IS 2486-3 (1974): Insulator Fittings for Overhead Power Lines with a Nominal Voltage Greater than 1000 Volts, Part III: Locking Devices [ETD 6: Electrical Insulators and Accessories]

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Indian Standard

SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE GREATER THAN 1 000 VOLTS

PART III LOCKING DEVICES

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE GREATER THAN 1 000 VOLTS

PART III LOCKING DEVICES

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SPECIFICATION FOR INSULATOR FITTINGS FOR OVERHEAD POWER LINES WITH A NOMINAL VOLTAGE GREATER THAN 1 000 VOLTS

PART III LOCKING DEVICES

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 26 July 1974, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 The object of this standard is to define the shapes and dimensions for locking devices and for the part of the socket into which they fit as well as certain properties with which the materials used shall comply in order to allow interchangeability of corresponding parts from different manufacturers.

0.3 While this standard (Part III) covers locking devices, general requirements and tests, the dimensional requirements of insulator fittings for overhead power lines with nominal voltage greater than 1 000 volts are covered in IS : 2486 (Part I)-1971* and IS : 2486 (Part II)-1974†.

0.4 In the preparation of this standard, assistance has been derived from IEC Pub 372-1 (1971) 'Locking devices for ball and socket couplings of string insulator units, Part I : Dimensions and general requirements' issued by the International Electrotechnical Commission.

0.5 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 insulator fittings for overhead power lines with a nominal voltage greater than 1 000 volts : Part I General requirements and tests (*first revision*).

†Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 volts : Part II Dimensional requirements (*first revision*).

‡Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III) applies to locking devices for ball and socket couplings of string insulator units and to the corresponding metallic fittings covered in IS : 2486 (Part II)-1974*.

2. GENERAL

2.1 This standard specifies two types of locking devices, one using a split-pin, the other a W-shaped clip.

2.2 The first type requires a circular hole in the socket, and the second one a rectangular hole. Consequently the standard also covers the shape and dimensions of the part of the socket into which the locking device fits. As this part of the socket is different for each type, split-pins and W-clips are not interchangeable.

3. DIMENSIONAL REQUIREMENTS

3.1 The dimensions concerning split-pins shall conform to the dimensions given in **7** to **9**.

3.2 The dimensions concerning W-clips shall conform to the dimensions given in **10** to **12**.

4. GENERAL REQUIREMENTS

4.1 The locking devices shall be resilient, corrosion resistant, and of suitable mechanical strength. The hardness and temper of the material are important for their satisfactory operation.

4.2 The locking devices shall retain their locking ability after being operated from the locking to the coupling position at least twenty times, at normal temperature. They should be effective at the lowest temperature likely to be encountered in service.

NOTE — These indications are given as minimum requirements. Mechanical tests on locking devices to ensure satisfactory operation will be included subsequently in a separate standard under consideration.

5. SHAPE AND POSITION OF THE SOCKET HOLE FOR THE LOCKING DEVICE

5.1 Split-Pins

5.1.1 Sockets for use with split-pins may have the hole for the split-pin located with its lower edge on the level of the bottom of the socket, or the

*Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 volts : Part II Dimensional requirements (*first revision*).

hole may be located above that level within the limits given by H_3 in Fig. 1. This allows the necessary margin when the split-pin hole is to be drilled. Examples of different methods of shaping the split-pin hole are shown in Fig. 1.

5.1.2 The hole for the split-pin and the length L_2 of the split-pin are designed to make the eye of the split-pin protrude at least 5 mm. This feature makes it easy to grip the split-pin by a suitable device.

5.1.3 The free ends of the split-pin are bent outwards and one of the legs has a hump. These features provide two distinct positions for the split-pin when operated for locking and coupling, and complete withdrawal is effectively prevented.

NOTE — The locking capability and operating characteristics of locking devices depend on the characteristics of the materials from which they are made (*see* **4**) and on the combination of dimensions of the locking device and the socket. Variations of untoleranced dimensions and even dimensions within the permitted tolerances may have an influence (*see also* **6**).

Locking devices should, therefore, not only be judged on dimensional conformity with this standard, but each combination of locking device and socket should be checked for satisfactory operation.

In the case of split-pins, attention is drawn to the fact that too much impact on the head of the pin during setting into the locking position may cause deformation to the extent that the locking capability is affected.

Care also shall be taken that the performance of the split-pin is not affected by deformation caused during opening out of the tips.

5.2 W-Clips — Sockets for use with W-clips have the lower edge of the rectangular slot at the level of the bottom of the socket. The slot is so shaped that it will accept the W-clip and retain it in two distinct positions when operated for coupling and locking. The shape of the W-clip is such that complete withdrawal when moving from the locking to the coupling position is prevented.

NOTE — The locking capability and operating characteristics of locking devices depend on the characteristics of the materials from which they are made (*see* **4**) and on the combination of dimensions of the locking device and the socket. Variations of untoleranced dimensions and even dimensions within the permitted tolerances may have an influence (*see* **6**).

Locking devices should, therefore, not only be judged on dimensional conformity with this standard, but each combination of locking device and socket should be checked for satisfactory operation.

6. INTERNAL HEIGHT OF THE SOCKET

6.1 As a result of the dimensions adopted in this standard, the internal height H_2^* of the socket and the corresponding gauge height should be

increased above the value of $H_{2(\min)}$ specified in IS : 2486 (Part II)-1974*. The increase is required since the locking device does not always rest on the bottom of the socket, and also to allow for the fact that the maximum thickness of the split-pins or W-clips is 0·2 mm greater than value of $T_{(\min)}$ specified in IS : 2486 (Part II)-1974*.

6.2 The increase required for H_2 is as follows:

a) For split-pins, $\triangle H_2 = H_{3(\max)} - \frac{1}{2} T_{(\min)} + 0{\cdot}1$; and

b) For W-clips, $\triangle H_2 = T_{(\max)} - T_{(\min)} = 0{\cdot}2$.

An increase of only 0·2 mm for H_2 may be neglected as the resulting reduction of 0·2 mm in clearance $Q_{(\min)}$ given in IS : 2486 (Part II)-1974* is permitted.

7. DIMENSIONS OF THE SOCKET HOLE FOR THE SPLIT-PIN

7.1 The dimensions of the socket hole for the split-pin shall be as shown in Fig. 1.

8. DIMENSIONS OF THE SPLIT-PIN

8.1 The dimensions of the split-pin shall conform to Fig. 2.

9. METHOD OF USING THE SPLIT-PIN

9.1 The split-pin is inserted through the hole and afterwards the legs are bent as shown in Fig. 2. It can then be operated between the locking and coupling positions as shown in Fig. 3.

10. DIMENSIONS OF THE SOCKET HOLE FOR THE W-CLIP

10.1 The dimensions of the socket hole for the W-clip shall be as shown in Fig. 4.

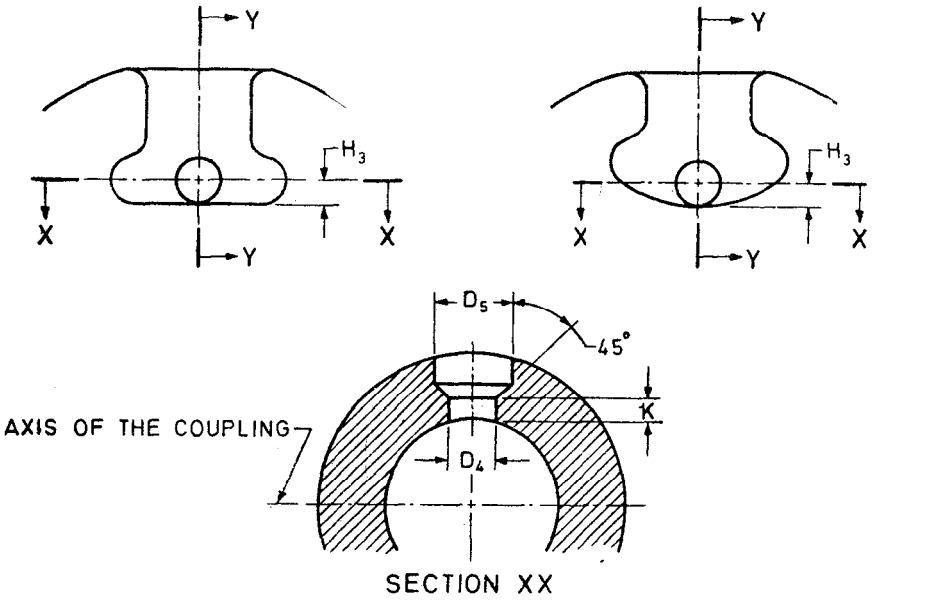
11. DIMENSIONS OF THE W-CLIP

11.1 The dimensions of the W-clip shall be as shown in Fig. 5.

12. METHOD OF USING THE W-CLIP

12.1 The W-clip is inserted through the socket entry and can then be operated between the locking and coupling positions as shown in Fig. 6.

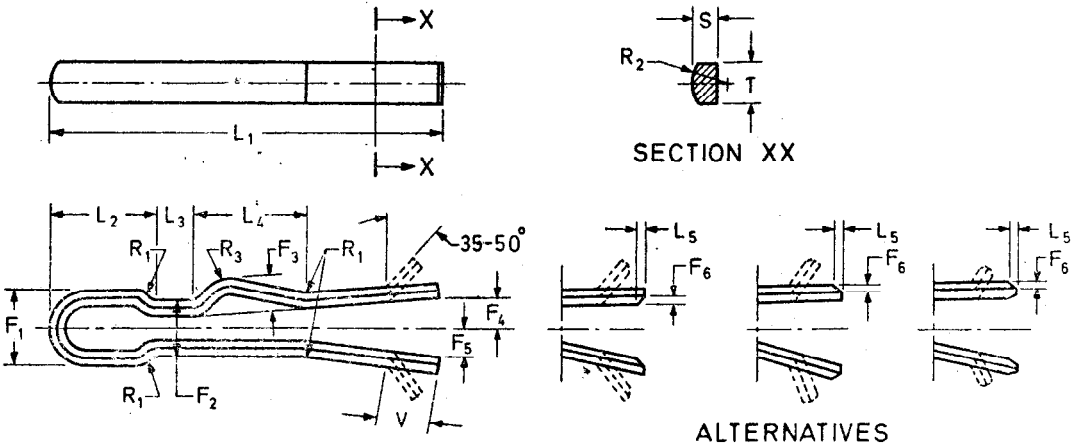
*Specification for insulator fittings for overhead power lines with a nominal voltage greater than 1 000 volts : Part II Dimensional requirements (*first revision*).



Standard Coupling	D_4	$D_{5\,(min)}$	H_3	K	$L_{(max)}$
11	$7{\cdot}5 \pm 0{\cdot}4$	13·5	$3{\cdot}75^{+1}_{-0}$	$3{\cdot}5 \pm 0{\cdot}6$	24
16 A	$9{\cdot}5 \pm 0{\cdot}5$	16·0	$4{\cdot}75^{+1}_{-0}$	$4 \pm 0{\cdot}7$	32
16 B	$10 \pm 0{\cdot}5$	18·0	$5\ ^{+1}_{-0}$	5 ± 1	32
20	$10 \pm 0{\cdot}5$	18·0	$5\ ^{+1{\cdot}2}_{-0}$	5 ± 1	4
24	$12 \pm 0{\cdot}5$	21·5	$6\ ^{+1{\cdot}5}_{-0}$	6 ± 1	51

All dimensions in millimetres.

FIG. 1 DIMENSIONS OF THE SOCKET HOLE FOR SPLIT-PIN



Standard Coupling	F_1	F_2	F_3	F_4	F_5	L_1	L_2	L_3	L_4	R_1	R_2	R_3	S	T	V
11	11·9 ± 0·5	8·4 ± 0·2	4·5 ± 0·2	3·5	2·5	50 ± 1·5	16·0 ± 0·5	4·6 ± 0·5	16	2	3·3	6·0	2·2 ± 0·1	4·8 $^{+0·2}_{0}$	8*
16 A	14·5 ± 0·5	10·5 ± 0·2	5·5 ± 0·2	4·5	3·0	65 ± 1·5	19·0 ± 0·5	5·2 ± 0·5	18	3	3·8	6·5	3·2 ± 0·1	5·5 $^{+0·2}_{0}$	12*

16 B	16·4 ± 0·5	10·9 ± 0·2	5·5 ± 0·2	4·5	3·5	65 ± 1·5	18·5 ± 0·5	6·5 ± 0·5	22	3	4·8	8·5	3·2 ± 0·1	7·9 $^{+0·2}_{0}$	12*
20	16·4 ± 0·5	10·9 ± 0·2	6·0 ± 0·2	4·5	3·5	80 ± 1·5	22·5 ± 0·5	6·5 ± 0·5	22	3	4·8	8·5	3·2 ± 0·1	7·0 $^{+0·2}_{0}$	12*
24	20·0 ± 0·5	13·0 ± 0·2	7·0 ± 0·2	7	4·0	100 ± 1·5	29·5 ± 0·5	7·7 ± 0·5	28	4	5·7	10·0	4·0 ± 0·1	8·7 $^{+0·2}_{0}$	12*

*Approximate values.

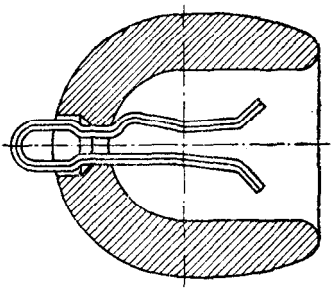
NOTE 1 — The length L_2 may be reduced provided that the conditions of **5.1** are fulfilled.

NOTE 2 — The tip of such split-pin leg may be cut straight or chamfered on one or both sides, as shown in the figure above. For guidance only, dimensions of the chamfers are given below:

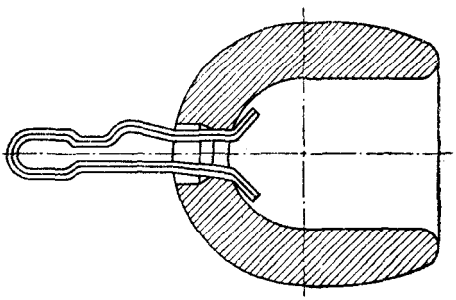
Standard Coupling	L_6	F_6
11	2	1
16 A	3	1·5
16 B	3	1·5
20	3	1·5
24	4	2

All dimensions in millimetres.

FIG. 2 DIMENSIONS OF SPLIT-PIN

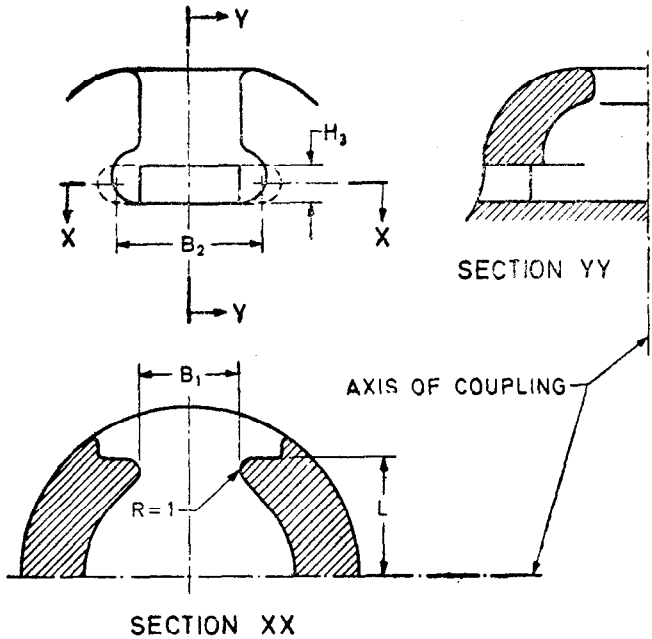


3A Locking Position



3B Coupling Position

FIG. 3 LOCKING AND COUPLING POSITIONS OF SPLIT-PIN



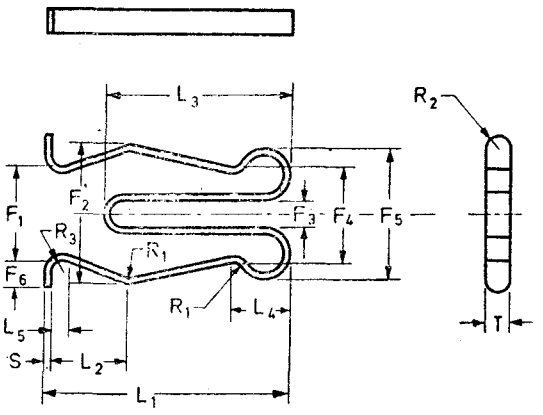
Standard Coupling	B_1	B_2 (min)	H_3	L (max)
11	12·5 ± 0·8	24	6·5 ± 0·8	18
16 A	16 ± 1	33	7 ± 0·8	24
16 B	16 ± 1	33	9·5 ± 0·8	24
20	17 ± 1	34	8·5 ± 0·8	29
24	17·5 ± 1	34·5	10·5 ± 0·8	34

NOTE 1 — Dimension B_2 is the length of the socket over which the height H_3 shall be maintained.

NOTE 2 — Beyond B_2 the shape of the socket is not important.

All dimensions in millimetres.

FIG. 4 DIMENSIONS OF THE SOCKET HOLE FOR W-CLIP



Standard Coupling	F_1	F_2	F_3	F_4	F_5	F_6	L_1	L_2	L_3	L_4	L_5	R_1	R_2	$R_{3(max)}$	S	T
11	15	20	4	13	19	$4^{+0.6}_{0}$	37 ± 1.5	12	24	8	3	2·5	3	1·5	1·2	$4.8^{+0.2}_{0}$
16 A	22	28	5	19	24	5^{+1}_{0}	50 ± 1.5	15·5	36	10·5	3	2·5	3	2·5	1·5	$5.5^{+0.2}_{0}$
16 B	22	28	5	19	24	5^{+1}_{0}	50 ± 1.5	15·5	36	10·5	3	2·5	4·5	2·5	1·5	$7.9^{+0.2}_{0}$
20	22	30	5	19	24	5^{+1}_{0}	62 ± 1.5	15·5	42	10·5	3	2·5	4·5	2·5	2	$7.0^{+0.2}_{0}$
24	22	30	5	19	25	5^{+1}_{0}	72 ± 1.5	15·5	50	10·5	3	2·5	5	2·5	2	$8.7^{+0.2}_{0}$

All dimensions in millimetres.

FIG. 5 DIMENSIONS OF W-CLIP

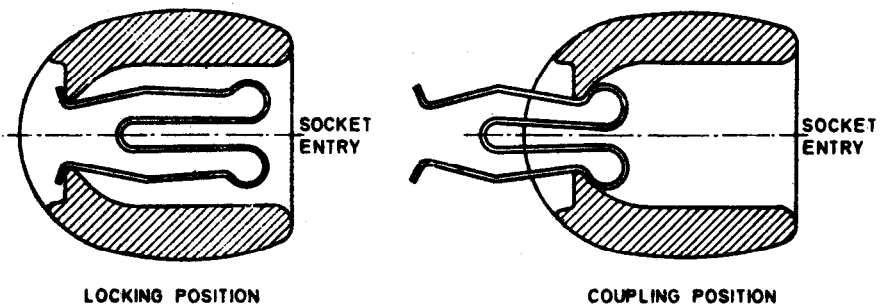


FIG. 6 LOCKING AND COUPLING POSITIONS OF W-CLIP

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