

## 5 Important Factors to Consider When Specifying Connectors

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During the product development process – the design phase, specifically – you’ll need to answer an important question about a rather mundane item. That question being, “What connector should I specify?” The major factors influencing your answer will of course be the current you need to carry and the number of circuits you need to pass through that connector.

But as any experienced engineer knows, this is just the beginning.

Other factors – related to cost and availability, production environment, the operating environment your equipment will be placed into, even aesthetics and marketing – will also influence your connector decision. Here then, is a rundown on five important factors to consider when specifying connectors.

- 1. Connector size** – After determining the amount of current and number of circuits your product will need, the next task is to zero in on the optimum connector size. Optimum being the size that offers you the best performance at the lowest price. Price-wise it’s always best if you can go with a standard size connector. That’s where you’ll find the biggest supply and most options to choose from. Plus, you’ll have shorter lead times and you won’t have to worry about “non-cancellable, nonreturnable” policies. Another reason to stick with a standard size is that as you move up or down in size (especially down to the micro level) connector costs will go up.

Then again, if your product calls for a large wiring gauge, a large number of contacts, if it’s running a large amperage, or some combination thereof...you may have no choice but to specify a less popular size connector. Here at Heilind we can help you make the right choices and get the best value in any connector size you choose.

- 2. Connector IP Rating** – Basically, you have two choices, IP67 or IP68. IP67 is typically referred to as the “splashproof” connector. You can temporarily immerse it in water without any problems. IP68 is what most people call the “waterproof” connector. An IP68 can be immersed in water a good long time and still work just fine.

IP67 is the least expensive of the two and with a lot more product on the market you’ll have more options. So you definitely want to specify IP67 if you can. On the other hand, if you know your product is going to be exposed to wet conditions for extended intervals you’ll obviously want to specify IP68. In most cases you’re going to know the typical operating environment for your product and can choose accordingly. In some instances though, it may not be so cut-and-dried, in which case you’ll have to make a judgment call between the two.

- 3. Connector Mounting Style** – For mounting styles you have three choices: wire-to-wire, wire-to-board and wire-to-bulkhead. I know I'm repeating myself but...the more you can stay with the most popular mounting style, the more options and availability you'll have and the lower your costs will be. In this case, wire-to-wire is, by far, the most popular mounting style.

Here at Heilind though, we well understand that for some applications a wire-to-wire mounting won't work. For example, if your PC board is going to mount to a chassis you're going to have to use a wire-to-board connector. Whatever the application, we'll help you identify the best connector for the job.

- 4. Connector Locking Style** – As with mounting styles, you have three choices when it comes to connector locking styles. Those choices are latchlock, bayonet and threaded – listed in order from low to high in terms of price and ruggedness.

For example, the latchlock style is a mated connector that locks when pushed together. While the latchlock connector is your least expensive choice it's possible that if it snags on something and gets a good yank it could come loose. The bayonet style connector locks with a push *and* a turn so there's much less chance of a disconnect with it. And with the threaded locking style one end threads into the other making it the most rugged and durable of the bunch. Also the most expensive.

As a rule, if your product is going to be in an enclosed, predictable, non-sterile environment – such as in a home electronics device or motor vehicle – the latchlock style will work just fine. On those products that will be outdoors 24/7 or in an industrial setting where a hosing-down is part of routine maintenance and cleaning you'll probably want to specify an IP68 sealed connector. With the bayonet style, there's really not that much out there and it's really not that popular.

- 5. Plastic or Metal Connector** – If you can go plastic, you should go plastic. There's a lot more product out there, there are a lot more options, and obviously it's a lot more cost-effective. On the other hand, if your equipment will be in a harsh environment, if as a rule it will get rough handling – be driven over for example, or used in military maneuvers – or if your product is expected to have a long lifecycle, then you want to specify a metal connector.

There's one more reason to specify metal that has nothing to do with exposure to the elements or ruggedness. That reason is the aesthetics related to the marketing of your product. Say for example you're making a medical device that will sell for \$60,000. It's going to be kept indoors. It's going to be treated delicately. A plastic connector would suit it just fine. Functionally, a metal connector is overkill; but it's not overkill for the

marketing of the device.

“What connector should I specify?” It’s an important question because, for the most part, once you answer it you don’t get a “do over.” There are no drop-in replacements. Once you decide on what connector series to specify you’re locked in.

You won’t be able to say, “Well, I can’t get it, so I’m going to use this manufacturer and just swap it out.” You have to change both sides of the connector. So if you don’t make the right decision upfront you have to go back in and change everything. These five factors may not cover every consideration but if you get these five right you’ll be well on your way to making the right choice.

At Heilind we know connectors. And along with maintaining one of the largest connector inventories on the planet...we have some of the most experienced and knowledgeable connector specialists you’ll find anywhere. We maintain and and we’ll help you make the right decision

The bottom line of why all these decisions are so important is that, for the most part, once you define, on a connector, there are not drop-in replacements. The connector series you're picking, you're not going to be able to go, "Well, I can't get it, so I'm going to use this guy and just swap it out." Unless you're using a military 30H999, (?) which isn't really in that world, you could swap out 30H999 because it's an industry standard for the military. For what I'm talking about, it's not really any of that. You can't, some standards like DeviceNet and MH and M12s, but for the most part, what you pick is going to be what you have to live with. You're going to end up picking one manufacturer and a part number that you're going to have to use. So it's kind of important that you make the right choice!costs, you may put a metal connector on there because ... if you're paying \$50-\$60 grand for a piece of equipment, it doesn't seem right that you would have a \$2.00 connector on there that could be absolutely fine and work great forever, but to see a sealed metal nice connector on there would probably make you feel better! That's an example of why someone might do it. It might be overkill for the application but it's not overkill for the marketing of the product.

6. In today's post, I give you my perspective on five factors to consider when specifying the humble, hard-working connector

One of the first decisions you have to make in the design process is the size of your connector. how big of a connector do you have room for. What you want is the optimum size when all issues are

taken on the whole – are equally important in determining what connector to specify. related to cost, production and the operating environment the equipment will be placed into and operational though, that taken Once you've made these determinations the next step is to consider those factors production and operating