11450.2A Reference Section(s)	RCDR Topic	RCDR Number
2-7.2.1(d) 2-7.2.2 (d)	Deviation from 11450.2A Anti-Spark Protection Requirements for Hazardous/Explosive environments	23-023

QUESTION

Q: NAVCRANECENINST 11450.2A sections 2-7.2.1(d) and 2-7.2.2 (d) require pendant pushbutton stations and electrical enclosures to be NEMA Type 7 for Class I, hazardous/explosive environments, and NEMA Type 9 for Class II, hazardous/explosive environments. NAVCRANECENINST 11450.2A does not recognize intrinsically safe circuitry* as a suitable alternative. Is it permissible to deviate from these requirements in order to allow the use of NEMA type 4 enclosures and pendant housing in conjunction with intrinsically safe circuitry while operating in hazardous/explosive environments?

* Intrinsic Safety per NEC Article 100 is a circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under prescribed test conditions.

ANSWER

A: This request is approved, based on the technical justification provided in Enclosure (1) of RCDR 23-023 entitled White Paper Intrinsic Safety, which supports safe and reliable use of these or similar catalog components in the stated environment. For completeness the white paper is included below. Note: Installation of intrinsically safe circuits shall be in accordance with NEC 504.30.

WHITE PAPER:
INTRINSICALLY SAFE BARRIER SYSTEMS AND PENDANT CONTROLS IN HAZARDOUS LOCATIONS

Prepared by

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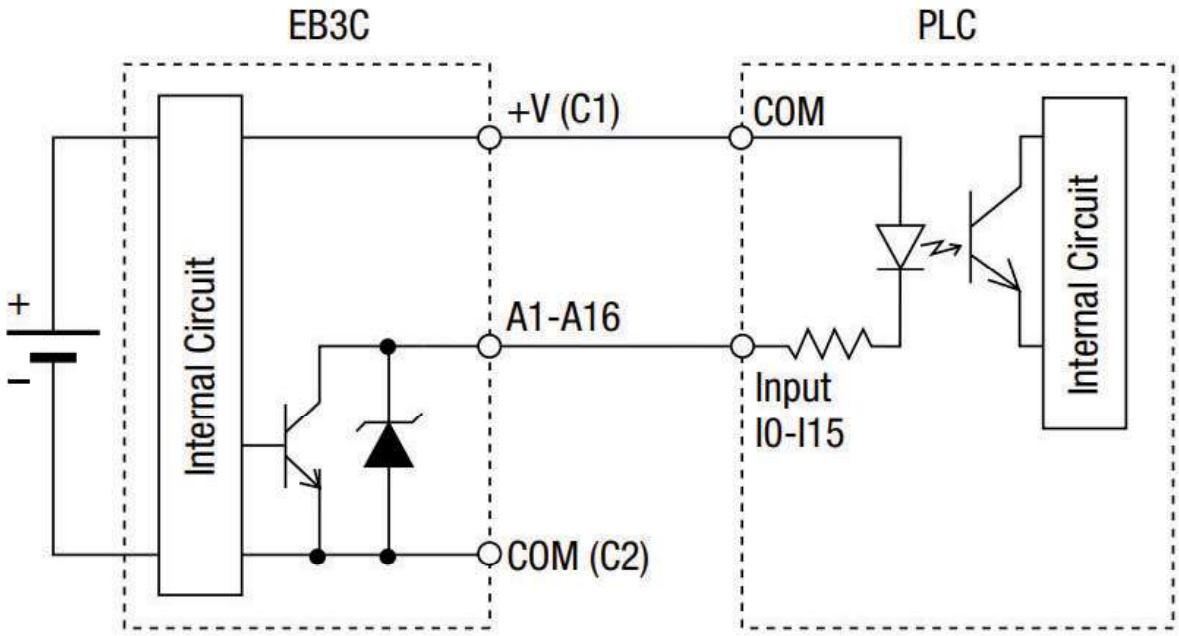
INTRODUCTION

This paper examines the usage of intrinsically safe pendant circuitry as an alternative to NEMA 7/NEMA 9 pendant enclosures. Intrinsically safe barriers (ISBs) are electronic devices that are designed to prevent the ignition of flammable gas, dust, or fibers that may be present in hazardous areas by limiting the electrical energy that can be transmitted to the hazardous area from a nonhazardous area. This functionality ensures if a short circuit does occur, energy is below the ignition curve of the gas mixture in the area. Because the ignition point varies depending on gas type and gas concentration, intrinsically safe barriers must be designed for their specific application.

EXISTING PRODUCT

Although multiple methods of electrical isolation exist, optical isolation is most seen in applications related to pendant controls. Optical isolation uses a phototransistor and LED. Using light as a signal allows for complete electrical isolation. The company named Idec is one manufacturer dealing with ISBs. The Idec model EB3C ISB is shown as an example.



Intrinsically Safe Barriers

	EB3C Relay Barriers	EB3N Safety Barriers	EB3L Lamp Barriers
Ratings		UL: Class I, II, III, Division 1 Groups A, B, C, D, E, F, G c-UL: Class I, Zone 0 [AExia] II C UL913, UL60079-0, UL60079-11, UL61010-1 FM, ATEX, IECEx	
Features	• Dry-contact switches can be connected • 8- and 16-circuit types are available in common wiring types • 1 to 16 channels • Three different output types available; electromechanical, logic, and transistor.	• Ensures protection and machine safety in explosive atmosphere • Machine safety system can be built in compliance with ISO13849-1 Cat. 4, Performance level e • Safety input devices applicable in any explosive gas and hazardous areas available	• Compact and lightweight • 8- and 16-channel types are available in common wiring types • 1 to 16 channels • No grounding required

Note: The manufacturer has stated, by NEC definition of Division 1 and Division 2 areas, a product rated for a Division 1 area may be used in a Division 2 area.

KEY FINDINGS

1. NEC Supported

By keeping current below ignition point, explosion risk is eliminated. This can be seen in the NEC excerpt below:

NEC 500.7 - Section 500.7(A) through (L) shall be acceptable protection techniques for electrical and electronic equipment in hazardous (classified) locations.

500.7(A) – Explosion proof Equipment. This protection technique shall be permitted for equipment in Class I, Division 1 or 2 locations

500.7(E) - Intrinsic Safety. This protection technique shall be permitted for equipment in Class I, Division 1 or 2; or **Class II, Division 1 or 2**; or Class III, Division 1 or 2 locations. The provisions of Articles 501 through 503 (See below) and Articles 510 through 516 (see below) shall not be considered applicable to such installations, except as required by Article 504, and installation of intrinsically safe apparatus and wiring shall be in accordance with the requirements of Article 504.

501 Class I Locations
502 Class II Locations
503 Class III Locations
504 Intrinsically Safe Systems
510 Hazardous Locations - Specific
511 Commercial Garages, Repair, and Storage
513 Aircraft Hangars

514 Motor Fuel Dispensing Facilities
515 Bulk Storage Plants
516 Spray application, Coating, etc.

2. Discrepancy between 11450.2A and NEC

We have a Class II area. As seen in point one, NEC 500.7 lists intrinsic safety as usable in Class I, II, and III while explosion proof containers are recommended in Class I only. Therefore, when the 11450.2A 2-7.2.1 (d)[see below] requires explosion proof containers in hazardous areas, it fails to acknowledge intrinsic safety barriers as a viable alternative to explosion proof containers.

2-7.2.1d) The pendant pushbutton station shall be NEMA Type 7 for Class I, hazardous environments; and NEMA Type 9 for Class II, hazardous environments, as classified by NEC.

CONCLUSION

- Intrinsic safety ensures a circuit is incapable of igniting combustible material in the air. This eliminates the need for containment of the explosion by removing the catalyst to an explosion occurring. This is acknowledged by the NEC in 500.7E, which exempts intrinsically safe circuits from the requirements of Class I, II, and III hazardous locations.
- While recognized by the NEC, the 11450.2A does not acknowledge intrinsic safety barriers as an explosion proof container alternative and most likely needs to address this in the next revision.