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CRYO-TEK™ FG
Food Grade Anti-Freeze for Heating and Cooling Systems

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A blend of food grade (not recycled) propylene glycol and high purity inhibitors, formulated for use in closed loop hydronic heating and cooling systems. **Cryo-Tek FG** is safe for use with potable water systems, water testing, geothermal loops and DWV systems. **Cryo-Tek FG** can also be used in radiant tube heating systems, most solar heating systems and geothermal loops. **Cryo-Tek FG** is compatible with PEX and elastomeric radiant tubing, commonly used materials for seals and bushings and provides corrosion protection for cast iron, steel, copper, brass and solder. **Cryo-Tek FG** should not be used in systems with galvanized piping as the zinc coating will be dissolved. **Cryo-Tek** is a 96% food grade propylene glycol blend that can be diluted with water to achieve the desired temperature protection for most systems. It has a lower freeze point and higher boiling point than water and is non-flammable, odorless, non-toxic, nonirritating and compatible with Hercules boiler stop leaks and heating system cleaner products. See the chart below for dilution ratios for the desired protection levels.



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

Test Kits and Accessories

Freeze protection levels and corrosion protection levels should be checked annually. Use **Hercules Refractometer** (35290) and **pH Meter** (35272). Add additional **Cryo-Tek** product if freeze protection is inadequate. Add **Sludgehammer Universal Corrosion Inhibitor** (35297) if pH is below 8.5. (see Maintenance)

APPROVALS & LISTINGS

The food grade propylene glycol used in **Cryo-Tek FG** is "GRAS" (Generally Recognized As Safe) for incidental contact with food. Meets and exceeds ASTM D1834.

SPECIFIC USES

Use any **Cryo-Tek FG** in hydronic closed loop heating and cooling systems, solar heating systems, groundwater and geothermal heat pumps, refrigerating systems, plumbing winterization, and any other application that require freeze protection and where there is concern about chemical contamination. . Operating Temperature Range for Closed System: Up to 250°F

SPECIFIC APPLICATIONS*

Add any **Cryo-Tek** product to protect pipes from freezing and bursting. Also prevents freeze-ups in chiller systems, recreational vehicles, seasonal homes, mobile homes, trailers, boats, sprinkler systems, and industrial use.

*For special applications which may not be covered on this or other Oatey literature, please contact Oatey Technical Services Department by phone 1-800-321-9532, or fax 1-800-321-9535, or visit our technical database web-site at www.oatey.com.

WARNINGS OR CAUTIONS

- Read all cautions and directions carefully before using this product.
- Not for use in steam systems.
- Not for use with CPVC pipe and fittings.
- Use **Hercules Boiler Liquid** or **Base Hit II** to stop leaks on system containing **Cryo-Tek** products.
- Use **Hercules Boiler & Heating System Cleaner** or **Sizzle** to clean system prior to using **Cryo-Tek** (see installations instructions).
- Do not use in internal combustion engines as a coolant.
- Do not use in water softeners. Disconnect all water softeners from system or provide back flow protection to prevent contamination of brine or resin bed.
- **Cryo-tek** products are not recommended:
 1. For use in systems containing galvanized components.
 2. For open solar systems and systems where operating stagnation temperatures are regularly over 300°F / 150°C.
 3. For systems with concentrating solar collectors or evacuated tube solar collectors.
 4. In systems containing aluminum. **(Please check with equipment manufacturer of system to determine compatibility with this product).**

CAUTION REGARDING COMPETITIVE PRODUCTS:

Hercules **Cryo-Tek** products are formulated using virgin propylene glycol and high purity Triple Protection Additives for assurance of materials compatibility and non-toxicity characteristics. Dilution or mixing of **Cryo-Tek** products with other manufacturers' products may compromise these critical requirements and is not recommended.

PHYSICAL PROPERTIES

pH	8.5 - 10.0
Density lb/gal. 60°F - 65°F	8.7 – 8.8 lb./ gallon
Specific Gravity 60°F - 65°F	1.054
Specific Heat BTU/lb°F @ 160° F	.600
Boiling Point	320°F / 160°C
Appearance and color	Green liquid. Odorless.

MATERIAL SAFETY INFORMATION

FOR MORE INFORMATION ON THIS PRODUCT, REQUEST SAFETY DATA SHEET (SDS) #7301E

For Delivery By Fax	Call 1-800-321-9535
Internet	See SDS section of www.Oatey.com

HMIS® ratings Health: 0
 Flammability: 0
 Physical hazard: 0

SIZE & PACKING

STOCK NUMBER	SIZE	PACKING	WEIGHT/CASE
Cryo-Tek FG			
35340	1 gal.	6	54.0 lbs
35341	5 gal.	1	46.9 lbs
35342	55 gal.	1	521.0 lbs
ALSO AVAILABLE			
35290 Refractometer		1	0.25 lbs
35272 pH Meter	-	11	0.3 lbs

DIRECTIONS FOR USE

- CLEAN THE SYSTEM** - It is recommended that any system, whether new or existing, be thoroughly cleaned prior to being charged with **Cryo-Tek** products. 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), or **Hercules Boiler and Heating System Cleaner** (Follow instructions on container). 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 such as **Hercules Sizzle** (except aluminum systems, check with boiler manufacturer). All systems should be checked for leaks prior to installation of any **Cryo-Tek** product.
- 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.

TABEL 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	1.6	-	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

- SELECT DESIRED TEMPERATURE COVERAGE

Using Table II determine protection level desired and match it to the appropriate **Cryo-Tek** product concentration.

TABEL II

% Concentration of Cryo-Tek FG	MIXING RATIO		PROTECTIONS		
	Parts of Cryo-Tek FG	Parts of Water	Freeze Protection Down to	Pumpable * Down to	Burst Protection Down to
70%	7	3	- 70°F / -57°C	-80°F / -62°C	-100°F / -73°C
50%	1	1	-29°F / -34°C	-47°F / -44°C	-80°F / -62°C
40%	4	6	-8°F / -22°C	-30°F / -34°C	-60°F / -51°C
35%	3.5	6.5	+2°F / -17°C	-20°F / -29°C	-50°F / -46°C
30%	3	7	+11°F / -11°C	-15°F / -26°C	-20°F / -29°C

*Pumpable down to protection levels are estimated and are dependent on system and equipment. Attempting to circulate fluid below freeze point may overload and/or cause pump failure

- DETERMINE AMOUNT OF CRYO-TEK PRODUCT REQUIRED IN SYSTEM

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

Total System Capacity (gal) X Concentration Factor of Cryo-Tek Product (%) = Amount of Cryo-Tek Product to be used (gal)

5. CHARGING THE SYSTEM

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 **Cryo-Tek** 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.

A. After providing for an air exit, pump solution into boiler through the boiler drain valve using a small pump.

B. 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 in 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 **Hercules Refractometer** with **Refractometer Reading Adjustment Chart** and **pH Meter** or **Cryo-Tek Test Strips** to test fluid to assure proper freeze and corrosion protection. Note: Automotive coolant tester will not work with **Cryo-Tek** or other propylene glycol anti-freeze mixtures.

8. MAINTENANCE

Systems with **Cryo-Tek** products installed should be tested annually for product concentration and inhibitor levels using **Hercules Refractometer** with **Refractometer Reading Adjustment Chart** and **pH Meter** or **Cryo-Tek Test Strips**. If **Cryo-Tek** product concentration levels are low, add **Cryo-Tek** products using the following formula:

$$\text{TOTAL SYSTEM CAPACITY (gal)} \times \frac{(\% \text{ Cryo-Tek} - \% \text{ Cryo-Tek in system})}{(\% \text{ Cryo-Tek used} - \% \text{ Cryo-Tek in system})} = \text{Number of gallons of Cryo-Tek product to be added}$$

If the corrosion inhibitor tests low, add one 8 oz. container of **Cryo-Tek inhibitor** for every 20 gallons of fluid capacity of the system. If the total system capacity is less than 20 gallons, add one 8 oz. container of **Cryo-Tek Inhibitor**. If after inhibitor addition and thorough system mixing the corrosion inhibitor still tests low, add another 8 oz. container of **Cryo-Tek** inhibitor for every 20 gallons of system capacity. If after this addition the inhibitor still tests low, the system should be drained, cleaned, and recharged with fresh **Cryo-Tek**.