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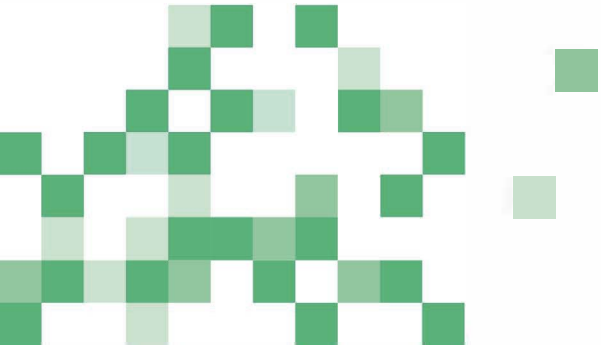
MAXWELL™ PG | TECHNICAL DATA



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TECHNICAL DATA

PHYSICAL AND CHEMICAL CHARACTERISTICS

Maxwell™ PG (Propylene Glycol) is an aluminum oxide based nanofluid that dramatically increases thermal conductivity and convective heat transfer, and is engineered for use in closed-loop hydronic systems where no phase change occurs.

Maxwell™ PG delivers:

- Efficient, reliable and consistent performance over a wide temperature range.
- Increased cooling and/or heating capacity when compared to systems using water and PG only. Maxwell™ removes the "glycol penalty".
- Lower first cost. equipment and MER sizing, and electrical power requirements.
- Savings in energy, operating and maintenance costs, and capital expenditures.

The fluid life in any system is dependent on the system design, operation and maintenance, and can vary by heat transfer fluid chemistry. Therefore, it is important to properly maintain fluid chemistry regarding pH, corrosion inhibitors and biocides. Fluid contamination will accelerate decomposition and may result in increased solids concentrations. Excess solids can and should be filtered and removed.

Maxwell™ will not reduce existing fluid life expectancy. It is important to note that Maxwell™ will not restore or reduce the effects of corrosion that may be present in systems that have not been properly maintained.

Maxwell™ has been tested using strict ASTM guidelines for metals and synthetic materials commonly used in the construction of heat transfer systems.

Maxwell™ has little effect on viscosity, therefore, no appreciable effect on system fluid pumping energy.

TYPICAL PROPERTIES*

COMPOSITION(% BY WEIGHT)			
Propylene Glycol			37
Performance Additives			9
Water			54
Colour			White
Odour			Odourless
pH			10
Density@ 20˚c (68˚F)	kg/m^3	(lb/ft^3)	1,078 (6 7)
Operating Range	ºC	(ºF)	-22to 180 (-8 to324)
Freeze Point	ºC	(ºF)	-22 (-8)
Burst Point	ºC	(˚F)	-51 (-60)
Boiling Point	ºC	(ºF)	105 (221)
Flash Point	ºC	(ºF)	104 (219)

*Typical properties for Maxwell™ PG (40%), not to be construed as specifications. Complete product specifications are available on request.

CORROSION TEST RESULTS*

Metal	**D.I. Water**	**Maxwell™ PG**
Solder	3.10	0.01
Aluminum	13.2	0.01
Copper	0.08	0.01
Brass	0.22	0.01
Greycast Iron	21.1	0.02
Carbon Steel	9.69	0.01

*Based on corrosion tests ASTM D7384, in mils per year (mpy).

Synthetic	**D.I. Water**	**Maxwell™ PG**
EPDM	0.0000061	0.0000057
VMQ	0.0000037	0.0000033
FKM	0.0000020	0.0000019
AEM	0.0000312	0.0000241
CR	0.0000125	0.0000104
HNBR	0.0000015	0.0000015

*Based on corrosion tests ASTM D477, in mils per year (mpy).

MAXWELL™ WITH 40% PG CONCENTRATION IN WATER						40% PG CONCENTRATION IN WATER ONLY			
TEMPERATURE		THERM. COND.	SPECIFIC HEAT	DENSITY	VISCOSITY	THERM. COND.	SPECIFIC HEAT	DENSITY	VISCOSITY
°C	°F	W/mK	kj/kg K	kg/m³	mPa-s	W/mK	kj/kg K	kg/m³	mPa-s
10	50	0.461	3.44	1,088	7.57	0.398	3.40	1,020	7.25
20	68	0.471	3.51	1,078	4.74	0.407	3.44	1,018	4.08
40	104	0.487	3.63	1,058	2.50	0.415	3.49	1,015	2.20
65	149	0.531	3.86	1,036	1.33	0.461	3. 71	1,010	1. 1 3

SATURATION PROPERTIES OF MAXWELL™ PG AT 30% PROPYLENE GLYCOL CONCENTRATION BY VOLUME									
TEMPERATURE		THERM. COND.		SPECIFIC HEAT		DENSITY		VISCOSITY	
°C	°F	W/mK	Btu/hr ft² (°F/ ft)	kJ/kg K	Btu/lb°F	kg/m³	lb/ft³	mPa-s	cps
10	50	0498	0.288	3.58	0.85	1,083	67.61	4.98	4.98
20	68	0.507	0.293	3.64	0.87	1,074	67.05	3.84	3.84
40	104	0.530	0.306	3.78	0.90	1,055	65.86	194	194
65	149	0.561	0.324	3.97	0.95	1,027	64.11	105	105

SATURATION PROPERTIES OF MAXWELL™ PG AT 40% PROPYLENE GLYCOL CONCENTRATION BY VOLUME									
TEMPERATURE		THERM. COND.		SPECIFIC HEAT		DENSITY		VISCOSITY	
°C	°F	W/mK	Btu/hr ft² (°F/ ft)	kJ/kg K	Btu/lb°F	kg/m³	lb/ft³	mPa-s	cps
10	50	0461	0.266	3.44	0.82	1,088	67.92	7.57	7.57
20	68	0471	0.272	3.51	0.84	1,078	67.30	4.74	4.74
40	104	0487	0.281	3.63	0.87	1,058	66.05	2.50	2.50
65	149	0.531	0.307	3.86	0.92	1,036	64.67	133	133

SATURATION PROPERTIES OF MAXWELL™ PG AT 50% PROPYLENE GLYCOL CONCENTRATION BY VOLUME									
TEMPERATURE		THERM. COND.		SPECIFIC HEAT		DENSITY		VISCOSITY	
°C	°F	W/mK	Btu/hr ft² (°F/ ft)	kJ/kg K	Btu/lb°F	kg/m³	lb/ft³	mPa-s	cps
10	50	0410	0.237	3.23	077	1,090	68.04	1162	1162
20	68	0423	0.244	3.31	0.79	1,082	67.55	8.01	8.01
40	104	0445	0.257	346	0.83	1,062	66.30	347	347
65	149	0480	0.277	3.66	0.87	1,042	65.05	170	170

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Our Total Lifecycle Care program is designed to support Maxwell'M customers throughout their system's lifecycle.

IN-SERVICE HEAT TRANSFER FLUID SAMPLE ANALYSIS

When Maxwell™ is used and maintained as advised, it will provide years of trouble-free service. To help users get maximum life, we offer regular testing of our in-service heat transfer fluids.

TECHNICAL SERVICE

Our experienced technical service specialists can help answer your questions regarding heat transfer fluid selection, system start-up and operational issues.

OPERATIONAL TRAINING

We believe that by sharing our experience with customers, we can help improve system design, promote safety and reduce overall cost Customers can take advantage of our heat transfer system operation and product training programs.

SAFETY AWARENESS TRAINING

We consider safety a priority and offer our customers safety awareness training that focuses on installation, operation and maintenance of heat transfer fluid systems. Also, please refer to the Maxwell™ Operating Guide.

INSTALLATION ASSISTANCE

We provide installation assistance by reviewing procedures and offering suggestions to reduce typical problems.

FLUSH FLUID AND FLUID REFILL

We recommend cleaning your systems prior to installing Maxwell™.

For more information, visit our website:

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