

Hydraulic Fluid

Hydraulic fluid categories

● General-purpose hydraulic oil

Petroleum-based	General-purpose hydraulic fluid (R&O)	
	Wear-resistant hydraulic fluid * ¹	Zinc based
		Non-zinc based

● Non-flammable or flame-resistant hydraulic fluid *²

Synthetic	Phosphate ester	Flame-resistant hydraulic fluid
	Fatty acid ester	
Hydrous	Water-glycol	Non-flammable hydraulic fluid
	Water/oil emulsion type	
	Oil/water emulsion type	
	Water soluble fluid	

● Special-purpose hydraulic oil (petroleum-based or synthetic)

Hydraulic fluid for low temperature	For cold regions and very cold regions * ³
Hydraulic fluid for high temperature	For high temperature application or tropical regions
High viscosity index fluid	Reduced viscosity change due to temperature change

● Biodegradable hydraulic fluid (easily disposable water soluble fluid)

Fatty acid ester
Vegetable oil (rapeseed oil)

Note: *¹ Categorized by the type of wear-resistant additive and base oil purification method.

Zinc based: Conventionally used general-purpose hydraulic fluid

Non-zinc based: Hydraulic fluid manufactured with sophisticated base oil purification method and capable of preventing sludge generation even in long-time use at high temperature

*² The conditions of use and the stability vary depending on the brand.

*³ Take the pour-point +13 to 15°C as the guide for the service temperature limit in cold regions.

Reference hydraulic fluid brands

● General-purpose hydraulic fluid

Manufacturer	Viscosity grade		
	ISO VG32	ISO VG46	ISO VG68
ENEOS	Super Mulpus DX 32	Super Mulpus DX 46	Super Mulpus DX 68
Exxon Mobil (EMG LUBRICANTS)	Mobil DTE Oil Light	Mobil DTE Oil Medium	Mobil DTE Oil Heavy Medium
Idemitsu Kosan	Daphne Hydraulic Fluid 32	Daphne Hydraulic Fluid 46	Daphne Hydraulic Fluid 68
Shell Lubricants Japan	Shell Morlina S2 B32	Shell Morlina S2 B46	—
Cosmo Oil LUBRICANTS	Cosmo ALLPUS 32	Cosmo ALLPUS 46	Cosmo ALLPUS 68

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● Wear-resistant hydraulic fluid

Manufacturer	Class in Fire Services Act	Additive classification	Viscosity grade		
			ISO VG32	ISO VG46	ISO VG68
ENEOS	Class 4, Petroleum	Zinc based	Super Highland 32	Super Highland 46	Super Highland 68
	Combustible liquids* ¹	Non-zinc based (high flash point type)	Super Highland SE-P 32	Super Highland SE-P 46	Super Highland SE-P 68
Exxon Mobil (EMG LUBRICANTS)	Class 4, Petroleum	Zinc based	Mobil DTE 24	Mobil DTE 25	Mobil DTE 26
		Non-zinc based	Mobil DTE XL 32	Mobil DTE XL 46	Mobil DTE XL 68
			Mobil DTE 10 Excel 32	Mobil DTE 10 Excel 46	Mobil DTE 10 Excel 68
Idemitsu Kosan	Class 4, Petroleum	Non-zinc based	Daphne Super Hydro A 32	Daphne Super Hydro A 46	Daphne Super Hydro A 68
			Daphne Super Hydro X 32	Daphne Super Hydro X 46	Daphne Super Hydro X 68
		Non-zinc based (energy saving type)	Daphne Super Hydro ST 32	Daphne Super Hydro ST 46	–
	Combustible liquids* ¹	Non-zinc based (high flash point type)	Daphne Super Hydro 32HF-ST	Daphne Super Hydro 46HF-ST	Daphne Super Hydro 68HF-ST
Shell Lubricants Japan	Class 4, Petroleum	Zinc based	Shell Tellus S2 M 32	Shell Tellus S2 M 46	Shell Tellus S2 M 68
	Combustible liquids* ¹	Non-zinc based	–	Shell Tellus S3 MT 46	Shell Tellus S3 MT 68
		Non-zinc based (Energy-saving, high flash point type)	Shell Tellus S4 ME 32	Shell Tellus S4 ME 46	–
			Shell Tellus S3 VE 32	Shell Tellus S3 VE 46	–
Cosmo Oil LUBRICANTS	Class 4, Petroleum	Zinc based	Cosmo HYDRO AW 32	Cosmo HYDRO AW 46	Cosmo HYDRO AW 68
		Non-zinc based	Cosmo SUPER EPOCH ES 32	Cosmo SUPER EPOCH ES 46	Cosmo SUPER EPOCH ES 68
	Combustible liquids* ¹	Non-zinc based (Energy-saving, high flash point type)	Cosmo SUPER EPOCH UF 32	Cosmo SUPER EPOCH UF 46	Cosmo SUPER EPOCH UF 68

Note: *¹ The combustible liquids have a flash point over 250°C and are not included in the hazardous materials under the Japanese Fire Services Act.

● Phosphate ester hydraulic fluid

Manufacturer	Viscosity grade
	ISO VG46
MORESC	NEOLUBE 46G
Shell Lubricants Japan	Shell Irus Fluid DR 46
Exxon Mobil (EMG LUBRICANTS)	Mobil Pyrotec HFD 46B

Note: When using this type of hydraulic oil, consult the hydraulic oil manufacturer before actual use.

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Compatibility among fluid types and materials

Material		Hydraulic fluid				
		Petroleum-based	Phosphate ester	Water-glycol	Water/oil emulsion type	Fatty acid ester
Sealing material	Nitrile rubber	Compatible	Incompatible	Compatible	Compatible	Compatible
	Perbunan N	Compatible	Incompatible	Compatible	Compatible	Compatible
	Perbunan S	Compatible	Incompatible	Compatible	Compatible	Compatible
	Fluorine rubber	Compatible	Compatible	Partly incompatible	Compatible	Compatible
	Teflon rubber	Compatible	Compatible	Compatible	Compatible	Compatible
	Silicone rubber	Compatible	Partly incompatible	Incompatible	Incompatible	Compatible
	Butyl rubber	Incompatible	Partly incompatible	Compatible	Incompatible	Incompatible
	Ethylene-propylene rubber	Compatible	Compatible	Compatible	Incompatible	Compatible
	Chloroprene rubber	Compatible	Incompatible	Compatible	Compatible	Compatible
	Urethane rubber	Compatible	Incompatible	Incompatible	Incompatible	Compatible
	Leather	Compatible	Compatible	Incompatible	Incompatible	Compatible
Paint	Epoxy resin	Compatible	Incompatible	Incompatible	Incompatible	Compatible
	Vinyl resin	Compatible	Incompatible	Incompatible	Incompatible	Compatible
	Urethane resin	Compatible	Incompatible	Incompatible	Incompatible	Compatible
	Phthalic resin	Compatible	Incompatible	Incompatible	Incompatible	Incompatible
	Phenol resin	Compatible	Incompatible	Incompatible	Incompatible	Incompatible
Metal	Steel	Compatible	Compatible	Compatible	Compatible	Compatible
	Cast iron	Compatible	Compatible	Compatible	Compatible	Compatible
	Copper	Compatible	Compatible	Compatible	Incompatible	Compatible
	Brass	Compatible	Compatible	Compatible	Partly incompatible	Compatible
	Aluminum	Compatible	Partly incompatible	Incompatible	Compatible	Compatible
	Magnesium	Compatible	Partly incompatible	Incompatible	Compatible	Compatible
	Zinc	Compatible	Compatible	Incompatible	Incompatible	Partly incompatible

Note: If unsure, consult the sealing manufacturer and hydraulic oil manufacturer to determine the hydraulic oil for actual use.

Hydraulic fluid contamination control

● NAS contamination class standard (NAS1638) (Quantity in 100 mL)

Size category µm	Class													
	00	0	1	2	3	4	5	6	7	8	9	10	11	12
5 to 15	125	250	500	1,000	2,000	4,000	8,000	16,000	32,000	64,000	128,000	256,000	512,000	1,024,000
15 to 25	22	44	89	178	356	712	1,425	2,850	5,700	11,400	22,800	45,600	91,200	182,400
25 to 50	4	8	16	32	63	126	253	506	1,012	2,025	4,050	8,100	16,200	32,400
50 to 100	1	2	3	6	11	22	45	90	180	360	720	1,440	2,880	5,760
100 minimum	0	0	1	1	2	4	8	16	32	64	128	256	512	1,024

● NAS contamination class standard (total mass of foreign substances alone) (Mass in 100 mL)

Class	100	101	102	103	104	105	106	107	108	109	110	111	112
Mass mg	0.02	0.05	0.10	0.30	0.50	0.70	1.0	2.0	4.0	6.0	8.0	10	10 minimum

Contact Details

Before using the product, please check the guide pages at the front of this catalog.

Internet

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Viscosity/Temperature Chart

