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Romania's first CO₂ transcritical store with parallel compression system by Advansor

04 March 2014

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In November 2013, the first transcritical Carrefour hypermarket was installed in Galati, Romania. Following a concept from technical consultant Frigo-Consulting, Frigotehnica took the lead in complete design and execution of the project. The system, supplied by Advansor, uses parallel compression that allows for better energy performance in high ambient region of Romania. 2014 will see several other CO₂ transcritical high ambient installations in Europe and beyond.

Whilst already over 2,880 stores have been equipped with CO₂ transcritical systems across Europe, in November 2013, the first of its kind was installed in a Carrefour hypermarket in Romania.



“This project was a success for Frigotehnica. For the first-time ever in Romania transcritical technology was used, and the complete design and installation was performed by our team,” commented Razvan Voicu, Operations Manager of Frigotehnica.

Carrefour is currently the only retailer focused on both transcritical and hybrid technology in Romania, noted Voicu of Frigotehnica, and expressed his hopes for some future projects with the retailer in the region.

For Advansor, the supplier of the system, this project was its first high ambient installation. Torben M. Hansen, Advansor's Director, gave a preview of the company's plans for the near future:

“Presently we are planning more jobs in Romania, Italy and Spain, expecting at least ten warm climate solutions this year in Europe. In addition our American colleagues are planning quite a few hot ambient projects.”

Parallel compression improves efficiency in high ambient

Advansor has supplied a full CO₂ system for LT and MT operation, with 2-stage heat recovery to water. “The system has a so called 'parallel compression' feature to enhance the energy performance of the system during warm ambient and also during winter heat-recovery operation,” explained Hansen.

“In traditional DX systems, the flash gas is generated and removed on the MT and LT stages. In a parallel compression system, the majority of flash gas is removed at a higher pressure by the parallel compressor and hence, the energy penalty from the flash gas is less.

In this way the parallel compression is quite similar to an economiser system in an NH₃ plant. When the CO₂ systems are operated in warm climates, the flash gas generation is particularly high and hence the parallel compression is justified in warm ambient regions,” he added.

The system allows for improved energy efficiency to HFC, however, the real benefit is the lower direct emission due to the refrigerant R744.

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The low stage has 3 LT compressors," described Hansen.

The Advansor booster unit compSUPER XL 4+1x4B installed in this project has the following specifications:

- The capacities are approximately 200 kW MT and 45 kW LT loads.
- 25 kW hot water produce at 60°C
- 240 kW building heat to water, 27°C -42°C

Other key components of the refrigeration system include:

- **Kimessa AG** CO₂ detection system consisting of 27 CO₂ sensors and complete monitoring, alarm
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