



EMI SHIELDING MATERIALS APPLICATION GUIDE

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RFI/EMI SHIELDING MATERIALS OVERVIEW

RFI/EMI shielding gaskets and components provide exceptional EMC shielding solutions to address regulatory compliance and performance needs. Our shielding solutions include electrically conductive gaskets, EMI shielding ventilation panels, shielded window, cable shielding and shielding components.

Why is EMI shielding important

Electromagnetic Interference - EMI

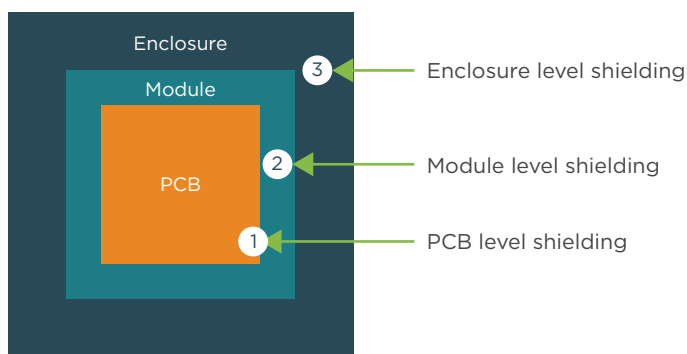
All active electronic devices have the potential to emit electromagnetic radiation. EMI shielding products protect critical electronic components and systems from EM interference.

- EMC compliance required by law/performance specifications
- EMC non-compliance causes system level redesign late in product development process

Where is EMI shielding used

EMI shielding gaskets are applied at the seams of an enclosure to establish a low resistance conductive path to block radiated emissions into and out of the enclosure.

- Conductive gaskets/windows/vents at enclosure assembly level
- Conductive gaskets for module assembly
- Conductive gasket at board level cans at PCB level



How we address electromagnetic compatibility (EMC)

Electromagnetic compatibility: Enables a device, equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to anything in that environment

Electromagnetic Compatibility & Performance Considerations

Electromagnetic Compatibility (EMC): The ability of a device, equipment, or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbance to anything in that environment.

Here are some of the factors affecting electromagnetic compatibility:

Design for EMC: Consider EMC early in the design process, from careful layout of PCB's and components ensuring good signal integrity. Design with the accommodation of EMI gaskets for enclosure seams and covers, I/O connections, doors etc. Retrofit is expensive.



Mechanical: Closure forces of gaskets vary dependant on material, profile, and size. Enclosure panel rigidity will dictate the minimum number of fixings. Compression limits should be used to protect the gasket from damage caused by over compression/deflection.

RFI/EMI Shielding: The basis of RFI/EMI shielding to make a faraday cage of the enclosure and ensure good grounding, this can be at PCB level for discreet components, modular and the final enclosure. Enclosures can vary in size from small handheld devices up to large cabinets and architectural rooms/buildings.



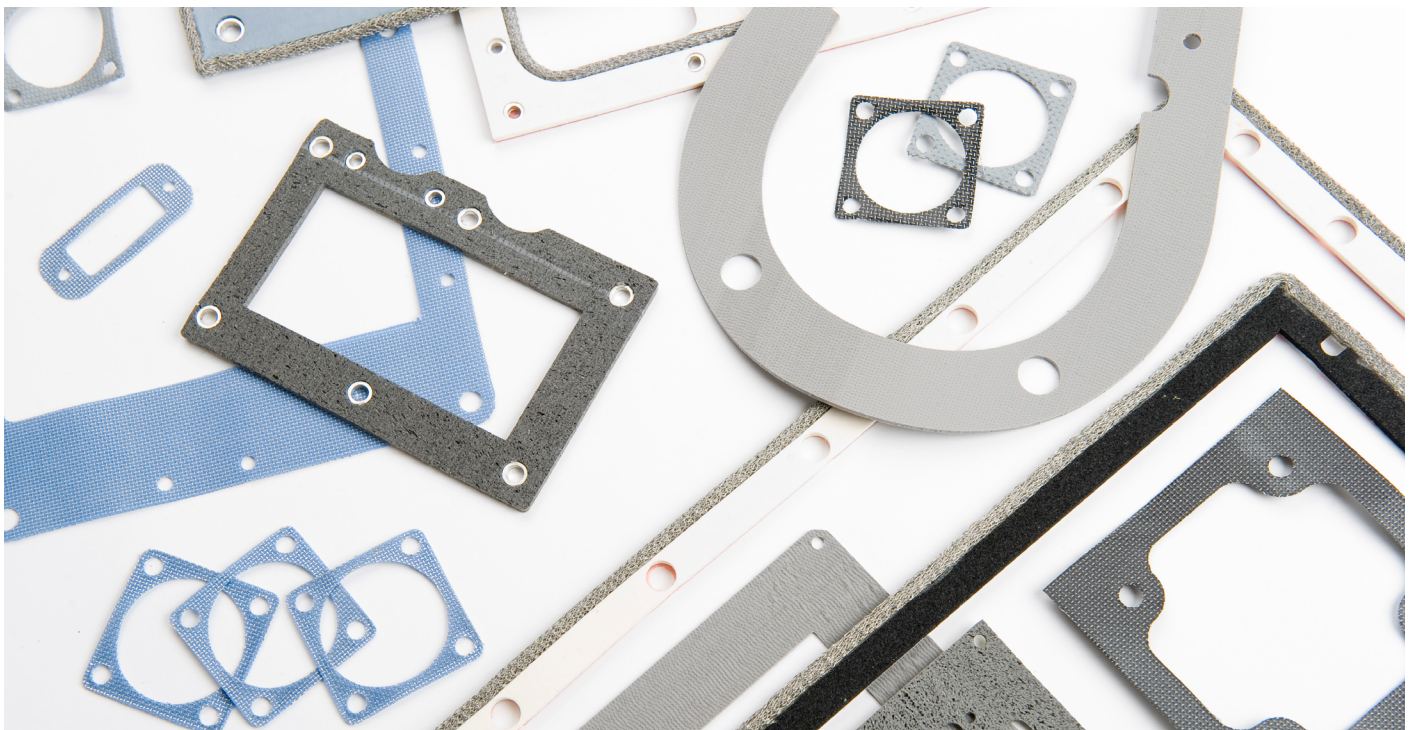
Shielding Effectiveness: To ensure good shielding effectiveness, low contact resistance is required between the gasket and the mating surface of the enclosure. For optimum shielding it is best to ensure metal to metal contact by using gaskets in grooves or incorporate labyrinth designs.

Environmental: Dust and moisture sealing is often a requirement alongside the EMC needs. Electrically conductive elastomers (ECE) provide this up to IP66 and above if the design is to achieve this. ECE fluorosilicones will seal against fuels, oils etc. For very harsh environments non-conductive seals can be incorporated in the design.

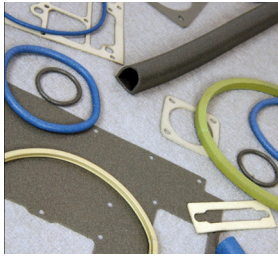


Chemical or Galvanic Compatibility: Two dissimilar metals in the presence of an electrolyte e.g. salt fog will act as a battery and create a flow of electric current. This effect can cause corrosion of the less noble material and will increase contact resistance between the gasket and enclosure causing a reduction in shielding effectiveness.

Electromagnetic Fields: When shielding magnetic fields generally the requirement is 10 kHz and above, high permeability metal type gaskets are needed these gaskets have a high current carrying capacity and are suitable for EMP protection. High frequency electric field 1 GHz and above require highly conductive more noble materials such as conductive elastomers with silver plated particles.

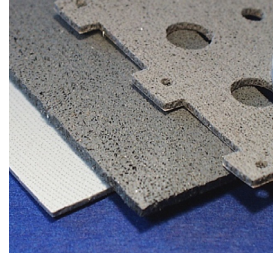


EMI/RFI PRODUCT PORTFOLIO IN KEY MARKETS



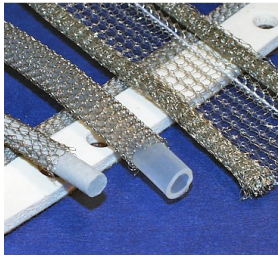
Conductive Elastomers

Excellent temperature range and are resistance to compression set and Fluorosilicone has superior resistance to fuel oils and solvents.



Oriented Wire in Silicone

Provides excellent shielding with EMP survivability and will also provide an environmental seal



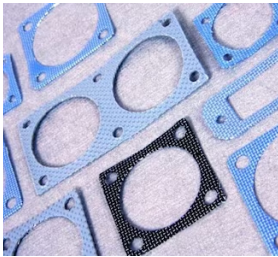
Knitted Wire Mesh

Knitted wire mesh gaskets provide an excellent cost-effective EMI gasket, providing shielding in the magnetic as well as electric fields.



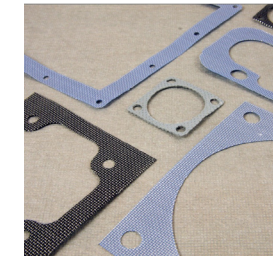
EMI Shielding Ventilation Panels

Made from aluminum honeycomb mounted into a frame.










Connector Gaskets

Tooling for a wide range of standard MIL connector gaskets. Different materials are available to meet the demands of EMI shielding, environmental sealing, galvanic compatibility and fuel/oil resistance.



Woven & Expanded Wire in Elastomers

Provides an excellent EMI and environmental seal, the metal reinforcement helps eliminate cold flow due to over compression.

Product	 Data & Wireless Communication	 Aerospace, Defense & Military	 Automotive	 Industrial & Commercial Transportation	 Energy	 Industrial	 Medical
Conductive Elastomers	●	●	●	●	●	●	●
Knitted Wire Mesh	●	●			●	●	
Oriented Wire in Silicone	●	●	●	●		●	●
Woven & Expanded Wire in Elastomers	●	●	●	●		●	●
EMI Shielding Ventilation Panels	●	●					●
Connector Gaskets	●	●	●	●	●	●	●

AEROSPACE, DEFENSE & MARINE



- The Aerospace and defense industries have always been the main drivers for RFI/EMI shielding design and products. Achieving EMC (electromagnetic compatibility) in this sector is safety-critical, whereas in everyday life it can just be a frustrating nuisance.
- Aircraft can get struck by lightning with regular occurrence which will cause an electromagnetic pulse or EMP. EMP will have a devastating effect on electronic circuitry, so it is important that the aircraft has a path for the lightning to continue without causing damage. Space is another matter; satellites are in a very hostile electromagnetic environment with solar flares that can emit a coronal mass ejection. We are protected on Earth by the magnetosphere, but satellites don't have that advantage, so shielding is paramount to ensure the safety of the satellite and its systems. Greater integration of electronics means electromagnetic compatibility between systems is of utmost importance to ensure they work in harmony and do not interfere with each other. Aircrafts are more fly-by-wire than mechanical systems, with complex software operating computerized systems. Sensors measuring the aircraft environment, flight data etc. all need to communicate with each other, operate independently and provide back up for system failure or malfunction. Electronics engineers are very familiar with this and will consider in their design good board layout, filtering, grounding, signal integrity etc. to try resolving EMI at its source. However, shielding of the enclosure is just as important and solves the problem of radiated emissions and susceptibility. Mating surfaces on an enclosure can look very flat and you think there is full metal to metal contact but, in a mass production process nothing can be that flat and gaps will exist. These gaps are slots and can become radiating antennas. This joint unevenness can be addressed by using an electrical gasket and adding more fixings to get good contact between the mating surfaces.
- RFI/EMI shielding is a mechanical fix for an electrical problem and the enclosure design engineer should be aware of the types of gaskets available and their different attributes and ensure there is enough land area on the enclosure seams, doors etc. to fit the gasket. In Aerospace, weight and size of equipment and systems is important so miniaturization where possible is used. This means that the shielding options available to the design engineers must also be small and offer good shielding. Electrically conductive elastomers are the best option for Aerospace as the material can be molded, extruded or fabricated into very small components or deposited directly to hardware. Many electrically conductive fillers are available to suit shielding requirements and a fluorosilicone base meets the needs of resistance to fuel oils etc.



ARMORED VEHICLE APPLICATION

Information Distribution System

Challenge: System requires high level of EMI shielding and an environmental seal; the structure is an assembly of machined aluminium housings within the vehicle

SHIELDING TYPE	FEATURES	BENEFITS
Conductive elastomer O ring seals	<ul style="list-style-type: none"> Conductive elastomers can provide great EMI shielding performance on casing lids Range of different materials and profiles available to suit the application including a UL94-V0 material" 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provide low-contact resistance between connector and enclosure
Connector gasket	<ul style="list-style-type: none"> Meet MIL-C standard sizes, and common sub D connector gaskets. 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance
Jam Nut Seals	<ul style="list-style-type: none"> Compression molded Compliant with MIL-FTL-38999, MIL-DTL-26482, MIL-DTL-81511. 	<ul style="list-style-type: none"> Maintain the integrity of the seal Ideal where small cross section and/or small inside diameter is required.

Rotary Base Joint (RBJ)

Challenge: Large housing in base of vehicle with many connectors, which requires EMI shielding and environmental sealing

SHIELDING TYPE	FEATURES	BENEFITS
Oriented Wire flat gasket	<ul style="list-style-type: none"> Solid and sponge silicone flat gasket material populated with vertically oriented Monel or aluminium wires up to 140/sq cm. 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provides excellent shielding with EMP (electromagnetic pulse) survivability and will also provide an environmental seal.
Connector gasket	<ul style="list-style-type: none"> Meet MIL-C standard sizes, and common sub D connector gaskets 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance
Jam Nut Seals	<ul style="list-style-type: none"> Compression molded Compliant with MIL-FTL-38999, MIL-DTL-26482, MIL-DTL-81511. 	<ul style="list-style-type: none"> Maintain the integrity of the seal Ideal where small cross section and/or small inside diameter is required.

Auxiliary turret pod

Challenge: Auxiliary electronics systems pod for attachment, to rear of turret, air cooled system

SHIELDING TYPE	FEATURES	BENEFITS
EMI Honeycomb vent	<ul style="list-style-type: none"> Allows good airflow and provides high level of EMI shielding 	<ul style="list-style-type: none"> Improved EMI shielding over air inlet/outlet apertures





MILITARY, AEROSPACE, UAV & DRONES APPLICATIONS

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive elastomer O ring seals	Control Systems	<ul style="list-style-type: none"> • Conductive elastomers can provide great EMI shielding performance at a relatively low cost • Range of different materials and profiles available to suit the application including a UL94-V0 material” 	<ul style="list-style-type: none"> • Material options to provide required EMI performance and galvanic compatibility • Provide low contact resistance between connector and enclosure
Connector Gasket	I/O Panel	<ul style="list-style-type: none"> • Meet MIL-C standard sizes, and common sub D connector gaskets 	<ul style="list-style-type: none"> • Ensures electrical bonding between the surfaces with a very low contact resistance
Fluorosilicone conductive elastomer O rings	Power distribution systems Control systems	<ul style="list-style-type: none"> • Conductive elastomers can provide great EMI shielding performance at a relatively low cost • Range of different materials and profiles available to suit the application including a UL94-V0 material” 	<ul style="list-style-type: none"> • Material options to provide required EMI performance and galvanic compatibility • Provide low contact resistance between connector and enclosure
Oriented wire gaskets	Power distribution systems and control systems	<ul style="list-style-type: none"> • Solid and sponge silicone flat gasket material populated with vertically oriented Monel or aluminium wires up to 140/sq cm. 	<ul style="list-style-type: none"> • Material options to provide required EMI performance and galvanic compatibility • Provides excellent shielding with EMP (electromagnetic pulse) survivability and will also provide an environmental seal.
Connector gaskets	Power distribution systems and control systems	<ul style="list-style-type: none"> • Offering a wide range of standard MIL connector gaskets. Different materials are available to meet the demands of EMI shielding, environmental sealing, galvanic compatibility and fuel / oil resistance. 	<ul style="list-style-type: none"> • Ensures electrical bonding between the surfaces with a very low contact resistance



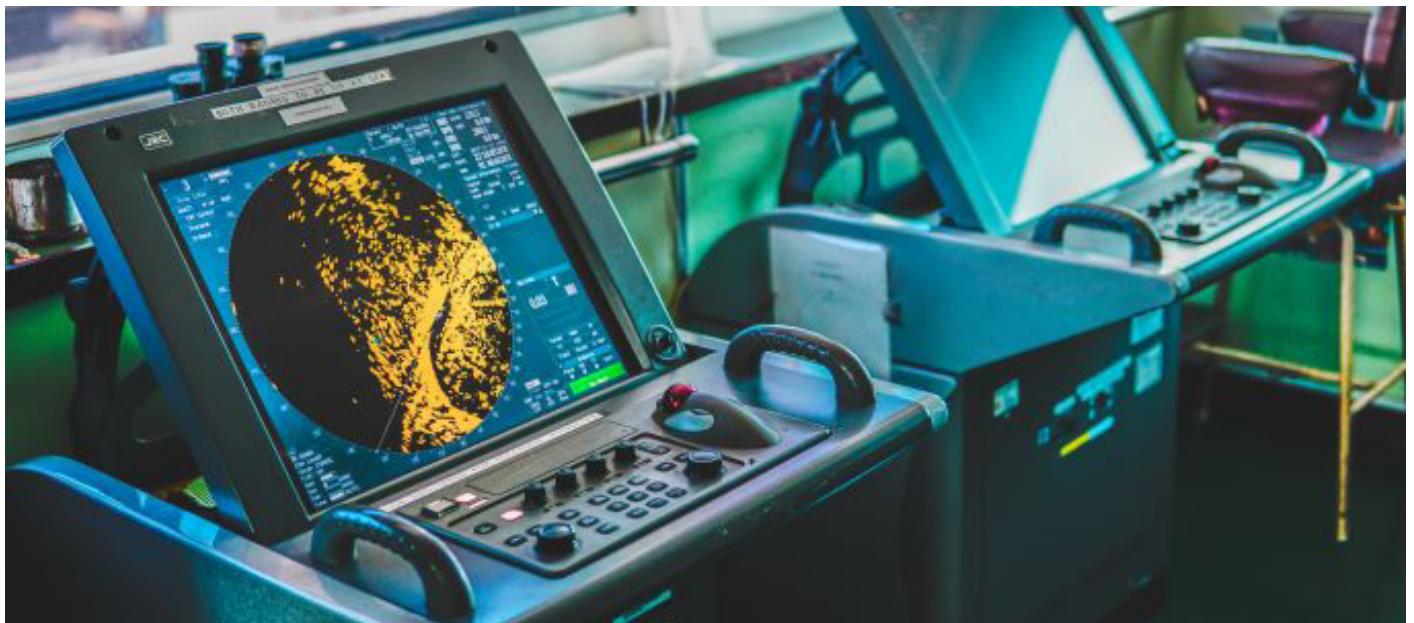
OTHER AEROSPACE, DEFENSE AND MARINE APPLICATIONS

Communication and monitoring Equipment

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive elastomer flat gaskets	Enclosure	<ul style="list-style-type: none"> Meet MIL-C standard sizes, and common sub D connector gaskets 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance
Oriented Wire Flat gasket	Distribution Control Panel Enclosure	<ul style="list-style-type: none"> Solid and sponge silicone flat gasket material populated with vertically oriented Monel or aluminium wires up to 140/sq cm. 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provides excellent shielding with EMP (electromagnetic pulse) survivability and will also provide an environmental seal.
Connector Gasket	I/O Panel	<ul style="list-style-type: none"> Offering a wide range of standard MIL connector gaskets. Different materials are available to meet the demands of EMI shielding, environmental sealing, galvanic compatibility and fuel / oil resistance. 	<ul style="list-style-type: none"> ensures electrical bonding between the surfaces with a very low contact resistance

Marine Tracking Equipment

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Knitted Wire Mesh	Enclosure	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.
Oriented wire flat gasket	Console Gland Plate External Antennas Gyroscope	<ul style="list-style-type: none"> Solid and sponge silicone flat gasket material populated with vertically oriented Monel or aluminum wires up to 140/sq cm. 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provides excellent shielding with EMP (electromagnetic pulse) survivability and will also provide an environmental seal.
Conductive elastomer flat gaskets	Power distribution	<ul style="list-style-type: none"> Meet MIL-C standard sizes, and common sub D connector gaskets 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance
Shielded window	Display	<ul style="list-style-type: none"> Very fine woven wire mesh trapped between or embedded in a clear optical substrate Termination of the EMI Shield is achieved with a continuous low resistance conductive edge around the window 	<ul style="list-style-type: none"> providing optimum transparency and EMI shielding.
EMI Shielding vent	Cabinet Enclosure Vent	<ul style="list-style-type: none"> Allows good airflow and provides high level of EMI shielding 	<ul style="list-style-type: none"> Improved EMI shielding over air inlet/outlet apertures



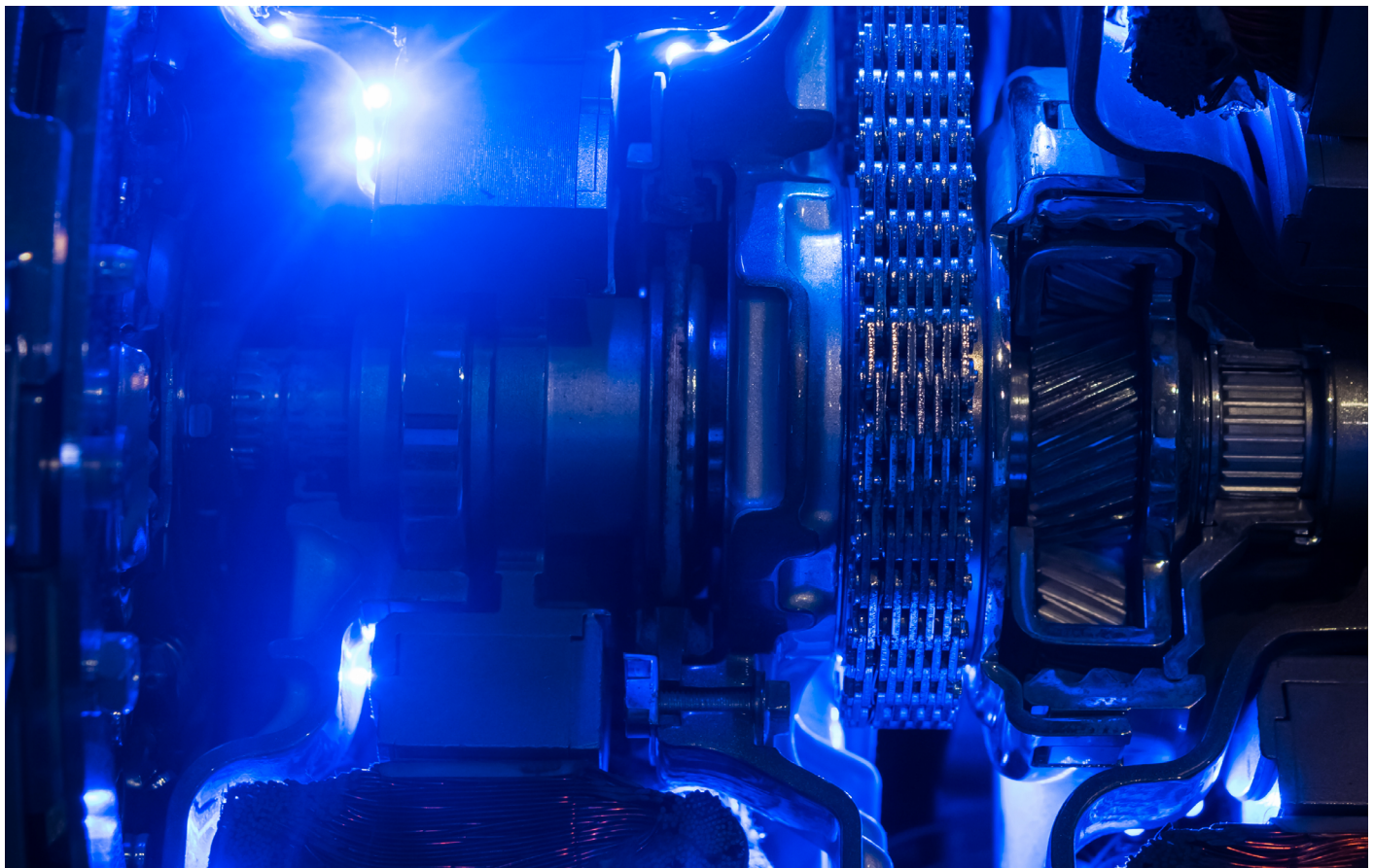


Communication Shelters

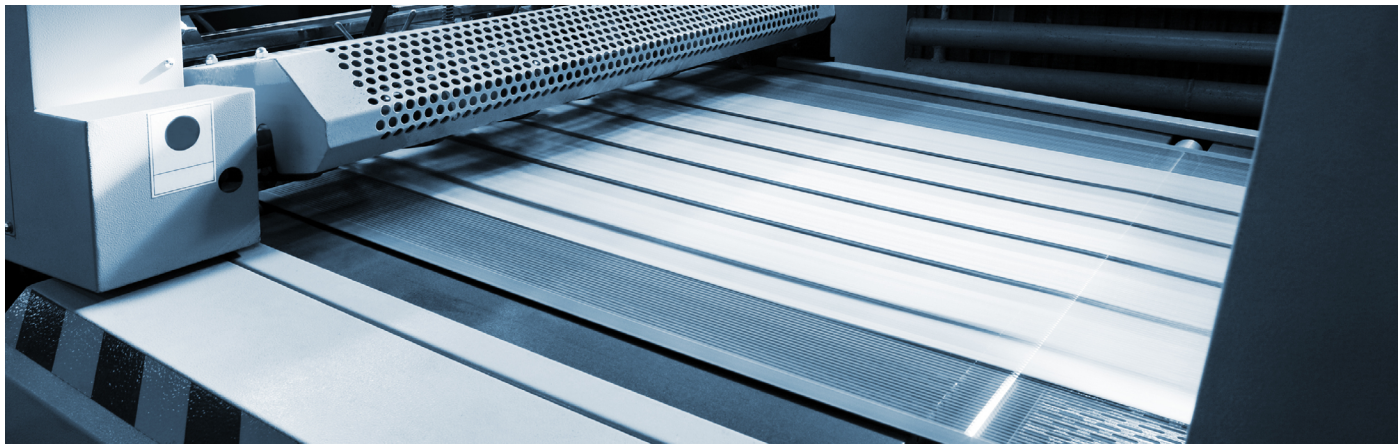
SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Knitted Wire Mesh	Door seals	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.
vents	HVAC	<ul style="list-style-type: none"> Hi-impact ABS UL94V-0 fire retardant moulding thick aluminum honeycomb and a nickel/copper fabric gasket to ground the honeycomb to the metalwork 	<ul style="list-style-type: none"> Deliver good air flow is required for cooling and ventilation but where EMC compliance must be ensured.
Oriented Wire	Access Panel	<ul style="list-style-type: none"> Solid and sponge silicone flat gasket material populated with vertically oriented Monel or aluminium wires up to 140/sq cm. 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provides excellent shielding with EMP (electromagnetic pulse) survivability and will also provide an environmental seal.
Knitted bandage	Shelter Panel seams	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.

Engine Control units

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Expanded and Woven Wire	Case Seal	<ul style="list-style-type: none"> Woven aluminum wire, expanded monel, or aluminum sheet, combined with silicone, flurosilicone or synthetic rubber Provides excellent EMI and environmental seal 	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it
Fluorosilicone conductive elastomer O rings	Fuel Control Unit FADEC (Full Authority Digital Engine Control)	<ul style="list-style-type: none"> Conductive elastomers can provide great EMI shielding performance at a relatively low cost Range of different materials and profiles available to suit the application including a UL94-V0 material" 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provide low contact resistance between connector and enclosure
Connector gaskets	Connector	<ul style="list-style-type: none"> Offering a wide range of standard MIL connector gaskets. Different materials are available to meet the demands of EMI shielding, environmental sealing, galvanic compatibility and fuel / oil resistance. 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance



INDUSTRIAL MACHINERY



Industrial Printers

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Oriented wire flat gaskets (470 material)	Enclosure	<ul style="list-style-type: none"> • Can be fitted with compression limit stops or collars. • Good conformity to allow for uneven surfaces. • Self-adhesive backing to allow for easy assembly 	<ul style="list-style-type: none"> • A good solution for achieving RFI/EMI/EMP and environmental sealing in a single gasket. • Ideal for use as access panels, seals, connector gaskets etc.
Conductive Elastomer O ring	Access panel	<ul style="list-style-type: none"> • Conductive elastomers can provide great EMI shielding performance on casing lids • Range of different materials and profiles available to suit the application including a UL94-V0 material" 	<ul style="list-style-type: none"> • Material options to provide required EMI performance and galvanic compatibility • Provide low-contact resistance

Industrial Weighing systems

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Oriented wire flat gaskets (470 material)	Enclosure	<ul style="list-style-type: none"> • Can be fitted with compression limit stops or collars. • Good conformity to allow for uneven surfaces. • Self-adhesive backing to allow for easy assembly 	<ul style="list-style-type: none"> • A good solution for achieving RFI/EMI/EMP and environmental sealing in a single gasket. • Ideal for use as access panels, seals, connector gaskets etc.
SNG Conductive Elastomer O ring	Access panel	<ul style="list-style-type: none"> • Conductive elastomers can provide great EMI shielding performance on casing lids • Range of different materials and profiles available to suit the application including a UL94-V0 material" 	<ul style="list-style-type: none"> • Material options to provide required EMI performance and galvanic compatibility • Provide low-contact resistance

RENEWABLE ENERGY



WIND TURBINE

Gear box casings, bearing casings, access panels, de-icing systems

Challenge: Gaskets are required for environmental sealing and for ESD/grounding, resistance to oils is required; for the US market versions UL-HB flammability rating is required

SHIELDING TYPE	FEATURES	BENEFITS
Conductive elastomer O ring seals	<ul style="list-style-type: none">• Conductive elastomers can provide great EMI shielding performance on casing lids• Range of different materials and profiles available to suit the application including a UL94-V0 material”	<ul style="list-style-type: none">• Material options to provide required EMI performance and galvanic compatibility• Provide low-contact resistance between connector and enclosure
Connector gasket	<ul style="list-style-type: none">• Meet MIL-C standard sizes, and common sub D connector gaskets.	<ul style="list-style-type: none">• Ensures electrical bonding between the surfaces with a very low contact resistance
Conductive 1/2 wrap	<ul style="list-style-type: none">• -Closed cell sponge with conductive fabric wrapped around 1 edge• Can be provided as a fabricated gasket	<ul style="list-style-type: none">• Will provide a combined EMI and environmental seal• Low closure force

Control Equipment Enclosures

Challenge: EMI and environmental seals required on the doors of equipment enclosures

SHIELDING TYPE	FEATURES	BENEFITS
Knitted Wire Mesh	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/ electromagnetic interference (EMI) shield between two metallic surfaces.
Connector gasket	<ul style="list-style-type: none"> Meet MIL-C standard sizes, and common sub D connector gaskets 	<ul style="list-style-type: none"> Ensures additional electrical bonding between the surfaces with a very low contact resistance
Jam Nut Seals	<ul style="list-style-type: none"> Compression molded Compliant with MIL-FTL-38999, MIL-DTL-26482, MIL-DTL-81511. 	<ul style="list-style-type: none"> Maintain the integrity of the seal Ideal where small cross section and/or small inside diameter is required.
EMI Honeycomb vent	<ul style="list-style-type: none"> Allows good airflow and provides high level of EMI shielding 	<ul style="list-style-type: none"> Improved EMI shielding over air inlet/outlet apertures



MEDICAL



SEQUENCING ANALYSIS

Lid/access panel sealing

Challenge: Covers for sample modules require a soft and conformable EMI gasket

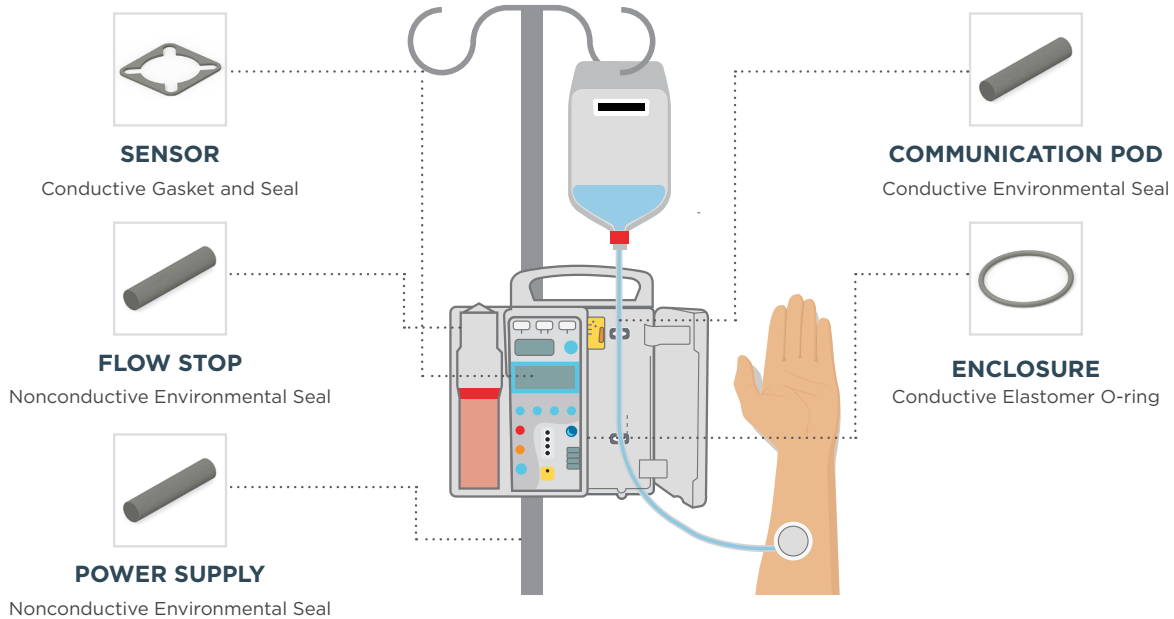
SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive foam	Module covers	<ul style="list-style-type: none"> • Very soft and conformable • Provided in cut parts • Provided with conductive adhesive backing 	<ul style="list-style-type: none"> • Low closure force • Adhesive backing aids assembly • Provides shielding on cover
Knitted mesh with environmental seal	Enclosure body seams	<ul style="list-style-type: none"> • Soft and conformable • Provides environmental and EMI seal • Adhesive backing on environmental part 	<ul style="list-style-type: none"> • Low closure force • Combined EMI and environmental seal • Adhesive backing aids assembly
Conductive fabric-over-foam	Enclosure	<ul style="list-style-type: none"> • Soft and conformable • Adhesive backing • Wide range of profiles • Can be fabricated into a gasket 	<ul style="list-style-type: none"> • Low closure force • Adhesive backing aids assembly



MASS SPECTROMETRY

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Oriented wire in silicone	Connector	<ul style="list-style-type: none"> • High EMI shielding performance • Reliable low surface contact resistance 	<ul style="list-style-type: none"> • provides shielding on the connector interface • Supplied as cut gasket
Conductive fabric over foam	Enclosure and access panels	<ul style="list-style-type: none"> • Soft and conformable • Adhesive backing to aid assembly • Supplied in standard lengths and cut to length during assembly 	<ul style="list-style-type: none"> • Low closure force • Takes up wide tolerances • Supplied as standard strip, easily cut to various lengths during assembly
Conductive foam	Internal shielding	<ul style="list-style-type: none"> • Soft and conformable • Provided as a cut flat gasket • Conductive adhesive backing to aid assembly 	<ul style="list-style-type: none"> • Low closure force • Provided as cut part to fit directly into assembly • Provides internal shielding within unit
Silicone sponge	Environmental sealing	<ul style="list-style-type: none"> • Soft and conformable • Bespoke flat gaskets to provide sealing in key areas • Adhesive backing to aid assembly 	<ul style="list-style-type: none"> • Low closure force • Supplied as pre-cut bespoke seals to fit directly into the assembly.

INFUSION PUMP



EMI Solution	Application	Key Product Features	Benefits
Conductive Elastomer O-Ring	<ul style="list-style-type: none"> Enclosure Communication Pod 	<ul style="list-style-type: none"> Conductive elastomers can provide great EMI shielding performance at a relatively low cost Range of different materials and profiles available to suit the application including a UL94-VO material" 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provide low contact resistance between connector and enclosure
Conductive Gasket	<ul style="list-style-type: none"> Sensor Power Supply 	-	<ul style="list-style-type: none"> Ensures additional electrical bonding between the surfaces with a very low contact resistance
Non-conductive Environmental Seal O-Ring	<ul style="list-style-type: none"> Housing Flow stop 	<ul style="list-style-type: none"> The groove also forms a compression stop for the O-Ring gasket 	<ul style="list-style-type: none"> Provides an environmental seal by achieving metal to metal contact Moisture or pressure sealing
Conductive Elastomer	<ul style="list-style-type: none"> Communication Pod 	<ul style="list-style-type: none"> Fully cured silicones or fluorosilicone loaded with a variety of highly conductive particles providing superior EMI/RFI shielding performance combined with excellent environmental sealing 	<ul style="list-style-type: none"> Ensure complete electrical conductivity is maintained across the joint Ensure galvanic compatibility whilst providing low contact resistance between mating surfaces

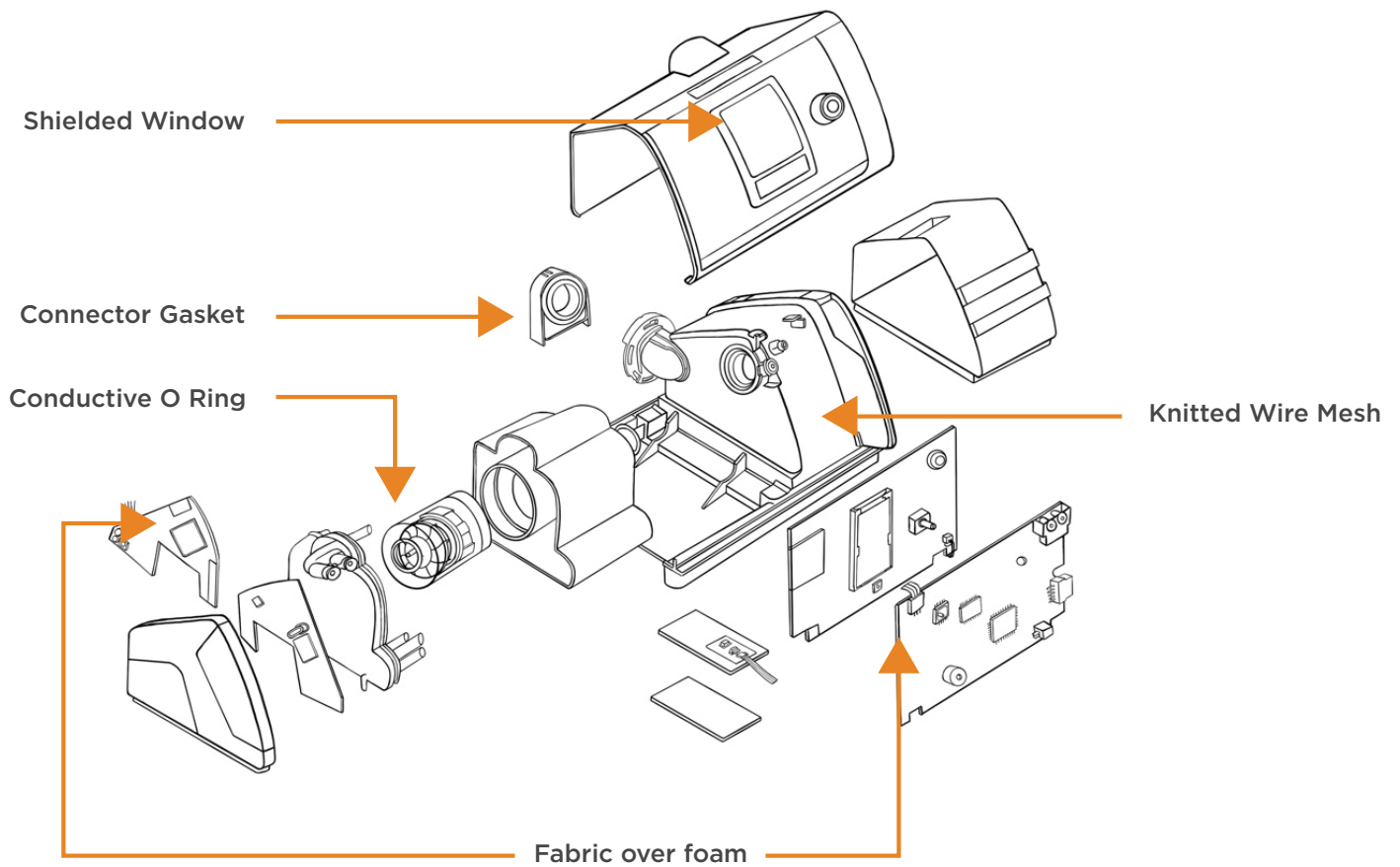
VENTILATOR

Interruption in medical device performance such as ventilator can be the difference between life and death. Without proper EMI shielding, medical devices, including life-support systems and essential monitoring equipment are vulnerable to signal noise, damage, or total functional impairment.

A ventilator that doesn't meet prescribed emission limits can lead to various unfavorable consequences for other medical devices: Potential Equipment Shutdown: In the worst-case scenario, the non-compliant ventilator might unexpectedly shut down, a critical issue when it's supposed to operate continuously, 24/7.

Intermittent Failures: Such non-compliance can result in intermittent failures, disrupting normal device operation. Identifying and troubleshooting the source of electromagnetic interference (EMI) disturbances can be time-consuming and challenging. These intermittent failures could lead to the malfunction of essential features like alarms, lights, motors, displays, and LED indicators during crucial moments.

Metastable Logic: Another consequence could be the occurrence of metastable logic, typically caused by a logic gate getting stuck between states 0 and 1. This can trigger a firmware error, necessitating a manual restart of the machine.



SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Connector Gasket	<ul style="list-style-type: none"> Air Filter Cover 	<ul style="list-style-type: none"> Offering a wide range of standard MIL connector gaskets. Different materials are available to meet the demands of EMI shielding, environmental sealing, galvanic compatibility and fuel / oil resistance. 	<ul style="list-style-type: none"> Ensures electrical bonding between the surfaces with a very low contact resistance
Shielded Window	<ul style="list-style-type: none"> LCD Display 	<ul style="list-style-type: none"> Termination of the EMI Shield windows to the enclosures is achieved with a continuous low resistance conductive edge around the window 	<ul style="list-style-type: none"> providing optimum transparency and EMI shielding.
Fabric over foam	<ul style="list-style-type: none"> PCB 	<ul style="list-style-type: none"> Soft and conformable, low closure force Available with adhesive backing Available in many profile options 	<ul style="list-style-type: none"> Grounding
Knitted Wire Mesh	<ul style="list-style-type: none"> Enclosure 	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.
Conductive o ring	<ul style="list-style-type: none"> Fan 	<ul style="list-style-type: none"> Conductive elastomers can provide great EMI shielding performance at a relatively low cost Range of different materials and profiles available to suit the application including a UL94-V0 material” 	<ul style="list-style-type: none"> Material options to provide required EMI performance and galvanic compatibility Provide low contact resistance between connector and enclosure

DATA & COMMUNICATIONS



In today's environment, data centers are gaining importance due to the trend of outsourcing data access through the Cloud, while supporting bandwidth-intensive applications. Data center managers want to squeeze every bit of performance out of the data center architecture. Network equipment manufacturers need to consider Electromagnetic Compatibility as a potential inhibitor to maximize speed and efficiency in data centers.

Increases in data speed lead to commensurate increases in noise and heat. Greater connectivity supporting more wireless devices results in more signals and increased connector heat. All of these changes related to 5G place greater emphasis on appropriate EMI shielding, and as 5G evolves, engineers will need to meet the challenges of designing for faster data speeds, increased connectivity, and higher frequencies.



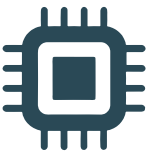
SYSTEM ARCHITECTURE

More complexity with multiple electronics sub-systems, ensuring overall system performance requires that these sub-systems do not interfere with each other.



CONNECTIVITY

Proliferating wireless devices augmenting # of signals and increasing connector heat



POWER DENSITY

Slowing of Moore's Law increases density creating more heat and signal noise



DATA SPEEDS

Increasing speeds create more noise and heat



EMC REGULATION

Growing regulation for electromagnetic compliance making EMC more important

Electromagnetic interference shielding refers to the attenuation, in reflection and/or absorption, of electromagnetic radiation through the use of a material that acts as a "shield" against it.

For radiated emissions, this can be achieved by using materials and components that will create a Faraday cage from the enclosure, or by creating a smaller Faraday cage within the enclosure.

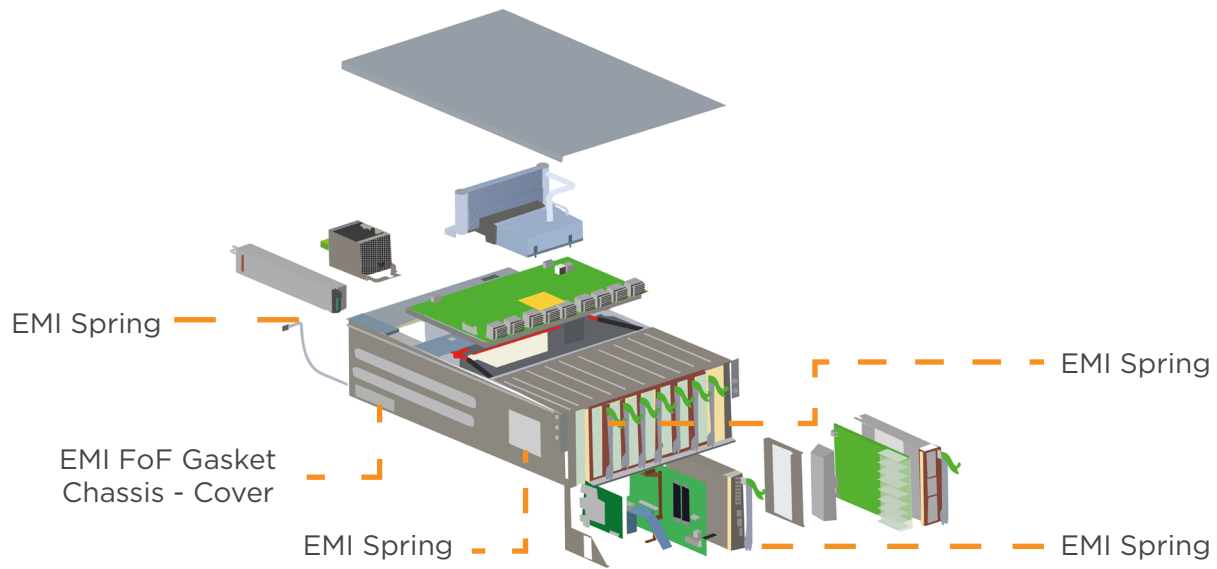
Data Center Racks



- 1** Gaskets fill gaps in enclosure seams and joins forming a conductive path.
- 2** Soft & flexible gaskets for poor tolerances with fabric over foam material
- 3** Vent panels allow air/cooling while maintaining the faraday cage.

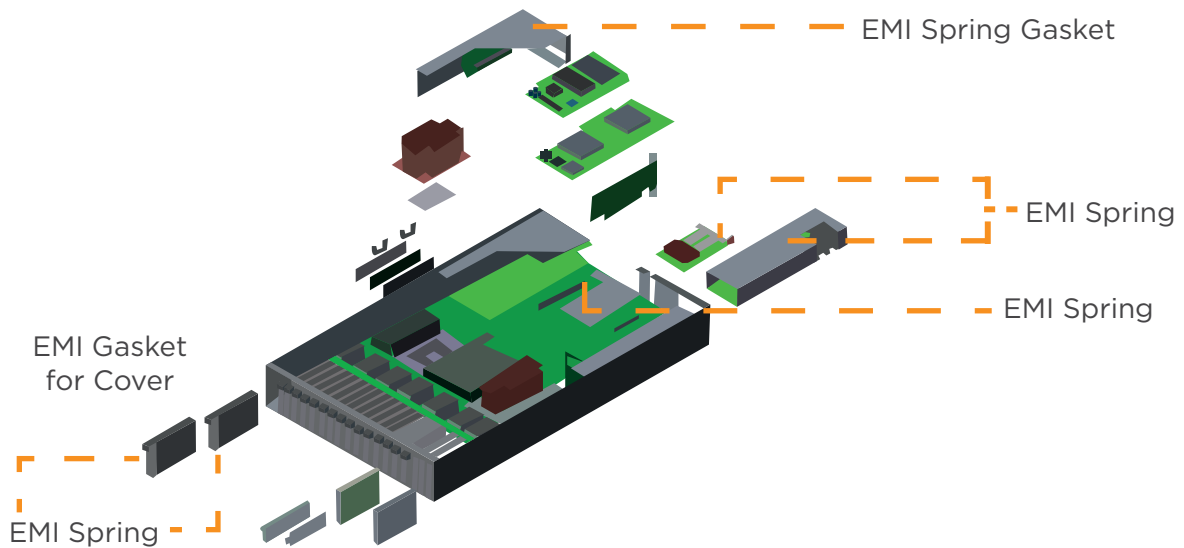
Product type	Application	Key Product features	Benefits
Spring Fingers	Strips for rack grounding	Suitable for repeated insertions	Reliable grounding of racks to enclosure
Knitted Wire Mesh	Door gasket	Available with a soft core	Robust gasket
EMI Honeycomb vent	Shielding over air inlet/outlet apertures	Allows good airflow and provides high level of EMI shielding	Improved EMI shielding over air inlet/outlet apertures
Conductive Fabric over foam	Door gasket Strips for rack grounding	Very soft and conformable high wear resistance	Reliable grounding of racks Provides door seal with a low closure force

Network Switches



Product type	Application	Key Product features	Benefits
Conductive fabric over foam	Chassis cover gasket	Soft and conformable	Provides EMI shielding on cover with low closure force
Metal spring fingers	Grounding to chassis	Suitable for repeated insertions	Reliable grounding
Metal spring fingers	Grounding of chassis to enclosure	Suitable for repeated insertions	Reliable grounding

2U RACK Mount Server



Product type	Application	Key Product features	Benefits
Conductive fabric over foam	Chassis cover gasket	Soft and conformable	Provides EMI shielding on cover with low closure force
Metal spring fingers	Grounding to chassis	Suitable for repeated insertions	Reliable grounding
Metal spring fingers	Grounding of chassis to enclosure	Suitable for repeated insertions	Reliable grounding



Satellite Communications

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive Elastomer	Enclosure	<ul style="list-style-type: none"> Fully cured silicones or fluorosilicone loaded with a variety of highly conductive particles providing superior EMI/RFI shielding performance combined with excellent environmental sealing 	<ul style="list-style-type: none"> Ensure complete electrical conductivity is maintained across the joint Ensure galvanic compatibility whilst providing low contact resistance between mating surfaces
Knitted Wire Mesh		<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces
Form in Place	Internal module	<ul style="list-style-type: none"> Elastomer compounds directly dispensed onto component hardware or enclosure via a pressurized fluid dispensing system RFI/EMI shielding and/or environmental seal for dust and moisture 	<ul style="list-style-type: none"> Suited to applications where small, intricate EMI gasket profiles are required, such as on multi-compartment labyrinth housings with minimum gaskets land area where traditional larger types of gaskets are not suit Reduces assembly costs associated with traditional gaskets
HoneyComb Vent	I/O Panel	<ul style="list-style-type: none"> Hi-impact ABS UL94V-0 fire retardant moulding thick aluminum honeycomb and a nickel/copper fabric gasket to ground the honeycomb to the metalwork 	<ul style="list-style-type: none"> Deliver good air flow is required for cooling and ventilation but where EMC compliance must be ensured

TRANSPORTATION



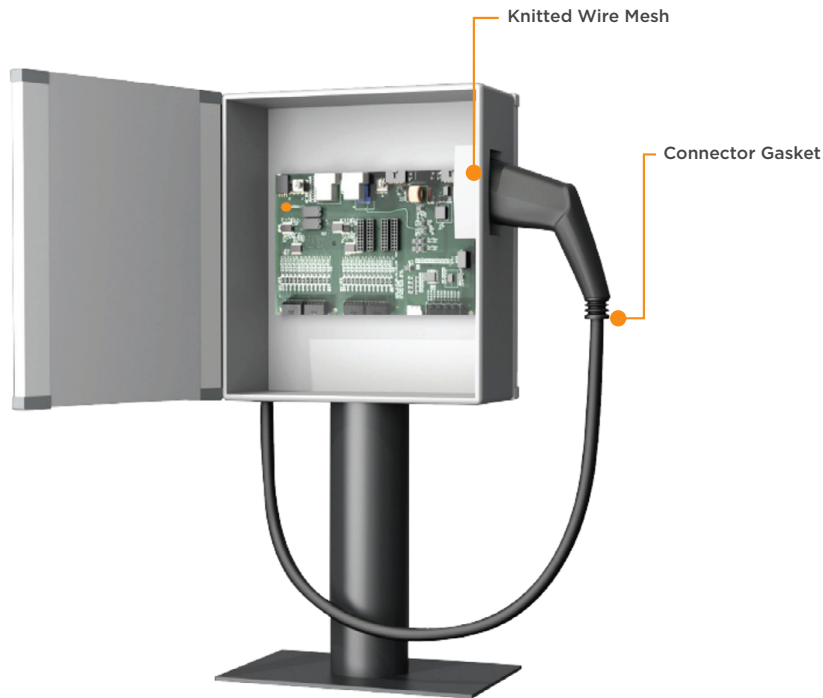
AC/DC CHARGING

In the dynamic and ever-evolving electric vehicle (EV) industry, it is imperative to partner with an experienced EMI/RFI shielding manufacturer that specializes in crafting tailored solutions for intricate and cutting-edge components.

At TE, our expertise in the production of customized EMI/RFI shielding components. Our extensive expertise in delivering custom solutions for electromagnetic interference (EMI) and radio-frequency interference (RFI) mitigation enables us to collaborate seamlessly with your design team. We offer valuable input on dimensional precision, tolerance specifications, and the selection of optimal raw materials to deliver cost-effective and efficient shielding solutions.

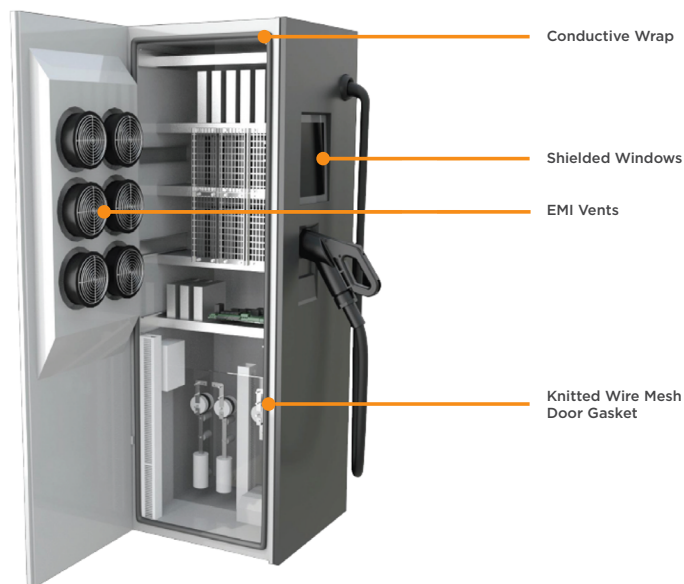
AC Charging

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive ½ wrap	Panel Enclosure	<ul style="list-style-type: none"> Closed cell sponge with conductive fabric wrapped around 1 edge Can be provided as a fabricated gasket 	<ul style="list-style-type: none"> Will provide a combined EMI and environmental seal Low closure force
Knitted Wire Mesh		<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.
Kemvent		<ul style="list-style-type: none"> Hi-impact ABS UL94V-0 fire retardant moulding thick aluminum honeycomb and a nickel/copper fabric gasket to ground the honeycomb to the metalwork 	<ul style="list-style-type: none"> Deliver good air flow is required for cooling and ventilation but where EMC compliance must be ensured.



DC Charging

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Conductive ½ wrap	Enclosure	<ul style="list-style-type: none"> Closed cell sponge with conductive fabric wrapped around 1 edge Can be provided as a fabricated gasket 	<ul style="list-style-type: none"> Will provide a combined EMI and environmental seal Low closure force
Knitted Wire Mesh	Door	<ul style="list-style-type: none"> The mono-filament interlocking loop construction gives strength while allowing it to conform to almost any size or shape. A selection of elastomer cores are available to meet conditions such as temperature range, compression set, compression force. 	<ul style="list-style-type: none"> Delivers good galvanic match with mating flanges, thereby limiting the possibility of corrosion between gasket and flange. Excellent radio frequency interference (RFI)/electromagnetic interference (EMI) shield between two metallic surfaces.
EMI Shielded Window	Display	<ul style="list-style-type: none"> Termination of the EMI Shield windows to the enclosures is achieved with a continuous low resistance conductive edge around the window 	<ul style="list-style-type: none"> Providing optimum transparency and EMI shielding.
EMI Vent	Ventilation	<ul style="list-style-type: none"> Hi-impact ABS UL94V-0 fire retardant moulding thick aluminum honeycomb and a nickel/copper fabric gasket to ground the honeycomb to the metalwork 	<ul style="list-style-type: none"> Deliver good air flow is required for cooling and ventilation but where EMC compliance must be ensured.
Environmental sealing gasket	Door	<ul style="list-style-type: none"> Offers versatile design and styles Enables complex shapes 	<ul style="list-style-type: none"> Sealing in the harshest environments



OTHER TRANSPORTATION APPLICATIONS



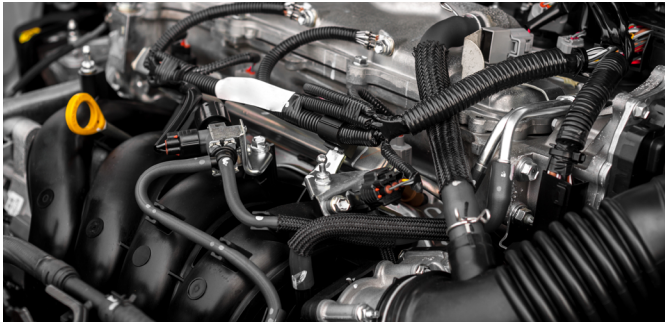
Tyre Pressure Monitoring system

- Electrically Conductive Elastomer O rings



Cherry picker vehicles

- Conductive elastomer O rings
- Environmental seals



Diesel engines for specific applications

- Rocker cover gasket
- Fluorosilicone conductive elastomer O ring



EV bus and truck development

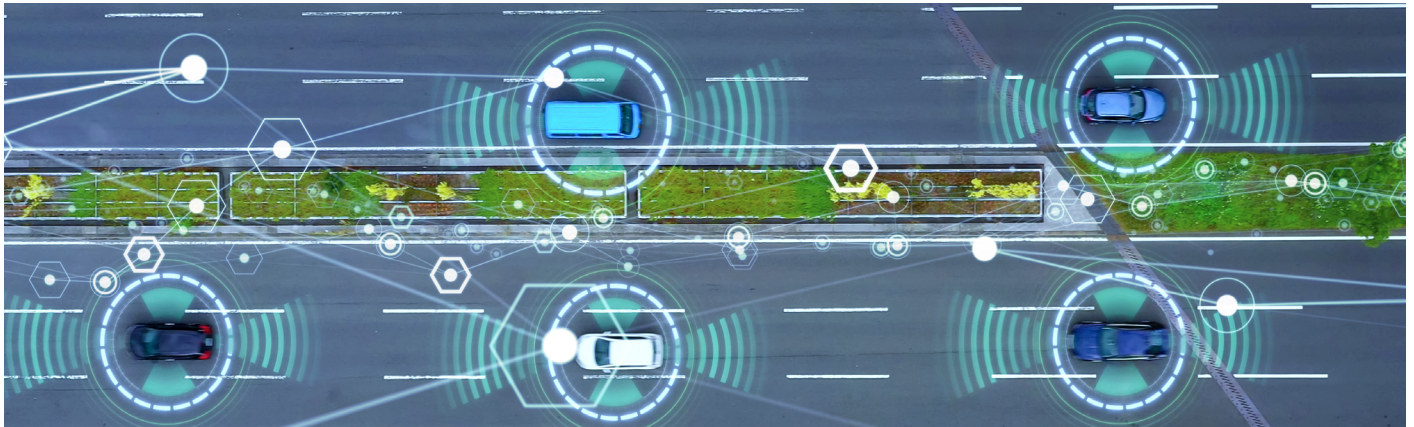
- O ring seals
- Electrically Conductive Elastomer O rings



EV unmanned race car

- Inverter housing
- Conductive elastomer O rings

ADVANCED DRIVER ASSISTANCE SYSTEMS (ADAS)



Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) pose threats to electronic signal integrity and strength, leading to disruptions and suboptimal performance in sensitive communication systems and devices. In the context of Advanced Driver Assistance Systems (ADAS), EMI becomes a critical safety concern. To mitigate these issues, robust engineering design is essential.

Vehicles with advanced driver assistance systems (ADAS) include a wide range of electronics, many of which have a high risk of propagating EMI. Numerous design best practices exist to address electronic noise, and while engineers might lack significant control over the electrical systems, there are still a few design considerations that can minimize the impact of electromagnetic interference (EMI) on sensors and software.

It is critical to consider EMI/RFI shielding solutions that effectively reduce susceptibility to electronic malfunctions by either blocking external electromagnetic waves or preventing the emission of internal electromagnetic waves that could interfere with surrounding circuits or devices in and around ADAS components.

SHIELDING TYPE	APPLICATION	FEATURES	BENEFITS
Form-in-Place	Housing Seal	<ul style="list-style-type: none">• Elastomer compound dispensed directly onto hardware• EMI shielding and/or environmental seal for dust and moisture	<ul style="list-style-type: none">• Suited to applications where small intricate EMI gasket profiles are required• Can reduce assembly costs• Low closure force
Conductive elastomer	Camera, Radar and Data Module Seal	<ul style="list-style-type: none">• Silicone or fluorosilicone loaded with highly conductive particles providing superior EMI shielding performance combined with excellent environmental sealing.	<ul style="list-style-type: none">• Material options to provide required EMI performance and galvanic compatibility• Provides low contact resistance between mating surfaces

Kemtron Extended Product Portfolio Contact Information

United Kingdom

Phone: +44 (0) 1376 348115
Email: info.braintree@te.com

France

Phone: + 33 (0) 160778316
Email: info.braintree@te.com

Germany

Phone: +44 (0) 1376348115
Email: info.braintree@te.com

Rest of Europe

Phone: +44 (0) 1376348115
Email: info.braintree@te.com

Asia

Phone: +44 (0) 1376348115
Email: info.braintree@te.com

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