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Shelters for Process Analyzers

GP 04-03-03

Scope

- 1) [I] This Global Practice (GP) covers materials, design, and erection of the following types of shelters used for process analyzers and associated systems housed with the analyzers:
 - a) Non-enclosed walk-in type shelters
 - b) Locally installed enclosed analyzer cabinets
 - c) Enclosed walk-in type shelters
- 2) [I] An asterisk (*) indicates that a decision is required by the Owner's Engineer or that additional information is furnished by the Owner's Engineer.

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1. Additional Requirements

* [I] The following Practices and Standards shall be used with this Practice as specified by the Owner's Engineer.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 03-06-01	Piping for Instruments
GP 04-01-02	Structural Steel Design
GP 04-01-03	Design Loads for Structures
GP 15-08-03	Combustible and Toxic Vapor Detection Systems
GP 15-10-01	Instrument Transmission Systems
GP 15-12-01	Instrument Wire and Cable
GP 16-01-01	Area Classification and Related Electrical Design for Flammable Liquids, Gases or Vapors
GP 16-04-01	Grounding and Overvoltage Protection
GP 16-09-01	Low Voltage AC Motors Up to 200 HP (150 kW)
GP 19-01-01	Paint and Protective Coatings
GP 20-01-01	Inspection of Equipment and Materials

1.2. ANSI–American National Standards Institute

ANSI Z97.1	Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test
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1.3. API–American Petroleum Institute

API RP 500	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
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1.4. ASTM–American Society for Testing and Materials

ASTM A 653/A 653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials

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1.5. IEC–International ElectroTechnical Commission

IEC 60079-16	Electrical Apparatus for Explosive Gas Atmospheres Part 16: Artificial Ventilation for the Protection of Analyzer(s) Houses
IEC 61285	Industrial-Process Control - Safety of Analyser Houses
IEC TR 61831	On-Line Analyser Systems - Guide to Design and Installation

1.6. NFPA–National Fire Protection Association

NFPA 55	Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
NFPA 70	National Electrical Code
NFPA 101	Life Safety Code
NFPA 496	Standard for Purged and Pressurized Enclosures for Electrical Equipment (National Fire Codes, vol. 7)
NFPA 780	Standard for the Installation of Lightning Protection Systems

2. General

- 1) * [S] Shelters shall comply with relevant local national standards and local building codes or those listed in Section 1 in countries with no comparable standards.
- 2) [S] Analyzer shelters and enclosed cabinets shall not be located in Class I, Division 1 (Zone 1) electrically classified areas.
- 3) [S] Hazardous area classification for each type of shelter shall be as follows:
 - a) Non-enclosed walk-in type shelters: the same as the area in which the shelter is installed.
 - b) Locally installed enclosed analyzer cabinets: the same as the area in which the enclosure is installed.
 - c) Enclosed walk-in type shelters:
 - i) if the shelter is installed in a Class I, Division 2 (Zone 2) area, OR
 - ii) samples containing flammable gases are piped into the house
 then the area classification inside the house is Class I, Division 2 (Zone 2).
 However, if ventilation air is taken from an unclassified (safe) area then at the owner's discretion non-certified equipment may be installed in the shelter, providing power to the analyzer equipment is automatically shut off in the event of loss of required ventilation air flow or flammable gas detection.
 - d) Enclosed walk-in type shelters:
 - i) if the shelter is installed in an unclassified (safe) area AND

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- ii) samples piped into the house do not contain flammable gases
then the interior of the shelter is an unclassified (safe) area
- 4) * [S] All electrical equipment and analyzers associated with analyzer shelters and local cabinets shall as a minimum be certified by an appropriate local authority to the relevant local National Standards for use in the electrical classified area (classification, gas group, and surface temperature rating) in which they are installed, taking into consideration shelter ventilation and safety interlocks.

3. Materials

- 1) [S] Structural load bearing materials shall be metal or reinforced concrete to ensure structural integrity. Alternative materials such as fiberglass shall be subject to approval by the Owner's Engineer.
- 2) [S] Materials with a flame spread classification greater than 25 per ASTM E 84 shall not be used for exposed interior or exterior surfaces.
- 3) [R], [C] Galvanized carbon steel sheets for roofing and siding shall be per ASTM A 653/A 653M, with a minimum weight of coating of 2 oz/ft² (610 g/m²) of sheet. Austenitic stainless steel shall be considered as an alternative.
- 4) [R], [C] Fiberglass construction shall not use wood for the substrate material and the coating used shall dissipate electrostatic buildup and provide protection against UV degradation.
- 5) [R], [C] Roof ventilators or other ventilators and louvers shall be of corrosion resistant materials.
- 6) [R], [C] Doors and frames shall be metal or compatible with the shelter construction materials. Locks and hinges shall be stainless steel.
- 7) [S] Glass shall be laminated or tempered "safety glass" meeting the requirements of ANSI Z97.1. Glass thickness shall be 1/4 in. (6 mm). The laminated glass shall have a 0.06 in. (1.5 mm) interlayer. Glass shall not be used in over pressure zones above 1.0 psig from potential explosion domains.

4. Design

- 1) * [O], [R] The type of shelter or use of locally installed enclosed cabinets will be specified. Accessibility for maintenance shall be a prime consideration in the design of the analyzer shelter and layout. The maintenance aisle shall be at least 3 ft wide for easy maintenance and testing. Each shelter shall be designed with space, utilities, terminals, and all facilities to accommodate one additional analyzer or shall be designed with a 15 percent excess of each commodity, whichever is greater. Space for one additional analyzer is defined as 4 ft wide by the full height of a wall.
- 2) * [C] If the basic type of construction and materials are not specified, proposals employing the most economical type of construction suitable for the required service and environmental exposure shall be submitted to the Purchaser for approval by the Owner's Engineer. Such proposals shall cover:
 - a) Layout
 - b) Architectural appearance
 - c) Material selection

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- d) Deviations from practice requirement
- e) Foundations and location

In addition to masonry or metal sheet construction, proposals to use prefabricated concrete construction, fiberglass, or laminated aluminum-foam-plastic-aluminum, may be submitted for consideration.

- 3) * [S], [M] Gas cylinders for calibration or carrier gases shall be securely mounted in bottle racks. Cylinders shall not be closer than 25 ft (7.5 m) to process pumps or other hazardous process equipment. The final location shall be approved by the Owner's Engineer. Cylinders mounted on an elevated pad must have a ramp for access. Installation of hydrogen cylinders shall meet the requirements of NFPA 55, Chapter 10.
- 4) [S] All piping, armored cable, wiring, and conduit (power, signal, control) entering enclosed shelters shall be sealed at the point of entry. The points of entry shall be on the sides or bottom of the cabinet or shelter and shall be identified with permanent tags. These points of entry shall be located to minimize piping and fittings inside the shelter. All conduit connections shall be rigid galvanized carbon steel or rigid aluminum and at least 1/2 in. (12.5 mm) threaded. All necessary explosion-proof seals shall be provided, but the seals shall not be poured until after completion of all onsite acceptance testing. Cable tray with armored cable is acceptable both inside and outside the house.
- 5) Doors:
 - a) [O] All exterior exit doors shall open outward.
 - b) [S] All doors shall be equipped with quick opening bars (panic bars) on the inside, which must override exterior locks. The doors shall be equipped with a 12 in. x 12 in. (30 cm x 30 cm) tempered safety glass windows unless specified otherwise. The doors shall be equipped with door gaskets made of suitable materials to ensure proper pressurization.
 - c) [S] Doors shall be provided with automatic closers.
- 6) [I] The shelters shall be provided with mounting plates and lifting lugs, as required. They shall also be provided with internal and external jacking points.
- 7) * [S], [E] Sample vents:
 - a) Analyzer sample vents and discharges shall be piped outside of the cabinet or shelter. Sample vented to the atmosphere shall conform to all local environmental requirements.
 - b) Where several analyzer systems require atmospheric vents, then they may all be combined into a common header. A ball valve should be provided to enable isolation of each analyzer system from the common header.
 - c) Vent systems shall have an upward running branch, terminating in a gooseneck, for venting gases or vapors. The vent point shall be located a minimum of 10 ft (3 m) above the enclosure and more than 25 ft (7.5 m) from any ventilation air intake or area where personnel may be present. Vent lines from analyzers subject to condensation shall be sloped to a low point equipped with drain facility and the lines that may be subject to freeze-up shall be heat traced.
 - d) [*] The total estimated flow rate from vent systems shall be calculated. The Owner's Engineer shall consider environmental and industrial hygiene requirements to determine whether the vents require hydrocarbon or toxic vapor scrubbing facilities.
- 8) [S] Lines containing flammable or toxic materials or oxygen located inside shelters or cabinets shall have a clearly labeled fire-safe ball valve located outside the shelter or local cabinet.

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