Synergists Additives based on Natural Silicates for Halogen and Halogen-Free Flame Retardant systems
ADINS® is a proprietary and patented technology based on natural silicates that through surface modifications, provides new functionalities and reinforces properties in organic and inorganic materials.
Our Technology

ADINS® Flame Retardant technology offers a versatile product range of additives for polymers that act as synergists with Halogen and Halogen Free Flame Retardant systems. They significantly improve the behavior of plastic components under fire conditions, enabling their compliance with the most stringent international health and safety regulations such as the European Construction Products Regulation (CPR) or the Railway EN45545.

ADINS® Flame Retardant synergists can be combined with the main polymeric systems (as well as other systems such as Intumescent Paints), including thermoplastics and thermosets, boosting the performance of Halogen and Halogen Free Flame Retardants. Some of the ADINS additives benefits under fire conditions are:

- Anti-dripping effect
- Reduction of the flame propagation
- Smoke suppression
- Reduction of the heat release

ADINS® Flame Retardant technology is a sustainable and cost-effective solution that significantly enhances the base material properties with low addition dosages (1% to 5% w/w), allowing compliance with the highest technical requirements under fire conditions.

PRODUCT OVERVIEW

ADINS® Clay

ADINS® Clay series are magnesium silicates modified in their surface with organic compounds to ease its dispersion in polymeric matrices.

The needle-like structure reinforces the consistency of the char, improving its properties and its gas barrier capabilities. This enhanced char decreases heat release and flame propagation, and also reduces smoke emissions and dripping (anti-dripping effect).

All these benefits are proven by using standard fire behavior characterization test methods such as UL-94, LOI and Cone Calorimeter.

ADINS® Fireproof & ADINS® Clay G1

ADINS® Fireproof are ceramifying additives based on a natural silicate activated with phosphate compounds whereas ADINS® Clay G1 are based on the modified silicate with low melting point glass.

These compounds reinforce the synergetic effect of the ADINS® technology with the flame retardant systems due to the low temperature glass they form after burning by enhancing the consistency of the 3D reinforcing network within the char.

This ceramic char is very stable, consistent and compact, therefore it’s more capable of reducing fire propagation by polymer dripping, minimizing heat release, decreasing Total Smoke Production and improving the integrity of the material.

The use of ADINS® Fireproof and ADINS® Clay G1 boosts the performance of Halogen and Halogen Free Flame Retardant systems to the highest levels, enabling your plastic components pass the most stringent fire requirements.

ADINS Flame Retardancy

HOW IT WORKS?

The needle-like morphological structure of these products forms a strong 3D reinforcing network within the Flame Retardant, creating a consistent char after burning. The char significantly improves its mechanical and gas barrier properties, leading to clear benefits such as:

- Thermal stabilization of the polymer
- Creation of a heat barrier that protects the polymer from burning
- Reduction of the emission of organic flammable volatile compounds
- Reduction of the oxygen penetration into the polymer decomposition zone
- Reduction of the dripping

Consequently, plastic components using ADINS® Technology improve drastically its performance under fire conditions, enabling compliance with the most stringent international health and safety regulations.
ADINS meets your needs

Increasingly stringent regulations as well as environmental, health and safety standards are directly influencing the demand for alternative and safe materials that grow day by day.

ADINS® products meet the growing demand for synergists, optimizing not only the consumption of conventional flame retardants, but also providing and enhancing desired properties and functionalities such as anti-dripping, char promotion, significant reduction of smoke and heat generation, among others.

ADINS® technology allows the development of customized grades that guarantee compliance with the specific client and industry requirements.

Anti-dripping improvement

ADINS® additives, based on natural silicates, allow to modify viscosity under fire conditions, avoiding dripping.

Smoke & Heat Release Reduction

The establishment of regulations such as the CPR in the EU and its adaptation in other markets have a big impact and scope in different industries, especially in the Wire & Cable.

The Construction Products Regulation harmonize a series of requirements regarding fire behavior, including the need to achieve a lower smoke emission and toxicity.

There is a need for safer materials and ADINS® products can help to achieve this goal:

ADINS® synergists promote char formation, creating a physical barrier, protecting the material and reducing heat and smoke emission as well as volatile organic compounds generated.

The required dosage of ADINS® are low, ranging from 1 to 5% for commonly used formulations, however, the impact on the properties is remarkable, even allowing to reduce FR doses.

Some examples of %TSP reduction are presented below:

PVC

PP - Halogen

ADINS synergists drastically reduce dripping allowing V-0 rating on different systems, such as polyamide and polyester.

<table>
<thead>
<tr>
<th>UL-94 TEST RESULTS</th>
<th>Intumescent</th>
<th>Halogen (ATO)</th>
<th>Hydroxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP</td>
<td>Reference</td>
<td>V-2</td>
<td>V-2</td>
</tr>
<tr>
<td></td>
<td>ADINS®</td>
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<td>V-0</td>
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<tr>
<td>PA</td>
<td>Reference</td>
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</tr>
<tr>
<td></td>
<td>ADINS®</td>
<td>V-0</td>
<td>-</td>
</tr>
<tr>
<td>EVA</td>
<td>Reference</td>
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<td>Reference</td>
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</tr>
<tr>
<td></td>
<td>ADINS®</td>
<td>-</td>
<td>V-0</td>
</tr>
</tbody>
</table>

The dosage of ADINS® to avoid dripping, will depend on each system. All samples has been tested at 1,6 mm.

In EVA, the reductions in heat release and smoke production are from 30 to 50%, and in the case of rubber, a reduction of almost 50% in the generation of smoke is achieved.

In addition and regarding mechanical properties, in EPDM formulations, the tensile and elongation break are improved when incorporating ADINS® as well as harness.
Metal hydroxides

ADINS® Clay in combination with Metal Hydroxide Flame Retardants (dosages around 3%) significantly increases the residual yield, which slows down the mass reduction rate and reduces the release of flammable gases. Simultaneously, the addition of ADINS® synergists creates a swelled and non-cracked char, therefore heat and mass transfer between flame and polymer substrate is effectively prevented. Consequently, Flame Retardant content can be reduced, improving the processability and mechanical properties of the material.

Intumescent

ADINS® Clay have also demonstrated further stabilization of the char in intumescent systems (dosages around 1-2%), improving the flame retardant efficiency.

ADINS® Clay synergy with intumescents decreases and delays the peak of the heat release rate and acts as a Smoke Suppressor.

The use of ADINS® Clay improves the cost efficiency of the formulations with intumescent flame retardants.

Halogen FR

ADINS® Clay in combination with Halogen Flame Retardants (dosages around 1%), dramatically reduces heat release as well as maximum smoke temperature, improving the UL-94 rating and increasing LOI percentage level.

ADINS® Clay has proven its efficiency as synergist with halogen flame retardant systems in standard formulations with PVC and PP, reducing smoke emissions up to 48%.

ATO Reduction

The antimony trioxide is one of the most widely used additive in industry, but its safety is under regulatory study, due to its toxicity and potential carcinogenicity. In addition, the variability of its prices, and problems in terms of supply, are other aspects that have generated concerns among end users.

However, in some applications such as E&E, its use is unavoidable. Alternatives such as increasing hydroxide FR load generate processability and performance problems. Therefore, there is a need for safer synergists like ADINS, that are able to reduce ATO dosage without damaging final properties and processability.

ADINS® helps to reduce up to 50% or eliminate the ATO content levels from the formulation (in PVC or PP matrices for example) when combined with flame retardant systems like ATH or MDH.

ADINS® Clay improves the efficiency of the flame retardant system by reducing its dosage, therefore creating more environmentally friendly solution that still complies with standard regulations.
**Products & Applications**

ADINS® is very efficient for a large number of matrices, some examples are shown in the table.

The recommendation will depend on the formulation, the most representative ones are shown.

<table>
<thead>
<tr>
<th>HYDROXIDE</th>
<th>INTUMESCENT</th>
<th>HALOGEN</th>
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<tbody>
<tr>
<td></td>
<td>EVA</td>
<td>PVC</td>
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<tr>
<td>ADINS® CLAY 20</td>
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<td>ADINS® CLAY 80T</td>
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<tr>
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<tr>
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<tr>
<td>ADINS® FIREPROOF SIL-1</td>
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</tr>
</tbody>
</table>

**ADINS® Clay**
Wire & Cable
Electricity & Electronics
Construction (pipes, insulating foams, etc.)
Transport

**ADINS® Fireproof & ADINS® Clay G1**
Ceramicable Wire & Cable
Special Structural Parts
Intumescent Paint & Coating