



Gas Well Deliquification Workshop

Sheraton Hotel, Denver, Colorado

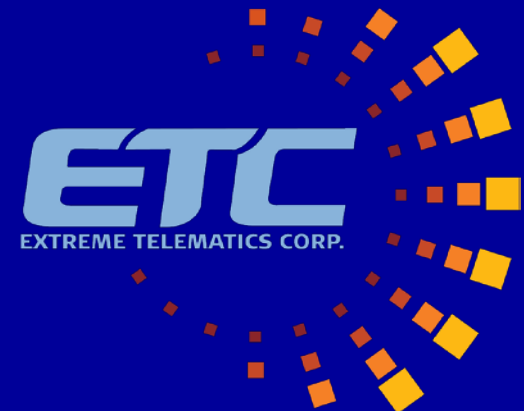
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Understanding Hazardous Locations Concepts

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Disclaimer

The content of this presentation is meant to be informative and cover the basic concepts behind hazardous locations. It is not intended to provide guidance for any particular installation and should not be relied on when making any decision regarding hazardous locations. Please consult your local electrical code for the applicable regulations as it will vary from region to region.

Overview

- **Confusion between standards, testing/certification organizations, and local regulations.**
- **Standards cover the requirements for safe installation and operation**
- **Many testing organizations worldwide. Many of which use the same or similar standards**
- **Local authorities decide which standards and which certifications to observe.**

Standards Development

IEC (International Electrotechnical Commission)

- Specializes in developing international standards
- Electrical, electronic, and related technologies



ATEX (Atmospheres Explosibles)

- European Union (EU) Directives



Certification Organizations

Commonly Recognized Names

- **CSA (Canadian Standards Association) - Canada**
- **UL (Underwriter's Laboratories Inc.) - USA**
- **ANCE (Association of Standardization and Certification) - Mexico**



Many Others

- **Intertek**
- **MET (Maryland Electrical Testing)**



Common North American Standards

Historical

- **CSA, UL, and ANCE all had different standards**
- **Could approve for each other's jurisdiction, but separate testing and certification required**
- **Division based system. i.e. Class I Div 1**



Harmonization

- **Adopted IEC 60079**
- **Easier to approve for multiple jurisdictions**
- **Zone based system i.e. Class I Zone 0**



Adoption in Canada and US

Canada

- All new installations must adhere to the zone based standard
- Existing installations are grand fathered

United States

- All installations can use division or zone system

What Does the Class Mean?

- **Each class identifies a different type of flammable material**
- **Class I**
 - **Flammable gases or vapors**
 - **Typically seen in Oil and Gas**
- **Class II**
 - **Combustible or electrically conductive dust**
 - **Typically seen in farming (i.e. Grain Dust)**
- **Class III**
 - **Ignitable fibers or flyings in the air**

Divisions vs. Zones

- **Division 1 – Hazard exists in normal conditions**
- **Division 2 – Hazard exists in abnormal conditions**
- **Zone 0 – Explosive atmosphere continuous**
- **Zone 1 – Explosive atmosphere likely**
- **Zone 2 – Explosive atmosphere not normal**



Intrinsic Safety vs. Explosion Proof

Intrinsic Safety

- Will not ignite the explosive atmosphere
- Voltage, current, and capacitance is designed to be low
- Component temperature does not exceed a threshold
- Internal spacing far enough apart to avoid arcing



Explosion Proof

- Contains a potential explosion



Ex Codes

- **IEC 60079 broken into a number of subsections**
- **Ex Code used to distinguish type of protection**
 - **Ex ia – intrinsically safe for zones 0, 1, 2**
 - **Ex ib – intrinsically safe for zones 1, 2**
 - **Ex ic – intrinsically safe for zone 2**
 - **Ex d – Flameproof (explosion proof)**

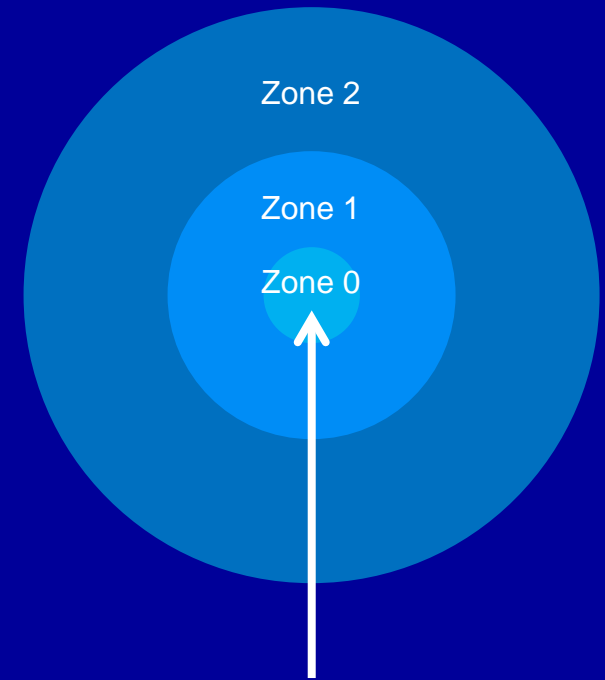
Zone Examples

Zone 0

- Inside a Tank
- Surface Casing Vent
- Instrumentation Vent (0.15m)
- Process Equipment Vent (0.5m min)

Zone 1

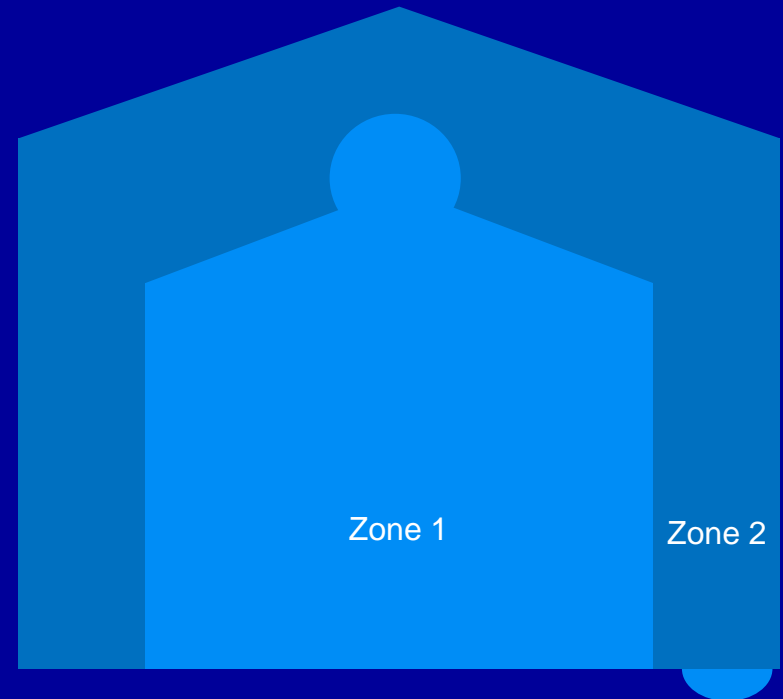
- Inside Well Shack
- Low Lying Areas
- Instrumentation Vent (0.5m)
- Process Equipment Vent (1.5m min)



Zone Examples

Zone 2

- **Outside Well Shack (3m)**
- **Instrumentation Vent (0.5m)**
- **Process Equipment Vent (1.5m min)**



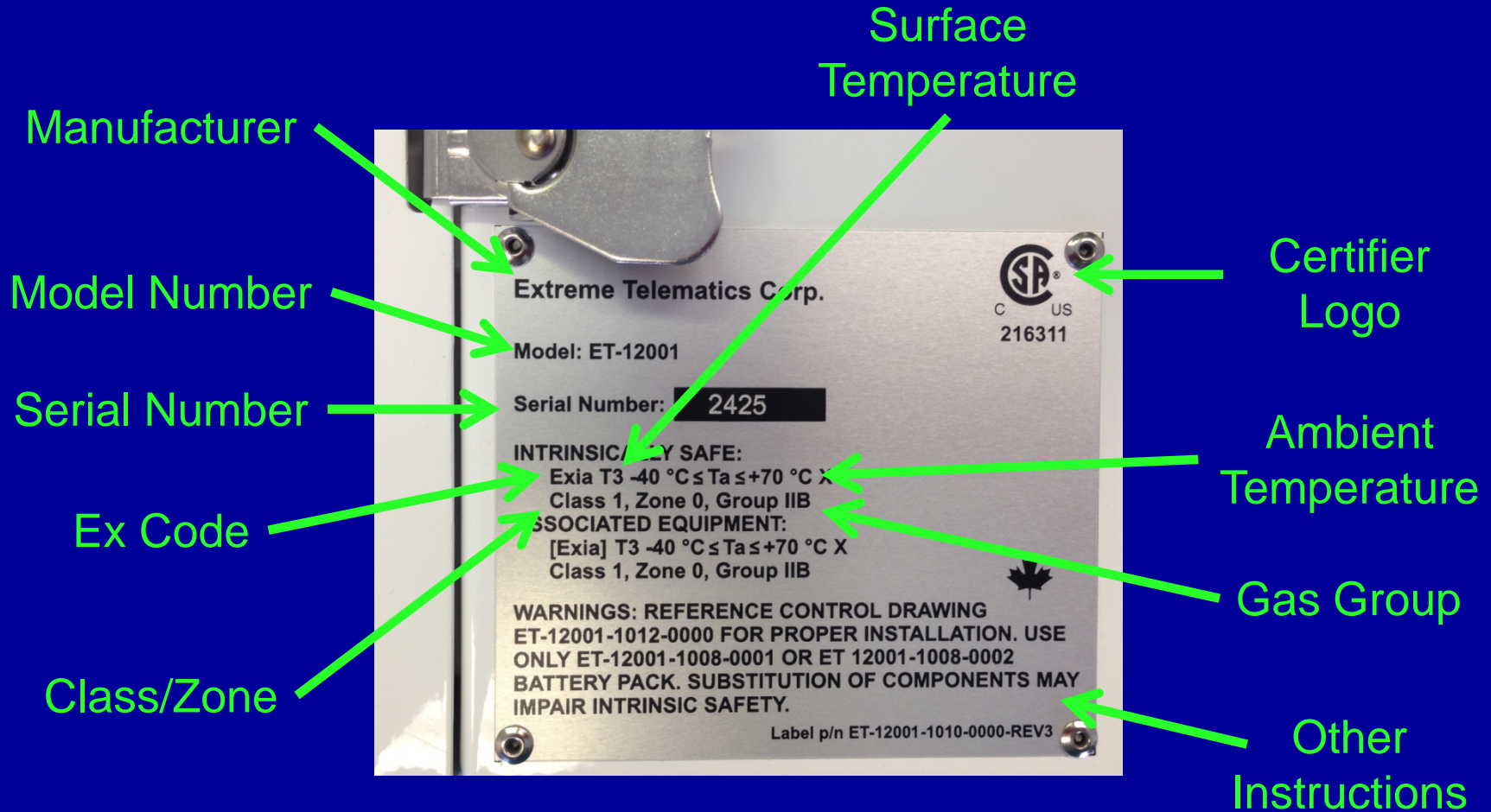
Gas Groups

- **Identifies the types of gases a product is approved for**
 - **IIA (D) – Propane, Methane**
 - **IIB (C) – Ethylene, Hydrogen Sulfide**
 - **IIC (A + B) – Hydrogen, Acetylene**
- **IIC is the most severe, while IIA is the least**
- **Product can be installed in an area with the designated gas group or a less severe group**

Temperature Codes

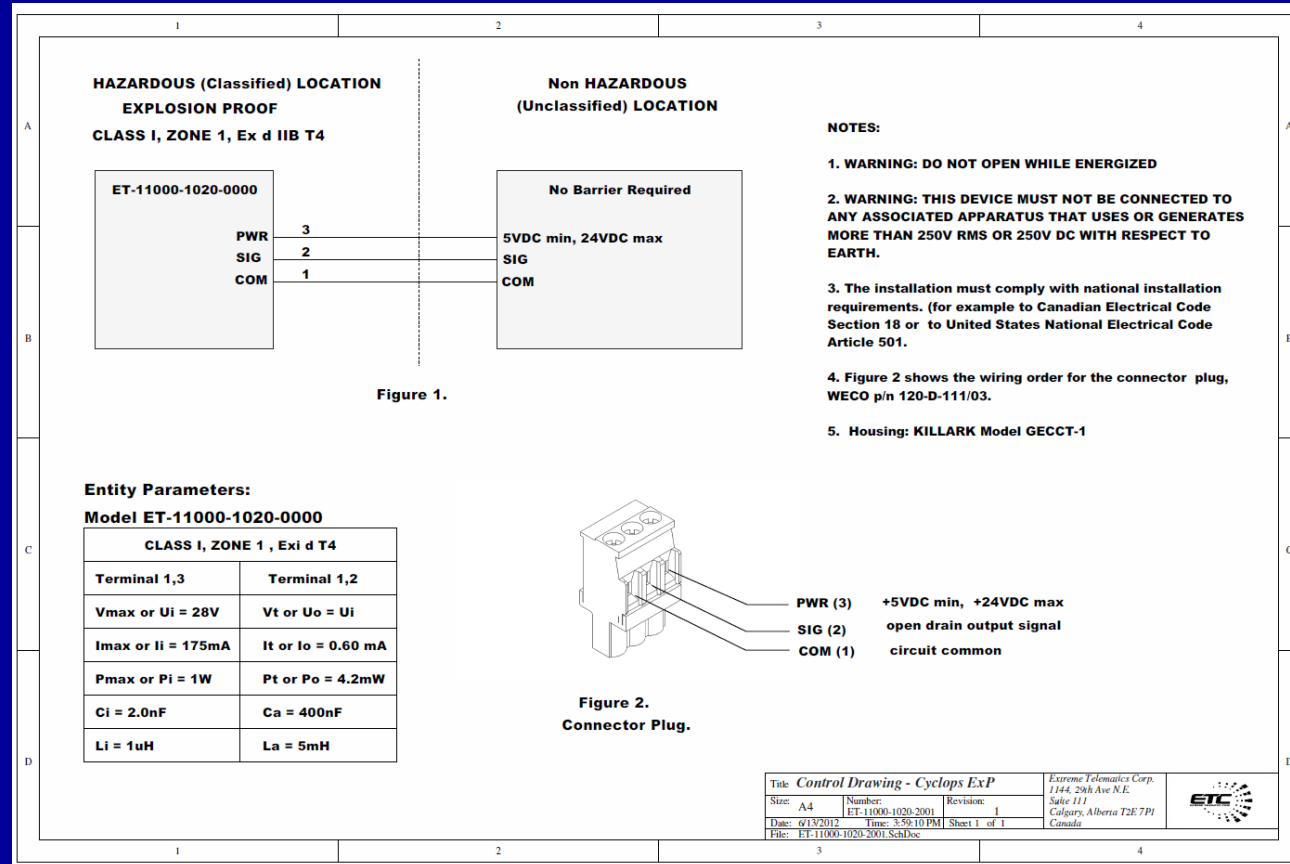
- Specifies the maximum surface temperature of the product
- Helps set the ambient temperature rating of a product
- The lower the surface temp, the higher the allowable ambient temp
- Common Codes
 - T2 – 300 C/572 F
 - T3 – 200 C/392 F
 - T4 – 135 C/275 F
- Several steps in between identified with letter A - D

Example Product Label



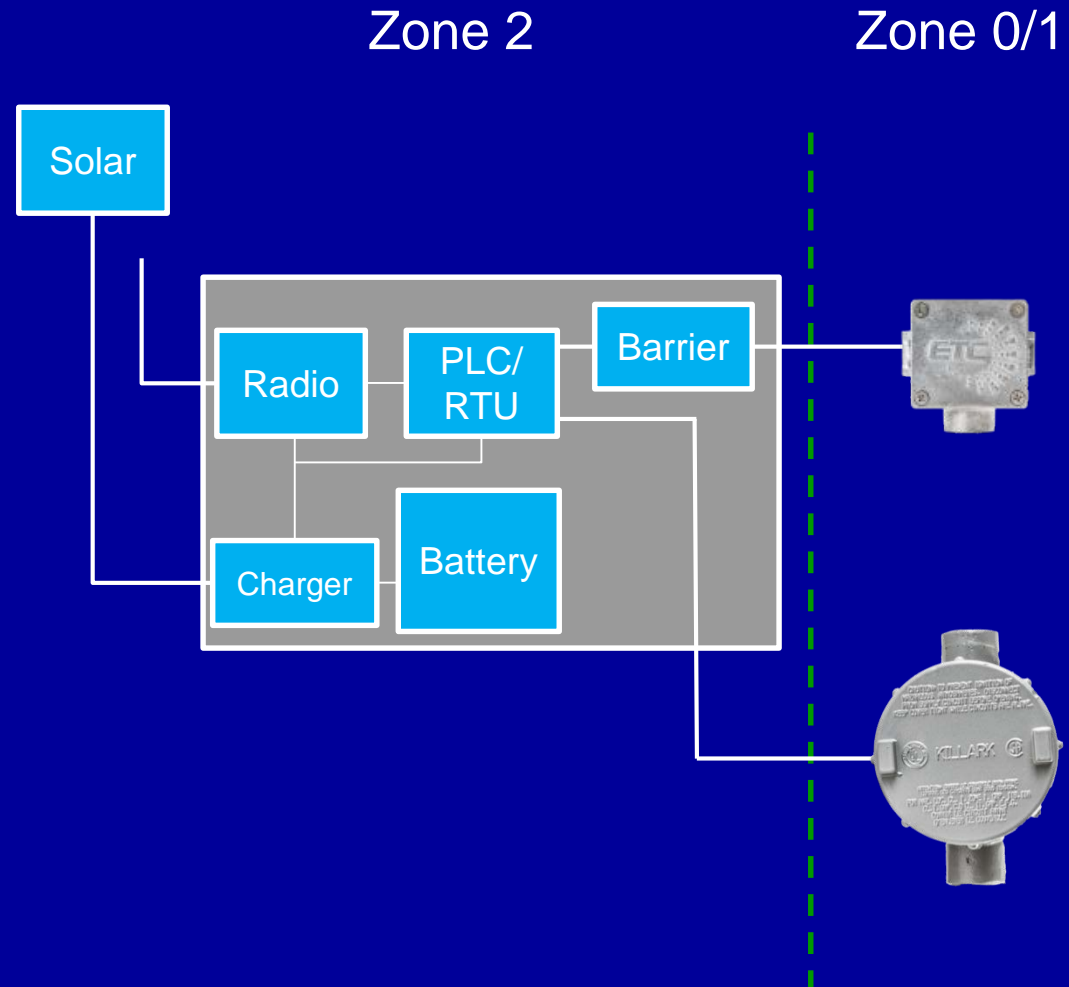
Control Drawing

- Must be provided by the manufacturer
- Identifies Entity Parameters
 - Allowable external connections that maintains safety
- Identifies Acceptable Zones

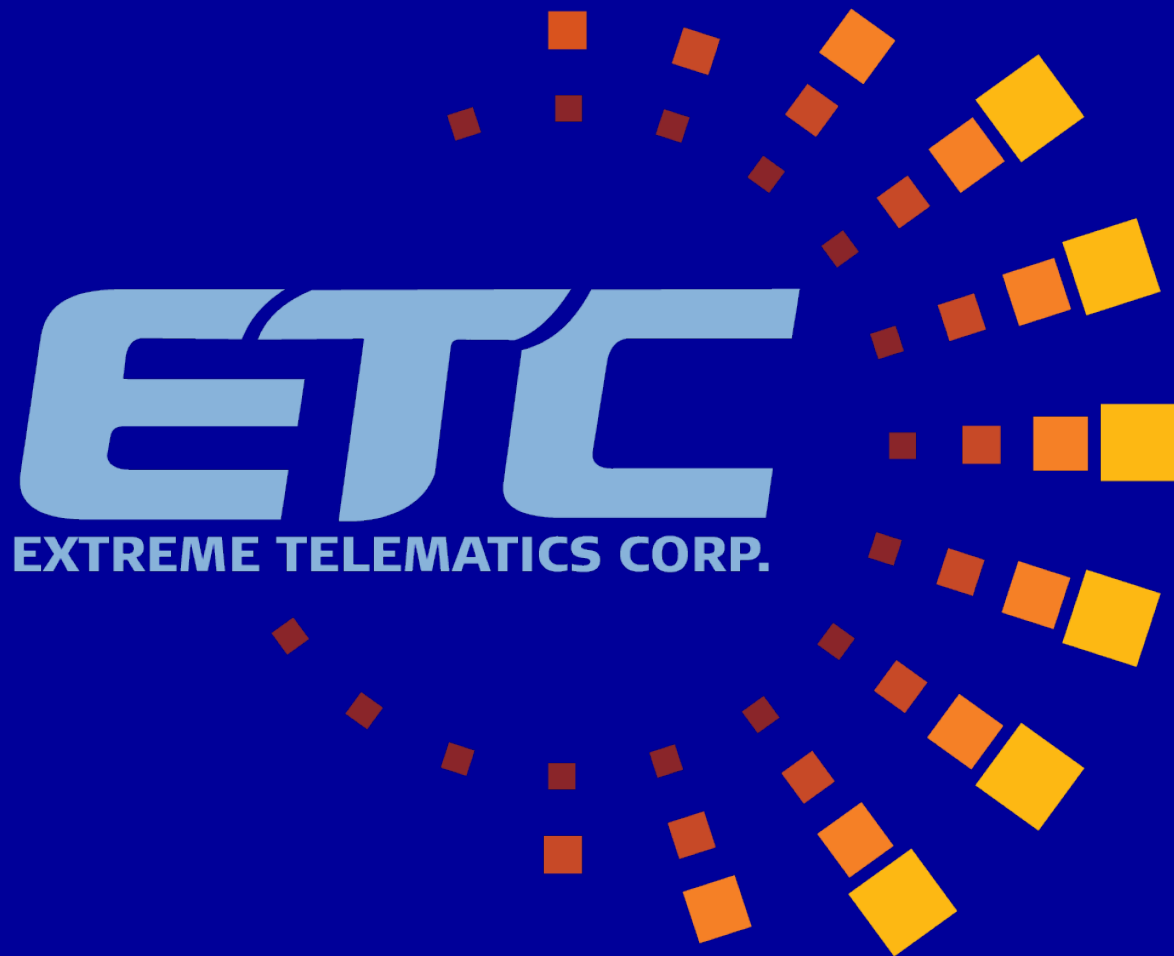


Crossing Zone Boundaries

- **Prevent propagation of gas**
 - Sealed cables if below a minimum cable length
- **Limit the transfer of energy**
 - Safe outputs in less hazardous area
 - Intrinsic Safety (IS) Barrier
- **Explosion Proof Protection**



Questions?



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