

# CARGILLE LABORATORIES

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Immersion Oil Type HF

18-April-2018

n (589.3nm) 23°C = 1.5150

## TYPICAL CHARACTERISTICS

|   |  |
|---|--|
| <u>COMPOSITION</u> .....                      | Aliphatic and Alicyclic Hydrocarbons   |
| <u>APPEARANCE</u> .....                       | Colorless liquid   |
| <u>COLOR STABILITY IN DIRECT SUN</u> .....    | In direct sunlight will slightly yellow after 14 years   |
| <u>INDEX CHANGE RATE BY EVAPORATION</u> ..... | Very Low: 0.00000 expected; exposed surface area to volume ratio of 0.2 cm <sup>2</sup> /cc @ 25°C for 32 days |
| <u>ODOR</u> .....                             | Slight, characteristic   |
| <u>FREEZING POINT</u> °C .....                | < -4   |
| <u>BOILING POINT</u> °C @ 760mm Hg .....      | > 315  |
| <u>FLASH POINT</u> °C C.O.C. ....             | > 177  |
| <u>DENSITY</u> g/cc @ 23°C .....              | 0.931  |
| <u>COEF. OF THERM. EXP.</u> cc/cc/°C .....    | 0.0007   |
| <u>VISCOSITY</u> @ 23°C .....                 | 700cSt <span style="float: right;">651cP</span>  |

SOLUBLE: Acetone, Carbon Tetrachloride, Diethyl Ether, Heptane, Methylene Chloride, Naphtha, Toluene, Turpentine, Xylene  
PARTLY SOLUBLE: Ethanol  
INSOLUBLE: Water

COMPATIBLE: 10-month immersion at 25°C: Acrylic, Cellulose Acetate, Epoxy, Mylar, Nylon, Polycarbonate, Polyester, Polyethylene, Polypropylene, Polystyrene, Polyurethane, Polyvinyl Chloride, Polyvinyl Toluene, Phenolic, Teflon, Neoprene, Fluorosilicone (Silastic 730 RTV), Silicone (Sylgard 184, 3140 RTV) Rubbers, Tygothane, Aluminum, Copper, Brass, Steel; (tests done on one example of each).

INCOMPATIBLE: Tygon F-4040-A, S-50-HL, R-3603, B-44-3, Latex Rubber

CAUCHY EQUATION: Refractive index as a function of wavelength at 23.0°C

W = wavelength (nm)

$$n(W) = 1.497785 + (5.864736E+03) / W^2 + (4.449869E+07) / W^4$$

| SOURCE OR SPECTRAL LINE           | WAVELENGTH (nm) | REFRACTIVE INDEX 23°C | % TRANSMITTANCE 23°C |           |       |
|-----------------------------------|-----------------|-----------------------|----------------------|-----------|-------|
|                                   |                 |                       | 1 mm                 | 1 cm      | 10 cm |
| near UV cut off                   | 310             | 1.564                 | 68                   | 2         | 0     |
| i ( Hg )                          | 365             | 1.544                 | 98                   | 85        | 19    |
| h ( Hg )                          | 404.7           | 1.5353                | 100                  | 96        | 66    |
| F' ( Cd )                         | 480             | 1.5241                | 100                  | 99        | 90    |
| F ( H )                           | 486.1           | 1.5234                | 100                  | 99        | 91    |
| e ( Hg )                          | 546.1           | 1.5180                | 100                  | 100       | 95    |
| D (Na D1, D2 mean)                | 589.3           | 1.5150                | 100                  | 100       | 96    |
| HeNe laser                        | 632.8           | 1.5127                | 100                  | 100       | 99    |
| C' ( Cd )                         | 643.9           | 1.5122                | 100                  | 100       | 99    |
| C ( H )                           | 656.3           | 1.5116                | 100                  | 100       | 99    |
| Ruby Laser                        | 694.3           | 1.5101                | 100                  | 100       | 99    |
| GaAs laser                        | 840             | 1.5062                | 100                  | 100       | 97    |
| Nd: YAG laser                     | 1064.8          | 1.503                 | 100                  | 95        | 60    |
| Diode                             | 1300            | 1.501                 | 99                   | 90        | 34    |
| Diode                             | 1550            | 1.500                 | 99                   | 83        | 16    |
| $n_F - n_C$                       |                 |                       | =                    | 0.0118    |       |
| Abbe $v_D: (n_D - 1)/(n_F - n_C)$ |                 |                       | =                    | 43.8      |       |
| Temp. coef: $dn_D/dt$ 15 - 35°C   |                 |                       | =                    | -0.000376 |       |

The above values are typical for this liquid and are calculated from values typical of its components