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OUTLINE OF INVESTIGATION
FOR
MECHANICAL PROTECTION TUBING

ISSUE NO: 1

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Summary of Topics:

This is the first issue of the Outline of Investigation for Mechanical Protection Tubing.

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1 Scope

1.1 This Outline applies to mechanical protection tubing (MPT) with a rigid metallic reinforcement, nonmetallic and metallic fittings and clamps for use as support and protection of insulated conductors in equipment intended for use in non-hazardous locations.

1.2 Tubing specified by this Outline is intended for use with fittings or clamps in compliance with Clauses 4.4 and 4.5, respectively. The fittings may be for wet or dry locations.

1.3 This Outline does not include tubing used to supply power from the fixed wiring of structures to utilization equipment.

2 Reference Publications

2.1 Where reference is made to other publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition up to the time when this Outline was approved.

UL Standards

UL 94

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 514B

Conduit, Tubing, and Cable Fittings

UL 746A

Polymeric Materials Short Term Property Evaluations

UL 746B

Polymeric Materials - Long Term Property Evaluations

ASTM Standards

D 2444-99

Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

D 5025-99

Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials

D 5207-98

Standard Practice for Calibration of 20 and 125 mm Test Flames for Small-Scale Burning Tests on Plastic Materials

D 5423-93 (1999)

Standard Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

ISO Standards

4892-1 1999

Plastics - Methods of Exposure to Laboratory Light Sources - Part 1: General Guidance

4892-2 2006

Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps

3 Glossary

3.1 The following definitions apply in this Outline:

3.2 Clamp – A device used to splice or secure MPT.

3.3 Connector – A fitting intended to terminate MPT to an enclosure, equipment or similar device.

3.4 Coupling – A fitting intended to connect two lengths of MPT or perform a similar function.

3.5 Fitting – A means for securing MPT to an enclosure, splicing between lengths of MPT, or securing MPT to equipment that maintains the support and protection of the MPT. See 3.3 and 3.4.

3.6 Mechanical Protection Tubing (MPT) – Mechanical protection tubing (MPT) – A thermoplastic duct, with a rigid metallic reinforcement, that is intended to flex frequently throughout its life.

3.7 Working Temperature – Working temperature – The temperature to which the MPT is subjected during its intended use.

4 Construction

4.1 Material

4.1.1 Working temperature of the tubing is 50 °C (122 °F) maximum and minus 18 °C (0 °F) minimum. Temperature ratings in excess of 50 °C (122 °F) can be obtained according to Clause 5.10.

4.1.2 Materials other than thermoplastics may also be employed to construct MPT and fittings if representative samples are found to meet the performance requirements of this Outline.

4.2 Dimensions

4.2.1 The manufacturer shall provide the maximum and minimum dimensions for MPT for the following: Internal diameter, external diameter, and web and wall thicknesses. These values, however, are not specified in this Outline.

4.3 Internal surface

4.3.1 The tubing's internal surface shall not cause abrasion of the conductor insulation or hinder the free passage of the conductors.

4.4 Fittings

4.4.1 A fitting for MPT shall be provided with a smooth end stop. The fittings shall meet the applicable requirements of Clauses 5.2, 5.3, 5.4, 5.9, 5.11, 5.12, 5.13 and 6.2 of this Outline.

4.4.1 effective September 19, 2013

4.4.2 Unless otherwise specified, a fitting shall be assembled as intended and in accordance with the manufacturer's instructions prior to each test.

4.4.3 A fitting for MPT shall be metallic or nonmetallic.

4.5 Clamps

4.5.1 A clamp for MPT shall be metallic or nonmetallic.

5 Tests

5.1 Test specimens

5.1.1 Each type of tubing and combinations of tubing, with each type of fitting designed for use with the tubing type, shall be subjected to the appropriate tests. Refer to Table 1.

5.2 Conditioning

5.2.1 Except where otherwise specified, all MPT and fittings shall be conditioned for not less than 24 h at 23 ± 5 °C (73 ± 6 °F), and $50 \pm 5\%$ relative humidity, before being tested under the same conditions.

5.2.2 Unless a cycle of testing or conditioning specifically requires further conditioning or testing to immediately follow or to follow within a prescribed minimum time period, the cycle is permitted to be discontinued for more than four hours under either of the following conditions:

- a) The samples are stored between cycles in an environment at a temperature of 23 ± 5 °C (73 ± 6 °F) and at a relative humidity of $50 \pm 5\%$, or
- b) The samples are sealed in an impermeable poly bag and stored at a temperature of 23 ± 5 °C (73 ± 6 °F).