

MFFFPEm Resource

From: Tiktinsky, David
Sent: Tuesday, January 19, 2010 2:53 PM
To: Wescott, Rex
Cc: MFFFHearingFile Resource; Morrissey, Kevin; Oesterle, Eric; Roman, Cinthya
Subject: Info from Dealis on IEEE 383 for MFFF fire chapter
Attachments: IEEE 383 Clarification Draft 7.2.4.1.doc

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7.2.4.1 Selection of Electrical Equipment in Gloveboxes

The following national codes and standards are used for selection of electrical equipment in gloveboxes to assure that the risk of electricity as an ignition source of fires and explosions is minimized:

- NFPA 70 – 1999, National Electrical Code
- Occupational Safety and Health Administration (OSHA) 29 CFR 1910 (2004), Occupational Safety and Health Standards
- UL 508 (1993 edition), Industrial Control Equipment
- ~~IEEE 383 (1974 Reaffirmed 1992), Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations or code that meets equivalent flame requirements. These equivalent codes are:~~

The cable insulation within the gloveboxes meet the flame requirements from one or more of the following standards:

- IEEE 383 (1974 Reaffirmed 1992), Standard for Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations
- NFPA 262-2002, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
- IEEE 1202-1991, Standard for Flame Testing of Cables for Use in Cable Tray in Industrial and Commercial Occupancies
- UL-910 – 1998, Standard for Safety Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical Fiber Cables used in Spaces Transporting Environmental Air
- UL-1666-2002, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
- UL-1685-1997, Standard for Safety Vertical-Tray Fire-Propagation and Smoke Release Test for Electrical and Optical-Fiber Cables
- FT4 of CSA C22.2 No. 0.3-92 Para 4.11.4, Test Methods for Electrical Wires and Cables (Acceptable Cable Flame Test)
- FT6 of CSA C22.2 No. 0.3-92 Appendix B, Test Methods for Electrical Wires and Cables (Acceptable Cable Flame Test)
- IEC 60332-3, Tests on Electric Cables under Fire Conditions Part 3: Tests on Bunched Wires or Cables (1992) (Acceptable Cable Flame Test)
- ICEA T-29-520, Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input Rate of 210,000 B.T.U/Hour (Acceptable Cable Flame Test)
- ASTM D2633, Standard Test Methods for Thermoplastic Insulating and Jackets for Wire and Cable

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The suitability of electrical distribution equipment, (i.e., wire, cable, and other equipment covered by the NFPA 70) for use within the process gloveboxes, is demonstrated by listing and appropriate labeling by a Nationally Recognized Testing Laboratory (NRTL), such as UL or FM.

NFPA 70 provides the primary criteria used in the design of electrical power distribution to the gloveboxes to minimize the risk of electricity as an ignition source of fires and explosions. Electrical power provided to the glovebox equipment is designed and installed according to the requirements of NFPA 70. The industrial electrical safety requirements of 29 CFR 1910 generally adopt and may supplement the electrical distribution criteria found in NFPA 70. Electrical distribution to the glovebox equipment is via electrical components selected, sized, assembled, and protected as required by NFPA and OSHA for industry.

Engineering studies were performed in accordance with Article 500 of NFPA 70 to determine the Hazardous Location classification of each glovebox environment. Electrical distribution and utilization equipment selected for each glovebox is based upon the classification assigned.

Within the process gloveboxes, electrical utilization equipment is considered acceptable per 29 CFR 1910.399 if it is:

- Listed by an NRTL; or
- Inspected by another federal, state, municipal, or local authority responsible for enforcing the National Electrical Code (NFPA 70) if the equipment is not covered by an NRTL; or
- Custom made and intended for use by a particular customer and documented by the manufacturer to be safe.

It is required that glovebox electrical utilization equipment either have evidence of this acceptability, be exempted by meeting the low power criteria of UL 508, or be accepted based on an evaluation in accordance with 29 CFR 1910.303, for its mechanical strength, and durability, electrical insulation, heating effects under conditions of use, arcing effects, and classification by type, size, voltage, current capacity, specific use, and any other factors that contribute to its safety and determine it to be safe from electrical fire potential.

~~Cables and wiring within the gloveboxes are selected to assure that the fire retardant criteria of IEEE 383 are met.~~

~~Bulk cable for the MFFF meets the IEEE criteria for Class 1E for flame tests. The remainder of the cable and wire is specific to particular electronics equipment, modules, sensors or actuators. A majority of this equipment is intended for general industry and~~

has not been tested to nuclear standards. General industry cable standards exist that are equivalent to or more stringent than the Class 1E flame tests. Vendor supplied cable is required to have been documented as meeting or exceeding the IEEE criteria by virtue of certification to these other standards. Where this documentation does not exist and when the bulk cable is not compatible for substitution, MOX Services may accept a limited quantity of cable tested to a less stringent standard after careful evaluation of the specific application and conditions.