2019 ASHRAE - UNEP Lower GWP Refrigeration and Air-Conditioning Innovation Award

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About the Award

The award promotes innovative design, research and practice by recognizing people who have developed or implemented innovative technological concepts applied in developing countries to promote lower global warming potential (GWP) refrigerants through refrigeration and air-conditioning applications.

The award is only presented to individuals and to teams of individuals who are involved in the research, design or introduction of the technology used in the project. While one or more individuals may be involved through their work with institutions, private sector organizations, or firms, awards is only made to and in the name of individuals rather than to their firms or other types of employers.

The selection takes into account the following criteria:

- Extent of need;
- Innovative aspects in transforming conventional practices;
- Technical replicability to developing countries; and
- Economy feasibility to developing countries.

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Panel of Judges:

Co-Chairs

James S. Curlin (UNEP)

Sheila J. Hayter (ASHRAE)

Judges

Nesreene Ghaddar (Lebanon)

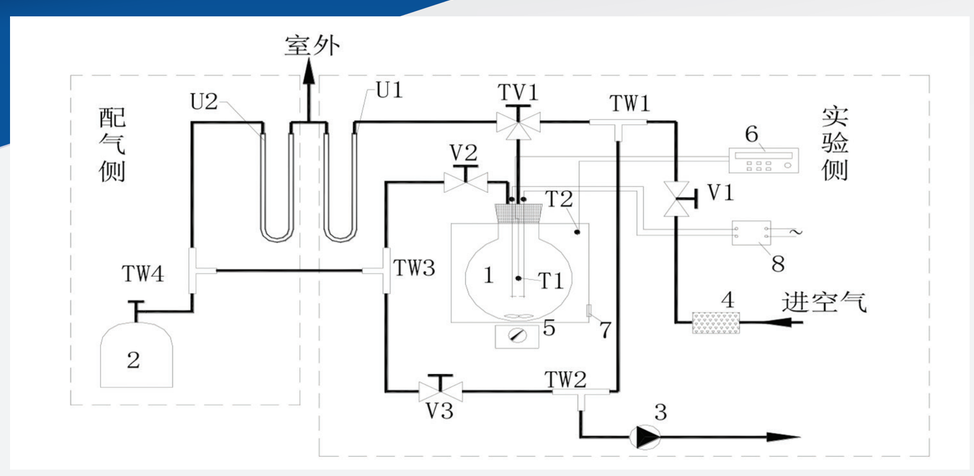
Steve Gill (UK)

Roberto Peixoto (Brazil)

James Wolf (USA)

Residential Applications

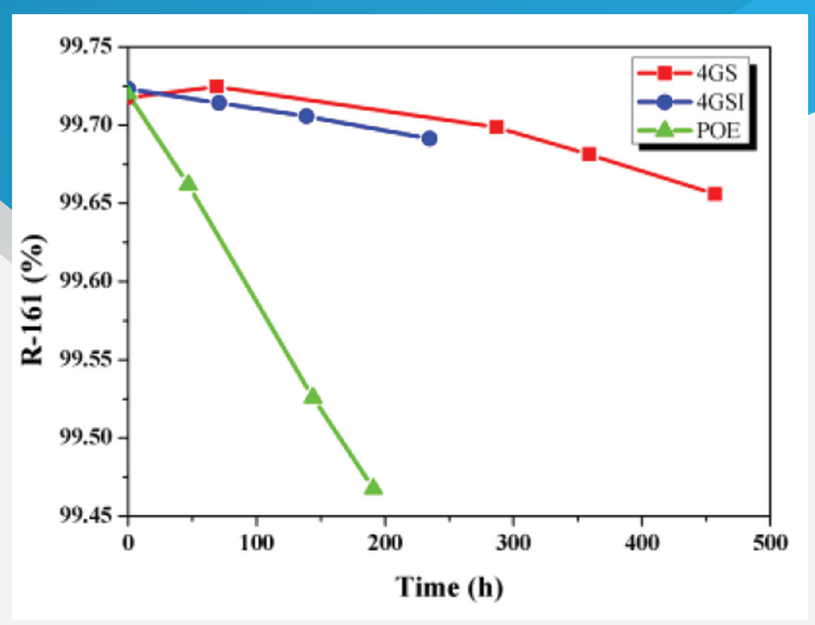
HFC-161 Application Technology Development for Replacing HCFC-22 in High Cooling Capacity Household Air Conditioners in China



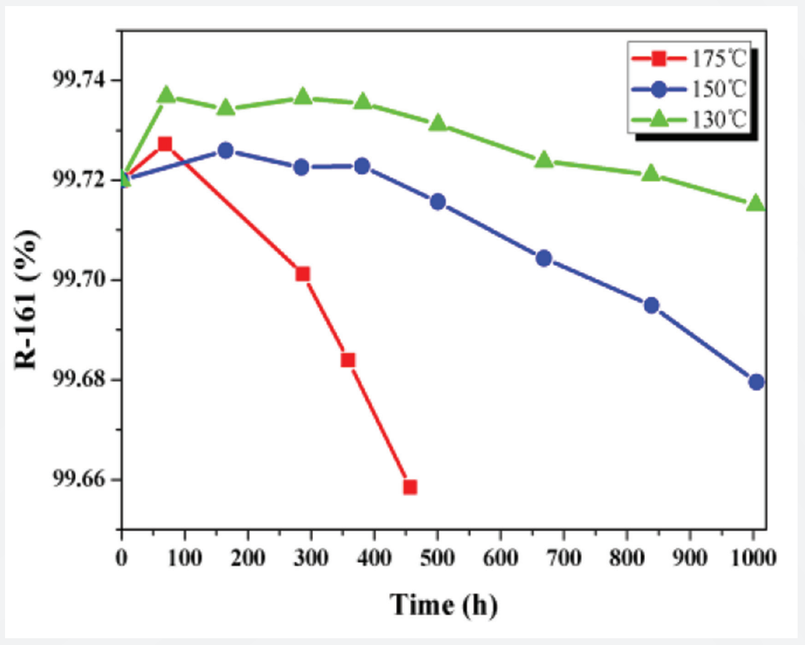
"Schematic diagram of the combustion limit test bench"
1-test container; 2-air storage tank; 3-vacuum pump; 4-filter; 5-stirring device; 6-temperature measurement system;
7-resistance heater; 8-ignition system; T1, T2- thermometer;
U1, U2- mercury pressure gauge

图 1.4.1　特殊条件下气体粉尘爆炸参数试验装置

Parameter test device for gas dust explosion under special conditions



HFC-161 stability in lubricating oil



HFC-161 stability at different temperatures

About the Project:

The central objective of the project was to develop a household air-conditioning system with a large cooling capacity that replaced the use of HCFC-22 for HFC-161 as a refrigerant. The project provides solutions to the high use of HCFC-22 in China through replacement technologies that meet the latest environmental protection requirements for the domestic household air-conditioning industry. HFC-161, with ODP value of 0 and GWP value of 4, can be one of the solutions to comply with the HCFC phase-out commitments while leapfrog the use of higher GWP alternatives in line with the Kigali Amendment.

Project Team:

Zhang Jianjun
Zhang Lei
Zhang Mingjie
Xie Pinzan
Guo Zhikai

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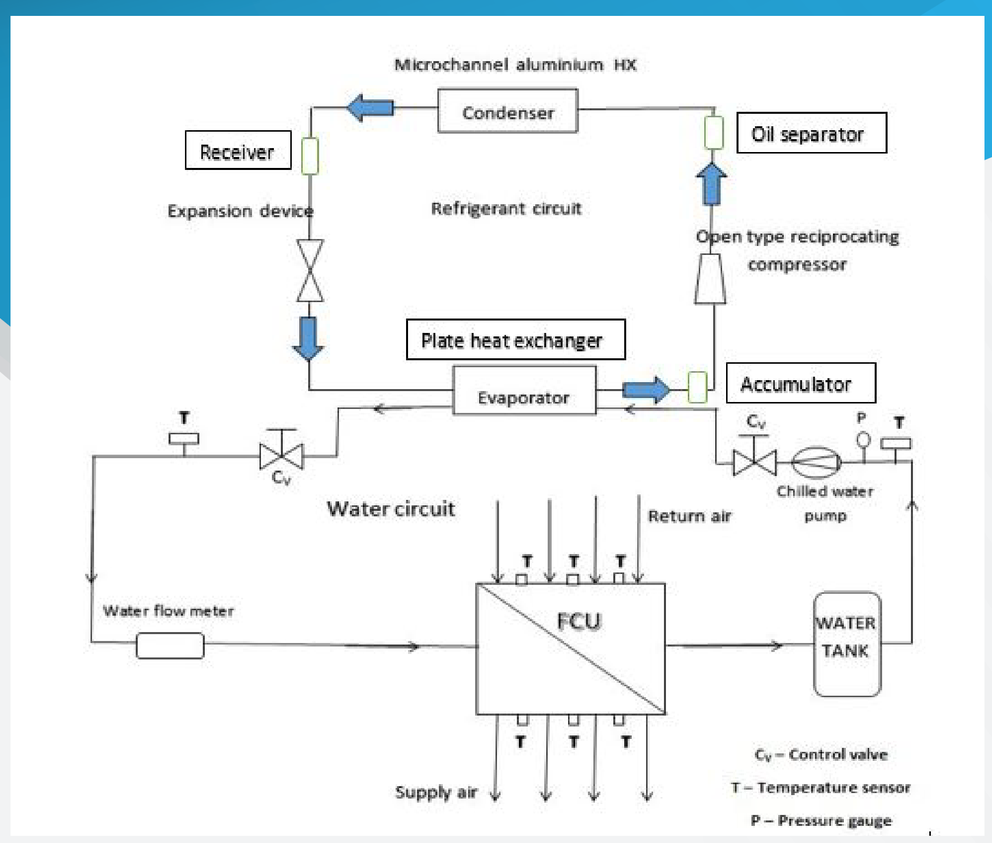
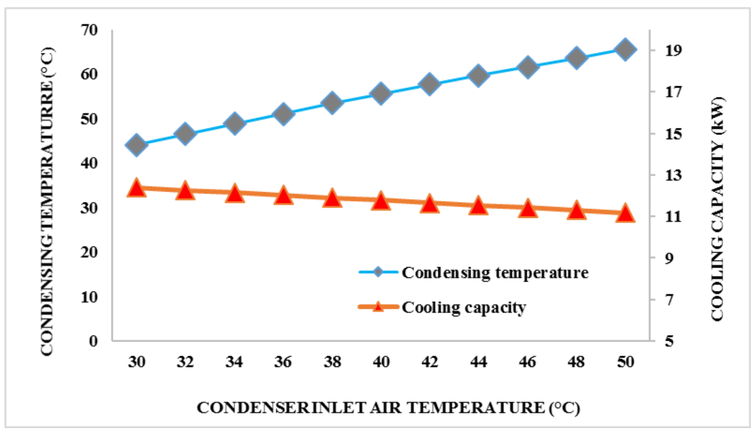
Residential Applications

Low Charge Ammonia Vapor Compression Refrigeration System for Residential Air-Conditioning in India



Schematic Of Ammonia Chiller

Effect of condenser inlet air temperature



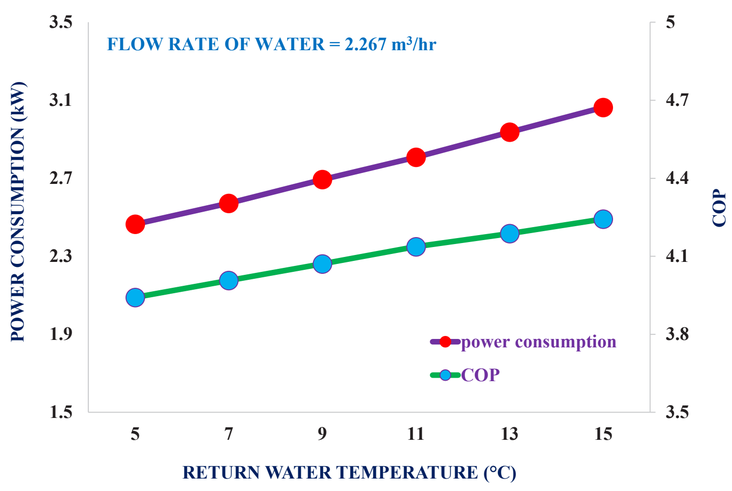


Fig.6 Effect of Return water temperature on compressor power consumption and cycle COP

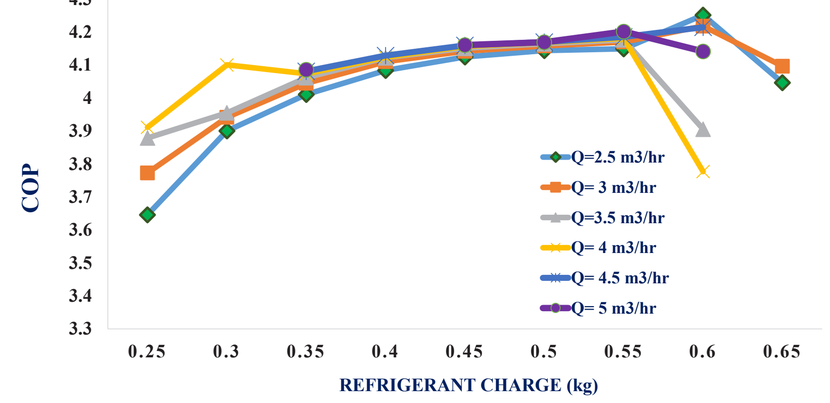


Fig.11 Effect of refrigerant charge on COP for different flow rates of water

Optimum charge = 550 grams
Lowest possible charge for 3 TR system = 250 grams

About the Project:

This project was envisaged to develop an ammonia vapor compression refrigeration system of 3 TR capacity for residential air conditioning and to analyze the minimum possible charge in order to reduce leakage hazards associated with the system. Ammonia is environmental friendly solution with zero ODP and zero GWP values.

Project Team:

Rajesh Kumar N
D. Mohan Laal
Kamalakannan R

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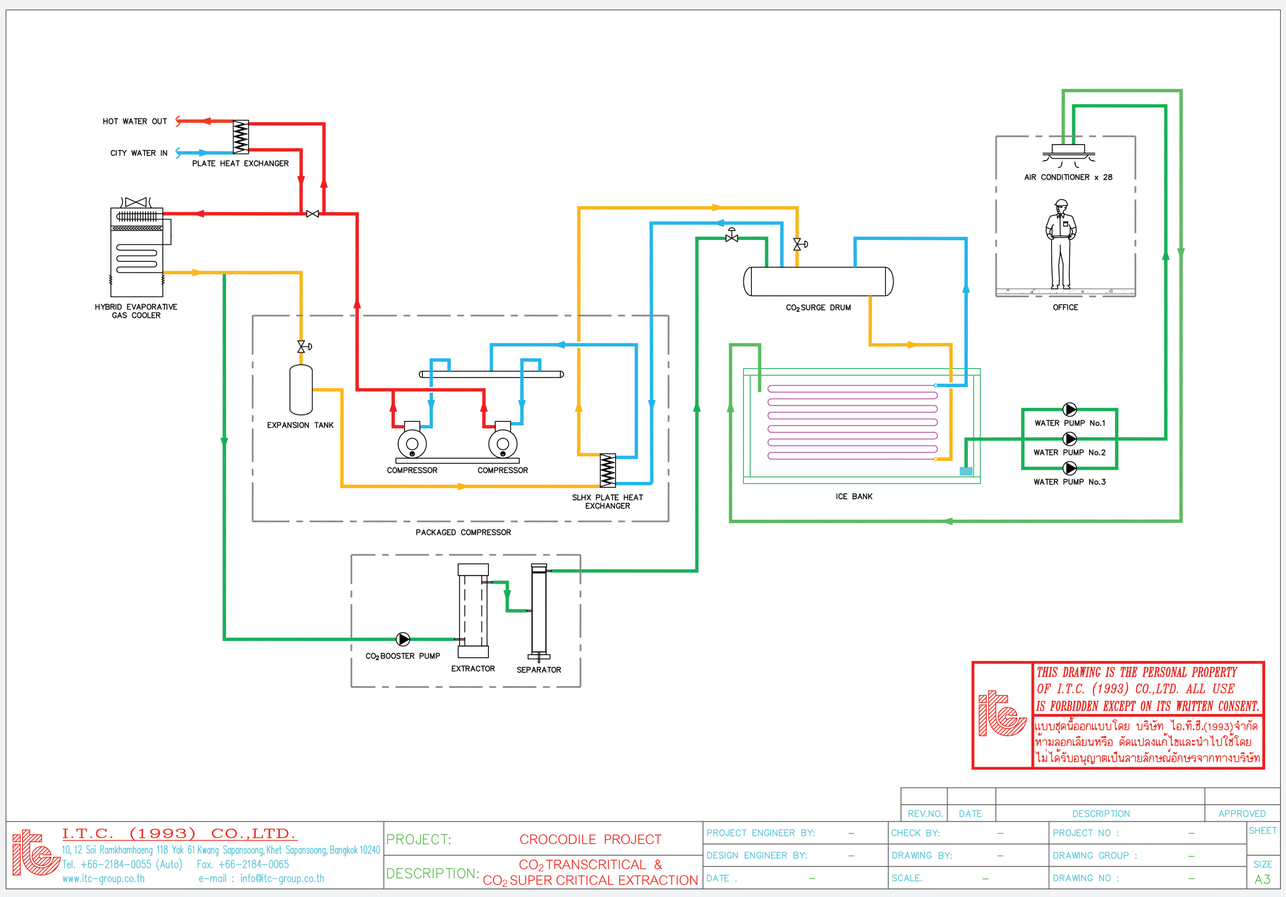
Commercial and Industrial Applications

The Crocodile Project CO2 Transcritical Refrigeration System for a Hot-and-Humid Region implemented in Thailand



About the Project:

The Crocodile Project is a CO_2 transcritical refrigeration system developed for high humidity and ambient temperature environments. It mainly consists of 2 parts: refrigeration and extraction. The refrigeration part is for the office building's air-conditioning system. The system will produce ice in the ice bank only at night, and the chilled water derived from this will be pumped to serve the air-conditioners during the daytime. The benefits of running at night is not only because the electrical demand charge is less, but because the ambient temperature is also lower, hence better system performance.

Project Team:

Kittitach Chumnarnwat
Wallop Lamlertpongpana
Warot Lamlertpongpana
Jittakorn Sukjareon

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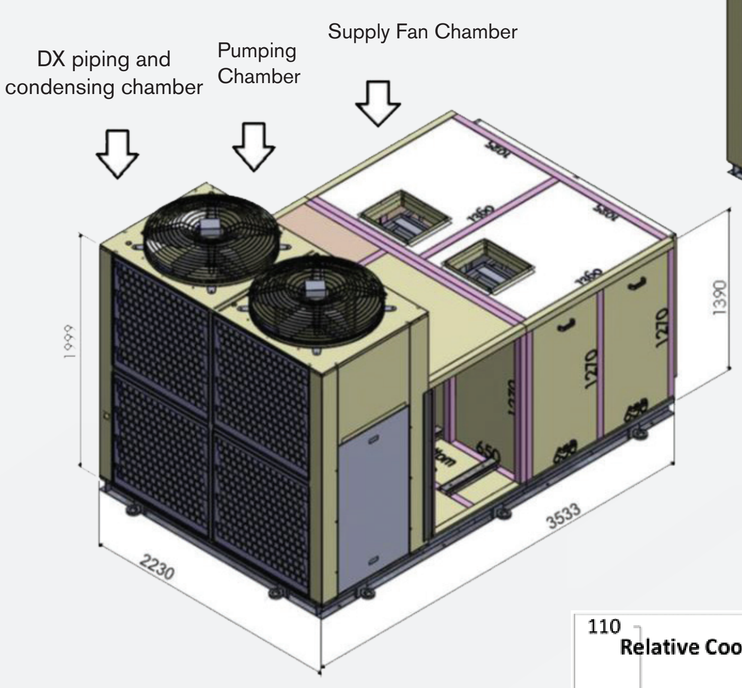
Commercial and Industrial Applications

Packaged Chillers with Integrated Air Handling Units Using HFC-32 and HC-290 in Saudi Arabia



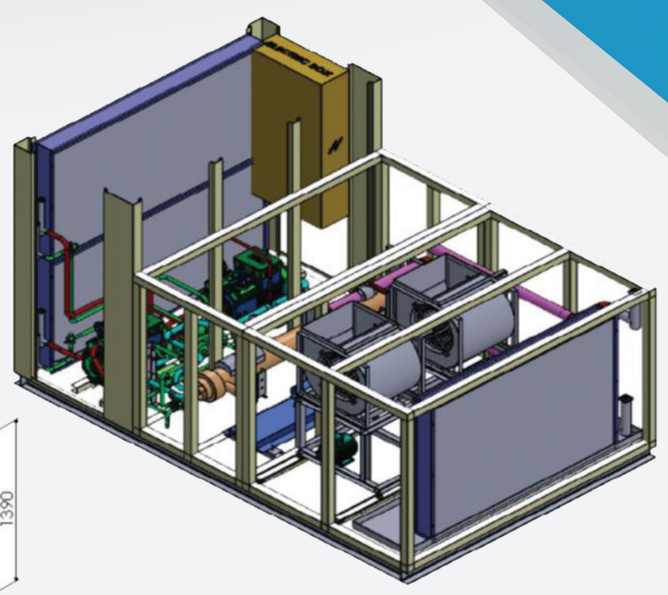
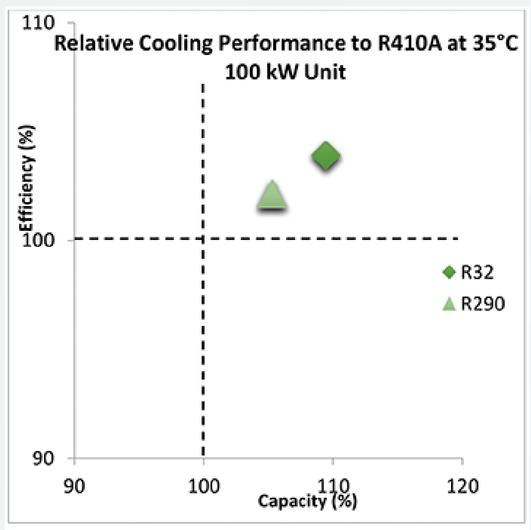
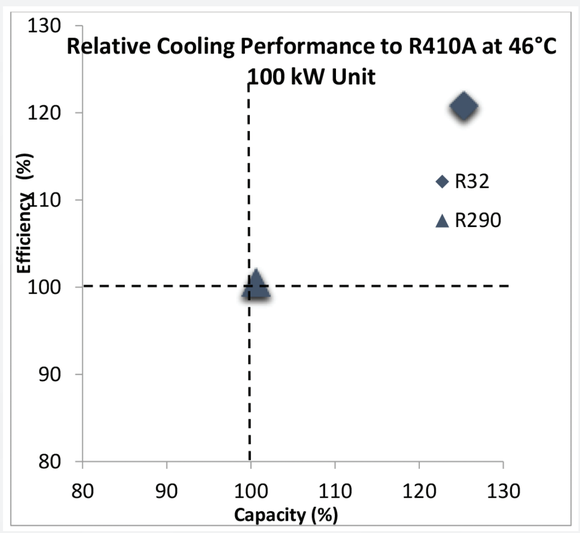
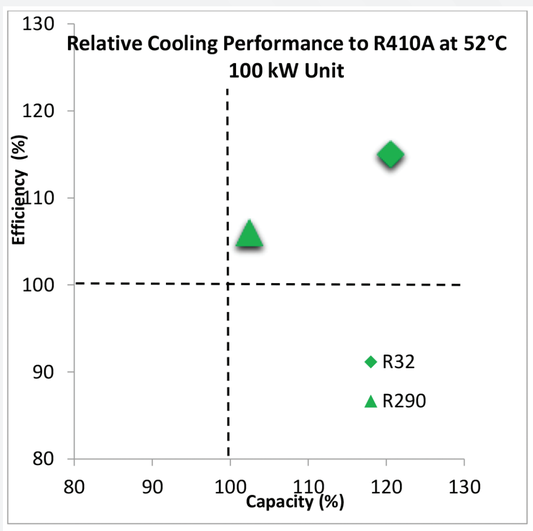


Figure 1: Schematic of 100 kW Prototype Air-Cooled Chiller with Integrated Air Handling Unit







About the Project:

The main goal for this project or research is to develop, design, manufacture and test a new large cooling capacity packaged air-conditioner (packaged chiller with integrated air handling unit) with a cooling capacity of 40, 70 and 100kW respectively, using low GWP refrigerants (A3 and A2L) at standard and high ambient temperature conditions. The two refrigerants are HFC-32 which is A2L mildly flammable and HC-290 which is A3 highly flammable refrigerant, also the main challenge of this research is to address the safety requirement for each prototype and adopt this safe design and components in the prototypes.

Project Team:

Samer Hamed Alfetiany
Samir Hamed Alfetiany
Husam Quedan

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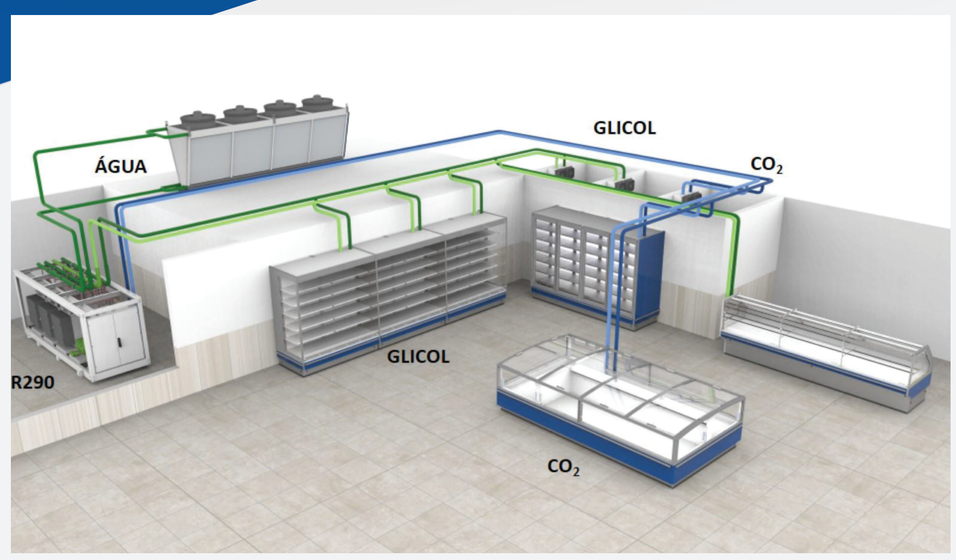
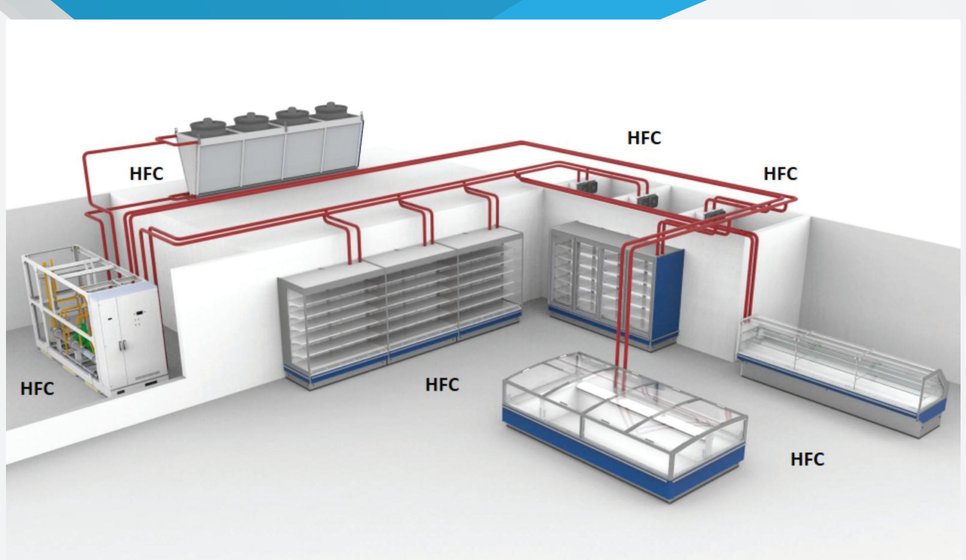
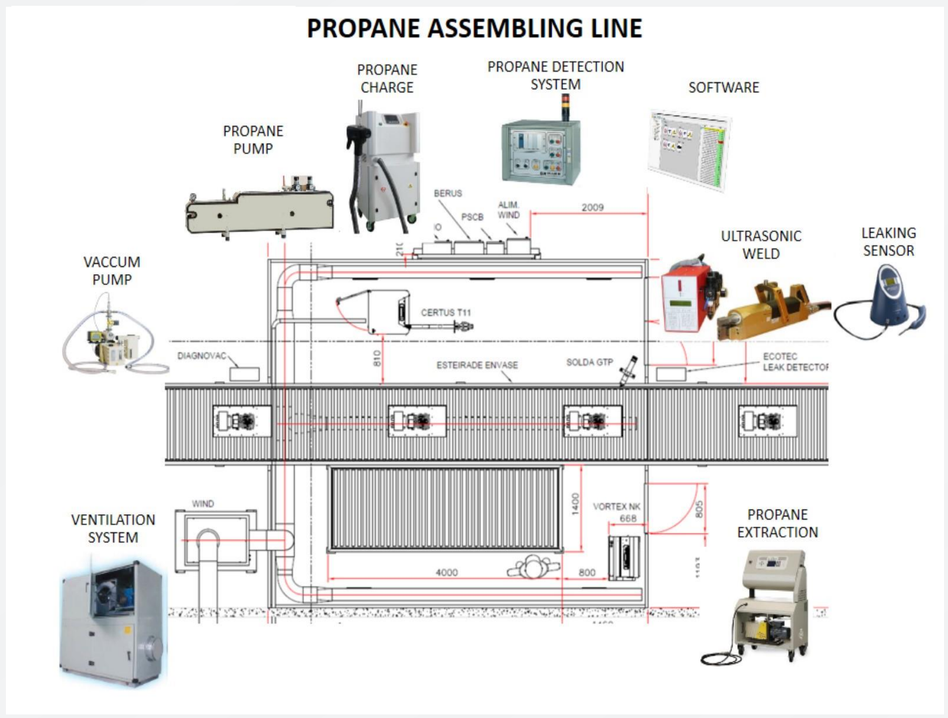
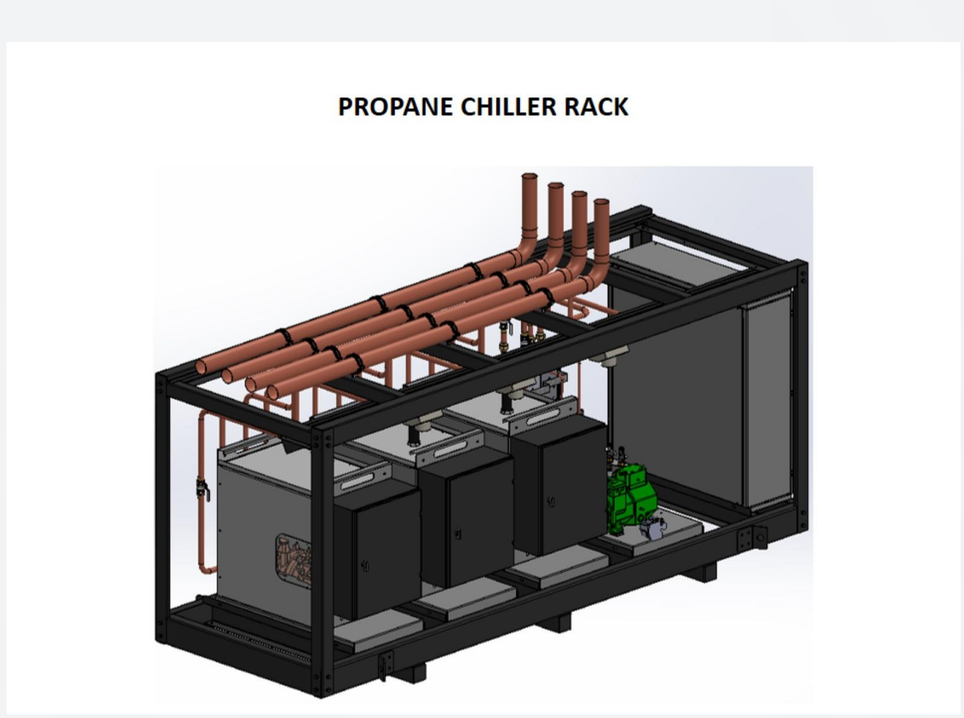
Commercial and Industrial Applications

Low Charge Propane Chiller for a Supermarket Commercial Refrigeration System implemented in Brazil









About the Project:

The goal of this project was to develop a natural refrigeration system to use in supermarkets. The propane chiller cools a secondary fluid, glycol, which is then used to cool medium temperature cabinets and cold rooms. For low temperature cabinets and cold rooms, CO_2 is condensed by the same glycol (subcritical system).

Project Team:

Gustavo Galdi Heidinger
Rogério Marson Rodrigues
Cassio Lucio Simonetti
Edgard Soares Pinto Neto
Ivair Lucio Soares Junior

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