Oil for Rotary Vacuum Pumps ULVOIL® R-4 / R-7 / R-80

R-4/ R-7, and R-80 are petroleum based oil for general use created for both cost effectiveness and quality through hydrogenation improvement and high vacuum rectification processing.

Features

- R-80 has great general applicability and was developed primarily for small, medium, and large oil rotary pumps.
  R-4 and R-7 are cost effective products with high general applicability. When using a pump with an extremely high gas load, chemical changes may occur in the oil due to generated heat and chemical composition of the gasses being pumped. Therefore, it is important to select oil that suits the pump type and operating conditions.
  Although fluoride based synthetic oil has stable chemical properties, the Super R series is recommended for even higher quality level of high end lubrication, rust prevention, and sealing.

Specifications

Item \ Model				Petroleum based mineral oils			Test method
				R-4	**R-7**	**R-80**	
Ultimate pressure			Pa	<4 x 10^{-1}	<4 x 10^{-1}	<7	Internal ULVAC evaluation method
Characteristics	Color			Light yellow, transparent	Light yellow, transparent	Light brown, transparent	Visual evaluation
	Kinematic viscosity	40 °C	mm^2/s	47	69	55	JIS K 2283
		100 °C	mm^2/s	7	9	8	JIS K 2283
	Viscosity index			108	102	110	JIS K 2283
	Water content		%	0.01>	0.01>	0.01>	JIS K 2275
	Total acid number		mg KOH/g	0.05>	0.05>	1.9>	JIS K 2501
	Density		g/cm^3	0.87	0.87	0.88	JIS K 2249
	Ignition point		°C	254	260	234	JIS K 2265
	Pour point		°C	–10.0>	–10.0>	–15.0>	JIS K 2269
Features				Low viscosity For low temperature startup	All-purpose pump oil	High viscosity index For high temperatures and high loads	—
Main applications				Roots pumps, small pumps	Medium to large pumps	Large pumps for food and packaging	—
Container			L	20, 2.0	20, 2.2	20, 2.0	—

Property Comparison by Product

Hydrofluoride resistivity

Kinematic viscosity fluctuation rate after hydrofluoride added and mixed.

Test oil	ULVOIL R-7	ULVOIL Super R-7000	ULVOIL Super R-7500
Qualitative evaluation	Good	Excellent	Excellent
Kinematic viscosity reduction (%)	27	1.1	1.3
Kinematic viscosity before test (mm^2/s)	72.6	72.8	68.5
Kinematic viscosity after test (mm^2/s)	53.0	72.0	67.6

(Note) Test procedure: 4.5 g of 47 % hydrofluoride was added to 150 g of test oil and mixed at 150 r/min for 6h under a temperature of 70 °C. The oil portion was then extracted using hexane, washed with water, and dehydrated. The kinematic viscosity was then measured.

Thermal oxidation resistance stability

Rotary pump oxidation stability test (RBOT) JIS K 2514*

Test oil	ULVOIL R-7	Petroleum based oils of other companies	ULVOIL Super R-8000	Hydrocarbon based synthetic oils of other companies
Qualitative evaluation	Excellent	Fair	Excellent	Good
Continuous time*	423	39	360	172

** Test procedure: 50 g of test oil and 5 ml of distilled water were placed in a test container containing a copper catalyst coil. The container was then sealed in a 0.63 M/Pa oxygen environment. This was rotated in a 150 °C isothermal bath at 100 r/min and the time required (min) for the oxygen pressure to fall 0.175 M/Pa from the maximum pressure was measured.*

Emulsification resistance test

Emulsification resistance test JIS K 2520*

Test oil	ULVOIL R-7	ULVOIL Super R-7000	Hydrocarbon based synthetic oils of other companies
Qualitative evaluation	Excellent	Excellent	Excellent
Test result	40-40-0(5)	40-40-0-(5)	40-40-0-(5)

** Test procedure: 40 ml of test oil and 40 ml of distilled water were placed in a test container and heated at 54 °C while being mixed by a fixed stirring plate at 700 r/min. The raw emulsification was then observed using the following formula: Oil layer (ml) - water layer (ml) - emulsification layer (ml)*

The amount of generated sludge

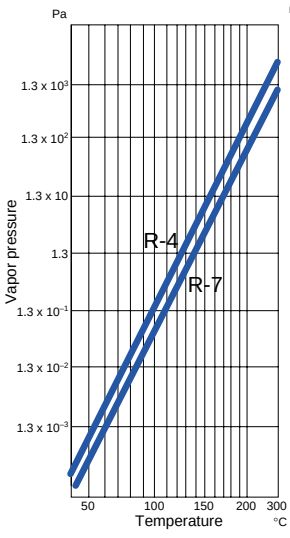
The amount of generated sludge with high load and long hour operation

Technical Data for R Series

- Satisfies the 3 major requirements of oil rotary pumps.
  R Series/Super R Series
  The following 3 checkpoints must be satisfied when selecting oil for oil-sealed rotary vacuum pumps.
  1. Low vapor pressure properties that determine ultimate pressure.
  2. Seal properties that close spaces must be suitable.
  3. Lubrication properties supporting mechanical part movements.
     ULVOIL R and Super R Series oil is specialized for oil-sealed rotary vacuum pumps and has excellent stability relative to thermal and mechanical loads while having little chemical reactivity relative to materials entering from outside the system.

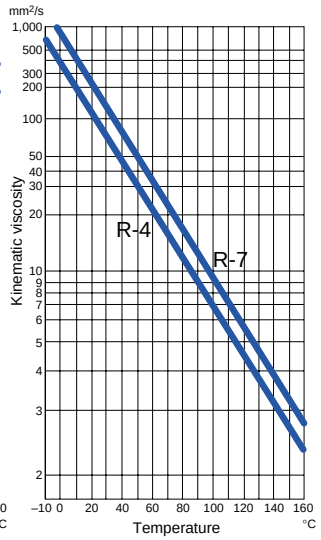
Vapor pressure

R Series vapor pressure - temperature characteristics



Viscosity characteristics

R Series kinematic viscosity - temperature characteristics



Total acid number characteristics

Total acid number changes for oil due to high loads and long term operation