

ENVIRONMENTAL FUTURE PROOF INSTALLATION, MADE WITH COLLABORATION OF CASTEL

A look to the environment and **to maintaining a low corporate CARBON FOOTPRINT is essential for every company.** The success of a company is based on the ability to adapt to the reality that surrounds it, trying NOT to impact the environment, and to do this it is necessary to have the ability to develop new, innovative, and visionary ideas, and to have the courage to collaborate with pioneering companies in the sector.

Castel has always had another consideration of the need for a low environmental impact. It was in fact one of the first companies producing components for modern refrigeration to embrace the philosophy of study, design, and **production of eco-friendly components, starting as early as 2011 to produce R744 compatible components.**

In this period, the creation and installation of R290 heat pumps is now widespread and growing rapidly, and so is the installation of R744 systems in large distribution chains, and large refrigeration centres. The challenge at this point was why not integrate these two technologies into one machine?

In order to achieve this challenge, however, it is necessary to have components for both types of fluids, and with all the certifications and sizes necessary for this type of plant. Last, but not least, it is necessary to be able to give support to the project developers regarding the selection and correct installation of these components.

The system, built by a customer in collaboration with Castel, is a **combination of a cooling system and a heat pump system.** Knowing that it's not possible to "create cold" but it's always possible to move heat from one source to another, all the heat that we extract from the cooling system is brought into the heating system by the compressors, but since in this case it requires heat, even at relatively high temperatures, a transcritical CO₂ system will be used in the design, with this system there is no need for an external gas cooler.

A transcritical CO₂ cooling system is not the most favorable solution, especially from an energy point of view. Therefore, a system with an R290 economizer is used inside the plant, based

on the thermodynamic fact that there is a large amount of heat released by CO₂ between 34°C and 14°C, and in this case the plant systems are also required to have water at different temperature levels, reaching up to 75°C.

By installing 4 different gas coolers at different temperatures in different branches, and different heat/water exchangers in selected branches of the circuit, we have reached the conclusion that an optimized CO₂ unit with R290 is by far the best solution, even reaching a COP level of 2.5 - 2.8.

In a climate of great uncertainty such as the one we are facing today there is only one awareness, and that is that **we cannot give up on the defense of the environment.** All the economies that surround us and globalization motivate us all to be efficient, and not keeping up due to a lack of skills, would mean the failure of the business economy as well as the failure to protect the environment in which we live, and therefore the failure of the main corporate missions.

The efficiency and vastness of the components offered by Castel underlines once again the "environmental friendly" spirit and philosophy of the entire Castel group.

