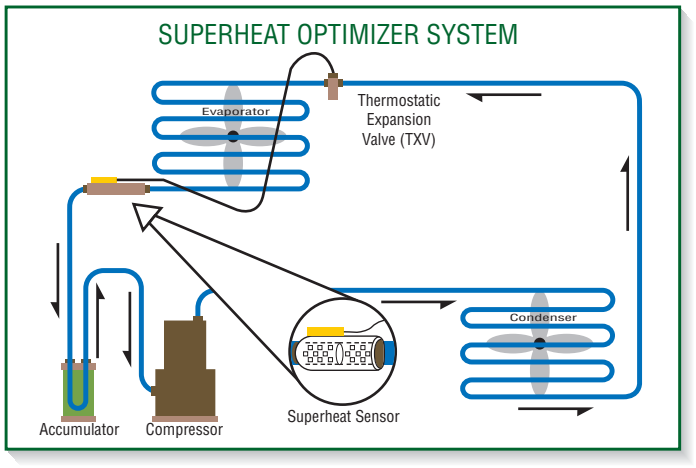


accurate superheat control, thus fully flooding the evaporator. The TXV sensing bulb is secured to the outer sensor tube. To further assist the superheat reading, a groove is formed in the outer tube, of the superheat sensor, to provide additional thermal contact and ensure perfect alignment of the TXV bulb to the suction line.

## IMPORTANCE OF INSULATING LIQUID LINES

Traditionally, most supermarket refrigerated cases incorporate a liquid-to-suction heat exchanger to improve efficiency. Field test readings of liquid line temperatures across various heat exchangers have lead to surprising results. It was expected that the temperature of the liquid leaving the heat exchanger would be consistently 10° F to 20° F lower than the entering temperature. However, in testing, the two temperatures across the heat exchanger were almost equal and actuated by up to 25° F in approximately 5 minute cycles. It was observed that the TXV was hunting at the same rate as well. The conventional thinking was that a bare copper liquid line was advantageous, as it produced further sub-cooling of the liquid. However, in actual operation, it was simply passing the heat from the liquid into the refrigerated case and increasing case loads, resulting in no net benefit. The liquid lines running through the case cooled the liquid, significantly reducing the approach temperatures of the suction-to-liquid heat exchanger, rendering it virtually ineffective. This scenario applies to literally thousands of heat exchangers installed in supermarkets across North America and worldwide.

The solution is both simple and straightforward; insulate the liquid line and all components (dryer, heat exchanger, shut-off valve, etc.) that are exposed to the cold case environment with 1/2" armaflex. The results are indisputably proven. Two parallel temperature readings approximately 15° F apart with the TXV controlling perfectly and a constant temperature liquid entering the valve. The suction gas temperature increases by up to 35° F across the heat exchanger.

## SYSTEM IMPROVEMENT AND BENEFIT SUMMARY

- Tests have consistently shown that implementing the superheat optimizer system allows for an increase in rack suction pressure of 5 to 7 psig, while maintaining the same case temperatures
- As the coils are running fully flooded at low steady state superheats (set at 3° F to 5° F), heat transfer is dramatically improved, TD's are reduced and uniform coil frosting is achieved. This allows for higher case humidity levels and shorter and more effective defrost cycles, resulting in less retail product shock, reduced shrinkage, improved product appearance and freshness
- ***Perishables, in terms of procurement and freshness are a major point of differentiation with supermarket retailers***
- The oversized orifices, distributors and TXVs provide improved control and much faster pull-downs
- The insulated liquid lines and components contribute to greatly enhanced suction-to-liquid heat exchanger performance as well as providing a constant temperature liquid to the valve
- By fully activating / flooding the evaporator, the amount of oil trapped in the evaporator coil is reduced; further aiding heat transfer and improving oil management
- Uniform frosting results in improved airflow and less problems with case icing
- ***Addresses the supermarket industry need to focus on operational and cost efficiencies***

The product benefits are just as or possibly even more important, financially, to the supermarket as are the energy savings realized by installing the superheat optimizer system. The superheat optimizer system has been successfully installed and implemented on both new and retrofit installations, in hundreds of supermarkets, since 1997.

## OTHER APPLICATIONS

The superheat optimizer system applies specifically to refrigerated display cases (low and medium temperature) and walk-in boxes. Superheat sensor applications include:

- sub-coolers
- HVAC
- blast freezers
- chillers
- any product requiring a TXV

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