



*NSF International Standard /
American National Standard*

NSF/ANSI 426 - 2019

Environmental Leadership and
Corporate Social Responsibility
Assessment of Servers



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Chair, Joint Committee on Environmental Standard for Servers
c/o NSF International
789 North Dixboro Road, PO Box 130140
Ann Arbor, Michigan 48113-0140 USA
Phone: (734) 769-8010 Fax: (734) 769-0109
Email: info@nsf.org
Web: www.nsf.org

NSF International Standard /
American National Standard
for Sustainability

**Environmental Leadership and
Corporate Social Responsibility
Assessment of Servers**

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Foreword²

This American National Standard, NSF/ANSI 426 Environmental Leadership and Corporate Social Responsibility Assessment of Servers, has been developed as part of the ongoing efforts of a number of interested parties to document and improve the environmental and corporate performance profile of servers using established and advanced scientific principles, practices, materials, and standards.

The purpose of this Standard for servers is to establish product environmental performance criteria and corporate performance metrics that exemplify environmental leadership and corporate social responsibility in the market. These performance criteria are intended to form the basis of conformity assessment programs, such as third-party certification or registration.

This edition of the Standard contains the following revisions:

Issue 8

This revision updates references to ENERGY STAR to the most current version in Sections 3.1.8, 3.1.49, 5.5.2, and 5.5.3.

This revision also includes an editorial update to the names of the Annexes within. The Annexes are being changed from alpha characters to numeric, preceded by a 'Normative' or 'Informative'. The Annexes have also been reordered so the Normative Annexes appear first, followed by the Informative Annexes. The table below shows the previous name of the Annex with the corresponding new name of the Annex:

Annexes	
Previously known as:	Now known as:
Annex A	Normative Annex 1 (N-1)
Annex B	Normative Annex 2 (N-2)
Annex C	Normative Annex 3 (N-3)
Annex D	Normative Annex 4 (N-4)
Annex E	Informative Annex 1 (I-1)

This Standard was developed by the NSF Joint Committee on Environmental Standard for Servers using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. This Standard is maintained on a continuous maintenance schedule and can be opened for comment at any time. Comments should be sent to: Chair, Joint Committee on Environmental Standard for Servers at standards@nsf.org, or c/o NSF International, Standards Department, PO Box 130140, Ann Arbor, Michigan 48113-0140, USA.

² The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

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NSF/ANSI Standard for Sustainability –

Environmental Leadership and Corporate Social Responsibility Assessment of Servers

1 Overview

1.1 Scope

This Standard defines environmental and corporate social responsibility performance criteria for computer servers as defined in the ENERGY STAR Server specification.³

This Standard establishes criteria for multiple levels of environmental leadership and corporate social responsibility 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-life management; and corporate responsibility.

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 and corporate social responsibility in the market.

The Standard provides a framework and 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 and corporate social responsibility attributes and performance metrics, alleviating individual purchasers from the arduous and complex task of defining environmental and corporate social responsibility performance for servers and server manufacturers. 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 is an environmental leadership and corporate social responsibility Standard, defined with the recognition that only leading products, i.e., approximately 25 to 35% of the products available in the marketplace, would be likely to qualify to the base or Bronze level, and even fewer at the Silver and Gold levels, at the date of publication of this Standard, although this Standard does not limit the number of products that can so qualify. As the environmental performance of products and that are available in the marketplace, and corporate social responsibility of server manufacturers, improves, it is intended that the criteria will be updated and revised to set a higher performance Standard for leadership products.

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

³ ENERGY STAR, US Environmental Protection Agency. 1200 Pennsylvania Ave NW Washington, DC 20460. <www.energystar.gov>

2 Normative references

The following referenced documents are indispensable for the application of this document. 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.

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ANSI/AIHA/ASSE Z10, *Occupational Health and Safety Management System*^{5,6}

ASHRAE *Thermal Guidelines for Data Processing Environments*, 4th Edition⁷

ASTM D256, *Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics*⁸

ASTM D7611/D7611M, *Standard Practice for Coding Plastic Manufactured Articles for Resin Identification*⁷

BizNGO Chemical Alternative Assessment Protocol⁹

BS EN 15343:2007, *Plastics. Recycled plastics. Plastics recycling traceability and assessment of conformity and recycled content*¹⁰

Clean Cargo Working Group (CCWG)¹¹

Conflict Free Tin Initiative¹²

DIN 6120-1, *Marking of packaging and packaging materials for recycling purposes – Plastics packaging and packaging materials – Part 1: Graphical symbols*¹³

EcoTransIT¹⁴

ECMA-341, *Environmental Design Considerations for ICT & CE Products*, 4th Edition / December 2010¹⁵

⁴ Ecova Plug Load Solutions. 5000 North Atlantic Street, Suite 1313, Spokane, Washington USA 99201. <www.plugloadsolutions.com>

⁵ American Industrial Hygiene Association. 3141 Fairview Park Drive, Suite 777, Falls Church, VA 22042. <www.aiha.org>

⁶ ASSE International. 18927 Hickory Creek Drive, Suite 220, Mokena, IL 60448. <www.asse-plumbing.org>

⁷ American Society of Heating, Refrigeration, and Air-Conditioning Engineers, Inc. 1791 Tullie Circle, NE, Atlanta, GA 30329. <www.ashrae.org>

⁸ ASTM International. 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. <www.astm.org>

⁹ Clean Production Action. 1310 Broadway, Suite 101, Somerville, MA 02144. <www.bizngo.org>

¹⁰ British Standards Institution (BSI). 389 Chiswick High Road, London, W4 4AL. <www.bsigroup.com>

¹¹ Business for Social Responsibility. 5 Union Square West, 6th Floor, New York, NY 10003. <www.bsr.org>

¹² Resolve. 1255 23rd Street NW, Suite 275, Washington, DC 20037. <www.resolve.ngo/site-cfti>

¹³ European Standards. Krimicka 134, 318 13 Pilsen, Czech Republic. <www.en-standard.eu>

¹⁴ EcoTransIT World. IVE mbH Lützerodestraße 10, 30161 Hanover, Germany. <www.ecotransit.org>

¹⁵ ECMA International. Rue du Rhône 114, 1204 Geneva, Switzerland. <www.ecma-international.org>

EN 16258, *Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)*¹⁰

EN 50581, *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*¹⁰

EN 50625, *Collection, logistics & treatment requirements for WEEE*¹⁰

ENERGY STAR, *Program Requirements for Computer Servers*³

e-Stewards, *Standard for Responsible Recycling and Reuse of Electronic Equipment*¹⁶

European Chemicals Agency, *Guidance on requirements for substances in articles*¹⁷

European Commission Joint Research Centre, *International reference Life Cycle Data System (ILCD) Handbook*¹⁸

European Union, Eco-Management and Audit Scheme (EMAS)¹⁹

European Union, European Commission Directive 94/62/EC of the European Parliament and of the Council on Packaging and Packaging Waste²⁰

European Union, European Commission Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE)²⁰

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/EEC²⁰

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)²⁰

European Union Product Environmental Footprint Guide²¹

European Union Regulation (EC) No. 1907/2006, *Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)*²⁰

Global Logistics Emissions Council (GLEC) Framework²²

Global Reporting Initiative²³

GreenScreen® for Safer Chemicals methodology²⁴

¹⁶ e-Stewards. 80 Yesler Way, Suite 300, Seattle, WA 98104. <www.e-stewards.org>

¹⁷ European Chemicals Agency. PO Box 400, 00121 Helsinki, Finland. <www.echa.europa.eu>

¹⁸ European Commission Joint Research Centre. Rue du Champ de Mars 21, 1050 Brussels, Belgium. <eplca.jrc.ec.europa.eu>

¹⁹ European Commission Environment. B-1049 Brussels, Belgium. <www.ec.europa.eu/environment/emas>

²⁰ European Union Directives are available at <www.europa.eu>.

²¹ European Union Product Environmental Footprint Guide. <www.eur-lex.europa.eu>

²² Global Logistics Emissions Council. Keizersgracht 560, Amsterdam, Netherlands. <www.smartfreightcentre.org>

²³ Global Reporting Initiative. PO Box 10039, 1001 EA, Amsterdam, The Netherlands. <www.globalreporting.org>

²⁴ Clean Production Action. 1310 Broadway, Suite 101, Somerville, MA 02144. <www.greenscreenchemicals.org>

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*²⁵

IEC 62321-3-2, *Determination of certain substances in electrotechnical products - 3-2: Screening - Total bromine in polymers and electronics by Combustion - Ion Chromatography*²⁵

IEC 62474, *Material declaration for products of and for the electrotechnical industry*²⁵

IEC TR 62635, *Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment*²⁵

IEC 63000, *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*²⁵

IEEE 1680.2-2012 Standard for the Environmental Assessment of Imaging Equipment²⁶

IEEE 1874 – IEEE Standard for Documentation Schema for Repair and Assembly of Electronic Devices / Manual²⁶

International Accreditation Forum (IAF)²⁷

International Air Transportation Association (IATA), RP 1678²⁸

International Maritime Organization (IMO)²⁹

Interstate Chemicals Clearinghouse (IC2), *Alternatives Assessment Guide, Hybrid or Sequential Frameworks*³⁰

IPCC, *Guidelines for National Greenhouse Gas Inventories, 2006*³¹

ISO 179, *Plastics – Determination of Charpy impact properties*³²

ISO 180, *Plastics – Determination of Izod impact strength*³²

ISO 1043, *Plastics – Symbols and Abbreviated Terms*³²

ISO 11469, *Plastics – Generic identification and marking of plastics products*³²

ISO 14001, *Environmental management systems – Requirements with guidance for use*³²

²⁵ International Electrotechnical Commission. 3, rue de Varembe, 1st floor, PO Box 131, CH – 1211, Geneva 20, Switzerland. <www.iec.ch>

²⁶ IEEE Standards Association. 445 Hoes Lane, Piscataway, NJ 08854-4141. <standards.ieee.org>

²⁷ International Accreditation Forum. PO Box 819, Cherrybrook 2126 NSW, Australia. <www.iaf.nu>

²⁸ International Air Transportation Association. IATA USA, 703 Waterford Way, Suite 600, Miami, FL 33126. <www.iata.org>.

²⁹ International Maritime Organization. 4, Albert Embankment, London SE1 7SR, United Kingdom. <www.imo.org>

³⁰ Interstate Chemicals Clearinghouse. 89 South Street, Suite 600, Boston, MA 02111-2651. <www.theic2.org>

³¹ Intergovernmental Panel on Climate Change. 7 bis Avenue de la Paix, C.P. 2300, CH-1211, Geneva 2, Switzerland. <www.ipcc.ch>

³² International Organization for Standardization. Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland. <www.iso.org>

ISO 14021, *Environmental Labels & Declarations – Self-declared environmental claims (Type II environmental labelling)*³²

ISO 14025, *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*³²

ISO 14040, *Environmental management – Life cycle assessment – Principles and framework*³²

ISO 14044, *Environmental management – Life cycle assessment – Requirements and guidelines*³²

ISO 17021-1, *Conformity assessment – Requirements for bodies providing audit and certification of management systems*³²

ISO/IEC 17065, *Conformity assessment – Requirements for bodies certifying products, processes and services*^{32,25}

ISO 50001, *Energy management systems – Requirements with guidance for use*³²

Korea Energy Management System (EnMS) Program³³

LCA Society of Japan, *Life-cycle Impact Assessment Method based on Endpoint modeling*³⁴

Model Toxics in Packaging Legislation [compilation was developed by CONEG and is administered by the Toxics in Packaging Clearinghouse (TPCH)]³⁵

National Academies of Science, *Design and Evaluation of Safer Chemical Substitutions – A Framework to Inform Government and Industry Decisions*³⁶

OECD, *Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*³⁷

OHSAS 18001, *Occupational Health and Safety Management*³⁸

Responsible Business Association (RBA) Code of Conduct³⁹

SmartWay Program⁴⁰

Social Accountability International (SA) 8000⁴¹

³³ Korea Energy Agency, Energy Management System. 323 Jongga-ro, Jung-gu, Ulsan (#528-1 Ujeong-dong), Republic of Korea 44538. <www.energy.or.kr/renew_eng/energy/industry/enms.aspx>

³⁴ LCA Society of Japan. LCA Development Office, 2-1, Kajicho 2-chome, Chiyoda-ku, Tokyo, 101-0044. <lca-forum.org/english>

³⁵ Model Toxics in Packaging Legislation. c/o NERC. 139 Main Street, Suite 401, Brattleboro, VT 05301. <www.toxicsinpackaging.org>

³⁶ National Academies of Sciences. 500 Fifth Street NW, Washington, DC 20001. <www.nap.edu>

³⁷ Organisation for Economic Cooperation and Development. 2, rue André Pascal, 75775 Paris Cedex 16, France. <mneguidelines.oecd.org>

³⁸ OHSAS 18001, BSI Group. 389 Chiswick High Road, London W4 4AL, United Kingdom. <www.bsigroup.com>

³⁹ Responsible Business Alliance. 1737 King Street, Suite 330, Alexandria, VA 22314. <www.responsiblebusiness.org>

⁴⁰ US EPA, SmartWay Program. SmartWay Transport Partnership, 2000 Traverwood Drive, Ann Arbor, MI 48105. <www.epa.gov/smartway>

⁴¹ Social Accountability International. 9 East 37th Street, 10th Floor, New York, NY 10016. <www.sa-intl.org>

Solutions for Hope¹²

Subsport Substitution Support Portal (SUBSPORT)⁴²

Sustainable Electronics Recycling International, *Responsible Recycling (R2) Standard for Electronics Recyclers*⁴³

UL ECVP 2809, *Environmental Claim Validation Procedure (ECVP) for Recycled Content*, 2nd edition⁴⁴

United Nations Protocol on Pollutant Release and Transfer Registry⁴⁵

University of Leiden Institute of Environmental Sciences (CML), *Handbook on LCA*⁴⁶

US Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Section 1502⁴⁷

US DOE 50001, *Superior Energy Performance (50001 SEP)*⁴⁸

US EPA, GHG Reporting Rule, Subpart I⁴⁹

US EPA, *Life Cycle Assessment: Principles and Practice*, Office of Research and Development. National Risk Management Research Laboratory, Editor 2006, US EPA: Cincinnati, OH⁴⁹

US EPA *Protocol for Measuring Destruction or Removal Efficiency (DRE) of Fluorinated Greenhouse Gas Abatement Equipment in Electronics Manufacturing (US EPA DRE Protocol)*⁴⁹

US EPA *Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) 2.1*⁴⁹

US EPA Toxics Release Inventory⁴⁹

US Securities Exchange Act of 1934, Rule 13p-1⁴⁷

WEEELABEX Treatment Standard⁵⁰

⁴² Substitution Support Portal. Bundesanstalt für Arbeitsschutz und Arbeitsmedizin (BAuA), Fabricestraße 8, 01099 Dresden, Germany. <www.subsportplus.eu>

⁴³ Sustainable Electronics Recycling International. PO Box 721, Hastings, MN 55033. <sustainableelectronics.org/r2-standard>

⁴⁴ UL LLC. 33 Pfingsten Road, Northbrook, IL 60062. <www.ul.com>

⁴⁵ United Nations Economic Commission for Europe, Palais des Nations, CH-1211 Geneva 10, Switzerland. <www.unece.org>

⁴⁶ Universiteit Leiden, Institute of Environmental Sciences. PO Box 9500, 2300 RA Leiden, The Netherlands. <www.cml.leiden.edu>

⁴⁷ US Securities and Exchange Commission. 100 F Street, NE, Washington, DC 20549. <www.sec.gov>

⁴⁸ US Department of Energy. 1000 Independence Avenue SW, Washington, DC 20585. <www.energy.gov>

⁴⁹ US Environmental Protection Agency. 1200 Pennsylvania Avenue NW, Washington, DC 20004. <www.epa.gov>

⁵⁰ WEEELABEX, U Habrovky. U Habrovky 11/247, 14000 Praha 4, Czech Republic. <www.weeelabex.org>

3 Definitions, special terms, acronyms, and abbreviations

3.1 Definitions

3.1.1 additives and fillers: Substances or compounds such as pigments and stabilizers added to polymers to improve processing, properties and end use performance.

3.1.2 bezel: Partial or full front facing cover of a product unit that may include openings for one or more drives or other replaceable devices.

NOTE — When extra drives or other replaceable devices are not installed, these bays are usually filled with blanks (see *cosmetic blank / dummy*) which are not technically part of the bezel.

3.1.3 blade server:³ 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.

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

3.1.5 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.

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

3.1.7 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.⁵¹

3.1.8 computer server:³ Hardware system providing 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 the most current version of the ENERGY STAR *Program Requirements for Computer Servers*.³ A computer server:

- is sold through enterprise channels for use in data centers and office / corporate environments;
- is primarily accessed via network connections, versus directly-connected user input devices such as a keyboard or mouse;
- 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);
- is packaged and sold with one or more AC/DC or DC/DC power supplies; and

⁵¹ United Nations Environment Program, Basel Convention.

— 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*.

3.1.9 conflict free: A product that does not contain 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”⁴⁷ 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 USC. 2151n(d) and 2304(b)) relating to the Democratic Republic of the Congo or an adjoining country.

3.1.10 conflict minerals:⁴⁷

— 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 US Secretary of State to be financing conflict in the DRC or an adjoining country.

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

3.1.12 conformance assurance process: Process used by the manufacturer to manage compliance of the product to a restricted substance requirement. The process includes:

— a description of how supplier, materials, parts, and/or subassemblies risk factors are evaluated and allocated;

— the utilization of risk rating (or high risk status) to determine what evidence is required for suppliers, materials, parts, and/or subassemblies, as determined to be applicable by the manufacturer;

— the collection and evaluation of the evidence determined necessary for applicability, quality and accuracy, and associated action taken for a negative result; and

NOTE — Analytical testing is an option, but is not required.

— a procedure to refresh the evidence as appropriate, based on the manufacturer’s evaluation of risk.

3.1.13 cosmetic blank / dummy: Cover or mockup provided as a placeholder for option(s).

3.1.14 deinstalled: Unplugged equipment that is destined for, or intended to be destined for, removal from a customer site.

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

3.1.16 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.

3.1.17 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.

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

3.1.19 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.

3.1.20 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), or has not been bleached with chlorine compounds.

3.1.21 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.

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

3.1.23 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.

3.1.24 environmental management system:³² 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.

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

3.1.26 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.

3.1.27 feedstock: Raw material used in a manufacturing process.

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

3.1.29 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; or
- have arrived for disposal and are finally disposed.

3.1.30 firmware: Combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device.

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

3.1.32 idle state:³ 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 Standards are applicable, idle state correlates only to ACPI System Level S0.

3.1.33 impact assessment categories:³⁹ Classifications of human health and environmental effects caused by a product throughout its life cycle.

3.1.34 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.

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

3.1.36 Life cycle assessment (LCA):³² Compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product system throughout its life cycle.

3.1.37 manufacturer: Any natural, legal person or entity who:

- manufactures a product;
- has a product designed or manufactured; or
- places a brand label on a ready-made product; and
- places it on the market under their own name or trademark.

3.1.38 multinode server:³ 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 multinode server, power is distributed to all nodes through shared power supplies. Server nodes in a multinode server are not designed to be hot-swappable.

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

3.1.40 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 customer.

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 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.

3.1.41 packaging component:³⁵ 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.

3.1.42 pedestal server:³ 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.

3.1.43 postconsumer recycled material:³² Material generated by households or by commercial, industrial and institutional facilities, 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.

3.1.44 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.

3.1.45 principal storage device: Primary hardware in the product that stores the operating system, applications and data.

3.1.46 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.

3.1.47 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.

3.1.48 processor: See *central processing unit* (CPU).

3.1.49 product: A computer server:

— within the scope of the most current version of the ENERGY STAR *Program Requirements for Computer Servers*,³ including managed servers and blade servers, and

— 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 — Refer to the most current version of the ENERGY STAR *Program Requirements for Computer Servers*³ for the definition of a computer server.

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.

3.1.50 product specification: Product 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.

3.1.51 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”.

3.1.52 rack-mounted server:³ 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.

3.1.53 recovery: Operations that are part of a process to recapture elements, compounds, or materials, and transform them into commodities.

3.1.54 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.

3.1.55 recycled content:³² Proportion, by weight, of recycled material in a product or packaging. Only preconsumer and postconsumer materials shall be considered as recycled content.

3.1.56 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.

3.1.57 refurbishment: Functional or aesthetic maintenance or repair of a product to restore to original or upgraded functional state.

3.1.58 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.

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

3.1.60 sensitivity analysis:³⁹ A systematic evaluation process for describing the effect of variation of inputs to a system on the output.

3.1.61 supplier: Entity that provides goods or services to the manufacturer.

3.1.62 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.

3.1.63 treatment: Material recovery or disposal operations, including preparation prior to recovery or disposal.

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

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

3.2 Special terms, acronyms and abbreviations

3.2.1 ANAB: ANSI-ASQ National Accreditation Board

3.2.2 BOB: buffered on board

3.2.3 BIOS: basic input / output system

3.2.4 CAS: chemical abstract number

3.2.5 CCWG: Clean Cargo Working Group

3.2.6 CPU: processor or central processing unit

- 3.2.7 **CSR:** corporate sustainability report
- 3.2.8 **DDR:** double data rate
- 3.2.9 **DIMMs:** dual in-line memory modules
- 3.2.10 **DRC:** Democratic Republic of the Congo
- 3.2.11 **EC:** European community number
- 3.2.12 **ECC:** error-correcting code
- 3.2.13 **ECF:** elemental chlorine free
- 3.2.14 **EICC:** electronic Industry Citizenship Coalition
- 3.2.15 **EMAS:** European Union Eco-Management and Audit Scheme
- 3.2.16 **EMI:** electromagnetic interference
- 3.2.17 **EMS:** environmental management system
- 3.2.18 **EnMS:** energy management system
- 3.2.19 **ESD:** electrostatic discharge
- 3.2.20 **EPA:** Environmental Protection Agency
- 3.2.21 **F-GHG:** fluorinated greenhouse gas
- 3.2.22 **GHG:** greenhouse gas
- 3.2.23 **GLEC:** Global Logistics Emissions Council
- 3.2.24 **HTML:** hypertext markup language
- 3.2.25 **IAF:** International Accreditation Forum
- 3.2.26 **IPSA:** independent private sector audit
- 3.2.27 **IATA:** International Air Transportation Association
- 3.2.28 **IMO:** International Maritime Organization
- 3.2.29 **IS:** International System of Units
- 3.2.30 **LCA:** life cycle assessment
- 3.2.31 **OECD:** Organisation for Economic Co-operation and Development
- 3.2.32 **OS:** operating system
- 3.2.33 **PCR:** postconsumer recycled
- 3.2.34 **PCF:** processed chlorine free

- 3.2.35 **PDF:** portable document format
- 3.2.36 **PSU:** power supply unit
- 3.2.37 **QR:** quick response
- 3.2.38 **SASB:** Sustainability Accounting Standards Board
- 3.2.39 **SEC:** Securities and Exchange Commission
- 3.2.40 **SVHC:** substances of very high concern
- 3.2.41 **TCF:** totally chlorine free
- 3.2.42 **URL:** uniform resource locator
- 3.2.43 **WEEE:** waste electrical and electronic equipment
- 3.2.44 **VAP:** validated audit process
- 3.2.45 **XML:** extensible markup language

4 Conformance, evaluation and assessment

This Standard is divided into eight performance 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-life management; and
- corporate responsibility.

4.1 Criteria

A summary of all criteria in this Standard, including required criteria and optional points, is provided in Annex N-1.

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 external 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 fiber content 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
10	Product longevity
10.1.1	Required – Replacement components availability
11	Responsible 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)
12.3.1	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; and
- **corporate criteria:** applies to the company that declares products to conform to this Standard.

4.1.4 Country or region specific criteria

All criteria in this 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 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.”

NOTE — “Region” means countries and territories whose independence may 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).

4.2 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; and
- **Gold:** meets all required criteria plus at least 75% of the optional criteria points.

The optional points can come from any of the 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
US 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 US and Canada ENERGY STAR Computer Servers Eligibility Criteria

Geographic applicability: This criterion shall be met 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) identification of which of the above requirements in Table 5.1 to which the product conforms;
- b) documentation demonstrating that product meets the relevant requirements in Table 5.1; and
- c) for products that are not ENERGY STAR certified or listed on an international partner's ENERGY STAR qualified product listing, test results from an ENERGY STAR accredited lab³ demonstrating that product conforms with the current version of the US 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 shall support Class A2 allowable environmental operating range published in the ASHRAE *Thermal Guidelines for Data Processing Environments, 4th Edition*, in Table 2.1.⁷

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 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 can operate in ASHRAE Class A2 conditions, including the estimated number of hours per a specified time period that the server can operate in the allowable range without materially affecting the server.

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 shall be shipped with capability to liquid cool the processor and system memory (DIMMs and associated independent buffers) at a minimum. Liquid cooling 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 edition, 2015) 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 liquid cool the processor and system memory (DIMMs and associated independent buffers) at a minimum	3

Point value: Maximum 3

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 indicating whether the product is classified as a resilient or nonresilient server, and indicating to which ASHRAE classification that the equipment can operate (ASHRAE Class A3 or Class A4). The documentation shall specify the estimated number of hours per a specified time period that the server can operate in the allowable range without materially affecting the server reliability; or
- b) documentation indicating the capability to liquid cool 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 Edition, 2015).⁷ Criteria for determination of “Resilient” Server to be taken from latest ENERGY STAR Product Specification for Servers.³

5.3 Power supply efficiency

5.3.1 Optional – 80 Plus® program

Power supply(ies) shipped with the product shall have been tested as in conformance with the requirements of the 80 Plus® program Titanium level.⁴

Points shall be awarded as detailed in Table 5.3 below.

Table 5.3
80 Plus® Titanium Level

Power supply unit	Total points
single output	1
multi-output	2

If the product does not ship with power supply(ies), “Not Applicable” may be declared. For blade servers, manufacturer shall declare “Not Applicable” for this criterion.

Point value: 1 or 2

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) statement from manufacturer indicating whether product contains single output or multi-output power supply; and
- b) test report from independent, third-party laboratory demonstrating conformance with 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; and
- **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 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 or screen snapshots of BIOS, firmware, or OS which show the power management states defined in above criterion are enabled on the product.

5.4.2 Optional – Server inactive Power State #1

The product 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, 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 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 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 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 and the time required to achieve full active state when reactivated from inactive Power State #1;
- b) test report showing power usage for inactive Power State #1 as a percentage of idle power measurement reported for certification to ENERGY STAR; and
- c) test report demonstrating the time required to return from the inactive Power State #1 to active power state.

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, such as the power supply(ies), a service processor and, or other

I/O electronics, necessary to allow for restart upon a call (signal) from the data center management software.

The inactive Power State #2 will have a power level which is 30% or less of the idle power as measured for the product conformance with ENERGY STAR Computer Servers Eligibility Criteria, 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 product specifications 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 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 and the time required to achieve full active state when reactivated from inactive Power State #2;
- b) test report showing power usage for inactive Power State #2 as a percentage of idle power measurement reported for certification to ENERGY STAR; and
- c) test report demonstrating the time required to return from the inactive Power State #2 to active power state.

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

Manufacturer shall demonstrate that supplier facilities providing the design and, or manufacture of one or more listed components or services meet one of the following:

- a) self-declaration of an energy management system that meets the requirements of ISO 50001, or a nationally adopted version of the standard;
- b) 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 certified individually or if it is within the scope of an enterprise ISO 50001 certification. Certification(s) shall be obtained from a certification body accredited by an accreditation body that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) with the appropriate scope of accreditation.

- c) Third-party certification to one of the following:
- the US DOE 50001 Superior Energy Performance™ (50001 SEP) program by an ANAB-accredited SEP verification body(ies); or
 - Korea Superior Energy Management System (Superior EnMS) Program); or
 - a nationally equivalent program. An equivalent program shall meet the requirements of the US DOE 50001 SEP program.⁴⁸

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 of facilities below.

The scope of facilities for this criterion includes suppliers of the following nine component or service categories for products within the scope of this Standard:

- printed circuit board;
- printed circuit board assembly;
- integrated circuit;
- memory;
- microprocessors;
- battery;
- power supply;
- fans; and
- final assembly.

Optional points shall be awarded based on the number of credits achieved through the suppliers' facilities meeting a), b) or c) above. Supplier facilities receive credit as follows:

- a) Facilities meeting part a) receive 1/2 credit
- b) Facilities meeting part b) receive 1 credit
- c) Facilities meeting part c) receive 2 credits

Optional points are awarded as follows:

- 1 optional point for 10 supplier facility credits; or
- 2 optional points for 20 supplier facility credits.

The number of facilities for which credits may be claimed are limited to:

- 2 suppliers per component or service category; or
- 3 facilities per supplier.

Point value: 1 or 2

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) identification of the suppliers, components, and number of facilities or enterprises that meet the requirements of Part a), b) or c);

b) for facilities claiming Part a), either copy of 50001 Ready program⁵² recognition certificate(s) at the facility level, or all of the following:

- copy of the EnMS policy;
- document demonstrating top management commitment to the EnMS;
- description of context and scope of the EnMS;
- energy review within the EnMS, scope and resulting significant energy uses, and at least 24 months of energy consumption data prior to the time product declaration;
- list of energy objectives, energy performance indicators (EnPIs), energy baseline(s) and action plans to achieve objectives;
- demonstration of process to manage and implement annual internal ISO 50001 audits and summary of results of annual internal ISO 50001 audits;
- documentation of annual management review and management decisions of effectiveness and suitability of the EnMS; and
- evidence of continual improvement of the organization's energy performance through the results of the implemented action plans.

c) either one, or a combination of the following:

- for Part b), 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. Certification(s) shall be obtained from a certification body accredited by an accreditation body that is a signatory to the IAF MLA with the appropriate scope of accreditation; and/or
- for Part c):
 - documentation of current US DOE 50001 SEP program certification, or certification(s) to a nationally equivalent 50001 SEP program; and
 - national program meets US DOE 50001 SEP program equivalency, if an equivalent 50001 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, 400/230 V or 480/277 V 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 most current version of the ENERGY STAR *Program Requirements for Computer Servers*.³

For blade servers, manufacturer shall declare “Not Applicable” for this criterion.

Point value: 1

⁵² US Department of Energy, Efficiency & Renewable Energy. 1000 Independence Avenue SW, Washington D.C. 20585. <www.energy.gov>

Geographic applicability: 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; and
- b) test results using the methodology specified in the ENERGY STAR *Program Requirements for Computer Servers*.³

References and details: None.

5.5.3 Optional – Logged server activity metrics

Product shall have the capability to log the metrics specified in the Standard Performance Data Measurements and Output Requirements section of the most current version of the ENERGY STAR *Program Requirements for Computer Servers*.³

Data acquisition and format shall be consistent with Annex N-2.

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) demonstration of the capacity to log the metrics specified in Section 5 of the ENERGY STAR *Program Requirements for Computer Servers*,³ and consistent with Annex N-2.

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 and its amendments 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 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 a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain; 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*.

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 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.); and
- b) at least one of the following:
 - test results demonstrating that battery(ies) in the product meets the substance requirements of the European Union Battery Directive;
 - statement from the battery supplier indicating that the product meets the substance requirements of the European Union Battery Directive; or
 - 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 > 1000 ppm chlorine or > 1000 ppm bromine⁵³. Parts that exceed 25% postconsumer recycled content shall contain a maximum of 5000 ppm chlorine and 5000 ppm bromine.

The following exceptions apply:

- printed circuit boards, cables and wiring, fans and electronic components; and
- parts for which the manufacturer has performed an alternative assessment in accordance with Annex N-3 on the substance(s) responsible for exceeding the bromine and chlorine levels and

⁵³ Based on chlorine and bromine thresholds specified in IEC 62474 Material declaration for products of and for the electrotechnical industry.

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 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 four options below:
 - test data showing that the part contains < 1000 ppm chlorine and < 1000 ppm bromine, as determined by test method IEC 62321-3-1 and IEC 62321-3-2; or
 - documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain; or
 - if the part contains > 25% PCR:
 - supplier letter supporting the > 25% PCR;
 - test data showing that the part contains < 5000 ppm chlorine and < 5000 ppm bromine; or
 - documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain;
 - demonstration that an alternative assessment was conducted, using the methodology outlined in Annex N-3 on the substance responsible for the observed bromine and/or chlorine levels and the possible alternatives 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 > 1000 ppm chlorine or > 1000 ppm bromine,⁵² in accordance with Table 6.1, with the following exception:

- parts which exceed 25% postconsumer recycled content may contain a maximum of 5000 ppm chlorine and a maximum of 5000 ppm bromine.

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

Table 6.1

Plastic parts	Points
At least one of the following: <ul style="list-style-type: none"> — printed circuit board laminates (excluding components soldered or affixed to the printed circuit board); or — fans. 	1
All plastic parts > 25 g	1

Point value: 1 or 2

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) a list of plastic parts exceeding 25 g;
- b) documentation that plastic parts per Table 6.1 exceeding 25 g meets one of the three options below:
 - test data showing that the part contains < 1000 ppm chlorine and < 1000 ppm bromine, as determined by test method IEC 62321-3-1 and IEC 62321-3-2; or
 - documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain; or
 - if the part contains > 25% PCR:
 - supplier letter supporting the > 25% PCR; and
 - test data showing that the part contains < 5000 ppm chlorine and < 5000 ppm bromine; or
 - documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain.

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 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*¹⁷ on the:

- European Union REACH Annex XIV (List of Substances Subject to Authorization) (1 point); or
- Candidate List of Substances of Very High Concern¹⁷ (SVHC) (1 point); or
- both.

Substances on the REACH Authorization List (Annex XIV) or on the REACH Candidate List of SVHCs with a *Date of inclusion* two 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 prescreen the European Union REACH Candidate List and Annex XIV using IEC 62474 *Material Declaration for Products of and for the Electrotechnical Industry*.

Manufacturer shall utilize a conformance assurance process 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*.¹⁷

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: Maximum 2.

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) method for determining applicable substances; and
- b) documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain.

6.2 Inventory and assessment of substances

6.2.1 Optional – Record of declarable substances

Manufacturer shall record 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 shall include all declarable substance groups and declarable substances designated criteria 1, 2 and 3 in the IEC 62474 database.

The manufacturer shall have one or both of the following:

- a process to manage, maintain, and update all data received on declarable substances listed in IEC 62474; and/or
- a conformance assurance process used to ensure that the product does not contain these substances.

The criterion does not require public disclosure.

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) record of IEC 62474 declarable substance groups and declarable substances (designated 1, 2, and 3) in the product at or above the reporting threshold; and
- b) documentation of a process to manage, maintain and update data received on declarable substances listed in IEC 62474; or
- c) documentation of a conformance assurance process that demonstrates conformity to this criterion through effective control of the supply chain.

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 record of IEC 62474 declarable substance groups and declarable substances in the product generated for conformance with Section 6.2.1. The inventory shall contain the CAS number for each declarable substance (not including declarable substance groups). The link to the record shall be placed on the product specification or documentation web page. 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 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 of the public disclosure; and
- b) record generated for conformance with Section 6.2.1, that:
 - includes the CAS number for each declarable substance, and
 - 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 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, MITI), for the inventory of substances.

“Request” means one or more of the following:

- 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; or
- 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
- 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 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 process for collecting the information requested in accordance with this criterion;
- b) documentation of process 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; and
- 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 Section 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:

$$\% \text{ mass of inventory of substances of the product} = \frac{\text{mass of substances inventoried}}{\text{total mass of the product}} \times 100$$

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 6.2.

Table 6.2

Data acquired on substance inventory	Points
Minimum of 75% of total product mass	1
Minimum of 90% of total product mass	2

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

Point value: 1 or 2

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 that the system or tool required in Section 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 6.2;
- b) calculation demonstrating the percentage of total product mass for which the manufacturer has a complete list of the substances; and
- c) evidence supporting the existence of a system for validating reports or other substance ingredient declarations from its suppliers.

6.2.5 Optional – Improving substance selection

Manufacturer shall demonstrate that a hazard assessment has been conducted on each substance that serves the following functions in the product, and provide the hazard assessment (e.g., GreenScreen® Benchmark™) score assigned, comparable to the GreenScreen® for Safer Chemicals methodology²⁴:

- flame retardants in plastic parts > 25 g;
- plasticizers in plastic parts > 25 g; and
- top three cleaning solvents used during final assembly (by volume).

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

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

Exclusions (for first and second bullets 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:⁵⁴

- 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, provided by recognized experts in conducting such assessments; and
- experience conducting at least one assessment that has been peer-reviewed by recognized experts in the field or published in relevant journals or in repositories of assessments.

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; and
- 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 GreenScreen® is used, not Benchmark 1)	1
Substances are not in the two highest hazard categories (e.g., if GreenScreen® is used, not Benchmark 1 or 2)	2

Point value: 1 or 2

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.

⁵⁴ Clean Product Action Licensed GreenScreen® Profilers and Authorized GreenScreen® Practitioners meet this requirement.

Verification requirements:

- a) list of substances used to serve the functions identified above, and their hazard assessment score, except those exempted in the criterion.
- b) demonstration that each of those substances have:
 - been assessed by an assessor with the qualifications listed in the criterion; or
 - publicly available Certified GreenScreen® Assessments such as those available on the Clean Production Action website²⁴ or the Interstate Chemicals Clearinghouse Chemical Hazard Assessment Database (IC2).³⁰
- c) demonstration that the assessments contain the information as required in the criterion.

6.2.6 Optional – Making safer substance use hazard assessments publicly available

The manufacturer shall publicly disclose the hazard assessment score of substances assessed with a methodology comparable with the GreenScreen® for Safer Chemicals methodology as required by Section 6.2.5.

The URL for the 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 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 of public disclosure on the manufacturer or other public website.
- b) public disclosure of the hazard assessment scores as required by Section 6.2.5.

6.3 Manufacturing chemicals**6.3.1 Optional – Mitigation and inventory of process fluorinated greenhouse gas emissions resulting from semiconductor manufacturing**

At least one supplier of central processing units (CPUs), dynamic random-access memory (DRAM), and or accelerators used in the product shall have:

- developed a process F-GHG emissions inventory using one of the following methods:
 - the most recent IPCC Tier 2a, 2b, or Tier 3 methodology, or
 - methods included in the US 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.

- a GHG emissions reduction goal, or maintains year-to-year GHG emissions reduction activities, and publicly reports progress toward this goal or on emission reduction activities, on an annual basis. The reduction goal and activities 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 SF₆, NF₃, PFCs and HFCs. Examples of F-GHGs include, but are not limited to, CF₄, C₂F₆, C₃F₈, C-C₄F₈, C₄F₆, C₄F₈O, CHF₃, CH₂F₂, CH₃F, NF₃, and SF₆.

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

Points shall be awarded according to Table 6.4.

Table 6.4

GHG emissions activity	Total points
F-GHG emissions inventory	1
F-GHG emissions inventory AND GHG emissions reduction goal or emission reduction activities	2

Point value: Maximum 2.

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) for F-GHG emissions inventory:
 - 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 US 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.

- unless specified already in the first verification above, reporting of:
 - specification of the method used in the first verification above to estimate F-GHG emissions; and
 - 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 or emission reduction activities:
 - supplier documentation that states emissions reduction goal or emission reduction activities and describes progress toward goal or progress made due to emission reduction activities, made publicly available for example on a website; and
 - if not already included in the previous verification, supplier letter that includes:

- definition of baseline year for process F-GHG emissions reduction goal or emission reduction activities; and
- 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; and
 - remote plasma clean.

References and details:

World Semiconductor Council *Best Practice Guidance of PFC Emission Reduction*, 2012.⁵⁵

Semiconductor Industry Association Post-2010 voluntary PFC emissions reduction goal.⁵⁶

7 Preferable materials use

7.1 Recycled content

7.1.1 Required – Declaration of postconsumer recycled plastic content

Manufacturer shall declare the minimum percentage of plastic derived from the use of postconsumer recycled plastic in plastic parts in the product. Individual parts ≥ 25 g shall be included in the calculation. The manufacturer may choose to include individual parts < 25 g in the calculation.

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 percentage is calculated as the minimum weight of postconsumer recycled resins in the included plastic parts (numerator) divided by the total weight of all included plastic parts (denominator). Only the weight of postconsumer recycled content in the commercial resin shall be included in the numerator.

Additives or fillers in plastic formulations shall not contribute to the 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 ≥ 25 g, the manufacturer may declare "Not Applicable" for this criterion.

⁵⁵ World Semiconductor Council. <www.semiconductorcouncil.org>

⁵⁶ Semiconductor Industry Association. 1101 K Street NW, Suite 450, Washington, DC 20005. <www.semiconductors.org>

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) supplier documentation stating minimum percentage of postconsumer recycled plastic content in material supplied to manufacturer or to manufacturer's part supplier; and
- 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.

7.1.2 Required – Minimum postconsumer recycled content in external enclosures

External enclosure of the server shall consist of a minimum 10% 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 < 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 five 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 percentage is calculated as the minimum weight of postconsumer recycled resins in the included plastic parts (numerator) divided by the total weight of all included plastic parts (denominator). Only the weight of postconsumer recycled content in the commercial resin shall be included in the numerator.

Additives or fillers in plastic formulations shall not contribute to the 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 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 percentage of postconsumer recycled plastic content in material supplied to manufacturer or to manufacturer's part supplier; and
- 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.

7.1.3 Optional – Postconsumer recycled plastic content

Product shall contain the minimum 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% WEEE-derived plastic	1

Individual parts ≥ 25 g shall be included in the calculation. The manufacturer may choose to include individual parts < 25 g in the calculation.

Calculation: The minimum percentage is calculated as the minimum weight of postconsumer recycled resins in the included plastic parts (numerator) divided by the total weight of all included plastic parts (denominator). Only the weight of postconsumer recycled content in the commercial resin shall be included in the numerator.

Additives or fillers in plastic formulations shall not contribute to the 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 ≥ 25 g, the manufacturer may declare “Not Applicable” for this criterion.

Point value: Maximum 3

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) Supplier documentation stating minimum 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 obtained from a certification body accredited by an accreditation body that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) with the scope of accreditation for ISO/IEC 17065; and
- 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: 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 $\geq 10\%$ PCR plastic, $\geq 25\%$ PCR plastic and $\geq 10\%$ 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 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 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 one or more of the following:
 - documentation of audits of magnet suppliers and purchasing records;
 - identification of the source(s) material type of recovered rare earth elements (does not require disclosure of supplier); and
 - 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 Material efficiency / dematerialization

7.2.1 Optional – Opt out program to reduce surplus parts

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 applicable to the product declared to conform to this Standard, 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; and
- bezel.

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:
 - all parts on the list are included in the program, except if not offered with or applicable to the product or subject to legal, functional or safety requirements; and
 - the program is offered through the typical ordering process used by purchasers.

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 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 statement for each packaging component or packaging material provided by the supplier that includes:
 - the specified heavy metals have not been intentionally added to any package or packaging component; and
 - 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 process (CAP) that demonstrates conformity to this criterion through effective control of the supply chain.

References and details: The requirements in this criterion are based on Model Toxics in Packaging legislation,³⁵ European Parliament and Council Directive 94/62/EC and California Health and safety Code Section 25214.11-25214.26.

Analytical testing of the packaging for the product declared to conform to this Standard 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.

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 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 compounds in processing packaging materials

Manufacturer shall document that any fiber-based materials (virgin or recovered) 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 and their fabrication into packaging for server products declared to conform to this Standard. The use of recovered fibers that were previously bleached is acceptable.

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 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 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 nonreusable packaging components ≥ 25 g shall be separable by material type, including by plastic material type as specified in b) below, using only commonly available tools. The following are exempt from this requirement: labels affixed to plastics bags or wraps, tape, staples, colaminated materials for purposes of moisture or ESD barrier protection, and plastic bags over expanded foam; and
- 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.¹³ The following are exempt from this requirement: 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.

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 from manufacturer:
 - for requirement a), manufacturer’s packaging part or assembly / disassembly drawing, or photographs; or
 - for requirement b), photographs or physical evidence of plastic markings.

References and details: None.

8.3 Recycled content packaging

8.3.1 Required – Recycled fiber in corrugated packaging

Corrugated fiber based packaging materials shall contain a minimum of 25% recycled fiber content (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 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; and
- b) supplier documentation with recycled content percentage from each applicable packaging material where recycled content percentage is claimed from suppliers.

References and details: None.

8.3.2 Optional – Higher recycled fiber content in corrugated packaging

Corrugated packaging materials shall contain a minimum of 50% recycled fiber content (by fiber weight). Manufacturers shall also state a preference in specifications, which are applicable to the product, for a minimum 25% postconsumer recycled fiber content (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: 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; and
- b) supplier documentation with recycled content percentage from each applicable packaging material where recycled content percentage is claimed from 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 – Elimination of individual packaging for hardware and components

All hardware and components shipped with the product shall be shipped installed. 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.

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) 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; and
- b) manufacturer statement indicating where listed exceptions apply.

References and details: None.

8.4.2 Optional – Bulk packaging

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

- by bulk packaging weight, as compared on a per unit basis to the single unit packaging; or
- 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. Reboxing 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: 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:
 - define a base packaging configuration for a single unit of the registered product (including external components as determined by the manufacturer);
 - 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); and
 - calculations demonstrating 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:

$$\frac{\text{total mass or total volume of bulk packaging}}{\text{quantity of product units contained in the bulk packaging}} < \frac{\text{total mass or total volume of the single unit packaging}}{\text{unit}}$$
- d) 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; and
- 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 packaging 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, 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 two or more units of two or more different product types; and
- 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 requiring selective treatment listed in the European Union WEEE Directive 2012/19/EU Annex VII²⁰ 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 called for in Section 9.2.1 or marked with a visual display as called for in Section 9.2.3.

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 that the product meets each of the required design features to facilitate repair, preparation for reuse, recycling, and safe handling; and
- 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; and
- separable by hand or with commonly available tools, such that plastic parts can be separated into “compatible” or “compatible with limitations” material types, per Annex C in ECMA-341 *Environmental Design Considerations for ICT & CE Products*, 4th Edition / December 2010.¹⁵ If a plastic part is made up of more than one resin, and “good compatibility” or “limited compatibility” cannot be determined because 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.

Printed circuit boards, connectors, wire and cables are excluded from this requirement.

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

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

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 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; and
- 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, connectors, 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; and
- 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 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 bullet 1 in the criterion. If the product contains molded, glued or otherwise attached metal inserts or metal fasteners, a letter from a recycler confirming that the metal components can be completely snapped off manually or entirely removed with commonly available tools is an option to demonstrate conformity; and
- c) documentation that each plastic part > 100 g meets the requirements of bullet 2 in the criterion including either:
 - 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
 - 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.

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.

NOTE — This calculation of the recyclability of printed circuit boards differs from that in IEC TR 62635

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.

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 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) publicly available and readily accessible manufacturer's website URL with calculation assumptions, methodology and calculation results; and

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

References and details: None

9.2 Information and 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,²⁰ for use by third-party reuse and recycling organizations, in a language of the manufacturer's choice. The information shall be made available to reuse and recycling organizations upon request.

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

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 that demonstrates that the information is available in all regions or countries in which the criterion is declared;
- b) a written procedure that assures that the information is available for seven years following the end of production of the product; and
- c) demonstration that the information complies with requirements of Article 15 of the European Union WEEE Directive 2012/19/EU.²⁰

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

The manufacturer shall make publicly available the 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
<ul style="list-style-type: none"> — information provided in conformance with Section 9.2.1; — 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; and — product trouble shooting information as provided to manufacturers' authorized repair and refurbishment suppliers. 	1
<ul style="list-style-type: none"> — 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; — 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
<ul style="list-style-type: none"> — information provided under an open-source license that allows redistribution and modification 	1

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

- user-friendly formatting on the web;
- downloadable PDFs for offline viewing; or
- machine-friendly file format: either HTML, XML or 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.

Point value: Maximum 3.

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) 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; and

- e) if one or more of the required 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 – Product marked to identify components and materials requiring selective treatment

The product shall visually display information on the presence and location of all components and materials requiring selective treatment 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 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. 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 Section 9.1.3.

For products that do not contain components requiring selective treatment, a label or other permanent marking shall be located on the product that indicates the absence of components requiring selective treatment 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 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 is compatible with the recyclability of the material on which it is placed as required in Section 9.1.3.

9.2.4 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 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 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 code; and
- b) link to a publicly available database or the manufacturer's website with the required information.

References and details: None.

9.2.5 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 five 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 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 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 URL demonstrating that the required software tools are publicly available; and
- b) documentation of the required written procedures, including identification if there is a cost.

References and details: None.

10 Product longevity

10.1 Replacement components

10.1.1 Required – Replacement components availability

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. For blade servers, replaceable components shall include, at a minimum, hard drives, memory, and processors (CPUs). Information regarding the availability of product replacement components and, or product service shall be publicly available on the manufacturer's website.

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 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's website URL; and
- b) demonstration that the website contains information regarding:
 - the availability of product replacement components and, or product service for at least five years after the date of sale; and
 - how to obtain product replacement components and, or product service through the manufacturer or an authorized third party.

11 Responsible end-of-life management

11.1 Take-back service

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

Manufacturers shall provide a 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 programs should consider the hierarchy of management of used and end-of-life electronic equipment and components 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.

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 Standard.

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) 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;
 - URL for the manufacturer's public website that describes the product take-back service, including how to utilize the service;
 - evidence that customers are informed of the product take-back service 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 deinstalled servers (corporate)

Manufacturer shall offer, either directly or through a third-party, a country-wide or region-wide take-back service to remove and process server equipment and components for which conformance has not been declared and servers from other manufacturers that are deinstalled at the customer site, for reuse and, or end-of-life management when new, equivalent servers for which conformance has been declared 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.

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 deinstalled 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 servers recovered under this criterion are managed in accordance with:

- the management hierarchy and conformance evidence requirements of Section 11.1.1, and
- Sections 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: 2

Geographic applicability: 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 that customers are informed of the take-back service for deinstalled servers in product promotional materials, and the URL for the manufacturer’s public website that describes the product tack-back service, including how to utilize the service.
- b) evidence that server equipment recovered is managed in conformance with verification requirements for Sections 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 servers collected by the manufacturer (or their contractual agent) pursuant to the “Required – Provision of product take-back service” Section (11.1.1) contained herein, by utilizing:

- a) a government-approved program for end-of-life electronics processing, which includes servers and in which the manufacturer does not control the selection of initial service providers for servers in the jurisdiction where the servers were taken back; or
- b) initial service providers that meet one of the following:
 - are certified by a certification body to a 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; and
 - WEEELABEX.

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

- demonstrate legal compliance to a Qualified Electronics Recycling Standard, in countries or regions that require compliance with a Qualified Electronics Recycling Standard; or
- are certified to OHSAS 18001 and either ISO 14001 or EU EMAS⁵⁷ 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 by an IAF member accreditation body to ISO/IEC 17021-1 or ISO 17065 and with competency to conduct an audit to the Qualified Electronics Recycling Standard.³²

For products declared in the US and Canada, manufacturers shall conform with a) or b), bullet 1, above.

For either option a) or b) 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.

⁵⁷ Certification to Recycling Industry Operating Standard™ (RIOS™) is equivalent; available at: <www.rioscertification.org>

Qualified Electronics Recycling Standard: A Qualified Electronics Recycling Standard shall be publicly available and meet minimum technical requirements a) through g) below. The NSF 426 Joint Committee on the Environmental Leadership and Corporate Responsibility Assessment of 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).

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;
- 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, recycling and 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. 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; and
- 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).

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:

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 with evidence that:

- the scope of products covered by the government-approved program includes servers covered under the scope of this Standard;
 - the government-approved program accepts servers from all server users, or the manufacturer offers take-back as per the requirements of this criterion for server products or users not covered by the government-approved program, if permitted; and
 - the manufacturer is participating in the government-approved program in that country / region.
- 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:
- identification of the Qualified Electronics Recycling Standard(s) used;
 - for initial service providers meeting the bullet above, copy / evidence of a current certification, performed by a certification body that is accredited to certify to the Qualified Electronics Recycling Standard (s); and/or
 - for initial service providers meeting the bullet above, demonstration of legal compliance to a Qualified Electronics Recycling Standard; and/or
 - for initial service providers meeting the bullet above, documentation of the accreditation and competency of third party conformity assessment body as specified in the bullet above, and findings (including all nonconformances) in the most recent third-party audit reports and other records confirming that all nonconformances have been closed and that the initial service provider conforms to the identified 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 – Transboundary movements (corporate)

If equipment and components collected pursuant to Sections 11.1.1 and 11.1.2 and materials derived from them are transported across national boundaries from the customer to the initial service provider facility, the manufacturer shall 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 Sections 11.1.1 and 11.1.2 are not transported out of the country or region in which collected.

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) a copy of the written procedure to identify and evaluate compliance with applicable legal requirements or documentation of a legal compliance system; and
- b) evidence of implementing the procedure to ensure compliance with applicable trade laws in exporting, transiting, and importing countries and/or regions when transferring materials between the customer and the initial service provider facility, if transboundary movement occurs.

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 annual total weight returned as shown in Figure 1) of the take-back service for each country into which the product is declared to conform to this Standard. This criterion applies only to servers taken back under Section 11.1.1. Servers recovered and processed under national or regional collection schemes (mandated programs) may be included if the data is made available to the manufacturer. If data is not available from a mandated program in which the manufacturer participates, and the manufacturer fulfills Section 11.1.1 solely through mandated programs, the manufacturer may declare “Not Applicable” to this criterion in the country or region.

With reference to Figure 1:

Determination and calculation of the reuse, recycling, and recovery achievements at the reuse or treatment facility pursuant to Section 11.2.1, shall start with the receipt of the mass of all 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 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 sent to a waste to energy facility; and
- [m_4] mass of equipment, components, or associated materials sent to a thermal or landfill facility for disposal.

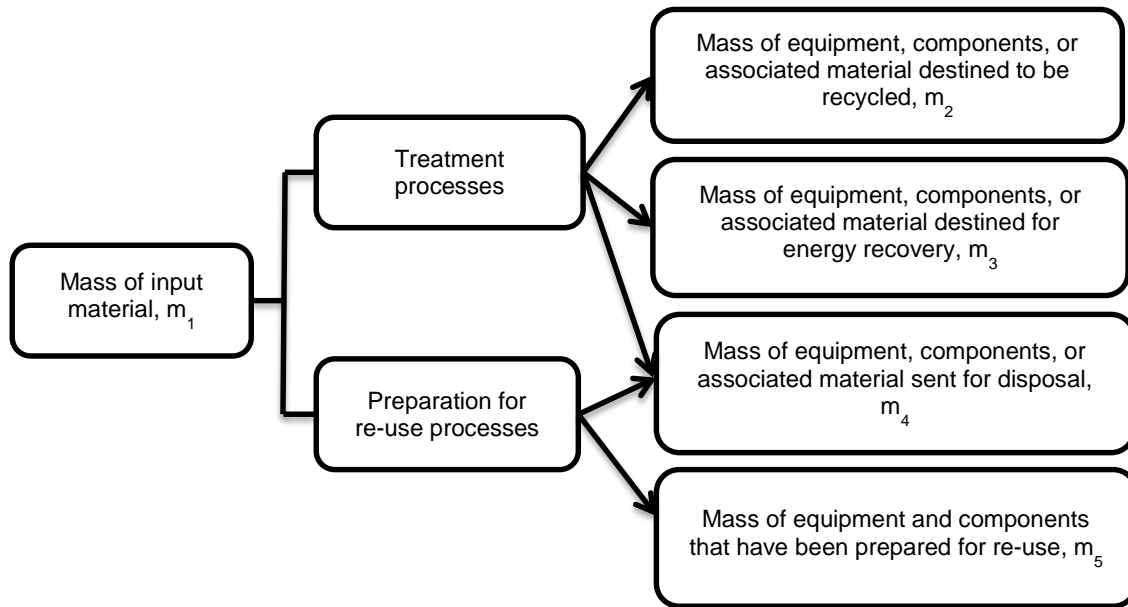


Figure 1
Flow chart showing separate parts of the reuse and treatment process

The total reuse achievement shall be calculated as:

$$\text{reuse achievement: } \% \text{ rate} = \frac{m_5}{m_1}$$

The total recycling achievement shall be calculated as:

$$\text{recycling achievement: } \% \text{ rate} = \frac{m_2}{m_1}$$

The total recovery achievement shall be calculated as:

$$\text{recovery achievement: } \% \text{ rate} = \frac{m_2 + m_3}{m_1}$$

Point value: 2

Geographic applicability: 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 Standard. At a minimum, the achievement must cover equipment collected under Section 11.1.1, but can include other server equipment; and
- b) statements of:
 - reuse from the initial service provider or reuse operator (percentage by weight to the mass of input equipment and, or components received for the preparation of reuse);
 - recycling from the initial service provider or treatment operator (percentage by weight to the mass of end-of-life equipment and, or components received); and
 - recovery from the initial service provider or 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 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 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:
 - copy of ISO 14001 certification(s), or copy of EMAS certification(s); and
 - for self-declared EMS, copy of EMS.
- 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; and
- c) demonstration that the EMS is applicable to those operations listed in the b).

12.1.2 Optional – Environmental management system (EMS) certification (corporate)

EMS specified in Section 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 body²⁷ 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 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 certificate or certificates covering company design and manufacturing operations in b); and
- b) list of all design and manufacturing operations of the company with significant responsibility for products declared to conform to this Standard.

12.2 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) listed in Table 12.1.

The disclosure for this criterion shall include performance information for at least nine suppliers, and shall include three of the manufacturer’s top six suppliers (by annual spend, fiscal or calendar) of each of the following three types of components, if applicable, for the product covered by this Standard:

- principal storage device(s);
- processor(s) (CPU); and
- printed circuit board(s).

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.

Reporting format and frequency:

- disclosures shall be publicly available on the manufacturer’s website. It is acceptable to provide a link on the manufacturer’s website to the disclosure on the supplier’s website;
- data shall be reported consistent with the Topic-specific Standards in the GRI Sustainability Reporting Standards (GRI Standards) listed in Table 12.1. Manufacturers or suppliers may use a reporting framework or program other than the GRI Standards (e.g., CDP, Electronic Industry Citizenship Coalition [EICC]) / Responsible Business Alliance [RBA], 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 Standards is not required, but would meet the requirements of this criterion if the report(s) covers the indicators specified in this criterion; and
- performance against the indicators shall be reported and publicly disclosed at least annually.

Manufacturer may claim up to 2 points for this criterion. To claim 1 point, any six of the indicators listed in Table 12.1 shall be publicly disclosed for all nine suppliers. To claim 2 points, ten of the twelve GRI indicators listed in Table 12.1 shall be publicly disclosed for all nine suppliers.

Table 12.1

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 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) if the manufacturer has less than three suppliers for any of the three listed components, a signed statement from manufacturer stating the number of suppliers of the component;
- c) if claiming 1 point, identification of which six indicators in Table 12.1 are addressed in the public disclosure for each of the nine suppliers. If claiming 2 points, identification of which ten indicators in Table 12.1 are addressed in the public disclosure for each of the nine suppliers;
- 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; and
- e) demonstration of at least one public disclosure for nine suppliers 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 suppliers (corporate)

Manufacturer shall publicly report on corporate environmental and social responsibility performance that includes the key performance indicators listed in Table 12.2, and which use the reporting format and frequency specified in Section 12.2.1.

The disclosure for this criterion shall include all suppliers who directly contract with the manufacturer and 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 Table 12.2.

Table 12.2

Consistent with topic-specific GRI Standards	Key performance indicators	Disclosure must include evaluation of supplier on these impacts:
414-1	new suppliers screened using social criteria	— disclosure must specify which social impacts were used for screening and evaluation for these indicators; and — labor practice criteria for screening and assessments must include compliance with laws on: — minimum wages; — working hours; and — compensation for overtime.
414-2	negative social impacts in supply chain and actions taken	
308-1	new suppliers that were screened using environmental criteria	— disclosure must specify which environmental impacts were used for screening and evaluation for these indicators.
308-2	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 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 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, and is not intended for public disclosure. The manufacturer may choose to identify suppliers in generic terms (such as Supplier A, B, C.)

c) 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; and

d) demonstration of at least one public disclosure for suppliers 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 facilities owned or operated by three of the manufacturer's top six suppliers (by annual spend, fiscal or calendar) for each component, if applicable for the product declared to conform to this Standard. The reported data shall be according to the reporting requirements and for chemicals listed on the:

— US 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 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, if reported by supplier, a link to a public repository containing the 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
a) the identity and volume of each release	1
b) the specific locations of the releases; and	1
c) the name of the company that is releasing the chemicals	

NOTE — For the purpose of this criterion “facility” is defined as a manufacturing site that is majority owned or operated by one of the suppliers within the scope of this criterion.

Point value: Maximum 2

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) 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 Toxics Release Inventory, United Nations Protocol on Pollutant Release and Transfer Registry, or applicable country / region registry for facilities owned or operated by three of the manufacturer’s top six suppliers of three components, if applicable to the product declared to conform to this Standard:
 - principal storage device(s);
 - principle semiconductor device(s); and
 - printed circuit board(s).
- c) if suppliers in scope do not release any chemicals subject to the requirement, provide a URL to manufacturer’s public disclosure of no emissions;
- d) if the manufacturer has fewer than three 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 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(s); and

NOTE — Aggregate reporting may fulfill this requirement.

- g) if claiming 2 points, the public disclosure of toxic release data must contain f), location of release and name of the company releasing the chemicals.

12.3 Responsible 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 US Securities Exchange Act of 1934; and
- make such disclosures publicly available on their websites. 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 US SEC, all elements of the disclosure under Rule 13p-1 are required, except the US administrative requirements (e.g., IRS employer identification number).

For the purposes of this criterion, an “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 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 US Securities Exchange Act of 1934.
- b) URL of the conflict mineral public disclosure on the company website.
- c) for exempt small businesses, a statement that the organization is not a subsidiary of nor under common control of a larger 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 – Sourcing from validated conflict free smelters (corporate)

Manufacturers shall conduct due diligence to determine all sources of conflict minerals used in the covered products and demonstrate that they are from either:

- recycled or scrap sources; or
- smelters and, or refiners that have been determined to be “conflict free”, consistent with the definitions provided for in Rule 13p-1 under the US 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.⁵⁸

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 US 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 postconsumer 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.³⁶

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) URL to a public website that contains a description of due diligence inquiry and determination.
- b) if claiming “conflict free,” copy 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)

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 US 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; and
- does not allow donation, participation or activities by a manufacturer’s foundation to meet requirements.

Examples of programs that meet this requirement include Responsible Artisanal Gold Solutions Forum, International Tin Research Institute (ITRI), iTSCi (International Tin Supply Chain Initiative), Better Sourcing Program (BSP), Partnership Africa Canada’s Just Gold Program, Diamond Development Initiative, European Partnership for Responsible Minerals (EPRM) and Public Private Alliance for Responsible Mineral Trade (PPA). “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.

⁵⁸ For example on a manufacturer’s website or SEC’s EDGAR (Electronic Data Gathering, Analysis, and Retrieval system), etc.

Point value: 2

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) 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); or
- b) documentation that the manufacturer sources conflict minerals for any of its products from certified conflict free sources in the Great Lakes Region of Africa, including:
 - name of sourcing program and evidence of manufacturer sourcing from program;
 - name of conflict mineral sourced from sourcing program and the minimum amount sourced annually by the manufacturer; and
 - 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 Section 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 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 management system documentation applicable to operations in a) that demonstrate conformance with ANSI/AIHA/ASSE Z10 or OHSAS 18001; or
- c) for certified facilities, copy of certification or certifications to ANSI/AIHA/ASSE Z10 or OHSAS 18001 applicable to operations in a).

12.4.2 Optional – Supply chain conformance to occupational health and safety performance standards (corporate)

Manufacturer shall ensure that three of their top six suppliers (by annual spend, fiscal or calendar) for each of these three main components, if applicable to the product declared to conform to this Standard, (principal storage device[s]; processor[s] [CPU]; and printed circuit board[s]) produce these components in supplier

facilities that conform to or are certified to either ANSI/AIHA/ASSE Z10 or OHSAS 18001 if the facility is owned or operated by the supplier. Certification(s) shall be obtained from a certification body accredited by an accreditation body that is a signatory to the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) with the appropriate scope of accreditation.

If there are less than three suppliers for a component type named above, every supplier for that component type needs to provide data.

NOTE — For the purpose of this criterion “facility” is defined as a manufacturing site that is majority owned or operated by one of the suppliers within the scope of this criterion.

Point value: 2

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) either demonstration of conformance or copy of current certificate or URL verifying current certification to either ANSI/AIHA/ASSE Z10 or OHSAS 18001 for facilities owned or operated by three of their top six suppliers that produce the following three components, if applicable, for the product declared to the Standard:

- principal storage device(s);
- principle semiconductor device(s); and
- printed circuit board(s).

b) if the manufacturer has fewer than three 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 supplier owned or operated facilities of three of its six top suppliers (by annual spend, fiscal or calendar) that manufacture each of three main components (principal storage device[s]; processor[s] [CPU]; and printed circuit board[s]), if applicable, for the product are:

- certified by accredited certification bodies to Social Accountability (SA) 8000.⁴¹ 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

- audited to the EICC/RBA Code of Conduct¹⁵ 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 for each facility:

- initial validated audit reports contained no major or priority non-conformance findings. If the facility was determined to be Low Risk⁵⁹ as defined by the EICC/RBA VAP, the initial report shall

⁵⁹ Currently defined by EICC/RBA as ≥ 180 of 200 points.

be no older than four years. If the facility was determined to be Medium or High Risk⁶⁰ as defined by the EICC/RBA VAP, the initial report shall be no older than two years; or

— closure audit report confirms that all major and priority nonconformance corrective actions resulting from previous VAP audits were remedied within time frame specified by the EICC/RBA (i.e., RBA VAP Gold Recognition Certificate). The initial audit report shall be no older than two years; or

— closure audit report confirms that all non-conformance corrective actions resulting from previous VAP audits were remedied within the time frame specified by the EICC/RBA (i.e., RBA VAP Platinum Recognition Certificate). The initial audit report shall be no older than four years.

Optional point shall be awarded for EICC/RBA 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.

NOTE — For the purpose of this criterion “facility” is defined as a manufacturing site that is majority owned or operated by one of the suppliers within the scope of this criterion.

Point value: 1 or 2

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) demonstration of certification to SA8000 or EICC/RBA VAP audits for all supplier owned or operated facilities of three of its six top suppliers that manufacture the three components listed above, if applicable, for the product declared to conform to this criterion, including either:

— certificate to SA8000 issued within three years prior to product declaration or product verification for all supplier owned or operated facilities of three largest suppliers that manufacture the three components; or

— certificate issued by the EICC/RBA VAP Operations Management Team for all supplier owned or operated facilities of three of its six top suppliers that manufacture the three components listed above for the product declared to conform to this criterion. Initial audit reports must be issued within the timeframes specified below and each certificate must verify that:

— the initial validated audit report contained no major or priority non-conformance findings. If the facility was determined to be Low Risk, the initial report must be issued within four years of product declaration or product verification. If the facility was determined to be Medium or High Risk, the initial report must be issued within two years of product declaration or product verification; or

— the closure audit report confirms that all major and priority non-conformance corrective actions were remedied within the time frame specified by the EICC/RBA (i.e., RBA VAP Gold Recognition Certificate). The initial audit report must be issued within two years of product declaration or product verification; or

⁶⁰ Currently defined by EICC/RBA as < 180 of 200 points.

— the closure audit report confirms that all nonconformance corrective actions were remedied within the time frame specified by the EICC/RBA (i.e., RBA VAP Platinum Recognition Certificate). The initial audit report must be issued within four years of product declaration or product verification.

b) if the manufacturer has fewer than three 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*.²¹ The LCA shall include all stages (see Annex N-4) of the product life-cycle, from extraction of raw materials through end-of-life (i.e., cradle-to-grave), and shall cover, at a minimum, the following impact assessment categories using either US EPA TRACI 2.1,⁴⁰ or CML 2001 (Nov 09),⁴⁶ or ILCD 2011,¹⁸ or LIME2³⁴ impact assessment methodologies:

- global warming potential (GWP 100 years);
- acidification potential (AP);
- photochemical ozone creation potential (POCP, or “Smog”);
- eutrophication potential (EP);
- ozone depletion potential (ODP);
- abiotic depletion potential (ADP) – or fossil fuels depletion when using TRACI.

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 three years prior to product registration or certification. The LCA may be conducted on a family or class of products that includes the declared product.

A new LCA will be required if:

- the previously submitted LCA is more than five 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 20% 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 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 LCA, URL to LCA, or URL to environmental product declaration (EPD) Type III label 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 Section 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;
- environmental product declaration (EPD) Type III label in accordance with ISO 14025; or
- submitting the LCA or life-cycle inventory data for use in a national database (such as the US 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 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:
 - third-party report of LCA as defined in Section 5.2 of ISO 14044, or
 - environmental product declaration (EPD) Type III label in accordance with ISO 14025; or
- b) documentation of LCA or 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 modes of freight movement utilized (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:

- the Global Logistics Emissions Council (GLEC) Framework;²²
- 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]):
 - **road:** SmartWay⁴⁰ or EN 16258;¹³
 - **air:** International Air Transportation Association (IATA) RP1678;²⁸

- **rail:** SmartWay or EcoTransIT;¹⁴
- **sea:** Clean Cargo Working Group (CCWG)¹¹ or International Maritime Organization (IMO);²⁹
- **inland waterways:** SmartWay or IMO.

— 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 CO₂e) and normalized GHG emissions (e.g., grams of CO₂e per tonne-km) for each mode (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 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 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); and
 - 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.

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.”

Normative Annex 1
(formerly Annex A)

Table of criteria and optional points

Criterion and 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
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
5.5.3 Optional – Logged server activity metrics	1
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
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 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
6.2.5 Optional – Improving substance selection	2
6.2.6 Optional – Making safer substance use hazard 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 Material efficiency / dematerialization		
7.2.1	Optional – Opt out program to reduce surplus parts	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 compounds 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 fiber content in corrugated packaging	—
8.3.2	Optional – Higher recycled fiber content in corrugated packaging	1
8.4 Packaging reduction		
8.4.1	Optional – Elimination of individual packaging for hardware and components	1
8.4.2	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 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	3
9.2.3	Optional – Product marked to identify components and materials requiring selective treatment	2
9.2.4	Optional – Information and reporting on disk drive magnet type and location	2
9.2.5	Optional – Functionality testing software tools	1
10 Product longevity		
10.1 Replacement components		
10.1.1	Required – Replacement components availability	—
11 Responsible 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 deinstalled servers (corporate)	2
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 Supply chain 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 suppliers (corporate)	2
12.2.3	Optional – Public reporting of toxics release data (corporate)	2
12.3 Responsible mineral sourcing		
12.3.1	Required – Public disclosure of use of conflict materials in products (corporate)	—
12.3.2	Optional – Sourcing 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 conformance to occupational health and safety performance standards (corporate)	2
12.4.3	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

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Normative Annex 2 (formerly Annex B)

Section 5.5.3 logged server activity metrics – Data acquisition and format

N-2.1 Format

This Annex defines requirements for logging server activity in Section 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; and
- if only one CPU, leave column for second CPU blank.

N-2.2 Column headers and data format shall be:

- date;
- time;
- demand (watts);
- CPU-1 Util (%);
- CPU-2 Util (%); and
- server inlet temperature (C°).

N-2.3 File management shall:

- store data in CSV format;
- store 45 days' worth of data (~ 65,000 records); and
- age off oldest record as each new record is written, and rename file as necessary.

N-2.4 File name:

- file name shall be: "host-ID_activity_year_MO_DD.csv"; and
- where the "host-ID" is the server host identifier, and most recent full day is included in the file name.

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Normative Annex 3 (formerly Annex C)

Section 6.1.3 reduction of bromine and chlorine content of plastic parts > 25 grams

N-3.1 Introduction

This Annex outlines the requirements for manufacturers to exempt themselves from the bromine and chlorine limits specified in Section 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 (see list in Section N-3.2).

N-3.2 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 Section 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”; or
- BizNGO Chemical Alternative Assessment Protocol.⁹

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.

N-3.3 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 the US EPA’s Design for the Environment Program Alternatives Assessment Criteria for Hazard Evaluation.⁶¹ 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).

⁶¹ Available at: <www.epa.gov/saferchoice/alternatives-assessment-criteria-hazard-evaluation>

- assessment must have been completed no longer than three (3) years before the date the product is declared to conform to this criterion.

N-3.4 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; and
- qualifications of the individual(s) conducting the assessment demonstrating appropriate expertise for conducting an alternative assessment.

N-3.5 Public availability of assessment

The manufacturer shall ensure the public available of the assessment and the documentation specified in Section N-1.4. This requirement may be met through:

- posting on a publicly available database such as the Substitution Support Portal (SUBSPORT)⁴² or the IC2 Database;³⁰ 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.

Normative Annex 4
(formerly Annex D)

Section 12.5.1 system boundaries

N-4.1 Example flow

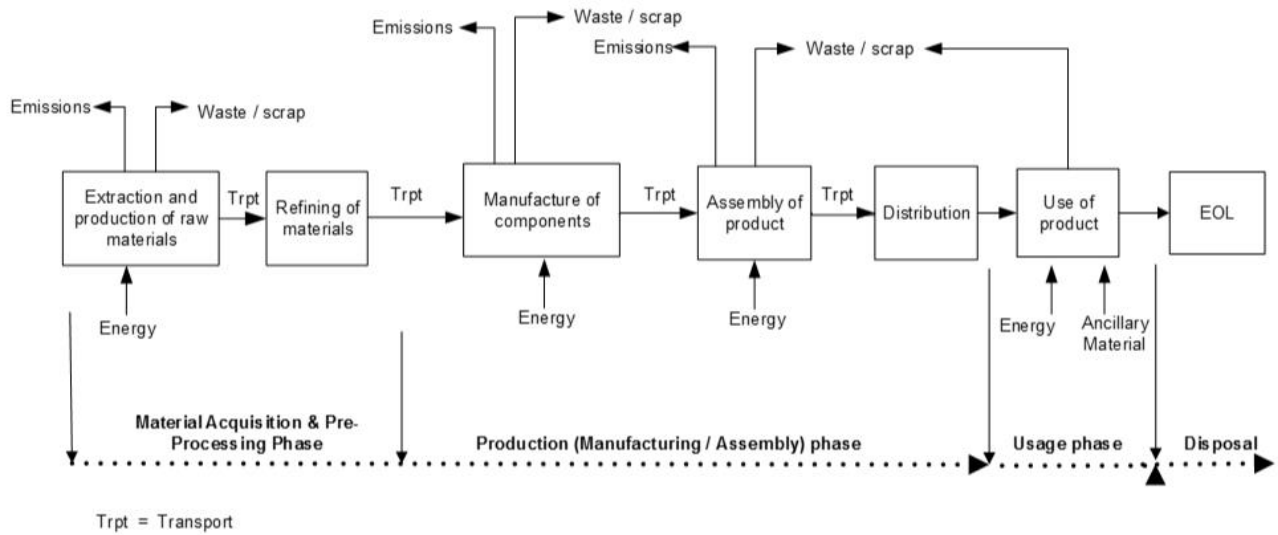


Figure 2
System boundaries, example flow

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Informative Annex 1 (formerly Annex E)

Bibliography

The information contained in this Annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to this Standard.

DIN EN 15343: 2008-02, Plastics - Recycled Plastics - Plastics recycling traceability and assessment of conformity and recycled content¹³

European LCA Platform Database¹⁸

Public Private Alliance for Responsible Mineral Trade⁶²

UL 746D, Standard for Polymeric Materials - Use in Electrical Equipment Evaluations⁴⁴

US LCI Database

⁶² Public-Private Alliance for Responsible Minerals Trade. <www.resolv.org/site-ppa>

Standards⁶³

The following Standards established and adopted by NSF as minimum voluntary consensus Standards are used internationally:

Std. #	Standard title
2	Food Equipment
3	Commercial Warewashing Equipment
4	Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transport Equipment
5	Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment
6	Dispensing Freezers
7	Commercial Refrigerators and Freezers
8	Commercial Powered Food Preparation Equipment
12	Automatic Ice Making Equipment
13	Refuse Processors and Processing Systems
14	Plastics Piping System Components and Related Materials
18	Manual Food and Beverage Dispensing Equipment
20	Commercial Bulk Milk Dispensing Equipment
21	Thermoplastic Refuse Containers
24	Plumbing System Components for Recreational Vehicles
25	Vending Machines for Food And Beverages
29	Detergent and Chemical Feeders for Commercial Spray-Type Dishwashing Machines
35	High Pressure Decorative Laminates (HPDL) for Surfacing Food Service Equipment
37	Air Curtains for Entrancesways in Food and Food Service Establishments
40	Residential Wastewater Treatment Systems
41	Non-liquid Saturated Treatment Systems
42	Drinking Water Treatment Units – Aesthetic Effects
44	Residential Cation Exchange Water Softeners
46	Evaluation of Components and Devices Used in Wastewater Treatment Systems
49	Biosafety Cabinetry – Design, Construction, Performance, and Field Certification
50	Equipment for Swimming Pools, Spas, Hot Tubs, and Other Recreational Water Facilities
51	Food Equipment Materials
52	Supplemental Flooring
53	Drinking Water Treatment Units – Health Effects
55	Ultraviolet Microbiological Water Treatment Systems
58	Reverse Osmosis Drinking Water Treatment Systems
59	Mobile Food Carts
60	Drinking Water Treatment Chemicals – Health Effects
61	Drinking Water System Components – Health Effects
62	Drinking Water Distillation Systems
140	Sustainable Carpet Assessment
169	Special Purpose Food Equipment and Devices
170	Glossary of Food Equipment Terminology
173	Dietary Supplements
177	Shower Filtration Systems – Aesthetic Effects

⁶³ The information contained in this list of Standards is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Standards page may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

Std. #	Standard title
184	Residential Dishwashers
223	Conformity Assessment Requirements for Certification Bodies that Certify Products Pursuant to NSF/ANSI 60 Drinking Water Treatment Chemicals – Health Effects
240	Drainfield Trench Product Sizing for Gravity Dispersal Onsite Wastewater Treatment and Dispersal Systems
244	Drinking Water Treatment Units Supplemental Microbiological Water Treatment Systems – Filtration
245	Wastewater Treatment Systems – Nitrogen Reduction
305	Personal Care Products Containing Organic Ingredients
321	Goldenseal Root (<i>Hydrastis canadensis</i>)
330	Glossary of Drinking Water Treatment Unit Terminology
332	Sustainability Assessment for Resilient Floor Coverings
336	Sustainability Assessment for Commercial Furnishings Fabric
342	Sustainability Assessment for Wallcovering Products
347	Sustainability Assessment for Single-Ply Roofing Membranes
350	Onsite Residential and Commercial Water Reuse Treatment Systems
350-1	Onsite Residential and Commercial Greywater Treatment Systems for Subsurface Discharge
358-1	Polyethylene Pipe and Fittings for Water-Based Ground-Source “Geothermal” Heat Pump Systems
358-2	Polypropylene Pipe and Fittings for Water-Based Ground-Source “Geothermal” Heat Pump Systems
358-3	Cross-linked Polyethylene (PEX) Pipe and Fittings for Water-based Ground-Source (Geothermal) Heat Pump Systems
358-4	Polyethylene of Raised Temperature (PE-RT) Tubing and Fittings for Water-based Ground-Source (Geothermal) Heat Pump Systems
359	Valves for Cross-linked Polyethylene (PEX) Water Distribution Tubing Systems
360	Wastewater Treatment Systems – Field Performance Verification
363	Good Manufacturing Practices (GMP) for Pharmaceutical Excipients
372	Drinking Water Treatment System Components – Lead Content
375	Sustainability Assessment for Water Contact Products
385	Disinfection Mechanics
401	Drinking Water Treatment Units – Emerging Compounds / Incidental Contaminants
416	Sustainability Assessment for Water Treatment Chemical Products
418	Effluent Filters – Field Longevity Testing
419	Public Drinking Water Equipment Performance – Filtration
426	Environmental Leadership and Corporate Social Responsibility Assessment of Servers
455-1	Terminology for the NSF 455 Portfolio of Standards
455-2	Good Manufacturing Practices for Dietary Supplements
455-3	Good Manufacturing Practices for Cosmetics
455-4	Good Manufacturing Practices for Over-the-Counter Drugs
457	Sustainability Leadership Standard for Photovoltaic Modules and Photovoltaic Inverters
600	Health Effects Evaluation and Criteria for Chemicals in Drinking Water
14159-1	Hygiene Requirements for the Design of Meat and Poultry Processing Equipment
14159-2	Hygiene Requirements for the Design of Hand-held Tools Used in Meat and Poultry Processing Equipment
14159-3	Hygiene Requirements for the Design of Mechanical Belt Conveyors Used in Meat and Poultry Processing Equipment



THE HOPE OF MANKIND rests in the ability of man to define and seek out the environment which will permit him to live with fellow creatures of the earth, in health, in peace, and in mutual respect.