



Application Update

The Use of Glass Reinforced Polyester (GRP) in the Design and Manufacture of Electrical Equipment for Harsh and Hazardous Areas

The oil and gas industry, particularly the offshore sector, is a demanding environment, at the best of times, but when there are also explosive gases present then electrical products must be manufactured to the highest standards. The protection of these electrical products against harsh environmental conditions and their safe operation in hazardous areas is essential. Therefore, the choice of material for the enclosure of such products is critical!

Traditionally, electrical products such as warning beacons, sirens, horns and loudspeakers have been manufactured in cast aluminium alloy and stainless steel. These metal enclosures are utilised because, until recently, only metal was considered to have the strength to withstand the explosion proof testing required by the safety authorities to allow a product to be certified for operation in a hazardous environment.

Metal products require accurate and extensive machining and painting and are expensive to produce. They are also subject to corrosion. When in operation the flanges or flame paths of these products must be regularly inspected, since any corrosion of these areas can render the product *unsafe*.

To overcome the problems associated with metal enclosures, MEDC have developed a new range of products based on enclosures manufactured from GRP (**G**lass **R**einforced **P**olyester).

This range of GRP products includes:

- * **Warning Beacons**
- * **Horns**
- * **Loudspeakers**
- * **Manual Call Stations**

These products are:

- * **Lower cost**, in comparison to both alloy and, particularly, stainless steel based products.
- * **Corrosion Free***. Requiring little or no inspection or maintenance.

The combination of these two benefits results in a significant reduction in overall costs.



Products Manufactured by MEDC in GRP are:

- Light:** An explosion-proof enclosure manufactured in GRP will be similar in weight to an alloy one, but considerably lighter than stainless steel.
- Strong:** Correctly designed, an GRP explosion-proof enclosure will exhibit equivalent impact, vibration, shock and explosion resistance to a metal unit designed for the same application.
- Corrosion Free*:** GRP is virtually unaffected by exposure to outdoor environments and weathering.
- Low Cost:** Many details which require machining into metal components can be 'moulded in' when using GRP. The machining of flamepaths and seal faces can be eliminated in some instances.
- Low Maintenance:** With no corrosion to contend with, users can virtually 'fit and forget' GRP products. Metal equivalents need a strict inspection regime to check for corrosion, especially on flamepaths.
- UV Stable:** The material exhibits excellent resistance to degradation through exposure to ultra violet radiation. Tests and long term experience in the field show that a service life of *over 50 years can be expected*. Extensive independent verification carried out by BASEEFA shows that the material is suitable for use in explosion-proof Certified equipment. Tests were carried out in accordance with ISO 4892, ISO 179 and BSEN 50014.
- Fire Retardant:** In order to be suitable for use in industrial environments where there is risk of fire and to be suitable for use as a material for the construction of explosion-proof equipment GRP has to be fire retardant. The grades of material used by MEDC exhibit excellent fire retardancy properties, tested by BASEEFA in accordance with ISO 1210.
- Thermally Stable :** A problem with conventional thermoplastics such as nylon, ABS and PVC is that they become unstable when heated and can exhibit long term degradation when exposed to high/low temperatures. GRP is a thermoset material and as such is less prone to this type of instability. The grades of GRP which MEDC use are thoroughly tested in order to prove that they will perform under the most arduous temperature extremes for very long periods and not deteriorate over many years. Tests are carried out in accordance with IEC 216-1, 216-2, ISO178, ISO R527 and independently verified by BASEEFA.
- Chemical Resistant:** GRP is resistant to attack by most dilute acids, alkalis and chemicals. Concentrated acids and strong alkalis can affect the material as they affect metals.

NOTE: MEDC have spent over 10 years in the research, design and manufacture of GRP products suitable for use in Hazardous Atmospheres. The types and grades of GRP used are specific to MEDC. The information supplied therefore applies only to MEDC GRP products and not necessarily to GRP in general.

* Under normal operating conditions.