

## ENERGY STAR® 2017 Emerging Technology Award Requirements: Solid-State Refrigeration<sup>1</sup>

Performance Metric	Criteria		Test Method/Required Documentation
Product Performance			
Energy Efficiency <sup>2</sup>	Coolers <sup>3</sup>	Outperform California Energy Commission (CEC) wine cooler energy consumption requirements by a minimum of 15%	2015 CEC Appliance Program <sup>4</sup> Section 1605.3.a.1 or DOE Test Procedure for Miscellaneous Refrigeration Products – 10 CFR 430, Subpart B, Appendix A <sup>5</sup>
	Laboratory Grade Refrigeration	Outperform ENERGY STAR energy consumption requirements by a minimum of 15%	ENERGY STAR Laboratory Grade Refrigerators and Freezers Version 1.0 Program Requirements <sup>6</sup>
	Commercial Refrigeration	Outperform ENERGY STAR energy consumption requirements by a minimum of 15%	ENERGY STAR Commercial Refrigerators and Freezers Version 4.0 Program Requirements <sup>7</sup>
	Other cooling products <sup>8</sup>		
	Energy consumption data shall be measured and recorded by an accredited laboratory		
Noise <sup>9</sup>	< 45 dB		Noise level measured and recorded in-house
Warranty Minimum	One year parts and labor		Copy of warranty agreement
Certification	Must meet all applicable U.S. electrical safety requirements		Copy of case files
Additional Company Requirements			
Product Commercial Status	This Award is not granted to products that are not available for sale in the US. Product(s) must meet the following criteria: 1) be for sale and at numerous retail locations, 2) have commercial orders pending and firm plans to sell products to customers within 3 months of Award application date		

<sup>1</sup> Solid-State Refrigeration Products: coolers, laboratory grade refrigerators, commercial refrigerators, or other cooling devices that use solid-state cooling as an alternative to refrigerants/compressors.

<sup>2</sup> Maximum energy consumption criteria, defined as maximum annual energy consumption (MAEC, kWh/yr) and maximum daily energy consumption (MDEC, kWh/day), are noted in detail on the following page. The volume (V) used to calculate these maximum energy values shall be consistent with the volume used by the standard designated for each product category. Product definitions and subcategories within Laboratory Grade and Commercial Refrigerators are listed within the respective ENERGY STAR specifications.

<sup>3</sup> Cooler means a cabinet, used with one or more doors, that has a source of refrigeration capable of operating on single-phase, alternating current and is capable of maintaining compartment temperatures either 1) no lower than 39°F or 2) in a range that extends no lower than 37°F but at least as high as 60°F (10 CFR Subpart A, Section 430.2). The 2017 Emerging Technology Award will consider residential coolers (V ≤ 30 ft<sup>3</sup>)

<sup>4</sup> <http://www.energy.ca.gov/2015publications/CEC-400-2015-021/CEC-400-2015-021.pdf>

<sup>5</sup> [http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=85675886d846868d723fa81693080280&ty=HTML&h=L&mc=true&n=pt10.3.430&r=PART#ap10.3.430\\_127.a](http://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=85675886d846868d723fa81693080280&ty=HTML&h=L&mc=true&n=pt10.3.430&r=PART#ap10.3.430_127.a)

<sup>6</sup> <https://www.energystar.gov/sites/default/files/Lab%20Grade%20RF%20Version%201.0%20Draft%203%20Specification.pdf>

<sup>7</sup> <https://www.energystar.gov/sites/default/files/Commercial%20Refrigerators%20and%20Freezers%20V4%20Spec%20Final%20Version.pdf>

<sup>8</sup> Other cooling products will be considered if the submitter can provide EPA with an industry standard and test method that the product significantly outperforms.

<sup>9</sup> The Noise requirement is not applicable to Commercial Refrigeration products

## Appendix: Emerging Technology Award Energy Consumption Requirements

- The levels shown below are the actual requirements for the award, not the ENERGY STAR levels from which the award requirements are derived.

### **Wine Coolers – Maximum Annual Energy Consumption**

- With manual defrost  
 $MAEC \leq 11.65V + 227$
- With automatic defrost  
 $MAEC \leq 14.79V + 293$

### **Laboratory Grade Refrigerators – Maximum Daily Energy Consumption**

- $0 < V < 25$   
 $MDEC \leq 0.105V + 1.70$
- $25 \leq V$   
 $MDEC \leq 0.103V + 1.76$

### **Commercial Refrigerators – Maximum Daily Energy Consumption**

- Solid Door
  - $0 < V < 15$   
 $MDEC \leq 0.019V + 0.82$
  - $15 \leq V < 30$   
 $MDEC \leq 0.056V + 0.26$
  - $30 \leq V < 50$   
 $MDEC \leq 0.034V + 0.93$
  - $50 \leq V$   
 $MDEC \leq 0.021V + 1.61$
- Transparent Door
  - $0 < V < 15$   
 $MDEC \leq 0.081V + 0.38$
  - $15 \leq V < 30$   
 $MDEC \leq 0.045V + 0.95$
  - $30 \leq V < 50$   
 $MDEC \leq 0.065V + 0.29$
  - $50 \leq V$   
 $MDEC \leq 0.089V - 0.94$
- Horizontal Closed (Solid or Transparent Door, All Volumes)  
 $MDEC \leq 0.043V + 0.24$