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CRYO-TEK™-100/AL

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Anti-Freeze for Aluminum Heat Exchanger Heating and Cooling Systems

A new generation of very efficient boilers utilizing ALUMINUM HEAT EXCHANGERS are becoming more popular in today's marketplace. These new boilers typically heat three times faster than traditional boilers and require a specific, unique blend of anti-freeze specific to protecting against acid corrosion.

Cryo-Tek -100/AL is a blend of virgin (not recycled) propylene glycol and **Hercules** exclusive Triple Protection additives designed for use in hydronic heating and cooling closed loop piping systems (including PEX and radiant tube heating systems), ice melt and general heating systems where aluminum heat exchangers are installed. **Hercules** Triple Protection additives provide outstanding protection against acid corrosion, scale and sedimentation formation in properly maintained systems containing recommended concentrations of **Cryo-Tek Anti-Freeze**.

- Acid neutralizing agent protects by neutralizing corrosive acids.
- Mineral Deposition Preventative eliminates scale formation on critical heat transfer surfaces, piping systems and equipment.
- Mineral Sediment Preventative keeps minerals in solution, resisting formation of clusters of mineral salts and preventing particles from precipitating out of solution.

Used at recommended levels, all three agents work together to prevent bio film (slime) build-up. **Cryo-Tek -100/AL** may be used in systems fabricated with metal, plastics (except CPVC) and rubber piping, fittings, seals, and other parts. Corrosion inhibitors in all **Cryo-Tek** products protect against corrosive build-up within the piping loop and are effective with most metals including steel, aluminum* and copper. **Cryo-Tek** solutions have a high specific heat and are efficient at transferring heat.

As packaged, **Cryo-Tek** is non-flammable, odorless, non-irritating, and compatible with **Hercules** boiler stop leaks. Formulated for the maximum propylene glycol protection directly out of the container. Certified Performance: Freeze Protection Down to -60°F / -51°C, Pumpable down** to -70°F / -57°C, and Burst Protection Down to -100°F / -73°C.

Cryo-Tek -100/AL can be diluted with water for less severe conditions. (See Chart.)



* 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 Test Meter** (35272). Add additional **Cryo-Tek** product if freeze protection is inadequate. Add **Cryo-Tek -100/AL Inhibitor** (35274) if pH is below 7.0. (see Maintenance)

APPROVALS & LISTINGS

The virgin propylene glycol used in **Cryo-Tek -100/AL** and all **Cryo-Tek** products 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, chillers, ice melt, solar heating systems, and general plumbing systems that require freeze protection. **Cryo-Tek -100/AL** is specifically formulated for aluminum based heat exchangers.

SPECIFIC APPLICATIONS*

Add **Cryo-Tek** product to protect pipes from freezing and bursting. Although **Cryo-Tek -100/AL** is specifically designed for use in boilers with aluminum heat exchangers, it can be used in more traditional applications, such as 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.

PHYSICAL PROPERTIES

pH	7.0 - 8.5
Density lb/gal. 60°F - 65°F	8.74 lb./ gallon
Specific Gravity 60°F - 65°F	1.050
Specific Heat BTU/lb°F @ 160° F	.806
Boiling Point	230°F / 110°C
Appearance and color	Orange 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 II** to stop leaks on system containing **Cryo-Tek** products.
- 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. **(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.

MATERIAL SAFETY INFORMATION

FOR MORE INFORMATION ON THIS PRODUCT, REQUEST SAFETY DATA SHEET (SDS) #7313E

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 100/AL			
35283	5 gal.	1	49.6 lbs
35291	55gal.	1	518.0 lbs
ALSO AVAILABLE			
35290 Refractometer	-	1	0.25 lbs
35272 pH Meter	-	1	0.3 lbs

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 -100/AL**. 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. Existing systems need to be flushed and cleaned to eliminate any build-up of rust, scale, lime and other non-organic matter. All systems should be checked for leaks prior to installation of any **Cryo-Tek** product. Minor leaks can be sealed with **Hercules Base Hit II** or **Hercules Boiler Liquid**.
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 steam 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" US Gallons of	US Gallons of Auid 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

% Concentration of Cryo-Tek -100 /AL	MIXING RATIO		PROTECTIONS		
	Parts of Cryo-Tek -100 /AL	Parts of Water	Freeze Protection Down to	Pumpable * Down to	Burst Protection Down to
100%	Undiluted	-	- 60°F / -51°C	-70°F / -57°C	-100°F / -73°C
75%	3	1	-18°F / -28°C	-32°F / -35°C	-75°F / -60°C
60%	3	2	+2°F / -17°C	-20°F / -29°C	-50°F / -46°C
50%	1	1	+12°F / -11°C	+5°F / -15°C	-20°F / -30°C

The above chart differs from the **Cryo-Tek -100**. **Cryo-Tek -100** is based on actual numbers developed at NJIT. The **Cryo-Tek -100/AL** chart above is based using the Dow tables at 60% PG.

* 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 -100/AL 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 -100/AL** 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 Test 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 -100/AL** installed should be tested annually for product concentration and inhibitor levels using **Hercules Refractometer** with **Refractometer Reading Adjustment Chart** and **pH Test Meter** (or, less accurately **Hercules Test Strips**). If **Cryo-Tek - 100/AL** concentration levels are low, add **Cryo-Tek -100/AL** using the following formula:

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

Be sure to drain adequate fluid from system before adding the additional

Cryo-tek -100/AL. The proprietary inhibitor used in Hercules Cryo-tek -100/AL has an exceptionally long life expectancy. The pH of the system solution should always be between 7.0 and 8.5.

If the corrosion inhibitor tests low, add one 8 oz. container of Cryo-tek -100/AL Inhibitor in accordance with inhibitor label instructions 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 -100/AL Inhibitor. If after inhibitor addition and thorough system mixing, the corrosion inhibitor pH still tests low, add another 8 oz. container of Cryo-tek -100/AL 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 -100/AL.