Systcold JDC
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Technical Newsletter Systcold JDC No. 6 · Special edition · Assistant, IASHAT and R-402B replacement

Special edition of Systcold JDC: how the Technical Assistant and the IASHAT engine answer, and a real case from this week, replacing R-402B. All figures come from manufacturer catalogs or from calculations validated against published data.

Who Systcold JDC is for

Systcold JDC is a calculation platform for refrigeration installers: it tells you which unit to install and why, using real catalog data. It covers cold room heat load (over 400 products), selection of evaporators, expansion valves and condensing units, copper line sizing and refrigerant changeover. The database holds about 260 manufacturer catalogs: more than 5,000 evaporator models, around 15,500 condensing units and close to 35,000 components.

The Technical Assistant: one concrete answer in under a second

The Assistant is free and answers with a specific catalog unit: what to install and what to order. It understands short queries without units ("valve 3 kw R404A te -10"), routes them to the specialised layer (evaporators, valves, condensing units), interpolates catalog capacities and shows a "How we read your query" line with what it understood. By default it works at 50 Hz with

single-phase units; "60 Hz" or "three-phase" switches to the matching unit version.

Query	Before	Now
Condensing unit	75 s	0.1–0.2 s
Evaporator	8–15 s	0.5–0.9 s
Expansion valve	3–6 s	0.4 s

IASHAT Engine: engineering calculations for subscribers

IASHAT Engine does not estimate from memory: it calls the same calculation engine used by the web templates, so its results match the website. It relies on recognised methods: a Helmholtz mixture model (the same type as NIST REFPROP) for refrigerants, the AHRI 540 polynomial for compressors, EN 328 conditions and table-based factors for evaporators, and subcooling and pressure-drop corrections for valves.

Real case: what replaces R-402B

To retrofit an R-402B (HP81) system, **R-448A** or **R-449A** is the general replacement: they keep the COP and discharge temperature with less than half the GWP. Theoretical cycle calculated by Systcold (condensing 40 °C, superheat 5 K, subcooling 2 K, isentropic efficiency 0.70; MT = −10 °C, LT = −30 °C):

Refrigerant	Capacity MT / LT	Discharge MT / LT	COP MT / LT	Glide	GWP
R-402B	reference	73 / 89 °C	2.77 / 1.65	1.7 K	2416
R-448A	−8 % / −13 %	73 / 90 °C	2.79 / 1.66	6.2 K	1387
R-449A	−9 % / −13 %	72 / 88 °C	2.79 / 1.66	5.8 K	1397
R-452A	−9 % / −14 %	61 / 71 °C	2.67 / 1.56	4.2 K	2140
R-404A	−8 % / −11 %	61 / 70 °C	2.60 / 1.50	0.6 K	3922

- **Capacity:** with the same compressor you lose 8 to 13 %; check the compressor's margin.
- **Expansion valve:** evaporating pressure drops from 4.2 to 3.6 bar; the valve must be readjusted or replaced.

- **Oil:** R-402B works with alkylbenzene (mineral oil only with at least 50 % AB); chlorine-free replacements require POE.
- **Glide of about 6 K:** charge in liquid phase and measure superheat against the dew point.

R-402B contains R-22 (HCFC). In the European Union it can no longer be used for recharging, and MARPOL Annex VI has prohibited new installations containing HCFCs on board ships since 2020.

Three weak points raised by an external review

Glide in retrofits: the cycle calculation gives the evaporating and condensing glide of each refrigerant, and the refrigerant changeover template compares it with capacity, COP and discharge temperature. **Multi-suction racks:** the multi-service project assigns each cold room to HT (+5 °C), MT (−10 °C) or LT (−30 °C) and adds up the load of each suction group to size the condenser; line sizing supports up to 12 nodes and 3 suction groups. **Oil return velocity:** copper line sizing checks the velocity in every section, node and branch, with the cumulative load of the downstream services.

How every figure is validated

A result is shown only if it comes from a catalog or from a recognised procedure checked against published data. The pressure-temperature table for R-402B, which has no published table, matches Chemours (≤ 1 %), a supplier data sheet at 72 °F (−0.4 % and −0.1 %) and the Gas Servei glide (0.1 K). The method was first tested on R-404A (0.1–1.7 %).

Try it

- R-402B data sheet
- R-402B pressure-temperature table
- Refrigerant comparison and regulations
- Expansion valve selector

The Assistant is available on every page of systcoldjdc.com.



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