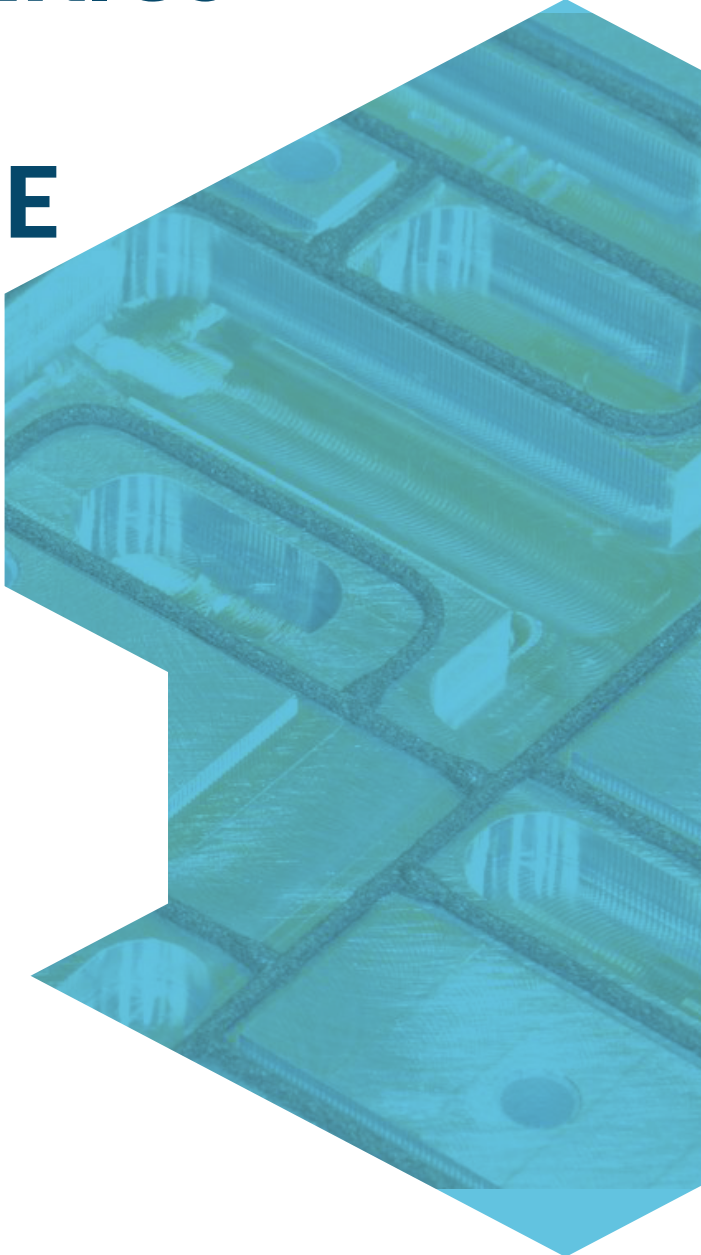
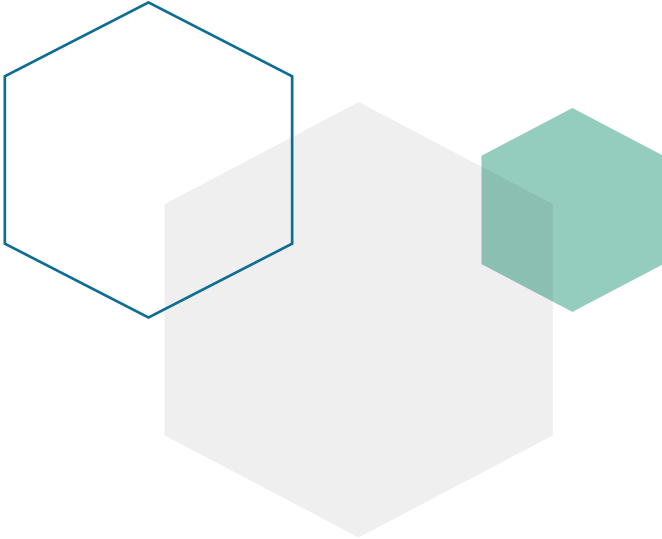


PARKER CHOMERICS EMI SHIELDING MATERIAL GUIDE

MODUS ENGINEERING
TEAM



Introduction | Parker Chomerics EMI Shielding Materials Guide

The Chomerics division of Parker Hannifin Corporation is a global leader in the development of thermal interface and electrically conductive materials. It is well known across many industries including aerospace, [defense](#), [medical device](#), [telecommunications](#), and emerging technology spaces. These industries expect nothing but the best and the EMI shielding materials from Parker Chomerics prove time and time again that they are up to the challenge.

Designing a device that requires electromagnetic shielding is no easy task. There are thousands of materials to choose from ([here's 27 of them!](#)) and just as many considerations to keep in mind regarding design. Ensuring that your device accomplishes the intended goal is critical, especially in industries where the end use involves extreme environments, like in space or defense applications.

Here at Modus Advanced, we're always ready to support our partners in bringing their life-changing and life-saving devices to market with speed and precision.

To get expert design feedback, engineering guidance, and manufacturing help, contact us at Modus Advanced.

[CONTACT US >](#)



Small Bead FIP: Breaking the Bead Sized Boundaries of Form-in-Place Gaskets

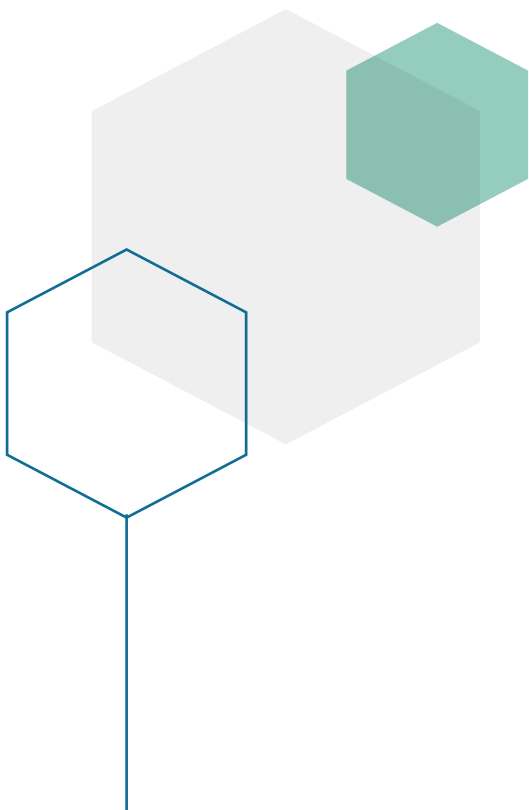
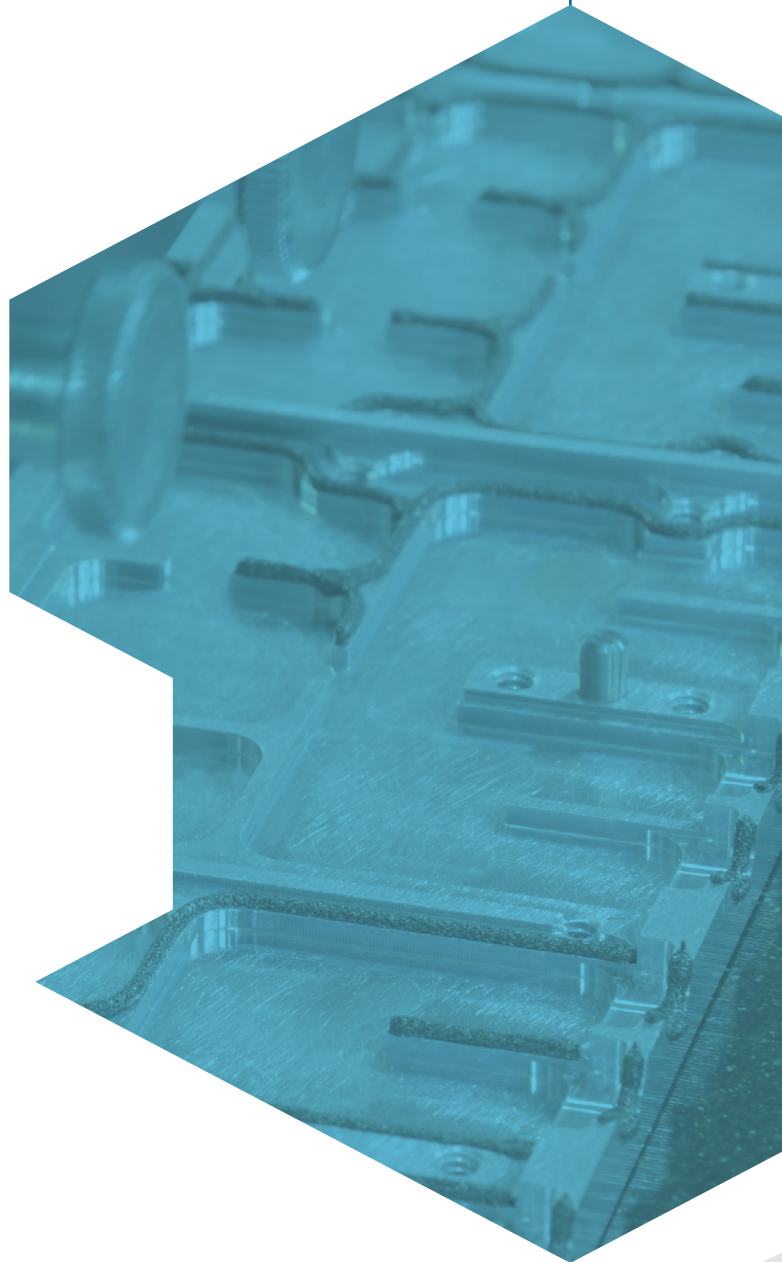
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Chapter 1

What is EMI Shielding
and Why is it Important?



Chapter 1 | What is EMI Shielding and Why is it Important?



Electromagnetic (EMI) shielding in electronic devices and equipment in the use of manufacturing techniques and materials to protect against signal disturbances and disruptions in sensitive electronic devices. It prevents signal ingress and egress so that surrounding components can function as intended.

The sources of EMI are plentiful, and include both man-made and natural sources. The ubiquitous nature of EMI in medical, aerospace, [defense](#), and emerging technologies industries, to name a few. Devices in these industries require that life-saving and life-changing devices be effectively protected – there is no room for failure. In many of these industries, a failed device can be a disaster; not just a loss of data or system failure, but it can potentially mean a loss of life.

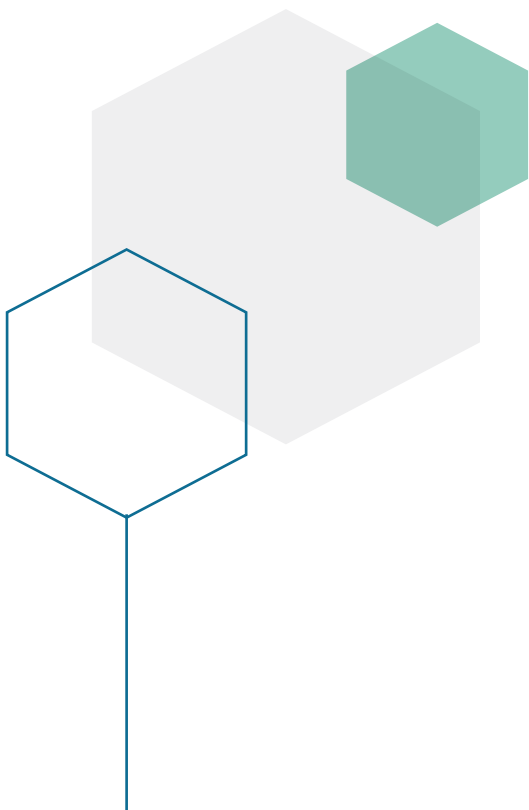
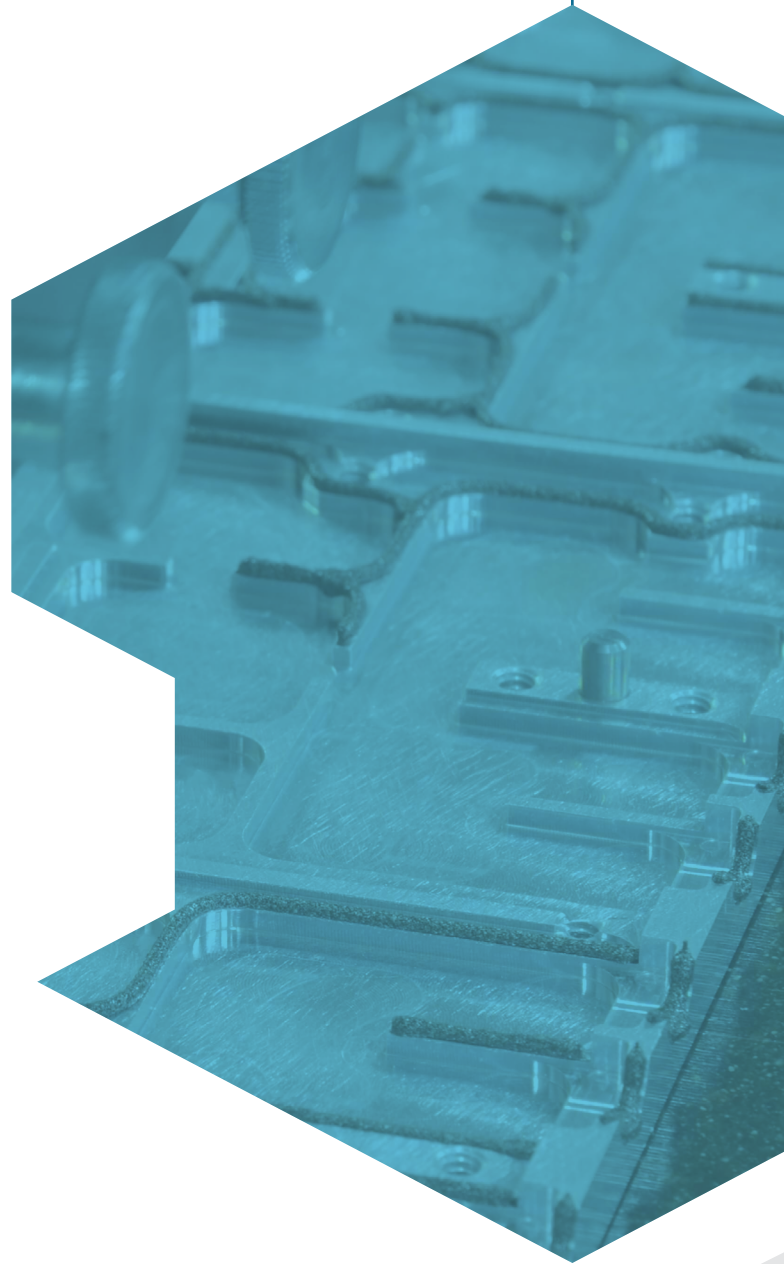
In the aerospace and defense industries specifically, intentional electromagnetic interference (IEMI), otherwise known as electronic warfare, is a serious threat to device performance. IEMI is increasingly more concerning as bad actors and the technology they employ become more sophisticated. Leveraging EMI shielding materials from Parker Chomerics is one of the ways you can ensure your devices function as intended and are free from disturbances, intentional or otherwise.

For engineers, it is critical to understand how electromagnetic energy (EME) in the intended application environment can cause interference and how an EMI shield works. Having at least a basic EMI awareness and corresponding material options will help support you in the design of an adequately protected device.

Want to freshen up your EMI awareness? Head to our [EMI Shielding Resource Center](#).

Chapter 2

Types of Parker Chomerics EMI Shielding Material



Chapter 2 | Types of Parker Chomerics EMI Shielding Material



There are many different types of EMI shielding materials to choose from, and selecting the correct one can mean the difference between a functional or failed device. Each application will have its own device requirements, which will dictate the properties and tolerances of which materials you'll be able to choose from.

There are literally thousands of materials to choose from, but we've done the footwork to partner with a time-tested brand that provides the highest quality materials. There are few instances where Parker Chomerics isn't the right fit, but for everything else, it's a sure winner. Parker Chomerics offers a host of EMI shielding materials that we use on a regular basis for a variety of applications, in concert with other Chomerics products, and with great success.

Parker Chomerics carries a wide variety of EMI shielding and grounding products including:

- Elastomer gaskets
- FIP gaskets
- Cable wrap/tubing
- Metal finger stock
- Fabric-over-foam
- Board level shielding
- Adhesives, coatings, and sealants
- Air vent panels
- Metal wire based
- Tapes/laminates
- Metal cable wrap

Coatings made of metallic inks are also applied to the interiors of electronic enclosures to provide an EMI shielding solution. Each of these shielding methods has its advantages, but today we are going to discuss four primary categories of EMI materials. They are:

- [Form-in-Place](#) (FIP) (CNC Dispensed)
- Rubber-Based Sheet or Roll Materials
- Fabric Over Foam
- Beryllium Copper

Let's dig into what each of these categories are and what they can do for you.



Form-in-Place (FIP) (CNC Dispensed)

Form-in-place (FIP) EMI gaskets are a great fit for devices that have complex requirements and dimensions. FIP gaskets are also a great option when size is a factor – smaller devices require smaller gaskets which can be flimsy and difficult to manage. Using an FIP gasket can reduce the assembly time and hassle of placing die cut parts.

Conductive Parker Chomerics Form-in-Place Gasket Materials

Parker Chomerics offers a line of electrically conductive FIP gasket materials called CHO-FORM®. These materials are dispensed using a CNC machine directly onto [machined metal](#), castings and conductive plastic housings and provide excellent electrical contact.

The benefits of the CHO-FORM line of products include:

- Short design time and minimal tooling
- Allows for very small cross sections
- Can be dispensed on small flanges or in grooves
- Lower total installed cost than stand-alone gaskets
- Wide selection of materials / fillers
- Great for quick turn samples and prototyping (or when you feel like [breaking the small bead boundaries of FIP](#))

There are several form-in-place gasket materials to choose from within the CHO-FORM line:

CHO-FORM 5513

CHO-FORM 5513 has a silicone base and conductive filler material made from silver and copper. This material comes with excellent electrical properties and adheres strongly to the surface on which it is dispensed. We often find that this material is a best fit for military applications.

CHO-FORM 5541

With a silicone base and a nickel and graphite filler, CHO-FORM 5541 offers superior resistance to corrosion and high temperatures, as well as strong electrical conductivity. This material is also highly effective at electromagnetic interference (EMI) shielding, although it is less effective than CHO-FORM 5513 and CHO-FORM 5560.

Chapter 2 | Types of Parker Chomerics EMI Shielding Material

CHO-FORM 5550

CHO-FORM 5550 is another Parker Chomerics form-in-place gasket material that contains a nickel and graphite filler material and silicone base material. The main property that differentiates this material from CHO-FORM 5541 is softness. Its hardness and tensile strength ratings are lower, but CHO-FORM 5550 still offers galvanic corrosion resistance and the ability to withstand high temperatures.

CHO-FORM 5560

Nickel and aluminum fill this silicone-based FIP gasket material. CHO-FORM 5560 stands out among the CHO-FORM line because it offers the best resistance to galvanic corrosion. Its other properties are highly similar to CHO-FORM 5550, with only slight differences.

CHO-FORM 5575

CHO-FORM 5575 has a silicone base and a silver and aluminum filler. This material scores the highest hardness rating of the CHO-FORM materials. Although it is not the most effective EMI shield of the line, CHO-FORM 5575 still offers effective EMI shielding.

CHO-FORM 5526

Silver filler makes this FIP gasket material from Parker Chomerics an excellent choice for conductivity, grounding and EMI shielding, but the costs associated with silver can make this material among the more expensive options as it has a high silver content. CHO-FORM 5526 is not recommended for applications that require galvanic corrosion resistance.

CHO-FORM 5528

CHO-FORM 5528 is a relatively soft material with low closure force. It's filled with silver and copper and based in silicone. Note that this material is less resistant to higher temperatures than many of the other materials in the CHO-FORM family. We often find this material a best fit for telecommunication applications.



Industry Spotlight: Medical Devices

[WATCH THE VIDEO >](#)



Curing Parker Chomerics FIP Gasket Materials

The Parker Chomerics EMI shielding FIP gasket materials listed above are either cured thermally or with moisture. Thermal curing takes place for at least half an hour at temperatures ranging from 100 to 150°C. Moisture curing takes place over at least 24 hours at room temperature. The thermal curing process tends to offer stronger adhesion, while the moisture curing process allows materials to be dispensed onto low-temperature housings.

Here are the Parker Chomerics FIP gasket materials that are cured thermally:

- CHO-FORM 5513
- CHO-FORM 5541
- CHO-FORM 5550
- CHO-FORM 5560

And here are the materials that are cured with moisture:

- CHO-FORM 5575
- CHO-FORM 5526
- CHO-FORM 5528
- CHO-FORM 5538

For more information on the properties of CHO-FORM FIP gasket materials, check out the material selector guide [here](#) and [here](#).

Rubber-Based Sheet or Roll Materials

Rubber-based conductive gaskets are typically made from a combination of synthetic or natural rubber and conductive fillers, like silicone, fluorosilicone, and EPDM. It can be manufactured in a variety of sizes and shapes to fit the needs of your application.



Fabric Over Foam, or Conductive Fabric Gasket

A conductive fabric gasket, more commonly referred to as a fabric-over-foam (FoF) gasket, is a type of gasket that is made of conductive material, either a fabric or a foam, that has been coated or infused with conductive materials such as metal particles or carbon. FoF gaskets are especially effective when softer compression forces are required for your design.

Foam-based materials are typically made by spraying a polyurethane foam with a copper or nickel solution which then fills the pores of the foam to make it conductive.

Some materials use a fabric or wire mesh wrapped over a low closure force urethane foam to achieve a similar effect. Fabric over foam solutions typically come in various cross sections (like D-shaped, O-shaped, or C-shaped), with hundreds of different profile offerings.

It's important to note that EMI materials rarely provide a good seal, particularly against water, so design requirements are a key factor in determining if a foam-based EMI shielding material is even possible to use in your application.

These types of gaskets are available at Parker Chomerics under their SOFT-SHIELD product line and can be an appropriate selection for a wide variety of applications, including commercial electronic enclosures, medical electronics and other general industrial applications.

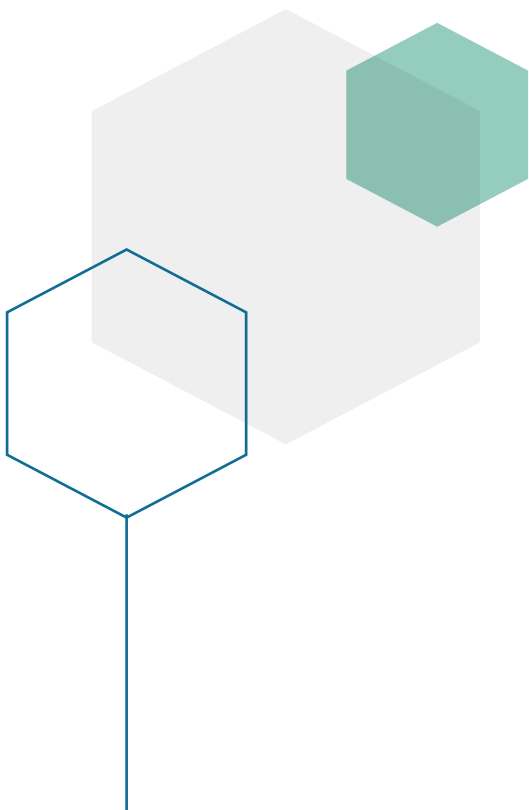
Beryllium Copper

Beryllium Copper (BeCu) is ideal for physically demanding applications that have extreme operating temperature ranges. It has a high tensile strength and superb electrical conductivity. We most often see “fingers” used in EMI shielding applications. Parker Chomerics offers a series of [SHIELDMESH](#) gaskets that are designed for applications that require small round or rectangular EMI seals.

Now that you have a basic understanding of the Parker Chomerics EMI shielding materials available to you, let's cover some of the advantages that are associated with using Parker Chomerics materials.

Chapter 3

How to Choose the Right Parker Chomerics EMI Shielding Material





Your specific application will dictate the requirements needed for your EMI shielding gasket. There are thousands of materials to choose from and Parker Chomerics will never leave you wishing for more. The selection they have to offer is significant. With that in mind, it may help to sort through the options with an expert to ensure you make the right choice for your device. (You can [contact us](#) at any time, we're here to help.)

EMI Shielding Gasket Design Questions

The design phase is easily the most difficult part of bringing your life-changing and life-saving devices to reality. Determining which EMI gasket material will work well with your design is as much of a science as it is an art. Ask yourself the following questions to help guide your decision-making process.

What type of filler do I need?

The metal filler you choose is a large part of the decision making process in creating an effective EMI shield. Different fillers have significant impacts on total material cost, which can be a driving factor in the design.

The gasket type will also dictate what filler materials are available, whether you choose a [fabric-over-foam solution](#), rubber-based material or solids, FIP materials, or a foam solution. Be sure to review each type of gasket (above) to dive deeper into which fillers are available for each type.

From a high level, your filler options are:

- Silver
- Silver aluminum
- Silver nickel
- Silver copper
- Nickel graphite

Again, cost can be a huge driver of a project and each of these fillers has their own costs associated. Silver is typically the most expensive and nickel graphite is the least expensive. The filler you choose will be based on a variety of considerations including the application and other components of your design.

Chapter 3 | Choosing Parker Chomerics EMI Shielding



Is galvanic compatibility a concern?

Galvanic corrosion happens when there is an exchange of electrons between two metals that come into contact. Your goal is to select an EMI shielding material that will not cause galvanic corrosion when it comes into contact with your housing (this is a recipe for device failure).

Refer to a chart like the one below to help you select a filler material that will suit the needs of your housing and application.

Contact Metal Metal Corroding	Magnesium & alloys	Zinc & alloys	Aluminium & alloys	Cadmium	Steel-carbon	Cast iron	Stainless steels	Lead, tin & alloys	Nickel	Brasses, nickel silvers	Copper	Bronzes, cupro-nickels	Nickel copper alloys	Nickel-Chrome-Mo Alloys Titanium, silver, graphite, gold, platinum
Magnesium & alloys	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zinc & alloys		X	X	X	X	X	X	X	X	X	X	X	X	X
Aluminium & alloys			X	X	X	X	X	X	X	X	X	X	X	X
Cadmium				X	X	X	X	X	X	X	X	X	X	X
Steel-carbon				X	X	X	X	X	X	X	X	X	X	X
Cast iron					X	X	X	X	X	X	X	X	X	X
Stainless steels					X	X	X	X	X	X	X	X	X	X
Lead, tin & alloys							X	X	X	X	X	X	X	X
Nickel									X	X	X	X	X	X
Brasses, nickel silvers						X	X	X	X	X	X	X	X	X
Copper							X	X	X	X	X	X	X	X
Bronzes, cupro-nickels											X	X	X	X
Nickel copper alloys												X	X	X
Nickel-Chrome-Mo Alloys Titanium, silver, graphite, gold, platinum														X

X = Galvanic Corrosion Risk

What are my shielding effectiveness requirements?

Many industries have their own shielding effectiveness requirements that will dictate what you can use and under what circumstances. Shielding effectiveness refers to how well a given part reflects or absorbs electromagnetic radiation.

In military applications for example, you may be required to meet MIL-STD-285, which is the military standard for electromagnetic shielding. In the medical device industry you may be required to meet the IEC 60601-1-2 standard.



What kind of environment will this device be exposed to?

Where is your device headed? The type of environment that your EMI shielding gasket will be exposed to is a critical consideration in determining what EMI shielding material you choose from Parker Chomerics. Medical devices are particularly at risk of seal degradation due to the repeated exposure of harsh cleaning chemicals that hospitals employ. Can your chosen materials stand up to that?

While reading a product catalog may help steer your decisions, enlisting the help of a trusted partner like Modus can take some of the weight of decision-making off your shoulders.

What are the space and weight constraints?

If space and weight are a concern, choosing a lighter and/or smaller gasket may be a better choice, while still ensuring an adequate shielding and overall effectiveness.

Are there any compression requirements?

Conductive elastomer gaskets, for example, are better suited for environments that require higher degree of compression for longer periods of time. They're also a better choice for sealing surfaces that are uneven or rough. Conductive fabric gaskets, on the other hand, are more compressible and can conform better to surfaces with less compression force.

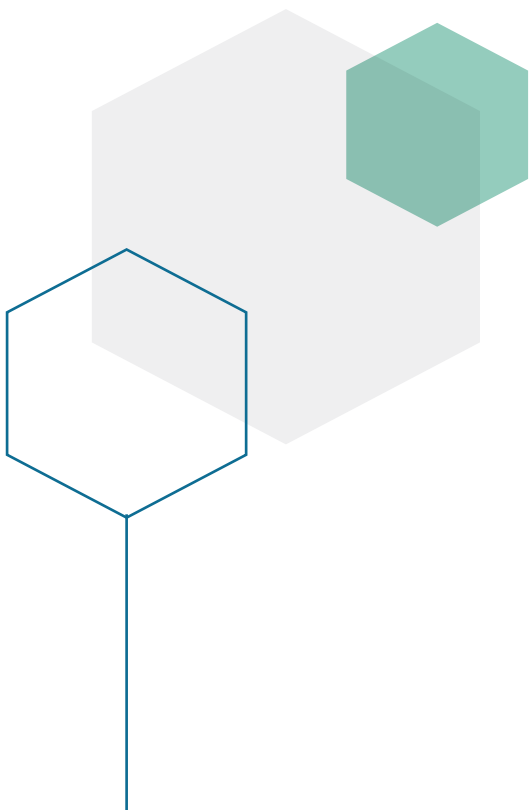


Learn more about our
CNC Machining Capabilities

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Chapter 4

Advantages & Use Cases





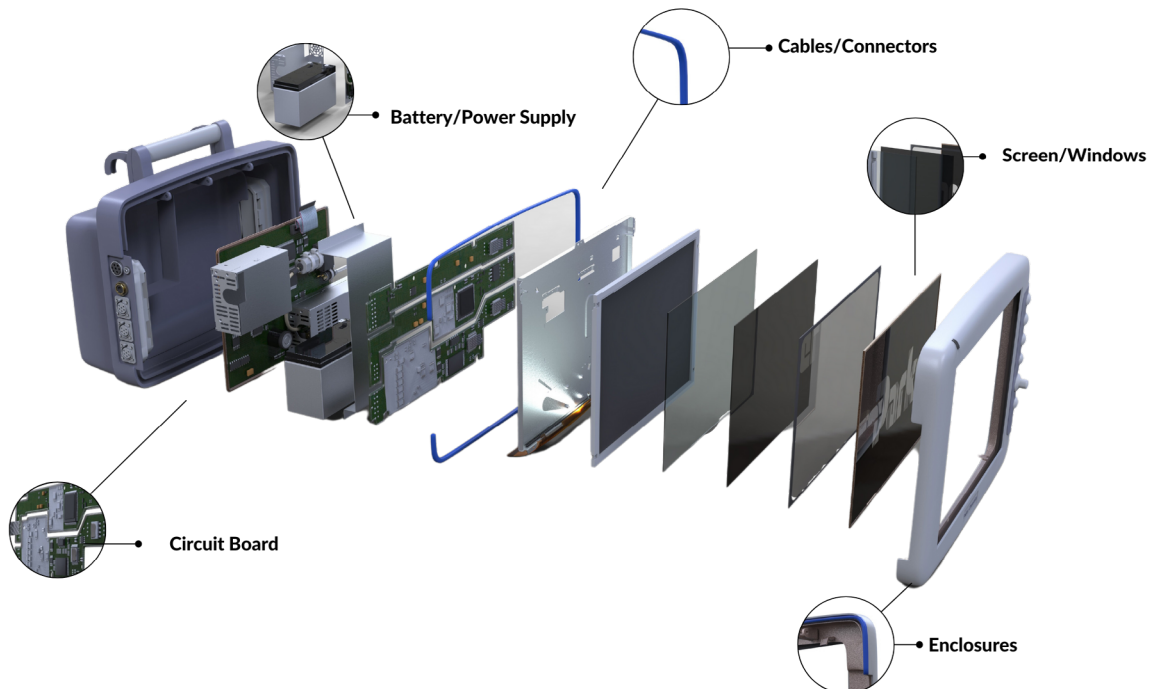
If you've made it this far, it's pretty obvious that we're a big fan of Parker Chomerics materials. As a preferred distributor, we've seen the incredible impact that the premium high-performance quality of these products can have on your life-saving and life-changing devices. Their integrated solutions are well prepared to meet the stringent requirements of a variety of industries.

Medical Devices

Handheld and portable devices have a demand unlike any other in that they are critical to life support and patient monitoring. These devices are increasingly becoming smaller in size which means that the EMI shielding and grounding need to be robust enough yet considerate of size in order to meet compliance.

As you can see in the image below, Parker Chomerics is ready for the challenge. The example illustrates a variety of EMI shielding materials, such as **CHOFORM** and **SOFTSHIELD**, used on a portable product such as a monitor.

Medical Device Solutions



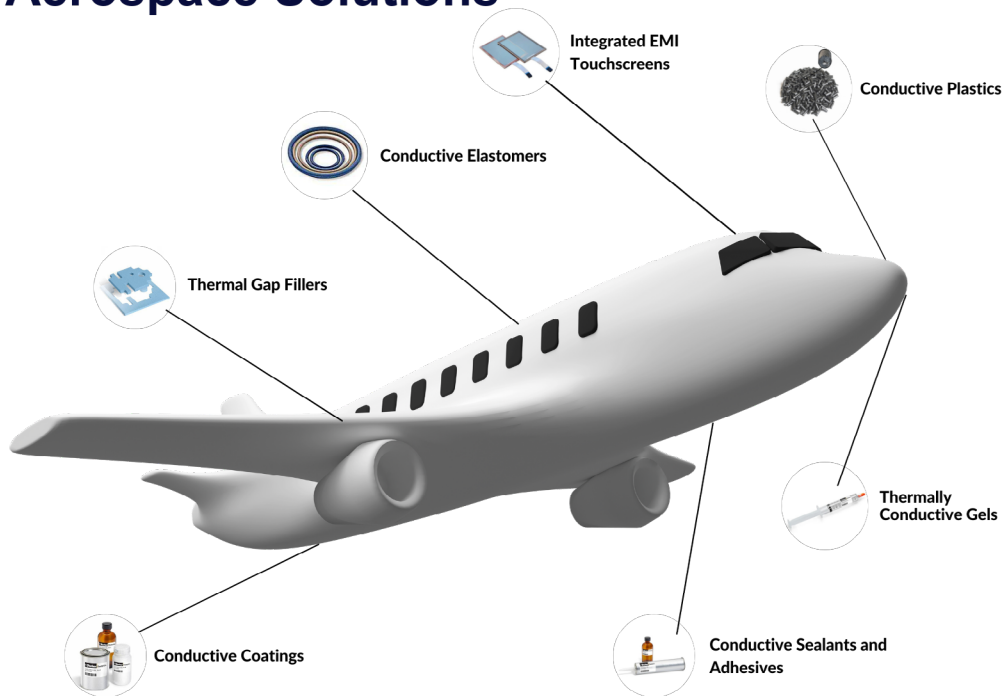


Aerospace and Defense

The core markets that Parker Chomerics serves is the aerospace and defense industries. The integrated systems solutions allow for a one stop shop, so to speak, with your budget in mind. Parker Chomerics understands that the highest performance standards must be achieved while holding closely to costs, so they've designed solutions that check all the boxes. You'll find their products in a variety of use cases including, but not limited to:

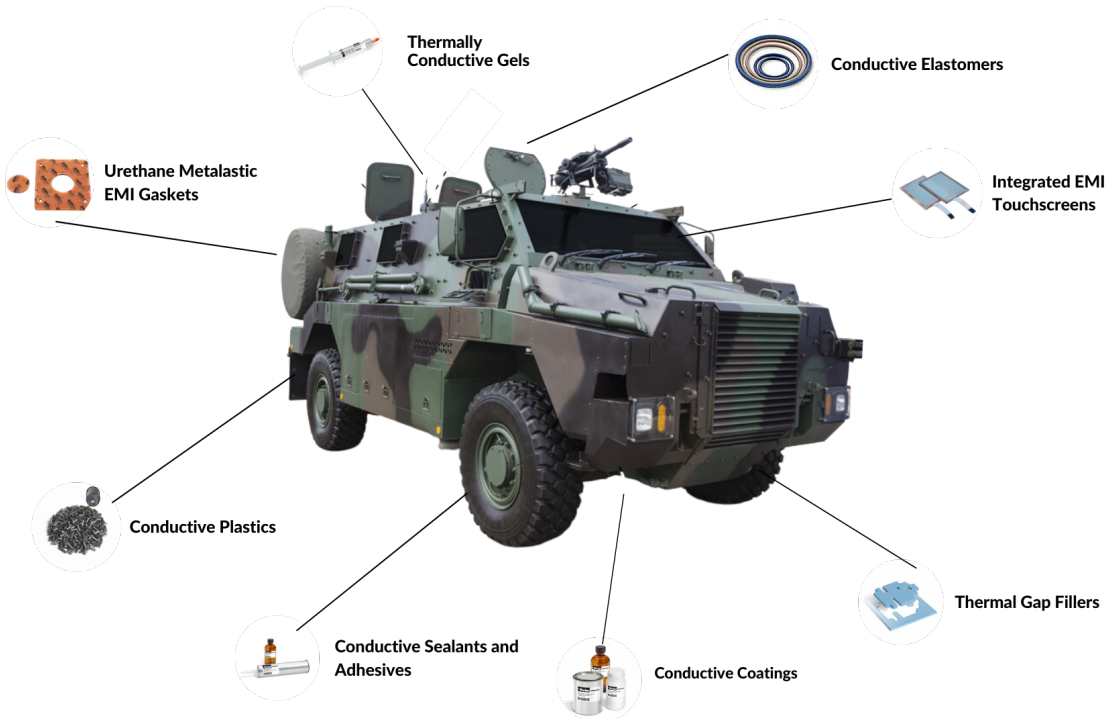
- Onboard navigation systems
- Control modules
- Radar systems
- Communications systems
- Weapon mounts

Aerospace Solutions





Defense Solutions

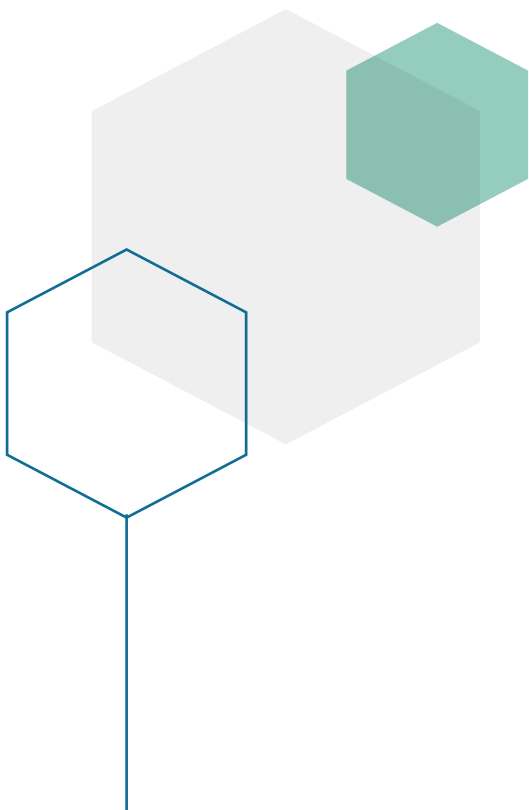
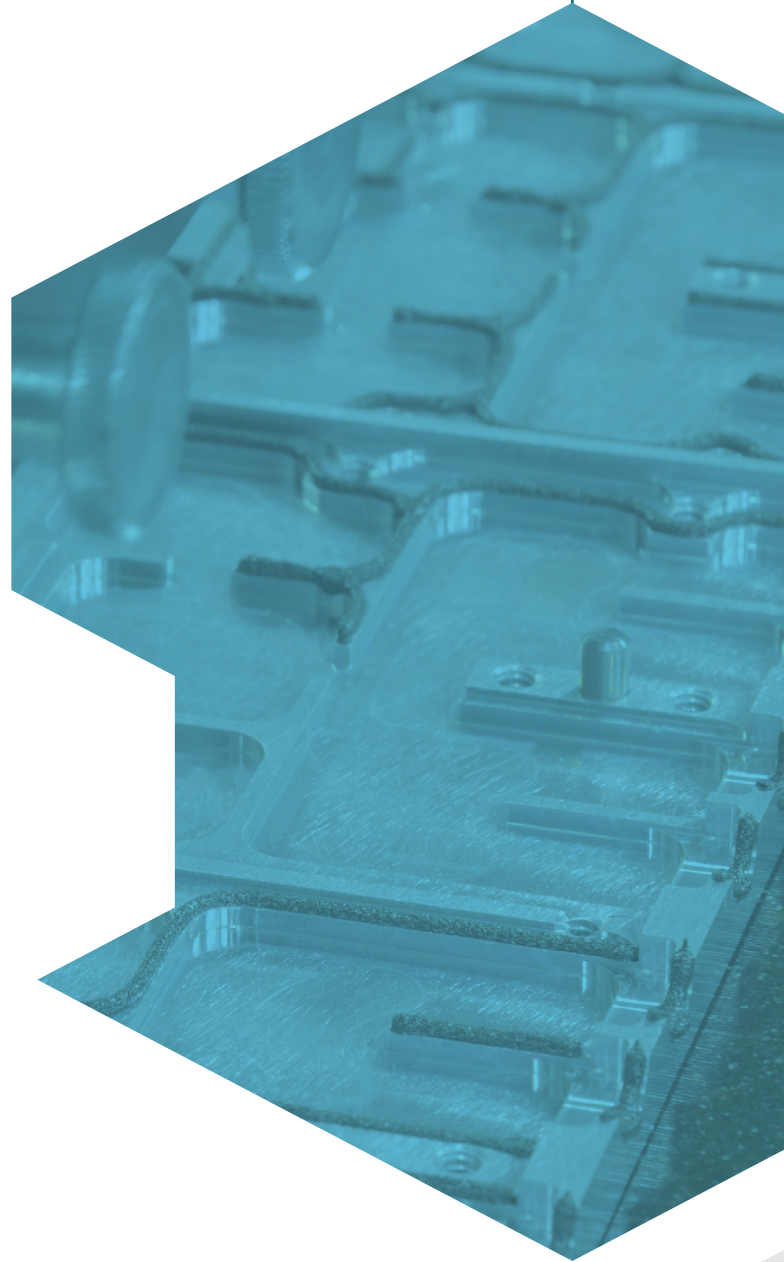


Building a 10 Year Strategic Relationship

[READ CASE STUDY >](#)

Chapter 5

How to Select the Right EMI Shielding Gasket Manufacturer





There are plenty of shops that will tell you they can handle your project. “No problem” they’ll say. Here’s the thing about EMI shielding gasket manufacturers: we’re not all the same. So how do you know your project is in the right hands? Here are several questions you can ask them (and yourself) to make sure that your gasket will be crafted with speed and precision.

Do they use the best EMI shielding materials?

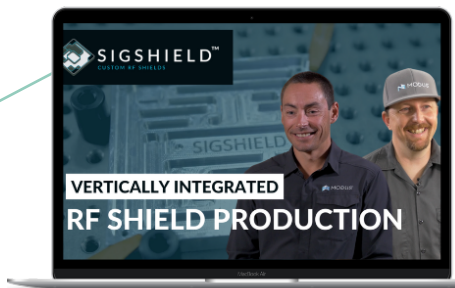
Safe to say that we’re big fans of Parker Chomerics, but there are plenty of other great brands that may be a good fit for your part. Open communication between you and your potential manufacturing partner will ensure that you understand what the benefits and drawbacks of each potential material are.

(And if they don’t use the best materials, swipe left.)

Are they certified?

While there aren’t any certifications required by law, there are several important ones that manufacturers should have and abide by. No matter the industry, you’ll want to ensure that your chosen partner has, at the very least, the [ISO 9001 certification](#). If you’re in the aerospace, defense, or other similar industry, you’ll want to look for the AS9100 certification as well.

We’re proud to carry both. You can see our certificate of [registration here](#).



Learn how Modus is redefining the RF Shield production and procurement process.

WATCH THE VIDEO >



Do they understand DfM?

If you need to explain what DfM means to them, you might want to keep searching for the right partner. The [design for manufacturability](#) process will ensure that your chosen partner knows how to iterate on design with you to suggest optimal design features and material choices to ensure your product performs as intended and meets your budget needs. A good partner may even be able to save you some money.

Quality is king.

How do you assess quality in a gasket manufacturer? Just ask them. But when you ask, really listen to their answer. They should be excited to talk about it. They should have defined quality management practices, a [robust quality system](#), and a well-staffed quality management team.

Are they vertically integrated?

What else can your chosen manufacturing partner do? If all they have on deck is your EMI shielding gasket, you may want to consider finding a partner that has other skills up their sleeves. Not only does this potentially save you money by reducing the amount of traveling your part has to do, but it also allows your vendor to help in the decision-making process as they understand the end goal much better than a singular vendor would.

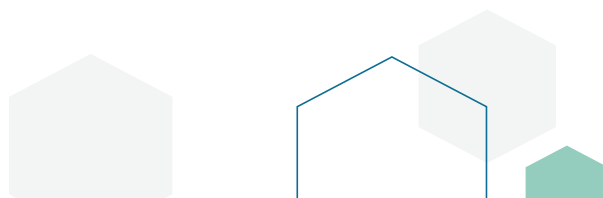
Assess their security measures.

If you're in an industry that is sensitive to bad actors, you need a manufacturing partner that is ready to go to bat for you. Okay, maybe not literally, but your partner needs to have the security features in place to protect your device from evil doers who are looking to get their hands on your device designs and specs.

Ask them if they follow the [Cybersecurity Maturity Model Certification](#) practices. Ask them to walk you through their security measures, and if something doesn't sound as secure as it should be, it's time to look elsewhere.

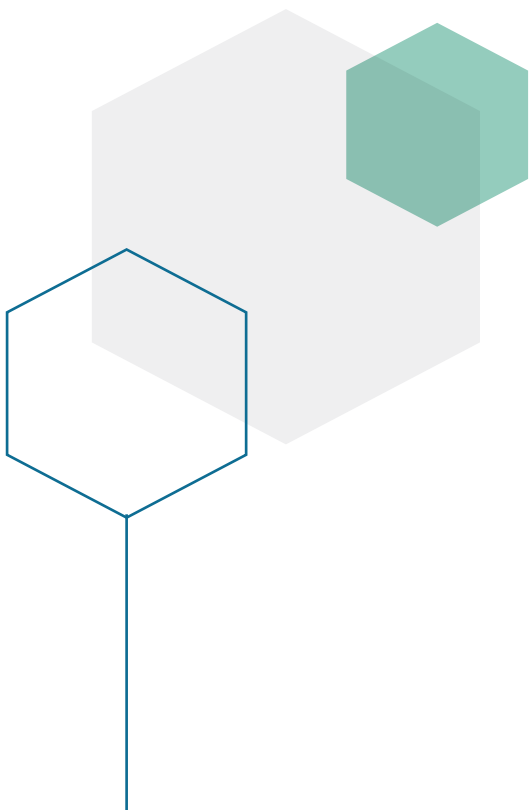
These considerations aren't outlined to scare you away from any one particular manufacturer, but they have hopefully given you a place to start in determining who might be a good fit.

At Modus, we're in it for the long haul. We're eager to work with partners where we can build a long-standing relationship founded on trust and rad projects. That's the kind of partnership you deserve.



Chapter 6

Choose Parker Chomerics
EMI Shielding Materials



Chapter 6 | Choose Parker Chomerics



Understanding what EMI shielding solution to use in your specific application can be a complex decision with a lot of moving parts. We get it, and that's why we're here to help. We have extensive knowledge in the entire suite of Parker Chomerics EMI shielding materials and we're ready to put it to work for you.

Whether you're designing EMI shielding for the aerospace and defense, medical device, or emerging technologies industries, Modus Advanced is eager to work in lock step with you to bring your life-saving and life-changing device to market with speed and precision – the Modus way.

Your mission is our mission. [Contact us](#) today.



Vertical Integration Alleviates Production Delays

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