



ENERGY STAR®

Laboratory Grade Refrigerators and Freezers Draft 2 Specification Webinar

U.S. Environmental Protection Agency
December 7, 2015





Introductions

- Melissa Fiffer– EPA Lab Grade R/F Product Lead
- John Clinger – ICF International



History of the Effort to Date

- 2008 – Launch effort – separated from CFS CRE
- 2010 – Redefined CRE as food grade only, removed lab grade equipment from scope
- 2009 – Started on test method development
- 2010 – Final test procedure based on the ASHRAE supplemental
- 2010 – Framework document distributed
- 2011 – DOE tested equipment and validated lab grade test method
- 2012 – DOE drafts Test Method
- 2014 – DOE finalized Test Method
- November 2014 – Draft 1 Specification distributed
- 2015 – Version 1.0 Data Assembly Extension
- **November 2015 – Draft 2 Specification distributed**

Where Are We Now?

Specification Development Cycle





Current Data Set

- Lab Grade Refrigerators – 14 (2010 data)
- Lab Grade Freezers – 12 (2010 data)
- Ultra-Low Freezers – 3 data points (plus 8 models from DOE 2013 field testing)

Note: After the call for data in December 2014 / January 2015, EPA did receive very limited product data on a few ULT models and would like to thank those stakeholders who provided the data for their contributions.



Reminder of Product Family Definition

- EPA is proposing the following definition of a product family:
 - Made by the same manufacturer
 - Have the same measured interior volume
 - Have the same number of external doors
 - Use same basic engineering design
- Product models within a family can differ in aesthetic characteristics and interior configurability
- Consistent with how we address product families in other specifications, EPA proposed that the highest energy-consuming unit in a product family will serve as the Representative Model for testing purposes



Scope Inclusions

- Lab Grade Refrigerators
 - Set points between 0° C and 12 ° C
 - Storing of non volatile reagents and biological specimens
 - Usually marketed through lab equipment supply stores and distributors
- Lab Grade Freezers
 - Set points between - 40 ° C and 0 °C
 - Storing of non volatile reagents and biological specimens
 - Usually marketed through lab equipment supply stores and distributors



Scope Exclusions

- Ultra-Low Temperature Freezers (ULTs)
- Combination Laboratory Grade Refrigerators/Freezers
- Portable Laboratory Grade Refrigerators/Freezers
- Walk-in Laboratory Grade Refrigerators/Freezers
- Explosion Proof Refrigerators/Freezers
- Incubators
 - Or products that are capable of temperature control above 15 ° C
- Products designed specifically to store blood and plasma samples



Proposed Removal of ULTs From Scope of Version 1.0

- EPA did not receive enough data to be able to differentiate ULT products in the market
- As a result, EPA is proposing to remove them from scope of the Version 1.0 specification.
- EPA welcomes additional data on ULT products to help build a more robust data set that can form the foundation for including ULTs in scope of the next revision of this specification.



MDEC Metric Requirements for Version 1.0

- EPA is proposing the Maximum Daily Energy Consumption (MDEC) criteria measured in kWh/day for refrigerators and freezers in Version 1.0
 - Aligns with approach used in commercial refrigerators and freezers
- Proposed efficiency requirements enable representation across a range of refrigerator and freezer volumes and defrost strategies, while maintaining a straightforward approach based on the performance data received



Proposed Refrigerator MDEC Requirements

- Separated by volume only
- Products with glass doors in the data set show an average total energy consumed per volume that is 41% lower than products with solid doors (counter-intuitive)
 - This aligns with previous findings in 2010 document that determined the data set does not support separating refrigerators by door type.
- Not enough data to support separating refrigerators by defrost type
- 14 refrigerators still on the market in the current data set

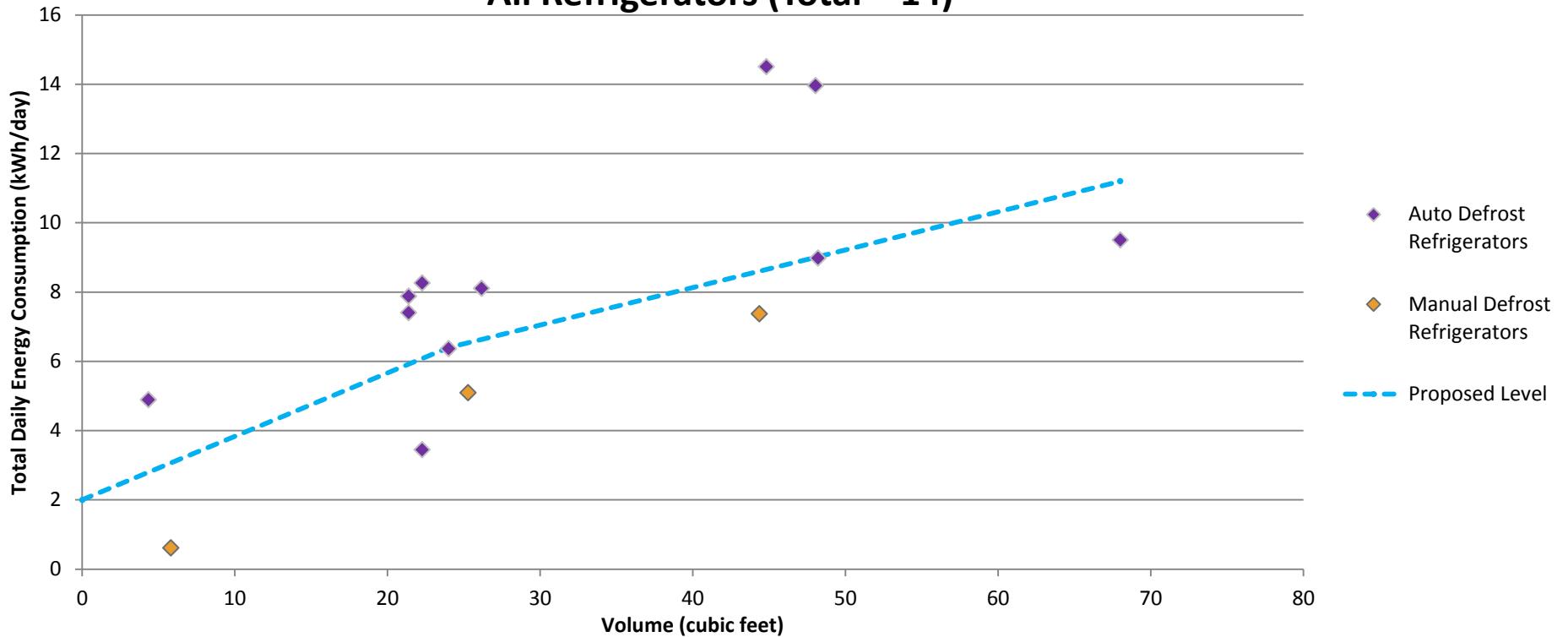
Table 1: Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Refrigerators	
Product Volume (in cubic feet)	Refrigerator
$0 < V < 24$	$\leq 0.183 V + 2.0$
$24 \leq V < 48$	$\leq 0.108 V + 3.8$
$48 \leq V$	$\leq 0.11 V + 3.72$

Note: V = AHAM volume, as defined in Section 1, in cubic feet (ft³).



Proposed Refrigerator MDEC Requirements Continued

All Refrigerators (Total = 14)





Proposed Freezer MDEC Requirements

- Separated by defrost type and by volume
- All freezers in data set have solid doors
- 12 total freezers still on the market in current data set

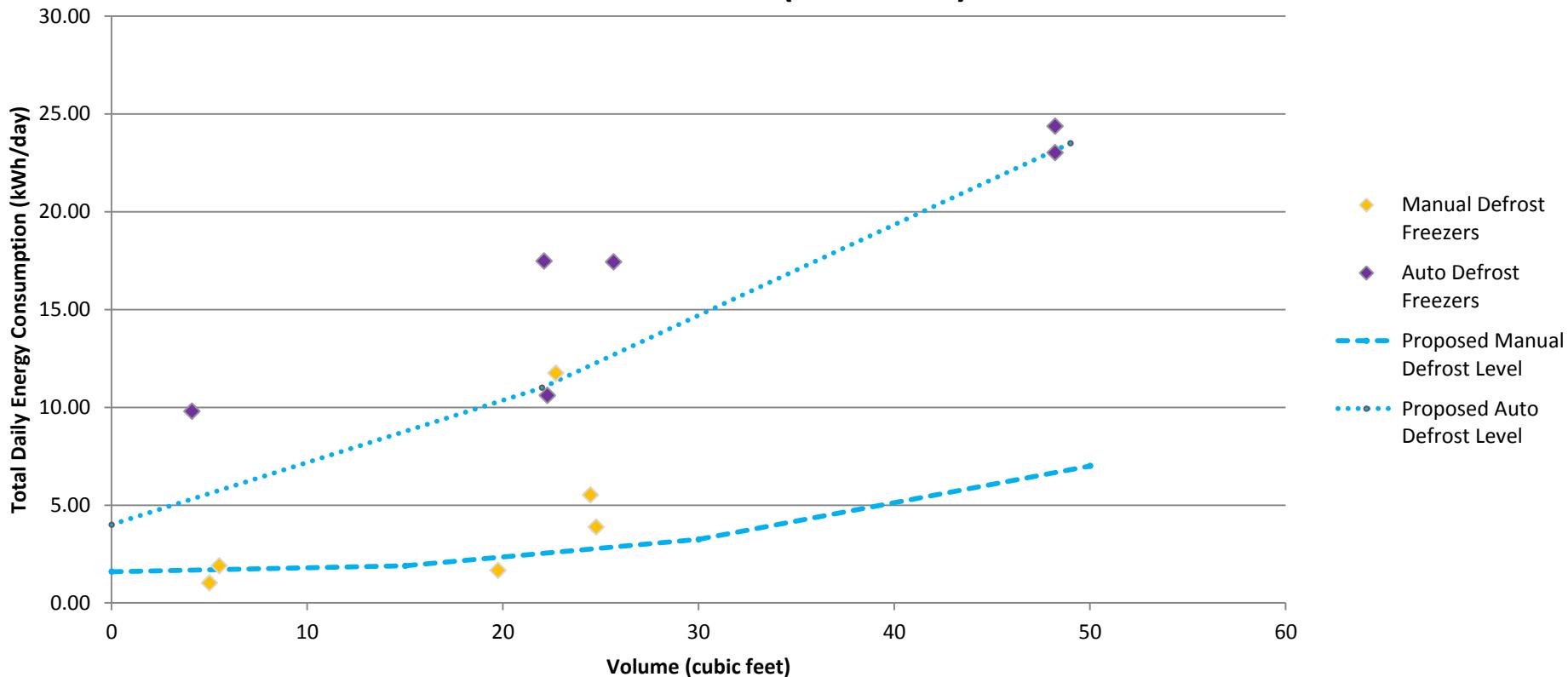
Table 2: Maximum Daily Energy Consumption (MDEC) Requirements (kWh/day) for ENERGY STAR Certified Laboratory Grade Freezers	
Product Volume (in cubic feet)	Freezer
<i>Manual Defrost</i>	
$0 < V < 15$	$\leq 0.02 V + 1.6$
$15 \leq V < 30$	$\leq 0.09 V + 0.55$
$30 \leq V$	$\leq 0.188 V - 2.375$
<i>Automatic Defrost</i>	
$0 < V < 22$	$\leq 0.318 V + 4.0$
$22 \leq V$	$\leq 0.463 V + 0.815$

Note: V = AHAM volume, as defined in Section 1, in cubic feet (ft³).



Proposed Freezer MDEC Requirements Continued

All Freezers (Total = 12)





Additional Considerations

- EPA is aware that the ENERGY STAR dataset is aged, and that the following areas of efficiency innovation are on the market and available for adoption by lab grade refrigerator and freezer manufacturers:
 - auto-off lighting combined with the use of LED lights;
 - energy efficient low-E glass used in glass door refrigerators;
 - more efficient cooling compressors; more advanced microprocessor temperature control and defrost sensors;
 - more efficient high-capacity air circulation systems, as well as hot gas defrost solutions; and
 - low global warming potential, energy efficient alternative refrigerant options
- EPA intends to highlight for buyers products that are employing some of these innovations now and incentivize broad use of these and other efficiency approaches in future specification revisions.



Timeline

- Written comments are due by December 18, 2015
 - Please send comments to labgraderefrigeration@energystar.gov
- Based on feedback, EPA will determine whether an additional draft is necessary prior to the final draft
- EPA intends to finalize the Version 1.0 specification in Q1 of 2016. The specification will take effect upon finalization.



Final Questions or Comments?





Please send any additional comments to labgraderefrigeration@energystar.gov or contact:

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