

Maintaining a cool environment

Testing is a critical component for the curing of hydraulic cement and concrete test specimens. Accurate and precise testing in test chambers allows for both the safety of products and individuals. However, the use of refrigerants in these chambers raises important issues regarding sustainability.

■ by **Michael Stratton**, Weiss Technik North America Inc, USA

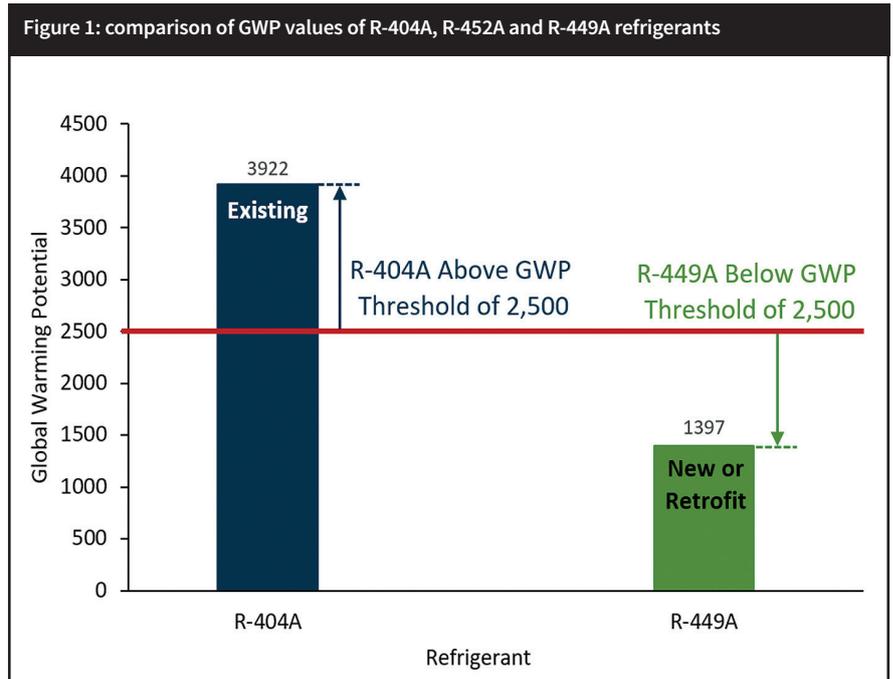
As companies increase their awareness of sustainability within their corporate culture, they look at ways to reduce their carbon footprint, and implement programmes and systems to help with efforts to protect the environment. A closer look at their testing procedures, including the use of refrigerants in test chambers, can form part of this process.

Environmental simulation test chambers (test chambers) are used to test a variety of products across multiple market sectors. In the cement and concrete industry, test chambers are used to validate that cement or concrete specimens not only meet critical standards but also conform to test standards such as ASTM C 511-06. This testing is critical for both the safety of the final product and individuals.

The refrigerant issue

Test chambers use refrigerants to transfer heat out of the test spaces that contain the cement and concrete specimens. While the selected refrigerant greatly impacts the performance of the test chamber, it can be inadvertently released into the atmosphere when the refrigeration system is decommissioned, serviced or charged. While refrigerants have been synthesised to deliver optimum results, this release into

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the atmosphere makes the initial selection of refrigerant important.

Some refrigerants have a high ozone-depleting potential (ODP) and/or global warming potential (GWP) value, which means they are more harmful to the environment than others. For example, refrigerant R-404A, commonly used in compressors of test chambers, is a larger contributor to global warming than CO₂ due to its GWP value of 3922, which means it stores 3922 times more energy than CO₂ (GWP=1).

The use of refrigerants with high GWP values is, or will soon be, impacted by international and regional agreements and regulations. For example, EU regulation no 517/2014, which came into force on 1 January 2020, means the use of fluorinated greenhouse gases with a GWP value of 2500 or more, to service or maintain refrigeration equipment with a charge size of 40t of CO₂ equivalent or more, is prohibited in the EU.

Meanwhile, the Kigali Amendment

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to the Montreal Protocol (2016) aims to strongly reduce the use of hydrofluorocarbons (HFCs), including R-404A.

These changes to regulatory frameworks will influence the price and availability of refrigerants, and users will need to take into consideration a range of options when purchasing a new test chamber, particularly as test chambers are often used for 15-20 years.

Weiss Technik has developed refrigerants with improved GWP values, supporting cement and concrete producers in their efforts to reduce the carbon footprint of their testing chambers



A cool solution

Aware of this issue and the upcoming changes, Weiss Technik North America is the first environmental simulation test chamber manufacturer to use refrigerants with lower GWP values for test chambers in the North American market.

Environmental simulation test

chambers are now available with Opteon™ XP40 (R-449A), which is a low-GWP refrigerant, without sacrificing performance or reliability. With a GWP value of 1397, R-449A meets the requirements of EU regulation no 517/2014, while also avoiding the future availability issues of R-404A.

Additional support

To support the drive for more environmentally friendly refrigerants, Weiss Technik has published a White Paper titled 'A New Option for Environmental Test Chambers That Helps Combat Climate Change'. The publication covers in detail the existing refrigerants and future guidelines, and helps cement and concrete producers to make informed decisions on the use of refrigerants in their testing procedures as part of their efforts to reduce their carbon footprint.

Conclusion

R-404A and similar refrigerants have been widely used in environmental simulation test chambers to enable optimum performance. However, due to the high GWP and the introduction of new regulations, R-404A is expected to see a global price increase as well as reduced availability over the next few years.

To help cement and concrete producers tackle this issue, environmental simulation test chambers with low-GWP refrigerants, such as Opteon™ XP40 (R-449A), are now available thanks to Weiss Technik North America Inc. ■