

Enclosure Maintenance

Enclosures Need TLC Too!



by David Crooks,
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As a manufacturer of enclosures used for protecting electrical and electronic components in hostile environments, we are sometimes called out into the field to assist a customer with a problem. When evaluating the field installation, we often find that the basic enclosure is fine, but some other factor has caused the problem. Sometimes the installation is not correct. For example, the improper installation of a liquid tight conduit fitting or cable gland can allow dust or water to enter the enclosure. Luckily problems such as these usually occur shortly after installation and are quickly resolved. However, what about the problem that manifests itself after months or years of successful operation? What has happened? What went wrong?

Think about it. We have our furnaces cleaned before every heating season, the oil changed in our cars every 3,000 miles, and, for ourselves, we have (or should have) routine physicals and check-ups. But when it comes to enclosures, it is “install and forget!” Perhaps that’s OK for an ideal situation but let’s examine what can happen in the real world.

Enclosure Maintenance: Typical Environments

Installed enclosures require periodic maintenance. The more hostile the environment, the greater the frequency of maintenance needed, and if done with vigilance, the greater the reward. Vibration, shock, or thermal expansion/contraction may loosen enclosure parts and fasteners. Constant flexing of conduit connections and stresses on liquid tight hubs may erode rubber fittings and seals. Routine inspections and periodic tightening of fasteners can prevent minor annoyances growing into major problems.

For outdoor enclosures, constant exposure to sunlight degrades protective paint finishes on metal or breaks down plastics such as unprotected fiberglass. While steps can be taken to minimize UV exposure, periodic maintenance will identify when replacement is warranted.

Whether installed indoors or outdoors, enclosure parts wear out! With moving parts, the protective plating or paint

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layer wears away with use. Ferrous metal parts, hinges, and hinge pins begin to rust. Locks, lock pawls, disconnect actuators and interlocks wear with use and cease moving smoothly. Inspection and lubrication of the electrical enclosure’s parts are necessary.

Enclosure Maintenance: Hostile Environments

In extremely hostile environments, e.g. wastewater treatment, the build up of “gunk” covering an enclosure can be significant. This “gunk” traps moisture and corrosive contaminants against the surface of the enclosure. Constant exposure to such chemical attack can significantly decrease the life of protective coatings and even damage tough, corrosion resistant NEMA 4X enclosures. These build-ups can alter the enclosure’s thermal characteristics resulting in overheated equipment. In this type of environment, a proactive intervention can return big dividends. (See Figure 1.)

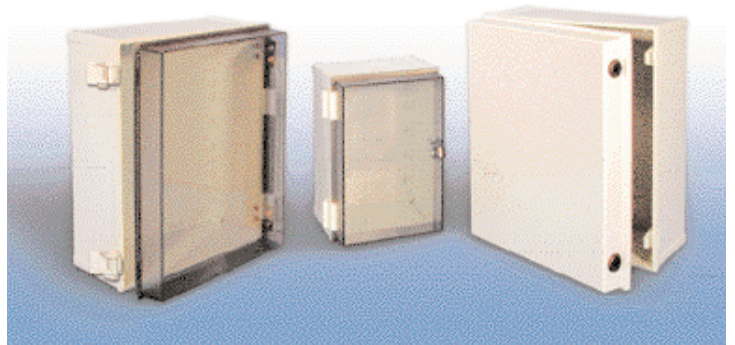


Figure 1. Fibox CAB Series NEMA 4X plastic enclosures molded of UV resistant polycarbonate.

Operator Error: No discussion of enclosure usage is complete without this observation. Enclosure performance is highly dependent on the user. Many of us have seen installed NEMA 4 enclosures with only 1 sealing clamp out of 4 in use. Or that screw cover enclosure without any cover screws. Or that NEMA 7 explosion proof enclosure that is missing a few cover-bolts. Be sure to replace missing parts and insist the enclosure be sealed properly.

Enclosures

Enclosure Maintenance



Figure 2. Eldon MAS Series NEMA 4/12 enclosure with powder paint finish, molded in place gasket and quarter turn latch.

In addition to the enclosure problems identified above, enclosures can be damaged other ways. Errant screwdrivers, wrenches and forklifts seem to scratch the paint finish within days of installation.

Immediate use of a manufacturer's "touch-up kit" would restore that damaged paint and extend the life of the installation. Sometimes that forklift does more than just scratch the surface. If so, a careful examination can reveal if the enclosure's environmental rating may be compromised.

Enclosure Maintenance: Manufacturers Reduce the Need

Over the last 15 years, dramatic changes in enclosure design, production and materials have occurred. Many of these changes have reduced the need for periodic enclosure maintenance. Let's examine what manufacturers have been doing to help and what the design engineer can look for when specifying his next enclosure.

Protective coatings: The development of recoatable powder paint finishes has revolutionized the industry. Whether smooth or textured, these extremely tough, durable, chemical resistant finishes virtually eliminated various categories of indoor/outdoor boxes and created the dual rated, indoor/outdoor, NEMA 4/12 enclosure. Powder coatings have reduced the need for specialty paints and primer only coated enclosures. The robotic application of powder paint ensures an even thickness of protective coating on all surfaces, inside and outside, of the enclosure. While paint "touch-up" kits are available, specifying a powder coated enclosure will greatly reduce the need to have one. (See Figure 2.)

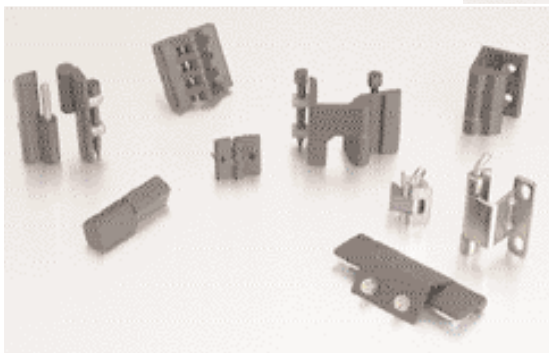


Figure 4. EMKA corrosion resistant hinges and hinge hardware.

Materials: Improvements in materials have reduced maintenance. While mild steel continues as the main material for metal enclosures, manufacturers are increasing the use of aluminum and more importantly, stainless steel for enclosures. These materials perform better in corrosive environments. Even better is plastic. Engineered plastics have come a long way. For example, high impact polycarbonates with UV inhibitors have always been superior performers, but are now even more resistant to sunlight exposure. Fiberglass formulations have been improved and are less UV susceptible. Hinges and hinge pins are made entirely of plastic. Cover screws are no longer metal, but plastic. Latches and locks have minimal metal components. Corrosion resistance has been maximized, which means maintenance has been minimized.

Gaskets: Gasket technology has leaped forward. Almost gone are the old hand applied, tape adhesive strip gaskets that always seemed to loosen, or leak at the splice point. In its place, are robotically applied, formed in place, polyurethane seamless gaskets. For injection molded



Figure 3. EMKA quarter turn locks and latches, which include NEMA 4 ratings, wide range of keying methods, plus many handle options.

enclosures, state-of-the-art manufacturers are moving to multiple component molding techniques in which TPE (thermoplastic elastomer) gasket material is actually molded concurrently with the molding of the enclosure.

Hardware: No more missing clamps and stripped screws.

Quarter turn locks and 3-point latches are replacing the old screw-down cover clamp. Many locks are permanently lubricated. (See Figure 3.)

Many manufacturers have replaced welded hinges with screw mounted cast hinges. These hinges are field replaceable, if needed, and also permit easy removal of a door for maintenance or field replacement. (See Figure 4.) Lastly, there has been a general upgrading of enclosure hardware. Rather than mild steel, stainless steel hinges, locks, screws, and hanger brackets are the norm (or should be) rather than the exception. Selecting an enclosure with these upgrades will minimize future required maintenance.

All of these advances have improved the durability of

Enclosure Maintenance

enclosures. Designing with enclosures that incorporate most, if not all, of these advances will improve the overall equipment design and reduce the need for ongoing maintenance. However, I stress the word reduce. Until we develop that perfect enclosure, a little tender loving care (TLC) for your installed enclosure base will reap valuable rewards.

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Figure 1. *Photo courtesy of Fibox Enclosures, Glen Burnie, MD*

Figure 2. *Photo courtesy of Eldon Enclosures, Drachten, Netherlands*

Figure 3. *Photo courtesy of EMKA Inc., Middletown, PA*

Figure 4. *Photo courtesy of EMKA Inc., Middletown, PA*

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