

K65 (CuFe2P) High-Pressure Pipework for CO2 Systems — Pipe, Fittings and Brazing Practice to 130 bar

cBallast Technical Sourcing · K65 copper-iron alloy pipe and fittings · issued 2026-10-03 · cballast.com/documents/k65-copper-alloy-co2-pipework-guide

Why transcritical CO2 pipework uses K65 copper-iron alloy instead of standard copper, which pipe sizes and fitting types the system covers (couplings, elbows, tees, reducers, caps to 130 bar), and the brazing and nitrogen-purging practice the joints require.

Why K65 exists

Transcritical CO2 (R744) systems run gas-cooler circuits at pressures standard refrigeration copper (EN 12735-1) is not rated for: 120 bar design pressure is normal on the high side of a transcritical booster plant. K65 is a copper-iron alloy (CuFe2P) developed for exactly this duty: it brazes and bends like copper but carries roughly twice the strength, allowing thin-wall tube rated to 130 bar in the standard refrigeration sizes. The catalogue carries the matched system — tube in 5 m lengths and a full wrought fitting programme — so the whole high-pressure side can be built in one material with one brazing process.

Pipe sizes in the catalogue (130 bar, 5 m lengths)

OD | Listing |

1/2" | K65 pipe 1/2" |

5/8" | K65 pipe 5/8" |

3/4" | K65 pipe 3/4" |

7/8" | K65 pipe 7/8" |

1 1/8" | K65 pipe 1 1/8" |

1 3/8" | K65 pipe 1 3/8" |

1 5/8" | K65 pipe 1 5/8" |

2 1/8" | K65 pipe 2 1/8" |

Fitting programme

The wrought K65 fittings mirror the familiar copper solder-fitting shapes. End types follow the usual convention: C (solder cup) and FTG (fitting end that enters a cup). The catalogue covers, per size from 3/8" to 2 1/8":

90° elbows, FTG × FTG and C × FTG street pattern — e.g. 90° elbow 3/4", 90° street elbow 1 1/8";

45° elbows in both patterns — e.g. 45° elbow 5/8";

couplings — e.g. coupling 7/8";

fitting reducers FTG × C — e.g. 1 1/8" × 7/8";

equal and reducing tees — e.g. tee 7/8", reducing tee 1 1/8" × 1 1/8" × 7/8";

end caps — e.g. cap 5/8".

High-pressure K65 ball valves with and without Schrader access complete the line — e.g. the 1 5/8" 140 bar K65 ball valve.

Brazing practice

K65 joints are brazed like copper-to-copper joints, with discipline: use a silver-bearing filler — 5 % Ag CuP for straightforward joints, or higher-silver rod such as Ag 15 % where joint gaps or vibration demand ductility (flux-coated Ag 40 % when joining to brass or steel). Purge with dry nitrogen during every braze: at 120 bar working pressure, internal oxide scale that flakes into an electronic expansion valve will stop a plant — the nitrogen purging guide covers flow settings and the regulator adapters. Do not overheat: CuFe2P tolerates normal brazing temperature but prolonged overheating degrades its strength advantage. After assembly, strength-test and leak-test to the design pressure regime of EN 378 for the installation class, and document the test for the plant file.

Design notes

Keep high-side K65 runs clamped at close centres — CO2 compressors transmit sharp pulsations; use insulated clamps that match the OD (see the pipe clamp guide). Transitions to component connections are made with the fitting reducers rather than by annealing and swaging tube, which is not acceptable on K65. For the low-pressure and subcritical parts of the plant, standard copper to EN 12735-1 with the wall thickness rated for the duty is used — the catalogue's hard-drawn copper pipe listings state the rating per size, e.g. 5/8" × 1.10 mm, 85 bar. CO2-rated check valves (5/8" ODS CO2) and 140 bar electronic expansion valves (Carel E3V45) complete the transcritical bill of materials.

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