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[6450-01-P]

**DEPARTMENT OF ENERGY**

[Case Number 2018-002; EERE-2018-BT-WAV-0002]

**Energy Conservation Program: Notice of Petition for Waiver of Store It Cold from the Department of Energy Walk-In Cooler Refrigeration System Test Procedure, and Notice of Grant of Interim Waiver**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Notice of petition for waiver, notice of grant of an interim waiver, and request for comments.

**SUMMARY:** The U.S. Department of Energy (“DOE”) announces receipt of and publishes a petition for waiver from Store It Cold, which seeks a waiver from the test procedure used for determining the efficiency of walk-in cooler refrigeration system basic models. Store It Cold seeks to use an alternate test procedure to address issues involved in testing certain basic models identified in its petition. Store It Cold asserts in its petition that for the specified °CoolBot® Walk-In Cooler refrigeration system basic models taking “refrigerant-side” measurements with refrigerant mass flow meters yields results that are unrepresentative of the basic models’ true energy consumption characteristics and provides materially inaccurate comparative data. Accordingly, Store It Cold seeks to test and rate the basic models identified in its petition using its recommended alternate test procedure, in which the refrigeration capacity is measured using psychrometric “air-side” measurements. This document announces that DOE is granting Store It Cold with an interim waiver from DOE’s walk-in cooler refrigeration system test procedure for the specified basic models, subject to use of the alternate test procedure as set forth in the Interim Waiver Order. DOE solicits comments, data, and information

concerning Store It Cold’s petition and its suggested alternate test procedure to inform its final decision on Store It Cold’s waiver request.

**DATES:** DOE will accept comments, data, and information with respect to the Store It Cold petition until **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

**ADDRESSES:** Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at <http://www.regulations.gov>. Alternatively, interested persons may submit comments, identified by case number “2018-002,” and Docket number “EERE-2018-BT-WAV-0002,” by any of the following methods:

- *Federal eRulemaking Portal:* <http://www.regulations.gov>. Follow the instructions for submitting comments.
- *E-mail:* [storeitcold2018wav0002@ee.doe.gov](mailto:storeitcold2018wav0002@ee.doe.gov). Include the case number [Case No. 2018-002] in the subject line of the message.
- *Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, Mailstop EE-5B, Petition for Waiver Case No. 2018-002, 1000 Independence Avenue, SW., Washington, DC 20585-0121. If possible, please submit all items on a compact disc (“CD”), in which case it is not necessary to include printed copies.
- *Hand Delivery/Courier:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L’Enfant Plaza, SW., Room 6055, Washington,

DC, 20024. If possible, please submit all items on a compact disc (“CD”), in which case it is not necessary to include printed copies.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on this process, see section V of this document.

*Docket:* The docket, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at <http://www.regulations.gov>. All documents in the docket are listed in the <http://www.regulations.gov> index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at <http://www.regulations.gov/docket?D=EERE-2018-BT-WAV-0002>. The docket web page contains simple instruction on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through <http://www.regulations.gov>.

**FOR FURTHER INFORMATION CONTACT:** Ms. Lucy deButts, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC 20585-0121. E-mail: [AS\\_Waiver\\_Requests@ee.doe.gov](mailto:AS_Waiver_Requests@ee.doe.gov).

Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, Mail Stop GC-33, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585-0103. Telephone: (202) 586-8145. E-mail: [Michael.Kido@hq.doe.gov](mailto:Michael.Kido@hq.doe.gov).

## **SUPPLEMENTARY INFORMATION:**

### **I. Background and Authority**

The Energy Policy and Conservation Act of 1975, as amended, (“EPCA”)<sup>1</sup> (42 U.S.C. 6291–6317), among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and industrial equipment. Title III, Part C<sup>2</sup> of EPCA established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency for certain types of industrial equipment. This equipment includes walk-in cooler refrigeration systems, the focus of this document. (42 U.S.C. 6311(1)(G)) A walk-in cooler and freezer is defined under DOE’s regulations as “an enclosed storage space refrigerated to temperatures, respectively, above, and at or below 32 degrees Fahrenheit that can be walked into, and has a total chilled storage area of less than 3,000 square feet; however[,] the terms do not include products designed and marketed exclusively for medical, scientific, or research purposes.” 10 CFR 431.302. See also 42 U.S.C. 6311(20) (statutory definition for “walk-in cooler, walk-in freezer”).

Under EPCA, DOE’s energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), and the authority to require information and reports from manufacturers (42 U.S.C. 6316).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the

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<sup>1</sup> All references to EPCA in this document refer to the statute as amended through America’s Water Infrastructure Act of 2018, Public Law 115–270 (October 23, 2018).

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part C was re-designated as Part A-1.

applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s))

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered products/equipment. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect the energy efficiency, energy use or estimated annual operating cost of a covered product/covered equipment during a representative average use cycle and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) The test procedure used to determine the net capacity and Annual Walk-in Energy Factor (“AWEF”) of walk-in cooler refrigeration systems is contained in the Code of Federal Regulations (“CFR”) at 10 CFR part 431, subpart R, appendix C.

Under 10 CFR 431.401, any interested person may submit a petition for waiver from DOE’s test procedure requirements. DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 431.401(f)(2). A petitioner must include in its petition any alternate test procedures known to the petitioner to evaluate the basic model in a manner representative of its energy consumption characteristics. 10 CFR 431.401(b)(1)(iii).

DOE may grant the waiver subject to conditions, including adherence to alternate test procedures. 10 CFR 431.401(f)(2). As soon as practicable after the granting of any waiver, DOE will publish in the *Federal Register* a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. 10 CFR 431.401(l). As soon thereafter as practicable, DOE will publish in the *Federal Register* a final rule. *Id.*

The waiver process also provides that DOE may grant an interim waiver if it appears likely that the underlying petition for waiver will be granted and/or if DOE determines that it would be desirable for public policy reasons to grant immediate relief pending a determination on the underlying petition for waiver. 10 CFR 431.401(e)(2). Within one year of issuance of an interim waiver, DOE will either: (i) publish in the *Federal Register* a determination on the petition for waiver; or (ii) publish in the *Federal Register* a new or amended test procedure that addresses the issues presented in the waiver. 10 CFR 431.401(h)(1).

When DOE amends the test procedure to address the issues presented in a waiver, the waiver will automatically terminate on the date on which use of that test procedure is required to demonstrate compliance. 10 CFR 431.401(h)(2).

## **II. Store It Cold's Petition for Waiver and Application for Interim Waiver**

On March 9, 2018, Store It Cold filed a petition for waiver and a petition for interim waiver from the test procedure applicable to walk-in cooler refrigeration systems set forth in 10 CFR part 431, subpart R, appendix C, and in response to DOE requests for technical clarification, Store It Cold submitted a revised petition for waiver and petition for interim waiver on May 16, 2018. (Store It

Cold, No. 1 at pp. 1-7<sup>3</sup>) AHRI Standard 1250P (I-P)-2009 titled “Standard for Performance Rating of Walk-in Coolers and Freezers” (“AHRI 1250-2009”) is incorporated by reference in the test procedure for walk-in cooler refrigeration systems with the modifications enumerated in 10 CFR part 431, subpart R, appendix C. Referencing AHRI 1250-2009, 10 CFR part 431, subpart R, appendix C provides two possible methods for measuring the refrigeration capacity of single-package systems<sup>4</sup>, the DX Dual Instrumentation method and the DX Calibrated Box method (see section C5.1 through C5.1.2 of AHRI 1250-2009). For both methods, the refrigeration capacity is determined by measuring the enthalpy change and mass flow rate of the refrigerant (“Refrigerant Enthalpy Method”).

Store It Cold’s petition for waiver and interim waiver lists walk-in cooler refrigeration system basic models CBLW08, CBLW10, CBLW12, CBLW15, CBLW18, CBLW25), which it states are single-package dedicated refrigeration systems. These walk-in refrigeration system basic models are comprised of a controller (*i.e.*, the °CoolBot® controller) and a room air conditioner (“RAC”), which as combined form a walk-in refrigeration system. Store It Cold stated in its petition that the resulting walk-in refrigeration systems are designated for both indoor and outdoor use. According to Store It Cold’s petition, the CoolBot’s technology controls a much smaller air conditioner designed to be installed in a window to maintain desired temperatures, as opposed to a traditional walk-in cooler that

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<sup>3</sup> A notation in this form provides a reference for information that is in the docket for this test procedure waiver (Docket No. EERE-2018-BT-WAV-0002) (available at <http://www.regulations.gov/docket?D=EERE-2018-BT-WAV-0002>). This notation indicates that the statement preceding the reference is document number 1 in the docket and appears at pages 1-7 of that document.

<sup>4</sup> “Single-packaged dedicated system” means a refrigeration system (as defined in 10 CFR 431.302) that is a single-package assembly that includes one or more compressors, a condenser, a means for forced circulation of refrigerated air, and elements by which heat is transferred from air to refrigerant, without any element external to the system imposing resistance to flow of the refrigerated air. 10 CFR 431.302.



would utilize large compressors, large surface area coils, multiple fans, and large volumes of refrigerant to do the same.<sup>5</sup>

Store It Cold asserts in its petition that, for the basic models listed in its petition, the Refrigerant Enthalpy Method (referred to as the “refrigerant-side” gross capacity method by Store It Cold) yields inconsistent refrigerant mass flow rates and lower than expected capacities. Store It Cold explains in its petition that the installation of the refrigerant mass flow meters used under this method significantly increased the refrigerant circuit’s internal volume, requiring the system to be charged with approximately twice the amount of refrigerant as was present from the factory. As a result, Store It Cold contends that the capacities calculated with this method are untrustworthy and unrepresentative of the equipment’s true performance capabilities.

In its suggested alternate test procedure, Store It Cold proposes instead to use an “air-side” method in which the refrigeration capacity is determined by measuring the enthalpy change and mass flow rate of the air passing through the evaporator side (*i.e.*, Indoor Air Enthalpy Method) and condenser side (*i.e.*, Outdoor Air Enthalpy Method). The condenser side measurement is adjusted by subtracting the system input power to determine refrigeration capacity. In its petition, Store It Cold presents “refrigerant-side” and “air-side” capacity test results, asserting that the latter yields more consistent measurements and accurate capacities for the basic models assessed. As outlined in the petition, in August of 2017, Intertek Testing Services, NA, Inc., at the request of Store It Cold,

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<sup>5</sup> Store It Cold notes in its product specification sheets, that the °CoolBot® controller is also distributed in commerce separately, *i.e.*, not as part of a walk-in cooler refrigeration system. This notice of waiver and notice of grant of an interim waiver apply only to the walk-in cooler refrigeration system basic models identified by Store It Cold, *i.e.*, the specific models listed in the Interim Waiver order, which contain °CoolBot® controllers integrated by Store It Cold with the specified RAC models.

attempted to conduct baseline performance evaluations on two of the basic models listed in their petition (CBLW10 and CBLW15) using the DX Dual Instrumentation method<sup>6</sup>, as prescribed by AHRI 1250-2009 for fixed-capacity single-package walk-in cooler refrigeration systems with outdoor condensing units. In November of 2017, Intertek then attempted to conduct baseline performance evaluations on two different basic models listed in their petition (CBLW08 and CBLW25) in accordance with the test procedure set forth in the AHRI 1250-2009, except that the units' refrigeration capacities were determined using the psychrometric "air-side" method proposed in its alternate test procedure. Store It Cold presents the test results in Table 1 and Figure 2 of its petition, which show that the "refrigerant-side" method required charging the unit to approximately twice the factory refrigerant charge because of the additional tubing needed to accommodate the flow meters required by the test procedure. Store It Cold presented data for basic models CBLW08 and CBLW25 at all three of the required capacity test conditions specified in AHRI 1250-2009 for walk-in cooler refrigeration systems with condensing units located outdoors. All three conditions require the same evaporator inlet air temperature but specify progressively decreasing condenser inlet dry-bulb air temperatures: 95°F for the A test condition, 59°F for the B test condition, and 35°F for the C test condition. For the CBLW10 basic model, the net capacity increases from 2,871 Btu/hr in test condition A to 15,897 Btu/hr in condition B and then decreases to 7,690 Btu/hr in condition C. Conversely, for the CBLW15 basic model, the net capacity decreases from 10,271 Btu/hr in condition A to 8,846 Btu/hr in condition B and then increases to 9,160 Btu/hr in condition C.

Store It Cold also presented data from the "air-side" test performed on two basic models, CBLW08 and CBLW25. For the CBLW08 basic model, the net capacity increases from 5,073 Btu/hr

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<sup>6</sup> The DX Dual Instrumentation method is the "refrigerant-side" method discussed above (*i.e.* Refrigerant Enthalpy Method) but with duplicate sensors for all measurements. This approach minimizes the risk of measurement error due to equipment inaccuracy.

in test condition A to 6,134 Btu/hr in condition B and then increases to 6,976 Btu/hr in condition C. For the CBLW25 basic model, the net capacity increases from 17,582 Btu/hr in condition A to 20,265 Btu/hr in condition B and then increases to 21,678 Btu/hr in condition C.

Store It Cold asserted that the proposed “air-side” method yields more accurate results for the basic models listed in its petition and thus that the alternate test procedure offered in its petition alleviates the issues identified with the current procedure.

Store It Cold also requests an interim waiver from the existing DOE test procedure. DOE will grant an interim waiver if it appears likely that the petition for waiver will be granted, and/or if DOE determines that it would be desirable for public policy reasons to grant immediate relief pending a determination of the petition for waiver. See 10 CFR 431.401(e)(2).

DOE understands that, absent an interim waiver, the specified basic models cannot be tested and rated for energy consumption on a basis representative of their true energy characteristics. As presented in Store It Cold’s petition, the subject basic models of walk-in cooler refrigeration systems are smaller than the typical walk-in cooler refrigeration systems. Because of the smaller size and configuration of the specified °CoolBot® Walk-In Cooler refrigeration systems, installation of the refrigerant mass flow meters as specified in the DOE test procedure significantly impacts the internal refrigeration system volumes and results in inconsistent refrigerant mass flow rate measurements and lower than expected capacities.

### **III. Requested Alternate Test Procedure**

EPCA requires that manufacturers use DOE test procedures when making representations about the energy consumption and energy consumption costs of products covered by the statute. (42 U.S.C. 6314(d)) Consistent representations are important for manufacturers to use in making representations about the energy efficiency of their products or equipment and to demonstrate compliance with applicable DOE energy conservation standards. Pursuant to its regulations at 10 CFR 431.401 applying to waivers and interim waivers from applicable test procedures, and after consideration of public comments on the petition, DOE will consider setting an alternate test procedure for the equipment identified by Store It Cold in a subsequent Decision and Order.

Store It Cold seeks to use an alternate test procedure to test and rate specific walk-in cooler refrigeration system basic models. Store It Cold suggested that the specified basic models be tested according to the test procedure in 10 CFR part 431, subpart R, appendix C, except that instead of using the Refrigerant Enthalpy Method to determine capacity, the specified basic units be tested using the Indoor Air Enthalpy and Outdoor Air Enthalpy test methods to determine capacity.

#### **IV. Summary of Grant of an Interim Waiver**

DOE has reviewed Store It Cold's application for an interim waiver, the alternate test procedure requested by Store It Cold, the company's testing and performance data, product characteristics, and product specification sheets published online by Store It Cold. All materials reviewed by DOE can be found in the docket.<sup>7</sup> The test photo provided by Store It Cold shows that the refrigerant tubing exiting the unit has multiple bends in it without any extended straight sections upstream and downstream of the refrigerant mass flow meters, which could have affected the accuracy of the mass flow measurements during testing. Additionally, Store It Cold stated that the refrigerant

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<sup>7</sup> The docket is available at <http://www.regulations.gov/docket?D=EERE-2018-BT-WAV-0002>

tubing as configured increased the refrigerant circuit's internal volume, requiring the system to be charged with approximately twice the amount of refrigerant as was present from the factory.

For refrigeration systems in general, it is expected that the capacity of the system would monotonically increase as the condenser air temperature decreases (until further increases are limited by refrigerant mass flow restriction of the expansion device for the lower condensing pressures that would occur for lower condenser air temperatures). This is because the cooler condenser air temperature can further cool the refrigerant such that it leaves the condenser at lower temperature and enthalpy,<sup>8</sup> and similarly enters the evaporator at lower enthalpy. This increases the amount of heat the refrigerant absorbs from the refrigerated space as it flows through the evaporator coil, increasing the capacity of the evaporator. DOE notes that the “refrigerant-side” method test data in Store It Cold’s petition do not follow this trend. Instead, as discussed in section II, the measured capacity increases and decreases as condenser air temperature decreases, with opposite trends for the tests of basic model CBLW10 as compared with CBLW15. These inconsistent results suggest that the capacity measurements are not accurate. The mass flow measurements may not be accurate due to the non-optimal test setup of the refrigerant lines conducting the refrigerant to and from the mass flow meters. Conversely, the data from testing using the “air side” method follows the expected trend, showing increasing refrigeration capacity as condenser air temperature decreases for both tested units. This gives much greater confidence that the measurements are accurate. “Air side” capacity measurements are well established for measurement of the capacity of air conditioners (*e.g.* as described in American Society of Heating and Air-Conditioning Engineers (“ASHRAE”) Standard 37-2009, “Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment”, which is

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<sup>8</sup> Enthalpy is a measure of refrigerant energy per unit mass—the evaporator capacity (not accounting for evaporator fan heat) is equal to refrigerant mass flow multiplied by its enthalpy increase.

incorporated by reference into the requested alternate test procedure), and the principles of air-conditioner capacity measurement apply equally to the capacity measurement for refrigeration systems.

Therefore, DOE initially agrees that, for the basic models listed in Store It Cold's petition, the current test procedure produces results unrepresentative of their true energy consumption characteristics and provides materially inaccurate comparative data. Alternatively, DOE notes that the "air-side" method suggested in Store It Cold's petition does not require installation of a refrigerant mass flow meter or any alteration of the test unit's refrigerant charge. Further, DOE finds that the test data for the proposed "air-side" method is consistent with the performance expected for refrigeration systems (*i.e.* refrigeration capacity varies inversely with condenser air temperature).

Based on this review, the alternate test procedure appears to allow for the accurate measurement of the efficiency of this equipment, while alleviating the testing problems associated with Store It Cold's implementation of walk-in cooler refrigeration systems testing for the basic models specified in its petition. Consequently, it appears likely that Store It Cold's petition for waiver will be granted. Furthermore, DOE has determined that it is desirable for public policy reasons to grant Store It Cold immediate relief pending a determination of the petition for waiver.

DOE recognizes that Store It Cold's refrigeration system, which is based primarily on an off-the-shelf room air conditioner coupled with its CoolBot controller, is an unconventional one compared to most other walk-in refrigeration systems. The Agency acknowledges, however, that Store It Cold identifies this equipment in its petition as a "single-package[d] dedicated system" used to refrigerate walk-in units and also offers this equipment as part of a complete walk-in kit. See

<https://www.storeitcold.com/coolbot-walk-in-cooler/>. DOE notes that its decision to grant Store It Cold with an interim waiver in this case is limited to the specific facts presented in this particular matter and does not necessarily reflect how DOE would view similar equipment -- but involving different facts – in other cases that may come before the Department.

For the reasons stated, DOE has issued an Order stating:

(1) Store It Cold must test and rate the following walk-in cooler refrigeration system basic models with the alternate test procedure set forth in paragraph (2):

<b>Brand</b>	<b>Basic Model Number<sup>9</sup></b>
CoolBot	CBLW08
CoolBot	CBLW10
CoolBot	CBLW12
CoolBot	CBLW15
CoolBot	CBLW18
CoolBot	CBLW25

(2) The alternate test procedure for the Store It Cold basic models listed in paragraph (1) is the test procedure for walk-in cooler refrigeration systems prescribed by DOE at 10 CFR part 431, subpart R, appendix C,<sup>10</sup> except as detailed below. All other requirements of 10 CFR part 431, subpart R, appendix C, and DOE’s regulations remain applicable.

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<sup>9</sup> The Interim Waiver Order applies only to the walk-in cooler refrigeration system basic models manufactured by Store It Cold specified in the petition and Interim Waiver Order. The Interim Waiver Order does not cover any other walk-in refrigeration cooler system basic models manufactured by Store It Cold, or any other manufacturer, even if such basic models use a °CoolBot® controller.

<sup>10</sup> AHRI Standard 1250P (I-P)-2009 (“AHRI 1250-2009”) titled “Standard for Performance Rating of Walk-in Coolers and Freezers” is incorporated by reference in the federal test procedure at 10 CFR 431.303(b)(2). The alternate test procedure provides amendments 10 CFR part 431, subpart R, appendix C that include required modifications to AHRI 1250-2009.

In 10 CFR part 431, subpart R, appendix C, section 3.1. *General modifications: Test Conditions and Tolerances* revise sections 3.1.1. and 3.1.4., and add instructions in a new section 3.1.6. regarding Tables 3 and 4 of AHRI 1250-2009, to read:

3.1.1. In Table 1, Instrumentation Accuracy, refrigerant temperature measurements shall have a tolerance of  $\pm 0.5$  F for unit cooler in/out. Temperature measurements used to determine water vapor content of the air shall be accurate to within  $\pm 0.4$  F,  $\pm 1.0$  F for all other temperature measurements.

3.1.4. In Tables 2 through 14, the Test Condition Outdoor Wet Bulb Temperature requirement and its associated tolerance apply only to units with evaporative cooling and single-packaged dedicated systems.

3.1.6. Tables 3 and 4 shall be modified to read as follows:



**Table 3. Fixed Capacity Matched Refrigerator System and Single-Packaged Dedicated System,  
Condensing Unit Located Indoor**

<b>Test Description</b>	<b>Unit Cooler Air Entering Dry- bulb, °F</b>	<b>Unit Cooler Air Entering Relative Humidity, %</b>	<b>Condenser Air Entering Dry-bulb, °F</b>	<b>Condenser Air Entering Wet-bulb, °F</b>	<b>Compressor Capacity</b>	<b>Test Objective</b>
Off-cycle Fan Power	35	<50	-	-	Compressor Off	Measure fan input wattage during compressor off cycle
Refrigeration Capacity	35	<50	90	75 <sup>1</sup> , 65 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at Rating Condition
<p>Note:</p> <ol style="list-style-type: none"> <li>1. Required only for evaporative Dedicated Condensing Units.</li> <li>2. Maximum allowable value for Single-Packaged Dedicated Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.</li> </ol>						

Table 4. Fixed Capacity Matched Refrigerator System and Single-Packaged Dedicated System, Condensing Unit Located Outdoor						
Test Description	Unit Cooler Air Entering Dry- bulb, °F	Unit Cooler Air Entering Relative Humidity, %	Condenser Air Entering Dry-bulb, °F	Condenser Air Entering Wet-bulb, °F	Compressor Capacity	Test Objective
Off Cycle Fan Power	35	<50	-	-	Compressor Off	Measure fan input wattage during compressor off cycle
Refrigeration Capacity A	35	<50	95	75 <sup>1</sup> , 68 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at Rating Condition
Refrigeration Capacity B	35	<50	59	54 <sup>1</sup> , 46 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at moderate condition
Refrigeration Capacity C	35	<50	35	34 <sup>1</sup> , 29 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at cold condition
Note: 1. Required only for evaporative Dedicated Condensing Units. 2. Maximum allowable value for Single-Packaged Dedicated Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.						

In 10 CFR part 431, subpart R, appendix C, section 3.2. *General Modifications: Methods of Testing* add the following instructions regarding additional modifications to appendix C of AHRI 1250-2009:

3.2.6 In appendix C, section C1. reads: *Purpose*. The purpose of this appendix is to provide a method of testing for Matched-pair, Single-packaged Dedicated Systems, as well as unit coolers and Dedicated Condensing Units tested alone.

3.2.7 In appendix C, section C5. and C5.1 read as follows:

3.2.7.1 C5 reads: *C5. Methods of Testing for walk-in cooler and freezer systems that have matched unit coolers and condensing units*. The testing of the walk-in cooler and freezer systems include a steady state test, defrost test and off-cycle fan power test. For single-packaged dedicated systems, calculate the refrigeration capacity and power consumption using the Indoor Air Enthalpy test method and the Outdoor Air Enthalpy test method. The Indoor Air Enthalpy test method shall be considered the primary measurement and used to report capacity. The Outdoor Air Enthalpy test method shall be considered the secondary measurement and used to calculate the Refrigeration Capacity Heat Balance. See Section C10 of this appendix for complete details on each test method.

3.2.7.2 C5.1 reads: The Gross Total Refrigeration Capacity of Unit Coolers for matched-pairs (not including single-packaged dedicated systems) from steady state test shall be determined by either one of the following methods.

3.2.8 In appendix C, section C7.1 reads: Refer to the standard rating conditions for a particular application listed in Section 5 of this standard. Test acceptance criteria listed in Table 2 in section 4 of this standard apply to the Dual Instrumentation and Calibrated Box

methods of test. Single-packaged dedicated system test tolerances are listed in each applicable Method of Test outlined in section C10.

3.2.9 In appendix C, section C7.2 reads: Data that need to be recorded during the test are listed in Table C2. For single-packaged dedicated systems tested in accordance with ASHRAE 37-2009, data that need to be recorded during the test are listed in ASHRAE 37-2009.

3.2.10 In appendix C, section C6. *Test Chambers Requirements*, add C6.3 to read as follows:

C6.3 For all system constructions (split systems, single-packaged, Unit Cooler tested alone, and Dedicated Condensing Unit tested alone), the Unit Cooler under test may be used to aid in achieving the required test chamber ambient temperatures prior to beginning any Steady-state test. However, the unit under test must be free from frost before initiating any Steady-state testing.

For single-packaged dedicated systems, refer to the applicable methods of test for single-packaged dedicated systems listed in section C10 of this appendix.

In 10 CFR part 431, subpart R, appendix C, section 3.3. *Matched systems, single-packaged dedicated systems, and unit coolers tested alone*, revise the language to read:

3.3 *Matched systems, single-packaged dedicated systems, and unit coolers tested alone*: Use the test method in AHRI 1250-2009 (incorporated by reference; see §431.303), appendix C as the method of test for matched refrigeration systems, single-packaged dedicated systems, or unit coolers tested alone, with the modifications listed below in sections 3.3.1 through 3.3.7.2.  
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In appendix C of AHRI 1250-2009, renumber the following sections and equations, and

references to the following sections and equations, as follows:

Section C10 to Section C11;

Section C11 to C12;

Section C11.1 to C12.1;

Section C11.1.1 to C12.1.1;

Equation C11 to C12;

Equation C12 to C13;

Section C11.2 to C12.2;

Section C11.3 to C12.3;

Equation C13 to C14;

Equation C14 to C15;

Equation C15 to C16;

Equation C16 to C17;

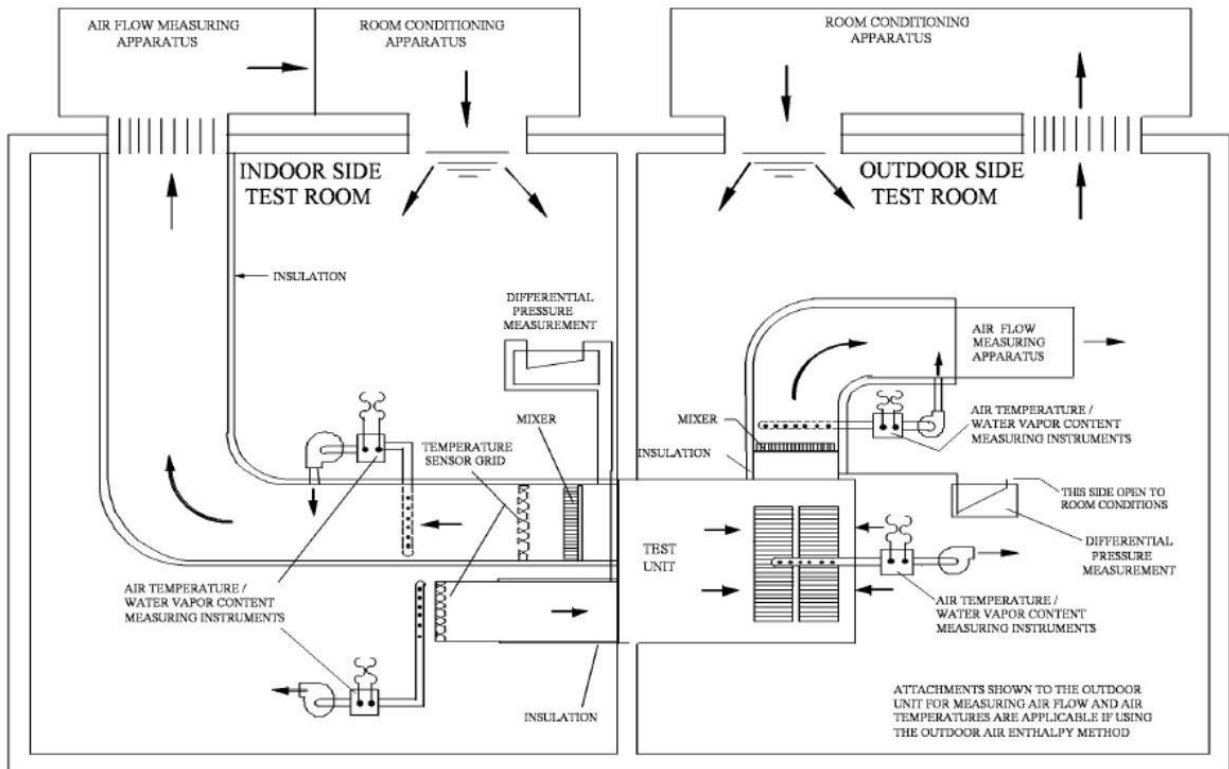
Section C12 to C13; and

Section C13 to C14.

Insert the following as sections C10 through C10.2.3, and equation C11:

*C10. Single-packaged Test Methods and Allowable Refrigeration Capacity Heat Balance.*

*C10.1 Single-packaged Test Methods.*



**Figure C3 - Air Enthalpy Method**

Also see the following website for Figure C3:

<https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0009>.

C10.1.1 *Indoor Air Enthalpy Method*. Determine Net Refrigeration Capacity of Unit

Cooler and input power in accordance with ASHRAE 37-2009, Figure C3, and the following modifications.

C10.1.1.1 Space conditioning capacity is determined by measuring airflow rate and the dry-bulb temperature and water vapor content of the air that enters and leaves the coil. Air enthalpies shall be determined in accordance with ANSI ASHRAE 41.6. Entering air is to be sufficiently dry as to not produce frost on the Unit Cooler coil. Therefore, only sensible capacity measured by dry bulb change shall be used to calculate capacity.

C10.1.1.2 Test Setup for Non-Ducted Unit Coolers. A single outlet plenum box shall be constructed in a cubic arrangement. The length of the longest dimension of the Unit Cooler outlet shall be used to determine the dimension of the cube outlet plenum. Four static pressure taps shall be installed in the center of each face. A 6" inlet plenum skirt shall be installed with four static pressure taps at each center face as well. Airflow shall be adjusted by the exhaust fan on the airflow plenum to achieve 0.00"WC ( $\pm 0.02$ "WC).

C10.1.2 *Outdoor Air Enthalpy Method*. Determine Net Refrigeration Capacity of Unit Cooler and input power in accordance with ASHRAE 37-2009, Figure C3, and the following modifications.

C10.1.2.1 Outdoor Air Enthalpy is only applicable on Dedicated Condensing Units for which the leaving air can be fully captured. Space conditioning capacity is determined by measuring airflow rate and the dry-bulb temperature and water vapor content of the air that enters and leaves the coil. Air enthalpies shall be determined in accordance with ANSI ASHRAE 41.6. Line loss adjustments in section 7.3.3.4 of ASHRAE 37-2009 are not applicable to package units.

C10.2 *Allowable Refrigeration Capacity Heat Balance*.

C10.2.1 Following the completion of the Steady-state capacity test, for each rating condition, the measured net capacities of the primary and secondary test methods must balance within 6%, per Equation C11<sup>11</sup>

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<sup>11</sup> The suggested alternate test procedure in Store It Cold's petition for waiver referenced equation C24. DOE understands this to be an error and that the appropriate equation to reference is C11.

$$-6\% \leq \frac{\dot{Q}_{\text{net,primary}} - \dot{Q}_{\text{net,secondary}}}{\dot{Q}_{\text{net,primary}}} \times 100\% \leq 6\% \quad \text{C11}$$

C10.2.2 If measured net capacities do not balance per Equation C11, investigate all potential test facility leaks and/or non-conformances. If no leaks or non-conformances are detected, proceed to Section C10.2.3. If any leaks or non-conformances are detected, remedy the concerns and rerun the Steady-state test at all applicable rating condition(s). If the measured net capacities balance per Equation C11, then the test is considered valid and capacity and power measurements from the primary method of the second test will be used. If the measured net capacities still do not balance per Equation C11, proceed to Section C10.2.3

C10.2.3 To achieve a capacity heat balance, the test lab may modify the exterior of the unit under test to reduce leakage and surface losses. Specifically, the lab may add insulation to the outside surface of the single-packaged dedicated system and/or tape and seal sheet metal edges to minimize outdoor ambient air intrusion to the Unit Cooler. After the unit is insulated, rerun the Steady-state test at all applicable rating condition(s). If the measured net capacities balance per Equation C11, then the lab facility and instrumentation are verified as complying with the applicable method of test. However, capacity, power, and all downstream calculations will be based on the results of the primary method from the first test, which occurred before the unit was altered. If the measured net capacities still do not balance per Equation C11, then the lab facility and instrumentation are considered non-compliant, must be remedied, and all prior tests for the unit under test are considered invalid.



In 10 CFR part 431, subpart R, appendix C, sections 3.3 through 3.3.7.2 replace references to AHRI-1250-2009 sections C10, C11, C11.1, C11.1.1, C11.2, and C11.3, with C11, C12, C12.1, C12.1.1, C12.2, and C12.3, respectively; and replace references to AHRI-1250-2009 equations C13 and C14 with equations C14 and C15, respectively.

(3) *Representations.* Store It Cold must make representations about the energy use, including the refrigeration capacity (in Btu/h), of basic models referenced in paragraph (1) for compliance, marketing, or other purposes only to the extent that the basic models have been tested in accordance with the provisions in the alternate test procedure and such representations fairly disclose the results of such testing.

(4) This interim waiver shall remain in effect according to the provisions of 10 CFR 431.401(h) and (k).

(5) This interim waiver is issued to Store It Cold on the condition that the walk-in cooler refrigeration system's performance characteristics, statements, representations, and documentation provided by Store It Cold are valid. DOE may revoke or modify this waiver at any time if it determines the factual basis underlying the petition for waiver is incorrect, or the results from the alternate test procedure are unrepresentative of the basic models' true energy consumption characteristics. 10 CFR 431.401(k)(1). Likewise, Store It Cold may request that DOE rescind or modify the interim waiver if Store It Cold discovers an error in the information provided to DOE as part of its petition, determines that the interim waiver is no longer needed, or for other appropriate reasons. 10 CFR 430.27(k)(2).

(6) Granting of this interim waiver does not release Store It Cold from the certification requirements set forth at 10 CFR part 429.

DOE makes decisions on waivers and interim waivers for only those basic models specifically set out in the petition, not future basic models that may be manufactured by the petitioner. Store It Cold may submit a new or amended petition for waiver and request for grant of interim waiver, as appropriate, for additional basic models of walk-in cooler refrigeration systems. Alternatively, if appropriate, Store It Cold may request that DOE extend the scope of a waiver or an interim waiver to include additional basic models employing the same technology as the basic model(s) set forth in the original petition consistent with 10 CFR 431.401(g).

## **V. Request for Comments**

DOE is publishing Store It Cold's petition for waiver in its entirety, pursuant to 10 CFR 431.401(b)(1)(iv). The petition includes a suggested alternate test procedure, as summarized in section III of this document, to determine the efficiency of Store It Cold's specified walk-in cooler refrigeration systems. DOE may consider including the alternate procedure specified in the Interim Waiver Order, and specified in section IV of this document, in a subsequent Decision and Order.

DOE invites all interested parties to submit in writing by [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***], comments and information on all aspects of the petition, including the alternate test procedure. Pursuant to 10 CFR 431.401(d), any person submitting written comments to DOE must also send a copy of such comments to the petitioner. The contact information for the petitioner is Brian R. Murphy, *brian@storeitcold.com*, 3879 Tennyson St., Denver, CO 80212.

Submitting comments via <http://www.regulations.gov>. The <http://www.regulations.gov> web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to <http://www.regulations.gov> information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (“CBI”). Comments submitted through <http://www.regulations.gov> cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through <http://www.regulations.gov> before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes

of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that <http://www.regulations.gov> provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to <http://www.regulations.gov>. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

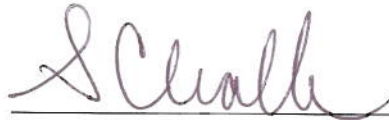
Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include (1) a description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the public interest.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

Signed in Washington, DC, on March 20, 2019.

A handwritten signature in dark ink, appearing to read "S. Chalk", written over a horizontal line.

Steven Chalk

Acting Deputy Assistant Secretary for Energy Efficiency  
Energy Efficiency and Renewable Energy



Store It Cold, LLC  
3879 Tennyson St., Denver, CO 80212  
Tel 720-456-1178

May 16, 2018

VIA E-MAIL: AS\_Waiver\_Requests@ee.doe.gov

Lucy deButts  
U.S. Department of Energy  
Building Technologies Program  
Test Procedure Waiver  
1000 Independence Avenue, SW  
Mailstop EE-5B  
Washington, DC 20585-0121

**I. RE: Petition for Waiver and Application for Interim Waiver of the requirement to measure the refrigerant enthalpy change and refrigerant mass flow rate for certain Store It Cold LLC °CoolBot® Walk-In Cooler refrigeration systems incorporating Room Air Conditioning (RAC) window units**

Dear Ms. deButts:

Pursuant to 10 C.F.R. § 431.401, Store It Cold LLC respectfully submits this petition for waiver, and application for interim waiver, of the requirements in Appendix C of the test procedure set forth in AHRI 1250-2009 (incorporated by reference; see §431.303(2)) for Walk-In Coolers and Freezers (WICF) with single-package dedicated refrigeration systems, found at Section 3.3 of Appendix C to Subpart R of 10 C.F.R. Part 431, that specify measurement of the refrigerant enthalpy change and the refrigerant mass flow rate to determine the Gross Total Refrigeration Capacity of the system. Specifically, Store It Cold LLC seeks to waive the ‘refrigerant-side’ measurement requirements for its °CoolBot® Walk-In Cooler refrigeration systems incorporating Room Air Conditioning (RAC) window units, because testing these systems with refrigerant mass flow meters installed, produces results unrepresentative of their true energy consumption characteristics, and would provide materially inaccurate comparative data. As explained below, Store It Cold LLC requests that in lieu of ‘refrigerant-side’ measurements, it be permitted to use psychrometric ‘air-side’ measurements to determine the Gross Total Refrigeration Capacity of these system.

**I. Store It Cold LLC**

Store It Cold LLC manufactures the °CoolBot® controller which when combined with a window air conditioner becomes an energy efficient °CoolBot® Walk-In Cooler refrigeration system.

°CoolBot® Walk-In Cooler refrigeration systems are intended as refrigeration systems for both indoor and outdoor walk-in cooler applications. Where traditional walk-in coolers utilize large compressors, large surface area coils, multiple fans, and large volumes of refrigerant, the CoolBot's patented technology intelligently controls a much smaller window air conditioner to maintain desired temperatures.

## II. Background

Sections C5.1.1 and C5.1.2 in Appendix C of the test procedure set forth in AHRI 1250-2009, specify that the refrigeration capacity shall be determined by measuring the enthalpy change and mass flow rate of the refrigerant. The result of this type of determination method is commonly termed 'refrigerant-side' gross capacity, and is represented in AHRI 1250-2009 by the following equation:

### 'Refrigerant-Side' Gross Capacity

$$Q_{\text{ref}} = m_{\text{ref}}(h_{\text{out}} - h_{\text{in}})$$

where

$Q_{\text{ref}}$  = Refrigerant-side gross capacity, Btu/h  $m_{\text{ref}}$

= Refrigerant mass flow rate, lb/h

$h_{\text{out}}$  = Refrigerant enthalpy leaving evaporator, Btu/lb  $h_{\text{in}}$

= Refrigerant enthalpy entering evaporator, Btu/lb

Similarly, refrigeration capacity can be determined by measuring the enthalpy change and mass flow rate of the air being conditioned. The result of this type of determination method is commonly termed 'air-side' gross capacity, and can be represented by the following equation:

### 'Air-Side' Gross Capacity

$$Q_{\text{air}} = m_{\text{air}}(h_{\text{airout}} - h_{\text{airin}})$$

where

$Q_{\text{air}}$  = Air-side gross capacity, Btu/h

$m_{\text{air}}$  = Mass flow rate of air circulated, lb/h

$h_{\text{airout}}$  = Enthalpy of air and water vapor mixture leaving evaporator, Btu/lb  $h_{\text{airin}}$

= Enthalpy of air and water vapor mixture entering evaporator, Btu/lb

## III. Basic Models for Which Waiver Is Requested

Store It Cold LLC requests a waiver from the 'refrigerant-side' measurement requirements for its °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units. Specifically, Store It Cold LLC requests a waiver for all basic models listed in the table below by brand name and model number:

**°CoolBot® Walk-In Cooler Refrigeration System Model Matrix**

Brand	Model	Window Unit Specifications									
		Brand	Model	BTU Rating	CEER	EER	Energy Star	Dehumid. (Pts/Hr)	Refrig.	Dry Air Flow (CFM)	Electrical Rating
CoolBot	CBLW08	LG	LW80**ER	8,000	12.0	12.1	Yes	2.2	R32	220	115VAC, 60Hz, 6.2A; 660Watts
CoolBot	CBLW10	LG	LW10**ER	10,000	12.0	12.1	Yes	2.7	R32	280	115VAC, 60Hz, 7.7A; 820Watts
CoolBot	CBLW12	LG	LW12**ER	12,000	12.0	12.1	Yes	3.8	R32	265	115VAC, 60Hz, 9.3A; 990Watts



CoolBot	CBLW15	LG	LW15**ER	15,000	11.8	11.9	Yes	3.3	R32	505	115 VAC, 60Hz, 11.8A; 1,260 Watts
CoolBot	CBLW18	LG	LW18**ER	17,500/ 18,000	11.8/ 11.8	11.9/ 11.9	Yes	4.9	R32	530	230/208 VAC, 60Hz, 7.5/6.9A; 1,470/1,510 Watts
CoolBot	CBLW25	LG	LW25**ER	24,000/ 24,500	10.3/ 10.3	10.3/ 10.3	Yes	7.7	R32	530	230/208VAC, 60Hz, 11.8/10.9A; 2,330/2,370 Watts

**°CoolBot® Walk-In Cooler Refrigeration System Model Matrix**

Also see the following website for Table-Model Matrix:

<https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0013>.

#### **IV. Grounds for Test Procedure Waiver**

DOE's regulations provide for granting of a test procedure waiver where testing of the basic model according to the prescribed test procedures would "evaluate the basic model in a manner so unrepresentative of its true energy... consumption characteristics as to provide materially inaccurate comparative data." Store It Cold LLC seeks a waiver from the 'refrigerant-side' measurement requirements for its °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units, because the prescribed installation of refrigerant mass flow meters, on these systems, so greatly affects the flow of refrigerant that the resulting measurements and calculated capacities become untrustworthy and unrepresentative of their true performance capabilities.

In August of 2017, Intertek Testing Services NA, Inc., a globally recognized and nationally accredited energy efficiency testing resource, at the request of Store It Cold LLC, attempted to conduct baseline performance evaluations on two °CoolBot® Walk-In Cooler refrigeration systems, in accordance with the test procedure set forth in AHRI 1250-2009. All test equipment, used for these tests, was in calibration and is traceable to National Institute of Standards and Technology (NIST) standards. As explained below, in both cases, the introduction of refrigerant mass flow meters significantly impacted the internal refrigeration system volumes and resulted in inconsistent refrigerant mass flow rate measurements and lower than expected capacities.

#### **Figure 1 - Refrigerant-Side Measuring Devices Installed for Attempted AHRI 1250-2009 Testing**

See the following website for Figure 1: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0007>.

The steady state capacity tests, prescribed in AHRI 1250-2009, for fixed capacity matched refrigerator systems, with outdoor condensing units, were attempted on a model CBLW10 10,000 BTU unit and a model CBLW15 15,000 BTU unit. Coriolis CMF025 flow meters were installed along with the other required 'refrigerant-side' measuring devices and approximately 25ft of additional 1/4" copper tubing (see *Figure 1*). When these refrigeration systems were evacuated and recharged, the corresponding increases in internal refrigeration

system volume, required approximately twice the amount of refrigerant as was present from the factory. These attempted AHRI 1250-2009 tests resulted in the inconsistent refrigerant mass flow rates and lower than expected capacities shown in *Table 1* below:

Unit Description								
Unit Type:	Fixed Capacity Matched Single-Package Refrigerator System							
Brand name:	Store It Cold,LLC							
Model Number:	CBLW10				CBLW15			
Window Unit Model Number:	LW1016ER				LW1516ER			
Window Unit Serial Number:	702TAGHDY631				6NPKG064611TAPEFC520			
Refrigerant:	R32							
Factory Charge:	13.8 oz				16.9 oz			
Test Charge:	25 oz				33 oz			
Test Data - August 2017								
Test Conditions	Average Refrigerant Mass Flow Rate (lb/hr)	Minimum Refrigerant Mass Flow Rate (lb/hr)	Maximum Refrigerant Mass Flow Rate (lb/hr)	Net Capacity (Btu/hr)	Average Refrigerant Mass Flow Rate (lb/hr)	Minimum Refrigerant Mass Flow Rate (lb/hr)	Maximum Refrigerant Mass Flow Rate (lb/hr)	Net Capacity (Btu/hr)
Capacity A Test: 35 - 95/75 (°F)	10.76	-0.32	25.65	2871.0	97.65	65.83	115.94	10271.5
Capacity B Test: 35 - 59/54 (°F)	124.03	15.39	173.5	15897.1	74.24	73.87	74.68	8846.1
Capacity C Test: 35 - 35/34 (°F)	32.19	31.64	37.75	7690.3	70.35	58.32	72.2	9160.3

**Table 1 - Flow Rates & Capacities Resulting from ‘Refrigerant-Side’ Measurement Tests**

Also see the following website for Table 1: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0010>.

In November of 2017, Intertek attempted to conduct baseline performance evaluations on two additional °CoolBot® Walk-In Cooler refrigeration systems, in accordance with the test procedure set forth in AHRI 1250-2009, using psychrometric ‘air-side’ measurements to determine the capacities. The steady state capacity, prescribed in AHRI 1250-2009, for fixed capacity matched refrigerator systems, with outdoor condensing units, were attempted on a model CBLW08 8,000 BTU unit and a model CBLW25 24,500 BTU unit. These attempted AHRI 1250-2009 tests resulted in the much more consistent measurements and more accurate capacities shown in *Table 2* below:

Unit Description								
Unit Type:	Fixed Capacity Matched Single-Package Refrigerator System							
Brand name:	Store It Cold,LLC							
ModelNumber:	CBLW08				CBLW25			
Window Unit ModelNumber:	LW8016ER				LW2516ER			
Window Unit Serial Number:	702TARUCW398				701TAULAD206			
Refrigerant:	R32							
Factory Charge:	9.5 oz				31.7 oz			
Test Charge:	9.5 oz				31.7 oz			
Test Data - November 2017								
Test Conditions	Average Total Air Flow (SCFM)	Minimum Total Air Flow (SCFM)	Maximum Total Air Flow (SCFM)	Net Capacity (Btu/hr)	Average Total Air Flow (SCFM)	Minimum Total Air Flow (SCFM)	Maximum Total Air Flow (SCFM)	Net Capacity (Btu/hr)
CapacityA Test: 35 - 95/75 (°F)	296.9	296.6	297.3	5073.0	681.3	679.6	682.9	17581.6
CapacityB Test: 35 - 59/54 (°F)	298.2	297.9	298.6	6134.2	711.4	704.3	714.4	20265.0

Capacity C Test: 35 - 35/34 (°F)	297.7	297.2	298.0	6975.7	710.4	708.4	712.3	21678.1
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**Figure 2 - Flow Rates & Capacities Resulting from ‘Air-Side’ Measurement Tests**

Also see the following website for Table 2: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0008>.

## V. Alternative Test Procedures

DOE's Appendix C to Subpart R of 10 C.F.R. Part 431, as currently promulgated but with the option of using psychrometric 'air-side' measurements to determine the Gross Total Refrigeration Capacity of systems incorporating RAC units, constitutes the appropriate alternate test procedure that will provide materially accurate comparative data and allow evaluation of the performance of Store It Cold LLC's °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units in a manner representative of their true energy characteristics. Therefore, Store It Cold LLC proposes to test the basic models for which it seeks a waiver by applying the entirety of Appendix C to Subpart R of 10 C.F.R. Part 431, with the following additions / modifications to it and the test procedure set forth in AHRI 1250-2009:

### **Appendix C to Subpart R of 10 C.F.R. Part 431 Modifications**

#### **REVISE THE FOLLOWING SECTIONS**

3.1.1. In Table 1, Instrumentation Accuracy, refrigerant temperature measurements shall have a tolerance of  $\pm 0.5$  F for unit cooler in/out. Temperature measurements used to determine water vapor content of the air shall be accurate to within  $\pm 0.4$  F,  $\pm 1.0$  F for all other temperature measurements.

3.1.4. In Tables 2 through 14, the Test Condition Outdoor Wet Bulb Temperature requirement and its associated tolerance apply only to units with evaporative cooling and Single-packaged Systems.

### **AHRI 1250-2009 Modifications**

#### **INCLUDE THE FOLLOWING ADDITIONAL DEFINITIONS**

1. *Dedicated Condensing Unit*. A specific combination of Refrigeration System components for a given refrigerant, consisting of an assembly that

(1) Includes one or more electric motor driven positive displacement compressors, condensers, and accessories as provided by the manufacturer; and

(2) Is designed to serve one refrigerated load.

2. *Refrigeration System*. The mechanism (including all controls and other components integral to the system's operation) used to create the refrigerated environment in the interior of a walk-in cooler or walk-in freezer, consisting of:

A Dedicated Condensing Unit; or

A Unit Cooler.

2.1 *Matched Refrigeration System (Matched-pair)*. A combination of a Dedicated Condensing Unit and one or more Unit Coolers specified by the Dedicated Condensing Unit manufacturer which are all distributed in commerce together. Single-Packaged Dedicated Systems are a subset of Matched Refrigeration Systems.

2.2 *Single-packaged Refrigeration System (Single-packaged)*. A Matched Refrigeration System that is a Single-packaged assembly that includes one or more compressors, a

condenser, a means for forced circulation of refrigerated air, and elements by which heat is transferred from air to refrigerant, without any element external to the system imposing resistance to flow of the refrigerated air.

### REVISE THE FOLLOWING SECTIONS AND TABLES

C1. *Purpose.* The purpose of this appendix is to provide a method of testing for Matched-pair, Single-packaged walk-in Refrigeration Systems, as well as unit coolers and Dedicated Condensing Units tested alone.

C5.1 The Gross Total Refrigeration Capacity of Unit Coolers for matched-pairs (not including Single-packaged Systems) from steady state test shall be determined by either one of the following methods.

C7.1 Refer to the standard rating conditions for a particular application listed in Section 5 of this standard. Test acceptance criteria listed in Table 2 in section 4 of this standard apply to the Dual Instrumentation and Calibrated Box methods of test. Single-package dedicated system test tolerances are listed in each applicable Method of Test outlined in section C10.

C7.2 Data that need to be recorded during the test are listed in Table C2. For Single-package dedicated systems tested in accordance with ASHRAE 37-2009, data that need to be recorded during the test are listed in ASHRAE 37-2009.

**Table 3. Fixed Capacity Matched Refrigerator System, Condensing Unit Located Indoor**  
Also see the following website for Table 3: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0011>.

<b>Table 3. Fixed Capacity Matched Refrigerator System, Condensing Unit Located Indoor</b>						
<b>Test Description</b>	<b>Unit Cooler Air Entering Dry-bulb, °F</b>	<b>Unit Cooler Air Entering Relative Humidity, %</b>	<b>Condenser Air Entering Dry-bulb, °F</b>	<b>Condenser Air Entering Wet-bulb, °F</b>	<b>Compressor Capacity</b>	<b>Test Objective</b>
Off-cycle Fan Power	35	<50	-	-	Compressor Off	Measure fan input wattage during compressor off cycle
Refrigeration Capacity	35	<50	90	75 <sup>1</sup> , 65 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at

						Rating Condition
Note: <ol style="list-style-type: none"> <li>1. Required only for evaporative Dedicated Condensing Units.</li> <li>2. Maximum allowable value for Single-packaged Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.</li> </ol>						

**Table 4. Fixed Capacity Matched Refrigerator System, Condensing Unit Located Outdoor**

Also see the following website for Table 4: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0012>.

**Table 4. Fixed Capacity Matched Refrigerator System, Condensing Unit Located Outdoor**

Test Description	Unit Cooler Air Entering Dry-bulb, °F	Unit Cooler Air Entering Relative Humidity, %	Condenser Air Entering Dry-bulb, °F	Condenser Air Entering Wet-bulb, °F	Compressor Capacity	Test Objective
Off Cycle Fan Power	35	<50			Compressor Off	Measure fan input wattage during compressor off cycle
Refrigeration Capacity A	35	<50	95	75 <sup>1</sup> , 68 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler, input power, and EER at Rating Condition
Refrigeration Capacity B	35	<50	59	54 <sup>1</sup> , 46 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at moderate condition
Refrigeration Capacity C	35	<50	35	34 <sup>1</sup> , 29 <sup>2</sup>	Compressor On	Determine Net Refrigeration Capacity of Unit Cooler and system input power at cold condition

Note:

1. Required only for evaporative Dedicated Condensing Units.
2. Maximum allowable value for Single-packaged Systems that do not use evaporative Dedicated Condensing Units, where all or part of the equipment is located in the outdoor room.

**INSERT THE FOLLOWING ADDITIONAL SECTION BEFORE C5.2 AND RE-NUMBER REMAINING SECTIONS**

C5.2 For Single-packaged Systems, calculate the refrigeration capacity and power consumption



using the Indoor Air Enthalpy test method and the Outdoor Air Enthalpy test method. The Indoor Air Enthalpy test method shall be considered the primary measurement and used to report capacity. The Outdoor Air Enthalpy test method shall be considered the secondary measurement and used to calculate the Refrigeration Capacity Heat Balance. See Section C10 of this appendix for complete details on each test method.

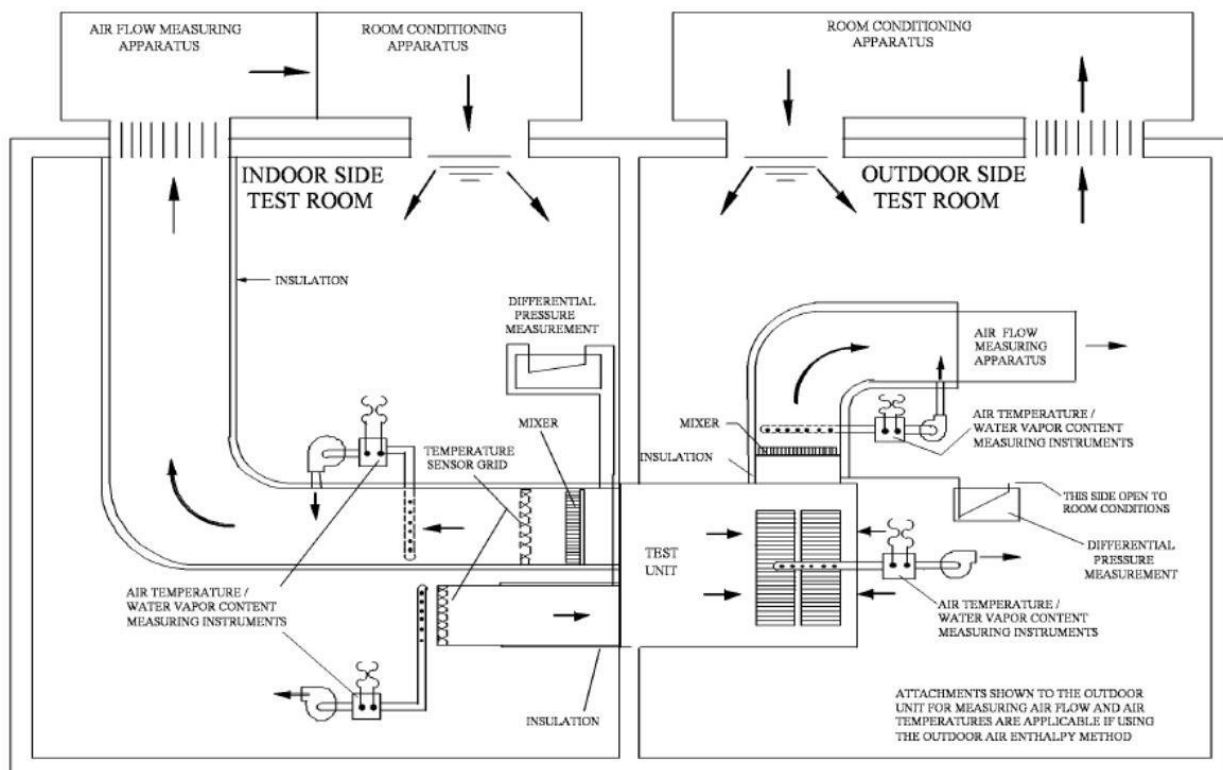
INSERT THE FOLLOWING ADDITIONAL SECTION BEFORE C6.1 & RE-NUMBER REMAINING SECTIONS

C6.1 For all system constructions (split systems, Single-packaged, Unit Cooler tested alone, and Dedicated Condensing Unit tested alone), the Unit Cooler under test may be used to aid in achieving the required test chamber ambient temperatures prior to beginning any Steady-state test. However, the unit under test must free from frost before initiating any Steady-state testing.

INSERT THE FOLLOWING ADDITIONAL SECTION

C6.4 For Single-package Systems, refer to the applicable methods of test for Single-package systems listed in section C10 of this appendix.

ADD THE FOLLOWING ADDITIONAL FIGURE



**Figure C3 - Air Enthalpy Method**

Also see the following website for Figure C3: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0009>.

INSERT THE FOLLOWING ADDITIONAL SECTIONS BEFORE C10 AND THE INCLUDED EQUATION BEFORE C11 & RE-NUMBER REMAINING SECTIONS AND EQUATIONS

C10. *Single-packaged Test Methods and Allowable Refrigeration Capacity Heat Balance.*

### C10.1 *Single-packaged Test Methods.*

C10.1.1 *Indoor Air Enthalpy Method.* Determine Net Refrigeration Capacity of Unit Cooler and input power in accordance with ASHRAE 37-2009, Figure C3, and the following modifications.

C10.1.1.1 Space conditioning capacity is determined by measuring airflow rate and the dry-bulb temperature and water vapor content of the air that enters and leaves the coil. Air enthalpies shall be determined in accordance with ANSI ASHRAE 41.6. Entering air is to be sufficiently dry as to not produce frost on the Unit Cooler coil. Therefore, only sensible capacity measured by dry bulb change shall be used to calculate capacity.

C10.1.1.2 Test Setup for Non-Ducted Unit Coolers. A single outlet plenum box shall be constructed in a cubic arrangement. The length of the longest dimension of the Unit Cooler outlet shall be used to determine the dimension of the cube outlet plenum. Four static pressure taps shall be installed in the center of each face. A 6" inlet plenum skirt shall be installed with four static pressure taps at each center face as well. Airflow shall be adjusted by the exhaust fan on the airflow plenum to achieve 0.00"WC ( $\pm 0.02$ "WC).

C10.1.2 *Outdoor Air Enthalpy Method.* Determine Net Refrigeration Capacity of Unit Cooler and input power in accordance with ASHRAE 37-2009, Figure C3, and the following modifications.

C10.1.2.1 Outdoor Air Enthalpy is only applicable on Dedicated Condensing Units for which the leaving air can be fully captured. Space conditioning capacity is determined by measuring airflow rate and the dry-bulb [sic] temperature and water vapor content of the air that enters and leaves the coil. Air enthalpies shall be determined in accordance with ANSI ASHRAE 41.6. Line loss adjustments in section 7.3.3.4 of ASHRAE 37-2009 are not applicable to package units.

### C10.2 *Allowable Refrigeration Capacity Heat Balance.*

C10.2.1 Following the completion of the Steady-state capacity test, for each rating condition, the measured net capacities of the primary and secondary test methods must balance within 6%, per Equation C24

$$-6\% \leq \frac{\dot{Q}_{\text{net,primary}} - \dot{Q}_{\text{net,secondary}}}{\dot{Q}_{\text{net,primary}}} \times 100\% \leq 6\% \quad \text{C11}$$

C10.2.2 If measured net capacities do not balance per Equation C11, investigate all potential test facility leaks and/or non-conformances. If no leaks or non-conformances are detected, proceed to Section C10.2.3. If any leaks or non-conformances are detected, remedy the concerns and rerun the Steady-state test at all applicable rating condition(s). If the measured net capacities balance per Equation C11, then the test is considered valid

and capacity and power measurements from the primary method of the second test will be used. If the measured net capacities still do not balance per Equation C11, proceed to Section C10.2.3

C10.2.3 To achieve a capacity heat balance, the test lab may modify the exterior of the unit under test to reduce leakage and surface losses. Specifically, the lab may add insulation to the outside surface of the Single-package system and/or tape and seal sheet metal edges to minimize outdoor ambient air intrusion to the Unit Cooler. After the unit is insulated, rerun the Steady-state test at all applicable rating condition(s). If the measured net capacities balance per Equation C11, then the

lab facility and instrumentation are verified as complying with the applicable method of test. However, capacity, power, and all downstream calculations will be based on the results of the primary method from the first test, which occurred before the unit was altered. If the measured net capacities still do not balance per Equation C11, then the lab facility and instrumentation are considered non-compliant, must be remedied, and all prior tests for the unit under test are considered invalid.

Note: Certain content phrasing and figures provided courtesy of The Air-Conditioning, Heating, and Refrigeration Institute (AHRI).

## **VI. Similar Products**

Store It Cold LLC is not aware of any other manufacturers offering Walk-In Cooler refrigeration systems comprised of RAC window units and proprietary controllers.

## **VII. Petition for Interim Waiver**

Pursuant to 10 CFR § 431.401, Store It Cold LLC also requests an interim waiver of the ‘refrigerant-side’ measurement requirements for its °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units. DOE will grant an interim waiver if it appears likely that the petition for waiver will be granted and/or if DOE determines that it would be desirable for public policy reasons to grant immediate relief pending a determination on the petition for waiver (10 CFR § 431.401(e)(2)). Interim relief is important to ensure that Store It Cold LLC can make materially accurate representations about the energy efficiency of its °CoolBot® Walk-In Cooler refrigeration systems in its certifications to the DOE and marketing materials while DOE is considering the merits of Store It Cold LLC’s petition for waiver.

Basic Models for Which Interim Waiver Is Requested: Store It Cold LLC requests an interim waiver for all basic models listed in the table below by brand name and model number:

**°CoolBot® Walk-In Cooler Refrigeration System Model Matrix**

Brand	Model	Window Unit Specifications									
		Brand	Model	BTU Rating	CEER	EER	Energy Star	Dehumid. (Pts/Hr)	Refrig.	Dry Air Flow (CFM)	Electrical Rating
CoolBot	CBLW08	LG	LW80**ER	8,000	12.0	12.1	Yes	2.2	R32	220	115VAC, 60Hz, 6.2A; 660Watts
CoolBot	CBLW10	LG	LW10**ER	10,000	12.0	12.1	Yes	2.7	R32	280	115VAC, 60Hz, 7.7A; 820Watts
CoolBot	CBLW12	LG	LW12**ER	12,000	12.0	12.1	Yes	3.8	R32	265	115VAC, 60Hz, 9.3A; 990Watts
CoolBot	CBLW15	LG	LW15**ER	15,000	11.8	11.9	Yes	3.3	R32	505	115 VAC, 60Hz, 11.8A; 1,260 Watts
CoolBot	CBLW18	LG	LW18**ER	17,500/ 18,000	11.8/ 11.8	11.9/ 11.9	Yes	4.9	R32	530	230/208 VAC, 60Hz, 7.5/6.9A; 1,470/1,510 Watts
CoolBot	CBLW25	LG	LW25**ER	24,000/ 24,500	10.3/ 10.3	10.3/ 10.3	Yes	7.7	R32	530	230/208VAC, 60Hz, 11.8/10.9A; 2,330/2,370 Watts

**°CoolBot® Walk-In Cooler Refrigeration System Model Matrix**

Also see the following website for Table-Model Matrix: <https://www.regulations.gov/document?D=EERE-2018-BT-WAV-0002-0013>.

Likely Success of the Petition for Waiver: For the reasons outlined above, Store It Cold LLC believes that there are strong arguments for granting the petition for waiver on the merits. Specifically, Intertek’s attempted testing of °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units, with refrigerant mass flow meters installed, showing that the increased internal volume of the refrigeration systems and the corresponding increases in the amount of refrigerant causes inconsistent flow rates and lower than expected capacity calculations.

Economic Hardship and/or Competitive Disadvantage. If Store It Cold LLC must continue to comply with the ‘refrigerant-side’ measurement requirements for its °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units, these systems will be disadvantaged in the market relative to other types of refrigeration systems for which ‘refrigerant-side’ measurements are possible. As shown above, the prescribed test set-up required for obtaining these measurements produces measurements and capacities that are unrepresentative of their true performance capabilities and thus prevents certification and distribution of these basic models in commerce.

Public Policy Reasons to Grant Interim Waiver. Without an interim waiver, these energy efficient walk-in coolers will be unavailable to consumers and is inconsistent with the policy objectives of EPCA. The °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units provide an economical refrigeration solution for small independent farmers and businesses that do not otherwise have the financial means for cold storage. This technology enables them to provide higher quality goods, extends the life of their products, and offers improved food safety.

For all of these reasons, the Department should grant an interim waiver while it considers the petition

for waiver set out above.

### **VIII. Conclusion**

For the reasons stated above, Store It Cold LLC respectfully requests that DOE grant this petition for waiver of the ‘refrigerant-side’ measurement requirements with respect to its °CoolBot® Walk-In Cooler refrigeration systems incorporating RAC window units. Store It Cold LLC further requests DOE to grant its request for an interim waiver while its petition for waiver is under consideration.

If you have any questions or would like to discuss this request, please contact me at (720) 456-1178. We greatly appreciate your attention to this matter.

/s/