

# NRTL Certification of Industrial Control Equipment

Presentation by James Hensley



# Introduction

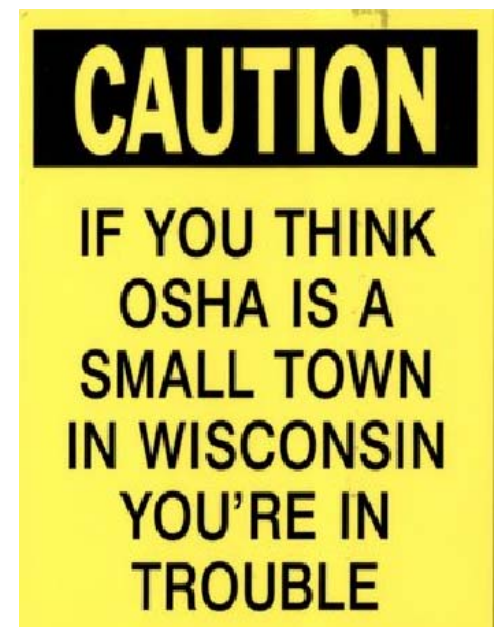
- How are Standards for Safety applied to electrical equipment?
- Who can Certify and List products to which standards?
- How to ensure that designs for custom panels comply with standards?
  
- Goal 1: to provide an overview of NRTLs, Standards, and Certifications
- Goal 2: demonstrate online tools for researching components
  
- Over 10 years at Dowland-Bach: ICP manufacturing, special Listing projects, NRTL certification consulting to customers

# Presentation Outline

- Section 1: OSHA and the Nationally Recognized Testing Laboratory (NRTL) program
  - Many NRTLs, each approved to evaluate & certify products to standards
- Section 2: Industrial Control Panels for Ordinary and Hazardous (Classified) Locations
  - Which standards apply to custom control panels and equipment?
- Section 3: Component selection and design considerations for ICPs
  - How to ensure a custom assembly can be listed by typical panel shop

## Section 1: OSHA & the NRTL program

- Become familiar with the different NRTLs and find to which standards each can evaluate and certify products
- Learn how OSHA evaluates NRTLs, and how NRTLs evaluate manufacturers and their products
- What to look for to determine if a product is Certified or Listed



# How many NRTLs are there?

- There are 17 current NRTLs in the program
- Each NRTL has ISO/IEC 17025 quality program
- Each NRTL has been approved to evaluate products to certain standards

<https://www.osha.gov/dts/otpca/nrtl/>

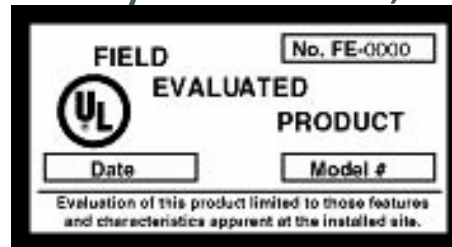


Standards are developed and maintained by various SDO (standards-developing organizations):

- ANSI, American National Standards Institute
- ISA, International Society of Automation
- IEEE, Institute of Electrical and Electronics Engineers
- CSA, Canadian Standards Association
- UL, Underwriters Laboratories
- FM, Factory Mutual
- NFPA, National Fire Protection Association

# How does a NRTL control the use of their mark?

- Testing, inspection, and certification
  - Components are typically sent to the NRTL testing lab
  - Regular inspections of manufacturing facility, tools, and procedures
  - Inspection of products in the process of manufacturing
- Surveillance of manufacturing facilities, quality programs, and procedures to comply with requirements of the standards
- Field labeling only allowed by the NRTL, not by any manufacturer



# How can I tell if a product is Certified or Listed?

- Manufacturers are required to mark products with specific information
  - Name of manufacturer and factory location
  - Type of product (i.e. Industrial Control Panel, Industrial Control Equipment)
  - NRTL mark with control number or other identifier
- Use online certification directories to verify the Listing
  - <http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.html>
  - <http://www.csagroup.org/services/testing-and-certification/certified-product-listing/>
  - <http://etlwhidirectory.etlsemko.com/WebClients/ITS/DLP/products.nsf/??Search?OpenForm>
- Look for “Recognized” products or those which may require evaluation of the overall assembly using the component

## Section 1 Review

- There are many NRTLs and each has a set of standards they can evaluate products to and provide Listing or Certification
  - Only the NRTLs may perform field evaluations and labeling
- OSHA requires that each NRTL have inspection plans for manufacturers to ensure adequate quality assurance and use of their marks
  - Factory inspections are typically quarterly (based on production volume) and unannounced; samples are inspected or taken for lab testing
- Online directories are easy to search to verify product Listing
  - Pay attention to categories, classes, and conditions of use



## Section 2: Industrial Control Panels for Ordinary and Hazardous (Classified) Locations

- Identify Safety Standards used for evaluation of this equipment
- Discuss the difference between Standards and UL category control numbers (CCN)
- Learn to find and use Guide Info for explanation of categories and standards to which products have been evaluated.



# Which standards apply to ICPs?

## Standards commonly used for ICPs:

- UL 508A – Industrial Control Panels for Ordinary Locations
- UL 698A – Industrial Control Panels Relating to Hazardous (Classified) Locations
- UL 913 – Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations
- UL 1203 – Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations

## Category Control Numbers (UL):

- NITW – Industrial Control Panels
- NRBX – Industrial Control Panels Relating to Hazardous Locations
  - [Intrinsically Safe Circuit Extensions]
- NNNY – Control Panels and Assemblies for Use in Hazardous Locations
  - [Class I, Div. 1 & 2]

# Standards used to evaluate UL Listed Industrial Control Panels for Hazardous Locations

Location Classification	Standard	Protection Technique
Class I, Division 1	<a href="#">ANSI/UL 1203</a> , "Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations"	Explosion-proof
	<a href="#">ANSI/UL 913</a> , "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations"	Intrinsic safety
	ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment"	Purged and pressurized (Type X or Y)
Class I, Division 2	ANSI/ISA-12.12.01, "Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations"	Hermetically sealed Nonincendive Nonsparking Sealed
	ANSI/NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment"	Purged and pressurized (Type Z)

- Each NRTL may be approved by OSHA to evaluate products to various standards published and maintained by different SDOs.
- The SDOs collaborate to ensure that standards are not duplicate or overlapping in scope to avoid discrepancies or conflicting requirements.

Table excerpted from UL Guide Information:  
AAIZ - Equipment for Use in and Relating to Class I, II and III, Division 1 and 2 Hazardous Locations

Q: Can we use CSA components in UL control panels?

A: Yes, but they must be in the MoU and comply with the stated conditions of acceptability

- Many CSA standards have been accepted by OSHA for use in the NRTL program
  - UL and CSA have harmonized selected standards under their Memorandum of Understanding to allow the use of Listed products and components in assemblies, with considerations based on intended use and final configuration
  - Memorandum of Understanding between UL and CSA is not a 1-1 relationship
  - UL Category Control Numbers must align with CSA Classes, or special conditions of acceptability
- [https://ul.com/global/documents/corporate/newsroom/MOU\\_Appendix1.pdf](https://ul.com/global/documents/corporate/newsroom/MOU_Appendix1.pdf)
  - <http://www.csagroup.org/services/testing-and-certification/agreement-on-acceptance-of-components/>



## Section 2: Review

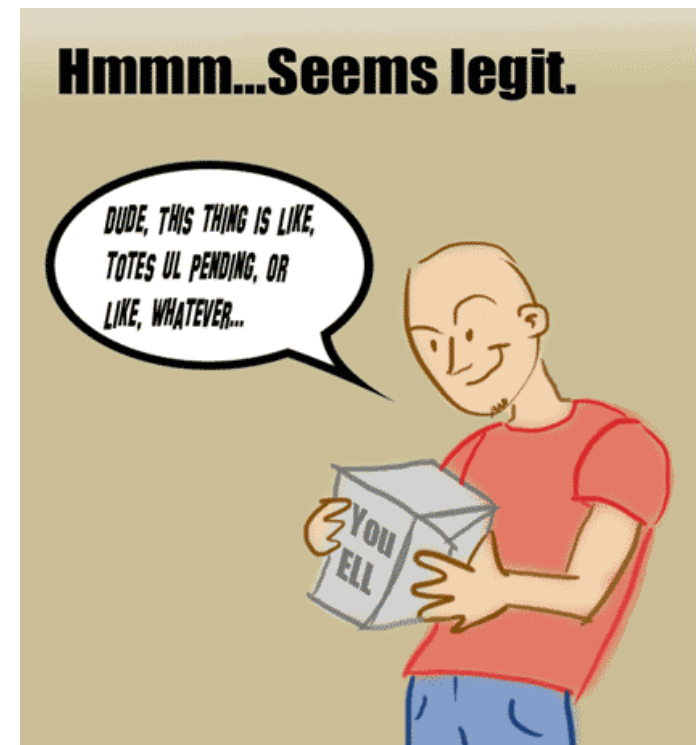
- Multiple standards may be applicable for evaluation of a product
- Each NRTL has categories and classes that reference multiple standards
- The UL-CSA agreement allows listed components to be used in assemblies, but may require additional verification and comply with specific conditions of acceptability

## Section 3: Component Selection and Design Considerations for ICPs (Ordinary and HazLoc)

- Provide overview of UL 508A Component Requirements (Table SA1.1)
- Learn to use NRTL directories to find components that meet the specific requirements of the standard
- Examples to show why manufacturers instructions must be followed for installations and applications (intended use)

## UL 508A Supplement A, Table SA1.1

- Standard includes list of components that are acceptable for use in Industrial Control Panels
- Components must be used for their intended purpose and installed per manufacturers instructions
- Standard may require additional markings or procedure description in panel fabricators listing report for certain components



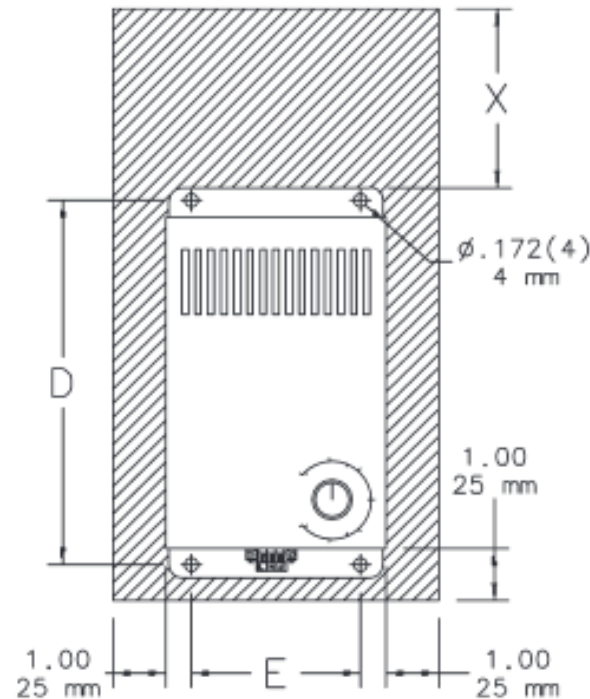
## Using online directories to find suitable components

Paragraph reference	Component description	UL Standard	Category control number(s)	Notes
14.2(a)	Recognized Terminal Blocks	UL 1059	XCFR2	Terminal block shall be suitable for field connection for the conductor size required by 15.1 as determined from the Recognized Component Information Page.
14.2(a)	Recognized grounding bar kits	UL 67, UL 891	QEUY2	Procedure described only
14.2(b)	Listed Grounding and Bonding Equipment	UL 467	KDER	Grounding terminal shall be suitable for the conductor size required by 15.1.
14.2(b)	Recognized Grounding and Bonding equipment	UL 467	KDER2	Grounding terminal shall be suitable for the conductor size required by 15.1.



# Follow manufacturers instructions!

- UL 508A, 26.4.3
  - A heater shall be mounted 2 inches or more from polymeric insulating materials of components and wiring, other than the internal wiring connected to the heater



Hoffman DAH electric heater instructions allow for less distance to other components. This is allowed due to specific testing performed by the NRTL.

## Section 3: Review

- UL 508A provides category control numbers (CCN) for acceptable components to be used in ICPs
  - Special instructions or procedure description may be required
- Online directories are easy to search by CCN to find manufacturers and part numbers for approved components
- Manufacturers may have special testing performed as part of NRTL evaluation to allow for use other than described in the standard
  - Follow the manufacturers instructions for installation and use!

# Summary

- OSHA website provides info for AHJs, manufacturers, and end users
  - NRTLs are authorized by OSHA to evaluate, test, and certify products
  - SDOs develop and maintain the safety standards used by the NRTLs
- Industrial Control Panels must comply with UL 508A, and components of ICPs comply with other applicable standards
  - Hazardous locations ICP must comply with other standards based on classification and type of protection
- Use the UL 508A standard and online resources to find approved components, and follow the manufacturers instructions

# Why is NRTL Listing important? Safety in the Workplace!



# ICP installed in instrument enclosure (CID2)



# ICP installed in instrument enclosure (unclassified)

