TSX Series ultra low temperature freezers

Introduction

We are committed to designing our products with the environment in mind. This fact sheet provides the rationale behind the environmental claims that Thermo Scientific™ TSX™ Universal Series ultra low temperature (ULT) freezers and Thermo Scientific™ TSX™ Core Series ultra low temperature (ULT) freezers meet ENERGY STAR criteria and are more energy efficient than conventional-refrigerant freezer models, contain less hazardous refrigerants and insulation, contain metals and packaging with recycled content, and have a longer warranty than comparable products on the market.

Product description

The TSX Series ULT freezers (Figure 1) feature our next-generation Universal V-drive adaptive control technology, designed to minimize energy consumption without sacrificing sample security. While conventional ULT freezers use single-speed compressors that continually cycle on and off, the V-drive runs the compressors at variable speeds, adjusting cooling performance to the cooling demands inside and outside the freezer. When conditions are stable, the V-drive controls the system at low speed, which helps reduce energy consumption while maintaining a stable temperature for sample protection. When there are frequent door openings or samples being added to the freezer, the system detects the activity and increases the drive speed. Additionally, the TSX Series ULT freezers operate at under 44 dB, a noise level similar to that of a library [1]; this allows them to be located conveniently inside the lab.

Figure 1. TSX Universal Series ULT freezer
Available in four sizes, the smallest unit, the TSX40086, shown here, can hold up to 400 standard 2" cryo boxes in a 8.21 sq. ft. footprint, while the largest unit, the TSX70086 freezer, can hold up to 700 boxes in an 14.26 sq. ft. footprint.

Green features

Less hazardous

In 2015, we committed to a more sustainable future by supporting U.S. White House efforts to transition to greener refrigerants, aimed at reducing the use and emissions of greenhouse gases, known as hydrofluorocarbons (HFCs). TSX Series freezers use non-hydrofluorocarbon (non-HFC) refrigerants, which help reduce environmental impact and further increase cooling efficiency. HFC refrigerants have been identified by the U.S. Environmental Protection Agency [2] and European Commission [3] as powerful greenhouse gases with significant global warming potential. Thermo Fisher has phased out use of these refrigerants in our freezers and refrigerators opting instead for more sustainable hydrocarbon alternatives that have a significantly lower Global Warming Potential (GWP) than other comparable products on market (Figure 2). Also, the foam insulation has a 0 GWP and Ozone Depleting Potential (ODP) and is water-blown, which helps reduce the chemical emissions and outgassing that are common with other foam products.

Less waste

TSX Series ULT freezers contain steel and aluminum with recycled content. For each ULT freezer unit, up to 70% of the unit is comprised of recycled steel and aluminum.* Our commitment to reducing waste doesn't end there, many of our ULT freezers are manufactured in Asheville, North Carolina, a facility that has achieved zero waste. This means at least 90% of non-hazardous waste is diverted from landfill, waste to energy and incineration. This includes recycling of steel and copper manufacturing scrap.

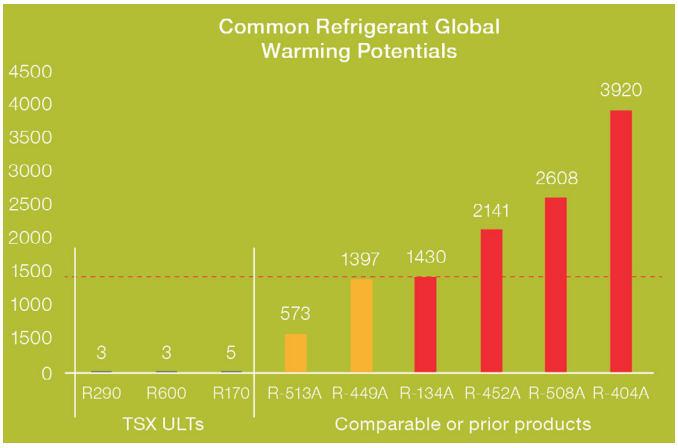

Figure 2. Common refrigerant global warming potentials. TSX ULT freezers comparable to other and prior products.

*Post-consumer/post-industrial content percentages vary by material lot and subcomponent part.

More energy efficient

TSX Series ULT freezers are among the 12 TSX freezer models that have earned ENERGY STAR certification. The ENERGY STAR mark is the U.S. government–backed symbol for energy-efficient choices. The certification program aims to provide simple, credible, and unbiased information to help consumers and businesses make well-informed purchasing decisions. The U.S. Environmental Protection Agency ensures each qualified product is independently certified to deliver expected quality, performance, and savings.

TSX ULT freezers not only meet ENERGY STAR requirements but also offer greater energy efficiency than some conventional-refrigerant freezers. For example, the TSX40086FA model uses 13% less energy compared to the Eppendorf™ F570h freezer to operate at –80°C; the TSX60086FA model uses 37% less energy than the Eppendorf™ F740hi freezer (Table 1). Power consumption (kW) for each model is based on ENERGY STAR specifications.** The "energy use reduction" percentage represents the energy efficiency gain when switching to the specified TSX model from the model shown. Choosing the TSX60086FA freezer over the Eppendorf F740HI freezer would help save more than 1640 kWh of energy over the course of a year, representing 0.68 metric tons of CO_2 equivalents [4] and annual savings of approximately $207 [5].

TSX ULT freezers are designed to meet the highest protection and sustainability standards. While some ULT freezer designs from other suppliers may further minimize energy consumption, they do so at the expense of critical performance factors—including cabinet temperature variation and door opening recovery—thereby compromising sample protection. TSX ULT freezers deliver exceptional total performance and strike a balance that enhances sustainability, reliability, and temperature management to help provide sample protection as well as energy efficiency benefits.

Additional energy savings can be obtained by running the TSX freezers at a –70°C set point (4.9 kWh/day for the TSX40086FA/CA model and 5.1 kWh/day for the TSX60086FA/CA models—34–37% additional energy savings when compared to the –80°C set point). Beyond these benefits, TSX ULT freezers emit less heat into the room, which may help lower heating, ventilation and air conditioning (HVAC) costs.

**https://www.energystar.gov/products/lab_grade_refrigerators_freezers

Responsibly packaged

Beyond the product itself, we have also implemented more responsible packaging for the TSX ULT freezers. The packaging for these units includes corrugated cardboard with 43% recycled content (33% post-consumer and 10% post-industrial) and polyethylene foam planks with 60% post-industrial recycled content. Additionally, these material types are recyclable [6].

Extended life

We confidently stand behind our products and offer a longer warranty as compared to other comparable products on the market. Our TSX Universal ULT freezers have a 12-year warranty, two years longer than the typical ULT freezer lifespan. When moving from a 10-year unit life to a 12-year unit life by providing this warranty means 17% fewer units produced, shipped and disposed each year.

In order to capture all the sustainability benefits of these new products, we also completed review and labeling through My Green Lab's ACT™ program* to provide the total Environmental Impact Factor for each product. Learn more about the ACT label at **act.mygreenlab.org.**

*TSX Core Series ULT freezers ACT label in process.

Table 1. Comparison of energy usage between TSX ULT freezers and conventional freezers operating at –80°C.*

Freezer model	Capacity (cu. ft.)	Power usage (kWh/cu. ft./day)	Daily energy usage (kWh/day)	Energy use reduction	Annual CO_2 equivalents (metric tons)	**Average annual operational cost
TSX40086FA	19.31	0.36	6.95	13%	1.1	$320
TSX40086CA	19.31	0.36	6.95	13%	1.1	$320
Eppendorf F570h	19.48	0.41	7.99		1.2	$367
TSX60086FA	28.79	0.27	7.77	37%	1.2	$357
TSX60086CA	28.79	0.27	7.77	37%	1.2	$357
Eppendorf F740hi	26.10	0.47	12.27		1.9	$564

*energystar.gov/productfinder/product/certified-lab-grade-refrigeration/details/3417896, energystar.gov/productfinder/product/certified-lab-grade-refrigeration/details/2376235, energystar.gov/productfinder/product/certified-lab-grade-refrigeration/details/3417884, energystar.gov/productfinder/product/certified-lab-grade-refrigeration/details/2319106.

**Based on $0.1260 current commercial energy cost from EPA.

References

1. IAC Acoustics. Comparative examples of noise levels. industrialnoisecontrol.com/comparative-noise-examples.htm
2. U.S. Environmental Protection Agency. SNAP program. epa.gov/snap
3. European Commission. Fluorinated greenhouse gases. ec.europa.eu/clima/policies/f-gas_en
4. U.S. Environmental Protection Agency. Greenhouse Gas Equivalencies Calculator. epa.gov/energy/greenhouse-gas-equivalencies-calculator
5. Based on an energy rate of $0.1260 as reported by the United States Energy Information Administration as the national average commercial rate. eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a
6. US Environmental Protection Agency, Advancing Sustainable Materials Management: 2015 Tables and Figures. epa.gov/sites/production/files/2018-07/documents smm_2015_tables_and_figures_07252018_fnl_508_0.pdf ; polyethylene foam is recyclable in only a limited number of communities having appropriate recycling facilities.

Reference sites

thermofisher.com/greenerbydesign | thermofisher.com/actlabel | thermofisher.com/csr

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

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