

Supermarket Refrigeration Retrofit - Expansion Valve Capacity

Technical Bulletin

Products: genetron Performax® LT (R-407F),

Solstice® N40 (R-448A)

Bulletin#: 06 rev 0.0

Application: Refrigeration retrofit to R-448A and R-407F



Background

Refrigerants with an ozone depletion potential and/or a high global warming potential are being replaced with lower GWP refrigerants in many commercial refrigeration systems. The more common refrigerants being replaced are R-404A, R-507, R-22, R-402A, and R-408A. These refrigerants can be replaced with Honeywell's Solstice N40 (R-448A) or Genetron Performax LT (R-407F).

Problem

Installing contractors need to know how a retrofit will affect expansion valves.

Resolution

This bulletin will address the impact changing refrigerants has on the expansion valve **capacity**. Bulletin 5 addresses the impact on the valves **adjustment range**.

Expansion valves are typically sized to be loaded at 35% - 80% loaded for balanced port TEV's, and 50% - 80% loaded for conventional TEV's. By looking at the relative capacity change with a refrigeration retrofit the likelihood of a valve change can be evaluated.

Original Refrigerant	Retrofit Refrigerant	Suction Temperature	TXV Capacity Change
R-22	R-448A	+20	-10%
	R-407F		+7%
	R-448A	-25	-4%
	R-407F		+8%
R-404A R-507	R-448A	+20	+50%
	R-407F		+70%
	R-448A	-20	+48%
	R-407F		+68%

Example: An existing R-404A system +20 degree system has a 14,000 Btuh load and the expansion valve has a capacity of 18,400 Btuh. System includes an assumed distributor.

- This valve is 65% loaded with R-404A ($12,000 \div 18,400$)
- With R-448A the capacity will be approximately 27,600Btuh. ($18,400 \times 1.5$)
- With R-448A the valve is loaded at 50% ($14,000 \div 27,600$)

In this instance the loaded percentage is within loading recommendations.

This example is for illustrative purposes. Variations in system design, distributor, and field conditions will impact the actual performance.

During R-404A/R-507/R-402A/R-408A retrofits the increase in capacity of the TEV with R-407F or R-448A may result in overcapacity and poor superheat control. In some situations, TEV replacement may be necessary.

During retrofits the contractor should be prepared with power elements and new valves.

Interim refrigerants such as R-402A and R-408A are expected to have capacity differences similar to R-448A in the chart above.

Refer to bulletin 5 for the impact of pressures upon the expansion valve adjustment range.

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2743 FP Ref v3 | April 2018
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