



**PROTECTS  
SYSTEMS  
TO -100°F.  
& BEYOND**

**NON-TOXIC HEAT  
TRANSFER FLUID**

**POLAR GRADE  
NO-FREEZ**

**EXTREME  
ANTI-FREEZE**

## TECHNICAL BULLETIN

PNF1002

**NO-FREEZ** Heat Transfer fluids are ideal for use in poorly insulated heating systems, such as summer homes, mountain cabins with low set thermostats, motels closed in winter, pleasure craft, marinas, recreation vehicles, solar units, factories and sprinkler systems, etc.

**POLAR GRADE NO-FREEZ EXTREME ANTI-FREEZE** is a solution of pure high grade propylene glycol with special anticorrosion inhibitors and color indicators. **NO-FREEZ** products contain propylene glycol because propylene glycol is the only material safe for most ordinary anti-freeze requirements. This is because propylene glycol is non-toxic and non-irritating and eliminates the possibility of contaminating domestic, potable water with toxic materials. Beware of products that may contain other ingredients such as methanol, ethanol or ethylene glycol, which cheapen these products and raise the toxicity of the anti-freeze. This defeats the very reason for using non-toxic anti-freeze. Also beware of products that are not inhibited or require you to add inhibitor bought separately. Don't endanger your system by using corrosive, uninhibited material. Proper amounts of the correct inhibitors are expensive and necessary. Uninhibited material is not a bargain. Do not use automobile anti-freeze. It contains ethylene glycol which is very toxic.

The best way to test freeze protection is with a refractometer. Refractometers are extremely accurate, easy to use and effective, regardless of solution colors, dyes and temperature.

**UTILITY REFRACTOMETERS** are offered for sale as an accommodation to **NO-FREEZ** users. Included with the refractometer are comprehensive instructions specifically written for **NO-FREEZ** applications. When a refractometer is not available, **UTILITY NO-FREEZ QUICK CHECK TEST STRIPS** may also be used.

**POLAR GRADE NO-FREEZ** lubricates pumps, valves and moving parts and will not harm plastic or rubber seals, diaphragms or washers. **POLAR GRADE NO-FREEZ** will not support bacterial growth.

First to develop non-toxic anti-freeze in potable systems for the plumbing and heating industries, **UTILITY** manufactures **POLAR GRADE NO-FREEZ** to the highest standards in laboratory facilities. With over 100 years of expertise, our dedication and commitment is your constant assurance of the very latest in technology and engineering, resulting in the finest non-toxic anti-freeze available.

### DIRECTIONS

1. Empty and flush entire system through faucets, petcocks and other openings. Then close all openings.
2. Replace all water in the system with an equal amount of **POLAR GRADE NO-FREEZ** solution. When using **POLAR GRADE NO-FREEZ** to make less concentrated solutions, use the top rows

of the chart as guidelines to make desired solutions. Do not make solutions less concentrated than those shown on the chart. They do not offer proper protection.

3. Be sure to protect all drains by adding **POLAR GRADE NO-FREEZ** to traps and toilets to prevent freezing. Open each faucet to be sure **POLAR GRADE NO-FREEZ** has displaced any water pockets. Close faucets when blue-green color of **POLAR GRADE NO-FREEZ** appears.
4. For circulating hot water heating systems and solar heating and cooling systems, **POLAR GRADE NO-FREEZ** may remain in system all year. Be sure to flush the system thoroughly to remove oil, dirt or scale prior to introduction.
5. Test the system for freeze protection and for inhibitor level. Additional **NO-FREEZ INHIBITOR** may be needed. Test the system annually thereafter.
6. **POLAR GRADE NO-FREEZ** solutions protect by lowering the freeze point. Below the freeze point, ice crystals begin to form and the remaining solution becomes more concentrated. This allows **POLAR GRADE NO-FREEZ** to become a flowable slush. Unlike water, **POLAR GRADE NO-FREEZ** actually contracts until a point where it will again start to expand. But since it remains a flowable slush, it can flow into available expansion volume in the system.

### SPECIAL CONSIDERATIONS

Do not use **POLAR GRADE NO-FREEZ** in systems containing galvanized pipe or aluminum. **POLAR GRADE NO-FREEZ** has a greater tendency to leak past faulty joints than water, so all leaks must be corrected properly. **UTILITY Qwik Seal Powdered Stop-leak** is the only chemical stop-leak that can be used, without risk of incompatibility, to correct leaks in systems containing **POLAR GRADE NO-FREEZ**. If your water system has an automatic makeup system, it should not be used because it can dilute and contaminate the system. New systems should be designed with an air cushion as much as 20% larger than required for water only systems to allow for low and high temperature expansion. In order to avoid a loss in heat transfer efficiency, new systems should be sized for increased flow rate to compensate for the lower Specific Heat of **POLAR GRADE NO-FREEZ** solutions and, therefore, have no efficiency loss.

**POLAR GRADE NO-FREEZ** is stable and suitable for use at continuous operating temperatures to 250°F, and will not degrade significantly from short exposure to temperatures up to 350°F. **POLAR GRADE NO-FREEZ** will not foam, if foaming occurs it is due to other factors, such as air or contamination in the system. Be sure the system is free from dirt, grease, oil and other contaminants before installing **POLAR GRADE NO-FREEZ**. As with any chemical product, compatibility should be checked prior to introducing **POLAR GRADE NO-FREEZ**.

# POLAR GRADE NO-FREEZ

## EXTREME ANTI-FREEZE

PERCENTAGE PRODUCT IN SOLUTION		40%	50%	60%	70%	80%	100%
MIXING PROPORTION	PARTS PRODUCT	$\frac{2}{3}$	$\frac{1}{1}$	$\frac{3}{2}$	$\frac{7}{3}$	$\frac{4}{1}$	$\frac{1}{0}$
	PARTS WATER						
EXPANSION DAMAGE PROTECTION POINT		-55°F.	-67°F.	-80°F.	-97°F.	-104°F.	-113°F.
FLOW POINT		-10°F.	-27°F.	-45°F.	-59°F.	-66°F.	-76°F.
REFRACTIVE INDEX $n_D$		1.365	1.372	1.379	1.387	1.394	1.408
THERMAL CONDUCTIVITY BTU / (HR.) (SQ. FT.) (°F./FT.)	-10°F.	0.261	0.249	0.240	0.231	0.221	0.207
	0°F.	0.263	0.250	0.241	0.231	0.220	0.204
	10°F.	0.265	0.251	0.242	0.230	0.219	0.202
	20°F.	0.267	0.252	0.242	0.230	0.217	0.198
	30°F.	0.269	0.254	0.242	0.229	0.215	0.195
	40°F.	0.271	0.255	0.243	0.229	0.214	0.192
	50°F.	0.272	0.256	0.243	0.228	0.213	0.190
	60°F.	0.273	0.258	0.244	0.228	0.211	0.186
	70°F.	0.275	0.259	0.244	0.228	0.210	0.183
	80°F.	0.278	0.260	0.245	0.228	0.208	0.179
	90°F.	0.280	0.261	0.245	0.227	0.207	0.177
	100°F.	0.282	0.263	0.246	0.227	0.206	0.174
	110°F.	0.284	0.264	0.246	0.226	0.204	0.170
	120°F.	0.288	0.265	0.246	0.226	0.203	0.167
	130°F.	0.290	0.267	0.247	0.225	0.201	0.165
	140°F.	0.292	0.268	0.248	0.225	0.200	0.161
DENSITY gms. / ml.	-20°F.	1.039	1.048	1.055	1.062	1.067	1.076
	0°F.	1.035	1.043	1.051	1.057	1.062	1.069
	20°F.	1.032	1.040	1.047	1.052	1.056	1.062
	40°F.	1.028	1.035	1.042	1.046	1.050	1.055
	80°F.	1.019	1.024	1.029	1.033	1.036	1.039
	100°F.	0.993	0.996	0.999	1.002	1.017	1.032
	180°F.	0.986	0.988	0.991	0.993	0.994	0.996
SPECIFIC HEAT BTU / LB. / DEGREE FAHRENHEIT	40°F.	0.94	0.91	0.88	0.85	0.84	0.85
	80°F.	0.95	0.92	0.90	0.87	0.83	1.00
	120°F.	0.95	0.93	0.91	0.88	0.86	1.00
	160°F.	0.96	0.94	0.92	0.89	0.87	1.00
	200°F.	0.96	0.95	0.93	0.91	0.90	1.00
	240°F.	0.97	0.96	0.95	0.93	0.92	1.00
VISCOSITY CENTIPOISE	0°F.	17.	24.	45.	66.	99.	480.
	50°F.	3.8	5.3	7.4	10.	14.	41.
	100°F.	1.6	1.9	2.4	1.3	3.7	8.6
	150°F.	0.8	1.1	1.3	1.6	1.8	3.2
	200°F.	0.5	0.6	0.7	0.7	0.9	1.8

THE SPECIFICATIONS LISTED ARE FOR TYPICAL IDEAL SITUATIONS. CONTAMINANTS IN THE SYSTEM MAY ALTER THE CHARACTERISTICS OF THIS PRODUCT.

## HOW TO SIZE YOUR SYSTEM

THE CAPACITY OF YOUR BOILER CAN BE FOUND ON THE BOILER PLATE, IN THE BOILER MANUAL OR CONTACT THE MANUFACTURER. USE THE FOLLOWING CHART TO HELP SIZE THE PIPING IN YOUR SYSTEM.

Nominal size		Gallons Per 100 ft. of Length	Length in Feet Per Gallon
3/8"	Type "L" Copper Tubing	0.753	132.6
1/2"	Type "L" Copper Tubing	1.21	82.6
5/8"	Type "L" Copper Tubing	1.81	55.2
3/4"	Type "L" Copper Tubing	2.51	39.8
1"	Type "L" Copper Tubing	4.29	23.4
1 1/4"	Type "L" Copper Tubing	6.55	15.3
1 1/2"	Type "L" Copper Tubing	9.25	10.8
2"	Type "L" Copper Tubing	16.05	6.2
2 1/2"	Type "L" Copper Tubing	24.78	4.0
3"	Type "L" Copper Tubing	35.38	2.8
3 1/2"	Type "L" Copper Tubing	47.84	2.1
4"	Type "L" Copper Tubing	62.	1.6
5"	Type "L" Copper Tubing	97.1	1.0
6"	Type "L" Copper Tubing	139.2	0.7
3/8"	Standard Steel Pipe	1.0	100.0
1/2"	Standard Steel Pipe	1.6	63.3
3/4"	Standard Steel Pipe	2.8	36.0
1"	Standard Steel Pipe	4.5	22.2
1 1/4"	Standard Steel Pipe	7.8	12.8
1 1/2"	Standard Steel Pipe	10.5	9.5
2"	Standard Steel Pipe	17.5	5.7
2 1/2"	Standard Steel Pipe	25.0	4.0
3"	Standard Steel Pipe	39.0	2.6
3 1/2"	Standard Steel Pipe	53.0	1.9
4"	Standard Steel Pipe	66.7	1.5

Stock Number	Size & Description	Pack	Lbs./ case
18-440	1 GALLON POLAR GRADE NO-FREEZ	4	36
18-441	5 GALLON POLAR GRADE NO-FREEZ	1	46
18-444	55 GALLON POLAR GRADE NO-FREEZ	1	500
18-465	REFRACTOMETER	1	1
18-460	NO-FREEZ QUICK CHECK TEST STRIPS	6	1
18-470	8 OZ. CONTAINERS NO-FREEZ INHIBITOR	12	7

### Also available:

NO-FREEZ & SUPER POLAR GRADE NO-FREEZ CONCENTRATE.

THE INFORMATION IN THIS BULLETIN IS BELIEVED TO BE ACCURATE. ALL RECOMMENDATIONS ARE MADE WITHOUT WARRANTY SINCE THE CONDITIONS OF USE ARE BEYOND OUR CONTROL. THE LISTED PROPERTIES ARE ILLUSTRATIVE AND ARE NOT PRODUCT SPECIFICATIONS. WE DISCLAIM ANY LIABILITY IN CONNECTION WITH THE USE OF THIS INFORMATION.

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