****

# SECTION 21 13 13

# WET PIPE FIRE SPRINKLER SYSTEMS

# Corrosion Management Specification

**PART 1 GENERAL**

1.01 DESCRIPTION OF WORK

1. Provide all required labor, materials, equipment and services necessary for a complete and operational Corrosion Management Program for the fire protection system(s) (FPS) as hereinafter described [and as indicated on the drawing(s)].
2. Basis of Design: Engineered Corrosion Solutions.
3. Corrosion Management Work

May include the following listed products and services:

* 1. Corrosion Management Products shall be as specified herein:

1. ECS Ejector Automatic Air Vent (PAV-W)
2. ECS Ejector Automatic Air Vent – Supervised (PAV-WS)
3. ECS Protector Wet SMART Vent (PSV-W)
4. ECS Protector Nitrogen Inerting Vent (PAV-WN)
5. ECS Protector Nitrogen Inerting Vent – Supervised (PAV-WNS)
6. ECS Protector Remote Inerting Station (RIS-1)
7. ECS In-Line Corrosion Detector (ILD-X)
8. ECS Protector Nitrogen Inerting Start-up Kit (NISK-1)
9. ECS Protector Handheld Gas Analyzer (PHGA-1)
   1. Installation of corrosion management products
   2. Miscellaneous piping, fittings, couplings, valves, etc. as required
   3. Coordination of work and schedules with other trades
   4. System pressure testing
   5. System commissioning

1.02 REFERENCES

1. All corrosion management work shall be designed, installed, inspected, tested and maintained in accordance with all applicable codes, referenced standards, documents listed herein, the manufacturer’s instructions and the provisions of this specification:
2. NFPA 13, Standard for Installation of Sprinkler Systems.
3. NFPA 25, Standard for the Inspections, Testing, and Maintenance of Water-Based Fire Protection Systems.
4. All corrosion Monitoring Devices shall be provided to achieve compliance with Section 23.1.5.2 (4) of the 2010 Edition [24.1.5.2 (4) of the 2013 / 2016 Edition] [5.1.5.2 of the 2019 Edition] of NFPA 13, Standard for the Installation of Sprinkler Systems and shall be U.L. 2987 listed for monitoring corrosion in fire sprinkler systems.

1.03 QUALITY ASSURANCE

1. Equipment and components not specifically specified shall be FM Approved or listed by Underwriter's Laboratories, Inc. for FPS installation.
2. All fire sprinkler system components shall be installed free of rust/corrosion or visible damage. All items not complying with this requirement shall be replaced without cost to the Owner.

1.04 REGULATORY REQUIREMENTS

1. All work shall meet the requirements of Section 1.02, References.
2. The fire sprinkler contractor shall not pursue any interpretations of the Corrosion Management Program except through the Engineer.

**PART 2 PRODUCTS**

2.01 PIPING

1. Wet Pipe FPS:
2. Per local requirements and NFPA 13.
3. All pipe shall have a Corrosion Resistance Ratio (CRR) equal to or greater than 1.00. Refer to the current UL Fire Protection Equipment Directory - Steel Sprinkler Pipe, for acceptable manufacturers, sizes, and joining methods.

2.02 JOINING OF PIPE AND FITTINGS

1. Wet Pipe FPS:
2. All pipe shall be joined in accordance with NFPA 13 and manufacturers recommendations.
3. Fittings shall be 175 psi screwed or flanged black cast iron or approved equivalent such as mechanical, plain end or welded connections. Where mechanical fittings and couplings are used together they shall be of the same manufacturer.

2.03 CORROSION MANAGEMENT PRODUCTS

1. ECS Ejector Automatic Air Vent (PAV-W) [**NOTE:** Select either PAV-W, PSV-W, or PAV-WN]:
2. The fire sprinkler contractor shall furnish and install an FM 1344 Approved automatic air vent; 175 psi rated working pressure. Install per manufacturer’s instructions.
   1. Provide at least one automatic air vent per automatic fire sprinkler system.
3. The automatic air vent shall have redundant float valves to prevent leakage from the device in the event that the primary float valve fails; the automatic air vent shall not require plumbing to drain.
4. The automatic air vent shall not require a drip pan or water collection device to prevent water discharge in the event that the primary float valve fails.
5. The automatic air vent shall have a pressure indicating element indicating functionality of the primary float valve that is visible from the floor or below the device.
6. [**NOTE:** The contractor shall install a supervised automatic air vent (model PAV-WS) when automatic monitoring is specified.] The supervised model shall be connected to an addressable monitoring module to monitor the pressure indicating element downstream of the primary float. The module will provide notification if the device has failed
7. Install automatic air vent at or near the remote high point of the FPS piping. Device location shall be at the location(s) provided on the drawings.
8. Install the automatic air vent in a location that provides a clear view of the pressure indicating element
9. The piping between FPS and automatic air vent shall not create a water trap; the connecting piping must drain when FPS is drained or automatic air vent cannot perform venting functions.
10. The fire sprinkler contractor shall leave the isolation ball valve in the open position after installation of the automatic air vent and the final testing of the system has been completed.
11. ECS Protector Wet SMART Vent (PSV-W) [**NOTE:** Select either PAV-W, PSV-W, or PAV-WN]:
12. The fire sprinkler contractor shall furnish and install automatic air vent; 175 psi rated working pressure.
    1. Provide at least one automatic air vent per automatic fire sprinkler system. Install per manufacturer’s instructions.
    2. The automatic air vent shall be compatible with nitrogen inerting.
13. The pressure relief device on the automatic air vent shall be rated at 40 psi to prevent loss of nitrogen gas during nitrogen inerting.
14. The automatic air vent is equipped with a solenoid valve and separate electric control box. A dedicated 120V AC power supply is required at the electric control box.
15. Install automatic air vent at or near the remote high point of the FPS piping. Device location shall be at the location(s) provided on the drawings.
16. The piping between FPS and automatic air vent must not create a water trap; the connecting piping must drain when FPS is drained or automatic air vent cannot perform venting functions.
17. The electric control box shall be mounted to an adjacent wall near vent installation location.
18. The solenoid valve shall be wired to the electric control box per NFPA 70 and local requirements.
19. The fire sprinkler contractor shall leave the isolation ball valve in the open position after installation of the automatic air vent and the final testing of the system has been completed.
20. The automatic air vent includes a nitrogen injection port when used with Wet Pipe Nitrogen Inerting (WPNI) protocol.
21. [**NOTE**: Include when nitrogen inerting FPS] Include Install nitrogen injection port at the riser on the system side of the control valve. The fire sprinkler contractor shall leave the isolation ball valve in the closed position after installation.
22. ECS Protector Nitrogen Inerting Vent (PAV-WN) [**NOTE:** Select either PAV-W, PSV-W, or PAV-WN]:
    1. The fire sprinkler contractor shall furnish and install an FM 1344 Approved nitrogen inerting vent; 175 psi rated working pressure. Install per manufacturer’s instructions.

Provide one nitrogen inerting vent per automatic fire sprinkler system when nitrogen inerting is specified for the FPS.

The nitrogen inerting vent shall not be installed when an automatic air vent has been specified.

* 1. The nitrogen inerting vent shall have redundant float valves to prevent leakage from the device in the event that the primary float valve fails; the inerting vent shall not require plumbing to drain.
  2. The nitrogen inerting vent shall not require a drip pan or water collection device to prevent water discharge in the event that the primary float valve fails.
  3. The nitrogen inerting vent shall have a pressure indicating element indicating functionality of the primary float valve that is visible from the floor or below the device.
  4. The nitrogen inerting vent shall include a pressure relief device rated at 40 psi to prevent loss of nitrogen gas during nitrogen inerting.
  5. The nitrogen inerting vent includes a nitrogen injection port to allow nitrogen delivery to the FPS.
  6. [**NOTE:** Include if supervised nitrogen inerting vent (model PAV-WNS) is required and automatic monitoring is specified.] The supervised model shall be connected to the building fire alarm system or building management system to monitor the pressure indicating element downstream of the primary float. The connection will provide notification if the device has failed.
  7. Install nitrogen inerting vent at or near the remote high point of the FPS piping. Device location shall be at the location(s) provided on the drawings.
  8. Install the nitrogen inerting vent in a location that provides a clear view of the pressure indicating element.
  9. The piping between FPS and nitrogen inerting vent must not create a water trap; the connecting piping must drain when FPS is drained or nitrogen inerting vent cannot perform venting functions.
  10. Install nitrogen injection port at the riser on the system side of the control valve. The fire sprinkler contractor shall leave the isolation ball valve in the closed position after installation.
  11. The fire sprinkler contractor shall leave the isolation ball valve in the open position after installation of the nitrogen inerting vent and the final testing of the system has been completed.

1. ECS Protector Remote Inerting Station (RIS-1): [**NOTE:** Only for use with Nitrogen Inerting Vent PAV-WN]
   * + 1. The fire sprinkler contractor shall furnish and install a Remote Inerting Station that allows for nitrogen inerting functions of the Nitrogen Inerting Vent (PAV-WN) to be provided at an easily accessible location. Install per manufacturer’s instructions.
       2. The remote inerting station shall include connections for system exhaust gas, gas purity sampling, and y-strainer purging from the nitrogen inerting vent.
       3. The connection for the y-strainer purge line shall be rated to operate under normal system pressure.
       4. Install inerting station on a wall or vertical surface near the vent assembly at an accessible location.
2. ECS In-Line Corrosion Detector:
3. The fire sprinkler contractor shall furnish and install an In-Line Corrosion Detector (ILD) [on each FPS/as shown on the drawings] as directed by the design engineer. Install per manufacturer’s instructions.
4. The ILD shall be U.L. 2987 listed for use in a fire sprinkler system.
5. Device location shall be determined by design engineer, equipment manufacturer or as show on drawings.
6. The ILD shall be a minimum of eighteen (18) inches long and equipped with rolled groove ends for installation within the FPS piping network.
7. The ILD corrosion detection surface shall be a minimum of six (6) inches long covering the entire circumference of the pipe and be no more than thirty-five (35) thousandths of an inch thick.
8. The ILD shall match the FPS pipe material (black/galvanized), pipe schedule, and pipe diameter at the installation location.
9. The ILD shall be equipped with DPDT Form C contacts that is capable of indicating when the ILD has been activated.
10. The ILD shall be provided with a local battery powered annunciator. The annunciator shall be capable of surface or flush mounting and have a push-to-test function.
11. The contractor shall connect the ILD output to the [building monitoring system (BMS)/Fire Alarm Control Panel (FACP)/remote annunciator]. Coordinate BMS/FACP interface with the [controls and instrumentation contractor/electrical contractor/fire alarm contractor].
12. ECS Protector Nitrogen Inerting Start-up Kit (NISK-1): [**NOTE:** Only for use with Nitrogen Inerting Vent PAV-WN]
    1. The fire sprinkler contractor shall furnish nitrogen inerting start-up kit when nitrogen inerting has been specified; provide one per building or as directed by design engineer.
    2. The nitrogen inerting start-up kit includes a nitrogen cylinder pressure regulator, 300 psi rated gas delivery hose, and quick-connect fittings for hose attachment to the nitrogen injection port.
    3. The nitrogen inerting start-up kit shall remain in the building or with designated site/facility personnel when commissioning is complete.
13. ECS Protector Handheld Gas Analyzer (PHGA-1):
    1. The fire sprinkler contractor shall furnish handheld gas analyzer when nitrogen inerting has been specified; provide one per building or as directed by design engineer.
    2. The handheld gas analyzer shall be equipped with a quick connect fitting compatible with gas sampling ports on all nitrogen inerting vents.
    3. The handheld gas analyzer includes a one button calibration feature. The oxygen sensing element of the analyzer has a useful life of two years and the device should be replaced after that time.
    4. The handheld gas analyzer provides nitrogen gas concentration during system commissioning via the gas sample port provided on the specified nitrogen inerting vent.
    5. The handheld gas analyzer shall remain in the building or with designated site/facility personnel when commissioning is complete.

**PART 3 EXECUTION**

3.01 COORDINATION WITH OTHER TRADES

1. Coordinate closely with the General Contractor, other trades and the Owner to expedite construction, commissioning and treatment and avoid interference.

3.02 SUPERVISION AND TRAINING

1. [**NOTE**: Include when nitrogen inerting is included in the project]The fire sprinkler contractor shall provide on-site ECS Commissioning Services Package which shall include an ECS certified representative on-site for a minimum of one (1) day to verify the installation of the equipment and provide training to the Owner and Owner’s Representative.
2. The fire sprinkler contractor shall provide one (1) printed copy and an electronic file of the Owner’s Operation and Maintenance Manual for all corrosion control equipment. The Owner’s Manual shall include protocols for operation and maintenance of all equipment installed as part of this scope of work.

3.02 CORROSION PRODUCTS/SYSTEM COMMISSIONING PROTOCOL

1. Wet Pipe FPS [**NOTE:** Select applicable statements based on scope of work]:
2. [**NOTE:** Include if Automatic Air Vent is included in the project]The fire sprinkler contractor shall confirm the automatic air vent is installed at the location indicated by the design documents (at a remote high point of the FPS). The pressure indicating element must be clearly in view from directly below.
3. [**NOTE:** Include if Nitrogen Inerting Vent is included in the project]The fire sprinkler contractor shall confirm the nitrogen inerting vent is installed at the location indicated by the design documents (at a remote high point of the FPS). The pressure indicating element must be clearly in view from directly below.
4. All venting devices shall be connected to the FPS using a piping arrangement that will not create a water trap. The devices and the connecting piping must drain when the FPS is drained.
5. [**NOTE:** Include if Nitrogen Inerting Vent is included in the project]The fire sprinkler contractor shall confirm the nitrogen injection port has been installed at the fire sprinkler riser and the ball valve has been left in the closed position.
6. [**NOTE:** Include if Nitrogen Inerting Vent is included and plant nitrogen is not available in the project]The fire sprinkler contractor shall supply nitrogen gas for the purpose of nitrogen inerting.
7. The fire sprinkler contractor, before the final filling of the FPS with water, shall open the isolation ball valve on the vent devices to ensure as much trapped gas is released from the system as possible. Upon filling the FPS with water the isolation ball valve shall remain in the open position.
8. [**NOTE:** Include if In-Line Corrosion Detector is included in the project]The fire sprinkler contractor shall confirm the In-Line Corrosion Detector is installed in the locations shown on the approved shop drawings and the pressure switch has been wired to the specified monitoring system.
9. [**NOTE**: Include when nitrogen inerting is included in the project] The fire sprinkler contractor shall coordinate with the equipment manufacturer to schedule the on-site commissioning package at a time that has been coordinated with the General Contractor, Owner and Owner’s Representative.
10. [**NOTE:** Include when nitrogen inerting is included in the project] Complete nitrogen inerting protocol will be provided as part of equipment manufacturer’s Consulting Services Package.

**END CORROSION MANAGEMENT SPECIFICATION INSERTS**