

EMS-CF-WQ-G

Handheld glycol refractometer, 0.0–90.0% (V/V), 0.2% resolution

Concentration check against the 25% v/v propylene glycol design basis

A handheld refractometer published at 0.0–90.0% (V/V) with 0.2% (V/V) resolution and $\pm 0.4\%$ (V/V) accuracy, plus a freeze-point scale of 0 to $-50\text{ }^{\circ}\text{C}$ at $1\text{ }^{\circ}\text{C}$ resolution and $\pm 1\text{ }^{\circ}\text{C}$ accuracy. It verifies the published 25% v/v propylene glycol design basis, whose freeze point is $-11\text{ }^{\circ}\text{C}$ by ASTM D1177 and whose boiling point is $103\text{ }^{\circ}\text{C}$ by ASTM D1120. Drifting off that basis shifts the pressure drop, moves the pump operating point, degrades heat-exchanger effectiveness and destabilises CDU control.

ORDERING INFORMATION

Part number	EMS-CF-WQ-G
Instrument	Handheld refractometer, glycol concentration
Measuring range	0.0–90.0% (V/V)
Resolution	0.2% (V/V)
Accuracy	$\pm 0.4\%$ (V/V)
Freeze-point scale	0 to $-50\text{ }^{\circ}\text{C}$, $1\text{ }^{\circ}\text{C}$ resolution, $\pm 1\text{ }^{\circ}\text{C}$ accuracy
Design basis verified	25% v/v propylene glycol (PG25)
Output	Visual scale reading; no electrical output

MEASUREMENT

Parameter	Value	Notes
Measurement principle	Handheld optical refractometer	Refractive index read against a graduated scale
Measuring range	0.0–90.0% (V/V) ethylene glycol	The published scale is stated for ethylene glycol (V/V). The loop design basis is propylene glycol, so the matching PG scale is confirmed against the supplier document at order
Resolution	0.2% (V/V)	Smallest scale division
Accuracy	$\pm 0.4\%$ (V/V)	Published as an absolute concentration figure, not as a percentage of reading and not as a percentage of full scale
Freeze-point scale	0 to $-50\text{ }^{\circ}\text{C}$	Read directly from the instrument scale
Freeze-point resolution	$1\text{ }^{\circ}\text{C}$	Smallest scale division on the freeze-point scale
Freeze-point accuracy	$\pm 1\text{ }^{\circ}\text{C}$	Published as an absolute temperature figure
Calibration interval	Open — not published	No interval is published in the source research; confirmed at order

CROSS-CHECKS ON THE FLUID

Parameter	Value	Notes
Refractive index cross-check	1.365 at $20\text{ }^{\circ}\text{C}$	DIN 51432-2; the laboratory method behind the handheld reading
Density cross-check	1.024 g/cm ³ at $20\text{ }^{\circ}\text{C}$	DIN 51757

Parameter	Value	Notes
Kinematic viscosity at 20 °C	2.88 mm²/s	Published for the mix; viscosity rises steeply with glycol concentration, which is why a flow meter's behaviour changes with the mix
Thermal conductivity at 20 °C	0.471 W/m-K	Published fluid property at the design basis
Specific heat capacity at 20 °C	3.92 kJ/kg-K	Published fluid property at the design basis
Freeze point at the PG25 mix	-11 °C	ASTM D1177; fluid-supplier figure for the 25% v/v mix, corroborating the published freeze-point curve
Boiling point at the PG25 mix	103 °C	ASTM D1120
Glycol concentration design basis	25% v/v propylene glycol with Hybrid-OAT corrosion inhibitors	PG25 is the published design basis for the loops these instruments serve

CONSEQUENCE OF DRIFTING OFF THE DESIGN BASIS

Parameter	Value	Notes
Pressure drop	Altered	A change in glycol percentage changes viscosity, so the same flow produces a different pressure drop
Pump operating point	Shifted	The pump runs off the point it was selected on
Heat-exchanger effectiveness	Degraded	Glycol has a lower thermal conductivity and specific heat capacity than water
CDU control stability	Destabilised	Control loops tuned at the design concentration respond differently at another
Seal behaviour	Elastomer swell or shrinkage	The seal sees the fluid at full concentration; the wrong elastomer in the wrong glycol concentration swells or shrinks

BANDS AND TARGETS THE READING SITS AGAINST

Parameter	Value	Notes
Conductivity band, glycol-premix or facility-water loop	50–300 µS/cm	Glycol is a weak electrolyte, so a PG25 or facility-water loop sits in this band; the loop type is named because the band does not apply to a de-ionised loop
Conductivity band, de-ionised technology cooling loop	0.2–20 µS/cm	A near-DI technology cooling loop with no glycol is held here
pH band, glycol-premix or facility-water loop	7.0–9.0 pH	Set by the metallurgy of the loop
pH band, de-ionised technology cooling loop	8.0–9.5 pH	The technology cooling side of the ASHRAE split loop
Fresh-fill pH reference	About 8.8 at 33% v/v in DI water	DIN EN 1262; a fresh charge sits near the top of the glycol-loop band

APPLICATIONS

- Concentration check at initial fill
- Check after any significant make-up fluid addition
- Check after a vacuum fill, where a glycol mixture can partially separate
- Periodic verification against the PG25 design basis

COMPATIBLE PRODUCTS

- EMS-CF-WQ-PH pH sensor for the fresh-fill pH reference
- EMS-CF-WQ-CI inductive conductivity cell on the glycol loop
- EMS-CF-FP-FC compact magnetic flow meter where viscosity shift matters
- EMS-CF-FP-DP element differential-pressure monitor

PUBLISHED PROPYLENE GLYCOL FREEZE-POINT CURVE

Parameter	Value	Notes
20% v/v PG	–7.2 °C	Published curve from the telemetry research file; the 25% point is the loop design basis
25% v/v PG	–10.1 °C	Design basis; a fluid-supplier figure of –11 °C by ASTM D1177 corroborates this point, and the two are the same published curve
30% v/v PG	–13.3 °C	Published curve
40% v/v PG	–22.2 °C	Published curve
50% v/v PG	–35.0 °C	Published curve
55% v/v PG	–43.3 °C	Published curve

WATER-QUALITY INSTRUMENT LADDER

Parameter	Value	Notes
EMS-CF-WQ-C	Contacting conductivity cell	0.04–200 µS/cm across the published fine cell constants
EMS-CF-WQ-CI	Inductive conductivity cell	Spans both the de-ionised and the glycol-premix or facility-water band
EMS-CF-WQ-PH	Process pH sensor	1–12 pH, 0–14 pH and 0–10 pH application variants
EMS-CF-WQ-NTU	Turbidity instrument	Polices the below-1 NTU loop target
EMS-CF-WQ-G	Glycol refractometer	0.0–90.0% (V/V) with 0.2% (V/V) resolution
EMS-CF-WQ-PC	Particle counter and contamination monitor	3-channel measurement to ISO 4406

NOTES

- The published concentration range is stated for ethylene glycol (V/V). The loop design basis is 25% v/v propylene glycol, so the propylene glycol scale is confirmed against the supplier document at order rather than assumed from the ethylene glycol scale.
- One freeze-point curve is published. The –11 °C fluid-supplier figure at 25% v/v by ASTM D1177 corroborates the 25% point on that curve; it is not a second curve.
- Viscosity rises steeply with glycol concentration, from roughly 1.7 to 8.2 mPa·s between 15% and 55% propylene glycol at 20 °C. Any flow measurement on the loop behaves differently at 55% than at 15%, which is why the concentration is verified before a flow reading is judged.
- Conductivity and pH bands are published with their loop type: 50–300 µS/cm and pH 7.0–9.0 on a glycol-premix or facility-water loop; 0.2–20 µS/cm and pH 8.0–9.5 on a de-ionised technology cooling loop.
- Calibration interval is not published in the source research and is confirmed against the supplier document at order.

Full specification sheet and current pricing
 EMS-Trade Cooling · ems-cool.com
 Typical lead time confirmed on order acknowledgement.

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