ROFLAM

FLAME RETARDANTS FOR EPOXY RESINS

GENERAL INFO & USES

ROFLAM SERIES - halogen-free flame retardants in the form of a colourless liquid with low dynamic viscosity. Products exhibit synergistic properties in combination with inorganic flame retardants in the powder form, enhancing the fire resistance effect and providing viscosity reduction.

KEY APPLICATIONS

- Composites
- Laminates
- Pultrusion & Infusion processes
- Thick intumescent coatings

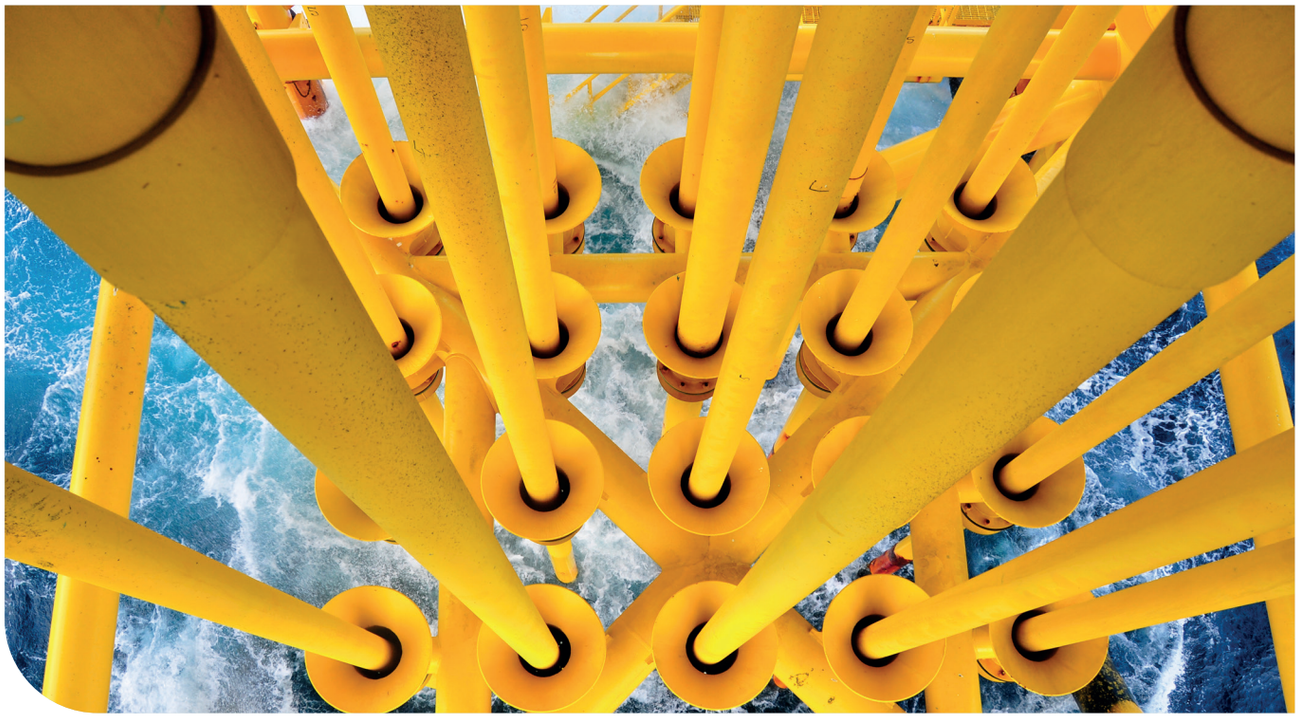
KEY FEATURES

- Excellent flame retarding profile
- Synergistic effect with solid FRs
- Easy for processing
- Viscosity reduction
- Fibers soak enhancing

TYPICAL PROPERTIES

Product name	Chemical name	Density at 25°C [g/cm^3]	Viscosity at 25°C [mPa*s]	Phosphorous content	Feature
Roflex 35	Isopropylated triaryl phosphate	1.19	45	8.8	Low viscosity
Roflex 50		1.17	53	8.5	
Roflex T70	t-butylated triaryl phosphate	1.18	72	8.5	Safe to human health
Roflex T70L*		1.12	310	7.4	No-labelling
Roflex CDP*	Diphenyl cresyl phosphate	1.20	37	9.1	Low smoke

* available upon request



PRODUCT PERFORMANCE

FR solution / features	FR efficiency	Low smoke	Viscosity reduction	Labelling	VOCs
Roflex 35	• •	•	• • •	•	• •
Roflex 50	• •	•	• •	•	• •
Roflex T70	• •	•	• •	• •	• • •
Roflex T70L	• •	• •	•	• • •	• • •
Roflex CDP	• • •	• •	• • •	• •	• •

• moderate • • good • • • excellent

FR SOLUTIONS FOR EPOXY BASED PLASTICS

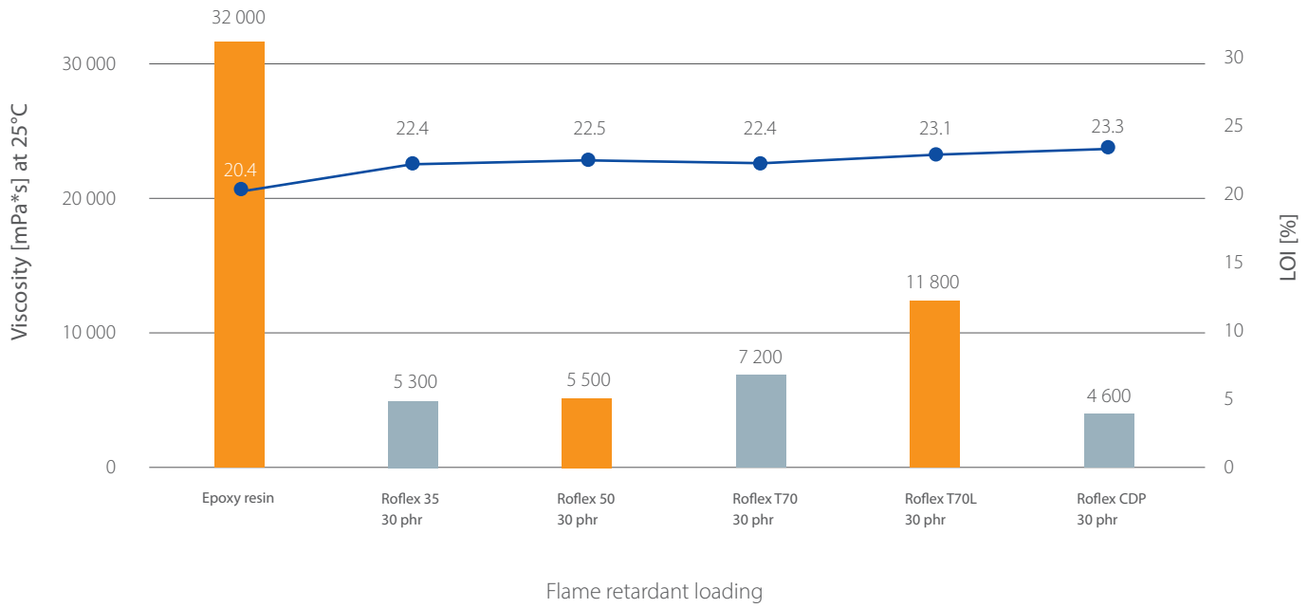
BASIC FORMULATION

Raw material	Loadings [phr]	Processing
Epoxy resin DGEBA	100	
Aliphatic amine	10	Cold cured resin
Flame retardant	0 – 30*	

FLAMMABILITY PERFORMANCE AND VISCOSITY REDUCTION

Flame retardant	phr*	Viscosity at 25°C [mPa*s]	LOI [%]
n/a	-	32 000	20.4
Roflex 35	10	14 500	22.0
	20	11 000	22.4
	30	5300	22.4
Roflex 50	10	15 000	21.9
	20	11 500	22.5
	30	5500	22.5
Roflex T70	10	16 700	22.0
	20	13 500	22.2
	30	7200	22.4
Roflex T70L	10	20 500	22.8
	20	15 500	23.0
	30	11 800	23.1
Roflex CDP	10	13 500	23.0
	20	7700	23.1
	30	4600	23.3

FR EFFICIENCY AND VISCOSITY REDUCTION



FR SOLUTIONS FOR HIGH FILLED SYSTEMS

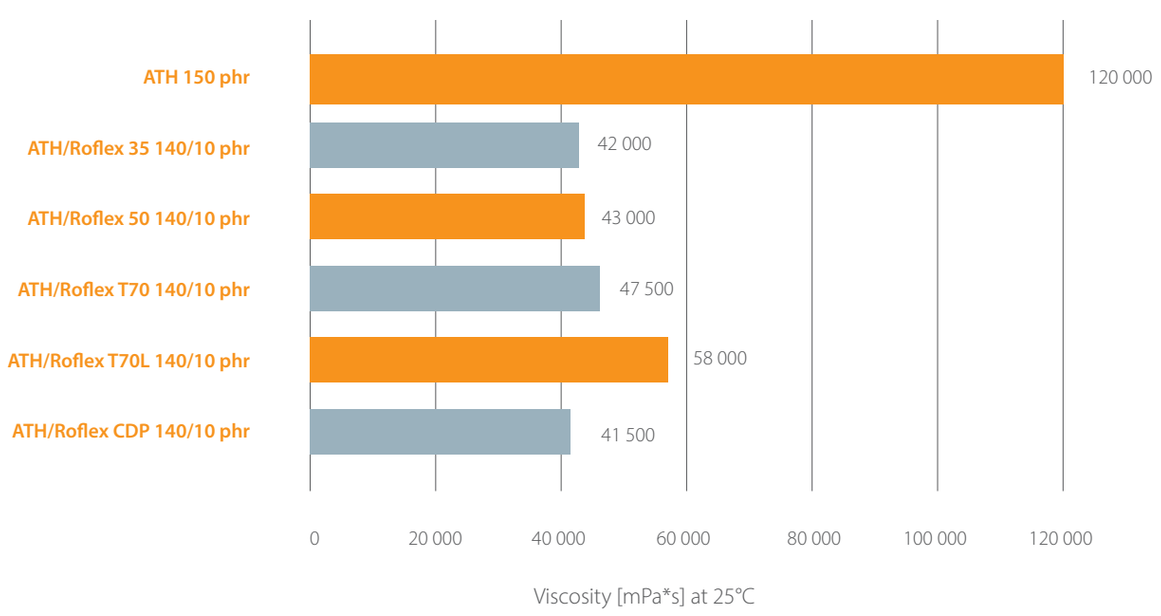
BASIC FORMULATION

Raw material	Loadings [phr]	Processing
Epoxy resin DGEBA	100	Cold cured resin
Aliphatic amine	10	
ATH	140-150	
Roflam	0-10	

FLAMMABILITY PERFORMANCE AND VISCOSITY REDUCTION

Solid flame retardant	phr	Phosphate	phr	Viscosity at 25°C [mPa*s]	LOI [%]	UL-94 3.5 mm
ATH	150	n/a	-	120 000	37.0	V0
	140	Roflex 35	10	42 000	38.5	
		Roflex 50		43 000	37.0	
		Roflex T70		47 500	36.8	
		Roflex T70L		58 000	37.2	
		Roflex CDP		41 500	37.0	

VISCOSITY REDUCTION - HIGH FILLED SYSTEMS



FR SOLUTIONS FOR THICK EPOXY BASED INTUMESCENT COATINGS

BASIC FORMULATION

Raw material	Loadings [phr]	Processing
Epoxy resin DGEBA	100	Cold cured resin
Aliphatic amine	10	
APP / Melamine / Pentaerythritol	5 / 1.7 / 1.7	
Roflam	0 - 20	

FLAMMABILITY PERFORMANCE AND VISCOSITY REDUCTION

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
APP	5	24.0	no class.	40 000
Melamine	1.7			
Pentaerythritol	1.7			

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
Roflex 35	10			
APP	5	25.6	V1	17 300
Melamine	1.7			
Pentaerythritol	1.7			
Roflex 35	20			
APP	5	27.7	V0	9 500
Melamine	1.7			
Pentaerythritol	1.7			

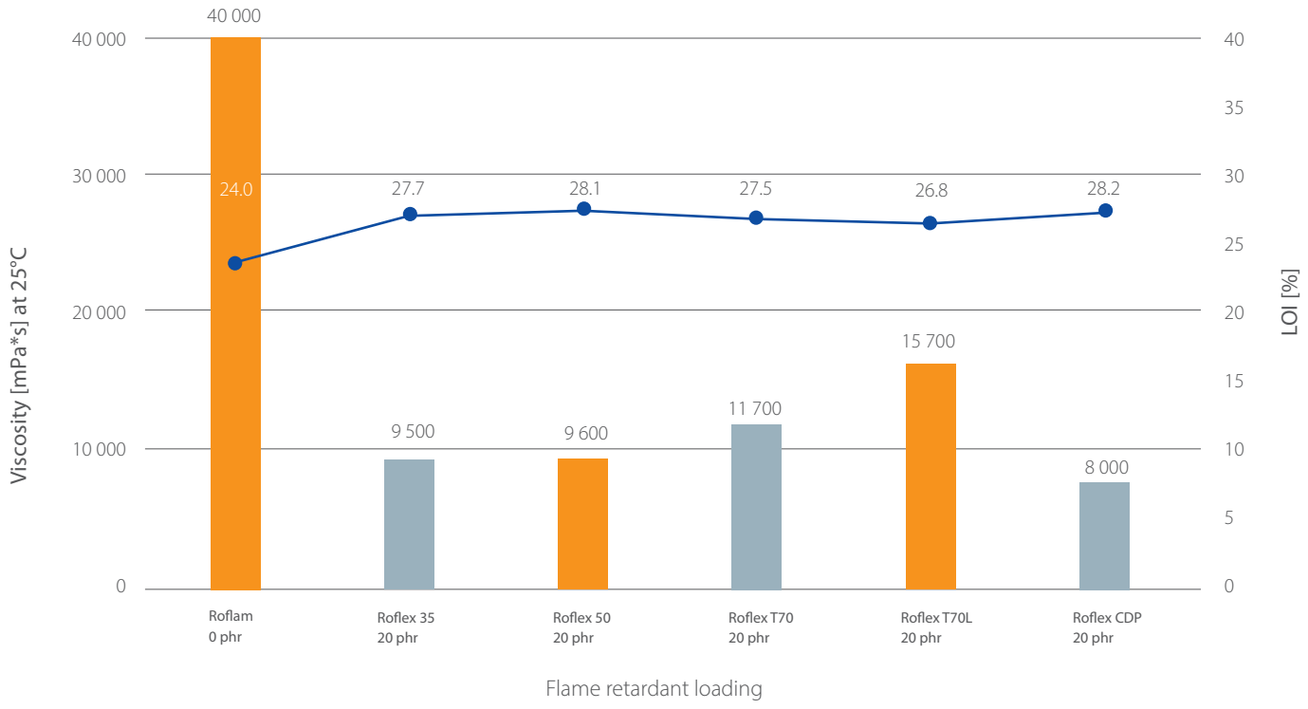
Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
Roflex 50	10			
APP	5	25.2	V1	17 600
Melamine	1.7			
Pentaerythritol	1.7			
Roflex 50	20			
APP	5	28.1	V0	9 600
Melamine	1.7			
Pentaerythritol	1.7			

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
Roflex T70	10	25.0	V1	18 900
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			
Roflex T70	20	27.5	V0	11 700
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
Roflex T70L	10	25.0	V1	22 500
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			
Roflex T70L	20	26.8	V0	15 700
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
Roflex CDP	10	25.0	V1	15 300
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			
Roflex CDP	20	28.2	V0	8 000
APP	5			
Melamine	1.7			
Pentaerythritol	1.7			

FR EFFICIENCY AND VISCOSITY REDUCTION



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