



Opteon™ XP40

Refrigerant (R-449A)

The Optimal Solution for Environmental Test Chambers



Weiss Technik demonstrates how smaller-sized equipment running on R-404A can easily make the switch to a sustainable refrigerant solution.

Replicating the variabilities of Mother Nature is no walk in the park. To reliably simulate a variety of climatic conditions, environmental testing facilities require adaptable systems with precise process control. A key component of these test chambers is the refrigerant. For decades, R-404A has remained the refrigerant of choice in many environmental test

chambers. The status quo is changing, however, as regulations drive the market toward alternatives with lower global warming potential (GWP)...without sacrificing performance. Weiss Technik North America, Inc., a leading manufacturer of environmental test chambers, has found a solution: Opteon™ XP40 (R-449A) by Chemours.



Chemours™



A Global Designer of Environmental Test Chambers

Weiss Technik North America, Inc. (Weiss Technik), as part of the global Schunk Group enterprise, is a leader in the design and manufacture of these state-of-the-art testing systems. Weiss Technik offers environmental test chambers that range from bench-top to drive-in models and accommodate items from as small as laptop computers up to large automobiles. Depending on the scale of the system, the refrigerant charge size is between 3-80 lb. These chambers are designed to mimic a variety of environmental conditions via manipulation of temperature, humidity, air pressure, and other variables. To enable this functionality, Weiss Technik's environmental test chambers must utilize refrigeration systems that meet demanding performance standards, while at the same time providing longevity—from both an operational/durability as well as regulatory standpoint.

“By leading the regulatory shift away from high GWP HFCs, Opteon™ XP40 is enabling Weiss Technik's test chambers to stand the test of time.”



Phase-Down of High GWP Refrigerants

For many years, refrigerant R-404A has been commonly used in the environmental test chambers of Weiss Technik and others. R-404A has proven to be a reliable refrigerant that enables test chambers to meet testing protocols quickly, accurately, and precisely. However, as a pure hydrofluorocarbon (HFC) with a relatively high GWP of 3,922,¹ R-404A has been under the spotlight as regulations focus on phasing down high GWP refrigerants.

Regulations Driving Change

A critical international regulatory milestone was the 2016 Kigali Amendment to the Montreal Protocol. Although not yet ratified in the U.S., this agreement has been adopted by over 80 countries as of October 2019 and puts in place the framework to phase down the use of HFC refrigerants by more than 80% over the next 30 years.

European countries have taken steps to ensure compliance through the EU F-gas regulation. A key component of the EU regulation is the prohibition, starting in 2020, of R-404A in new stationary refrigerant systems and “virgin” R-404A for servicing existing systems. In Germany, Weiss Technik's parent company, Weiss Umwelttechnik, identified the R-404A issue early and reacted swiftly to find an alternative refrigerant for their environmental test chambers. After an initial meeting at the Chillventa conference in 2014, Weiss Umwelttechnik worked closely with Chemours in evaluating Opteon™ refrigerants—a portfolio of environmentally sustainable, hydrofluoroolefin (HFO)-based, lower GWP refrigerants as potential solutions.

In Europe, Weiss Umwelttechnik ultimately selected Opteon™ XP40 (R-449A) as its replacement for R-404A in new test chambers and Opteon™ XP44 (R-452A) as a retrofit replacement for R-404A in existing chambers. With GWPs of 1,282 and 1,945 respectively,¹ Opteon™ XP40 and XP44 offer a significant GWP reduction. Furthermore, they have the credibility of being adopted by major transport refrigeration equipment and commercial refrigeration OEMs.

¹GWP - IPCC Fifth Assessment Report (AR5)

Weiss Technik North America Selects Opteon™ XP40

In North America, measures are also being taken to drive the transition away from high GWP HFC refrigerants. In 2015, the U.S. Environmental Protection Agency (EPA) listed R-404A as “unacceptable” in various end uses under the Significant New Alternatives Policy (SNAP). Even though EPA SNAP rules 20 and 21 were later vacated in a court decision, a number of U.S. states have announced their intention to phase down the use of R-404A and other HFCs. For example, Michigan—the home of Weiss Technik’s corporate headquarters—is one of a growing number of states who have joined the U.S. Climate Alliance: a bipartisan coalition committed to, and in the process of, reducing greenhouse gas emissions.

As R-404A is phased down in certain states, production and availability is likely to decline. Taking a proactive approach, Weiss Technik set out to find a suitable low GWP alternative refrigerant for North America. Following the lead of its German parent company, Weiss Technik also selected Opteon™ XP40 as the R-404A replacement for its environmental test chambers.

Opteon™ XP40—A Reliable, Low GWP Refrigerant

With a GWP of 1,282, Opteon™ XP40 offers a greater than 65% reduction in CO₂ equivalent emissions relative to R-404A (GWP = 3,922), meeting the sustainability goal of a GWP under 2,500 to ensure long-term restriction-free testing.

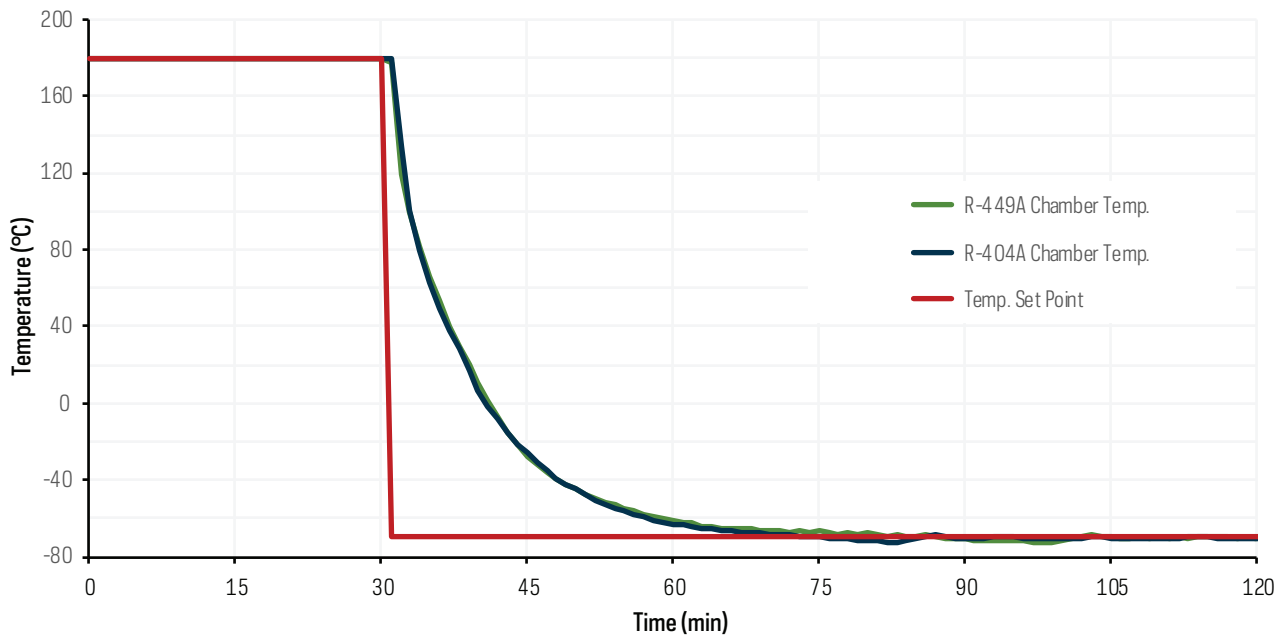
As is the case with any refrigerant replacement, however, it is important to consider not only GWP reduction, but meeting the existing performance standards of the equipment.

Weiss Technik’s environmental test chambers are equipped with complex control systems designed to rapidly change temperature and humidity, as well as introduce stressors such as vibration and/or radiation. To accommodate the range of applications in industries that include automotive, electronics, or pharmaceuticals, operating temperatures ranging from 180 to -70°C (355 to -95°F), with rates of change that may exceed 25°C (45°F)/min, are a prerequisite. Chamber systems must be highly responsive to input parameters and able to reproduce climatic conditions precisely and accurately. Therefore, the performance and capability of these refrigeration units is clearly integral to the overall environmental test chamber operation.

One method Weiss Technik uses to assess performance is through temperature profile tests. After developing a system using Opteon™ XP40, Weiss Technik was able to achieve an identical temperature profile to an R-404A chamber with the same test volume and refrigerant charge size, and under the same test parameters,² as seen in **Figure 1**. By matching the performance standard of R-404A systems, XP40 is validated as a dependable and sustainable alternative refrigerant for this application.

²Industry standard IEC 60068-3-5

Figure 1. Opteon™ XP40 (R-449A) Matches the Performance of R-404A in Environmental Test Chambers Under Standard Conditions





Opteon™ XP40—An Optimal Alternative

Once sustainability and performance goals were confirmed, Weiss Technik needed to ensure Opteon™ XP40 would be readily available to serve their customers. Fortunately, XP40 is already used extensively in stationary commercial and industrial refrigeration systems—both new and converted—throughout the world, with well-established supply and distribution networks. Weiss Technik saw clear additional benefits in both the nonflammability of XP40, as well as cost stability over time as R-404A is phased down. With the optimal balance of sustainability, performance, and cost, Opteon™ XP40 was the ideal candidate to replace R-404A.

Stand the Test of Time

Backed by over 32,000 hours of testing, the conversion from R-404A is complete. Aside from a few exceptions—due to existing contracts or minor application restrictions—all new test chambers leaving the Weiss Technik production line are now equipped with Opteon™ XP40. Weiss Technik's

customers take great satisfaction in knowing they are doing their part to combat climate change, as they perform testing with chambers that meet all of their demanding performance and reliability needs. By leading the regulatory shift away from high GWP HFCs, XP40 is enabling Weiss Technik's test chambers to stand the test of time, well into the future. The Weiss Technik Group is proud to be the first environmental test chamber manufacturer to develop and offer a low GWP testing solution, facilitated by Opteon™ XP40.



Scan here to find an Opteon™ XP40 stocking location near you.

For more information on the Opteon™ family of refrigerants, or other refrigerants products, visit opteon.com or call (800) 235-7882.

The information set forth herein is furnished free of charge and based on technical data that Chemours believes to be reliable. It is intended for use by persons having technical skill, at their own risk. Because conditions of use are outside our control, Chemours makes no warranties, express or implied, and assumes no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under, or a recommendation to infringe, any patents or patent applications.

© 2019 The Chemours Company FC, LLC. Opteon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC. Chemours™ and the Chemours Logo are trademarks of The Chemours Company.

C-11882 (11/19)