



DOW CORNING

Plastics and Rubber
Solutions

Dow Corning® 43-821 Additive

Unique FR synergist restores mechanical properties and reduces corrosivity in PA compounds



POLYAMIDES



**EXTEND
PROPERTIES**

Features

- Excellent FR synergist performance at low loadings (1 to 2 percent)
- Stability at high processing temperatures required for glass-filled PA
- Powder form for easy blending
- Global availability

Advantages

- Cuts loading of organic phosphorous FR additives by up to 40 percent
- Restores desirable mechanical properties of PA
- Delivers FR performance meeting UL-94 V0 requirements
- Reduces total formulation cost by a minimum of 10 percent
- Reduces corrosivity of metallic parts in contact with the formulation



Glass-reinforced polyamide (PA6 and PA66) compounds are widely used in electrical and electronic applications, such as enclosures, fuse boxes and switches, in the automotive and appliance industries. For regulatory compliance and safety, these materials incorporate flame-retardant (FR) additives. Many compounders and their customers want halogen-free FR performance for sustainability, and organic phosphorous additives such as aluminum phosphinate – often blended with melamine polyphosphate – are a popular choice. However, high loadings (up to 20 percent) are required to meet regulatory requirements.

These high loadings of organic phosphorous FR additives have significant drawbacks:

- Degradation of key PA mechanical properties such as impact, maximum force at traction and elongation
- Accelerated aging that can cause embrittlement
- Lower flow properties that negatively affect processability and design freedom (such as the ability to mold thin walls and complex geometries)
- Corrosivity issues that can appear under some conditions.

Target Applications

- Glass-reinforced PA compounds used in electrical enclosures, fuse boxes and switches in the automotive and appliance industries

Target Customers

- PA compounders
- Manufacturers of electrical/electronic parts

Many Solutions. One Source

As a longtime global leader in developing innovative silicon-based technologies, Dow Corning offers a variety of additives and ready-to-use solutions that enhance processing and performance of resins and composites. From fluids to powders and pellets, our products simplify access to the benefits of silicone technology.

To learn more about Dow Corning's wide range of plastics and composites solutions, visit dowcorning.com/plascomp, email the Plastics team at plastics@dowcorning.com, or go to dowcorning.com/ContactUs for a contact close to your location.

To avoid these problems, compounders and OEMs have had few alternatives:

1. Replace PA compounds with expensive, over-engineered materials such as polyether ether ketone (PEEK), polyamideamine-epichlorohydrin (PAE) and polyacrylic acid (PAA), which are self-extinguishing or hard to burn.
2. Attempt to find synergistic approaches that reduce the level of phosphorus in the formulation to make it less corrosive, while improving mechanical performance.

Unique FR Synergist for PA

To address industry demand for a better option, Dow Corning has developed *Dow Corning*[®] 43-821 Additive, the first product in a new family of unique FR synergists. Due to its strong synergistic effects on PA resins, this patented, non-phosphorous-based technology enables compounders to reduce the total phosphorus content in glass-reinforced PA6 and PA66 compounds by up to 40 percent, while delivering excellent FR properties. These include strong char formation, anti-dripping and reduced heat generation.

Tests indicate that 30 percent glass-filled PA compounds incorporating 10 wt% of aluminum phosphinate and 2 wt% of *Dow Corning*[®] 43-821 Additive can achieve UL-94 V0 rating at 1.6mm. Importantly, a formulation containing a slightly higher loading (13 percent) of aluminum phosphinate with the same 2 wt% of *Dow Corning*[®] 43-821 Additive met the requirements for UL-94 V-0 at 1mm.

New *Dow Corning*[®] 43-821 Additive, incorporated at a low loading of 1 to 2 percent:

- Recovers PA's desirable mechanical properties (impact, elongation at break, maximum force at traction) compared to the original formulation (containing 18-20 wt% of a totally phosphorous-based FR additive) by minimizing or eliminating the negative effects of high loadings of the FR additive
- Lowers corrosivity by reducing the total phosphorous content of the formulation

Further, the new *Dow Corning*[®] 43-821 Additive technology can reduce the total cost of the formulation by a minimum of 10 percent by nearly halving the amount of FR additive required and minimizing the amount of synergist needed.

This innovative *Dow Corning*[®] brand silicone technology can benefit PA compounders, electrical part manufacturers and OEMs by restoring the desirable mechanical properties of PA and reducing the corrosivity profile of the formulation, while delivering a high level of FR performance and regulatory compliance.

Dow Corning[®] 43-821 Additive is supplied in powder form, making it easy to blend with leading aluminum phosphinate additives.