



Multipurpose R&O Oil

Multipurpose R&O Oil is a rust and oxidation (R&O)-inhibited, antiwear circulating oil developed for use in circulation systems, centrifugal air compressors, geared turbines, lightly loaded enclosed gear drives and many other industrial applications. It contains a low level of ashless (zinc-free) antiwear additive for mild wear protection.

Multipurpose R&O Oil is formulated to provide protection against rust, corrosion and deposit formation, plus mild wear protection. It has good oxidation resistance at high temperatures to minimize sludge and varnish formation, resulting in long service life. It protects system components against rust and corrosion. It has excellent water-separating properties to minimize the formation of emulsions, and is resistant to excessive foam buildup that can interfere with proper lubrication. An ashless antiwear additive provides mild wear protection to help increase equipment life.

Applications

- Air tools and other pneumatic equipment lubricated through air line lubricators
- Centrifugal air compressors
- Steam turbines and hydroelectric turbines, both direct-drive and with gear drives
- Lightly loaded enclosed industrial gearboxes where the OEM specifies a R&O type oil (ISO VG 68 and higher, typically)
- Lightly loaded plain and rolling-element bearings, such as those in electric motors and blowers
- Vacuum pumps, deep-well water pumps and machine tools
- General-purpose machinery and shop lubrication

Multipurpose R&O Oil meets the requirements of the following industry and OEM specifications:

- ABB G12106
- Alstom Power HTGD 90 117 for geared turbines
- ANSI/AGMA Standard 9005-E02, R&O Inhibited Oils
- ASTM D4304 Type I Turbine Oil (ISO VG 32, 46, 68, 100)
- British Standard 489
- Denison Hydraulics HF-1
- DIN 51517 Part 1, Lubricating Oils, Type CL
- DIN 51524 Part 1, Hydraulic Oils, Type HL
- General Electric GEK 101941A, GEK 46506e, GEK 27070 (obsolete), GEK 28143A (obsolete)
- Ingersoll-Rand Centak centrifugal compressors

**Rust & Oxidation-
Inhibited,
Antiwear
Circulating Oil**

CONTACT INFORMATION

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- Solar Turbines ES 9-224 Class II Turbine Oil
- U.S. Military MIL-L-17672D
- U.S. Steel 126

Features/Benefits

- Good oxidation resistance to minimize sludge and varnish formation
- Mild wear protection
- Protects against rust and corrosion
- Excellent water-separating properties
- Low carbon-forming tendency for use in centrifugal air compressors
- Good foam resistance

Multipurpose R&O Oil

Typical Properties

ISO Grade	22	32	46	68	100
AGMA Grade	—	0	1	2	3
Specific Gravity @ 60°F	0.856	0.862	0.868	0.873	0.877
Density, lbs/gal @ 60°F	7.13	7.18	7.23	7.27	7.30
Color, ASTM 1500	L 0.5	L 0.5	L 0.5	L 0.5	L 0.5
Flash Point (COC), °C (°F)	210 (410)	232 (450)	238 (460)	243 (469)	268 (514)
Pour Point, °C (°F)	-40 (-40)	-40 (-40)	-40 (-40)	-34 (-29)	-34 (-29)
Viscosity,					
cSt @ 40°C	22.0	32.5	45.0	68.0	101
cSt @ 100°C	4.3	5.4	6.7	8.8	11.3
SUS @ 100°F	115	168	232	352	527
SUS @ 210°F	40.7	44.4	48.7	55.9	65.0
Viscosity Index	101	99	101	102	98
Acid Number, ASTM D974, mg KOH/g	0.14	0.14	0.14	0.14	0.14
Copper Corrosion, ASTM D130	1a	1a	1a	1a	1a
Demulsibility, ASTM D1401, minutes to pass	20	20	20	20	20
Foam Test, ASTM D892, Seq. I, ml	0/0	0/0	0/0	0/0	0/0
Four-Ball Wear, ASTM D4172, Scar Diameter, mm	—	0.54	0.48	0.45	0.45
FZG Scuffing Test, ASTM D5182, Failure Load Stage	—	10	10	10	10
Oxidation Stability,					
TOST, ASTM D943-04a, hours	—	4,500	4,500	4,500	4,500
RPVOT, ASTM D2272, minutes	—	750	750	700	700
Rust Test, ASTM D665 A&B	Pass	Pass	Pass	Pass	Pass

Typical properties are average values only and do not constitute a specification. Minor variations that do not affect product performance are to be expected during normal manufacture, and at different blending locations. Product formulations are subject to change without notification.

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Multipurpose R&O Oil

Typical Properties				
ISO Grade	150	220	320	460
AGMA Grade	4	5	6	7
Specific Gravity @ 60°F	0.882	0.885	0.889	0.892
Density, lbs/gal @ 60°F	7.35	7.37	7.40	7.43
Color, ASTM D1500	2.5	3.5	4.5	5.0
Flash Point (COC), °C (°F)	277 (531)	285 (545)	304 (579)	307 (585)
Pour Point, °C (°F)	-17 (1)	-15 (5)	-15 (5)	-15 (5)
Viscosity,				
cSt @ 40°C	158	220	320	464
cSt @ 100°C	15.3	18.8	24.1	30.6
SUS @ 100°F	830	1,164	1,704	2,488
SUS @ 210°F	81.0	95.9	120	150
Viscosity Index	97	95	96	95
Acid Number, ASTM D974, mg KOH/g	0.14	0.14	0.14	0.14
Copper Corrosion, ASTM D130	1a	1a	1a	1a
Demulsibility, ASTM D1401, minutes to pass	20	20	20	25
Foam Test, ASTM D892, Seq. I, ml	0/0	0/0	0/0	0/0
Four-Ball Wear, ASTM D4172,				
Scar Diameter, mm	0.41	0.41	0.40	0.40
FZG Scuffing Test, ASTM D5182,				
Failure Load Stage	10	10	10	10
Oxidation Stability,				
TOST, ASTM D943-04a, hours	4,000	4,000	4,000	4,000
RPVOT, ASTM D2272, minutes	700	700	700	700
Rust Test, ASTM D665 A&B	Pass	Pass	Pass	Pass

Health and Safety Information

For recommendations on safe handling and use of this product, please refer to the Material Safety Data Sheet via <http://w3apps.phillips66.com/NetMSDS>.

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