

TECHNICAL NEWS

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THE OKONITE COMPANY

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Engineering
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C-L-X® SHEATHED CABLES APPROVED FOR HAZARDOUS LOCATIONS

The Okonite Company's C-L-X sheathed cable from #16 AWG to 1000 kcmil 600V and 5 through 35kV shielded cable are UL listed for use in Class I Division 1 "Hazardous Location." These cables are marked with the "MC-HL" mark. All "MC-HL" labeled cable require a grounding conductor and an overall jacket.

Background

This is a new designation for C-L-X due to a change in the 1996 National Electrical Code. The NEC includes a provision for the use of continuously corrugated (C-L-X) aluminum sheathed, Type MC cable in Division 1 hazardous locations. Continuously corrugated aluminum sheathed cables are the first practical type cable and the only cable other than mineral insulated metallic sheathed (MI) cable authorized for use in Class I or II Division 1 locations. Prior to this 1996 Code allowance, standard installation practice was wires pulled into metallic conduit with seals and explosion proof fittings for these areas.

Okonite's C-L-X Type MC cables authorized for such use were qualified by Underwriters Laboratories to its new standard UL 2225 "Standard For Metal-Clad Cable and Cable Sealing Fittings For Hazardous (Classified) Locations." This standard imposes more stringent requirements than those required of Type MC cable (UL 1569). A comparison of the test requirements is provided in the Appendix. Qualification to UL 2225 allows the cable to be marked "MC-HL".

Code Construction Requirements

The specific NEC articles that allow C-L-X cable in hazardous locations are as follows:

- Class I Division 1: Article 501-4(a) Exception No. 2
- Class II Division 1: Article 502-4(a) Exception No. 2
- Class III Division 1: Article 503-3(a)

For Class I and Class II the Code requires that the cables have:

1. A gas/vapor tight continuous corrugated aluminum sheath.
2. A separate grounding conductor per Article 250-95.
3. An overall polymeric jacket.

NOTE that interlocked armored cables are not allowed in these locations.

UL Performance Requirements

In developing the 2225 standard, UL based their requirements on Canadian experience. The Canadian Electrical Code has allowed this type cable in Division 1 locations for the past few years. UL met with users and cable manufacturers in September 1995 at Calgary, Canada. As a result of this work, they issued UL 2225 that incorporated most of the CSA cable hazardous location cable requirements. To meet UL 2225 cable performance requirements, the cable must comply with all applicable performance requirements of UL 1569 (Standard for Metal-Clad Cables (Type MC) and;

- 1) Meet a low temperature -25°C (or optionally lower) impact test. (Our C-L-X product meets -40°C)
- 2) Meet a more severe room temperature impact test.*
- 3) Meet a more severe room temperature crush test.*
- 4) Meet a more severe vertical tray flame test.*

Applications for C-L-X MC-HL Listed Cable

1. Users with Division 1 locations can now use C-L-X MC-HL instead of expensive metal conduit with seals and explosion proof conduit fittings.
2. Users that are currently using Type TC cable in tray and then switching to conduit in Division 1 locations, can now go with C-L-X MC-HL all the way with no transition at the Division 1 boundary.
3. Users of conduit and wire in Division 2 and unclassified areas have a more economical alternative that provides added mechanical protection and flame resistance than standard MC cable.
4. Existing users of C-L-X should specify the "HL" option to assure themselves of the increased performance.

Advantages of C-L-X MC-HL vs Metallic Conduit in Division 1 Locations

1. Less expensive.
2. Easier to install.
3. Easier to seal with approved HL cable sealing fittings.
4. Eliminates chance of internal conduit corrosion.
5. Eliminates need to splice if going from Type TC to wires in conduit.

*see appendix over

APPENDIX

**COMPARISON OF PERFORMANCE REQUIREMENTS
TYPE MC versus MC-HL**

Qualification Test	Requirement	Type MC	Type MC-HL
Low Temperature	9 ft-lbs No Cracks Must Pass (8 out of 10)	Not Required	Required @ -25°C Optional at lower temperatures
Mechanical Damage-Impact Samples: 3/C #14 AWG 3/C #2 AWG	Must Pass (8 out of 10)	15 ft - lbs 50 ft - lbs	25 ft - lbs 50 ft - lbs
Crushing Test Samples: 3/C #14 AWG 3/C #2 AWG	Must Pass (8 out of 10)	1000 pounds 2000 pounds	1500 pounds 2000 pounds
Vertical Tray Flame Test	Must Not Propagate	UL 1569	IEEE 1202 (CSA FT-4)