SUBJECT: PRECAUTIONS WHEN OPERATING CHILLERS WITH SETPOINTS BELOW 48°F **#3-A-95 5/14/2012**

A chiller typically operates with a setpoint of 50°F or higher. However, if setpoints between 20° - 48°F are required, special precautions must be taken to prevent freezing and possible damage. Attention must be given to freeze protection, water supply and pressure switch limit adjustments.

Maximum Series Portable Chiller
10 ton Air-Cooled

A. FREEZE PROTECTION.

It is understood that untreated water freezes at 32°F. The refrigerant in the chiller's evaporator must be 10°F or more colder than the desired fluid set point to create heat transfer. Advantage recommends a fluid temperature lower limit of 48°F for straight water. Below 48°F a water and inhibited propylene glycol mixture is recommended to lower the fluid freeze point. Limiting the lower set point for straight water to 48°F allows for a small buffer between the operating evaporating temperature and the fluid freeze point minimizing the risk of freezing the evaporator. Evaporator freezing can cause it to fail and result in extensive damage to the chiller.

An inhibited propylene glycol and water solution must be used in lieu of straight water for set points below 48°F. Prescribed amounts are listed in the chart shown on page 2. While the inhibited glycol percentages listed may provide freeze protection well below the minimum protection level required, the percentages listed are the minimum recommended by most fluid manufacturers for the included biological and corrosion inhibitors to work properly.

Titan Series Central Chiller
60 ton Water-Cooled

On initial installation of the unit, the water/glycol solution should be premixed, then added to the reservoir. After the pump has been started, water lines filled and air purged, it may be necessary to add more water/glycol solution to maintain the recommended reservoir level.

Note: A refractometer, such as Misco 7084VP+ should be used on a (http://www.misco.com/products/7084VP%2B.html) regular basis to determine the mixture strength according to freeze point. The freeze point temperature should be 25° below the lowest required setpoint. Water will evaporate from the mixture, and if you continue to add a premixed solution eventually you will have too much glycol. It is necessary to add water or glycol to maintain proper freeze point temperature.

AUTOMOTIVE TYPE ANTIFREEZE MUST NOT BE USED IN YOUR ADVANTAGE CHILLER.

Automotive type anti-freeze contains silicates that adhere to heat transfer surfaces of the system preventing maximum heat transfer. Also, higher than required ratios of inhibited propylene glycol to water inhibits effective heat transfer. See the chart shown on page 2 and the chiller's operating manual for specific details.

Continued ...

ADVANTAGE Engineering, Inc. 525 East Stop 18 Road Greenwood, IN 46142 317-887-0729 fax: 317-881-1277
Web site: www.advantageengineering.com email: sales@advantageengineering.com

B. WATER SUPPLY.

The automatic water make up (if equipped) restores the reservoir water level as needed. However, if straight water is added to a water/glycol solution, dilution will occur decreasing the freeze protecting ability of the solution. Therefore, the water supply source must be disconnected and the connection capped. The operator must monitor the water/glycol level and manually make-up to maintain proper reservoir level.

C. LIMIT SWITCH ADJUSTMENTS.

Fig A

Typical Adjustable Low Refrigerant pressure Switch

To ensure safe and efficient operations at lower setpoints, adjustments of the freezestat (where equipped) and low pressure switch factory settings are required. The chart below lists the appropriate settings.

The low pressure switch serves as the main defense against freezing and to protect the compressor from adverse suction pressures. Suction pressures decrease with lower operating setpoints. To prevent freezing and short cycling of the compressor, the low pressure switch must be adjusted to accommodate the lower setpoint. Units may be equipped with an adjustable low pressure switch (Fig A) or a non adjustable “fixed” low pressure switch (Fig B). For units with adjustable pressure switches (Fig A) adjustments to the low pressure switch are made by rotating the adjusting screws on top of the control and observing the movement of the pointers in the control window until the prescribed setting is determined.

Fig B

Typical Fixed Low Refrigerant pressure Switch

For units with non-adjustable “fixed” pressure switches, the low pressure switch (Fig B) must be replaced with a switch with the appropriate lower range (contact Factory). A certified refrigeration technician must make this change.

Fig C

Typical Mechanical Freezestat

Some units are equipped with freezestats (Fig C). For mechanical freezestats, adjustments are made by removing the cover and rotating the selector dial with a screwdriver. Electronic freezestats are adjusted through the setup parameters via the instrument control panel (consult the operating manual for details).

D. PRECAUTIONS.

At any setpoint, the possibility of freezing exists and it is the operator’s responsibility to take necessary action to prevent freezing at all times. The Advantage warranty does not cover damages caused by freezing.

OPERATION TEMPERATURE :		***48°F - 70°F***	***25°F - 47°F***	***10°F - 24°F***
Glycol	**Percentage**	0%	30%	40%
Freeze Point	**of fluid**	32°F	10°F	-5°F
Freezestat	**Set At**	38°F	15°F	5°F
Cut-Out	**Temperature**	32°F	10°F	-5°F
Cut-In	**Temperature**	36°F - 39°F	15°F - 18°F	0°F - 7°F
Low Pressure Switch Settings (by Refrigerant type)				
R22	**Cut-Out**	58#	33#	20#
	Cut-In	63#	38#	25#
R134A	**Cut-Out**	28#	12#	4#
	Cut-In	33#	17#	9#
R410A	**Cut-Out**	102#	63#	43#
	Cut-In	111#	72#	52#
R404A	**Cut-Out**	72#	44#	29#
	Cut-In	79#	49#	34#
R407C	**Cut-Out**	52#	28#	16#
	Cut-In	58#	34#	22#

Chart showing

- Glycol Levels
- Refrigerant Low Pressure Switch Cut-Out and Cut-In Settings
- Freezestat Settings

ADVANTAGE Engineering, Inc. 525 East Stop 18 Road Greenwood, IN 46142 317-887-0729 fax: 317-881-1277
Web site: www.advantageengineering.com email: sales@advantageengineering.com