

Cable Seals for Type TC/Type TC-ER Cables

We are asked from time to time when and how Type TC/Type TC-ER cables need to be sealed per the requirements of the National Electrical Code (NEC).

For hazardous locations, the 2017 NEC requires the following from 501.15 (E), **Cable Seals, Class I, Division 2**:

Exception: Cables with an unbroken gastight/vaportight continuous sheath shall be permitted to pass through a Division 2 location without seals. No seal required at the boundary. Okonite's Type TC/Type TC-ER multiconductor cables have gas/vaportight continuous sheaths and therefore qualify for this allowance.

(1) Terminations. Cables entering enclosures that are required to be explosionproof shall be sealed at the point of entrance. This is straight-forward. If the enclosure is explosionproof, then the cable shall be sealed. Multiconductor cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core that are installed in a Division 2 location shall be sealed with a listed fitting after the jacket and any other coverings have been removed so that the sealing compound can surround each individual insulated conductor in such a manner as to minimize the passage of gases and vapors.

Please note: Although Okonite's Type TC and Type TC-ER multiconductor cables have gas/vaportight continuous sheaths, like most other TC or TC-ER cables, they are capable of transmitting gases or vapors through the cable core.

Special Note: In the 1980's Okonite developed a cable with a core that was sealed, commonly known as "Gas-Blocked CLX". This type cable eliminated the need for sealing glands altogether. With the advent of economical end seals (fittings, glands), the higher cost of a gas-sealed cable made "Gas-Blocked" cable obsolete. The NEC retains the classification for a gas-blocked core in the event that a manufacturer develops an economical cable.

There are two exceptions to this paragraph.

Exception 1: *Cables leaving an enclosure or room that is unclassified as a result of Type Z pressurization and entering a Division 2 location shall not require a seal at the boundary. (However, if there is no seal, there will be continuous leakage of pressurization gas through the cable core from the pressurized (unclassified) room to the classified area.)*

Exception 2: *Shielded cables and twisted pair cables shall not require the removal of the shielding material or separation of the twisted pairs, provided the termination is by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.*

Even though this exception does not require the shielding material to be removed from around each shielded pair or triad, nor does it require the individual conductors of a twisted pair or triad unit to be

separated from one another, the cable would still need to be sealed around each individual pair or triad unit using a tray cable sealing gland.

(2) Cables That Do Not Transmit Gases or Vapors. This paragraph is not applicable to Okonite Type TC/Type TC-ER cables. See special note above.

(3) Cables Capable of Transmitting Gases or Vapors. Cables are not required to be sealed unless entering an enclosure that is required to be explosionproof, or unless the cable is attached to process equipment or devices that may cause a pressure in excess of 1500 pascals (6 inches of water) to be exerted at a cable end, in which case a seal shall be provided to prevent migration of flammables into an unclassified area. Type TC/TC-ER cables from Okonite and other manufacturers fall under these requirements. To seal or not to seal where cables are not entering explosionproof enclosures must be determined by others, i.e., if the cables are attached to process equipment or devices that may cause a pressure in excess of 1500 pascals (6 inches of water) to be exerted at a cable end.

(4) Cables Without Gas/Vaportight Sheath. This paragraph is not applicable to Okonite Type TC/Type TC-ER cables.

Where a sealing gland is not required, these cables should be terminated with a listed fitting for Type TC/TC-ER cable types. See Engineering Note 13-02 for more details regarding these glands.

Remember that the National Electrical Code requirements are the minimum. Your customer's installation specifications or the inspector on the job site may have more stringent sealing requirements regardless of the installation. There have also been times where an engineer has stated that he or she thinks a cable seal should be installed for any Class I, Division 2 area. So be it. In the end the customer, engineer or contractor has to make the decision to use a cable seal and even then is subject to the inspector. It is recommended that the inspector is consulted prior to installation.

Also, although a cable may not be in a hazardous area, a seal may be required to prevent any type of gas or liquid from entering the core of the cable. Common sense is the rule here.

Regarding tray cable sealing glands, there are two types of barrier material and at least two manufacturers. The two types of barrier material are the "putty" type and the "resin" type.

The resin type is recommended over the putty type. The resin type flows between and around the conductors forming a seal, whereas the putty has to be pressed in between the conductors. The resin type requires that the conductors are wiggled to allow the resin to displace the air. The conductors in the putty type must not be wiggled once the material is pressed in place, or voids may form which could allow gases or vapors to pass through the gland. The resin type sets up, or cures in minutes, where the putty type may take ten times as long, or longer, at the same ambient temperature.

The sealing compound must be from the same manufacturer as the cable sealing gland.

Appleton makes the PXSS2K-REX Series Liquid Resin Barrier Type Cable Connector for Unarmored, Tray, Shipboard, and SO type cables.

Crouse-Hinds has a sealing gland for MC, MC-HL and TC cables, but their instructions are not clear on how to install on a TC or TC-ER cable. Also, field experience reveals that if the ground spring is not removed from the gland for these cable types, it can cut into the jacket.