

Northbrook, Illinois • (708) 272-8800
 Melville, New York • (516) 271-6200
 Santa Clara, California • (408) 985-2400
 Research Triangle Park,
 North Carolina • (919) 549-1400



Underwriters Laboratories Inc.®

Subjects 1684, 6, 514B,
 651, 651A, 797, and 1242

1285 Walt Whitman Road
 Melville, NY 11747
 August 13, 1993

TO: Electrical Council of Underwriters Laboratories Inc;
 Subscribers to UL's Listing Service for
 Rigid Nonmetallic *Fiberglass* Conduit (DZKT),
 Rigid Ferrous Metal Conduit (DYIX),
 Rigid Nonferrous Metal Conduit (DYWV),
 Conduit Fittings (DWTT),
 Rigid Nonmetallic Conduit, Plastic, Schedule 40 and Schedule 80 PVC (DZYR),
 Rigid Nonmetallic Underground Conduit, Plastic (EAXX),
 Rigid Nonmetallic Conduit, Utility Specification (DWVJ),
 Electrical Metallic Tubing (FJMX), and
 Intermediate Ferrous Metal Conduit (DYBY);
 and
 Others Interested

SUBJECT: Announced Listing of Fiberglass-Reinforced Epoxy Conduit
 for Aboveground Work; Renaming of Product Category DZKT

Plastic conduit (category DZKT) has included category DZYR covering Schedule 40 and Schedule 80 rigid PVC conduit under the UL 651 standard and category EAXX covering the following underground-use-only products: Type A PVC conduit, Type EB PVC conduit, and Schedule 40 HDPE conduit under the UL 651A standard and fiberglass-reinforced epoxy conduit under requirements that currently are being developed into a standard to be designated as UL 1684. UL has now Listed fiberglass-reinforced epoxy conduit for aboveground work under category DZKT and has inserted *fiberglass* into the name of the DZKT category. The newly Listed conduit is marked "Rigid Nonmetallic Conduit (Fiberglass Reinforced Epoxy Conduit)" whereas the existing, similar, underground-use-only conduit continues to be marked "Rigid Nonmetallic Conduit Underground (Fiberglass Reinforced Epoxy Conduit)". UL expects to transfer underground fiberglass-reinforced epoxy conduit from EAXX to DZKT.

The new Listing covers fiberglass-reinforced epoxy conduit intended for use in accordance with Article 347 and other applicable parts of the National Electrical Code. This conduit is in sizes 1/2 inch - 6 inches and is for use with 90°C and lower-temperature wires aboveground, including exposed work where not subject to physical damage. The Listing covers straight lengths and elbows and other bends. Fittings for this conduit are Listed under "Conduit Fittings" (DWTT). The marking "Reagent Resistant", together with the name and concentration of the specific reagent(s) for which this conduit has been investigated, signifies that the conduit is for direct exposure to the named reagent(s).

An independent,
 not-for-profit organization
 testing for public safety

The UL Listing Mark for this product includes UL's name and/or symbol together with the word LISTED, a control number, and the product name RIGID NONMETALLIC CONDUIT (FIBERGLASS REINFORCED EPOXY CONDUIT).

Manufacturers who desire UL Listing of fiberglass-reinforced epoxy conduit for use in accordance with the National Electrical Code in aboveground work should contact UL's Engineering Services at Melville (John Sun at 516-271-6200 Ext. 518), at Northbrook (Richard Berman at 708-272-8800 Ext. 42554), at Santa Clara (Shari Duzac at 408-985-2400 Ext. 2550), or at RTP (Isaac Clark at 919-549-1400 Ext. 1608).

UNDERWRITERS LABORATORIES INC.

Glenn Rusinski (cit)

GLENN RUSINSKI (Ext. 670)

Project Engineer

Engineering Services — Section 216T

REVIEWED BY:

John M. Sun (cit)

JOHN M. SUN (Ext. 518)

Engineering Team Leader

Engineering Services — Section 216T

SR:WHH

1684BUL.H01;WH;cit

DOCUMENT NUMBER: 44 797

ORDER OF DATA

[illegible]



Underwriters Laboratories Inc.®

A not-for-profit organization dedicated to public safety
and committed to quality service

May 3, 1995

Revision pages for

Standard for

Electrical Metallic Tubing

UL 797, Sixth Edition

Attached to this transmittal notice is a revision of the Sixth edition of UL 797.

Attached to this transmittal notice is a reprinted title page for the Sixth edition of UL 797.

A CHANGE ON A PAGE DATED MAY 3, 1995 IS INDICATED BY A SMALL PRINT NOTE FOLLOWING THE AFFECTED ITEM, PRECEDED AND FOLLOWED BY AN ASTERISK.

THESE NEW AND REVISED REQUIREMENTS ARE NOW IN EFFECT.

Attention is directed to the note on the title page of this standard outlining the procedure to be followed to retain the approved text of ANSI/UL 797-1995.

Attention is directed to the note on the title page of this standard identifying that the Department of Defense has adopted the text of UL 797.

Revised and/or additional pages may be issued from time to time.

With the inclusion of the accompanying material, the standard consists of pages dated as shown in the following checklist:

Page	Date
1	May 28, 1993 (Reprinted May 3, 1995)
2	—
3, 4	May 28, 1993
5, 6	May 3, 1995
7 – 9	May 28, 1993
10	May 3, 1995
11 – 13	May 28, 1993



Documents

Document Sharing Hub

MAY 28, 1993
(Title Page Reprinted: May 3, 1995)



1

UL 797

Standard for

Electrical Metallic Tubing

First Edition – April, 1942
Second Edition – May, 1973
Third Edition – June, 1973
Fourth Edition – August, 1977
Fifth Edition – December, 1988

Sixth Edition

May 28, 1993

Approval as an American National Standard (ANSI) covers the numbered paragraphs on pages dated May 28, 1993 and May 3, 1995. These pages should not be discarded when revised or additional pages are issued if it is desired to retain the ANSI approved text.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Approved as ANSI C33.98-1973, June 20, 1973
Reaffirmed as ANSI/UL 797-1983 (R1989), February 9, 1989
Approved as ANSI/UL 797-1995, February 20, 1995

The Department of Defense (DoD) has adopted UL 797 on January 25, 1982. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Revisions of this standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest published set of revision pages.

ISBN 1-55989-420-2

COPYRIGHT © 1973, 1995 UNDERWRITERS LABORATORIES INC.

INTRODUCTION

1 Scope

1.1 These requirements cover electrical metallic tubing for use as a metal raceway for the installation of wires and cables in accordance with the National Electrical Code.

1.2 A product that contains features, characteristics, components, materials, or systems new or different from those covered by the requirements in this Standard, and that involves a risk of fire, electric shock, or injury to persons shall be evaluated using the appropriate additional component and end-product requirements as determined necessary to maintain the acceptable level of safety as originally anticipated by the intent of this Standard. A product whose features, characteristics, components, materials, or systems conflict with specific requirements or provisions of this Standard cannot be judged to comply with this Standard. Where considered appropriate, revision of requirements shall be proposed and adopted in conformance with the methods employed for development, revision, and implementation of this Standard.

1.2 added May 3, 1995

2 Units of Measurement

2.1 In addition to being stated in the inch/pound units that are customary in the USA, each of the requirements in this standard is also stated in units that make the requirement conveniently usable in countries employing the various metric systems (practical SI and customary). Equivalent – although not necessarily exactly identical – results are to be expected from applying a requirement in USA or metric terms. Equipment calibrated in metric units is to be used when a requirement is applied in metric terms.

3 References

3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

GENERAL

4 Tube

4.1 Each tube used in the manufacture of electrical metallic tubing shall be of steel, an aluminum-base alloy not containing more than 0.40 percent copper, or another metal which, upon investigation (see 4.3), is found to be acceptable for the purpose. The tube shall be straight and shall have a circular cross section. The wall shall be uniformly thick throughout the length of the tube. The welding of all seams shall be thoroughly well done.

4.2 Each welded seam shall be without any metal trimmings, sharp edges, and sharp projections.

4.3 Each nonferrous metal not specifically known to be corrosion-resistant and otherwise acceptable for electrical metallic tubing shall be investigated.

4.4 Both the inside and outside surfaces of each steel tube shall be cleaned of all scale and rust. The cleaning process shall leave the surface of the tube in a condition that enables the protective coating to have a smooth finish.

4.5 After cleaning and before the protective coating is applied, the interior surface of each steel tube shall be examined to determine the absence or presence of scale. The examination is not required if the tube is cold-formed of scale-free strip and is welded.

4.6 Scale can be recognized ordinarily as a sharply defined edge or a rough surface extending for some distance along the tube, causing a slight but appreciable decrease in the internal diameter. At the ends of the tube, scale can be identified by scraping the surface of the tube and thereby removing the hard brittle scale.

4.7 Electrical metallic tubing shall not be threaded unless the integral fittings mentioned in 4.8 and 7.2 are steel, and the thread is not of the standard pipe-thread dimensions. The end of the tubing shall be cut off squarely, and shall be without any burrs and sharp edges.

4.8 Electrical metallic tubing may be provided with an integral fitting or fittings in accordance with one of the following:

a) An integral quick-connect (non-setscrew, noncompression) fitting may be provided at each end of steel electrical metallic tubing. Each such fitting shall comply with the requirements for fittings as given in the Standard for Fittings for Outlet Boxes (UL 514B), except that the corrosion protection on the inside surface of a male fitting may comply with the requirements for electrical metallic tubing instead of those for fittings.

b) An integral fitting of a type other than mentioned in item A may be provided at one end of steel or nonferrous electrical metallic tubing. Each such fitting shall comply with the requirements for fittings.

4.8 revised May 3, 1995

4.9 Electrical metallic tubing shall be capable of being bent, as described in 5.2 and 5.3, without the formation of any cracks in the metal, the opening of the seam or weld, nor appreciable distortion of the circular cross section of the tube. Compliance of tubing with this requirement regarding cracks and openings shall be determined, after bending, by subjecting the tubing to a visual examination.

4.10 If the results of visual examination to check for compliance with 5.2 and 5.3 are in dispute, the tubing shall be subjected to a hydrostatic pressure of $40 \pm 10 \text{ lbf/in}^2$ or $276 \pm 69 \text{ kN/m}^2$ or $27.6 \pm 6.9 \text{ N/cm}^2$ or $28 \pm 7 \text{ gf/mm}^2$ as a reference test to check for compliance with 5.2 and 5.3.

5 Protective Coatings

5.1 General

5.1.1 Unless the metal employed is inherently resistant to corrosion, both the inside and outside surfaces of electrical metallic tubing shall be protected against corrosion. Coatings other than zinc on the outside surface, and zinc or enamel on the inside surface, as described in 5.1.2, shall be made the subject of an investigation.

5.1.2 The protective coating used on the inside and outside of the tubing shall not crack or flake when a finished sample of the smallest available trade size produced by the manufacturer is tested at any time up to 1 year after the time of manufacture by bending it into a semi-circle, the inner edge of which has a radius as described in Table 5.1.

Table 5.1
Radius of bend

Trade size	Radius of bend	
	in	mm
1/2	3-1/2	89
3/4	3-3/4	95
1	4-3/4	121
1-1/4	6	152
1-1/2	6-3/4	171
2	7-1/2	191
2-1/2	8	203
3	10	254
3-1/2	11-1/2	292
4	12	305

5.2.10 If the part of the specimen that was immersed has any bright deposit of firmly adhering metallic copper outside the 1/8 in or 3 mm longitudinal cut-end portions and cut-edge portions, an estimate is to be made and recorded of the percentage of each broad surface that is covered with bright, adherent copper.

5.2.11 Regardless of whether the first dip resulted in a bright, adherent deposit of copper, the immersion, washing, rubbing, drying, examining, estimating, and recording operations are to be repeated three additional times using the same specimen and beaker of solution. After the dips have been completed on any one specimen, the portion of the solution of copper sulphate used is to be discarded. A fresh portion of the solution is to be employed for each of any succeeding specimens.

5.2.12 The results are to be expressed as an estimate of the percentage of the total immersed surface (omitting the area of 1/8 in or 3 mm cut-end and cut-edge portions) that shows a bright, adherent deposit of copper after each dip – that is, after the specimen is dipped, washed, rubbed, dried, and then examined. The tubing is not acceptable if any specimen shows a bright, adherent deposit of copper as a result of 4 or fewer dips.

5.3 Enamel Coatings

5.3.1 An enamel coating shall cover evenly the surface to which it is applied, shall be of uniform quality throughout, shall have a smooth and even appearance, and shall not soften at a temperature of 49.0°C (120.2°F).

5.3.2 The enamel used for the protective coating on electrical metallic tubing, when applied to a sheet steel test piece and baked in an oven for 5 h, shall withstand without damage, ten successive bends of the test piece back and forth through an angle of 180° against an edge having a radius of 1/16 in or 1.6 mm.

5.3.3 The apparatus is to consist of flat pieces of sheet steel 3 in or 75 mm wide, 5 in or 125 mm long, and approximately 0.010 in or 0.25 mm thick; an oven for baking the test pieces; and a vise with jaws at least 3 in or 75 mm wide for holding the test pieces during the bending test. The 3 in or 75 mm edge of each jaw is to be rounded to a radius of 1/16 in or 1.6 mm.

5.3.4 Two test pieces are to be cleaned with an organic solvent to remove all grease and foreign material and are then to be dipped in the enamel used for coating the electrical metallic tubing. After air drying for 30 min, the test pieces are to be suspended by means of short wires in the baking oven. The test pieces are to be baked for 5 h at the normal baking temperature for the enamel in question but, if the normal baking temperature for the enamel is lower than 135°C (275°F) or if the enamel is regularly air dried, the oven temperature is to be maintained at 135 – 150°C (275 – 302°F).

5.3.5 At the end of the 5 h, the test pieces are to be removed from the oven and cooled in still air to room temperature. Each flat test piece is to be secured in the vise, gripped at its free end, and then bent for 90° against one of the 3 in or 75 mm edges of the vise jaws. Each test piece is then to be bent back past its original position through 180° to end bent 90° against the other 3 in or 75 mm edge of the vise jaws. It is then to be bent for 90° in the opposite direction, ending with the test piece in its original position. This cycle is to be repeated 5 times. The enamel is not acceptable if the enamel coating on any test piece cracks, flakes off, or is damaged otherwise.