



Heat Transfer Oils

Phillips 66® Heat Transfer Oils are high-quality straight or inhibited mineral oils developed for use in open and/or closed liquid-phase heat transfer systems. They have excellent thermal stability and provide excellent resistance to cracking and sludge formation for long service life. They are **not** recommended for use in vapor-phase heat transfer systems.

Heat Transfer Oil 32/46 is a straight paraffinic mineral oil recommended for use in closed systems operating under relatively mild conditions. Heat Transfer Oils 22, 32 and 46 are paraffinic mineral oils fortified with select additives that provide enhanced oxidation resistance for long service life, and detergency to help keep the system providing maximum heat transfer efficiency. They are recommended for use in both open and closed systems operating under more severe conditions.

Applications

Heat Transfer Oils 22, 32, 32/46 and 46 are recommended for use in closed, liquid-phase, forced circulation heat transfer systems equipped with expansion tanks and pressure relief valves, where the maximum bulk oil temperature does not exceed 550°F (288°C). Preventive measures should be taken to minimize oil oxidation by eliminating air from the system prior to bringing the oil up to operating temperature. The use of an inert gas, such as nitrogen, under positive pressure in the expansion tank is recommended at all times during operation. Under no circumstances should the hot oil come into contact with air.

Heat Transfer Oils 22, 32 and 46 also are recommended for use in open, liquid-phase, forced circulation heat transfer systems where the maximum bulk oil temperature does not exceed 374°F (190°C).

Skin film temperature can be estimated at 50°F to 75°F above bulk oil temperature in properly designed and operating systems. If skin film temperatures rise higher than this, the service life of the oil may be shortened. Additionally sludge and coke may be deposited resulting in reduced efficiency of the system.

Some common heat transfer applications include:

- Direct and indirect-fired hot oil heaters in asphalt plants
- Hot corrugation and gluing
- Dehydration
- Molding and extrusion equipment
- Plastic and wax coating equipment
- Organic synthesis hot oil systems

Note: Always follow the equipment manufacturer's recommendations on oil change intervals, and for recommended practices when switching over from another brand of heat transfer oil.

**High-Quality
Heat Transfer
Oils for Open &
Closed Systems**

**KEEPING THE
WORLD
RUNNING
SMOOTHLY.**





Features/Benefits

- Excellent resistance to thermal breakdown at high temperatures
- Excellent performance in both open and closed heat transfer systems
- Long service life
- Excellent deposit control
- Low odor
- Non-corrosive

Heat Transfer Oils

Typical Properties					
ISO Grade		32/46	22	32	46
Specific Gravity @ 60°F					
@ 15.6°C (60°F)		0.867	0.854	0.864	0.871
@ 38°C (100°F)		0.853	0.840	0.850	0.857
@ 160°C (320°F)		0.775	0.762	0.772	0.779
@ 288°C (550°F)		0.693	0.680	0.690	0.697
@ 316°C (600°F)*		0.675	0.662	0.672	0.679
Density, lbs/gal @ 60°F					
@ 15.6°C (60°F)		7.22	7.11	7.19	7.25
@ 38°C (100°F)		7.10	6.99	7.08	7.13
@ 160°C (320°F)		6.45	6.34	6.43	6.48
@ 288°C (550°F)		5.77	5.66	5.74	5.80
@ 316°C (600°F)*		5.62	5.52	5.60	5.66
Color, ASTM D1500	ASTM D1500	0.5	1.0	1.0	1.0
Flash Point (COC), °C (°F)	ASTM D92	222 (432)	215 (419)	218 (424)	240 (464)
Auto-ignition Temperature, °C (°F)	ASTM E659	348 (658)	339 (642)	342 (648)	343 (649)
Pour Point, °C (°F)	ASTM D97	-15 (5)	-18 (0)	-42 (-44)	-39 (-38)
Viscosity	ASTM D445				
cSt @ 40°C		40.0	22.5	31.7	46.0
cSt @ 100°C		6.3	4.43	5.5	6.8
Viscosity Index	ASTM D2270	105	106	110	102
Acid Number, mg KOH/g	ASTM D974	0.02	0.28	0.28	0.28
Carbon Residue, wt %	ASTM D524	0.04	0.17	0.17	0.17
Oxidation Stability, RPVOT, minutes	ASTM D2272	---	57	57	57

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.



Heat Transfer Fluids

Typical Thermal Properties				
Grade	32/46	22	32	46
Coefficient of Thermal Expansion, 1/°C (1/°F)				
@ 15.6°C (60°F)	0.000737 (0.000409)	0.000748 (0.000416)	0.000740 (0.000411)	0.000734 (0.000408)
@ 38°C (100°F)	0.000749 (0.000416)	0.000761 (0.000423)	0.000752 (0.000418)	0.000746 (0.000414)
@ 160°C (320°F)	0.000825 (0.000458)	0.000839 (0.000466)	0.000828 (0.000460)	0.000821 (0.000456)
@ 288°C (550°F)	0.000922 (0.000512)	0.000940 (0.000522)	0.000926 (0.000514)	0.000917 (0.000509)
@ 316°C (600°F)*	0.000946 (0.000526)	0.000965 (0.000536)	0.000950 (0.000528)	0.000941 (0.000523)
Specific Heat Capacity, C _p , Btu/lb-°F				
@ 15.6°C (60°F)	0.445	0.449	0.446	0.444
@ 38°C (100°F)	0.465	0.469	0.466	0.464
@ 160°C (320°F)	0.571	0.575	0.572	0.570
@ 288°C (550°F)	0.683	0.688	0.685	0.681
@ 316°C (600°F)*	0.707	0.712	0.708	0.705
Thermal Conductivity, Btu/hr-ft-°F				
@ 15.6°C (60°F)	0.0775	0.0786	0.0778	0.0771
@ 38°C (100°F)	0.0765	0.0777	0.0768	0.0762
@ 160°C (320°F)	0.0714	0.0724	0.0716	0.0711
@ 288°C (550°F)	0.0660	0.0670	0.0663	0.0657
@ 316°C (600°F)*	0.0648	0.0658	0.0651	0.0645
Vapor Pressure, psia (kpa)				
@ 15.6°C (60°F)	0.0017 (0.012)	0.0077 (0.053)	0.0015 (0.011)	0.0039 (0.027)
@ 38°C (100°F)	0.0039 (0.027)	0.014 (0.097)	0.0039 (0.027)	0.0097 (0.067)
@ 160°C (320°F)	0.023 (0.16)	0.095 (0.65)	0.058 (0.400)	0.085 (0.59)
@ 288°C (550°F)	0.75 (5.17)	1.48 (10.20)	1.11 (7.65)	1.07 (7.38)
@ 316°C (600°F)*	1.05 (7.24)	2.27 (15.65)	2.22 (15.31)	1.84 (12.69)

*Values at 316°C (600°F) are provided for reference and engineering purposes.

Health & Safety Information

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