

Refrigerant Leak Detection — Electronic Detectors, UV Tracer and Bubble Methods in Practice

cBallast Technical Sourcing · Leak detection equipment · issued 2026-10-03 · cballast.com/documents/refrigerant-leak-detection-methods-electronic-uv-bubble

When to use an electronic heated-diode/infrared detector, UV tracer dye or bubble solution for refrigerant leak search, what sensitivity classes mean under EN 14624 and the F-gas inspection regime, sensor replacement practice (Inficon D-TEK, TIF), and a structured search routine that actually finds the leak.

Three methods, one sequence

Serious leak search is a sequence, not a single tool: electronic detector to localise the area, bubble solution to pinpoint and prove the joint, and UV tracer as the long-term witness for intermittent and assembly-internal leaks. The F-gas regulation's periodic checks (frequency by CO₂-equivalent charge) accept direct methods — electronic detection, bubbles, UV — applied systematically; the plant log must record method and result.

Electronic detectors

Heated-diode and infrared cells detect halogenated refrigerants at the grams-per-year level demanded by EN 14624-class instruments; A2L-capable and hydrocarbon-capable versions extend coverage to R32, R1234ze/yf and R290. The sensing cell is a consumable: sensitivity decays with exposure, and the maker's replacement interval (typically annually in service use) is the difference between an inspection and a ritual. The catalogue stocks the replacement sensors — Inficon D-TEK 3 / Stratus sensor (HFC + A2L), D-TEK Select sensor, and TIF tips and elements (ZX-14 tip, ZX-2 sensor, ZX-15 filters). Search technique: plant off or fans quiet, probe moved slowly (2–5 cm/s) under joints since refrigerants fall, confirm every alarm twice from fresh air, and verify the instrument daily against a reference leak if it has one.

Bubble solutions

The pinpoint tool: a film of leak-detection fluid over the suspect joint shows the exact pore as growing foam. Use purpose-made fluid, not washing-up liquid (chlorides + copper = corrosion). Bubbles need positive pressure — on a recovered system, a dry-nitrogen stand at test pressure makes every joint testable; that is also the EN 378 tightness-test setup. Limitations: slow on large plants, useless on sub-gram/year seepers, awkward overhead — exactly the gaps the electronic detector covers.

UV tracer

A small dose of UV-fluorescent dye (UV tracer canister, 4.5 kg) circulates with the oil; any escape path accumulates a glowing witness mark inspected with a UV lamp weeks later. It is the method for intermittent leaks (vibration-opened joints, pressure-dependent seals) and for finding which of fifty flare nuts weeps. Rules: dose per the dye maker's oil-charge table — overdosing thins oil; use dye compatible with POE; log the dye addition in the plant record so later samples are interpreted correctly; and clean old dye off repaired joints, or every future inspection re-finds the ghost.

A search routine that works

History first: where was the last repair, what does the oil spot pattern on the floor say, how fast is the charge going (log data)?

Electronic sweep of the usual suspects: flare nuts, rotalock gaskets (renew PTFE gaskets), Schrader cores and caps, valve bonnets, braze joints at vibration points, pressure-switch capillaries.

Bubble-confirm every electronic hit before wrenching.

If nothing found and loss continues: nitrogen stand-test section by section, then dye for the long game.

Repair, evacuate, recharge by weight, and record method + result in the F-gas log.

On A2L/A3 refrigerants, detectors must be rated for the gas and the space ventilated during search; hot work only after recovery and nitrogen purge — see the purging guide. Fixed gas detection in machinery rooms (EN 378 occupancy rules) complements, never replaces, the periodic hand search.

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