ZNT Boost [TM] **Liquid**
Zyvex Nano-Engineered Additive

zyvex [TM]
technologies

Description

ZNT-Boost is a novel additive for high-performance composites designed to significantly improve durability and fracture toughness while maintaining or increasing stiffness and strength. Typical improvements can range from 50% to 100% depending on the resin system and application of the technology. ZNT-Boost liquid typically works best with high-performance epoxy systems that are liquid at room temperature and cure at elevated temperatures.

ZNT-Boost (Liquid) has been shown to work very well in amine cured epoxies with some cycloaliphatic amines such as, 4,4′-Methylenebis(cyclohexylamine) (Amnicure PACM) and aromatic amines like, diethyltoulene diamine (Ethacure 100-LC). However, it is not recommend for low performance and flexible curing agents such as polyetheramines. . For more flexible and lower performance epoxy applications, Zyvex Technologies is currently developing new technologies to address these systems.

ZNT-Boost provides improvements for current resin systems with a simple drop-in technology without requiring process, or epoxy/curing agent ratio changes. It is the simplest and most cost-effective path to nanomaterial integration. While other raw nanomaterials can greatly increase the viscosity of the material system, ZNT-Boost produces only a slight increase (10%) in viscosity.

Features

- Improves durability and toughness properties in a wide range of composites without degrading strength or modulus

- Cured carbon nanomaterial additive is non-reactive for a simple drop-in to current products

- Specifically created for existing applications, no process changes required

- Does not change formula ratios of material system

- No large increases in material system viscosity

Table 1 | Applications and Industries

Industries	Demonstrated Applications
Aerospace	Epoxies

Automotive	Poly/vinyl esters*
Energy	SMC*
Industrial	BMC
Marine	Many amine-cured epoxy systems
Sports	Most production processes
Other performance composite applications	

*Due to the presence of a tertiary amine on ZNT-Boost, the accelerator ratios may need to be changed for polyester and vinyl ester systems.

Material Characteristics

Table 2 | Materials Characteristics

Characteristic	ZNT boost
Color	Black
Nanomaterial	Multi-wall carbon nanotubes
Nanomaterial loading level in Boost	3.4- 4.0%
Appearance	Medium viscosity paste
Total Solids, weight %	≥99%
Shelf Life	24 months

Typical loading level[1]	2.5 -10 phr (parts per hundred) of resin
Specific gravity	1.09

[1]**Loading Level**: Contact Zyvex to determine the optimal loading level for your application.

Mixing Procedure

ZNT-Boost is easy to integrate into a wide range of host polymer systems. The following mixing procedure generally produces the best results. For additional mixing assistance, please contact Zyvex Technologies.

Procedure for Loading 10 phr Boost:

Preheat the ZNT-Boost and thermoset resin prior to mixing. Do not exceed 110°C. Transfer 1 lb ZNT-Boost into 10 lbs thermoset resin. Mix the contents at 20- 50 RPM using a dispersive stirrer blade for 10-15 minutes. After 10 to 15 minutes of mixing, the CNTs should be uniformly dispersed into the resin. Typically a 5% - 10% increase in viscosity will be observed when the ZNT-Boost is uniformly dispersed into the resin. Additional mixing times may be necessary if the viscosities of the host resins are greater than 10,000 cps. To incorporate ZNT-Boost into the resin formulations, NO CHANGES NEED TO BE MADE in your catalyzing procedure. However, due to a tertiary amine in the polymeric structure, if any accelerators are added to the resin formulation, the total amount may need to be decreased to compensate for the addition of Boost. In most cases, the mixing equipment used in catalyzing the resin can be used for mixing the Boost. For lower phr loading levels, simply reduce the ratios equally.

Additional notes:

Note 1: No adjustments need to be made in the quantities or type of curing agents. The stoichiometry and the application of the resin should remain unchanged even after adding ZNT-Boost.

Note 2: Loadings of 2.5 -10 phr will provide mechanical reinforcement. The loadings are calculated based on the resin part only.

Note 3: ZNT-Boost has a tendency to turn into a tacky solid when exposed to cold temperatures, such as during shipment. These effects can be removed by heating the tacky solid to 30°C or allowing the material to rise to room temperature.

Note 4: In some applications, gel times may be affected; therefore we advise processing a small sample to ensure that gel time is not adversely affected.

Note 5: Preheating ZNT-Boost is recommended for full dispersion. Do not exceed 110°C.

Safety Handling

Zyvex Technologies provides its customers with a product-specific Material Safety Data Sheet (MSDS) to cover potential health effects, safe handling and use information. Zyvex encourages its customers to review all relevant MSDS prior to use.

Disclaimer

Zyvex Technologies believes that the technical data provided is accurate as of the published date. Performance values are considered representative but are not intended as a specification.

Contact Zyvex

For United States quotes, orders and product information call toll free 877.Go.Zyvex (877.469.9839).

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