Hazardous Locations Classifications

A Guide to Practical Application of HazLoc for Emergency Responder Organizations

Overview

Many products for use in emergency services applications receive certification to hazardous locations (HazLoc) standards. The level, scope, and applicability of these vary based on the products' inherent capability to meet these requirements, the market applications and user needs, and the geographic location where the products are being marketed and used.

Due the complexity of these standards, emergency responders can become confused as to what the terminology means and what the benefits really are. This confusion is made worse by manufacturers that misunderstand and/or misrepresent the level or type of certification that their products actually attain.

Non-Incendive vs. Intrinsic Safety

Perhaps the most common concept Emergency Responder Organizations grapple with is that of Intrinsic Safety. Often, emergency responders seek products that are Intrinsically Safe without understanding what this term really represents. Further, manufacturers often claim their products to be Intrinsically Safe, when, in fact, their products are not.

Intrinsic Safety and Non-Incendive are Protection Design Techniques, which also include Non-Sparking, Explosionproof, Pressurized, and others. These techniques are governed by various standards for specific applications.

In North America, the most common HazLoc system is the Division system. In the Division system, products are first categorized by Class, which indicates if they protect against atmospheres that are contaminated with gasses and vapors (Class I), dust (Class II), or fibers and filings (Class III). NFPA 1801-2013, Standard on Thermal Imagers for the Fire Service requires adherence only to Class I atmospheres (see Table 1 for an overview of Class I Protection Design Techniques).

Products are then sub-categorized by Division, which indicates the level of protection both when the product is operating in its "average" condition and when it is in an "unusual" condition. The average condition is normal operation; the unusual condition is when it is functioning abnormally. Further, the Division system details which gas or dust the product protects against and for what temperature ranges.

For Class I atmospheres, the applicability of Intrinsically Safe versus Non-Incendive Protection Design Techniques is derived from the frequency of flammable concentrations of gases and vapors. If a product is to be used in atmospheres where these concentrations are normally present, then a product rated as Intrinsically Safe is appropriate. Where these concentrations are only present in abnormal situations, such as a leak, a product with a rating of "Non-Incendive" is acceptable.

Table 1 – Summary of Class I Protection Design Techniques

Class	Division	Where ignitable concentrations of flammable gases or vapors are present:	Protection Design Technique
Class I	Division 1	For long periods of time under normal conditions	Intrinsic Safety
Class I	Division 2	Only under abnormal conditions	Non-Incendive
Non Hazardous Area			Not Applicable

Perhaps most importantly, there is a misconception that products rated as Intrinsically Safe keep emergency responders that much safer. This can be true, but only in the very specific and unusual circumstances where an Intrinsically Safe product affords additional meaningful protection. Other product attributes, such as overall reliability, fitness for use, and general performance measures are far more likely to impact emergency responder safety. For instance, a thermal imager that is built to withstand high degrees of shock, heat, and other environmental elements is more likely to work at a call where reliability is severely tested than an imager that is built to a lower ruggedness standard. Most people would conclude that the more reliable product, because it has a better chance of remaining operational in such atmospheres, is "safer".

What these Protection Design Techniques mean for Emergency Responders

For emergency responders, the first thing to understand is whether any Protection Design Technique is applicable for the atmospheres in which responders work. According to the Occupational Health and Safety Administration (OSHA), examples of Class I atmospheres, where flammable concentrations may exist under normal circumstances, are petroleum refineries and gasoline storage and dispensing areas; dry cleaning plants where vapors from cleaning fluids can be present; spray finishing areas; aircraft hangars and fuel servicing areas; and utility gas plants and operations involving storage and handling of liquefied petroleum gas or natural gas. Examples of Class I, Division 1 atmospheres that would require an Intrinsically Safe product, are "areas near open dome loading facilities or adjacent to relief valves in a petroleum refinery".

Before specifying product requirements, Emergency Responder Organizations should ask themselves if and how they would respond to calls where explosive atmospheres are believed to be present. Do they understand the standards and protection factors in detail? Do they have guidelines and processes for how to respond to these calls? Do they know what types of equipment they should bring to these calls and how to appropriately use this equipment? Are responders adequately trained to respond in these environments? Would implementing compliancy standards and practices significantly reduce risk? Is the risk of putting responders into these situations warranted? There are a lot of questions that go well beyond merely looking at a rating on a product label and presuming safety.

Practically speaking, responses to Class I, Division 1 atmospheres are rare, and organizations that do respond regularly to such situations would most likely utilize teams that are well versed in HazLoc principles and therefore thoroughly understand their equipment needs. For teams responding to these types of calls, equipment choices that meet intrinsic safety standards, whether flashlights, radios, or something else, are limited. For most everyone else, responses will rarely involve Division 1 atmospheres, as the vast majority of responses will not involve flammable concentrations as a normal condition. The National Fire Protection Association (NFPA) understood this need for a balance of safety and practicality when it did not make Intrinsic Safety a requirement for NFPA 1801-2013. Instead, NFPA specified Non-Incendive Class I, Division 2.

Truth in Advertising?

Partly due to the complexity of HazLoc standards and the temptation to play "fast and loose" with popular terminology, some manufacturers that have attained North American Class I, Division 2 (Non-Incendive) compliance for their thermal imagers incorrectly tout them as "Intrinsically Safe". This can confuse customers who are comparing models and, at worst, create a misconception that a product meets a standard that it does not. The takeaway for Emergency Responder Organizations is that, when it comes to claims regarding Intrinsic Safety, the truth is often markedly different from what is printed on a brochure or listed on a website.

Summary

With the emergence of an NFPA standard for Thermal Imagers and its inherent requirement for Class I, Division 2 (Non-Incendive) compliance, Hazardous Locations terminology is making its way into the lexicon of the average emergency responder. Yet, the overwhelming technical complexity of the standards that make up HazLoc classifications creates challenging disconnects in marketing hype, market understanding, and actual user needs.

The practice of adhering to the letter of HazLoc requirements goes well beyond simply buying a product that attains a certain rating and adding it to response toolkit. It also includes researching the requirements fully so that operating guidelines can be implemented to ensure safe and effective responses to incidents where HazLoc issues are present. There is a compelling argument that other product attributes, including product reliability, impact overall safety to a much greater extent and far more commonly than does a product's adherence to a HazLoc standard.

Emergency Responder Organizations must weigh the benefits of utilizing products that achieve certain HazLoc ratings against the actual costs of attempting to research, train, implement, and execute in accordance with HazLoc principles. In the potentially very small number of cases where responders may be in danger by their mere presence in highly flammable atmospheres, the effort of attempting to "get it completely right" may not be worth the risk.

Sources:

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