Head-Pressure Control with Water-Regulating Valves — Penn V46 Fresh- and Sea-Water Selection

cBallast Technical Sourcing · Pressure-actuated water valves · issued 2026-10-03 · cballast.com/documents/water-regulating-valves-penn-v46

How a pressure-actuated water-regulating valve holds condensing pressure on water-cooled plants, selecting Penn V46 sizes 3/8" to 2", why sea-water service requires the bronze B-versions, setting procedure and the fouling maintenance that keeps them modulating.

Size table (OD system)

Refrigeration pipework is specified by tube outside diameter — unlike plumbing tube named by nominal bore. The standard soft/hard-drawn ACR sizes:

OD (in) | OD (mm) | Typical wall (mm) | Working pressure* (bar) | Common duty |

1/4" | 6.35 | 0.8 | ~140 | Gauge lines, cap tubes out |

3/8" | 9.52 | 0.8 | ~95 | Liquid lines small splits |

1/2" | 12.7 | 0.8 | ~70 | Liquid/suction small systems |

5/8" | 15.88 | 1.0 | ~70 | Suction lines, heat pumps |

3/4" | 19.05 | 1.0 | ~58 | Suction/discharge |

7/8" | 22.22 | 1.14 | ~57 | Suction medium plants |

1 1/8" | 28.58 | 1.27 | ~49 | Suction/liquid headers |

1 3/8" | 34.92 | 1.4 | ~44 | Suction risers |

1 5/8" | 41.28 | 1.52 | ~41 | Large suction |

2 1/8" | 53.98 | 1.78 | ~36 | Rack suction mains |

*Order-of-magnitude allowable pressures for hard-drawn Cu-DHP at 50 °C with standard ACR walls — derate brazed joints at higher temperatures; the system standard (EN 378 / EN 14276) and the tube producer's tables govern design.

Plain copper or K65?

R410A condensing at 43 bar and transcritical CO2 at 90–130 bar exceed what larger plain-copper sizes allow. For R410A, thicker-wall copper covers common line sets; for CO2 above ~52 bar the industry answer is the copper-iron alloy K65 (CuFe2P) with matching fittings, rated 120 bar in the standard programme: see K65 couplings, K65 blanking caps and the full jointing walkthrough in the K65 CO2 pipework guide. Never braze a plain-copper fitting into a K65 line — the fitting, not the tube, sets the joint rating.

Metric sites and insulation

Continental drawings sometimes call metric copper (6, 10, 12, 15, 18, 22, 28 mm OD); couplings between the systems exist but each joint must use a fitting made for the two actual ODs — 15.88 mm tube does not seal in a 16 mm compression fitting. Suction lines are insulated to prevent condensation and capacity loss: wall thickness per line temperature and ambient humidity, closed-cell elastomeric as standard — matching sizes are listed under HVAC & Refrigeration together with impulse tubes and brazing consumables (silver-alloy guide).

Frequently asked questions
What is 7/8 copper tube in mm?7/8\u2033 ACR tube is 22.22 mm outside diameter — close to, but not the same as, metric 22 mm plumbing tube.Is ACR tube measured by OD or bore?By outside diameter. A 5/8\u2033 ACR tube is 15.88 mm OD; plumbing tube of the same name would be measured by nominal bore and differ.Can plain copper be used for CO2 refrigeration?Only on low-pressure parts of subcritical systems within the tube's rating; transcritical CO2 lines above ~52 bar use K65 (CuFe2P) tube and fittings rated 120 bar.What wall thickness does 5/8 ACR tube have?Standard ACR 5/8\u2033 (15.88 mm) tube comes with a 1.0 mm wall in the common hard-drawn programme.Why can't I use a 16 mm compression fitting on 5/8 tube?5/8\u2033 is 15.88 mm OD — 0.12 mm under 16 mm metric. Compression and press fittings seal on exact OD, so each joint needs a fitting made for the actual size.

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