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SPECIFICATION FOR

CABLE TRUNKING MADE OF INSULATING MATERIAL

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
SPECIFICATION FOR CABLE TRUNKING MADE OF INSULATING MATERIAL

SLS 1206: 2000
(AMD 363, AMD 375 & AMD 419 incorporated)

Gr .7

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SRI LANKA

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This Standard does not purport to include all the necessary provisions of a contract.

Sri Lanka Standard
SPECIFICATION FOR CABLE TRUNKING MADE OF INSULATING MATERIAL

FOREWORD

This standard was approved by the Sectoral Committee on Electrical Appliances and Accessories and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2000-12-27.

This standard specifies dimensions, system of classification and method of tests for trunking made out of insulation material. A guideline for additional marking code is also given in Appendix **A**.

All values given in this specification are in SI units.

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 **SLS 102**. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

In the preparation of this standard the assistance derived from **BS 4678**: **Part 4**:**1982** including **Amd. No.1:1985** published by the British Standards Institution is gratefully acknowledged.

1. SCOPE

This standard specifics dimensions and performance requirements for non-flame propagating cable trunking made of insulating material. It also specifies a system of classification for cable trunking according to its material and properties.

2. REFERENCES

SLS 102 : Presentation of numerical values
SLS 963 : Classification for degrees of protection provided by enclosures.

3. DEFINITIONS

For the purpose of this standard the following definitions shall apply :

3.1 cable trunking : A system of enclosures for the protection of conductors or cables assembled together by means of couplers and allowing cables or conductors to be laid in.

3.2 coupler : A devices for joining together lengths of cable trunking.

3.3 insulating trunking : A trunking that consists of insulating material and that has no conductive components.

3.4 non-flame propagating trunking : A trunking that is liable to ignite a result of applied flame, but in which the flame does not propagate and is extinguished within a limited time after the applied flame is removed.

3.5 basic insulation : Insulation applied to live parts to provide basic protection against electric shock.

NOTE : *Basic insulation does not necessarily include insulation used exclusively for functional purposes.*

3.5.1 supplementary insulation : Independent insulation applied on addition to basic insulation in order to provide protection against electric shock in the event of failure of basic insulation.

4 CLASSIFICATION

Cable trunking shall be classified under the following headings.

4.1 According to material

4.2 According to mechanical properties

4.2.1 *trunking for medium mechanical stresses*
4.2.2 *trunking for heavy mechanical stresses*

4.3 According to temperature tolerance (see Table 1)

Temperature Classification (1)	**Temperature normally not less than**		**Permanent application temperature range** ^{0}**C** (4)
	Storage and transport ^{0}**C** (2)	**Use and installation** ^{0}**C** (3)	
- 5	-5	-5	-5 to +60
-25	-25	-15	-15 to +60
+15	+15	+15	+15 to +60

TABLE 1 – Temperature classification

4.4 According to electrical characteristics

4.4.1 *trunking without electrical insulating characteristics*

4.4.2 *trunking with electrical insulating characteristics*

4.5 According to resistance against ingress of solid objects

4.5.1 *non-protected trunking*

4.5.2 *trunking protected against solid objects greater than 1.0 mm (IP4X)*

4.5.3 *dust-protected trunking (IP5X)*

4.5.4 *dust-tight trunking (IP6X)*

4.6 According to resistance against ingress of water

4.6.1 *non-protected trunking*

4.6.2 *trunking protected against dripping water (IPX2) :*

4.6.3 *trunking protected against spraying water (IPX3) :*

4.6.4 *trunking protected against splashing water (IPX4) :*

4.6.5 *trunking protected against water jets (IPX5) :*

NOTE : *The categories of items 4.5 and 4.6 are referred in* ***SLS 963***

4.6.6 According to resistance against corrosive or polluting substances

4.6.7 *non-protected trunking*

4.6.8 *trunking with low protection*

4.6.9 *trunking with medium protection*

4.6.10 *trunking with high protection*

4.6.11 According to resistance against flame propagation

4.6.12 *non-flame propagating trunking*

4.6.13 *flame propagating trunking*

5 REQUIREMENTS

5.1 General

Cable trunking shall be so designed and constructed in that it ensure reliable mechanical protection to the conductors and / or cables contained in it. Cable trunking shall also provide adequate electrical protection.

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

Compliance shall be checked by carrying out all the tests specified in this standard.

5.2 Construction

5.2.1 The inside and outside surface of the trunking shall be free from burrs, flash and similar defects. In addition, any edges shall not be liable to damage the conductors or cables.

Compliance shall be checked by inspection, if necessary after cutting the specimens apart.

5.2.2 If screws or studs are used to secure the cover, the dividers or coupler, or to provide means of connection for electrical continuity, they shall not be liable to damage the conductors or cable.

Screws shall have isometric threads.

Where provision is made in cable trunking for partitions or dividers for the segregation of circuits, such partition or dividers shall be adequately secured to the main body of the cable trunking.

5.3 Dimensions

The external dimensions (i.e. the width and the height), in millimeters, of rectilinear cable trunking shall be selected from any combination of the following numbers.

10.0, 12.5, 14.0, 16.0, 20.0, 25.0, 32.0, 37.5, 40.0, 50.0, 75.0, 100, 150.

Tolerance of external dimensions shall be ± 0.5 mm.

5.4.1 Mechanical Properties

Cable trunking shall have adequate mechanical strength.
Compliance shall be checked by the tests specified in **7.2** and **7.3**

After the cable supporting test (see **7.2**) the distortion measured shall not exceed 5 per cent of the nominal horizontal dimension of the specimen, and the cover shall not become detached from the body so as to invalidate the classification made in accordance with **4.5** and **4.6.**

After the Impact test (see **7.3)** samples shall show no signs of disintegration nor shall there be any cracks visible to the naked eye. Any cracks in internal dividers shall be ignored.

5.4.2 Resistance to heat

Cable trunking shall have adequate resistance to heat.
Compliance shall be checked by the ball pressure test specified in **7.4**. The diameter of the impression made by the steel shall not exceed 2 mm.

5.4.3 Resistance to flame propagation

Non-flame propagating cable trunking with the cover secured in position either shall not ignite or, if ignited, shall not continue to burn when the burner of ignition is removed.

Compliance shall be checked by the test specified in **7.5.**

If the specimen burns during the test, it shall do so slowly and the flame shall not spread appreciably; any flame shall have died out in less than 30 s after the removal of the burner.

5.7 Insulating characteristics

Trunking shall have an adequate electrical insulating strength and insulation resistance in order to provide supplementary insulation (see **4.4**).
Compliance shall be checked by the tests specified in **7.6** and **7.7**.

No breakdown shall occur during the tests. The insulation resistance shall be not less than 100 MΩ.

6. MARKING

6.1 Each length of trunking shall be marked, in a durable and legible manner with :

a) the name, trade mark or other identifying symbol of the manufacturer or responsible vender.

b) a classification code with a three-digit mandatory marking code, the first digit denoting Mechanical properties, the second and third digits denoting the Temperature classification, as follows :

First digit : Mechanical properties

Very light mechanical stresses : 1
Light mechanical stresses : 2
Medium mechanical stresses : 3
Heavy mechanical stresses : 4
Very heavy mechanical stresses : 5

Second and third digits : Temperature classification

-5 trunking : 05
-25 trunking : 25
+15 trunking : 15

c) size of cable trunking (the width and the height) in mm.
d) the internal usable area for cables in mm^2 for the trunking.

It is desired to mark trunking with an additional code denoting properties other than mechanical classification or temperature classification, the additional code shall follow immediately after the mandatory marking code and shall be separated from it by an oblique stroke (/).

The additional code shall be as specified in Appendix **A.**

Marking may be applied by stamping, printing, adhesive labels, waterslide transfers or by moulding.

6.2 Flame-propagating trunking shall be manufactured from orange-coloured material. It shall not be coloured orange by painting. etc. Non-flame propagating trunking shall be any color except yellow, orange or red.

6.3 Marking shall be checked by inspection and by rubbing the marking by hand, suitably protected, for 50 s with a piece of cloth soaked with water and again for 50 s with a piece of cloth soaked with petroleum spirit**.**

NOTE: *Petroleum spirit is defined as the alphatic solvent hexane with a content of aromatics of maximum 0.1 per cent volume, a kauri-butanol value of 29, initial boiling point 65 ^oC, a dry point 69 ^oC, and specific density approximately 0.68 kg/l.*

After the test marking shall be legible.

7. TESTS

7.1 Type tests

7.1.1 The tests specified in this standard shall be type tests.

7.1.2 Type tests shall not be commenced until 10 days after manufacturing.

7.1.3 Samples of cable trunking for the various tests shall be taken from different lengths of cable trunking. Two sets of samples shall be provided.

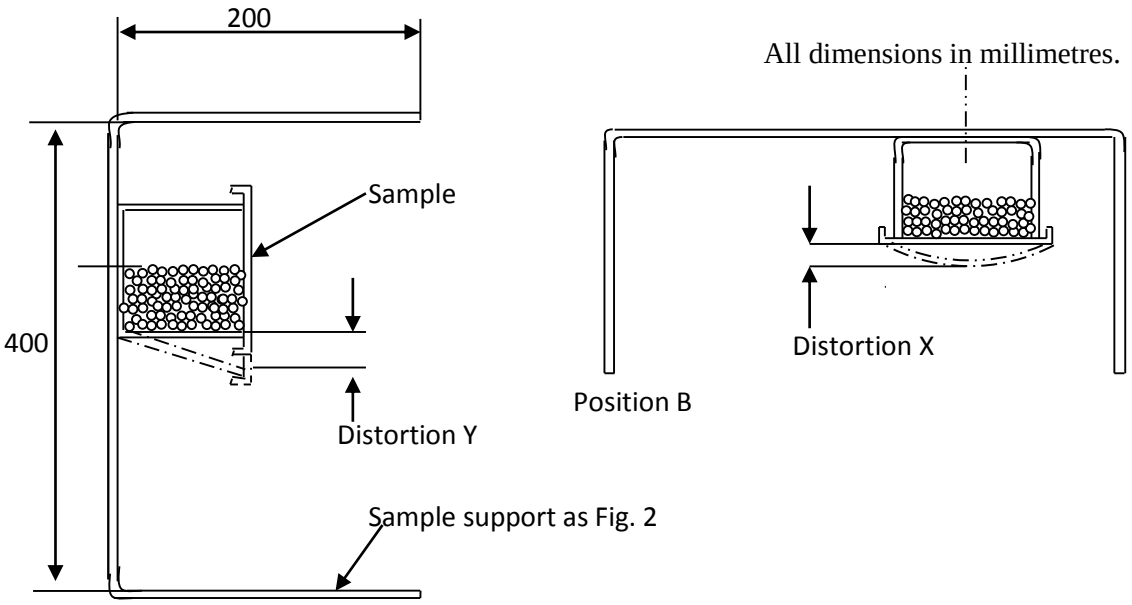
7.1.4 Cable trunking shall be deemed to comply with the requirements of this standard if there are no failures in any of the tests.

If one sample fails in a test, that test and those preceding it, which may have influenced the result of that test, shall be repeated on another set of samples of the number specified.

If there are no failures in any of the repeated tests, the cable trunking shall be deemed to comply with the requirements of this standard.

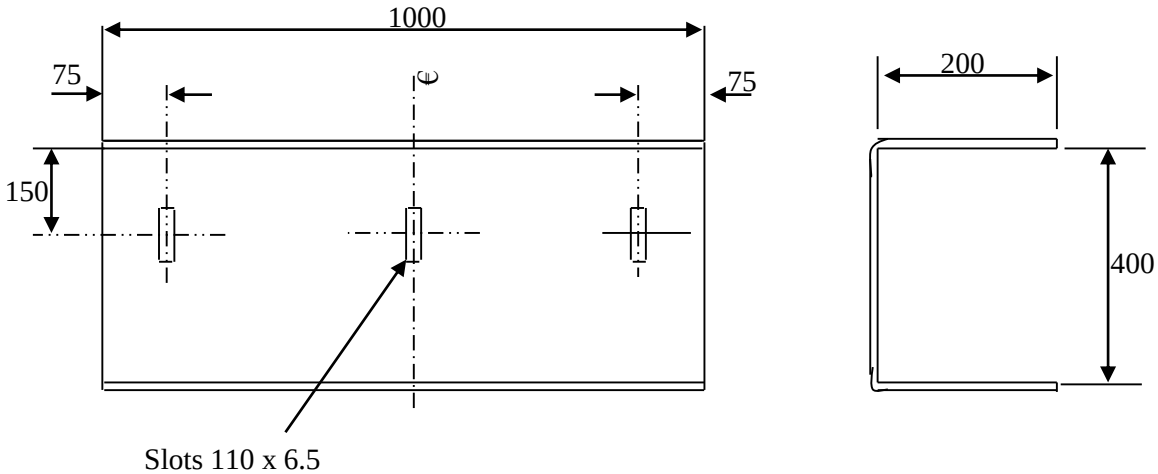
7.2 Cable supporting test

Carry out the test on three samples, with the covers secured in position, at a temperature of $20 \pm 5\ ^{0}$C.
Securely fix each sample in turn to the test apparatus as shown in Figure **1** and Figure **2.**



NOTE: *The distortion measurement is to be taken at the centre fixing.*

FIGURE 1- Cable supporting test apparatus



All dimensions in millimetres.

NOTE: *The Support is to be made of steel.*

FIGURE 2 - Cable supporting test sample support

With the sample in position **A**, subject it to a load of 0.13 kg per square centimetre of trunking cross-sectional area per meter length. The load shall comprise single-stranded uninsulated copper cables. After the load has been applied for 2 h measure the distortion. Then place the sample in position B and again subject it to a load of 0.13 kg per square centimetre of trunking cross-sectional area per metre length. The load shall again be single-stranded uninsulated copper cables. After the load has been applied for 2 h measure the length.

7.3 Impact test

Carry out the test on three samples each approximately 250 mm long.
Before the test, condition the sample at a temperature of $60 \pm 2\ ^0$C for 240 h.

Place the test apparatus shown in Figure **3** on a pad of its sponge rubber 40 mm – thick, and put this, together with the samples, in to a refrigerator, within which the temperature shall be maintained at the appropriate temperature specified in Column 2 of Table **1** within $\pm 1^0$C.

When the sample have attained the temperature of the air within the refrigerator or after 2 h, whichever is the longer period, place each sample in turn in the apparatus with the cover uppermost so that blows can be applied, firstly to the centre of the cover and secondly to the edge of the cover. Allow the hammer to fall so that it imparts the appropriate impact energy as specified in Table **2**.

TABLE 2 – Impact test data

Mechanical classification of trunking	**Impact energy J**	**Mass of hammer Kg**	**Fall height mm**
(1)	**(2)**	**(3)**	**(4)**
Medium	2.0	2.0	100 ± 1
Heavy	6.0	2.0	300 ± 1

After the test, Samples shall show no signs of disintegration nor shall there be any cracks visible to the naked eye. Any cracks in internal dividers shall be ignored.

7.4 Ball pressure test

Prepare three samples by cutting flat portions from the trunking and place them in the horizontal position on a steel support, as shown in Figure **4**. Place the support and the sample in a heating cabinet at a temperature of $60 \pm 2\ ^0$C
As soon as the support and the samples have attained the temperature specified, press a steel ball of 5 mm diameter against the surface of the sample with a force of 20 N.
After 1 h, remove the ball and take the sample out of the heating cabinet. When the specimen has attained room temperature, measure the diameter of the impression made by the ball. The diameter of the impression made by the steel shall not exceed 2 mm.

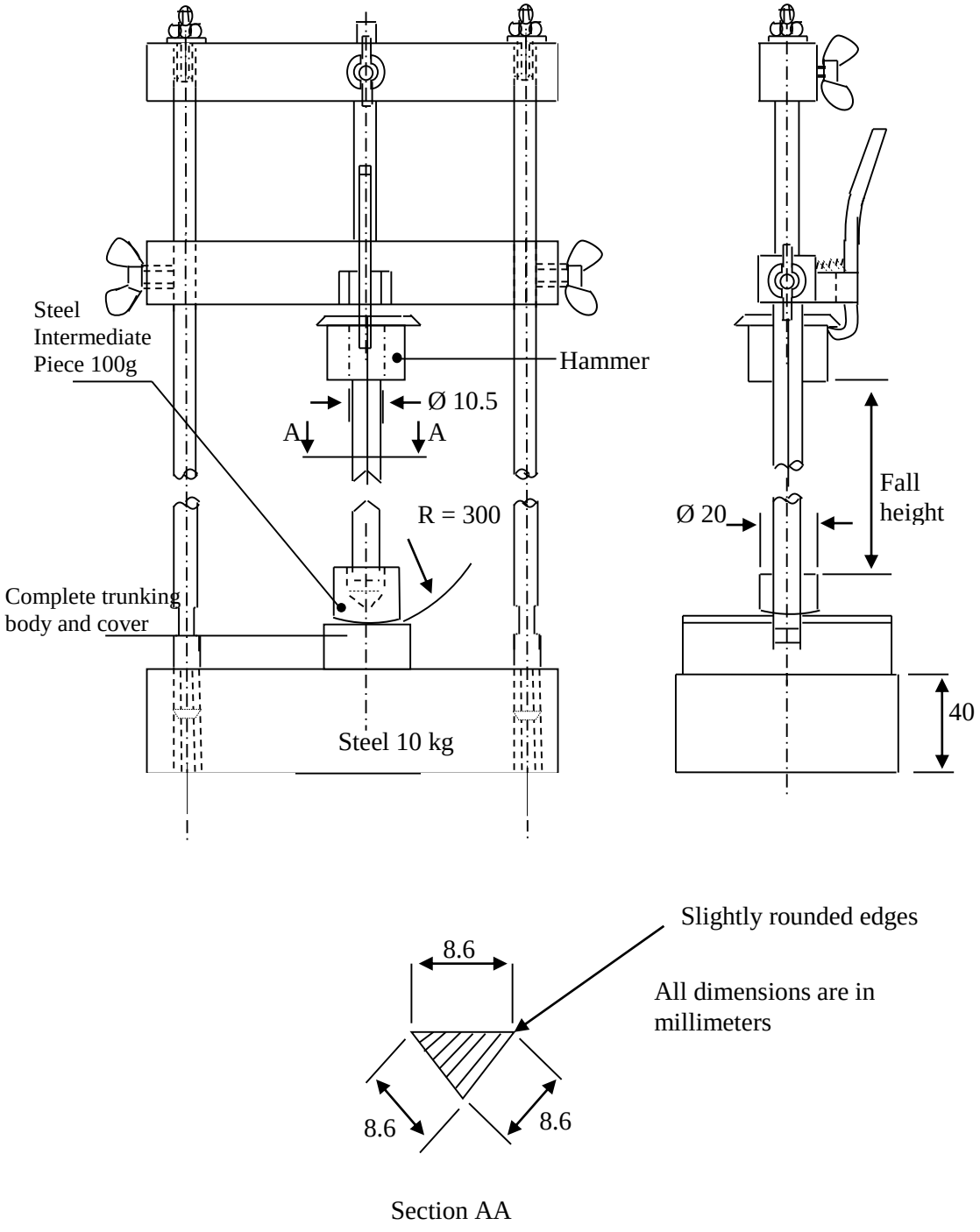
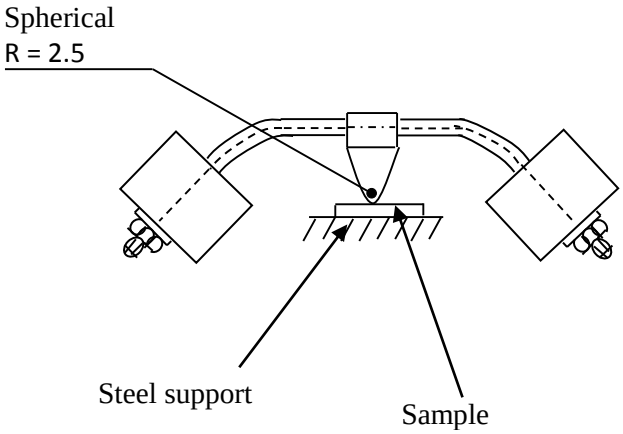


FIGURE 3 - Impact test apparatus



The dimension is in millimetres

FIGURE 4 - Ball pressure apparatus

7.5 Flame propagation test

The test shall be made on three samples, each having a length of 600 mm.

Carry out the test in still air with a Bunsen burner having a nozzle with an internal diameter of 9±1 mm. The gas used for the test shall be such that, with the diameter of the flame as specified, the theoretical heat output of the burner is not less than 900 W.

While the burner is still in the vertical position, adjust the flame so that its overall length is 100 mm and the length of the inner blue cone is 50 mm. Then support the burner so that its axis is at an angle of 45^{0} to the vertical.

Hold the sample 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 the lower end, as far as it is practicable.

Expose the specimen to the flame for the time given in Table **3.**

TABLE 3 – Flame application time

Material thickness mm	Flame application time s
Up to 2.5	Three times successively, each time for 25 s, with an interval of 5 s between each of the applications
Over 2.5 up to 3	Once for 80
Over 3 up to 5	Once for 125
Over 5	Once for 180

If the sample burns during the test, it shall do so slowly and the flame shall not spread appreciably; any flame shall have died out in less than 30 s after the removal of the burner.

7.6 Electrical insulating strength test

Where the trunking has partitions or dividers, test each compartment as a separate trunking and apply the test voltage also to the partitions or dividers.

Coat three samples on the inside and the outside with non-ferrous foil or gauze, as shown in Figure **5**. Take care to place the foil or gauze so that no flashover occurs at the edge.

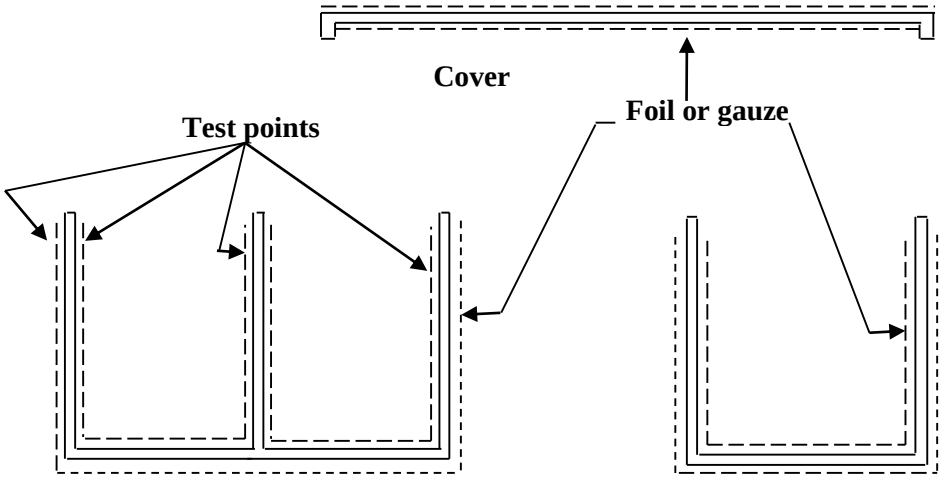
Apply a voltage of 2 500 V of substantially sine-wave form, having a frequency of 50 Hz and with a characteristics that enables it to supply 200 mA at 1 000 V, to the foil or gauze as shown in Figure **5.** Apply initially not more than half the voltage and then raise the voltage to 2 500 V, as rapidly as possible consistent with its accurate attainment without transient overvoltage. Maintain the voltage at 2 500 V for 1 min.

No breakdown shall occur during the test.

7.7 Insulation resistance test

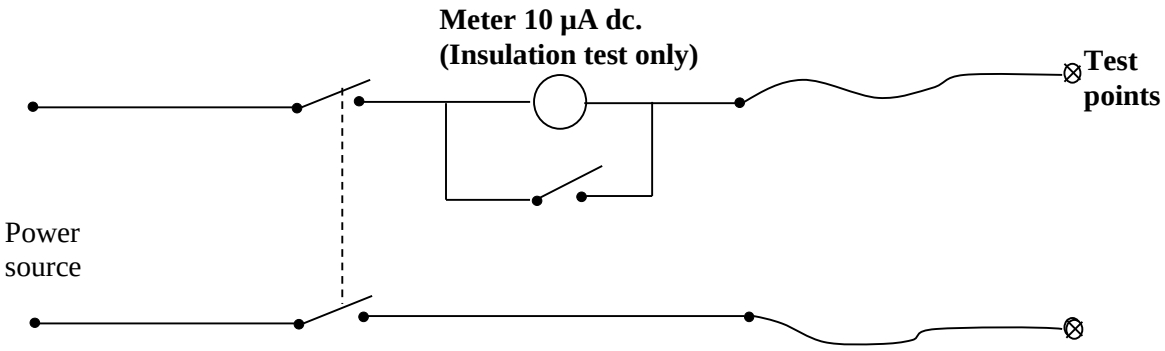
After carrying out the electrical insulating strength test (see **7.6**), measure the insulation resistance of the sample by the application of a d.c. voltage of 500 V . Make measurement 1 min after the application of the voltage.

No breakdown shall occur during the test. The insulation resistance shall be not less than 100 MΩ.



(a) Compartmented trunking

(b) Single trunking



(c) Typical circuit diagram for test of electrical insulating strength

FIGURE 5 - Electrical insulating test apparatus

APPENDIX A
ADDITIONAL MARKING CODE

A.1 Additional Code

The additional code shall consist of five digits, as follows.

If code markings in respect of any of the additional properties are not required they shall be replaced by a zero in the five – digit sequence.

First additional digit : Electrical properties

Trunking suitable for use as supplementary insulation : 1

Second additional digit : Resistance against ingress of solid objects

Trunking protected against solid objects greater than 1 mm : 1
Dust- protected trunking : 2
Dust-tight trunking : 3

Third additional digit : Resistance against ingress of water

Trunking protected against dripping water : 1
Trunking protected against spraying water : 2
Trunking protected against splashing water : 3
Trunking protected against water jets : 4

Fourth additional digit : Resistance against corrosion

Trunking with low protection : 1
Trunking with medium protection : 2
Trunking with high protection : 3

Fifth additional marking code : Resistance to flame propagation

Non-flame propagating trunking : 1
Flame propagating trunking : 2

A.2 Examples of code marking

A marking of 205 denotes a trunking suitable for Light mechanical stress, with a temperature classification of -5, no other property being claimed.

A marking 305/12421 denotes trunking suitable for Medium mechanical stress, with a temperature classification of -5, suitable for use as supplementary insulation, dust protected, protected against water jets, medium protection against corrosion with non flame propagating.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

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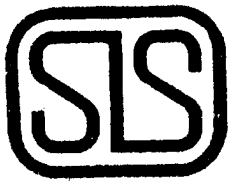

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SRI LANKA STANDARDS INSTITUTION

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