

WHITE PAPER

How the EU F-Gas Regulation Affects Lab & Process Chillers

Understanding the GWP Deadline — and Why PolyScience's R290 Platform Is Already Built for It

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Executive Summary

The EU F-Gas Regulation (EU) 2024/573 sets a hard deadline for the refrigerants used in lab and process chillers: as of January 1, 2027, new self-contained chillers with a cooling capacity of 12kW or less must use a refrigerant with a global warming potential (GWP) of 150 or lower. Most of the refrigerants in wide use across the lab chiller market today — R404A, R410A, R134a, and blends like R513a — sit far above that line, some by more than twenty times. For manufacturers and buyers alike, this is not a distant regulatory footnote; it is a near-term deadline that determines what can legally be placed on the EU market starting in 2027, and it is already reshaping refrigerant choices industry-wide.

PolyScience began moving its chiller platforms to R290 (propane), a natural refrigerant with a GWP of just 3, well ahead of this deadline. The result is a lineup already positioned to meet the strictest GWP threshold currently adopted anywhere in the world — with the engineering in place to keep shipping globally, including by air, without the hazardous-goods complications that a larger flammable-refrigerant charge would create. This paper explains what the regulation requires, why it matters for chiller buyers specifically, and how PolyScience's R290 platform addresses it.

What Is the EU F-Gas Regulation?

The EU F-Gas Regulation is the European Union's framework for phasing down fluorinated greenhouse gases — the family of synthetic refrigerants that includes HFCs like R404A, R410A, and R134a, along with HFC/HFO blends like R513a. The current version, Regulation (EU) 2024/573, tightens rules that trace back to an earlier 2014 F-Gas Regulation, and it does so through two connected mechanisms: a shrinking annual EU-wide quota on the total volume of high-GWP refrigerant that can be placed on the market, and equipment-specific GWP limits with defined effective dates.

For self-contained lab and process chillers, the equipment-specific limit is the one that matters most directly. It works on a sliding scale by cooling capacity, summarized below.

Effective Date	Equipment Covered	Requirement
January 1, 2027	New self-contained chillers ≤12kW cooling capacity	Refrigerant GWP must be ≤150
January 1, 2027	New self-contained chillers >12kW cooling capacity	Refrigerant GWP must be ≤750
~2032 (further phase-down)	Broader HFC quota reductions across the EU F-Gas schedule	Tightens further; exact scope set by later implementing rules

Table 1. Key EU F-Gas Regulation (EU) 2024/573 dates and thresholds for self-contained chillers. Confirm current implementing details against the official regulation text before citing a specific date to a customer.

Beyond the equipment deadline, the regulation's shrinking quota also puts steady upward pressure on the price and availability of the high-GWP refrigerants that remain legal to service existing equipment — a dynamic the industry has already lived through once with R-22, whose price rose an estimated 8 to 15 times over as its own production quota tightened in prior years.

Why This Matters for Lab & Process Chillers

Recirculating and process chillers are refrigeration equipment first and lab instruments second — and the refrigerant inside them is squarely what this regulation targets. The chillers most exposed are exactly the ones common on a bench or in a process skid: self-contained, air-cooled units in the roughly 0.25 to 3-ton range, almost all of which fall under the ≤12kW bracket and its GWP ≤150 requirement.

Today, the large majority of chillers in this class — across the industry, not just from any one manufacturer — run on R404A, R410A, R134a, or an HFC/HFO blend such as R513a. Every one of those refrigerants exceeds the 150 GWP threshold, several of them by a wide margin, as shown below.

Refrigerant	GWP (AR5, 100-yr)	ASHRAE Class	Meets ≤150 (2027)?
R404A	3,922	A1	No
R410A	2,088	A1	No
R134a	1,430	A1	No
R513a	573	A1	No
R290 (propane)	3	A3	Yes

Table 2. GWP values are AR5, 100-year basis — the figure cited in current EU F-Gas regulatory text. R404A, R410A, R134a, and R513a are common refrigerants across the broader lab and process chiller market and do not represent any single competitor's product line.

For a chiller manufacturer, this means new-unit designs sold into the EU after January 1, 2027 have to use a compliant refrigerant — there is no path to keep selling a ≤12kW self-contained chiller on R404A, R410A, R134a, or R513a into that market past the deadline. For a buyer, it means the chiller purchased today needs a service and replacement-parts outlook that extends past 2027, and it means refrigerant availability and cost for the unit's existing charge should be part of the purchase decision, not just the sale price.

Is a Flammable Refrigerant Safe to Use in a Lab?

The tradeoff for R290's very low GWP is its ASHRAE 34 safety classification: A3, meaning higher flammability, versus the A1 (non-flammable) classification of R404A, R134a, and R513a. That classification is real and deserves a direct answer, not a footnote.

R290 systems are not simply older A1 designs with the refrigerant swapped in. Equipment safety standards for A3 refrigerants — including IEC/UL 60335-2-40 — set requirements around total refrigerant charge, component sealing, ventilation, and ignition-source control that shape the whole system design. PolyScience's R290 chiller platforms are engineered around those requirements from the ground up: a reduced total refrigerant charge achieved through lower-internal-volume condensers, evaporators, and filter driers, paired with a system architecture designed to the applicable A3 safety standards. The result is a chiller that carries a flammable refrigerant classification on paper while being engineered specifically to manage that risk in ordinary lab and process use.

It is also worth noting that R290 is not a novel or unproven refrigerant — propane has decades of use in commercial and household refrigeration internationally, and its adoption in chillers and other self-contained cooling equipment has been accelerating industry-wide as manufacturers respond to the same GWP pressure described above.

PolyScience: Positioned Ahead of the Deadline

PolyScience began investing in low-GWP natural refrigerant development in accordance with the F-Gas 2020 initiative put forth by the European Union — well before the current 2024/573 regulation and its 2027 deadline took shape. That head start means the R290 transition already underway across the DuraChill® chiller platform is not a last-minute scramble to meet a looming deadline; it is the continuation of a development path PolyScience committed to years ago.

The practical result is a chiller lineup engineered to meet the strictest GWP standard currently adopted anywhere in the world — the EU F-Gas ≤ 150 threshold — well ahead of its effective date. While GWP-based restrictions on this class of equipment are, at present, most fully codified in the EU, similar regulatory direction is anticipated elsewhere as other regions continue tightening HFC policy; a chiller platform already compliant with the EU's threshold today is a platform that does not need to be re-engineered to meet whatever comes next.

This is a meaningful distinction for a global buyer. A chiller purchased today, wherever it ships, carries a refrigerant that is compliant now and has substantial margin against further tightening — R290's GWP of 3 is not just under the 150 threshold, it is under it by nearly two orders of magnitude.

Solving the Air-Freight Challenge

A3-classified refrigerants introduce a second, more operational question alongside the regulatory one: how does a flammable-refrigerant chiller actually ship, particularly by air, where flammable gas cargo is tightly restricted? PolyScience's R290 platforms are engineered specifically to keep this from becoming a bottleneck.

The DuraChill® R290 chillers are built around a refrigerant charge of 99 grams — achieved through the same reduced-internal-volume condenser, evaporator, filter drier, and turbine pump design used to meet the A3 safety standards described above. That charge level keeps the unit under the commonly applied thresholds for classifying flammable-refrigerant equipment as hazardous air cargo, rather than sitting above them the way a larger flammable charge would. In practical terms, that means an R290 chiller can move through standard air-freight channels rather than requiring dangerous-goods handling, special routing, or the extended transit times that come with surface-only shipping for hazardous cargo.

For a global buyer, this matters as much as the regulatory compliance itself. A chiller that has to ship by ocean freight because of its refrigerant charge can add weeks to a delivery timeline; one engineered to stay under the relevant air-freight thresholds can ship the same way non-flammable-refrigerant equipment always has.

PolyScience's R290 chiller platform is built around a 99-gram total refrigerant charge — engineered to keep shipments below the commonly applied thresholds for classifying flammable-refrigerant equipment as hazardous air cargo, so units can move through standard air-freight channels rather than requiring dangerous-goods handling.

What This Means for Chiller Buyers

For EU-based labs and process facilities, the planning horizon is concrete: any new $\leq 12\text{kW}$ self-contained chiller purchased for installation after January 1, 2027 will need to run on a refrigerant with a GWP of 150 or lower. Procurement and facilities teams evaluating chiller purchases now — even for delivery well before that date — should weigh the service and replacement-parts outlook of a high-GWP unit against a platform already built around a compliant refrigerant.

- Confirm the refrigerant and its GWP for any chiller under consideration, not just its cooling capacity and footprint.
- For EU installations, treat January 1, 2027 as a hard planning date for new $\leq 12\text{kW}$ self-contained chillers, regardless of the requested delivery date.
- For non-EU installations, a low-GWP unit purchased today avoids exposure to the refrigerant price and availability pressure that has historically followed HFC quota tightening — R-22 pricing rose an estimated 8 to 15 times over during its own phase-down.
- For any application requiring air freight or fast international delivery, ask specifically about the unit's total refrigerant charge and its air-shipping classification.

None of this requires a lab or process facility to become a refrigerant policy expert. It requires asking the right question of a chiller supplier before the purchase, not after the regulation takes effect.

Conclusion

The EU F-Gas Regulation's GWP thresholds are not a hypothetical future constraint — they take effect January 1, 2027, and they apply to the class of self-contained chillers that make up most of the lab and process cooling market today. Refrigerants in wide use across that market now, including R404A, R410A, R134a, and R513a, do not meet the new threshold. PolyScience's R290 chiller platform does, with wide margin, and it was engineered around the safety and shipping realities of a flammable refrigerant from the start — not adapted to them after the fact.

Planning a chiller purchase with the 2027 deadline in mind?

Contact PolyScience to talk through your application, your target markets, and which R290 chiller model fits your cooling and shipping requirements.

This white paper is provided for general informational purposes and reflects PolyScience's understanding of EU F-Gas Regulation (EU) 2024/573 as of the publication date. It is not legal or regulatory compliance advice. Regulatory dates, thresholds, and implementing details should be confirmed against the official regulation text and, where applicable, qualified counsel before being relied upon for a compliance decision. GWP figures are AR5, 100-year basis. Refrigerant charge, safety classification, and air-shipping information reflect PolyScience's current R290 chiller platform and are subject to change; confirm current specifications with PolyScience before quoting a customer.