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# Compressor Capacity: Net Refrigeration Effect vs Compressor Capacity


## Technical Bulletin

Product: Refrigerant Blends with glide (R-400 series)
Bulletin#: 04 rev 0.0
Application: Refrigeration

**Background:** Zeotropic blended refrigerants exhibit glide due to the different properties of the blended refrigerants. To get the fullest benefit from the new generation of refrigerants it is important to understand the impact of glide.

This is especially true when sizing compressors with refrigerants with glide such as Solstice® N40 (R-448A). One important impact is the difference between **compressor capacity** and net refrigeration effect[1].

**Problem:** Many designers are accustomed to using compressor capacity to select compressors. Use of compressor capacity gives a higher Btuh value than is actually experienced by the evaporator. Also, refrigerants with glide (such as Solstice N40) provide much higher percentage of total cooling in the evaporator versus the suction line. Using compressor capacity can lead to improperly-sized systems or the necessity of added safety factors in the system design.

**Resolution:** *Use net refrigeration effect when sizing compressors*

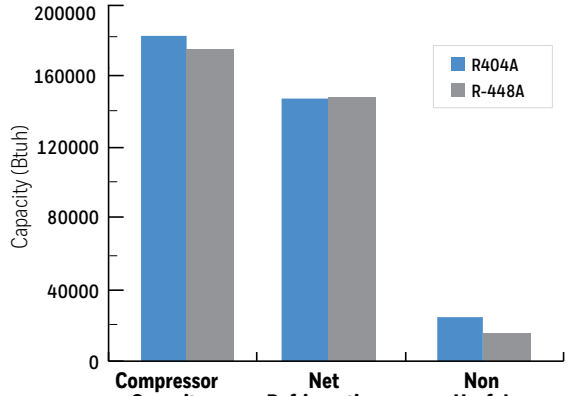
Compressor selection software typically allows a choice of using net refrigeration effect or compresssor capacity.

- Net refrigeration effect is the work done in the evaporator
- Compressor capacity includes the work done in the evaporator plus the heat transfer in the suction line between the evaporator and the compressor. The heat transfer in the suction line is usually referred to as non-useful superheat because it has no benefit in the evaporator.

Be sure to input real world evaporator superheat values (4-8°F) in compressor software. Using higher values will result in false evaporator capacities. Also be sure to use real word return gas temperatures and not the default 65 degrees.

### Typical Parallel Refrigeration Rack Configuration

-25°F SST, 115°F SCT, 20°F Return Gas, 6° Evaporator Superheat

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|---|---|---|---|
| R404A | 192200 | 157100 | 35100 |
| R-448A | 179000 | 157500 | 21500 |

The chart shows typical low temperature capacities[2].

1. Compressor capacity: includes non-useful superheat and evaporator cooling
2. Net refrigeration effect: the cooling in the evaporator.
3. Non useful superhea: the non-useful heat gain in the suction line.

The chart shows that while Solstice N40 has lower compressor capacity it actually has higher evaporator capacity. And that is what counts!

**The net refrigeration effect should be used when sizing systems in relation to published fixture or cooler loads.**

When net refrigeration effect is used the designer does not need to add safety factors as when using compressor capacity.

**Using net refrigeration correctly shows the benefit of increased refrigeration effect in an evaporator when using refrigerants with glide.**

[1] *Some programs using the term evaporator capacity instead of net effect.*

[2] *With medium temperature compressors Solstice N40 outperforms R-404A to a greater extent.*

**For more information:**
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