NSF International

Joint Committee Correspondence

MEMORANDUM

TO: Joint Committee on Environmental Leadership Standard for Servers

FROM: Matthew Realff, Chairperson of the Joint Committee

DATE: **January 17, 2017**

SUBJECT: Proposed revision to IEEE-NSF Joint Standard – *IEEE 1680.4/NSF 426 Standard for Environmental Leadership Assessment of Servers* (426i2r2).

Draft 2 of IEEE-NSF Joint Standard - *IEEE 1680.4/NSF 426 Standard for Environmental Leadership Assessment of Servers,* issue 2, is being forwarded to the Joint Committee for consideration. Please review the changes proposed to this standard and **submit your ballot by February 16, 2017** via the NSF Online Workspace (http://standards.nsf.org).

This ballot allows voters the opportunity to change or reaffirm their original vote based on the proposed revisions to the standard. Please note that if you do not return a vote in this revision ballot, your original vote will remain in effect.

If submitting comments on Draft 2, please use the version (highlight and strikethrough) that is provided in this memo (below). A CLEAN copy is also provided for your reference only.

Purpose

The purpose of this ballot is to affirm the proposed new and revised language of IEEE-NSF Joint Standard - *IEEE 1680.4/NSF 426 Standard for Environmental Leadership Assessment of Servers*, based on the comments received during the balloting period for revision 1.

Background

The comments received during the balloting period for revision 1 were addressed by NSF and IEEE jointly through Joint Task Group (JTG) meetings. The JTG met at a face to face meeting on October 25th, 26th and 27th, and teleconferences on November 10th, 22nd, December 13th, 20th, 2016 and January 5th and 10th, 2017. All of the comments submitted for the IEEE and NSF ballots, and responses proposed by the JTG, are included in the attached reference document titled ***IEEE NSF Ballot Comments 170110 Final.***

During the NSF 426 Joint Committee teleconference on January 10th, 2017, the JC voted in favor of balloting the proposed revisions from the JTG:

> VOTE: 16 voted in favor (12 via teleconference and 4 via email)
> 1 opposed (Sarah Westervelt). (Craig Stephens, not a member or observer of NSF 426 JC, also voiced concern). Motion Passed.

Please see the attached JC meeting summary titled ***NSF 426 Meeting Summary 170110*** under the referenced items for additional information.

The proposed revisions are shown in highlight and strikethrough in the below ballot document.

Issues:

This revision will have no negative impact on public health.

If you have any questions about the technical content of the ballot, you may contact me in care of:

Chairperson, Joint Committee
c/o Jessica Slomka
Joint Committee Secretariat
NSF International
Tel: (734) 214-6219
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Standard for Environmental Leadership Assessment of Servers

1 Overview

1.1 Scope

This standard defines environmental performance criteria for computer servers as defined in the ~~Energy Star~~ENERGY STAR Server specifications[1]~~, including managed servers and blade servers~~.

This standard establishes criteria for multiple levels of environmental leadership and performance throughout the product life cycle, relating to energy efficiency; management of substances; preferable materials use; product packaging; design for repair, reuse and recycling; product longevity; responsible ~~end-of-service/~~end-of-life management; and corporate responsibility ~~reduction or elimination of environmentally sensitive materials, materials selection, design for end of life, life cycle extension, energy conservation, end of life management, corporate responsibility, and packaging~~.

1.2 Purpose

The purpose of this standard for servers is to establish product environmental performance criteria and corporate performance metrics that exemplify environmental leadership in the market.

The standard provides a framework and ~~consistent~~ standardized set of performance objectives for manufacturers and the supply chain in the design and manufacture of servers and server components. For purchasers, this standard provides a consensus-based definition of key environmental attributes and performance metrics, alleviating individual purchasers from the arduous and complex task of defining environmental performance for servers. This standard can be used within an established system for the identification of environmentally preferable products by purchasers and to provide market recognition for conforming products and brand manufacturers.

This standard ~~was developed based on the principle that only~~ is an environmental leadership standard, defined with the recognition that only leading products, ~~those in~~ i.e., approximately ~~the top third of~~ 25 – 35% of the products available in the marketplace, ~~are expected~~ would be likely to qualify to ~~the standard at~~ the base or Bronze level, and even fewer at the Silver and Gold levels, at the date of publication of ~~the~~this standard, although this standard does not limit the number of products that can so qualify. ~~Only a very few, if any, products are expected to meet the highest performance level (Gold) at the date of publication of the standard.~~ As the environmental performance of products that are available in the marketplace improves, it is intended that the criteria will be updated and revised to set a higher performance standard for leadership products.

[1] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~

This standard will be continually maintained and periodically reviewed to ensure that the definition of environmental leadership, as reflected in the performance criteria, progresses with the evolution of technology and services and environmental improvements in the product sector.

2 Normative References

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies. European Union Directives, which contain the adoption date in their title, shall not be treated as "dated standards or regulations" (as defined above). Unless explicitly indicated otherwise, when a European Union Directive is referenced in this standard, a new or updated European Union Directive shall apply as the referenced Directive upon its enforcement date.

80 Plus[2]

American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 4th ~~3rd~~ Edition[3]

ANSI/AIHA/ASSE Z10, Occupational Health and Safety Management System[4]

ASTM D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics[5]

ASTM D7611/D7611M, Standard Practice for Coding Plastic Manufactured Articles for Resin Identification[6]

BizNGO Chemical Alternative Assessment Protocol[7]

BS EN 15343:2007, Plastics. Recycled plastics. Plastics recycling traceability and assessment of conformity and recycled content[8]

Clean Cargo Working Group (CCWG) [9]

~~Conflict Free Sourcing Initiative (CFSI)~~[10]

Conflict Free Tin Initiative[11]

[2] http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx
[3] https://www.ashrae.org/resources--publications/bookstore/datacom-series#thermalguidelines
[4] http://www.asse.org/ansiaihaasse-z10-2012-occupational-health-safety-management-systems/ansi/aiha/asse-z10-2012-occupational-health-and-safety-management-systems/
[5] ASTM publications are available from the American Society for Testing and Materials http://www.astm.org/
[6] ASTM publications are available from the American Society for Testing and Materials http://www.astm.org/
[7] http://www.biznGO.org/alternatives-assessment
[8] http://shop.bsigroup.com/ProductDetail/?pid=000000000030097507
[9] https://www.bsr.org/en/collaboration/groups/clean-cargo-working-group
[10] ~~http://www.conflictfreesourcing.org/conflict-free-smelter-refiner-lists/~~
[11] http://solutions-network.org/site-cfti/

~~Creative Commons[12] (CC-BY)~~

DIN 6120-1 - Marking of packaging and packaging materials for recycling purposes - Plastics packaging and packaging materials - Part 1: Graphical symbols[13]

~~Ecospold v.2[14]~~
EcoTransIT[15]

ECMA-341 Environmental Design Considerations for ICT & CE Products, 4th Edition / December 2010[16]

Electronic Industry Citizenship Coalition (EICC) Code of Conduct[17]

EN 16258 Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)[18]

EN 50581, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances[19]

EN 50625 Collection, logistics & treatment requirements for WEEE[20]

ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~[21]

e-Stewards *Standard for Responsible Recycling and Reuse of Electronic Equipment*[22]

European Chemicals Agency, Guidance on requirements for substances in articles[23]

European Commission Joint Research Centre, International reference Life Cycle Data System (ILCD) Handbook[24]

[12] www.creativecommons.org
[13] http://www.en-standard.eu
[14] Ecospold V.2 Data Format http://www.ecoinvent.org/data-providers/how-to-submit-data/ecospold2/
[15] http://www.ecotransit.org/
[16] ECMA-341 Environmental Design Considerations for ICT & CE Products, 4th Edition / December 2010.
[17] http://www.eiccoalition.org/
[18] http://www.en-standard.eu/csn-en-16258-methodology-for-calculation-and-declaration-of-energy-consumption-and-ghg-emissions-of-transport-services-freight-and-passengers/
[19] https://www.en-standard.eu/csn-en-50581-technical-documentation-for-the-assessment-of-electrical-and-electronic-products-with-respect-to-the-restriction-of-hazardous-substances/
[20] http://www.cenelec.eu/
[21] ENERGY STAR publications are available from the ENERGY STAR Website at http://www.energystar.gov
[22] http://e-stewards.org
[23] http://echa.europa.eu/
[24] http://eplca.jrc.ec.europa.eu/?page_id=86. See Recommendations for Life Cycle Impact Assessment in the European context (EUR 24571 EN-2011) at: http://eplca.jrc.ec.europa.eu/uploads/ILCD-Recommendation-of-methods-for-LCIA-def.pdf

European Union, Eco-Management and Audit Scheme (EMAS)[25]

European Union, European Commission Directive 94/62/EC of the European Parliament and of the Council on Packaging and Packaging Waste[26]

European Union, European Commission Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) [27]

European Union, European Commission Directive 2006/66/EC of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC

European Union, European Council former Directive 2002/95/EC as amended by 2005/618/EC and 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

European Union Product Environmental Footprint Guide[28]

European Union Regulation (EC) No. 1907/2006, Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)[29]

Global Logistics Emissions Council (GLEC) Framework[30]

Global Reporting Initiative[31]

GreenScreen® for Safer Chemicals methodology[32]

IEC 62321-3-1, Determination of certain substances in electrotechnical products - Part 3-1: Screening - Lead, mercury, cadmium, total chromium and total bromine using X-ray fluorescence spectrometry

IEC 62321-3-2, Determination of certain substances in electrotechnical products - 3-2: Screening - Total bromine in polymers and electronics by Combustion - Ion Chromatography

IEC 62474, Material declaration for products of and for the electrotechnical industry[33]

IEC TR 62635 Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment[34]

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[25] http://ec.europa.eu/environment/emas/index_en.htm
[26] European Union Directives are available at http://europa.eu
[27] European Union Directives are available at http://europa.eu
[28] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179
[29] REACH regulations and information are available from the European Union at http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm
[30] http://www.smartfreightcentre.org/glec/what-is-glec
[31] https://www.globalreporting.org/
[32] www.greenscreenchemicals.org/method/method-documents
[33] IEC publications are available from the International Electrotechnical Commission http://www.iec.ch/
[34] Ibid

IEC 63000, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

IEEE 1680.2-2012 Standard for the Environmental Assessment of Imaging Equipment[35]

IEEE 1874 – IEEE Standard for Documentation Schema for Repair and Assembly of Electronic Devices/oManual[36]

International Accreditation Forum (IAF)[37]

International Air Transportation Association (IATA) RP1678[38]

International Maritime Organization (IMO)[39]

Interstate Chemicals Clearinghouse (IC2) Alternatives Assessment Guide, Hybrid or Sequential Frameworks[40]

IPCC Guidelines for National Greenhouse Gas Inventories, 2006[41]

ISO 179, Plastics—Determination of Charpy impact properties[42]

ISO 180, Plastics—Determination of Izod impact strength

ISO 1043, Plastics—Symbols and Abbreviated Terms

~~ISO 9001, Quality Management Systems~~

ISO 11469, Plastics—Generic identification and marking of plastics products

ISO 14001, Environmental management systems—Requirements with guidance for use

ISO 14021, Environmental Labels & Declarations—Self-declared environmental claims (Type II environmental labelling)

ISO 14025, Environmental labels and declarations—Type III environmental declarations—Principles and procedures

[35] IEEE publications are available from The Institute of Electrical and Electronics Engineers http://standards.ieee.org/.
[36] IEEE publications are available from The Institute of Electrical and Electronics Engineers http://standards.ieee.org/
[37] http://www.iaf.nu/
[38] http://www.cofret-project.eu/downloads/pdf/rp-carbon-calculation.pdf
[39] http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/MEPC.1_Circ.684_Guidelines%20for%20Voluntary%20use%20of%20EEOI.pdf
[40] www.newmoa.org/prevention/ic2/IC2_AA_Guide-Version_1.pdf
[41] Available online at http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
[42] ISO publications are available from the ISO Central Secretariat http://www.iso.org/

ISO 14040, Environmental management—Life cycle assessment—Principles and framework

ISO 14044, Environmental management—Life cycle assessment—Requirements and guidelines

~~ISO/IEC 17020, Conformity assessment – Requirements for the operation of various types of bodies performing inspections~~

ISO 17021-1, Conformity assessment – Requirements for bodies providing audit and certification of management systems

ISO/IEC 17065, Conformity assessment – Requirements for bodies certifying products, processes and services

~~ISO 18602, Packaging and the environment – Optimization of the packaging system~~

ISO 50001 - Energy management systems — Requirements with guidance for use

~~IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book")~~[43]

LCA Society of Japan, Life-cycle Impact Assessment Method based on Endpoint modeling[44]
Model Toxics in Packaging Legislation [compilation was developed by CONEG and is administered by the Toxics in Packaging Clearinghouse (TPCH)][45]

National Academies of Science, Design and Evaluation of Safer Chemical Substitutions – A Framework to Inform Government and Industry Decisions[46]

OECD, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas~~, 12 n.2 (2011)~~[47]

OHSAS 18001, Occupational Health and Safety Management[48]

Responsible Recycling ("R2") Standard for Electronics Recyclers[49]

SmartWay[50]

Social Accountability (SA) 8000[51]

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[43] ~~http://goldbook.iupac.org/C01039.html~~
[44] http://lca-forum.org/english/
[45] Available at http://www.toxicsinpackaging.org/
[46] http://www.nap.edu/catalog.php?record_id=18872
[47] Available at https://mneguidelines.oecd.org/mining.htm
[48] For OHSAS 18001, see http://www.ohsas-18001-occupational-health-and-safety.com/ohsas-18001-kit.htm and http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/
[49] http://www.sustainableelectronics.org/r2-documents/
[50] https://www.epa.gov/smartway
[51] http://www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&pageId=937

Solutions for Hope[52]

Substitution Support Portal (SUBSPORT)[53]

UL ECVP 2809 (2nd edition), Environmental Claim Validation Procedure (ECVP) for Recycled Content[54]

United Nations Protocol on Pollutant Release and Transfer Registry[55]

University of Leiden Institute of Environmental Sciences (CML), Handbook on LCA[56]

U.S. Department of Energy Superior Energy Performance (SEP)[57]

U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502[58]

U.S. EPA GHG Reporting Rule, Subpart I[59]

U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.[60]

U.S. EPA Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing (U.S. EPA DRE Protocol)[61]

U.S. EPA Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) 2.1[62]

U.S. EPA Toxics Release Inventory[63]

U.S. Securities Exchange Act of 1934, Rule 13p-1[64]

WEEELABEX Treatment Standard[65]

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[52] http://solutions-network.org/site-solutionsforhope/
[53] http://www.subsport.eu/about-the-portal
[54] http://ulstandards.ul.com/standard/?id=2809
[55] Available at http://www.unece.org/env/pp/prtr/Protocol%20texts/PRTR_Protocol_e.pdf
[56] http://cml.leiden.edu
[57] www.energy.gov/isosep
[58] https://www.sec.gov/spotlight/dodd-frank/speccorpdisclosure.shtml
[59] http://www.epa.gov/ghgreporting/reporters/subpart/i.html
[60] http://www.epa.gov/research/NRMRL/std/lca/pdfs/chapter1_frontmatter_lca101.pdf
[61] http://www.epa.gov/semiconductor-pfc/documents/dre_protocol.pdf
[62] U.S. EPA, Tool for the Reduction and Assessment of Chemical and other Environmental Impacts, http://www.epa.gov/nrmrl/std/traci/traci.html
[63] Available at http://www.epa.gov/TRI/
[64] 17 CFR Parts 240 an 249b at https://www.sec.gov/rules/final/2012/34-67716.pdf
[65] http://media.wix.com/ugd/968606_0dbec6e7617cd83ae8307684f59d4244.pdf

3 Definitions, special terms, acronyms, and abbreviations

3.1 Definitions

Additives and fillers: ~~Ingredients~~ Substances or compounds such as pigments and stabilizers added to polymers to improve processing, properties and end-use performance.

Blade server[66]: A computer server that is designed for use in a blade chassis. A blade server is a high-density device that functions as an independent computer server and includes at least one processor and system memory, but is dependent upon shared blade chassis resources (e.g., power supplies, cooling) for operation. A processor or memory module that is intended to scale up a standalone server is not considered a blade server.

Bulk packaging: Single primary package used to ship more than one product.

Central processing unit (CPU): The logic circuitry that responds to and processes the basic instructions that drive a server. A typical CPU is a physical package to be installed on the server motherboard via a socket or direct solder attachment. The CPU package may include one or more processor cores.

Commonly available tools: A hand operated tool which is readily available for purchase by any individual or business without restrictions.

Competent authority: The governmental authority designated to be responsible, within such geographical areas as the Party may think fit, for receiving notifications of transboundary movements and any related information and for responding to such notifications.[67]

Computer server[68]: ~~Computer servers~~ Hardware system providinge services and manage networked resources for client devices (e.g., desktop computers, notebook computers, thin clients, wireless devices, PDAs, IP telephones, other computer servers, or other network devices).

NOTE 1 **–** For the purposes of this standard, the definition of computer server aligns with ENERGY STAR Program Requirements for Computer Servers 2.1. A computer server:

- is sold through enterprise channels for use in data centers and office/corporate environments. ~~A computer server~~
- is primarily accessed via network connections, versus directly-connected user input devices such as a keyboard or mouse. ~~For purposes of this standard, a computer server must meet all of the following criteria:~~
- Is marketed and sold as a computer server;
- Is designed for and listed as supporting one or more computer server operating systems (OS) and, or hypervisors;
- Is targeted to run user-installed applications typically, but not exclusively, enterprise in nature;
- Provides support for error-correcting code (ECC) and, or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations);

[66] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~

[67] United Nations Environment Program, Basel Convention.

[68] ~~Ibid~~ ENERGY STAR Program Requirements for Computer Server Version 2.1

- Is packaged and sold with one or more AC-DC or DC-DC power supplies; and
- Is designed such that all processors have access to shared system memory and are visible to a single OS or hypervisor.

NOTE 2 – also see *Product*.

Conflict free: A product that does not contain ~~conflict~~ minerals that directly or indirectly finance or benefit armed groups in the Democratic Republic of the Congo (DRC) or an adjoining country.

NOTE 1 **–** Conflict minerals that a manufacturer or its supplier(s) obtains from recycled or scrap sources, are considered conflict free.

NOTE 2 – The term "armed group" [69] means an armed group that is identified as perpetrators of serious human rights abuses in the annual Country Reports on Human Rights Practices under sections 116(d) and 502B(b) of the Foreign Assistance Act of 1961 (22 U.S.C. 2151n(d) and 2304(b)) relating to the Democratic Republic of the Congo or an adjoining country.

Conflict minerals[70]:

- Columbite-tantalite (coltan), cassiterite, gold, wolframite, or their derivatives, which are limited to tantalum, tin, and tungsten; and

- Any other mineral or its derivatives determined by the U.S. Secretary of State to be financing conflict in the Democratic Republic of the Congo or an adjoining country.

Conformity assessment body: An independent, third-party, organization that conducts audits and determines conformance against the requirements of a specific standard.

Cosmetic blank/dummy: Cover or mockup provided as a placeholder for option(s). ~~Examples may include, but are not limited to: cosmetic covers, blanks, hard drive dummies, power supply dummy, power supply blank, optical drive blank, etc.~~

~~**Declaration:** Information made publicly available:~~

- ~~By the manufacturer on a publicly available registry; or~~
- ~~On the manufacturer's website in the form of a certification report, or equivalent, issued by the certifying organization; or~~
- ~~On the manufacturer's website, if the product is self-declared to conform to the standard.~~

De-installed: Unplugged equipment that is destined for, or intended to be destined for, removal from a customer site.

Disclosure: Information made available to the audience specified in criterion (e.g. purchasers, public, etc.).

[69] U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502, and the U.S. Securities and Exchange Act of 1934, Rule 13p-1 (17 CFR Parts 240 and 249b)

[70] As defined in the U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502, and the U.S. Securities and Exchange Act of 1934, Rule 13p-1 (17 CFR Parts 240 and 249b)

Direct reuse: The using again, by a person other than its previous owner, of equipment and components that are not waste for the same purpose for which they were conceived without the necessity of repair, refurbishment or hardware upgrading.

Disposal: Any operation which does not lead to materials recovery, recycling, reclamation, or reuse of equipment or components, with or without energy reclamation. This includes operations which result in: the deposition of waste into, or on, land or water, or treatment via incineration.

Documentation: Information to be provided at time of verification or certification.

Electronic components: An individual part or combination of parts that, when together, perform a design function(s) and are typically directly attached to a printed circuit board.

NOTE—Examples include cables, connectors, sockets, discrete printed circuit board components and integrated circuits.

Elemental chlorine free (ECF): Packaging material produced with pulp from virgin content that has been bleached using a chlorine derivative such as chlorine dioxide (ClO2), but without the use of elemental chlorine (Cl).

End-of-life: Life cycle stage of electronic equipment and components when they are no longer intended for use and are destined, or intended to be destined for, dismantling, material recovery, recycling or disposal.

~~**End-of-service:** Life cycle stage of electronic equipment and components when they are no longer wanted by the customer whether in working order, or not, or suitable of being prepared for reuse~~.

Energy recovery: An operation where the material is used principally as a fuel or to generate energy.

ENERGY STAR certified: A product has been found to be in conformance with the ENERGY STAR Computer Servers eligibility criteria by an ENERGY STAR approved third-party certification body, and the product is listed on the ENERGY STAR Qualified Product List located at www.energystar.gov.

Environmental management system[71]: Part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities.

NOTE 1 – Management system: set of interrelated or interacting elements of an organization to establish policies and objectives and processes to achieve those objectives. A management system can address a single discipline or several disciplines (e.g. quality, environment, occupational health and safety, energy, financial management). The system elements include the organization's structure, roles and responsibilities, planning and operation, performance evaluation and improvement. The scope of a management system can include the whole of the organization, specific and identified functions of the organization, specific and identified sections of the organization, or one or more functions across a group of organizations.

NOTE 2 – Environmental aspects: element of an organization's activities or products or services that interacts or can interact with the environment.

[71] ISO 14001:2015 ~~Second Edition~~: 09/01/2015 ~~2004-11-15~~

~~Part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects.~~

~~NOTE 1 – A management system is a set of interrelated elements used to establish a policy and objectives and to achieve those objectives.~~

~~NOTE 2 – A management system includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources.~~

External enclosure: The outside casing of the product that houses its components.

Fan: An instrument for producing a current of air, comprised of 1) an impeller, or assembly of blades attached to an integral hub; and 2) an enclosure that surrounds the blades and hub and attaches to the hub.

Feedstock: Raw material used in a manufacturing process.

Fiber-based: Cellulose material derived from trees and other plants**,** including but not limited to wood, hemp, kenaf, palm, bamboo, straw and bagasse.

Final disposition: The last facility or operation managing equipment and or components and materials derived from them at which they either:

- Cease to be a waste by being processed into materials that will be used directly in manufacturing new products or processes;

~~– Are prepared for reuse (including direct reuse); and, or~~

- Have arrived for disposal and are finally disposed.

Firmware: ~~System, hardware, component, or peripheral programming provided with the product to provide basic instructions for hardware to function inclusive of all applicable programming and hardware updates.~~ Combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device.

First customer: ~~Customer~~ Organization or individual who first acquires (purchases, leases, receives by donation, etc.) and then uses the new product.

~~**GRI boundary:** The area of operations and impact upon which the Global Reporting Initiative (GRI) disclosure is based. The boundary may be "within the organization" or it may include some part of the organization's supply chain.~~

Idle state[72]: The operational state in which the OS and other software have completed loading, the computer server is capable of completing workload transactions, but no active workload transactions are requested or pending by the system (i.e., the computer server is operational, but not performing any useful work). For systems where ACPI ~~s~~Standards are applicable, idle state correlates only to ACPI System Level S0.

[72] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~

Impact assessment categories[73]: Classifications of human health and environmental effects caused by a product throughout its life cycle.

Initial service providers: Companies who contract directly with manufacturers or companies who contract with an agent acting on behalf of the manufacturer to provide one or more of the following take-back services: preparation for reuse or treatment of product/equipment/components.

Inventory data: The identification and quantification of energy, resource usage, and environmental emissions for a particular product, process, or activity.

Life cycle assessment (LCA)[74]: Compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product system throughout its life cycle.

~~**Life cycle inventory**~~**:**

Manufacturer: Any natural, legal person or entity who:

- Manufactures a product, or
- Has a product designed or manufactured, or
- Places a brand ~~l~~Labels on a ready-made product,

~~A~~and places it on the market under their own name or trademark.

Multi-node server[75]: A computer server that is designed with two or more independent server nodes that share a single enclosure and one or more power supplies. In a multi-node server, power is distributed to all nodes through shared power supplies. Server nodes in a multi-node server are not designed to be hot-swappable.

Optical components: An individual part or combination of parts that are used in the creation, transmission, manipulation, or detection of light**.**

Packaging: All materials of any nature to be used for the containment, protection, handling, delivery and presentation of products from the manufacturer to the user or the ~~consumer~~ customer. ~~See packaging system.~~

> NOTE - for the purposes of this standard, unless otherwise noted, the term “packaging” only applies to sales packaging or primary packaging, i. e. packaging that contains and protects and is designed to deliver a product unit to the final user or ~~consumer~~ customer, and does not include pallets or the mechanism such as nails, screws and bolts that is used to temporarily attach primary packaging to pallets.

[73] U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.

[74] ISO 14044: ~~1997(E)~~ 2006

[75] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~

Packaging component[76]: Any individual assembled part of packaging such as, but not limited to, any interior or exterior blocking, bracing, cushioning, weatherproofing, exterior strapping, coatings, closures, inks, and labels.

~~**Packaging system[77]:** Complete set of packaging for a packaged good, encompassing one or more of the following that are applicable (depending on the packaged goods): primary packaging, secondary packaging (i.e., a grouping of single unit primary packages), tertiary (i.e., distribution or transport) packaging.~~

~~NOTE – "Primary packaging" is defined above under "packaging"~~

Pedestal server[78]: A self-contained computer server that is designed with PSUs, cooling, I/O devices, and other resources necessary for stand-alone operation. The frame of a pedestal server is similar to that of a tower client computer.

Postconsumer recycled material[79]: Material generated by households or by commercial, industrial and institutional facilities ~~in their role as end-users of the product~~, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

NOTE – This definition applies to materials such as plastic, fiber, metal, etc.

Prepared for reuse: Equipment and components that have been checked, tested, cleaned, and/or repaired, and determined to be safe and fully functional~~,~~ with the intent to be placed back on the market in their original use or in their upgraded state, without further processing.

Principal storage device: Primary hardware~~, or hard drive,~~ in the product that stores the operating system, applications and data.

Printed circuit board: A thin board made of fiberglass, composite epoxy, or other laminate material with conductive pathways etched or "printed" onto the board, with the purpose of or to be used for the connection of different components on the board, such as transistors, resistors, and integrated circuits.

Processed chlorine free (PCF): Packaging material produced with pulp from virgin and/or recycled content that has been bleached without any type of chlorine, or that has not been bleached at all. Recycled content may have originally been bleached with chlorine or chlorine derivatives.

Processor (CPU): ~~The logic circuitry that responds to and processes the basic instructions that drive a server. A typical CPU is a physical package to be installed on the server motherboard via a socket or direct solder attachment. The CPU package may include one or more processor cores.~~ See *Central processing unit (CPU)*

Product: A computer server:

- Within the scope of the ENERGY STAR Program Requirements for Computer Servers Version 2.1~~0~~, including managed servers and blade servers, and

[76] Model Toxics in Packaging Legislation (www.toxicsinpackaging.org)
[77] ~~ISO 18602: 2013(E)~~
[78] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~
[79] ISO 14021, Environmental Labels & Declarations

– A marketing model with one or more specific configurations identified, inclusive of the product's full range of configurations and as tested for compliance with ENERGY STAR.

NOTE 1 – ENERGY STAR Program Requirements for Computer Servers Version 2.1~~0~~ defines a computer server as all hardware and materials contained within the chassis, including the power supply unit.

NOTE 2 – also see *Computer Server*.

NOTE 3 – also see *Blade Server.* Only the blade server and not the blade chassis (i.e., shared blade chassis resources required for operation of the blade server) is within the scope of this standard.

Product specification: Product ~~marketing~~ details of key parametric information, such as, but not limited to, number of CPUs, amount of memory, number of internal disk drives, I/O bandwidth, and enclosure dimensions.

Publicly available: Obtainable to the public without restriction of access; for example, cannot require member only access. A requirement to provide a name and, or organization to obtain access is not considered a "restriction of access".

Rack-mounted server[80]: A computer server that is designed for deployment in a standard 19-inch data center rack as defined by EIA-310, IEC 60297, or DIN 41494. For the purposes of this standard, a blade server is considered under a separate category and excluded from the rack-mounted category.

Recovery: Operations that are part of a process to recapture elements, compounds, or materials and transform them into commodities ~~which need no further processing, cleaning, separation, or recycling and are not destined for disposal~~.

Recyclable: Materials that can be removed or recovered from the whole product and put back into productive use as a material, not including energy recovery~~, using technologies that are available in existing recycling systems~~.

Recycled content[81]: Proportion, by weight, of recycled material in a product or packaging. Only preconsumer and postconsumer materials shall be considered as recycled content.

Recycling: Operations by which products, components, materials, or waste are processed and converted into raw materials for use in the production of new products or in processes, not including energy recovery or disposal.

Refurbishment: Functional or aesthetic maintenance or repair of a product to restore to original, upgraded, or ~~upgraded~~ equivalent functional state.

Reuse: Using again, equipment or components for the originally intended purpose, a similar purpose, or in an upgraded state, possibly after refurbishment, repair or hardware upgrading.

Reuse operator: The entity responsible for preparing equipment or components for reuse.

[80] ENERGY STAR Program Requirements for Computer Server Version 2.1~~0~~

[81] ISO 14021, Environmental Labels & Declarations

Sensitivity analysis[82]**:** A systematic evaluation process for describing the effect of variation of inputs to a system on the output.

~~**Substance**[83]**:** Matter of constant composition best characterized by the entities (molecules, formula units, atoms) it is composed of. Physical properties such as density, refractive index, electric conductivity, melting point etc. characterize the chemical substance.~~

Supplier: Entity that provides goods or services to the manufacturer.

Tier 1 suppliers: A party with whom the manufacturer directly contracts that is either a final assembly site, i.e. performs final assembly of the product subassemblies into the enclosure, and packages the product for transit; or is an original design manufacturer (ODM), i.e. performs design and manufacture of the product, which may include contracting with suppliers of materials, components, subassemblies, manufacturing services, or product assembly services. Tier 1 supplier does not include suppliers contracted with/by a final assembly site or ODM. ~~Companies that provide the manufacturer with materials, components, subassemblies, manufacturing services, or product assembly services, and with which the manufacturer has a contractual relationship.~~

Totally chlorine free (TCF): Packaging material produced with pulp from virgin content that has been bleached without any type of chlorine, or that has not been bleached at all.

Treatment: Material recovery or disposal operations, including preparation prior to recovery or disposal. ~~Note: This definition aligns with international convention such as IEC TR 62635, although it is recognized that regulation in the U.S. does not consider "disposal" as part of "treatment".~~

Treatment facility: Location where end-of-life equipment, components, or materials undergo treatment.

Treatment operator: The entity responsible for the treatment of equipment or components.

3.2 Special terms, acronyms and abbreviations

ANAB: ANSI-ASQ National Accreditation Board

BOB: Buffered on board

BIOS: Basic input/output system

CAS: Chemical abstract number

CCWG: Clean Cargo Working Group
CPU: Processor or central processing unit

CSR: Corporate sustainability report

[82] U.S. EPA, Life Cycle Assessment: Principles and Practice, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, U.S. EPA: Cincinnati, OH.
[83] ~~IUPAC, Compendium of Chemical Terminology, 2nd ed. (the "Gold Book")~~ ~~http://goldbook.iupac.org/C01039.html~~

DDR: Double data rate

DIMMs: Dual in-line memory modules

DRC: Democratic Republic of the Congo

EC: European community number

ECC: Error-correcting code

ECF: Elemental chlorine free

EICC: Electronic Industry Citizenship Coalition

EMAS: European Union Eco-Management and Audit Scheme

EMI: Electromagnetic interference

EMS: Environmental management system

ESD: Electrostatic discharge

EPA: Environmental Protection Agency

F-GHG: Fluorinated greenhouse gas
GHG: Greenhouse gas

GLEC: Global Logistics Emissions Council

HTML: Hypertext markup language

IAF: International Accreditation Forum

IPSA: independent private sector audit

IATA: International Air Transportation Association

IMO: International Maritime Organization

IS: International System of Units

LCA: Life cycle assessment

OECD: Organisation for Economic Co-operation and Development

OS: Operating system

PCR: Postconsumer recycled

PCF: Processed chlorine free

PDF: Portable document format

PSU: Power supply unit

QR: Quick response

SASB: Sustainability Accounting Standards Board

SEC: Securities and Exchange Commission

SVHC: Substances of Very High Concern

TCF: Totally chlorine free

URL: Uniform Resource Locator

WEEE: Waste electrical and electronic equipment

VAP: Validated Audit Process

XML: Extensible markup language

4 Conformance, evaluation and assessment

This standard is divided into eight performance ~~environmental~~ categories consisting of required criteria and optional criteria:

- Energy efficiency
- Management of substances
- Preferable materials use
- Product packaging
- Design for repair, reuse and recycling
- Product longevity
- Responsible ~~end-of-service/~~end-of-life management
- Corporate responsibility

4.1 Criteria

A summary of all criteria in this standard, including required criteria and optional points, is provided in Annex A.

4.1.1 Required criteria

Each category has required criteria that must be met in order to conform to this standard.

Table 4.1

	Required Criteria
5 Energy efficiency	
	5.1.1 Required - ENERGY STAR
	5.2.1 Required - Allowable temperature and humidity specifications
6 Management of substances	
	6.1.1 Required - Conformance with provisions of European Union RoHS Directive
	6.1.2 Required - Conformance with substance restriction requirements of the European Union Battery Directive
	6.1.3 Required - Reduction of Bromine and Chlorine content of plastic parts > 25 grams
	6.1.5 Required – Conformance with supply chain communication provisions of European Union REACH Regulation
7 Preferable materials use	
	7.1.1 Required – Declaration of postconsumer recycled plastic content
	7.1.2 Required - Minimum postconsumer recycled content in e~~E~~xternal enclosures
8 Product packaging	
	8.1.1 Required—Elimination of added heavy metals in packaging
	8.1.2 Required—Restriction on the use of elemental chlorine as a bleaching agent in paper-based packaging material
	8.2.1 Required - Enhancing recyclability of packaging materials
	8.3.1 Required - Recycled content fiber in corrugated packaging
9 Design for repair, reuse and recycling	
	9.1.1 Required - Design for repair, reuse and recycling
	9.1.2 Required - Design for plastics recycling
	9.1.4 Required - Product recyclability calculation and minimum 90% recyclability rate
	9.2.1 Required - Information and reporting in preparation for reuse and recycling
	~~9.2.4 Required - Informing reuse operators and treatment operators of information available for their assistance (corporate)~~
10 Product longevity	
	10.1.1 Required - Replacement components availability
11 Responsible ~~end-of-service/~~end-of-life management	
	11.1.1 Required – Provision of product take-back service (corporate)
	11.2.1 Required - End-of-life processing requirements (corporate)
	11.2.2 Required - Trans-boundary movements (corporate)
12 Corporate responsibility	
	12.1.1 Required - Environmental management system (EMS) (corporate)
~~**12.3 Conflict mineral sourcing**~~	
	12.3.1 Required - Public disclosure of use of conflict materials in products (corporate)
	12.4.1 Required - Manufacturer conformance with occupational health and safety performance (corporate)

4.1.2 Optional points

Once the required criteria are met, products may achieve higher levels of conformance by meeting a specified percentage of optional criteria.

4.1.3 Product and corporate criteria

This standard includes two types of criteria.

- Product criteria: Applies to the product declared to conform to the standard.

- Corporate criteria: Applies to the company that declares products to conform to this Standard.

4.1.4 Country or region specific criteria

All criteria ~~Each criterion~~ in the standard are applicable only in countries or regions for which the product is declared to conform to this standard. Each criterion shall specify either of the following statements below on geographic applicability:

- "This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region"; or

- "A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard. ~~A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard~~."

NOTE – Region means countries and territories whose independence may ~~is~~ not be recognized by all countries (e.g., Taiwan).

4.1.5 Units of measure

Unless specified otherwise, units of measure within this standard shall be reported in the International System of Units (SI).

~~4.1.6 Dated and undated references~~

~~A reference to another standard or regulation is either dated or undated.~~

- ~~Dated standards or regulations remain the reference in this Standard even if the referenced standard or regulation is subsequently amended or replaced.~~

- ~~Undated standards or regulations will automatically update within this Standard when the referenced standard or regulation is updated (including any amendments or corrigenda). In order to remain in conformance with this Standard, the product and, or manufacturer shall conform to the referenced aspects of the updated standard or regulation when it goes into effect, as applicable.~~

- ~~For European Union Directives, which contain the adoption date in their title, shall not be treated as "dated standards or regulations" (as defined above). Unless explicitly indicated otherwise, when an~~

~~European Union Directive is referenced in this Standard, a new or updated European Union Directive shall apply as the referenced Directive upon its enforcement date.~~

~~4.1.7 Declare, disclose, and document~~

~~Within this Standard, these three terms are used as follows:~~

- ~~**Disclosure/disclose** – Information made available to the audience specified in criterion (e.g., purchasers, public, etc.).~~
- ~~**Documentation/document** – Information to be provided at time of verification or certification.~~
- ~~**Declaration/declare** – Information made publicly available:~~
  - ~~By the manufacturer on a publicly available registry; or~~
  - ~~On the manufacturer's website in the form of a certification report, or equivalent, issued by the certifying organization; or~~
  - ~~On the manufacturer's website, if the product is self-declared to conform to the standard.~~

4.2 Levels of conformance

There are three levels of conformance:

- Bronze – meets all required criteria
- Silver – meets all required criteria plus at least 50% of the optional criteria points
- Gold – meets all required criteria plus at least 75% of the optional criteria points

The optional points can come from any of the ~~environmental~~ performance categories. More than one point may be assigned to each optional criterion. If an optional criterion is not applicable (as noted in the criterion), those points are not included in the denominator of the calculation of percentage of optional criteria points.

5 Energy efficiency

5.1 ENERGY STAR

5.1.1 Required - ENERGY STAR

The product shall conform with the most current version of the ENERGY STAR Computer Servers program, as per the requirements in Table 5.1 below.

Table 5.1

Region or Country	Requirement
U.S. and Canada	• Product shall be ENERGY STAR certified
ENERGY STAR international partner countries or regions	• Product shall conform with the international partner country's or region's current ENERGY STAR Computer Servers Qualification Criteria; or

	• Product shall be on the country's or region's ENERGY STAR qualified product listing
Countries or regions that are not ENERGY STAR international partners	• Product shall conform with the current version of the U.S. and Canada ENERGY STAR Computer Servers Eligibility Criteria

~~Manufacturer shall declare to which of the above the product conforms.~~ ~~This criterion may be declared differently by country or region.~~

Geographic applicability: This criterion shall be ~~declared~~ met the ~~same~~ in all countries or regions for which the product is declared to conform to this standard ~~and is applicable only in declared countries or regions for which the product is declared to conform to this standard~~. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Identification of which of the above requirements the product conforms.

b) Documentation demonstrating that product meets the relevant requirements in Table 5.1.

c) For products not required to be ENERGY STAR certified or listed on an international partner's ENERGY STAR qualified product listing, test results from an ENERGY STAR accredited ~~qualified~~ lab[84] demonstrating that product conforms with the current version of the U.S. and Canada ENERGY STAR Computer Servers Eligibility Criteria.

References and details: None

5.2 Allowable temperature and humidity specifications

5.2.1 Required - Allowable temperature and humidity specifications

Product ~~specification~~ shall support Class A2 allowable environmental operating range published in the *American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) Thermal Guidelines for Data Processing Environments, 4th ~~3rd~~ Edition*, in Table 2.1~~3, on a continuous basis~~.

If the product is liquid cooled, "Not Applicable" may be declared.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification Requirements:

a) Documentation that the product ~~equipment~~ can operate in ASHRAE Class A*2* conditions, including~~.~~ ~~The documentation shall specify~~ the estimated number of ~~continuous~~ hours per a specified time

[84] https://www.energystar.gov/index.cfm?fuseaction=recognized_bodies_list.show_RCB_search_results

period that the server can operate in the allowable range without materially affecting the server reliability ~~is capable of operating at the extremes of the allowable range~~.

References and details: None

5.2.2 Optional – Liquid cooled server or air cooled servers operable at ASHRAE Class A3/A4 Temperature Ranges

The product ~~Server~~ shall be shipped with capability to ~~for external~~ liquid cool~~ing of~~ the processor and system memory (DIMMs and associated independent buffers) at a minimum. Liquid ~~External~~ cooling ~~is represented by liquid immersion cooling, cold plate, or functional equivalent, where the final heat exchange occurs outside of the IT space;~~ involves the direct transfer of the heat from the processor and memory system to a liquid for removal of the heat from the information technology (IT) equipment;

Or

The air cooled server shall have allowable equipment environmental ranges as specified in *ASHRAE TC9.9 Thermal Guidelines for Data Processing Environments (4th ~~3rd~~ edition, 2015~~2~~)* of Class A3 or A4.

Optional points to be awarded as follows:

Table 5.2

Server Type	Criterion	Optional Points
Other (Non Resilient) Air Cooled Server	Server Operable in ASHRAE Class A3 Conditions	1
Resilient Air Cooled Server	Server Operable in ASHRAE Class A3 Conditions	2
Other (Non Resilient) Air Cooled Server	Server Operable in ASHRAE Class A4 Conditions	2
Resilient Air Cooled Server	Server Operable in ASHRAE Class A4 Conditions	3
Liquid Cooled Server	Server shipped with capability to ~~for external~~ liquid cool~~ing of~~ the processor and system memory (DIMMs and associated independent buffers) at a minimum	3

Point value: 3 maximum

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation ~~Statement from manufacturer~~ indicating whether the product is classified as a Resilient or Non Resilient Server, and indicating to which ASHRAE classification that the equipment can operate (ASHRAE Class A3 or Class A4). The documentation ~~statement~~ shall specify the estimated number of ~~continuous~~ hours per a specified time period that the server can operate in the allowable range without materially affecting the server reliability ~~is capable of operating at the extremes of the allowable range~~.

Or

b) ~~Manufacturer shall provide d~~Documentation indicating the capability to ~~for external~~ liquid cool~~ing of~~ the processor and system memory (DIMMs and associated independent buffers) at a minimum.

References and details: ASHRAE TC9.9 Thermal Guidelines for Data Processing Environments (4th ~~3rd~~ Edition, 2015~~2~~) Criteria for determination of "Resilient" Server to be taken from latest ~~Energy Star~~ENERGY STAR Product Specification for Servers (http://www.energystar.gov/products/specs/).

5.3 Power supply efficiency

5.3.1 Optional - 80 plus program

Power supply/supplies shipped with the product shall have been tested as in conformance with ~~and certified as meeting~~ the requirements of the 80 Plus© program Titanium level (http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx).

Points shall be awarded ~~based on the 80 Plus® program level (Gold, Platinum, or Titanium) requirements to which the power supply conforms~~ as detailed in Table 5.3 below. ~~Manufacturer may claim the points associated with only one 80 Plus© level.~~

Table 5.3
80 Plus Titanium Level

Power Supply Unit	~~80 Plus Titanium Level~~	Total Points
Single Output	~~Platinum~~	1
	~~Titanium~~	~~2~~
Multi Output	~~Gold~~	~~1~~
	~~Platinum~~	2
	~~Titanium~~	~~3~~

~~Manufacturer shall declare whether the product contains single output or multi-output power supply units (PSUs).~~

If the product does not ship with power supply/supplies, "Not Applicable" may be declared.

Point value: 1 or 2 ~~or 3~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Statement from manufacturer indicating whether product contains single output or multi-output power supply~~, and stating the 80 Plus© level (Gold, Platinum, or Titanium) achieved by the power supply~~.

b) Test Report from independent, third-party laboratory demonstrating conformance with ~~appropriate~~ 80 Plus® Titanium level requirements.

References and details: None

5.4 Active and Inactive Power States

5.4.1 Optional— Active State Power Management Enablement

Product shall be shipped with all of the following active state power management states enabled:

- Processor dynamic voltage and frequency scaling: Processors have the ability to dynamically change the voltage and frequency of the processor system based upon the load demand or activity level of the processor.
- Processor low power idle state: Idle processor cores are able to reduce applied voltage below minimum operating voltage during periods of inactivity.
- Dynamic Memory low power state: Memory devices are put into low power states during periods of inactivity such as the current self-refresh implementations in DDR memory.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

~~a) Manufacturer shall provide a statement indicating that active state power management states defined in above criterion are enabled.~~

a) ~~Manufacturer shall provide~~ Product specification or screen snapshots of BIOS ~~bios~~, firmware, or OS ~~screen snapshots~~ which show the power management states defined in above criterion are enabled on the product ~~server~~.

5.4.2 Optional – Server Inactive Power State #1

The product ~~server~~ is capable of achieving an inactive power state that seeks to reduce the energy use across the system to the extent practical while maintaining a rapid recovery time.

The Inactive Power State #1 will have a power level which is less than the idle power measurement reported for certification to ~~Energy Star~~ENERGY STAR, and recovery to a full active state (as specified in Verification Requirements) can be achieved in 10 seconds or less.

Manufacturer will provide information in product specification ~~Server publication~~ on Inactive Power State #1 power usage and the time required to achieve full active state when reactivated from Inactive Power State #1.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Product specification ~~Statement~~ from manufacturer indicating the Inactive Power State #1 power usage, the percentage of Inactive Power State #1 power usage when compared to the idle power measurement reported for certification to ~~Energy Star~~ENERGY STAR and the time required to achieve full active state when reactivated from Inactive Power State #1.

b) ~~SERT 1~~ Test Report[85]~~, or the equivalent~~, showing power usage for Inactive Power State #1 as a percentage of idle power measurement reported for certification to ~~Energy Star~~ENERGY STAR.

c) ~~SERT~~ Test Report~~, or the equivalent~~, demonstrating the time required to return from the Inactive Power State #1 to active power state ~~as measured by the time measurement from the issue of the reactivation command to the SERT Sleep-Response Time Hybrid ssj worklet, or the equivalent, running the first Target Load Level power increment (100% load) to the satisfaction of the SERT quality criteria, or the equivalent~~.

References and details: Using the provided sleep and wake signals, data center control systems could passively manage power usage through scheduled low power states for certain percentages of available servers based upon anticipated loads, or dynamically manage power usage through hierarchical management of idle and deep sleep states for banks of servers based upon realized loads.

Statement with Inactive Power State #1 power usage and the time required to achieve full active state when reactivated from Inactive Power State #1 will enable the data center operator to determine how the power state can be integrated into the dynamic management of the data center.

5.4.3 Optional – Server Inactive Power State #2

The server is capable of achieving an inactive power state in which all components are unpowered with the exception of a subset of components necessary to allow for restart upon demand, such as the power supply(ies), a service processor and/or other I/O electronics allowing sleep and wake signals to be received and processed.

[85] ~~This information is given for the convenience of users of this standard and does not constitute an endorsement by IEEE or NSF of SERT. Equivalent tests may be used if they can be shown to lead to the same results.~~

The Inactive Power State #2 will have a power level which is 30% or less of the idle power ~~measurement~~ as measured for the product conformance with ENERGY STAR Computer Servers Eligibility Criteria ~~reported for certification to Energy Star~~, and recovery to a full active state (as specified in Verification Requirements) can be achieved in 20 minutes or less.

Manufacturer will provide information in Server Publication on Inactive Power State #2 power usage and the time required to achieve full active state when reactivated from Inactive Power State #2.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Statement from manufacturer indicating the Inactive Power State #2 power usage, the percentage of Inactive Power State #2 power usage when compared to the idle power measurement reported for certification to ~~Energy Star~~ENERGY STAR and the time required to achieve full active state when reactivated from Inactive Power State #2.

b) ~~SERT 1~~ Test Report[86]~~, or the equivalent~~, showing power usage for Inactive Power State #2 as a percentage of idle power measurement reported for certification to ~~Energy Star~~ENERGY STAR.

c) ~~SERT~~ Test Report~~, or the equivalent~~, demonstrating the time required to return from the Inactive Power State #2 to active power state ~~as measured by the time measurement from the issue of the reactivation command to the SERT Sleep-Response-Time Hybrid ssj worklet, or the equivalent, running the first Target Load Level power increment (100% load) to the satisfaction of the SERT quality criteria, or the equivalent~~.

References and details: Using the provided sleep and wake signals, data center control systems could passively manage power usage through scheduled low power states for certain percentages of available servers based upon anticipated loads, or dynamically manage power usage through hierarchical management of idle and deep sleep states for banks of servers based upon realized loads.

Statement with Inactive Power State #2 power usage and the time required to achieve full active state when reactivated from Inactive Power State #2 will enable the data center operator to determine how the power state can be integrated into the dynamic management of the data center.

5.5 Systems energy efficiency

5.5.1 Optional - Energy efficient supply chains

~~[86] This information is given for the convenience of users of this standard and does not constitute an endorsement by IEEE or NSF of SERT. Equivalent tests may be used if they can be shown to lead to the same results.~~

~~Product~~ Manufacturer shall ~~contain~~ demonstrate that component(s) manufactured by ~~at least~~ one or more suppliers that have~~s~~ one or more facilities meet one of the following:

a) Third party certification to ISO 50001 or a nationally adopted version of ISO 50001. A supplier manufacturing facility will be considered ISO 50001 certified if it is within the scope of an enterprise ISO 50001 certification. Certification(s) shall have been obtained from a third party certification body accredited by an International Accreditation Forum (IAF) member accreditation body whose scope of accreditation includes the specified standard.

b) Third party certification ~~ed by an ANSI-ANAB-accredited SEP verification body(ies) as~~ to the U.S. DOE Superior Energy Performance™ (SEP) program Silver level or higher, at the time of manufacture, by an ANAB-accredited SEP verification body(ies), or a nationally equivalent program at the Silver level or higher. An equivalent program shall meet the requirements of the US DOE SEP program[87].

Where a corporate certification is achieved by a supplier in accordance with a multisite certification, the certificate shall include all facilities claimed in the scope.

The scope of facilities includes suppliers of the following components or services for products within the scope of this standard:

- Printed Circuit Board
- Printed Circuit Board Assembly
- Integrated Circuit
- Memory
- Microprocessors
- Battery
- Power supply
- Fans
- Final assembly

Points shall be awarded based on the total source energy ~~use~~ consumption of the suppliers' ~~SEP certified~~ facilities, as outlined in table 5.4 below:

Table 5.4

Total Source Energy ~~Use~~ Consumption in aggregate from any combination of facilities meeting part a) or b)	**Total Source Energy Consumption in aggregate from any combination of facilities meeting part a) or b); and with at least 5 facilities meeting part b)**	**Points**
>~~0.1 trillion BTU~~ 500 million kilowatt-hour per year	>300 million kilowatt-hour per year	1
>=~~1 trillion BTU~~ 1 billion kilowatt-hour per year	>600 million kilowatt-hour per year	2

[87] Equivalency is defined by U.S. DOE at www.energy.gov/eere/amo/SEP-equivalency

Point value: 1 or 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Identification of the component(s) in a bill of materials

~~b) Name of supplier(s) and location of facility(ies) supplying component(s)~~

c) Calculation of energy consumption and identification of the facilities or enterprises that met the requirements of Part a) or Part b) above based on energy consumption calculation.

d) Either one, or a combination of a) and b) below:

a. For Part a), certificates, either at facility or enterprise level to ISO 50001 certification(s) or to certification(s) to a nationally adopted version of the standard for all facilities claimed in scope from a third party certification body accredited by an International Accreditation Forum member accreditation body whose scope of accreditation includes the specified standard

b. For Part b):

i. Documentation of current U.S. DOE SEP program Silver level or higher certification, or certification(s) to a nationally equivalent SEP program ~~for the facility(ies) by an ANSI-ANAB-accredited SEP verification body(ies), and evidence that the SEP certification was awarded prior to product declaration or certification~~.

ii. National program meets U.S. DOE SEP program equivalency, if an equivalent SEP program is used

References and details: None

5.5.2 Optional - Reduce energy lost from power conversion

The product shall operate at high voltage AC power as shown in Table 5.5 to reduce energy loss from power conversion during distribution and provide an overall higher system efficiency. The product shall be tested using the methodology specified in the *ENERGY STAR Program Requirements for Computer Servers Version 2.1~~0~~*.

Table 5.5

High Voltage AC Power	Points
400/230v or 480/277v	1
~~600v or higher~~	~~2~~

Point value: 1 ~~or 2~~

Geographic applicability: ~~This criterion can vary by region or country and is applicable only in countries or regions for which the product is declared to conform to this standard.~~ A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard.

Verification requirements:

a) Documentation of the high voltage AC power

b) Test results using the methodology specified in the ENERGY STAR Program Requirements for Computer Servers

References and details: None

5.5.3 Optional - Logged server activity metrics

Product shall have the capability to log the metrics specified in Section 5 of the *ENERGY STAR Program Requirements for Computer Server Version 2.0*.

Data acquisition and format shall be consistent with Annex B.

Point value: 1~~2~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Demonstration of the capacity to log the metrics specified in Section 5 of the *ENERGY STAR Program Requirements for Computer Server Version 2.0* and consistent with Annex B.

References and details: None

6 Management of substances

6.1 Reduction of substances of concern

6.1.1 Required - Conformance with provisions of European Union RoHS Directive

The product shall meet the substance restriction requirements of the European Union RoHS Directive in effect at the time the product is declared to conform to this standard. All exemptions to the substance restrictions as defined by the Directive are applicable.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Demonstration of a supply chain management system to meet the requirements of this criterion. ~~A supply chain management system may include supplier management and grading procedures, Material Declaration and, or Disclosure, and, or analytical testing~~ The system shall include a supplier trustworthiness assessment and may include any of the following:

~~Supplier trustworthiness assessment,~~

i. Supplier Declaration of Conformity,

ii. Material Declaration and Disclosure, or

iii. Analytical testing.

~~Note that analytical testing is one option, but is not required.~~

Or

b) Technical documentation in accordance with EN 50581 or IEC 63000 as required by the European Union RoHS Directive

References and details: The European Union RoHS Directive stipulates maximum concentration values (MCVs) by weight for the presence of each substance within homogeneous materials.

Technical documentation, as required in Article 7(b) of the European Union RoHS Directive, can be generated per standard *EN 50581, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances* or *IEC 63000, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*. ~~The European Union Commission has identified EN 50581 as a harmonized standard for European Union RoHS technical documentation.~~

6.1.2 Required - Conformance with substance restriction requirements of the European Union Battery Directive

Batteries in the product shall meet the substance restriction requirements of the European Union Battery Directive in effect at the time the product is declared to conform to this standard.

If the product does not contain batteries, “Not Applicable” may be declared.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) List of batteries in the product, including their composition type (e.g. lithium ion, metal hydride, etc.)

b) At least one of the following:

i. Test results demonstrating that battery(ies) in the product meets the substance requirements of the European Union Battery Directive

ii. Statement from the battery supplier indicating that the product meets the substance requirements of the European Union Battery Directive

iii. Material Declaration and Disclosure from the supplier

References and details: This criterion only applies to those substances for which the European Union Battery Directive establishes threshold limits on the amount of the substance in batteries. This criterion does not apply to those substances only subject to the European Union Battery Directive labeling requirements.

6.1.3 Required - Reduction of Bromine and Chlorine content of plastic parts > 25 grams

Plastic parts exceeding 25 g shall not contain greater than 1000 ppm chlorine or greater than 1000 ppm bromine[88]. Parts that exceed 25% postconsumer recycled content shall contain a maximum of 5000 ppm chlorine and 5000 ppm bromine.

~~with t~~The following exceptions apply:

- ~~Parts which exceed 25% postconsumer recycled content may contain a maximum of 3000~~ 5000 ~~ppm chlorine and a maximum of 3000~~ 5000 ~~ppm bromine before an alternatives assessment is required.~~

- Printed circuit boards, ~~and~~ wiring, fans and electronic components.

- Parts for which the manufacturer has performed an alternative assessment in accordance with Annex C on the substance(s) responsible for exceeding the bromine and chlorine levels and demonstrates that the substance was determined to be safer than, or as safe as, the available alternatives.

If the product does not contain plastic parts > 25 g, “Not Applicable” may be declared.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) A list of plastic parts exceeding 25 g

b) Documentation that each plastic part exceeding 25 g meets one of the three options below:

[88] Based on chlorine and bromine thresholds specified in *IEC 62474 Material declaration for products of and for the electrotechnical industry*

i. Test data showing that the part contains less than 1000 ppm chlorine and less than 1000 ppm bromine, as determined by test method IEC 62321-3-1 and IEC 62321-3-2, or

ii. Demonstration of a supply chain management system used to ensure that the ~~product~~ plastic part does not contain these substances. The system shall include a supplier trustworthiness assessment and may include any of the following:

- ~~Supplier trustworthiness assessment,~~
- Supplier Declaration of Conformity,
- Material Declaration and Disclosure, or
- Analytical testing.

~~Note that analytical testing is one option, but is not required.~~

iii. If the part contains greater than 25% PCR:

- Supplier letter supporting the greater than 25% PCR
- Test data showing that the part contains less than ~~3000~~ 5000 ppm chlorine and less than ~~3000~~ 5000 ppm bromine

OR

iii. Demonstration of a supply chain management system used to ensure that the product does not contain these substances. The system shall include a supplier trustworthiness assessment and may include any of the following:

- ~~Supplier trustworthiness assessment,~~
- Supplier Declaration of Conformity,
- Material Declaration and Disclosure, or
- Analytical testing.

~~Note that analytical testing is one option, but is not required.~~

OR

iv. Demonstration that an alternative assessment was conducted, using the methodology outlined in Annex C on the substance responsible for the observed bromine and/or chlorine levels and the substance was determined to be safer than, or as safe as, the available alternatives.

6.1.4 Optional – Further reduction of Bromine and Chlorine content of plastic parts > 25 grams

Plastic parts exceeding 25 g shall not contain greater than 1000 ppm chlorine or greater than 1000 ppm bromine[89], in accordance with Table 4.1, with the following exception:

- Parts which exceed 25% postconsumer recycled content may contain a maximum of ~~3000~~ 5000 ppm chlorine and a maximum of ~~3000~~ 5000 ppm bromine ~~before an alternatives assessment is required~~.

If the product does not contain plastic parts > 25 g, "Not Applicable" may be declared.

Table 4.1

Plastic Parts	Points
At least one of the following: • Printed circuit board laminates (excluding components soldered or affixed to the printed circuit board) • Fans	1
All plastic parts > 25 g	1

Point value: 2~~1~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) A list of plastic parts exceeding 25 g

b) Documentation that ~~each~~ plastic parts per Table 4.1 exceeding 25 g meets one of the three options below:

ii. Test data showing that the part contains less than 1000 ppm chlorine and less than 1000 ppm bromine, as determined by test method IEC 62321-3-1 and IEC 62321-3-2, or

iv. Demonstration of a supply chain management system used to ensure that the product does not contain these substances. The system shall include a supplier trustworthiness assessment and may include any of the following:

~~– Supplier trustworthiness assessment,~~

– Supplier Declaration of Conformity,

[89] Based on chlorine and bromine thresholds specified in *IEC 62474 Material declaration for products of and for the electrotechnical industry*

– Material Declaration and Disclosure, or

– Analytical testing.

~~Note that analytical testing is one option, but is not required.~~

iii. If the part contains greater than 25% PCR:

– Supplier letter supporting the greater than 25% PCR

– Test data showing that the part contains less than ~~3000~~ 5000 ppm chlorine and less than ~~3000~~ 5000 ppm bromine

OR

v. Demonstration of a supply chain management system used to ensure that the product does not contain these substances. The system shall include a supplier trustworthiness assessment and may include any of the following:

– ~~Supplier trustworthiness assessment~~,

– Supplier Declaration of Conformity,

– Material Declaration and Disclosure, or

– Analytical testing.

~~Note that analytical testing is one option, but is not required~~.

References and details: None

6.1.5 Required – Conformance with supply chain communication provisions of European Union REACH Regulation

Manufacturer shall disclose in accordance with the Article 33 requirements of the European Union REACH Regulation in effect at the time the product is declared to conform to this standard.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Disclosure of substances on REACH candidate list present in the product above the threshold, as applicable

References and details: European Union Regulation (EC) No 1907/2006

6.1.6 Optional - Reduction of substances on the European Union REACH Regulation Annex XIV (authorization list) and Candidate Substances of Very High Concern

The product shall not contain applicable substances above 0.1% per substance by weight per ”article”, or lower threshold as applicable, as per Article 33 paragraph 1 of the European Union REACH regulation and interpreted according to the European Chemicals Agency “*Guidance on requirements for substances in articles*”[90] on the:

- European Union REACH Annex XIV (List of Substances Subject to Authorization) (1 point), and, or
- Candidate List of Substances of Very High Concern[91] (SVHC) (1 point)

Substances ~~Subject to Authorization and~~ on the REACH Authorization List (Annex XIV) or on the REACH Candidate List of SVHCs with a *Date of inclusion* two ~~one~~ years or more before the product is declared to conform to this criterion are subject to this requirement.

In order to identify applicable substances, manufacturers may pre-screen the European Union REACH Candidate List and Annex XIV using *IEC 62474 Material Declaration for Products of and for the Electrotechnical Industry*. ~~If IEC 62474 is not used, and screening is conducted, the manufacturer shall demonstrate the method for determining applicability of the substances.~~

Manufacturer shall ~~document that~~ utilize a system ~~is used~~ to ensure that the product does not contain these substances above 0.1% by weight per ”article”, or lower threshold as applicable, as per Article 33 paragraph 1 of the European Union REACH regulation and interpreted according to the European Chemicals Agency “*Guidance on requirements for substances in articles*.”[92] The system may include supplier management and trustworthiness assessment, Supplier Material Declaration and, or Disclosure to manufacturer, and, or analytical testing, is used to ensure that the product does not contain these substances.

Optional points shall be awarded as follows (maximum 2 points total):

Avoid or eliminate all applicable Annex XIV substances from product	1 point
Avoid or eliminate all applicable Candidate SVHC substances from product	1 point

Point value: 2 maximum

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Method for determining applicable substances

[90] http://echa.europa.eu/guidance-documents/guidance-on-reach
[91] Candidate List of Substances of Very High Concern: http://echa.europa.eu/web/guest/candidate-list-table.
[92] ibid

b) Demonstration of a supply chain management system used to ensure that the product does not contain these substances. The system shall include a supplier trustworthiness assessment and may include any of the following:

~~Supplier trustworthiness assessment,~~

i. Supplier Declaration of Conformity,

ii. Material Declaration and, or Disclosure, or

iii. Analytical testing.

~~Note that analytical testing is one option, but is not required.~~

References and details: Trustworthiness assessment is defined in IEC 63000.

6.2 Inventory and assessment of substances

6.2.1 Optional – Record ~~Documentation~~ of declarable substances

Manufacturer shall record ~~document~~ the presence of IEC 62474 declarable substance groups and declarable substances in the product at or above the reporting threshold amounts stated in the IEC 62474 database at the time the product is declared to conform to this standard. The record ~~documentation~~ shall include all declarable substance groups and declarable substances designated criteria 1, 2 and 3 in the IEC 62474 database.

The manufacturer shall have a process to manage, maintain, and update all data received on declarable substances listed in IEC 62474.

The criterion does not require public disclosure.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Record ~~Documentation~~ of IEC 62474 declarable substance groups and declarable substances (designated 1, 2, and 3) in the product at or above the reporting threshold

b) Documentation of a process to manage, maintain and update data received on declarable substances listed in IEC 62474

References and details: IEC 62474 declarable substances and groups.

6.2.2 Optional - Disclosure of declarable substances

Manufacturer shall make publicly available on their website the ~~inventory~~ record of IEC 62474 declarable substance groups and declarable substances in the product generated for conformance with criterion 6.2.1. The inventory shall contain the CAS number for each declarable substance (not including declarable substance groups). The link to the ~~inventory~~ record shall be placed on the product specification or documentation web page. ~~The manufacturer shall declare the URL of the public disclosure.~~ The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

~~The product specification or documentation means the product marketing details of key parametric information, such as, but not limited to, number of CPUs, amount of memory, number of internal disk drives, I/O bandwidth, and enclosure dimensions.~~

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Declaration of~~ URL of the public disclosure

b) ~~inventory~~ Record generated for conformance with Criterion 6.2.1, that:

i. Includes the CAS number for each declarable substance, and

ii. Is located on the product specification or documentation web page

6.2.3 Optional - Requesting full substance inventory

The manufacturer shall request (or otherwise have access to) information from suppliers on the inventory of substances in the substances, components, and parts contained in the ~~covered~~ product. The supplier requests shall cover either:

- Materials, components, and parts encompassing at least 90% of the total product mass, or

- At least 90% of the directly contracted suppliers of substances, components, and parts

The manufacturer shall have a documented process, and a system or tool, to record the collected information, and to calculate the percentages stated above.

Manufacturer shall request suppliers to disclose the standardized number (e.g. CAS, EC~~N~~, MITI ~~IMDS, GHS~~), for the inventory of substances.

"Request" means one or more of the following:

a) The manufacturer, or an agent or supplier of the manufacturer, has requested this information in writing from the supplier directly (e.g. email, letter). In all cases "request" includes documented acknowledgement of receipt by the supplier representative. ~~Sending an email is not sufficient to meet this requirement~~, or

b) A contract, agreement, or purchase order between the supplier and the manufacturer (or between the supplier and an intermediary supplier [e.g. contract manufacturer]) requires the supplier to provide this information, or

c) A specification or other document to which the supplier is held by the manufacturer or an intermediary supplier that requests this information.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Process documentation for collecting the information requested in accordance with this criterion

b) Process documentation for an information management system or tool adequate to address the nature and quantity of parts, suppliers and information relevant to the requested substance information

c) Summary of information used to calculate percentages achieved of requested information from suppliers

6.2.4 Optional - Acquiring substance inventory

The manufacturer shall demonstrate that it has in the system or tool required in ~~database, per~~ 6.2.3, a complete list of the substances in the products/components supplied to the manufacturer from its suppliers, as specified in the table below.

The following equation shall be used to calculate the percentage:

% mass of inventory of substances of the product = (Mass of substances inventoried / Total mass of the product) x 100

In the calculation only the portion of materials, components, and parts for which substance inventory information is received from the supplier shall be counted in the numerator. If a supplier withholds disclosure on the basis of confidential business information, the mass of the undisclosed substances shall not be included in the numerator.

For instances where there are multiple suppliers for a given material, component, or part, at a minimum the manufacturer shall select which inventoried supplier mass(es) to include in the calculation.

Manufacturer may claim the points associated with only one level in Table 6.1.

Table 6.1

Data Acquired on Substance Inventory	Points
Minimum of 75~~0~~% of total product mass	1
~~Minimum of 85% of total product mass~~	~~2~~
Minimum of 90~~5~~% of total product mass	2~~3~~
~~Minimum of 99% of total product mass~~	~~4~~

The manufacturer shall have a system for validating reports or other substance ingredient declarations from its suppliers.

Point value: ~~1,~~ 2 maximum~~, 3 or 4~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation that the system or tool required in ~~database, per~~ 6.2.3, includes a complete list of the substances in the products/components supplied to the manufacturer from its suppliers, as specified in Table 6.1

b) Calculation demonstrating the percentage of total product mass for which the manufacturer has a complete list of the substances

c) Evidence supporting the existence of a system for validating reports or other substance ingredient declarations from its suppliers

6.2.5 Optional - Safer substance use ~~Alternatives assessment (corporate)~~

Manufacturer shall demonstrate that a hazard assessment has been conducted on substances that serve the following functions in the product, and a hazard assessment (e.g. benchmark) score assigned, comparable to the GreenScreen® for Safer Chemicals methodology[93]:

1) Flame retardants in plastic parts > 25 g
2) Plasticizers in plastic parts > 25 g
3) Top three cleaning solvents used during final assembly (by volume)

The assessment shall consider transformation products from combustion comparable to the GreenScreen® for Safer Chemicals methodology.

[93] www.greenscreenchemicals.org/method/method-documents

The manufacturer shall only use hazard assessments for which the most recent version was completed no more than 3 years prior to when the product is declared conformant to this criterion.

Exclusions (for numbers 1 and 2 above only): The manufacturer may exclude conducting hazard assessments on the substances in printed circuit boards, cables, connectors, fans and power supplies.

All substances listed above (i.e. flame retardants, plasticizers and cleaning solvents) used to serve the functions identified above shall be assessed, except those that do not exceed 0.1% by weight of the mixture or part.

For products that do not contain any of the above substances, the criterion has been met and 2 points are awarded.

Assessments shall be performed by assessors with the following qualifications[94]:

- A degree in chemistry, chemical engineering, biology, toxicology, environmental sciences, or related fields relevant to the subject matter in the assessment
- Received training in conducting hazard assessments
- Experience conducting at least two assessments that have been peer-reviewed by recognized experts in the field or published in relevant journals or in repositories of reviewed assessments such as ~~Subsport~~ Substitution Support Portal (SUBSPORT), Interstate Chemicals Clearinghouse Chemical Hazard Assessment Database (IC2) and TCO

The assessments shall include the following information:

- Name of assessor
- Documentation of the assessor qualifications listed above
- Indication of whether the assessment has been verified according to the GreenScreen® Verification Program
- Date of the assessment and date of expiration
- Level of ingredient disclosure and reporting in the assessments

Optional Points are assigned based on the hazard assessment of the substances used to serve the functions above are to be awarded as follows (maximum 2 points total):

Performance	Total Points Earned
Substances are not in the highest hazard category (e.g. if GreenSreen® is used, not benchmark 1)	1
Substances are not in the two highest hazard categories (e.g. if GreenSreen® is used, not benchmark 1 or 2)	2

[94] Clean Product Action Licensed GreenScreen® Profilers and Certified GreenScreen® Practitioners meet this requirement

Point value: 2 maximum

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification Requirements:

1) List of substances used to serve the functions identified above, and their hazard assessment score, except those exempted in the criterion

2) Demonstration that each of those substances have:

   a. Been assessed by an assessor with the qualifications listed in the criterion

      Or

   b. Publicly available verified profiles such as those available on the GreenScreen® website[95] or the Interstate Chemicals Clearinghouse Chemical Hazard Assessment Database (IC2)[96]

3) Demonstration that the assessments contain the information as required in the criterion

~~Manufacturer shall document that it or a supplier or a third party has performed alternative assessments on substances of concern used in its products or processes used in the production of these products. Points are awarded as follows:~~

~~Number of Alternative Assessments Conducted~~	~~Points Awarded~~
~~5 – 10~~	~~1~~
~~>10~~	~~2~~

~~Alternatives assessments shall be performed on alternatives to substances listed in the "Declarable Substances List" (Table A) of *IEC 62474, Material Declaration for Products of and for the Electro-technical Industry* or listed as a carcinogen, mutagen, reproductive toxicant, persistent, bioaccumulative, and toxic (PBT) substance, or endocrine active substance in the lists in Annex C of this standard. Manufacturer shall consider exposure and risk throughout the products' life cycle as part of the assessment.~~

~~Assessments shall be performed consistent with one of the following frameworks[97]:~~

[95] http://www.greenscreenchemicals.org/gs-assessments

[96] http://theic2.org/hazard-assessment

~~[97] Other alternatives assessment frameworks are under development and may be included in later versions of this standard when published. For example, a guidance document is being developed for the California Safer Products regulations–CA Code of Regulations Title 22, Division 4.5, Chapter 55 Article 5, Sections 69505.5-69505.7~~

- Interstate Chemicals Clearinghouse *Alternative Assessment Guide,*[98]

- Report of the National Academies of Science project *A Framework to Guide Selection of Chemical Alternative*[99]

- BizNGO *Chemical Alternative Assessment Protocol*[100]

Assessments performed by a supplier or third party may be utilized to meet this criterion provided they are relevant to the products declared to conform to this standard.

Manufacturer documentation of the alternatives assessments shall include:

- Framework used;

- Date of completion of the assessment - each assessment shall have been completed no more than three years prior to the date any product is declared by the manufacturer to conform to this criterion;

- Substances and potential alternatives evaluated.

- Which of the following outcomes resulted from the alternative assessment:

  - A safer alternative was identified and substituted for the original substance in the manufacturer's design standards or product specifications; or

  - The original substance was determined to be safer than, or as safe as, the evaluated potential alternative(s), or

  - A safer alternative was identified but is not commercially or technically viable for that application and the manufacturer has taken steps to improve the alternative's commercial or technical viability; or

  - The need for the function provided by the substance was eliminated.

For the purposes of the criterion, a safer alternative is an alternative for which the total environmental, health and consumer safety benefits caused by substitution are likely to outweigh the total environmental, health and consumer safety negative impacts thereof.

An alternative assessment performed under 6.1.3 shall not be eligible for this optional criterion.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.

[98] www.newmoa.org/prevention/ic2/IC2_AA_Guide_Version_1.pdf
[99] http://www.nap.edu/catalog/18872/a-framework-to-guide-selection-of-chemical-alternatives
[100] http://www.biznge.org/alternatives-assessment

~~**Verification requirements:**~~

~~a) Evidence supporting that the manufacturer, or a supplier or third party, has performed an alternatives assessment on substances of concern (as described in the criterion) used in its products or processes used in the production of the products declared to conform to this standard.~~

~~b) Documentation that the alternatives assessment includes the requirements listed in the criterion.~~

~~c) Evidence that the manufacturer has taken steps to improve the commercial or technical viability of a safer alternative which may include any one of the following actions – supplier engagement, industry group collaboration, or regulatory advocacy.~~

6.2.6 Optional - Making safer substance use hazard assessments ~~alternatives assessment~~ publicly available

The manufacturer shall publicly disclose ~~on their website~~ the hazard assessment score of substances assessed with a methodology comparable with the GreenScreen® for Safer Chemicals methodology as required by ~~documentation required for conformance with~~ criterion 6.2.5. ~~and provide a list of criteria and weighting used in the alternative assessments~~ by either:

~~– Posting on a publicly available database such as the Substitution Support Portal (SUBSPORT)[101] or the IC2 Database[102], or~~

~~– Making the documentation publicly available on the manufacturer's website.~~

~~In the case of an assessment done as part of a partnership or industry consortium, the other participating parties shall be named.~~

~~The manufacturer shall declare the URL of the public disclosure.~~ The URL for the ~~manufacturer's~~ public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Declaration of the~~ URL of public disclosure on the manufacturer or other public website

~~b)~~ Public disclosure of the ~~GreenScreen™ Benchmark~~ hazard assessment scores as required by ~~manufacturer documentation of the alternatives assessments as listed in~~ criterion 6.2.5~~, and a list of criteria and weighting used in the alternative assessments, by either:~~

~~[101] http://www.subsport.eu/about-the-portal~~

~~[102] http://www.newmoa.org/prevention/ic2/projects/resource/hazassesstool.cfm~~

~~i. Posting on a publicly accessible database such as the Substitution Support Portal (SUBSPORT)[103] or the IC2 Database[104], or~~

~~ii. Making accessible on the manufacturer's website~~

~~c) If the an assessment is done as part of a partnership or industry consortium, the public disclosure identifies the other participating parties~~

~~**References and details:** None~~

6.3 Manufacturing chemicals

6.3.1 Optional - Mitigation and inventory of process fluorinated greenhouse gas emissions resulting from semiconductor manufacturing

~~The manufacturer shall provide a statement that a~~At least one supplier of central processing units (CPUs), dynamic random-access memory (DRAM), and or ~~major semiconductor components such as~~ accelerators used in the product shall have:

1) Developed a process F-GHG emissions inventory using one of the following methods:

   i. The most recent IPCC Tier 2a, 2b, or Tier 3 methodology, or

   ii. Methods included in the U.S. EPA GHG Reporting Rule, Subpart I

   If the emissions inventory is not already publicly available, the supplier shall make the process F-GHG emissions inventory available to the manufacturer for the following categories of process F-GHGs: SF6, NF3, PFCs, and HFCs.

2) A GHG emissions reduction goal ~~a commitment to reduce GHG emissions~~, or maintains year-to-year GHG emissions reduction activities, and publicly reports progress toward this goal, on an annual basis. The reduction goal may include other GHG emission sources, but shall at least include direct process F-GHG emissions from the semiconductor manufacturing process. Process F-GHG's are defined as SF_6, NF_3, PFCs and HFCs. Examples of F-GHGs include, but are not limited to, CF_4, C_2F_6, C_3F_8, c-C_4F_8, C_4F_6, C_4F_8O, CHF_3, CH_2F_2, CH_3F, NF_3, and SF_6.

~~The supplier shall also demonstrate that it has developed a process F-GHG emissions inventory using one of the following methods:~~

~~iii. The most recent IPCC Tier 2a, 2b, or Tier 3 methodology, or~~

~~iv. Methods included in the US U.S. EPA GHG Reporting Rule, Subpart I, or~~

~~v. Other regulatory reporting or voluntary reporting demonstrated to be equivalent to or more rigorous than B.i. or B.ii.~~

~~[103] http://www.subsport.eu/about-the-portal~~

~~[104] http://www.newmoa.org/prevention/ic2/projects/resource/hazassesstool.cfm~~

~~If the emissions inventory is not already publicly available, the supplier shall make the process F-GHG emissions inventory available to the manufacturer for the following categories of process F-GHGs: SF6, NF3, PFCs, and HFCs.~~

This criterion applies to fabrication facilities ~~fab operations~~ associated with products covered under this standard. It is acceptable if only a portion of the supplier fabrication facilities ~~fab~~ is associated with the products covered under this standard.

Points shall be awarded according to Table 6.4~~1~~.

Table 6.4~~1~~ ~~(maximum of 2 points available)~~

~~Part Completion~~ GHG Emissions Activity	Total Points
~~Part B~~ 1) F-GHG emissions inventory	1
1) F-GHG emissions inventory AND 2) GHG emissions reduction goal ~~Part A and B~~	2

Point value: 2 maximum

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification Requirements:

a) For F-GHG emissions inventory:

i. Documentation of process F-GHG emissions inventory and reporting using one of the following:

- Latest IPCC Tier 2a, 2b, or Tier 3 methodology, or
- Subpart I of the U.S. EPA GHG Reporting Rule

If the emissions inventory is not already publicly available, documentation that the supplier has made the process F-GHG emissions inventory available to the manufacturer for the following categories of process F-GHGs: SF6, NF3, PFCs, and HFCs.

ii. Unless specified already in verification a)i), reporting of:

- Specification of the method used in a)i) to estimate F-GHG emissions
- Specification of the method used to estimate DREs of abatement equipment (e.g. facility-specific measurements or IPCC defaults)

b) For GHG emission reduction goal:

i. Supplier documentation that states emissions reduction goal and describes progress toward goal, made publicly available for example on a website

ii. If not already included in verification b)i), supplier letter that includes:

- Definition of baseline year for process F-GHG emissions reduction goal
- Description of the method(s) implemented to reduce process F-GHG emissions. This may include any one or a combination of, but not limited to, the pollution prevention approaches outlined below, as applicable:
  - Process Recipe Optimization
  - Greenhouse gas replacement
  - Point of Use (POU) abatement
  - Remote Plasma Cleans

~~a) Documentation of process F-GHG emissions inventory and reporting using any one of the following:~~
~~1. Latest IPCC Tier 2a, 2b, or Tier 3 methodology, or~~
~~2. Subpart I of the US U.S. EPA GHG Reporting Rule, or~~
~~3. Other regulatory reporting or voluntary reporting demonstrated to be equivalent to or more rigorous than B.i. or B.ii.~~
~~If the emissions inventory is not already publicly available, documentation that the supplier has made the process F-GHG emissions inventory available to the manufacturer for the following categories of process F-GHGs: SF6, NF3, PFCs, and HFCs.~~

~~b) Unless specified already in verification b), reporting of:~~
~~1. Specification of the method used in b) to estimate F-GHG emissions~~
~~2. Specification of the method used to estimate DREs of abatement equipment (e.g. facility-specific measurements or IPCC defaults)~~

References & Details:
World Semiconductor Council Best Practice Guidance of PFC Emission Reduction, 2012.[105]
Post-2010 voluntary PFC emissions reduction goal.[106]

7 Preferable materials use

7.1 Recycled content

7.1.1 Required – Declaration of postconsumer recycled plastic content

Manufacturer shall declare the minimum net percentage of plastic derived from the use of postconsumer recycled plastic in plastic parts in the product. Individual parts greater than or equal to 25 g shall be included in the calculation. The manufacturer may ~~exclude~~ choose to include individual parts less than 25 g ~~from~~ in the calculation.

[105] http://www.semiconductorcouncil.org/wsc/uploads/Final_WSC_Best_Practice_Guidance_26_Sept_2012.pdf
[106] http://www.semiconductors.org/clientuploads/WSC-2011-Joint-Statement-Final%20(2).pdf, p.6

The declaration shall be provided either 1) on a publicly available registry; or 2) on the third party certification organization website or manufacturer's website in the form of a certification report, or equivalent, issued by the certifying organization; or 3) on the manufacturer's website, if the product is self-declared to conform to the standard.

Calculation: The minimum net percentage is calculated as the minimum net weight of postconsumer recycled resins in the included plastic parts (where net weight refers to the weight of postconsumer recycled content in the commercial resin) divided by the total weight of all included plastic parts.

Additives or fillers in plastic formulations shall not contribute to the net weight of recycled content, except in the case where the additives or fillers are derived from a recycled feedstock.

Exclusions: The manufacturer may also exclude any of the following items from the calculation: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, fans, and biobased plastic content.

For products that do not contain individual plastic parts weighing greater than or equal to 25 g, the manufacturer may declare "Not Applicable" for this criterion.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Supplier documentation stating minimum net percentage of postconsumer recycled plastic content in material supplied to manufacturer or to manufacturer's part supplier

b) Documentation of a calculation that includes a list of the included plastic component part name(s) or other part identifier that contains the postconsumer recycled plastic content, weight (g) of postconsumer recycled plastic in the component part, and postconsumer recycled plastic resin type. If the part identifier is not descriptive, a description of the type of part shall be provided

References and details: None ~~Additives or fillers in plastic formulations are not considered to contribute to the net weight of recycled content, except in the case where the additives or fillers are derived from a recycled feedstock.~~

7.1.2 Required – Minimum Postconsumer recycled content in e~~E~~xternal enclosures

External enclosure of the server shall consist of a minimum 10% net postconsumer recycled (PCR) plastic content. External enclosure parts < 100 g may be excluded from this requirement. In addition, the manufacturer may declare "Not Applicable" for this criterion if the sum of all plastic parts in the external enclosure weighs less than 10% of the total weight of all external enclosure parts. For the purpose of this criterion, bezels, latches, brand badges, labels, and mounting brackets are not considered part of the enclosure.

Exemption: this requirement is not applicable to resin grades on the market for less than 5 years in applications for the information technology industry. For the purposes of this exemption, "on the market" refers to the first commercial lot shipment with the resin grade designation.

Calculation: The minimum net percentage is calculated as the minimum net weight of postconsumer recycled resins in the included plastic parts (where net weight refers to the weight of postconsumer recycled content in the commercial resin) divided by the total weight of all included plastic parts.

Additives or fillers in plastic formulations shall not contribute to the net weight of recycled content, except in the case where the additives or fillers are derived from a recycled feedstock.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Supplier documentation stating minimum net percentage of postconsumer recycled plastic content in material supplied to manufacturer or to manufacturer's part supplier

b) List of the included plastic component part name(s) or other part identifier that contains the postconsumer recycled plastic content, weight (g) of postconsumer recycled plastic in the component part, and postconsumer recycled plastic resin type. If the part identifier is not descriptive, a description of the type of part shall be provided

References and details: None ~~Additives or fillers in plastic formulations are not considered to contribute to the net weight of recycled content, except in the case where the additives or fillers are derived from a recycled feedstock.~~

~~The following are not considered part of the external enclosures: cables, external power supplies.~~

7.1.3 Optional – Postconsumer recycled plastic content

Product shall contain the minimum net percentage of postconsumer recycled plastic content in Table 7.1. Manufacturer may claim one point for each achievement listed in the table.

Table 7.1

Postconsumer Recycled Content	Points
≥ 10% PCR plastic	1
≥ 25 % PCR plastic	1
≥10 % ~~derived~~ WEEE-derived plastic	1

Individual parts greater than or equal to 25 g shall be included in the calculation. The manufacturer may ~~exclude~~ choose to include individual parts less than 25 g in the calculation.

Calculation: The minimum net percentage is calculated as the minimum net weight of postconsumer recycled resins in the included plastic parts (where net weight refers to the weight of postconsumer recycled content in the commercial resin) divided by the total weight of all included plastic parts.

Additives or fillers in plastic formulations shall not contribute to the net weight of recycled content, except in the case where the additives or fillers are derived from a recycled feedstock.

Exclusions:~~The following plastic parts may be excluded from the calculation~~ The manufacturer may also exclude any of the following items from the calculation: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, fans, and biobased plastic content~~ and parts less than 25 g~~.

For products that do not contain individual plastic parts weighing greater than 25 g, the manufacturer may declare "Not Applicable" for this criterion.

~~Calculation: The net percentage is calculated as the weight of postconsumer recycled resins, fillers and additives in the included plastic parts, divided by the total weight of all included plastic parts.~~

Point value: maximum 3

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Supplier documentation stating minimum net percentage of postconsumer recycled plastic content in material supplied to manufacturer or to manufacturer's part supplier

   and

   For WEEE-derived plastic, certification attesting that the average minimum content of the resin is made from WEEE-derived plastics and in accordance with either UL ECVP 2809 (2nd edition) or BS/EN 15343:2007. Certification shall be by a certification body that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Arrangement for the scope of accreditation for ISO/IEC 17065.

b) List of the included plastic component part name(s) or other part identifier that contains the postconsumer recycled plastic content, weight (g) of postconsumer recycled plastic in the component part, and postconsumer recycled plastic resin type. If the part identifier is not descriptive, a description of the type of part shall be provided.

References and details: ~~Additives or fillers are not considered recycled plastic, except in the case where the additives or fillers are derived from a recycled feedstock.~~

The points in Table 7.1 are cumulative. For example, if the product contains 30% PCR derived from WEEE, the manufacturer could claim 3 points: 1 points from each ≥ 10% PCR plastic, ≥ 25 % PCR plastic and ≥10 % derived WEEE plastic.

7.1.4 Optional - Postconsumer recycled content of rare earth elements in hard drive(s) in product

Products that contain a hard drive(s) with actuator/voice coil or spindle magnets shall contain 5% or more PCR content neodymium or dysprosium by weight of neodymium or dysprosium in the magnet. The

neodymium or dysprosium shall be provided through the recycling of magnets from used devices, not limited to electronic devices.

If the product does not contain a hard drive with magnets that contain these rare earth elements, "Not Applicable" may be declared.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

~~a) Documentation identifying at least one supplier of the PCR material~~

a) Evidence from hard drive manufacturer(s) that the magnets in the hard drives contain 5% or more PCR content neodymium or dysprosium and documentation of its source through means such as

i. Documentation of audits of magnet suppliers and purchasing records

ii. Identification of the source(s) of recovered rare earth elements

iii. Certification attesting to the minimum PCR content of neodymium or dysprosium using UL 2809 Environmental claim validation procedure (ECVP) or equivalent chain-of-custody procedure

References and details: None

~~**7.2 Biobased content**~~

~~**7.2.1 Optional— Minimum 10% content of biobased plastic**~~

~~Plastic parts in the product shall contain a combined minimum net 10 percent, and a minimum of 10 g, of biobased content. Individual parts greater than or equal to 100 g shall be included in the calculation. Individual parts less than 100 g may be excluded from the calculation.~~

~~Calculation: The minimum net percentage is calculated as the minimum net weight of biobased plastics in the included plastic parts (where net weight refers to the weight of only biobased content in the commercial resin) divided by the total weight of all included plastic parts.~~

~~The scope of plastic parts may exclude the following items from the calculation Exclusions: printed circuit boards, labels, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and post-consumer resin content, and plastic parts less than 100 g.~~

~~For products that do not contain individual plastic parts greater than 100 g, the manufacturer may declare "Not Applicable" for this criterion.~~

~~Point value: 1~~

~~**Geographic applicability:** This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

~~**Verification requirements:**~~

~~a) Supplier letter statement(s) stating minimum net percentage of biobased content in covered plastic material supplied to manufacturer, or to manufacturer's plastic part supplier(s).~~

~~b) List of the included plastic part name(s) or other part identifier that contains the biobased content, mass (in g) of biobased content in the plastic part, and type of biobased resin and/or type of biobased material used in the plastic. If the part identifier is not descriptive, a description of the part shall be provided.~~

7.23 Material efficiency/dematerialization

7. 23.1 Optional - Opt out program to reduce surplus parts ~~Reduction of surplus parts by default~~

The manufacturer shall implement a program that offers purchasers the option to "opt out" of receiving the parts on the list below. The list below only applies to parts that are offered with the product, and does not apply to parts or documentation that are required for legal, functional or safety purposes. The program shall be offered through the same ordering process as typically used by purchasers.

The "opt out" program shall include the following:

- Keyboards/mice
- Power cables
- Mounting hardware (e.g., rails, rack ears, shelving, cable management system)
- Product documentation and marketing
- Installation media
- Additional cosmetic blanks/dummies
- Bezel

The manufacturer shall inform the customer if there is additional cost to the purchaser for the above customization options.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation of the "opt out" program demonstrating that it meets the above requirements, including:

   i. All parts on the list are included in the program, except if not offered with the product or subject to legal, functional or safety requirements

ii. The program is offered through the typical ordering process used by purchasers

b) Documentation of how the customer is informed if there is an additional cost for customization options

References and details: None

~~The manufacturer shall document and implement a customization program to reduce surplus parts. The program shall identify the minimal product configuration, as determined by the manufacturer and outlined below:~~

~~– Keyboards/mice – zero by default; 1 keyboard and, or 1 mouse as options. Indicate connector required (e.g., PS/2, USB, specific).~~

~~– Power cables (where appropriate) – zero by default; 1 for each power supply as option.~~

~~– Mounting hardware – zero by default; specific mounting hardware as an option.~~

~~– Documentation and advertising – zero by default; 1 per server type in order as option.~~

~~– Installation media – zero by default; 1 per server type in order as option.~~

~~– Cosmetic blanks/dummies – option of not receiving parts that are not required.~~

~~– Fans – include option of ordering minimum as determined by manufacturer.~~

~~The manufacturer shall inform the customer declare whether there is additional cost to the purchaser for the above customization options.~~

~~Point value: 1~~

~~**Geographic applicability:** This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

~~**Verification requirements:**~~

~~a) Documentation of minimum product configuration~~

~~b) Documentation of how customer is informed of customization program and customizes product during ordering process~~

~~c) Declaration Documentation of how the customer is informed if there is an of additional cost to purchaser for customization options~~

~~**References and details:** None~~

8 Product packaging

8.1 Reduction of substances of concern in packaging

8.1.1 Required—Elimination of added heavy metals in packaging

Heavy metals— lead, cadmium, mercury, and hexavalent chromium—shall not be intentionally added to any package or packaging component. For incidental presence, the sum of the combined concentrations of lead, cadmium, mercury, and hexavalent chromium present in any packaging component shall not exceed 100 ppm by weight.

Pallets are excluded for the purposes of this criterion.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

~~Either:~~

a) Supplier ~~letter~~ statement for each packaging component or packaging material provided by the supplier that includes:

   i. The specified heavy metals have not been intentionally added to any package or packaging component;

   And

   ii. The sum of the combined concentration of the four metals present in any packaging component does not exceed 100 ppm by weight.

Or

b) Documentation of a conformance assurance system that demonstrate conformity to this criterion through effective control of the supply chain.

Or

c) Demonstration of a supply chain management system used to ensure that the packaging meets the requirements of the criterion. The system shall include a supplier trustworthiness assessment and may include any of the following:

   i. Supplier Declaration of Conformity,

   ii. Material Declaration and Disclosure, or

   iii. Analytical testing.

References and details: The requirements in this criterion are based on Model Toxics in Packaging legislation[107], European Parliament and Council Directive 94/62/EC and California Health and safety Code Section 25214.11-25214.26.

Analytical testing is not required for verification to this criterion. However, it is implied that supplier statements or manufacturer programs are based on a conformance assurance system that includes periodic analytical testing. ~~However, if testing is undertaken, ensure that appropriate test methods are used. For example, energy dispersive x-ray fluorescence spectrometry can be used with limitations to quantitatively determine the amount of heavy metals (lead, cadmium, mercury, and total chromium) in polymeric materials by following ASTM F 2617-08[108]. This method does not determine hexavalent chromium. Materials that exceed 100 ppm chromium with this method should be further analyzed using destructive wet testing methods. Laboratory analysis for total metals in polymeric and other materials can be performed using procedures such as EPA SW-846 Method 3052[109] and IEC 62321:2008[110].~~

8.1.2 Required—Restriction on the use of elemental chlorine as a bleaching agent in paper-based packaging material

Manufacturer shall state in the manufacturer's environmental packaging requirement that elemental chlorine shall not be used as a bleaching agent to bleach virgin or recovered content fibers used in paper-based product packaging.

Product packaging that is made Elemental Chlorine Free (ECF), Total Chlorine Free (TCF), or Processed Chlorine Free (PCF) meets the requirements of this criterion.

Additionally, recycled content that may have been previously bleached with chlorine or chlorine derivatives meets the requirements of this criterion.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Copy of manufacturer's environmental packaging requirement as provided to packaging supplier

References and details: None.

8.1.3 Optional – Restriction on the use of chlorine in processing packaging materials

[107] Model Toxics in Packaging Legislation [compilation was developed by CONEG and is administered by the Toxics in Packaging Clearinghouse (TPCH) http://www.toxicsinpackaging.org/]

[108] ~~ASTM F2617-08 http://www.astm.org~~

[109] ~~U.S. EPA Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Detailed Tables and Figures http://www.epa.gov/epawaste/nonhaz/municipal/msw99.htm~~

[110] ~~IEC 61249-2-21 ed. 1.0, Materials for printed boards and other interconnecting structures—Part 2-21: Reinforced base materials, clad and unclad—Non-halogenated epoxide woven E-glass reinforced laminated sheets of defined flammability (vertical burning test), copper-clad, published 2003-11-12 http://www.iec.ch/~~

Manufacturer shall document that any fiber-based materials used in packaging was not bleached with chlorine compounds. Unbleached packaging is also eligible for this optional point. This requirement applies to the bleaching of fiber-based materials (including recycled fiber) and their fabrication into packaging for server products declared to conform to this standard, and not to prior uses of the fiber.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation that fiber-based materials are not bleached with chlorine compounds (e.g., supplier letter or supplier data submission to manufacturer). Documentation that packaging is made ~~Elemental Chlorine Free (ECF),~~ Total Chlorine Free (TCF)~~,~~ or Processed Chlorine Free (PCF) meets this verification requirement.

References and details: None.

8.2 Recyclability of packaging materials

8.2.1 Required - Enhancing recyclability of packaging materials

Product packaging shall meet the following requirements:

a) All non-reusable packaging components ≥25 g shall be separable by material type, including by plastic material type as specified in ~~the bullet~~ b) below, without the use of tools, with the exception of labels affixed to plastics bags or wraps, tape, staples, ~~nails in pallets~~, co-laminated materials for purposes of moisture or ESD barrier protection, and plastic bags over expanded foam.

b) All plastic packaging components ≥ 25 g shall be clearly marked with material type in accordance with ISO 11469/1043, ASTM D7611/D7611M, or DIN[111], with the exception of plastic protective films, stretch wraps, strapping, and expanded polyurethane foam. For products with packaging that does not contain any plastic components, manufacturer may declare “Not applicable” for requirement b) in this criterion.

~~Each requirement above shall be declared separately. For products with packaging that does not contain any plastic components, manufacturer may declare “Not applicable” for requirement b) in this criterion.~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

[111] DIN 6120-1 - Marking of packaging and packaging materials for recycling purposes - Plastics packaging and packaging materials - Part 1: Graphical symbols (http://www.en-standard.eu)

a) Documentation from manufacturer:

i. For requirement a) manufacturer's packaging part or assembly drawing, or photographs

ii. For requirement b) photographs or physical evidence of plastic markings

References and details: None

8.3 Recycled content packaging

8.3.1 Required - Recycled content fiber in corrugated packaging

Corrugated fiber based packaging materials shall contain a minimum of 25% recycled content fiber (by fiber weight).

If the product packaging does not contain corrugated fiber based materials, "Not Applicable" may be declared.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) List of applicable packaging materials and weights

b) Supplier documentation with recycled content percentage from each applicable packaging material where recycled content percentage is claimed from ~~first tier~~ suppliers

~~If the product packaging does not contain corrugated fiber based materials, "Not Applicable" may be declared.~~

References and Details: None

8.3.2 Optional – Higher r~~R~~ecycled content fiber in corrugated packaging

Corrugated packaging materials shall contain a minimum of 50% recycled content fiber (by fiber weight). Manufacturers shall also state a preference in specifications, which are applicable to the product, for a minimum 25% postconsumer recycled content fiber (by fiber weight). Fiber-based packaging materials derived from alternative sources to traditional paper mill products are exempt from this recycled fiber requirement and shall not be included in the calculation of recycled content.

Point value: 1

Geographic applicability: ~~This criterion can vary by region or country and is applicable only in countries or regions for which the product is declared to conform to this standard.~~ A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard.

Verification requirements:

a) List of applicable packaging materials and weights

b) Supplier documentation with recycled content percentage from each applicable packaging material where recycled content percentage is claimed from ~~first tier~~ suppliers

References and Details: Examples of alternative sources include, but are not limited to, bamboo and mushrooms.

8.4 Packaging reduction

~~**8.4.1 Optional - Optimization of packaging system to reduce excess packaging**~~

~~A packaging system evaluation shall be conducted on the product packaging to determine the required level of protection and avoid excess packaging. As per ISO 18602, Packaging and the environment: Optimization of the packaging system, manufacturer shall determine and substantiate the performance criteria that dictates the amount of packaging for delivery of the product to the customer. Consideration should be given to product design in cases where product fragility requires extra protection. Conformance to this criterion requires documentation of a packaging system evaluation on the frequently used packaging configuration applicable to this product.~~

~~For this criterion, manufacturer must include at a minimum the primary packaging, but also may include secondary and tertiary packaging to the packaging system evaluation at the manufacturer's discretion.~~

~~For this criterion, manufacturer may include secondary and tertiary packaging to the packaging system evaluation at the manufacturer's discretion.~~

~~Point value: 1~~

~~**Geographic applicability:** This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

~~**Verification requirements:**~~

~~a) Identification and weight of each packaging constituent used to deliver product to customer~~

~~b) Documentation of packaging system evaluation using ISO 18602~~

8.4.1~~2~~ Optional - Elimination of individual packaging for hardware and components

All hardware and components required for operation of the server (and shipped with the product) shall be shipped inside the server. Exceptions are components and accessories normally used external to the server such as power cords, keyboard, or mounting rails; spare parts; and components that require individual packaging for safety reasons such as lithium-ion batteries. No hardware shall be shipped in individual or separate packaging, either within the primary or secondary packaging container or within the server product.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Evidence such as photographs that product is not shipped with individual or separate packaging except for components and accessories normally used external to the server

~~Or~~

~~1) Letter from at least two purchasers of the product that the product shipment contained no individual or separate packaging except for components and accessories normally used external to the server~~

~~Or~~

b) Manufacturer statement indicating where listed exceptions apply ~~in product documentation that packaging is minimized and no hardware is shipped in individual or separate packaging except components and accessories normally used external to the server or where required for safety reasons~~

References and details: None

8.4.2~~3~~ Optional – Bulk packaging

Manufacturer shall offer a bulk packaging option to institutional customers that reduces the amount of packaging:

a) By bulk packaging weight, as compared on a per unit basis to the single unit packaging; or

b) By bulk packaging volume, as compared on a per unit volume basis to single unit packaging.

The bulk packaging option shall be offered to institutional customers through the same ordering process as typically used by institutional purchasers.

Bulk packaging shall function as the primary packaging from the point of final assembly of the product through delivery to the institutional customer. Re-boxing of a finished product from single unit packaging to bulk packaging does not meet the requirements of this criterion.

Manufacturer may declare “Not applicable” for a region or country if bulk packaging for the product is prohibited by law.

Point value: 1

Geographic applicability: ~~This criterion can vary by region or country and is applicable only in countries or regions for which the product is declared to conform to this standard.~~ A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard.

Verification requirements:

a) Engineering specification or schematic for the bulk packaging option(s)

b) Demonstration that bulk packaging option(s) is offered to institutional customers as an alternative to single unit packaging in the primary ordering process used by institutional purchasers. Demonstration may include, for example, marketing materials, customer order form, screenshot of an order screen, or sales contract.

c) To demonstrate reduction in packaging mass or volume, the manufacturer shall:

   i. Define a base packaging configuration for a single unit of the registered product (including external components as determined by the manufacturer)

   ii. Define a bulk packaging configuration for shipping multiple units of the registered product (including any external components as determined by the manufacturer in the bullet above)

   iii. Calculations demonstrating ~~Demonstrate~~ that the bulk package has a lower mass or volume of packaging on a per unit basis as compared to the single unit packaging such that:

   [total mass or total volume of bulk packaging / quantity of product units contained in the bulk packaging] < [total mass or total volume of the single unit packaging / unit]

d) ~~Declarations~~ Statements from the party that applies the bulk packaging at the point of final product assembly, and the party that ships the product in the bulk packaging to the institutional customer, if different, or other documentation demonstrating that the bulk packaging is the primary packaging at point of final product assembly and shipment to customer, and that the product(s) is not re-packaged from a single unit packaging.

e) Documentation of law prohibiting bulk packaging, if applicable.

References and details:

Total volume calculations should be determined by the outer dimensions of the packaging (e.g., bulk packing or single unit packaging.)

A packaging “configuration” is the combination of packaging materials and how they are assembled (configured) to contain product(s).

The manufacturer determines:

a) The bulk packaging option(s) (for example, ~~6~~ the number of product units per single bulk packaging) for products declared to conform to this criterion. The bulk packaging option(s) can vary by product

type. The bulk packaging option(s) may include the shipment of 2 or more units of 2 or more different product types ~~(for example, 2 desktop computers and 2 monitors)~~.

b) Which external components that are included in the packaging for both the single unit base packaging configuration and the base bulk packaging configuration. The only stipulation that the single unit packaging and the bulk packaging have the same included external components.

9 Design for repair, reuse and recycling

9.1 Design for repair, reuse and recycling

9.1.1 Required - Design for repair, reuse and recycling

The product shall be designed with the following features to facilitate repair, preparation for reuse, recycling, and safe handling, unless otherwise required as part of compliance with safety regulations, safety standards or as part of a safety certification:

– External enclosures, or those portions of the enclosures that must be removed to accomplish repair, reuse, recycling or safe handling, shall be removable by hand or with commonly available tools, without destruction of the enclosure.

– Components ~~with special handling needs~~ requiring selective treatment listed in the European Union WEEE Directive 2012/19/EU Annex VII shall be identified and removable by hand or with commonly available tools.

– At a minimum, if present in the product, data drives or cards, processor (CPU), memory DIMMs, power supply, fans and I/O cards, shall be replaceable by hand or with commonly available tools, and

– Wires and cables that connect to external sources of power or data shall be removable from the products by hand or with commonly available tools without cutting either the wire or cable, or the product being rendered unusable, unless required for technical or safety reasons.

In order for a component to be considered "identified" for the purposes of this criterion either the component shall be called out in the product documentation ~~disassembly report~~ called for in criterion 9.2.2~~1~~ or marked with a visual display as called for in 9.2.5~~4~~.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Description of disassembly process,~~ Documentation that the product ~~which demonstrates~~ meets~~ing~~ each of the required design features to facilitate repair, preparation for reuse, recycling, and safe handling

b) If one or more of the required features is not included in the product design, justification that this is due to compliance with safety regulations, safety standards or as part of a safety certification

References and details: None

9.1.2 Required - Design for plastics recycling

All plastic parts >100 g shall meet the following requirements:

- Clearly marked with material type in accordance with ISO 11469/1043, with the exception of printed circuit boards, wire and cables;

- Separable by hand or with commonly available tools, such that plastic parts can be separated into ~~parts with the~~ "compatible" or "compatible with limitations" material types, per Annex C in ECMA-341 Environmental Design Considerations for ICT & CE Products, 4th Edition / December 2010[112] ~~reference in note 2~~. If one or more of the resins is not reflected in ECMA-341 Annex C, the manufacturer shall demonstrate that the plastic part is compatible with recycling.

If the product does not contain plastic parts weighing >100 g, "Not Applicable" may be declared.

NOTE ~~1 –~~ For components containing plastic parts, the 100 g threshold applies to the plastic part only.

~~NOTE 2 – See Appendix A of ECMA-341 for a table of compatible plastics at https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/mineralsmetals/pdf/mms-smm/busi-indu/rad-rad/pdf/2005-42(cf)cc-eng.pdf~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation stating each part number or name for plastic parts >100 g.

b) Visual documentation such as photos documenting material type marking on each plastic part >100 g.

c) Description of procedures for separating the plastic parts by hand or with commonly available tools, including a list of commonly available tools needed, if any

References and details: None

9.1.3 Optional - Further design for plastics recycling

Plastic parts >100 g, with the exception of printed circuit boards, wire and cables, shall not have:

- Molded, glued or otherwise attached metal inserts or metal fasteners, unless the metal component can be completely snapped off manually or entirely removed with commonly available tools;

[112] ECMA-341 Environmental Design Considerations for ICT & CE Products, 4th Edition / December 2010.

- Adhesives, coatings, paints, or finishes that have a significant impact on the physical or mechanical properties of the plastic when it is recycled.

If the product does not contain plastic parts weighing >100 g, "Not Applicable" may be declared.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation stating each part number or name for plastic parts >100 g.

b) Documentation that each plastic part >100 g meets the requirements of the criterion. The documentation for adhesives, coatings, paints, or finishes shall include either:

i. Test results showing no more than a 25% reduction in either the notched Izod impact at room temperature between a test sample made from the original plastic without adhesives, coatings, paints, or finishes and test sample made from the plastic with adhesives, coatings, paints, or finishes, as measured using ASTM D256 or ISO 180, or the Charpy impact for the same test samples as measured using ISO 179; or

ii. Peer reviewed published literature concluding no significant impact

References and details: None

9.1.4 Required - Product recyclability calculation and minimum 90% recyclability rate

Manufacturer shall perform a calculation for the recyclability of the product, at the product family level as determined by the manufacturer, using the IEC TR62635 methodology, and shall make the assumptions, methodology and calculation results publicly available on their website. ~~A link to that information shall be declared.~~

The product shall have a minimum recyclability rate of 90% by weight based on technology and processes available at the time the product is declared to conform to this standard.

Determination of the recyclability rate shall start with the receipt of the untreated waste equipment (if beyond reuse) and end when the end-of-waste status for fractions is achieved. Printed circuit board substrate material, included in printed circuit boards that will be sent to a smelter for metals recycling, shall be considered recyclable for the purpose of the calculation.[113]

For the purposes of this criterion, end-of-waste status means materials that need no further processing, cleaning, separation, or recycling and are not destined for energy recovery or final disposal, but will instead be used as a direct feedstock in primary manufacturing processes.

[113] Note that this calculation of the recyclability of printed circuit boards differs from that in IEC TR 62635

The methodology shall identify the recycling technologies and practices that are sufficient for achieving the claimed recyclability rate. These technologies and practices must be common in existing recycling systems, though they need not be available everywhere or throughout the world. Also, the methodology shall identify the information about the product from the manufacturer which would be needed by a treatment operator in order to achieve the claimed rates.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Declaration of~~ pPublicly available and readily accessible manufacturer's website URL with calculation assumptions, methodology and calculation results.

b) Documentation that the methodology includes identification of the requirements specified in the criterion.

~~c) Documentation that the IEC TR 62635 methodology was used to calculate a recyclability rate of at least 90% by weight.~~

References and details: None

9.2 Information and ~~facilitation~~ tools for reuse and recycling

9.2.1 Required - Information and reporting in preparation for reuse and recycling

The manufacturer shall publish product information, as required by Article 15 of the European Union WEEE Directive 2012/19/EU[114], for use by third-party reuse and recycling organizations, in a language of the manufacturer's choice. The information shall be~~: M~~ made available to reuse and recycling organizations upon request.

~~Available in any region or country in which the product is declared to conform to this standard.~~

The manufacturer shall have a written procedure that requires the information to be available for a minimum of 7 years following the end of production of the product.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Documentation that demonstrates that the information is available in all regions or countries in which the criterion is declared.

[114] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0019

b) A written procedure that assures that the information is available for 7 years following the end of production of the product.

c) Demonstration that the information complies with requirements of Article 15 of the European Union WEEE Directive 2012/19/EU[115].

9.2.2 Optional – Further information and reporting in preparation for reuse and recycling

~~The information provided in conformance with criterion 9.2.1 shall be publicly available on a website. The manufacturer shall declare the URL of the public disclosure.~~

~~In addition to the requirements of 9.2.1 t~~The manufacturer shall make publicly available ~~provide~~ the ~~following~~ additional information about preparation for reuse and recycling listed in Table 9.1, including the same information as provided by the manufacturer for use by its technicians for the same purposes.

Table 9.1

Information Made Publicly Available	Points
• Information provided in conformance with criterion 9.2.1 • Disassembly information that includes, at a minimum, step-by-step disassembly instructions with required tools for field replaceable components and assemblies; and • Description and manufacturer part numbers for field replaceable components and assemblies; and • Product trouble shooting information as provided to manufacturers' authorized repair and refurbishment suppliers	1
• Technical specification of each individual sub-assembly providing 1) a pin diagram, and 2) the make and model of each connector capable of being replaced in the field, as provided to manufacturer repair/authorized service centers; and • Schematic diagrams sufficient to facilitate efficient repair of printed circuit boards. • A list of components that cannot be replaced by non-manufacturer supplied components; and • A list of any components provided by the manufacturer that are compatible or equivalent with original components.	1
• Information provided under an open-source license that allows redistribution and modification, such as Creative Commons (www.creativecommons.org) (CC-BY)	1

[115] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0019

~~– Disassembly information that includes, at a minimum, step-by-step disassembly instructions with required tools for field replaceable components and assemblies~~

~~– Description and manufacturer part numbers for field replaceable components and assemblies~~

~~– Product trouble shooting information as provided to manufacturers authorized repair and refurbishment suppliers~~

~~The manufacturer may exclude from the manual any information that is confidential business information. The manufacturer may exclude information for safety reasons.~~

The information ~~manual~~ shall be available in one or more of the following formats:

- User-friendly formatting on the web; or ~~and~~
- Downloadable PDFs for offline viewing; or
- Machine-friendly file format: either HTML, XML or in alignment with ~~oManual~~*/IEEE 1874 – IEEE Standard for Documentation Schema for Repair and Assembly of Electronic Devices*.

The URL for the manufacturer's public website disclosing this information shall be provided at the time of product registration, certification or self-declaration, and thereby made publicly available. The manufacturer may exclude information for safety reasons and any information that is confidential business information. ~~The manufacturer shall have editorial control over the contents of the manual~~.

Point value: ~~1~~ Maximum 3

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) URL for public disclosure on manufacturer's website

b) Documentation that demonstrates that the information is available in all regions or countries in which the criterion is declared.

c) Demonstration that all of the required information is provided.

d) Demonstration that the formatting meets the specified requirements.

e) If one or more of the required ~~manual~~ contents is not included for safety concerns, justification that this is due to compliance with safety regulations, safety standards or as part of a safety certification.

~~9.2.3 Optional - Additional information and reporting in preparation for reuse and recycling~~

~~The manufacturer shall include the following information about preparation for reuse and recycling in the manual required in criterion 9.2.1, or a separate manual meeting the same availability and formatting requirements as the manual specified in criterion 9.2.1:~~

- ~~Technical reference of each individual sub-assembly providing 1) a pin diagram, and 2) the make and model of each connector capable of being field terminated, as provided to manufacturer repair/authorized service centers; and~~

- ~~The components that cannot be replaced by non-manufacturer supplied components; and~~

- ~~A list, updated at least annually, of any components provided by the manufacturer that are compatible or equivalent with original components.~~

~~Point value: 1~~

~~**Geographic applicability:** This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

~~**Verification requirements:**~~

~~a) Documentation that demonstrates that the manual is available in all regions or countries in which the criterion is declared.~~

~~b) A written procedure that assures that the manual is available for 7 years following the end of production of the product.~~

~~c) Documentation that demonstrates that the manual contains all the required information.~~

~~d) Documentation that demonstrates that the formatting meets the specified requirements.~~

~~9.2.4 Required - Informing reuse operators and treatment operators of information available for their assistance (corporate)~~

~~Manufacturers shall inform reuse operators and treatment operators with which they, or an organization working on their behalf, have a business relationship for providing end-of-service/end-of-life management of the products declared to this standard regarding the availability of the information provided under any of the following criteria to which they declare conformance: 9.2.1, 9.2.2, 9.2.3, 9.2.5, and 9.2.6.~~

~~The method of informing reuse operators and treatment operators shall be in writing and a record of its distribution shall be documented.~~

~~**Geographic applicability:** This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

~~**Verification requirements:**~~

~~a) Documentation that demonstrates the manufacturer has identified all reuse and treatment operators with which they, or an organization working on their behalf, have a business relationship for providing end-of-service/end-of-life management of the products.~~

~~b) Documentation of written notification and its distribution as required informing reuse operators and treatment operations.~~

~~**References and details:** None~~

9.2.~~3~~5 Optional - Product marked to identify components and materials requiring selective treatment ~~with special handling needs~~

The product shall visually display information on the presence and location of all components and materials requiring selective treatment ~~with special handling needs~~ as identified in the European WEEE Directive 2012/19/EU Annex VII. The information shall be provided on a label or other permanent marking located on the product or visible upon removal of the external enclosure in order to clearly identify the presence before any treatment. Each component requiring selective treatment ~~with special handling needs~~ need not be labeled, but only a single label need be on the product.

The label, or permanent marking, shall link to the required information on a website that identifies the presence and location of the components and materials requiring selective treatment ~~with special handling needs~~. The code shall be either a Quick Response (QR) code, or other code, at the choice of the manufacturer, that is in common use with available apps for utilization on mobile devices. If the QR code directs the user to a web page that is no more than one (1) click away from the information for the registered product, then the point value of this criterion is two (2) points. If two (2) or more clicks are required to access the product-specific information, then the point value of this criterion is one (1) point.

The label, or permanent marking, shall not interfere with the recyclability of the material on which it is affixed. If the label or marking is on a part made of plastic, that part with the label or marking shall meet the requirements of criterion 9.1.3.

For products that do not contain components requiring selective treatment ~~with special handling needs~~, a label or other permanent marking shall be located on the product that indicates the absence of components with special handling needs and the product shall be awarded 2 points.

Point value: 1 or 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification Requirements:

a) Visual documentation such as photos of the information displays on the product, showing either a label or permanent marking that is a readable QR code or other code, at the choice of the manufacturer, that is in common use with available apps for utilization on mobile devices

b) Documentation of how the label or permanent marking ~~does not interfere~~ is compatible with the recyclability of the material on which it is placed as required in criterion 9.1.3

9.2.~~46~~ Optional - Information and reporting on disk drive magnet type and location

The manufacturer shall indicate the type of actuator/voice coil and spindle magnets in the product's hard disk drive on the external enclosure of the hard disk drive by means of a QR code, or other code, at the choice of the manufacturer, that is in common use with available apps for utilization on mobile devices. The ~~QR~~ code shall link directly to the magnet type and location information on a publicly available database or publicly available on the manufacturer's website in at least English.

The voice coil and the spindle magnet locations in the hard disk drive shall be identified by metric measurements from the edges of the disk drive.

If the product does not contain a hard disk drive with magnets, "Not Applicable" may be declared.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Visual documentation such as photos of a readable ~~QR~~ code

b) Link to a publicly available database or the manufacturer's website with the required information

References and details: None

9.2.~~57~~ Optional - Functionality testing software tools

The manufacturer shall make publicly available, and provide access to the necessary hardware functionality testing software tools and applicable updates that would be necessary to ensure the product meets operating specifications and can be returned to service. Hardware functionality testing software tools developed by a third party may be utilized to meet this requirement, provided the software tools are publicly available and the manufacturer provides information on their accessibility and applicable updates.

Manufacturer shall also make available and provide access to any system or peripheral firmware (BIOS, etc.) and drivers for the server hardware. Test software, updates, drivers and firmware do not have to support versions of the OS newer than the last version officially supported by the manufacturer. Peripheral support only needs to cover peripherals sold and supported by the manufacturer.

The manufacturer shall have a written procedure that makes all of these items available for a minimum of 5 years following the end of production of the product and identifies if there is a cost. The manufacturer shall declare if there will be any cost associated with the provision of the functionality testing software tool.

~~The manufacturer shall declare the URL of the public disclosure.~~ The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Declaration of p~~Public disclosure URL demonstrating that the required software tools are publicly available.

b) Documentation of the required written procedures.

References and details: None

10 Product longevity

10.1 Replacement components

10.1.1 Required - Replacement components availability

~~Product replacement components and, or product service shall be made available through the manufacturer or an authorized third party for at least 5 years after the product is first placed on the market~~. An option to purchase product replacement components and, or product service through the manufacturer or an authorized third party for at least five years after the date of sale shall be made available. This option may be available free of charge or at separate charge.

Replacement components shall include, at a minimum, power supplies, fans, hard drives, memory, processors (CPUs) and printed circuit board assemblies. Information regarding the availability of product replacement components and, or product service shall be publicly available on the manufacturer's website. ~~The manufacturer shall declare the URL of the public disclosure~~. The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) ~~Declaration of m~~Manufacturer's website URL.

b) Demonstration that the website contains information regarding the availability of product replacement components and, or product service for at least 5 years after the date of sale ~~product is first placed on the market~~.

c) How to obtain product replacement components and, or product service through the manufacturer or an authorized third party.

11 Responsible ~~end-of-service/~~end-of-life management

11.1 Takeback service

11.1.1 Required – Provision of product take-back service (corporate)

Manufacturers shall provide a ~~nationwide~~ country-wide or region-wide product take-back service for reuse, refurbishment, and/or recycling for products declared and formerly declared to conform to this standard, either directly, or through a contracted third-party. The reuse, refurbishment, and recycling ~~and refurbishment~~ programs should consider the hierarchy of management of used and end-of-life electronic equipment and components ~~based on reuse, refurbishment, and/or materials recovery first, before considering energy recovery and/or~~ disposal, which prioritizes reuse and refurbishment of equipment and components, then materials recovery. If reuse and/or recovery are not possible, energy recovery and/or disposal may be considered. The manufacturer shall take responsibility for the provision of the product take-back service.

Manufacturer shall inform customers in product promotional materials (e.g., web-based sales information, product specifications) of the availability of the take back service, and make available information describing the product take-back service, including how to utilize the service, on the manufacturer's public website~~.:~~ The URL for the manufacturer's public website describing the product take-back service shall be provided during product registration, certification or self-declaration, and made publicly available.

~~1) To customers in product promotional materials (e.g. product specifications, sales documents, product description). The manufacturer may satisfy this requirement by providing the URL for the manufacturer's public website that describes the take-back service in at least one web-based product promotional material.~~

~~And~~

~~2) On the manufacturer's public website. The manufacturer shall declare the URL of the public disclosure.~~

Manufacturer shall make information available to the customer and final owner that identifies if there are any direct costs associated with use of the product take-back service. This information may be provided on the public website or upon request.

In jurisdictions where there are existing laws and/or regulations which establish a program for the collection and recycling of registered and formerly registered products, demonstration of compliance with those legal requirements meets the requirements of this criterion.

This criterion is applicable only in countries or regions for which the product is declared to conform to this ~~S~~standard.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) In jurisdictions within a country or region where the product is declared to conform to this standard and where there are existing laws/and or regulations which establish a program for the collection and recycling of registered products, the manufacturer shall demonstrate compliance to those laws and/or regulations.

b) In jurisdictions within a country or region where the product is declared to conform to this standard and where there are no existing laws/and or regulations which establish a program for the collection and recycling of products declared to conform to this standard, the following shall apply:

— Demonstration that product take-back service is provided for products declared and formerly declared to conform to this standard

— ~~Declaration of the~~ URL for the manufacturer's public website that describes the product take-back service, including how to utilize the service

— ~~Demonstration that~~ ~~information describing~~ Evidence that customers are informed of the product take-back service~~, including how to utilize the service is made available to customers~~ in product promotional materials, and

— Demonstration that information is made available to customers and final owners identifying if there are any direct costs associated with use of the product take-back service. This information identifying if there are any direct costs can be available on the public website, but is not required to be publicly available, provided it is available upon request.

References and details: Manufacturer is not obligated to demonstrate utilization of product take-back management services.

11.1.2 Optional - Manufacturer take-back service for de-installed ~~equipment~~ servers (corporate)

Manufacturer shall offer, either directly or through a third-party, a country-wide or region-wide take-back service to ~~collect~~ remove and process de-installed server equipment and components, including non-registered ~~products~~ servers and ~~products~~ servers from other manufacturers, for reuse and, or end-of-life management when new, equivalent registered ~~products~~ servers are sold. Manufacturer shall offer the take-back service option either directly or through its distribution channels to the first customer; the customer may choose to utilize the take-back service option or not.

~~Notification of the take-back service for de-installed products~~ ~~servers, including how to utilize the service(s), shall be available in sales information and product documentation, including website-based sales information and user manuals in formats provided to customers (e.g., website, compact disc, hard copy) at the time of purchase/lease.~~

Manufacturer shall inform customers in product promotional materials (e.g., web-based sales information, product specifications) of the availability of the take back service for de-installed servers, and make available information describing the product take-back service, including how to utilize the service, on the manufacturer's public website.

Manufacturer shall ensure that the ~~equipment~~ servers recovered under this criterion are ~~is~~ managed in accordance with:

- The management hierarchy and conformance evidence requirements of criterion 11.1.1, and
- Criteria 11.2.1 and 11.2.2.

This criterion is applicable only in countries or regions for which the product is declared to conform to this standard.

Point value: ~~1~~2

Geographic applicability: ~~This criterion can vary by region or country and is applicable only in countries or regions for which the product is declared to conform to this standard.~~ A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard.

Verification requirements:

a) Evidence of notification of the take-back service for de-installed ~~products~~ servers, including how to utilize the service(s), in sales information and product documentation, including website-based sales information and user manuals in formats provided to customers (e.g., website, compact disc, hard copy) at the time of purchase/lease.

b) Evidence that server equipment recovered is managed in conformance with verification requirements for 11.1.1, 11.2.1, and 11.2.2.

11.2 End-of-life management

11.2.1 Required - End-of-life processing requirements (corporate)

The manufacturer shall demonstrate the following requirements are met for all end-of-life ~~equipment~~ servers collected by the manufacturer (or their contractual agent) pursuant to the "Required—Provision of product take-back service" criterion (11.1.1) contained herein, by utilizing:

1) A government-approved program for end-of-life electronics processing in which the manufacturer does not control the selection of initial service providers for ~~the covered product~~ servers in the jurisdiction where the servers were taken back.

Or

2) Initial service providers that meet one of the following:

a) Are certified by a certification body to a ~~publicly available~~ Qualified Electronics Recycling Standard (as specified below), such as:

- The Responsible Recycling (R2) Standard for Electronics Recyclers
- The e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment
- EN 50625
- WEEELABEX

Certification bodies shall be accredited by an IAF member accreditation body to certify to the specific Qualified Electronics Recycling Standard identified.

Or

b) Demonstrate legal compliance to a Qualified Electronics Recycling Standard, in countries or regions that require compliance with a Qualified Electronics Recycling Standard

Or

c) Are certified to OHSAS 18001 and either ISO 14001 or EU EMAS[116] by a conformity assessment body that is accredited by an IAF member accreditation body to certify to the applicable management system standards;

And

Demonstrate conformance through annual third-party audits to a Qualified Electronics Recycling Standard. The audit shall be performed by a third-party conformity assessment body accredited to ~~ISO/IEC 17020,~~ ISO/IEC 17021-1~~,~~ or ISO 17065 and with competency to conduct an audit to the Qualified Electronics Recycling Standard.[117]

For products declared in the ~~US~~ U.S. and Canada, manufacturers shall conform with 1) or 2) a) above. For either option 1) or 2) above, the manufacturer may use an initial service provider located in a country other than where the end-of-life equipment is collected in compliance with national laws implementing applicable international agreements.

Qualified Electronics Recycling Standard: A Qualified Electronics Recycling Standard shall be publicly available and meet minimum technical requirements a) through g) below. The IEEE-NSF Joint Task Group on the Environmental Leadership Standard for Servers through the NSF Continuous Maintenance process will establish a Standards Qualification Panel to review and qualify standards against Minimum Technical Requirements a) through g)~~, while protecting the intellectual property of the owner of the standard when requested~~.

The Minimum Technical Requirements for a Qualified Electronics Recycling Standard are:

a) The standard is applicable within the country(s)/region(s) being declared to, and is applicable to the scope of equipment covered by this criterion.

[116] Certification to Recycling Industry Operating Standard™ (RIOS™) fulfills this requirement; available at: http://www.rioscertification.org/.

[117] ISO/IEC 17020, Conformity assessment – Requirements for the operation of various types of bodies performing inspections; ISO 17021-1, Conformity assessment – Requirements for bodies providing audit and certification of management systems; ISO/IEC 17065, Conformity assessment – Requirements for bodies certifying products, processes and services

b) The standard includes:

- A definition for "materials of concern" (or analogous term identifying materials with hazardous characteristics as well as materials with special handling needs),
- Requirements for handling and disposition of those materials to protect human health and the environment, and
- A requirement that initial service providers have a written management plan that addresses "materials of concern" and applicable legal requirements.

c) The standard requires that initial service providers shall document, maintain, review annually, and update as needed, an environmental, health and safety management system, and train their workers regarding the implementation of this system.

d) The standard requires that material intended for reuse, repair, refurbishment, ~~remanufacturing,~~ recycling and/or disposal shall be managed in accordance with applicable trade and transporting laws of the exporting, transit, and importing countries, as determined by the competent authority of the countries involved.

e) The standard requires that equipment/components going for reuse, repair or refurbishment shall be tested or evaluated to determine if the product is suitable for reuse, refurbishment, or repair prior to export. ~~and .~~ In addition, the standard requires that transboundary movement for reuse, repair, or refurbishment must be in conformance with the laws of the importing, exporting, and transit countries, as determined by the competent authority of the countries involved. For any equipment going for reuse, key functions must be confirmed to be working properly prior to export.

f) The standard requires that initial service providers shall control, document and track the material flow of all equipment, components, and materials covered by the standard, that pass through its facilities or its control.

g) The standard requires initial service providers to track all "materials of concern" to final disposition, and to ensure that the downstream take-back service providers are meeting the requirements of items b) through f).

~~This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

1) For each of the country(s)/region(s) within which the manufacturer is declaring the product conformant, the following shall be documented:

   a) Government-approved program(s) utilized by the manufacturer in the jurisdiction where the

product was taken back, the scope of products covered by the government-approved program. (e.g., consumer, commercial/institutional, or both), and evidence of participating in the government-approved program in that country/region;

and/or

b) For each initial service provider that performs take-back services outside of a government-approved program in the jurisdictions where the product was taken back, in conformance with a Qualified Electronics Recycling Standard:

i) Identification of the Qualified Electronics Recycling Standard (s) used

ii) For initial service providers meeting 2a) above, copy/evidence of a current certification, performed by a certification body, to the Qualified Electronics Recycling Standard (s), and/or

iii) For initial service providers meeting 2b) above, demonstration of legal compliance to a Qualified Electronics Recycling Standard

iv) For initial service providers meeting 2c) above, documentation of the accreditation and competency of third party conformity assessment body as specified in 2c) above, and findings (including all non-conformances) ~~and planned/implemented resolutions of~~ in the most recent third-party audit reports and other records confirming that all non-conformances have been closed and that ~~examining the performance of~~ the initial service provider ~~against~~ conforms to the identified ~~the~~ Qualified Electronics Recycling Standard.

c) When an agent is being used, the manufacturer must demonstrate that it has a contract with the agent and that the agent has a contract with the initial service providers that are providing the take-back services for the manufacturer.

11.2.2 Required - Trans-boundary movements (corporate)

If equipment and components collected pursuant to criteria 11.1.1 and 11.2.1 and materials derived from them are transported across national boundaries ~~at any point~~ from the customer to the initial service provider facility, the manufacturer shall ~~Ensure that such transboundary movement is in compliance with applicable trade laws[118] in all countries involved (export, transit, and import); and C~~create, maintain, and implement a written procedure to at least annually identify and evaluate compliance with applicable legal requirements in all countries involved (export, transit and import) for such transboundary movements. Manufacturer is considered conformant with this criterion if equipment and components collected pursuant to criteria 11.1.1 and 11.1.2 are not transported out of the country or region in which collected.

~~[118] This typically pertains to materials determined to be hazardous or otherwise restricted by any of the countries involved in transboundary movement, based on domestic laws implementing international treaties such as the Basel Convention and the OECD Council Decisions, and may apply to materials being shipped between countries for the purposes of recycling, repair, disposal, and direct reuse.~~

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

~~a) For each country and/or region that the manufacturer declares conformance to this Standard:~~

~~i. An up-to-date list of all countries and/or regions involved in the transit and import of equipment and components collected pursuant to criteria 11.1.1. and 11.1.2, and any materials derived from them, and~~

~~ii. A list of laws applicable to transboundary movement;~~

b) A copy of the written procedure to identify and evaluate compliance with applicable legal requirements or documentation of a legal compliance system; and

c) Evidence of implementing the procedure ~~manufacturer's controls in place when implementing the procedure~~ to ensure compliance with applicable trade laws in exporting, transiting, and importing countries and/or regions when transferring materials ~~at any point~~ between the customer and the initial service provider facility, if transboundary movement occurs.

~~Note: Examples of include, but are not limited to: list of countries approved to receive equipment; list of countries that manufacturer restricts shipments to; communication to or training of employees in transboundary trade requirements; and software that disallows shipments to countries not authorized to receive shipments.~~

11.2.3 Optional - Publicly available record of the reuse/recycling achievement (corporate)

Manufacturer shall make publicly available on their website the annual reuse, recycling, and recovery achievements (as separate percentages of their annual total weight returned) of the take-back service for each country into which the product is declared to conform to this ~~S~~standard. This criterion applies only to servers ~~equipment~~ taken back under criterion 11.1.1. ~~Equipment~~ Servers recovered and processed under national or regional collection schemes (mandated programs) may be included if the data is made available to the manufacturer.

With reference to Figure 11.1:

Determination and calculation of the reuse, recycling, and recovery achievements at the reuse or treatment facility pursuant to 11.2.1, shall start with the receipt of the mass of all ~~equipment~~ servers or server components through the take-back service [m_1] and end with:

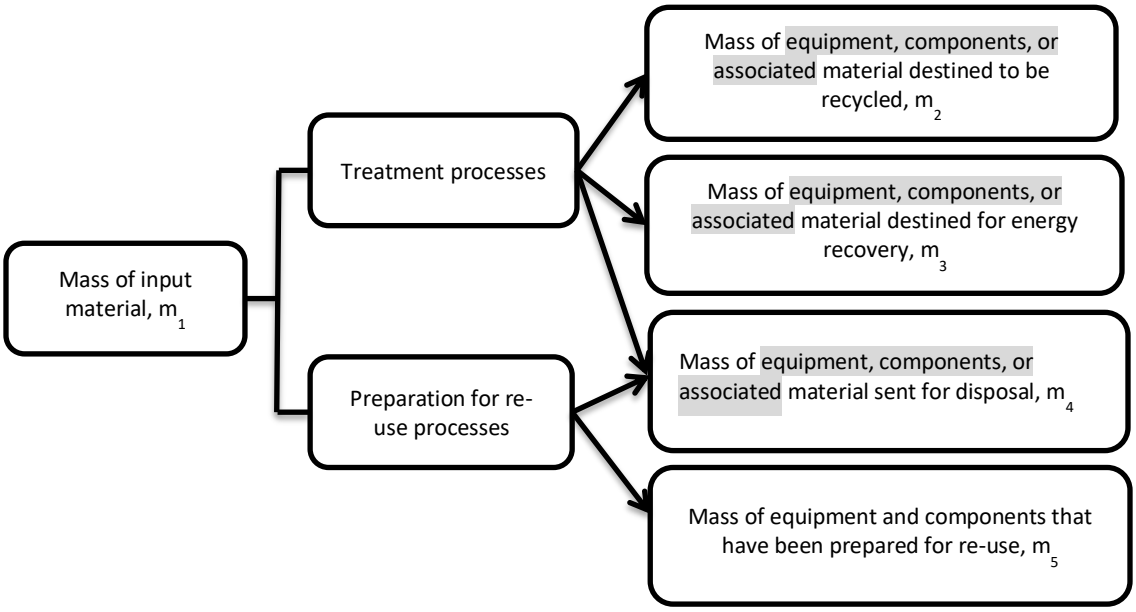
- [m_5] mass of equipment or components prepared for reuse;

- [m_2] mass of equipment, components, or associated materials ~~material~~ intended for recycling that has been sent to the next treatment facility or final destination facility (e.g., smelter, extrusion plant, etc.);

- [m_3] mass of equipment, components, or associated materials ~~material~~ sent to a waste to energy facility; and

– [m_4] mass of equipment, components, or associated materials ~~material~~ sent to a thermal or landfill facility for disposal.

Figure 11.1: Flow chart showing separate parts of the reuse and treatment process



The total reuse achievement shall be calculated as:

$$\text{Reuse achievement: \% rate} = \frac{m_5}{m_1}$$

The total recycling achievement shall be calculated as:

$$\text{Recycling achievement: \% rate} = \frac{m_2}{m_1}$$

The total recovery achievement shall be calculated as:

$$\text{Recovery achievement: \% rate} = \frac{m_2 + m_3}{m_1}$$

Point value: 2

Geographic applicability: ~~This criterion can vary by region or country and is applicable only in countries or regions for which the product is declared to conform to this standard.~~ A manufacturer may declare this criterion differently in each country or region for which the product is declared to conform to this standard.

Verification requirements:

a) Public URL for manufacturer's website with annual reuse, recycling, and recovery achievements (as separate percentages of their annual total mass returned) of the take-back service for each country or region into which the product is declared to conform to this ~~S~~standard. At a minimum, the achievement must cover equipment collected under 11.1.1, but can include other server equipment.

b) Statements of:

- Reuse from the initial certified reuse operator (percentage by weight to the mass of input equipment and, or components received for the preparation of reuse);

- Recycling from the initial certified treatment operator (percentage by weight to the mass of end-of-life equipment and, or components received); and

- Recovery from the initial certified treatment operator (percentage by weight to the mass of end-of-life equipment and, or components received).

12 Corporate responsibility

12.1 Environmental management system

12.1.1 Required - Environmental management system (EMS) (corporate)

Manufacturer shall have formal, self-declared EMS for those parts of the company that have significant responsibility for the design and manufacture~~r~~ of all products declared to conform to this standard. The EMS shall meet the requirements of ISO 14001. Certification to either ISO 14001 or EMAS (European Union Eco-Management and Audit Scheme) meets this requirement.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Demonstration that the EMS meets the requirements of ISO 14001:

i. Copy of ISO 14001 certification(s), or copy of EMAS certification(s)

ii. For self-declared EMS, copy of EMS ~~manual~~

b) List of all design and manufacturing operations of the company with significant responsibility for products declared to conform to this standard OR a signed statement from a company official that the company does not perform ANY design and manufacturing in-house

c) Demonstration that the EMS is applicable to those operations listed in b)

12.1.2 Optional - Environmental management system (EMS) certification (corporate)

EMS specified in 12.1.1 shall be certified to either ISO 14001 or European Union EMAS by an accredited third-party certification body. Certification bodies shall be accredited by an International Accreditation Forum member accreditation body[119] ~~(http://www.laf.nu/)~~ to certify to the specific standard identified. Manufacturers who do not perform their own product design and who do not manufacture products in their own facilities shall claim not applicable.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Copy of ISO 14001 or European Union EMAS ~~certification~~ certificate or certificates covering company design and manufacturing operations in b)

b) List of all design and manufacturing operations of the company with significant responsibility for products declared to conform to this standard.

12.2 ~~Public~~ Supply chain reporting

12.2.1 Optional - Environmental and social responsibility reporting on nine suppliers (corporate)

Manufacturer shall publicly disclose corporate environmental and social responsibility performance using the key performance indicators (or indicators) ~~of the Global Reporting Initiative (GRI)~~ listed in Table 12.1.

~~The GRI boundary for reporting on~~ The disclosure for this criterion shall include performance information for at least ~~be~~ nine suppliers~~:~~, and shall include three of the manufacturer's top six ~~three~~ suppliers (by annual spend, fiscal or calendar) of each of the following three types of components for the product category covered by this ~~S~~standard:

- Principal storage device(s);
- Processor(s) (CPU);
- Printed circuit board(s).

[119] http://www.laf.nu/

The suppliers included in the disclosure may change from year to year. If there are less than three suppliers for a component type named above, every supplier for that component type shall be included in the public disclosure.

Manufacturer may publicly disclose key performance indicators by supplier or in aggregate. Supplier names are not required in the public disclosure.

~~GRI r~~Reporting format and frequency:

- Disclosures shall be publicly available on the manufacturer's website. ~~The manufacturer shall declare the URL of the public disclosure~~. ~~For supplier data i~~It is acceptable to provide a link on the manufacturer's website to ~~supplier GRI reporting~~ the disclosure on the supplier's website.

~~–~~ Data shall be reported consistent with the ~~Specific Standard Disclosures in the Global Reporting Initiative (GRI) Guidelines~~ Topic-specific Standards in the GRI Sustainability Reporting Standards (GRI Standards) listed ~~that are in effect at the time the disclosures are made as described~~ in Table 12.1. ~~(Note: GRI updated its guidelines in 2013, calling the new guidelines "G4." Companies making GRI disclosures after December 31, 2015 must use the G4 indicators.)~~ Manufacturers or suppliers may use a reporting framework or program other than the GRI Standards (e.g., CDP, Electronic Industry Citizenship Coalition (EICC), or Sustainability Accounting Standards Board (SASB)) if it can be demonstrated how the required Topic-specific Standards in Table 12.1 map to the alternative framework or program.

- Publication of a full report or reports 'in accordance' with the GRI ~~Guidelines~~ Standards is not required, but would meet the requirements of this criterion if the report(s) covers the indicators ~~and boundaries~~ specified in this criterion.

- Performance against the~~se~~ indicators shall be reported and publicly disclosed annually~~; data included in the report must be from within the last two years~~.

Manufacturer may claim up to 2 points for this criterion. To claim 1 point, any 6 of the ~~GRI~~ indicators listed in Table 12.1 shall be publicly disclosed for all 9 suppliers. To claim 2 points, all 12 of the GRI indicators listed in Table 12.1 shall be publicly disclosed for all 9 suppliers.

Table 12.1

~~GRI Indicator Code (G4)~~	~~GRI Indicators~~
~~G4-EN4~~	~~Energy consumption~~
~~G4-EN5~~	~~Energy intensity~~
~~G4-EN6~~	~~Reduction of energy consumption~~
~~G4-EN15~~	~~Direct GHG emissions (Scope 1)~~
~~G4-EN16~~	~~Energy indirect GHG emissions (Scope 2)~~
~~G4-EN1~~	~~Materials used by weight or volume~~
~~G4-EN8~~	~~Total water withdrawal by source~~
~~G4-EN10~~	~~Percentage of water recycled and reused~~
~~G4-EN23~~	~~Total weight of waste by type and disposal method~~

~~G4-HR4~~	~~Freedom of association and collective bargaining~~
~~G4-HR6~~	~~Operations with risk for forced or compulsory labor~~
~~G4-HR5~~	~~Operations with risk for incidents of child labor~~

Key Performance Indicators	Consistent with Topic-specific GRI Standard Disclosure
Energy consumption outside of the organization	302-2
Energy intensity	302-3
Reduction of energy consumption	302-4
Direct GHG emissions (Scope 1)	305-1
Energy indirect GHG emissions (Scope 2)	305-2
Materials used by weight or volume	301-1
Total water withdrawal by source	303-1
Water recycled and reused or Water discharge by quality and destination	303-3 or 306-1
Waste by type and disposal method	306-2
Freedom of association and collective bargaining	407-1
Operations with risk for forced or compulsory labor	409-1
Operations with risk for incidents of child labor	408-1

Point value: maximum 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) URL for public disclosure on manufacturer's website for the scope of suppliers covered by the criterion

b) ~~Copy of public disclosure of GRI data for the top three suppliers of the 3 components listed above and~~ If the manufacturer has less than 3 suppliers for any of the 3 listed components, a signed statement from manufacturer stating the number of suppliers of the component

c) If claiming 1 point, identification of which 6 ~~GRI~~ indicators in Table 12.1 are addressed in the public disclosure for each of the nine suppliers. Note: if claiming 2 points, public disclosure must include all 12 of the ~~GRI~~ indicators in Table 12.1

d) For each disclosure that uses a reporting framework or program other than GRI, demonstration of how the key performance indicators map to the Topic-specific GRI Standard disclosures in Table 12.1

e) Demonstration of annual disclosure ~~of b). Public disclosures~~ for ~~the~~ nine suppliers ~~in b) must be~~ available at the time of first declaration to the criterion, and annually thereafter

12.2.2 Optional - Environmental and social responsibility reporting on T~~t~~ier 1 suppliers (corporate)

Manufacturer shall publicly report on corporate environmental and social responsibility performance that includes the key performance indicators ~~of the GRI~~ listed in Table 12.2, and which use~~ing~~ the ~~GRI~~ reporting format and frequency specified in criterion 12.2.1.

The disclosure ~~GRI boundary~~ for ~~reporting o~~n this criterion shall ~~be~~ include all Tier 1 suppliers who perform a manufacturing or assembly function for the manufacturer's server products. Public disclosure of supplier names is not required.

Public disclosure shall be made in accordance with ~~include the details outlined for all GRI aspects in~~ Table 12.2.

Table 12.2

~~GRI Indicator Code~~ ~~(G4)~~ Consistent with Topic-specific GRI Standards	~~GRI~~ Key Performance Indicators	Disclosure must include evaluation of supplier on these impacts:
~~G4-LA14~~ 414-1	~~Percentage of n~~New suppliers screened ~~with labor practice~~ using social criteria	Disclosure must specify which social impacts were used for screening and evaluation for these indicators. Labor practice criteria for screening and assessments must include compliance with laws on: - Minimum wages - Working hours - Compensation for overtime
~~G4-LA15~~ 414-2	~~Significant~~ nNegative social impacts ~~for labor practices~~ in supply chain and actions taken	
~~G4-SO9~~	~~Percentage of new suppliers screened using criteria for impacts on society~~	~~Disclosure must specify which societal impacts were used for screening and evaluation for these indicators.~~
~~G4-SO10~~	~~Significant negative impacts on society in supply chain~~	
~~G4-EN32~~ 308-1	~~Percentage of n~~New suppliers that were screened using environmental criteria	Disclosure must specify which environmental impacts were used for screening and evaluation for these indicators.
~~G4-EN33~~ 308-2	~~Significant actual and potential n~~Negative environmental impacts in the supply chain and actions taken	

If a manufacturer does not contract for the manufacturing and assembly for the manufacturer's server products, "Not Applicable" may be declared.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) URL for public disclosure on manufacturer's website in accordance with the requirements of the criterion

b) List of Tier 1 Suppliers who perform manufacturing or assembly functions for the product declared to conform to this standard *(Note: this list is only provided for verification purposes.)*

~~c) Copy of public disclosure of GRI data in Table 12.2 for Tier 1 Suppliers~~

d) For each disclosure that uses a reporting framework or program other than GRI, demonstration of how the key performance indicators map to Topic-specific GRI Standard disclosures in Table 12.2.

e) Demonstration of annual public disclosures ~~of c). Public disclosures~~ for ~~the~~ Tier 1 Suppliers ~~in c) must be~~ available at the time of first declaration to the criterion, and annually thereafter

12.2.3 Optional - Public reporting of toxics release data (corporate)

Manufacturer shall publicly report annually toxics release data for the following three types of components for servers (principal storage device(s); processor(s) (CPU); and printed circuit board(s)) from each of the top three suppliers (by spend) for each component. The reported data shall be according to the reporting requirements and for chemicals listed on the:

- U.S. EPA Toxics Release Inventory; or
- United Nations Protocol on Pollutant Release and Transfer Registry, or the applicable country's or region's equivalent (e.g., Canadian National Pollutant Release Inventory).

The data collected from the suppliers can be for their entire company or the specific part of the company that manufactures an identified component in a product declared to conform to this ~~S~~standard.

If there are less than three suppliers for a component type named above, every supplier for component type needs to provide data.

Manufacturer may publicly report toxic release data by supplier or in aggregate. If the suppliers within scope do not release any toxics above reporting thresholds, the manufacturer may report that its suppliers report no emissions subject to reporting.

Manufacturer's website shall either provide the annual disclosure or a link to a public repository containing the disclosure. ~~The manufacturer shall declare the URL of the public disclosure~~. The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

Manufacturer may claim one point each for inclusion of the reporting elements listed in Table 12.3.

Table 12.3

Reporting Elements	Points
– The specific locations of the releases, and – The identity and volume of each release	1
– The name of the company that is releasing the chemicals	1

Point value: maximum 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) URL for manufacturer's website with public disclosure of or hyperlinks to toxic release data in b).

b) Toxic release data conforming to reporting format and chemicals listed on ~~US~~ U.S. Toxics Release Inventory, United Nations Protocol on Pollutant Release and Transfer Registry, or applicable country/region registry for the manufacturer's top 3 suppliers of 3 components:

   i. Principal storage device(s)

   ii. Principle semiconductor device(s)

   iii. Printed circuit board(s)

c) If suppliers in scope do not release any chemicals subject to the requirement, URL to manufacturer's public disclosure of no emissions.

d) If the manufacturer has fewer than 3 suppliers of components listed in b), a signed statement from a company official stating the number of suppliers the company has for the product declared to the criterion.

e) Demonstration that the toxic release data is reported annually. Data must be reported within ~~the~~ a year prior to declaration to the criterion, and annually thereafter.

f) If claiming 1 point, the public disclosure of toxic release data must identify chemical(s) and volume of release and location of release.

g) If claiming 2 points, the public disclosure of toxic release data must contain d) and the name of the company releasing the chemicals.

12.3 Conflict mineral sourcing

12.3.1 Required - Public disclosure of use of conflict materials in products (corporate)

Manufacturers shall:

- Determine whether any of their products that they manufactured or contracted to have manufactured contain conflict minerals that are necessary to the functionality or production of those products and prepare disclosures on use and sources of these minerals in conformance with Rule 13p-1 under the U.S. Securities Exchange Act of 1934~~, regardless of the applicability of Rule 13p-1 to the company, with the exception of small business status~~.

- Make such disclosures publicly available on their websites ~~and shall declare the URL of the public disclosure~~. The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

These requirements apply to all manufacturers with products conforming to this standard, regardless of whether they are SEC registrants. Small business as defined below are exempt from this criterion. In instances where the manufacturer is not required to be a registrant with the U.S. SEC, all elements of the disclosure under Rule 13p-1 are required, except the U.S. administrative requirements (e.g. IRS employer identification number).

~~Small businesses meeting the definition of are exempt from this criterion. A small business shall be defined as one that:~~

~~i) Is not a subsidiary of a larger electronics company, and~~

~~ii) Showed annual revenues of less than $50 million during the most recently completed fiscal year (at the time of product registration) for which audited financial statements are available.~~

For the purposes of this criterion, "exempt small business" is a company that is not a subsidiary of or under common control with one or more other companies and whose annual revenues are less than $50 million in the most recent complete fiscal year for which audited financial statements are available, provided that the period for such audited financials concluded within the thirty-six months preceding product registration.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Public disclosure on the company website of conflict minerals found in its products in conformance with Rule 13p-1 under the U.S. Securities Exchange Act of 1934.

b) ~~Declaration of the~~ URL of the public disclosure on the company website.

c) For exempt small businesses, ~~exempt from this criterion~~ a statement that the organization is not a subsidiary of a larger ~~electronics~~ company and a copy of its most recent (but not more than three years old) audited financial statements, indicating that annual earnings were below $50 million.

12.3.2 Optional - Conflict mineral sourced only from validated conflict free smelters (corporate)

Manufacturers shall conduct due diligence ~~in good faith~~ to determine all sources of conflict minerals used in ~~all~~ the covered products and conclude that they are from either:

- Recycled or scrap sources; or

- Smelters and, or refiners which have been determined to be "conflict free" ~~compliant with the Conflict Free Smelter Program (CFSP) by the Conflict Free Sourcing Initiative (CFSI), or by one of CFSP's mutually recognized assessment programs, and appear on CFSI's list of validated smelters and refiners~~, consistent with the definitions provided for in Rule 13p-1 under the U.S. Securities Exchange Act of 1934.

Due diligence shall conform to a nationally or internationally recognized due diligence framework, such as the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* (OECD Guidance). A brief description of the due diligence inquiry and the determination shall be publicly disclosed.

~~Starting in 2016, or in 2018 (for exempt smaller business companies), if~~ If claiming "conflict-free", independent private sector audit (IPSA) is required to verify manufacturer's control systems and justification for determination, conducted in accordance with Rule 13p-1 under the U.S. Securities Exchange Act of 1934.

> NOTE – For this criterion, "recycled or scrap sources" are defined as recycled metals that are reclaimed from end-user or post-consumer products, or scrap processed metals created during product manufacturing. Recycled metal includes excess, obsolete, defective, and scrap metal materials which contain refined or processed metals that are appropriate to recycle in the production of tin, tantalum, tungsten and, or gold. Minerals partially processed, unprocessed or a bi-product from another ore are not recycled metals.[120]
>
> ~~NOTE – For CFSI list, see http://www.conflictfreesourcing.org/conflict-free-smelter-refiner-lists/.~~

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Description of due diligence inquiry and determination.

b) If claiming "conflict free," c~~C~~opy of the independent private sector audit report, as specified in the criterion, verifying the manufacturer's determination of conflict-free sourcing

12.3.3 Optional - Participation in in-region conflict-free sourcing program (corporate)

[120] OECD, Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (Second Edition), p12 n.~~2~~1 (2013). Available at: http://dx.doi.org/10.1787/9789264185050-en

Manufacturer shall participate in or source minerals from at least one of the in-region conflict free controlled chain-of- custody sourcing programs which are validating and, or sourcing minerals from certified conflict free sources in the Great Lakes region of Africa. In-region conflict free controlled chain-of-custody sourcing programs shall also meet the following criteria:

- Multi-stakeholder participation (i.e., more than just one organization)
- Is endorsed, recognized, funded, or contracted by the International Conference of the Great Lakes Region (ICGLR), European Union, OECD, United Nations or U.S. government agency/stakeholder (USAID, state department)
- Increases the supply of conflict-free minerals (3TG or other raw minerals) or reduces human rights abuses associated with mineral extraction
- Has a system of oversight and public reporting
- Does not allow donation, participation or activities by a manufacturer's foundation to meet requirements

Examples of programs that meet this requirement include Solutions for Hope, Conflict Free Tin Initiative, and Public Private Alliance for Responsible Mineral Trade. "Participation in" may include, but is not limited to, providing in-kind personnel services or other resources to an in-region conflict-free sourcing program.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Evidence of participation in at least one in-region conflict free sourcing program, as defined above (e.g. manufacturer listed on program website, or confirmation from the program)~~:~~

~~i. Solutions For Hope,~~

~~ii. Conflict Free Tin Initiative~~

~~iii. Public Private Alliance for Responsible Mineral Trade, or~~

~~iv. Other initiatives that meet the following criteria:~~

~~a. Multi-stakeholder participation (i.e., more than just one organization)~~
~~b. Is endorsed, recognized, funded, or contracted by the International Conference of the Great Lakes Region (ICGLR), European Union, OECD, United Nations or US U.S. government agency/stakeholder (USAID, state department)~~
~~c. Increases the supply of conflict-free minerals (3TG or other raw minerals) or reduces human rights abuses associated with mineral extraction~~

~~d. Has a system of oversight and public reporting~~
~~e. Does not allow give manufacturer credit for donation, participation or activities by their a manufacturer's foundation to meet requirements~~

Or

b) Documentation that the manufacturer sources ~~a defined amount of~~ conflict minerals for any of its products from certified conflict free sources in the Great Lakes Region of Africa, including:

i. Name of sourcing program and evidence of manufacturer sourcing from program

ii. Name of conflict mineral sourced from sourcing program and the minimum amount sourced annually by the manufacturer

iii. Component and product that the conflict-free mineral is used

12.4 Compliance with occupational health and safety and social responsibility performance standards

12.4.1 Required - Manufacturer conformance with occupational health and safety performance (corporate)

Conformance to *ANSI/AIHA/ASSE Z10, Occupational Health and Safety Management Systems*, or OHSAS 18001 shall be maintained for all manufacturer-owned operations with significant responsibility for the manufacture or assembly of products declared to conform to this standard. The manufacturer shall incorporate these standards into the manufacturer's management system specified in criterion 12.1.1 or maintain separate conformance to one of these occupational health and safety standards.

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) List of all manufacturer-owned operations with significant responsibility for the manufacture or assembly of products declared to conform to this standard OR a signed statement from a company official that the company does not directly perform ANY manufacturing or assembly of the products declared to conform to the standard.

And

b) For self-declared, a copy of ~~MS~~ management system documentation applicable to operations in a) ~~with identification of sections~~ that demonstrate conformance with ANSI/AIHA/ASSE Z10 or OHSAS 18001

Or

For certified EMS, ~~C~~copy of certification or certifications to ANSI/AIHA/ASSE Z10 or OHSAS 18001 applicable to operations in a).

12.4.2 Optional - Supply chain certification to occupational health and safety performance standards (corporate)

Manufacturer shall ensure that their three largest suppliers (based on total spend) for each of these three main components (principal storage device(s); processor(s) (CPU); and printed circuit board(s)) produce these components in supplier facilities that are certified by accredited certification bodies to either ANSI/AIHA/ASSE Z10 or OHSAS 18001. Certification bodies shall be accredited by an International Accreditation Forum (IAF) member accreditation body (http://www.iaf.nu/) to certify to the specific standard identified.

If there are less than three suppliers for a component type named above, every supplier for that component type needs to provide data.

Point value: 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Copy of current certificate or URL verifying current certification to either ANSI/AIHA/ASSE Z10 or OHSAS 18001 for facilities of 3 largest suppliers that produce the following 3 components for the product declared to the standard:

   i. Principal storage device(s)

   ii. Principle semiconductor device(s)

   iii. Printed circuit board(s)

b) If the manufacturer has fewer than 3 suppliers of components listed in a), a signed statement from a company official stating the number of suppliers the company has for the product declared to the criterion.

12.4.3 Optional - Certification to social responsibility performance standard (corporate)

Manufacturer shall ensure that all facilities of its three largest suppliers (based on total spend) that manufacture each of three main components (principal storage device(s); processor(s) (CPU); and printed circuit board(s)) for the product are:

1) Certified by accredited certification bodies to Social Accountability (SA) 8000[121]. Certification bodies shall be accredited by an authorized accreditation body to certify to the SA8000. The certification shall be no older than three years. (2 points)

   Optional points shall only be awarded for SA8000 certification if all facilities designated above are certified to SA8000. If there are fewer than three suppliers for a component type named above, every supplier for that component shall conform to this criterion.

   Or

2) Audited to the EICC Code of Conduct[122] using the Validated Audit Process (VAP). (1 point)

   Optional point shall only be awarded for VAP audits if a certificate has been issued by the VAP Operations Management Team to verify that:

   – Validated audit reports contain no major or priority non-conformance findings as defined by the EICC VAP and shall be no older than two years; or

   – Closure audit report confirming that all major or priority non-conformance corrective actions resulting from VAP audits were remedied within time frame specified by the VAP and the VAP audit shall be no older than two years.

   Optional point shall be awarded for EICC VAP audits if all facilities designated above meet the VAP audit requirements or facilities meet a combination of VAP audits and SA8000 certification.

If there are fewer than three suppliers for a component type named above, every supplier for that component shall conform to this criterion.

Point value: 1 or 2

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Demonstration of certification to SA8000 or EICC VAP audits for all facilities of the 3 largest suppliers that manufacture the 3 components listed above for the product declared to conform to this criterion, including either:

   i) Certificate to SA8000 ~~within~~ 2 years prior to ~~of~~ product declaration or product verification for all facilities of 3 largest suppliers that manufacture the 3 components

   Or

[121] SAI website: http://www.sa-intl.org/index.cfm?; SAI standard: http://www.sa-intl.org/index.cfm?fuseaction=Page.ViewPage&pageId=937
[122] http://www.eiccoalition.org/

ii.) Certificate issued by the EICC VAP Operations Management Team for all facilities of the 3 largest suppliers that manufacture the 3 components listed above for the product declared to conform to this criterion. Each certificate must be issued within 2 years of product declaration or product verification and verify that:

- the validated audit report contain no major or priority non-conformance findings, or

- the closure audit report confirms that all major or priority non-conformance corrective actions were remedied within the time frame specified by the VAP.

b) If the manufacturer has fewer than 3 suppliers of components listed in a), a signed statement from a company official stating the number of suppliers the company has for the product declared to the criterion.

12.5 Product life cycle assessment

12.5.1 Optional - Conduct life cycle assessment

The manufacturer shall conduct a life cycle assessment (LCA) of the product declared to this standard in accordance with ISO 14040/14044 or the *European Union Product Environmental Footprint Guide*[123]. The LCA shall include all stages (see Annex D) of the product life-cycle, from extraction of raw materials through end-of-life (i.e., cradle to grave), and shall ~~address~~ cover, at a minimum, the following impact assessment categories using either U.S. EPA TRACI 2.1[124], or CML 2001 (Nov 09)[125] , or ILCD 2011[126], or LIME2[127] impact assessment methodologies:

1) Global warming potential (GWP 100 years);

2) Acidification potential (AP);

3) Photochemical ozone creation potential (POCP, or “Smog”);

4) Eutrophication potential (EP);

5) Ozone depletion potential (ODP);

6) Abiotic depletion potential (ADP) – or fossil fuels depletion when using TRACI.

[123] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32013H0179

[124] U.S. EPA, Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) (http://www.epa.gov/nrmrl/std/traci/traci.html)

[125] University of Leiden Institute of Environmental Sciences (CML), Handbook on LCA (http://cml.leiden.edu)

[126] European Commission Joint Research Centre, International reference Life Cycle Data System (ILCD) Handbook (http://eplca.jrc.ec.europa.eu/?page_id=86). See Recommendations for Life Cycle Impact Assessment in the European context (EUR 24571 EN-2011) at: http://eplca.jrc.ec.europa.eu/uploads/ILCD-Recommendation-of-methods-for-LCIA-def.pdf

[127] LCA Society of Japan, Life-cycle Impact Assessment Method based on Endpoint modeling (http://lca-forum.org/english/)

To qualify under this criterion, the LCA must have been reviewed in accordance with ISO 14044 Section 6.1 by an independent third party external to the manufacturer, and must have been conducted no more than 3 years prior to product registration or certification. The LCA may be conducted on a family or class ~~group~~ of products that includes~~, but~~ the declared product. ~~shall be listed on the LCA.~~

A new LCA will be required if:

- The previously submitted LCA is greater than 5 years old; or

- Changes have been made to the product manufacturing or design and a sensitivity analysis indicates that those changes have resulted in significant differences (a significant difference is when there have been changes or updates in the product that resulted in a change in environmental performance of the product entailing either an increase or decrease of 10% or more on any one of the impact assessment categories listed above.)

Point value: 3

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification requirements:

a) Copy of ~~or URL to~~ LCA, or URL to LCA, applicable to the product declared to conform to the standard

b) Documentation of independent third party review of LCA in accordance with ISO 14044 Section 6.1

12.5.2 Optional - Public disclosure of LCA results

The LCA produced in 12.5.1 shall be made publicly available on the manufacturer's website using one of the following documents:

- Third party report of the LCA as defined in section 5.2 of ISO 14044; or

- Environmental product declaration (EPD) Type III label in accordance with ISO 14025; or

- Submitting the LCA or ~~LCI~~ life-cycle inventory data for use in a national database (such as the U.S. LCI Database, the European LCA Platform Database, or the LCA Society of Japan Database, or other public disclosure system.

This criterion may be satisfied by the manufacturer providing a link on its website to another publicly available website. ~~The manufacturer shall declare the URL of the public disclosure~~. The URL for the manufacturer's public website disclosing this information shall be provided during product registration, certification or self-declaration, and made publicly available.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions and is applicable only in countries or regions for which the product is declared to conform to this standard.

Verification requirements:

a) URL to manufacturer's public website that contains either:

i. Third party report of LCA as defined in section 5.2 of ISO 14044, or

ii. Environmental product declaration (EPD) Type III label in accordance with ISO 14025

Or

b) Documentation of LCA or ~~LCI~~ inventory data submitted to a national database

12.5.3 Optional -- Environmental Impact of Product Transportation (corporate)

Manufacturers shall annually conduct an assessment of greenhouse gas (GHG) emissions from supply chain transportation activities for products declared to conform to this standard, from the point of final product assembly to the customer, or transfer of product ownership.

The scope shall include transport for the applicable modes of freight movement for road, air, sea, inland waterways and rail, for products declared to conform to this standard. The manufacturer may include additional products in the scope.

The manufacturer may choose to exclude from the assessment transportation segments where the customer controls the decision on the carrier choice and/or mode of transportation.

The assessment of supply chain GHG emissions shall include well-to-wheel GHG emissions from all of the modes of freight movement utilized (at a minimum road, air, sea, inland waterways and rail), and shall be performed once per fiscal or calendar year using one or a combination of the following approaches:

1. The Global Logistics Emissions Council (GLEC) Framework[128]

2. The following mode-specific methodology as geographically applicable (if well-to-tank emissions are not included in a mode-specific methodology they shall be included by means of a scaling factor (such as that included in GLEC)):

a. Road - SmartWay[129] or EN 16258[130]

[128] http://www.smartfreightcentre.org/glec/what-is-glec
[129] https://www.epa.gov/smartway
[130] http://www.en-standard.eu/csn-en-16258-methodology-for-calculation-and-declaration-of-energy-consumption-and-ghg-emissions-of-transport-services-freight-and-passengers/

b. Air - International Air Transportation Association (IATA) RP1678[131]

c. Rail - SmartWay or EcoTransIT[132]

d. Sea – Clean Cargo Working Group (CCWG) [133] or International Maritime Organization (IMO)[134]

e. Inland Waterways – SmartWay or IMO

3. A methodology which includes a well-to-wheel performance-based assessment that uses fuel-based or activity-based metrics for each applicable mode (e.g. weight and/or volume of freight moved, and/or distance by mode). Data used shall include fuel consumption and published emission factors by fuel type.

A summary of results for absolute freight GHG emissions (e.g., annual tonnes of CO_2e) and normalized GHG emissions (e.g. grams of CO_2e per tonne-km) for each mode (at a minimum road, air, rail, inland waterways and sea) shall be publicly disclosed and shall indicate what framework or mode-specific approaches were used and where third-party verification applies.

Manufacturers shall also develop a transport supply chain greenhouse gas emission reduction goal and publicly report progress towards meeting this goal annually.

Point value: 1

Geographic applicability: This criterion shall be declared the same in all countries or regions ~~and is applicable only in countries or regions~~ for which the product is declared to conform to this standard. The approach used to conform to this criterion may vary by country or region.

Verification Requirements:

a) Demonstration of one of the following:

i. The location where the summary of results, the transport supply chain greenhouse gas reduction emission goal and progress report towards the goal are publicly posted (e.g. manufacturer URL, Corporate Sustainability Report (CSR) report or program URL), or

ii. If applicable, third-party verification in conformance with the applicable modes in the GLEC Framework or other mode-specific approaches described above. Document shall include credentials and contact information of third party verifier

[131] http://www.cofret-project.eu/downloads/pdf/rp-carbon-calculation.pdf
[132] http://www.ecotransit.org/
[133] https://www.bsr.org/en/collaboration/groups/clean-cargo-working-group
[134] http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Technical%20and%20Operational%20Measures/MEPC.1_Circ.684_Guidelines%20for%20Voluntary%20use%20of%20EEOI.pdf

References and Details:

Well-to-wheel emissions is an accounting of the life cycle GHG emissions from transportation of products. Well-to-wheel analysis assesses the overall greenhouse gas impacts of a fuel, that include each stage of its production and use. GLEC defines this as an “approach to estimate the impact of the full fuel cycle including fuel production.”

Well-to-tank emissions is an accounting of the GHG emissions from fuel production, including extraction, cultivation, refining, transformation, transport and distribution of fuels. This is the first stage of the life cycle GHG emissions, before the combustion “tank to wheel” or “operating phase.” GLEC defines “Well to Tank” as “upstream phase of fuel production only.”

Annex A (Normative)

Table of Criteria and Optional Points

Criterion & Section	Optional Points
5 Energy efficiency	
5.1 ENERGY STAR	
5.1.1 Required - ENERGY STAR	
5.2 Allowable temperature and humidity specifications	
5.2.1 Required - Allowable temperature and humidity specifications	
5.2.2 Optional – Liquid cooled server or air cooled servers operable at ASHRAE Class A3/A4 Temperature Ranges	3
5.3 Power supply efficiency	
5.3.1 Optional - 80 plus program	2~~3~~
5.4 Active and Inactive Power States	
5.4.1 Optional— Active State Power Management Enablement	1
5.4.2 Optional – Server Inactive Power State #1	1
5.4.3 Optional – Server Inactive Power State #2	1
5.5 Systems energy efficiency	
5.5.1 Optional - Energy efficient supply chains	2
5.5.2 Optional - Reduce energy lost from power conversion	1~~2~~
5.5.3 Optional - Logged server activity metrics	1~~2~~
6 Management of substances	
6.1 Reduction of substances of concern	
6.1.1 Required - Conformance with provisions of European Union RoHS Directive	
6.1.2 Required - Conformance with substance restriction requirements of the European Union Battery Directive	
6.1.3 Required - Reduction of Bromine and Chlorine content of plastic parts > 25 grams	
6.1.4 Optional – Further reduction of Bromine and Chlorine content of plastic parts > 25 grams	2~~1~~
6.1.5 Required – Conformance with supply chain communication provisions of European Union REACH Regulation	
6.1.6 Optional - Reduction of substances on the European Union REACH Regulation Annex XIV (authorization list) and Candidate Substances of Very High Concern	2
6.2 Inventory and assessment of substances	
6.2.1 Optional – Record ~~Documentation~~ of declarable substances	1
6.2.2 Optional - Disclosure of declarable substances	1
6.2.3 Optional - Requesting full substance inventory	1
6.2.4 Optional - Acquiring substance inventory	2~~4~~

	6.2.5 Optional - Alternatives assessment (corporate)	2
	6.2.6 Optional - Making alternatives assessment publicly available	1
6.3	**Manufacturing chemicals**	
	6.3.1 Optional - Mitigation and inventory of process fluorinated greenhouse gas emissions resulting from semiconductor manufacturing	2
7 Preferable materials use		
7.1	**Recycled content**	
	7.1.1 Required – Declaration of postconsumer recycled plastic content	
	7.1.2 Required – Minimum postconsumer recycled content in external enclosures	
	7.1.3 Optional – Postconsumer recycled plastic content	3
	7.1.4 Optional - Postconsumer recycled content of rare earth elements in hard drive(s) in product	2
~~**7.2**~~	~~**Biobased content**~~	
-	~~7.2.1 Optional – Minimum 10% content of biobased plastic~~	~~1~~
7.2~~3~~	**Material efficiency/dematerialization**	
	7.2~~3~~.1 Optional - Reduction of surplus parts by default	1
8 Product packaging		
8.1	**Reduction of substances of concern in packaging**	
	8.1.1 Required—Elimination of added heavy metals in packaging	
	8.1.2 Required—Restriction on the use of elemental chlorine as a bleaching agent in paper-based packaging material	
	8.1.3 Optional – Restriction on the use of chlorine in processing packaging materials	1
8.2	**Recyclability of packaging materials**	
	8.2.1 Required - Enhancing recyclability of packaging materials	
8.3	**Recycled content packaging**	
	8.3.1 Required - Recycled content fiber in corrugated packaging	
	8.3.2 Optional - Higher r~~R~~ecycled content fiber in corrugated packaging	1
8.4	**Packaging reduction**	
	~~8.4.1 Optional - Optimization of packaging system to reduce excess packaging~~	~~1~~
	8.4.1~~2~~ Optional - Elimination of individual packaging for hardware and components	1
	8.4.2~~3~~ Optional – Bulk packaging	1
9 Design for repair, reuse and recycling		
9.1	**Design for repair, reuse and recycling**	
	9.1.1 Required - Design for repair, reuse and recycling	
	9.1.2 Required - Design for plastics recycling	
	9.1.3 Optional - Further design for plastics recycling	2
	9.1.4 Required - Product recyclability calculation and minimum 90% recyclability rate	
9.2	**Information and ~~facilitation~~ tools for reuse and recycling**	
	9.2.1 Required - Information and reporting in preparation for reuse and recycling	

9.2.2 Optional – Further information and reporting in preparation for reuse and recycling	31
~~9.2.3 Optional - Additional information and reporting in preparation for reuse and recycling~~	~~1~~
~~9.2.4 Required - Informing reuse operators and treatment operators of information available for their assistance (corporate)~~	
9.2.35 Optional - Product marked to identify components and materials with special handling needs	2
9.2.46 Optional - Information and reporting on disk drive magnet type and location	2
9.2.57 Optional - Functionality testing software tools	1
10 Product longevity	
10.1 Replacement components	
10.1.1 Required - Replacement components availability	
11 Responsible ~~end-of-service/~~end-of-life management	
11.1 Takeback service	
11.1.1 Required – Provision of product take-back service (corporate)	
11.1.2 Optional -Manufacturer take-back service for de-installed servers ~~equipment~~ (corporate)	21
11.2 End-of-life management	
11.2.1 Required - End-of-life processing requirements (corporate)	
11.2.2 Required - Trans-boundary movements (corporate)	
11.2.3 Optional - Publicly available record of the reuse/recycling achievement (corporate)	2
12 Corporate responsibility	
12.1 Environmental management system	
12.1.1 Required - Environmental management system (EMS) (corporate)	
12.1.2 Optional - Environmental management system (EMS) certification (corporate)	1
12.2 Public reporting	
12.2.1 Optional - Environmental and social responsibility reporting on nine suppliers (corporate)	2
12.2.2 Optional - Environmental and social responsibility reporting on Tier 1 suppliers (corporate)	2
12.2.3 Optional - Public reporting of toxics release data (corporate)	2
12.3 Conflict mineral sourcing	
12.3.1 Required - Public disclosure of use of conflict materials in products (corporate)	
12.3.2 Optional - Conflict mineral sourced only from validated conflict free smelters (corporate)	1
12.3.3 Optional - Participation in in-region conflict-free sourcing program (corporate)	2
12.4 Compliance with occupational health and safety and social responsibility performance standards	
12.4.1 Required - Manufacturer conformance with occupational health and safety performance (corporate)	
12.4.2 Optional - Supply chain certification to occupational health and safety performance standards (corporate)	2
12.5.3 Optional - Certification to social responsibility performance standard (corporate)	2
12.5 Product life cycle assessment	

	12.5.1 Optional - Conduct life cycle assessment	3
	12.5.2 Optional - Public disclosure of LCA results	1
	12.5.3 Optional - Environmental Impact of Product Transportation (corporate)	1

1

Annex B (Normative)

Criterion 5.5.3 Logged Server Activity Metrics: Data Acquisition and Format

B.1 Format

This Annex defines requirements for logging server activity in criterion 5.5.3.

- Each value listed shall be sampled at a minimum of 2 Hz (i.e., twice per second)
- Each value listed shall be averaged over a one minute period and that average value shall be logged as one record per minute
- For each record, include date and time stamps as of the end of that one minute period in UTC format
- If product includes two CPUs, include percent utilization entries for each CPU
- If only one CPU, leave column for second CPU blank

B.2 Column headers and data format shall be:

- Date
- Time
- Demand (watts)
- CPU-1 Util (%)
- CPU-2 Util (%)
- Server inlet temperature (deg. C)

B.3 File management shall:

- Store data in CSV format
- Store 45 days' worth of data (~ 65,000 records)
- Age off oldest record as each new record is written, and rename file as necessary

B.4 File name:

- File name shall be: "host-ID_activity_year_MO_DD.csv"
- Where the "host-ID" is the server host identifier, and most recent full day is included in the file name

ANNEX C (Normative)

Criterion 6.1.3 Reduction of Bromine and Chlorine content of plastic parts > 25 grams

C.1 Introduction

This Annex outlines the requirements for manufacturers to exempt themselves from the bromine and chlorine limits specified in Criterion 6.1.3 by conducting an alternatives assessment as outlined below.

For the purposes of the criterion, a safer alternative is an alternative for which the total environmental and health benefits caused by substitution are likely to outweigh the total environmental and health negative impacts thereof, using the same framework.

C.2 Alternative Assessment

Manufacturer shall document that it or a supplier or a third party has performed an assessment of alternatives to any material that causes the registered product to exceed the bromine and/or chlorine limits specified in Criterion 6.1.3.

Assessments shall be performed consistent with one of the following frameworks:

- Interstate Chemicals Clearinghouse *Alternative Assessment Guide*
- Report of the National Academies of Science project “A Framework to Guide Selection of Chemical Alternatives”
- BizNGO Chemical Alternative Assessment Protocol

Assessments performed by a supplier or third party may be utilized to qualify for the material exemption provided they consider the same Br or Cl containing material used in the same application as in the product declared to conform to this standard.

C.3 Scope of Assessment

- **Scope of alternatives**: The goal of the alternatives assessment is to evaluate alternatives for brominated/chlorinated compounds used in a particular function. The alternatives identification should focus on alternatives that are technically feasible, available and in commercial use, and highlight those that represent more than marginal improvements over the Br/Cl compounds. Alternatives should not be eliminated solely on the basis of cost, but economic and social factors may be integrated after the environmental and human health endpoints considered below.
- **Parameters included in assessment:** The assessment shall cover a comprehensive set of relevant human health and environmental endpoints including, but not limited to, those listed in U.S. EPA’s Design for the Environment Program Alternatives Assessment Criteria for Hazard Evaluation (www.epa.gov/dfe/alternatives_assessment_criteria_for_hazard_eval.pdf). The assessment also shall include consideration of the potential environmental impacts of the brominated/chlorinated material and the alternatives throughout the life cycle of the product from

manufacture to disposal practices (i.e. recycling, landfilling and incineration), (i.e. life cycle impacts).

- Assessment must have been completed no longer than three (3) years before the date the product is declared to conform to this criterion.

C.4 Documentation

Manufacturer documentation of the alternatives assessments shall include:

- Framework used;
- Date of completion of the assessment - each assessment shall have been completed no more than three (3) years prior to the date any product is declared by the manufacturer to conform to this criterion;
- Substances and potential alternatives evaluated and the criteria used for selecting alternatives to be evaluated
- Criteria used to evaluate the human health and environmental impacts of the Br/Cl material and the alternatives evaluated
- Qualifications of the individual(s) conducting the assessment demonstrating appropriate expertise for conducting an alternative assessment

C.5 Public Availability of Assessment

The manufacturer shall ensure the public available of the assessment and the documentation specified in A.4. This requirement may be met through:

- Posting on a publicly available database such as the Substitution Support Portal (SUBSPORT)[135] or the IC2 Database[136], or
- Making the documentation publicly available on the manufacturer's or other website.

In the case of an assessment done as part of a partnership or industry consortium, the other participating parties shall be named.

The manufacturer shall declare the URL of the public disclosure.

~~Lists of carcinogens, mutagens, reproductive toxicants, persistent, bioaccumulative, and toxic (PBT) substances and endocrine active substances~~

~~C.1 Carcinogens~~

[135] http://www.subsport.eu/about-the-portal
[136] http://www.newmoa.org/prevention/ic2/projects/resource/hazassesstool.cfm

~~Listed by the International Agency for Research on Cancer as:~~

- ~~Group 1: carcinogenic to humans~~
- ~~Group 2A: probably carcinogenic to humans~~

~~Listed by the National Toxicology Program as:~~

- ~~Known human carcinogen~~
- ~~Reasonably anticipated human carcinogen~~

~~Meet the criteria under the Globally Harmonized System of Classification and Labeling (GHS) for the carcinogenicity hazard class (codes H350, H351)~~

~~C.2 Mutagens~~

~~European Union CMR List~~

- ~~Category 1: Substances known to be mutagenic to man~~
- ~~Category 2: Substances which should be regarded as if they are mutagenic to man~~

~~European Union Classification, Labeling, and Packaging (CLP)~~

- ~~H340: May cause genetic defects~~
- ~~H341: Suspected of causing genetic defects~~

~~Globally Harmonized System of Classification and Labeling (GHS)~~

- ~~Category 1A: Chemicals known to induce heritable mutations in germ cells of humans~~

- ~~Category 1B: Chemicals which should be regarded as if they induce heritable mutations in the germ cells of humans~~

- ~~Category 2: Chemicals which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans~~

~~European Union. *Annex I – Classification and labeling requirements for hazardous substances and mixtures.* 2008 [cited 2011 September 13]; Available from: http://ec.europa.eu/enterprise/sectors/chemicals/documents/classification/index_en.htm~~

~~ECB, *Annex I of Directive 67-548-EEC. 2007*~~

~~GHS, *Germ Cell Mutagenicity. 2009,* United Nations~~

~~C.3 Reproductive toxicants~~

~~Listed under the State of California Safe Drinking Water and Toxic Enforcement Act (Prop 65) for reproductive or developmental toxicity~~

~~Meet the criteria under the Globally Harmonized System of Classification and Labeling (GHS) for the Reproductive Toxicity hazard class (codes H360 Categories 1A and 1B, H361, H362)~~

~~C.4 PBT substances~~

- ~~Stockholm Convention Persistent Organic Pollutants~~
- ~~U.S. – Canada Binational Toxics~~
- ~~Toxics Release Inventory (TRI) PBT chemicals~~
- ~~RCRA Waste Minimization Priority Chemicals~~

~~C.5 Endocrine active substances~~

~~The Endocrine Disruptor Exchange (TEDX) list http://endocrine.org/endocrine-disruption/tedx-list-of-potential-endocrine-disruptors/overview)~~

~~EC candidate list http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances_en.htm~~

~~EPA estrogen receptor results list https://www.epa.gov/endocrine-disruption/endocrine-disruptor-screening-program-edsp-estrogen-receptor-bioactivity~~

ANNEX D (Normative)
Criterion 12.2.1 System Boundaries

D.1 Example Flow

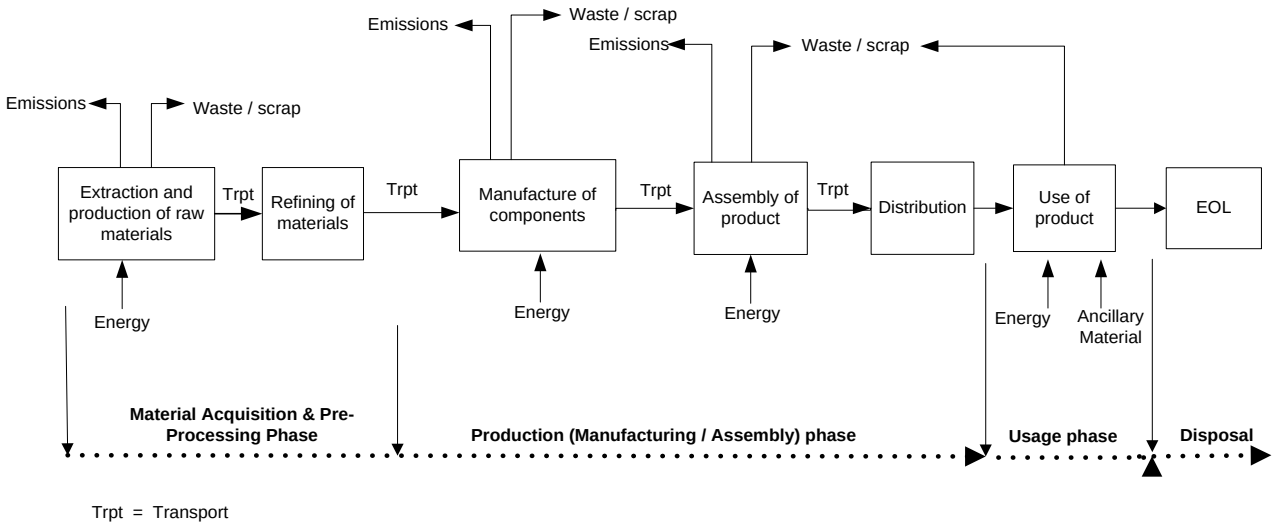


Figure 1: System Boundaries, example flow

ANNEX E
(Informative) Bibliography

California Safer Products regulations–CA Code of Regulations Title 22, Division 4.5, Chapter 55 Article 5, Sections 69505.5-69505.7[137]

DIN EN 15343: 2008-02, Plastics - Recycled Plastics - Plastics recycling traceability and assessment of conformity and recycled content[138]

EN 50581, Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances[139]

European LCA Platform Database[140]
~~Global Protocol on Packaging Sustainability 2.0[141]~~

LCA Society of Japan Database[142]

Public Private Alliance for Responsible Mineral Trade[143]

UL 746D, Standard for Polymeric Materials - Use in Electrical Equipment Evaluations[144]

U.S. LCI Database[145]

World Semiconductor Council Best Practice Guidance of PFC Emission Reduction, 2012[146]

[137] https://www.dtsc.ca.gov/LawsRegsPolicies/Title22/
[138] http://www.en-standard.eu/store/
[139] http://www.en-standard.eu/store/
[140] Available at: http://eplca.jrc.ec.europa.eu/
[141] http://www.theconsumergoodsforum.com/download-global-protocol-on-packaging-sustainability-gpps
[142] http://lca-forum.org/english/
[143] http://www.resolv.org/site-ppa/
[144] http://ulstandards.ul.com/
[145] Available at: http://www.nrel.gov/lci/
[146] http://www.semiconductorcouncil.org/wsc/uploads/Final_WSC_Best_Practice_Guidance_26_Sept_2012.pdf