Patech

PATECH FINE CHEMICALS CO., LTD
百達精密化學股份有限公司

Our Conviction

Quality
Service
Innovation

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Product Categories

Refrigeration Lubricants

- POE for HFC Refrigerants
- POE for HCFC Refrigerants
- POE for HFO Refrigerants

Special Plasticizers

- Nontoxic Plasticizer
- Hi & Low Temperature Plasticizer
- Polymeric Plasticizer
- Viscosity Depressant

Lubricant for Plastics

- Internal & External Lubricant for PVC
- Lubricant for TPU
- Lubricant for Engineering Plastics
- Lubricant for General Plastics

Base Oil for Lubricants

- Lubricant for Metal Working
- Lubricant for Industrial
- Lubricant for Automobile
- Lubricant for Textile
- NSF HX-1 Certified Lubricant

Esters for Cosmetics

- Ester for Hair Care
- Ester for Skin Care
- Ester for Sunscreen
- Ester for Make-up

Quality | Service | Innovation

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Profile

Patech Fine Chemicals Co., Ltd., led by a group of highly trained and experienced chemical engineers, was founded in year 2000 during the financial crisis. Despite the unfavorable macro-environment, the company was able to complete its factory construction, developed product line, and commenced production all within the first year. Today, we are equipped with a fully automatized factory and have developed an advanced core technology in Esters. In addition, we are committed to being an environmentally friendly and flexible company. Over the years, Patech has actively pursuit

the development of esters for use in different areas of chemical application and established a complete customized service program. Our diversified portfolio of high quality products is not only well received in the Asia-Pacific and Greater China, but also helped us successfully entered the Japan and EU market.

Our conviction of "Quality, Service, and Innovation" and our commitment to protect the environment is evident in our ISO 9001 and ISO 14001 certification. We are dedicated to providing reliable high quality products and services to our customers, at the same time protecting the safety of our employees and the environment. Through expansions and debottlenecking of production, and continuous research, we strive to satisfy the needs of our customers and help create competitive advantages and growth opportunities for both parties.

In addition, Patech has proactively sought to gain compliance with the European Union's regulation on chemical products. We have successfully completed REACH pre-registration for most of our products, and will aggressively expand to full registration. Patech has continued to uphold a high safety standard so that our customers can feel at ease using our products worldwide.

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Patech's Strengths

- Industry's leader in professional esterification technology.
- Self-developed production systems.
- Reliable supply of consistent & high quality products.
- International Quality Standard ISO 9001 & ISO 14001 certified.
- Geographically located near the main supply market of raw material for refrigeration lubricants.
- Manufactured in Taiwan to ensure both high quality and cost economy.
- Advanced research and production equipment that enables us to provide high standard of technical support.
- In-house ability to perform seal-tube oxidation stability, refrigerant miscibility, and PVT analysis.
- Flexible and fully automated production line to provide highly customized products and satisfies customer's demands.

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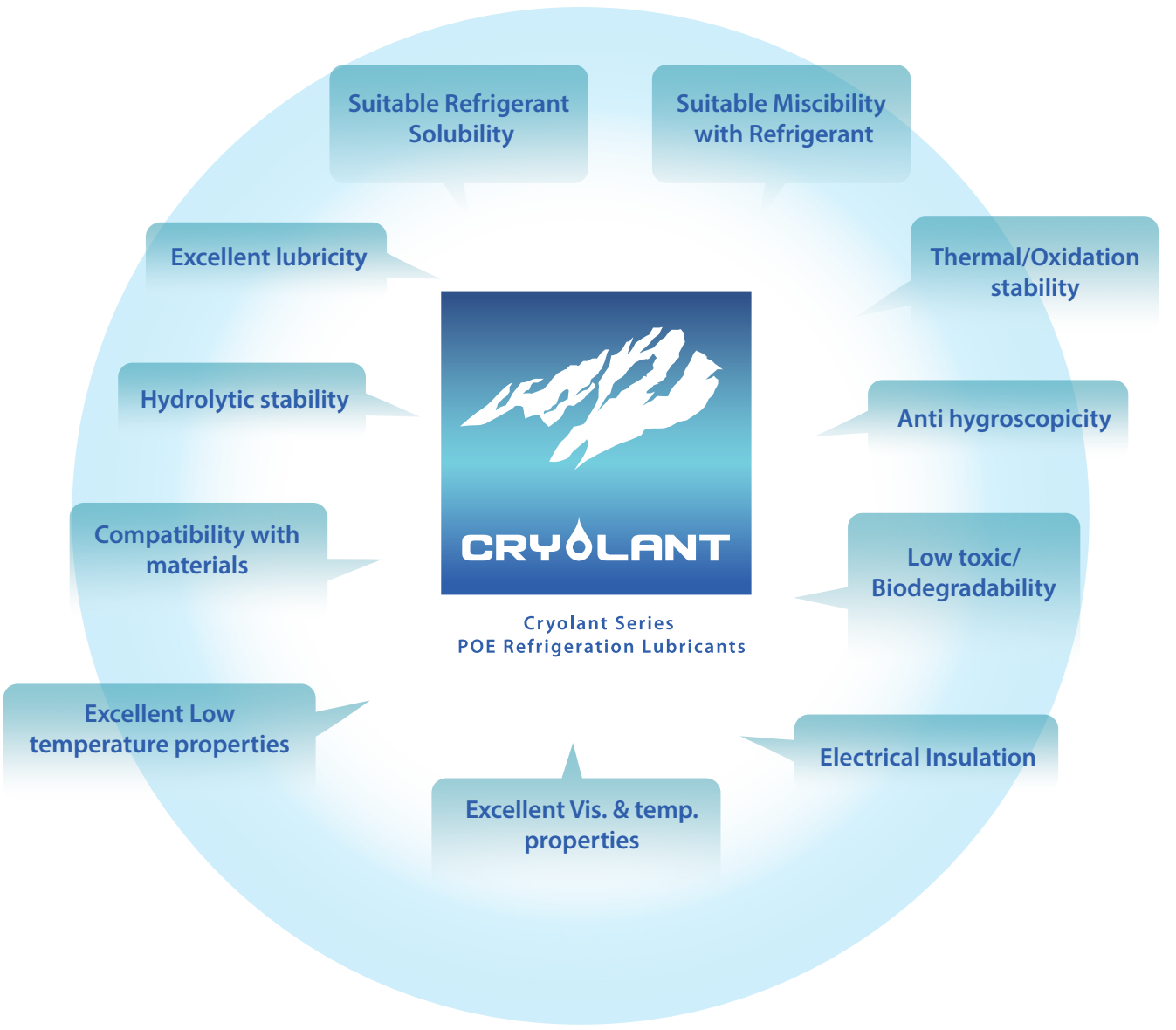
Refrigeration Lubricant Requirements



Polyol Ester (POE) Refrigeration Lubricants: Patech Cryolant Series

- HFC / HCFC / CO2 / HFO

Using Patech's leading chemical structure design and production technique, we have successfully developed a range of poyol ester (POE) refrigeration lubricants within our Cryolant series products. We now offer a complete product line, covering a wide viscosity range with outstanding low temperature characteristics, and excellent thermal, oxidation, and hydrolytic stability. This enabled the Cryolant series to satisfy the harsh performance demands of the refrigeration industry.

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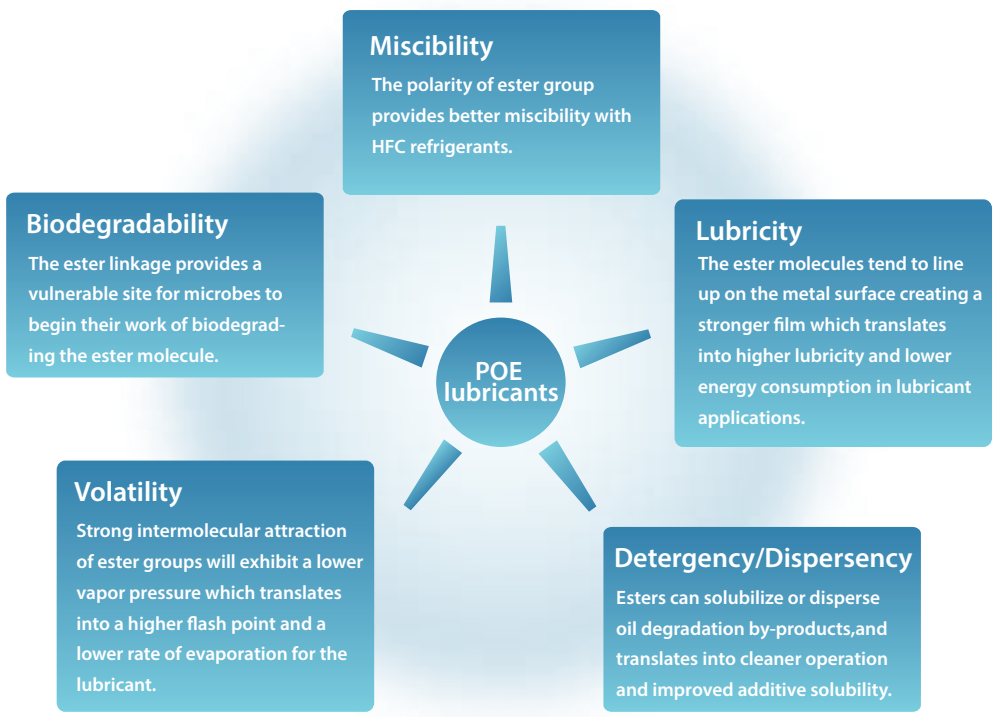
Advantage of Cryolant POE Refrigeration Lubricant



Refrigeration Lubricants Comparison

Requirements	Polyol Ester POE	Polyvinyl ether PVE	Polyalkylene Glycol PAG	Alkybenzene AB	Mineral Oil MO
Chemical Stability	●	●	●	●	●
Thermal Stability	●	●	●	▲	×
Hydrolytic Stability	▲	●	●	●	●
Miscibility with HFC	●	●	●	×	×
Miscibility with CO2	●	▲	●	×	×
Miscibility with HC	●	--	--	●	●
Volatility	●	●	▲	●	▲
Low Temperature Properties	●	●	▲	●	▲
Viscosity & Temperature Properties	●	●	●	▲	▲
Anti Hygroscopicity	▲	▲×	▲×	●	●
Volume Resistivity	●	●	▲	●	●
Seal Material Compatibility	▲	●	●	●	●
Lubricating Properties	●	●	●	●	●
Biodegradability	●	●	●	▲	×

● : GOOD ▲ : FAIR × : POOR

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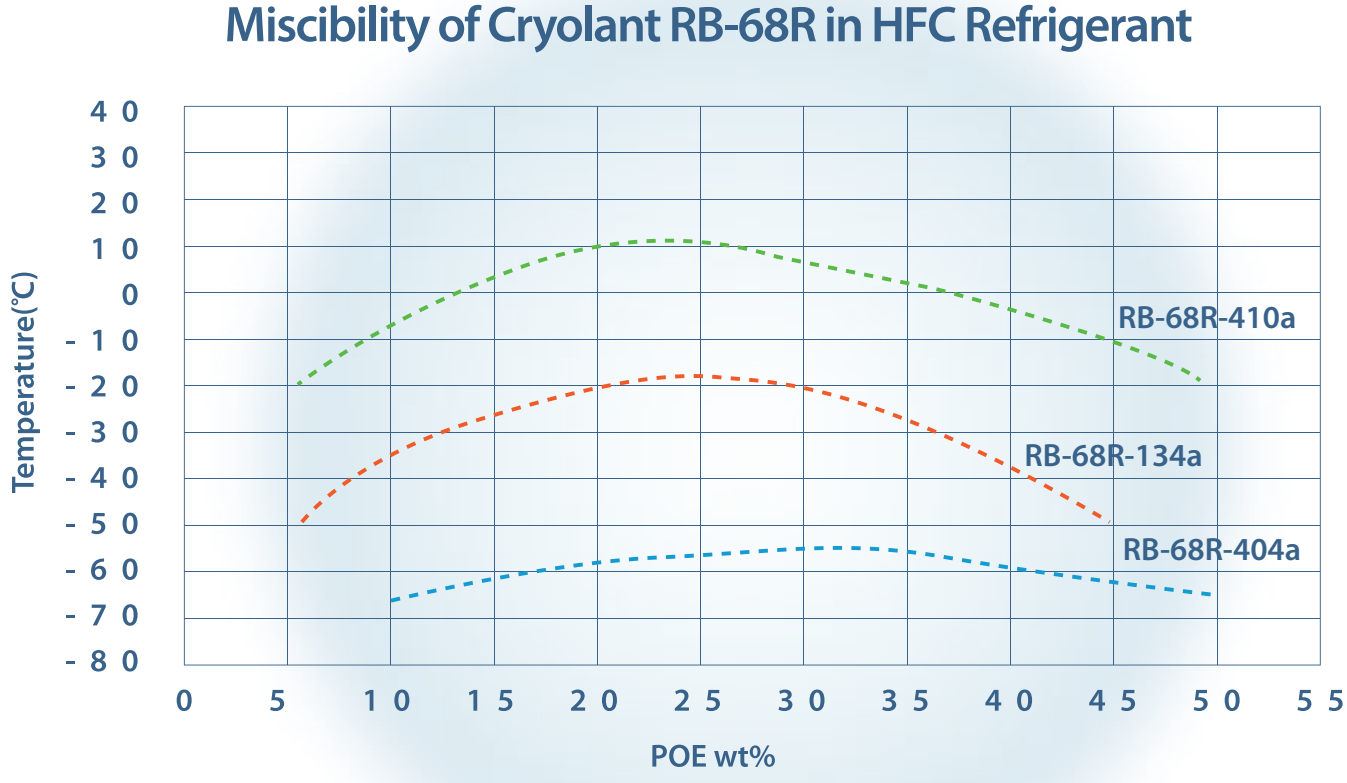
Patech possesses in-house ability to perform refrigerant miscibility, P-V-T charts and seal-tube thermal oxidation stability.

Lubricant design for optimum energy efficiency requires consideration of the solubility and miscibility of the refrigerant/lubricant combination in both the compressor and refrigeration loop.

Miscibility Curves



Consideration:

- Oil return for compressor design
- Impact on evaporator heat transfer
- Impact on condenser heat transfer

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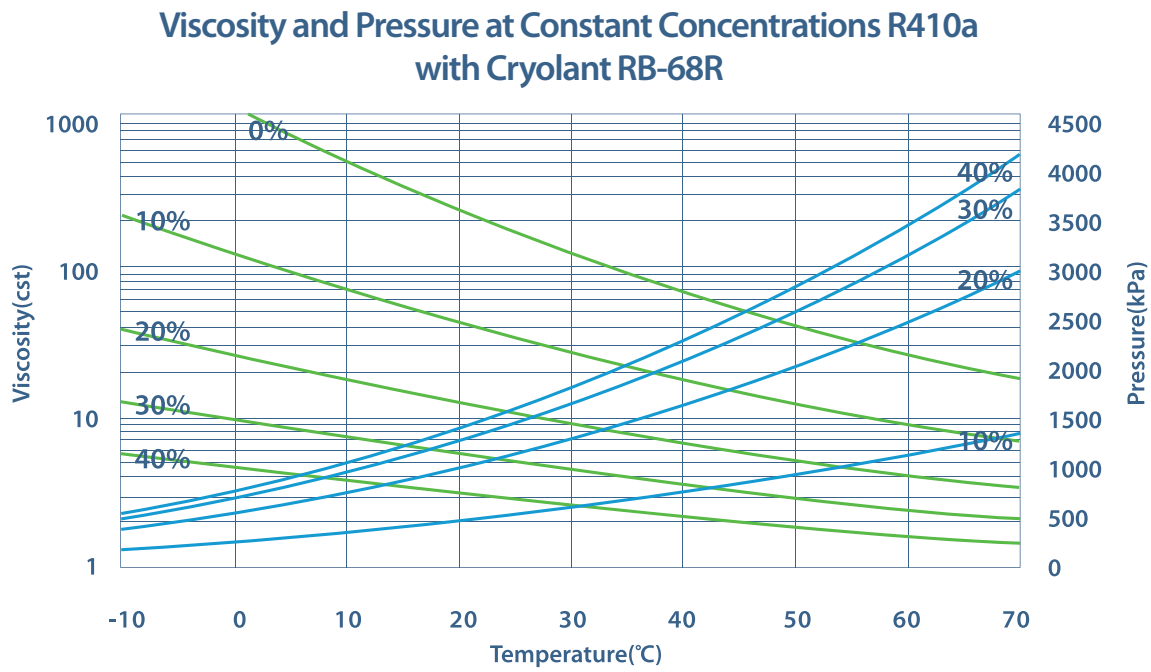
P-V-T Charts (Solubility Curves)



- Pressure-Viscosity-Temperature-composition relationship
- Compressor design consideration

Thermal Oxidation Stability (Seal-Tube Test)

Thermal Stability Test of Cryolant RB68R with HFC Refrigerant

		Cryolant RB68R	Cryolant RB68R	Cryolant RB68R
Initial Lubricant Moisture(ppm)		20	20	20
Refrigerant		R134a	R404a	R410a
Appearance		Clear	Clear	Clear
Sludge Formation		None	None	None
Acid Value (mgKOH/g)	Initial	0.01	0.01	0.01
	After	<0.1	<0.1	<0.1
The state of metal*	Copper	◎	◎	◎
	Iron	◎	◎	◎
	Aluminum	◎	◎	◎

✳Visual Rating ◎: No Chage ○: Slight Color Change △: Moderate Colro Change
Test Method: Sealed Glass Tube Test (ANSI/ASHRAE Standard 97-2007)
Temperature: 175℃ Duration: 14 days Lubricant / Refrigerant (wt/wt) = 1/1

- Thermal stability consideration in compressor & condenser
- Capillary tube pressure drop & blockage consideration

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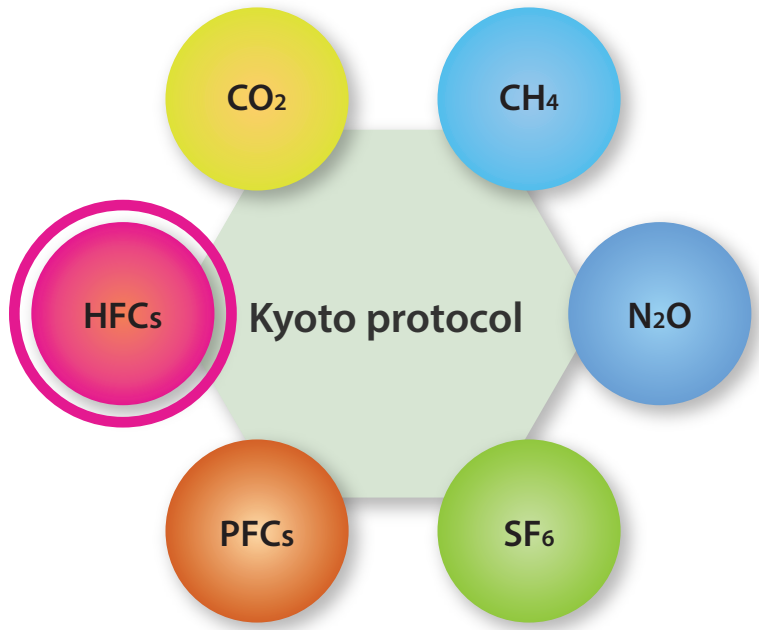
Best Solution for Next Generation Low GWP Refrigerants

Using Patech's leading chemical structure design and production technique, we have successfully developed a range of poyol ester (POE) refrigeration lubricants for next generation refrigerants, for example: R32 and HFO

Global-warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere.



ODP = 0	ODP = 0 Low GWP
R134a GWP = 1430	R32 GWP = 675
R404a GWP = 3900	HFO GWP < 10
R407c GWP = 1800	
R410a GWP = 2100	

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