ig-loo™ Propylene Glycol

Heat Transfer Fluid Reference Guide

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PGHD IS DESIGNED FOR HEATING, COOLING APPLICATIONS

ig-loo™ PGHD heat transfer fluid is a heavy-duty formulation of 100% virgin propylene glycol and a specially formulated package of industrial corrosion inhibitors for use in closed systems with copper, brass, solder, steel,cast-iron and aluminum. You can count on a consistent formulation like **ig-loo PGHD** to provide reliable, long-lasting protection and performance. The use of a high-quality heat transfer fluid and corrosion inhibitor package prolongs the fluid life and helps lower the cost of ownership.

ig-loo PGHD inhibitor package meets or exceeds industry standards when tested according to ASTM D8039, D8040 and D1384 methods. It is compatible with most plastics, elastomers, and types of rubber. It also contains tolyltriazole which is primarily used for the protection of copper and metal alloys used in cooling water or boiler systems by the industrial water treatment industry. Tolyltriazole decreases the corrosion rate of metals and alloys by forming a coating, or passivation layer, which prevents access of the corrosive substance to the metal or alloy underneath. This is of particular importance in industries where fluids routinely need to be in continuous contact with metals that require protection.

ig-loo PGHD protects all metals found in heat transfer fluid systems. **ig-loo PGHD** controls the corrosion of metals, helps prevent scaling and fouling of heat transfer surfaces and buffer the pH to maintain it in the optimum operating range. The inhibitor system is based on a high-phosphate, multi-component formulation. **ig-loo PGHD** operating temperature range of -60ºF to +350ºF (-50°C to 177°C) and can be used to provide both freeze and burst protection for systems which may be exposed to very low temperatures. **ig-loo PGHD** is not approved as an NSF category HT1 for use as a heat transfer fluid where incidental contact with food is possible.

Water used to dilute the fluid can be low-hardness, city water or well water, although the use of deionized water is best. It is recommended that water with no more than 170 ppm hardness be used to dilute the concentrate or be used as make-up water. Higher hardness levels may cause excessive inhibitor consumption, scale deposits, and metal pitting.

PGFG IS DESIGNED FOR FOOD GRADE APPLICATIONS

ig-loo PGFG is an NSF registered food grade heat transfer fluid additive package that is mixed with a 100% virgin propylene glycol base. It is used where it may come into incidental or accidental contact with food, beverage products or drinking water may occur. For example, it could be used in HVAC systems, fire systems, solar heating, refrigeration warehouse floor heating, sidewalk/playing field subsurface heating/cooling, cold room dehumidification systems.

ig-loo PGFG contains food grade dipotassium phosphate as its primary inhibitor. Contains GRAS ingredients, or “Generally Recognized As Safe” ingredients, by the FDA and acceptable as Direct Food Additives (Food Additives Regulations, Subparts 182 and 184). The regulation for: • Propylene Glycol: 21 CFR 1821666 • Dipotassium phosphate is CFR 182.6285

ig-loo PGFG prevents corrosion of metals, minimizes scaling and fouling of heat transfer surfaces, and buffers the pH to maintain it in the optimum operating range. ig-loo PGFG is based on a balanced high phosphate formulation and is compatible with all common metals in heat transfer fluid systems and is compatible with most plastic construction materials.

ig-loo PGFG recommended operating temperature range of -45ºF (-50°C) to +250ºF (120°C). The lowest temperature to which the finished product can be exposed depends upon the amount of water with which the concentrated product is mixed can be used to provide both freezing protection and burst protection for systems which may be exposed to very low temperatures.

ig-loo™ PREDILUTED PROPYLENE GLYCOL

ig-loo Prediluted is a formulated pre-mixed ready to use Propylene Glycol. Water quality concerns are no longer limited to our drinking water. Due to the high total hardness in wells or municipal water system, boiler equipment manufacturers are now more cautious than ever. When mixing propylene glycol on-site, poor water quality can ead to long-term damage to heating systems. ig-loo Prediluted addresses those concerns, with a ready- to-use antifreeze that eliminates these water quality concerns. **ig-loo Prediluted** can be introduced directly into systems with no on-site dilution, **ig-loo Prediluted** is premixed with deionized water ensuring no mineral content or hardness levels and the elimination of chlorides, which are second only to oxygen as a leading cause of heating system corrosion. **ig-loo Prediluted** blends are available in 25, 30, 35, 40, 45, 50, 55, 60 and 70% propylene glycol concentrations.

Please check with the equipment manufacturer of the system to determine compatibility with this product. Minimum flow protection levels are estimated and are dependent on system and equipment.

Freeze protection and corrosion protection levels should be checked annually. Use a Refractometer and pH Meter for adequate system protection. Add additional ig-loo PGHD product if freeze protection is inadequate. The ideal level is 9–10.5, once the system pH goes below 8.5, inhibitors with buffering agents will need to be added to elevate the pH levels.

APPROVALS & LISTINGS

ig-loo PGHD conforms to ASTM D8039, D8040 and D1384 corrosion protection.

ig-loo PGFG - Registered with NSF International Registration Guidelines for Proprietary Substance and Nonfood Compounds, this product is acceptable for use as a heat transfer fluid where there is possibility of incidental food contact (HT1). Conforms to ASTM D1384 corrosion protection.

NSF

Nonfood Compounds
HT1

SYSTEM REQUIREMENTS and LIMITATIONS

Read all cautions and directions carefully before using this product.

- Not recommended for use with CPVC or PVC in concentrations greater than 35% (-5°F Burst Protection)
- Do not use in water softeners. Disconnect all water softeners from the system or provide back flow protection to prevent contamination of brine or resin bed.
- Clean system prior installing **ig-loo PG**
- Should not be used with other chemicals.
- Do not use in internal combustion engines as a coolant.

Ig-loo PGHD products are not recommended:

1. For use in systems containing galvanized components. **ig-loo PGHD** will remove zinc from galvanized materials, therefore contact with galvanized materials should be minimized. Systems constructed of aluminum will also experience corrosion with **ig-loo PGHD**, particularly at temperatures above 150°F / 66°C.
   (Please check with equipment manufacturer of system to determine compatibility with this product).
2. In systems where temperatures regularly exceed 275°F / 135°C or in systems that are permanently open to the atmosphere.
3. For systems with concentrating solar collectors or evacuated tube solar collectors.

PHYSICAL PROPERTIES OF ig-loo™ PGHD

	ig-loo	PGHD 60	PGHD 55	PGHD 50	PGHD 45	PGHD 40	PGHD 35	PGHD 30	PGHD 25
PG RATIO	95%	60%	55%	50%	45%	40%	35%	30%	25%
100% VIRGIN PG	YES	YES	YES	YES	YES	YES	YES	YES	YES
Food Grade (HT1)	NO	NO	NO	NO	NO	NO	NO	NO	NO
Color	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW	PINK YELLOW
Freeze Point @ 100% @ 50%	Below -60°F -23.1°F	Below -60°F +9.2°F	-42.8°F +11.5°F	-28.3°F +14.0°F	-16.1°F *	-6.0°F *	+2.4°F *	+9.2°F *	+14.0°F *
Freeze Point @ 100% @ 50%	Below -51.1°C -30.6°C	Below -51.1°C -12.7°C	-41.5°C -11.4°C	-31.0°C -9.6°C	-24.0°C *	-20.0°C *	-16.0°C *	-13.0 °C *	-10.0°C *
Burst Point @ 100% pH	-100 °F 10.0 to 11.0	-100 °F 9.5 to 10.8	-100.0°F 9.5 to 10.8	-85.0°F 9.5 to 10.8	-65.0°F 9.5 to 10.8	-60.0°F 9.5 to 10.8	-48.0°F 9.5 to 10.8	-16.0 °F 9.5 to 10.8	-16.0 °F 9.5 to 10.8
Boiling Point (°F)	310°F	225°F	223°F	222°F	220°F	219°F	217°F	216°F	214°F
Temperature Rating	350°F	350°F	350°F	350°F	350°F	350°F	350°F	350°F	350°F

*Minimum recommended Concentration is 25%
*The burst protection temperature is an estimate only and it will be affected by system design as well as the materials used in its construction.

PHYSICAL PROPERTIES OF ig-loo PGFG

	ig-loo	PGFG 70	PGFG 50	PGFG 45	PGFG 40	PGFG 35	PGFG 30	PGFG 25
PG RATIO	96%	70%	50%	45%	40%	35%	30%	25%
100% VIRGIN PG	YES	YES	YES	YES	YES	YES	YES	YES
NSF Food Grade (HT1)	YES	YES	YES	YES	YES	YES	YES	YES
Color	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE	CLEAR BLUE
Freeze Point @ 100% @ 50%	Below -60°F -20.0°F	Below -60°F +2.4°F	-29.8°F +14.0°F	-17.2°F *	-6.9°F *	+1.8°F *	+9.2°F *	+9.2°F *
Freeze Point @ 100% @ 50%	Below -51.1°C -29.3°C	-51.1°C -16.4°C	-34.3°C -10.0°C	-27.3°C *	-21.6°C *	-16.8°C *	-12.7 °C *	-12.7°C *
Burst Point @ 100% pH	-100.0°F 10.0 to 11.0	-100.0°F 9.0 to 10.5	-85.0°F 9.0 to 10.5	-65.0°F 9.0 to 10.5	-60.0°F 9.0 to 10.5	-48.0°F 9.0 to 10.5	-16.0°F 9.0 to 10.5	-16.0°F 9.0 to 10.5
Boiling Point (°F)	310°F	230°F	225°F	220°F	219°F	217°F	216°F	214°F
Temperature Rating	250°F	250°F	250°F	250°F	250°F	250°F	250°F	250°F

*Minimum recommended Concentration is 25%
*The burst protection temperature is an estimate only and it will be affected by system design as well as the materials used in its construction.

DIRECTIONS FOR PRODUCT USE

1. **CLEAN THE SYSTEM -** It is recommended that any system, whether new or existing, be thoroughly cleaned prior to being charged. Any system contaminated with dirt and other materials reduces efficiency and wears the system prematurely. New systems need to be free of flux, solder residue, grease, and any foreign particles. Most boiler manufacturers recommend cleaning new systems with a solution of Tri-Sodium Phosphate (TSP). Existing systems need to be flushed and cleaned to eliminate any build-up of rust, scale, lime, and other non-organic matter. These systems should be cleaned with an inhibited hydrochloric acid. (check with boiler manufacturer). All systems should be checked for leaks prior to installation of any ig-loo product.

2. **MEASURE THE TOTAL CAPACITY OF THE SYSTEM** using one of the following methods.

   ### DIRECT METHOD

   - Fill system completely, making sure all components of system are full.
   - Shut system down, let pressure drop to a safe level.
   - Drain out fluid into suitable container and record the number of gallons removed.

     This is TOTAL SYSTEM FLUID CAPACITY.

   ### ESTIMATION METHOD

   - Determine system pipe sizes and amount of linear footage for each size. Using Table I, calculate the volume of the system piping.
   - Add this number to the gallon capacity of the boiler or equipment in the system to determine the TOTAL SYSTEM FLUID CAPACITY.

TABLE I (Note: 1 US Gallon = 3.785 Liters)

Description	Pipe Diameter Nominal Size	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"
Standard Steel Pipe	US Gallons of Fluid per 100 ft. pipe	1.0	1.60	-	2.8	4.5	7.8	10.6	17.5	24.9	38.5
Type "L" US Gallons of	US Gallons of Fluid per 100 ft. pipe	0.76	1.22	1.81	2.52	4.30	6.55	9.27	16.12	24.86	35.48

3. **SELECT DESIRED TEMPERATURE COVERAGE**

   - Using Table II determine the protection level desired and match it to the appropriate ig-loo™ product concentration. (See next page)

DIRECTIONS FOR PRODUCT USE (cont.)

Propylene Glycol Concentration versus Freezing Points and Boiling Points

TABLE II (Cont.)

Freezing Point		Wt % Propylene Glycol	Vol % Propylene Glycol	Vol % ig-loo™ PGFG	Vol % ig-loo™ PGHD	Boiling Point		Degree Brix††	Refractive Index 22°C
°F	°C					°F @ 760 mm Hg	°C @ 0/96. Barr		
32.0	0.0	0.0	0.0	0.0	0.0	212	100	0.00	1.333
15.6	-9.1	24.0	23.4	24.5	24.9	213	101	18.40	1.360
14.7	-9.6	25.0	24.4	25.5	26.0	214	101	19.00	1.362
13.7	-10.2	26.0	25.3	26.5	26.9	214	101	19.60	1.363
12.6	-10.8	27.0	26.4	27.6	28.1	214	101	20.20	1.364
11.5	-11.4	28.0	27.4	28.6	29.1	215	102	20.80	1.365
10.4	-12.0	29.0	28.4	29.7	30.2	215	102	21.40	1.366
9.2	-12.7	30.0	29.4	30.7	31.3	216	102	22.00	1.368
7.9	-13.4	31.0	30.4	31.8	32.3	216	102	22.70	1.369
6.6	-14.1	32.0	31.4	32.8	33.4	216	102	23.60	1.370
5.3	-14.8	33.0	32.4	33.9	34.5	216	102	24.40	1.371
3.9	-15.6	34.0	33.5	35.0	35.6	216	102	25.30	1.362
2.4	-16.4	35.0	34.4	36.0	36.6	217	103	26.10	1.373
0.8	-17.3	36.0	35.5	37.1	37.8	217	103	26.90	1.374
-0.8	-18.2	37.0	36.5	38.2	38.8	217	103	27.50	1.376
-2.4	-19.1	38.0	37.5	39.2	39.9	218	103	28.00	1.377
-4.2	-20.1	39.0	38.5	40.3	41.0	218	103	28.50	1.378
- 6.0	-21.1	40.0	39.6	41.4	42.1	219	104	29.10	1.379
-7.8	-22.1	41.0	40.6	42.4	43.2	219	104	29.60	1.380
-9.8	-23.2	42.0	41.6	43.5	44.3	219	104	30.20	1.381
-11.8	-24.3	43.0	42.6	44.5	45.3	219	104	30.70	1.383
-13.9	-25.5	44.0	43.7	45.7	46.5	219	104	31.30	1.384
-16.1	-26.7	45.0	44.7	46.7	47.6	220	104	31.80	1.385
-18.3	-27.9	46.0	45.7	47.8	48.6	220	104	32.40	1.386
-20.7	-29.3	47.0	46.8	48.9	49.8	220	104	33.00	1.387
-23.1	-30.6	48.0	47.8	50.0	50.9	221	105	33.50	1.388
-25.7	-32.1	49.0	48.9	51.1	52.0	221	105	34.10	1.389
-28.3	-33.5	50.0	49.9	52.2	53.1	222	106	34.70	1.390
-31.0	-35.0	51.0	50.9	53.2	54.1	222	106	35.50	1.391
-33.8	-36.6	52.0	51.9	54.3	55.2	222	106	35.90	1.392
-36.7	-38.2	53.0	53.0	55.4	56.4	223	106	36.60	1.394
-39.7	-39.8	54.0	54.0	56.5	57.4	223	106	37.20	1.395
-42.8	-41.6	55.0	55.0	57.5	58.5	223	106	38.00	1.396
-46.0	-43.3	56.0	56.0	58.5	59.6	223	106	38.50	1.397
-49.3	-45.2	57.0	57.0	59.6	60.6	224	107	39.00	1.398
-52.7	-47.1	58.0	58.0	60.6	61.7	224	107	39.60	1.399
-56.2	-49.0	59.0	59.0	61.7	62.8	224	107	40.10	1.400
-59.9	-51.1	60.0	60.0	62.7	63.8	225	107	40.60	1.401

Typical properties are not to be confused with specifications. For additional protection, select a temperature in the above table that is at least 5°F lower than the expected lowest ambient temperature. When using solutions of less than 30% glycol, adjust inhibitor levels.

DIRECTIONS FOR USE (cont.)

4. DETERMINE AMOUNT OF ig-loo™ PGHD PRODUCT REQUIRED IN SYSTEM

Determine the amount of ig-loo PGHD product needed in system by multiplying total system capacity in gallons by the concentration factor of ig-loo PGHD product (first column in each chart above).

Total System Capacity (gal) X Concentration Factor of ig-loo PGHD Product (%) = Amount of ig-loo PGHD Product to be used (gal)

5. CHARGING THE SYSTEM

The system should be completely empty with burner and pump shut off. All internal valves, including zone valves, should be open. THE ENTIRE SYSTEM SHOULD BE OPEN TO PREVENT ANY AREA OF IT FROM BEING ISOLATED. First, add the computed amount of ig-loo **PGHD** product, second add water if necessary. The system can be filled using one of the following two alternatives. The main objective is to fill the system with little or no air trapped in it.

- After providing for an air exit, pump solution into boiler through the boiler drain valve using a small pump.
- Pour solution through a removed air vent at the HIGHEST point in the system.

6. PURGE THE AIR IN SYSTEM

Since air (which includes oxygen) trapped in a system not only results inefficiencies in the operation of the system (wasted energy and excessive noise), it can also cause corrosion. To prevent this, the system, once filled, needs to be purged of all air.

7. TEST THE SYSTEM

Once installed and fully operational, use a Refractometer with Refractometer Reading Adjustment Chart and pH Meter to test fluid to assure proper freeze and corrosion protection. Note: Automotive coolant tester will not work with **ig-loo PGHD** or other propylene glycol anti-freeze mixtures.

8. MAINTENANCE

Systems with **ig-loo PGHD** products installed should be tested annually for product concentration and inhibitor levels using Refractometer with Refractometer Reading Adjustment Chart and pH Meter. If a lower freezing point is required, the concentration of glycol must be increased accordingly. Use the formula below to determine the amount of solution to drain and the number of gallons of ig-loo PGHD fluid to add to increase glycol concentration.

PROCEDURE FOR ADJUSTING FREEZE POINT OF GLYCOL FLUIDS

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

To decrease the glycol concentration, the following formula should be used to determine the volume to drain and replace it with High Quality Water (deionized water).

A=V (P-D) / P

A = The quantity in (gallon or liters) of **ig-loo PGHD** fluid to be added to the system to lower the freeze point, or the quantity in (gallon or liters) of glycol solution that must be drained from the system do decrease glycol concentration.

V = The total solution capacity of the system, in (gallon or liters).

D = The volume percent of **ig-loo PGHD** fluid desired in the system.

P = The volume percent of **ig-loo PGHD** fluid presently in the system.

PRODUCT AVAILABILITY

PRODUCT AVAILABILITY	SIZE VOLUME IN GALLONS / PART NUMBER			
	1 Gal Jug	5 Gal. Pail	55 Gal. Drum	275 Gal. Tote
ig-loo™ PGHD PINK	10100100	10500100	15500100	17500100
ig-loo™ PGHD 70 PINK	10170100	10570100	15570100	17570100
ig-loo™ PGHD 60 PINK	10160100	10560100	15560100	17560100
ig-loo™ PGHD 55 PINK	10155100	10544100	15555100	17555100
ig-loo™ PGHD 50 PINK	10150100	10550100	15550100	17550100
ig-loo™ PGHD 45 PINK	10145100	10545100	15545100	17545100
ig-loo™ PGHD 40 PINK	10140100	10540100	15540100	17540100
ig-loo™ PGHD 35 PINK	10135100	10535100	15535100	17535100
ig-loo™ PGHD 30 PINK	10130100	10530100	15530100	17530100
ig-loo™ PGHD 25 PINK	10125100	10535100	15535100	17535100
ig-loo™ PGFG CLEAR	20100000	20500000	25500000	27500000
ig-loo™ PGFG 70 CLEAR	20170000	20570000	25570000	27570000
ig-loo™ PGFG 60 CLEAR	20160000	20560000	25560000	27560000
ig-loo™ PGFG 55 CLEAR	20155000	20555000	25555000	27555000
ig-loo™ PGFG 50 CLEAR	20150000	20550000	25550000	27550000
ig-loo™ PGFG 45 CLEAR	20145000	20545000	25545000	27545000
ig-loo™ PGFG 40 CLEAR	20140000	20540000	25540000	27540000
ig-loo™ PGFG 35 CLEAR	20135000	20535000	25535000	27535000
ig-loo™ PGFG 30 CLEAR	20130000	20530000	25530000	27530000
ig-loo™ PGFG 25 CLEAR	20125000	20525000	25525000	27525000
ig-loo™ PGFG BLUE	20100200	20500200	25500200	27500200
ig-loo™ PGFG 70 BLUE	20170200	20570200	25570200	27570200
ig-loo™ PGFG 60 BLUE	20160200	20560200	25560200	27560200
ig-loo™ PGFG 55 BLUE	20155200	20555200	25555200	27555200
ig-loo™ PGFG 50 BLUE	20150200	20550200	25550200	27550200
ig-loo™ PGFG 45 BLUE	20145200	20545200	25545200	27545200
ig-loo™ PGFG 40 BLUE	20140200	20540200	25540200	27540200
ig-loo™ PGFG 35 BLUE	20135200	20535200	25535200	27535200
ig-loo™ PGFG 30 BLUE	20130200	20530200	25530200	27530200
ig-loo™ PGFG 25 BLUE	20125200	20525200	25525200	27525200

Printed in USA
V-6 8.13.24