

Short communication

## Maintaining certification compliance of equipment used in hazardous (classified) locations

Cheryl A. Gagliardi\*, Bob Baker

*FM Approvals, Electrical Systems, 1151 Boston-Providence Turnpike, Norwood, MA 02062, USA*

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### Abstract

In order to understand how to maintain certification compliance of equipment used in hazardous (classified) locations, one must first have an understanding of what a hazardous (classified) location is and what the requirements are for the equipment certification. These will be explained in Part I by Cheryl Gagliardi, a senior engineer with FM Approvals. Part II will cover recommendations for end-user actions for maintaining the certification compliance and will be provided by Bob Baker, an industry consultant to Emerson Process Management.

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### Part I: Hazardous (Classified) Locations and Requirements for Certification

*Cheryl A. Gagliardi, Senior Engineer, FM Approvals*

#### Hazardous (Classified) Locations: What Does It Mean?

A hazardous (classified) location is a location where fire or explosive hazards may exist due to the presence of (i) flammable gases or vapors, (ii) flammable liquids or (iii) combustible dust or easily ignitable fibers or flyings. A hazardous (classified) location is defined by four elements:

1. *Class:* This represents the properties of the flammable vapors, liquids, gases, dusts or fibers.
2. *Division or Zone:* This is determined by the frequency the flammable material is present.
  - *Zone 0:* ignitable concentrations are present continuously or for long periods.
  - *Division 1/Zone 1:* ignitable concentrations are likely to exist under normal operating conditions.
  - *Division 2/Zone 2:* ignitable concentrations are likely not to occur in normal operating conditions or will only be present for a short period of time.

3. *Group:* This represents the characteristics of the material (gas, dust or fiber) in relation to its ignition capability.
4. *Temperature Class:* surfaces of equipment must not exceed the autoignition temperature of the flammable environment into which it is being installed. The temperature class is the marking on the equipment which represents the maximum surface temperature of the equipment as determined during the certification process.

There are several allowable protection techniques in North America for equipment used in a hazardous location, a few of these being explosionproof, intrinsic safety, non-incendive and increased safety. Explosionproof equipment is acceptable for use in a Division 1 location. Intrinsically Safe equipment is acceptable for use in Division 1, Zone 0 and Zone 1 locations. Non-incendive equipment is acceptable for use in a Division 2 location. Increased Safety equipment is acceptable for use in a Zone 1 location. Each protection technique requires specific design criteria as outlined in the appropriate product safety standards.

#### Hazardous (Classified) Locations: Regulatory and Certification Requirements

Regulatory requirements for equipment being installed in a hazardous (classified) location are found in the National Elec-

\* Corresponding author. Tel.: +1 781 255 4817; fax: +1 781 762 9375.  
E-mail address: [cheryl.gagliardi@fmapprovals.com](mailto:cheryl.gagliardi@fmapprovals.com) (C.A. Gagliardi).

trical Code<sup>1</sup> (NEC), Articles 500–506 and Occupational Safety and Health Administration<sup>2</sup> (OSHA), 29 CFR (Code of Federal Regulations), Subpart S; 1910.307.

The burden of equipment compliance to these regulatory requirements is placed on the “user”, not the “manufacturer” (and/or “repairer”). Both the NEC and OSHA require the equipment be identified or approved for use in a hazardous location and the preferred method is a listing by a Nationally Recognized Testing Laboratory (NRTL). An NRTL is recognized by OSHA in accordance with OSHA 29 CFR 1910.7. The NRTL product safety testing and certifications are to appropriate product safety standards that are listed by OSHA under the NRTL program. Per 29 CFR 1910.7, the NRTL shall implement control procedures for identifying the listed and labeled equipment, inspect the run of production of such items at factories for product evaluation purposes to assure conformance with the test standards; and conduct field inspections to monitor and to assure the proper use of its identifying mark or labels on products.

FM Approvals is recognized under OSHA’s NRTL program and the FM Approvals certification mark is an accepted mark for equipment used in hazardous (classified) locations.



The FM Approvals certification mark is a statement of conformity that a product is in compliance with defined standards at the time the product leaves the *manufacturing and/or repair facilities audited and approved by FM Approvals (hereinafter referred to as an FM Approved facility)*. A manufacturer can have multiple facilities audited by FM Approvals, allowing all of them to mark product with the FM Approvals certification mark. Once approved equipment is in use, continued compliance with applicable codes and standards becomes the responsibility of the end-user. The installation and maintenance of the equipment is critical to the approval. All instructions provided by the manufacturer must be followed throughout the life of the equipment.

Changes made to the equipment after it has left an FM Approved facility may unknowingly affect the equipment’s continued compliance to the standards which it was certified to. A “change” can include equipment that is refurbished, remanufactured, reconditioned, salvaged, new surplus or repaired.

FM Approvals defines repair as “Work performed to the unit that would bring it back to its original condition approved by FM Approvals”. In other words, product compliance with the applicable standards has been reconfirmed. This definition is taken from FM Approvals Standards Class 3606:1998 - *Repair Service for Process Control Equipment Used in Hazardous (Classified) Locations* and Class 3605:1994 - *Repair Service for Communication Equipment Used in Hazardous (Classified) Locations*. Such “repair” includes refurbished, remanufactured, reconditioned, salvaged or new surplus devices when the “Work performed to the unit would bring it back to its original condi-

tion approved by FM Approvals”. Product compliance with the applicable standards has been reconfirmed.

### Requirements for Repairing FM Approved Equipment for use in Hazardous (Classified) Locations

Equipment bearing the FM Approvals certification mark can be repaired in several ways which reconfirms product compliance with the applicable standards.

- *OEM*: The most obvious is returning the equipment to the original equipment manufacturer (OEM). The “manufacturer” can be any OEM owned or OEM Authorized facility (including repair facilities) that is audited by FM Approvals. They have the design control and knowledge of the original FM Approvals certification requirements and can return the equipment to its originally certified condition and mark it with the FM Approvals certification mark.
- *Third-party*: A second option is having the equipment repaired by a third-party repair facility that is FM Approved in accordance with class standard 3606. Such approval will be specific to product brands and models, with the repair facility audited by FM Approvals specifically for those product brands and models. A third-party can meet the requirements of FM Approvals class 3606 only with cooperation from the OEM. It will be the OEM who will authorize and supply the third-party repair facility with the necessary proprietary intellectual property such as documentation, testing procedures, quality assurance requirements, etc., as well as OEM replacement parts, allowing the device to be restored to its originally certified condition.
- *End-user*: The repair can also be performed by the end-user if they are FM Approved in accordance with class standard 3606. The same requirements listed above for a third-party repair facility would apply to the end-user repair facility if it is to be FM Approved.

### Issue: Inability to Distinguish Compliant vs. Non-compliant Equipment

The inability to distinguish between compliant and potentially non-compliant equipment can be challenging for the end-user. There are potential safety and regulatory compliance risks. Existing nameplates, with FM Approvals certification marks, are typically left on repaired devices even when the repair facility is not FM Approved (as defined in prior section above).

The preference of FM Approvals is that the certification mark be removed from the product when the repair is done by a facility not FM Approved. There is no written requirement mandating this, but remember that, as the end-user, you bear the burden for equipment compliance to the regulatory requirements.

An incident requiring an investigation by OSHA may result in citations not directly associated with causing the incident. For example, an explosion in 2005 in the Gulf Coast resulted in the following: Citation: “The employer does not ensure the equipment is approved for the class of location and for the ignitable or combustible properties of the specific gas, vapor, dust, or fiber

<sup>1</sup> NFPA 70, *National Electrical Code*®.

<sup>2</sup> U.S. Department of Labor, Occupational Safety and Health Administration.

that will be present". This resulted in 167 individual items; each classified as "Willful" and carrying a fine of US\$ 70,000 per item. This resulted in a total fine of US\$ 11,690,000 for this company.<sup>3</sup>

## Part II: Recommended End-User Actions for Maintaining Certification Compliance

*Bob Baker, Industry Consultant to Emerson Process Management*

### Reducing process safety risks and meeting regulatory requirements

As an end-user having the responsibility to meet regulatory requirements, there are a number of actions you can take to better ensure purchase and installation of compliant devices:

- Specify and purchase repaired equipment from facilities audited and inspected by the NRTL whose certification mark is on the product.
- Require proof from your supplier that the equipment is traceable directly back to the NRTL audited and inspected manufacturing or repair facility.
  - An NRTL signed report or certificate for the equipment brands and models the facility is approved for.
  - Documentation of updated audit inspections.
- Require facilities not audited and inspected by the NRTL to indicate such on all documentation, such as
  - Specification documents
  - Quotations
  - Packing lists
  - Invoices
- Request non-approved facilities to remove nameplates containing the original NRTL certification mark.

Using the above vendor qualification methods, any anticipated application of potentially non-compliant equipment should be known. Appropriate MOC evaluations can then be undertaken before installation of potentially non-compliant devices.

Work processes can be implemented to identify and abate potentially non-compliant devices and sustain awareness of compliance requirements.

- Identification—Identify existing, potentially non-compliant devices, including equipment currently installed and/or in stores.
  - Start with a manageable cross-section of equipment types such as instrumentation.
  - Identify plant areas classified as hazardous locations.
  - Identify equipment purchased from facilities not audited and inspected by the NRTL.
  - Cross-check purchases to plant areas (Tag #).

- Verify suspect equipment via a walk-down.
- Abatement—Replacement of identified, potentially non-compliant devices can be executed in full during turnarounds or opportunistically during normal MRO (Maintenance, Repair, Other) operations.
  - **Turnarounds:** Identify and abate all potentially non-compliant devices while process unit(s) are shut down.
  - **MRO:** Can be handled by initially replacing a small number of non-compliant devices with compliant devices from an NRTL listed facility.
  - Send the removed devices to an NRTL listed facility for repair.
  - Use the repaired devices as replacements for additional non-compliant devices.
  - Continue this rotational replacement until all non-compliant devices have been abated.
- Awareness—A key element in avoiding future installation of potentially non-compliant devices is sustaining awareness of requirements for NRTL listed equipment.
  - Ensure training is provided to all personnel involved with the specification and/or purchase of electrical devices, with training to include:
    - Identification of protection techniques and regulatory requirements for equipment installed in a hazardous (classified) location.
    - NRTL requirements for listing the equipment with the specific protection techniques.
    - Vendor qualification requirements.
    - Access to acceptable, qualified vendor list(s).

### Summary

Over the last few years, there has been an increasing population of potentially non-compliant electrical instrumentation, for use in hazardous (classified) locations, being introduced into the chemical process and refining industries.

Non-compliance often results from the repair of devices by facilities not approved by an NRTL. Such facilities typically do not remove the original manufacturer's nameplate containing an original NRTL certification mark. This creates the misperception that such devices are still compliant to NRTL approvals as required by OSHA for use in hazardous (classified) locations.

Industry awareness of the regulatory and/or safety compliance issues should provide end-users with the impetus to develop corporate policies and guidance directing inspection, engineering, maintenance, and procurement organizations to ensure the installation of compliant devices.

Going forward, stringent supplier qualification can be a straightforward and efficient preventive solution. For suspect equipment that is already installed, identification and appropriate abatement processes may be needed.

Such actions assist in creating a safe workplace and in demonstrating a proactive safety culture by reducing the probability of non-compliant devices being the focal point of a future, potentially significant incident.

<sup>3</sup> U.S. Department of Labor, OSHA: Citation and Notification of Penalty, 9/21/05; OSHA National News Release, 9/22/05.