

MPPE Insulation and The Incredible Shrinking Medical Device

As the demand for portable medical devices increases both in the home and emerging markets abroad, design engineers find their solution for weight and space savings through innovative recyclable MPPE insulation for wire and cable.

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With rapidly advancing technology in the world today, there is a medical arms race to promote and expand healthy living and proper care in all regions of the world. Although the average levels of care can be drastically different, smaller and, thus, more portable medical devices help bridge the gap between developed and developing markets. Hospitals in the United States and similarly developed countries have become overwhelmed in a sea of beeping devices, displays, and wires, inundating both patients and caregivers. Leading advancements are trending towards decreasing the noise in such environments while simplifying the overall experience. At the opposite end of the spectrum, in emerging markets, the traditional doctor's or dentist's office might not be accessible by all, creating demand for devices' increase in portability.

With an aging population across the globe, the same devices found in hospitals are transitioning to the home, where the need for portability and ease of use is even greater. In a 2010 report published by the United Nations Department of Economic and Social Affairs, it is projected the world's population will increase to over 9 billion by 2050, with over 15% of the total population aged 60 and older. Coupled with the high costs associated with inpatient care, many with chronic conditions are finding this option more cost effective in addition to more convenient. With the inevitable shift in healthcare management into the patients' hands, it is imperative that devices shrink to become suitable for home use.

When designing an application to be smaller, it is often the smallest components, such as the wire and cable that tend to get overlooked. However, when the arms or the body of a device shrinks, the wire and cable needed to power it must shrink as well to obtain the required flexibility and motion. MPPE insulation is able to achieve this result through its inherently superior characteristics. How do you disrupt the low-cost PVC commonly found in medical devices, and the insulation powerhouse of the wire and cable industry? You make something smaller, lighter, and tougher.

MPPE, which stands for modified polyphenylene ether, is a thermoplastic that is inherently lighter and tougher than traditional PVC. Its superior dielectric properties allow for less insulation when used on wire and cable, resulting in reduced wall thickness. The material also carries a specific gravity of 1.03, which is 25% to 40% lower than other materials such as PVC, polyethylene, and cross-linked polyethylene. This, along with the reduced wall thickness, contributes to the weight savings of up to 40%. When paired with wire, MPPE insulation can result in a hook-up wire that is up to 45% smaller and 40% lighter, with 10x the abrasion resistance of standard PVC hook-up wire.

MPPE's capabilities are not only limited to hook-up wire. The insulation can be formulated and used across a wide variety of configurations, including multiconductor static and flexing cables. For example, Alpha Wire's EcoGen™ growing line of wire and cable, including EcoWire® and EcoFlex™, continues to utilize MPPE as insulation and jacket material to overhaul the "round gray stuff" most commonly found in the industry. MPPE's wide temperature range and high dielectric strength, combined with its flame resistance, allowed Underwriters Laboratories (UL) to approve of MPPE as a suitable insulation or jacket for over 100 AWM cable styles and a VW-1 flame rating. MPPE insulated wire and cable easily stand their ground against traditional PVC, with room to spare (literally).

Not only is MPPE revolutionary for its size and performance, but also for its recyclability. MPPE is 100% recyclable, the first of its kind in the wire and cable industry. The compound contains no halogens, phthalates or heavy metals, thus meeting RoHS and WEEE requirements for the elimination of hazardous substances and recyclability. This insulation is a pioneer in the industry in its ability to meet temperature, tensile, elongation, and flame retardant requirements for UL and CSA approvals, without using halogens or heavy metal additives.

More often than not, engineers are reluctant to change a component with higher performance in favor of a “greener” product because they fear they will lose other benefits in the process. However, with the recent changes in RoHS Directive (RoHS 2) in effect as of January 2, 2013 to now include medical devices and monitoring and control equipment, there is now a greater emphasis on medical device manufacturers to move towards a “greener” engineering philosophy. Traditional PVC insulation found in many medical devices contains harmful halogens such as fluorine and chlorine that emit toxic acids when disposed of at the end of its life cycle. When looking to decrease the size and weight of their products to meet demand, device manufacturers must now meet increased regulatory standards to successfully compete in the marketplace. As a result, the new Directive to eliminate use of such hazardous substances will undoubtedly have a significant impact on the traditional insulation mainstays of the market.

MPPE insulation has helped to disprove the myth that green products require a trade of decreased performance for environmental benefit. The use of this insulation will enable engineers to have confidence not only in meeting regulatory standards, but in improving the quality and performance of their product as well. The future of medical devices is moving towards a smaller and “greener” design, and MPPE insulation will help to pave the way.

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