Spec Sheet #S00041
April 2011

cryo-tek™

ANTI-FREEZE for heating and cooling systems

EXCLUSIVE CRYO-TEK TRIPLE PROTECTION

DESCRIPTION

A blend of virgin (not recycled) propylene glycol and high purity Triple Protection additives, formulated for use in closed loop hydronic heating and cooling systems. **Cryo-tek** can also be used in radiant tube heating systems, most solar heating systems and geothermal loops. Hercules' exclusive Triple Protection formula stabilizes pH to prevent acid corrosion, chelates hard water minerals and inhibits the formation of scale and sediment. These components work together to keep the system clean and operating efficiently by eliminating system deposits, improving heat transfer and minimizing wear to moving parts and seals. **Cryo-tek** 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** has not been tested for use in systems containing CPVC plastic. Standard **cryo-tek** products should not be used in systems containing aluminum. **Cryo-tek -100/AL** is available for aluminum systems. **Cryo-tek** should not be used in systems with galvanized piping as the zinc coating will be dissolved. **Cryo-tek** is a 94-98% efficient heat transfer solution in most application dilutions. 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.

Cryo-tek is available in 3 formulations:

Cryo-tek Original

Contains virgin (not recycled) propylene glycol with Triple Protection corrosion inhibitor, pre -mixed ready to use formulation. Can be added directly into system undiluted or diluted as required. Certified Performance: Freeze Protection Down to -22°F / -30°C, Pumpable Down to -27°F / -33°C, and Burst Protection Down to -80°F / -62°C. **Cryo-tek Original** can be further diluted with water for less severe conditions.(see Table II, page 3)

Cryo-tek -100

Contains virgin (not recycled) propylene glycol with Triple Protection corrosion inhibitor, pre -mixed ready to use formulation. Certified Performance: Freeze Protection Down to -70°F / -57°C, Pumpable Down to -80°F / -62°C, and Burst Protection Down to -100°F / -73°C. **Cryo-tek -100** can be diluted with water for less severe conditions. (see Table II, page 3)

Cryo-tek AG

A concentrated virgin (not recyled) propylene glycol with Triple Protection corrosion inhibitor, which can be diluted with water to desired protection levels. (see Table II, page 3)

Test Kits and Accessories

Freeze protection levels and corrosion protection levels should be checked annually. Use **Hercules Refractometer** (35290) and **pH Meter** (35272) or, **cryo-tek Test Kit** (35271). Add additional **cryo-tek** product if freeze protection is inadequate. Add **cryo-tek Inhibitor** (35276) if pH is below 8.5. (see Maintenance, page 4)

* 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.

HERCULES®

specifications

Cryo-tek™

cryo-tek™

ANTI-FREEZE for heating and cooling systems

SIZES AND PACKING

STOCK NO.	SIZE	PACK	WT/CASE
cyro-tec Original			
35253	1 gal.	6	53.2 lbs
35260	5 gal.	1	46.5 lbs
35267	55 gal.	1	518.0 lbs
cyro-tec –100			
35281	1 gal.	6	54.0 lbs
35284	5 gal.	1	46.9 lbs
35286	30 gal.	1	286.0 lbs
35287	55 gal.	1	521.0 lbs

STOCK NO.	SIZE	PACK	WT/CASE
cyro-tec AG			
35282	1 gal.	6	54.0 lbs
35285	5 gal.	1	46.9 lbs
35288	30 gal.	1	286.0 lbs
35289	55 gal.	1	521.0 lbs
Inhibitor			
35276	8 oz.	24	17.8 lbs

STOCK NO.	PACK	WT/CASE
ALSO AVAILABLE		
35271 test kit	6-10 pk	0.3 lbs
35290 Refractometer	1	0.25 lbs
35272 pH meter	1	0.3 lbs
35279 Protection Tags		24
Tags Free / Available upon request		

APPROVALS AND LISTINGS

The virgin propylene glycol used in **cryo-tek** is “GRAS” (Generally Recognized As Safe) for incidental contact with food.

SPECIFIC USES

Use any **cryo-tek** Anti-Freeze in hydronic closed loop heating and cooling systems, solar heating systems, and general plumbing systems that require freeze protection. 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.

PHYSICAL PROPERTIES

	cryo-tek Original	**cryo-tek -100**	**cryo-tek AG**
pH	8.5 - 9.0	9.0 - 9.5	9.5 - 10.0
Density lb/gal. 60°F - 65°F	8.7 lb./ gallon	8.78 lb./ gallon	8.78 lb./ gallon
Specific Gravity 60°F - 65°F	1.04	1.054	1.054
Specific Heat BTU/lb°F @ 160° F	.908	.843	.681
Boiling Point:	220°F / 104°C	230°F / 110°C	370°F / 188°C
Appearance and color:	Blue liquid. Odorless.	Red liquid. Odorless.	Blue liquid. Odorless.

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**TM **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.

DIRECTIONS FOR USE

1. 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.

* For special applications which may not be covered on this or other Hercules literature, please contact Hercules Technical Services Department by phone at 1-800-221-9330 or send a fax to 1-800-333-3456.

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

DIRECT METHOD

A. Fill system completely, making sure all components of system are full.

B. Shut system down, let pressure drop to a safe level.

C. Drain out fluid into suitable container and record the number of gallons removed. This is TOTAL SYSTEM FLUID CAPACITY.

ESTIMATION METHOD

A. Determine system pipe sizes and amount of linear footage for each size. Using Table I, calculate the volume of the system piping.

B. 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	1.6	-	2.8	4.5	7.8	10.6	17.5	24.9	38.5
Type "L" Copper Tubing	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 protection level desired and match it to the appropriate **cryo-tek** product concentration.

TABLE II

Cryo-tek Original

	MIXING RATIO		PROTECTIONS		
% Concentration of cryo-tek Original	Parts of cryo-tek Original	Parts of Water	Freeze Protection Down to	Pumpable☆ Down to	Burst Protection Down to
100%	Undiluted	-	-22°F / -30°C	-27°F / -33°C	-80°F / -62°C
90%	9	1	-17°F / -27°C	-22°F / -30°C	-60°F / -51°C
80%	4	1	-5°F / -21°C	-10°F / -23°C	-50°F / -46°C
67%	2	1	+2°F / -17°C	-2°F / -19°C	-20°F / -29°C

Cryo-tek -100

	MIXING RATIO		PROTECTIONS		
% Concentration of cryo-tek -100	Parts of cryo-tek -100	Parts of Water	Freeze Protection Down to	Pumpable☆ Down to	Burst Protection Down to
100%	undiluted	-	-70°F / -57°C	-80°F / -62°C	-100°F / -73°C
75%	3	1	-21°F / -30°C	-33°F / -36°C	-60°F / -51°C
60%	3	2	0°F / -18°C	-10°F / -23°C	-40°F / -40°C
50%	1	1	+10°F / -12°C	+5°F / -15°C	-20°F / -29°C

Cryo-tek AG

	MIXING RATIO		PROTECTIONS		
% Concentration of cryo-tek AG	Parts of cryo-tek AG	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.

4. 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:** An 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** product using the following formula:

$$\text{TOTAL SYSTEM CAPACITY (gal) X } \frac{\text{(\% cryo-tek - \% cryo-tek in system)}}{\text{(\% cryo-tek used - \% cryo-tek in system)}} = \text{Number of gallons of cryo-tek product to be added.}$$

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**.

ADDITIONAL APPLICATIONS

FOR TOILETS: Drain tank and bowl then add 1 quart or more of undiluted **cryo-tek Original** to each toilet bowl to prevent freeze-up.

FOR BOATS AND TRAILERS: For boats and trailers with pressurized hot water systems, see TABLE III. For these systems, disconnect water tank and join inlet and outlet to form a bypass. Drain water tank thoroughly and add **cryo-tek Original** (diluted to desired freeze protection, see Table III) to displace possible water pockets.

TABLE III (Boats and Trailers)

Size of Boat/Trailer	Add Cryo-tek Original to capacity of water tank
Under 18 ft.	2-3 gal.
18 ft. - 23 ft.	3-4 gal.
23 ft. and over	4-5 gal.

MATERIAL SAFETY INFORMATION

FOR MORE INFORMATION ON THIS PRODUCT,
REQUEST MATERIAL SAFETY DATA SHEET (MSDS) #41 cryo-tek Original,
(MSDS) #40 cryo-tek -100,
(MSDS) #42 cryo-tek AG.

For Delivery by Fax	Call 1-800-942-4636
Internet	*See MSDS section of* www.herchem.com
Mail	Contact Hercules at address below or any Hercules representative

HMIS Hazard Warning 0-0-0-A.

INGREDIENTS	CAS#
PROPYLENE GLYCOL NJ-T.S.R. #31348300 5018P, 5002P	57-55-6

*For special applications which may not be covered on this or other Hercules literature, please contact Hercules Technical Services Department by phone 1-800-221-9330, or fax 1-800-333-3456, or visit our technical database web-site at www.herchem.com.

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