

CR-6 Series Products Overview

Neomera™ Polyamide-6 Composite Sheets

Products in the Neomera™ CR-6 Series are polyamide-6 (PA-6) thermoplastic composite sheets containing chopped fiber reinforcement (glass, carbon, or hybrid).

Key Attributes and Benefits

The unique combination of performance attributes makes CR-6 Series products very attractive for high-volume manufacturing. The composite sheets are characterized by:

- excellent formability, critical for producing parts with complex three-dimensional shapes
- tailored flowability, advantageous for minimizing waste during processing
- high strength-to-weight ratio, enabling weight reduction
- isotropy, streamlining design considerations through achievable pseudo-isotropic mechanical properties
- recyclability, allowing users to address concerns regarding end-of-life of parts and to meet sustainability requirements.

Material Design Flexibility

CR-6 Series composites can be tailored for specific applications by controlling:

- fiber type (glass, carbon, basalt, aramid)
- fiber length (0.5 inch to 2.0 inch)
- fiber content (40% to 70%, by weight)
- fiber-matrix adhesion (which can be enhanced through proprietary sizing)
- fiber distribution and flowability (free from physical constraints existing in glass mat thermoplastic products).

JM Proprietary Technology

JM's expertise in glass fiber manufacturing, an in-depth understanding of fiber-polymer interfaces and constant monitoring of the trends in the composites market led to the development of a pioneering manufacturing technology to produce fully impregnated PA-6 organosheets.

The proprietary technology, covered by multiple U.S. and foreign patents, is versatile in terms of reinforcing materials and can be used to impregnate glass, carbon, aramid, and hybrid reinforcements.

Neomera™ PA-6 composite sheets are produced in a continuous process through the impregnation of fiber reinforcements with low viscosity caprolactam monomer, followed by the *in situ* anionic polymerization of caprolactam to form the thermoplastic polyamide-6 matrix.

Applications and Processing

Neomera™ CR-6 Series composites are suitable for a host of processing methods including hybrid molding processes (injection and compression), conventional compression molding, thermoforming, and stamping.

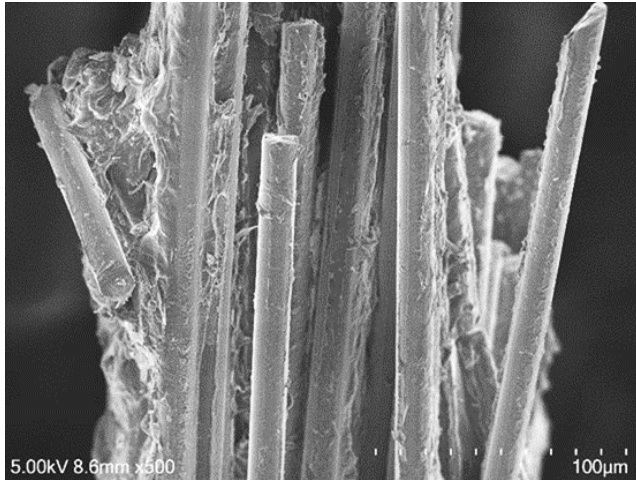


Examples of seat pan and seat back structures incorporating Neomera™ CR-6 Series composite sheets.

Advantages of Neomera™ CR-6 Series Organosheets over Other Thermoplastic Composite Sheets

The JM proprietary manufacturing technology provides excellent control over length and loading of fiber reinforcement. CR-6 Series composites are produced through impregnation and *in situ* polymerization of caprolactam, a very low viscosity monomer. This leads to:

- complete impregnation of reinforcing fibers
- void-free composites
- high molecular weight PA-6 resulting from anionic polymerization of caprolactam.



Fully impregnated Neomera™ CR-6 Series composite sheet

Additional Advantages for Glass Fiber Composites

JM's reactive glass product, StarRov® 886 roving, has the sizing chemistry tailored for promoting the polymerization of caprolactam. The reactive sites on glass fiber surfaces provide strong fiber-resin bonding, resulting in improved properties of the glass fiber PA-6 composites.

Samples

Johns Manville Composites in the CR-6 Series are semi-finished sheets. Samples are available upon request.

About JM

Johns Manville, a Berkshire Hathaway company (NYSE: BRK.A, BRK.B), is a leading manufacturer and marketer of premium-quality building and specialty products. In business since 1858, the Denver-based company has annual sales of over \$3 billion and holds leadership positions in all the key markets that it serves. Johns Manville employs 8,000 people and operates 46 manufacturing facilities in North America, Europe, and China.

Additional information can be found at www.jm.com.



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