

When the heat is on...

Without proper consideration heat can easily build up inside electrical enclosures, triggering damage to the electrical and electronic components within. Additionally, such heat can also lead to pressure variances which in turn can draw in moisture and cause problems. Chris Lloyd, Spelsberg UK Managing Director, offers a common-sense overview of the main concerns and their resolution.

The air inside any enclosed space can heat up remarkably quickly. In an electrical enclosure this may shorten the working life of the equipment it contains. It can also lead to the formation of condensation, which could cause short circuits, rust and other problems. Further, in the case of an electrical equipment enclosure fitted with high performance seals, the internal pressure will fluctuate with the temperature. The potential for damage to the sensitive components within enclosures is, therefore, significant.

Naturally good engineers will try to design out such issues in their electrical installations. Simple measures, taken during design and installation, will alleviate many of the potential problems, for example:

- Site enclosures away from direct sunlight, heat sources, etc.
- Avoid locations where there are likely to be temperature fluctuations, such as in kitchens or near furnaces if possible.
- Steer clear of damp areas, waterside locations and places where steam or water splashes are possible.
- Do not overfill enclosures with electrical equipment; instead, make sure there is enough room to allow a free flow of air.
- Ensure there is enough space around the enclosure for air circulation.
- If an enclosure is to be wall-mounted, it may be appropriate to provide an airspace or heat sink between the wall and enclosure.
- Some electrical equipment will generate heat when in use. Account for this in equipment layouts with extra space. Place such parts near the top of the enclosure and, if appropriate, provide ventilation.
- Remember that lid seals will restrict ventilation and heat dissipation.
- Forced draught or even water-jacket cooling may be necessary in some cases.
- Talk to an expert from your enclosure supply company about thermal management issues. They will be able to do detailed calculations and recommend optimum solutions.

The materials used in the construction of an enclosure will have a significant effect of heat considerations. In short, metal enclosures are better at conducting heat than plastic ones; painted metal enclosures conduct less heat than bare metal. However, this does not simply mean that metal is a better option, because heat transfer can be into or out of the enclosure. It may be more accurate to say that plastic enclosures are better at resisting ambient temperature rises, while metal ones are good at dispersing internally generated heat.

The rate of heat dissipation of an enclosure is related to its surface area as well as its material of construction. However, because heat rises rather than falls, more heat escapes from the top of an enclosure than the bottom. Also, heat generating components are likely to create localised 'hot spots' at certain points on the enclosure's surface. Therefore, an accurate calculation of an enclosure's heat transfer capabilities is very involved, so most suppliers use standardised look-up tables, graphs or software to provide a fast route to an answer.

In many applications there is a need for one or more enclosures to be located outdoors, where they may be subjected to environmental conditions, weather, accidental damage, vandalism, etc. Extra seals and other protection including possibly building a shelter round the enclosure will help mitigate some of these issues, but may affect thermal regulation compared to an indoor installation.

Condensation

Obviously, condensation inside distribution boxes can reduce the reliability and safety of the electrical equipment. It's very easy to forget about condensation when specifying an enclosure, especially when a high IP rating has been specified. However, these are the enclosures where condensation can cause the biggest problems; if you use seals to keep moisture out, then they will also act to keep condensation in.

At Spelsberg we've addressed this with the new AK Air range. These enclosures have an integrated ventilation system which protects against ingress while allowing for pressure and temperature regulation – eliminating virtually all condensation formation.

Separate ventilation components are also available on the market, but need to be specified separately and fitted to standard enclosures. This leads to an increase in both cost and installation time and can also compromise the IP rating.

The AK Air provides guaranteed IP65 protection, making it suitable for most outdoor and industrial applications. It is constructed from tough, UV-resistant polycarbonate and features several mounting options, which do not compromise the integrity of the unit's sealing. Hinged, transparent doors provide easy access to the distribution boards, once installed and provide a well-finished aesthetic, suitable for high-quality installations.

In conclusion, we can say that heat dissipation and thermal management matters require attention when specifying or installing electrical enclosures. In many cases the applications requirements will be straightforward and easily addressed, but in a significant number of situations there will be issues that require some thought. A reputable enclosure supplier will be happy to work with you and bring their considerable technical knowledge and experience to bear.

Perhaps the final comment should be: spend a few extra minutes on your enclosure design and take into consideration the location environment and you may save a fortune in lost production further down the line.

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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