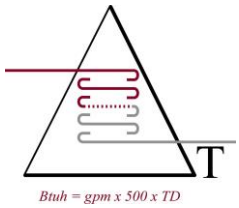

PROTOCOL® FG

FCC/USDA GRADE COOLANT

Product Description

PROTOCOL FG is an FCC grade of propylene glycol inhibited for applications where the possibility of incidental food contact exists.
FG blends meet the criteria established by the United States Department of Agriculture and exceed the quality requirements outlined in the Food Chemicals Codex under Title 21 CFR 184.1666 and the inhibitor package used in PROTOCOL FG meets the quality requirements outlined under FCC Title 21 CFR 182.6285. In addition, PROTOCOL FG blends meet the Grade A Milk Pasteurization Ordinance of the United States Dairy Industry. This product was developed to satisfy the requirements established for non-toxic service, as well as to provide excellent freeze point depression, burst protection, and corrosion protection in closed circuit Hydronic systems.

PROTOCOL FG fluids have an operating range from -50°F to 250°F and contain inhibitors specifically formulated to keep system metals free from corrosion without fouling critical heat exchange surfaces or comprising the integrity of the food grade propylene glycol.

PROTOCOL FG is available as concentrate or premixed with deionized water to meet your exact specification for freeze, burst, and boil-protection. We recommend that PROTOCOL FG heat transfer fluid be purchased premixed with deionized water to ensure that optimal corrosion protection and heat transfer efficiency is achieved.

** PROTOCOL FG coolants should not be used in systems containing galvanized steel components or in systems constructed with CPVC piping.*

Technical Data

Typical composition: FG-100, v%

Propylene Glycol	≥ 93
Inhibitors	≥ 6
Color	Water white
Specific Gravity	1.04 – 1.06
pH, 50% solution	8.0 – 10.0
Reserve Alkalinity, 100%	~ 10.0

Typical Physical Properties:

BP @ 760 mm Hg (40%)	~ 219 °F
Flash Point (<90%)	None
VP mm Hg (40% @ 100°F)	~ 44.3
Thermal Conductivity (40% @ 100°F)	~ 0.24
Specific Heat (40% @ 100°F)	~ 0.91
Viscosity, cP (40% @ 100°F)	~ 2.3

Typical properties of aqueous solutions:

Freeze Point (°F)	Volume %	Boiling Point (°F)
26	10	212
19	20	213
15	25	214
8	30	216
1	35	217
- 7	40	219
- 28	50	222

Calculations for Freeze Point Adjustments

If the concentration needs to be increased, use the following:

A = V (D - C) / 100 - C

Where:
A = Quantity of concentrate to add.
V = Volume capacity of the system.
D = Desired concentration (freeze point).
C = Current concentration.

However, if the concentration needs to be decreased, the following formula should be applied.

A = V (C - D) / C

Maintaining Optimal Performance

Once the heat transfer system is operational, it is important that you participate in our fluid-testing program. Our Heat Transfer Fluids Laboratory utilizes advanced analytical testing equipment to provide our customers with fast, accurate, and reliable results. The whole concept behind this support program is to ensure that you maximize the service life of your heat transfer fluid and your equipment. Approximately 10 days after your glycol sample is received by the laboratory, you will receive a detailed report highlighting the results and commenting on any unusual or troublesome (if any) conditions that exist. With PROTOCOL Heat Transfer Fluids, and our comprehensive fluid analyses program, you're assured of receiving exceptional quality and value for years to come.

System Preparation

Prior to installing your new heat transfer fluid, it is important that the system is properly cleaned and flushed. Typically, newer systems are coated with oil; grease, dirt or corrosion products, and these forms of contamination must be removed from the system piping to ensure optimal heat transfer efficiency and corrosion protection. For existing systems, it is equally important for the system to be cleaned and flushed, especially if the previous fluid contained silicates, a different glycol based, or was improperly maintained. Cleaners and Degreasers are available from Thermal Fluid Technologies. For more information please contact your local supplier and request our TechSpec™ for PROTOCOL SC-101 and PROTOCOL SD-102.

Expansion Tank

The main function of the expansion tank is to allow for fluid expansion upon heating. A properly designed expansion tank can minimize or eliminate many problems from the initial start-up through everyday operation of the heat transfer system. The expansion tank should be sized so that it is approximately 25% full at ambient temperature and 75% full under normal operating temperatures. This basic design principle should cause sufficient positive fluid pressure on the pump suction side during start-up while minimizing the vapor space in the tank during normal operation. Fluid expansion can be calculated by dividing the fluids density at the lower temperature by the density of the fluid at the highest temperature. Keep in mind that the resulting expansion volume is based on 50% of the total tank volume (difference between 25% and 75%). Therefore, a properly designed expansion tank should be capable of holding twice the expansion volume.

Premixed Solutions

PROTOCOL® heat transfer fluids are available in a wide range of pre-blended solutions to satisfy your heating and cooling needs. Whenever a pre-blended version of PROTOCOL is purchased you not only get a ready-to-use product that's been premixed to your exact specifications, but you also get the added benefit of having your product inhibited as if it were a 50/50 mix. Keep in mind that if you purchase concentrate and dilute it down to a 30% solution for example, not only have you diluted the glycol, but you've also diluted the inhibitors down to minimum levels. With a pre-blended product purchased from Thermal Fluid Technologies, or any of our manufacturing affiliates, you will receive your finished product inhibited as if it were a 50% blend, regardless of the glycol concentration. This of course is only one aspect of the dilution scenario. Water quality issues as well as the hassles of achieving the required freeze or burst point specification can make field blending difficult, time consuming, and risky practice when considering the cost involved with replacing corroded or ruptured pipes. Due to today's higher construction, labor, and material costs we highly recommend purchasing PROTOCOL heat transfer fluids premixed with deionized water.

PROTOCOL Heat Transfer Fluids
"Performance products of unparalleled quality and value"