

Dekoron-Unitherm Electric Traced Tubing Bundles with Power and Control Wires - Wire Design and Selection

Design Overview

Certain steps must be taken when designing an electric traced bundle with integral power and control wires to be used in hazardous areas. Wire and cable choices must meet the requirements of the National Electric Code and all local codes. They must also meet the limitations set forth in the Approval granted by Factory Mutual Approvals to Dekoron-Unitherm. A primary limitation is that the wires or cables must be used in support of the main function of the bundle. For example, the bundle cannot contain wires used for plant lighting.

This design guide outlines the steps necessary to meet both requirements.

Step One - Determine the Hazard Classification

The electric heating element, wires, and cables, must be approved for use in the specific hazardous area. Determine the hazard Class, Division, Group, and maximum temperature ("T" rating). If the IEC Zone rating system is used, determine Class, Zone, and Gas Group of the area. If the customer is unsure or if they are asking for bundles designed to our "standard" rating, you must still determine the maximum temperature rating to correctly select the heating element.

You cannot continue with the design until this information is complete.

Dekoron-Unitherm Electric Traced Tubing Bundles are approved by FM Approvals for use in:

Class I Division 2 Groups B, C, and D;

Class II Division 2 Groups F and G;

Class III Division 2;

Class I Zone 2 Gas Group IIB+H₂, hazardous areas.

There is a separate approval for:

Class I Division 1 Group D, hazardous areas.

Electric Traced Tubing Bundles cannot be designed for hazardous areas other than those listed.

As stated above, the "T" Rating of the bundle will be based on the electric heating element.

Step Two - Determine the Installation Method

The National Electric Code limits the selection of wire and cable types based on how they will be installed.

Armored cables are allowed in all the areas covered under our Approval.

Non-armored cables are allowed in Division 2 areas where the bundle is installed in cable trays.

Non-incendive wires (RTD or T/C wires) are allowed in Division 2 areas for all installation methods.

Note:

The local authority may allow the use of non-armored cables in bundles installed using methods other than cable trays. **Have this approval in writing before shipping.**

Step Three - Determine the wire and/or cable designs to be used

Four points must be considered when choosing wire or cable constructions used in these bundles:

1. the wire use; power? control (relay)? sensor (Temperature or Limit)?;
2. the voltage present in the wire: signal only? low voltage (<24V)? higher voltage?;
3. the wire or cable size, determined either by customer specification or current draw;
4. the number of wires or cables of each type specified.

Table 1 of this Design Guide shows the types of wires and cables approved for use in Dekoron-Unitherm Electric Traced Tubing Bundles. The table shows the wire/cable type, areas allowed, installation method allowed, maximum voltage and current, and maximum number of wires allowed. This table defines the limitations allowed by our FM Approval. Deviations are not allowed without prior written authority from FM Approvals and Dekoron-Unitherm.

Table 1. Wire and Cable Usage

Cable Type	Usage	Wire Size (AWG)	Max Voltage	Maximum Current		Max Number Wires
				204°C Rating*	100°C Rating*	
MI / MC-HL	1,2	14	277	10	22	3
MI / MC-HL	1,2	12	277	12	27	3
MI / MC-HL	1,2	10	277	16	36	3
MC / TC	1,2	18	277	5	12	6
MC / TC	1,2	16	277	7	16	6
MC / TC	1,2	14	277	10	22	3
MC / TC	1,2	12	277	12	27	3
MC / TC	1,2	10	277	16	36	3
PLTC	3	18	30	1000VA	1000VA	6
PLTC	3	16	30	1000VA	1000VA	6
ITC	2	20	150	1	1	6
ITC	2	18	150	5	5	6
ITC	2	16	150	5	5	6
TFN or PFA	4	18	signal only	n/a	n/a	12
TFN or PFA	4	16	signal only	n/a	n/a	12

Usage code: 1 – Power Supply 2 – Remote Control or Signaling 3 – Power-Limited Circuits 4 – Non-Incendiary (T/C or RTD only)

* Temperature rating denotes maximum bundle operating temperature. Heater surface temperature rating (and bundle “T Rating”) may be higher. If the bundle operating temperature is higher than the value listed, use the next higher column.

Step Four - Review Customer Specifications

This may seem backwards, but the last step is to review Customer Specifications for wire or cable selection.

This allows you to determine if there are any parts of the Customer Specification that is in conflict with the National Electric Code or our Approval.

All conflicts must be resolved in writing prior to shipping the bundle.

Completing the Design

The bundle design can be completed after following the four steps outlined above.

Use Engineering Form E73-1-03-1 to record the information on the wires selected. This form should be attached to the RFQ and filed with Engineering records.

The bundle design should have all wires cabled over the insulated core, just beneath the outer jacket. Cables can be run parallel if required to accommodate metal calibration tubes, but only for this reason.

Plastic calibration tubes should be cabled between insulation layers to prevent damage during installation.

This document contains empirical and theoretical information from the Dekoron-Unitherm Engineering Library and does not constitute or imply a warranty. All values represent typical performance data for the condition given. Actual results may vary.