

Compressor Capacity: Midpoint vs Dewpoint

Technical Bulletin

Product: Refrigerant Blends with glide (R-400 series)

Bulletin#: 03 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 for refrigerants with glide such as Solstice® N40 (R-448A). It is important to understand the difference between midpoint¹ and dewpoint compressor capacities.

This bulletin will describe how to properly use midpoint when sizing compressors.

Problem: Compressors can be sized by selecting either midpoint or dewpoint in compressor selection software.

By using dewpoint, the compressor is sized using the saturated vapor temperature at the evaporator pressure. Because refrigerants with glide have an average coil temperature significantly lower than the dewpoint, the use of dewpoint will lead to an incorrectly-sized compressor.

If dewpoint temperature is used, compressor sizing programs will show an evaporator capacity lower than what the compressor actually provides. This can lead to oversizing of compressors, extra cost, and possible system issues.

Refrigeration designers are accustomed to sizing compressors using the dewpoint temperature. This is because legacy refrigerants did not have glide and so the dewpoint and midpoint temperature were equal. Using dewpoint with legacy refrigerants had no effect on the compressor capacity.

Resolution: Select midpoint in compressor sizing programs when using refrigerants with glide.

Selecting midpoint is important because it will reflect the actual refrigeration impact of the refrigerant on the product being cooled. With Solstice N40 (R-448A), choosing dewpoint would give a false 5°F rise in the temperature of the evaporator coil.

The table on the right gives the relative impact of choosing midpoint for R-448A and R-404A.

Bulletin 04 will discuss the value of using net refrigeration effect when sizing compressors.



Gain in compressor capacity when using midpoint

| Usage | Capacity Impact |
|--------------------|--------------------|
| R-448A Medium temp | +4.4% |
| R-448A Low temp | +6.6% |
| R-404A Medium temp | +0.1% ² |
| R-404A Low temp | +0.8% ² |

Selecting midpoint will:

- Give actual capacities to allow for the correct sizing of compressors and equipment
- Prevent oversizing of equipment and result in a reduction in capital costs
- Give an accurate performance comparison of single component refrigerants versus refrigerants with glide such as Solstice N40 (R-448A)

¹ The term midpoint is used for simplicity. The actual coil temperature will be nominally impacted by system parameters. Some programs use the term "mean" instead of midpoint.

² R-404A has minimal glide which is reflected in the nominal impact of using midpoint with R-404A.

Please contact Honeywell Technical Services for a more detailed description of selecting midpoint in compressor sizing programs.

For more information:

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