



# TECHNICAL DATA

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## #281A SYNTHETIC PLUS HEAT TRANSFER OIL

Synthetic Plus Heat Transfer Oil is a non-corrosive, non-fouling, para-synthetic heat transfer fluid that is formulated to provide fast and efficient heat transfer when used in a closed system application with expansion tank temperatures up to 600°F or in open system applications where the oil temperature does not exceed 650°F and bulk temperature of 450°-500°F at the point of exposure to air.

Synthetic Plus Heat Transfer Oil is blended from the finest severely hydrotreated polyalphaolefin (PAO) synthetic base fluids and select high viscosity index 100% pure paraffin base stocks available. This unique combination provides Synthetic Plus Heat Transfer Oil with the following characteristics:

1. **High Viscosity Index** – This results in a minimum change in viscosity over a broad temperature range.
2. **Superior Thermal and Oxidative Stability** – This results in the product having excellent resistance to cracking, carbon, sludge, varnish and lacquer formation during high temperature operation.
3. **Very Low Volatility Characteristics** – The low volatility of paraffin base oils results in lower makeup requirements, eliminates vapor lock in circulating pumps and reduces the possibility of cavitation.
4. **Flash and Fire Points Significantly Above 400°F (204°C) and Auto-Ignition Temperature Above 608°F (320°C).**
5. **Excellent Low Temperature Pumpability** – This results in the elimination of hot spots (dangerously high fluid temperature) at the heater, during cold weather start-ups.

Blended into these para-synthetic base fluids is a multi-functional high temperature additive system that provides the Synthetic Blend Heat Transfer Oil with mild detergency to clean up existing sludge and varnish deposits and high temperature oxidation protection in order to eliminate the formation of high temperature deposits and sludge that may otherwise insulate the coils against efficient heat transfer and obstruction to fluid flow.

Continued On Next Page

TD-281A (07/2010)

## TD-281A

### Page 2

Synthetic Plus Heat Transfer Oil in addition to the above described performance benefits also offers the following benefits:

1. High thermal efficiency for rapid and efficient transfer of heat.
2. Low vapor pressure at elevated temperature and a high boiling point to prevent pressure build-up.
3. Non-corrosive to system parts.
4. Excellent hydrolytic stability and resistance to emulsification with water.
5. Excellent compatibility with petroleum base and synthetic hydro-carbon base heat transfer oils.
6. Excellent compatibility with all types of seals, materials of construction and finishes commonly used in heat-transfer systems.
7. Non-fouling on degradation.
8. Neutralization of acidic components that may be present in the system due to the formation of previous varnish and organic buildup.
9. Virtually odorless and essentially non-toxic.
10. Long service life for proven trouble free operation.

### TYPICAL PROPERTIES

Specific Gravity	.867
Viscosity cSt, @ 40°C (ASTM D-945)	42.00 – 49.00
Viscosity cSt, @ 100°C (ASTM D-945)	6.5 – 7.2
Viscosity Index (ASTM D-2270)	120
Flash Point °F/°C (ASTM D-92)	460°/237.78°
Fire Point °F/°C (ASTM D-92)	495°/257.22°
Auto-ignition Temperature °F/°C	705°/373.89°
Pour Point °F/°C (ASTM D-97)	-20°/-28.89°
Conradson Carbon % (ASTM D-189)	0.01%
Ramsbottom Carbon Mass % (ASTM D-524)	0.03%
Copper Strip Corrosion Test (ASTM D-130)	1a
Vapor Pressure (ASTM D-2879) mm Hg @ 68°F/20°C	<0.1
Noack Volatility (ASTM D-5800) % Evaporation Loss @ 150°C	8.5%
Aniline Point °F/°C (ASTM D-611)	235°/112.78°
Total Acid No. (ASTM D-664)	0.1

Continued on Next Page

TYPICAL PROPERTIES (Continued)

Distillation, Gas Chromatograph F

Initial Boiling Point	650°F
5%	720°F
25%	775°F
50%	835°F
75%	865°F
95%	925°F
Coefficient of Expansion ml/ml/°C	$9.2 \times 10^{-4}/^{\circ}\text{C}$
Coefficient of Expansion ml/ml/°F	$5.1 \times 10^{-4}/^{\circ}\text{F}$
Thermal Conductivity Btu-inches/hr-sq ft-°F	
20°F/-7°C	0.941082042
32°F/-0°C	0.937718263
100°F/-38°C	0.918586851
122°F/50°C	0.912307024
212°F/100°C	0.887079585
250°F/121°C	0.880400382
300°F/149°C	0.862323875
302°F/150°C	0.861761246
392°F/200°C	0.836442909
400°F/204°C	0.834192388
450°F/232°C	0.820126644
482°F/250°C	0.811124567
500°F/269°C	0.8060609
600°F/315°C	0.777929412
Thermal Conductivity Watt/Meter-k (W/M-°K)	
20°F/-7°C	0.135731718
32°F/-0°C	0.135244837
100°F/-38°C	0.132485842
122°F/50°C	0.131593226
212°F/100°C	0.127941616
250°F/121°C	0.126978288
300°F/149°C	0.124371152
302°F/150°C	0.124290005
392°F/200°C	0.120638395
400°F/204°C	0.120313807
450°F/232°C	0.118285134
482°F/250°C	0.116986784
500°F/269°C	0.116256462
600°F/315°C	0.112199117

Typical Properties Continued on next page

Specific Heat Btu/lb/°F	
20°F/-7°C	0.426364422
32°F/-0°C	0.432163838
100°F/-38°C	0.465027191
122°F/50°C	0.475659452
212°F/100°C	0.51955.067
250°F/121°C	0.537519882
300°F/149°C	0.5616854113
302°F/150°C	0.562650682
392°F/200°C	0.606146297
400°F/204°C	0.610012557
450°F/232°C	0.634176787
482°F/250°C	0.649641894
500°F/269°C	0.658341017
600°F/315°C	0.76669477
Specific Heat Kilojoule/kilogram-K (kj/kg-°K)	
20°F/-7°C	1.783908742
32°F/-0°C	1.808173498
100°F/-38°C	1.945673767
122°F/50°C	1.990159147
212°F/100°C	2.1721448
250°F/121°C	2.239271863
300°F/149°C	2.35008629
302°F/150°C	2.354130453
392°F/200°C	2.536116107
400°F/204°C	2.552292538
450°F/232°C	2.65339677
482°F/250°C	2.718101684
500°F/269°C	2.754498815
600°F/315°C	2.956694509

Typical Properties Continued on next page

Thermal Diffusivity in <sup>2</sup> /hr	
20°F/-7°C	0.469
32°F/0°C	0.463
100°F/-38°C	0.458
122°F/50°C	0.458
212°F/100°C	0.449
250°F/121°C	0.446
300°F/149°C	0.435
302°F/150°C	0.435
392°F/200°C	0.424
400°F/204°C	0.419
450°F/232°C	0.413
482°F/250°C	0.407
500°F/269°C	0.402
600°F/315°C	0.391
Thermal Diffusivity mm <sup>2</sup> /s	
20°F/-7°C	0.084
32°F/0°C	0.083
100°F/-38°C	0.082
122°F/50°C	0.082
212°F/100°C	0.0815
250°F/121°C	0.080
300°F/149°C	0.078
302°F/150°C	0.078
392°F/200°C	0.076
400°F/204°C	0.075
450°F/232°C	0.074
482°F/250°C	0.073
500°F/269°C	0.072
600°F/315°C	0.070