



ADINS



Flame
Retardancy

by TOLSA

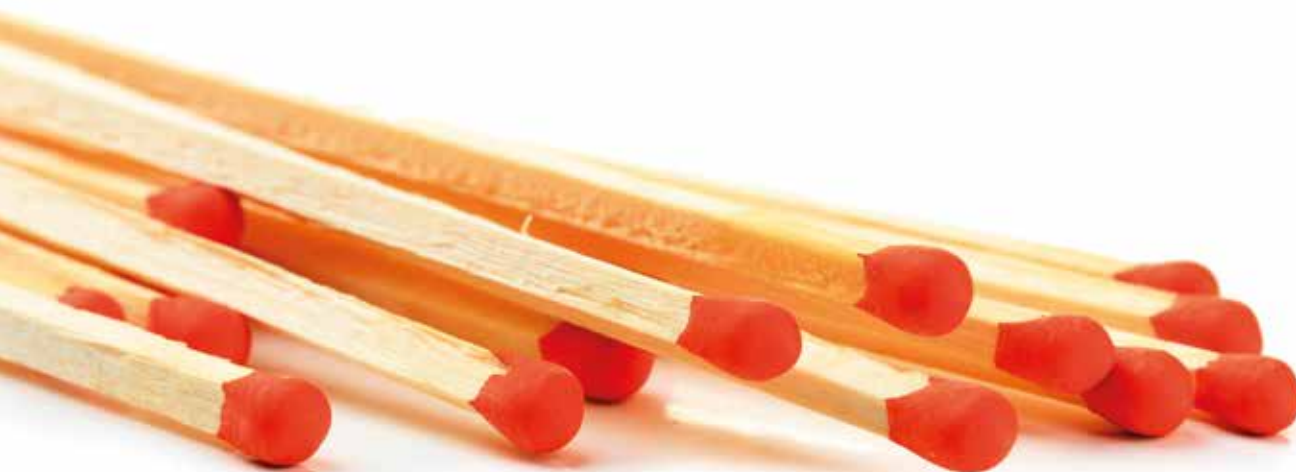
ADINS® is a proprietary and patented technology based on natural silicates that through surface modifications, provides new functionalities and reinforces properties in organic and inorganic materials.

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, 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 6% w/w), allowing compliance with the highest technical requirements under fire conditions.





TOLSA Flame Retardant Proprietary Technology

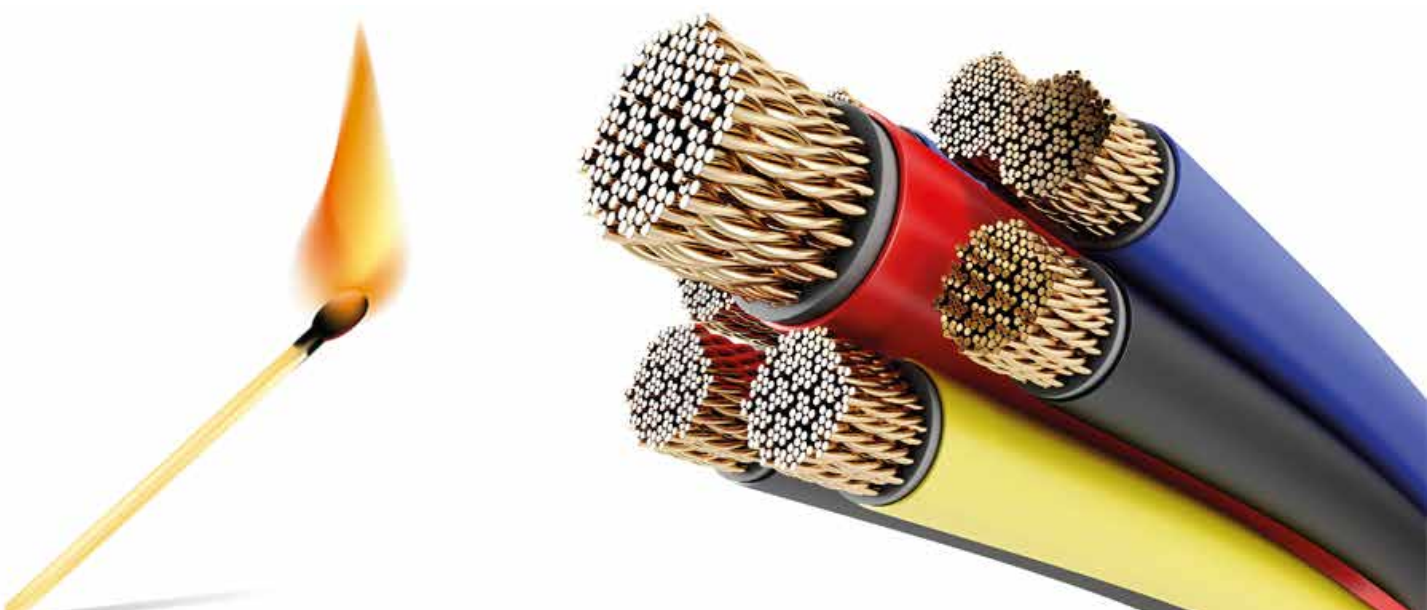
ADINS Flame Retardancy

ADINS® Clay and ADINS® Fireproof are synergists for Flame Retardants. These additives for polymers have been developed using ADINS Technology, based on natural silicates.

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 Clay works in synergy with Halogen and Halogen Free Flame Retardant systems used in industrial applications. In the ADINS Clay product range the natural silicates are modified in its surface with organic compounds to ease its dispersion in polymeric matrices.

The needle like structure of ADINS Clay reinforces the consistency of the char, improving its mechanical properties and its gas barrier capabilities. This enhanced char decreases heat release and flame propagation, and also reduces smoke emissions and dripping. All these benefits are proven by using standard fire behavior characterization test methods such as UL-94, LOI and Cone Calorimeter. ADINS Clay additives improve fire performance in plastic components enabling compliance with international health and safety regulations.



ADINS Fireproof is a ceramifying additive based on a natural silicate activated with phosphate compounds. 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 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 Clay

Synergies with FR Systems

Halogen FR

ADINS Clay in combination with Halogen Flame Retardants (dosages of 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%. ADINS Clay is used to reduce or eliminate the ATO content levels from the formulation 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.



PPh



PPh_40MB



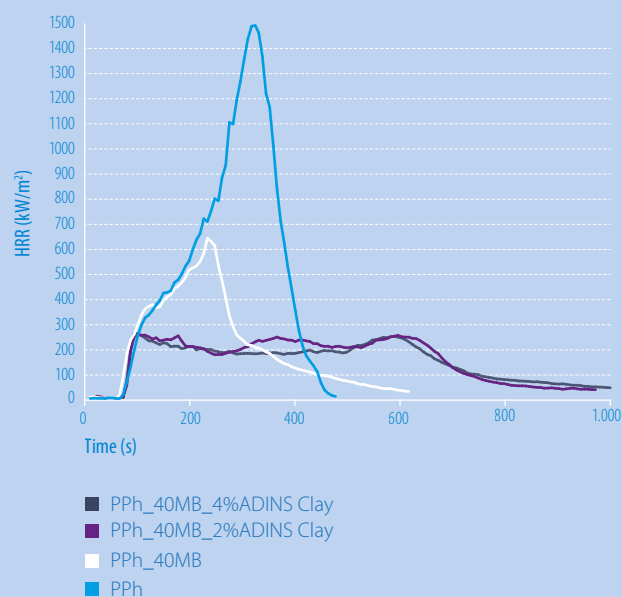
PPh /40MB/2% Clay



PPh /40MB/4% Clay

Char layer obtained using ADINS Clay in combination with a Halogen FR after cone calorimeter test

Cone Calorimeter Test at 50 kW/m²



Heat Release Rate of different Polypropylene homopolymer formulations with 40% of a Halogen FR masterbatch (LDPE + 50%DBDPE + 25%ATO) and different dosages of ADINS Clay.

Vertical Burning Test UL94-ASTM D 3801

Sample	UL-94 Rating	LOI (%O ₂)
PPh	No Rating	18.7
PPh_40MB	No Rating	22.5
PPh_40MB_2% ADINS Clay	V-1	23.6
PPh_40MB_4% ADINS Clay	V-0	24.3

Influence of ADINS Clay in the UL-94 and LOI test

	PVC K70	DINP	ADINS Clay	ESO	CaCO ₃	ATH	CaZn Stab.
REFERENCE	100	60	-	5	40	48	0.67
ADINS Clay 80T	100	60	4	5	40	48	0.67

	pHRR	THR	MARHE	TSP (1200s)	Ds max (20')	VOF4
REFERENCE	225.98	46.4	158.21	10,490	890.3	2,297.9
ADINS Clay 80T	169.76	48.8	119.68	5,403.9	367.7	750.2

Metal hydroxides

ADINS Clay in combination with Metal Hydroxide Flame Retardants (dosages of 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 process ability and mechanical properties of the material.



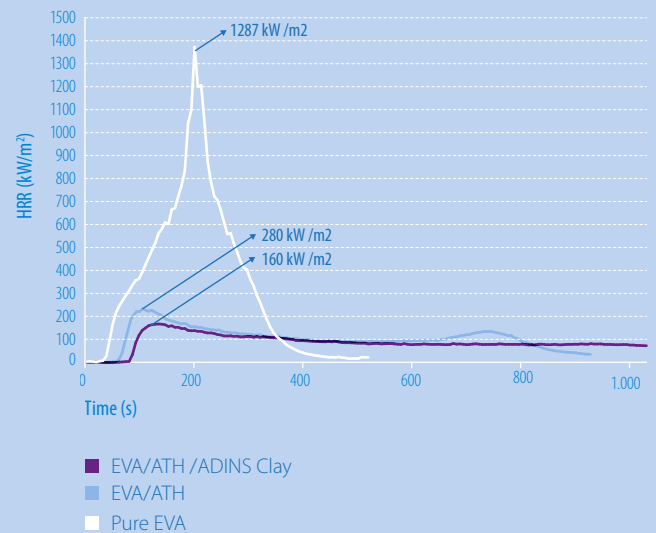
EVA/ATH



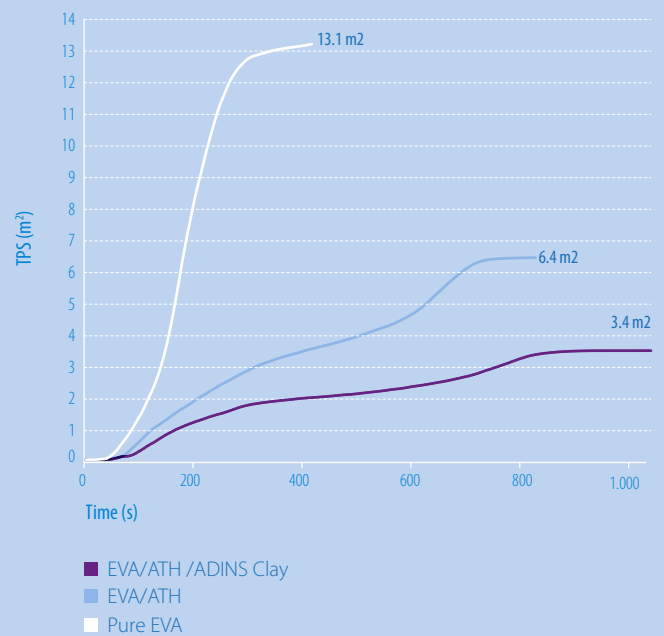
EVA/ATH/ADINS

Char layer obtained using ADINS Clay in a cable formulation based on EVA

Cone Calorimeter Test at 50 kW/m²



Total Smoke Production



Heat Release Rate and Total Smoke Production of a EVA formulation with 3% of ADINS Clay and 62% of ATH in comparison with pure EVA and EVA with 65% of ATH.

ADINS Clay

Intumescent

ADINS Clay have also demonstrated further stabilization of the char in intumescent systems (dosages of around 1-2%), improving the flame retardant efficiency. ADINS Clay synergy with intumescent decreases and delays the peak of the heat release rate and acts as a Smoke Suppressor.

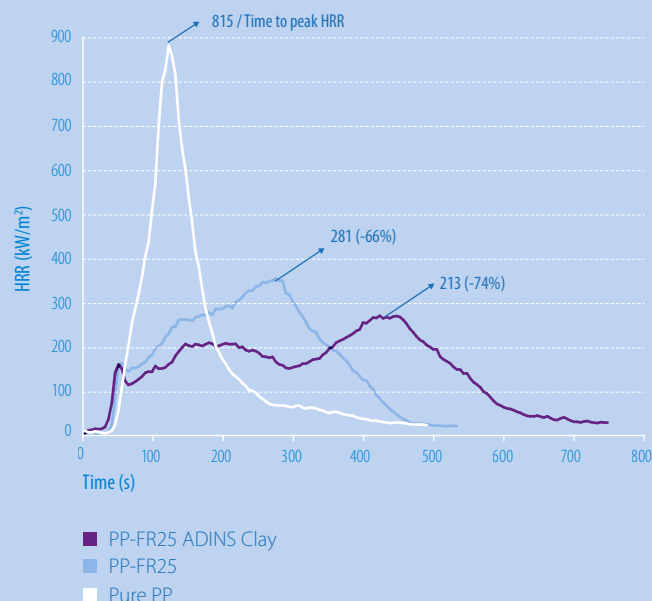
The use of ADINS Clay leads to improve the cost efficiency of the formulations with intumescent flame retardants.

Burning Behaviors – UL-94 and LOI Tests

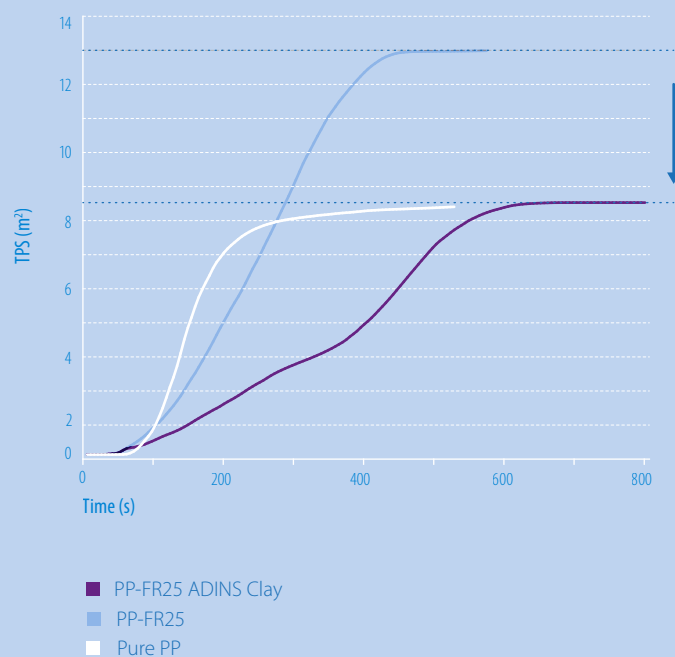
Samples	UL-94 Rating	LOI (%)	PHRR (kW/m ²)
PPh + 20% Intumescent + 0.25% AOX	V-2	32.3	307
PPh + 20% Intumescent + 0.25% AOX + 2% ADINS Clay	V-0	32.1	212

Table shows the values obtained in LOI, UL-94 and peak Heat Release Rate using 2% of ADINS Clay in a Polypropylene homopolymer formulation with 20% of intumescent and 0,25% of antioxidant (50 kW/m²)

Cone Calorimeter Test at 50 kW/m²



Total Smoke Production



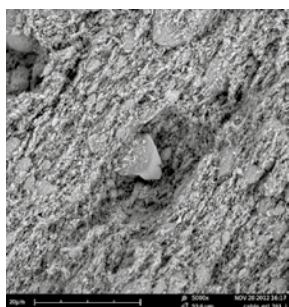
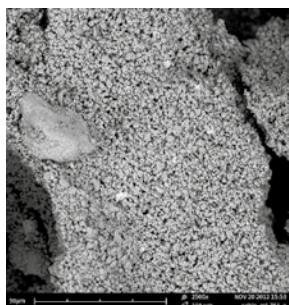
Heat Release Rate and Total Smoke Production of a PP copolymer formulation with 2% of ADINS Clay and 23% of intumescent in comparison PP with 25% of intumescent.

ADINS Fireproof

Ceramifying additives

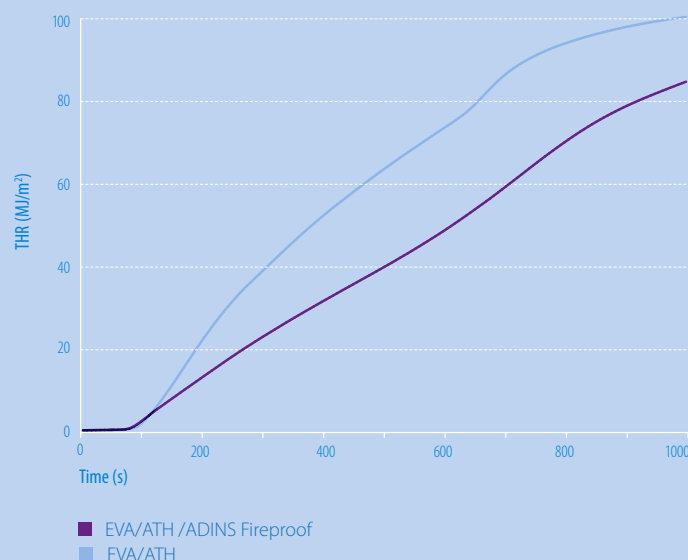
ADINS Fireproof additive is based on an activated natural silicate, with phosphate compounds, that in combination with flame retardants, allows for obtaining a ceramifying layer under fire conditions. This additive forms a very strong reinforcing network within the flame retardant by creating an extremely consistent char that reduces the peak and the total heat release.

ADINS Fireproof allows increasing LOI and reducing Total Smoke Production (dosages of around 6%).

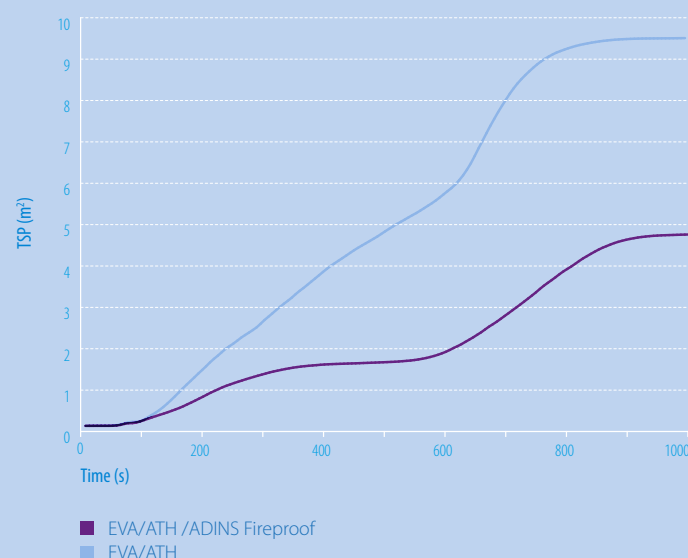


Char layer obtained using Fireproof in a EVA formulation with ATH.

Cone Calorimeter Test at 50 kW/m²



Total Smoke Production



Total Heat Release and Total Smoke Production of a EVA formulation with 13% of ADINS Fireproof and 47% of ATH in comparison with EVA with 60% of ATH.

Applications



ADINS Clay

- Wire & Cable
- Electricity & Electronics
- Construction (pipes, insulating foams, etc.)
- Transport

ADINS Fireproof

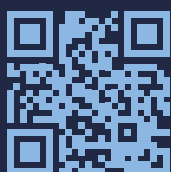
- Ceramifiable Wire & Cable
- Special Structural Parts

About Tolsa

TOLSA, based in Madrid(Spain), has one of the broadest ranges of special clays worldwide, offering additives and industrial products that provide high added value and improve the performance and efficiency of materials. Also, TOLSA is the largest European manufacturer of pet hygiene products, marketed under its own brands as well as private label.

The company has more than 20 mining operations to produce the highest quality sepiolite, bentonite, attapulgite, phosphates, peat, and marble, which generate more than 100 million tonnes of raw materials. The acquisition of new deposits is a key priority in order to renew reserves as well as to offer each customer new raw materials to meet their needs.

The TOLSA focuses on intelligent production that is modern, efficient, flexible, safe, and respectful of the environment. Each process is subjected to stringent quality controls, and the company is certified under ISO 9000 and ISO 14000. TOLSA has a production capacity of more than 1 million tonnes, and its factories are located near mining operations, or in port areas near our markets. For more information about TOLSA, visit www.tolsa.com/adins



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