

Composites control corrosion costs and reduce handling problems

Steel, cast iron and concrete have traditionally been used in the construction industry for manhole and trench covers. However, a need to control corrosion and reduce weight for safer handling is driving their replacement by composites. Companies such as Fibrelite are expanding this market. *Reinforced Plastics* reports.

A major issue that faces ageing underground infrastructure and one of the principal factors related to the deterioration of infrastructure is corrosion.

The traditional materials used to make manhole covers and trench covers for underground infrastructure are steel, cast iron and concrete. All of these materials, including, to a lesser extent concrete, are subject to corrosion. When manhole covers or grates are used in areas with vehicular access, they must be capable of bearing heavy loads. Load bearing manhole covers or grates are typically constructed from cast iron. In particular, ductile cast iron (cast iron with added magnesium) has been used for manhole covers and frames since the 1950s for its durability, ductility and high compressive strength. The engineering community in particular engineers designing underground infrastructure, rarely considered any reason to use an alternative material than



Traditional materials for manhole covers are subject to corrosion.



Corroded covers can be a problem in areas that need to stand up to heavy loads and severe impacts.

cast iron for manhole covers or related products.

High costs of occupational injuries

As manhole and trench covers are used to access underground systems and piping, they are a key component in the infrastructure of water distribution and water treatment facilities as well as in industries that include electrical utilities, telecommunications and energy companies, for example. Given their prevalence in underground infrastructure, it is obvious that

manhole covers are handled frequently by individuals involved in maintaining such systems.

While cast iron manhole covers provide for a highly durable, strong product capable of standing up to heavy loads and severe impact, the weight of cast iron creates its own problems. When a manhole cover weighing that much is removed using traditional tools and lifting techniques, it has the potential to cause a multitude of injuries to the individual or individuals attempting to remove it. The types of injuries caused

by heavy castings are numerous and can be quite severe: lacerations, amputations of fingers and toes, broken bones, repeated muscle strains and sprain, wrenched backs and repetitive trauma caused by improper lifting techniques.

Corrosion resistant materials

As the underground systems currently installed are retrofitted or upgraded and new facilities are designed, engineers are moving towards specifying corrosion resistant materials in the place of steel, cast iron and concrete. This is particularly true in underground infrastructure that is located in areas that are more prone to corrosion (coastal regions or colder areas where salt is commonly used as a de-icing agent) or in infrastructure applications that store or convey water, wastewater or corrosive liquids. Such piping systems are common in the sewer and wastewater treatment industries as well as the petrochemical, pharmaceutical and pulp and paper industries.

GRP composites

Glass-reinforced plastic (GRP) products are now being widely used for applications where corrosion can destroy underground infrastructure. A prime reason for using GRP products is because of their inherent corrosion resistance. In many cases, they are the only materials that will handle a given service environment and in other cases their corrosion resistance is combined with their lower unit cost to make them the most economical acceptable solution (for example, when compared to high grade stainless steel). Corrosion resistance of GRP is a function of both the resin content and the specific resin used in the laminate. There are various resin systems available which provide long-term resistance to almost every chemical and temperature environment. Optimum corrosion resistance is achieved by the appropriate resin selection and laminate construction.

Covered trenches

In applications involving highly corrosive or environmentally damaging liquids, engineers

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