



# HOW TO SELECT THE RIGHT TYPE OF EMI FILTER FOR HARSH ENVIRONMENT OPERATION



# HOW TO SELECT THE RIGHT TYPE OF EMI FILTER FOR HARSH ENVIRONMENT OPERATION

---



## ***EMI Filter Inserts Offer Advantages Traditional Filters Can't Match***

*A failed MIL-461 compliance test – it's arguably the most crucial time in the development of any product. After days, months, maybe even years of design and production...the product fails to meet compliance standards and you're forced to hit the pause button on all product support, such as marketing campaigns and launch planning. Do you head back to the drawing board and redesign?*

*More often than not, the problem can be solved by utilizing a filter. But what kind of filter? That is the million-dollar question that has troubled designers of defense products for ages.*

*By and large, your decision comes down to a traditional filter or an EMI filter insert. So let's examine what you need to get out of that filter to help us draw a conclusion.*



## WILL THE FILTER FIT?

Inside of any electronic device, space is always at a premium. So whether we are talking about packing more computing power into a laptop or fitting all of the necessary navigation equipment into the dash of a humvee, maximizing the use of space is a top priority.



**Traditional Filtered Connectors** are typically large, bulky devices that require a fair amount of room for installation. Making on-the-fly changes to accommodate such an addition within your product's space limitations can be a challenge – if not entirely impossible. Additionally, the weight limitations of your product would also have to be considered at this stage of the game.



**EMI Filter Inserts** are thin and virtually invisible once installed. The silicone rubber materials utilized in the construction of the insert yield a lightweight solution, adding minimal mass to your product. As the custom circuit is embedded directly into this silicone rubber packaging technology, it can be placed inside of the connector of your existing product, ensuring it won't impact the environmental qualification of an aircraft box.

## DOES THE ADDITION OF YOUR FILTER COMPROMISE PERFORMANCE?

Whether redesigning your product or adding a simple retrofit, the end result must yield a product that performs equal to the original. Additionally, if your product operates in harsh environments, the addition of the filter must not compromise the integrity of the rugged design originally intended.

As mentioned above, traditional filters – in-line or filtered connectors – are often big and bulky. As such, they will add additional mass to your device. There are three common byproducts of adding mass at this stage of product development:

1. To pass shock and vibration testing, a special mounting scheme may need to be designed and implemented.
2. The product's center of gravity may change, leading to re-testing for vibration, crash-safety, operational and non-operational shock.
3. Implementing a new mounting scheme can be challenging during production, requiring alterations to build and sequencing.

Opting for an EMI filter insert adds minimal mass, keeping your product's center of gravity intact. As it's protected inside the connector, it's simple to meet MIL-STD-1344 shock and vibration standards with no re-testing required.

## DOES YOUR PRODUCT STILL WORK?

When you find yourself in the unenviable position of troubleshooting a product that failed an EMI test, you can sometimes get tunnel vision, working tirelessly to pass standards such as MIL-461 – but the device still needs to work! Ideally when adding a filter, the goal is for nothing to change, other than reducing or eliminating the EMI.

When adding a traditional filter to the interior of a product, it can alter the airflow patterns inside of the box. Such changes can affect performance while also leading to mandatory re-testing to prove compliance with the requirements for operating temperature and temperature variation.

EMI filter inserts are typically installed on the exterior of the box, inside one of the incoming or outgoing connectors. This placement ensures that there are no changes in air flow, which prevents issues that would negatively

impact performance. With no major change in design and performance, there would be no need to repeat MIL-STD-810 temperature and temperature variation tests (or even altitude and overpressure tests).

### CAN YOU KEEP YOUR PROJECT ON-SCHEDULE AND ON-BUDGET?

By the time you reach compliance testing, you're likely near the end of your project schedule and have little room for delays and added costs. Thus, you're looking for the fastest, simplest, least-costly solution that works.

Traditional filters samples can have lead times of more than 20 weeks. Once the filter arrives, it needs to be re-fit into the product, stabilized, and secured.

Finally, the compliance testing portion would have to start all over again, a new appointment would have to be booked, and all the appropriate company personnel would again have to be flown to the testing location.

In most cases, an EMI filter insert sample can be designed, manufactured, shipped, and in your hands in

short-order. The fully customized insert could very well arrive in time to retest before the team heads home to your company headquarters - and often at half the cost of a traditional filter.

### CONCLUSION

Both traditional filters and EMI filter inserts will work – and work well. But when making the choice between the two, you're looking for advantages inherent to one that aren't offered by the other.

An EMI filter insert will fit right into your host connector, so no redesign is necessary. It will withstand even the harshest environments and provide an additional layer of environmental seal to your connector. A filter insert will not alter your product's functionality, ensuring a device that worked before will continue to work now. And an EMI filter insert is a cheaper alternative that can be in your hands in just a day or two, not weeks or months from now.

No one wants to fail a MIL-461 compliance test – but if your product does fail, then your filter choice could be the difference between your product's success or failure.

[Click here to request a FREE EESeal® sample ►](#)

