EXPLOSION PROOF & SEVERE DUTY HVAC EQUIPMENT CONSIDERATIONS

SPECIFIC SYSTEMS™
CUSTOMERS FIRST

INTRODUCTION

Agenda
Company Info
Applications

AGENDA

Company Overview

People

Process

Industry Applications

Challenges

Hazardous Applications

Solutions

Summary

Q&A

PEOPLE

Our Team provides 300 years of diverse HVAC experience to your company.

LEAN Six Sigma Capability

1 Master Black Belt

3 Green Belt

PROCESS

Focus on process improvement utilizing Lean Six Sigma tools

Growth of our production capabilities to support your business

COMPANY OVERVIEW

Founded 1974 in Tulsa, OK

Leader in customizable HVAC systems engineered for industrial applications

Centralized location allows for easy shipping across the U.S. and around the world

SPECIFIC SYSTEMS™
CUSTOMERS FIRST

INDUSTRY APPLICATION

Oil & Gas / Petrochemical

Water & Wastewater Treatment

Power Generation

Mining

Pulp & Paper Mills

Energy Storage and UPS

Grain Processing and Storage

Steel Manufacturing

APPLICATION CHALLENGES

Common problems that are difficult to overcome with standard HVAC equipment

CHALLENGES

Corrosion

Extreme Ambient Temperatures

High Internal Sensible Heat Loads

Air Contaminants

Remote Locations & Critical Applications

Limited Space for Installation

Hazardous Atmospheres

EXTREME AMBIENT TEMPERATURES

Very hot conditions:

As high as 131°F (55°C)

Very cold conditions:

As low as -70°F (-57°C)

HIGH INTERNAL SENSIBLE HEAT LOADS

Sensible vs. Latent heat

Cooling equipment rather than people

AHRI standard:

95°F ambient, 80°F return air @ 50% relative humidity

Typical electronics shelter:

Variable ambient, 75–95°F return air @ 35% relative humidity

AIR CONTAMINANTS

Particulate:

Dust, pollen, bugs, fibers

Chemical:

Corrosive, toxic, combustible

REMOTE LOCATIONS & CRITICAL APPLICATIONS

Unit Inaccessibility

- Unreliable systems
- Routine maintenance

Integration with Building Automation Systems

- Notification of unit or component failure

LIMITED SPACE FOR INSTALLATION

System Footprint

Wall Space is Always at a Premium

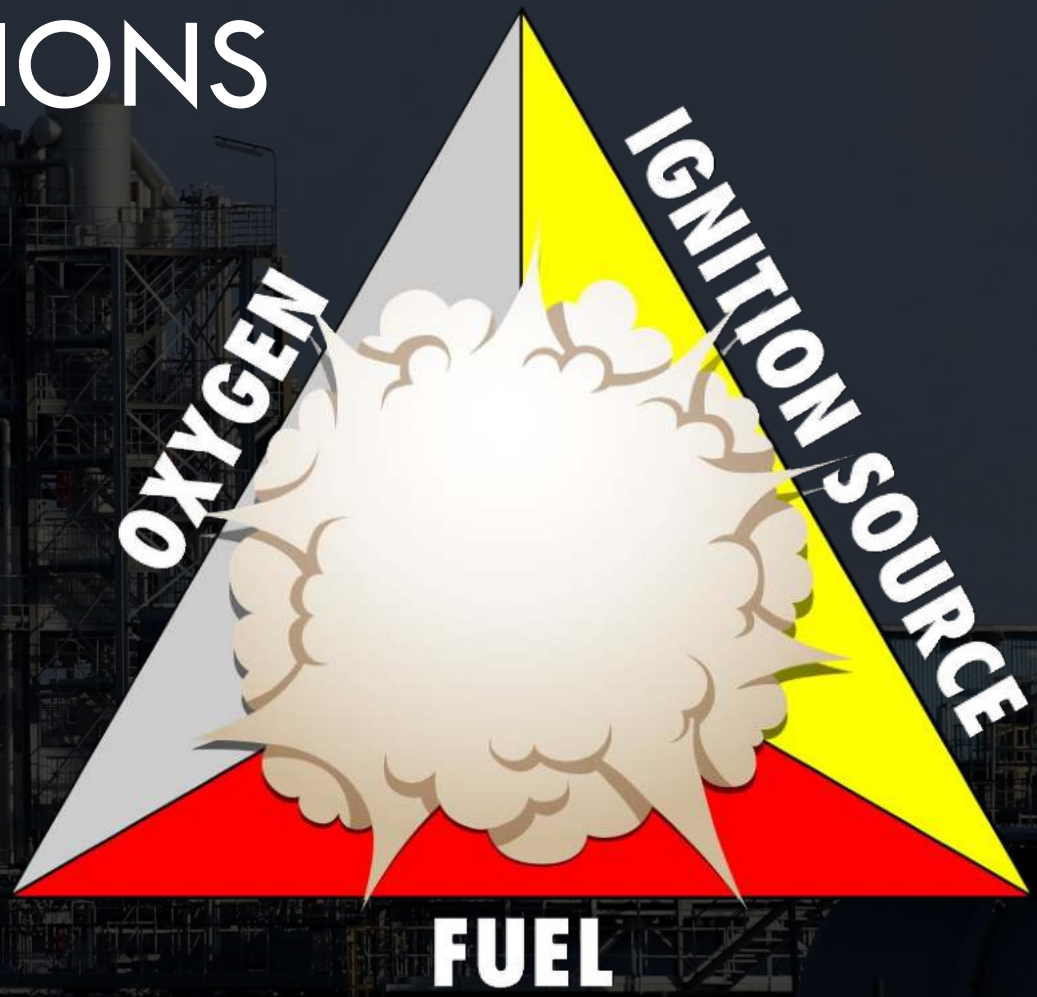
HAZARDOUS LOCATIONS

As defined by NEC, NFPA, UL, CSA, ATEX, IEC, IECEX, and other initialisms

HAZARDOUS LOCATIONS

What does explosion proof mean?

Who defines it?



HAZARDOUS LOCATIONS

CLAS
S I

CLAS
S II

CLASS
III

HAZARDOUS LOCATIONS

CLASS I

Chemical Plants
Refineries
Aerospace Sites
Bulk Loading Stations
Mines
Munitions Storage Areas
Offshore Platforms
Nuclear Facilities
Power Gen Facilities

CLASS II

Land-Based Drilling Rigs
Mines
Grain Storage Processing
Coal Handling/Storage
Metal Grinding
Pharmaceutical Mfg Plants
Cosmetics Mfg Plants

CLASS III

Textile Mills
Cotton Mills
Wool Processing Facilities
Wood Processing Facilities

HAZARDOUS LOCATIONS

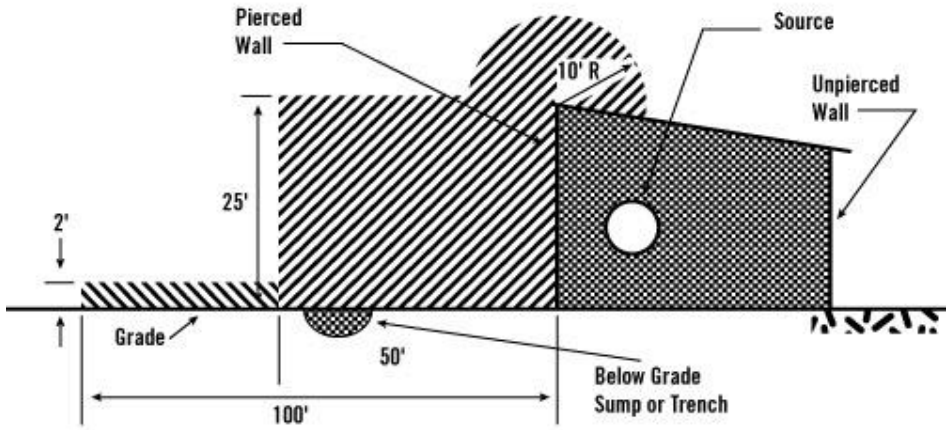
Division 1

Division 2

SOME ADDITIONAL NFPA CODES & STANDARDS

NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 820	Standard for Fire Protection in Wastewater Treatment and Collection Facilities
NFPA 61	Standard for Prevention of Fires in Agricultural Food Processing
NFPA 850	Prevention of Fires in Electric Generating Plants and High Voltage Direct Converter Stations
NFPA 664	Standard for Fire Protection in Wood Processing and Wood Working Facilities

HAZARDOUS LOCATIONS



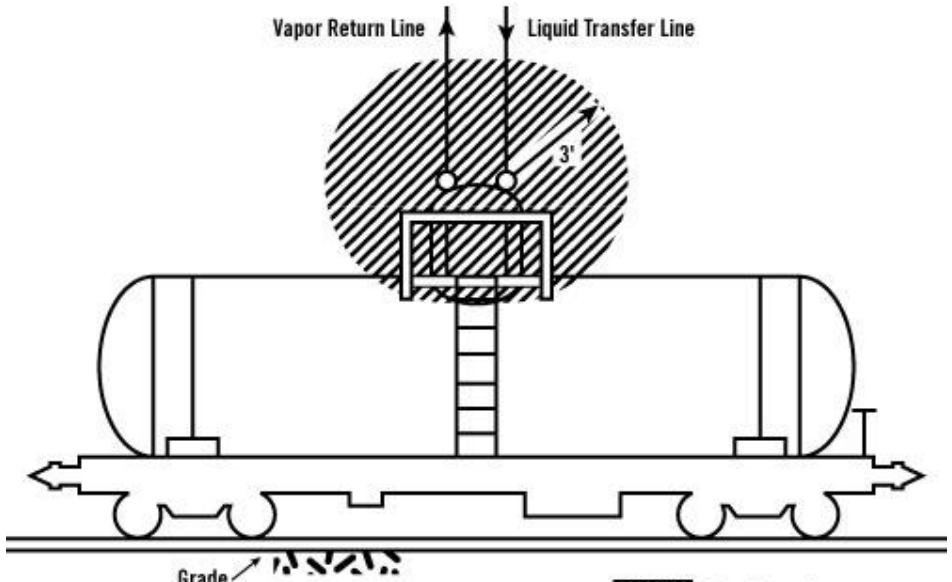
Material: Flammable Liquid

	Small/Low	Moderate	Large/High
Process Equipment Size		×	×
Pressure			×
Flow Rate		×	×

Division 1

Division 2

Additional Division 2
Use precaution



Material: Flammable liquid

Division 1

Division 2

HAZARDOUS LOCATIONS

How can you put electronic equipment in a hazardous location?

- All equipment rated for use hazardous location (XP rated or intrinsically safe)
- Utilize the techniques in NFPA 496 to purge and pressurize the building

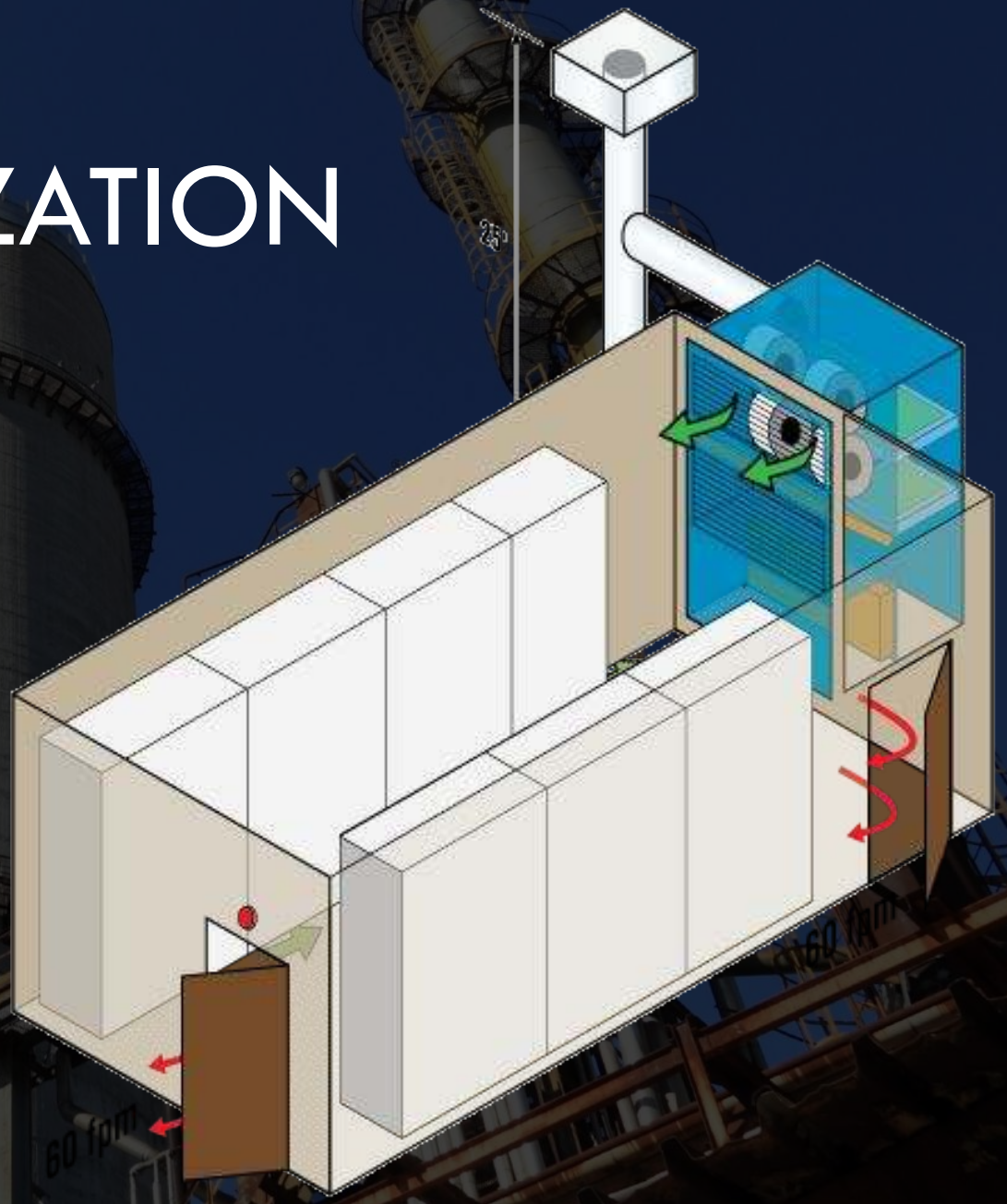
PURGE & PRESSURIZATION

What is purging?

- Force 60 fpm through any opening used for egress
- This does not include machine loading doors or transoms that are locked shut during normal operation of the building

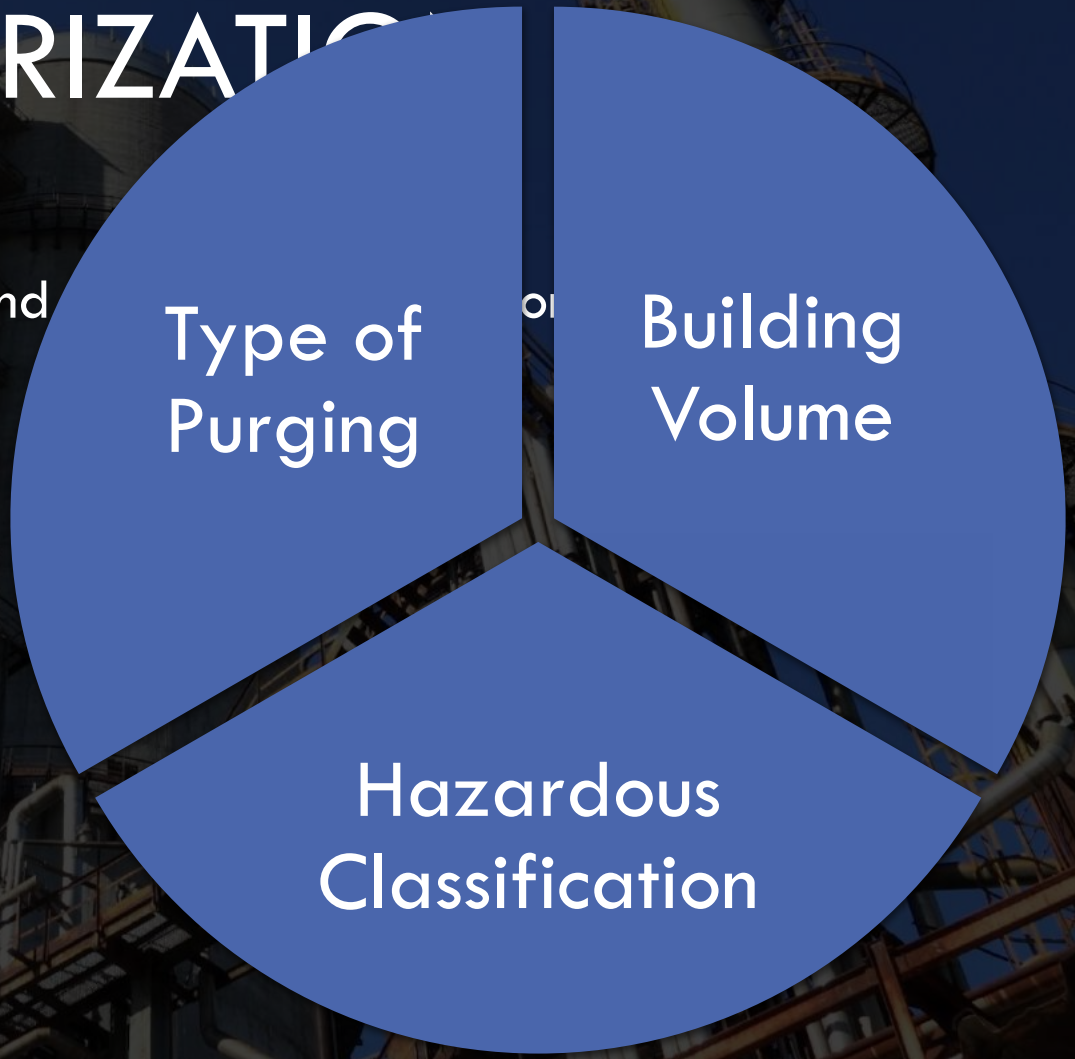
What is pressurization?

- Maintain 0.1” w.c. (25 Pa) positive pressure leaving the enclosure



PURGE & PRESSURIZATI

What is required to specify the purge and



ALL-IN-ONE SOLUTION

Complete environmental control system with industrial-grade features standard

ALL-IN-ONE SOLUTION

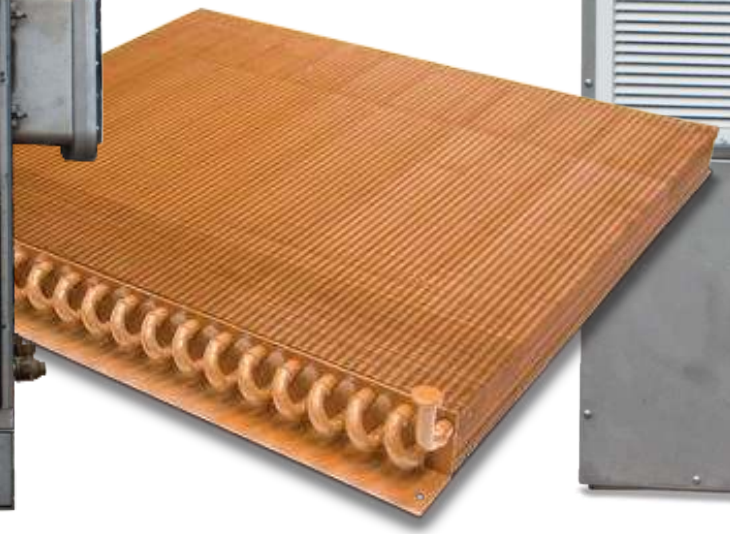
Completely self-contained packaged environmental control systems engineered to provide standard customized solutions to explosion proof, severe-duty and industrial applications

CORROSION RESISTANCE

Utilize 316 stainless steel throughout cabinet

Corrosion resistant coil coatings

Fully coated condenser section



EXTREME AMBIENT TEMPERATURES

Solutions for Hot Environments

- Upsized coils
- Alternative refrigerants, such as R-134A

Solutions for Cold Environments

- Economizers
- Low Ambient Controls (-40°F/C)
  - *Ultra* Low Ambient Controls require additional special equipment for mechanical cooling down to approximately -70°F)

HIGH SENSIBLE HEAT CAPACITY

Proper unit capacity sizing

Reverse air flow configuration

Proper duct design

AIR FILTRATION

Return Air

- Standard foam/aluminum mesh washable filter
- Optional 2-inch MERV-8 filters

Outside Air

- Standard foam/aluminum mesh washable filter
- Optional 2-inch MERV-8 filters
- Optional additional filtration up to MERV-18

Condenser Air

- Available clip-on style cotton seed filters
- Available pull out washable hog-hair filters

AIR FILTRATION

Built-In Chemical Filtration

- 2-inch MERV-8 particulate pre-filter
- 2 banks of chemical filter media
- 4-inch MERV-8 particulate final-filter

Chemical Filtration Deep Bed Scrubber

- 2-inch MERV-8 particulate pre-filter
- 2 6-inch banks of chemical filter media
- V-Bank MERV-11 particulate final-filter
- Includes pressurization blower

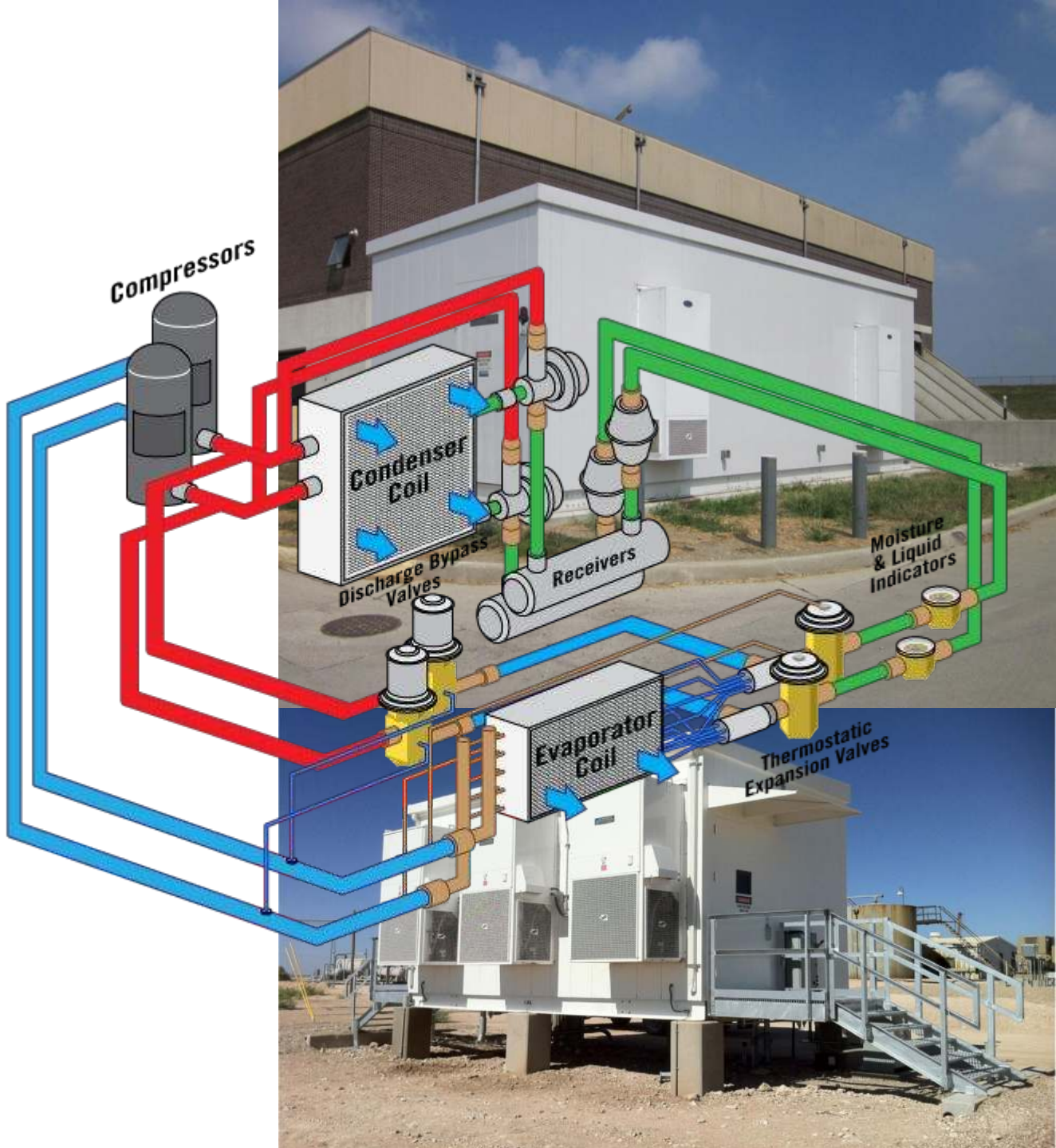
TWO TYPES OF REDUNDANCY

External Redundancy

- 100% redundant systems
- N+1

Internal Redundancy

- 2 or 4 stages of cooling provide inherent partial capacity in the event of a component failure



BAS INTEGRATION

Ensure at minimum Form-C Dry contacts available for alarm output

Remote system shutdown

Remote system monitoring

Remote full system control

EASE OF MAINTENANCE

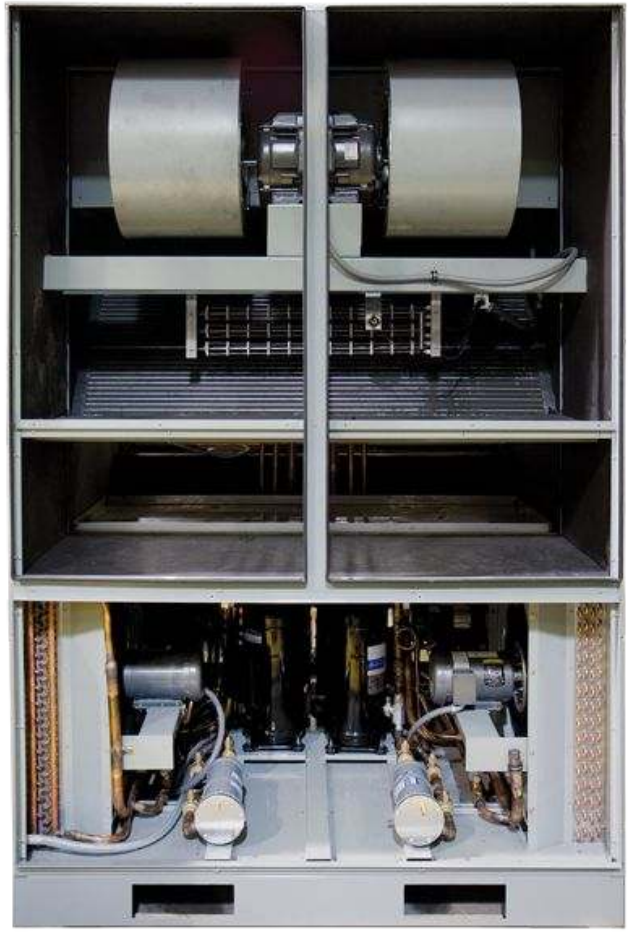
Ensure access to filters and components that have potential for failure

Through-the-wall mounting reduces need for man-lift for most maintenance and component replacement

Hinged doors throughout

Modular pull-out design of most components

Coil fin spacing of ~8 FPI



MINIMIZED FOOTPRINT AND WALL PENETRATION

Through the wall design can reduce opportunity for leaks from poor building seal

Interlaced refrigerant coils drastically reduce space requirements, allowing for the smallest possible cabinet per capacity

Enhances ease of installation and use

EXPLOSION PROOF BY DESIGN

Don’t settle for modified

EXPLOSION PROOF BY DE

Class 1 Div 2 TEAO (totally enclosed air over) evaporator motors

Class 1 Div 2 TEFC (Totally enclosed fan cooled) condenser motors

Built-in NFPA 496 compliant fully automated purge & pressurization

Corrosive and Combustible Gas Alarms

Stack Adapter for Standard or Freestanding Fresh Air Intake Stack

UL 508A Panels – Fabricated In-House

Units Fully CSA Certified to UL Standards

ALTERNATIVE UNIT CONFIGURATIONS

MULTIPLE UNIT CONFIGURATIONS

AVAILABLE SIZES AND CAPACITIES

Explosion Proof and Severe Duty Systems

- Fully Configurable Single Unit Capacities from 2–50 Tons

Industrial Grade Wall-Mount Systems

- Capacities from 5–20 Tons

OTHER AVAILABLE OPTIONS

Alarms

- Combustible, toxic, corrosive gas alarms and detection
- Clogged filter alarms
- Smoke detection and alarms
- High/Low pressure and temperature alarms

Heat

- Standard wire element
- Finned tube electric
- Explosion proof electric
- Steam heat

Other Environmental Controls

- Chilled water evaporator coil
- Humidity control
- Water cooled condenser

Misc

- Other refrigerants, including R-407C
- Blast dampers for evap and condenser
- Full touch screen HMI controls
- Aluminum or galvanized cabinet with custom color matching

OTHER AVAILABLE SERVICES

Heat loads for time savings or comparison

Duct design and installation

3D modeling of building airflow

Custom controls design

SUMMARY

Recap and takeaways

SUMMARY: KEY TAKEAWAYS

Is the specified HVAC system ready to address the below issues?

1. **Corrosion:** Specify a system with corrosion resistant features such as 316 stainless steel, corrosion resistant coatings, and proper coil construction.
2. **Explosion risk:** Specify a system that is certified, designed, built, and tested to meet applicable regulatory and statutory requirements.
3. **High capacity:** Can the unit cool 24/7 with drastically variable and extremely high heat loads?
4. **Reliability:** Will the system minimize downtime with built-in redundancy? Is the system easy to maintain?
5. **Filtration:** Specify an all-in-one system that includes the proper filtration for the environment

QUESTIONS?

In the unlikely event we don't know an answer, we'll find out.

WEB PAGE

www.specificsystems.com