# Engineering Specification

# Reliable Model DDX Type D PrePaK Assembled Unit with Integral Nitrogen Generator

**Recommended CSI MasterFormat Specification Location: 21 13 19, Preaction Sprinkler Systems (formerly 13940)**

A self-contained, fully integrated preaction sprinkler system complete with automatic nitrogen generator shall be provided. The system must be **[**cULus Listed**] [**FM Approved**]** components within a cabinet specifically designed for the intended use as an assembled unit, containing all the factory installed hydraulic and electrical components, fittings, gauges, mechanical couplings and supervisory air and nitrogen supply necessary for the operation of an approved automatic preaction sprinkler system in accordance with NFPA 13 **[**year**]** edition.

Cabinet shall contain a domestically factory-assembled and tested preaction system riser assembly with galvanized electric actuation trim. Cabinet size shall be limited to an area of 7.0 ft2. The cabinet shall be 12-gauge steel with rustproof exterior powder-coated black finish, and rustproof interior powder-coated white finish for improved interior cabinet visibility. Cabinet enclosure shall have removable panels for access to interior components. Cabinet door shall be lined with a neoprene gasket and shall contain viewing ports for water supply pressure, supervisory air pressure, system pressure gauges, and release control panel screen that are securely mounted.

The preaction system riser assembly shall include a properly sized water control valve, water supply manifold and drain manifold with grooved end connections, system drain, grooved end system control indicating butterfly valve with a pre-wired supervisory tamper switch assembly, grooved-end system discharge outlet, and associated electric actuation release trim listed as part of the deluge valve assembly. An optional system-side butterfly control valve with integral tamper switch wired to the releasing control panel shall be available. Deluge valve electric trim shall be galvanized and shall consist of all trim components necessary to enable the system to be used as a **[**Single Interlock**] [**Single Interlock, Cross-Zoned**] [**Double Interlock**] [**Double Interlock, Cross Zoned**]** preaction system. These components include a normally closed, powered open electric solenoid valve, main drain, alarm line test, water pressure gauges, push rod chamber supply connections, manual emergency release valve, pressurizing line connection, and closed drain assembly. A condensate drain trim shall also be included to prevent water columning above the clapper. Low air supervisory and water flow pressure switches shall be included as part of this assembly. Where applicable, electrical devices shall be wired for Class “A” service but shall also be fully functional with Class “B” wiring.

Supervisory gas supply shall be provided by an integral nitrogen generation unit located within the cabinet. Preaction system supervisory nitrogen shall be regulated through a regulating pressure maintenance device set to a pressure of 10 psi (0,7 bar).

A programmable releasing control panel shall be provided as part of the assembled preaction system unit. The unit shall be domestically manufactured, assembled and tested. Release panel shall be housed in an 18-gauge steel enclosure having a hinged door with a key lock and mounted entirely within the cabinet enclosure. The releasing control panel shall be a field-programmable Potter PFC-4410 RC releasing panel capable of providing programming to utilize the pre-action system for a **[**Single Interlock**] [**Single Interlock, Cross-Zoned**] [**Double Interlock**] [**Double Interlock, Cross-Zoned**] [**Custom Program for New York City Compliance**]** application as referenced in Reliable Technical Bulletin 735.

For all applications, loss of supervisory air pressure only shall provide a low-pressure supervisory alarm. All programming functions shall have the capability of being password protected. The control panel shall be mounted within the within the main cabinet and have a 32-character backlit LCD display. All diagnostic and alarm event information shall be viewable in text form on this display. Four integral SPDT relay contacts shall be available for connection to external auxiliary equipment.

Three separate 120 VAC power connections shall be provided: one connection for the nitrogen generator, one connection for the releasing panel, and one connection for the air compressor. Each has a separate power connection within the 120 VAC terminal box. All terminals from the releasing control panel shall be translated to a watertight terminal box mounted inside the cabinet. All field wiring shall be connected to this box.

Assembled unit preaction system to be **[**2”**] [**2½”**] [**3”**] [**4”**]** Reliable Model DDX Type D N2Blast PrePaK. Refer to Reliable Bulletin 735 for associated information.

**Deluge Valve**

Deluge valve shall be a **[**cULus Listed**] [**FM Approved**]** hydraulically operated, differential latching clapper-type valve. Valve construction shall be of lightweight, ductile-iron construction with “screw in” stainless steel seat and clapper assembly. Seat shall have O-ring seals to resist corrosion and leakage. Clapper facing shall be pressure actuated, providing a limited compression seat for the sealing force between the clapper rubber facing and the valve seat. Valve shall have an external reset knob for resetting the clapper without having to remove the valve face plate. Push-rod chamber design shall consist of a stainless steel piston/pushrod and spring assembly with diaphragm seal secured to the casting through a pushrod guide constructed of a synthetic engineering plastic to resist corrosion. Casting shall have a bleeder hole located on the pushrod chamber for air/water leakage indication. Trip ratio shall be approximately a 3:1 force differential. Valve shall be of the straight-through design to minimize friction loss and shall be activated by pneumatic actuation trim. Inlet restriction orifice shall be factory installed into inlet port of deluge valve push-rod cover plate and not be a separate part of the valve trim. Valve trim shall consist of galvanized and brass components specifically **[**cULus Listed**] [**FM Approved**]** with the dry-pipe valve. Trim components shall include 2” main drain, alarm line test, water pressure gauges, push rod chamber supply connections, manual emergency release valve, and closed drain assembly. Condensate drain valve shall also be included to prevent water columning above the clapper. Deluge valve shall be **[**2” (50 mm)**] [**2½” (65 mm)**] [**3” (80 mm)**] [**4” (100 mm)**]** grooved end connections per ANSI/AWWA C606.

Valve trim shall consist of preaction electric/electric (Type “D”) release consisting of galvanized and brass components specifically listed/approved with the deluge valve. Trim components shall include 2” main drain, alarm line test, water pressure gauges, push rod chamber supply connections, manual emergency release valve, and closed drain assembly. Condensate drain valve shall also be included to prevent water columning above the clapper. Deluge valve releasing device shall be a normally closed solenoid valve activated by input to the releasing panel from both a detector and low air pressure switch.

**System Components**

### **System Control Valve**

A **[**2½” (65mm)**] [**3” (76mm)**] [**4”(100mm)**] [**6” (150mm)**] [**8” (203mm)**]** slow close grooved indicating butterfly control valve shall be **[**cULus Listed**]** **[**FM Approved**]** for fire protection systems. The valve shall have AWWA C606 grooved end connections with integral supervisory tamper switch. The valve shall be supervised **[**Open (yellow indicator)**] [**Closed (white indicator)**]**. The valve body construction shall be coated brass with Nylon-11, an EPDM encapsulated coated disc in accordance with ASTM A-536, and 416 stainless steel stem. The valve shall have a weatherproof gear operator rated for indoor/outdoor use with handwheel and raised position indicator. Two internal factory-mounted supervisory switches shall be housed within the switch box housing; a S.P.S.T. switch having a rating of 15A @ 125 VAC, 1/2A @ 125 VDC, and a S.P.D.T. switch having a rating of 11A @ 125 VAC, 1 A @ 28 VDC. All lead wires for external connections shall be 18 AWG, exiting the switch box housing through a single hole suitable for ½” conduit fittings. The Butterfly Control Valve shall be listed for 300 psi (20.7 bar) working pressure with a maximum working temperature of 250°F.

The grooved water supply control valve shall be a Reliable Model BFG 300 Butterfly Valve. Refer to Reliable Bulletin 831 for associated information.

### **Solenoid Valve**

Deluge valve releasing device shall be a 2-way, normally closed, pilot operated ½” electric solenoid valve UL listed for its intended use. The solenoid valve shall be constructed of a brass body with stainless steel sleeve tube, springs, stop and plunger, and with ½” female NPT end connections, having a NEMA 4X enclosure rating. Diaphragm shall be of nylon fabric and Buna-N rubber. Solenoid valve shall have a maximum working pressure of 175 psi and maximum ambient temperature rating of 150 deg. F. Power consumption of integrated coil shall be limited to **[**10 watts (175 psi rated)**] [**22 watts (300 psi rated)**]** and require 24 VDC from a releasing control panel listed for such service. Solenoid valve shall be a Skinner ½” normally closed solenoid valve, Model **[**73218BN4UNLVNOC111C2 (175 psi rated)**] [**73212BN4TNLVNOC322C2 (300 psi rated)**]**.

### **Supervisory Nitrogen Supply**

The Nitrogen Generation System shall be South-Tek Systems model FPS-900 and shall have an oil-less air compressor located within the PrePaK Preaction cabinet. The system shall provide a minimum of 98% Nitrogen purity to the fire protection system utilizing Pressure Swing Adsorption (PSA) nitrogen separation and must be *UL 508A - Industrial Control Panel Listed.*

The Nitrogen Generation System shall be sized to maintain NFPA 25 acceptable leak rate (3 PSI loss over 2 Hours).

The Nitrogen Generation System shall be provided with the integrated BlastOff™ Series alarms. These alarms shall be programmed into the PLC and connected to the Building Monitoring System (BMS), if applicable. The connection shall contain an isolated dry contact rated up to 240VAC 16 amps (NC & NO Contacts available). The Fire Sprinkler Contractor shall run a DC or AC signal line in code approved electrical conduit from the Nitrogen Generation System to the supervisory circuit on the Building Monitoring System.

The BlastOff™ I - *Leak Detection System* shall alarm should significant leaks develop within the fire protection system piping, prior to them becoming catastrophic and causing supervisory pressure to fall below specification. The leaks shall be addressed immediately by the Fire Sprinkler Contractor in order to minimize unnecessary runtime on the Nitrogen Generation System.

The BlastOff™ II - *Air Bypass Alarm* shall alarm should the Nitrogen Generation System be bypassed by the air compressor.

**AutoPurge System**

A single South-Tek Systems - *AutoPurge System®* shall be installed per zone, within the sprinkler pipe network, at an area where water/moisture will not typically collect.

Each *AutoPurge System®* is to be provided with a needle valve (i.e. flow control located on the front of the device) which allows correct purge rate per the manufacturer’s specifications to achieve 98% Nitrogen Purity within two weeks (14 days).

The purge device shall not require any electrical connection, AC or DC.

The *AutoPurge System®* shall have a connection allowing the Quick-Check® - *Portable Purity Sensor* orQuick-Check® *- Purity Manifold* to connect for verifying Nitrogen purity within the Zone.

**Supervisory Gas Monitoring – Nitrogen Purity Sensors**

Furnish either (1) Quick-Check*®* - *Portable Handheld Nitrogen Purity Sensor* per project and/or (1) Quick-Check*®* - *Purity Manifold* per project.

The Quick-Check*®* - *Portable Handheld Nitrogen Purity Sensor* is to be manually connected to the outlet of the *AutoPurge System®* during periodic inspections in order to obtain a quick purity reading of the Nitrogen content within any particular Zone.

Quick-Check*®* *- Purity Manifold* shall be provided in either a 1, 6, 10 or 20 zone model, capable of monitoring 1, 6, 10 or 20 individual zones.

Quick-Check*®* *- Purity Manifold* shall be programmed by the manufacturer to monitor the Nitrogen purity within each zone, daily. If the Nitrogen content within the zones meets the 98% purity spec, the *AutoPurge System/s*will remain closed. If the Nitrogen purity spec is not met, the *AutoPurge System/s* shall remain in the “OPEN” position until the Nitrogen purity spec is met.

¼” polyethylene plenum rated tubing shall connect each *AutoPurge System®* to the Quick-Check*®* – *Purity Manifold* (tubing to be provided by the manufacturer).

### **Air Compressor**

Furnish Reliable Model QRM Air Compressor to provide secondary compressed air source for preaction fire protection system. Compressor shall be **[**1/2 HP**]** **[**1 HP**]**. **[**1 HP Model shall include an integral one-gallon tank.**]** Air supply connection kit to preaction system shall be included as part of the system components.

**Note: 1/2 HP compressor for 2”, 2 1/2" and 3” valve. 1 HP compressor for 4” valve.**

### **Detection System**

To initiate actuation of the preaction system deluge valve, a detection system shall be provided. The detection devices installed shall be compatible with the preaction system releasing control panel. **[**Insert applicable product specification**]**.

**Note: For New York City Applications, add the following: A minimum of two detectors shall be installed for each zone in the protected area. Cross zoning of preaction detection initiating circuits is prohibited. Class A method of wiring of detectors shall be used.**

### **Releasing Control Panel**

The releasing control panel shall be a Potter PFC 4410 RC field programmable releasing panel having a 32-character backlit LCD display. All diagnostic and alarm event information shall be viewable in text form on this display. All operational features of the control panel shall be field programmable using menu driven selections on the alpha-numeric display and on-board controls. No special programmer will be required and jumpers or switches to configure operational features shall not be permitted. The control panel shall be equipped with 15 preset programs for water delivery built into the panel memory, along with custom program capability. The control panel shall sound a local audible for trouble and supervisory conditions. Four separate integral SPDT relay contacts for alarm, trouble, supervisory, and waterflow conditions shall be provided for connection to external auxiliary equipment or for remote annunciation. The releasing panel enclosure shall contain two 12 VDC, 12 amp-hour stand-by batteries capable of operating the system for up to 90 hours of battery back-up. It shall be housed in an 18-gauge steel enclosure having a hinged door with a key lock and recessed mounted within the cabinet door. The releasing control panel shall include a fully supervised integral power supply/battery charger capable of providing 200 mA to the auxiliary power circuit and 2.5 A to all releasing and indicating circuit appliances combined. All programming functions shall be password protected. The releasing control panel shall have four fully supervised Class A initiating circuits capable of supporting the operation of the manufacturer’s specified number of compatible detectors on one **[**two**]** circuit(s), waterflow, and dedicated low air.

It shall also include one fully supervised Class A supervisory circuit for the monitoring of the system control valve. Four fully supervised Class B output circuits shall be provided for notification appliances and for the solenoid releasing circuit. The releasing circuit shall be supervised and shall be programmable for cross-zoning operation when required. An optional auxiliary relay module designed to operate with the PFC-4410RC series release panels to provide an additional eight independent form C relay outputs in 3 different operating modes shall be available (Potter Electric Signal Co. Model ARM-44.)

**RCDS-1 Releasing Circuit Disable Switch**

A single Potter Electric RCDS-1 Releasing Circuit Disable Switch which complies with the requirements of NFPA 72 shall be installed within the enclosure. The switch shall have the capability to disconnect the release circuit in place of a software controlled disconnect and shall create a supervisory condition on the release control panel when activated.

**Manual Pull Station**

A single manual pull station shall be installed inside the PrePaK enclosure to facilitate setup and to allow testing of the functionality of the preaction system without activation of the detection system located within the protected area.

### **Low Air Supervisory Pressure Switch**

Supervisory air pressure within the preaction system piping shall be monitored through the use of a low air supervisory pressure switch. It shall be **[**cULus Listed**] [**FM Approved**]**. The switch shall be a field-adjustable, bellows-activated type pressure switch compatible with system devices. The pressure switch shall have the capability to provide alarm response between 4 and 20 psi but shall be factory wired to respond at 8 to 4 psi on decreasing pressure. The pressure switch shall have a field replaceable SPDT (Form C) contact(s) rated at 10.0 amp @ 125/250 VAC and 2.5 amp @ 6/12/24 VDC. Switch shall be provided with a ½” NPT male glass-reinforced nylon pressure connection and shall have a maximum pressure rating of 250 psi. Two conduit connection holes shall be provided in the mounting plate to accept standard ½” conduit fittings. The switch enclosure shall be weatherproof and carry a UL 4x/NEMA 4 rating when used with proper electrical fittings and conduit. The cover shall have the wiring diagram cast into it and incorporate tamper-resistant screws. Low air supervisory pressure switch shall be a Potter Electric PS 10-2 pressure switch.

### **Water Flow Pressure Switch**

An alarm pressure switch installed on the alarm line trim of the deluge valve shall provide a water flow alarm. It shall be **[**cULus Listed**] [**FM Approved**]**. The switch shall be a field-adjustable, bellows-activated type pressure switch compatible with system devices. The pressure switch shall have the capability to provide alarm response between 4 and 20 psi but shall be factory adjusted to respond at 4 to 8 psi on rising pressure. The pressure switch shall have a field replaceable SPDT (Form C) contact(s) rated at 10.0 amp @ 125/250 VAC and 2.5 amp @ 6/12/24 VDC. Switch shall be provided with a ½” NPT male glass-reinforced nylon pressure connection and shall have a maximum pressure rating of 250 psi. Two conduit connection holes shall be provided in the mounting plate to accept standard ½” conduit fittings. The switch enclosure shall be weatherproof and carry a UL 4x/NEMA 4 rating when used with proper electrical fittings and conduit. The cover shall have the wiring diagram cast into it and incorporate tamper-resistant screws. Alarm pressure switch shall be a Potter Electric PS 10-2 pressure switch.