# Engineering Specification

# Reliable DDX-LP PrePaK Assembled Unit with Integral Nitrogen Generator

**Recommended CSI MasterFormat Specification Location: 21 13 16, Dry-Pipe Sprinkler Systems (formerly 13935)**

A self-contained, fully integrated low-pressure dry-pipe 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 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 dry-pipe system riser assembly with galvanized trim. Cabinet size shall be limited to an area of 7 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, and system pressure gauges that are securely mounted.

The low-pressure dry-pipe 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 pneumatic actuation release trim listed as part of the dry-pipe valve assembly. Dry valve trim shall be galvanized and shall consist of all components necessary to enable the system to be used as a low-pressure system. These components include a low-pressure dry pilot actuator, 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 valve shall also be included to prevent water columning above the clapper. Low air supervisory and water flow alarm pressure switches shall be included as part of this assembly.

Supervisory gas supply shall be provided by an integral nitrogen generation unit located within the cabinet. Dry-pipe system supervisory nitrogen shall be regulated through a regulating pressure maintenance device set to a pressure of 8 psi – 24 psi (0.6 bar – 1.7 bar). A 120/220 VAC watertight terminal box mounted inside the cabinet shall be provided for power connection to the air compressor. Wiring of control valve supervisory switch, low pressure alarm switch, waterflow alarm pressure switch, and optional low nitrogen pressure switch shall be translated to a watertight terminal box mounted inside the cabinet. All field wiring shall be connected to these boxes.

Assembled unit dry-pipe system to be **[**2”**] [**2½”**] [**3”**] [**4”**]** Reliable Model DDX-LP N2-Blast PrePaK. Refer to Reliable Bulletin 737 for associated information.

### **Dry-Pipe Valve**

Dry-pipe 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 dry-pipe 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. Dry-pipe valve releasing device shall be a low pneumatic pressure dry pilot actuator 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 psi (0.6 bar) and a maximum of 28 psi (1.9 bar) supervisory pressure for proper setting in accordance with the manufacturer’s instructions. Low-pressure actuator shall be the Reliable Model LP actuator (Reliable Bulletin 505). Dry-pipe valve shall be **[**2” (50 mm)**] [**2½” (65 mm)**] [**3” (80 mm)**] [**4” (100 mm)**]** with grooved end connections per ANSI/AWWA C606. Dry-pipe valve shall be the Reliable Model DDX-LP. Refer to Reliable Bulletin 338 for associated information.

**SYSTEM COMPONENTS:**

### **System Control Valve**

A **[**2” (50mm)**] [**2½” (65mm)**] [**3” (76mm)**] [**4”(100mm)**]** 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.

### **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).

### **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.

**Mechanical Accelerator (Optional)**

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 (Optional, 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.

### **Sprinklers**

Insert applicable sprinkler specifications here.