



Propylene Glycol

Contains DOWFROST™ heat transfer fluid



Application:

Many industrial and commercial water systems are required to operate at temperatures below the freezing point of water. It then becomes necessary to suppress the freezing point in order to protect the system from freezing or bursting pipes. In these types of applications, adding propylene glycol to the water will achieve the desired operating temperature. Because propylene glycol has a low toxicity level, it can be used in equipment that has contact with food products and beverages. Some examples are packaging food products, cooling beverages, secondary cooling and heating agents, defrosting and dehumidifying.

Secondary loop systems often employ propylene glycol as a heat transfer fluid because it changes temperature as it gains or loses heat energy without changing phase. It is inert to all common piping materials and most non-metallic gaskets and seals. Propylene glycol has proven to be the most suitable secondary fluid since it is nontoxic, nonflammable, does not contribute to global warming and provides optimal performance compared to other secondary fluid alternatives.

	Part #	Concentration	Container Size
BLUE DYE	55PG35D	35%	55 gallon
	5PG40	40%	5 gallon
	55PG40	40%	55 gallon
	55PG45	45%	55 gallon
	1PG70	70%	1 gallon
	5PG70	70%	5 gallon
	55PG70	70%	55 gallon
NO DYE	55PG35	35%	55 gallon
	5PG96	96%	5 gallon
	55PG96	96%	55 gallon
FOOD GRADE	PROPYL55G	Uninhibited USP Food-Grade Kosher 99.9%	55 gallon

35% Inhibited Propylene Glycol containing Dowfrost™ is a requirement for medium temperature secondary refrigeration systems designed by major supermarket equipment manufacturers.

Freeze Protection V

Freeze protection is required if a system is going to be actively pumping fluid at the lowest ambient temperature and/or where there is no room in the system for expansion to accommodate an ice/slush formation. To obtain adequate freeze protection, the glycol solution must maintain a freezing point at least 5°F lower than ambient temperature.

Table 1: Freeze and Burst Protection of Various

FOR FREEZE PROTECTION					
TEMP °F	Volume %				
	PG35	PG40	PG45	PG70	PG96
20	49	43	38	25	18
10	80	70	62	40	29
0	99	86	77	49	36
-10			90	58	42
-20			98	63	46
-30				69	50
-40				74	54
-50				78	57
-60				82	60

Based on the desired application temperature, the amount of

$$\text{Volume of PG required} = (\text{System Volume})^*$$

S. Burst Protection

Burst protection is required if the system will sit dormant at temperatures below the freezing point of the fluid and there is adequate space to accommodate the expansion of the ice/slush mixture while the system is inactive. For these situations, the system needs enough glycol to keep the fluid from freezing solid. As the temperature drops below the freezing point, ice crystals begin to form. Because water in the solution freezes first, the remaining glycol solution becomes concentrated. This results in a flowable slush of ice crystals and glycol.

Solution Concentration of Propylene Glycol

FOR BURST PROTECTION

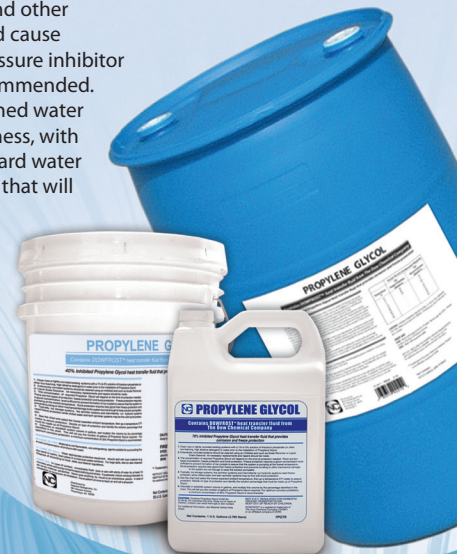
TEMP °F	Volume %				
	PG35	PG40	PG45	PG70	PG96
20	33	29	26	16	12
10	55	48	43	27	20
0	66	58	51	33	24
-10	77	67	60	38	28
-20	82	72	64	41	30
-30	91	79	70	45	33
-40	96	84	75	48	35
-50	96	84	75	48	35
-60	96	84	75	48	35

propylene glycol can be calculated with the following formula:
 (percentage of PG based on Table 1 value)* (0.01)

Usage Guidelines:

1. Clean a new or lightly corroded existing system with a 1% to 5% solution of trisodium phosphate (or other low-foaming, high alkaline detergent) in water prior to the use or addition of Propylene Glycol.
2. Extensively corroded systems should be cleaned using an inhibited acid such as Scale Remover or Liquid Scale Dissolver. All necessary repairs and component replacements should be made prior to the use or addition of Propylene Glycol.
3. The concentration of Propylene Glycol required will depend on the kind of protection needed, burst or freeze protection. Typically, ice storage systems, fire sprinkler systems and intermittently run hydronic systems need freeze protection while idle. Chilled water and lawn sprinkler systems may be fine with burst protection.
4. See **Freeze and Burst Protection Table**. Determine the lowest expected ambient temperature and select a temperature 5°F colder to assure protection. Dilution with deionized water is strongly recommended.*
5. Calculate or establish system volume in gallons, and multiply this volume by the percentage identified in the **Freeze and Burst Protection Table** to give the number of gallons of Propylene Glycol required.

* The water used to dilute Propylene Glycol must meet certain minimum standards for purity. Impurities in dilution water can increase metal corrosion, reduce the effectiveness of corrosion inhibitors, cause formation of scale and other deposits on heat transfer surfaces and cause clogging of system components. To assure inhibitor effectiveness, deionized water is recommended. The water available from publicly owned water facilities has varying degrees of hardness, with much of it containing high levels of hard water ions such as calcium and magnesium that will react with the inhibitor to form scale.



Thermal Conductivity (Btu ft/hr ft² °F) of Aqueous Solutions of Propylene Glycol

TEMP	Concentrations in Volume % Propylene Glycol			
	35%	40%	45%	70%
°F				
0	—	0.201	0.191	0.145
10	0.217	0.205	0.194	0.146
20	0.220	0.208	0.197	0.148
30	0.224	0.211	0.200	0.149
40	0.227	0.214	0.203	0.151
50	0.230	0.217	0.205	0.152
60	0.234	0.220	0.208	0.153
70	0.237	0.223	0.211	0.154
80	0.239	0.225	0.213	0.155
90	0.242	0.228	0.215	0.156
100	0.245	0.230	0.217	0.157
110	0.247	0.232	0.219	0.158
120	0.249	0.234	0.220	0.159
130	0.251	0.236	0.222	0.160
140	0.253	0.237	0.223	0.160
150	0.255	0.239	0.225	0.161
160	0.256	0.240	0.226	0.161
170	0.257	0.241	0.227	0.162
180	0.258	0.242	0.228	0.162
190	0.259	0.243	0.228	0.162
200	0.260	0.243	0.229	0.162

Glycol In-Service Quality Testing Available:

- Determine glycol type (ethylene glycol or propylene glycol)
- Measure glycol concentration to determine freeze and burst protection temperatures
- Determine pH to measure inhibitor effectiveness
- Check for contaminants
- Comprehensive testing available when indicated by system problems



Distributed By:
National Refrigerants, Inc.

11401 Roosevelt Boulevard
Philadelphia, PA 19154
800.262.0012
fax: 215.698.7466
web: www.refrigerants.com
e-mail: info@refrigerants.com