



DATA SHEET  
NYACOL® APE1540

## Nonaqueous Dispersion of Colloidal Antimony Pentoxide Flame Retardant Additive

### NYACOL® APE1540

Nyacol Nano Technologies, Inc. offers nonaqueous colloidal antimony pentoxide dispersions as synergists with halogenated flame retardants for use in unsaturated polyester and vinyl ester resins.

#### ADVANTAGES OVER CONVENTIONAL ANTIMONY TRIOXIDE SYSTEMS

- Greater surface area for faster halogen reactivity on burning.
- Less potential health hazards through dust-free handling.
- Much less wear on pumps, valves, and nozzles.
- More chemically resistant.
- Better penetration into the structure for improved dimensional consistency and no “spongy laminate” feel.
- Non-pigmenting for translucent composite or enhanced mass tone colors.

FORM: NYACOL APE1540 flame retardant additive is a dispersion of nano-sized (colloidal) antimony pentoxide particles in a liquid isophthalic polyester resin. The oxide particles are nearly 1/100 the size of powdered antimony trioxide.

FUNCTION: NYACOL APE1540 is a non-settling antimony dispersion for use as a flame-retardant synergist in halogen containing polyester and vinyl ester resins. APE1540 is used with room temperature cure systems using cobalt-MEKP type cure systems. APE1540 can be substituted for antimony trioxide in formulations involving any polyester or vinyl ester resin system containing bromine or chlorine. NYACOL APE1540 has been used in epoxy coating systems. Using antimony trioxide in critical corrosion resistant applications always results in totally opaque laminates.

NYACOL dispersions can enhance quality control. The fine particles are nearly invisible, allowing in-process and final inspection with the same degree of confidence as non-FR laminates. APE1540 can be added to the resin with simple stirring. It will not settle and concentrate at the bottom of the container. In filament winding operations, APE1540 assures more reliable operation without settling in the resin trough. Total labor cost savings in mixing and fabrication can be significant.

#### TYPICAL PROPERTIES:

	APE1540
Antimony pentoxide (Sb <sub>2</sub> O <sub>5</sub> ), % by weight	40
Unsaturated liquid polymer, % by weight	50
Specific gravity	1.70
Form	Viscous liquid



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**TUNNEL TEST DATA FOR NYACOL APE1540**

Below is a compilation of ASTM E-84 tunnel test data on specific FR corrosion-resistant polyester and vinyl ester resins. NYACOL APE1540, a 40% antimony pentoxide dispersion in a liquid polyester resin, was used in place of antimony trioxide powder.

Each supplier made special test panels under closely controlled conditions. Tunnel tests were performed at different testing laboratories. Because settling of antimony trioxide is eliminated when NYACOL APE1540 is used, potential differences in plant and lab conditions will be minimized.

	PERCENT APE1540	E-84 FLAME SPREAD		PERCENT APE1540	E-84 FLAME SPREAD
<i>ASHLAND INC.</i>			<i>Derakane® 510C-350</i>		
Hetron® 197AT-P	4	Class I	Derakane® 510C-350	2.5	Class II
Hetron® 92AT	3	Class I	Derakane® 510N	3.75	Class I
Hetron® 99P	3	Class I	Derakane® 510N	2.5	Class II
Hetron® FR-992	3	Class I	Derakane® 510N	3.75	Class I
<i>HETRON® 604T-20</i>			<i>INTERPLASTIC CORPORATION</i>		
Hetron® FR-693	4	Class I	CoREZYN® VE8441	7.5	Class I
<i>DOW CHEMICAL</i>			<i>CoREZYN® 16-AA-063</i>		
Derakane® 510A	2	Class I	CoREZYN® VE8440	7.5	Class I
<i>Derakane® 510B-700 PAT</i>			<i>REICHHOLD, INC.</i>		
Derakane® 510B-700 PAT	2	Class I	Dion® FR 7704	5	Class I
Derakane® 510B-700 PAT	2.5	Class I	Dion® FR 9300	4	Class I
			Dion® FR 6695	5	Class I
			Atlac® 711 05A	7.5	Class I
			Atlac® 711 05AS	7.5	Class I

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- ® Registered trademark of Dow Chemical
- ® Registered trademark of Interplastic Corporation
- ® Registered trademark of Reichhold, Inc.

**FORMULATING GUIDELINES FOR APE1540**

Many U.S. and Canadian manufacturers of halogenated polyester and vinyl ester resins have run tunnel tests (ASTM E-84) using NYACOL APE1540 with most of their popular corrosion-resistant FR resins. Nyacol Nano Technologies, Inc. publishes a regularly updated compilation of these test results, listing levels of NYACOL APE1540 and the achieved flame spread rating. The individual resin suppliers can verify this data.

In most cases the amount of antimony oxide added is less than 3 percent. Typical antimony trioxide levels are specified at between 3 percent and 5 percent. If you are working with a resin not listed by Nyacol Nano Technologies, Inc. but have a specific antimony trioxide recommendation, simply multiply by 2.5 to determine the



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level of NYACOL APE1540 to give an equivalent or better test result. A typical FR resin requires 3 phr of antimony trioxide for a class one rating. 7.5 phr of APE1540 will give equivalent FR performance.

NYACOL APE1540 provides superior reliability as a fire retardant synergist in corrosion-resistant laminate. This benefit results from the ease of dispersion and excellent suspension stability of the APE1540 in the resin, and the translucency of the laminate, allowing the detection and avoidance of air entrapment.

#### CURE OF POLYESTER RESINS CONTAINING NYACOL APE1540

Under normal process conditions, when a cobalt-promoted resin is catalyzed within 24 hours after the addition of APE1540, the cure is not affected significantly. However, most high reactive vinyl ester and polyester resins with low cobalt levels will require cure adjustment even without extended time between the APE1540 addition and the catalyzing of the resin. Some vinyl ester resins require double the amount of cobalt.

The effect on cure properties is dependent on the inherent reactivity of the resin, the cobalt concentrations, and the quantity of APE1540 added. Use of any of the following corrective procedures is effective in minimizing or eliminating the cure problem:

1. Keep the time between APE1540 and MEKP additions as short as possible.
2. With an unusually long time prior to MEKP addition, readjust the cure rate by adding more cobalt.
3. Formulate the cure system with higher level of cobalt.

#### PACKAGING

	APE1540
Container:	Plastic pail
Size:	5 gallons, 20 liters
Weight:	60 pounds net, 27 kg. net
Container:	Steel drum
Size:	30 gallons, 114 liters
Weight:	375 pounds net, 170 kg. net

#### SHELF LIFE

The shelf life of NYACOL APE1540 is not less than one year. The carrier is a low viscosity liquid isophthalic resin with no styrene.

#### FOR ADDITIONAL INFORMATION OR TO PLACE AN ORDER

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