

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 9537-8 (2003): Conduits for Electrical Installations,
Part 8: Rigid Non-Threadable Conduits of Aluminium Alloy
[ETD 14: Electrical Wiring Accessories]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

विद्युत संस्थापनों के लिए तार नालियाँ — विशिष्टि

भाग 8 ऐल्युमिनियम मिश्रधातु की दृढ़ चूड़ी रहित तार नालियाँ

Indian Standard

CONDUITS FOR ELECTRICAL
INSTALLATIONS — SPECIFICATION

PART 8 RIGID NON-THREADABLE CONDUITS OF ALUMINIUM ALLOY

ICS 29.120.10

© BIS 2003

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

FOREWORD

This Indian Standard (Part 8) was adopted by the Bureau of Indian Standards, after the draft finalized by the Electrical Wiring Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

Many requirements and test methods to different types of conduits are similar, therefore, these have been covered in Part 1 of this standard with the intention of covering specific requirement of individual types of conduits in subsequent parts. This standard (Part 8) is one of this series.

This standard (Part 8) is to be conjunction with IS 9537 (Part 1) 'Conduits for electrical installations: Part 1 General requirements to which reference' has been given regarding general requirements as well as test methods. Should, however, any deviations exist between IS 9537 (Part 1) and this standard, the provisions of the latter shall apply. Sequence of clauses used in this standard is the same as in IS 9537 (Part 1) for easy reference. Whenever particular requirement is not applicable to this type of conduits, the same has been indicated accordingly. Any addition to the existing provisions of a sub-clause of IS 9537 (Part 1) has been indicated as under:

Addition — Followed by the text of the additional matter.

Clauses/Tables which are additional to those of IS 9537 (Part 1) are numbered starting from 101 and additional sub-clauses are numbered with the main clause number followed by 101, 102, for example, 6.101.

The Indian Standards, which are necessary adjunct to this standard, are given in Annex A.

The normal trade practice, while supplying conduits, is to provide one coupler with each conduit. However, for the purpose of conformity to this standard, this is not a mandatory condition of compliance.

This standard is based on corresponding IEC Publication 60614-2-7 (1995) 'Specification for conduits for electrical installations: Part 2 Particular specifications for conduits, Section 7 Rigid non-threadable conduits of aluminium alloys', issued by the International Electrotechnical Commission with the following modifications:

Classification of test, namely, type and acceptance test including sampling and criteria for acceptance have been specified in 101 and Annex B for the purpose batch/lot inspection.

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

CONDUITS FOR ELECTRICAL INSTALLATIONS — SPECIFICATION

PART 8 RIGID NON-THREADABLE CONDUITS OF ALUMINIUM ALLOY

1 SCOPE

This clause of Part 1 is applicable except as follows.

1.1 Addition

This standard specifies requirements for plain rigid conduits of aluminium alloy.

NOTE — A typical material is Al Mg Si.

2 TERMINOLOGY

This clause of Part 1 is applicable.

3 GENERAL REQUIREMENTS

This clause of Part 1 is applicable.

4 GENERAL NOTES ON TESTS

This clause of Part 1 is applicable except as follows:

4.4 Replacement

Three manufacturing lengths of conduit are required and the total length of the samples is at least 9 m.

4.5 Addition

Samples for the various tests are taken one from each length.

5 CLASSIFICATION

This clause of Part 1 is applicable except as follows:

5.1 (a)(2), 5.1 (a)(3), 5.1 (b)(1), 5.1 (b)(2)(ii), 5.1 (c)(1), 5.1 (c)(2), 5.1 (c)(3), 5.1 (c)(5), 5.1 (d)(2), 5.1 (d)(3), 5.1 (d)(4), 5.1 (e), 5.1 (f)(1), 5.1 (g)(1), 5.1 (g)(1)(ii), 5.1 (g)(1)(iii), except for waves, and 5.1 (h) are not applicable.

6 MARKING

This clause of Part 1 is applicable except as follows:

Additional sub-clause:

6.101 The conduits may also be marked with the Standard Mark.

The use of the Standard Mark is governed by the provisions of the *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.

7 DIMENSIONS

This clause of Part 1 is applicable except as follows:

The wall thickness shall comply with Fig. 102.

7.101 Additional sub-clause:

The minimum outside diameter of the conduit is checked by means of the gauge in accordance with Fig. 101.

7.2 Replacement

The wall thickness shall comply with Fig. 102.

7.102 For checking the uniformity of wall thickness of conduits, three samples, taken from different lengths, are cut along a plane perpendicular to the axis. The wall thickness at each cut edge is measured at four places (as far as possible) equally spaced around the circumference, one of the measurements being made at the thinnest place.

In no case shall the difference between the value measured and the average of the 12 values obtained from the three samples exceed $0.1 \text{ mm} + 10 \text{ percent of the average value}$.

8 CONSTRUCTION

This clause of Part 1 is applicable.

9 MECHANICAL PROPERTIES

This clause of Part 1 is applicable except as follows:

Conduits shall have adequate mechanical strength.

9.1.1 Replacement

Conduits according to their types, when bent or compressed, or exposed to shocks or extreme specific temperature, either during or after installation, shall show no cracks and shall not be deformed to such an extent that the introduction of the cables becomes difficult, or that the installed conductors or cables are likely to be damaged while being drawn in.

9.1.2 Replacement

Compliance is checked by the tests specified in 9.2 and 9.3.

9.2 Bending Test

Replacement:

9.2.1 Conduit sizes 16, 20 and 25 shall be subjected to a bending test, for example, by means of a device as shown in Fig. 103.

Samples having a length equal to 30 times their outside diameter are bent through 90°C so that the inside radius of the bend is equal to six times the outside diameter of the sample.

Three samples are tested.

After the test, the basic material of the conduit shall show no cracks visible by normal or corrected vision without magnification: the section of the conduit shall not have distorted unduly. The distortion of the section is checked as follows:

The bent conduit is held in such a position that the straight portions are at 45° to the vertical, with one end of the sample upwards and the other downwards. It shall then be possible to pass the appropriate gauge in accordance with Fig. 104.

9.3 Compression Test

9.3.2 Para 2 and Table 1, Replacement

A slowly increasing compression force shall then be applied for intermediate piece. The force of 1 250 N with a tolerance of ± 5 percent, shall be obtained in 30 ± 3s. The speed of the application of the force shall be as linear as possible without jerking.

9.3.3 Para 2 Replacement

The difference between the initial diameter and the diameter of the flattened sample shall not exceed 10 percent of the outside diameter measured before the test.

9.4 Not applicable.

9.5 Not applicable.

10 RESISTANCE TO HEAT

This clause of Part 1 is not applicable.

11 RESISTANCE TO BURNING

This clause of Part 1 is not applicable.

12 ELECTRICAL CHARACTERISTICS

Under consideration.

12.2 Not applicable.

13 EXTERNAL INFLUENCES

This clause of Part 1 is applicable except as follows:

13.4 Replacement

Resistance to corrosion for conduits according to this standard is checked by the relevant tests specified in IS 9000 (Part 11).

13.5 Not applicable.

101 CLASSIFICATION OF TESTS

101.1 Type Tests

The following shall constitute the type tests:

- a) Checking of dimensions (see 7);
- b) Bending test (see 9.2);
- c) Compression test (see 9.3);
- d) Electrical characteristics (see 12); and
- e) External influences (see 13).

101.2 Acceptance Tests

The following shall constitute the acceptance tests:

- a) Checking of dimensions (see 7);
- b) Bending test at room temperature only (see 9.2);
- c) Compression test (see 9.3), and
- d) Electrical characteristics (see 12).

101.2.1 A recommended sampling plan for acceptance tests is given in Annex B.

ANNEX A

(Foreword)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
2500 (Part 1) : 1992	Sampling inspection procedures: Part 1 Attribute sampling plan indexed by acceptable quality level (AQL) for lot by lot inspection (second revision)	9000 (Part 11) : 1983	Basic environmental testing procedures for electrical and electronic items: Part 11 Salt mist test
		9537 (Part 1) : 1980	Specification for conduits for electrical installations: Part 1 General requirement

ANNEX B

(Clause 101.2.1)

SAMPLING AND CRITERIA FOR CONFORMITY

B-1 LOT

B-1.1 In any consignment, all the manufactured lengths of conduits of the same type and of size manufactured by the same factory during the same period shall be grouped together to constitute a lot.

B-1.2 The number of conduits to be selected from each lot shall depend upon the size of the lot and shall be in accordance with col 1 and 3 of Table 101.

B-1.2.1 These conduits shall be selected from the lot at random. In order to ensure the randomness of selection, procedure given in IS 2500 (Part 1) may be followed.

B-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

B-2.1 All the conduits selected in the first sample at random according to col 1 and 3 of Table 101 shall be examined for dimensional requirements. A conduit failing to satisfy any of these requirements shall be termed as 'defective'. The lot shall be considered as conforming to these requirements if the number of defectives found in the first sample is less than or equal

to the corresponding acceptance number (*see* col 4 of Table 101). If the number of defectives is greater than or equal to the corresponding rejection number (*see* col 5 of Table 101), the lot shall be deemed as not conforming to the requirements.

Conforming to the requirements. If the number of defectives is greater than the acceptance number but less than the rejection number, a second sample of the same size as the first shall be taken to determine the conformity or otherwise of the lot. The number of defectives found in the first and second samples shall be combined and if the combined number of defectives is less than or equal to the corresponding acceptance number of the second sample. The lot shall be declared as conforming to these requirements; otherwise not.

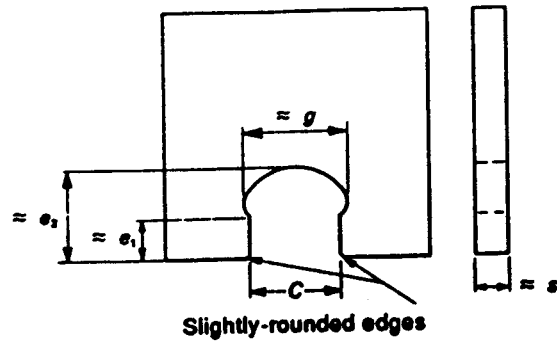
B-2.2 The lot which is found conforming to the dimensional requirements, shall then be tested for other acceptance tests. For this purpose, sample size, acceptance number and rejection number are given in col 6, 7, and 8 of Table 101 respectively.

B-2.3 The lot shall be considered as conforming to the requirements of acceptance tests if B-2.1 and B-2.2 are satisfied.

Table 101 Sample Size, Acceptance and Rejection Number

(Clauses B-1.2, B-2.1 and B-2.2)

Sl No.	Lot Size	Stage of Sample	For Dimensional Requirements			For Other Acceptance Test		
			Sample Size	Acceptance No.	Rejection No.	Sample Size	Acceptance No.	Rejection No.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Up to 300	First	8	0	2	3	0	2
		Second	8	1	2	3	1	2
ii)	301 to 500	First	13	0	2	5	0	2
		Second	13	1	2	5	1	2
iii)	501 to 1 000	First	20	0	3	8	0	2
		Second	20	3	4	8	1	2
iv)	1 001 and above	First	32	1	4	13	0	3
		Second	32	4	5	13	3	4

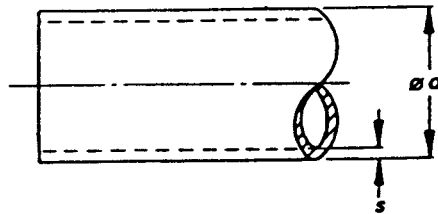


Size	C	Manufacturing Tolerances	Admissible Wear	e_1	e_2	g	s
	mm	mm	mm	mm	mm	mm	mm
16	15.70	0 -0.018	+0.018 0	8	17	18	8
20	19.70	0 -0.022	+0.022 0	10	13	27	9
25	24.60	0 -0.022	+0.022 0	10	23	27	9
32	31.60	0 -0.025	+0.025 0	12	29	34	10
40	39.60	0 -0.030	+0.030 0	14	35	42	10
50	49.50	0 -0.030	+0.030 0	16	42	52	12
63	62.40	0 -0.030	+0.030 0	18	49	65	12

NOTES

- 1 Material: Steel.
- 2 It shall not be possible to pass the gauge over the conduit, in any position, without undue force.

FIG. 101 GAUGES FOR CHECKING THE MINIMUM OUTSIDE DIAMETER OF CONDUITS



Size Reference	Wall Thickness mm
16	1.0 ± 0.2
20	1.0 ± 0.2
25	1.2 ± 0.2
32	1.6 ± 0.2
40	2.0 ± 0.2
50	2.0 ± 0.2
63	Under consideration

NOTE — Manufacturing length: 3 mm preferred.

FIG. 102 WALL THICKNESS OF CONDUITS

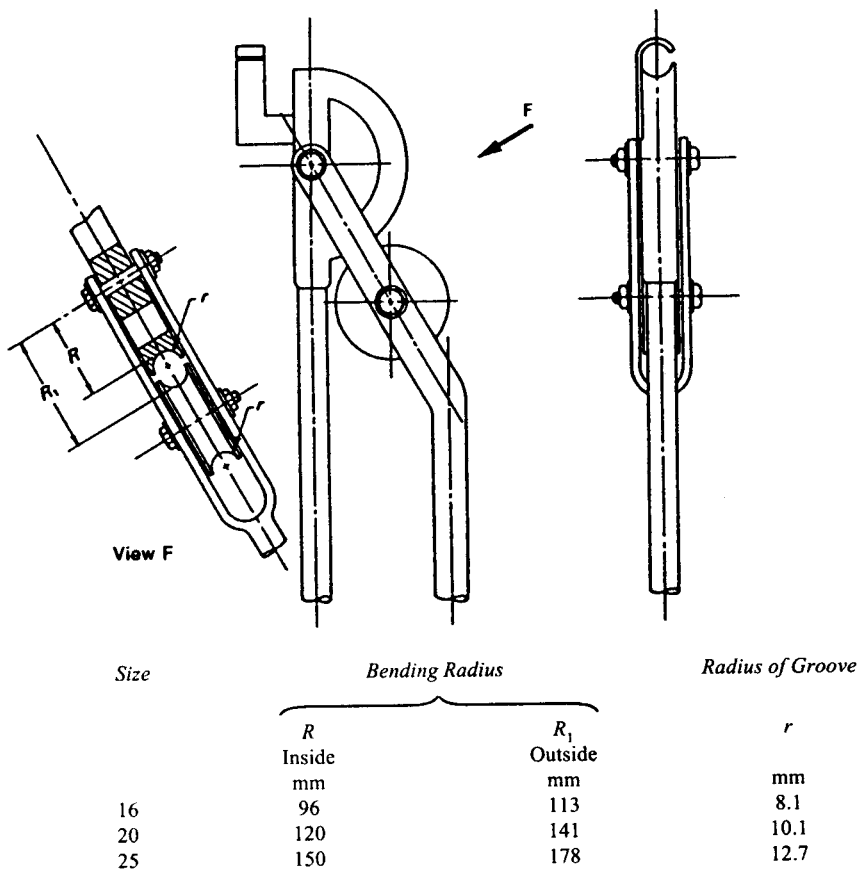
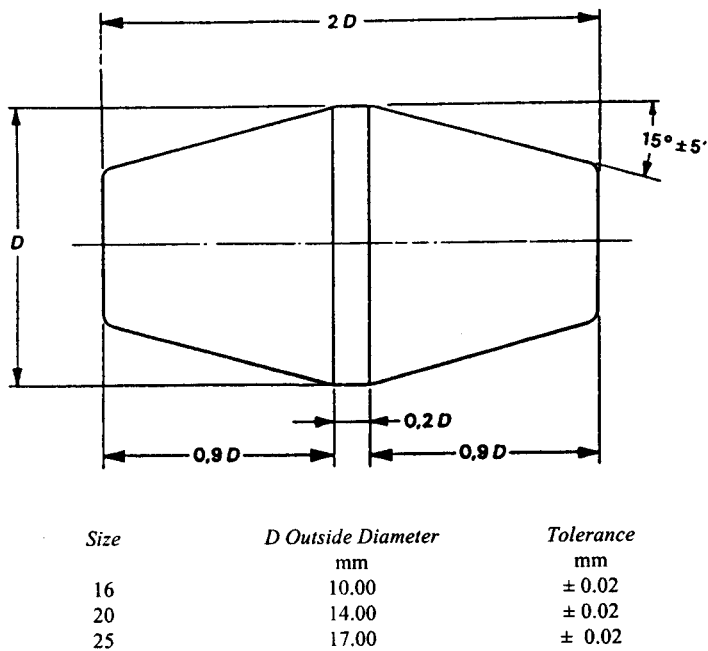


FIG. 103 EXAMPLE OF BENDING DEVICE



NOTES

- 1 Material: steel hardened and polished.
- 2 Tolerance on axial dimensions: ± 0.2 mm.
- 3 It shall be possible for the appropriate gauge to pass through the conduit under its own weight and without any initial speed.

FIG. 104 GAUGE FOR CHECKING MINIMUM INSIDE DIAMETER OF CONDUITS IN THE BENT CONDITION

Bureau of Indian Standards

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

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review 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 Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. ETD 14 (5157).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 2323 0131, 2323 33 75, 2323 9402

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

	Telephone
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110 002	{ 2323 7617 2323 3841
Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700 054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022	{ 60 3843 60 9285
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600 113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400 093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches : AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. FARIDABAD.
GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR.
NALAGARH. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.