



Opteon™

Opteon™ is chosen by Dechra
for pharmaceuticals process
refrigeration



Innovation & Technology

Dechra Pharmaceuticals, a British company dedicated to the production of vaccines, hyperimmune serums, diagnostic kits and medicines for the veterinary segment, decided to face the challenge of making its industrial operations more efficient and reduce greenhouse gas (GHG) emissions.

Among its sustainability commitments, the company has the ongoing goal of reducing its scope 1, 2 and 3 greenhouse gas emissions, reaching net zero by 2050. To start this pioneer project, Gessé Junior, a refrigeration technician from Dechra Brazil's engineering department at the Londrina unit, initiated the retrofit of R-404A refrigerant from Dechra freeze dryers and cold rooms to lower GWP Opteon™ refrigerants.

Freeze Dryer & Opteon™ XP44

Freeze-drying is a process that aims to maintain the physical and chemical properties of products for extended periods of time, which for vaccines and serums is essential. In the first step of the process, it is necessary to rapidly reduce the temperature of the environment so that the water freezes quickly, requiring very low evaporation temperatures close to -70 °C.

After conducting intensive research in the refrigeration market, the pharmaceutical maker, in partnership with Chemours, selected the refrigerant Opteon™ XP44 (R-452A), to replace R-404A in the first of three circuits of the freeze-drying equipment. Each freeze dryer circuit has 16 TR capacity, three Bitzer compressors model S6G-25.2Y, six Danfoss TES 5 thermostatic expansion valves and used 23kg of R-404A with polyolester lubricating oil.

During planning of the retrofit, several steps were undertaken to assure a safe and reliable start-up, including the recovery of the R-404A refrigerant; replacement of the lubricant because it already presented degradation, as well as that of the filter drier. Additional steps included were general cleaning of the system; nitrogen test; vacuum below 250 microns, refrigerant pre-charge, start-up and adjustments of superheat and sub-cooling parameters.



"Finding an optimal refrigerant from a thermodynamic perspective was a major challenge due to the operating regime. The refrigerant change was also a crucial step in adopting proactive measures aligned with the Montreal Protocol and Kigali Amendment. After all, each circuit operates on somewhere between 20 and 26kg of R-404A, and this aspect has also led Dechra to take a preventative approach.", details Gessé Junior, responsible for the execution of the retrofit, performance analysis and adjustments of operational parameters at Dechra do Brasil.

The equipment now operating with Opteon™ XP44 is used in the production of vaccines and antivenoms against snakes and spiders. The refrigerant is responsible for ensuring that the surface temperature of the vaccines and antiophidics are in the range of -50 °C to -70 °C, a procedure that increases the durability of the product outside of refrigeration.

The production of a particular item can last from 48 hours to five days, and each process generates between 200,000 and 380,000 ampoules. The choice of Opteon™ XP44 led to a 54% reduction in direct emissions, as this refrigerant has a proportionally lower GWP than R-404A. Additionally, it was possible to reduce the refrigerant charge in the equipment by 7%, and after operational adjustments, there was also a 13% reduction in energy consumption compared to the previous operation with R-404A.

"The results were extraordinary. The refrigerant replacement resulted in a 54% reduction in global warming potential (GWP) and a 7% reduction in refrigerant charge, decreasing from 23 kilograms to 21.4 kilograms. The adjustments and load balancing also led to a 13% gain in energy consumption", argues Gessé Junior, highlighting that the other two circuits of the freeze dryer are being prepared to undergo the same operational reconfiguration.

The technician emphasized that the concern also extended to the recovery and recycling of the refrigerant, in addition to the investment in leak detection technologies to ensure the integrity of the system.

"The strategic partnership with Chemours was crucial for choosing the right refrigerant, a detail that showed the importance of collaboration in the search for sustainable solutions that extend the life of equipment." Renan continues, **"Dechra believes that sustainability should be embedded in the business and the choice of more environmentally friendly refrigerants and cleaning agents is in line with the entire sustainability strategy adopted by the company, in which we seek to measure and improve our performance at the same time as we make a positive impact on the environment."**



Focus on Sustainability

Opteon™ XP44 has 54% lower GWP versus R-404A



Pioneering

Dechra Brazil's first industrial plant to operate with Opteon™ refrigerants

Cold Rooms & Opteon™ XP40



Similar to the retrofit carried out on the freeze dryer, Dechra implemented another project at the same manufacturing unit in Londrina, this time using Opteon™ XP40 (R-449A) in its cold rooms. The choice of the product was based on the various benefits it brings to the operation, starting with the low GWP, representing a 67% reduction compared to R-404A, the refrigerant used until then. When compared to R-404A, Opteon™ XP40 can reduce energy consumption by up to 12%, is non-flammable, and has been approved by the major manufacturers of components, compressors and refrigeration equipment, in addition to being tested in the field without modifications to equipment, lubricants and seals.

"At the moment, we are in the process of gradually applying the Opteon™ XP40 in other cold rooms, as well as in other equipment in our plant", comments Renan Soncini Pinto, Maintenance Coordinator at Dechra Brazil. He emphasizes that the idea is to replicate this type of retrofit in other units of the multinational worldwide.

Cleaning & Opteon™ SF80

During maintenance procedures and retrofits, flushing (system cleaning) was performed with Opteon™ SF80, replacing hydrochlorofluorocarbon HCFC-141b. Due to the Montreal Protocol and in line with its sustainability objectives, Dechra has chosen to discontinue the use of HCFC-141b in the cleaning of refrigeration systems, since this solvent has the potential to degrade the ozone layer and is being phased out in the domestic market.

Opteon™ SF80 has been developed to meet the high solvency needs required by the industrial cleaning industry.

Additionally, Opteon™ SF80 does not degrade the ozone layer and has a GWP 99.7% lower than HCFC-141b. It is not classified as a flammable liquid, has higher solvency power (Kb value = 99), making it a safe product that does not damage the seals and o-rings of refrigeration systems.



Learn more

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