

How True Manufacturing Reports Scientific Refrigerator Performance Specifications

True Scientific provides a specification sheet for every product in the True Scientific portfolio. The “Spec Sheet” provides a wide variety of performance specifications including temperature uniformity, temperature stability, energy usage, rejected heat rate and usable capacity. The performance specifications are obtained using the Energy Star test protocol for laboratory refrigerators and freezers. True reports all of its product performance parameters so the end user has a clear understanding of the performance expected.

The Energy Star test protocol for laboratory/pharmacy products requires that a quantity of 9 – 5ml test vials with temperature sensors inside the vial be placed throughout the cabinet as shown in figure 1. An image of a unit under test is shown in figure 2. The unit is run for 24 hours and includes an 8-hour period of 15 second door openings (3 per hour). The temperature measurements are collected from each of the 9 temperature sensors during the 24-hour period. The purpose of placing 9 different temperature sensors throughout the cabinet is to effectively measure the temperature uniformity and stability of the refrigerator under test. The reason for using a 5ml vial is to simulate a typical laboratory/pharmacy sample. The test results obtained using the Energy Star test protocol is what True Scientific states on its specification sheets.

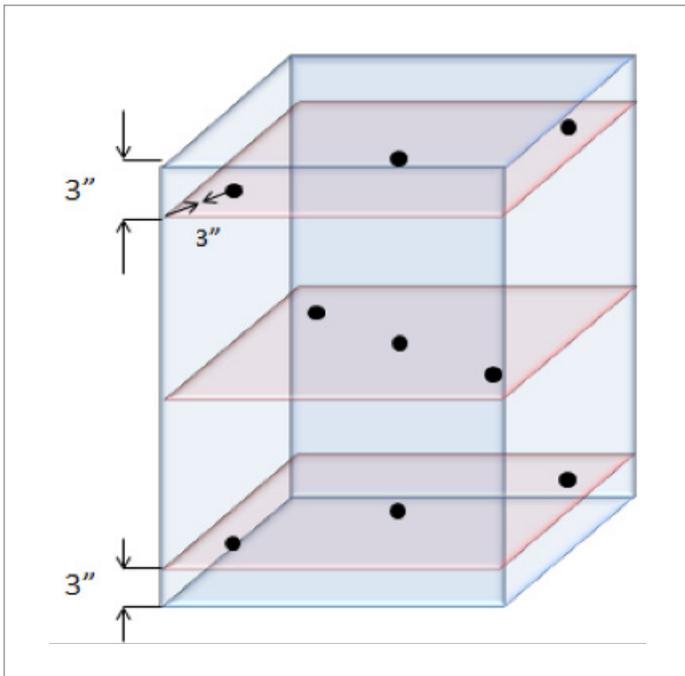


Fig. 1. Temperature sensor locations throughout the cabinet.



Fig. 2. TSCI unit door open test.

Not all manufacturers report refrigerator performance using Energy Star test protocols. Other manufacturers make up their own test procedure in order to claim desired or competitive stability and uniformity performance. One competitor states the following regarding how they test for temperature variation in their cabinets:

“ $\pm 1^{\circ}\text{C}$ Variation. The published temperature variation is derived from the maximum deviation of an NTC sensor in a 1 oz. vial located nearest the chamber geometric center during a 24 hour test period.”

1 oz equals 29.6 ml, which is almost 6 times larger than the required test vessel for Energy Star test for laboratory refrigerators (Figure 3). Using a larger test vessel reduces the impact from temperature change within the cabinet as it takes more heat transfer to change temperature of a 29.6 ml vessel as compared to a 5ml vessel. In addition, using only one test vessel is not a valid test to determine uniformity as you need to have several sensors placed throughout the cabinet to determine cabinet uniformity.

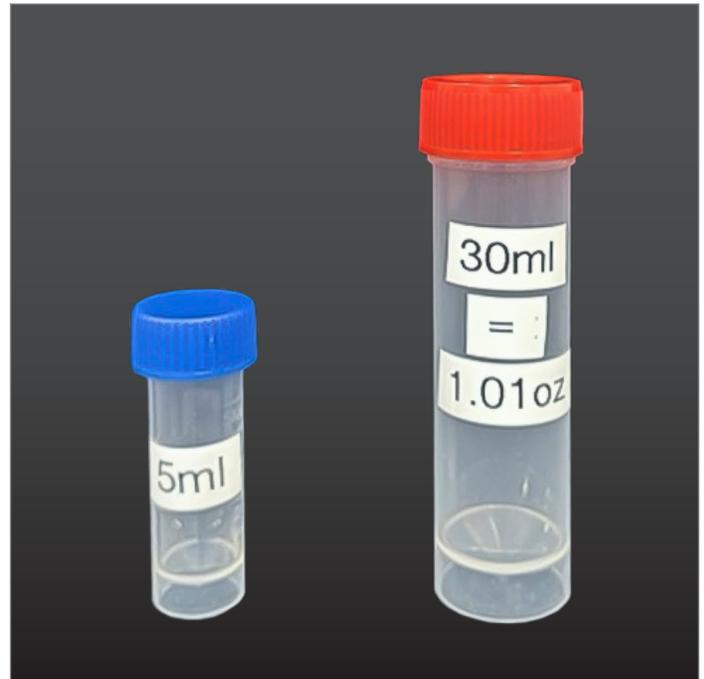


Fig. 3. Test vessel.

During the Energy Star test for laboratory refrigerators and freezers, energy consumption data is also collected which is used to determine if the energy used meets Energy Star Standards. True provides this same energy consumption on its spec sheets which are the same energy consumption figures stated for True Scientific products on the Energy Star web site. For competitor products that are not energy star certified, it is difficult to determine what test protocol they used to obtain their energy consumption claims.

Energy consumption limits for Energy Star certification are derived using the internal volume of the cabinet. Each manufacturer must calculate the internal volume of their refrigerators and freezers in order to calculate the Energy Star energy consumption limit. Again, True Scientific reports the internal volume on its spec sheets which matches the calculated internal volume for Energy Star. Some manufacturers provide a higher internal volume for their units compared to the calculated internal volume used for Energy Star which can be misleading. Some manufacturers calculate the internal volume using the overall width, depth and height but do not deduct all of the areas inside the refrigerator that take up space including the evaporator fan. This makes it difficult for people looking to buy scientific refrigerators and freezers to compare equivalent products.

In conclusion, the performance specifications that True Scientific provides in its spec sheets and other marketing collateral is determined by the established Energy Star test protocol for laboratory refrigerators and freezers.