



energize
INNOVATION

POWERED BY
CALIFORNIA
ENERGY COMMISSION

EPIC Symposium Presentation

Introduction to Natural Refrigerant Chillers and Heat Pumps for the Industrial Market Sector

"Natural" is what we design for!

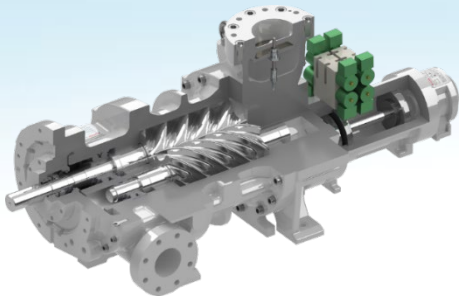
MAYEKAWA



Applied Thermal Solutions, The Strength of Mayekawa's History



MYCOM Reciprocating Compressor



MYCOM Screw Compressor

- **Mayekawa is a global leader in the development and manufacture of high efficiency MYCOM screw, reciprocating and scroll compressors for Industrial and Commercial Refrigeration, Air Conditioning and Hot Water applications.**
- **Mayekawa USA, a subsidiary of Mayekawa Japan began operations in Los Angeles in 1967 and is celebrating 50+ years operation in the USA!**
- **Manufacturer of a wide variety of Factory Engineered, Packaged Products and Solutions including Refrigeration Freezing Systems, Chillers and Heat Pumps utilizing Natural Refrigerants.**

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- **Natural Refrigerants including CO₂ (Carbon Dioxide), Ammonia, Water and Air have excellent thermodynamic properties which allow for high energy efficiencies for Industrial Chillers and Hot Water Heat Pumps.**
- **Environmentally friendly refrigerants that have been used for over 150 years and known as “Future Proof” refrigerants that are not subject to EPA phase outs on their use.**
- **Synthetic refrigerants including HFC’s and HFO’s have a high GWP (Global Warming Potential) that can impact our environment, and increased regulations limit their use in the Industrial and Commercial HVACR sectors, especially in California.**
- **While the new HFO refrigerants that are now being used for HVACR equipment offer an initial lower GWP value, there is now much concern over the possible TCA (Trifluoroacetic Acid) pollution that has been found to occur in our water supplies such as Lakes, Streams and the Oceans with the breakdown of HFO refrigerants in our atmosphere.**

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California Industrial Beverage Processor

- Project funded by CEC for energy comparison using an Air Cooled Ammonia Chiller versus an existing HFC refrigerant chiller system for a Process Cooling application.
- New Air Cooled Ammonia Chiller has a very low refrigerant charge to increase safety.
- New Air Cooled Ammonia Chiller uses no water like traditional Water Cooled chillers.
- Current energy comparison data shows over 20% energy reduction versus the existing HFC chiller system, as well as water savings.



Special Thanks to CEC and EPRI for Your Support!

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Natural Refrigerants | CO₂ HOT WATER HEAT PUMPS

CO₂ Hot Water Heat Pumps Are Able To Achieve 149F to 194F Hot Water Supply Temperatures with High Energy Efficiency!



**UNIMO aw Air Source
CO₂ Heat Pump**



**UNIMO ww Water Source
CO₂ Heat Pump**

unimo

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Natural Refrigerants | CO₂ HEAT PUMP PROJECT EXAMPLE

- High End Cabernet Estate Winery Facility located in California -
First New Commercial Winery in the World to Achieve LEED Platinum Certification!

CO₂ Water Source Heat Pumps provide simultaneous Domestic Hot Water for Winery and Tank Cleaning and Chilled Glycol for Barrel Room and Tank Cooling



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Industrial Applications in California for Natural Refrigerant Chillers and Heat Pump Technology Include:

- Food Processors including Beef, Pork and Poultry facilities
- Beverage Processors including Wineries and Breweries
- Dairy Product Producers including Milk, Cheese and Yogurt facilities
- Frozen Food Manufacturers including Ice Cream and Packaged Foods
- Cold Storage Warehouses and Freezing facilities
- Industrial Manufacturing including Plastics, Aerospace and Finished Goods

Thank You For Your Interest!

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