65	8·63	8·33
115/B	2·180	0·81	11·56	11·25	9·93	9·63
135/B	2·180	0·81	13·96	13·65	12·33	12·03
141/B	2·180	0·81	14·45	14·15	12·83	12·53

6.2 Leakage

When the tubes are tested in accordance with the method given in **3** of IS 7182 : 1973, the filter papers shall not show any absorption of water at any time during the one hour test period.

6.3 Lacquer Curing Test

When the tubes are internally lacquered, they shall pass the test for lacquer adhesion and flexibility as detailed in **4.1** and **4.2** of IS 7182 : 1973.

6.4 Lacquer Porosity Test

Internally coated tubes when tested in accordance with the method given in **5.1** of IS 7182 : 1973, shall comply with the limits specified below:

Tube Dia	*Permissible Current Flow*
mm	mA
12·7	50
13·5	50
16	60
19	60
22	75
25	75
28	80
30	85
32	85
35	100
38	100
40	110
45	110

NOTE — Limit for internally lacquered and waxed tubes will be a maximum of 10 mA for all sizes of tubes.

6.4.1 The test prescribed in **5.2** of IS 7182 : 1973 may be carried out if agreed to between the purchaser and the supplier, as an alternate method.

6.5 Lacquer-Product Compatibility Test

6.5.1 Internally lacquered tubes when tested in accordance with the method given in **6** of IS 7182 : 1973, the product to be packed and the internal lacquer shall meet the requirements of the test.

6.5.2 If the lacquered collapsible tubes are used for packing food products, suitable food grade lacquer shall be used.

6.6 External Decoration

6.6.1 *Product Compatibility Test*

When tested in accordance with the procedure given in **7.1** of IS 7182 : 1973, the external surface of the tube shall not show any sign of blistering or loosening of external decoration or bleeding of coating or inks to any noticeable extent.

6.6.1.1 The external decoration shall be capable of withstanding sterilization conditions if asked by the purchaser.

6.6.2 *Flexibility Test*

When tested in accordance with the method prescribed in **7.2** of IS 7182 : 1973, the tubes shall pass the test.

6.7 Metal Particles Test

If required by the purchaser the tubes shall be tested for their freedom from metal particles as per the method given in **8** of IS 7182 : 1973. The degree of freedom from metal particles shall be as agreed to between the purchaser and the supplier.

7 INFORMATION TO BE SUPPLIED BY THE PURCHASER

7.1 When specifying the collapsible tubes the requirements shall be stated in the following order:

a) Material,
b) Diameter,
c) Length,
d) Nozzle diameter or designation, and
e) Orifice diameter.

7.1.1 Full details of the caps to be used shall also be given.

8 PACKING AND MARKING

8.1 Packing

Subject to agreement between the purchaser and the supplier, tubes shall be supplied in clean fibre board cases with or without dividers.

8.2 Marking

8.2.1 The tubes may be marked legibly and indelibly with the manufacturer's name, initials or recognized trade-mark and year of manufacture if required by the purchaser.

8.2.2 *BIS Certification Marking*

8.2.2.1 The tubes may also be marked with the Standard Mark.

8.2.2.2 The use of Standard Mark is governed by the provisions of Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmoious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Addition'.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	331 01 31 331 13 75
Eastern : 1/14 C. I. T. Scheme VIII M, V. I. P. Road, Maniktola CALCUTTA 700054	37 84 99, 37 85 61 37 86 26, 37 86 62
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022	60 38 43, 60 20 25,
Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113	235 02 16, 235 04 42 235 15 19, 235 23 15
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	632 92 95, 632 78 58 632 78 91, 632 78 92

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