

Glycol Heat-Transfer Fluids — Ethylene vs Propylene, Dowcal 100/200 and Concentration Practice

cBallast Technical Sourcing · Secondary refrigerants · issued 2026-10-03 · cballast.com/documents/glycol-heat-transfer-fluids-dowcal-selection

Choosing between ethylene glycol (Dowcal 100 class) and propylene glycol (Dowcal 200 class) for secondary cooling circuits, how concentration sets freeze protection and penalises pumping, why inhibited fluids and not automotive antifreeze belong in process circuits, and commissioning checks.

Two chemistries, one decision rule

Ethylene glycol (EG) — the Dowcal 100 class, stocked as 28 kg concentrate — gives the better thermophysical properties: lower viscosity at low temperature, higher heat capacity per unit flow, smaller pumps. Its drawback is toxicity: it is excluded wherever leakage could reach food, potable water or occupied spaces that drain uncontrolled. Propylene glycol (PG) — the Dowcal 200 class, stocked as 25 kg and 220 kg drum, plus a red-dyed MPG 210 kg — is the food-safe-adjacent choice used in breweries, dairies, fish processing and HVAC circuits in occupied buildings. The decision rule is simply: PG wherever people or product could contact the fluid; EG where the better hydraulics pay and the circuit is contained (industrial and marine machinery circuits).

Concentration: protection vs penalty

Freeze protection comes from concentration, and every percentage point costs viscosity and heat capacity. Typical inhibited-glycol planning values (volume %, verify against the fluid maker's tables for the batch in use):

Vol % | EG freeze point "H | PG freeze point "H |

25 % | " 12 °C | " 10 °C |

30 % | " 16 °C | " 13 °C |

40 % | " 25 °C | " 21 °C |

50 % | " 37 °C | " 33 °C |

Design to hold the fluid ~5 K below the coldest surface temperature in the evaporator (not the air setpoint). Below about " 25 °C duty, PG viscosity grows steep enough that EG or a different secondary fluid class is usually the engineering answer. Above 60 % concentration both chemistries lose — freeze point gains reverse and viscosity soars; 50 % is the practical ceiling for most plants.

Inhibitors and why automotive fluid is excluded

Process fluids like the Dowcal series carry industrial corrosion-inhibitor packages matched to mixed-metal circuits (steel, copper, brass, solder) and are silicate-free; automotive antifreeze carries silicate/OAT packages designed for engine alloys and service lives, and its additives foul plate heat exchangers and drop out in low-flow process circuits. Never mix inhibitor families: a circuit being converted should be flushed, cleaned and refilled, not topped with a different brand. Make-up water matters equally — use demineralised or at least soft water within the fluid maker's chloride and hardness limits; chlorides drive pitting in stainless plate exchangers.

Commissioning and maintenance checks

Measure, don't assume, concentration: refractometer at several points after full mixing, logged in the plant file. Re-check annually; concentration drifts with make-up.

pH and inhibitor reserve annually on sealed circuits, per the fluid vendor's test kit regime; glycols oxidise to acids as inhibitors deplete.

Deaerate thoroughly: glycol mixtures hold air stubbornly; microbubbles erode pump impellers and ruin heat transfer.

Pump and coil derating: apply the fluid maker's correction factors — at 40 % EG / " 10 °C, expect noticeably higher pressure drop and several percent lower coil capacity vs water; PG more so.

Label the circuit (fluid, concentration, dye colour, fill date) at every fill point; the red-dyed MPG exists precisely so a glance identifies the fluid class.

Secondary circuits pair naturally with the primary-side hardware elsewhere in the catalogue — plate-exchanger condensing units (Tecumseh WLX water-cooled series), water-regulating valves (Penn V46) and the temperature controls in the controls guide.

Part numbers and designations are those of the original manufacturers and are given for identification. cBallast is an independent supplier. © cBallast 2026 · cballast.com