

Unlocking the promise of Carbon Nanotubes  
(CNT) usage, economically!

## Technical Data Sheet

**ANTIS™ - EPO**  
**CONDUCTIVE CNT - EPOXY MASTERBATCH**

## DESCRIPTION

A multi-walled carbon nanotube (MWCNT) - epoxy system specifically designed as an additive for epoxy based static dissipative and electrically conductive applications.

## PRODUCT OVERVIEW

Delivery form : Viscous paste

Volume Resistivity :  $2\Omega\text{cm}$

Epoxy Carrier : Olin Epoxy Resin (Modified Bisphenol A Liquid Epoxy Resins) - D.E.R.<sup>TM</sup> 324  
[EEW based on solids(g/eq): 195 - 204]

MWCNT concentration : 1 wt.%

Cure system : Consult the resin manufacturer for recommended curing agents and conditions

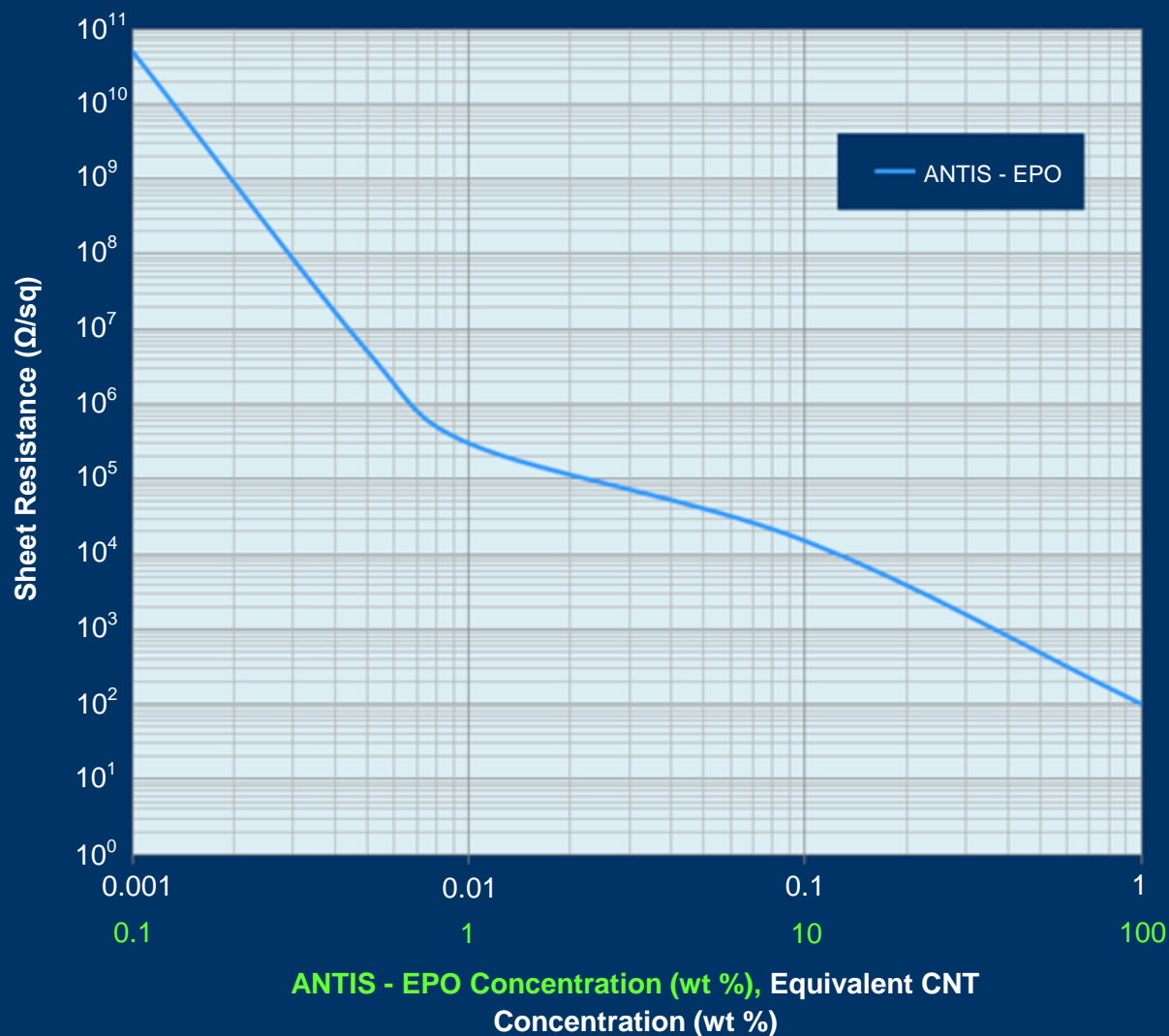
Specific Gravity : 1.14

Color : black

Carrier solvents/Diluents : none

When formulating to the Mohm/sq. regime ( $\geq 10^6 \Omega$  approx.), the carbon content is extremely low, Therefore, it is generally acceptable to treat ANTIS<sup>TM</sup> - EPO as D.E.R.<sup>TM</sup> 324 for stoichiometry calculations.

## SHEET RESISTANCE



*Volume resistivity measurements were conducted using a  $<100\mu\text{m}$  ( $<4$  mil) film prepared with ANTIS<sup>TM</sup>-EPO, EPON 828/D.E.R. 331, EPIKURE 3370 curing agent, without pigment. Volume resistivity may vary for different formulations, curing agents, film thicknesses and measurement conditions.*

The weight percentage of ANTIS<sup>TM</sup> - EPO is in the final compound, including Part B.

### EXAMPLE:

1 wt.% of ANTIS<sup>TM</sup> - EPO sample can be made using 1g of ANTIS<sup>TM</sup> - EPO and 99g of epoxy part A (e.g., EPON 828 or D.E.R. 331) and B (curing agent). The ratio of epoxy part A and B must be selected according to the supplier recommendation.

## APPLICATIONS

ESD/anti-static protection	Conductive inks
Coatings and paints	Adhesives
Flooring	Fiber-reinforced composites
Lightning strike protection	Corrosion protection
EMI/RFI protection	

## DILUTION GUIDELINES

Dilute ANTIS™ - EPO masterbatch in a clean, compatible container. The container volume should not be more than 3 to 4 times the total volume of mixed material. Accurate weighing of all material components using an appropriate scale is recommended for optimal product performance.

Use a mechanical mixer equipped with an appropriate mixing element (e.g., high shear dispersion blades) and blend until the mixture is homogeneous. The blade speed, temperature, and mixing time may need to be adjusted to obtain a consistent mixture. Check the mixing impeller blade and container walls and bottom for any ANTIS™ - EPO masses that remains undispersed in the host material (darker and more viscous masses than the mixture). Remove any undispersed masses from the container and mixing impeller surfaces and continue stirring until dispersion is complete. ***For optimum dispersion, Nanorial would recommend to use high shear mixing blades and mixing speeds around 1500rpm.***

If needed, a multi-stage dilution is recommended for concentrations less than 5 wt.% of ANTIS™ - EPO, to achieve the most favourable results in the final compound. In this case, first, dilute 1 - 5 wt.% of ANTIS™ - EPO in a sufficient amount of host resin and then top up and mix with the rest of the host resin. If needed, dispersing agents, which are recommended for carbon black, can be used to achieve optimum dispersion. Add other secondary additives, such as color pigments, as needed. After mixing is complete, a deaerating step is recommended to remove the air bubbles. Mix the solution at 100-200 rpm for up to 5 - 10 min. Add curing agent and mix the system until it is homogeneous and then vacuum the container, if possible.

Shelf life of the final mixture following dilution is viscosity dependent and should be determined by experimentally. For best results, dilute the masterbatch when ready to use and cure it immediately, if possible.

## **MEASURING THE RESISTANCE**

Measuring sheet resistance of static dissipative coatings ( $> 10^6$  ohm) usually involves very low currents. It is important to use highly sensitive measuring equipment, such as a Megohm meter with 5-lb resistance probes in compliance with ASTM F150, or a DC four-point probe analyzer with silver-painted electrodes in accordance with ANSI/ASTM D257. In both cases, the electrodes have much lower resistance than the sample and should not contaminate the sample (in the case of the silver-painted electrodes).

## **STANDARD PACKAGING**

1kg, 20 kg quantities, Non-permeable, plastic-lined container  
Larger quantities available

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