

Lit. T-12 (10/04)**Nanocomposites Using Nanomer® I.28E Nanoclay****General Information:**

Nanomer® I.28E nanoclay is a modified montmorillonite mineral which is formulated for anhydride-cured epoxy resins. When properly dispersed, Nanomer I.28E nanoclay creates a near-molecule blend commonly known as a nanocomposite. This new type of composite enhances strength and thermal properties, especially glass transition temperature (T_g). I.28E is supplied as a white powder which disperses to particles so thin they are nearly transparent in the resin system. For more information about Nanomer structure and dispersion mechanism consult Tech Data G-100.

Loading Levels:

Unlike conventional mineral fillers, Nanomers enhance performance at low loading, generally 10-25 phr. This unique feature allows for improved performance at minimal added weight.

Viscosity:

I.28E disperses into particles with a surface area of 750 sq. meters/gm. The interaction between particles and resin will increase viscosity. Table 1 gives typical viscosity data for low and high recommended loadings. The suspension will be permanent and will not “drop” over time.

TABLE 1

Resin	Curing Agent	Nanoclay (phr)	RPM 10	RPM 30	RPM 50
EPON®828	ECA® 100	0	740 cps	740 cps	740 cps
		10	1020 cps	970 cps	930 cps
		25	2700 cps	2080 cps	1900 cps

* Brookfield Model RV DV III, spindle # 3. All viscosities measured at 23°C.

If viscosity build-up is too high for your mixing equipment one option is to switch to grade I.22E. However, this grade forms only a semi-stable suspension. Consult Tech Data T-10 for information on this Nanomer grade.

Strength Properties:

Epoxy nanocomposites exhibit improved mechanical properties due to reinforcing effects. Generally, the magnitude of improvement is larger in the region above the T_g. Figure 1 presents the DMA for neat epoxy and the corresponding nanocomposite of 25 phr loading.

Glass Transition:

I.28E creates a new, more interlinked structure in epoxy matrices. This is most apparent in the T_g. Increases of 10 - 20°C are common. Although T_g increases with increased loading, most of the benefit is seen at the low end of the recommended range. A 10 phr loading usually produces 90% of the T_g improvement possible.

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Nanoclay Incorporation:

I.28E can be dispersed into the resin, curing agent or a combination of the two. Although it is easy to disperse, some simple guidelines must be followed. For detailed information consult Tech Date T-14.

Curing Accelerators:

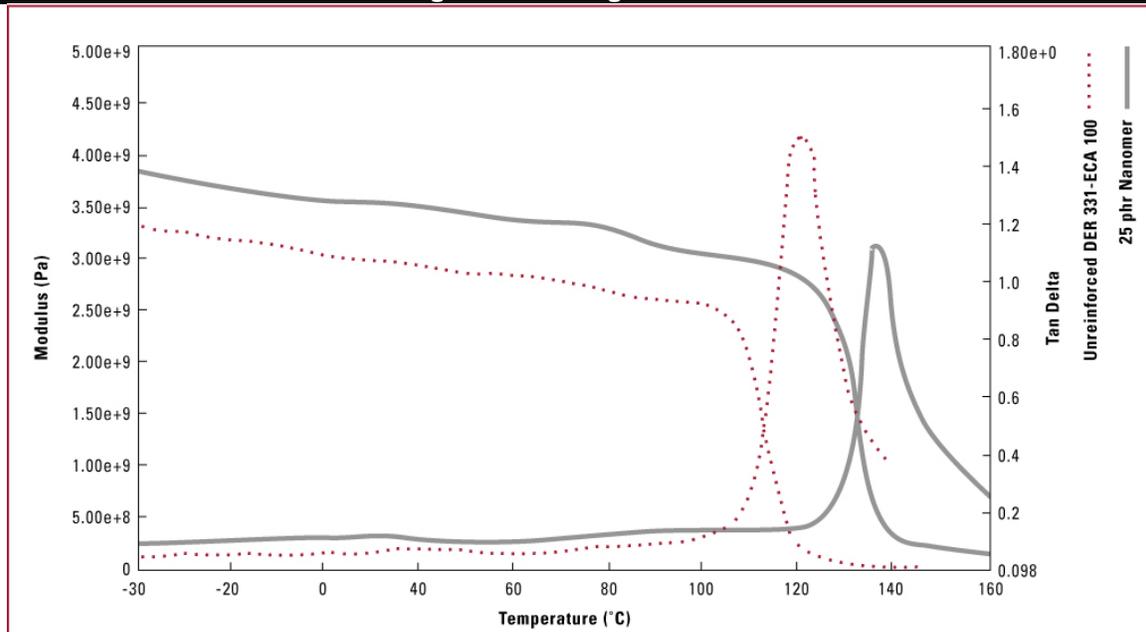
I.28E accelerates curing to a moderate extent. Usually no additional curing accelerates are needed. I.28E is compatible with most common accelerators, should you feel one is desirable.

PHYSICAL PROPERTIES

Appearance	White Powder
Mean Dry Particle Size (microns)	8-10
+ 325 Mesh Residue (%)	0.1
Specific Gravity	1.9
Bulk Density (pounds/ft ³)	26
(gm/cc)	0.42
Moisture (%)	3 max
Mineral Purity (% min)	98.5

Product Availability:

Nanomer I.28E is available in 20 kg (44 lb) polylined bags or fiber drums.

Figure 1 – Storage Modulus


For more information on how Nanomer® nanoclays can work for you, contact Nanocor's Technical Service Group.

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