PCC

Rokolub® FR Series

Fire resistant hydraulic fluids

Local. Global. Integrated.


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

About us

The PCC Group is an international capital structure made up of dozens of companies operating in three major sectors of the economy: Chemicals, Energy and Logistics. The organisations within the PCC Group are both business units engaged in production activities and service companies operating simultaneously for the external market.

The PCC Group is centrally managed by the German company PCC SE and comprises more than 74 companies at 39 locations in 17 countries around the world. One of the key elements of PCC SE's strategy is the dynamic development of the chemicals business by exploiting the potential of new market segments and diversifying the portfolio of raw materials and chemical formulations in line with current trends in various industries. Every day, our specialists work on the stable growth and development of their organisations, making the PCC Group stronger and building a solid business platform for all contractors interested in reliable and longterm cooperation.

PCC ROKITA SA
PCC PCG OXYALKYLATES IRPC

Polyols

- Polyether polyols
- Polyester polyols
- Prepolymers
- Polyurethane Systems

PCC ROKITA SA

Chlorine

- Chlorine
- MCAA
- Other Chlorine Downstream Product

PCC ROKITA SA

Phosphorus

- Phosphorus derivatives
- Naphthalene derivatives
- Polycarboxyethers (PCE)

PCC EXOL SA
PCC CHEMAX INC
PCC PCG OXYALKYLATES

Surfactants

- Anionic surfactants
- Cationic surfactants
- Nonionic surfactants
- Amphoteric surfactants (betaines)
- Chemical formulation

PCC SYNTEZA

Alkylphenols

- Nonylphenol
- Dodecylphenol
- Tristyrylphenol

PCC CONSUMER PRODUCTS SA

Consumer Products

- Household & industrial Cleaners, Detergents and Personal Care Products

PCC ROKITA SA

Energy

- Renewable Energy
- Conventional Energy

PCC INTERMODAL SA

Logistics

- Intermodal transport
- Road Haulage
- Rail Transport

PCC BAKKISILICON HF.

Silicon

- Microsillica
- Silicon Metal

PCC SE

Holding & Projects

- Portfolio Management
- Project Development

General information

Rokolub® FR is a synthetic base oil series intended for formulating non-aqueous fire-resistant hydraulic fluids (HFDR type) in accordance with ISO 6743-4. Thanks to their unique properties, Rokolub® FR fluids are the best available option for applications with a high potential risk of fire. Furthermore, both perfect oxidation stability and appropriate thermal stability make Rokolub® FR series preferable for high temperatures as well. Rokolub® FR's features enable the formulation of fire resistant fluids suitable for the power generation industry as well as many general industrial applications requiring outstanding fire resistance.

Rokolub® FR, the newest generation phosphate ester that stands out balanced hazard statements. In accordance with GHS neither of these fluids give influence on human health. Moreover, both Rokolub® FR T-46 ultra and Rokolub® FR T-68 distinguishes themself from other HFDR fluids since neither labels nor classification are applicable for them.

Applications:

- steel & aluminum die casting machines
- tilting systems of iron melting furnaces
- reciprocating air compressors
- gas & steam turbines

Features:

- extremely difficult to ignite
- self-extinguishing properties
- unique fire-resistant performance
- excellent lubrication
- perfect water separation
- no copper or steel corrosion
- outstanding thermal and oxidative stability
- improved environmental & human health hazard statements

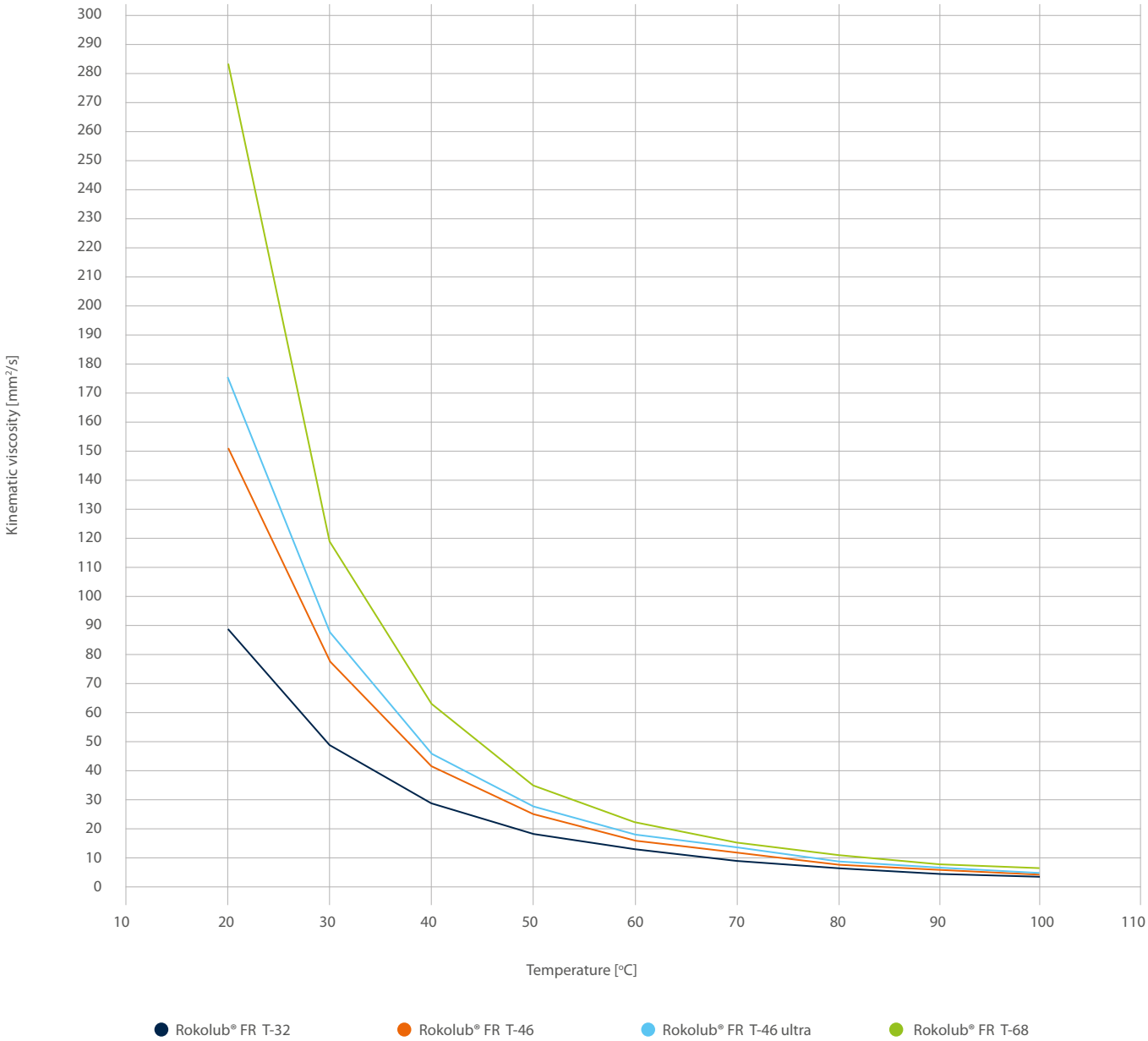
Fire performance comparison of hydraulic fluids

Parameter	Phosphate ester	POE	PAG	Mineral oil
Flash point, °C ASTM D92	240-270	260-320	200-270	230-250
Fire point, °C ASTM D92	310-330	310-380	300-310	260-280
Autoignition temperature, °C ASTM E659	550-590	400-430	400-420	300-340
Wick flame persistence, s ISO 14935	< 4	burning continues	burning continues	burning continues
Manifold ignition, °C ISO 20823	> 700	440-480	400-420	370-395
Spray ignition FM Global Standard	Group 1	Group 1-2	Group 2	Group 3
Spray ignition, <60 s ISO 15029-1	pass	fail	fail	fail

Typical properties

Product name	Chemical name	Appearance	ISO VG	Density (at 20°C)	Acid number	Water content
		visual method	ISO 3448	ISO 2811	in-house method	ISO 760
		—	—	g/cm³	mgKOH/g	% w/w
Rokolub® FR T-32	tert-butylphenyl-phenyl phosphate	transparent, colourless to slightly yellow liquid	32	1.16	< 0.1	< 0.1
Rokolub® FR T-46			46	1.15	< 0.1	< 0.1
Rokolub® FR T-68			68	1.13	< 0.1	< 0.1
Rokolub® FR T-46 ultra			46	1.15	< 0.1	< 0.1

Kinematic viscosity-temperature chart



Complementary data

Product name	Viscosity at 40°C	Viscosity at 100°C	Viscosity Index	Flash point	Fire point	Autoignition temperature	Pour point
	ISO 3104	ISO 3104	ASTM D2270	ISO 2592	ISO 2592	ASTM E659	ISO 3016
	mm^2/s	mm^2/s	—	°C	°C	°C	°C
Rokolub® FR T-32	30.6	5.1	91	> 240	> 300	> 500	< (-15)
Rokolub® FR T-46	41.7	5.4	35				
Rokolub® FR T-68	65.4	6.6	15				
Rokolub® FR T-46 ultra	50.2	5.9	32				

Fire resistance performance

Product name	Wick flame persistence	Manifold ignition	Spray ignition	Spray ignition
	ISO 14935	ISO 20823	ISO 15029-1	ISO 15029-2
	s	—	s	—
Rokolub® FR series	< 1	> 700°C, category I(T)	< 1	E (D/D)

Corrosiveness & stability

Product name	Oxidation stability*	Hydrolytic stability*	Hydrolytic stability*	Copper strip corrosion test
	DIN EN 14832	DIN EN 14833	ASTM 2619	EN ISO 2160
	mg/gKOH	mg/gKOH	mg/gKOH	—
Rokolub® FR series	< 2.0	< 2.0	< 0.5	pass

* total acid number change

AW/EP performance

Product name	AW 4-ball test		EP 4-ball test	
	ASTM D4172*		ASTM D2783** / DIN 51 350**	
	Method B	Method A		
	Scar diameter, mm		Last non-seizure load, kg	Weld point, kg
Rokolub® FR series	0.52 – 0.59	0.40 – 0.45	50	80

* conditions: temperature 75°C, duration 60 min, method A - load 15 kg (147 N), method B - load 40 kg (392 N)
** conditions: room temperature, 10 sec

Applications

Product name	General Industrial Hydraulic Systems			Power Generation			
	Steel & aluminium die casting	Hydraulic tilting systems	Reciprocating air compressors	Gas turbine hydraulics & lubrication	Steam turbine hydraulics & lubrication	Combined-cycle power systems	Steam turbine EHC systems
Rokolub® FR T-32	o	o	o	●	●	●	o
Rokolub® FR T-46	●	●	o	●	●	●	o
Rokolub® FR T-68	o	o	●	o	o	o	o
Rokolub® FR T-46 ultra	●	●	o	●	●	●	●

● highly recommended use
o optional use

Compatibility

All components, such as seals, adhesives, coatings, and wire insulations need to be made with phosphate ester resistant materials. These specialty materials are well-known and available into component manufacturers and suppliers.
Silicone-, butyl-, fluorocarbon-based seals are considered as fully compatible materials. In case of any non-resistant materials swelling may occur and as a consequences leakage of fluid may appear. Material specified as insulated in wire are polytetrafluoroethylene, silicone rubber, polyethylene, polypropylene, and nylon. Polyvinyl chloride is not advised as an outer coating of wires. Most of paints and coatings, especially these polyurethane and two-component epoxies-based ones, are non-compatible with phosphate ester fluids. That is why uncoated surfaces are recommended to have contact with these products.

Product mixing

Take notice that using of Rokolub® FR series with other fluid types, excluding aryl phosphate ester fluids, is not advised. In particular, fluids that contains water are incompatible with them and they cannot be mixed.

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Please visit our capital group business platform:
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