Hill PHOENIX
REFRIGERATION SYSTEMS

Second Nature Low Temp

SNLTX2

Direct Expansion
CO_2 Cascade

Key System Benefits

- Energy efficient design saves operating costs
- Low cost natural refrigerant widely available
- Very low global warming potential
- Smaller copper piping lowers cost and carbon footprint
- System components widely available for ease of maintenance when required

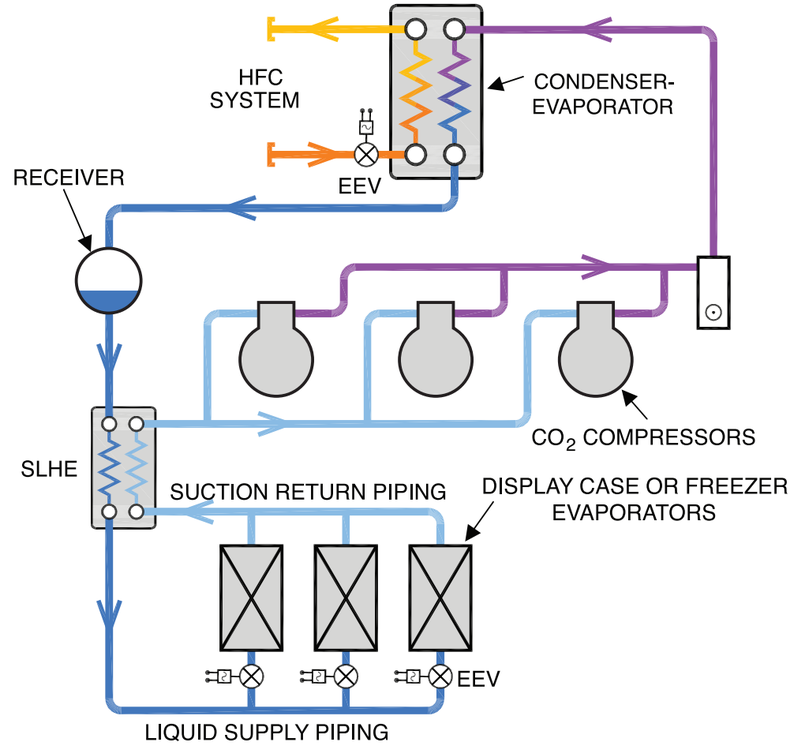
Second Nature® Low Temperature Direct Expansion Cascade (SNLTX2) is a new Hill PHOENIX® refrigeration technology that offers significant sustainability benefits when compared to conventional refrigeration technologies. It is one of the most environmentally-friendly, low-temperature refrigeration systems available in the industry today and represents the next step in CO_2 refrigeration technology.

SNLTX2 systems utilize CO_2 as a direct expansion (DX) refrigerant. Since CO_2 has excellent thermodynamic and transport properties, the CO_2 removes heat from display cases and walk-in freezers via copper piping that is significantly smaller than what is typically required in traditional HFC-based direct expansion systems, even smaller than our SNLT2 CO_2 secondary systems.

And, since the HFC refrigerant is confined to the primary system located in the machine room, the total refrigerant charge and the potential for leaks are greatly reduced. SNLTX2 systems allow for significant reductions in the amounts of copper and HFC refrigerant required, providing sustainability benefits that will pay dividends throughout the life if the system.

Benefits of Using Second Nature CO_2 Refrigeration Technology

- CO_2 is considered a natural refrigerant with very low global warming potential (GWP=1).
- CO_2 is inexpensive refrigerant compared with HFC and is widely available.
- An excess of 70 percent reduction in HFC refrigerant charge can be achieved. The entire primary refrigerant charge is confined to the machine room and condenser to enable simple leak detection and servicing.
- The piping system utilizes a modified-loop copper piping system – CO_2 lines are typically one to two sizes smaller than traditional DX piping systems.
- System uses efficient and quiet CO_2 subcritical compressors.
- CO_2 has better heat transfer properties compared to conventional HFCs.
- Excellent material compatibility – most components for commercial refrigeration can be used.



Liquid CO_2 is expanded in the EEV and heat is absorbed in the display case through evaporators similar to those used in traditional DX systems, but specially designed for use with carbon dioxide direct expansion cascade systems. The CO_2 completely evaporates in the coils and the suction gas returns to the system through a highly-efficient suction-liquid heat exchanger (SLHE). The CO_2 is then compressed and discharge gas from the compressors is condensed in the condenser-evaporator heat exchanger by the HFC system operating at medium-temperature conditions. Liquid is then directed to a CO_2 receiver and SLHE before being distributed in the liquid supply piping.

- System energy performance equivalent or better than conventional HFC systems.
- System footprint is smaller than Second Nature LT2 CO_2 secondary technology.

System Options

- System features either Copeland CO_2 hermetic scroll or Bitzer reciprocating compressors and a high-efficiency plate suction-liquid heat exchanger.
- HFC system refrigerant charge can be further minimized by using water-cooled condensers and hydronic heat-reclaim loops.
- HFC system can also be used to refrigerate other medium-temperature loads including Second Nature MT secondary systems.
- Low-temperature display cases and freezers can be equipped with the Hill PHOENIX Smart Valve™ system with EEV's for steady, automatic control of superheat leaving the evaporators.
- Available as stand-alone rack or installation in Mechanical Center or WeatherPac™ enclosure.
- Optional glycol-cooled CO_2 condensers allow smaller systems to be packaged for modular indoor systems (similar to InviroPac™).
- Multiple CO_2 suction groups on low-temperature system can further improve energy efficiency.

SECOND NATURE®

Hill PHOENIX®
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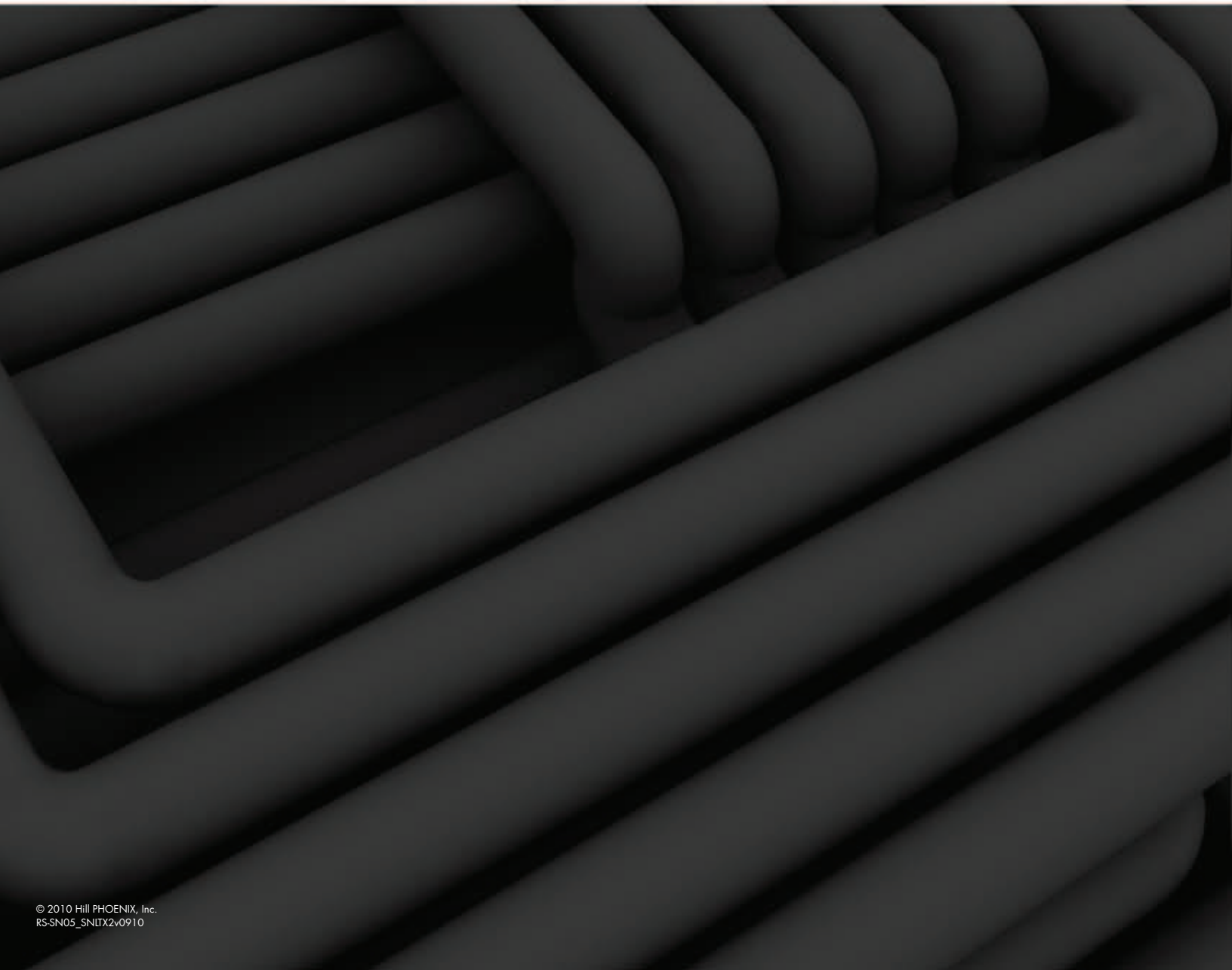

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