UL 797A

STANDARD FOR SAFETY

Electrical Metallic Tubing – Aluminum and Stainless Steel

UL Standard for Safety for Electrical Metallic Tubing – Aluminum and Stainless Steel, UL 797A

Third Edition, Dated January 30, 2014

Summary of Topics

This revision of ANSI/UL 797A dated November 17, 2021 includes Electrical Metallic Tubing, addition of trade sizes 5" & 6" in Aluminum: 1.1, 4.4, Table 6.1, Table 6.2, Table 6.3, and Table 7.1.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The revised requirements are substantially in accordance with Proposal(s) on this subject dated September 10, 2021.

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UL 797A

Standard for Electrical Metallic Tubing – Aluminum and Stainless Steel

Prior to the third edition, the previous editions covered requirements for aluminum electrical metallic tubing and were entitled Standard for Electrical Metallic Tubing – Aluminum.

First Edition – July, 2000
Second Edition – July, 2007

Third Edition

January 30, 2014

This ANSI/UL Standard for Safety consists of the Third Edition including revisions through November 17, 2021.

The most recent designation of ANSI/UL 797A as an American National Standard (ANSI) occurred on November 17, 2021. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 These requirements cover aluminum and stainless steel electrical metallic tubing (EMT) and elbows in trade sizes 3/8 – 6 (12 – 155) for use as a metal raceway for the installation of wires and cables in accordance with the National Electrical Code. The values in parentheses are metric designators of tubing.

1.2 Tubing provided with an exterior coating of zinc or a zinc-based, nonmetallic, or other alternate corrosion-resistant material and an interior coating of an organic or zinc material, is covered by the Standard for Electrical Metallic Tubing – Steel, UL 797.

2 Units of Measurement

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

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 shall be of an aluminum alloy or stainless steel containing no more than 0.40 percent copper. Other metal shall be evaluated.

4.2 Each tube shall have a circular cross section. All seams shall be thoroughly welded.

4.3 A welded seam shall be without any metal trimming, sharp edge or sharp projection.

4.4 Raised surfaces provided on the interior wall along the length of the tubing shall:

a) Be without any sharp edges or sharp projections;

b) Not exceed 0.38 mm (0.015 in) in height for the trade size 16 – 53 (1/2 – 2) or 0.51 mm (0.020 in) in height for the trade size 63 – 155 (2-1/2 – 6); and

c) Not result in a total reduction of the internal diameter of the tubing of greater than 4% of the values identified in Table 6.2 when calculated also considering with the welded seam of the tube.

5 Protective Coatings

5.1 Aluminum and stainless steel electrical metallic tubing does not require a protective coating.

Exception: Aluminum electrical metallic tubing intended for use in concrete, for direct burial, or for use in severely corrosive environments, shall be provided with a protective coating.

5.2 It is not prohibited for one or more protective coatings to be employed. When such protective coatings have not been evaluated as supplying corrosion resistance for the tube they shall be marked in accordance with 10.4.

5.3 Nonmetallic coatings shall be evaluated with respect to flame propagation, the fit of couplings, and electrical continuity with couplings.

6 Straight Tubing

6.1 The length of electrical metallic tubing shall not be greater than given in Table 6.1.

Table 6.1
Length

Trade size	(Metric designator)	Maximum length, feet	(meters)
1/2 – 3/4	16 – 21	10' 1/4"	3.05
1 – 2	27 – 53	15' 1/4"	4.58
2-1/2 – 6	63 – 155	20' 1/4"	6.10

6.2 The external diameter and weight of finished tubing shall be within the limits indicated in Table 6.2 or Table 6.3.

Table 6.2
Dimensions and weight in USA customary units

Trade size	(Metric designator)	External diameter in inches	Internal diameter in inches (not a requirement)	Wall thickness in inches (not a requirement)	Aluminum minimum weight in pounds per foot of length[a]	Stainless steel minimum weight in pounds per foot of length[c]
1/2	16	0.706 ±0.005	0.622	0.042	0.099	0.300
3/4	21	0.922 ±0.005	0.824	0.049	0.151	0.500
1	27	1.163 ±0.005	1.049	0.057	0.221	0.680
1-1/4	35	1.510 ±0.005	1.380	0.065	0.329	1.000
1-1/2	41	1.740 ±0.005	1.610	0.065	0.381	1.100
2	53	2.197 ±0.005	2.067	0.065	0.484	1.380
2-1/2	63	2.875 ±0.010	2.731	0.072	0.717	b
3	78	3.500 ±0.015	3.356	0.072	0.875	b
3-1/2	91	4.000 ±0.020	3.834	0.083	1.137	b
4	103	4.500 ±0.020	4.334	0.083	1.295	b
5	129	5.563 ±0.020	5.373	0.095	1.828	b
6	155	6.625 ±0.030	6.435	0.095	2.184	b

[a] The minimum weight of 1/2 – 6 trade sizes of nonferrous tubing was determined by multiplying the weight shown for aluminum tubing by the ratio of A to B: where A is the density (in pounds per cubic inch) of the nonferrous alloy used; and B is 0.098, which is the density of aluminum in pounds per cubic inch.

[b] The minimum weight of the 2-1/2 – 6, and 4 trade sizes of tubing is to be established by investigation of the effect that the dimensions and the particular alloy used have on the strength and rigidity of the finished tubing.

[c] The weight shown is for a stainless steel alloy (Type 304 or 316) with a density of 0.284 pound mass per cubic inch. For a stainless steel alloy of a different density, the minimum weight shall be determined by multiplying the weight shown by the ratio of the density of the alloy used in pound mass per cubic inch to 0.284.

Table 6.3
Dimensions and weight in metric units

Trade size	(Metric designator)	External diameter in mm	Internal diameter in mm (not a requirement)	Wall thickness in mm (not a requirement)	Aluminum minimum weight in kilograms per meter of length[a]	Stainless steel, minimum weight in kilograms per meter of length[c]
1/2	16	17.93 ±0.13	15.80	1.07	0.197	0.136
3/4	21	23.42 ±0.13	20.93	1.24	0.224	0.226
1	27	29.54 ±0.13	26.64	1.45	0.329	0.308
1-1/4	35	38.35 ±0.13	35.05	1.65	0.489	0.453
1-1/2	41	44.20 ±0.13	40.89	1.65	0.566	0.498
2	53	55.80 ±0.13	52.50	1.65	0.721	0.625
2-1/2	63	73.03 ±0.25	3.051	1.83	0.830	b
3	78	88.90 ±0.38	3.720	1.83	0.397	b
3-1/2	91	101.60 ±0.50	4.837	2.11	0.516	b
4	103	114.30 ±0.50	5.506	2.11	0.587	b
5	129	141.30 ±0.50	136.46	2.41	2.721	b
6	155	168.28 ±0.76	163.45	2.41	3.249	b

[a] The minimum weight of 1/2 – 6 trade sizes of nonferrous tubing was determined by multiplying the weight shown for aluminum tubing by the ratio of A to B: where A is the density (in kilograms per cubic meter) of the nonferrous alloy used; and B is 2710, which is the density of aluminum in kilograms per cubic meter.

[b] The minimum weight of the 2-1/2 – 6, and 4 trade sizes of tubing is to be established by investigation of the effect that the dimensions and the particular alloy used have on the strength and rigidity of the finished tubing.

[c] The weight shown is for a stainless steel alloy (Type 304 or 316) with a density of 7861 kg/m^3. For a stainless steel alloy of a different density, the minimum weight shall be determined by multiplying the weight shown by the ratio of the density of the alloy used in kg/m^3 to 7861.

6.3 Each length of tubing on which measurements are made is to be finished, smooth and clean wherever it is to touch any part of a measuring device or tool. All of the individual outside diameter measurements are to be performed at the center and at least one end of the tubing.

6.4 The measurements from a length of finished tubing are to be determined for comparison with the limits specified in inches in Table 6.2, or in millimeters in Table 6.3, and are to be made by one of the following means:

a) A machinist's micrometer caliper that has a flat-ended spindle, a flat anvil, and is calibrated having a minimum resolution of 0.001 inch or 0.01 mm; or

b) A vernier caliper that is calibrated having a minimum resolution of 0.001 inch or 0.01 mm.

6.5 If desired, methods, tools, and measurement techniques may be employed to determine compliance with the above dimensional requirements provided they are accurate to within ±0.001 inch or ±0.01 mm and have been determined to be acceptable.

6.6 To determine the outside diameter when using a micrometer caliper or vernier caliper, at least four measurements (every 45 degrees) are necessary at each place to ensure that the largest and smallest diameters are found. The recorded diameters are to be compared with the diameter in inches in Table 6.2 or in millimeters in Table 6.3 for the trade size of tubing involved. The recorded diameters shall not differ from the diameter in the applicable table by more than the specified tolerances.

7 Elbows

7.1 Elbows shall be made from the same grade of tubing as straight lengths of electrical metallic tubing and shall be treated, coated, etc. according to the applicable requirements for the tubing.

7.2 An elbow is not prohibited from being provided with an integral coupling which complies with the applicable requirements in the Standard for Fittings for Cable and Conduit, UL 514B, on one or both ends.

7.3 An elbow shall not be sharper than 90 degrees. The radius R and the length L_S of the straight portions at the ends of an elbow shall not be smaller than indicated in Table 7.1. See Figure 7.1.

Table 7.1
Minimum dimensions of elbows

Trade size	(Metric designator)	Radius R to center line of tube, inches	Radius R to center line of tube, (mm)	Shortest length L_S of each straight end portion of tubing, inches	Shortest length L_S of each straight end portion of tubing, (mm)
1/2	16	4	102	1-1/2	38
3/4	21	4-1/2	114	1-1/2	38
1	27	5-3/4	146	1-7/8	48
1-1/4	35	7-1/4	184	2	51
1-1/2	41	8-1/4	210	2	51
2	53	9-1/2	241	2	51
2-1/2	63	10-1/2	267	3	76
3	78	13	330	3-1/8	79
3-1/2	91	15	381	3-1/4	83
4	103	16	406	3-3/8	86
5	129	24	610	3-5/8	92
6	155	30	762	3-3/4	95