

CLASSIFICATION NOTES

CABLE TRAYS/PROTECTIVE CASING MADE OF PLASTICS MATERIALS

CONTENTS

SECTION

- 1 General Design Requirements**
- 2 Mechanical Requirements**
- 3 Fire Properties**
- 4 Special Requirements**

Section –1

GENERAL DESIGN REQUIREMENTS

1.1 Scope

The following requirements apply to the plastics cable trays and protective casings which are used in cable installations.

1.2 Ambient Temperatures

Cable tray/protective casings are to be designed to the following ambient temperatures

-25°C to 90° C for outdoor use

+5° C to 90° C for indoor use

Note : * Consideration will be given to the use of plastic cable trays/protective casings in the cold environment where the ambient temperature is below – 25°C provided the mechanical properties of the plastics can be maintained for the intended purpose and the installation location. In this particular instance, the cold bend and cold impact properties of the material should also be considered.

1.3 Safe working Load

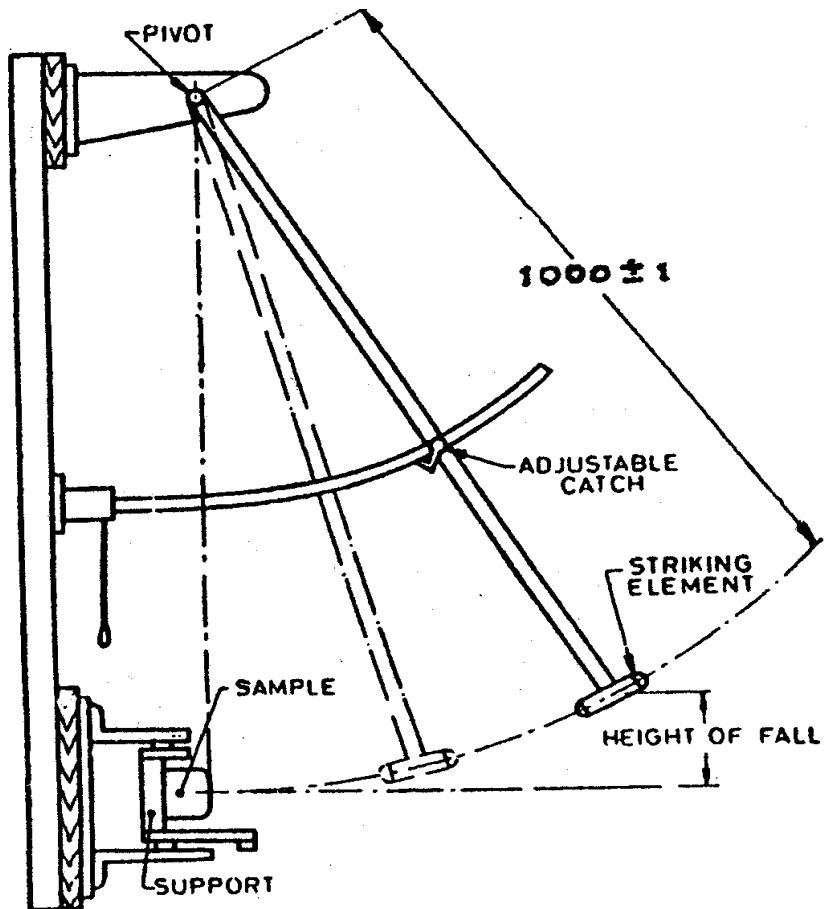
Cable tray/protective casings are to be assigned with a safe Working Load.

Section -2

MECHANICAL REQUIREMENTS

2.1 Impact Resistance Test

The test should be performed according to IEC 60068-2-75 using the pendulum hammer. (Refer the sketch shown below)



All dimensions in millimetres.

IMPACT TEST APPARTUS

- a) The test should be carried out on samples of cable tray lengths or cable ladder lengths of $250\text{mm} \pm 5\text{mm}$ long. Samples of ladder should consist of two side members with one rung positioned centrally. Samples of mesh trays should be prepared in such a way that there will be a wire in the center.

- b) Before the test, plastics components should be aged at a temperature of $90^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 240 hours continuously.
- c) The samples should be mounted on wooden fibreboard of thickness $20\text{mm} \pm 2\text{mm}$.
- d) The samples to be tested should be placed in refrigerator, the temperature with in which is maintained at the declared temperature according to 1.2 above with a tolerance of $\pm 2^{\circ}\text{C}$.
- e) After 2h, the samples should in turn, be removed from the refrigerator and immediately placed in the test apparatus.
- f) At $10\text{ s} \pm 1\text{ s}$ after removal of each sample from the refrigerator the hammer should be allowed to fall with impact energy, the mass of the hammer and the fall height :

Approximate energy J	Mass of hammer Kg.	Fall height mm
10	5.0	200 ± 2

- g) The impact should be applied to the base, or the rung, in the first sample, to one of the side members in the second sample, and to the other side member in the third sample.
In each case, the impact should be applied to the center of the face being tested.
- h) After the test, the samples should no signs of disintegration and/or deformation that will impair the safety.

2.2 Safe Working Load (SWL) Test

- a) Cable trays/protective casing and joints should be assigned a Safe Working Load (SWL) satisfying the following criteria, tested at the declared temperatures according to 1.2 above (See note):-
 - the maximum deflection should not exceed $L/100$ where L is the distance between the supports,
 - no mechanical defects or failure observed when tested to $1.7 \times \text{SWL}$
- b) All loads should be uniformly distributed (UDL) over the length and width of the samples.

The loads should be applied in such a way that a UDL is ensured even in the case of extreme deformation of the samples.

To allow for settlement of the samples, a pre-load of 10% of the test load unless otherwise specified, should be applied and held for at least 5 min, after which the measurement apparatus should be calibrated to zero.

- c) The load should then be gradually increased evenly longitudinally and transversely up to the test load continuously or when a continuous increase is impractical, the load may be increased by increments.

These increments should not exceed about a quarter of the safe working load. The load increments should be distributed through the load parts longitudinally and transversely as evenly as is practical.

- d) After loading, the deflection should be measured at the points specified to give a practical mid-span deflection.
- e) The samples should be left and the deflections measured every 5 minutes until the difference between two consecutive sets of readings is less than 2% with regard to the first set of the two consecutive sets of readings. The first set of readings measured at this point is the set of deflections measured at the test load.
- f) When subject to the test load the samples, their joints and internal fixing devices, should show no damage or crack visible to normal view or corrected vision without magnification.
- g) The load should then be increased to 1.7 times the test load.

The samples should be left and the deflections measured every 5 min until the difference between two consecutive sets of readings is less than 2% with regard to the first set of two consecutive sets of readings. The samples should sustain the increased loading without collapsing. Buckling and deformation of the samples is permissible at this loading.

Note : Tests are to be carried out accordingly to any one of the following as applicable :-

- at any temperature within the declared range if documentation is available which stated that the relevant structural properties of the materials as used within the system do not differ by more than 5% of the average between the maximum and minimum property values or,
- Only at maximum temperature within the range, if documentation is available, which states that the relevant structural properties of the materials, as used within the system decrease when the temperature is increasing, or
- At maximum and minimum temperature only.
- Tests should be carried out for the smallest and largest sizes of cable trays lengths or cable ladder lengths, having the sample material, joint and topological shape.

Section-3

FIRE PROPERTIES

3.1 Flame Retardant Test :

The cable trays/protective casings should be at least flame retardant. They should be tested in accordance with IEC60092-101 or IEC60695-2-2.

3.2 Smoke and Toxicity Test

The cable tray/protective casings should be tested in accordance with the IMO Fire Test Procedures Code (FTPC), Resolution MSC.61 (67), Part 2- Smoke and Toxicity Test, or equivalent international or national standard.

Section-4

SPECIAL REQUIREMENTS

4.1 Resistivity Test

Cable trays/protective casings passing through a hazardous area should be electrically conductive.

The volume resistivity level of the cable trays/protective casings and fittings should be below 10^5 ohm and the surface resistivity should be below 10^6 ohm. The cable tray/protective casings should be tested in accordance with IEC60093.

Note : The resistance to earth from any point in these appliances should not exceed 10^6 ohm.