Smart Notes

What does the thermal performance data shared by Thermo Fisher Scientific for the TSX Series refrigerators and freezers really mean, and how can I use it to select the right cold storage?

Thermo Scientific™ TSX Series high-performance refrigerators are an essential piece of equipment for any scientific or clinical institution working with critical products that are sensitive to temperature variation. Understanding the meaning and test methodology behind thermal performance data published by manufacturers, including that of the TSX Series refrigerators, is important when selecting the right cold storage product for your unique application.

To help with this selection, Thermo Fisher publishes technical data sheets (TDSs) for our cold storage equipment, which are information sheets that summarize important data of our products:

- Application
- Electrical and mechanical
- Dimensional
- Typical thermal performance

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The thermal performance data section shares typical performance of a specific model. The values listed are intended to be used to help assess if the product is likely to meet the storage need of a specific application and use case. The values are generated within a controlled environment and follow very specific test procedures. They are not a large sample average or minimum/maximum performance summary and, as such, should not be used to build acceptance criteria against. That criteria for validation or acceptance should be performed based on the specific acceptance criteria needed to support your application.

Our TDSs contain a diagram for the locations of what we call our marketing thermocouples (Figure 1). These are unweighted type T thermocouples (TCs) placed throughout the usable volume of the cabinet. For models with a load limit line, the TCs on the top shelf are placed below the load limit line.

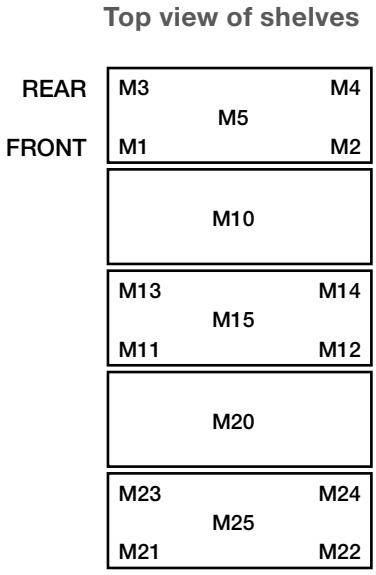

Figure 1. Diagram showing locations for marketing thermocouples.

Typical performance characteristics

The Typical Performance Characteristics block (Figure 2) contains summary information on what performance in a specific model will be. Not all manufacturers use the same test criteria for and definitions of performance characteristics. Below are some important notes related to this information:

- Testing for this data is performed in a controlled environment room at 20°C ambient temperature.
- TCs are placed on the shelves 3 inches from the walls and distributed below the load limit line, if a load limit line is present, as per Figure 1.
- There is no load in the cabinet during testing.
- Figure 2A shows the unit performance during initial power-on (or "Pull Down") and when the unit is turned off ("Warm Up"). The line is the average of all TCs during this time.
- Figure 2B shows the TCs during normal running or cycling of the refrigerator or freezer. It highlights the warmest TC ('MAX'), coldest ('MIN') and average of all of them ('AVG'). Where appropriate for auto-defrost models, defrost cycles may be seen in this chart and the performance data include those portions of the test.
- Figure 2C summarizes the performance of the specific test unit used for the test ('MSO Number'). Important definitions in this section:
  - Average cabinet temperature: The average temperature of all the TCs over the entire test period at the specified setpoint temperature.

Figure 2A | Figure 2B | Figure 2C

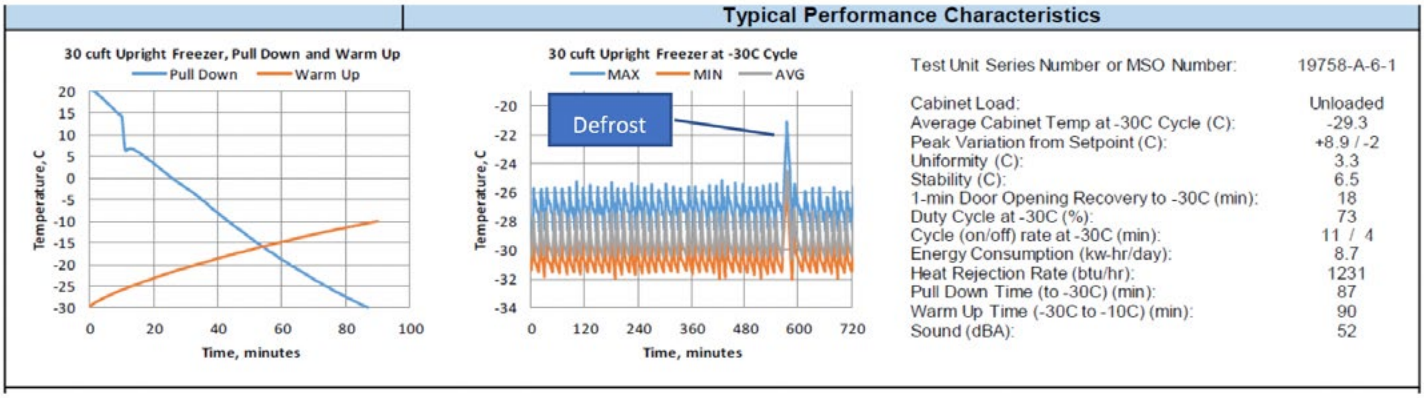

Figure 2. Typical performance characteristics graphic.

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– Peak variation from setpoint: The highest TC temperature difference over all locations and all time of the entire cycle test period. It simply is the difference between the highest and the lowest temperature observed during closed door testing on the sample unit.

– Uniformity: The maximum temperature difference between all TCs at any specific moment in time. We publish the average uniformity during the cycle portion of the test.

– Stability: The maximum temperature difference over the entire test for any specific location. The average stability during the cycle is the value published.

– 1-minute door open recovery: The time between the start of a 1-minute door opening and when the average of all the TCs is again below the setpoint. The temperature control probe is not used for this calculation.

Our technical data sheets are an accurate representation of a typical unit's performance under a specific set of conditions. There is unit-to-unit variation and environmental conditions that make it difficult to replicate the exact test by a customer. TDSs and other product documentation are updated routinely to ensure the latest product information is represented.

Conclusion

Thermo Fisher Scientific provides detailed and accurate performance characteristics for their cold storage equipment to help you determine which cold storage solution is right for your unique application. Understanding what the data represents and how it is derived is important when comparing to your own acceptance criteria or when comparing to other cold storage products.

Find out more at **thermofisher.com/cold**

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