



Polymer  
Dynamix



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DynaSil™

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# DynaSil™

## DynaSil™ - Eliminate Antimony and Free Your Formulation

Many flame retardant formulas utilize antimony trioxide as a synergist to improve efficiency and performance of halogenated flame retardants. During combustion the antimony reacts with halogen flame retardants to extinguish the flame and offer a product that can meet rigid fire standards such as UL94 or VW1 for wire and cable jackets and insulations. Antimony trioxide has proven to be a useful flame retardant synergist, however it does have many negative aspects. For example it has been added to the SVHC list (substance of very high concern), which means it could be hazardous to human, animal and or the environment. Antimony trioxide is also a mineral that historically is in limited supply and often subject to high pricing and drastic price increases.

DynaSil™ has proven to be able to completely replace antimony trioxide in many high performance flame retardant formulations while maintaining flame retardant performance. Several studies have been conducted to prove the validity of replacing antimony trioxide with DynaSil™ Technology across a broad spectrum of resins from PVC to Polyolefin, to engineering grade polymers such as polyamides. DynaSil™ is a completely inert polymer technology that has clearance for indirect food contact and proven to be a very safe, environmentally friendly material. The silicon based DynaSil™ is derived from the most abundant mineral on the earth, thus providing security of supply and price stability to all versions of DynaSil™.

## How DynaSil™ Works

DynaSil™ offers a unique approach to flame retardancy. When the DynaSil™ burns, it forms a thin glass barrier that holds the halogen or active flame retardant in the matrix for maximum efficiency. As the fire is extinguished, the DynaSil™ flows to the flame front and rapidly reacts to form a robust char layer that will choke off the fuel source, helping to block the polymer from reigniting. Even after burning, the DynaSil™ remains active in the matrix, thus if a part is exposed to repeated burns, the DynaSil™ will continue to work to extinguish the fire and form a continuous char. This is demonstrated in the images taken from a study using a cone calorimeter, which measures the flame resistant properties by burning a plaque. In the first image, a grate is placed on top of the plaque and is then exposed to a flame. After the flame is removed, a continuous char layer can be observed. The grate was then removed to expose layers below that were shielded from the flame due to the grate. The sample was then re-exposed to the flame to observe the flame retardancy now that some non-combusted polymer is exposed to the flame. As was observed in the bottom image, the DynaSil™ (in conjunction with other flame retardants) was able to move into the gaps exposed by the removal of the grate, and the DynaSil™ was able to help form a continuous char over the entire surface.



## Maintain Flame Retardant Properties in PVC Plenum

Using a standard PVC plenum formulation, the DynaSil™ was evaluated as a 100% replacement of Antimony Trioxide and compared using LOI (Limited Oxygen Index) and physical properties.

REPLACING ANTIMONY IN PVC			
	No Antimony	Control 1.5% Antimony	3% DynaSil™*
LOI	26	31	31
UL94 (1/16")	Fail	V0	V0

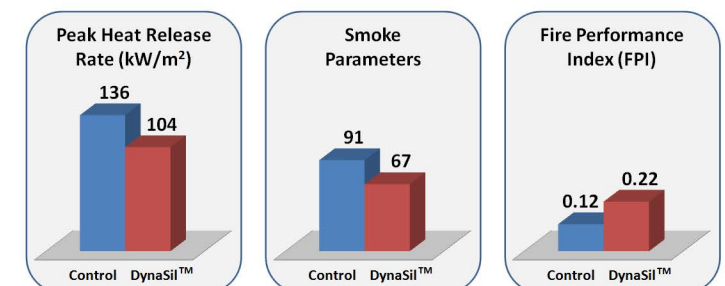
\* 100% replacement of Antimony on active basis

The DynaSil™ is a 50% active concentrate adding 3% DynaSil™ effectively is a one to one replacement of Antimony, all flame retardant properties and mechanical properties are maintained.

## Decrease Smoke Generation without the Use of Metal Salts or AOM

To investigate additional benefits the DynaSil™ brings, AOM (ammonium octomolybdate) was removed from a standard PVC plenum formulation and replaced with DynaSil™. The control and the sample with DynaSil™ were then compared at an outside lab using a cone calorimeter.

These results show that not only does the DynaSil™ successfully work as a replacement for AOM, but it offers a reduced Peak Heat Release, reduced smoke parameters, and improved Fire Performance Index.



## Remove Antimony From Any Flame Retardant Plastic Formulation

Evaluating DynaSil™ at varying loadings in a standard flame retardant PA66 formula demonstrates that DynaSil™ can effectively replace antimony and maintain the required flame retardant properties, even at half the active loading of antimony, as shown in the chart on the right. DynaSil™ can effectively eliminate or reduce the need for antimony required in formulations. Removing antimony will reduce density and cost with no effect on properties.

### REPLACING ANTIMONY IN POLYAMIDE 6,6

Control w/ 9% Antimony			DynaSil™ FR20 MB 9% / No Antimony			DynaSil™ FR20 MB 13% / No Antimony		
1/8"	1/16"	1/32"	1/8"	1/16"	1/32"	1/8"	1/16"	1/32"
V0	V0	V1	V0	V0	Fail	V0	V0	V1

In addition to PA66, data is available in PBT, PA6, ABS, and other thermoplastics, and can be provided upon request along with cost calculators showing the savings in density and cost.

## DynaSil™ Technology Offers:

- Cost effective option for antimony replacement
- Improved overall fire performance
- Friendly ecotox profile
- No regulatory concerns
- Easy to handle
- Decrease flame retardant required

[www.polymerdynamix.com](http://www.polymerdynamix.com)

formulations that *free*

your imagination



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