Santicizer® Phosphate Esters in Roofing

Santicizer® phosphate esters are excellent specialty plasticizers for flame retarded, low smoke calendered films for roofing applications. Santicizer® phosphate esters are of non-halogen nature, and avoid adverse perceptions associated with halogenated fire retardants. In PVC, Santicizer® phosphate esters act as high solvating plasticizers, offering permanence, faster fusion and high plasticizing efficiency. Santicizer® phosphate esters are also an excellent choice to replace antimony based flame retardants.

Benefits:

- Active fire suppressants replacing other plasticizers which may act as fuels
- Low smoke properties
- Compatibility in many polymer systems offers versatility
- High plasticizer efficiency to reduce plasticizer loadings
- Fast-fusing plasticizer in PVC systems to boost throughput
- Non-halogenated to avoid regulation and adverse perception

Example of replacement of Sb2O3 in roofing foils:

Formulations

	Ref	A	B	C
SPVC K70	100	100	100	100
Santicizer® 148		50	50	50
DIDP	63			
Sb2O3	8			
Al(OH)3		20	20	20
ZincBorate			10	
ZnO				3
TiO2	14	14	14	14
Acrylic Processing Aid	4	4	4	4
Stearic Acid	0.3	0.3	0.3	0.3
ESO	6	6	6	6
Therm-Chek RC 215 P	3	3	3	3

In these formulations the amount of Sb2O3 is reduced to zero by using a combination of Santicizer® 148 and flame retardant fillers. Synergistic fillers as Aluminium Trihydrate, Zinc Borate and Zinc Oxide were used.

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Testing Results:

	Ref	A	B	C
SHORE A	78	81	82	80
Flopyness (mN)	194	244	259	241
Max Elongation (%)	326	274	238	296
Tensile Strength (MPa)	17.3	18.1	16.2	17.1
LOI	25.7	26.6	27.2	26.6
NBS Souldering Dmc	514	335	203	181
NBS Flaming Dmc	662	436	341	362
DIN 4102 B2	Pass	Pass	Pass	Pass

The mechanical properties of the formulas are very similar, considering Shore A hardness, Flopyness (force expressed in mN needed to bend a pressed test sample over an angle of 30°), Elongation and Tensile Strength.

Limited Oxygen Index (LOI) is improved for all formulations based on Santicizer® 148, which highlights high fire retardant performance. All formulations pass the DIN 4102 (B2) standard, an ignitability test where the total burned length is taken into account.

A primary benefit of all formulations made with Santicizer® 148 is the reduced smoke generation, seen in a reduction of more than 200 units for the Dmc value (smoke density).

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