# Engineering Specification

# Reliable Model DDX Type F PrePaK Assembled Unit

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

A self-contained, fully integrated preaction sprinkler system 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**]** **[**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 **[2”, 2½”, 3”, 4” size**: 5.0 ft2**] [6” & 8” size:** 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/pneumatic actuation release trim listed as part of the deluge valve assembly. Deluge valve electric/pneumatic trim shall be galvanized and shall consist of all trim components necessary to enable the system to be used as a **[**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. All 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 as described elsewhere in this specification Preaction system supervisory gas shall be regulated through a pressure maintenance device set to maintain a pressure between 10 and 28 psi (0.7 to 1.5 bar) for proper setting of the low-pressure pneumatic actuator in accordance with the manufacturer’s instructions.

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.

**NOTE: PrePaK units are available without the Potter PFC 4410 RC releasing panel. These units will still retain their listings and approvals. However, the specifier should make sure that any remote releasing control panel used with the PrePaK units is Listed/Approved and programmed/wired to ensure the required sequence of operation necessary to operate the automatic sprinkler system.**

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 **[**Double Interlock**] [**Double Interlock, Cross-Zoned**] [**Custom Program for New York City Compliance**]** application as referenced in Reliable Technical Bulletin 736.

**NOTE: For NYC applications, the use of double-interlock systems is permitted only in areas subject to freezing.**

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.

Two separate 120 VAC power connections shall be provided: one connection for the releasing panel and one connection for the air compressor. Each shall have 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”**] [**6”**] [**8”**]** Reliable Model DDX Type F PrePaK. Refer to Reliable Bulletin 747 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 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 shall be **[**2” (50 mm)**] [**2½” (65 mm)**] [**3” (80 mm)**] [**4” (100 mm)**] [**6” (150 mm)**] [**8” (200 mm)**]** grooved end connections per ANSI/AWWA C606.

Valve trim shall consist of preaction electric/pneumatic (Type “F”) 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 devices shall be a normally closed solenoid valve activated by input to the releasing panel and a mechanical low-pressure pneumatic actuator.

**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)**]**.

### **Dry Pilot Actuator**

The low-pressure pneumatic actuator shall be of cast iron construction utilizing a diaphragm and compression spring design to separate the push-rod chamber water pressure from the system piping pneumatic supervisory pressure. The low-pressure actuator shall require a minimum of 8 and a maximum of 28 psi (0,6 to 1,9 bar) supervisory pressure for proper setting in accordance with the manufacturer’s instructions. Low-pressure actuator shall be Reliable Model LP actuator.

### **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).

### **Sprinklers**

Insert applicable sprinkler specifications here.

**Compressed Air Supply**

Supervisory air supply shall be provided by an integral automatic tank-mounted air compressor sized for the capacity (volume) of the double interlock preaction system piping and be capable of restoring normal air pressure in the system within 30 minutes. Double interlock preaction system shall only require between 10 and 28 psi (0.7 to 1,9 bar) supervisory pressure for proper setting of the low-pressure pneumatic actuator in accordance with the manufacturer’s instructions. Tank mounted compressor shall be a motor mounted, oil-less, piston compressor, including gauge, regulating pressure switch, check valve, drain valve, and safety relief valve. Single-phase motor shall have internal thermal protection. Air supply shall be equipped with an automatic pressure maintenance device capable of maintaining a constant system pressure regardless of pressure fluctuations in the compressed air source, or system piping.

**Owner’s Air Supply**

Supervisory air supply shall be provided by an owner supplied air system in conjunction with **[**cULus Listed**] [**FM Approved**]** automatic pressure maintenance device, capable of maintaining a constant system pressure regardless of pressure fluctuations. Double interlock preaction system shall only require between 10 and 28 psi (0.7 to 1.5 bar) supervisory pressure for proper setting of the low-pressure pneumatic actuator in accordance with the manufacturer’s instructions. The pressure maintenance device shall consist of galvanized trim and brass parts, including a strainer and a field adjustable pressure regulator, and have a working pressure rating of 175 psi (12.1 bar). The pressure regulator shall have an adjustable outlet pressure range of 5 to 75 psi (.34 to 5,2 bar). Pressure maintenance device shall be the Reliable Model A.

**Nitrogen**

Nitrogen cylinders provided by an approved source shall provide the nitrogen supply. Double interlock preaction system shall only require between 10 and 28 psi (0.7 to 1,9 bar) supervisory pressure for proper setting of the low-pressure pneumatic actuator in accordance with the manufacturer’s instructions. The nitrogen cylinder pressure shall be regulated and supervised using a nitrogen regulating device and low-pressure trim kit. This device shall consist of a brass, single stage pressure regulator, equipped with high pressure inlet and low-pressure outlet gauges, and ¼” copper connection tubing with galvanized ¾” x ¼” reducer bushing. Low-pressure trim kit shall be included to monitor the regulated nitrogen supply pressure to provide a low-pressure supervisory alarm. This kit shall include a low-pressure switch with associated galvanized connection trim. Assembly shall be a Reliable Nitrogen Regulating Device.

This device is to be used in conjunction with the Reliable Model A pressure maintenance device.

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

Supervisory air pressure within the preaction system piping shall be monitored using a low air supervisory pressure switch. Supervisory air pressure switch shall be **[**cULus Listed**] [**FM Approved**]**, field-adjustable, bellows-activated type pressure switch compatible with system devices. The pressure switch shall have the capability to provide alarm response between 10 and 60 psi but shall be factory wired to respond at 18 psi on decreasing pressure and 28 psi on increasing 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 25-2 pressure switch.

### **Waterflow 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.

**Pressure Maintenance Device**

An automatic, regulating type of pressure maintenance shall be used with pneumatic supplies provided by a source of compressed air or nitrogen cylinders equipped with a regulating device. The pressure maintenance device shall be **[**cULus Listed**] [**FM Approved**]** capable of maintaining a constant system pressure, automatically, regardless of any pressure fluctuations from the compressed air of nitrogen source. The device shall be constructed of galvanized trim and brass parts, consisting of ¼” supply bypass piping and a ¾” section of piping for rapid restoration of system pneumatic pressure. The ¼” bypass piping shall contain shutoff valves, a strainer, a check valve and a field adjustable pressure regulator. The pressure regulator shall have an adjustable outlet pressure range of 5 to 75 psi (.34 to 5,2 bar). The ¾” section of piping shall contain a ball valve for rapid restoration of system pressure and associated trim for connection to the dry pipe valve system air supply line. The assembly shall have a working pressure rating of 175 psi (12,1 bar). The pressure maintenance device shall be the Reliable Model A.

### **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.

**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 allow testing of the functionality of the preaction system without activation of the detection system located within the protected area.

### **Desiccant Air Dryer**

Where dry air is desired, a dehydrator assembly shall be factory installed in the air trim, with bowl guard, supply control and drain valves. Dehydrator shall be manually generated desiccant-type air dryer, the desiccant acting as a moisture indicator by changing color. Desiccant dehydrator shall be Wilkerson Model X04

**Mechanical Accelerator**

For system capacities in accordance with NFPA 13 up to a maximum of 1500 gallons (5678 L) a mechanical accelerator with associated galvanized trim kit shall be provided to exhaust air pressure from the pneumatic actuator trim piping in order to hasten operation of the dry-pipe system. Minimum pneumatic pressure shall be 15 psi (1.0 bar) to ensure proper accelerator operation. Accelerator shall be **[**cULus Listed**] [**FM Approved**]** for use with the low pressure dry-pipe valve trim. Accelerator shall be capable of adjusting for small fluctuations in system air pressure without causing operation. The accelerator shall contain an integral Accelo-Check (anti-flooding) assembly to prevent entry of water and debris into critical internal areas during operation. Accelerator body and dome to be of cast aluminum and epoxy coated inside and out. Diaphragm construction shall consist of Dupont Fairprene BN 5049 with stainless steel filter assembly. Trim kit shall consist of all galvanized and brass parts, including an isolating ball valve. Accelerator and trim kit shall be Reliable Model B-1.

**Electronic Accelerator (cULus only)**

For system capacities in accordance with NFPA 13 up to a maximum of 1690 gallons (6397 L) an electronic accelerator with associated galvanized trim kit shall be provided to exhaust air pressure from the pneumatic actuator trim piping in order to hasten operation of the dry-pipe system. The electronic accelerator shall be cULus Listed, field-adjustable with an air pressure range from 10 psi (0.69 bar) to 65 psi (4.48 bar). The electronic accelerator shall be housed in a NEMA 2 rated 18-gauge steel enclosure having a hinged door with a keyed lock. Power shall be supplied by a single 120 VAC (0.75 A) circuit, with 24-hour rated battery back-up provided by two 12-volt (1.3 AH) batteries located inside the cabinet. The accelerator shall sound a local audible for trouble and supervisory conditions, and shall provide individual LED indication of AC Power, Trouble/Supervisory, Battery Trouble and a Tripped condition. Electronic accelerator shall be a VIZOR as manufactured by Tyco/Johnson Controls, Inc.