DOCKETED

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Reduce Greenhouse Gases by replacing HFC systems with Ammonia refrigerant

A typical R-507A system of 300 tons, in a refrigerated warehouse application, the system would contain approximately 600 lbs of refrigerant. This amount of refrigerant would have a life-cycle Direct Global Warming Potential (lb CO2/Ton-year) or LCGWP=[GWPrx(LrxLife+Mr)xRc/Life where:

GWPr=3900, Leakage rate Lr=.02, Life=20 years, End of life loss or Mr=.1 and Refrigerant charge or Rc=600 lbs

Therefore: LCGWP=[3900x(.02x20+.1)x600/20=58,500 lbs of CO2/ton in a year

Compare to an Ammonia system of 300 tons with 200 lbs of ammonia, which has 0 GWP and 0 ODP, the LCGWP is: 0

Using ammonia in lieu of R507A will eliminate 58,500 lbs of CO2 equivalent from the atmosphere, in addition, the total energy of the ammonia system is less (by over 200,000 kwh per year) thus saving energy as well.

Additional submitted attachment is included below.

evapcold®

Low Charge Packaged Refrigeration Systems

The *natural evolution* of ammonia refrigeration systems

evapco® for LIFE

An Employee Owned Company

Member of iiar International Institute of Ammonia Refrigeration www.iiar.org

MEMBER OF AHRI Air-Conditioning, Heating, and Refrigeration Institute

IARW International Association of Refrigerated Warehouses

evapco for LIFE

EVAPCO Global Headquarters, Taneytown, Maryland USA

Since its founding in 1976, EVAPCO, Incorporated has become an industry leader in the engineering and manufacturing of quality heat transfer products around the world. EVAPCO's mission is to provide first class service and quality products for the following markets:

- Industrial Refrigeration
- Commercial HVAC
- Industrial Process
- Power

Evapcold® is manufactured in Greenup, IL, in a new 100,000 sq. ft. building dedicated to the assembly of all components required for the Evapcold system. The Evapcold manufacturing operation utilizes a lean assembly line process which provides fabrication and assembly in the most efficient way possible with the highest quality and shortest lead time.

Evapcold Manufacturing, Greenup, Illinois

evapcold®

The Perfect Solution

Expanding government regulations and industry codes are adversely impacting users of ammonia refrigeration systems and restricting the use of possible alternative refrigerants. These regulations and codes are making it increasingly difficult and cost-prohibitive to add cold storage capacity or process rooms to existing facilities due to the impact on the total system charge. Minimizing the total system charge is now a key objective for many owners and operators who are evaluating the refrigeration system design for new warehouse and food processing facilities.

EVAPCO has developed the perfect solution to address these challenges...the **NEW Evapcold Low Charge Refrigeration (LCR)** product line. With over 250 models available in the initial product launch, Evapcold packaged systems provide the required refrigeration while significantly reducing ammonia charge, total cost of ownership and the perceived risk associated with conventional systems today.

The Evapcold LCR product line features a pumped liquid ammonia refrigeration system consisting of highest quality, industry-recognized components and new innovative technologies engineered specifically for low charge package systems. Evapcold is the first in a series of low charge refrigeration products which EVAPCO will be developing to meet the current and future needs of the industrial refrigeration industry.

The Evapcold product is another example of EVAPCO's commitment to use its industry leading research and development capabilities to develop product solutions which make life simpler, more reliable and more sustainable for you.

PRODUCT APPLICATIONS

- **10 TR to 100 TR Capacity**
- **-20F° to +50F° Room Temperature**
- **Water-Cooled or Air-Cooled Condensing**
- **Roof Mounted Design for Efficient Cooling**

Research & Development

The Evapcold product line has been engineered by a team of industry experts with over 200 years of professional experience in screw compressor packaging, ammonia system engineering, microprocessor controls technology, field construction and system commissioning. In addition, every Evapcold packaged ammonia system combines innovative patent-pending technology with the highest quality ammonia screw compressors, heat exchangers, valves, controls and piping to ensure efficient system operation and reliability with the lowest possible refrigerant charge.

The advantage of Evapcold manufactured refrigerant systems is further enhanced by EVAPCO's ability to perform actual full scale unit testing in a wide range of environmental conditions. The Evapcold product and components have been tested in -35°F to 100°F ambient temperature conditions in the Wilson E. Bradley R&D Center, located at EVAPCO World Headquarters in Taneytown, MD.

Evapcold testing includes verification of many operational parameters under a wide range of conditions as shown below:

- **Thermal Performance (Cooling and Heat Rejection Capacity)**
- **Total Energy Consumption (kW) and Component Optimization**
- **Refrigerant Charge Volume**
- **Refrigerant Recirculation Rate**
- **Operational Excursions including Cold and Hot Starts**

The result of this extensive testing is Evapcold, an "evolutionary" low charge packaged ammonia refrigeration system, expertly designed with proven system components and patent-pending technology. Evapcold offers single-source responsibility for the complete system design, thermal performance, in-house factory-assembly and testing. This ensures simplified design and installation, easy start-up, reliable operation and peace of mind safety.

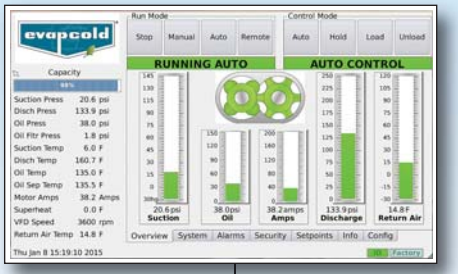
Evapcold units in the Wilson E. Bradley R&D Center, Taneytown, MD

Evapcold R & D Test Stand

evapcold®

The Natural Leader in Complete Self-

Single-Source Responsibility for Complete Design, Factory Assembly, Operation and S



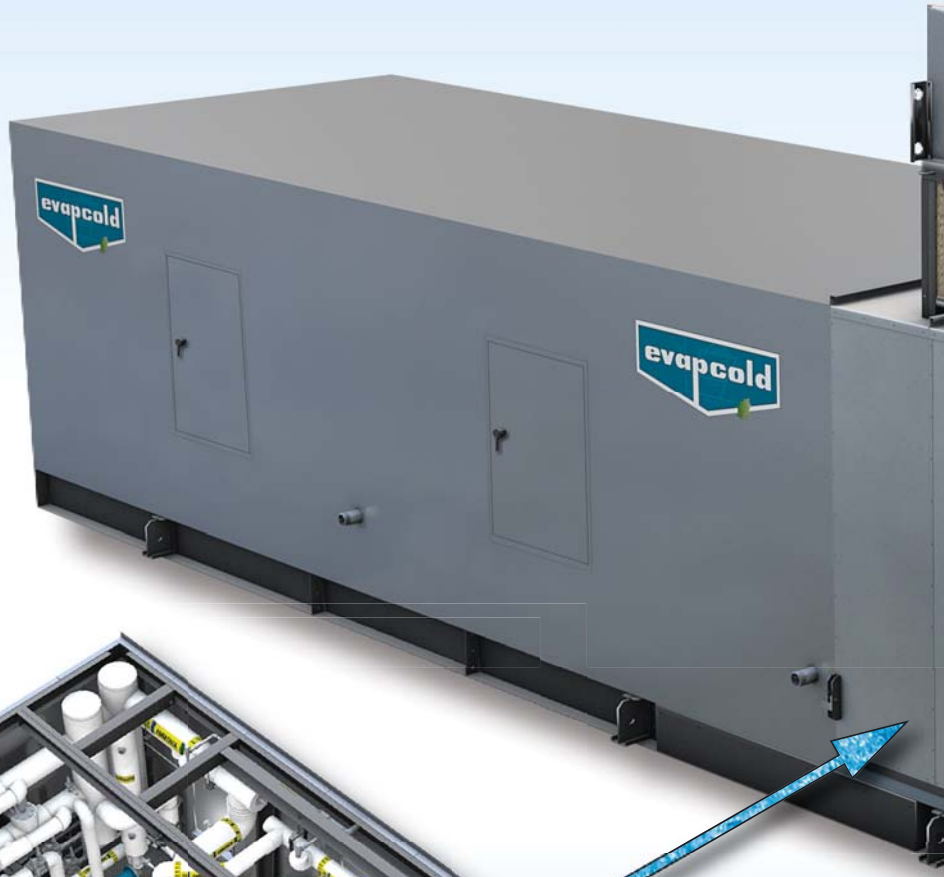
Touch Screen
HMI Control Panel

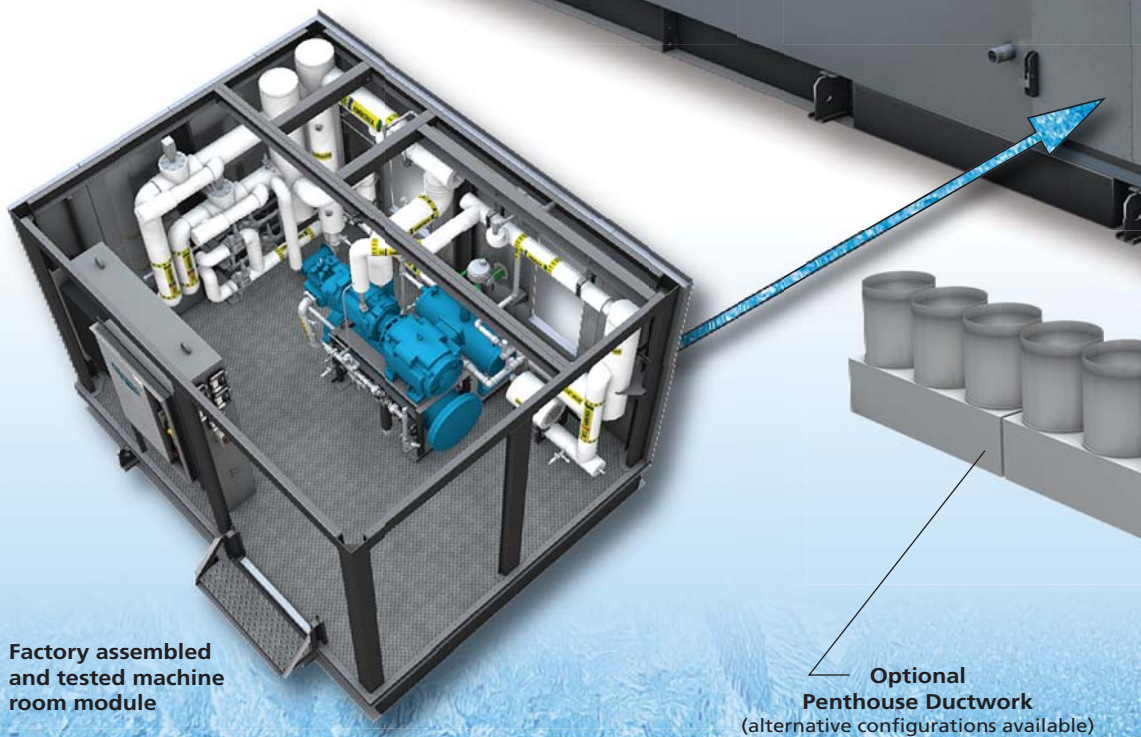
Main Control Panel – Interior View

Exterior Service Panel

Water-Cooled & Air-Cooled Models Available

(Air-Cooled Shown: Model # LCR-60P-L20-2-H-W)





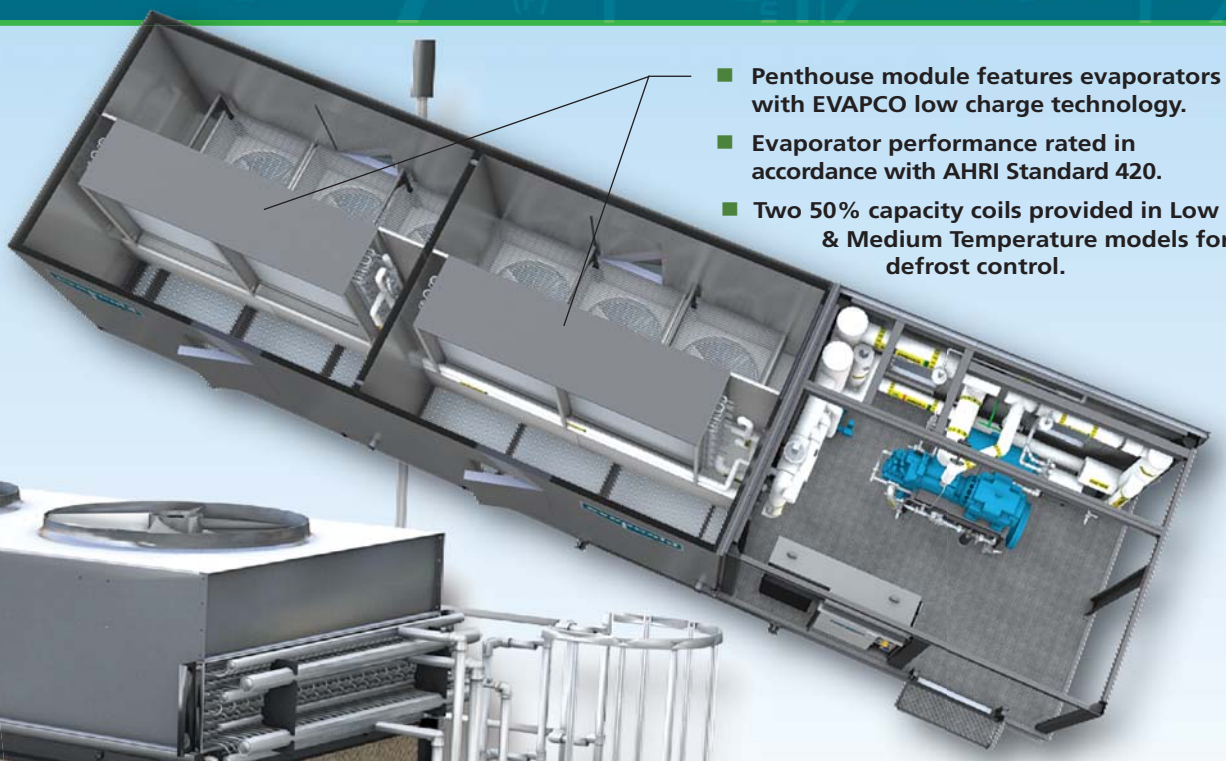
Complete Packaged Machine Room With Patent Pending System Technology

Factory assembled and tested machine room module

Optional
Penthouse Ductwork
(alternative configurations available)

Contained Low Charge Ammonia Refrigeration Systems

System Safety



- Penthouse module features evaporators with EVAPCO low charge technology.
- Evaporator performance rated in accordance with AHRI Standard 420.
- Two 50% capacity coils provided in Low & Medium Temperature models for defrost control.

Overhead view of machine room and penthouse modules.

Innovative insulated machine room floor for installation over refrigerated space

- Engineered in accordance with industry codes including: IIAR, ASHRAE, IBC, IMC, IFC, UMC, OSHA, NEC and ASME
- True "plug & play" design simplifies installation, start-up and commissioning
- Significantly reduces system ammonia charge to approximately 3 lb./TR
- Compact design reduces piping and eliminates components typically found in high charge systems

FEATURES AND BENEFITS

- Innovative walk-in machine room design incorporates all safety & access requirements.
- High quality screw compressors, valves, controls and piping (95% of system piping is 304 stainless steel).
- Low 1.2 : 1.0 recirculation rate for optimum evaporator performance.
- Pumped ammonia liquid feed design for reliable and stable operation.
- Direct refrigerant to air cooling coil for maximum efficiency.
- Variable speed screw compressor operation for maximum efficiency.
- System control with industry leading microprocessor technology designed specifically for low charge refrigerant systems.

Typical Applications & Benefits

LCR Water Cooled Design

LCR units shown with cooling water piping from cooling tower or fluid cooler

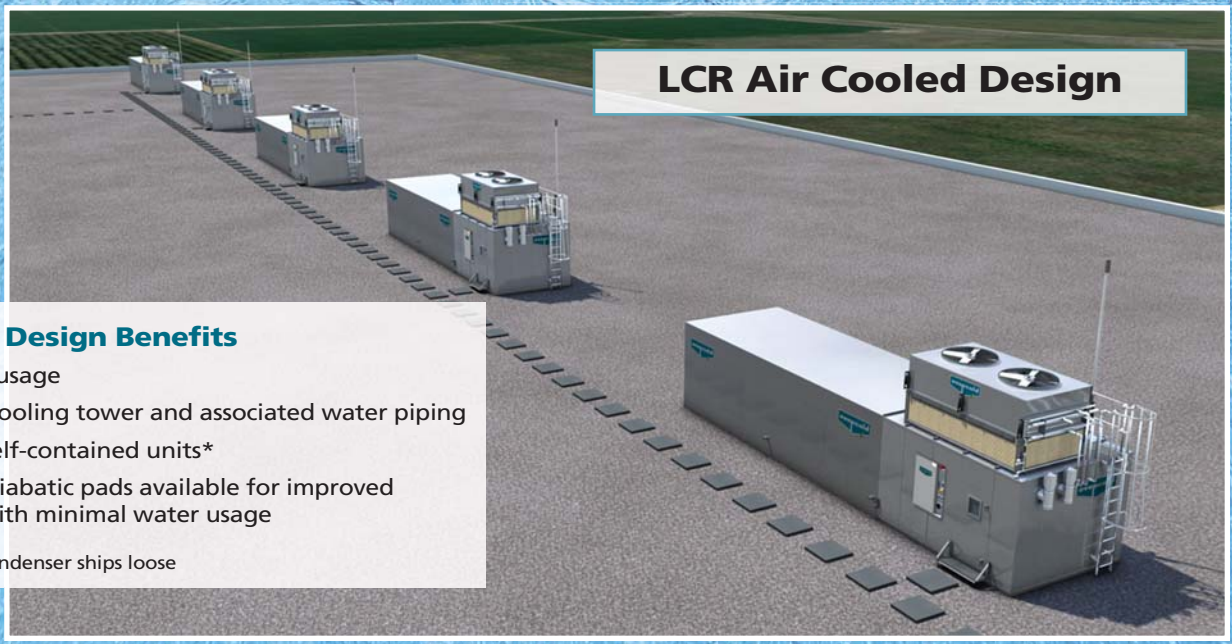
Water Cooled Design Benefits

- Provides maximum energy efficiency and lowest refrigerant charge
- No ammonia field piping

Evapcold Applications Include:

- Cold storage or process room expansions
- New cold storage and distribution facilities
  - Designed with a 100% Evapcold LCR product solution
  - Hybrid system with Evapcold LCR units and a smaller conventional field-erected system

LCR Air Cooled Design



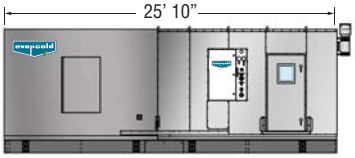
Air Cooled Design Benefits

- Zero water usage
- Eliminates cooling tower and associated water piping
- Complete self-contained units*
- Optional adiabatic pads available for improved efficiency with minimal water usage

*Air-cooled condenser ships loose

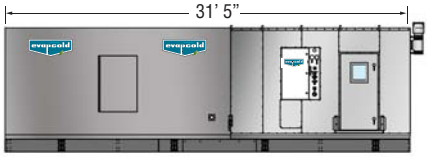
Engineering Data & Dimensions

HIGH TEMPERATURE UNITS

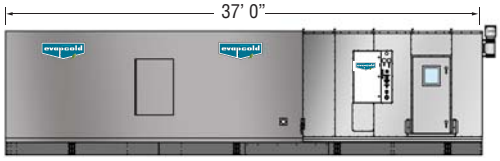


DIMENSIONS (all units) (ft.-in.)		
L	W	H
(See Unit)	10' 10"	9' 7"

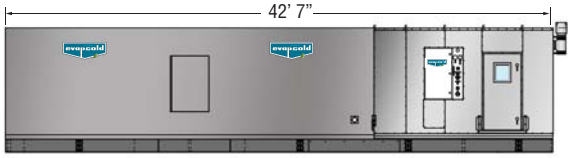
NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
10 TR to 14 TR	35°F to 55°F	LCR-10P-H25 thru LCR-10P-H40



NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
15 TR to 29 TR	35°F to 55°F	LCR-15P-H25 thru LCR-25P-H40

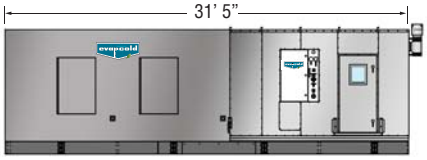


NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
30 TR to 39 TR	35°F to 55°F	LCR-30P-H25 thru LCR-30P-H40



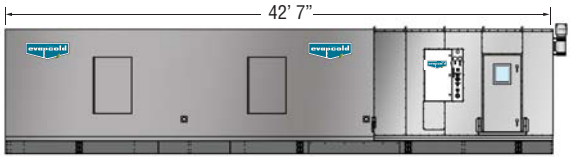
NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
40 TR to 100 TR	35°F to 55°F	LCR-50P-H25 thru LCR-100P-H40

MEDIUM & LOW TEMPERATURE UNITS

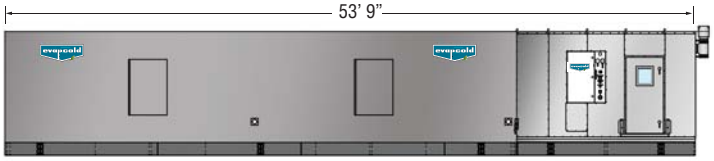


DIMENSIONS (all units) (ft.-in.)		
L	W	H
(See Unit)	10' 10"	9' 7"

NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
10 TR to 35 TR	5°F to 35°F	LCR-10P-M0 thru LCR-30P-M25
10 TR to 35 TR	(-)20°F to 5°F	LCR-10P-L30 thru LCR-30P-L5



NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
35 TR to 60 TR	5°F to 35°F	LCR-40P-M0 thru LCR-50P-M25
35 TR to 55 TR	(-)20°F to 5°F	LCR-40P-L30 thru LCR-50P-L5
55 TR to 65 TR	(-)20°F to 5°F	LCR-60P-L30 thru LCR-60P-L5
60 TR to 75 TR	5°F to 35°F	LCR-70P-M0 thru LCR-70P-M25



NOMINAL CAPACITIES		LCR MODEL RANGE
TR Range	Room Temp. Range	
75 TR to 95 TR	5°F to 35°F	LCR-90P-M0 thru LCR-90P-M25

Note: Tables and figures shown above are nominal ratings and based on water-cooled units and 95°F condensing temperature. Please consult factory for ratings and selections.

EVAPCOLD MODEL NOMENCLATURE

FAMILY	NOMINAL CAPACITY (TR)	CONFIGURATION	DUTY	EVAPORATOR TEMP. (°F)	NUMBERS OF COILS	DEFROST	CONDENSING
LCR	XXX	P	L	XX	2	H	W

W WATER COOLED CONDENSING
A AIR COOLED CONDENSING

A AIR DEFROST
H HOT GAS DEFROST
N NO DEFROST

1 1 COIL
2 2 COIL

EVAPORATOR REFRIGERANT TEMPERATURE
("L" Duty denotes negative temp.)

L LOW TEMP ECONOMIZED
M MEDIUM TEMP ECONOMIZED
H HIGH TEMP NON-ECONOMIZED

PENTHOUSE PACKAGE SOLUTION

Nominal TR

Low Charge Refrigeration

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