

Living in a material world...How to decide which material type is best suited to the enclosures for your application.

A quick online search for electrical enclosures shows just how many options and variations there are on today's market;there is a myriad of apparent choices for material and each seems to offer unique benefits and features.It can be hard to pin down the enclosure type that is best for your application, both in terms of performance and cost,so what are the key considerations when specifying an enclosure'sconstruction material; and how can you be sure that the products you choose will meet the application's requirements?

Chris Lloyd, Managing Director for Spelsberg els UK Ltd, explains the choices available.

What are your choices?

The term 'electrical enclosure' is incredibly broad. It can cover a vast spectrum of possible applications and requirements; from a small junction box that protects a terminal block located in the ceiling of an air conditioned office; to a large electrical housing unit that is protecting vital PLCs in a hazardous industrial application. To complement the scope of possible applications, there is a massive availability of choice in terms of materials when specifying an enclosure. Initially this can seem daunting; but with the correct guidance it is quick and simple to find an enclosure that is suitable for almost any job.

What may appear to be the first and most fundamental choice, metal vs. plastic, is also possibly the simplest. While metal enclosures certainly have their place when it comes to applications that require extremely high impact resistance or explosion protection; most applications require a combination of Ingress Protection, Ease of Installation, Cable Retention, Impact Protection, UV Protection, Cost Effectiveness and Aesthetics. With these considerations in mind, the options afforded by the plastic variations on the market are where most choices will come from today.

Assuming that your application is included with the majority that is best suited to a plastic enclosure, the next step is to choose the material type. It is at this stage that decisions become more personal and it is important to understand the different strengths and characteristics of each option.

Of the choices available, the four most common that best cover the range of protection requirements are PVC – a cheaper option, that is often used for low-end, small junction boxes; Polystyrene – suitable for most internal applications with medium impact requirements and up to IP68 ingress protection; Polycarbonate – a tough material that can withstand substantial knocks, offers UV protection and up to IP68 ingress protection; and GRP (glass reinforced polyester) – an very robust material that is suited to extremely harsh industrial environments and can be manufactured with UV stabilisers for outdoor use.

PVC – Does budget have its place?

Due to its low cost of production and the ease to which it can be worked, PVC is one of the most widely produced plastics in the world. It is found towards the budget end of the enclosure spectrum and is typically used in smaller junction boxes which are used to house terminal blocks and connectors. PVC enclosures are extremely cheap, which is often appealing to contractors who are conscious of budgets. However, it has one drawback that means that Spelsberg has chosen not to carry any PVC products in its range.

PVC, or polyvinyl chloride, contains chlorine, one of a group of elements known as halogens which, when they burn, release highly toxic dioxins –a type of chemical that is known to increase the likelihood of cancer as well as reproductive, developmental and immune problems. These dioxins can slowly bleed into the atmosphere as the PVC breaks down from exposure to UV light; they are also released when exposed to fire.

While EU legislation has long banned a number of halogens (such as PBB and PBDE) it is yet to clamp down on PVC. Spelsberg is one of a growing list of companies that has taken the decision to remain PVC free, opting to use completely halogen free plastics such as polystyrene, polycarbonate and GRP.

Polystyrene Vs. Polycarbonate?

For the majority of applications, the choice comes down to polystyrene or polycarbonate. Both materials are completely free of harmful halogens and, while polystyrene is typically the least expensive material, both are strong enough to withstand knocks, and provide high cable retention and IP68 protection when used in conjunction with suitable cable glands or a gelling compound. They can both be easily worked to produce aesthetic enclosures and most cable entry options can be accommodated – Spelsberg are also able to offer a recessed lid on some enclosures to allow for the flush placement of a membrane keypad.

The similarities end, however, when compared against each other in certain application environments. Installed internally in a washdown environment, both materials would be capable of providing long-term protection from water ingress. However placed externally, a polystyrene enclosure would show signs of being exposed to UV long before the polycarbonate alternative showed any signs of UV exposure. This is because polycarbonate offers a far higher level of UV protection which makes it the ideal material for external applications, or applications exposed to direct sunlight.

Polycarbonate also has far greater resistance to high, or fluctuating, operating temperatures. For applications where an enclosure is to be used as a drive controls housing, for example, polycarbonate would be the most suitable option.

Polycarbonate also has a higher impact resistance when compared to Polystyrene making it more suitable for applications such as on vehicles i.e. Road Tankers.

Tough industrial protection?

In some applications, especially industrial environments, enclosures need to be able to withstand more than submersion in water, exposure to sunlight and occasional knocks. They may be subjected to corrosive environments (such as sea air) or chemicals (such as cleaning agents), vibrations and extreme temperatures.

GRP constructed enclosures are for used in industrial environments where extremely high levels of protection are required. Offering a high level of rigidity at minimal thickness, equating to increased protection from impact in a lightweight, aesthetic design; GRP enclosures provide effective corrosion resistance for electrical and electronic controls in the harsh environments that are typical of many industries, such as marine, offshore, petrochemical, paper and water treatment.

Conclusion

There is an extremely wide range of possible applications and environments in which an electrical enclosure may be necessary; each presents different challenges and different environments from which to provide protection. This is why manufacturers, such as Spelsberg, have invested so heavily in developing different material technologies. The intention is to make sure that each customer can specify an enclosure that is cost effective and ideally suited to the environment in which it will be placed.

Of course the list of materials mentioned is by no means exhaustive; they have been selected as a representative group that demonstrates how, beneath a similar surface, there can be stark contrasts between performance capabilities. There are many highly specialised materials, that have not been mentioned, that are designed for extreme environments and offer protection levels beyond the capabilities of the materials listed above, but these are only necessary for a minority of specialty applications.

As with all electrical equipment, it is important that you consult an expert such as Spelsberg before specifying enclosures for your application. All reputable manufacturers and distributors should provide easy access to a sales force for technical support that can answer questions on halogens, resistance capabilities and material comparisons.

Photo Captions

Picture 1: Flame Testing for Enclosures.

Picture 2: Example of membrane keypads/overlay designs on enclosure cover.

Picture 3: Outdoor protection enclosures.

Picture 4: Range of materials for enclosures.

Picture 5: Tough GRP Enclosures.

“Space for you”

Spelsberg's company philosophy is based around the idea of providing flexibility and freedom to its customers. The space provided within each junction box; the large distribution and warehousing space; and the freedom to customise almost any product, irrespective of quantity, all equates to “Space for you”.

About Spelsberg

Spelsberg is one of the largest manufacturers of electrical enclosures in the world. With over 4,000 enclosures available as standard and further customisation possible, it offers solutions for almost any application.

With the largest supply of non-metallic enclosures, ex-stock in the UK, its products are often available for delivery within 24 hours; customisation is possible on any product, including bespoke entries, engraved corporate logos or fitted terminals, within 48 hours. Products can be ordered direct from Spelsberg or from most leading supply specialists including RS, Rapid, Farnell and CPC.

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