

Subject 7001

December 10, 2012

SUMMARY OF TOPICS

The following is being proposed for preliminary review and comment only:

1. For Preliminary Review Only: The Second Edition of AHAM 7001/CSA R7001/UL 7001, Sustainability Standard for Household Refrigeration Appliances

COMMENTS DUE: JANUARY 16, 2013

This proposal is for review and comment only (no ballot at this time). Please note that comments on a preliminary review document will not receive a response from the proposal author through CSDS. Instead, the proposal author will be asked to review the comments and adjust the proposals and/or supporting rationale as the author determines to be appropriate. The preliminary review process is an informal mechanism that provides authors with the opportunity to refine their proposals before they advance to the next stage in UL's standards development process.

In some cases, the author of the proposals may choose to discontinue them. In this case, the author need not do anything after preliminary review has ended. Normally, the next step in the process is the more formal STP ballot and stakeholder review process. Only comments posted during the STP ballot and stakeholder review process will be provided with a response in CSDS.

1. For Preliminary Review Only: The Second Edition of AHAM/CSA/UL 7001, Sustainability Standard for Household Refrigeration Appliances

RATIONALE

Proposal submitted by: Task Force on Sustainability Standard for Refrigeration Appliances

AHAM members have been engaged in environmental performance for decades. Prior to the passage of the National Appliance Energy Conservation Act (NAECA) in 1987, AHAM member companies have encouraged greater energy efficiency in appliances. Since that time, AHAM members have worked with the U.S. Department of Energy and energy regulatory agencies in many countries to reduce the energy demands of household appliances. Beyond energy, AHAM members have also been working to increase appliance recycling, improve the use of materials, reduce the use of materials that have been deemed troublesome to the environment, improve manufacturing operations, and maximize product performance. Household appliances have been on the cutting-edge of development of the U.S. EPA ENERGY STAR™ program. Home appliances are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

Through all of these advancements, each area of environmental performance has been viewed independently. Through the measurement of sustainability, the major areas of energy and water efficiency, manufacturing, materials, and end-of-life product management can be viewed as a balanced, holistic approach to product improvement.

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AHAM members believe through the development of sustainability standards, we can:

- Assist manufacturers with future product development in environmental performance
- Allow manufacturers to plan technological and design advancements with regard to the environment
- Develop energy & water efficiency in a life-cycle balance to other environmental matters
- Have a consensus measurement tool to demonstrate environmental improvements

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's global membership includes over 150 companies throughout the world. AHAM members produce more than 95% of the household appliances shipped for sale in the United States and Canada and are valued at more than \$30 billion annually. The home appliance industry employs tens of thousands of workers and through its products and innovation, is essential to consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to jobs and economic security.

AHAM is also a standards development organization and has authored numerous appliance performance testing standards used by manufacturers, consumer organizations and governmental bodies to rate and compare appliances. In partnership with the CSA Group, and UL Environment, AHAM developed the first sustainability standards for home appliances. AHAM's consumer safety education program has educated millions of consumers on ways to properly and safely use appliances such as portable heaters, clothes dryers, and cooking products.

Throughout this sustainability standards process, we have drawn on the product expertise within the AHAM member companies, the environmental knowledge base of Five Winds Consulting, the research of UL Environment, the international (ISO TC111) standards activities of CSA, and the standards development and writing expertise of UL and CSA.

The first year was largely spent conducting background research, basic understandings of life cycle analysis and development of a common approach. Through research conducted by Five Winds (a division of PE International) we were able to draw on the use of Life Cycle Analysis tools such as "gabi" LCA software, and Hot Spot Analysis.

The Standards Development Process

The standards development process was designed to offer the best approach to a new area. AHAM, CSA, and UL have long histories of being outstanding standards development organizations and operating under the American National Standards Institute (ANSI) and Standards Council of Canada (SCC) guidelines for development of consensus standards development. AHAM, CSA and UL decided, in the case of product sustainability standard, to develop these in a two part process. First a collaborative process was designed to give excellent opportunities for all parties to inject comments and suggestions at critical junctures in the standards development process, but to emerge from this process with a standard that could be published and used by manufacturers. Following the publishing of this non-consensus document and following experience with the use of it by all parties, the document would enter the open consensus process under ANSI and SCC guidelines.

Very early in the process, it was decided to develop a list of outside stakeholders with knowledge and experience in sustainability. We invited and were very pleased to welcome representatives from several major retailers (Lowe's, Best Buy, Walmart, Kohl's and Sears), representatives of U.S. Environmental Protection Agency, and Environment Canada, organizations with experience in consumer interest

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(Consumers Union), and environmental organizations such as Environmental Defense Fund and Carbon Disclosure Project. We welcomed the participation of The Sustainability Consortium, a private organization with academic, retail, and industry-based membership that are conducting sustainability research. We have utilized this group of stakeholders at critical junctures in the standards development process to give input, suggestions, and comments on the standards drafts. These comments were factored into the final standards.

The Standards

AHAM intends to develop a series of product sustainability standards. The first standard was for Refrigeration Products, covering household refrigerators, freezers, compact refrigerators and will ultimately be expanded to cover wine coolers and beverage centers.

The second sustainability standard encompasses over 70 different types of electrically powered portable and floor care home appliances. The third sustainability standard encompasses electrically powered clothes washers. Subsequent standards will include cooking appliances, microwave ovens, clothes dryers, dishwashers, and room air conditioners. Other products may be added as necessary.

AHAM, CSA and UL have agreed that the standards should include a significant section in the Informative Annex to the standard to explain how that particular standard was developed and give all relevant research information on the LCA and Hot Spot Analysis for each standard. In this way, the readers of the standards will have access to the rationale behind each standard, the choice of attributes and criteria, and the weighting.

The standards will include several common sections but will also include attributes or criteria that relate directly to that individual product category. For example the standards will likely all include attributes covering materials, energy during use, end-of-life, product performance and manufacturing and operations. Some product standards, where applicable, may include an attribute covering consumables that are used with the appliance. Within each of these attributes, individual criteria will be developed and the criteria will be subdivided by metrics to describe how to measure that particular aspect. Many of the criteria will be repeated throughout standards to maintain similarities for appliances and the processes under which they are evaluated for their environmental performance. These attributes and criteria are based on Life Cycle Analysis, Hot Spot Analysis, interviews with stakeholders, experiences of the product task forces who have written the standards, and available literature covering the environmental performance.

Measurement

While we believe the standards should explain how to measure the particular product, we recognize that the standards will have multiple uses. The standards can be used internal to manufacturers to plan product development. They can be used to see environmental growth of the product. They can be used to work with suppliers to reduce the environmental burden of their operations and materials. They can be used in marketing to give definitive evidence of the environmental impact of the appliance. We do not believe aspects of these standards should be made mandatory. We believe companies should be able to voluntarily use self-assessment to these standards. We also recognize that companies may wish to contact third-party assessment or Certification Bodies for a more formal review of the product and manufacturing. Because of this, we have included information on a common rating scale for measuring and displaying the sustainability level of the products within each standard.

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PROPOSAL

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1 Scope

1.1 This Standard covers two-phase refrigerant compression-type refrigeration appliances for household use included within the scope of the US Department of the Environment (DoE) and Natural Resources Canada (NRCAN) minimum energy performance requirements. This includes the following product categories:

- (a) refrigerators;
- (b) refrigerator-freezers;
- (c) chest and upright freezers; and
- (d) compact refrigerators/compact freezers.

1.2 This Standard does not cover absorption-type refrigerators or refrigeration appliances for commercial use.

2 General

2.1 In this Standard, "shall" is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the Standard; "should" is used to express a recommendation or that which is advised but not required; and "may" is used to express an option or that which is permissible within the limits of the standard. Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material. Notes to tables and figures are considered part of the table or figure and may be written as requirements. Annexes are designated normative (mandatory) or informative (nonmandatory) to define their application.

3 References

3.1 Normative references

3.1.1 Where reference is made to any Standards, such reference shall be considered to refer to the latest editions and revisions thereto available at the time of printing, unless otherwise specified.

AHAM (Association of Home Appliance Manufacturers)

ANSI/AHAM-HRF-1

*Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers
Recommended Practices for Minimizing HFC Emissions from Refrigerator-Freezer Factories*
<http://www.aham.org/ht/a/GetDocumentAction/i/17520>

European Commission

EMAS [Regulation (EC) No. 1221]

European RoHS Directive (Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment)

2002/95/EC

2005/618/EC

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GRI (Global Reporting Initiative)

Sustainable Reporting Guidelines
, version 3.1

IPC (Association Connecting Electronics Industries)

1752A
Materials Declaration Management

IPCC (Intergovernmental Panel on Climate Change)

AR4:
IPCC Fourth Assessment Report
http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html
http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

ISO (International Organization for Standardization)

11469
Plastics – Generic identification and marking of plastics products

14024
Environmental labels and declarations – Type I environmental labelling – Principles and procedures

14025
Environmental labels and declarations – Type III environmental declarations – Principles and procedures

14040
Environmental management – Life cycle assessment – Principles and framework

14044
Environmental management – Life cycle assessment – Requirements and guidelines

14050
Environmental management – Vocabulary

14064-1
Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals

ISO/IEC (International Organization for Standardization/International Electrotechnical Commission)

17000
Conformity assessment – Vocabulary and general principles

Guide 67
Conformity assessment – Fundamentals of product certification

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UNEP (United Nations Environment Programme)

Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, 8th ed. (2009)
http://ozone.unep.org/Publications/MP_Handbook/MP-Handbook-2009.pdf

United Nations

Report of the World Commission on Environment and Development: Our Common Future (1987)

US Government

CFR Part 260 (63 FR 24240, May 1, 1998)
Federal Trade Commission's Guides for the Use of Environmental Marketing Claims
<http://www.ftc.gov/bcp/grnrule/guides980427.htm>

WTO (World Trade Organization)

World Trade Organization Barriers to Trade (WTO/TBT) Agreement

3.2 Informative references

3.2.1 A list of informative references to laws and regulations for refrigeration products is provided in Annex B.

4 Definitions

4.1 The following definitions apply in this Standard:

4.2 **Attestation** – issue of a statement, based on a decision following review, that fulfillment of specified requirements has been demonstrated. [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.3 **Attribute** – a characteristic of a product that has a direct influence on the environmental performance of the product.

4.4 **Brand owner** – a company that manages a brand name. This company may or may not have engineering, manufacturing, quality assurance activities. This company may be an original equipment manufacturer (OEM) but may also purchase a finished product from an OEM and conduct sales, marketing, and management of the brand name.

4.5 **Certification** – third-party attestation related to products, processes, or persons that convey assurance that specified requirements have been demonstrated. [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.6 **Cradle-to-gate** – term commonly used to identify the extent of a system boundary of a given LCI data set or LCA study. Suggests that all inventories and impacts associated with the goods are captured up to the point of sale or exchange; therefore, a cradle-to-gate data set or study does not include the use or disposal of that good or service (e.g., component that is used in another product).

4.7 **Criteria** – the environmental requirements that the product needs to meet in order to be awarded an environmental label. [Environmental Labels and Declarations - Type I Environmental Labelling - Principles and Procedures, ISO 14024]

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4.8 **Direct greenhouse gas emission (scope I)** – see “Greenhouse gas (GHG) scopes” 4.17.

4.9 **Efficient use of raw materials** – the reduction of the mass of and/or number of materials used in the production of the final product. Some standards use the term “Dematerialization.”

4.10 **Energy indirect greenhouse gas emission (scope II)** – see “Greenhouse gas (GHG) scopes” 4.17.

4.11 **Environmental management system (EMS)** – part of an organization’s management system used to develop and implement its environmental policy and manage its environmental aspects. [Environmental management - Vocabulary, ISO 14050]

4.12 **EU eco-management and audit scheme (EMAS)** – an environmental performance management tool covered in Regulation (EC) No. 1221 of the European Parliament and of the Council of 25 November 2009, based on Environmental Management System (EMS) guided by ISO 14001, *Environmental management systems — Requirements with guidance for use*. EMAS provides a methodology for environmental audit, policy development, system implementation, and requires independent third-party verification and validation of the EMAS and results in a registry listing and certified eco-label. http://ec.europa.eu/environment/emas/index_en.htm

4.13 **First party** – generally the person or organization that provides the object. In the case of this Standard, the first party is the appliance manufacturer. Also see “Third Party”, 4.41.

4.14 **First-party declaration** – procedure by which a first party conveys assurance that the object of conformity fulfills specified requirements. [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.15 **Fresh water** – Includes surface and ground water.

4.16 **Greenhouse gas (GHG)** – gaseous constituent of the atmosphere, both natural and anthropogenic, that absorbs and emits radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth’s surface, the atmosphere, and clouds. [Environmental management - Vocabulary, ISO 14050]

4.17 **Greenhouse gas (GHG) scopes** –

Direct greenhouse gas emission (WRI scope I) – GHG emission from greenhouse gas sources owned or controlled by the organization.

Energy indirect greenhouse gas emission (WRI scope II) – GHG emission from the generation of imported electricity, heat, or steam consumed by the organization.

Other indirect greenhouse gas emission (WRI scope III) – GHG emission, other than energy indirect GHG emissions, which is a consequence of an organization’s activities, but arises from greenhouse gas sources that are owned or controlled by other organizations. [Greenhouse gases Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals, ISO 14064-1]

4.18 **Global warming potential (GWP)** – factor describing the radiative forcing impact of one mass-based unit of a given GHG relative to an equivalent unit of carbon dioxide over a given period of time.

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4.19 Impact category – a class representing environmental issues of concern to which LCA results can be assigned.

Note: Commonly accepted LCA impact categories include

- (a) climate change potential (also known as global warming potential — GWP);
- (b) acidification potential (AP);
- (c) ozone depletion potential (ODP); and
- (d) eutrophication potential (EP).

For some impact categories, LCA might not be the most appropriate quantification tool. For example, the ecotoxicity (ET) and human toxicity (HT) impact categories are more commonly determined using chemical risk assessment.

4.20 Interested parties – groups that have a stake in the success or performance of this Standard and that might be influenced by the development and use of this Standard or that might have an influence over it.

4.21 Life cycle assessment (LCA) – compilation and evaluation of the inputs, outputs, and potential environmental impacts of a product system throughout its life cycle. [Reprinted from Environmental management Life cycle assessment - Principles and framework, ISO 14040]

4.22 Life cycle inventory (LCI) – the step in conducting a life cycle assessment that involves data collection and modeling of the product system, as well as description and verification of data. This encompasses all data related to environmental (e.g., CO₂) and technical (e.g., intermediate chemicals) quantities for all relevant unit processes within the study boundaries that compose the product system.

Note: Examples of inputs and outputs quantities include inputs of materials, energy, chemicals, and “other” – and outputs of air emissions, water emissions or solid waste. Other types of exchanges or interventions such as radiation or land use can also be included. [ISO 14040 and ISO 14044]

4.23 Metric – quantification of the criteria that can be measured.

4.24 Original equipment manufacturer (OEM) – the manufacturer or assembler of the complete refrigerator. The OEM may include fabrication of components, molded or stamped parts, or partial assemblies. The OEM also refers to the location where the completed refrigerator is assembled for shipment to the retailer or end customer.

4.25 Other indirect greenhouse gas emission (WRI scope III) – See “Greenhouse gas (GHG) scopes”, 4.17.

4.26 Ozone depletion potential (ODP) – number that refers to the amount of ozone depletion caused by a substance.

Note: The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the ODP of CFC-11 is defined to be 1.0. Other CFCs and HCFCs have ODPs that range from 0.01 to 1.0. Halons have ODPs ranging up to 10, carbon tetrachloride has an ODP of 1.2, and methyl chloroform's ODP is 0.11. HFCs have zero ODP because they do not contain chlorine.

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4.27 **Ozone depleting substance (ODS)** – a compound contributing to stratospheric ozone depletion ODS that includes chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), halons, methyl bromide, carbon tetrachloride, hydrobromofluorocarbons, chlorobromomethane, and methyl chloroform.

4.28 **Packaging** – a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging is the material that contains the product, protects, preserves, and transports the product, and informs the customer. Packaging includes the customized containment intended for storage and protection of the appliance during its useful life.

4.29 **Post-consumer** – material that is an end product that has completed its life cycle as a consumer item and would otherwise have been disposed of as a solid waste. See Annex F.

4.30 **Pre-consumer** – material that has been produced in a manufacturing process but has not made it into a consumer item and would otherwise have been disposed of as a manufacturing waste or byproduct. See Annex F.

4.31 **Product certification** – an activity by which a third-party gives written assurance that a product fulfils specified requirements. [Reprinted from Conformity Assessment – Fundamentals of Product Certification, ISO/IEC Guide 67]

4.32 **Product stewardship** – product stewardship is a product-centered approach to environmental protection. It calls on those in the product lifecycle – manufacturers, retailers, users, and disposers – to share responsibility for reducing the environmental impacts of products.

Note: *Product stewardship is described by the U.S. EPA at <http://www.epa.gov/epawaste/conserve/tools/stewardship/index.htm>*

4.33 **Progress** – the ability to show, based on empirical data, an increase or decrease in the relevant measurement over a specified time period. The specified time period will be defined as the term is used in individual sections.

4.34 **Recycle** – the series of activities, including collection, separation, and processing, by which products or other materials are recovered from the solid waste stream for use in the form of raw materials for the manufacture of new products (other than fuel).

4.35 **Registration** – third-party attestation related to systems that convey assurance that specified requirements have been demonstrated. Such systems include those established for the management of product, process, or service quality and environmental performance. [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.36 **Stakeholder** – those groups or individuals:

(a) that can reasonably be expected to be significantly affected by the organization's activities, products, and/or services; or

(b) whose actions can reasonably be expected to affect the ability of the organization to successfully implement its strategies and achieve its objectives. [Reprinted from GRI]

4.37 **Standard** – document approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for products or related processes and production methods, with which compliance is not mandatory. [Reprinted from WTO TBT Agreement]

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4.38 **Sustainable development** – development that meets the needs of the present without compromising the ability of future generations to meet their own needs. [Reprinted from UN *World Commission on the Environment and Development*]

4.39 **Task force** – the AHAM-CSA Group-UL Task Force responsible for the development of and revisions to this Standard.

4.40 **Test** – technical operation that consists of the determination of one or more characteristics of a given product, material, equipment, organism, person's qualification, physical phenomenon, process, or service in accordance with a specified technical procedure (test method). [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.41 **Third-party** – the person or body that is recognized as being independent of the person or organization that provides the object, as well as the user or customer of the object. Also see "First Party", 4.13. [Reprinted from Conformity assessment – Vocabulary and general principles, ISO/IEC 17000]

4.42 **Tier-one supplier** – top-level supplier that provides components or parts to the original equipment manufacturer for integration into the final consumer product.

4.43 **Weighting** – assigning a weighting factor to each attribute, criteria, and metric in this Standard, depending on its relative importance.

5 General requirements

5.1 Units of measurement

5.1.1 For the purposes of this Standard, values shall be reported in accordance with the requirements of the individual criteria and shall be in SI units, where they exist.

5.1.2 If SI units of measurement are not available, the units used shall be documented and justified as to the reason and relevance for that change.

5.2 Attributes

5.2.1 Eligible refrigeration products shall be evaluated for their sustainability on attributes (a) – (e) below. Item (f), innovation, is a bonus attribute, and is therefore not required.

- (a) materials;
- (b) energy consumption during use;
- (c) manufacturing and operations;
- (d) product performance;
- (e) end of life; and
- (f) innovation (bonus attribute).

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5.2.2 The choice of the above six attributes is explained in Annex A. Product evaluations shall be conducted using the attribute evaluation criteria for each of the attributes outlined in this Standard.

5.2.3 Products shall receive points from the attribute categories in Items (a) to (e), according to the results of the evaluations, and may receive points from the innovation attribute category (see Clause 6.1 for clarification).

5.3 Assessment

5.3.1 Assessment of product attributes and criteria shall be based on the year the candidate product is produced.

6 Point allocation system

6.1 Products shall be allocated points for performance in each of the attribute categories in accordance with the point system. The points from all attributes shall be added together to produce a total score. A product can achieve a maximum score of 100 points from the sum of points when evaluated against the required five attributes.

6.2 The sixth attribute, innovation, is a bonus attribute. A maximum of 10 innovation points may be added to the product score if it has less than 100 points, but the product score shall not receive innovation points that take the total score above 100 points.

6.3 For products to be considered as having some level of recognized environmental performance under this Standard, such products shall:

- (a) have received a minimum of 60 points;
- (b) meet ENERGY STAR® performance criteria within the energy consumption during use attribute;
- (c) meet the requirements of the product performance attribute; and
- (d) have some points in each of the required attributes [i.e., Items (a) to (e) in Clause 5.3].

Note: *One balanced manner of reaching the 60 point level – and the scenario under which this recommendation was developed – is for the product to achieve 30 points in the energy consumption during use attribute, 12 points in the materials attribute, 5 points in the performance attribute, 5 points in the end of life attribute, and 8 points in the manufacturing and operations attribute.*

6.4 Points are awarded on each attribute through a combination of prerequisites and optional points. The maximum points achievable for each attribute are as follows:

- (a) materials (25 points);
- (b) energy consumption during use (45 points);
- (c) manufacturing and operations (15 points);
- (d) product performance (5 points);
- (e) end of life (10 points); and
- (f) innovation (10 points).

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7 Prerequisites

7.1 Prerequisites shall be met as the minimum performance level. There are two types of prerequisites:

- (a) attribute level; and
- (b) criteria level prerequisites.

7.2 Prerequisites are identified under each attribute heading.

7.3 Products shall meet all prerequisites in a particular attribute in order to be eligible for evaluation using the points system in that attribute. Products shall meet all prerequisites in a particular criterion to be eligible for evaluation using the points system in that criterion. If a product does not meet one or more of the prerequisites in a particular attribute or criteria level, it shall not be evaluated against that attribute or criteria, or receive any points from that attribute or criteria. The product may still be assessed and receive points against the other attributes or criteria, provided their associated prerequisites are met.

8 Audit scope and boundaries

8.1 There can be significant differences in the term “manufacturer” with regard to vertical integration. Some companies purchase products and have no manufacturing facilities. Other companies control the design and production through to the level of component production. It is obvious that the manufacturer that actually operates a manufacturing factory may exert more control over its sustainability-related activities compared to one that is only a brand owner and has no direct control on how its products are manufactured. Regardless of whether a manufacturer owns a brand or controls the manufacturing process, this Standard contemplates the company bringing forward a product for evaluation shall apply sustainability principles to the production process. In addition, the sustainability of the product is a property of the product and the lifecycle history that its parts have experienced.

8.2 Several organizational constructs can exist in the market and their impact is described below:

- (a) A brand owner sources a finished good from an OEM for design and manufacture and the brand owner conducts or arranges to conduct the sustainability audit:
 - (i) In this case, the sustainability analysis is performed for all attributes by the OEM's engineering organization.
 - (ii) The analysis includes the assembly process at the OEM's manufacturing operation. Full documentation is provided to the brand owner for all criteria.
 - (iii) The sustainability score(s) are provided to the OEM manufacturing operation to apply to the product.
- (b) The design, engineering, and testing are performed by the brand owner, at a location that is separate from the OEM's manufacturing operation:
 - (i) In this case, the sustainability analysis is performed for all attributes by the brand owner's engineering organization.
 - (ii) The analysis includes the assembly process at the OEM's manufacturing operation. The point value earned for the attributes is either evaluated by the brand owner or evaluated by the OEM with full documentation provided to the brand owner for all criteria.

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(iii) The sustainability score(s) are provided to the OEM manufacturing operation to apply to the product.

(c) The brand owner provides the design, testing, and manufacture of the product:

(i) In this case, the sustainability analysis is performed for all attributes by the brand owner's engineering organization.

(ii) The analysis includes the assembly process at the manufacturing operation. The point value earned for the attributes is evaluated by the brand owner with full documentation provided for all criteria.

(iii) The sustainability score is provided to the manufacturing operation to apply to the product.

8.3 The manufacturer controls the process of ordering, engineering, assembling, and quality control of the parts that make up the product at the point where assembly is complete. The manufacturer shall provide all necessary documents to support the points allocated.

8.4 If the documentation on the analysis is not available, the points shall not be awarded.

8.5 In the case of multiple manufacturing locations for the same model, the analysis for each product shall include the assembly process at the manufacturing operations where the model is produced. The point value earned for the attributes shall be evaluated by the engineering organization for each manufacturing location as a shipment weighted average based on the production volume at each location.

9 Attributes, criteria, and metrics

9.1 Materials attribute

9.1.1 General

9.1.1.1 A maximum of 25 points are available under the materials attribute.

9.1.1.2 Products shall be evaluated on the basis of the environmental and human health impact of materials used during the production phase, within the final product, and in the packaging of the product.

9.1.1.3 The product shall be evaluated based on the following criteria with the following maximum points available:

- (a) materials of concern: 7 points;
- (b) refrigerant and foam blowing agents selection: 12 points;
- (c) product recycled content: 2 points;
- (d) packaging recycled content: 2 points; and
- (e) de-materialization/efficient use of raw materials: 2 points.

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9.1.2 Attribute prerequisite

9.1.2.1 For compliance, the product shall not contain a chemical that is designated as an Annex B, Group 1 or Annex C, Group 1 ozone depleting substance as defined by the Montreal Protocol (see United Nations Environment Programme, Ozone Secretariat http://ozone.unep.org/new_site/en/index.php and the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer*).

9.1.3 Criteria: Materials of concern

9.1.3.1 Criteria prerequisite

9.1.3.1.1 For compliance, the manufacturer shall show documentation of cross-references of the materials with the regulations in effect for the jurisdictions into which the product is placed on the market.

9.1.3.2 Materials impact assessment

9.1.3.2.1 The materials impact assessment applies to substances used in the final product and in the final manufacturing/assembly processes.

9.1.3.2.2 The product shall be evaluated based on the following metrics:

(a) A product shall receive 1 point if the manufacturer establishes a Materials of Concern (toxic and restricted chemicals) Policy approved by senior engineering and/or technology management. This policy shall include tracking of US, Canadian, and international regulatory status, whether currently in force or pending actions.

(b) A product shall receive 2 points if the manufacturer creates and uses an assessment procedure for identifying the pathways of greatest exposure to the consumer during the use phase, and greatest exposure to the environment at end of life. Pathways of greatest exposure to the consumer during the use phase include exposure of particular materials to food, ice, or water intended for consumption, frequent consumer touch contact, or inhalation potential. Pathways of greatest exposure to the environment at end of life include the refrigerant, foam blowing agent release or capture, or decomposition products of particular materials following disposal.

Note: One methodology that may be used is UL 113, Section 4.2.

(c) A product shall receive 1 point for compliance with EU RoHS Directive with regard to Directive 2002/95/EC of 27 January 2003, Article 4, and 2005/618/EC of 18 August 2005, Article 1. The refrigeration product shall not contain substances in the RoHS Directive above the allowable amount, with the exception of the European ROHS regulation 2010 exemptions.

To be eligible for the points listed in Items (a) to (c) of this set of metrics, the manufacturer shall demonstrate that on the basis of IPC 1752A, or other similar documentation, that all suppliers of materials or components have documented their compliance with the above Directives. The manufacturer may utilize chemical testing results or internal audit programs to show that they are taking steps to make sure that the product in question does not contain the substances in the above Directives above the amounts allowed.

(d) A product shall receive 1 point if the manufacturer identifies, based on its assessment procedure and tracking of US, Canadian, and international regulations, which substances should be targeted for phase-out or reduced use.

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(e) A product shall receive 1 point if the manufacturer uses a technique to show that the material being considered for substitution does not show greater hazard in direct contact with food, ice, or water for consumption, or environmental pollution impact. One approach that may be used is the EPA's *Alternative Assessment Criteria for Hazard Evaluation*.

A manufacturer should be able to show that by internal policies, contact with suppliers, testing, or other documentation that their suppliers have shown reductions or that the OEM finished goods manufacturer has taken steps to construct a timetable or phase-out plan for the targeted substances.

(f) A product shall receive 1 point if the manufacturer has identified a candidate material for substitution, has removed the materials, and has replaced these with materials that do not show greater hazard in dermal, food, or environmental pollution impact. To be eligible for the points in this section, the manufacturer should be able to demonstrate the actual phase out of or reduction of chemicals that they have identified.

9.1.3.2.3 The points for this set of criteria are cumulative to a maximum of 7 points.

9.1.4 Criteria: Refrigerant and foam blowing agent selection

9.1.4.1 Criteria Prerequisite

9.1.4.1.1 A product's refrigerant and foam blowing agent shall have a total effective Global Warming Potential (GWP) of less than 1835.

9.1.4.2 Assessment

9.1.4.2.1 A product's refrigerant and foam blowing agent shall be awarded points for low total effective GWP based on the normalized mass weighted average GWP of the material in the final product, rounded to the nearest integer using the following formula (see Annex C for additional information):

$$Total\ Points = 12.18 - 0.0024 * \sum_{n=1}^N (M_n * GWP_n)$$

where

N = total number of refrigerants and blowing agents in the refrigerator design

n = individual refrigerant / blowing agent in the refrigerator design

M_n = total mass of the refrigerant or blowing agent component in the design, lbm

GWP_n = Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) 2007, Working Group 1 value of the GWP of the refrigerant or blowing agent component in the design based on the 100 year values, IPCC AR4: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

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9.1.4.2.2 Annex C contains background information, tables, and graphs for further explanation. However, the formula shown in Clause 9.1.4.2 should be used to assign the nearest integer for points.

9.1.4.2.3 GWP_e is the total effective GWP for the refrigerant materials (blowing agent and compressor gas) is the normalized summation of the mass weighted average of the refrigerant and the blowing agent:

$$GWP_e = \frac{\sum_{n=1}^N (M_n \cdot GWP_n)}{2.5 \text{ lbm}}$$

9.1.4.2.4 The points in this category are assigned based on the product rating and range from a minimum of 0 to a maximum of 12. Points are not cumulative and a product shall receive points for the one performance rating category that it meets. A product can achieve a maximum of 12 points in this attribute category.

9.1.5 Criteria: Product recycled content

9.1.5.1 Criteria prerequisite

9.1.5.1.1 The manufacturer shall inventory the percentage of pre-consumer and post-consumer recycled materials in the product, measured as a percentage of total weight of the product. Regional or global average recycled content data may be used where more specific information from a supplier is not available.

9.1.5.2 Assessment

9.1.5.2.1 The purpose of this set of criteria is to seek the most optimal level of recycled material content in appliances without degrading the performance, safety, or aesthetics of the appliance. It is important to design for the use of both pre-consumer and post-consumer recycled material content.

9.1.5.2.2 The product shall be evaluated based on the following:

(a) A product shall receive 1 point if the manufacturer implements a program and sets targets for increasing the percentage of pre-consumer recycled materials in the product and shows progress toward meeting the targets.

(b) A product shall receive 1 point if the manufacturer implements a program and sets targets for increasing the percentage of post-consumer recycled materials in the product and shows progress toward meeting the targets.

9.1.5.2.3 If the company does not have a fixed baseline at present for comparison, units with similar features produced within the preceding five years shall be used for comparison. If the company does not have a similar unit from previous production for comparison (i.e., the company is producing and introducing into the market a totally new model family), the manufacturer should review the product design against that used for other similar featured products in the preceding five-year period. The new model or current model design should be compared against a baseline unit produced within the preceding five years for pre- and post-consumer recycled product material to determine progress.

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9.1.5.2.4 The points in this category are cumulative to a maximum of 2 points.

9.1.6 Criteria: Packaging recycled content

9.1.6.1 Criteria prerequisite

9.1.6.1.1 The manufacturer shall inventory the percentage of pre-consumer and post-consumer recycled materials in the packaging, measured as a percentage of total weight of the product packaging.

9.1.6.2 Assessment

9.1.6.2.1 The purpose of this set of criteria is to seek the most optimal level of recycled content for product packaging without degrading the performance of the packaging and affecting the safety or performance of the appliance.

9.1.6.2.2 The product shall be evaluated based on the following metrics:

(a) A product shall receive 1 point if the manufacturer implements a program and sets targets for increasing the percentage of pre-consumer recycled materials in the product packaging and shows progress toward meeting the targets.

(b) A product shall receive 1 point if the manufacturer implements a program and sets targets for increasing the percentage of post-consumer recycled materials in the product packaging and shows progress toward meeting the targets.

9.1.6.2.3 If the company does not have a fixed baseline at present for comparison, units with similar features produced within the preceding five years shall be used for comparison. If the company does not have a similar unit from previous production for comparison (i.e., the company is producing and introducing into the market a totally new model family), the manufacturer should review the packaging against that used for other similar size products in the preceding five-year period. The new model or current model packaging should be compared against the baseline unit produced within the last five years for pre- and post-consumer recycled packaging material to determine progress.

9.1.6.2.4 The points in this category are cumulative to a maximum of 2 points.

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