Product Sheet
HEAT TRANSFER FLUIDS

Protectogen ® L

HEAT TRANSFER FLUID INCLUDING CORROSION INHIBITORS

BASED 1,2-PROPYLENE GLYCOL

CLARIANT INTERNATIONAL LTD
BU INDUSTRIAL & CONSUMER SPECIALTIES

Rothausstrasse 61
4132 Muttenz
Switzerland

CONTACTS

Technical: + 49 (0) 8679 7 4665
Commercial: + 41 61 469 7834

ISSUE
January 2014

Product discription

Protectogen® L is a clear, purple liquid for use as a heat transfer fluid or cooling brine. Protectogen® L is based on 1,2-propylene glycol and an anti-corrosion package.

The optimization of the corrosion inhibition system was performed without the use of CMR-substances (cancerogenic, mutagenic, reprotoxic).

According to the formulation Protectogen ® L doesn't contain any restricted substances as described in the EG-guideline 2002/95/EG (RoHS = Restriction of Hazardous Substances, Artikel 4 §1): Lead, mercury, hexavalent chromium, polybrominated biphenyl (PBB) respectively polybrominated diphenyl ether (PBDE).

Declaration of Reach-Conformity

Clariant declares that all of its products marketed in the EU, i.e. substances, preparations or sarticles within meaning the Article 3, Section 1-3 of Regulation (EC) 1907/2006 of the European Parliament and the Council of 18.12.2006 (REACH), hereinafter referred to as „substances" are delivered in accordance with all applicable chemical laws, with special references to the Reach Regulations (EC).

Applications

Protectogen® L is commonly used as a cooling brine and heat transfer medium in heat pump systems, in the food industry, e.g. in breweries, dairies, ice-cream factories, cold stores etc. and in pharmaceutical applications. Furthermore Protectogen® L can be used in solar heating systems.

Recommended Usage Concentrations

The minimum concentration to ensure adequate corrosion protection is 25 % v/v . The actual concentration of antifreeze used depends only on the required application. At very high concentrations (above 50 % v/v), the physical parameters (e.g. viscosity, relative pressure loss at low temperatures) should be considered in plant planning.

Recommended Usage Temperatures

A range of -25 °C to 150 °C can be recommended as a usage temperature; frost protections higher -25 °C are known in practice, but take notice of an increased viscosity at lower temperatures.

Typical properties

Color	-	purple
Density at 20 °C	g/cm³	approx. 1.041
Refractive index at 20 °C	-	approx. 1.433
Reserve Alkalinity	mL 0.1 M HCl / 10 mL	min. 1.5
pH-value [1:2]	-	approx. 9
Boiling point	°C	approx. 166

Physical values of Protectogen® N / water mixtures

Concentration [% v/v]	Frost Protection [°C]	Refractive Index [20 °C]	Density [20 °C]
25	approx. -10	1.361	1.021
32	approx. -15	1.369	1.027
35	approx. -17	1.373	1.029
38	approx. -20	1.376	1.032
43	approx. -24	1.382	1.036
50	approx. -32	1.390	1.040

Product properties

The technical data below is used to describe the product and is taken from our own measurements or from literature. It does not constitute part of the delivery specification. The actual product specification may be obtained upon request.

The certified quality system in accordance with DIN EN ISO 9001 is used in production and quality control. This ensures consistently high product quality.

The following tables give information about the most important physical characteristics of Protectogen® L water mixtures. Due to the used calculation software smaller deviations of individual physical characteristic values can occur.

Technical data of Protectogen® L at 25 %v/v

Temperature [°C]	-10	0	20	40	80	100
Viscosity [mm^2/s]	9.78	5.75	2.50	1.37	0.64	0.48
Density [g/cm^3]	1.030	1.028	1.021	1.011	0.987	0.973
Thermal conductivity [W/m·K]	0.462	0.470	0.483	0.495	0.517	0.529
Specific Heat[kJ/kg·K]	3.91	3.92	3.95	3.98	4.05	4.09

Technical data of Protectogen® L at 38 %v/v

Temperature [°C]	-20	-10	0	20	40	80	100
Viscosity [mm²/s]	40.7	19.6	10.5	4.06	2.04	0.85	0.61
Density [g/cm³]	1.051	1.048	1.043	1.032	1.020	0.993	0.978
Thermal conductivity [W/m·K]	0.419	0.422	0.424	0.427	0.430	0.437	0.444
Specific Heat[kJ/kg·K]	3.66	3.69	3.71	3.76	3.81	3.92	3.98

Technical data of Protectogen® L at 47 %v/v

Temperature [°C]	-30	-20	-10	0	20	40	80	100
Viscosity [mm²/s]	179.2	68.4	30.4	15.8	5.68	2.73	1.06	0.73
Density [g/cm³]	1.066	1.061	1.056	1.051	1.038	1.026	0.996	0.981
Thermal conductivity [W/m·K]	0.396	0.396	0.396	0.395	0.392	0.389	0.386	0.389
Specific Heat[kJ/kg·K]	3.44	3.47	3.51	3.54	3.61	3.67	3.81	3.88

System preparation

Prior to filling a system with Protectogen® L water mixtures, it is important to inspect the equipment to ensure that it is clean and free of corrosion and growth of microorganism. Any contamination should be removed prior to filling the Protectogen® L water mixtures by thoroughly flushing with water or other means as needed. Corrosion should also be removed. Corrosive plants with existing rust can't be operated non-corrosive with Protectogen® L later. Mixtures with external products must be avoided.

Water Quality for Protectogen® L/water mixtures

The water used to dilute Protectogen® L shall contain no more than 100 mg/kg (ppm) chlorides. A wide range of water hardness is acceptable (between 0 and 25 °dH). In addition to fully deionized water, ordinary tap water can be used.

Material compatibility

Protectogen® L water mixtures are compatible with a wide range of materials. However, limited incompatibilities should be noted.

Do not use the product in galvanized pipelines as all glycol/water mixtures can dissolve zinc and precipitate as zinc glycolate. If despite our recommendation galvanized pipelines were used and the formation of zinc glycolate were observed we suggest to install a microfilter (approx. 100 to 150 µm). In case the zinc is dissolved the subjacent steel is protected against corrosion due to the corrosion additive package of Protectogen® L.

The following plastics and elastomers are compatible with Protectogen® L water mixtures:

Polyethylene crosslinked (CPE), Polypropylene (PP), Polybutene (PB), Polytetrafluoroethylene (PTFE), Polyamide (PA), Poly-ester Resins (UP), Natural Rubber up to 80°C (NR), Styrene Butadiene Rubber up to 100°C (SBR), Butyl Rubber (IIR), Low Density and High Density Polyethylene (LDPE, HDPE), Polyacetal (POM), Nitrile Rubber (NBR), Silicone Rubber (Si), Unplasticized Polyvinyl Chloride (uPVC)

Other materials, which should be avoided as well as are polyurethane elastomers, plasticized PVC and phenolic resins.

Safety and handling

Protectogen®L/water mixtures have neither a flash point nor a fire point.

1,2-Propylene glycol, the product on which Protectogen® L is based, is classified in water hazard class WGK 1 (slightly water-polluting) according to the list of water-polluting substances (VwVwS from 17.05.1999). This also applies to mixtures of Protectogen® L with water.

Spent Protectogen® L/water mixtures can be disposed off in accordance with local regulations. According to the 2nd general administrative regulation relating to the German waste management act of 10.04.1990, reuse is preferable to disposal. The product is recyclable.

In concentrations up to 1000 mg/l, Protectogen® L/water mixtures show no acute harmful effects on fish and bacteria. They are readily biodegradable.

Further information will be found in the current EG safety data sheet.

Transport and storage

Protectogen® L is supplied by our Antifrogen® distributors in road tankers. Further informations about our distributors you can find on our homepage www.antifrogen.com.

Protectogen® L has a storage stability of two years, if stored in closed original packaging. Since zinc is not resistant to Protectogen® L, this should be considered when the product is transferred to other containers.

Clariant International Ltd