

## 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.