

INTRINSIC SAFETY AND ASHCROFT[®] SWITCHES

WHAT IS INTRINSIC SAFETY?

Intrinsic Safety is an explosion prevention technique applied to electrical equipment and wiring in hazardous locations. It is type of protection that limits energy in the hazardous location to a level below that which would ignite the specific hazardous material being handled in that location. For a system to be intrinsically safe, all equipment in the system must be taken into consideration. For analysis, applications are usually broken down into individual systems or loops, which include a component such as a switch or transmitter in the hazardous area, and a receiver in a “safe area”. A specially designed barrier is located in the “safe” area to prevent unsafe levels of voltage or current from getting into the hazardous area.

WHY INTRINSIC SAFETY?

Properly designed and installed, intrinsically safe systems are safer than similar systems that utilize explosion-proof enclosures for protection. The use of explosion-proof enclosures implies that there will be an explosion. Therefore, the enclosure is designed to contain it. Intrinsically safe design implies that the explosion will be prevented and, therefore, should be safer even without expensive explosion-proof enclosures. By limiting energy to the hazardous area, there will be no spark, or it will be too weak to propagate an explosion.

Most guidelines require that two simultaneous failures, such as a short and component failure can occur within the same loop before safety is compromised. With explosion-proof enclosures, the single act of leaving the cover off a switch could result in an unsafe condition. The consequences of human error are thus diminished with intrinsically safe design.

ARE ASHCROFT[®] PRESSURE OR TEMPERATURE SWITCHES INTRINSICALLY SAFE?

This is the way the question is often asked, but it is technically an incomplete question. Intrinsic safety is related to the whole system, including apparatus and wiring. In order for electrical apparatus, such as a switch, to be intrinsically safe, it must be wired correctly to an approved barrier, which is designed to limit voltage and current to it.

Fortunately, Ashcroft[®] Pressure and Temperature switches are classified as “simple apparatus” since they do not create nor store energy.

According to ANSI/ISA Section 3.21 12.06.01-2003 “simple apparatus” neither store nor generate electricity. “Therefore, switches are normally useable in intrinsically safe circuits without further certification, provided the power source of the circuit is certified Ex*i* and the installation is in accordance with the relevant codes of practice.” This is essentially an International Electrotechnical Committee (IEC) guideline, and is followed by CENELEC in Europe and ANSI/ISA and FM in the USA.

ADDITIONAL COMMENTS

- Hermetically sealed switch contacts are recommended because low currents and voltages are often handled, and hermetically sealed contacts are more reliable in most applications.
- Explosion-proof enclosures are not required, but may be desirable because of their rugged construction.