

Roflam series

Phosphorus flame retardants for
flexible and semi-rigid PU foams

Operating in 17 countries, in 39 different locations, PCC SE currently employs over 3 300 people.



About us

PCC Rokita SA is one of the largest chemical companies in Poland, offering a wide range of advanced products for various industrial sectors. The company has four main chemical complexes: Chlorine Complex, Polyols Complex, Phosphorus Chemicals Complex and Lubricants Complex. Each specialises in the production of innovative raw materials and additives used in a wide range of industries. Thanks to modern technologies and strong research and development facilities, PCC Rokita SA plays an important role in the European chemical market,

providing high quality products that meet the stringent requirements of its customers.

PCC Rokita pays particular attention to sustainable development, which is one of the key elements of its corporate strategy. In order to strengthen its competitive position in the chemical market, the company is committed to promoting responsible production and consumption along the entire value chain. The concept of sustainable development is therefore a key aspect of all the company's management and operational processes.

PCC ROKITA SA PCC PCG OXYALKYLATES IRPC	PCC ROKITA SA	PCC ROKITA SA	PCC EXOL SA PCC CHEMAX INC PCC PCG OXYALKYLATES	PCC SYNTEZA
Polyols 	Chlorine 	Phosphorus 	Surfactants 	Alkylphenols 
<ul style="list-style-type: none"> • Polyether polyols • Polyester polyols • Prepolymers • Polyurethane Systems 	<ul style="list-style-type: none"> • Chlorine • MCAA • Other Chlorine Downstream Product 	<ul style="list-style-type: none"> • Phosphorus derivatives • Naphthalene derivatives • Polycarboxyethers (PCE) 	<ul style="list-style-type: none"> • Anionic surfactants • Cationic surfactants • Nonionic surfactants • Amphoteric surfactants (betaines) • Chemical formulation 	<ul style="list-style-type: none"> • Nonylphenol • Dodecylphenol • Tristyrylphenol

PCC CONSUMER PRODUCTS SA	PCC ROKITA SA	PCC INTERMODAL SA	PCC BAKKISILICON HF.	PCC SE
Consumer Products 	Energy 	Logistics 	Silicon 	Holding & Projects 
<ul style="list-style-type: none"> • Household & industrial Cleaners, Detergents and Personal Care Products 	<ul style="list-style-type: none"> • Renewable Energy • Conventional Energy 	<ul style="list-style-type: none"> • Intermodal transport • Road Haulage • Rail Transport 	<ul style="list-style-type: none"> • Microsilica • Silicon Metal 	<ul style="list-style-type: none"> • Portfolio Management • Project Development

Roflam series – flame retardants

General info & uses

Roflam series – phosphorus-based flame retardants (FRs) thanks to their unique flame retarding profile are considered as one of the most efficient FR group. Phosphorus based FRs, both chloro-phosphates and non-halogenated provide a perfect balance of

process ability, flame retardancy and physical properties. Roflam products are particularly suitable safety solutions for furniture and textile application, as well as for a wide range of uses in the transport sector or building & construction industry.

Features

- Excellent flame retarding profile
- Compatibility
- Easy for processing
- High efficiency

Applications

- Acoustic insulation systems
- Sound proofing foam for car interiors
- Foam for mattress fillings
- Upholstered furniture
- Composite foam
- Thermal insulation
- Spray foam systems
- One Component Foams
- CASE
- Abrasion resistant cable jacketing materials





Typical properties

Product name	Chemical name	Viscosity (at 25°C)	Density (at 25°C)	Phosphorus content	Chlorine content
		EN ISO 12058	EN ISO 2811	based on composition (GC-MS analysis)	based on composition (GC-MS analysis)
		mPa·s	g/cm ³	% (w/w)	% (w/w)

Halogen-free FRs based on phosphate esters

Roflam B7	tert-butylated triaryl phosphate	72	1.18	8.5	—
Roflam B7V		70	1.18	8.5	—
Roflam B7L		310	1.12	7.4	—
Roflam F5	isopropylated triaryl phosphate	53	1.17	8.5	—
Roflam F6		69	1.16	8.3	—
Roflam R	tetraphenyl resocinol diphosphate	600	1.30	11.0	—

Oligomeric phosphorus FRs

Roflam OA20*	oligomeric aliphatic phosphate	2000	1.25	18	—
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Reactive halogen-free FR based on phosphorus

Roflam 6*	N,N-bis-(2-hydroxyethyl) aminomethane phosphonic acid diethyl ester	200	1.16	12.2	—
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Highly efficient chlorine-containing FRs

Roflam P	tris(2-chloro-1-methylethyl) phosphate	66	1.28	9.5	32.5
Roflam P LO		66	1.28	9.5	32.5

* available upon request












Solutions for PU flexible & semi-rigid foams

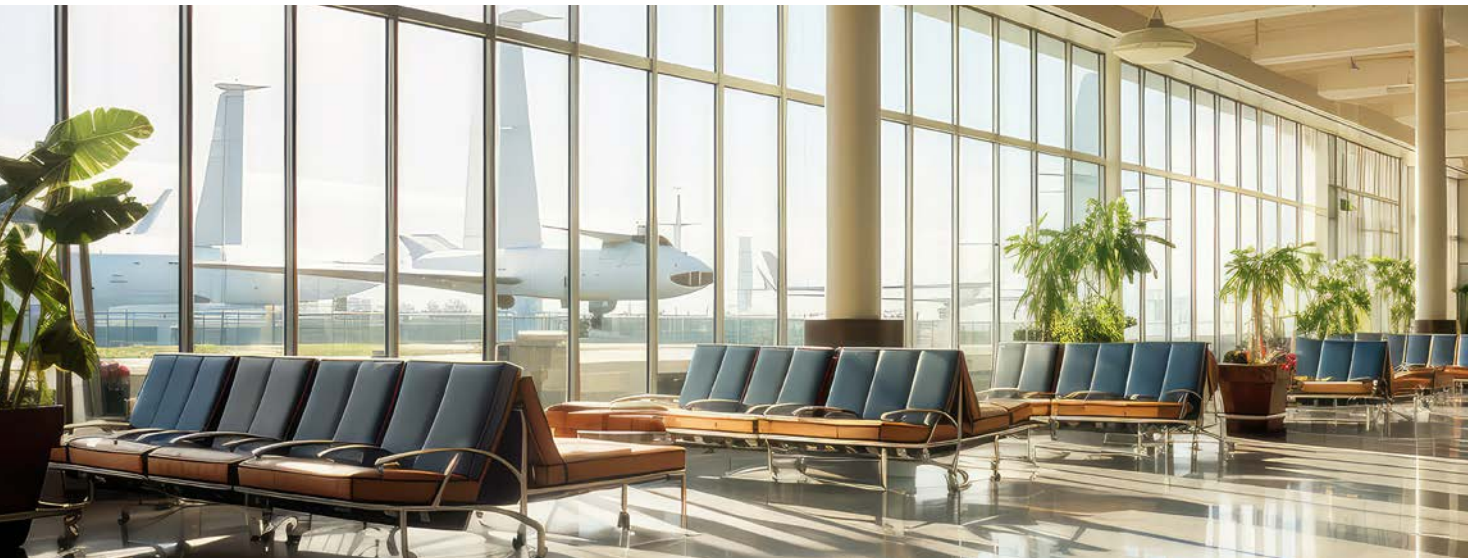
General info & uses

Product name	Activity type	FR type	FR efficiency	Viscosity reduction	Process ability	VOC emission	Scorch
Roflam P	additive	chlorine-containing	•••	•••	•••	high	moderate
Roflam B7	additive		••	••	••	moderate	low
Roflam B7L	additive		••	••	••	low	low
Roflam B7V	additive		••	••	••	low	low
Roflam OA20*	additive		•••	•	••	low	low

* available upon request

• good results •• very good results ••• excellent results

Roflam B7V	Roflam B7L	Roflam OA20
  Purpose: applications requiring significantly low VOC emission GHS pictograms: environmental hazard	     Purpose: applications requiring extremely safe solutions GHS pictograms: not applicable	    Purpose: specialty applications requiring outstanding fire resistance GHS pictograms: not applicable



Conventional polyether foams for automotive industry

Form. 1	Form. 2	Form. 3
Without flame retardant	Roflam OA20 2 php	Roflam OA20 3 php

Foam properties	Form. 1	Form. 2	Form. 3
Fire test FMVSS 302/ DIN 75200 / ISO 3795	B	Self-extinguishing SE/NBR	Self-extinguishing SE
Density	28-30 kg/m ³	28-30 kg/m ³	28-30 kg/m ³
Hardness (CV 40)	3-4 kPa	3-4 kPa	3-4 kPa
Resilience (ball rebound test)	45%	45%	45%
Compression set (50%, dry)	< 5%	< 5%	< 5%
Air flow	1-2 dm ³ /s	1-2 dm ³ /s	1-2 dm ³ /s

Components	php
Polyols	100
Water	3.0-3.5
Surfactants	1.0-1.5
Amine catalysts	0.1-0.3
Flame retardants*	2-3
Tin catalysts	0.2-0.4
TDI index	104

* depending on flammability requirements



Conventional polyether foams for the automotive industry

Form. 1	Form. 2	Form. 3	Form. 4	Form. 5
Roflam B7 / Roflam B7V / 5 php Roflam B7L	Roflam B7 / Roflam B7V / 6 php Roflam B7L	Roflam B7 / Roflam B7V / 10 php Roflam B7L	Roflam P 3 php	Roflam P 5 php

Foam properties	Form. 1	Form. 2	Form. 3	Form. 4	Form. 5
Fire test FMVSS 302 / DIN 75200 / ISO 3795	self-extinguishing BR < 102 mm/s SE/B	self-extinguishing no burn rate SE/NBR	self-extinguishing BR = 0 SE	self-extinguishing no burn rate SE/NBR	self-extinguishing BR = 0 SE
Density	30 kg/m³	30 kg/m³	30 kg/m³	30 kg/m³	30 kg/m³
Hardness (CV40)	3-4 kPa	3-4 kPa	3-4 kPa	3-4 kPa	3-4 kPa
Resilience (ball rebound test)	45%	45%	45%	45%	45%
Compression set (50%, dry)	< 4%	< 4%	< 4%	< 4%	< 4%
Air flow	2-3 dm³/s	2-3 dm³/s	2-3 dm³/s	2-3 dm³/s	2-3 dm³/s

Components	php
Polyols	100
Water	3.5-4.0
Surfactants	1.0-1.5
Amine catalysts	0.1-0.3
Tin catalysts	0.15-0.25
Flame retardants*	3-10
TDI index	110

* depending on flammability requirements



Conventional polyether foams for the automotive industry

Form. 6	Form. 7	Form. 8	Form. 9	Form. 10
Roflam B7 / Roflam B7V / 2 php Roflam B7L	Roflam B7 / Roflam B7V / 3 php Roflam B7L	Roflam B7 / Roflam B7V / 4 php Roflam B7L	Roflam P 2 php	Roflam P 3 php

Foam properties	Form. 6	Form. 7	Form. 8	Form. 9	Form. 10
Fire test FMVSS 302 / DIN 75200 / ISO 3795	self-extinguishing BR < 102 mm/s SE/B	self-extinguishing no burning rate SE/NBR	self-extinguishing no burning rate SE	self-extinguishing no burning rate SE/NBR	self-extinguishing no burning rate SE
Density	38-40 kg/m ³	38-40 kg/m ³	38-40 kg/m ³	38-40 kg/m ³	38-40 kg/m ³
Hardness (CV40)	4.5-5.5 kPa	4.5-5.5 kPa	4.5-5.5 kPa	4.5-5.5 kPa	4.5-5.5 kPa
Resilience (ball rebound test)	50%	50%	50%	50%	50%
Compression set (50%, dry)	< 3%	< 3%	< 3%	< 3%	< 3%
Air flow	0.8-1.3 dm ³ /s	0.8-1.3 dm ³ /s	0.8-1.3 dm ³ /s	0.8-1.3 dm ³ /s	0.8-1.3 dm ³ /s

Components	php
Polyols	100
Water	2.5-3.0
Surfactants	0.5-1.5
Amine catalyst	0.1-0.3
Tin catalyst	0.15-0.25
Flame retardants*	2-4
TDI Index	115

* depending on flammability requirements



High resilience moulded foams for transportation and furniture

Form. 1		Form. 2		Form. 3	
Roflam B7 / B7V / B7L	9 php	Roflam B7 / B7V / B7L Roflam P	15 php 5 php	Roflam B7 / B7V / B7L Roflam P Melamine	20 php 5 php 25 php

Foam properties	Form. 1	Form. 2	Form. 3
Fire test FMVSS 302 / DIN 75200 / ISO 3795	pass	—	—
Fire test BS 5852 CRIB 5	—	pass	—
Fire test 14 CFR / CS 25.853	—	—	pass
Density	55 kg/m ³	55 kg/m ³	55 kg/m ³
Hardness (CV40)	6 kPa	6 kPa	6 kPa
Hardness (CLD)	260 N	260 N	260 N
Compression set	< 10%	< 10%	< 10%

Components	php
Polyols	100
Water	3.0-4.0
Surfactants	0.8-1.2
Amine catalysts	1.8-3.0
Flame retardants*	9-50
MDI index	300

* depending on flammability requirements



High resilience slabstock foams for furniture

Form. 1	Form. 2	Form. 3
Roflam B7 / B7V / B7L Melamine	10 php 20 php	Roflam P Melamine
	10 php 15 php	Roflam P
		20 php

Foam properties	Form. 1	Form. 2	Form. 3
Fire test BS 5852 CRIB 5	pass	pass	pass
Density	35-40 kg/m ³	35-40 kg/m ³	35-40 kg/m ³
Hardness (CV40)	4.5 kPa	4.1 kPa	3.5 kPa
Resilience (ball rebound test)	45-55%	45-55%	45-55%
Compression set (50%, dry)	< 10%	< 10%	< 10%
Air flow	1-2 dm ³ /s	1-2 dm ³ /s	1-2 dm ³ /s

Components	php
Rokopol iPol H	100
Water	3.5-4.0
Surfactant for CMHR foams	0.25-0.30
DEOA 90%	0.8-1.4
Crosslinker	1.0-1.4
Amine catalysts	0.04-0.16
Tin catalysts	0.10-0.20
Flame retardants*	20-30
TDI index	98-105

* depending on flammability requirements





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September 2025

The information in the catalogue is believed to be accurate and compiled to the best of our knowledge; however, it should be considered as introductory only. Detailed information about our products is available in TDS and MSDS.

The suggestions for product applications are based on our best knowledge.

The responsibility for the use of products in conformity or otherwise with the suggested application, and for determining product suitability for the user's own purposes rests with the user.

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