

SUMMARY OF TOPICS

The following changes in requirements to the Standard for Conduit, Tubing and Cable Fittings, UL 514B, are being proposed for preliminary review and comment only:

- 1. For Preliminary Review Only: Addition Of Requirements Specific To 'Heavy-duty' Liquid-Tight Flexible Metal Fittings**
- 2. For Preliminary Review Only: Clarification of the Tightening Torque for Compression-Type Fittings (6.2.1)**
- 3. For Preliminary Review Only: Armored Cable (AC) Tolerances for Assembly Test (8.15.2.2)**
- 4. For Preliminary Review Only: Clarification of the Tightening Torque for Compression-Type Fittings (8.17.2.1)**
- 5. For Preliminary Review Only: Metal-Clad (MC) Cable, Type ACG90 Cable, and Type ACGWU90 Cable Tolerances for Assembly Test (8.22.2.4)**
- 6. For Preliminary Review Only: Clarification of the Tightening Torque for Compression-Type Fittings (8.27.2.1)**
- 7. For Preliminary Review Only: Flexible Cord Tolerances for Assembly Test (8.27.2.2)**
- 8. For Preliminary Review Only: Clarification of the Tightening Torque for Compression-Type Fittings (8.28.2.2)**
- 9. For Preliminary Review Only: Tray Cable Tolerances for Assembly Test (8.28.2.2 and 8.28.2.3)**
- 10. For Preliminary Review Only: Tray Cable Tolerances for Assembly Test (8.28.2.5)**
- 11. For Preliminary Review Only: Revision of Locknut Requirements**
- 12. For Preliminary Review Only: Cross-Sectional Area of Conduit Bodies**
- 13. For Preliminary Review Only: Editorial Correction**
- 14. For Preliminary Review Only: Depth Specifications in Clause 5.7.3.7 and Table 8 and Table 9**
- 15. For Preliminary Review Only: Addition of the Corrosion Resistance test in 8.31.4.2**
- 16. For Preliminary Review Only: 8.4.2 Pulling Speed**

**UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL**



Documents

Document Sharing Hub

17. For Preliminary Review Only: Bend and Pull Tests for Fittings Intended for Metal-Covered Cables

18. For Preliminary Review Only: Removing XRW Fittings for Clause 5.6.2.2

COMMENTS DUE: June 24, 2018

This proposal is for review and comment only (no ballot at this time). Please note that comments on a preliminary review document will not receive a response from the proposal author through CSDS. Instead, the proposal author will be asked to review the comments and adjust the proposals and/or supporting rationale as the author determines to be appropriate. The preliminary review process is an informal mechanism that provides authors with the opportunity to refine their proposals before they advance to the next stage in UL's standards development process.

In some cases, the author of the proposals may choose to discontinue them. In this case, the author need not do anything after preliminary review has ended. Normally, the next step in the process is the more formal STP ballot and stakeholder review process. Only comments posted during the STP ballot and stakeholder review process will be provided with a response in CSDS.

For your convenience in review, proposed additions to existing requirements are shown underlined and proposed deletions are shown ~~lined-out~~.

1. For Preliminary Review Only: Addition Of Requirements Specific To 'Heavy-duty' Liquid-Tight Flexible Metal Fittings

RATIONALE

Proposal submitted by: Guy Benjamin, Thomas & Betts (member of ABB group)

Although an acceptable wiring method in specific installations (ref.: CE Code), some Liquid-Tight Flexible Metal Conduit (LTFMC) did not offer the conductor protection they were intended to provide (although properly certified).

Field experience with LTFMC had shown there to be a considerable variation to their performance. It was determined that the Liquid Tight Flexible Metallic Conduit (LTFMC) has been either flexed, crushed or pulled-out with forces beyond the minimum requirement currently stipulated in standards UL514B/ CSA No. 18.3/NMX-J017-ANCE. Such mechanical stress negatively impacted the LTFMC capabilities to protect the conductors; a non-desirable condition in hazardous location.

One of the major concerns is the LTFMC can be pulled out of its mating connector with a relatively low pulling force, thus separating the LTFMC from the connector and exposing the insulated conductors. This of course would not be acceptable in hazardous locations and/or in some industrial application.

In addition to meeting the test requirements currently listed in the current version of the standard, "Heavy - Duty" marked LTFMC fitting shall be evaluated for compliance to more severe pull-out levels. The specifics of the marking will remain voluntary at manufacturer discretion.

The proposed higher pull test value is a result of testing the combination of LTFMC fitting samples assembled on Liquid Tight Flexible Conduit samples (both currently found on the market). The following table outlines the lowest and average pull test results on trade sizes 16 (1½") and 21 (¾") products, the current requirements extracted from UL514B/CSA No. 18.3/NMX-J017-ANCE and the recommended pull test requirements for LTFMC fittings that would then be identified as "Heavy Duty".

Tests	Non-suitable No 2 (low / ave) lbf	Barely Suitable No 1 (low / ave) lbf	Suitable No 1 (low / ave) lbf	Suitable No 2 (low / ave) lbf	Suitable No 3 (low / ave) lbf	C22.2 No 18.3 / UL514B Requirement	Heavy Duty Proposed Requirement
Fitting pull (till conduit pulls off) Trade size 16 (1/2")	285 / 308	342 / 367	398 / 487	545 / 580	571 / 607	75 to 150 lbf for 5 minutes	350 lbf for 5 minutes

Tests	Non-suitable No 1 (low / ave) lbf	Non-suitable No 3 (low / ave) lbf	Barely suitable No 2 (low / ave) lbf	Suitable No 1 (low / ave) lbf	Suitable No 2 (low / ave) lbf	C22.2 No 18.3 / UL514B Requirement	Heavy Duty Proposed Requirement
Fitting pull (till conduit pulls off) Trade size 21 (3/4")	215 / 262	322 / 374	346 / 363	582 / 616	560 / 568	75 to 150 lbf for 5 minutes	350 lbf for 5 minutes

Note: lbf = pounds-force

The Canadian Electrical Code will list installation requirements for the 'HD' marked conduit. CSA Std No. 56, applicable to Liquid Tight Flexible Conduit, is being updated to implement the 'HD' voluntary marking on Liquid Tight Flexible Metallic Conduit. Updating the UL514B/CSA No. 18.3/NMX-J017-ANCE would align with both the CE Code as well as the companion LTFMC standard.

PROPOSAL

3 Definitions

3.1 The definitions in Clauses 3.2 – 3.29 apply in this standard. Terms used throughout this standard which have been defined in Clause 3 are in SMALL ROMAN CAPITAL type font.

3.2 **ANGLE FITTING**: A FITTING with or without a removable cover (or cap), intended to change the direction of the raceway. A FITTING for the connection of two cables or conduits into one knockout or into a coupling is not considered to be an **ANGLE FITTING**.

3.3 **BUSHING**: A FITTING provided to protect wires from abrasion and intended for use where conductors enter or leave the raceway system.

3.4 **BUSHING, INSULATING**: A FITTING consisting of a polymeric insulator provided to protect wires from abrasion and intended for use where conductors enter or leave the raceway system.

3.5 **BUSHING, METAL STUD**: A FITTING provided to protect the outer jacket of a cable from sharp edges in cut or punched holes in metal studs into which cables are fished or supported.

3.6 **CONCRETE-TIGHT FITTING**: A FITTING that excludes concrete aggregate (Portland-type cement and sand).

3.7 **CONDUIT BODY**: In Mexico and the United States, a CONDUIT BODY is a means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction of two or more conduit or tubing sections or at the terminal point of a conduit or tubing.

In Canada, this term does not apply.

3.8 CONNECTOR: A FITTING intended to terminate a cable, cord, or raceway to a box or similar device.

3.9 COUPLING: A FITTING intended to connect two lengths of raceway or perform a similar function.

3.10 COUPLING, REDUCING: A FITTING intended to join lengths of two different sizes of raceway.

3.11 ELASTOMER: Rubber or any polymer other than a thermoplastic elastomer that has properties similar to those of rubber.

3.12 ELBOW: A FITTING used to change the direction of a raceway system.

3.13 FITTING: A means for securing conduit, cable, or tubing to an enclosure, box, or raceway system.

3.14 FITTING, EXPANSION: A FITTING intended to compensate only for linear thermal expansion of a span of rigid metal conduit, intermediate metal conduit, or electrical metallic tubing.

Please note that this text may appear in another topic of this ballot

3.15 FITTING, EXPANSION-DEFLECTION: An expansion FITTING that compensates for linear expansion and compensates for lateral or angular deflection in a span of rigid metal conduit, intermediate metallic conduit, or electrical metallic tubing.

3.16 FITTING, DEFLECTION: A FITTING intended to compensate only for lateral or angular deflection in a span of rigid metal conduit, intermediate metallic conduit, or electrical metallic tubing.

3.17 FITTING, FLEXIBLE CORD: A CONNECTOR used to reduce strain at points of termination for flexible cord.

3.18 FITTING, LIQUID-TIGHT: A FITTING intended for use in wet industrial environments that contain machine oils and coolants.

3.19 FITTING, SEALING: A FITTING used with conduit or tubing that includes provision for preventing the circulation of air inside of the conduit or tubing.

3.20 GRIP, PULLING: A means of pulling conductors or cable into a raceway.

3.21 GRIP, STRAIN-RELIEF: A means of reducing strain at points of termination for cable or flexible conduit.

3.22 GRIP, SUPPORT: A means of holding the weight and restraining the arc-of-bend of a cable.

3.22A 'HEAVY DUTY' FITTING FOR LIQUID-TIGHT FLEXIBLE METAL CONDUIT: A fitting for liquid-tight flexible metal conduit fitting showing a higher level of pull force.

3.23 HUB: A FITTING, or part of a fitting intended for use with threaded conduit for connection to an enclosure.

3.24 LOCKNUT, CONDUIT: An internally threaded FITTING for use on rigid metal conduit or intermediate metal conduit, intended to inhibit turning and to provide a secure joint.

3.25 LOCKNUT, FITTING: A component of a CONNECTOR intended to inhibit turning and to provide a secure joint.

3.26 NIPPLE: An externally threaded FITTING intended primarily to serve as a short raceway between close-spaced enclosures.

3.26A SEALING RING: A fitting used in conjunction with a liquid-tight fitting or a fitting or conduit locknuts to provide a seal at a knockout in a box or enclosure.

3.27 SERVICE-ENTRANCE HEAD: An enclosed FITTING intended for use at service entrances where a service drop is connected to a service-entrance cable or raceway system.

3.28 THREADLESS FITTING: A FITTING intended for use with nonthreaded rigid metal conduit, intermediate metal conduit, or electrical metallic tubing.

3.29 TRANSITION COUPLING: A FITTING intended to attach one or more metal sheathed cables or flexible metal conduit to one non-flexible metallic raceway.

7.14 FITTINGS for liquid-tight flexible metal conduit

7.14.1 In Mexico and the United States, a straight fitting for use with liquid-tight flexible metal conduit for direct burial shall be marked "direct burial".

In Canada, this requirement does not apply.

7.14.2 (Canada Only) A fitting for liquid-tight flexible metal conduit in trade sizes 16 (1/2) and larger, that complies with the tests in Annex D may be surface marked: "Heavy-Duty"*** or "HD".

Table 19
Carton markings
(See Clauses 7.1.5, 7.1.7, 8.7.1, 8.11.9.1, and 8.11.9.2.)

Item	Condition of use or installation	Carton marking ^a
1	For use in poured concrete	Concrete-tight or Concrete-tight when taped
2	For use with unthreaded rigid or intermediate metal conduit	Unthreaded for ___ ^b conduit
3	For use with threaded rigid or intermediate metal conduit	Unthreaded for threaded ___ ^b conduit
4	For liquid-tight applications	Liquid-tight
5	For use with steel (FE) EMT	For EMT or EMT or Electrical Metallic Tubing
6	For use with steel (FE) or aluminum (AL) EMT	For (FE or STEEL or AL) EMT or Electrical Metallic Tubing
7	For use in dry locations	Dry locations
8	For use in wet locations	Wet locations
9	For use in wet locations only with a separate gasket installed between the box and FITTING	In wet locations, use ___ ^d between box and FITTING
10	For use with specific type of rigid nonmetallic conduit above or below ground	For ___ ^c rigid nonmetallic conduit
11	For use in COUPLING cable and/or conduit to different raceway systems	For ___ ^e and rigid metal conduit, IMC ^e , and EMT or Electrical Metallic Tubing
12	For use with all types of FMC (flexible metal conduit)	Complete Abbreviated For FMC FMC
13	For use with steel (FE) or aluminum (AL) FMC only	For FE FMC FEFMC For STEEL FMC STEELFMC

Table 19 Continued

Item	Condition of use or installation	Carton marking ^a	
		For AL FMC	ALFMC
		For ALUM FMC	ALUMFMC
		For ALUMINUM FMC	ALUMINUMFMC
14	For use with reduced-wall FMC only	For RWFMC	RWFMC
15	For use with reduced-wall steel (FE) or aluminum (AL) FMC only	For FE RWFMC	FERWMC
		For STEEL RWFMC	STEELRWFMC
		For AL RWFMC	ALRWFMC
		For ALUM RWFMC	ALUMRWFMC
		For ALUMINUM RWFMC	ALUMINUMRWFMC
16	For use with extra reduced-wall FMC only	For XRWFMC	XRWFMC
17	For use with extra reduced-wall steel (FE) or aluminum (AL) FMC only	For STEEL XRWFMC	STEELXRWFMC
<u>18 (Canada Only)</u>	<u>For use with 'Heavy Duty' or 'HD' marked Liquid-Tight Flexible Metal Conduit</u>	<u>For use with 'Heavy Duty' or 'HD' marked Liquid-Tight Flexible Metal Conduit</u>	

^a The carton marking specified above shall be prefixed by "Intended for" instead of "For" or shall use the word "only."

^b Blank to be filled in with "rigid," "intermediate," or a combination of the two, followed by the material type – FE (or STEEL) or AL (or ALUM or ALUMINUM).

^c Blank to be filled in with the use of the intended type of conduit, such as "PVC underground," as required or applicable.

^d Blank to be filled in with specific identification of the component to be used, including the part number, to identify the gasket, seal or similar component that must be installed to provide a rain-tight connection.

^e Blank to be filled in with specific identification of the cable or conduit to be used, such as NM, NMD90, NMSC, AC, MC, or FMC.

In Canada, IMC is not recognized.

UL COPYRIGHTED MATERIAL –
NOT AUTHORIZED FOR FURTHER REPRODUCTION OR
DISTRIBUTION WITHOUT PERMISSION FROM UL



Documents

Document Sharing Hub