

TDE Series ultra-low temperature freezers

Introduction

We are committed to designing our products with the environment in mind—it's part of how we support our mission to enable our customers to make the world healthier, cleaner and safer. This fact sheet provides the rationale behind the environmental claim that Thermo Scientific™ TDE Series ultra-low temperature (ULT) freezers are energy efficient and use up to 10% less energy than prior models that are new and up to 42% less energy than prior models that are in use and aging.

Product description

The TDE Series ULT freezers are designed for ease of use with a focus on product reliability and performance. Powered by the H-drive hydrocarbon refrigeration system, the TDE Series models deliver sample security with a focus on operational savings and usability. The hybrid touchscreen user interface provides an elegance of the modern day ULT freezer with the functional simplicity for today's lab.

In addition to these energy-saving features, TDE Series ULT freezers use natural, non-hydrofluorocarbon (HFC) refrigerants, which help reduce environmental impact and further increase cooling efficiency. The United States Environmental Protection Agency [1] and European Commission [2] have identified that HFCs are powerful greenhouse gases with

significant global warming potential. We are phasing out the use of these refrigerants in our freezers and refrigerators in favor of hydrocarbon (HC) alternatives, which are more environmentally friendly. Additionally, the foam insulation in TDE Series freezers is water blown, which helps reduce the chemical emissions and outgassing that are common in other foam products.

Our commitment to environmental responsibility doesn't end there. Our freezers and refrigerators are also manufactured in a zero waste to landfill—certified facility [3] which means that more than 90% of the waste generated at the manufacturing site is diverted from landfills.

Finally, TDE Series ULT freezers are relatively quiet, operating at 50–52 decibels, a similar noise level to a home conversation [4]. This allows the freezers to be conveniently located inside the lab rather than relegated to the hallway.

Green feature

Energy efficient

TDE Series ULT freezer models TDE40086FD and TDE60086FD use up to 10% less energy than new prior models TSE400D and TSE600D, respectively (Table 1). The energy savings are even more significant when comparing the TDE Series ULT freezers against 5-year-old models—TDE Series models use



Green benefits

- Energy efficient—use up to 10% less energy than new prior models and up to 42% less energy than aging prior models
- Save an additional 36–39% energy at a -70°C setpoint

up to 42% less energy. Aging and the design of the previous models leave them more susceptible to performance degradation, which can come in the form of insulation degradation over time and loss of refrigeration system efficiency. Based on this degradation, quantitative modeling calculations were conducted, which estimate the increased energy consumption for a unit that has been in operation for more than 5 years.

Choosing a TDE40086FD ULT freezer over a new TSE400D would reduce energy use by 10%, saving 510 kWh of energy over the course of 1 year. This savings represents 0.36 metric tons of CO₂ equivalents, or the greenhouse gas emissions from driving 880 miles in an average passenger car [5]. It also translates into an energy cost savings of \$54 annually [6], based on commercial sector electricity rates. When comparing a TDE40086FD model to an aging TSE400D, the energy use reduction is 42%, saving 3,360 kWh of energy over the course of 1 year. This savings represents 2.4 metric tons of CO₂ equivalents, or the greenhouse gas emissions from driving 5,800 miles in an average passenger car [5]. This would translate into an energy cost savings of \$356 annually [6].

Energy and cost from using heating, ventilation, and air conditioning (HVAC) should also be taken into consideration when evaluating the total energy usage for larger equipment. Heat generated by a freezer is displaced into the room and must be removed by the HVAC system. TDE Series ULT freezers emit less heat into the room, which lowers HVAC costs. For example, the TDE40086FD model emits 1,791 BTU/hr compared to 3,099 BTU/hr for a 5-year-old TSE400D model. Therefore, choosing the TDE40086FD model to replace an aging TSE400D unit could translate into a total energy cost savings of \$457 annually (Table 2) [6].



TDE Series ULT freezer
(Cat. No. TDE60086FD).

Table 1. Comparison of energy usage between TDE Series ULT freezers and prior models (new and aging) operating at -80°C.

Freezer model (Cat. No.)	Energy use per storage volume (kWh/day/cu. ft.)	Daily energy usage (kWh/day)	Energy usage change relative to TDE model	Annual CO ₂ equivalents (metric tons)	Annual unit operational cost*
TDE40086FD	0.65	12.6	-	3.2	\$485
TSE400D (new)	0.61	14.0	+10%	3.6	\$539
TSE400D (5 years old)	0.95	21.8	+42.2%	5.6	\$841
TDE60086FD	0.48	13.8	-	3.5	\$531
TSE600D (new)	0.52	14.5	+4.8%	3.7	\$558
TSE600D (5 years old)	0.81	22.6	+39%	5.8	\$871

* Does not include costs related to HVAC.

Table 2. Comparison of energy usage between TDE Series ULT freezers and prior models (new and aging) operating at -80°C including HVAC energy usage.

Freezer model (Cat. No.)	HVAC daily energy usage* (kWh/day)	Total energy usage (kWh/day)	Annual CO ₂ equivalents (metric tons)	Annual unit operational cost*
TDE40086FD	3.6	16.2	4.2	\$623
TSE400D (new)	4.0	18.0	4.6	\$692
TSE400D (5 years old)	6.2	28.1	7.2	\$1,080
TDE60086FD	3.9	17.7	4.5	\$683
TSE600D (new)	4.1	18.6	4.8	\$717
TSE600D (5 years old)	6.4	29.1	5.8	\$1,119

* HVAC energy calculation based on an average seasonal energy efficiency ratio (SEER) of 12.

References

1. www.epa.gov/snap
2. https://ec.europa.eu/clima/policies/f-gas_en
3. 90% diversion is based on internal audits. Certification is pending.
4. <http://www.industrialnoisecontrol.com/comparative-noise-examples.htm>
5. US EPA Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>, accessed 16 September 2019.
6. Based on an energy rate of \$0.1055 as reported as the national average Commercial rate by US Energy Information Administration. https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a, accessed 23 July 2019.

Find out more at thermofisher.com/cold

For Research Use Only. Not for use in diagnostic procedures. © 2019 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries unless otherwise specified. COL23641 1219