



**Hill PHOENIX**  
REFRIGERATION SYSTEMS

## Second Nature Low Temp

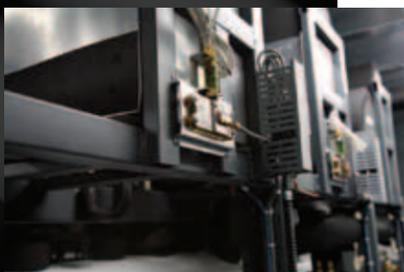
# SNLTX2

*Direct Expansion  
CO<sub>2</sub> 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



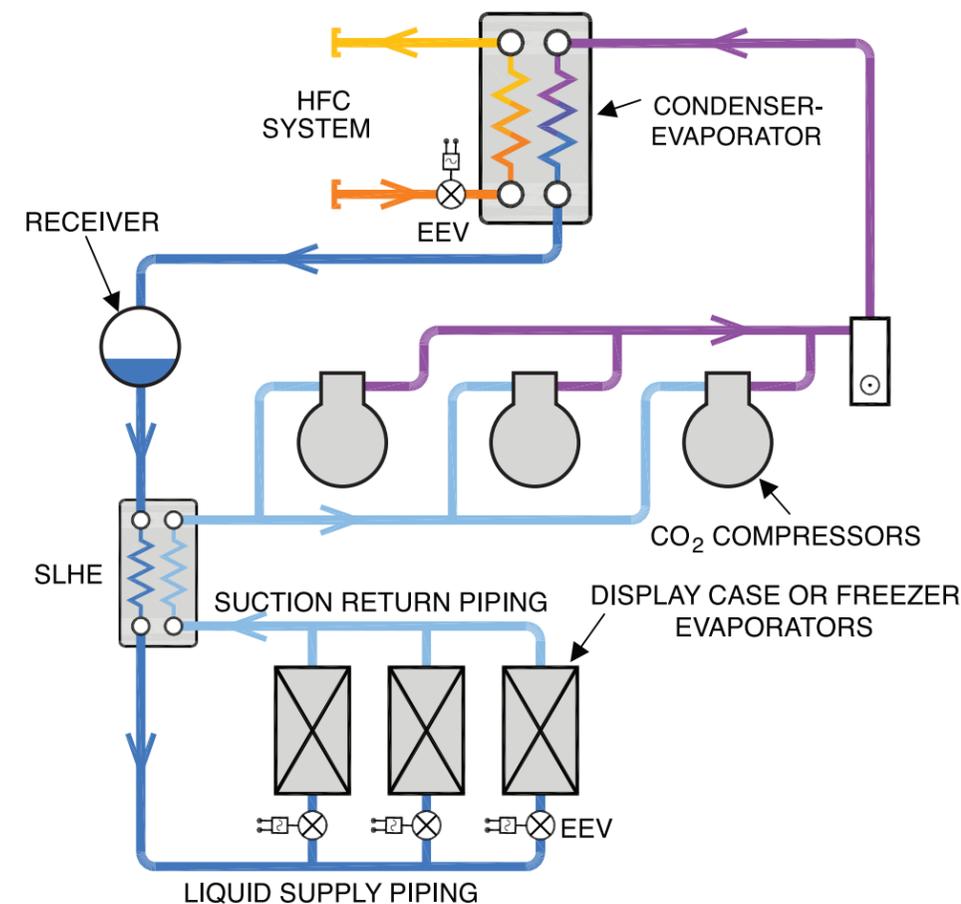
Second Nature® Low Temperature Direct Expansion Cascade (SNLTX2) is a new Hill PHOENIX® refrigeration technology that offers significant sustainability benefits when compared to conventional refrigeration technologies. It is one of the most environmentally-friendly, low-temperature refrigeration systems available in the industry today and represents the next step in CO<sub>2</sub> refrigeration technology.

SNLTX2 systems utilize CO<sub>2</sub> as a direct expansion (DX) refrigerant. Since CO<sub>2</sub> has excellent thermodynamic and transport properties, the CO<sub>2</sub> 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<sub>2</sub> 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 of the system.

### Benefits of Using Second Nature CO<sub>2</sub> Refrigeration Technology

- CO<sub>2</sub> is considered a natural refrigerant with very low global warming potential (GWP=1).
- CO<sub>2</sub> 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<sub>2</sub> lines are typically one to two sizes smaller than traditional DX piping systems.
- System uses efficient and quiet CO<sub>2</sub> subcritical compressors.
- CO<sub>2</sub> has better heat transfer properties compared to conventional HFCs.
- Excellent material compatibility – most components for commercial refrigeration can be used.



Liquid CO<sub>2</sub> 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<sub>2</sub> completely evaporates in the coils and the suction gas returns to the system through a highly-efficient suction-liquid heat exchanger (SLHE). The CO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> secondary technology.

### System Options

- System features either Copeland CO<sub>2</sub> 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<sub>2</sub> condensers allow smaller systems to be packaged for modular indoor systems (similar to InviroPac™).
- Multiple CO<sub>2</sub> suction groups on low-temperature system can further improve energy efficiency.



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