



# 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

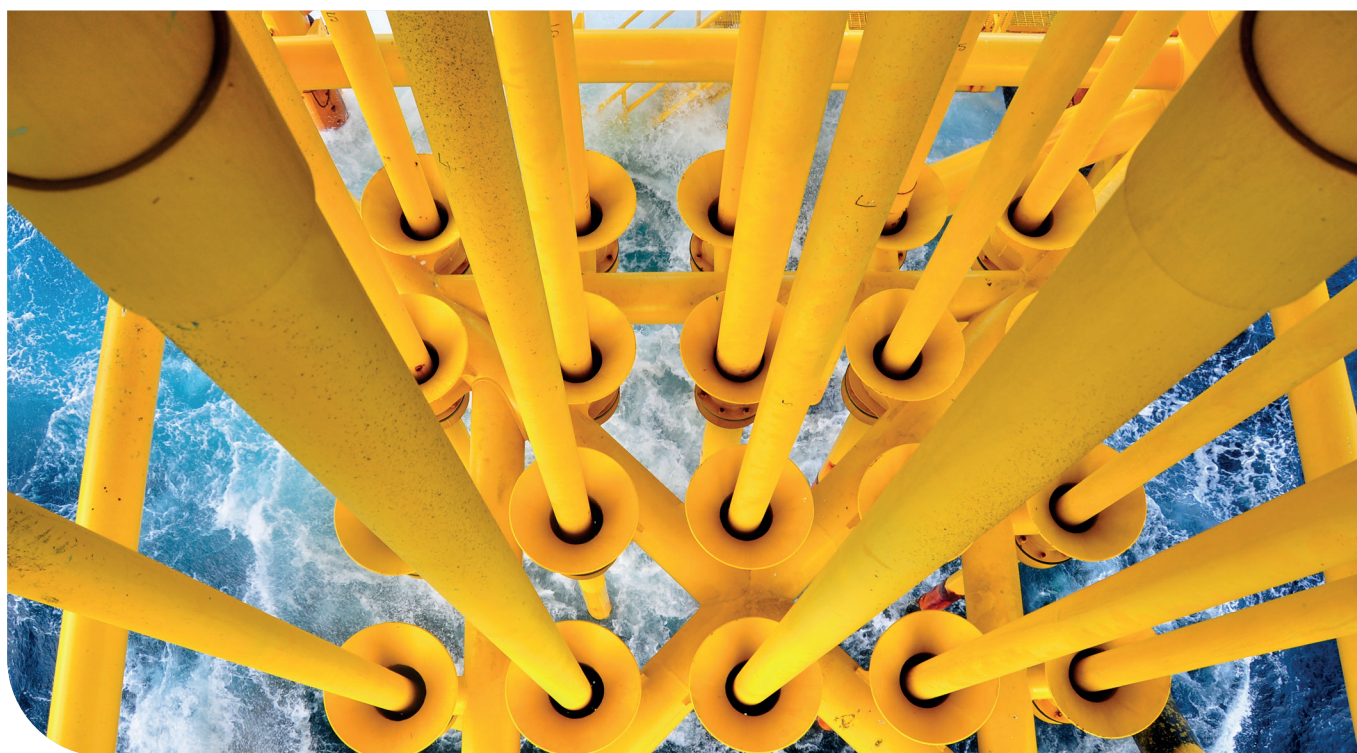
## KEY FEATURES

- 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 <sup>3</sup> ]	Viscosity at 25°C [mPa*s]	Phosphorous content	Feature
<b>Roflex 35</b>	Isopropylated triaryl phosphate	1.19	45	8.8	Low viscosity
<b>Roflex 50</b>		1.17	53	8.5	
<b>Roflex T70</b>	t-butylated triaryl phosphate	1.18	72	8.5	Safe to human health
<b>Roflex T70L*</b>		1.12	310	7.4	No-labelling
<b>Roflex CDP*</b>	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

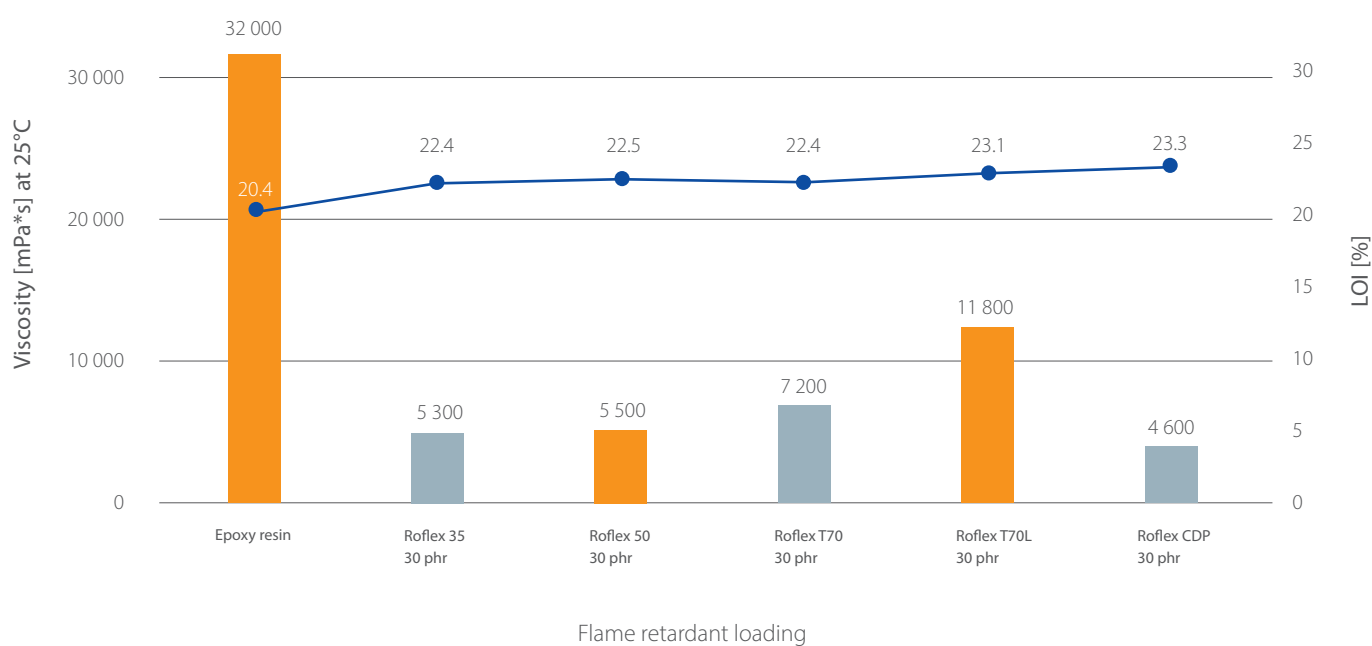
### BASIC FORMULATION

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	5 300	22.4
Roflex 50	10	15 000	21.9
	20	11 500	22.5
	30	5 500	22.5
Roflex T70	10	16 700	22.0
	20	13 500	22.2
	30	7 200	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	7 700	23.1
	30	4 600	23.3

## FR EFFICIENCY AND VISCOSITY REDUCTION



# FR SOLUTIONS FOR HIGH FILLED SYSTEMS

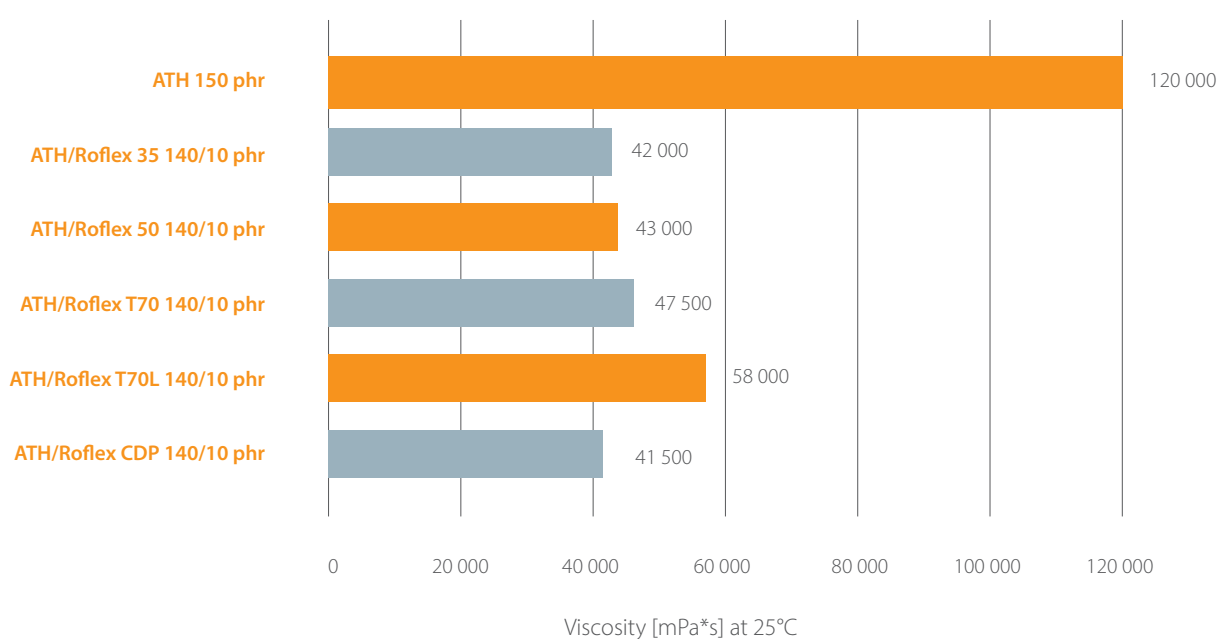
## BASIC FORMULATION

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	
	140	Roflex T70	10	47 500	36.8	
		Roflex T70L		58 000	37.2	
		Roflex CDP		41 500	37.0	

## VISCOSITY REDUCTION - HIGH FILLED SYSTEMS



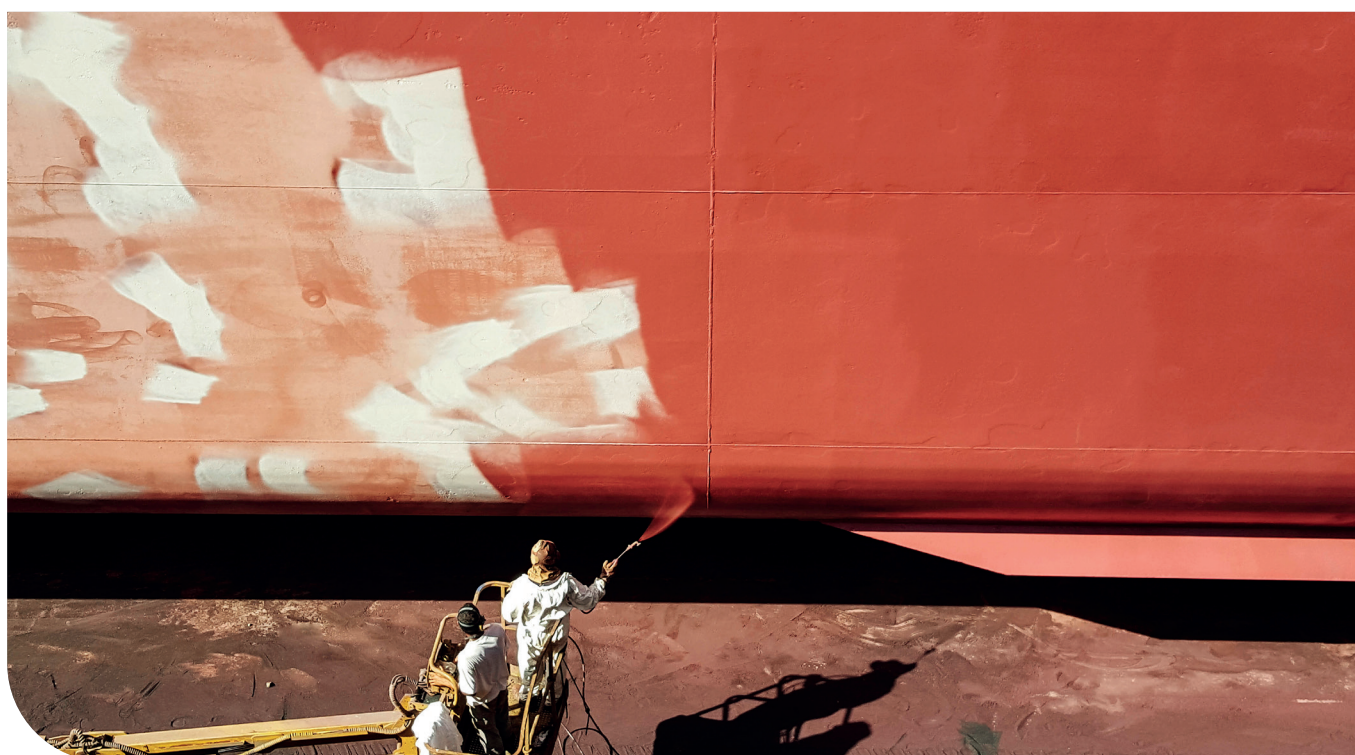
# FR SOLUTIONS FOR THICK EPOXY BASED INTUMESCENT COATINGS

## 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]
<b>Roflex 35</b>	10			
<b>APP</b>	5			
<b>Melamine</b>	1.7	25.6	V1	17 300
<b>Pentaerythritol</b>	1.7			

<b>Roflex 35</b>	20			
<b>APP</b>	5			
<b>Melamine</b>	1.7	27.7	V0	9 500
<b>Pentaerythritol</b>	1.7			

Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
<b>Roflex 50</b>	10			
<b>APP</b>	5			
<b>Melamine</b>	1.7	25.2	V1	17 600
<b>Pentaerythritol</b>	1.7			

<b>Roflex 50</b>	20			
<b>APP</b>	5			
<b>Melamine</b>	1.7	28.1	V0	9 600
<b>Pentaerythritol</b>	1.7			

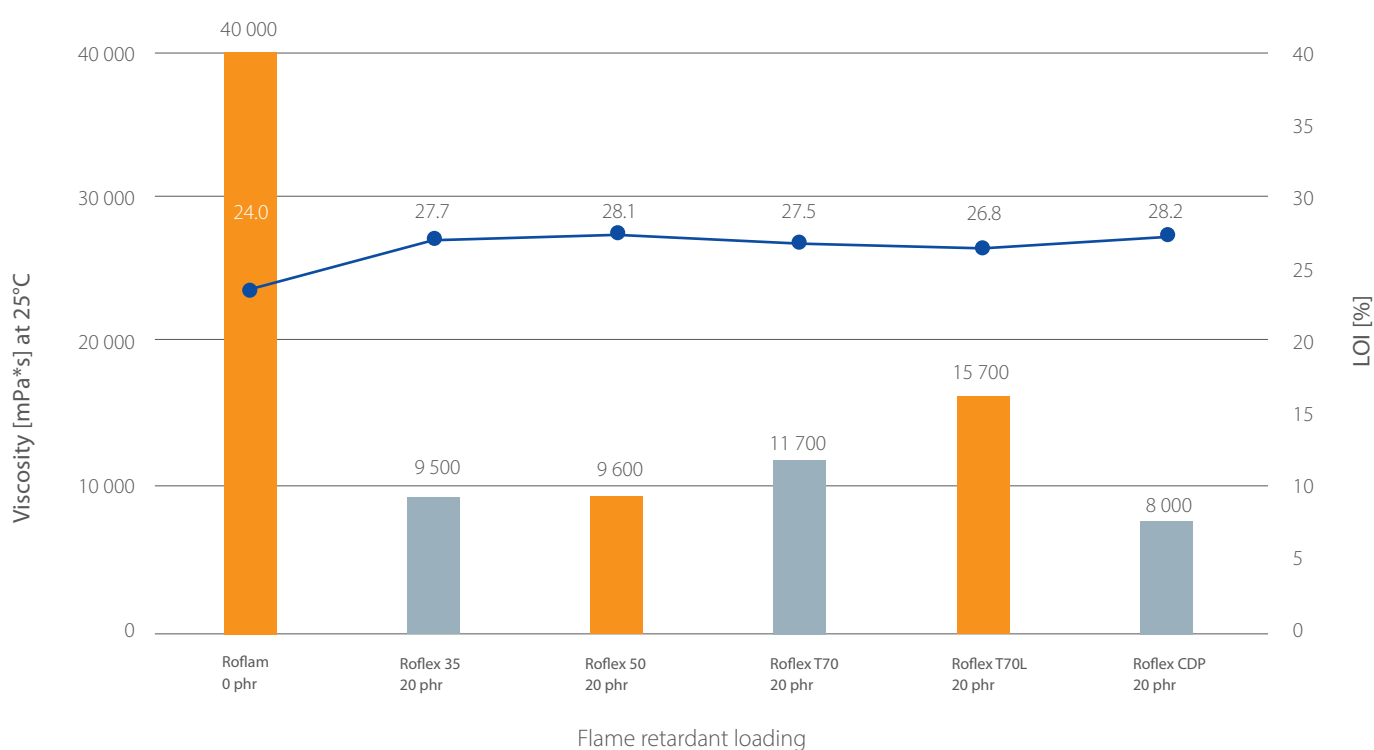
Formulation	phr	LOI [%]	UL-94 3.5 mm	Viscosity at 25°C [mPa*s]
<b>Roflex T70</b>	10			
<b>APP</b>	5			
<b>Melamine</b>	1.7	25.0	V1	18 900
<b>Pentaerythritol</b>	1.7			
<b>Roflex T70</b>	20			
<b>APP</b>	5			
<b>Melamine</b>	1.7	27.5	V0	11 700
<b>Pentaerythritol</b>	1.7			

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









PCC Rokita SA  
Sienkiewicza St. 4  
56-120 Brzeg Dolny, Poland  
products@pcc.eu

Please visit our capital group  
business platform:  
[www.products.pcc.eu](http://www.products.pcc.eu)

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