Santicizer® 141 & 148 vs TCP & DPC

Santicizer® 141 and 148 are non-classified, highly efficient, low smoke generating flame retardants which are excellent alternatives to the human health and environmentally classified, less efficient and higher density Tri-Cresyl (TCP) and Diphenyl Cresyl (DPC) Phosphate Esters.

Product Properties

	Santicizer® 141	Santicizer® 148	TCP	DPC
Molecular Weight (g/mol)	362	390	368	340
Specific Gravity (25°c)	1.09	1.07	1.18	1.21
Viscosity (mPas, 20°C)	25	40	70	50
% Phosphorous	8.6	7.9	8.4	9.1

Santicizer® phosphate ester have lower viscosity and density compared to DPC and TCP, which results in easier handling and improved cost in volume based applications as cables and sealants. Santicizer® 148 is clearly the phosphate ester with the lowest volatility.

In PVC formulations

Santicizer® versus DPC

	F1	F2	F3
S PVC (K70)	100	100	100
Santicizer® 141	30		
Santicizer® 148		30	
DPC			38
Lankroflex E2307	3	3	3
BaZn Stabilizer	3	3	3
Shore A	92	93	92
Low Temperature Flexibility (°C)	-7	-4	2
Electrical Burner NF 92-503	M2	M2	M2
Smoke ASTM E662 Flaming (Dmc)	387	409	706
Smoke ASTM E662 Smouldering (Dmc)	222	197	487
LOI	31	31	35

As Santicizer® 141 and 148 are more efficient plasticizers compared to DPC, 22% less is added in the above formulations. Doing so the Santicizer® based formulation perform similar in terms of Shore A and fire retardancy (NF 92-503) and much better in terms of low temperature flexibility and smoke generation (ASTM E662). For lowest volatiles, Santicizer® 148 is the preferred option.

Santicizer® versus TCP

	F1	F2	F3
S PVC (K70)	100	100	100
Santicizer® 141	43	37	
TCP			43
BaZn Stabilizer	3	3	3
Bending Resistance to angle of 30° (mN)	266	334	1548
ASTM D568-77	Pass	Pass	Pass
ASTM D568-77 (Av length of burn in cm)	6	6	6

As Santicizer® 141 is the more efficient plasticizer compared to TCP, 14% less is added in the above formulations. Doing so the Santicizer® based formulation perform similar in terms of fire retardancy (ASTM D568-77) but much better in terms of flexibility (bending resistance) suggesting that even less Santicizer® can be used which will improve flame retardancy further.

Summary

Santicizer® 141 and 148 are more efficient plasticizers compared to DPC and TCP, allowing the usage of up to 20% less plasticizer. Doing so similar flexibility, hardness & flame retardancy is achieved, while significant smoke reduction is observed.

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