SPECIAL SOLUTIONS

These "Special Solution" products reflect additional Rittal solutions that have been engineered for specific applications and do not necessarily reflect off-the-shelf availability. Please contact your Rittal representative for additional information.

AE/PS EMC Enclosure Solutions

EMI/RFI Protection

Rittal's special EMC enclosures are based on zinc-coated metal surfaces combined with self-adhesive, low potential EMC gaskets that provide excellent shielding results at an incomparable cost/performance ratio.

Available off-the-shelf in popular AE and PS size configurations.

AE Enclosure														Mounting Panel			
Part No.	Standard AE Enclosure Part No.	Approximate outside dimensions H"xW"xD"	NEMA rating	Number of doors	Exact outside dimensions									Dimensions			
					inches			mm						inches		mm	
					H	W	D	H	W	D				H	W	H	W
1380700	1380600	15x15x8	1, 12	1	14.96	14.96	8.27	380	380	210				13.98	13.15	355	549
1039700	1039600	15x24x8	1, 12	1	14.96	23.62	8.27	380	600	210				13.98	21.61	355	549
1060700	1060600	24x24x8	1, 12	1	23.62	23.62	8.27	600	600	210				22.44	21.61	570	549
1180700	1180600	40x32x12	1, 12	1	39.37	31.50	11.81	1000	800	300				37.60	29.09	955	739

AE Accessories									
Part No.	Standard AE Enclosure Part No.	Swing frame (also order EL 2093 screws & EL 2092 nuts)	Wallmounting brackets		Base		Handles		Plastic print pocket
			3/8" standoff	1-5/8" standoff	4" high	8" high	Thumb turn	T-handle	
1380700	1380600	-	2508200	2503200	-	-	2576000	2575000	2514000
1039700	1039600	2026200	2508200	2503200	-	-	2576000	2575000	2514000
1060700	1060600	2027200	2508200	2503200	-	-	2576000	2575000	2514000
1180700	1180600	-	2508200	2503200	2818200	2828200	2576000	2575000	2514000

PS Enclosure													Mounting Panel			
Part No.	Standard PS Enclosure Part No.	Approximate outside dimensions H"xW"xD"	NEMA rating	Number of doors	Exact outside dimensions									Dimensions			
					inches			mm						inches		mm	
					H	W	D	H	W	D				H	W	H	W
4806700	4806600	79x32x24	1, 12	1	78.74	31.50	23.62	2000	800	600				74.65	27.52	1896	699
4808700	4808600	79x32x32	1, 12	1	78.74	31.50	31.50	2000	800	800				74.65	27.52	1896	699

PS Accessories								
Part No.	Standard PS Enclosure Part No.	Side wall (1 pair)	Cable base		Interconnecting		Print pocket	Fluorescent light
			4" high	8" high	Brackets	Pins		
4806700	4806600	4106200	2833000	2834000	4582000	4580000	4118000	9968112
4808700	4808600	4108200	2848000	2849000	4582000	4580000	4118000	9968112

AE Configuration

- Vertical mounting rails on doors
- Right or left hand hinging
- Turnbuckle locks for easy access and secure seal
- Shielded mounting holes allow direct wallmounting or the use of optional mounting feet
- One piece body construction with continuously welded seams
- Mounting panel included
- Mesh over foam EMI gasket

AE Technical Specifications

Material:

- Aluminum-zinc coated sheet steel
- *Housing:* 16ga/1.5 mm
- *Door:* 14ga/2 mm
- *Mounting panel:* 11 gauge hot-dipped galvanized zinc

Finish/color:

- *Housing:* aluminum/zinc coating; powder painted on outside, RAL 7032 pebble grey; inside surfaces aluminum-zinc
- *Mounting panel:* Type M

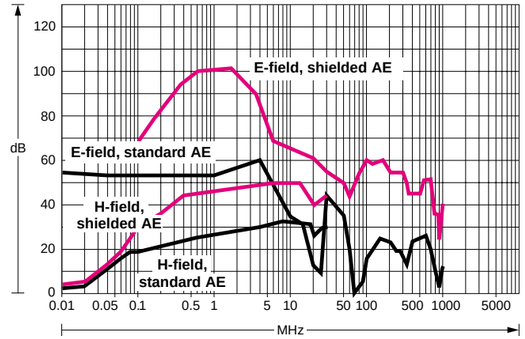
AE Protection Ratings

NEMA Type ■ 1 □ 3R □ 4 ■ 12 □ 13

AE Technical Drawings

Pages . . . . . .**WMT 37-38**

Noise Protection Diagram For AE



PS Configuration

- Enclosures can easily be interconnected for multi-bay applications
- Patented 9-fold frame design
- Reversible hinging door
- Maximum strength and stability through welded frame and corner piece design
- Time saving quick assembly method through the use of the .98"/25 mm hole pattern
- Self-adhesive EMC gaskets that provide all-around bonding

PS Technical Specifications

Material:

- *Frame:* 9 fold, roll-formed, aluminum-zinc coated sheet steel
- *Door:* 14ga/2 mm aluminum-zinc coated sheet steel
- *Rear wall:* 16ga/1.5 mm aluminum-zinc coated sheet steel
- *Mounting panel:* 11ga/3 mm hot-dipped galvanized zinc

Finish/color:

- *Frame:* aluminum/zinc surface
- *Door, rearwall and roof:* outside painted, RAL 7032 pebble grey; inside surfaces aluminum-zinc

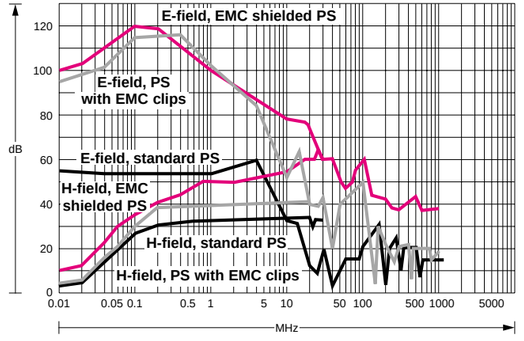
PS Protection Ratings

NEMA Type ■ 1 □ 3R □ 4 ■ 12 □ 13

PS Technical Drawings

Pages . . . . . .**FST 21-22**

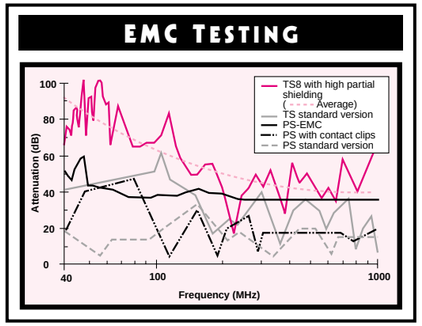
Noise Protection Diagram For PS



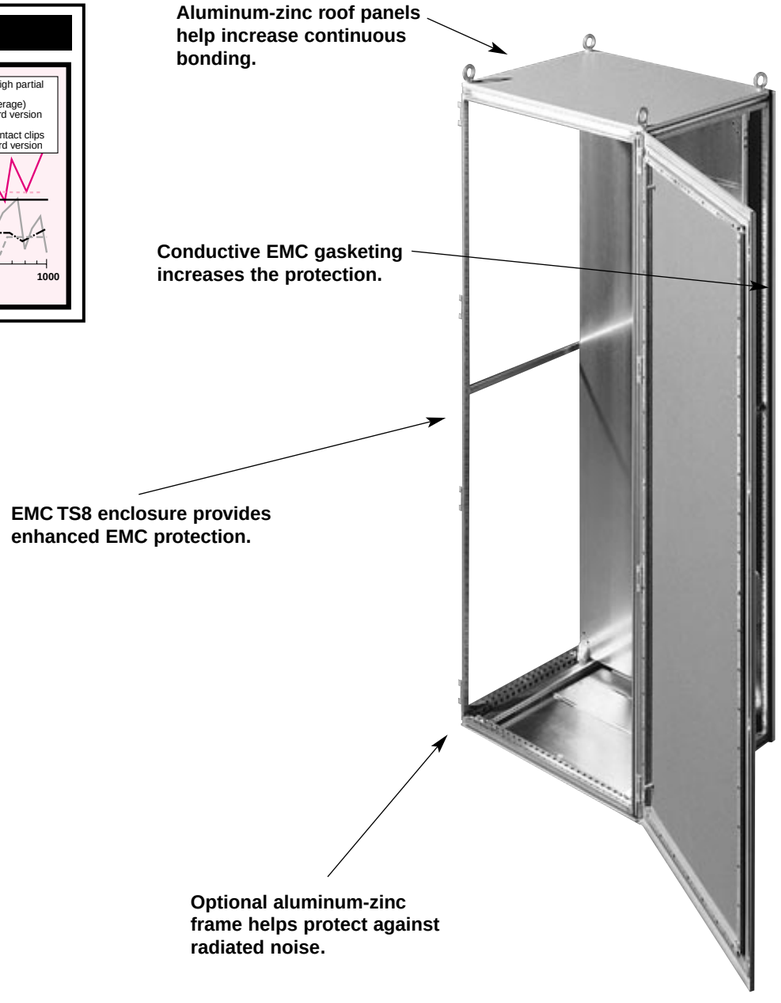
EMC Compatibility

Because of higher packaging densities and increasing transmission speeds of components, errors frequently occur that can be attributed to electromagnetic interference. Proper shielding techniques are therefore needed to protect the control electronics inside the enclosure and environment outside from radiated electrical noise.

The Rittal TS8 provides two levels of EMC protection. First, the standard enclosure offers high levels of protection against radiated noise with integral grounding clips that are inserted in the gland panels, sidewalls, rear wall and roof during factory assembly. The standard TS8 also provides inherent grounding on all surfaces. If no active components are mounted on the skins/surfaces, bonding straps are not required as electrical continuity is maintained (details available upon request). The second level of protection is obtained by additional components that increase the shielding, including conductive gasketing, aluminum-zinc panels and more. From grounding straps and built-in bonding clips to zinc mounting panels and fully shielded enclosures, Rittal has the appropriate solution to effectively channel common return currents and suppress radiated electrical noise.



The continuous electical bonding of the flat parts (like sidewalls) with the TS8 frame results in a higher shielding level than the PS system.



Technical Information

Enclosure EMI/RFI Shielding

The requirements and standards for enclosure electromagnetic compatibility are continually increasing with the proliferating application of electronics for industrial process control, information processing and communication equipment.
In the United States, the Federal Communications Commission establishes the requirements and regulates the amount of electromagnetic interference, EMI. Since January 1,1996 the European Union (EU) has enforced legislation, Electromagnetic Compatibility (EMC) Directive 89/336/EEC, which regulates the amount of EMI and Radio Frequency Interference (RFI) that products can emit or must repel to function acceptably.

While the enclosure itself is not covered by these requirements, once the electronic equipment is installed within the enclosure, the package must comply with applicable EMI/RFI directives. Shielding and electromagnetic compatibility are highly specialized with their own terminology. The following definitions will be help to specify EMI/RFI compatibility and select enclosures if the acronyms and technology are unfamiliar:

Attenuation
is a measure of the ability to contain or repel the EMI/RFI energy. It can also be called shielding effectiveness and is usually expressed in decibels (dB).

Decibel
is the measure used to express the effectiveness of a material or system in reducing electromagnetic interference. If a shielded enclosure reduces the EMI by 30 dB, it means the power of the interfering wave will be reduced by a factor of 1000 in passing through the enclosure. If the EMI reduction is 40 dB, the power is reduced by a factor of 10,000.

Electromagnetic Emissions
include the energy radiated into the environment intentionally by an antenna or incidentally by an electronic component or power equipment during a switching operation.

Electromagnetic Fields
are the invisible fields which surround energized conductors such as wire or antennas. The fields have both electric and magnetic components.

Electromagnetic Immunity
is the capability of an electronic component or electrical equipment to perform its intended function in the presence of external electromagnetic fields.

EMC
(Electromagnetic Compatibility) is the ability of electronic equipment to perform its intended function in the presence of EMI and RFI disturbances without affecting proper operation.

EMI
(Electromagnetic Interference) can emanate from high voltage equipment or power lines, welding equipment, switches, relays, or any device that generates an electric spark or corona. The random voltages or currents generated by these sources are coupled to electronic systems with undesirable results. EMI waves are not well ordered, vary widely in intensity and cause interference over a wide frequency range. The sun is a natural generator of EMI.

EMP
(Electromagnetic Pulse) interference is caused by a large and sudden electrical discharge such as lightning. EMP is short duration, but can radiate intense power. Like EMI, EMP is not well ordered and causes interference over a wide range of frequencies.

RFI
(Radio Frequency Interference) is caused by radio waves which emanate from commercial radio and television stations, amateur radio broadcasts, airport radar, microwave ovens, etc. Once again the voltages or currents from these sources are coupled to electronic systems with undesirable consequences. Radio waves are usually well defined in terms of amplitude and frequency.

How to interpret an EMC diagram?

In all diagrams, the damping value of an enclosure is shown as a function of the anticipated interference frequency and the type of field; electric field E, magnetic field H, and the combined electromagnetic field. In the diagram below for example, a frequency of 10 MHz results in the following damping values:

Point 1: Electric field high: 72 dB

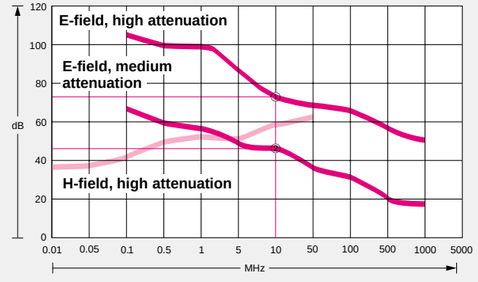
Point 2: Electric field middle: 58 dB

Point 3: Electric field standard: 42 dB

In all diagrams, the attenuation value is expressed in the physical unit “dB” on the vertical Y-axis.
This unit represents the logarithmic ratio between the fields inside and outside the enclosure.
The frequency spectrum is expressed as a logarithmic progression on the horizontal X-axis. The damping value “a” is determined as follows:

$$a=20 \log \frac{E_0}{E_1} \quad \textbf{and} \quad a=20 \log \frac{H_0}{H_1}$$

Attenuation in dB	Ratio between inside/outside
6	1/2
20	1/10
40	1/100
60	1/1000



Seismic/Zone 4 Applications

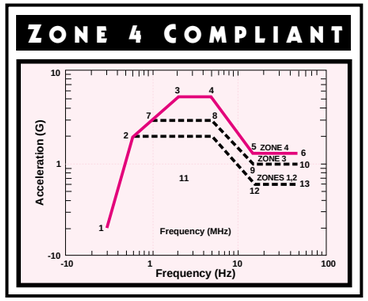
With the explosion of networking equipment deployed all over the world, many companies are seeing that equipment is being exposed to more and more hostile environments. One of the more demanding environments is any place there is a chance for seismic activity. The areas that are most susceptible to seismic activity have been identified as Zone 4.

Rittal's TS8 enclosures have been built and tested to fully comply with these stringent requirements. Our standard TS8 enclosure has been tested with 330 pounds on the mounting panel with a standard plinth to achieve a Zone 3 certification. With 400 pounds and an enhanced plinth, the TS8 was Zone 4 certified. Additional add-on components enable the seismic TS8 to be strengthened and increase its weight capability to 1100 pounds.

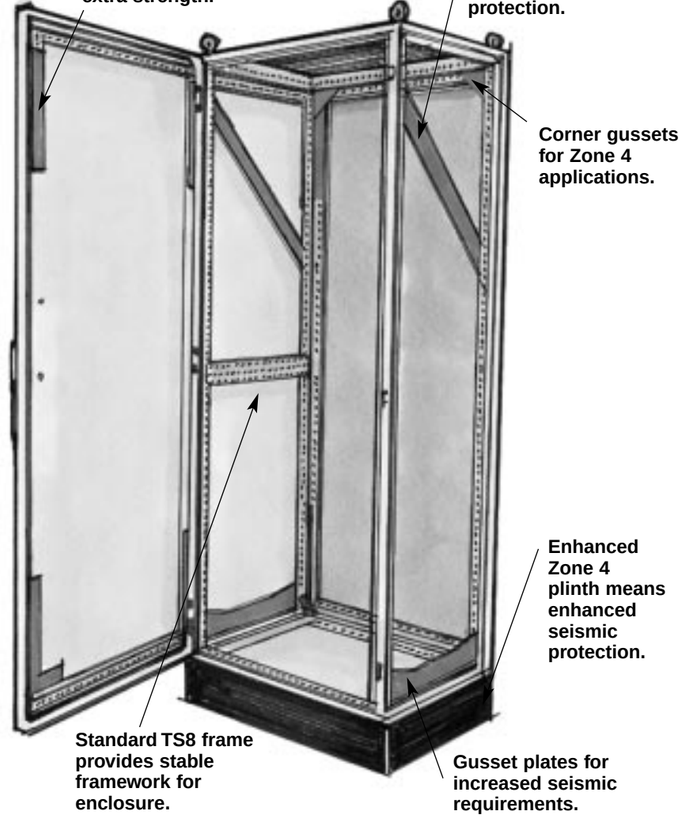
Seismic Level	Weight (lbs/kg)	Enclosure Model
Zone 3	330 lbs/150 kg	Standard TS8 — no upgrades
Zone 4	400 lbs/180 kg	Standard TS8 with enhanced plinth
Zone 4	1100 lbs/500 kg	Seismic TS8 with door stiffener, corner gussets and diagonal brackets

The TS8 offers Zone 3 certification out of the box. Additional upgrade features enable the TS8 to be strengthened and thus made suitable for Zone 4 earthquake regions.

ZONE 4 COMPLIANT

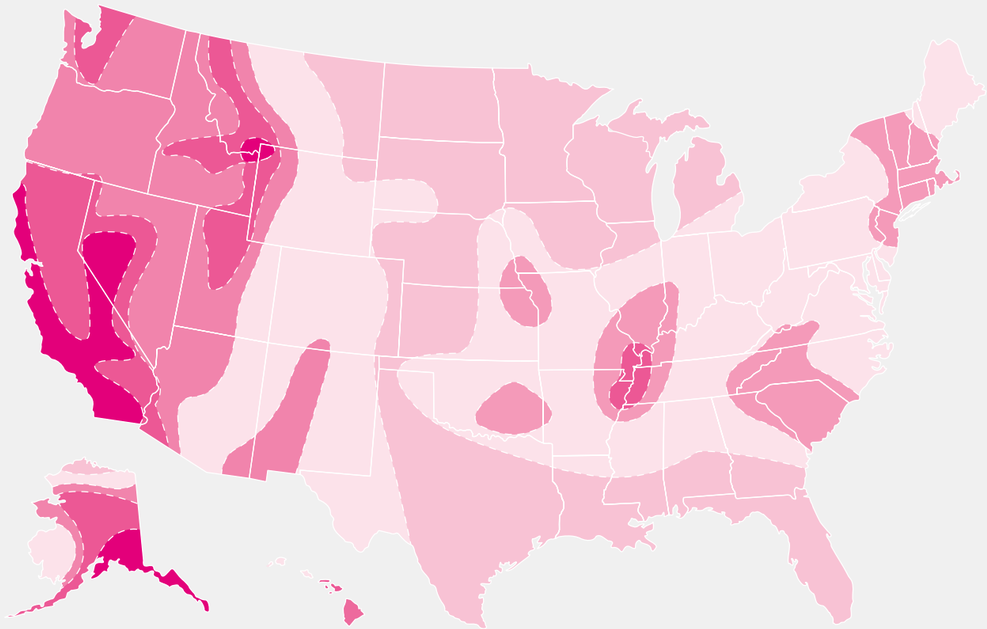


Note:
The PS enclosure series is also available in Zone 4 compliant configurations for 19" server applications. Please contact your local Rittal representative for additional information.



Zone 4 Cabinet Specifications

Rittal offers NEBS GR-63 compliant Zone 4 cabinets as a standard product. These cabinets were tested at an approved test lab to fully comply* with all of Zone 4 requirements for enclosures. These cabinets were loaded with 1000 lbs of weight to simulate one of the most strenuous applications found in todays' networking environment. This 1000 lbs of weight was distributed with 50% of the weight below the center of gravity of the cabinet and the other 50% located above.



- Seismic Zone 4
- Seismic Zone 3
- Seismic Zone 2B
- Seismic Zone 2A
- Seismic Zone 1
- Seismic Zone 0

Seismic map provided courtesy of FEMA.

*All testing performed to NEBS GR-63. Enclosures preconfigured as described and comply to seismic testing criteria. Every application is different. Final certification of system is the responsibility of the system integrator.

SPECIAL SOLUTIONS

Purge/Pressurization Solutions

Purge/Pressurization Systems

Available for Type X, Y and Z purge/pressurization applications, Rittal's new purge systems are the ideal fit for these types of hazardous areas. The units, which meet Class/Division standards as well as Zone classification for North America, are designed for enclosures up to 200 cubic feet (larger volume systems upon request). The purge/pressurization components are UL and cUL classified and are recommended for Rittal enclosures rated NEMA Type 4 or 12.

Y-Z Purge/Pressurization Systems

Part No.	Reclassification certification (from/to)		Cubic feet capacity*	Panel mounting configuration	Pressure vent		Exact dimensions					
							inches			mm		
	Type Y	Type Z			Straight	90° Angle	H	W	D	H	W	D
9968221	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 75 cubic feet	Left	9968229	9968230	15.0	11.5	6.3	381.0	292.1	158.8
9968222	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 75 cubic feet	Right	9968229	9968230	15.0	11.5	6.3	381.0	292.1	158.8
9968223	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 75 cubic feet	Top	9968229	9968230	12.0	15.3	6.3	304.8	388.6	158.8
9968224	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 75 cubic feet	Bottom	9968229	9968230	12.0	15.3	6.3	304.8	388.6	158.8
9968225	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 200 cubic feet	Left	9968231	9968232	16.3	13.5	8.0	412.8	342.9	203.2
9968226	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 200 cubic feet	Right	9968231	9968232	16.3	13.5	8.0	412.8	342.9	203.2
9968227	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 200 cubic feet	Top	9968231	9968232	12.0	16.8	8.0	304.8	425.5	203.2
9968228	Class I/Div. 1 to Div. 2	Class I/Div. 2 to non-hazardous	< 200 cubic feet	Bottom	9968231	9968232	12.0	16.8	8.0	304.8	425.5	203.2

* Calculation of cubic feet capacity = height(ft) x width(ft) x depth(ft) of enclosure. For bayed enclosures you must add the cubic feet of each enclosure.

X Purge/Pressurization Systems

Part No.	Configuration	Reclassification certification (from/to)	Cubic feet capacity*	Installation location of control unit	Flow monitor type	Solenoid valve kit	Exact dimensions					
							inches			mm		
		Type X					H	W	D	H	W	D
9968240	Control unit	Class I-II/Div. 1 to non-hazardous	—	Safe area	—	—	9.1	4.8	3.8	229.9	121.9	96.5
9968241	Control unit	Class I-II/Div. 1 to non-hazardous	—	Hazardous area	—	—	11.8	9.8	6.4	298.5	247.7	163.6
9968242	Pressure monitor	—	< 15 cubic feet	—	Compensation	9968244	4.7	4.7	3.5	119.9	119.9	89.9
9968243	Pressure monitor	—	< 15 cubic feet	—	Continuous	9968244	4.7	4.7	3.5	119.9	119.9	89.9
9968245	Pressure monitor	—	> 15 cubic feet	—	Compensation	9968247	4.7	4.7	3.5	119.9	119.9	89.9
9968246	Pressure monitor	—	> 15 cubic feet	—	Continuous	9968247	4.7	4.7	3.5	119.9	119.9	89.9

* Calculation of cubic feet capacity = height(ft) x width(ft) x depth(ft) of enclosure. For bayed enclosures you must add the cubic feet of each enclosure.

Configuration

Type Y-Z Purge/Pressurization Systems

- Same panel can be used for both Type Y or Z systems
- Type Y system reduces the inside of the enclosure from Class I/Division 1 to Class I/Division 2
- Type Z system reduces the inside of the enclosure from Class I/Division 2 to non-hazardous
- Available for enclosure sizes ranging from 75 to 200 cubic feet
- Panels are available specifically for left, right, top, or bottom mounting
- All components mounted to a T-304 stainless steel panel
- All tubes and fitting are T-316 stainless steel
- Includes low pressure alarm output
- Filter-regulator with pressure gauge provides clean gas to the enclosure
- UL and cUL Classified
- Meets the requirements of NFPA 496 and ISA RP12.4-1996 standards
- Pressure vent is required for all systems and is available in a straight or 90° versions

Type X Purge/Pressurization Systems

- Type X system can be configured by combining a control unit, pressure monitor and 3-way solenoid valve package
- Type X systems enable general purpose equipment to be operated inside a hazardous area
- Available for enclosure sizes ranging from less than or greater than 15 cubic feet
- Control units are available for general purpose and hazardous areas
- Control circuits are intrinsically safe
- Control units disables power if airlock is broken
- Fully automatic purge/pressurization is controlled by cycle timers
- LED display and indicators show time remaining and purge/pressurization stages
- Can be used for both 120 VAC or 220 VAC
- Control units and pressure vent combination are UL and cUL Classified
- Meets NFPA 496 and ISA RP12.4-1996 standards for Type X purging
- Pressure monitor and solenoid valve kit are required for all systems
- Pressure monitors are available in compensation or continuous flow monitoring

Technical Specifications

Type Y- Z Purge/Pressurization Systems

- *Panel:* brushed T-304 stainless steel
- *Tubes:* T-316 stainless steel
- *Fittings:* Swagelok T-316 stainless steel
- *Purging and pressurization valve:* T-316 stainless steel
- *Differential pressure gauge:* die-cast aluminum housing with baked hammerloid epoxy finish
- *Differential pressure gauge:* impact resistant face
- *Low pressure alarm housing:* anodized cast aluminum
- *Filter regulator and pressure gage:* cast aluminum body with polyurethane resin (ISOPLAST 304) components
- *Pressure vents:* aluminum housing with 1" NPT mounting nut and gasket

Type X Purge/Pressurization Systems

- *Control unit/safe area:* Polycarbonate housing and clear lid
- *Control unit/hazardous area:* Cast aluminum enclosure with viewing port
- *Pressure monitor:* epoxy coated aluminum housing
- *Filter regulator:* cast aluminum body with polyurethane resin (ISOPLAST 304) components
- *Solenoid valve:* epoxy coated aluminum housing
- *Tubes:* 1/4" or 3/8" OD nylon
- *Fittings:* nickel-plated brass

Certifications / Approvals

Type Y- Z Purge Pressurization Systems

- UL and cUL Classified
- *Type Y:* Class I, Div.1 to Class I, Div. 2/ Class I, Zone 1 to Class I, Zone 2
- *Type Z:* Class I, Div. 2 to non-hazardous/ Class I, Zone 2 to non-hazardous
- Panels with low pressure alarm are certified for Group C-D/IIB

Type X Purge/Pressurization Systems

- Control units and pressure vent combination are UL and cUL Classified
- Control circuits (except solenoid): Intrinsically safe, Class I, II, Div. 1 and 2, Group A-G/Class I, Zone 1
- Pressurization system: NFPA 496 standard for Type X purging

Technical Information

Hazardous Area Classification

Hazardous areas are classified for purposes of defining wiring practices, electrical enclosures, protection methods and so on. The three classifications are Class, Division and Group and are explained below:

Class defines the type of hazard, designated by roman numerals:

I. Flammable gases or vapors
II. Combustible dust
III. Ignitable fibers

Division defines the condition under which the hazard is present:

1 Hazards commonly exist under normal operating conditions.
2 Hazards exist only during faulty operating conditions.

Group defines the hazardous substance:

A, B, C, D Gases
E, F, G Dusts

For more information on hazardous area classifications, refer to article 500 of NFPA 70, National Electric Code.

Types of Systems

The NFPA 496 standard recognizes three types of pressurization: X, Y and Z.

Type X systems reduce the classification of the enclosure from Division 1 to non-hazardous.

Type Y systems reduce the classification of the enclosure from Division 1 to Division 2.

Type Z systems reduce the classification of the enclosure from Division 2 to non-hazardous.

For European regulations on purge systems, refer to standards IEC79-2 and EN50 016.

Choosing a System

The following information is an overview of how to select an X, Y or Z purge system. There are four primary factors that determine which purge system is appropriate for your application:

- Classification of the area.
- Ratings of the equipment inside the enclosure.
- Enclosure size, position of doors, windows and any accessories.
- Power requirement to the enclosure (Type X systems).

Area Classification

The area classification determines the type of purge system needed. For Division 1 areas, the equipment inside the enclosure determines whether a Type X system (equipment rated for general purpose) or a Type Y system (equipment rated for Division 2) can be used.

Equipment Ratings

The rating on the equipment inside the enclosure becomes important in evaluating which purge system to use in a Division 1 area. If the Division 1 area contains at least one general purpose component, a Type X system is required. If all devices in the enclosure are rated for Division 2, then a Type Y system can be used. Special conditions exist for enclosures such as gas analyzers and chromatographs that contain a flammable gas. Refer to NFPA 496 1998 for more information.

Enclosure Size

The size of the enclosure determines the size of the purge system. How the system is mounted depends on the position of doors, windows and cable entrances.

Power Requirement

For Type X systems, the control unit operates the power disconnect to the enclosure. If the power requirement for the enclosure exceeds the contact ratings on the control unit, a control relay must be added. If the control relay is located in the hazardous area, it must be rated for that hazardous location. As power increases inside the enclosure, high temperatures become a problem. Refer to NFPA 496 1998 for more information.

SPECIAL SOLUTIONS

Notes