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 3419 (1989): Fittings for rigid non-metallic conduits
[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"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

Indian Standard

SPECIFICATION FOR FITTINGS
FOR RIGID NON-METALLIC CONDUITS

(Second Revision)

UDC   621·315·674 : 621·315·671·1

BUREAU   OF   INDIAN   STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 7

Indian Standard

SPECIFICATION FOR FITTINGS FOR RIGID NON-METALLIC CONDUITS

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards on 26 July 1988, after the draft finalized by the Electrical Wiring Accessories Sectional Committee had been approved by the Electro-technical Division Council.

0.2 This standard covers the general requirements and methods of test of the fittings for rigid non-metallic conduits.

0.3 The non-metallic conduit fittings covered in this standard are intended to be suitable for use with rigid non-metallic conduits covered by IS : 9537 (Part 3) - 1983*, using plain joints (with or without cement).

0.4 This standard was published in 1965 and was first revised in 1976. The present revision has been undertaken to take into account the experience gained since then and to bring it in line with the latest international publications on the subject.

0.5 This revision has also been prepared to bring this in line with IS : 9537 (Part 3)-1983*. The

---

*Specification for conduits for electrical installations: Part 3 Rigid plain conduits of insulating materials.

dimensions have been changed to suit the conduits having dimensions in accordance with IS : 9537 (Part 3)-1983*.

0.6 Care should be exercised in the choice and use of fittings for rigid non-metallic conduits with cables having aluminium conductor (*see also* IS : 732-1963†).

0.7 While preparing this revision, assistance has been derived from BS 4607 (Part 1) : 1984 'Rigid PVC conduits and conduit fittings. Metric units', issued by the British Standards Institution.

0.8 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, shall be rounded off in accordance with IS : 2-1960‡. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

*Specification for conduits for electrical installations: Part 3 Rigid plain conduits of insulating materials.
†Code of practice for electrical wiring installations (system voltage not exceeding ō50 volts) (*revised*).
‡Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard specifies the requirements and methods of test for rigid conduit fittings manufactured from insulating materials for use with circular, rigid, non-flame propagating and non-threadable plain conduits of insulating materials.

1.1.1 This standard covers conduit fittings suitable for temperature between —5°C and +60°C.

> NOTE — Non-metallic conduit fitting complying with this standard will be suitable for use at temperatures below —5°C subject to a reduction in mechanical strength.

1.1.2 Only plain type fittings are covered in this standard.

1.2 The fittings covered by this standard are:

a) Couplers,

b) Bends,

c) Elbows,

d) Tees,

e) Inspection sleeves, and

f) Boxes.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions, in adition to those specified in IS : 9537 (Part 1)-1980* shall apply.

2.1 Components — A part of a conduit fitting which may be common to several conduit fittings.

2.2 Fittings — Accessories used in conjunction with conduits for the purposes of uniting, changing direction, drawing-in and obtaining access to the insulated electrical conductors.

---

*Specification for conduits for electrical installations: Part 1 General requirements.

2.3 Type Tests — Tests carried out to prove conformity with the requirements of this standard. These are intended to prove the general qualities and design of a given type of fitting.

2.4 Routine Tests — Tests carried out on each fitting to check the essential requirements which are likely to vary during production.

2.5 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

3. GENERAL REQUIREMENTS

3.1 The fittings shall be so designed and constructed that they ensure reliable mechanical protection to the conductors and/or cables therein and fit properly with the conduits with which these are used.

These shall withstand the stresses likely to occur during transport, storage, recommended installation and usage.

In general, compliance is checked by carrying out all the tests specified.

4. GENERAL NOTES ON TESTS

4.1 Tests specified in this specification are type tests. Type tests on fittings made of insulating materials shall not be commenced before 10 days after manufacture.

4.2 Unless otherwise specified, the tests are carried out at an ambient temperature of $27 \pm 5°C$.

4.3 Unless otherwise specified, each test is made on three new samples.

4.4 Unless otherwise specified, fittings are deemed not to comply with this specification if more than one sample fails in any one of the tests. If one sample fails in a test, that test and those preceding, which may have influenced the result of that test, are repeated on another set of samples of the number specified, all of which shall then comply with the repeated tests.

5. CONSTRUCTION

5.1 General

5.1.1 The fittings shall be homogeneous and non-porous and shall be so designed and constructed as to have adequate mechanical strength and be able to withstand such rough usage as may be expected during and after installation.

5.1.2 The inside and outside surfaces of the fittings shall be smooth, clean and uniform, and free from projections, grooving and other defects.

5.1.3 The interior of the fittings shall be free from obstructions which might cause abrasion of the cables or which might interfere with the ready introduction or withdrawal of cables of the maximum size and number permitted to be enclosed by the conduit.

5.1.4 The inside edges of all openings through which cables are intended to pass, shall be smoothly rounded in order to prevent damage to the cable.

NOTE — Conformity to the dimension specified in this standard ensures compliance with this requirement.

5.1.5 The conduit entries of fittings and components shall be so designed that a reliable joint can be made between the appropriate conduit and the fitting or component.

5.2 Inspection Windows

5.2.1 *Elbows* — The area of the opening in the case of inspection elbow shall not be less than two-and-a-half times the internal cross-sectional area of the corresponding conduit. The cover shall be of the same material as the accessory and shall have a minimum thickness of 1·5 mm. It shall be attached to the elbow by means of at least two M4 (*see* IS : 4218*) fixing screws. The ends of the screws shall not protrude into the cable way and at least 4 threads of engagements in the hole shall be provided.

NOTE — The cover of the inspection window shall overlap the opening by at least 5 mm.

5.2.2 *Tees* — The area of the opening for inspection tees shall not be less than three times the internal cross-sectional area of the corresponding cover. Details shall be the same as for Inspection elbows (*see* **5.2.1**).

NOTE — The cover of the inspection window shall overlap the opening.

5.3 Covers

5.3.1 The cover of the circular box may be made of the same material boxes and shall have a minimum thickness of 1·6 mm. They shall be fixed to the box by means of M4 (*see* IS : 4218*) fixing screws.

5.3.2 The covers shall be of the following two sizes:

a) Diameter equal to the external diameter of the box, and

b) Diameter not less than 12·5 mm larger than the external diameter of the box.

5.3.3 Holes for fixing screws for covers or accessories as specified shall be provided in pillars formed in the side of the fittings with or without metal inserts to provide a minimum threaded length of 10 mm. The hole shall extend for the whole inside depth of the fitting but openings in the back will not be permitted.

5.3.4 The means of attaching components or covers to conduit fittings shall not cause damage to cable insulation.

---

*ISO metric screw threads.

6. DIMENSIONS

6.1 Nominal Size — The nominal size of the outlets of the fittings shall correspond to the nominal outside diameter of the conduits covered by IS : 9537 (Part 3)-1983*.

6.2 Fittings — The fittings shall comply with the appropriate tables as specified below:

a) Slip type couplers	Table 1
b) Socketed type couplers	Table 2
c) Clamp type couplers	Table 3
d) Normal type bends	Table 4
e) Slip type coupling bends	Table 5
f) Normal type elbows	Table 6
g) Normal type tees	Table 7
h) Socketed type tees	Table 8
j) Spout type circular boxes	Table 9

*Specification for conduits for electrical installations: Part 3 Rigid plain conduits of insulating materials.

7. MARKING

7.1 Each fitting shall be marked clearly and indelibly with the following information:

a) Manufacturer's name or trade-mark,

b) Type reference including the diameter, and

c) Country of manufacture.

7.1.1 The conduit fittings may also be marked with the Standard Mark.

NOTE — 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 Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

TABLE 1 SLIP TYPE COUPLERS

(*Clause* 6.2)
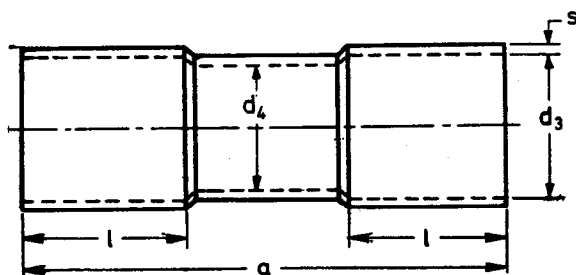
All dimensions in millimetres
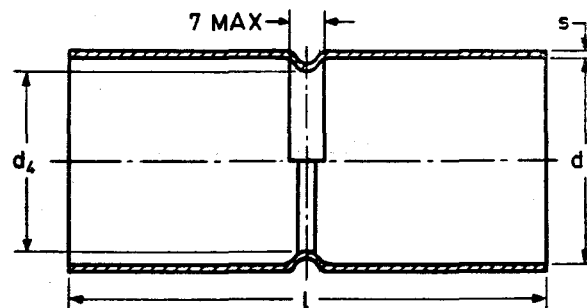
Nominal Size	Inside Diameter of Collar d_3	Inside Diameter of Ridge d_4	Minimum Over-all Length l	Minimum Wall Thickness s
(1)	(2)	(3)	(4)	(5)
16	$16\cdot1 \; {}^{+0\cdot2}_{-0}$	$13\cdot5 \; {}^{+0\cdot4}_{-0}$	80	1·1
20	$20\cdot1 \; {}^{+0\cdot2}_{-0}$	$17\cdot5 \; {}^{+0\cdot4}_{-0}$	80	1·2
25	$25\cdot1 \; {}^{+0\cdot3}_{-0}$	$22\cdot0 \; {}^{+0\cdot5}_{-0}$	80	1·4
32	$32\cdot1 \; {}^{+0\cdot3}_{-0}$	$29\cdot0 \; {}^{+0\cdot5}_{-0}$	160	1·5
40	$40\cdot1 \; {}^{+0\cdot4}_{-0}$	$37\cdot0 \; {}^{+0\cdot6}_{-0}$	100	1·5
50	$50\cdot1 \; {}^{+0\cdot4}_{-0}$	$46\cdot4 \; {}^{+0\cdot6}_{-0}$	120	1·7
63	←———————— Under consideration ————————→			

TABLE 2 SOCKETED TYPE COUPLERS

(*Clause* 6.2)

All dimensions in millimetres.

Nominal Size	Inside Diameter of Collar	Inside Diameter of Ridge	Minimum Overall Length		Minimum Wall Thickness
	d_3	d_4	a	l	s
(1)	(2)	(3)	(4)	(5)	(6)
16	16·1 } +0·2 / −0	13·5 } +0·4 / −0	100	35	1·1
20	20·1 }	17·5 }	100	35	1·2
25	25·1 } +0·3 / −0	22·0 } +0·5 / −0	110	35	1·4
32	32·1 }	29·0 }	120	45	1·5
40	40·1 } +0·4 / −0	37·0 } +0·6 / −0	130	45	1·5
50	50·1 }	46·4 }	140	55	1·7
63	←————————— Under consideration —————————→				

TABLE 3 CLAMP TYPE COUPLERS

(*Clause* 6.2)

All dimensions in millimetres.
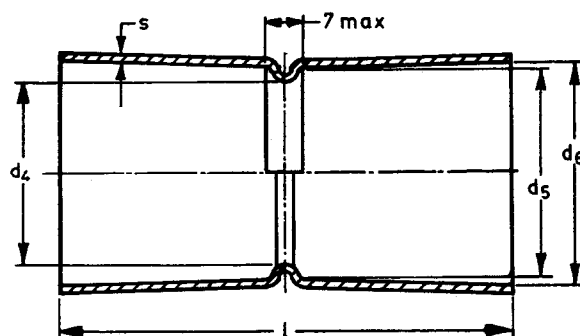
Nominal Size	Inside Diameter of Collar		Inside Diameter of Ridge	Minimum Length	Minimum Wall Thickness
	d_6	d_5	d_4	l	s
(1)	(2)	(3)	(4)	(5)	(6)
16	16·1 } +0·2 / −0	15·6 } +0 / −0·3	13·5 } +0·4 / −0	80	1·1
20	20·1 }	19·6 }	17·5 }	80	1·2
25	25·1 } +0·3 / −0	24·6 } +0 / −0·4	22·0 } +0·5 / −0	80	1·4
32	32·1 }	31·6 }	29·0 }	100	1·5
40	40·1 }	39·6 } +0 / −0·5	37·0 } +0·6 / −0	100	1·5
50	50·1 }	49·6 }	46·3 }	120	1·7
63	←————————— Under consideration —————————→				

4

TABLE 4 NORMAL TYPE BENDS

(*Clause* 6.2)

All dimensions in millimetres.
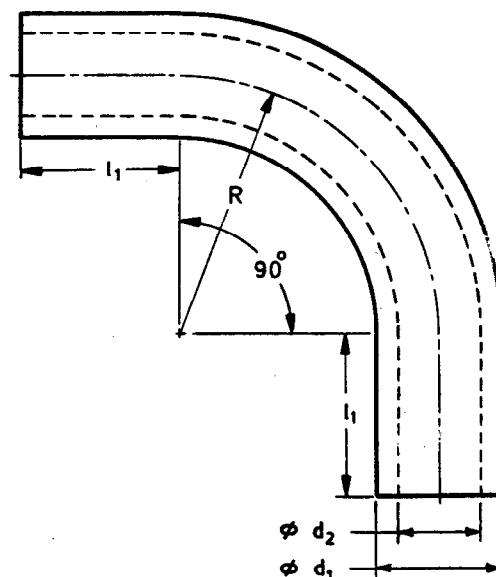
NOMINAL SIZE	OUTSIDE DIAMETER	MINIMUM INSIDE DIAMETER		
	d_1	d_2	R	l_1
(1)	(2)	(3)	(4)	(5)
16	$16^{+0}_{-0.3}$	13·1	55	45
20	$20^{+0}_{-0.3}$	16·9	65	50
25	$25^{+0}_{-0.3}$	21·3	90	70
32	$32^{+0}_{-0.3}$	27·9	125	90
40	$40^{+0}_{-0.3}$	35·5	160	100
50	$50^{+0}_{-0.3}$	44·7	210	110
63	←————————— Under consideration ————————→			

5

TABLE 5   SLIP TYPE COUPLING BENDS

(*Clause* 6.2)

All dimensions in millimetres.
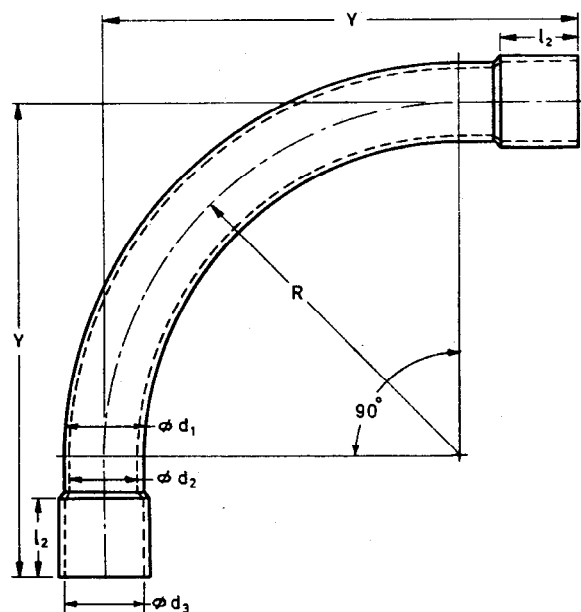
Nominal Size	Outside Diameter of Bend	Minimum Inside Diameter of Bend	Inside Diameter of Collar			
	d_1	d_2	d_3	R	Y	l_2
(1)	(2)	(3)	(4)	(5)	(6)	(7)
16	$16^{+0}_{-0.3}$	13·1	$16·1$ $\left.\right\}$ $+0·2$ -0	55	100	35
20	$20^{+0}_{-0.3}$	16·9	$20·1$ $\left.\right\}$	65	115	35
25	$25^{+0}_{-0.3}$	21·3	$25·1$ $\left.\right\}$ $+0·3$ -0	90	160	35
32	$32^{+0}_{-0.3}$	27·9	$32·1$ $\left.\right\}$	125	215	45
40	$40^{+0}_{-0.3}$	35·5	$40·1$ $\left.\right\}$ $+0·4$ -0	160	260	45
50	$50^{+0}_{-0.3}$	44·7	$50·1$ $\left.\right\}$	210	310	55
63	←————————Under consideration————————→					

TABLE 6 NORMAL TYPE ELBOWS

(*Clause* 6.2)

All dimensions in millimetres.

NOMINAL SIZE	INSIDE DIAMETER OF COLLAR		*l*	*r*	MINIMUM WALL THICKNESS
(1)	(2)		(3)	(4)	(5)
16	16·1 ⎱ +0·2		35	16	1·1
20	20·1 ⎰ −0		35	20	1 2
25	25·1 ⎱ +0·3		35	25	1·4
32	32·1 ⎰ −0		45	32	1·5
40	40·1 ⎱ +0·4		45	40	1·5
50	50·1 ⎰ −0		55	50	1·7
63	← Under consideration →				

TABLE 7 NORMAL TYPE TEES

(*Clause* 6.2)

All dimensions in millimetres.

NOMINAL SIZE OF THE TEE	INSIDE DIAMETER OF COLLAR		*l*	*r*	MINIMUM WALL THICKNESS
(1)	(2)		(3)	(4)	(5)
16	16·1 ⎱ +0·2		5	1	1·1
20	20·1 ⎰ −0		35	20	1·2
25	25·1 ⎱ +·3		35	25	1·4
32	32·1 ⎰ −0		45	32	1·5
40	40·1 ⎱ +0·4		45	40	1·5
50	50·1 ⎰ −0		55	50	1·7
63	← Under consideration →				

7

TABLE 8 SOCKETED TYPE TEES

(*Clause* 6.2)

All dimensions in millimetres.
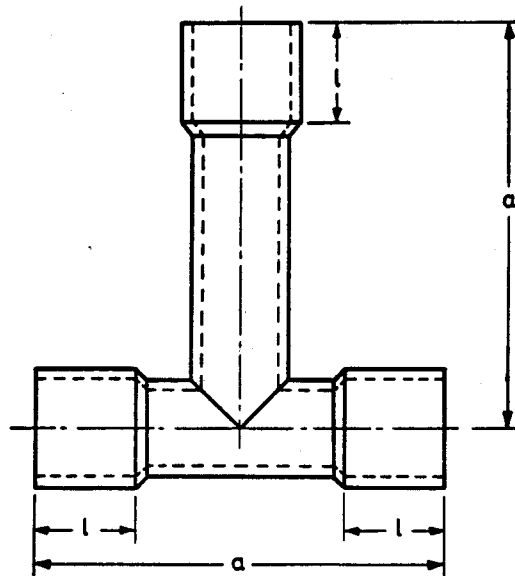
NOMINAL SIZE OF THE TEE	INSIDE DIAMETER OF COLLAR	*a*	*l*	MINIMUM WALL THICKNEES
(1)	(2)	(3)	(4)	(5)
16	16·1 ⎫ +0·2	125	35	1·1
20	20·1 ⎬ −0	125	35	1·2
25	25·1 ⎫ +0·3	150	35	1·4
32	32·1 ⎬ −0	200	45	1·5
40	40·1 ⎫ +0·4	200	45	1·5
50	50·1 ⎬ −0	250	55	1·7
63	← ———————— Under consideration ———————— →			

TABLE 9 SPOUT TYPE CIRCULAR BOXES

(*Clause* 6.2)

OPTIONAL SPOUT

(Continued)

9

TABLE 9 SPOUT TYPE CIRCULAR BOXES — *Contd*

(A) TERMINAL

(B) THROUGH

(C) ANGLE

(D) THREE - WAY

(E) FOUR - WAY
INTERSECTION
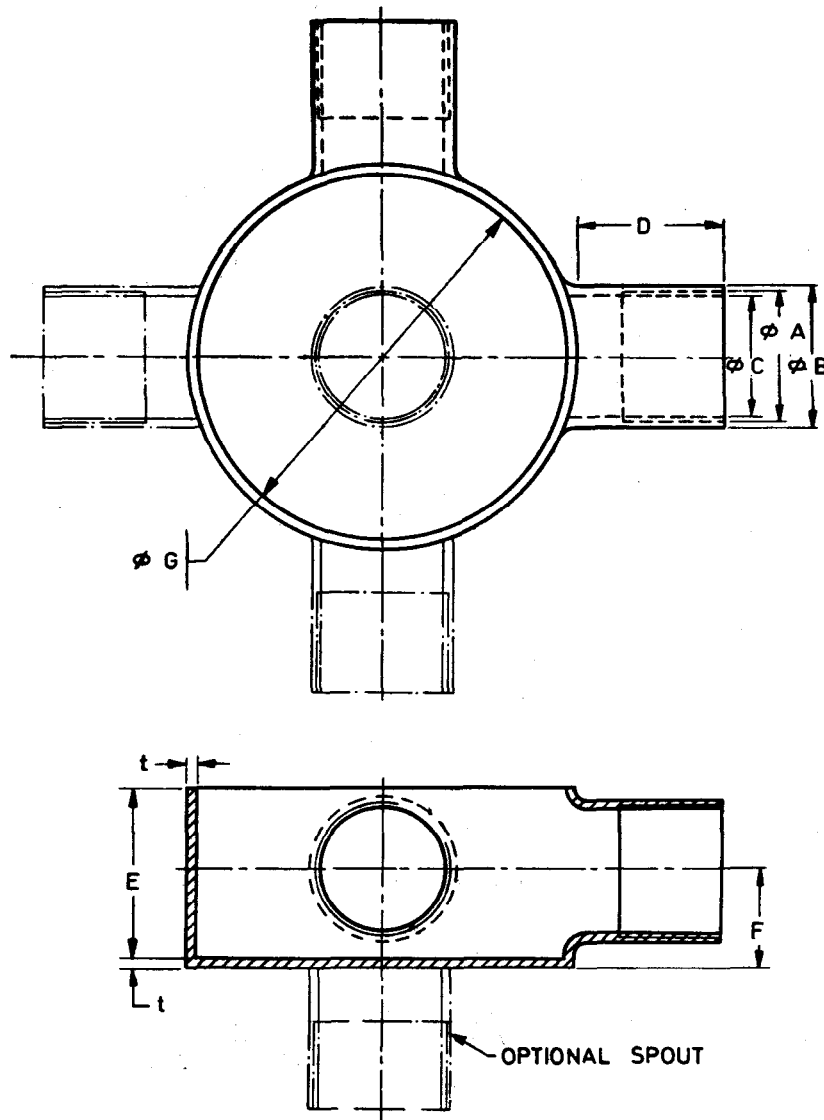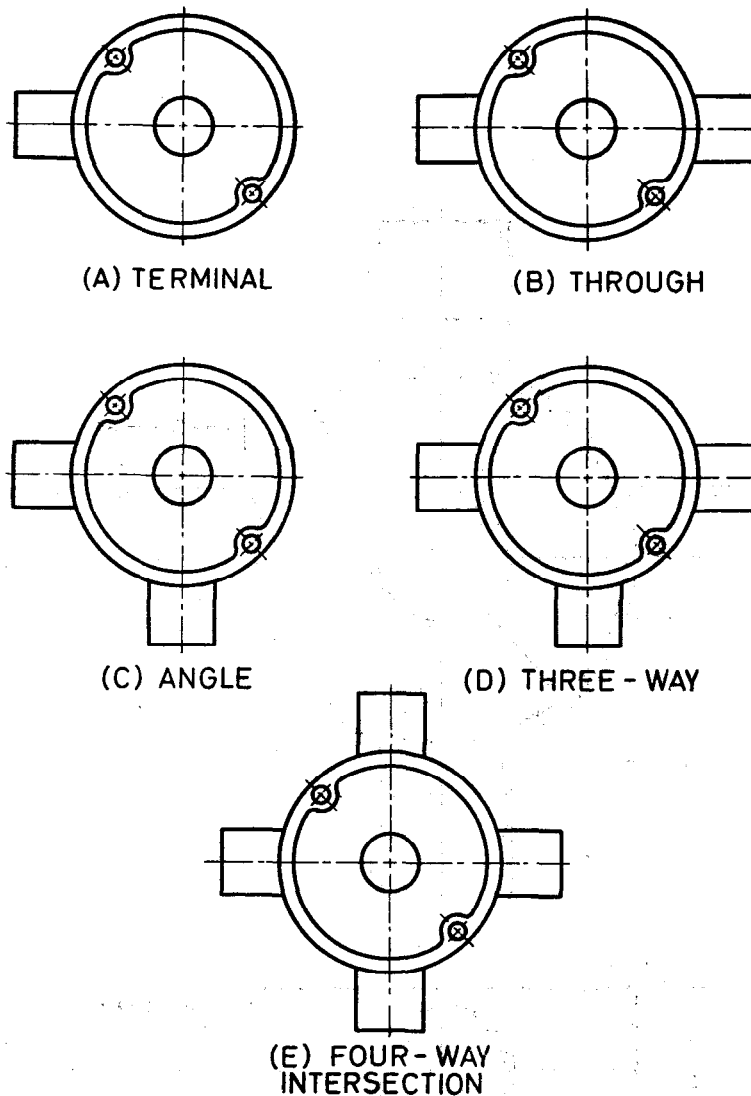
NOMINAL OUT-SIDE DIAMETER OF CONDUIT A	B, Min	C	D, Min	E, Min	F		G	t Min
					Max	Min		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
16	19·5	$13\cdot75 {+0\cdot25 \atop -0}$	18·0	25	12·5	12·0	$60 {+1\cdot5 \atop -0}$	1·6
20	23·0	$17\cdot00 {+0\cdot25 \atop -0}$	20·0	25	14·5	13·5	$60 {+1\cdot5 \atop -0}$	1·6
25	29·5	$22\cdot75 {+0\cdot25 \atop -0}$	23·0	28	17·5	16·5	$60 {+1\cdot5 \atop -0}$	1·6

8. VISUAL EXAMINATION

8.1 Each conduit fitting shall be examined for conformity to the requirements specified in **5**.

9. CHECKING OF DIMENSIONS

9.1 The selected samples shall be tested for correctness of dimensions, such as, diameter, length and thickness.

10. RESISTANCE TO HEAT

10.1 Fittings and components shall be resistant to heat. Compliance is checked by the test specified in **10.2**.

10.2 Cut a sample of suitable size from the fitting. Place it in a horizontal position on a steel support as shown in Fig. 1, the support and the sample being placed in a heating cabinet, the temperature within which is maintained at 60 ± 2°C.

After 2 hours, a steel ball of 5 mm dia shall be pressed against the upper surface of the sample by a force of 20 N.

After 1 hour, the ball shall be removed and the sample taken out of the heating cabient. After 2 hours, at room temperature, the diameter of the impression shall be measured which shall not exceed 2 mm.
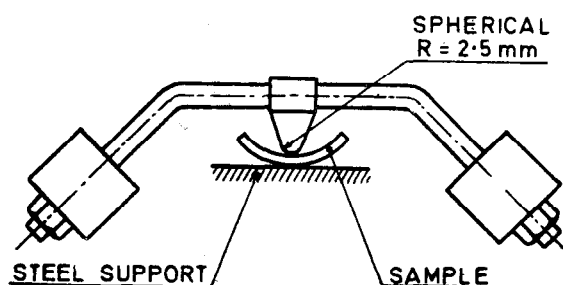

FIG. 1 BALL PRESSURE APPARATUS

11. RESISTANCE TO BURNING

11.1 Fittings and components shall be self extinguishing. Compliance shall be checked by the test specified in **11.2**.

11.2 The test shall be made in still air with a Bunsen burner, having a nozzle with an internal diameter of 9 mm.

While the burner is in the vertical position, the flame is adjusted so that the overall length is 100 mm. The intensity of the flame shall meet the following requirements:

A bare copper wire, 0·71 mm in diameter and at least 10 cm long, is held horizontally so that it passes through the middle of the frame, 5 cm above the top of the burner, its free end being vertically above the edge of the burner. The wire should melt within 6 seconds.

For testing the fittings, the burner is supported so that its axis is at an angle of 45° to the vertical.

The sample is held in such a position that the part above the flame is vertical and that the tip of the inner cone of the flame touches the surface of the sample at a distance of approximately 100 mm from its lower end, as far as practicable.

11.3 The flame shall be held for 1 min. If the sample burns, it shall do so slowly that the burning shall not spread. Any flame shall die out in less than 30 s after the removal of the burner.

12. MOISTURE ABSORPTION TEST

12.1 Fittings shall be resistant to moisture absorption. Compliance is checked by the test specified in **12.2**.

12.2 Sample shall be dried by heating at a temperature of 60 ± 2°C for 24 hours and then cooled to the ambient temperature of the test room and the dry weight is taken. The sample shall then be immersed for 24 hours in water at a temperature of 27 ± 2°C. After taking it out of water and wiping off the excess moisture, the sample is left to dry for one hour at the ambient temperature of the test room and is then weighed again.

12.3 The increase in weight corresponding to the moisture absorbed shall not exceed 1·0 percent.

13. RESISTANCE TO CHEMICAL ACTION

13.1 Test for Resistance to Chemical Action — Two samples are required for this test. The fittings shall not be affected by salt or moderate contamination of the atmosphere with acid or alkali.

13.2 The specimens shall be immersed, one in each, in the following solutions:

a) *Acid Solution* — 330 ml of hydrochloric acid (sp gr 1·16) diluted to 1 litre of water, and

b) *Alkaline Solution* — 80 g of sodium hydroxide dissolved in water and diluted to 1 litre of water.

The specimens shall remain in respective solutions for a period of one week.

13.3 During the period of immersion, there shall be no visible sign of deterioration of the specimens. Slight changes in colour of the specimens shall, however, be allowed.

14. COPPER TEST

14.1 A 25-mm wide strip of annealed copper shall be wound on each sample centrally to form a close helix of three complete turns. The sample shall then be maintained at 120 ± 2°C for 7 hours. At the completion of this period, the copper strip shall be carefully removed. There

shall be no visible evidence of formation of copper salts on the sample.

NOTE — Where three turns are not possible, the number of turns shall be maximum possible turns.

15. RESISTANCE TO OIL

15.1 The external diameters of the sample (external dimensions in case of boxes) shall be measured. The sample shall then be immersed in insulation oil conforming to IS : 335-1983* for a period of 48 hours, the temperature of the oil being maintained at $60 \pm 1°C$ throughout this period.

15.2 At the completion of this period, the sample shall be carefully withdrawn from the oil and allowed to remain at a temperature of $27 \pm 2°C$ for a period not less than 15 minutes.

15.3 The external diameter of the sample (the external dimensions in case of boxes) shall be measured and shall not differ by more than 5 0 percent from the value of the first measurement (*see* **15.1**).

15.4 A strip, 12·5 mm wide, shall then be cut from the sample and on visual examination, neither the strip nor the sample shall show any sign of penetration of oil. Upon visual examination, the strip shall show no sign of cracking or splitting.

16. RESISTANCE TO IMPACT

16.1 Fittings and components shall be strong enough to withstand an impact during normal use.

Compliance is checked by the test method prescribed in Appendix A.

16.2 After the test, the samples shall show no damage or cracks visible to the naked eye.

17. ELECTRICAL CHARACTERISTICS

17.1 The fittings shall have adequate electric strength and insulation resistance.

Compliance is checked by tests specified in **17.2** and **17.3**.

17.2 Electric Strength — The fittings are fitted with covers in the manner prescribed by the manufacturer except that the fixing means may be of insulating material. All entries except one are closed with plugs of insulating material. One of the plugs shall allow two separate cables to 25 mm inside the sample, 12·5 mm of the cables within the sample being without insulation and the ends of the cables being spread so that there is a distance of 12·5 mm between them.

The inside of the sample is filled with sphenoidal metal objects of a maximum size of 2·5 mm and

___
*Specification for new insulating oils for transformers and switchgear (*first revision*).

remaining entry closed. This sample is placed in a container completely filled with similar sphenoidal metal objects.

The conductivity of the metal objects inside the sample is checked by measuring the resistance between the two cables which have penetrated the sample. This resistance shall be not more than 10 Ω.

An electrode is immersed in the metal objects external to the sample. A voltage of 2 500 V of substantially sine-wave form and having a frequency of 50 Hz is applied for 15 minutes between the electrode and the cables.

No breakdown shall occur during the test.

17.3 Insulation Resistance — The insulation resistance of each sample is measured at a temperature of $60 \pm 2°C$ by applying a dc voltage of approximately 500 V between the electrode and the cables. The insulation resistance is measured 1 min after the application of the voltage.

The insulation resistance shall not be less than 100 MΩ.

18. TESTS

18.0 Classification of Tests — The tests are classified as type tests, acceptance tests and routine tests.

18.1 Type Tests — The tests given below shall constitute type tests and shall be carried out on fittings of a given type and size (preferably selected at random from regular production). The sequence of type test shall be in accordance with Appendix B.

   a) Visual examination (*see* **8**),

   b) Checking of dimensions (*see* **9**),

   c) Test for resistance to heat (*see* **10**),

   d) Resistance to burning (*see* **11**),

   e) Moisture absorption test (*see* **12**),

   f) Test for resistance to chemical action (*see* **13**),

   g) Copper test (*see* **14**),

   h) Test for resistance to oil (*see* **15**),

   j) Resistance to impact (*see* **16**), and

   k) Test for electrical characteristics (*see* **17**).

18.1.1 *Criteria of Acceptance* — All samples shall successfully pass all the type tests for proving conformity with the requirements of this standard. If any of the samples fail in any of the type tests, a further set of samples shall be selected and that test shall be repeated. If the second set of samples also proves unsatisfactory, the lot shall be rejected.

18.2 Acceptance Tests — The following tests shall constitute acceptance tests:

a) Visual examination,

b) Checking of dimensions,

c) Test for resistance to heat, and

d) Test for electrical characteristics.

18.2.1 A recommended sampling procedure for acceptance tests is given in Appendix C.

18.3 Routine Tests — The following shall constitute routine tests:

a) Visual examination, and

b) Checking of dimensions.

APPENDIX A

(*Clause* 16.1)

IMPACT TEST APPARATUS

A-1. DESCRIPTION OF THE APPARATUS

A-1.1 A typical impact apparatus is shown in Fig. 2.

A-1.2 The striking element has a hemispherical face of radius 10 mm made of hardwood, polyamide or similar material weighing 0·15 kg. It is rigidly fixed to the lower end of a steel tube with an external diameter of 9 mm and thickness 0·5 mm which is pivoted at its upper end in such a way that it swings only in vertical plane of the axis of the striking element*. The design of the

*The axis of pivot is 1 m above the axis of the striking element.

apparatus is such that a force between 1·0 and 2·0 N has to be applied to the face of the hammer to maintain the pendulum in a horizontal position.

A-1.3 The fitting under test is held against a solid wall of bricks concrete of the like and the test apparatus is so arranged that the pivot of the pendulum is vertically above the point of impact of the hammer. The hammer is then allowed to fall from a height so that the impact energy of each blow is 1 Nm. Three such blows are applied.
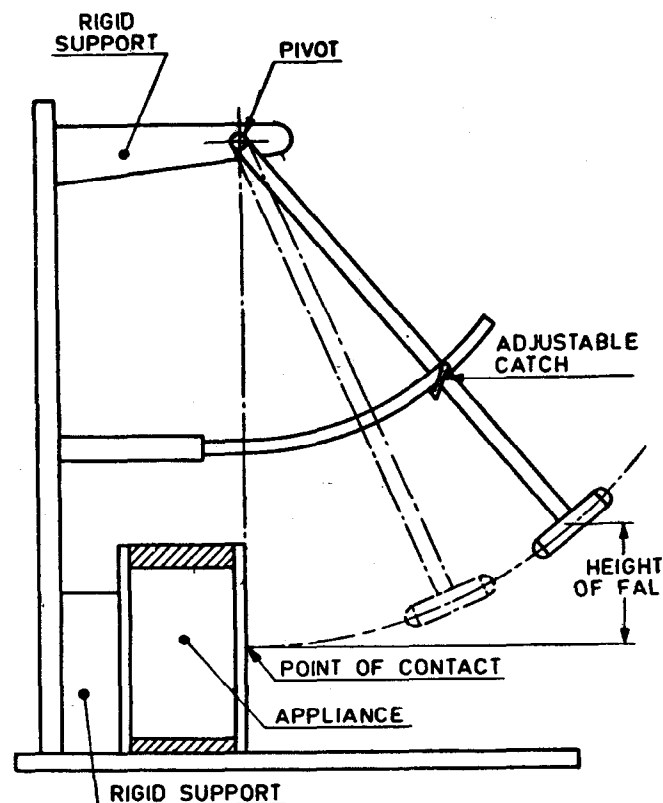

FIG. 2 APPARATUS FOR IMPACT TEST

APPENDIX B

(*Clause* 18.1)

SEQUENCE OF TYPE TESTS

All the 12 samples
|
Visual examination (*see* **8**)
|
Checking of dimensions (*see* **9**)
|

1 Sample	1 Sample	1 Sample	1 Sample	1 Sample	1 Sample	3 Samples	3 Samples
Resistance to heat	Resistance to burning	Resistance to moisture absorption	Resistance to chemical action	Copper test	Resistance to oil	Resistance to impact	Electrical characteristics
(*see* **10**)	(*see* **11**)	(*see* **12**)	(*see* **13**)	(*see* **14**)	(*see* **15**)	(*see* **16**)	(*see* **17**)

APPENDIX C

(*Clause* 18.2.1)

SAMPLING PROCEDURE FOR ACCEPTANCE

C-1. LOT

C-1.1 In any consignment, all the fittings of same make, model and type, and manufactured under similar conditions of production shall be grouped together to constitute a lot.

C-2. SELECTION OF SAMPLE

C-2.1 From each lot, a certain number of fittings, as prescribed in Table 10 shall be selected at random and subjected to acceptance tests specified in **18.2**.

C-2.2 The number of fittings to be selected shall depend upon the size of the lot and shall be in accordance with col 2 of Table 10.

C-2.2.1 If required for repeat test(s) (*see* **C-3.2**), additional fittings as given in col 3 of Table 10 shall also be selected at random.

TABLE 10 SAMPLING SCHEME

(*Clauses* C-2.1, C-2.2, C-2.2.1, C-3.1 *and* C-3.2)

Lot Size	First Sample Size n_1	Second Sample Size n_2	Acceptance Number a	First Rejection Number r_1	Second Rejection Number r_2
(1)	(2)	(3)	(4)	(5)	(6)
Up to 100	5	5	0	2	2
101 to 300	8	8	0	2	2
301 to 500	13	13	0	3	4
501 to 1 000	20	20	1	4	5
1 001 to 3 000	32	32	2	5	7
3 001 and above	50	50	3	7	9

C-3. CRITERION FOR CONFORMITY

C-3.1 The lot shall be considered as conforming to the requirements of acceptance tests if the number of failures in the first sample is less than or equal to the acceptance number a, given in col 4 of Table 10. If the number of failures is greater than or equal to the first rejection number r_1 as given in col 5 of Table 10, the lot shall be considered as not conforming to the requirements of the acceptance tests.

C-3.2 If the number of failures is between a and r_1, a second sample of same size (n_2) fittings shall be selected and subjected to the acceptance tests. If the number of failures in the two samples combined is less than the second rejection number r_2, as given in col 6 of Table 10, the lot shall be considered as conforming to the requirements of the acceptance tests, otherwise not.

15