# MAK THERMIC FLUID A

## High performance heat transfer fluid

MAK Thermic Fluid A is a new generation, superior quality heat transfer oil formulated exclusively from highly refined base stock and specially chosen additive. The antioxidant additive provides excellent resistance to oxidation and break down of the oil and ensures longer operating life. This oil has a very high flash point, low vapour pressure and low volatility. MAK Thermic Fluid A is compatible with seal materials normally used in heat transfer systems with mineral oil.

**Applications:**
MAK Thermic Fluid A is developed for indirect heating in a closed system with forced circulation. It is recommended for heat transfer systems for industrial applications like chemical plants, process heating, textile plants etc. It is also suitable for applications where repeated heating and cooling cycles are involved. MAK Thermic Fluid A can be used in continuous heat transfer system with the following temperature limit:
Max. Bulk Temperature: 300$^{O}$C

**Performance/ Benefits:**
**Excellent Oxidation Resistance** – Outstanding resistance to sludge and deposit formation even when the oil undergoes repeated heating and cooling cycles. Dual-stage-antioxidant system keeps heat exchanger surface clean. Longer operating life and lower operating cost.

**Excellent Thermal Stability** – provides resistance to break down and deposit formation inside the piping for optimum life and performance.

**Low Viscosity** – low viscosity assures excellent fluidity and heat transfer over a wide temperature range.

**Low Volatility and Low Vapour Pressure –** low volatility coupled with low vapour pressure and high flash point indicates low evaporative loss. Reduces top up quantity. Low vapour pressure resists cracking and minimises the formation of volatile decomposition products.

**Excellent Thermal Conductivity** – high heat transfer coefficient ensures rapid heating.

**Consistent Performance** – offers extended oil life, good pump circulation and efficient fluid heating.

**Non-Corrosive and Non-Toxic –** no corrosion of the piping and other system elements. Provides safe working environment to the operators.

**Specification:**
- IS 14745:1999 (Reaffirmed 2004)

**Typical Physico-Chemical Data: MAK Thermic Fluid A**

| Characteristics | Method | Value |
|---|---|---|
| Appearance | Visual | Clear & Bright |
| Colour | Visual | Light Yellow |
| Density, g/cc @15$^{O}$C | ASTM D1298 | 0.859 |
| Copper Corrosion, 100$^{O}$C, 3 hrs. | ASTM D130 | 1a |
| Pour Point, $^{O}$C, | ASTM D97 | -18 |
| Flash Point, COC, $^{O}$C | ASTM D92 | 238 |
| Fire Point, COC, $^{O}$C | ASTM D92 | 268 |
| Kinematic Viscosity @40$^{O}$C, cSt | ASTM D445 | 31.5 |
| Kinematic Viscosity @100$^{O}$C, cSt | ASTM D94 | 5.54 |
| Viscosity Index | ASTM D2270 | 115 |
| Initial Boiling Point, $^{O}$C | ASTM D1160 | 380 |
| Final Boiling Point, $^{O}$C | ASTM D1160 | 480 |
| Neutralisation Value, mg KOH/ g | ASTM D664 | <0.2 |
| Co-efficient of Thermal Expansion, per $^{O}$C | -- | 0.00080 |
| Thermal Conductivity @29.5$^{O}$C, Cal/cm. S $^{O}$C | -- | 0.000321 |

**Storage & Handling:**
The product should be stored inside. Keep it properly sealed to avoid contamination. Avoid freezing. Shelf life is 5 yrs. under protected storage conditions.

**Health & Safety:**
They are unlikely to be hazardous when properly used in recommended applications. Contamination of the oil from other oils, greases, chemicals, dirty water etc. can occur during the use. It should be avoided. Regular monitoring of the in-use product is recommended.

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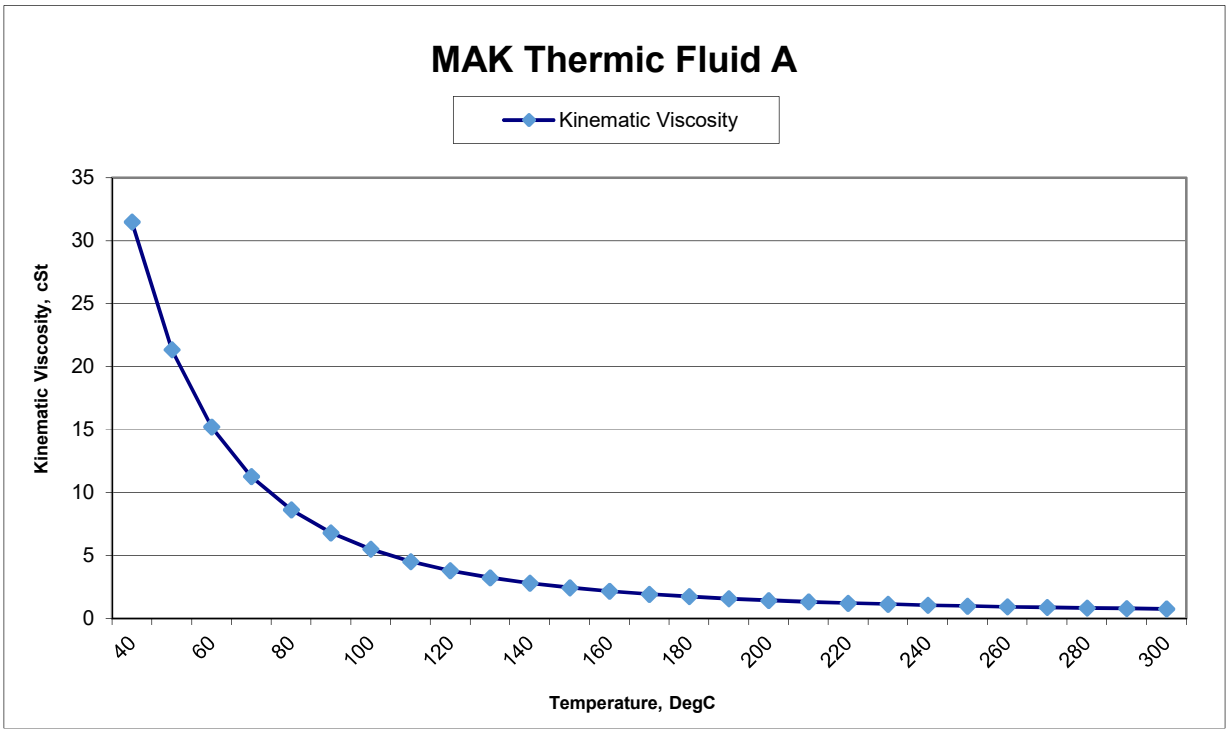
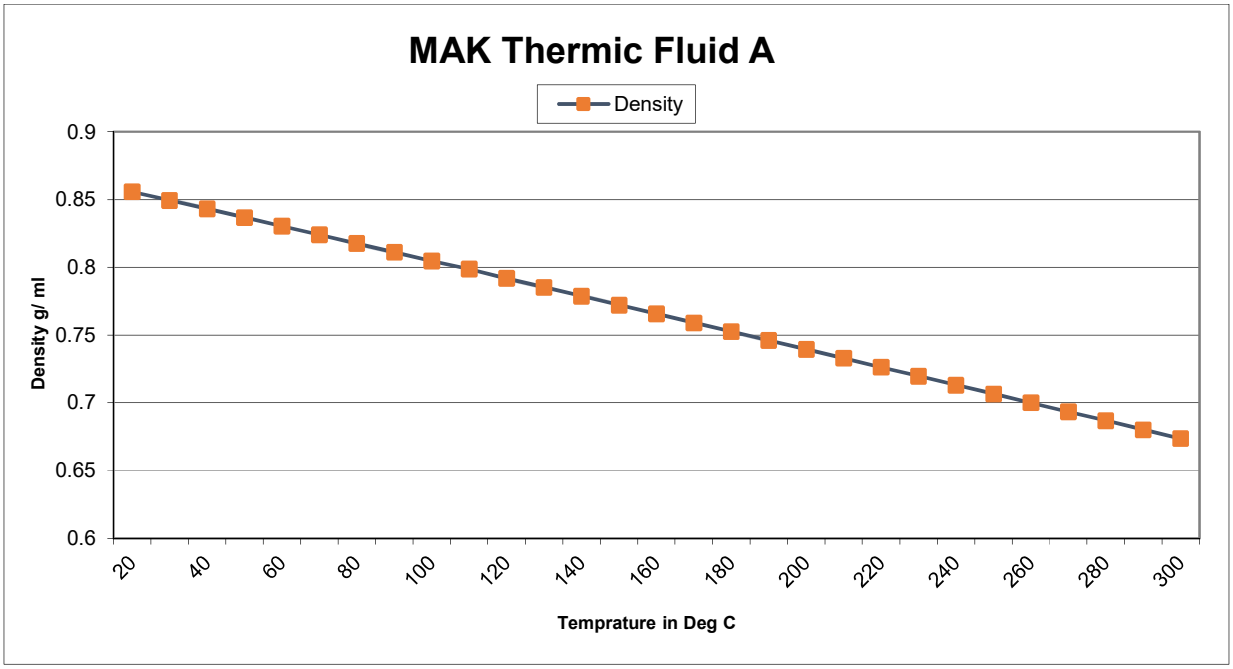
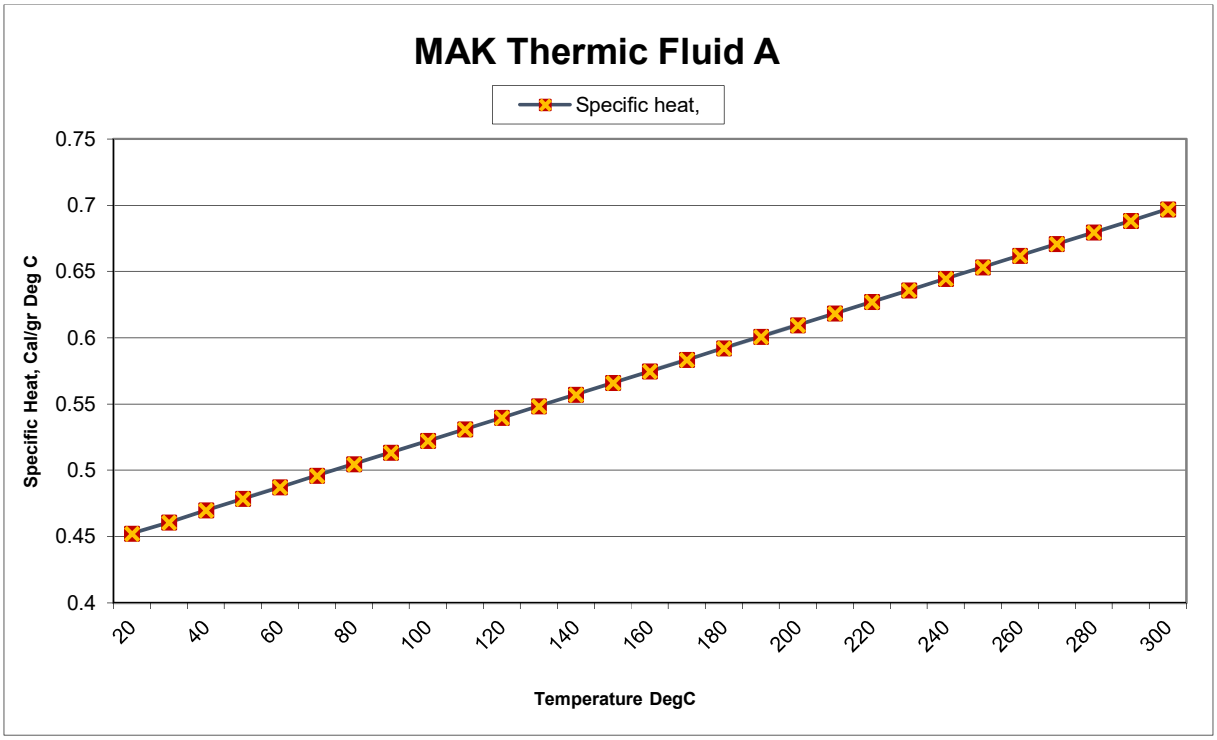
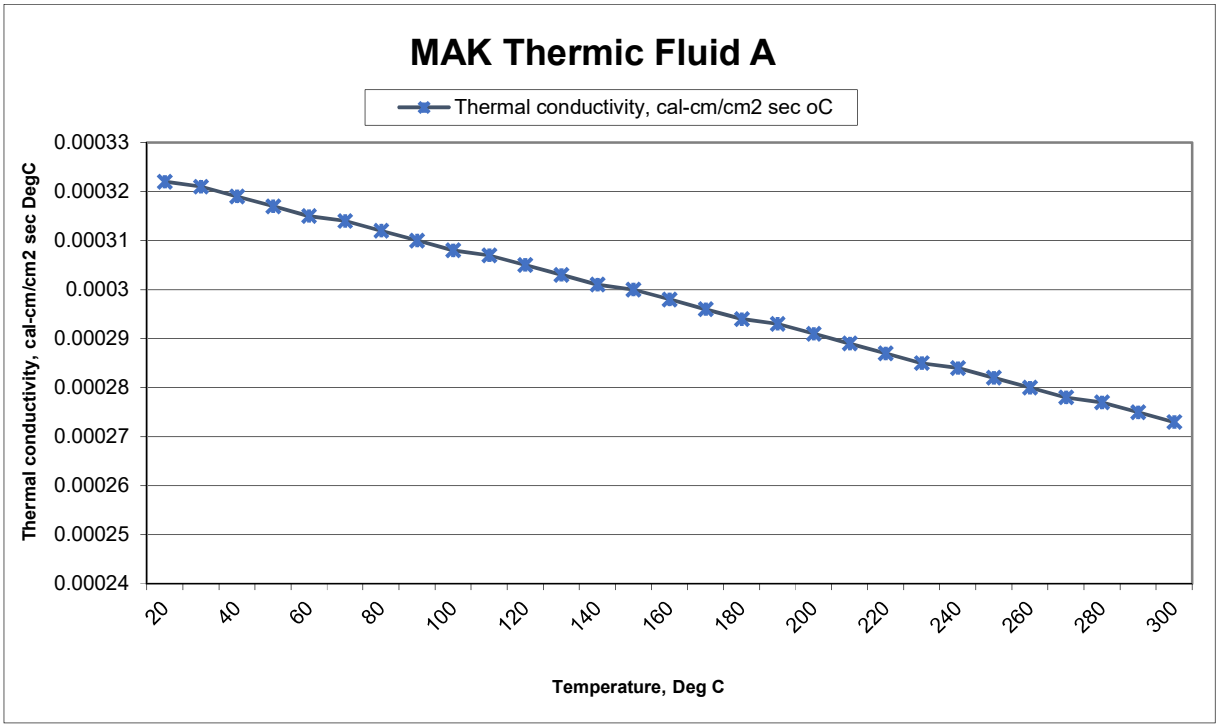
## Additional Data:




MAK Thermic Fluid A
Specific heat,
Specific Heat, Cal/gr Deg C
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Temperature DegC


MAK Thermic Fluid A
Thermal conductivity, cal-cm/cm2 sec oC
Thermal conductivity, cal-cm/cm2 sec DegC
0.00033
0.00032
0.00031
0.0003
0.00029
0.00028
0.00027
0.00026
0.00025
0.00024
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Temperature, Deg C

## MAK Thermic Fluid A

| Temperature, $^{O}$C | 15 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
|---|---|---|---|---|---|---|---|---|
| Kinematic Viscosity, cSt | | | | 31.5 | 21.36 | 15.21 | 11.27 | 8.64 |
| Density, g/ml | 0.859 | 0.8558 | 0.8495 | 0.8432 | 0.8368 | 0.8305 | 0.824 | 0.8176 |
| Specific heat, cal/g $^{O}$C | 0.447928 | 0.452298 | 0.4606 | 0.469777 | 0.478517 | 0.487256 | 0.495996 | 0.504735 |
| Thermal conductivity, cal/cm sec $^{O}$C | 0.000323 | 0.000322 | 0.00032 | 0.000319 | 0.000317 | 0.000315 | 0.000314 | 0.000312 |

| Temperature, $^{O}$C | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 |
|---|---|---|---|---|---|---|---|---|
| Kinematic Viscosity, cSt | 6.81 | 5.51 | 4.54 | 3.81 | 3.25 | 2.81 | 2.46 | 2.17 |
| Density, g/ml | 0.8112 | 0.8047 | 0.7987 | 0.7918 | 0.7853 | 0.7788 | 0.7722 | 0.7657 |
| Specific heat, cal/g $^{O}$C | 0.513475 | 0.522214 | 0.530954 | 0.539693 | 0.548433 | 0.557172 | 0.565912 | 0.574652 |
| Thermal conductivity, cal/cm sec $^{O}$C | 0.00031 | 0.000308 | 0.000307 | 0.000305 | 0.000303 | 0.000301 | 0.0003 | 0.000298 |

| Temperature, $^{O}$C | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 |
|---|---|---|---|---|---|---|---|---|
| Kinematic Viscosity, cSt | 1.94 | 1.75 | 1.58 | 1.44 | 1.33 | 1.22 | 1.14 | 1.06 |
| Density, g/ml | 0.7591 | 0.7526 | 0.746 | 0.7395 | 0.7329 | 0.7263 | 0.7197 | 0.7131 |
| Specific heat, cal/g $^{O}$C | 0.583391 | 0.592131 | 0.60087 | 0.60961 | 0.618349 | 0.627089 | 0.635828 | 0.644568 |
| Thermal conductivity, cal/cm sec $^{O}$C | 0.000296 | 0.000294 | 0.000293 | 0.000291 | 0.000289 | 0.000287 | 0.000285 | 0.000284 |

| Temperature, $^{O}$C | 250 | 260 | 270 | 280 | 290 | 300 | | |
|---|---|---|---|---|---|---|---|---|
| Kinematic Viscosity, cSt | 0.997 | 0.938 | 0.886 | 0.839 | 0.798 | 0.76 | | |
| Density, g/ml | 0.7066 | 0.7000 | 0.6934 | 0.6868 | 0.6802 | 0.6736 | | |
| Specific heat, cal/g $^{O}$C | 0.653307 | 0.662047 | 0.670786 | 0.679526 | 0.688266 | 0.697005 | | |
| Thermal conductivity, cal/cm sec $^{O}$C | 0.000282 | 0.00028 | 0.000278 | 0.000277 | 0.000275 | 0.000273 | | |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