



Engineered
Corrosion
Solutions

Corrosion Solutions for Fire Sprinkler Systems



Setting the standard in corrosion control.

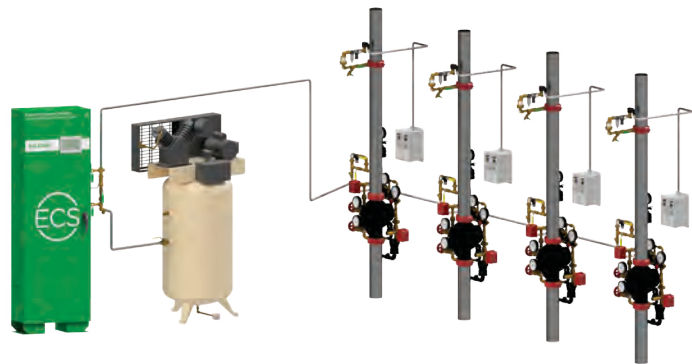
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Why ECS?

- All products sold direct to fire sprinkler contractors, not through distributors
- All dry/preaction equipment installed in riser room
- Superior customer service and support
- Industry best lead times - 72 hours from PO to shipment
- No nitrogen storage tank or compressed air dryer required
- Patented “Fill & Purge” breathing method of nitrogen inerting
- All ECS vents are equipped with a “quick connect” for ease of servicing

Three critical elements of DPNI:

- 1 FM-Approved nitrogen generator
- 2 Integral venting device
- 3 System to control the nitrogen breathing process



Dry Pipe and Preaction System Solutions

Available Models and Specifications

	WALL MOUNT				STAND ALONE W/ SEPARATE AIR COMPRESSOR			
	AG-675	AG-950	AG-2000	AG-3500	AG-6500	AG-11000	AG-18500	AG-22500
Total System Capacity	675 gal	950 gal	2,000 gal	3,500 gal	6,500 gal	11,000 gal	18,500 gal	22,500 gal
Single System Capacity @ 40 psi ⁽¹⁾	215 gal	265 gal	800 gal	800 gal	1,150 gal	1,440 gal	2,025 gal	2,900 gal
Single System Capacity @ 20 psi ⁽¹⁾	540 gal	590 gal	1,800 gal	1,800 gal	2,300 gal	2,880 gal	4,050 gal	5,800 gal
Air Compressor	Integral	Integral	Integral	Integral	Separate	Separate	Separate	Separate
Size (H x W x D)	36x24x9	36x24x9	29x40x12	29x40x12	53x24x9 ⁽²⁾	53x24x9 ⁽²⁾	76x24x12 ⁽²⁾	76x24x12 ⁽²⁾
Weight	115 Lbs	125 Lbs	186 Lbs	192 Lbs	152 Lbs ⁽²⁾	152 Lbs ⁽²⁾	300 Lbs ⁽²⁾	300 Lbs ⁽²⁾
Electrical	120VAC	120VAC	240VAC	240VAC	120VAC ⁽³⁾	120VAC ⁽³⁾	120VAC ⁽³⁾	120VAC ⁽³⁾
Lead Time	72 hrs	72 hrs	72 hrs	72 hrs	72 hrs	72 hrs	72 hrs	72 hrs

NOTES:

(1) Single system capacity based on 30 min. fill requirement of largest single sprinkler system; a secondary air compressor with normally closed isolation valve can be used to meet fill requirement for larger individual systems
 (2) Size and weight of nitrogen generator only, does not include separate air compressor
 (3) Power requirement for stand alone nitrogen generator only, does not include separate air compressor power requirements, options include: 200VAC/230VAC/460VAC 3 phase
 (4) Lead time refers to time from order receipt to shipment from ECS facility, does not include shipping time
 (5) All nitrogen generators include 1 year manufacturer's warranty per ECS terms and conditions

Nitrogen Generators

UL508A Listed Industrial Control Panel | UL508A Listed to Canadian Standards



Wall-Mount Nitrogen Generator
AG-675 | AG-950 | AG-2000 | AG-3500
Up to 3,500 Gal.



Stand Alone Nitrogen Generator
AG-6500 | AG-11000 | AG-18500 | AG-22500
Up to 22,500 Gal.

Accessories



ECS AdvancedIQ Vent Controller
(AVC-1)



ECS Protector Vent
(PAV-D/DQ)



ECS Protector Dry SMART Vent
(PSV-D)



ECS Nitrogen Interface Controller
(NIC-1)



ECS SMART Gas Analyzer
(SGA-1)

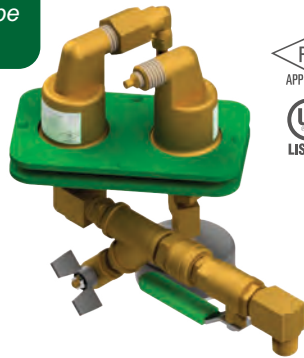


ECS Handheld Gas Analyzer
(PHGA-1)

- Notes:
- One (1) venting device required per sprinkler system, vent assembly requires 1/2" connection at riser
 - Install Dry SMART Vent control box on wall adjacent to vent assembly installed at riser
 - One (1) SMART Gas Analyzer recommended per nitrogen generator, must be installed adjacent to ECS vent
 - Products for use under U.S. Patents 8,636,023, 8,720,591, 8,720,951, 9,095,736, 9,144,700, 9,186,533, 9,526,933, 9,610,466, 9,717,935, 9,839,802, and 10,188,885

Wet Pipe System Solutions

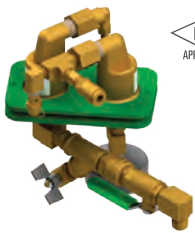
The 2016 Edition of NFPA 13 requires a means of venting air on **all** wet pipe fire sprinkler systems.



ECS Ejector Automatic Air Vent (PAV-W)

PAV-W Advantages:

- 1 Redundant air release
- 2 No plumb to drain
- 3 Low clear height
- 4 High-visibility



ECS Protector Nitrogen Inerting Vent (PAV-WN)



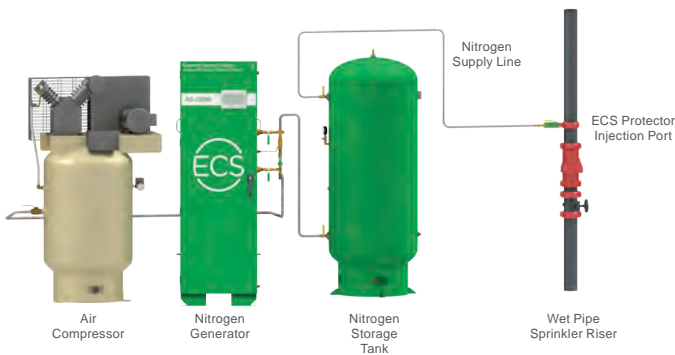
ECS Nitrogen Inerting Start-up Kit (NISK-1)



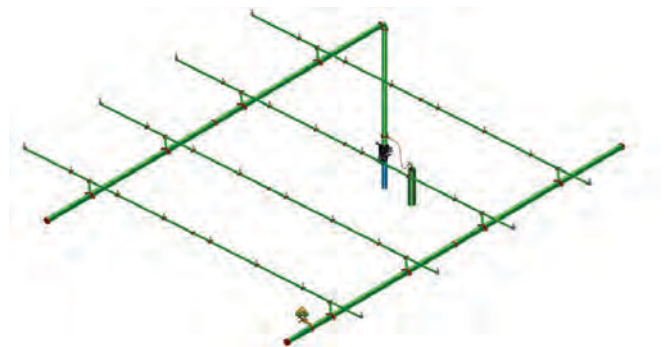
ECS Remote Inerting Station (RIS-1)



Wet Pipe Nitrogen Inerting Configurations



Sprinkler System with Nitrogen Generator
(Vent placed at furthest point on the system)

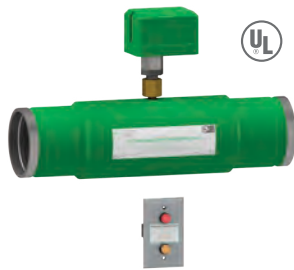


Sprinkler System with Nitrogen Cylinder
(Vent placed at furthest point on the system)

Notes:

- At least one (1) Nitrogen Inerting Start-up Kit recommended per WPNI project, multiple kits recommended for projects with many sprinkler systems to decrease time required for WPNI
- One (1) Handheld Gas Analyzer recommended per WPNI project

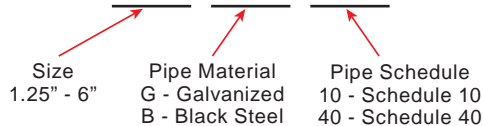
Monitoring Devices



ECS In-Line Corrosion Detector (ILD)

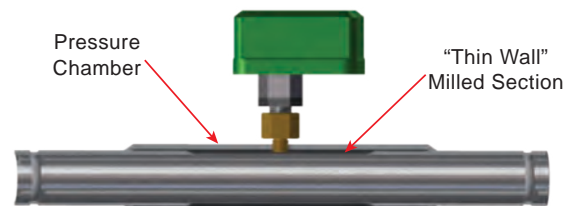
- Provides continuous real-time corrosion monitoring
- Matches size, schedule, and material of system piping
- Provides 360° surface area to detect internal corrosion
- Thin wall section that is monitored by an UL Listed/FM Approved pressure switch
- Includes remote test station, can be monitored remotely and with fire alarm or building automation systems

ILD-



Example: ILD-1.5B40

→ 1.5" Schedule 40 Black Steel Chamber

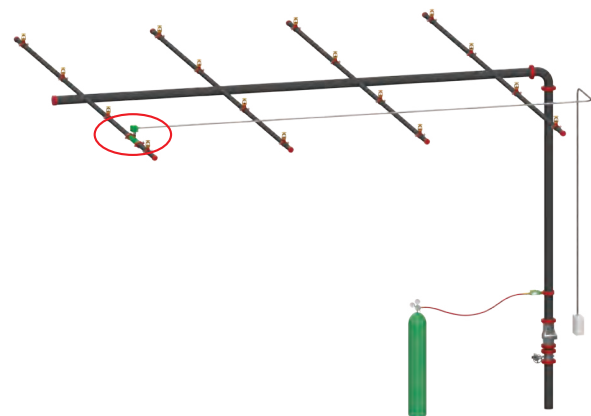


Installation Locations



Dry Pipe/Preaction Sprinkler System

- Install ILD on a horizontal portion of a feed main at low elevation near riser.
- On existing systems separate main at fitting and inspect pipe for small pools of trapped water.



Wet Pipe Sprinkler System

- Install ILD on a branch line near the highest elevation of the system, or adjacent to area where trapped air is likely to collect.
- On existing systems separate branch line at fitting and inspect pipe interior for signs of air/water interface.

Notes:

- At least one (1) In-Line Corrosion Detector recommended per project
- In-Line Corrosion Detector typically installed on wet system branch lines at air/water interface
- In-Line Corrosion Detector typically installed on dry/preaction system mains where trapped water collects

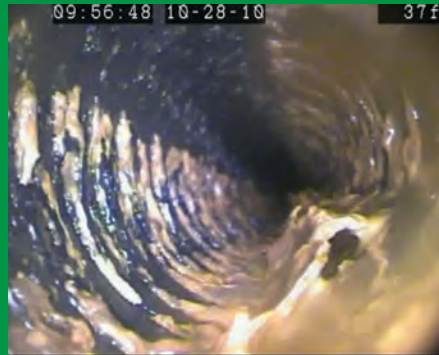
Corrosion Assessments

Primary Investigative Tools:

Internal Video Scoping ①

Pipe Sample Analysis ②

EDS Deposit Analysis ③



Branch line at 37ft with significant corrosion deposits, clear air-water interface



Same branch line at 16ft with no corrosion, water filled with no air-water interface

Why perform an ECS Corrosion Assessment?

NFPA 25 requires a five (5) year internal investigation, if deposits are found an obstruction investigation is required. If sufficient obstructions are found a complete flushing protocol must be implemented.

The corrosion assessment combined with surgical pipe replacement and a corrosion control program can save up to **90% of total system replacement costs** and significantly extend the useful life of the existing sprinkler system.

Before media blasting →



After media blasting →



Cold Storage



Nitrogen Generator:

- Eliminate Ice Plugs
- Eliminate Corrosion
- Minimal Maintenance
- Supply Many Systems

VS



Dry Air Pac™:

- Ice Plugs Possible
- No Corrosion Protection
- Extensive Maintenance
- Limited Volume Per Unit

Nitrogen Generator installed in Riser Room



ECS Solution

- (1) ECS Protector PGEN-40 - Stand-Alone Nitrogen Generator System
- (1) TCMP-40 - 5HP Compressor Package
- (1) ECS Protector Dry SMART Vent (PSV-D)
- (1) ECS Protector Handheld Gas Analyzer (PHGA-1)

“Nitrogen Generators provide a superior source of supervisory gas for dry and preaction systems.”

Overview

A cold storage facility in the food service industry was originally built in 1992 with one (1) preaction system covering the freezer area that is kept at (-10°F). Wayne Automatic Sprinkler Corporation located in St. Louis, MO has been contracted for the facility fire sprinkler inspection and service. As part of the quarterly maintenance procedures, Wayne Automatic Sprinkler routinely inspects the supervisory gas supply line and preaction system mains for ice plugs.

System Information

The preaction system was maintained with a legacy Dry Air Pac™*. Ice was continually found in the air supply line during the quarterly inspections. Not only was ice present in the air line at the freezer penetration, it also occasionally caused a total blockage in the preaction air supply line.



“50% of cold storage fire sprinkler systems have ice plugs” -FM Global

These ice plugs resulted in frequent supervisory low air signals. Additionally, the fire alarm control panel was programmed to receive the supervisory low air signals as alarm signals which resulted in the facility’s horns and strobes being activated and the fire department being dispatched.

Dry Air Pac™ Replaced

In the fall of 2017 Wayne Automatic elected to install an ECS Nitrogen Generator after struggling with poor performance of the Dry Air Pac™ for years. This picture (right) was taken before commissioning prior to the line being cleared of ice during a quarterly inspection. Frost and ice had formed near the entry to the freezer area in the air line. There was an approximate 20% blockage in the air supply line before commissioning of the nitrogen generator.



The preaction system was initially filled and then maintained with high purity nitrogen. Seven (7) months after the commissioning of the nitrogen generator, no ice buildup has been found in any of the nitrogen supply lines or preaction mains. Both the building owner and the fire sprinkler service provider are pleased with the results.

Annual Maintenance Cost: \$300 Nitrogen Generator vs. \$2,300 Dry Air Pac™ (Based on manufacturer’s suggested maintenance and average U.S. sprinkler fitter labor rate)

* General Air Products asserts that it owns trademark rights in Dry Air Pac™. ECS does not claim to own any rights in that mark.

DPNI - Data Center in the Atlanta, GA Region

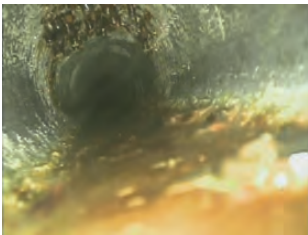
Overview

A data center in the Atlanta area was originally built in 2009. The fire sprinkler system was comprised of ten (10) preaction system, each consisting of schedule 10 mains and schedule 40 branch lines. During the initial construction, the specifying engineer suggested the use of nitrogen as a pressure maintenance gas, but the building owner declined. By 2013, the systems had experienced numerous leaks on the main piping of the preaction systems. That same year, ECS was contacted to determine what next steps were required to mitigate the risk of future leaks in the mission critical facility. A nitrogen generator was installed within several months to limit the reintroduction of oxygen into the system piping, and a permanent gas analyzer was installed to ensure oxygen levels were kept to a minimum. Subsequently, a series of internal investigations were performed to identify areas of the original galvanized piping that needed replacement and to continue to monitor the internal condition of the sprinkle piping.



June 2014

First corrosion assessment performed, identified severe corrosion in feed main piping of the preaction systems.



Zone 2 – feed main (2014)

- Large amounts of trapped water present in this piping, combined with the compressed air pressure maintenance gas, resulted in localized corrosion of the galvanized pipe, eventually resulting in leaks.
- Pipe samples taken from the systems identified localized corrosion of up to 69.2% pipe wall loss.
- Only metal loss consistent with oxygen corrosion was observed.
- Partial replacement of feed main piping on five (5) of the systems was performed.

February 2016

Second corrosion assessment performed, additional feed mains were scoped for three more systems (not previously inspected). Significant damage was found in the original galvanized mains, with metal loss of up to 90.6%. The feed mains for these three additional zones were also replaced with black steel pipe.



Zone 4 – feed main

(The pitch of the pipe traps a significant amount of water and iron oxide debris.)

August 2017

Third corrosion assessment performed, piping over the data halls and electrical rooms (original galvanized piping, not previously replaced) was reinspected to look for increased levels of corrosion. The piping was still in good condition.



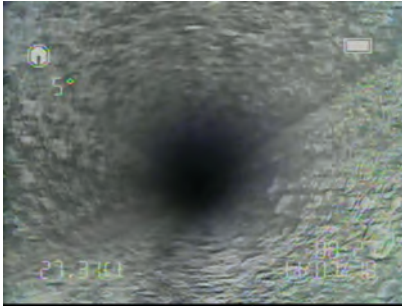
Zone 4 – feed main (2016)



Zone 4 – feed main (2017)

CASE STUDIES

The original galvanized piping of zone 4 did not contain any trapped water or evidence of significant corrosion.



Zone 4: 4" Main – Original Galvanized Pipe

November 2018

Fourth corrosion assessment performed, original galvanized piping over data halls was reinspected to look for evidence of increased corrosion.

- Still dry and in good condition.
- No liquid water/oxygen, no corrosion. Replaced black steel mains were inspected for signs of corrosion since install. Almost completely dry, no corrosion. Where water was present, no corrosion due to limited availability of oxygen.
- Two additional areas of original piping were inspected that were not previously scoped. Some localized corrosion of the original galvanized mains was observed.

November 2019

Fifth corrosion assessment performed, prior to this video scoping, the first leak since the installation of the nitrogen generator was reported, having occurred on some of the original galvanized piping not previously replaced/ inspected.

- Additional areas of the original galvanized system piping were inspected that were not previously accessible (over critical areas). Some localized corrosion was found, where trapped water was present.
- The majority of this damage occurred prior to the implementation of the nitrogen generator, but a leak eventually formed at the location of localized metal loss at the weld seam of the pipe.
- Replacement of the remaining accessible galvanized pipe is planned for the future.

Zone 10: 3" Main – Original Galvanized Pipe over Chiller Room B

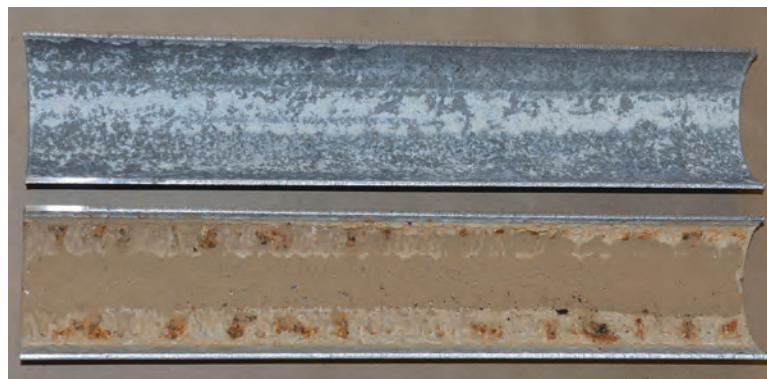


(Scoping north from the south end of the main over Chiller Room B, trapped water was present the entire run. Some tubercles were observed over the run, so a pipe sample was identified to quantify the severity of the corrosion.)

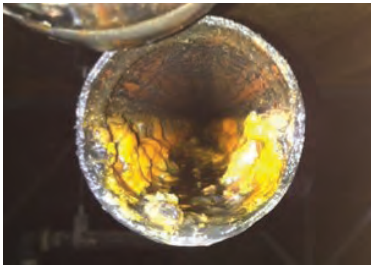
Take Aways

Galvanized piping is acutely susceptible to leaks developing resulting from oxygen corrosion. Implementation of a nitrogen inerting corrosion control strategy has significantly limited the internal corrosion rates in the system. The ideal way to mitigate risk in mission critical applications is to perform a corrosion assessment, surgically replace damaged piping, and implement a nitrogen-based corrosion control strategy.

Internal corrosion as received, pipe sample from 2014 assessment



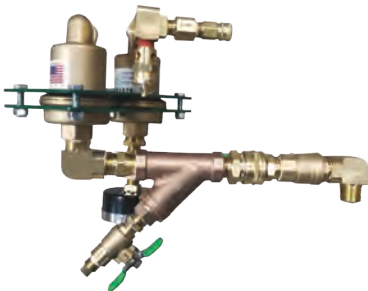
WPNI



Corrosion at Air/Water Interface

Mission Critical Manufacturing:

Project Type: Large Manufacturing Warehouse
 Owner: Aerospace Equipment Manufacturer
 Location: Los Angeles, CA
 Sprinkler Systems: Twenty-five (25) Wet Systems
 Nitrogen Introduced: October 2010



Equipment Design

- On-site nitrogen generation
- (25) ECS Protector Nitrogen Inerting Vent (PAV-WN) with included nitrogen injection port

**NO CHEMICAL
 ADDITIVES OR
 COATINGS**

Overview

The one million square foot building was built in the 1960's and protected by twenty-five (25) overhead wet pipe sprinkler systems that had been renovated several times. The wet pipe systems were characterized by several elevation changes and large pockets of trapped air. The majority of damaged piping was found at the air/water interface. Many of the sprinkler mains contained large amounts of corrosion by-product (iron oxide) solids from the black steel piping.

The building had a long history of leak repairs (averaging one leak every two weeks) and some of the systems were completely replaced over time. Based on the leak history, Engineered Corrosion Solutions was contracted to provide a corrosion assessment to determine the root cause of corrosion and the extent of damage within the existing sprinkler piping.

System Information

Water supply - municipal drinking water feeding a 200,000 gallon fire water storage tank

Fire sprinkler system design configuration

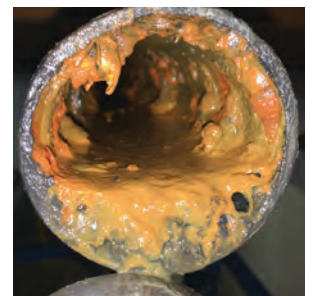
- Fire water loop serving large campus of buildings with fire pump and jockey pump
- External wet pipe risers using a "tree" type fire sprinkler design configuration

Fire sprinkler piping materials

- Threaded schedule 40 black steel piping
- Repair and replacements of piping over 40 year period
- Old and new pipe patchwork throughout the facility

Nitrogen Adopted

In the fall of 2010 the client elected to install ECS Protector Nitrogen Inerting Vents and injection ports on each system to remove oxygen from the piping.



"Wet Pipe Nitrogen Inerting removes all oxygen from wet pipe sprinkler systems"

Wet Pipe Nitrogen Inerting (WPNI) ROI: Since the facility was treated with nitrogen in 2010, there has only been one (1) reported leak. The routine service maintenance personnel did not follow the protocol to maintain a nitrogen atmosphere and allowed oxygen to enter – resulting in a leak. The system was re-treated with nitrogen and no additional leaks have been reported.



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Our Mission

We are not your typical fire protection equipment manufacturer. We think differently. We are innovators at the intersection of corrosion and fire protection who set out to become the world's best. Our laser focus on the industry is the reason why we're the leader in corrosion control solutions and services.

As an organization, we have over 100 years of experience working in the fire protection industry. Each employee at ECS adds a unique perspective and skill set that has created an unequaled knowledge base. Our team includes Licensed Fire Protection and Mechanical Engineers, an Accredited Chemist, Industrial Engineers, a Metallurgical Engineer and an Electrical Engineer. Three (3) of our people have worked in fire protection system design as consultants prior to joining ECS. We have been members of NFPA technical committees, NICET, and have a firm grasp of the Codes and Standards that regulate our industry.

Our focus on service keeps our customers coming back. Our clients often remark on how easy it is to receive technical support, all you have to do is call us to immediately get in touch with a product specialist who can solve your problem. Our technical background and extensive fire protection experience allows us to provide services that simply cannot be matched by manufacturers that work through a distributor. We are invested in the success of our partners. We realize that our success is tied to yours.



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