



ROSTABIL

SECONDARY THERMAL STABILIZERS

GENERAL INFO & USES

ROSTABIL SERIES – phosphites short-life thermal stabilizers – provide unique protection against degradation during processing. Considered as the most effective secondary stabilizers exhibit outstanding thermal stabilization in conjunction with primary antioxidants. Dedicated to rigid and flexible PVC industry, also used in powder coatings, polyurethane foams, thermosets and rubber industry.

KEY APPLICATIONS

- Ducting pipes
- Window frames
- Wires & cables
- Household appliances
- Technical foils & films

KEY FEATURES

- Enhance thermal stabilization during processing
- Provide brighter, more consistent colors
- Sustain excellent protection against degradation
- Ensure high performance at low loadings

TYPICAL PROPERTIES

TRIALKYL PHOSPHITES

Products / Properties	Color (Hazen units)	Density at 25°C [g/cm ³]	Refractive index n ²⁵ _D	Total phenol content [%]
Rostabil TTDP	Max. 100	0.884	1.4630	Max. 1
Rostabil TTDP-V	Max. 100	0.884	1.4630	Max. 0.05
Rostabil TDP	Max. 50	0.887	1.4547	Max. 1
Rostabil TDP-V	Max. 100	0.887	1.4547	Max. 0.05

ARYL AND ALKYL-ARYL PHOSPHITES

Products / Properties	Color (Hazen units)	Density at 25°C [g/cm ³]	Refractive index n ²⁵ _D	Free phenol content [%]
Rostabil TNF	Max. 150	0.975	1.5300	n/a
Rostabil DPDP	Max. 100	1.030	1.5214	Max. 1
Rostabil DDPP	Max. 100	0.947	1.4817	Max. 1

PRODUCT PERFORMANCE IN PVC

Raw material / formulation	Rigid	Non-FR flexible	FR flexible	FR flexible with ESBO
Rostabil TTDP	••	•	•	•••
Rostabil TTDP-V	••	•	••	•••
Rostabil TDP	••	•	•	•••
Rostabil TDP-V	••	•	••	•••
Rostabil DPDP	•••	•••	•	••
Rostabil DDPP	•••	•••	•	••

• moderate •• good ••• excellent

APPLICATION

RIGID PVC

Compound	phr
S-PVC	100
Primary stabilizers (Zn/Ca mixed metals)	4
Secondary stabilizer	0-1*

Secondary stabilizer	phr*	First color change ¹ [min]	Total blacking ¹ [min]	Oxidative Induction Time ² [min]	Dynamic thermal degradation ³ [s]	Congo red method ⁴ [min]
n/a	–	0	25	1	304	20
Rostabil TTDP	1	30	60	17	424	32
Rostabil TTDP-V	1	50	80	1	320	35
Rostabil TDP	1	40	60	15	328	26
Rostabil TDP-V	1	40	60	4	320	26
Rostabil DPDP	1	50	80	28	438	45
Rostabil DDPP	1	30	60	11	336	41

Tip

- Alkyl-aryl types Rostabil DPDP and Rostabil DDPP are recommended for rigid PVC.

¹**Static stability** - test comprised color change observation in non-oxygen, isothermal (170°C) conditions. Defined two levels of PVC degradation: first color change (as first degradation step) and total blacking (as complete degradation).

²**OIT** – Oxidative Induction Time, test illustrated PVC ability to prevention against oxygen degradation in isothermal conditions.

³**Dynamic stability** – test simulated standard processing procedure. Degradation was measured by changes in PVC viscosity during processing in isothermal (170°C) conditions.

⁴**Thermal stability Congo red method** – determination of thermal stability at elevated temperature (180°C) of PVC compounds which undergo dehydrochlorination affects in Congo red indicator color change.

NON-FR FLEXIBLE PVC

Compound	phr
S-PVC	100
DOTP (dioctyl terephthalate)	40
Primary stabilizers (Zn/Ca mixed metals)	4
Secondary stabilizer	0-1*

Secondary stabilizer	phr*	First color change [min]	Total blacking [min]	Oxidative Induction Time [min]	Dynamic thermal degradation [s]	Congo red method [min]
n/a	–	60	100	11	3016	48
Rostabil TTDP	1	40	90	20	3440	58
Rostabil TTDP-V	1	50	80	10	3704	42
Rostabil TDP	1	70	100	30	3568	46
Rostabil TDP-V	1	50	80	26	2952	42
Rostabil DPDP	1	100	150	85	3784	79
Rostabil DDPP	1	80	110	72	3744	72

Tip

- Alkyl-aryl types Rostabil DPDP and Rostabil DDPP are recommended for non-FR flexible PVC.

FR FLEXIBLE PVC

Compound	phr
S-PVC	100
DOTP (dioctyl terephthalate)	20
Roflex 50 (phosphate)	20
Primary stabilizers (Zn/Ca mixed metals)	4
Secondary stabilizer	0-3*

Secondary stabilizer	phr*	Oxidative Induction Time [min]	Dynamic thermal degradation [s]	Congo red method [min]
n/a	–	39	1552	44
Rostabil TTDP	3	61	2592	48
Rostabil TTDP-V	3	62	3160	54
Rostabil TDP	3	57	3096	47
Rostabil TDP-V	3	59	3368	53
Rostabil DDPDP	3	76	2336	53
Rostabil DDPP	3	77	2440	52

Tip

- Phosphites should be used in greater loadings than 1 phr when phosphates are applied.



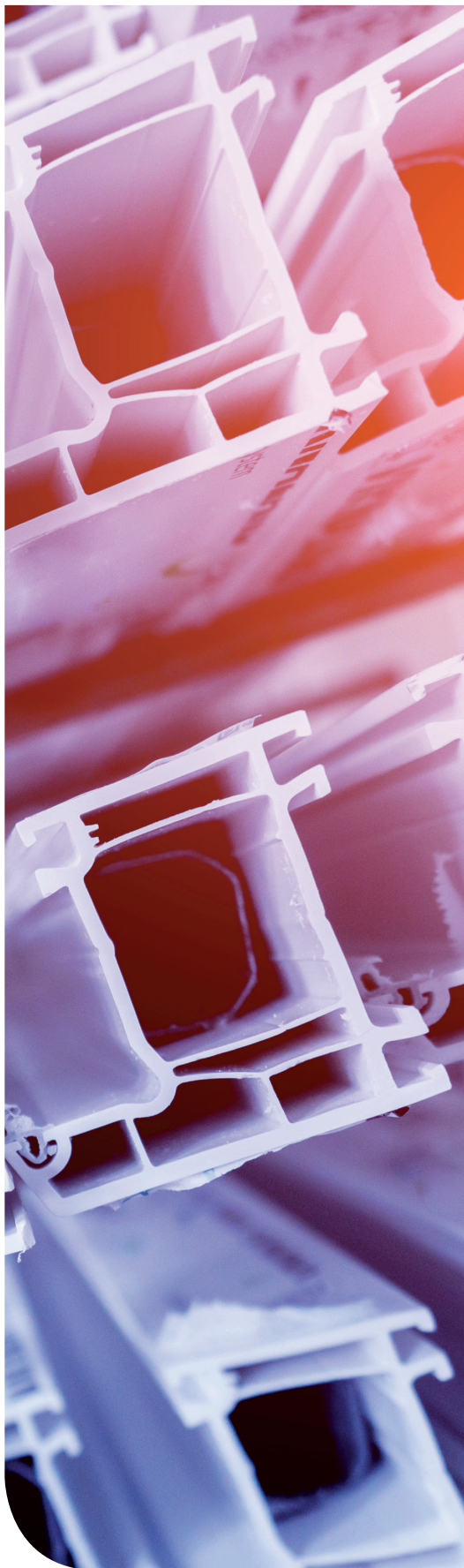
FR FLEXIBLE WITH ESBO

Compound	phr
S-PVC	100
DOTP (dioctyl terephthalate)	20
Roflex 50 (phosphate)	20
ESBO	5
Primary stabilizers (Zn/Ca mixed metals)	4
Secondary stabilizer	0-1*

Secondary stabilizer	phr*	Oxidative Induction Time [min]	Dynamic thermal degradation [s]	Congo red method [min]
n/a	–	35	3000	57
Rostabil TTDP	1	42	3600	69
Rostabil TTDP-V	1	37	3500	66
Rostabil TDP	1	45	3560	70
Rostabil TDP-V	1	36	3520	68
Rostabil DPDP	1	53	3808	64
Rostabil DDPP	1	52	4096	64

Tip

- Phosphites might be combined with ESBO when phosphates are used to enhance effectiveness.



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