REFRIGERATED WAREHOUSES DISTRIBUTION CENTERS

CARNOT TRANSCRITICAL CO₂ SYSTEM

Efficiency, quality and reliability built-in all our ecofriendly products



« WITH CARNOT'S REFRIGERATION SYSTEM, WE HAVE TRIPLED THE VOLUME OF OUR WAREHOUSE AND MAINTAINED THE SAME LEVEL OF ENERGY CONSUMPTION. »

DENIS PAGEAU Vice President of business development, Michal Inc.

CO₂ solution by Carnot: a smart, <u>ecofriendly</u> and profitable choice

Made by the most experienced company in CO₂ transcritical solutions in North America, the CO₂ refrigeration system by Carnot is the smart choice for owners of warehouses and distribution centers.

PROVEN EFFICIENCY FOR MAJOR SAVINGS

Superior quality, performance and energy stability;

Flawless redesign to replace existing R-22 solutions;

Financial savings of up to 50% year after year due to the reduction of energy costs, maintenance and service costs and the elimination of refrigerant fees;

High standstill pressure system.

"[...] As you know, we have completed our new cold store in Quebec and it is now in the process of taking in cranberries for our customers. At this point they have been frozen by others, but for the upcoming season, we intending to freeze 25 000 000 lbs. which is the capacity of the facility. We accomplished something of a record as the whole project was completed in 17 weeks through a wonderful effort of our contractors as well as the use of many computer assisted projects. Even the pipe welding was done with lasers.

It is a 'green' project using fully CO_2 refrigeration (no ammonia) which cannot be used with cranberries as any leak turns the berries black and unusable). Also, as the source of power in Quebec is hydro so we have a zero global warming effect, not to mention very low power rates at least one third what we pay in Massachusetts. So a big competitive advantage and we love doing business in Quebec!

The installation of the refrigeration system which consists of three compressor packages each with thirteen compressors was factory built and fully tested offsite in Trois-Rivieres, about sixty miles from our plant by Carnot Refrigeration. They also did all of the instal lation including evaporators, condensers and all the piping. Having built many cold stores over the years this project was by far and away the best and represents a new era in refrigeration technology. We can't say enough good things about Carnot, and I believe they have a bright future and will become a significant factor in the industry."

ROBERT HAMPSON

Excerpt from an e-mail addressed to the Chairman of IARW

TWO STAGE TRANSCRITICAL CO2

Compressor Stage	Cooling Capacity	Evaporating Temperature	Condensing Temperature							Gas Cooling		
	[Tons]	[°F]	[°F]	50	55	60	65	70	75	80	85	85 GC
Low Stage [LS]	200	-20	Capacity [Tons]	200	200	200	200	200	200	200	200	200
			kW	120	120	120	120	120	120	120	120	120
			THR [MBH]	2809	2809	2809	2809	2809	2809	2809	2809	2809
High Stage [HS]	80	23	Capacity [Tons] ¹	314	314	314	314	314	314	314	314	314
			kW	137	158	182	209	240	276	319	377	399
			Total kW	257	278	302	329	360	396	439	497	519
			System COP	3.84	3.55	3.27	3.00	2.75	2.50	2.25	1.99	1.90
Heat Reclaim			COP w/HR	4.18	3.87	3.56	3.27	2.99	2.72	2.45	2.17	2.07
Ejector Defrost			COP w/HR	4.26	3.94	3.63	3.33	3.05	2.77	2.49	2.21	2.11

¹ Capacity [Tons] [LS THR + HS Load]

SINGLE STAGE TRANSCRITICAL CO2

Compressor Stage	Cooling Capacity	Evaporating Temperature	Condensing Temperature							Gas Cooling		
	[Tons]	[°F]	[°F]	50	55	60	65	70	75	80	85	85 GC
	250		Capacity [Tons]	350	350	350	350	350	350	350	350	350
			kW	117	137	159	184	213	247	289	342	370
nigii stage [ns]	350	32	THR [MBH]	4599	4666	4743	4829	4929	5045	5185	5370	5463
			СОР	10.6	9.0	7.8	6.7	5.8	5.0	4.3	3.6	3.3
Heat Reclaim			COP w/HR	10.8	9.3	8.0	6.9	5.9	5.1	4.4	3.7	3.4
Ejector Defrost			COP w/HR & ED	11.6	9.9	8.5	7.3	6.3	5.5	4.7	3.9	3.7



SEATTLE



BOSTON



PHILADELPHIA



 kW
 ENERGY CONSUMPTION

 THR
 REJECTED CAPACITY

 COP w/HR
 REFRIGERATION COEFFICIENT OF PERFORMANCE

 COP w/HR & ED
 COMBINED COEFFICIENT OF PERFORMANCE

 INCLUDING HEAT RECLAIM OR EJECTOR DEFROST





TURLOCK

ALBANY

CO₂ technology by Carnot: a powerful refrigeration system

POWERFUL TECHNOLOGY, QUITE SIMPLY

Modular solution designed by a qualified engineering team;

Process optimization for increased efficiency;

Simplified quick-plug installation;

On-site assistance for equipment start-up;

Complete training for technical staff;

Fully automated system.

<image>

A SMART SUSTAINABLE BUSINESS DECISION

Harmless refrigerant reduces or eliminates risk of facing environmental or health and safety restrictions in the future;

Equipment outlasts conventional installations;

Substantial financial savings are generated throughout equipment life;

Significant reduction in greenhouse gases (GHG);

« CARNOT NOT ONLY HELPED US REDUCE OUR USE OF R-22 AND NH3, OUR ENERGY CONSUMPTION AND OUR WATER USE, BUT ALSO THE NEED TO DEPEND ON A CHEMICAL CONDITIONING PROCESS. IT'S A WIN-WIN SITUATION. »



HENNINGSEN FACILITIES

06

RNO



SYSTEM COST **\$534K LESS**







\$200K-\$400K LESS



UTILITIES **LESS WATER AND SEWER**







100

000

« SIMPLICITY IS THE ULTIMATE SOPHISTICATION »

- Leonardo Da Vinci

« EXCELLENT SERVICE, QUICK RESPONSE AND VERY COMPETENT STAFF. »

OPTIMIZED TECHNOLOGY, SUPERIOR RELIABILITY AND SAFETY

Designed in compliance with the highest quality standards in the industry;

Strict quality control in a controlled environment;

Highly reliable processes tried and tested in the most extreme conditions;

POWERFUL TECHNOLOGY, QUITE SIMPLY

Remote controlled equipment and alarm system;

Real-time monitoring and performance reports by a highly qualified team;

24/7 technical support, quick and efficient interventions.

35% FASTER INTERVENTION

Alarm	Detection time	Customer reaction	Phone call	Technician diagnosis	Repair
STANDARD IN	TERVENTION	Diagnosis	75%		
Alarm	Remote control	and attempt to repair remotely	75% of alarms resolved here	Technician intervention on-site	Repair

🌀 CARNOT INTERVENTION

CO₂ technology by Carnot: <u>customize</u> your system

• HEAT RECOVERY / RCINTELLIGENT

Reuse the energy created by your process using a custom heat recovery strategy for major financial savings year after year.

ENCLOSURE FOR OUTSIDE INSTALLATION

Weatherproof construction.

O CO₂ RAIN CYCLE

Use the natural cycle of evaporation and condensation of CO² to avoid overusing compressors for major savings on operating costs.

• GAS COOLER / CONDENSER

Different options available for optimal performance and durability.

O STAINLESS STEEL

Stainless steel covering and piping.

• ENERGY METER WITH DISPLAY

Real-time display of your refrigeration consumption.

• INTERNET MODULE

To closely monitor your process using your smartphone or computer.

• TURNKEY INSTALLATION

For peace of mind, done by professionals to meet your needs, from design to start-up.

Carnot: a pioneer in transcritical CO₂ and cooling systems

Carnot has proven itself regarding the performance of its CO₂ transcritical refrigeration system. With the longest-lasting legacy of high quality demonstrations across North American and Europe since 2008, CO₂ refrigeration technology by Carnot has set standards with its efficiency, profitability, sustained performance in the most extreme conditions, simplicity and operational reliability.

NOTEWORTHY FACTS

Installations performed throughout North-America and Europe;

Daily savings for our clients;

Highly qualified engineers who are constantly trying to set higher standards for CO₂ refrigeration technology;

Standards and certifications including CSA, UL and CE;

Awards and recognition from recognized organizations such as ASHRAE and EPA;

Competent customer service team focused on customer satisfaction.

LEADER IN HIGH PRESSURE CO2 COOLING AND REFRIGERATION SYSTEMS

PASSION INNOVATION THOROUGHNESS

INNOVATIVE COOLING SOLUTIONS BUILT FOR ENVIRONNEMENTAL SUSTAINABILITY

WE OFFER

- Design and engineering
- Manufacturing
- Project management
- Commissioning and help desk 24/7

WE SERVE

- Industrials
- Supermarkets
- Sports centers
- Data centers

WE ARE

Working to make
 Eco-friendly refrigeration
 a global standard

« CO₂ IS NOURISHMENT FOR TREES: SYNTHETIC MOLECULES ARE NOT. »

MARC-ANDRÉ LESMERISES CEO of Carnot, United Nations conference

REFRIGERATED WAREHOUSES DISTRIBUTION CENTERS

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