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/RF 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 Configuration

- Vertical mounting rails on doors
- Right or left hand hinging
- Tumbuckle latches for easy access and secure seal
- Shielded mounting holes allow direct wall mounting or the use of optional mounting kit
- 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: 11 gauge hot-dipped galvanized zinc
- 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

AE Protection Ratings

Noise Protection Diagram For AE

AE Technical Drawings

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 38 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: 16 gauge 1.5 mm aluminum-zinc coated sheet steel
- Rear wall: 16 gauge 1.5 mm aluminum-zinc coated sheet steel
- Mounting panel: 11 gauge hot-dipped galvanized zinc

Finish/color:
- Frame: aluminum/zinc surface
- Door, rear and roof outside painted, RAL 7032 pebble grey, inside surfaces aluminum-zinc

PS Protection Ratings

Noise Protection Diagram For PS

PS Technical Drawings

PS Enclosure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1502193</td>
<td>1502190 1502194 1502197 1502198</td>
<td>1200 x 610</td>
<td>1102190</td>
<td>1102190 1102191 1102192 1102193 1102194 1102195 1102196 1102197 1102198</td>
<td>1200 x 610</td>
</tr>
<tr>
<td>1502199</td>
<td>1502190 1502194 1502197 1502198</td>
<td>1200 x 610</td>
<td>1502190</td>
<td>1502190 1502191 1502192 1502193 1502194 1502195 1502196 1502197 1502198</td>
<td>1200 x 610</td>
</tr>
<tr>
<td>1102199</td>
<td>1102190 1102191 1102192 1102193 1102194 1102195 1102196 1102197 1102198</td>
<td>1200 x 610</td>
<td>1102190</td>
<td>1102190 1102191 1102192 1102193 1102194 1102195 1102196 1102197 1102198</td>
<td>1200 x 610</td>
</tr>
</tbody>
</table>

PS Accessories

- Cable hoes:
  - High
- Interconnecting:
  - High
- Print panel:
  - Fluorescent light
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 skin/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.

Conductive EMC gasketing increases the protection.

EMC TS8 enclosure provides enhanced EMC protection.

Optional aluminum-zinc frame helps protect against radiated noise.

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 decibels (dB). Decibel is a logarithmic ratio between the fields inside and outside the enclosure. The attenuation value is the capability of an electronic component or electrical equipment to perform its intended function in the presence of external electromagnetic fields.

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).

For example, if the attenuation value is 40 dB, the power is reduced by a factor of 10,000.

Attenuation in dB Ratio between inside/outside
6 1/100
20 1/1000
40 1/10000
60 1/100000

Electromagnetic Fields 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.

Frame helps protect against radiated noise.

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 resist 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 20 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.

EMF (Electromagnetic Pulse) interference is caused by a large and sudden electrical discharge such as lightning. EMP is short duration, but can radiate immense 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 decibels (dB). Decibel is a 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:

\[ a = 20 \log_{10} \left( \frac{E_2}{E_1} \right) \]
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.

Zone 4 Cabinet Specifications

<table>
<thead>
<tr>
<th>Seismic Level</th>
<th>Weight (lbs/kg)</th>
<th>Enclosure Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 3</td>
<td>330 lbs/150 kg</td>
<td>Standard TS8 —</td>
</tr>
<tr>
<td>Zone 4</td>
<td>400 lbs/180 kg</td>
<td>no upgrades</td>
</tr>
<tr>
<td>Zone 4</td>
<td>1100 lbs/500 kg</td>
<td>Seismic TS8 with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>door stiffner,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>corner gussets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and diagonal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>brackets</td>
</tr>
</tbody>
</table>

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.

Seismic map provided courtesy of FEMA.

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.

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 today’s 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 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.

Zone 4 Cabinet Specifications

<table>
<thead>
<tr>
<th>Seismic Level</th>
<th>Weight (lbs/kg)</th>
<th>Enclosure Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 3</td>
<td>330 lbs/150 kg</td>
<td>Standard TS8 —</td>
</tr>
<tr>
<td>Zone 4</td>
<td>400 lbs/180 kg</td>
<td>no upgrades</td>
</tr>
<tr>
<td>Zone 4</td>
<td>1100 lbs/500 kg</td>
<td>Seismic TS8 with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>door stiffener,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>corner gussets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and diagonal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>brackets</td>
</tr>
</tbody>
</table>

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.

Seismic map provided courtesy of FEMA.

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.

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 today’s 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.

*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.
Purge/Pressurization Systems

Available for Type X, Y and Z purge/pressurization applications. Rittal’s new purge systems are the ideal fit for those 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.

Purge/Pressurization Systems

Type X Purge/Pressurization Systems
- Type X system can be configured by combining a control unit, pressure monitor and 3-way solenoid valve package.
- Control units are available for 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 disable power if a switch 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 monitor combination is UL and cUL classified.
- Meets NFPA 496 and ISA RP12.4-1996 standards for Type X purging.
- Type X system reduces the inside of the enclosure from Class I/Division 2 to non-hazardous.
- Types Y and Z systems are available in a straight or 90° versions.

Type Y Purge/Pressurization Systems
- Type Y system reduces the inside of the enclosure from Class I/Division 1 to Class I/Division 2.
- Control units reduces the classification 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 Type 304 stainless steel panel.
- All tubes and fitting are Type 316 stainless steel.
- Includes low pressure alarm output.
- Fiber 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 monitor is required for all systems and is available in a static or 90° versions.

Type Z Purge/Pressurization Systems
- Type Z system reduces the inside of the enclosure from Class I/Division 2 to non-hazardous.
- Type Z system reduces the classification of the enclosure from Division 2 to non-hazardous.
- Type Z system reduces the classification of the enclosure from Class I, Zone 2 to non-hazardous.
- Panels with low pressure alarm are certified for Group IIC/ULB.
- Fiber regulator: cast aluminum body with polyethylene resin (ISOPLAST 304) components.
- Solenoid valve: epoxy coated aluminum housing.
- Tubing: 1/4” or 3/8” OD nylon.
- Fittings: nickel-plated brass.

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:
  - I. Flammable gases or vapors
  - II. Combustible dusts
  - III. Ignitable fibers
- Division defines the condition under which the hazard is present:
  - I. Flammable gases or vapors
  - II. Combustible dusts
  - III. Ignitable fibers
- Group defines the hazardous substance:
  - A, B, C, D: Gases
  - E, F, G: Dusts

Equipment Ratings
- The area classification determines the type of purge system to use (Division 1 area, Division 2 area, hazardous area).
- Equipment inside the enclosure must be selected according to the purge system required for the specific purpose of the enclosure.
- Equipment inside the enclosure must be certified through the manufacturer, supplier or appropriate standards agency.
- Equipment inside the enclosure must be certified through the manufacturer, supplier or appropriate standards agency.
- Equipment inside the enclosure must be certified through the manufacturer, supplier or appropriate standards agency.

Technical Specifications
- Technical specifications for each purge system are listed in the table below.
- Fiberglass reinforced plastic
- Epoxy coated aluminum
- Cast aluminum
- Type 316 stainless steel
- Type 304 stainless steel

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.

Certifications / Approvals
- UL and cUL classified.
- Type X: Class I, Div. 1 to Class I, Div. 2, Class I, Zone 1 to Class I, Zone 2.
- Type Y: Class I, Div. 2 to non-hazardous.
- Type Z: Class I, Div. 2 to non-hazardous.

Power Requirement
- For Type X systems, the control unit operates the power disconnect to the enclosure. The power requirement for the enclosure when the purge system is operating under the purge pressure is 230 Volt AC or 120 Volt AC.

Calculations / Formulas
- 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.