

Silver Brazing Alloys for Refrigeration Pipework — Choosing Between CuP, Ag 15 %, Ag 40 % and Ag 57 %

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What the silver percentage of a brazing rod buys in a refrigeration joint, when a self-fluxing copper-phosphorus rod is enough, when flux-coated high-silver rod is mandatory (brass, steel, vibration, food plants), and the joint preparation and nitrogen purge that make the braze survive.

The three alloy families

Copper-phosphorus (CuP) rods, 0–15 % Ag. The phosphorus makes them self-fluxing on copper-to-copper joints — no paste flux needed. Rising silver content increases ductility and gap tolerance: a plain CuP rod suits tight factory-fit joints; Ag 15 % CuP (and the Ø2/Ø3 mm 5283RB20/5283RB30) is the field standard for refrigeration copper, tolerating the wider gaps and vibration of site work. CuP rods must never be used on steel or nickel alloys — the phosphorus forms a brittle phosphide at the interface.

High-silver alloys (Ag 40–57 %) with flux. Required for copper-to-brass, copper-to-steel and any dissimilar joint, and preferred where maximum ductility is needed. They melt lower and flow faster than CuP. The catalogue carries flux-coated Ag 40 % Ø2 mm 1 kg (also 0.1 kg and AG40SN with flux, 0.5 kg) and Ag 57 % Ø2 mm (1 kg pack) for the most demanding joints — thin-wall valve bodies, vibration-loaded connections and cadmium-free food-plant work.

Quick selector

Joint | Rod | Flux |

Copper tube to wrought copper fitting, workshop | CuP 2–5 % Ag | None |

Copper to copper on site, vibration, wider gaps | Ag 15 % CuP | None |

Copper to brass valve or fitting | Ag 40 % flux-coated | Integral / paste |

Copper to steel or stainless stub | Ag 40–57 % | Mandatory |

Thin-wall components, minimum heat | Ag 57 % | Mandatory |

K65 CO2 pipework | Ag-bearing per the K65 guide | Per joint type |

Joint preparation

Capillary brazed joints want a clean, closely fitted overlap: abrade to bright metal, deburr, and keep the clearance in the few-hundredths-of-a-millimetre range that solder-cup fittings provide. Heat the fitting and the tube evenly until the rod melts on the metal, not in the flame, and feed at the joint mouth so capillary action pulls the alloy through. On flux joints, apply flux thinly to the male part only, and wash residues off after brazing — flux remnants are corrosive and will be blamed on the next leak search. Overheating burns the zinc out of brass and the phosphorus out of CuP alloys; a dull-red joint temperature is the target.

Nitrogen purge — not optional

Brazing a refrigerant line without a dry-nitrogen purge coats the bore with black copper-oxide scale. That scale detaches during operation and collects in the two most expensive places on the plant: expansion-valve orifices and compressor suction screens. Purge at a gentle flow before, during and after each joint — the nitrogen purging guide gives the regulator setup, including the catalogue adapters (1/4" BSP × 1/4" flare) that connect a purge regulator to standard charging hoses. On A2L/A3 refrigerant systems, recovery and purge before hot work is a safety requirement, not just a cleanliness one.

Inspection and documentation

A sound braze shows a continuous fillet around the full circumference with the alloy drawn into the capillary, no pinholes and no flux inclusions. On marine and class-surveyed plants, document the filler alloy, joint count and strength/tightness test results in the work report — the EN 378 pressure-test record plus the brazer's consumable batch is what a surveyor asks for. Keep separate rods for separate duties in the kit: one CuP workhorse, one flux-coated Ag 40 %, and Ag 57 % for the delicate work covers everything a service van meets.

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