Customer Case Study

Klea® 473A provides SJJ with a long-term, environmentally sustainable replacement for R23/R508B.

The Challenge

SJJ needed to Identify a low GWP refrigerant to replace R-23/R-508 in support of its corporate values focused on minimizing environmental impact whilst:

- Finding a solution compatible with current semi-hermetic and hermetic compressor technology.
- Ensuring equivalent system capacity, energy efficiency, and performance without the need for any fundamental design change along with compatibility of lubricants within current installations.
- Confirming the replacement refrigerant as a long-term, F-Gas-compliant solution, with the potential to extend into ultra low-temperature ranges and applications.

The Impact

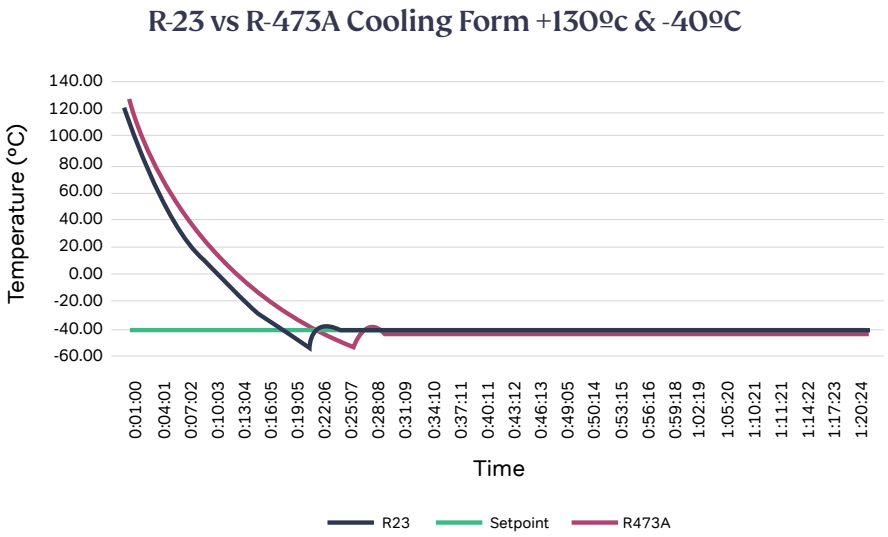
SJJ has a proud tradition of technical innovation and vast experience with cascade refrigeration systems within the environmental test chamber sector, and we set ourselves to the highest quality standards in meeting the needs of our customers around the world. Increasingly, this means making choices that minimize our impact on the environment when it comes to selecting refrigerants – and in Klea® 473A, we have found a long-term environment-friendly solution with an AR4 GWP of 1830 as opposed to 14,800 GWP with R-23".

- Steve Jones, Managing Director of SJJ system services Ltd

The Future Ready Solution

SJJ undertook some initial research and then launched a series of carefully controlled field tests to assess the viability of Klea® 473A as a very low GWP solution for environmental test chambers. The tests demonstrated near-equivalent performance with Klea® 473A vs R-23, see figure A, with slight expansion valve adjustment only whilst using the same charge of with Klea® 473A as R-23.

First, SJJ benchmarked the performance of the system running R-23 with a rate of change at 10°C/Min to enable detailed comparison. In this case, the original POE 32 oil was used in the compressor with no issues following eight months of operation.



Recovery Process

Klea® 473A has been successfully recovered and recharged by SJJ during maintainance of a system in the same method they use to recover R-23 and R-508B. Their method uses standard recovery equipment. Although this achieves recovery, it can be significantly slower and less efficient than recovering lower-pressure refrigerants. Klea® 473A, similar to R-23 and R-508B, exhibits high vapor pressures and does not condense easily under typical ambient conditions; recovery is limited to vapor phase only. Liquid-phase recovery is not feasible without subcooling, which standard units cannot provide. Furthermore, due to the substantial expansion ratio of these refrigerants from liquid to vapor, a significantly larger recovery cylinder is required to safely accommodate the increased volume. Using an undersized cylinder can pose safety risks and operational inefficiencies.

Recovery of high-pressure refrigerants is best performed using a dedicated cascade recovery unit. This is the recommended method due to the thermodynamic properties of these refrigerants. For efficient, safe, and complete recovery, a cascade-rated recovery unit with appropriate cylinder sizing is strongly advised. This is the same recovery process that is recommended for R-23 and R-508B. So, our experience is that no change to recovery practices from those used for R-508 or R-23 is needed to enable recovery of Klea® 473A.

Conclusion

In summary, Klea® 473A is a near drop-in replacement with the same cooling capacity as R-23 with a near-equivalent refrigerant charge. Therefore, it is a long-term refrigerant solution for SJJ's environmental test chambers range. The process for recovery is comparable to the process used for R-23 and R-508B and has been successfully demonstrated by SJJ.

As a result of the successful testing of Klea® 473A, SJJ is introducing the refrigerant into their environmental test chambers. SJJ is satisfied with the results because with Klea® 473A, the company can continue to serve its clients with the same performance but with added safety (A1, non-flammable), sustainability (90% reduction in GWP), and provide peace of mind for users with a long-term refrigerant solution.

Key Features

A1 ASHRAE Classification (Non-Flammable/ Non-Toxic)

Low GWP: 90% reduction vs R23/508

Effective down to -75°C

Low Glide

Reduced Carbon Footprint

Supply Chain Security

About SJJ System Services Ltd

SJJ System Services Limited was established in September 2015 by Mr Steve Jones. With a well experience team of staff with all over 25 years of experience within the industry of environmental test chambers and test systems we offer you a fast, efficient and friendly service operation ranging from one off visits to fully comprehensive cover depending on our customers requirements and budgets available. With our extensive knowledge we have the flexibility to be able to deal with all types of manufactures of chambers working on all aspects of refrigeration systems, electrical panels and *control systems (*unless locked out by manufacturer, thus limiting the service providers) However we offer upgrade and modification work which can eliminate this function should the customer wish to source alternative service providers.

About Orbia Fluor & Energy Materials

Orbia Fluor and Energy Materials has over 50 years of experience delivering trusted solutions, with innovation, sustainability and customer focus driving our approach. We produce innovative refrigerant gases for the world's biggest organizations across commercial refrigeration, automotive and stationary air conditioning applications. Klea® refrigerants are trusted by major manufacturers and aftermarket professionals all over the world across the HVAC, automotive and refrigeration industries. Worldwide Klea® 134a is used in millions of vehicles and is trusted by leading industry brands. Our air conditioning products are approved by major equipment manufacturers.

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