

Ensuring System Reliability by Selecting the Right Protection Environment for different Food manufacturing conditions.

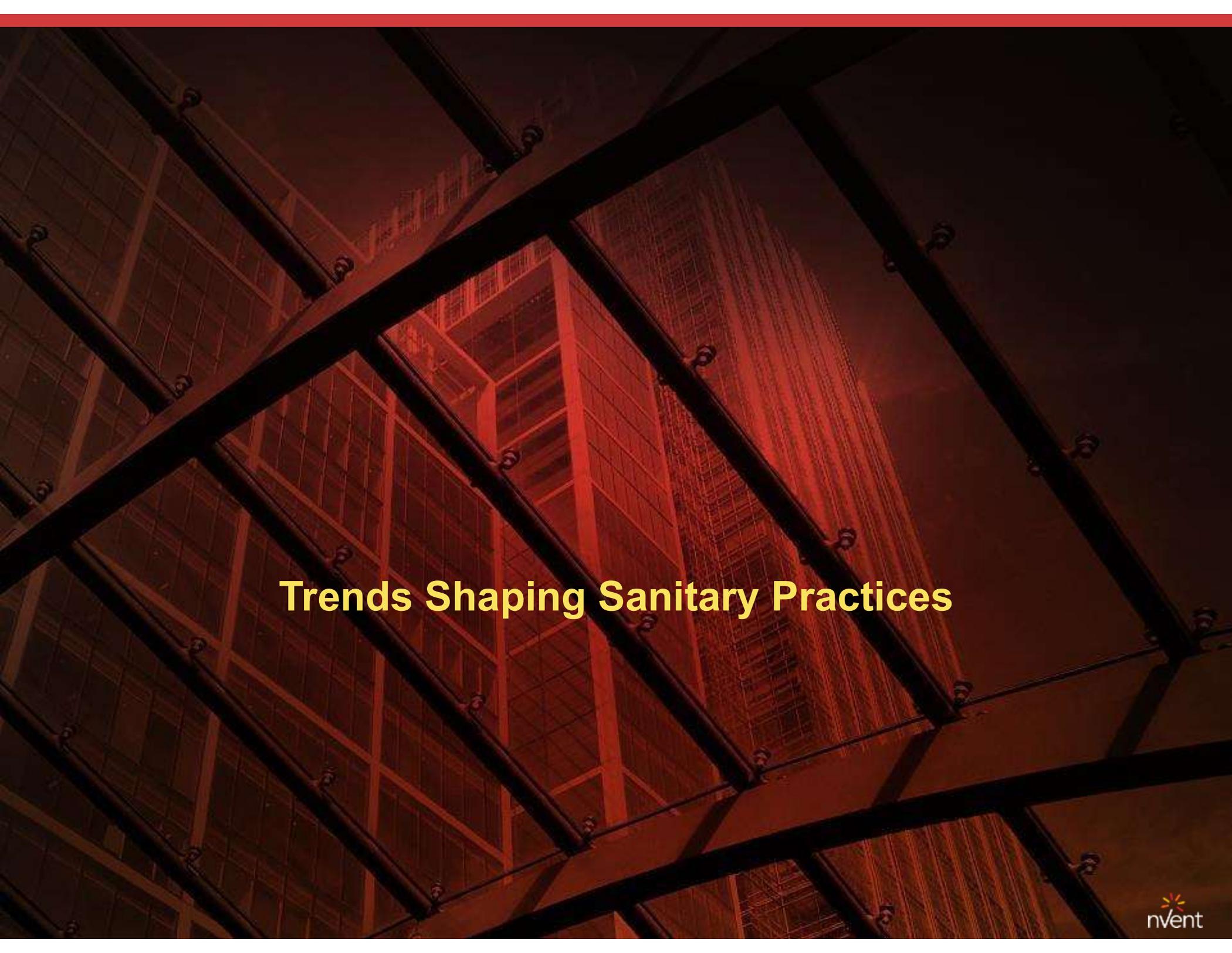


Agenda

Trends Shaping Sanitary Practices

Principles & Standards Driving Hygienic Design

Enclosure & Thermal Management Best Practices



Trends Shaping Sanitary Practices

Food Safety

➤ Every year:

- U.S. food industry loses an estimated \$55 billion annually
- About 48 million people (1 in 6 Americans) get sick
- 128,000 are hospitalized
- 3,000 die

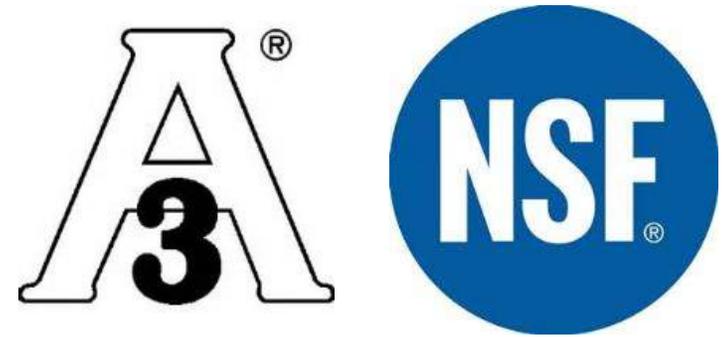
➤ 2018

- 20 foodborne disease outbreaks
- More than 200 food recalls

➤ FDA Food Safety Modernization Act (FSMA)

- Prevention
- Inspection and Compliance
- Response
- Imports
- Enhanced Partnerships

FDA FOOD SAFETY
MODERNIZATION ACT



Signs You Have a Problem

Sanitary Design Gone Wrong



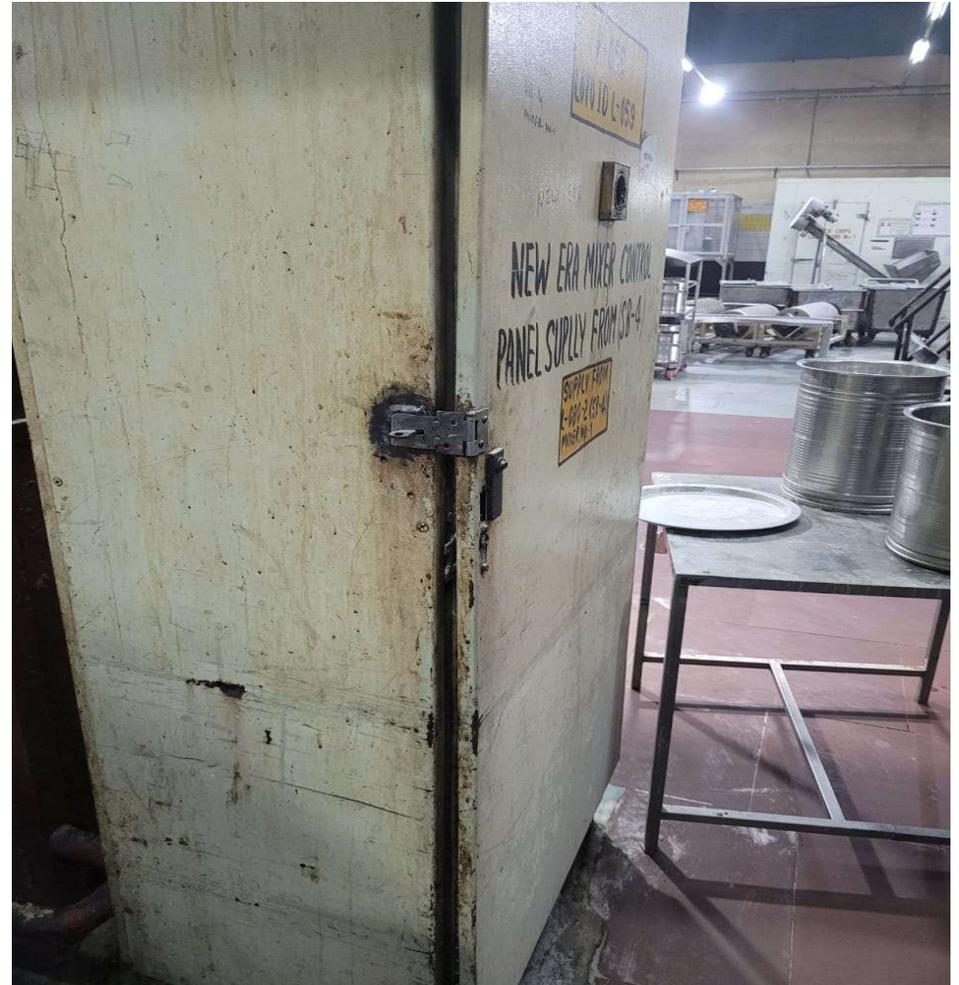
Moisture management. Bacterial risk. Failing gasket.

Sanitary Design Gone Wrong



Lack of moisture management

Sanitary Design Gone Wrong



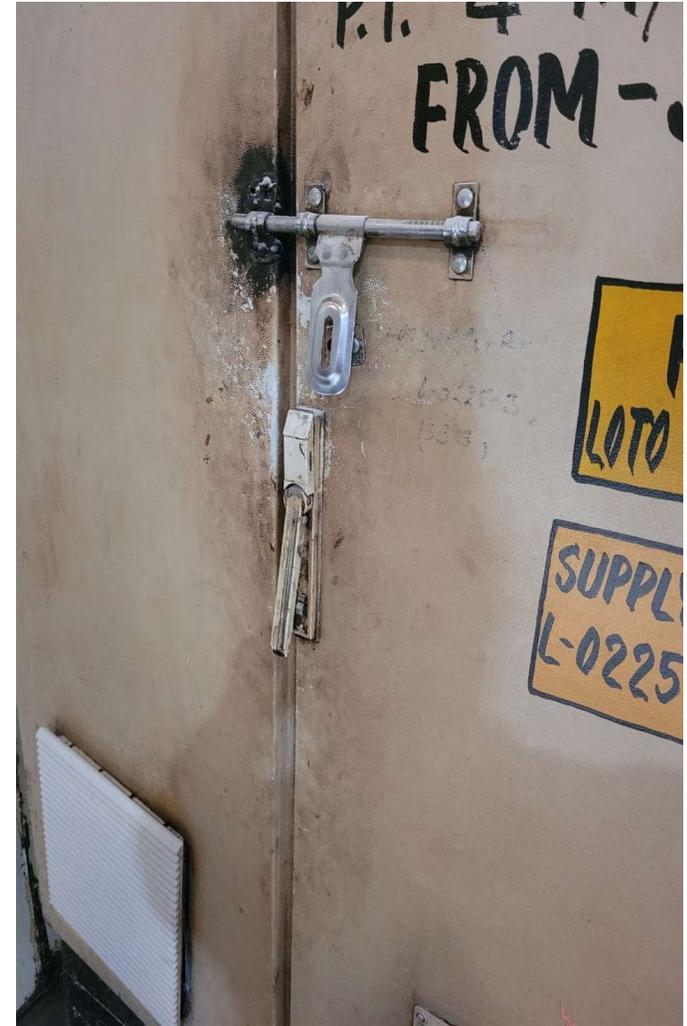
Make-shift solutions

Sanitary Design Gone Wrong



Failing hinges

Sanitary Design Gone Wrong



Latch corrosion and harborage point

Sanitary Design Gone Wrong



Hygiene / Environment factors not considered.

Sanitary Design Gone Wrong



Bagging or shielding of enclosures

Sanitary Design Gone Wrong



- 5 Lakh Biscuit PKTS / DAY / PLANT
- 5 lines means 1 Lakh PKTS @ 20 per day
- Total Production per day = 20,00,000
- Avg Hourly output = $2000000 / 20 = \text{INR } 1 \text{ Lakh}$
- Loss of production / revenue of 1.5 hrs / day due to breakdown / maintenance is 1.5 L / day
- Loss per month = 45 Lakhs

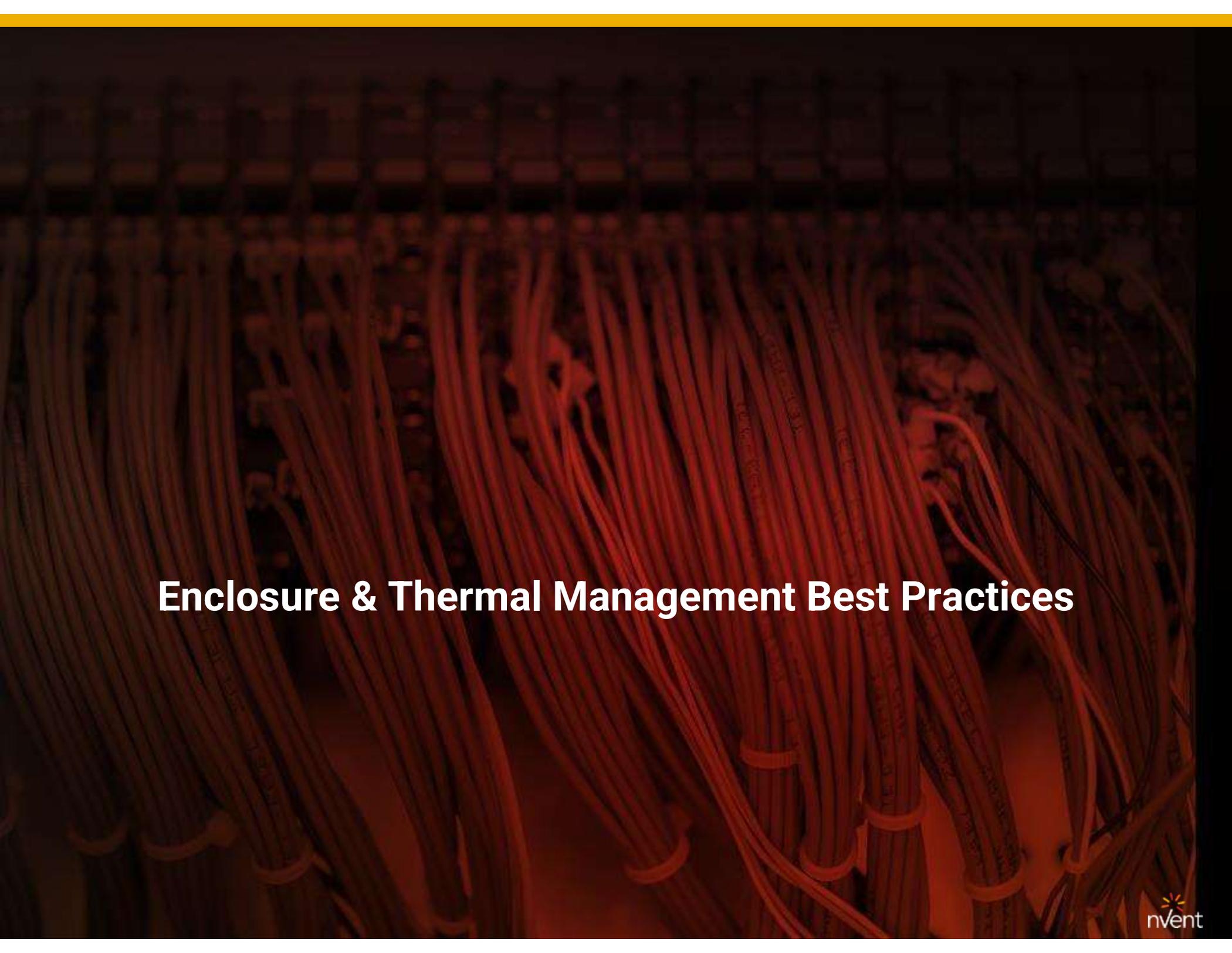
Bagging or shielding of enclosures

Sanitary Design Gone Wrong



- **Reliable Gasket**
- **Reliable Locking Systems**
- **Canopies wherever deemed fit**
- **Moisture Management**
- **Heat / Thermal Management**
- **Environment considerations**

Paramount Factors to be considered



Enclosure & Thermal Management Best Practices

Three Layers of Protection for Sanitary Applications

Basic Sanitation

Concept Slope-Top



- Sloped top
- Foam-in-place gasket
- UL Type 4X rated
- Corner-formed doors are interchangeable and easily removed by pulling hinge pins

Medium Sanitation

WaterShed



Concept slope-Top plus:

- FDA
- Avail. in free-stand sizes
- Pre-tapped mount holes
- 22 WM and 9 FS Models

High Sanitation

HyShed



WaterShed features plus:

- IP69K, 3-A, Type 4, Type 4x, NSF FDA
- Replaceable silicone gasket
- Screw and hinge cover
- No pre-rapped mounting holes

Complete Sanitary Offering

4X Moisture Management



IP69K Accessories



Sanitary Stand-Offs
(2 & 4 Inch)

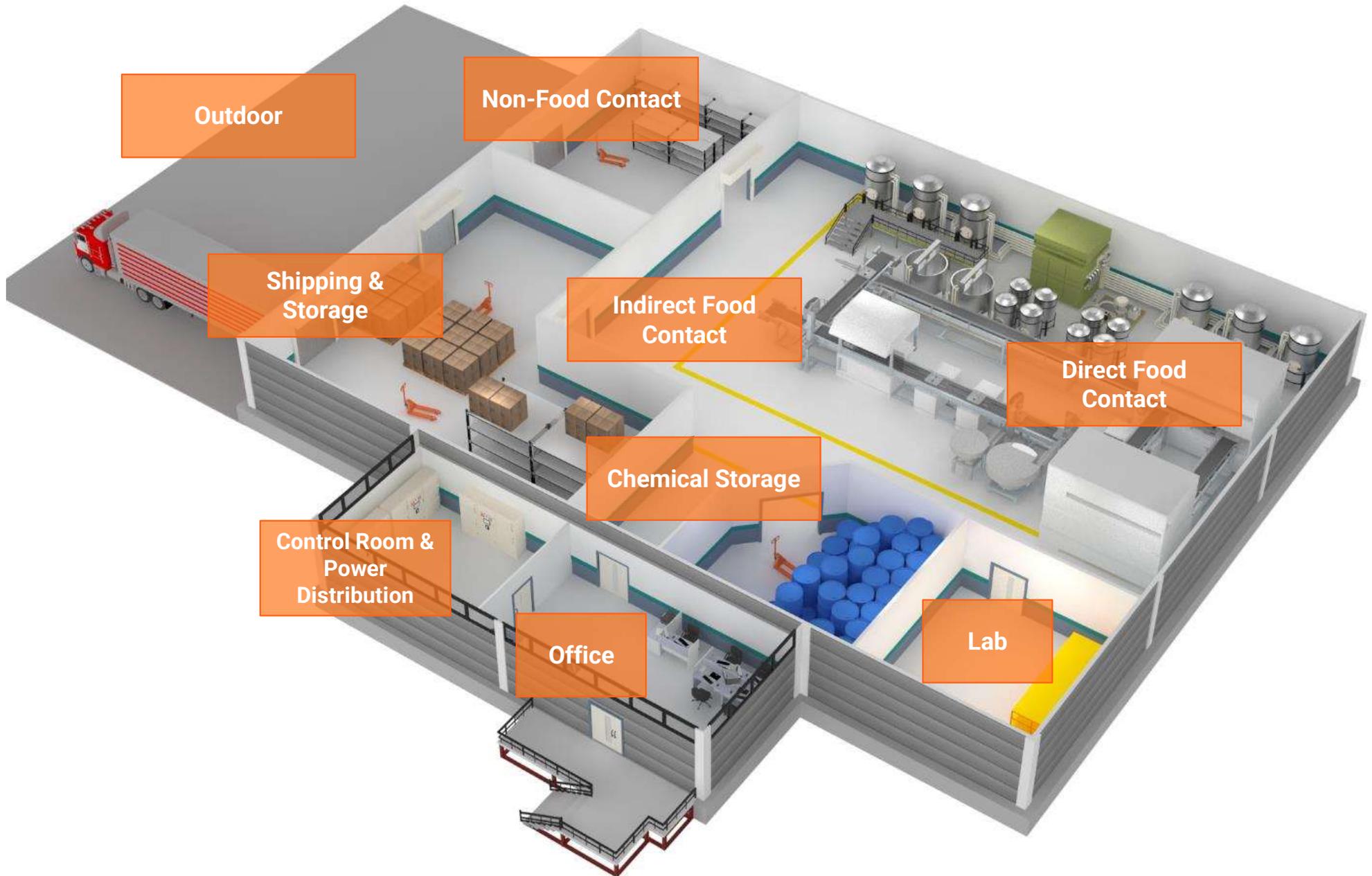
Thermal Management



Other Solutions



Sanitary Environments: Wide Range of Needs



Sanitary Environments: What to Use Where

Outdoor Use

UL Type 4x,
3R



Non-Food Contact

UL Type 4x (Concept
Sloped Top)



Direct Food Contact

UL IP69k
(HyShed, Syspend)



Shipping & Storage

UL Type 4/4x,12



Indirect Contact

UL Type 4x
(WaterShed)



Control Room & Power

Distribution UL
Type 4 Modular
Cabinet ,
Remote
Monitoring



Chemical Storage

UL Type 4x
(304/316SS)



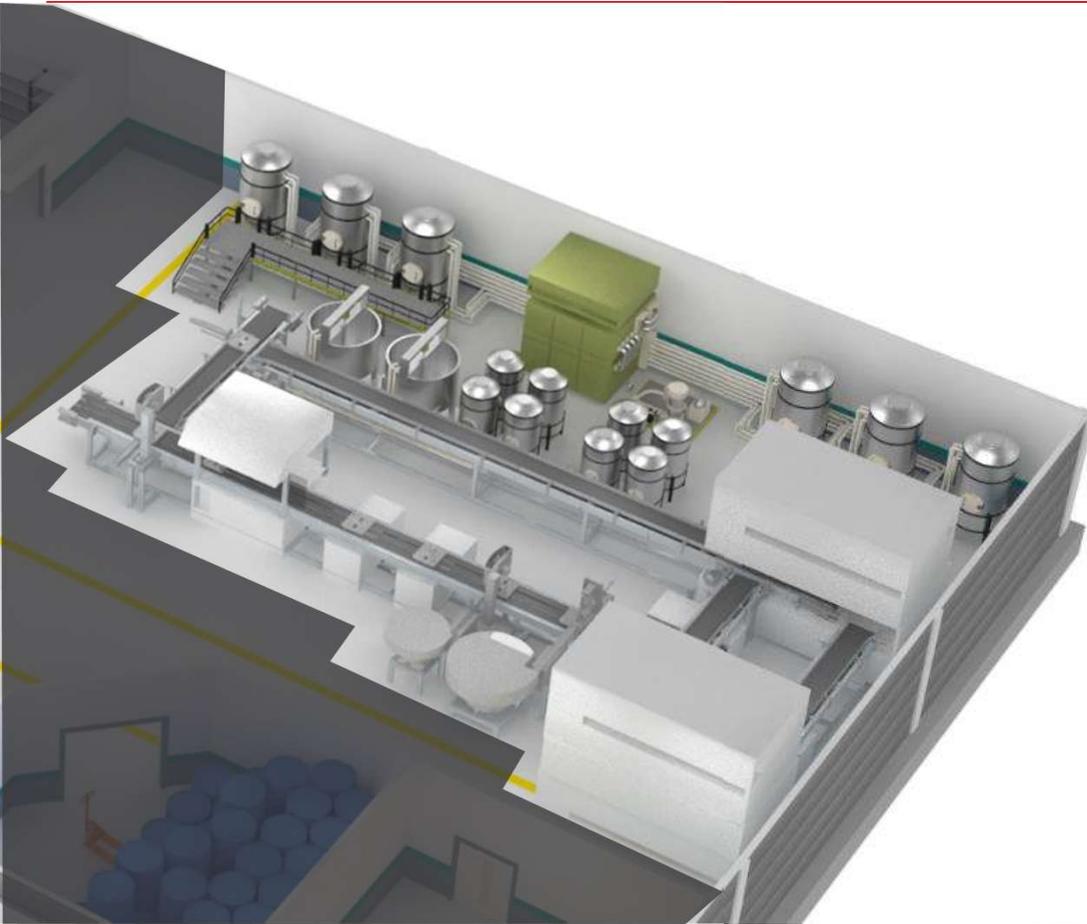
Enclosure Cooling & Condensation Management



Direct Food Contact Areas

Enclosures Designed for Harsh Washdowns & Chemicals

- DIN & IEC IP69(K) rated enclosures, UL Certified to IP69K
- Gasketing designed to withstand washdown chemicals & moisture
- Complete sanitary design features



Stand-Offs



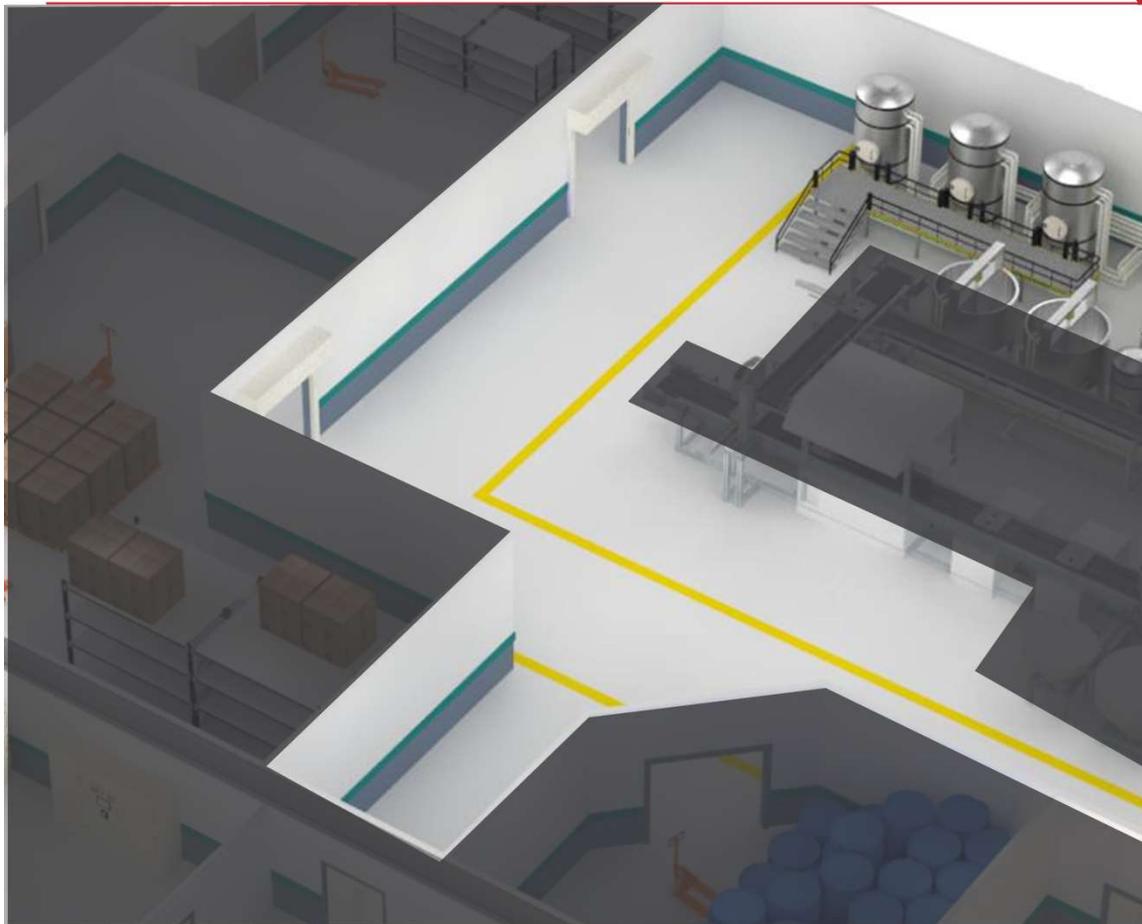
Sypend IP69 HMI



HyShed – Total Sanitary Washdown Solution

In-Direct Food Contact Areas

Enclosures Designed for Light Washdowns & Chemicals



- UL Type 4X rated enclosures
- Medium level sanitation features
- External hinging, foam gasket, stainless steel latching



WaterShed –
Wallmount, Free-Stand and Disconnect
model options



Thermal



UL 4X Stand-Offs

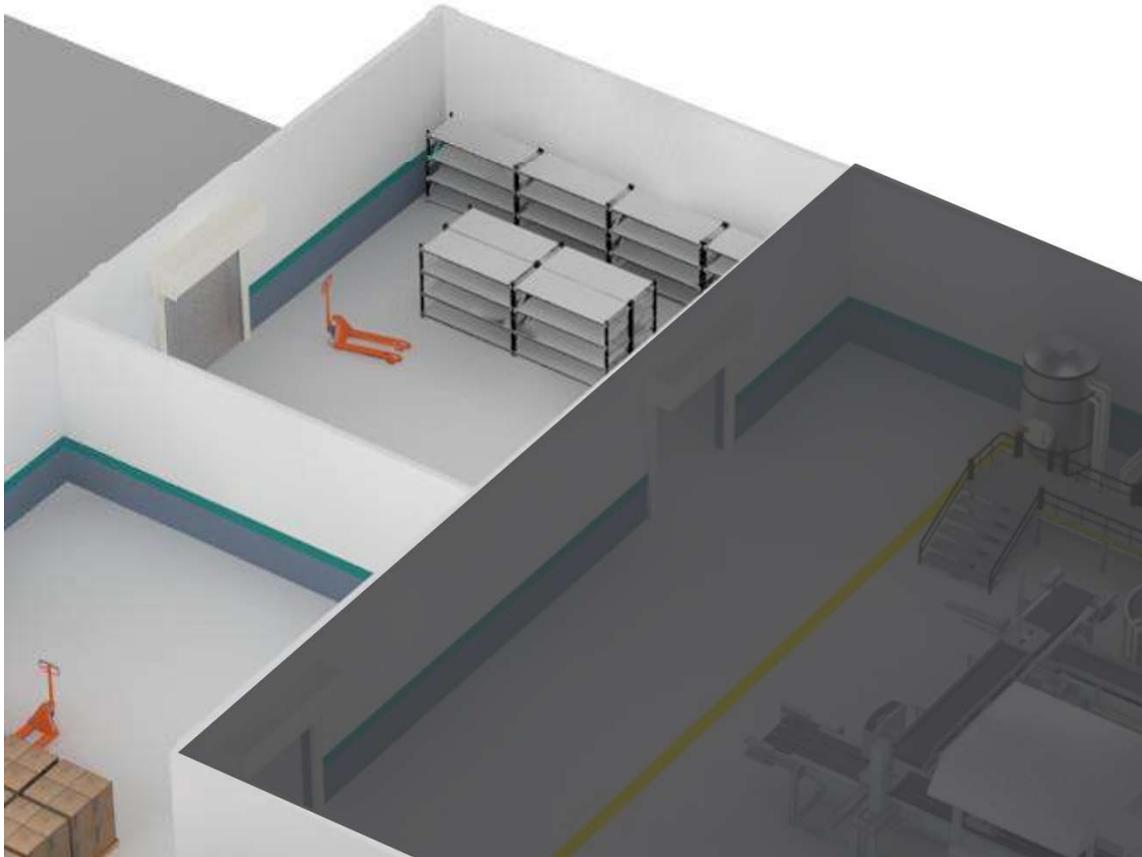


UL 4X Moisture Management

Non-Food Contact Areas

Enclosures Designed for Minimal Washdowns & Chemicals

- UL Type 4X rated enclosures
- Low level sanitary features
- External hinging, foam gasket, non-metallic latching components



Corrosion Inhibitors



UL 4X Stand-Offs



SS Wireway Solutions

Concept Sloped Top

Additional Sanitary Solutions

Syspend HMI Sanitary



- IEC IP69K, Type 4/4X
- Supports up to 90 lbs.
- 304 SS
- Syspend lock attachment method

Moisture Management



- **Vent Drain**
 - Gravity Fed
 - Type 4/4x
- **Dehumidifier**
 - 24 VDC
 - Type 4/4x, 12
 - 5.5in x 6 in

Wireway



- Clean-Tray System
- Type 1
- Quarter-Turn Top
- Slatted Bottom

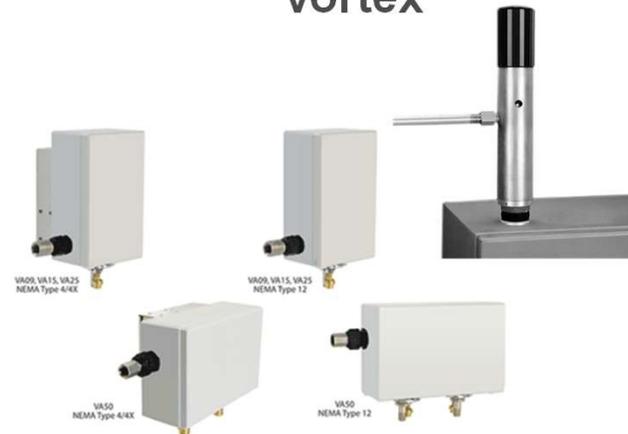
Thermal Management Solutions

Thermoelectric



- Optional condensate manager
- 24VDC or 48VDC
- 60, 100, 200 watts
- Type 12, 3R, 4/4X

Vortex



- Optional air filters
- 400, 900, 1500, 2500, 5000 BTU/Hr
- 100-120 VAC
- Type 4/4X, 12

ProAir



- Harsh environment AC
- 1600-8000 BTU/Hr
- 100-120VAC – 400-460VAC
- Type 12, 3R, 4/4X

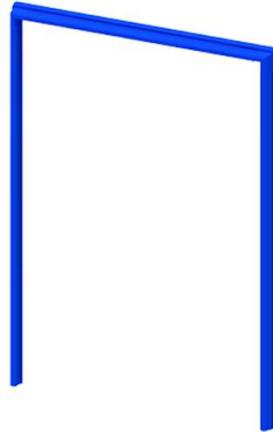
Thermal Management Solutions

4x Filter Fan Shroud



- 304 stainless steel & mild steel
- UL 508A Type 4/4X
- Tool-free maintenance
- FDA-grade silicone gasket

Replacement Gasket



- Fits 4x fan shroud
- FDA-grade silicone
- Easy, tool-free installation

Filter for 4x Shroud



- Tool-free maintenance
- 4 sizes
- Black and light gray
- Type 12 on its' own

Corrosive Environment Thermal Management Solutions

Traditional Evap/Cond.



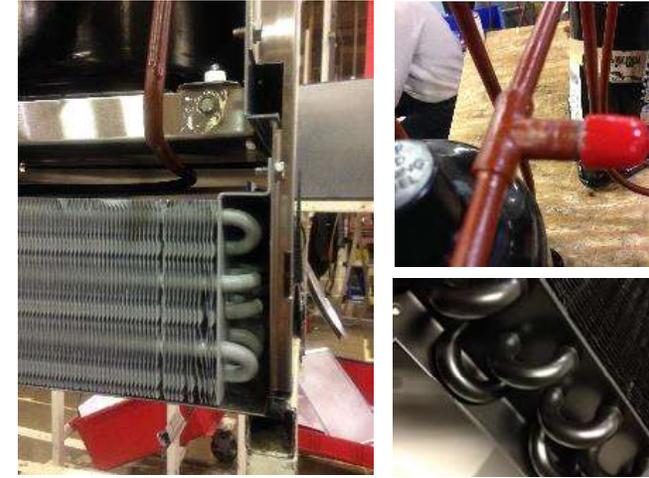
- Spectracool with advanced corrosion protection
- Designed for use in harsh, chemical rich environments

+ Level 1 Protections



- + Protective coatings of ambient critical components
- Coatings on ambient coils & copper/solder

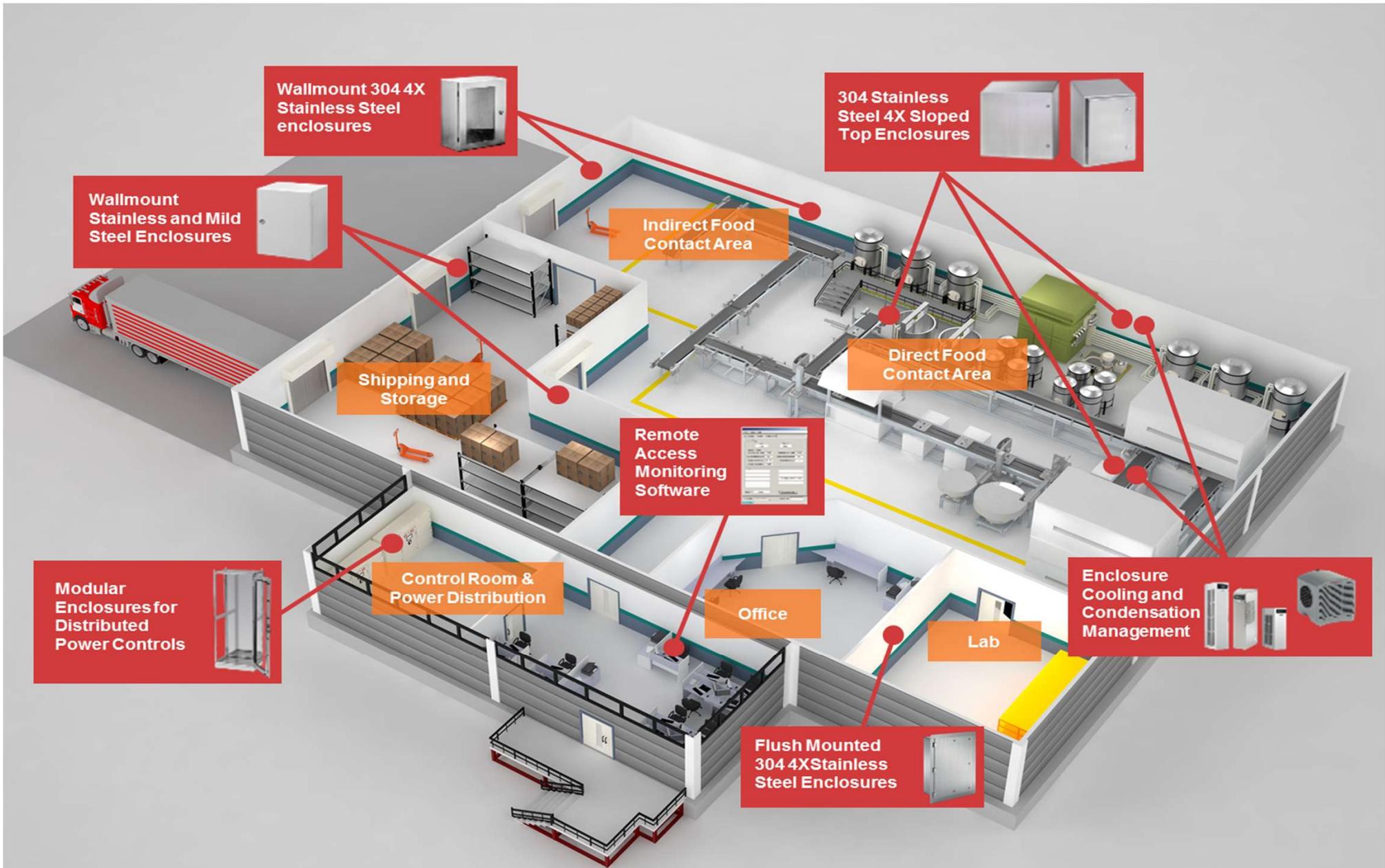
+ Level 2 Protections



- + Protective coatings of internal critical components
- Coatings on internal coil, copper lines, solder joints, thermostat wrap (non-RAC units), etc.

Prevents premature failure: Lack of cool air production, fluid leaks, etc.

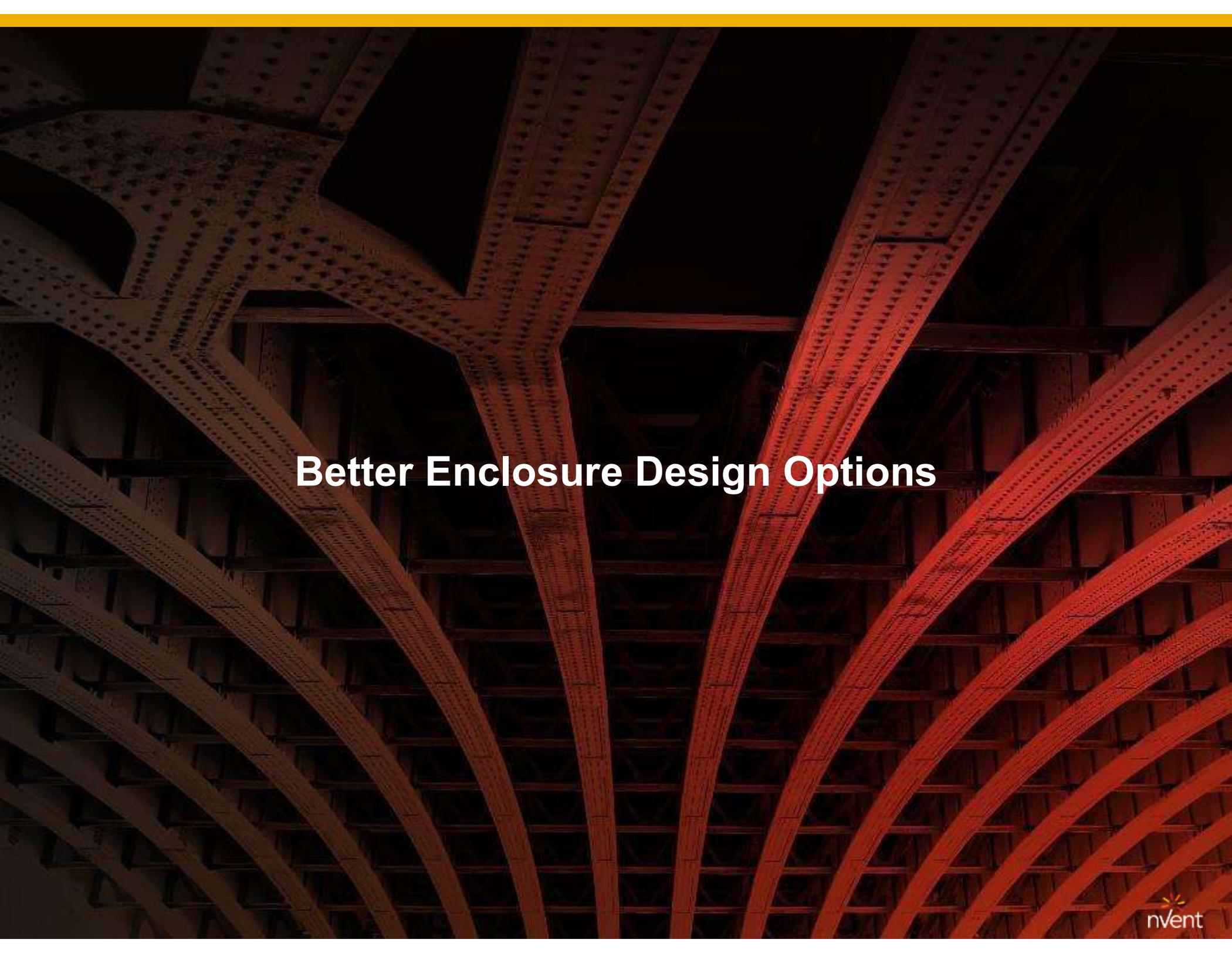
Industrial Solutions: Food & Beverage



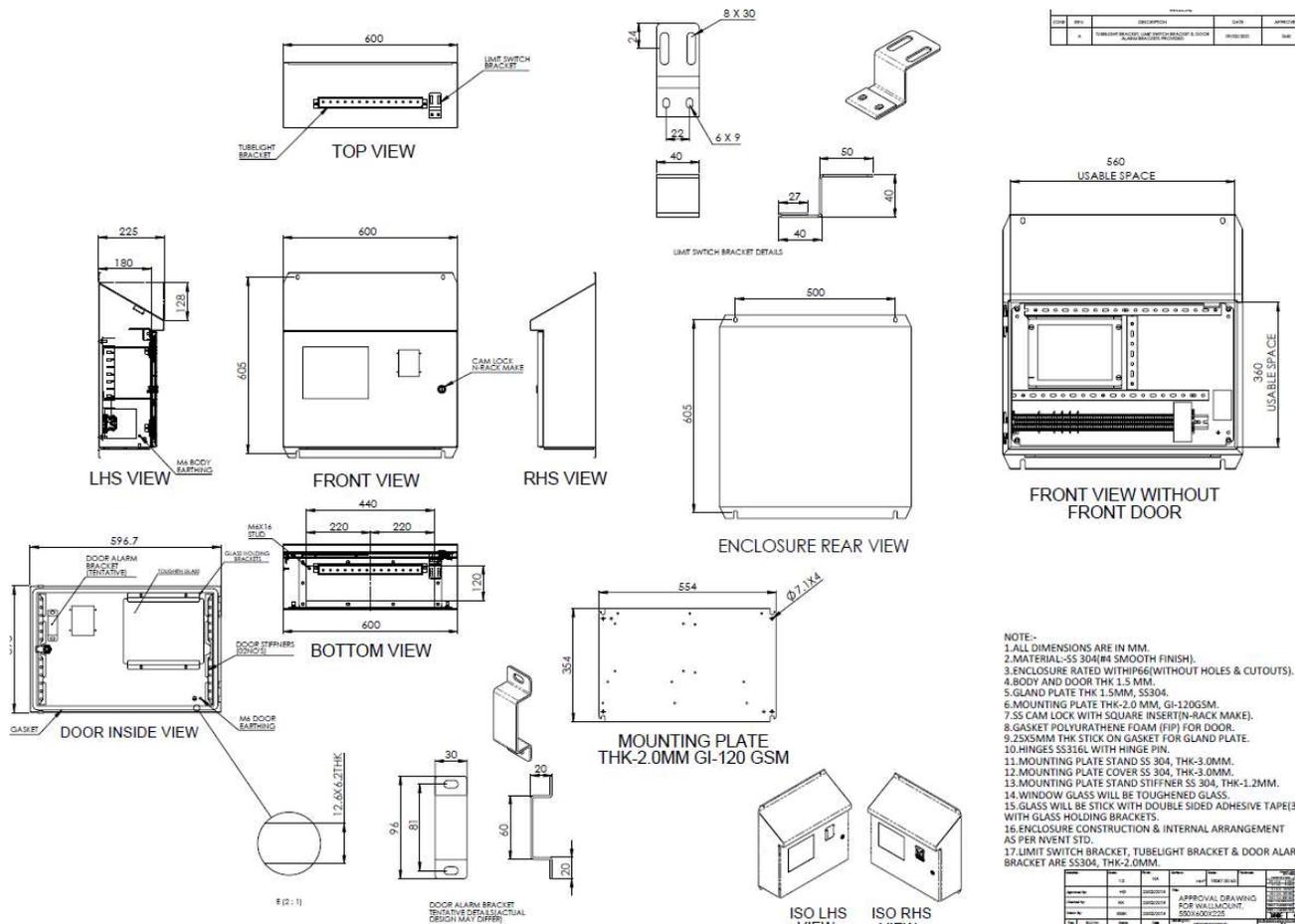
Meeting Hygienic Standards



No longer just an old, gray box



Better Enclosure Design Options



Salient Features

- Slope top
- Protrusion top
- No external canopy
- Easy maintenance
- Provision for limit switch and door alarm
- IP 66 , NEMA 4X

Design for Indian Conditions

Nvent Hoffman – Portfolio for Food Grade

HY Shed Design : High Level Protection



Water shed Design : Medium Level Protection



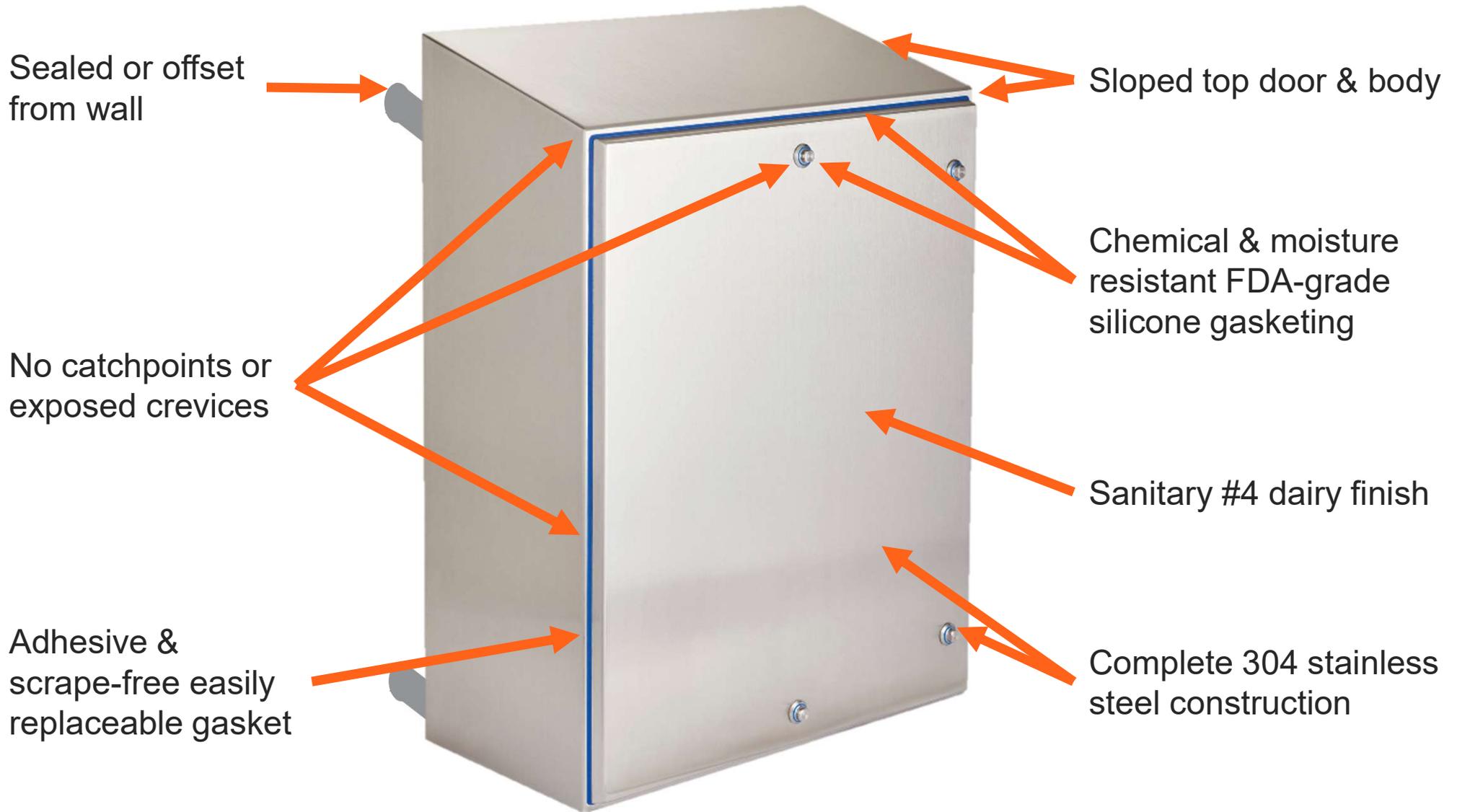
Hybrid Design : Medium Level Protection



Slope Top Enclosure : Basic Level Protection



Meeting Hygienic Standards



Sanitary Design Done Right

UL Type 4



UL Type 4x
DIN IP69K
IEC IP69



Certified vs Self Declared

➤ Nationally Recognized Test Laboratory Certified or Listed

- Tested by 3rd party, accredited to ISO17025
- Certificate and construction report
- Routinely audited

➤ Self Declared

- Manufacturer claims product complies or meets a requirement
- Example: IP69K compliant or meets IP69K requirement
- Most likely internally tested, not routinely audited



UL 508A Listed; Type 4, 4X, 12; File Number E61997
cUL Listed per CSA C22.2 No 94; Type 4, 4X, 12; File Number E61997
UL and cUL Classified to IEC 60529, IP66, IP69; File Number E503705

NSF 169 Special Purpose Food Equipment and Devices
3-A SSI Replacement Parts and System Component Qualification
Certificate
NEMA/EEMAC Type 4, 4X, 12
DIN 40050-9, IP69K

Verify 3rd party certified

Water Washdown Standards

- NEMA **Type 4 / 4X** Hose Down
- IEC 60529 **IPX6** Hose Down
- DIN 40050-9 **IP69K** Road Vehicles; Degrees of Protection (IP-code); Protection Against Foreign Objects; Water and Contact; Electrical Equipment
- IEC 60529 Edition 2.2 2013 **IP69** Degrees of Protection Provided by Enclosures (IP Code)
- NEMA ICS 5 Annex F-2002 (R2007, R2012) *High Pressure Power Wash Test Procedures for Self-Contained Control-Circuit Devices*
- NEMA 250; 2018 PW

Type 4X Hose Down

- **UL508A / CSA 22.2 NO 14** Industrial Control Panels
- **NEMA 250** Standard for Enclosures for Electrical Equipment (1000 Volts Maximum)
- **UL50 / CSA C22.2 NO 94.1** Enclosures for Electrical Equipment, Non-Environmental Considerations
- **UL50E / CSA C22.2 NO 94.2** Enclosures for Electrical Equipment, Environmental Considerations
- **Type 4X** Enclosures constructed ...protection ... against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.



Test Description

- 10 -12 ft away at 65 gal/min
- Directed at all seams at rate of 6mm/sec
- Pass result criteria: No water entry

Required certification Type 4X traditional minimum washdown

IPX6 Hose Down

IEC60529: 2013 Degrees of protection provided by enclosures (IP Code)

- **Test for second characteristic numeral 6**
- **Test Description**
 - Internal diameter of the nozzle: **12,5 mm**
 - Delivery rate: **100 l/min ± 5 %**
 - Test duration per square metre of enclosure surface area likely to be sprayed: **1 min**
 - Minimum test duration: **3 min**
 - Distance from nozzle to enclosure surface: **between 2,5 m and 3 m**



Acceptance Criteria

In general, if any water has entered, it shall not be sufficient to interfere with the correct operation of the equipment or impair safety

IP6X Dust

IEC60529: 2013 Degrees of protection provided by enclosures (IP Code)

- **Test for first characteristic numeral 6**
- **Test Description**
 - Dust test talcum powder used shall be able to pass through a square-meshed sieve the smaller than 75 micron
 - is 2 kg per cubic metre of the test chamber volume. It shall not have been used for more
 - 2 kPa (20 mbar), for a period of 8 h

Acceptance Criteria

At the end of the test, no dust shall enter



IP66 and IP69(K) – first character references dust

Water shed Design : Medium Level Protection

WaterShed is specially designed to facilitate washdown runoff



90 degree body flange channels liquids away from opening

STANDARDS

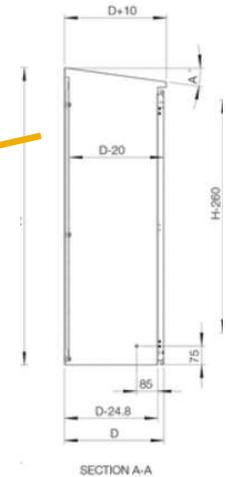
- UL 508A, Type 4X
- IP66 in accordance with IEC 60529

Hybrid Design : Medium Level Protection

The stainless steel single door wall mounted enclosure range, AFS, has an integrated sloping roof and IP 66 protection degree

STANDARDS

Corresponds with
IP 66 | TYPE 4X,
12, 13 | IK 10.



The top of the body has an integral sloping roof at an angle of between 8 and 20 degrees,



10 mm overhang, to move any liquids away from the door. Folded and seam welded.

Slope Top Enclosure :Basic Level Protection

The Concept Sloped Top portfolio helps protect equipment in minimal washdown applications

STANDARDS

- UL 508A, Type 4X
- IP66 in accordance with IEC 60529



210-degree opening door
easily removed by pulling
clip-style hinge pins



90 degree body flange channels
liquids away from opening



90 degree body flange channels
liquids away from opening



Flexible mounting options
direct mounting through back of enclosure or
with external brackets

Economical & Effective in case of limited water interference

Sanitary Organizations and Standards

- National Sanitary Foundation

- NSF 169 Special purpose food equipment and devices



- 3-A Sanitary Standards Inc.



- The European Hygienic Engineering & Design Group (EHEDG)



- BISSC - Baking Industry Sanitation Standards Committee



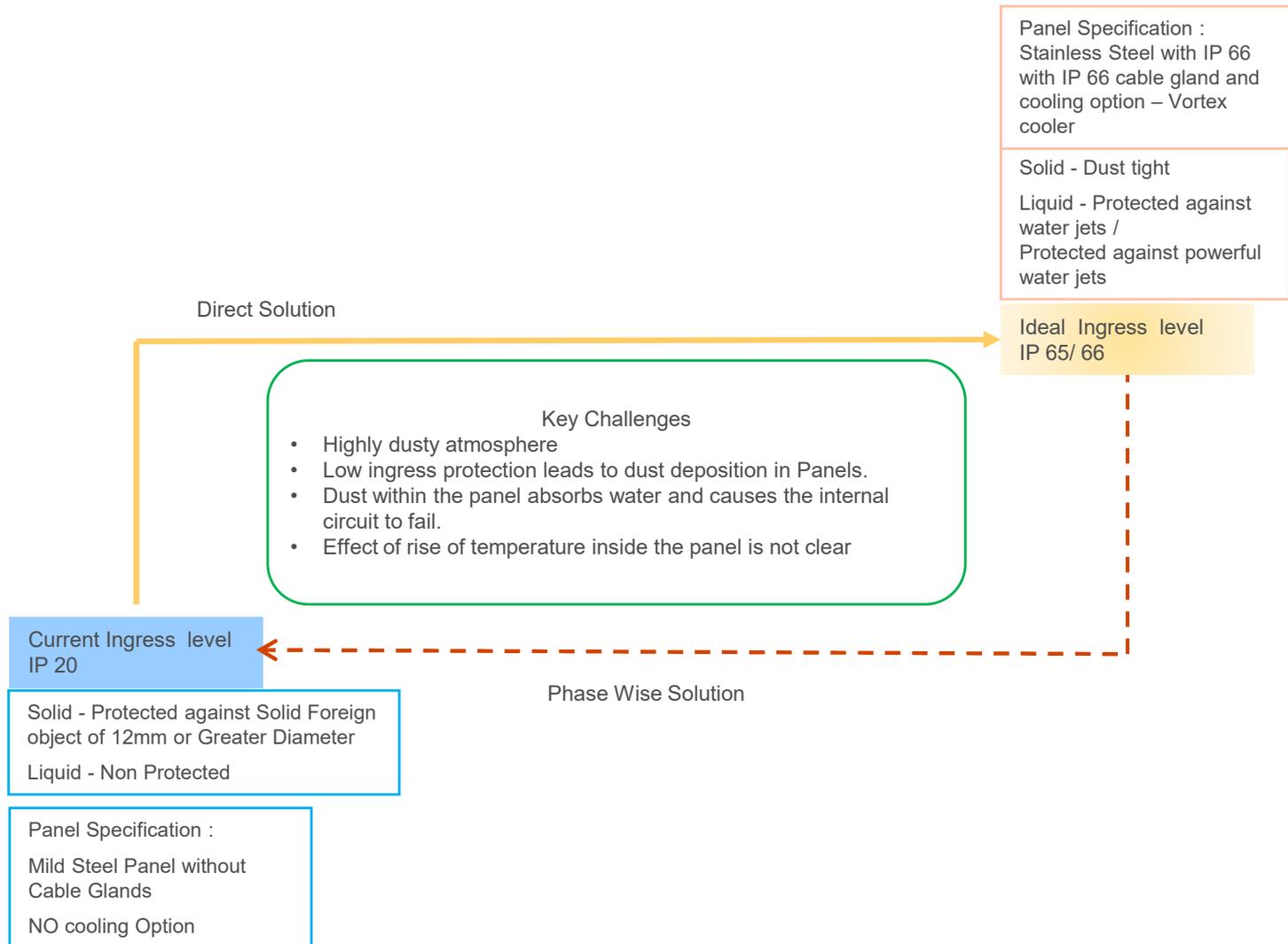
- NAMI – North American Meat Institute



Case Study



Detergent Line



Key Failures of the Panel



Lack of Cable Glands



Rusting of Doors



Lack of Gasket

Key Failures of the Panel



Dusty Atmosphere



Gaps in Panels



Dust Deposition and Rusting

Direct Solution – Replacement of Panel and Installation Cooler

Mild Steel Enclosure



1200 X 800 X 300
IP 66

Stainless Steel Enclosure



VA251604X
Nema 4X
733 W

+

=

IP 66 , NEMA 4X System
Protection from Dust and Water
Temperature regulation inside the enclosure

Phase Wise Solution

1. Ingress Improvement

1. Install New Gasket in all the panels
2. Installation of PVC cable glands in all panels
3. Use of silicon based sealants to close the gaps within the panel *



STEP 1

2. Change of all cable glands

3. Repair doors locking for all the panels.

4. Installation of hygrostat in all panels

Key Measurements

- Periodic Measurement of Temperature inside the panels
- Failure data analysis of current panel



STEP 2

Case Study – Mondelez International... (1/2)



MONDELEZ INTERNATIONAL

They are a big company! Who believe, above all, in one thing – something that’s unique to them – and that’s the power of big and small. Mondelez International has the scale and resources of a global powerhouse. But also the speed, creativity and agility of a fresh new start-up.

LOCATION

All plants in India –
Malanpur - Near Gwalior
Baddi - Himanchal
Induri - Near Pune
Sricity - Chennai



ABOUT THE PROJECT

The customer has 4 plants in India, the most recent being Sricity, Chennai. One of their global projects focused on the central server was to combine all manufacturing lines digitally while tracking all production lines as well as real-time production online. The server would then aid in sending the results tracked on to a single screen to the principal plant.

WHAT WAS NVENT HOFFMAN’S CONTRIBUTION

As part of the project the customer wanted all the lines to have an HMI system to monitor the production on real time. Each production line had a unique requirement based on different ground conditions.

nVent HOFFMAN started the first project in Baddi, and as part of the project supplied more than 80 finished HMI systems to all their plants in India. The unique aspect of each plant was that it had a different ground condition, resulting in Hoffman designing 15 different types of HMI systems for each condition.

SPACE SAVING MODULAR ENCLOSURE SOLUTION CREATED TO SEPARATE AND PROTECT CRITICAL COMPONENTS

Case Study – Mondelez International... (2/2)



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SCOPE

The scope for nVent Hoffman comprised of a Wallmount Enclosure attached to an arm through a swivel. The arm terminated into a swing system which was installed on the stand

CHALLENGE

Since there was limited standardization between the plants, each plant utilized different computer hardware systems, coupled with the fact that each location had their own boundaries and challenges, this meant each product had to be unique.

HIGHLIGHTS

-  Design 15 different types of HMI system for the same project
-  System stability check
-  Vendor development and coordination for outsourced components
-  Faster delivery of products with a lead time of 8 weeks and a high level of customization

Corrosion Protection Levels

Level 1 protective coatings are only applied to components on the condenser (exterior facing) side

Level 2 protective coatings are applied to all air conditioner components

Condenser coil is coated for protection against corrosion

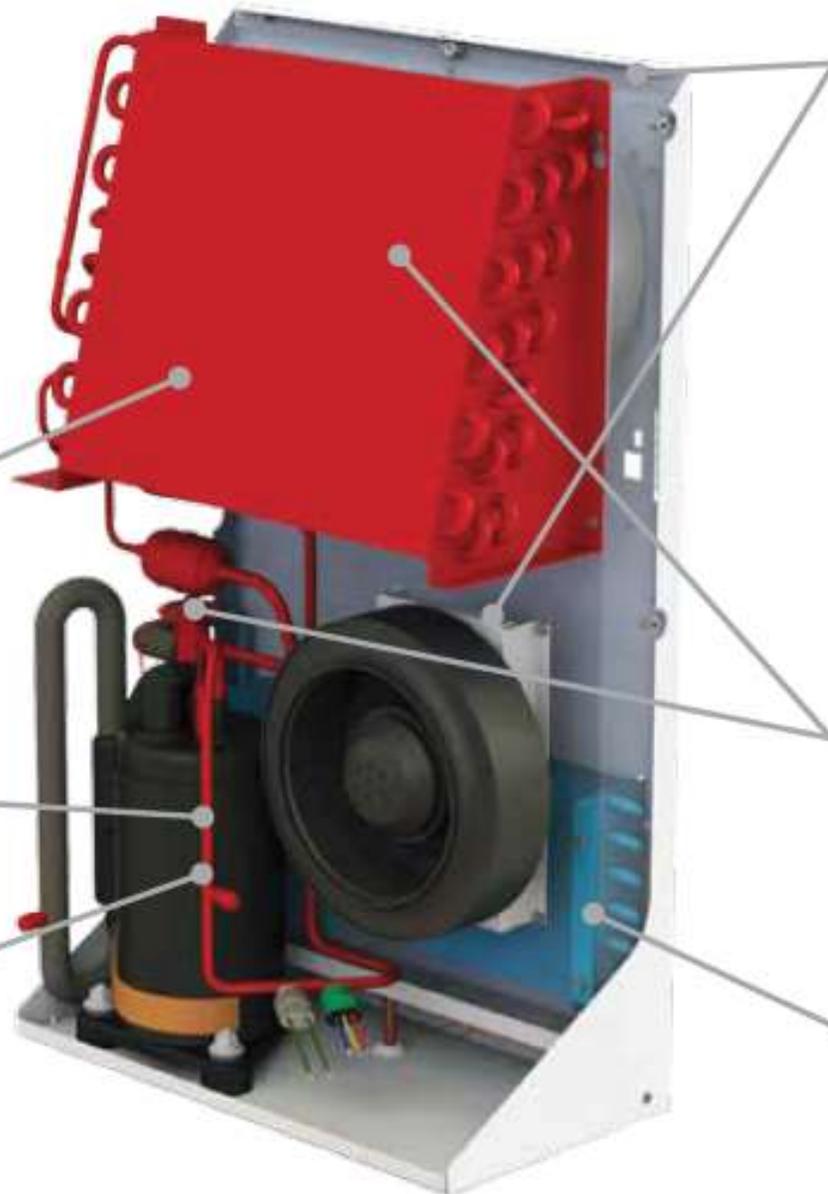
All exposed copper tubing is coated for protection against corrosion

All solder joints are coated for protection against corrosion

No. 316 stainless steel hardware and shroud for G102 and G820 suffixed models

Thermostat (hidden behind condenser) and TXV solder joints, including sensing bulb joints, and copper are coated for corrosion protection

Evaporator coil is coated for protection against corrosion



Discussion

Thank you for your time & attention today!

