

Rosemount® DP Level Fill Fluid Specifications

1.1

Fill fluids

- Silicone 200
- Silicone 200 for Vacuum Applications
- Silicone 704
- Silicone 704 for Vacuum Applications
- Silicone 705
- Silicone 705 for Vacuum Applications
- UltraTherm™ 805
- UltraTherm 805 for Vacuum Applications
- SYLTHERM™ XLT
- Inert (Halocarbon)
- Neobee M-20®
- Glycerin and water
- Propylene glycol and water



1.2 Silicone 200 – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: -45 to 205 °C (-49 to 400 °F)

Viscosity at 25 °C (77 °F): 9.5 cs

Specific Gravity @ 25 °C (77 °F): 0.934

Coefficient of Thermal Expansion: 0.00108 cc/cc/C (0.00060 cc/cc/F)

Chemical Name: Polydimethylsiloxane polymer

Chemical Composition: $(\text{CH}_3)_3\text{SiO}[\text{SiO}(\text{CH}_3)_2]_n\text{Si}(\text{CH}_3)_3$

CAS Number: 63148-62-9

1.2.1 Description/applications

Silicone 200 is a good general purpose fill fluid for industrial applications and is used in over half of all remote seal assemblies. This fluid has a broad temperature range to cover ambient and process conditions and has a low viscosity for good time response. Silicone fluids have a unique combination of properties that give superior performance in a wide variety of applications. Silicones provide excellent thermal stability and low vapor pressure.

For applications below 14.7 psia (1 bar-a), use Silicone 200 for Vacuum Applications found in [Section 1.3](#).

1.3 Silicone 200 for Vacuum Applications – fill fluid specifications

Temperature Limits:

Below Atm pressure:	See Figure 1-1 for Vapor Pressure Curve
At or above Atm pressure:	-45 to 205 °C (-49 to 400 °F)

Viscosity at 25 °C (77 °F): 9.5 cs

Specific Gravity @ 25 °C (77 °F): 0.934

Coefficient of Thermal Expansion: 0.00108 cc/cc/C (0.00060 cc/cc/F)

Chemical Name: Polydimethylsiloxane polymer

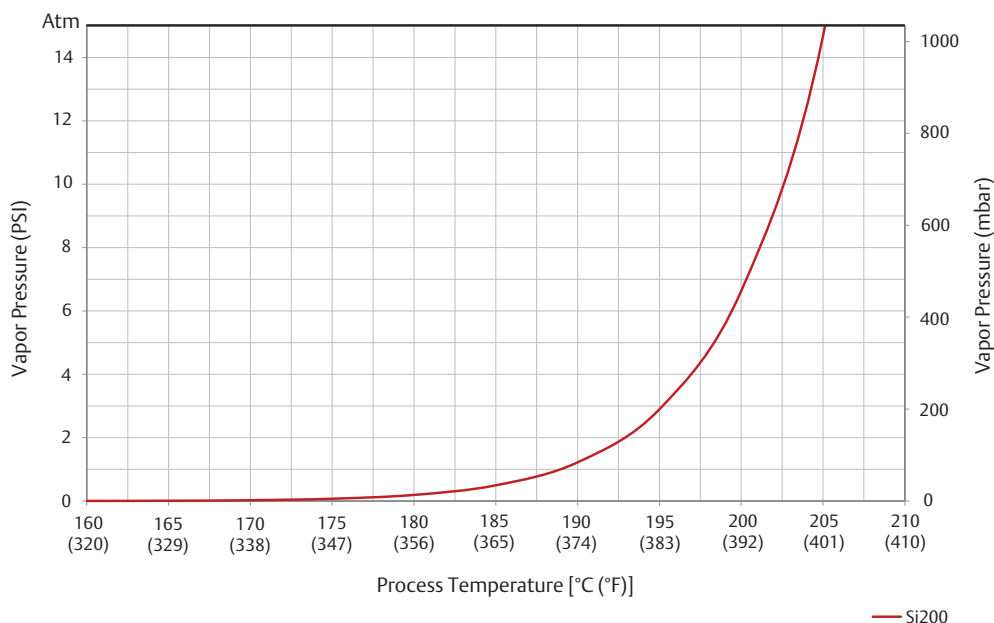
Chemical Composition: $(\text{CH}_3)_3\text{SiO}[\text{SiO}(\text{CH}_3)_2]_n\text{Si}(\text{CH}_3)_3$

CAS Number: 63148-62-9

1.3.1 Description/applications

Silicone 200 for Vacuum Applications is designed for optimal performance in vacuum (< 1bar-a). Refer to the vapor pressure curve below for acceptable operating pressure and temperature limits.

Figure 1-1. Silicone 200 for Vacuum Applications Vapor Pressure Curve



1.4 Silicone 704 – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: 0 to 315 °C (32 to 600 °F)

Viscosity at 25 °C (77 °F): 39 cs

Specific Gravity @ 25 °C (77 °F): 1.07

Coefficient of Thermal Expansion: 0.00095 cc/cc/C (0.00053 cc/cc/F)

Chemical Name: Tetramethyltetraphenyltrisiloxane

CAS Number: 3982-82-9

1.4.1 Description/applications

Silicone 704 is a fill fluid intended for use in applications with higher operating temperatures beyond the maximum limit of Silicone 200. This specialty silicone fluid has a much higher molecular weight than Silicone 200, which increases its operating temperature. Its main limitation is its higher viscosity, so heat tracing of capillaries or use of the Rosemount Thermal Ranger Expander is suggested for many outdoor applications. The 0.03-in. (0.7 mm) ID capillary is not allowed for Silicone 704 because of its higher viscosity.

For applications below 14.7 psia (1 bar-a) use Silicone 704 for Vacuum Applications found in [Section 1.5](#).

1.5 Silicone 704 for Vacuum Applications – fill fluid specifications

Temperature Limits:

Below Atm pressure: See Figure 1-2 for Vapor Pressure Curve

At or above Atm pressure: 0 to 315 °C (32 to 600 °F)

Viscosity at 25 °C (77 °F): 39 cs

Specific Gravity @ 25 °C (77 °F): 1.07

Coefficient of Thermal Expansion: 0.00095 cc/cc/C (0.00053 cc/cc/F)

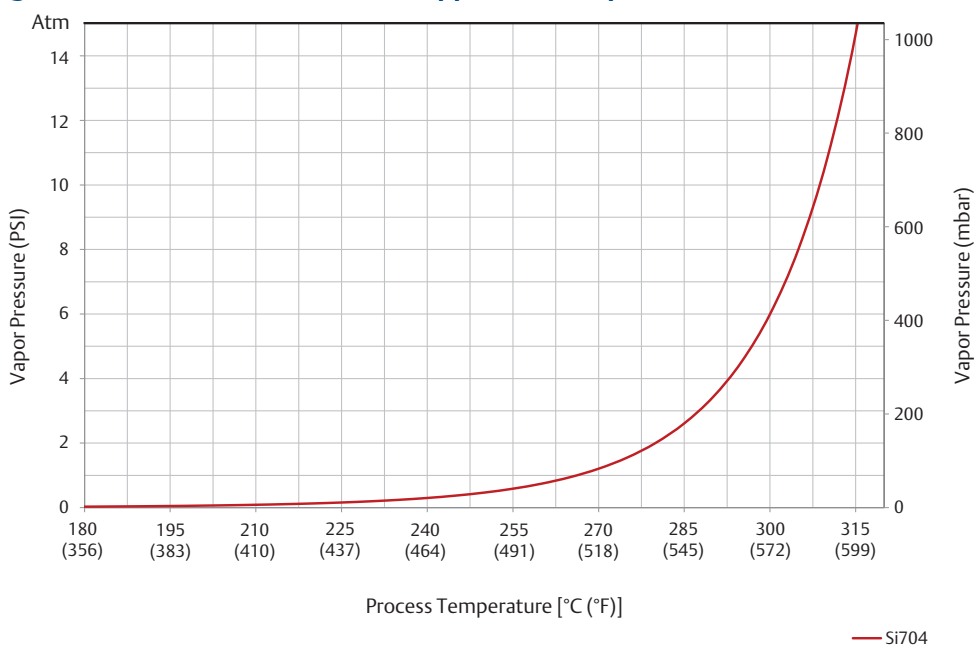
Chemical Name: Tetramethyltetraphenyltrisiloxane

CAS Number: 3982-82-9

1.5.1 Description/applications

Silicone 704 for Vacuum Applications is specifically designed for applications below 14.7 psia (1bar-a) that have higher operating temperatures than Silicone 200 for Vacuum Applications can support. This specialty silicone fluid has a much higher molecular weight than Silicone 200, which increases its operating temperature and lowers its vapor pressure. Its primary limitation is its higher viscosity, so heat tracing of capillaries or use of the Rosemount Thermal Ranger Expander is suggested for many outdoor applications. The 0.03-in. (0.7 mm) ID capillary is not allowed for Silicone 704 for Vacuum Applications because of its higher viscosity. Refer to the vapor pressure curve below for acceptable operating pressure and temperature limits.

Figure 1-2. Silicone 704 for Vacuum Applications Vapor Pressure Curve



1.6 Silicone 705 – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: 20 to 370 °C (68 to 698 °F)

Viscosity at 25 °C (77 °F): 175 cs

Specific Gravity @ 25 °C (77 °F): 1.09

Coefficient of Thermal Expansion: 0.00077 cc/cc/C (0.00043 cc/cc/F)

Chemical Name: Trimethylpentaphenyl trisiloxane

CAS Number: 3390-61-2

1.6.1 Description/applications

Silicone 705 is a specialty silicone fill fluid intended for use in applications with higher operating temperatures beyond the maximum limit of Silicone 704. Silicone 705 has a higher molecular weight than Silicone 704, which extends seal operating temperatures. Its primary limitation is high viscosity, so heat tracing of capillaries or use of the Rosemount Thermal Ranger Expander is often needed for acceptable response time. The 0.03-in. (0.7 mm) ID capillary is not allowed for Silicone 705 because of its higher viscosity.

For applications below 14.7 psia (1 bar-a) use Silicone 705 for Vacuum Applications found in [Section 1.7](#).

1.7 Silicone 705 for Vacuum Applications – fill fluid specifications

Temperature Limits:

Below Atm pressure: See Figure 1-3 for Vapor Pressure Curve

At or above Atm Pressure: 20 to 370 °C (68 to 698 °F)

Viscosity at 25 °C (77 °F): 175 cs

Specific Gravity @ 25 °C (77 °F): 1.09

Coefficient of Thermal Expansion: 0.00077 cc/cc/C (0.00043 cc/cc/F)

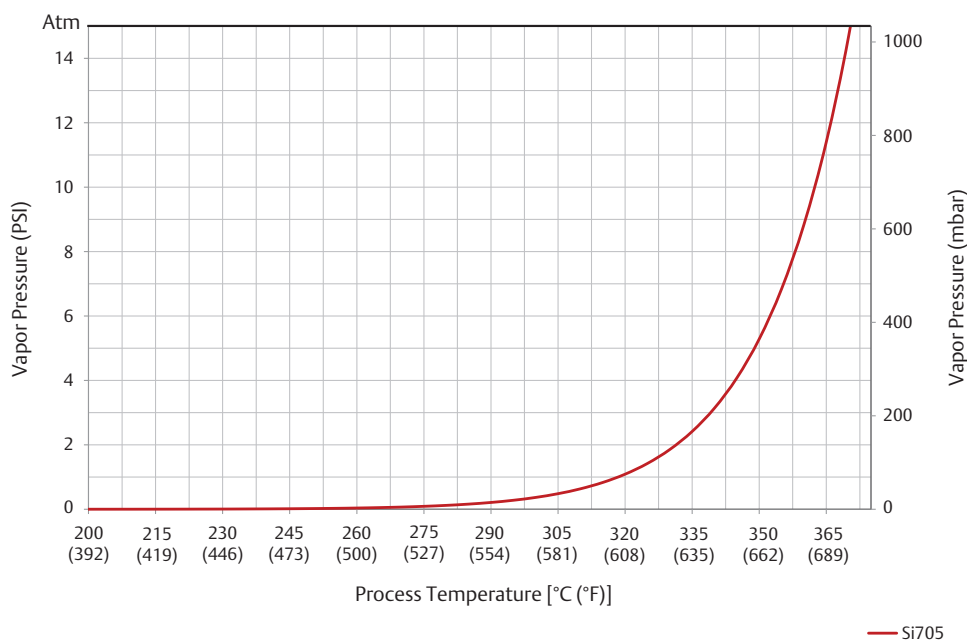
Chemical Name: Trimethylpentaphenyl trisiloxane

CAS Number: 3390-61-2

1.7.1 Description/applications

Silicone 705 for Vacuum Applications is specifically designed for applications below 14.7 psia (1bar-a) that has higher operating temperature than Silicone 704 for Vacuum Applications can support. This specialty silicone fluid has a higher molecular weight than Silicone 704, which increases its operating temperature and lowers its vapor pressure. Its primary limitation is its higher viscosity, so heat tracing of capillaries or use of the Rosemount Thermal Ranger Expander is suggested for many outdoor applications. The 0.03-in. (0.7 mm) ID capillary is not allowed for Silicone 705 because of its higher viscosity. Refer to the vapor pressure curve below for acceptable operating pressure and temperature limits.

Figure 1-3. Silicone 705 for Vacuum Applications Vapor Pressure Curve



1.8 UltraTherm 805 – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: 410 °C (770 °F)

Viscosity at 25 °C (77 °F): 1000 cSt

Specific Gravity @ 25 °C (77 °F): 1.20

Coefficient of Thermal Expansion: 0.0008 1/°C

1.8.1 Description/applications

UltraTherm 805 fill fluid is a high-temperature silicone free fluid with exceptionally low volatility, high thermal stability, and is a halogen-free, clear, colorless fluid. It is extremely resistant to degradation from heat. UltraTherm 805 is designed for applications where extreme high temperature and adverse environments are expected. Because of its high viscosity, it cannot be used in capillary lines and is only available with the Thermal Range Expander. UltraTherm 805 fill fluid is not inert.

For applications below 14.7 psia (1 bar-a) use UltraTherm 805 for Vacuum Applications.

1.9 UltraTherm 805 for Vacuum Applications – fill fluid specifications

Temperature Limits:

Below Atm pressure: See Figure 1-4 for Vapor Pressure Curve

At or above Atm Pressure: 410 °C (770 °F)

Viscosity at 25 °C (77 °F): 1000 cSt

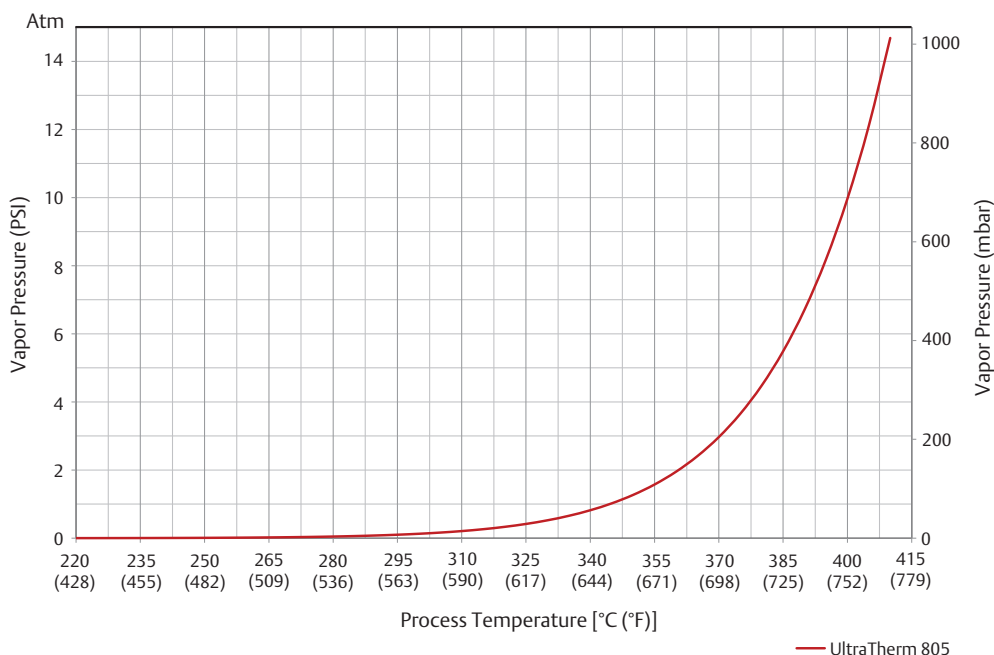
Specific Gravity @ 25 °C (77 °F): 1.20

Coefficient of Thermal Expansion: 0.0008 1/°C

1.9.1 Description/applications

UltraTherm 805 for Vacuum Applications is specifically designed for applications below 14.7 psia (1bar-a) that have a higher operating temperature than Silicone 705 for Vacuum Applications can support. This specialty fluid is silicone free and has a higher molecular weight than Silicone 705, which increases its operating temperature and lowers its vapor pressure. Because of its high viscosity, it cannot be used in capillary lines and is only available with Thermal Range Expander. Refer to the vapor pressure curve below for acceptable operating pressure and temperature limits.

Figure 1-4. UltraTherm 805 for Vacuum Applications Vapor Pressure Curve



1.10 SYLTHERM XLT – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: -75 to 145 °C (-102 to 293 °F)

Viscosity at 25 °C (77 °F): 1.6 cs

Specific Gravity @ 25 °C (77 °F): 0.85

Coefficient of Thermal Expansion: 0.001198 cc/cc/C (0.00066 cc/cc/F)

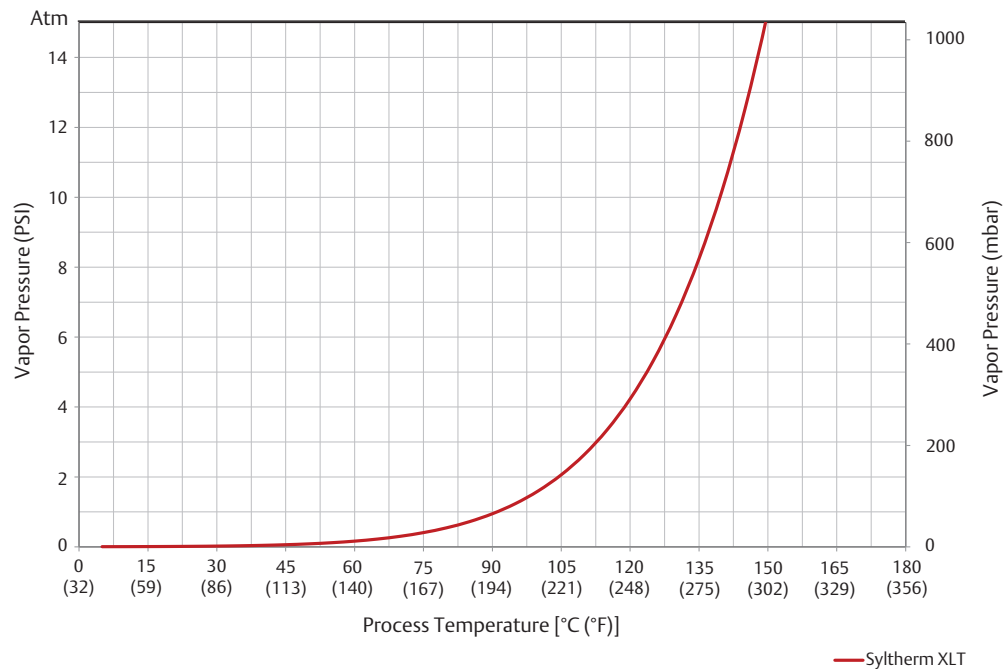
Chemical Name: Dimethyl Polysiloxane

CAS Number: 063148-62-9

1.10.1 Description/applications

SYLTHERM XLT is a low viscosity silicone fluid used specifically for cold temperature applications.

Figure 1-5. SYLTHERM XLT Vapor Pressure Curve



1.11 Inert (Halocarbon) – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: -45 to 160 °C (-49 to 320 °F)

Viscosity at 25 °C (77 °F): 6.5 cs (4.2 cs at 100 °F)

Specific Gravity @ 25 °C(77 °F): 1.85

Coefficient of Thermal Expansion: 0.000864 cc/cc/C (0.00048 cc/cc/F)

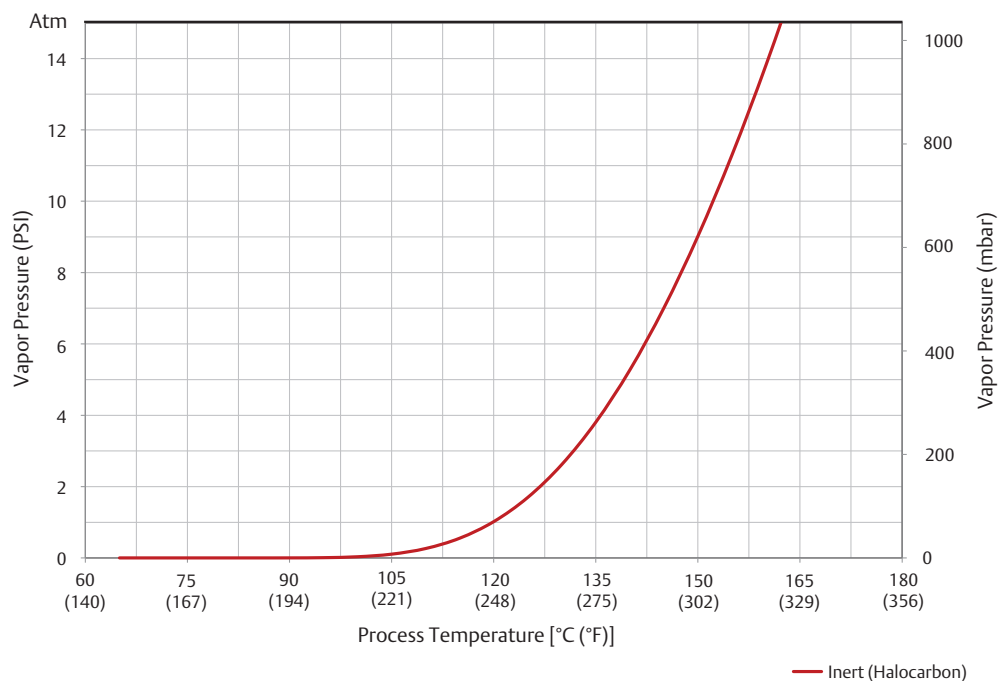
Chemical Composition: Chlorotrifluoroethylene polymer (CTFE)

CAS Number: 9002-83-9

1.11.1 Description/applications

Halocarbon 4.2 is the standard inert fluid offering with Rosemount remote seals. 4.2 fill fluid refers to the viscosity in centistokes at 100 °F. Inert fill fluids are essentially non-reactive to a wide range of chemicals, including halogens, oxygen, and other specialty gas applications. Other applications to consider using Inert Fluid include those where silicone fluids are banned due to product contamination concerns (i.e. paint manufacturing). Inert fluid has a higher vapor pressure than standard Silicone 200 and restricts applications, especially in vacuum service. Inert fluid should not be used for food grade applications.

Figure 1-6. Inert (Halocarbon) Vapor Pressure Curve



1.12 Neobee M-20 – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: -15 to 225 °C (5 to 437 °F)

Viscosity at 25 °C (77 °F): 9.8 cs

Specific Gravity @ 25 °C (77 °F): 0.94

Coefficient of Thermal Expansion: 0.001008 cc/cc/C (0.00056 cc/cc/F)

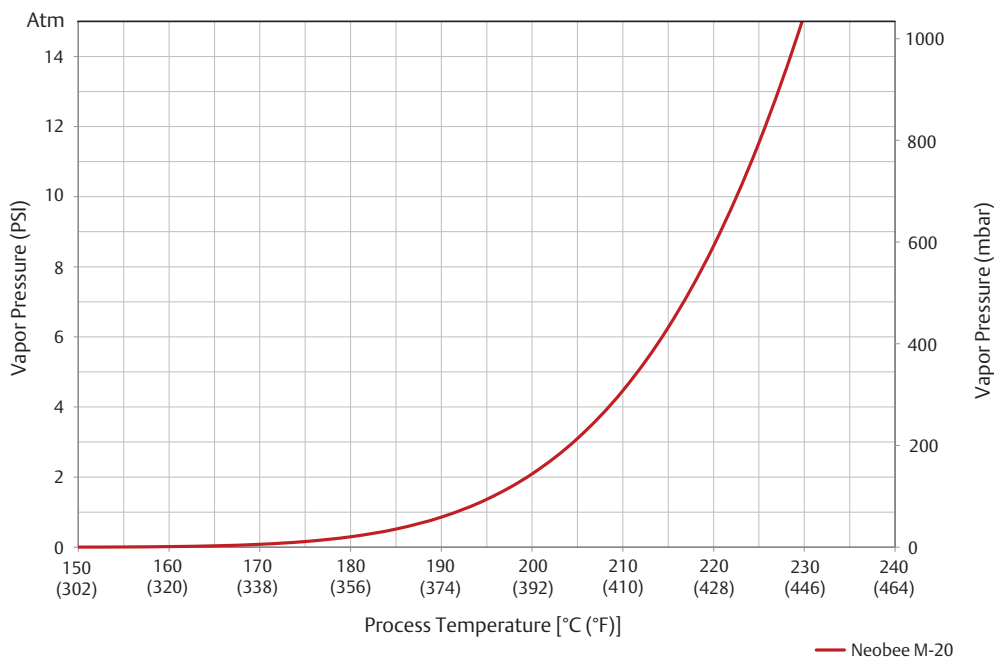
Chemical Composition: Derived from coconut oil and propylene glycol:
Dicaprylate/Dicaprate

CAS Number: 68583-51-7

1.12.1 Description/applications

Neobee M-20 is the most commonly used fill fluid for hygienic applications because of its low viscosity and thermal stability. Neobee is approved under 21CFR 172.856 as a direct food additive and under 21CFR 174.5 as an indirect food additive. It is soluble in alcohol containing up to 20% water, has a smooth non-oily feel and unusually low viscosity, similar to Silicone 200. Neobee properties make it a suitable all purpose fill fluid. On colder applications, the response time should be evaluated due to increased viscosity.

Figure 1-7. Neobee M-20 Vapor Pressure Curve



1.13 Glycerin and water – fill fluid specifications

Temperature Limits:

At or above Atm Pressure: -15 to 95 °C (5 to 203 °F)

Viscosity at 25 °C (77 °F): 12.5 cs

Specific Gravity @ 25 °C (77 °F): 1.13

Coefficient of Thermal Expansion: 0.000342 cc/cc/C (0.00019 cc/cc/F)

Chemical Composition: 50% glycerin and 50% water (by volume)

1.13.1 Description/applications

Glycerin is commonly used in many food, pharmaceutical, and cosmetic products. Glycerin is mixed with water in order to decrease its viscosity. Being a Generally Recognized As Safe (GRAS) substance, it may be used as a fill fluid in food, beverage, dairy, and pharmaceutical applications. Since it has a low coefficient of thermal expansion, it is also a good choice in applications requiring high performance as long as the temperature limits are not exceeded. FDA Code of Federal Regulations reference number: 21CFR 182.1320.

1.13.2 USP grade

These chemicals are manufactured under current Good Manufacturing Practices (GMP). These materials meet the requirements listed in the United States Pharmacopeia (USP). The USP lists each chemical along with certain specifications the product must meet in order to be considered a USP product.

1.13.3 FCC grade

These products meet the specifications listed in the Food Chemicals Codex. This is a book of specifications written by the Food and Nutrition Board, the Institute of Medicine, and the National Academy of Sciences. The chemicals that carry the FCC name are considered “Food Grade”.

Glycerin and water should not be used in vacuum applications below 14.7 psia (1 bar-a).

1.14 Propylene glycol and water – fill fluid specifications

Temperature Limits:

At or above Atm Pressure:	-15 to 95 °C (5 to 203 °F)
Viscosity at 25 °C (77 °F):	2.85 cs
Specific Gravity @ 25 °C (77 °F):	1.02
Coefficient of Thermal Expansion:	0.00034 cc/cc/C (0.00019 cc/cc/F)

Chemical Composition: 30% USP & FCC grade propylene glycol and 70% water (by volume)

1.14.1 Description/applications

Propylene glycol is commonly used as a raw material for paints and polyester and alkyd resins, a basic component of brake fluids, an ingredient for deicing / antifreeze fluids, and a heat transfer fluid. The food grade versions are also used as a solvent for flavors, extracts and drugs, as food antioxidants, lubricants and mold inhibitors. Being a Generally Recognized As Safe (GRAS) substance, it may be used as a fill fluid in food, beverage, dairy, and pharmaceutical applications. Since it has a low coefficient of thermal expansion, it is also a good choice in applications requiring high performance as long as the temperature limits are not exceeded. FDA Code of Federal Regulations reference number: 21CFR 184.1666.

1.14.2 USP grade

These chemicals are manufactured under current Good Manufacturing Practices (GMP). These materials meet the requirements listed in the United States Pharmacopeia (USP). The USP lists each chemical along with certain specifications the product must meet in order to be considered a USP product.

1.14.3 FCC grade

These products meet the specifications listed in the Food Chemicals Codex. This is a book of specifications written by the Food and Nutrition Board, the Institute of Medicine, and the National Academy of Sciences. The chemicals that carry the FCC name are considered “Food Grade.”

Propylene glycol and water should not be used in vacuum applications below 14.7 psia (1 bar-a).

Global Headquarters

Emerson Process Management

6021 Innovation Blvd

Shakopee, MN 55379, USA

☎ +1 800 999 9307 or +1 952 906 8888

☎ +1 952 949 7001

✉ RFQ.RMD-RCC@EmersonProcess.com

North America Regional Office

Emerson Process Management

8200 Market Blvd.

Chanhassen, MN 55317, USA

☎ +1 800 999 9307 or +1 952 906 8888

☎ +1 952 949 7001

✉ RMT-NA.RCCRFQ@Emerson.com

Latin America Regional Office

Emerson Process Management

1300 Concord Terrace, Suite 400

Sunrise, Florida, 33323, USA

☎ +1 954 846 5030

☎ +1 954 846 5121

✉ RFQ.RMD-RCC@EmersonProcess.com

Europe Regional Office

Emerson Process Management Europe GmbH

Neuhofstrasse 19a P.O. Box 1046

CH 6340 Baar

Switzerland

☎ +41 (0) 41 768 6111

☎ +41 (0) 41 768 6300

✉ RFQ.RMD-RCC@EmersonProcess.com

Asia Pacific Regional Office

Emerson Process Management Asia Pacific Pte Ltd

1 Pandan Crescent

Singapore 128461

☎ +65 6777 8211

☎ +65 6777 0947

✉ Enquiries@AP.EmersonProcess.com

Middle East and Africa Regional Office

Emerson Process Management

Emerson FZE P.O. Box 17033,

Jebel Ali Free Zone - South 2

Dubai, United Arab Emirates

☎ +971 4 8118100

☎ +971 4 8865465

✉ RFQ.RMTMEA@Emerson.com

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