

R2v3

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THE SUSTAINABLE ELECTRONICS REUSE & RECYCLING (R2) STANDARD

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First Public Comment Draft (April 2019)

This draft has been recommended for public review by the R2 Consensus Body. To submit a comment on this proposed standard, go to the SERI website at <http://www.sustainableelectronics.org> and access the public comment form in the R2v3 section. The draft is subject to modification until it is approved for publication by the SERI Board of Directors. Until this time, the current edition of the standard (R2:2013) remains in effect. The current edition of the standard may be obtained at <https://sustainableelectronics.org/r2-standard/r2-document-library>.

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INTRODUCTION

The R2 Standard establishes responsible reuse and recycling (“R2”) practices for the management and processing of used electronics globally. By certifying to this Standard through an accredited third-party Certification Body, an R2 Facility can help IT asset managers, sellers of used electronics, and prospective purchasers of IT Asset Disposition, refurbishment, remarketing, and recycling services (among others) make informed decisions and have increased confidence that used electronic equipment is managed in an environmentally responsible manner, protective of the health and safety of workers and the public, and that all data on all devices is secure and effectively destroyed. Thus, certification to R2 allows an R2 Facility to highlight their value to suppliers, customers, employees, their community, and the public.

R2 was developed by a multi-stakeholder group – the R2 Technical Advisory Committee (TAC) – through an open, transparent, and consensus-based approach in conformance with the ANSI Essential Requirements. The TAC consists of representatives from key stakeholder groups, including: refurbishers/recyclers, customers/users of recycling services like manufacturers and retailers, regulatory/public interest and other industry experts. The process for development of R2 included public comment, response to comments, and an appeals opportunity so that all interested parties had the ability to participate in the revision process. This version has been approved by the balanced R2 Consensus Body according to the SERI Manual of Policies and Procedures for R2 Standard Development. The R2 Standard is also reviewed by the SERI Board of Directors to ensure that it is in line with the mission of the organization and then formally adopted.

Where a requirement of the standard is unclear or ambiguous, SERI may provide additional guidance or clarification to ensure the consistent application and implementation of the requirement, in line with its originally intended meaning. In addition, any stakeholder can request a formal interpretation of the meaning or intent of a specific requirement of the standard by completing a submission in accordance with the SERI Manual of Policies and Procedures for R2 Standard Development. Any changes to this Standard must be approved by the R2 Consensus Body, including the publication of Formal Interpretations.

Comprehensive

The requirements contained within R2 are comprehensive, covering environmental, health, safety, and data security practices. To further ensure the integrity and strength of the Standard, R2 also requires facilities to obtain certification to one or more generally-accepted environmental, health and safety management systems. Certain activities, like the test and/or repair of used electronics for reuse, require an additional quality management system certification.

Legal

The R2 Standard specifically requires that domestic and international trade in used and end-of-life electronics be conducted legally and responsibly. This requirement is made explicit in R2, by requiring compliance (including documentation) with the laws and regulations of all importing, transit, and exporting countries. Further, if a requirement of this document conflicts with an applicable legal requirement, the recycler must adhere to the legal requirement.

Conformance

The R2 Standard incorporates a set of core requirements and a number of process-specific requirements. All the R2 Core Requirements and any R2 Process Requirements applicable to the scope of activities undertaken shall be conformed to by an R2 Facility. Many of the R2 requirements specify a result or outcome of the practice. This is different than management system requirements which specify a policy or written plan. R2 requires the R2 Facility to perform the function and demonstrate the expected result is achieved. The burden of proof resides with the R2 Facility to demonstrate conformity to each requirement with evidence and records. An absence of records is not just a non-conformity to Requirement 3, but is potential grounds for non-certification, suspension, or revocation if the R2 Facility cannot satisfactorily demonstrate that it operates in conformance with parts of the R2 Standard due to a lack of evidence. Where an organization cannot demonstrate conformance or meet the requirements, the organization cannot be R2 certified. Certain processes can be outsourced only as specified within the defined requirements of this standard. All other outsourcing not specifically defined in the Standard, is prohibited.

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Applicability

For easier reading of this standard, the R2 Standard uses the term “R2 Facility” to encompass the entities performing various types of collection, repair, reuse, processing, etc. and other activities that may be part of the recycling chain to reuse electronic equipment or components or recycle the materials at the end of their useful life.

R2 Certification is applicable to all organizations within the recycling chain, regardless of their size or location. R2 Certification includes all electronics reuse or recycling related activities that are owned and/or operated by an R2 Facility, at a specific physical address, regardless of any subdivision into rooms, units, suites, buildings or otherwise. R2 Certification also includes any activities related to the operations of the R2 Facility that may not occur at the site, but that are under the control of the R2 Facility. Where multiple legal entities occupy the same physical address, only where the Certification Body can verify that legally separate businesses, that are independently owned and operated, and physically separated within a building, can there be R2 Certification of the operations of one of the businesses at a physical address without the other.

The scope of a facility’s R2 Certification shall apply to all electronics reuse or recycling related activities controlled by the R2 Facility through title, physical possession or other contractual control of electronic equipment, components or materials. Scope shall include all activities, internal or external that are necessary to fulfill the processes of the R2 Facility. This may include external processes or facilities, such as but not limited to brokering, collection, and additional storage or processing buildings. While not at the same physical address, these activities are required activities to fulfill the electronics recycling processes of the R2 certified facility. However, certification is not company-wide unless all facilities are R2 Certified.

Certification may be extended to multiple physical addresses of the same legal entity (company) through a campus certificate, multi-site certificate, or additional individual certificates. It may also be extended as a multi-site sampling certificate when the management system is shared by multiple locations in accordance with the R2 Code of Practices.

Normative References

The following external documents are referenced in the R2 Standard rather than duplicating the requirements, and the current list of acceptable versions is maintained on the SERI website.

RIOS – Recycling Industry Operating Standard
ISO 9001:2015 – Quality Management System
ISO 14001:2015 – Environmental Management Systems
ISO 45001:2018 – Occupational Health and Safety Management Systems
OHSAS 18001:2007 – Occupational Health and Safety Management Systems (Until March 2021)
AS/NZS 4801:2001 – Occupational Health and Safety Management Systems
NSA/CSS Policy Manual 9-12 – NSA Storage Device Sanitization Manual

R2 Equipment Categorization (REC)

This revised R2 Standard incorporates a new document titled “R2 Equipment Categorization” (REC). The REC is written and revised by the R2 Technical Advisory Committee and formally approved by the R2 Consensus Body and the SERI Board consistent with SERI’s Manual of Policies and Procedures for R2 Standard Development. This companion document is intended to be used in conjunction with the R2 Standard and provides the framework for evaluating electronic equipment and categorizing its R2 condition throughout each step of the R2 process. The categories identified in the REC must be incorporated into the R2 Facility’s categorization process and procedures, or a written cross-reference to existing internal categories maintained. The REC is not intended to facilitate trade between parties.

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About SERI

Sustainable Electronics Recycling International (“SERI”) is a non-profit organization dedicated to promoting the responsible reuse, repair, and recycling of electronic products, and established to administer and promote the R2 Standard. It consists of an independent Board of Directors and a staff. In addition, the R2 Technical Advisory Committee (“TAC”) is a voluntary group of concerned stakeholders appointed by the SERI Board of Directors and responsible for providing technical and other guidance during the R2 Standard development process. The R2 Consensus Body is a balanced subgroup of the TAC that approves change proposals, draft standards, and formal interpretations through a consensus process. SERI is the administrator and owner of the R2 Standard. Additional resources and information, including the SERI Manual of Policies and Procedures for R2 Standard Development are available at www.SustainableElectronics.org.

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R2 Certification

R2 Code of Practices

The R2 Code of Practices is a companion document to the R2 Standard. The Code of Practices defines the processes used in applying and administering the R2 Standard and is designed to facilitate consistency in R2 audits, maintenance of certification, and SERI's oversight of the R2 certification process. All requirements of the R2 Code of Practices must be adhered to for R2 audits and throughout R2 Certification. In certain circumstances, allowances are permissible where requirements are clearly not applicable to the facility within the recycling chain, and where allowances will not negatively impact the validity of the certification. Such allowances are specifically defined in the R2 Code of Practices and must be adhered to as defined without modification.

R2 Guidance

R2 Guidance is intended to provide an explanation of complex requirements in the R2 Standard along with examples and audit recommendations. However, R2 Guidance is not auditable and cannot be cited in relation to any nonconformances. The explanations in R2 Guidance are intended to prevent misinterpretation of the R2 Standard – not to add to, subtract from, or modify the R2 Standard. The examples cited may not be the only way to fulfill a requirement of the standard.

R2 Implementation Guide

Those implementing the R2 Standard and applying for certification may use the R2 Implementation Guide for further instructions and suggestions on how to meet the requirements. It includes templates and other referenced tools to assist in implementation. The R2 Implementation Guide includes recommendations, but it is not the only way to fulfill a requirement of the standard. It is not auditable and cannot be cited in relation to any nonconformances.

Auditing

All requirements in the R2 Standard are auditable. General Principles and Notes used for context and explanation throughout the Standard are not auditable. Nonconformances may be cited by an auditor against any requirements in the R2 Standard, including when an R2 Facility is not meeting the intent of the standard requirements. Other supporting information, including but not limited to notes in the standard, guidance, implementation guides, and newsletter articles, is meant to explain the R2 Standard to prevent misinterpretation of the requirements but cannot be the basis for a nonconformance.

Applicants for R2 Certification and Certified R2 Facilities shall demonstrate the effective implementation of the R2 Standard requirements. Where specific documentation is not required, the recycler is expected to demonstrate evidence of conformance to the requirements through results of implementation. Absent, lost, or missing records shall be interpreted as not meeting the R2 Standard requirement.

R2 Certification

Certified R2 Facilities are required to be audited and certified to all R2 Core Requirements as well as all applicable Process Requirements that fall within the scope of their operations and processing activities. The Core Requirements are defined in Section 1 of this Standard. The Process Requirements are defined in Section 2.

R2 Certificates

Upon successful completion of the specified R2 Audits, the Certification Body will issue an R2 Certificate for the R2 Facility. The R2 Certificate will include an accurate description of the scope of operations covered under the R2 Certification, reflective of all processes and activities undertaken for the electronic equipment, components and materials managed by the facility. The R2 Certificate will also note each R2 Process Requirement (Appendix) that is applicable to the R2 Facility's activities, as well as any allowances audited and approved by the R2 Certification Body.

DEFINITIONS

Brokering

“Brokering” (sometimes called “trading”) is the process where an R2 Facility sources equipment, components, or materials and controls their delivery directly to a downstream vendor without physically receiving or processing the equipment in the R2 Certified facility. Brokering may be the only activity of an R2 Facility or brokering may be a process in addition to those performed at the R2 Facility.

Certification Body

“Certification Body” is an organization accredited by an International Accreditation Forum member body under the current ISO/IEC Standard 17021-1 and approved by SERI to conduct R2 Certification audits.

Collectible Electronics

“Collectible Electronics” includes items that are rare, vintage, or have historical significance, and that are no longer manufactured or supported by original manufacturers.

Control

“Control” of electronic equipment, components or materials begins at the point where and when the R2 Facility takes title, physical possession, or contractual obligation for the material, regardless of ownership.

Data

“Data” is the private, personally identifiable, confidential, licensed or proprietary information contained on an electronic device or memory component that requires secured management and sanitization under this standard. Data does not include General Information as defined in the R2 Standard.

Downstream Vendors

“Downstream Vendors” include any entity to which a recycler transfers used or end-of-life electronic equipment, components, or materials including reuse, refurbishing, de-manufacturing, processing, materials recovery, energy recovery, incineration, and disposal facilities. Suppliers of equipment to the R2 Facility can also be downstream vendors when the equipment or materials are returned to the supplier.

Electronic Equipment

“Electronic Equipment”, also referred to as “equipment and components”, includes computers and peripheral equipment – including, but not limited to central processing units (CPU’s); monitors; printers; keyboards; scanners; storage devices; servers; networking systems; copiers; fax machines; imaging systems; printing systems; telephones; televisions; video cassette recorders; camcorders; digital cameras; control boxes; stereo systems; compact disc players; radios; cell phones; pagers; personal digital assistants (PDAs); tablets; smartphones; calculators; organizers; game systems and their accessories; and any components of the types of equipment listed here. It furthermore includes any types of equipment that are designed primarily to store, process or convey information electronically, and any accessories to such equipment. Electronic Equipment also includes any other equipment specified in the R2 Equipment Categorization (REC).

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Evaluation Stage Category

“Evaluation Stage Category” refers to the specific classification of equipment prior to and during various stages of evaluation of the equipment, as defined in the R2 Equipment Categorization (REC), in order to determine the applicable R2 requirements for the equipment and ensure proper handling and disposition.

Focus Materials

“Focus Materials”, also referred to as “FMs”, are materials in electronic equipment that warrant greater care during recycling, refurbishing, materials recovery, energy recovery, incineration, and/or disposal due to their toxicity or other potential adverse health and safety impacts on workers, the public and the environment if the materials are managed without appropriate safeguards.

The table below provides further information about each FM and when tracking the FM in the recycling chain may stop.

<i>Focus Material</i>	<i>Description/Note</i>	<i>When tracking requirement stops</i>
Polychlorinated biphenyls (PCBs)		When received at a government licensed or permitted hazardous waste landfill or hazardous waste incinerator; or when received by a downstream R2 certified facility.
Mercury		When retorted and distilled; or when received at a licensed or permitted hazardous waste storage facility; or when received by a downstream R2 certified facility.
CRT Glass	<i>Glass from Cathode Ray Tubes (CRTs), except for the panel glass that has been separated from funnel glass and cleaned of phosphors, CRT fines, coatings, and frit: and is demonstrated to leach less than 5 part per million lead.</i>	When the CRT glass has been processed for use in its entirety in a new product with a known end use and existing market; or when received at a government licensed or permitted smelter; or when received by a downstream R2 certified facility.
Batteries	<i>All battery chemistries from electronic equipment except alkaline batteries that do not contain mercury.</i>	When received at a facility that will recover metals, and where practical, other materials from batteries; or when received by a downstream R2 certified facility.
Circuit boards	<i>Whole, partial, or shredded circuit boards regardless of lead and/or mercury content.</i>	When received at a facility that will recover metals, and where practical, other materials from circuit boards; or when received by a downstream R2 certified facility.

Electronic equipment, components, or materials (whole or shredded) that have undergone safe and effective mechanical processing or manual dismantling to remove FMs, yet still retain de minimis amounts of FMs, are not subject to the R2 requirements that are triggered by the presence of FMs.

General Information

“General information” is publicly available information or information that is provided with the original electronic equipment from the manufacturer. General information does not require sanitization.

R2 Facility

“R2 Facility” includes, but is not limited to, entities that perform the following activities related to electronics:

- (1) Collect
- (2) Refurbish
- (3) Repair
- (4) Resell
- (5) De-manufacture
- (6) Recover Assets
- (7) Broker
- (8) Recycle

Recycling

“Recycling” is an operation by which materials are reprocessed into products, materials or substances, whether for the original use or other purposes, but does not include energy recovery or the reprocessing into materials that are to be used only as fuels or only for land disposal operations. Hazardous characteristics of the material must be removed in the recycling process or provide a desired benefit in the manufacturing or characteristics of new products. Materials are not considered recycled until in the form of raw materials or products.

Recycling Chain

“Recycling Chain” refers to all the downstream vendors that handle electronic equipment, components, or materials that have passed through an R2 Facility or its control. The Recycling Chain includes all processing steps but does not extend beyond the final processing of a Focus Material, or the first tier of downstreams for non-focus materials.

Refurbishing

“Refurbishing” is any modification of an electronic device or its operating system, including disassembly for the purpose of internal testing or troubleshooting, or replacement or repair of non-functioning parts, to return the device to its originally intended function and, where possible, condition.

Reuse

“Reuse” is the provision of tested and verified functioning product to another user for its intended purpose.

Sanitization

“Sanitization” consists of the removal and destruction of data from a data storage device such that data recovery using generally available software or techniques is prevented. Sanitization includes the logical or physical destruction of data from the storage device, as well as the removal of all user labels, markings, and activity logs. The method of sanitization varies depending upon the storage device in question, and may include software over writing, degaussing, incineration, shredding, disintegration, grinding, embossing, etc.

Scope

“Scope” is the extent of the R2 Certification covering all processes and activities related to the collection, refurbishment, repair, resale, de-manufacturing, asset recovery, brokering and recycling of electronic equipment, components and materials both at its facility and under its control.

Although the operations within an R2 Facility may be physically separated, all certifiable activities at the site must be included in the scope of the R2 Certification regardless of any subdivision into rooms, units,

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suites, buildings or otherwise, with the use of fences, walls, or any other dividers.

Only where the Certification Body can verify that legally separate businesses, that are independently owned and operated, and completely separated physically within a building or site, and where any interaction between the businesses or their processes is traceable, documented and conforms with the R2 Standard, can there be R2 Certification of the operations of one of the businesses at a site without the other.

Specialty Electronics

“Specialty Electronics” is rare and specialized electronic equipment that is not generally available in retail. For example, medical, diagnostic, laboratory, or other devices, which are customized for a specific purpose.

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SECTION 1

R2 CORE REQUIREMENTS

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1. Scope

General Principle – *An R2 Facility shall identify and certify all processes and activities related to the collection, refurbishment, repair, resale, de-manufacturing, asset recovery, brokering and recycling of used electronic equipment, components and materials both at its facility and under its control.*

- (a) An R2 Facility shall be audited and R2 certified for all used electronic equipment managed and all processing activities undertaken at the facility, as well as any external processes and locations under the control of the R2 Facility and associated with its certification, including all:
 - (1) R2 Core Requirements in this Section 1, and
 - (2) R2 Process Requirements in Section 2 applicable to its scope of operations.
- (b) An R2 Facility shall document and have published on the R2 Certificate:
 - (1) An accurate statement of the scope of operations covered under the R2 Certification reflective of all processes and activities undertaken for the used electronic equipment, components and materials managed, and
 - (2) All applicable R2 Process requirements to which it has been certified, and
 - (3) Authorized allowances in accordance with the R2 Code of Practices, and
 - (4) All legal names and entities operating at or in conjunction with the R2 Facility.
- (c) An R2 Facility shall maintain and communicate publicly on an ongoing basis a current listing of all additional locations owned and/or operated by the R2 Facility that are not R2 Certified and are used to manage used or end-of-life electronic equipment, components or materials.

2. Hierarchy of Responsible Management Strategies

General Principle – *An R2 Facility shall develop and adhere to a policy for managing used and end-of-life electronic equipment, components and materials that is based on a hierarchy of responsible management strategies prioritizing reuse first, followed by materials recovery for recycling into new products.*

- (a) An R2 Facility shall develop in writing and adhere to a policy stating how it manages used and end-of-life electronic equipment, components, and materials – with respect to collection and on-site activities, as well as the selection of downstream vendors – that is based on a hierarchy of responsible management strategies:
 - (1) Reuse – An R2 Facility shall take all practical steps to test received equipment, and to sort and direct functioning equipment and components to reuse and resale, and to direct equipment capable of reuse to qualified refurbishers through Appendix C – Test and Repair. Equipment that is not legal to sell such as lost/stolen, counterfeit, or recalled equipment shall not be reused and instead be directed to Materials Recovery.
 - (2) Materials Recovery – An R2 Facility shall take all practical steps to separate, through manual dismantling and/or mechanical processing, the materials in equipment and components that are not directed to reuse or refurbishment and direct them to properly-equipped materials recovery facilities for recycling.
 - (3) Disposal – Only when all opportunities for reuse or materials recovery have been exhausted may an R2 Facility direct material to the most environmentally beneficial option of energy recovery, incineration or land disposal¹.
- (b) This policy shall incorporate and be consistent with the Focus Material (FM) Management Plan that the R2 Facility develops in accordance with Core Requirement 8.

¹ Land disposal includes any application of materials to the ground, including forms of alternative daily cover and storage cells in landfills.

3. **EH&S Management System**

General Principle – *An R2 Facility shall possess and maintain a certified Environmental, Health, and Safety Management System (EHSMS) to plan, implement, and monitor its environmental, health, and safety practices, including the activities it undertakes to conform to each requirement of the R2 Standard. This EHSMS shall be certified to an accredited management system standard(s).*

- (a) An R2 Facility shall be certified to one or more EHSMS standards that have been approved by SERI² to plan and manage the environmental, health and safety aspects of its operations. The R2 Facility shall be certified to the EHSMS standard(s) and R2 by an independent accredited Certification Body.
- (b) An R2 Facility shall develop, document, fully implement, review at least annually through internal audits, and update as needed (e.g. as operations, products and/or technologies change) this written EHSMS, which shall include:
 - (1) A combination of written documents covering and requiring the organization to systematically manage its on-site and downstream environmental, health, safety, and data security matters in a manner consistent with each requirement of the R2 Standard, and
 - (2) A list of the activities necessary to conform to each requirement of this R2 Standard; a list of the documentation necessary to show conformity with these requirements; and a commitment and process to take effective corrective action to promptly stop any issues of nonconformance and prevent future recurrence.
- (c) All records necessary to demonstrate conformity to each requirement of this R2 Standard shall be stored, secured, preserved, readily available, and organized for audit.
- (d) An R2 Facility shall have access at the certified facility to documents and records necessary to demonstrate conformity to each requirement of this document for a minimum three years.

General Principle – *An R2 Facility shall use practices and controls at its facilities that protect the health and safety of workers, the public, and the environment under both normal and (reasonably foreseeable) exceptional circumstances.*

- (e) An R2 Facility shall:
 - (1) Demonstrate the expertise, knowledge, and technical capability to process each type of electronic equipment, component, and material it accepts in a manner that is legal and protective of the health and safety of workers, the public, and the environment, and
 - (2) Identify, analyze, and effectively control important environmental impacts, and health and safety risks both internal to the R2 Facility and through its recycling chain activities to prevent potential negative environmental impacts and health and safety incidents, and
 - (3) Fully implement processes to visually inspect equipment and components received and handled for any conditions or damage that may result in adverse environmental, health or safety incidents during handling, storage or processing of the equipment, and ensure that controls are in place to properly contain, segregate and store all items for proper handling, and
 - (4) Maintain a process to periodically evaluate the risk of exposure to hazardous substances such as mercury, lead, beryllium, cadmium, PCBs, phosphor compounds, flame retardants, silica dust, chlorinated or brominated dibenzodioxins and dibenzofurans, and hexavalent chromium through processing or handling electronic equipment, components and materials, and

² Due to changes over time, accepted combinations of EHSMS standards are maintained on the SERI website www.SustainableElectronics.org. Combinations of standards which may currently be used to meet this requirement include RIOS, ISO 14001, ISO 45001, OHSAS 18001, and AS/NZS 4801. Certification is required by a Certification Body accredited by an International Accreditation Forum (IAF) member organization.

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- (5) Adhere to good housekeeping standards, including keeping all work and storage areas clean and orderly. Housekeeping for all areas of the facility shall be planned, regularly implemented, and monitored, and
- (6) Provide access to safe drinking water, and
- (7) Provide sanitary facilities with safe wastewater disposal, and
- (8) Prevent the consumption of food in areas not maintained free of contaminants, and
- (9) Treat its entire workforce, such as volunteer workers, consultants, temporary workers, and anyone else performing activities under its direction, using the same standard of care, and
- (10) Designate a qualified employee(s) or contract worker(s) to coordinate its efforts to promote worker health and safety, and environmental protection. This designated individual(s) shall be identified to all employees and two-way communication shall be proactive and effective between employees and this individual regarding potential hazards and how best to address them, and
- (11) Prepare, periodically test, and update, as appropriate and necessary, an emergency plan(s) for responding to the identified emergency situations and exceptional circumstances to protect workers, the public, and the environment, and
- (12) Report the occurrence of emergency events, including reportable releases, accidents, spills, fires, and explosions to the authorities as required by law and the emergency plan.

4. Legal and Other Requirements

General Principle – *An R2 Facility shall comply with all environmental, health, safety, and data security legal requirements applicable to its operations and shall only import and export equipment, components, and materials in full compliance with all applicable importing, transit, and exporting countries' laws.*

- (a) An R2 Facility shall develop a legal compliance plan to maintain full compliance with all environmental, health, safety, and data security legal requirements applicable to its operations, as well as full compliance with all applicable import and export laws covering shipments of materials, electronics, and components. This plan shall be included as a section of its EHSMS.
- (b) **Facility Compliance:** The plan shall identify and document the environmental, health, safety, and data security legal requirements that cover the recycler's operations both at the facility and all associated off-site locations where activities within the scope of certification are occurring, and define the controls, competence, and monitoring activities to maintain full compliance.
- (c) **Import/Export Compliance:** The plan shall also identify and document the legality – under the laws of the exporting, transit, and importing countries – of all international shipments of materials, electronics, and components that have passed through the R2 Facility and/or its control, including shipments made by downstream vendors.
- (d) **Monitoring Compliance:** The R2 Facility shall:
 - (1) Keep the legal compliance plan up to date, consistent with changes in its FM Management Plan, and
 - (2) Identify and implement the steps necessary to ensure the R2 Facility's compliance with all legal, environmental, and import/export requirements, and
 - (3) Periodically audit its compliance with legal requirements by a competent auditor knowledgeable in the operations and applicable regulatory requirements, and
 - (4) Take corrective action to promptly stop and resolve any issues of non-compliance; and
 - (5) Notify the Certification Body within 30 days of receiving any regulatory order or notice of violation that requires any action to address the violation and follow up with the issuing agency.

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- (e) Child and Forced Labor: An R2 Facility shall not use child labor, as defined by the International Labor Organization (ILO) or forced labor, where the worker cannot leave or terminate employment freely.
- (f) Prison Labor: The use of prisoners is only acceptable if it is voluntary, compensated beyond room and board, and skills are taught for gainful employment after release.
- (g) Non-Discrimination Policy: An R2 Facility shall document and adhere to a non-discrimination policy stating the fair and equal treatment and compensation of all workers, regardless of gender, race, religion, or sexual orientation. The policy shall define the process to report, investigate and respond to discrimination complaints, and shall be periodically communicated to all staff.

5. Tracking Throughput

General Principle – *An R2 Facility shall track and manage the throughput of all electronic equipment, components and materials, and maintain sufficient records to document the flow of all electronic equipment, components, and materials that pass through its control.*

- (a) For all inbound electronic equipment, components, and materials controlled by the R2 Facility through physical possession, title, or other contractual agreement, the R2 Facility shall:
 - (1) Maintain bills of lading or other commercially-accepted records, and
 - (2) Ensure records have accurate dates, detailed descriptions including types and quantities, and supplier names, and
 - (3) Maintain a summary report of all transactions.
- (b) For all electronic equipment, components, and materials controlled by the R2 Facility, the R2 Facility shall:
 - (1) Track, manage, and maintain accurate records of the quantity of FMs in the recycler's control from receipt through processing, storage, and shipment, and
 - (2) Maintain total inventory levels below the defined limits in conformance with the R2 Facility's legal requirements, closure plan, and financial assurance, and
 - (3) Not store controlled equipment or components, or materials with a negative value for longer than one year, however, components may be stored for longer than one year if they have been evaluated and inventoried in accordance with Appendix C – Test and Repair.
- (c) For all outbound electronic equipment, components, and materials, controlled by the R2 Facility, the R2 Facility shall:
 - (1) Maintain bills of lading, or other commercially-accepted records, and
 - (2) Ensure records have accurate dates, detailed descriptions including types and quantities, and customer or downstream vendor names, and
 - (3) Maintain a summary report of all transactions.

6. Sorting, Categorization, and Processing

General Principle - *An R2 Facility shall evaluate, sort and categorize all equipment, components, and materials in accordance with the R2 Equipment Categorization companion document to ensure the applicable R2 requirements are followed throughout processing and outbound through the downstream recycling chain. Equipment and components may change categorization through stages of processing.*

(a) Documentation:

An R2 Facility shall develop and maintain a written process to evaluate, sort and categorize equipment, components, and materials received and processed. This process shall:

- (1) Conform with the hierarchy in Core Requirement 2; and
- (2) Include the applicable categories from the R2 Equipment Categorization (REC) to demonstrate the levels of functionality, data sanitization and physical condition of the items; and
- (3) Identify all data storage devices; and
- (4) Define the instructions and criteria to determine if the equipment and components are capable of reuse based on (1) physical condition, (2) functionality, and (3) value in the destination market; and
- (5) Include follow up actions when processing changes the category of the equipment.

(b) Categorize:

- (1) All equipment, components, and materials controlled by the R2 Facility shall be identified with its corresponding R2 equipment category from the REC³.
- (2) An R2 Facility may use the categories assigned by an R2 Certified supplier in accordance with the R2 Equipment Categorization to continue processing equipment, components, or materials received from the R2 Certified supplier.
- (3) Equipment, components, or materials received from a supplier that is not R2 certified shall be treated as nonfunctional and data containing and identified according to the REC as controlled equipment.

(c) Evaluate:

The R2 Facility shall evaluate all equipment and components in accordance with the defined process to determine the capability of reuse and direct evaluated equipment, components, and materials to the appropriate next process.

(d) Process:

- (1) All equipment and components shall be evaluated for data, including connected user accounts and services, and identified with the corresponding data sanitization category from the R2 Equipment Categorization.
- (2) All equipment and components that may contain data shall be secured and controlled to prevent unintended access or theft of data, until processed in accordance with Core Requirement 7 for data security.
- (3) An R2 Facility shall not reuse, sell, or donate equipment or components prohibited by written and binding commercial agreements with those from whom the equipment or components were received. Equipment and components not allowed to be sold or donated for reuse shall conform, where applicable, to Core Requirement 7 for data security and Appendix E – Materials Recovery.

³ The identification need not require a physical label on the equipment. The equipment categories may be cross-referenced to other categories used by the R2 Facility. New equipment and components in unopened, original packaging are outside of the scope of the R2 Standard.

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- (4) Equipment or components that are evaluated and determined to be capable of reuse shall be:
 - (A) Identified with unique identifier for each piece of whole equipment, or grouped in batches and assigned a unique batch identifier for non-serialized equipment or components, and
 - (B) Tested, refurbished and/or repaired internally according to Appendix C – Test and Repair, or
 - (C) Transferred to a downstream vendor qualified in accordance with Appendix A – Downstream Recycling Chain, for testing, repair, and refurbishment, or
 - (D) Processed in accordance with Appendix D – Specialty Electronics Reuse, or
 - (E) Processed in accordance with Appendix F – Service Only.
 - (5) Equipment and components not capable of reuse and other materials for recovery shall be processed by the R2 Facility in accordance with Appendix E – Materials Recovery, or transferred to a downstream vendor qualified in accordance with Appendix A – Downstream Recycling Chain.
 - (6) Equipment that is not owned by the R2 Facility but is serviced for a customer that directs the downstream disposition may only be transferred in accordance with Appendix F – Service Only.
- (e) Output:
- (1) Any equipment or components evaluated and determined to be Exempt Equipment (EX) shall:
 - (A) Be clearly identified and managed separately from Controlled Equipment (CTRL), and
 - (B) Demonstrate the justification for the exemption, and
 - (C) Maintain adequate records tracking the type of equipment, reason for return, and evidence of all transfers of the equipment.
 - (2) Prior to transferring functioning products⁴, an R2 Facility shall:
 - (A) Identify and disclose the functional, cosmetic, and data sanitization categories of the equipment or components to the buyer, and
 - (B) Reference the unique identifier(s) in commercial sales and shipping records, and
 - (C) Prior to a transboundary shipment, verify import/export compliance of each shipment in accordance with its legal compliance plan in Core Requirement 4⁵ that affirms the transboundary shipment is legal, and
 - (D) Package and protect equipment and components in such a way as to prevent damage during shipment, and
 - (E) Make the product return policy available to potential buyers prior to sale.
 - (3) Collectible and Specialty Electronics may be transferred:
 - (A) In accordance with Section (e)(2) of Core Requirement 6, without testing if sales do not exceed 1% of total individual units by quantity sold on a rolling 12-month average, and equipment may be returned by the buyer if not wanted under a documented warranty/return policy at no cost to the buyer, or
 - (B) In accordance with Appendix D – Specialty Electronics Reuse for Verified Specialty Electronics.

⁴ Equipment or components demonstrated to be functional in accordance with the R2 Equipment Categorization are exempt from controls of equipment and components containing Focus Materials in the R2 Standard because of their functioning status.

⁵ The documentation shall be in a language understandable to the electronics recycler, and consist of original documentation from the importing or exporting country's Competent Authority or a copy of a law or court ruling that demonstrates the import country legally accepts such imports, and the export country legally allows such exports.

7. Data Security

General Principle – *An R2 Facility shall be responsible for data security and proper sanitization of all data storage devices. These requirements are intended to correspond with data protection regulations.*

(a) Documentation:

- (1) An R2 Facility shall document and maintain a Data Sanitization Plan and procedures, including the following:
 - (A) types of data storage devices accepted that may contain data, and
 - (B) types of data to be sanitized, and
 - (C) declaration of general information that does not need to be sanitized, and
 - (D) potential associations to network services that could repopulate data on the device, and
 - (E) written contractual requirements not to sanitize data on user's data storage devices when requested, and
 - (F) applicable legal, supplier, and other requirements for data sanitization including applicable data breach and privacy regulations, and
 - (G) the mapping of legal, supplier, and other requirements to written policies and procedures where each is implemented for conformance, and
 - (H) methods for data sanitization for each type of data storage device, and
 - (I) planned durations to sanitize data from the time of receipt, and
 - (J) downstream vendor(s) or contractor(s) that perform data sanitization in accordance with this plan, if data sanitization is not performed internally, and, where applicable, those downstream vendor(s) whose services will be provided in another country, and
 - (K) records maintained, and
 - (L) process for authorizing and monitoring workers, visitors, and others permitted to have access to equipment and components containing data, and
- (2) An R2 Facility shall document and maintain a written data security policy that:
 - (A) prohibits unauthorized individuals from accessing or handling equipment containing data, and
 - (B) assigns a competent Data Protection Manager responsible for the organization's data security and legal compliance, and
 - (C) mandates reporting of known and suspected breaches of security and data to the Data Protection Manager, and
 - (D) requires completed training and confidentiality agreements prior to individual authorization to handle equipment containing data, and
 - (E) identifies penalties for non-compliance with the policy, including personal liability.
- (3) All workers shall be trained regularly and verified to be competent on these policies and procedures for data security, consistent with their level of authorization.

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(b) Security

General Principle – *An R2 Facility shall employ security measures appropriate for the electronic equipment it handles and the suppliers it serves.*

- (1) An R2 Facility shall implement and maintain a security program that controls access to all or parts of the facility in a manner and to a degree appropriate given the type of electronic equipment handled, sensitivity of data on storage devices, and the needs of the suppliers served. This security program should consider risk of theft and unauthorized access to the facility and equipment.
- (2) An R2 Facility shall develop and implement levels of security authorizations to control access for employees, visitors, and contract workers based on the types of equipment received, the sensitivity of the data handled, and the legal, supplier and other requirements applicable to the facility. Authorizations shall be granted by the Data Protection Manager and based on documented evaluations allowed by law.
- (3) Secured areas shall be clearly identified and labeled with signage to warn against unauthorized access.
- (4) Appropriate security controls shall be implemented and monitored to limit access to equipment based on established security authorizations and the workers' need for access.
- (5) For individuals granted security authorization, the R2 Facility shall maintain in writing individual acknowledgements of the responsibility to prevent disclosure of data; and to report any theft of equipment or data, or data breaches; and to disclose any incidents that may change their security authorization.
- (6) An incident response procedure shall be created and implemented to investigate potential data or security breaches, and to notify affected suppliers, legal authorities and other interested parties as required by law, of any potential or actual breaches.

(c) Transportation

- (1) When equipment or components containing data are transported, the R2 Facility shall ensure adequate security and tracking in transportation as appropriate for the sensitivity of the data on the devices and the requirements of the suppliers served.
- (2) Contracts are enforced with the transporter with a level of service that conforms to these requirements.
- (3) Additional security controls are used to conceal the package contents from public view and prevent unintended access during transportation.

(d) Process

- (1) For all equipment and components evaluated and determined to possibly contain data, the R2 Facility shall provide to the supplier, and maintain:
 - (A) A record of acceptance of equipment or components containing data, including the type of data sanitization method⁶ to be used and whether it will be performed internally or by a downstream vendor; or
 - (B) If received in aggregate without individual tracking, a general notice to suppliers of the data sanitization methods to be used and whether the sanitization will be performed internally or as a downstream process, and

⁶ All data must be sanitized unless the supplier has requested it not be sanitized and contractually stipulated this requirement against the recommendation of the R2 Facility. The R2 Facility may not exclude their responsibility for data sanitization of accepted equipment or components through waivers, limitations of liability language, or other types of contracts with the supplier.

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- (2) Equipment and components containing data shall be sanitized in a timely and effective manner, in accordance with one of the following methods, as disclosed to the supplier:
 - (A) Sanitize the data on the data storage devices in accordance with Appendix B – Data Sanitization, or
 - (B) Physically destroy the data storage media in accordance with an applicable method defined in Table A-1 of the NIST Guidelines for Media Sanitization: Special Publication 800-88 (rev.1), and verify destruction in accordance with Table 1 of Appendix B – Data Sanitization, or
 - (C) Ship/transfer data storage devices under written contract to an R2 Certified downstream vendor that has been certified to Appendix B – Data Sanitization, with the capabilities to sanitize data from the type of equipment shipped in accordance with the planned method disclosed to the supplier.

(e) Notifications

- (1) Unless through written agreement the customer contractually opts out of notification requirements, an R2 Facility shall notify the supplier when:
 - (A) Changes are made in downstream vendors selected to process supplier's equipment and components containing data, and
 - (B) Breaches in security are suspected or confirmed.

8. Focus Materials

General Principle – *An R2 Facility shall manage, both on-site and in the selection of downstream vendors, the Focus Materials that pass through its facility or control in a manner protective of the health and safety of workers, the public, and the environment. An R2 Facility also shall perform due diligence on downstream vendors to which it ships these materials.*

Development and Adherence to a FM Management Plan

- (a) An R2 Facility shall analyze, plan, regularly review, and update as necessary how the FMs that pass through its facility or control will be properly managed both on-site and down the recycling chain (and include this analysis and plan as the “FM Management Plan” section of its EHSMS). The FM Management Plan shall state how the recycler and its downstream vendors shall conform to the applicable requirements of the R2 Standard including:
 - (1) The demonstrated expertise and the demonstrated capacity required to process each type of electronic equipment containing an FM, and
 - (2) The planned methods and demonstrated capabilities needed to process each type of electronic equipment containing an FM, and
 - (3) A flowchart of the downstream recycling chain selected according to Appendix A – Downstream Recycling Chain, including identification of international movements, to either final disposition or the first downstream R2 Certified facility.

Non-Focus Materials Requiring Specific Management

- (b) An R2 Facility shall manage print cartridges in accordance with Core Requirement 2 through print cartridge remanufacturers, recyclers, or Original Equipment Manufacturers (OEM), in facilities that meet all applicable regulatory requirements to receive these print cartridges, and that use technology designed to safely and effectively manage ink and toner print cartridges.
- (c) An R2 Facility shall manage all equipment, components, and materials that pass through its facility or control that do not contain Focus Materials or are not electronic equipment, in accordance with Core Requirement 2, in full legal compliance, protective of the environment, and protective of worker and public health and safety.

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Prohibition on Energy Recovery, Incineration, and Land Disposal of FMs

- (d) An R2 Facility shall not use energy recovery, incineration, or land disposal as a management strategy for FMs or equipment and components containing FMs unless applicable law requires the use of a specific technology (e.g., hazardous waste landfill or incineration of PCBs). However, if documented extreme and rare circumstances beyond the control of the R2 Facility disrupts its normal management of an FM, it may consider using these technologies to the extent allowed under applicable law until normal management is again possible.

9. Facility Requirements

General Principle – An R2 Facility shall process and store electronic equipment, components and materials in a manner that is legally compliant and protects the health and safety of workers, the public and the environment.

- (a) An R2 Facility shall conduct all processing operations indoors unless adequate controls are in place to prevent uncontrolled releases to the environment.
- (b) An R2 Facility shall store all equipment, components, and Focus Materials, in a manner that:
- (1) Protects them from reasonably foreseeable adverse weather conditions, and
 - (2) Is in full legal compliance, and
 - (3) Is secure from unauthorized access, and
 - (4) Is in clearly labeled containers and/or storage areas.
- (c) An R2 Facility shall store all equipment destined for reuse indoors.

General Principle – An R2 Facility shall possess insurance that is adequate to cover the potential risks and liabilities associated with the nature and size of the facility's operations.

- (d) The R2 Facility shall demonstrate that it has evaluated the risks related to the scope of its operations, including any changes in operations and volume of material processed, and that it has adequate insurance or reserves to cover liabilities arising from all activities and locations in which it operates. Insurance or reserves shall include:
- (1) Adequate coverage for treatment of work-related injury and illnesses of workers, and
 - (2) Any process insurance requirements specified elsewhere in this R2 Standard.

General Principle – An R2 Facility shall have adequate legal and financial assurances in place for the proper closure of its facility.

- (e) An R2 Facility shall develop and maintain a current, written plan that assures proper closure of the facility in the event of abandonment. The plan shall include the use of appropriate commercial businesses to manage any electronic equipment, components and materials under the R2 Facility's control. The closure plan shall:
- (1) Consider the risks identified, including equipment and materials that could be received under the R2 Facility's certification scope, and applicable law, and
 - (2) Include reasonably foreseeable costs in the financial instrument for processing remaining inventory, sampling for environmental contamination, and possible site remediation to restore premises to sellable condition, and
 - (3) Establish an effective financial instrument for closure in the event of abandonment for the proper closure, consistent with applicable law and the closure plan, and
 - (4) Include any process or other closure requirements specified elsewhere in this R2 Standard.

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- (f) Closure plans, financial instruments, and insurance shall be registered with SERI.
- (g) Financial instruments to assure closure in the event of abandonment are not required if:
 - (1) The total cost to properly close the facility in the event of abandonment is less than \$10,000 United States Dollars, and
 - (2) The size of all buildings owned, leased, or used by the R2 Facility is less than 1,000 square meters, and,
 - (3) The facility prohibits and never accepts equipment or materials containing mercury, CRT glass, lithium primary batteries, or polychlorinated bi-phenyls.

10. Transport

General Principle – An R2 Facility shall transport all electronic equipment, components, and materials using entities that meet the applicable legal requirements for transportation of the material, and in a manner protective of physical and data security, health, safety, and the environment.

An R2 Facility shall ensure that:

- (a) All electronic equipment, components, and materials to be transported are packaged appropriately:
 - (1) Considering the risk they could pose during transportation to data security, health, safety or the environment, and
 - (2) To the level of care warranted by its intended use, and
 - (3) To secure in accordance with Core Requirement 7.
- (b) All shipping documentation, labeling, and import/export declarations use accurate codes, descriptions, and required declarations consistent with regulatory obligations for the equipment, components, and materials being transported.
- (c) Transporters meet the legal requirements under Core Requirement 4 to transport the electronic equipment, components, and materials.

SECTION 2

R2 PROCESS REQUIREMENTS

DRAFT

Appendix A – Downstream Recycling Chain

General Principle: *An R2 Facility that is not the final processor shall manage the downstream recycling chain for all output streams of untested equipment, non-functioning equipment and components, and Focus Materials to ensure that all downstream vendors operate in conformance with the R2 Standard.*

- (1) An R2 Facility shall manage the movement of FMs and Controlled Equipment through their downstream recycling chain to final disposition or the first R2 Facility using the R2 Equipment Categorization, and confirm conformance by each downstream vendor to this Appendix A.
- (2) If the equipment, components, or materials handled have a negative value, then the R2 Facility shall:
 - (a) Maintain pollution liability insurance covering these risks, and
 - (b) Include these equipment, components, and materials in a closure plan and financial instrument in accordance with Core Requirement 9.

Transboundary Movements

- (3) Prior to any transboundary shipment, the R2 Facility shall verify import/export compliance of each shipment in accordance with its legal compliance plan in Core Requirement 4⁷ that affirms the transboundary shipment is legal. Verification shall document:
 - (a) If the equipment, components, or materials are a regulated waste under the regulations of the export, transit, and import countries, and
 - (b) If determined to be a regulated waste, determine if the waste is hazardous.

Transparency

- (4) An R2 Facility shall verify with commercially-accepted records that FMs and Controlled Equipment and components containing FMs are received at the downstream vendor's facility.
- (5) An R2 Facility shall provide, to each supplier to the R2 Facility that owns or arranges for transfer of equipment, components or materials to the R2 Facility, upon request and with appropriate intellectual property and commercial controls as legally appropriate and required by the discloser, the names and locations of all downstream vendors in the recycling chain that handle said supplier's Controlled Equipment, components, and FMs.
- (6) An R2 Facility shall notify all suppliers that are R2 Certified or when contractually required prior to shipping the supplier's Controlled Equipment and components containing FMs or FMs generated from supplier's electronic equipment to a new or changed downstream vendor.
- (7) An R2 Facility shall register with SERI, the downstream recycling chain, including all FMs to final disposition or the first R2 Facility and maintain registration changes to the recycling chain prior to shipment.

Downstream Vendor Qualification

- (8) If a downstream vendor is R2 Certified, then verification of the R2 Certificate to continue to be active⁸ with a certification scope consistent with the equipment, components, and material received and the processes⁹ performed shall qualify the downstream vendor to receive shipments without further due diligence.

⁷ The documentation shall be in a language understandable to the electronics recycler and auditor, and consist of original documentation from the importing or exporting country's Competent Authority or a copy of a law or court ruling, that demonstrates the import country legally accepts such imports, and the export country legally allows such exports.

⁸ Verified current and active R2 Certification for the specific address and scope through the SERI website at www.SustainableElectronics.org.

⁹ The R2 Certification of the downstream vendor must include audited Process Requirements applicable to the intended processing of the equipment and materials received.

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- (9) If a downstream vendor is not R2 Certified, the R2 Facility shall determine before shipment and confirm at least annually and document, through audits or other formal review, that each downstream vendor receiving Controlled Equipment and components containing FMs and removed FMs through the entire recycling chain continues to conform to the requirements of this section for as long as it receives Controlled Equipment, components, or materials directly or indirectly from the R2 Facility. The R2 Facility shall verify that the downstream vendor:
- (a) Demonstrates their capabilities and conforms to the R2 Facility's FM Management Plan in Core Requirement 8.a, and
 - (b) Adheres to a documented system to manage environmental, health, and safety risks and legal requirements. The management system shall include, at a minimum, the components of Core Requirement 4 (Legal and Other Requirements) and Core Requirement 3 (EH&S Management System), and
 - (c) Complies with all applicable environmental and health and safety legal requirements and maintains a current list of its permits and copies of each, and
 - (d) If testing, refurbishing, or repairing the equipment or components received for reuse:
 - (1) Tests, refurbishes, and repairs equipment and components in accordance with Core Requirement 6 and Appendix C – Test and Repair, and
 - (2) For equipment and components received from the R2 Facility, only sells or donates Functional (F) category equipment and components according to the R2 Equipment Categorization¹⁰, and
 - (3) Transfers all non-functioning equipment or components containing FMs to an R2 Certified recycler, or to a non-R2 Certified recycler qualified to this Appendix A and approved by the R2 Facility that supplied the equipment and components, and
 - (e) Processes equipment and components containing FMs for materials recovery in conformance with Appendix E – Materials Recovery, and
 - (f) Tracks throughput to demonstrate with records:
 - (1) Receipt and acceptance of the Controlled Equipment and components or material containing FMs from each shipment from the R2 Facility, and
 - (2) Controlled Equipment and components and materials with a negative value are not stored for longer than one year, and
 - (g) Provides records of proof of destruction of all data containing equipment and components, if the downstream receives equipment or components containing data requiring sanitization.

¹⁰ Downstream refurbishers that are not R2 Certified may not sell untested or non-working equipment or components to others. Brokering or reselling of untested or non-working equipment and components for outsourced testing is prohibited.

Appendix B – Data Sanitization

General Principle: *An R2 Facility that performs data sanitization is required to operate in accordance with international best practices for data destruction. The level of data sanitization undertaken is required to meet norms to prevent the public from recovering residual data using generally available software or techniques. It is not intended to prevent forensic recovery of data with highly sophisticated and specialized techniques. Where the sensitivity of data requires higher security in the data sanitization, as indicated by the customer, a more stringent level of data sanitization is required by the R2 Facility to conform to this section for that equipment.*

- (1) An R2 Facility shall add to its Data Sanitization Plan and procedures in Core Requirement 7 the following:
 - (a) Declarations of secured areas dedicated to data sanitization with access limited to authorized individuals, and
 - (b) Records of sanitization and verification being maintained, and
 - (c) Methods to distinguish sanitized devices from devices containing data, and
 - (d) Quality controls to verify that data has been successfully sanitized from the data storage device, and
 - (e) Processes for corrective action and nonconforming product management, and
 - (f) Security controls to protect data in the R2 Facility's control, and
 - (g) Monitoring activities to ensure continued effectiveness of the execution of this plan, and
 - (h) Competency requirements to perform sanitization and verification.
- (2) For traceability, records shall be kept of the unique identifier of each data storage device or tracking through other means from the point of control by the R2 Facility through the sanitization process.
- (3) Data sanitization workers shall be regularly trained and evaluated as processes, data storage devices, and methods change to be competent to perform the specific methods for data sanitization and processes to which they have been authorized.
- (4) All markings associating a device with its previous user shall be removed or destroyed.
- (5) Effective security controls that are appropriate to the most sensitive classification of media accepted at the facility shall be implemented, tested, and maintained. These security controls shall include:
 - (a) Physical Security controls including locked and alarmed access points during both working and after hours, and
 - (b) Enclosed work and storage spaces that are secured, and
 - (c) Closed circuit camera systems with at least 90 days of recordings covering all areas of the facility where equipment or components containing data are received, stored, or passed through, and
 - (d) Active monitoring of security cameras, access points, and other security controls for secured areas, and
 - (e) Regular tests of the effectiveness of these security controls, and
 - (f) Inventory tracking to identify the physical location of any recorded data storage device at any time while in the R2 Facility's control.
- (6) Data sanitization services delivered outside of the certified R2 Facility shall be performed in conformance with this Appendix B and Core Requirement 7.
- (7) Data security and sanitization audits shall be performed annually by a competent and independent auditor to verify the data sanitization processes are effective and conforming to the R2 Standard, legal requirements, and the data sanitization plan.

PHYSICAL SANITIZATION (Destruction)

- (8) Where physically sanitized, data storage devices shall be physically destroyed according to Table 1 – Physical Destruction Methods, or in accordance with a National Security Agency (NSA)¹¹ Storage Device Sanitization Manual using equipment listed on the Evaluated Products List. If customer, legal, or sensitivity of information requirements necessitate more stringent methods, the most stringent requirements shall be implemented.
- (9) Video recording, maintained for at least 90 days, shall be used to record the physical destruction of all media and correlated with the sanitization records.
- (10) Outputs from physical destruction shall be verified by the Data Protection Manager to be effectively sanitized of data in accordance with Table 1 – Physical Destruction Methods prior to leaving the R2 Facility or its control.

Table 1 - Physical Destruction Methods

Data Storage Device	Method	Criteria	Verification
Magnetic Tape	Degauss*		10% sampled for recoverability of data.
	Incineration	Reduced to ash	Record of the material received at the incinerator and confirmation from the incineration of destruction.
Magnetic Hard Disk Drive	Degauss* & Crush	Media must be both degaussed and crushed with a hard disk crusher.	10% verified after degauss and before crushing to be unrecoverable unless the process used is uninterrupted. 100% visual inspection of crushed hard disk drives.
	Shred/Physical destruction	Platters reduced to fragments or other means of physical destruction of the platters making them inoperable and data unrecoverable	100% visual inspection.
	Incineration	Fully melted to metals	100% visual inspection.

¹¹ The National Security Agency Central Security Service is a United States Government Agency that has provided public information to protect sensitive data upon disposal of the data storage media. This expertise may be adopted for best practices by an R2 Facility.

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Data Storage Device	Method	Criteria	Verification
Diskettes	Degauss*		10% sampled for recoverability of data.
	Shred/Disintegration	Magnetic disk reduced to fragments or other means of physical destruction of the disk making it inoperable and data unrecoverable	100% visual inspection.
	Incineration	Reduced to ash	100% visual inspection.
Optical Disks (CD, DVD, Blu-Ray disks)	Shred/Disintegration	Disk reduced to fragments or other means of physical destruction of the disk making it inoperable and data unrecoverable	100% visual inspection.
	Incineration	Reduced to ash	100% visual inspection.
Solid State Storage (SIM Card, SDRAM, Flash Drive, Circuit Board, Solid-State Drive, Cell Phone, Tablet, etc.)	Shred/Disintegration	Chips reduced to fragments or other means of physical destruction of the chips making them inoperable and data unrecoverable	100% visual inspection.
	Crush	SSD crusher designed to crush chip sets	100% visual inspection.
	Incineration	Reduced to ash	100% visual inspection.
Hard Copy Storage (paper, film, etc.)	Shredding	Media reduced to fragments or other means of physical destruction of the media making data unrecoverable	100% visual inspection.
	Incineration	Reduced to ash	100% visual inspection.
Other	Any NSA approved method for the data storage device	Criteria specified by NSA for the device and method	100% visual verification if physically destroyed, and 10% verification if method leaves the device intact.

* Degausser must be rated by the manufacturer for the type of media on which it is being used.

LOGICAL SANITIZATION (Erasure)

- (11) Where logically sanitized, electronic records of data sanitization created by the software used to sanitize the data shall be maintained for each unique identifier of the data storage media.
- (12) Data sanitization software used shall be:
 - (a) Configured to sanitize all user-addressable locations on the data storage media containing data that was not original when the device was purchased, and
 - (b) Configured to fail the media if any user-addressable locations cannot be sanitized, and
 - (c) Maintained with software patches, and
 - (d) Verified to be the current approved version before use.
- (13) All logins, passwords, locks, or any other connections to a remote service shall be removed and no longer connected to the device.
- (14) Each data storage media logically sanitized shall be verified by the Data Protection Manager to have a successful record of sanitization, and 5% of logically sanitized data storage media shall be routinely sampled and validated by a competent and independent party to demonstrate data is not recoverable by commercial software, with increased sampling where issues are identified until full conformance can be demonstrated.
- (15) If logical sanitization is unsuccessful or cannot be verified, then the item or data-bearing component must be physically destroyed in accordance with the requirements above.

QUALITY CONTROL

- (16) Quality controls shall be implemented to verify that received equipment and components containing data:
 - (a) were processed as planned, and
 - (b) quantities processed match quantities received, and
 - (c) suppliers are notified of any discrepancies.
- (17) After verification of (16)(a)-(c) above, data storage devices shall be approved by the Data Protection Manager and records retained prior to release.
- (18) When quality control issues are detected, corrective actions shall be implemented in accordance with the data sanitization plan.

Appendix C – Test and Repair

General Principle: *An R2 Facility with the internal competency and tools to test, repair, or refurbish electronic equipment shall meet the applicable requirements of this Appendix to demonstrate their ability to produce functional equipment if they intend to do so. The R2 Equipment Categorization shall be used in connection with these requirements to classify and communicate the level of functionality, cosmetic grading, and data sanitization process used specific to the equipment.*

- (1) An R2 Facility certifying to Appendix C – Test and Repair shall also be certified, throughout the duration of its R2 certification, to a quality management system (QMS) standard that has been approved by SERI¹² with a scope that includes all the equipment, components and processes to which this Appendix C applies.
- (2) An R2 Facility shall document a plan to reuse electronics titled “R2 Reuse Plan”. The R2 Reuse Plan shall include:
 - (a) Written instructions for each of the requirements in this section applicable to the scope of operations of the R2 Facility, and
 - (b) Competency requirements for workers testing, repairing, and verifying equipment and components, and
 - (c) Product safety plans to verify that equipment and components are safe to reuse, including:
 - (1) Procedures to check for recalls by the manufacturer, and
 - (2) Procedures to check equipment for damage affecting product safety, and
 - (d) Test plans to verify the functions of the equipment or components are working, including:
 - (1) Defining the functions by each equipment type tested, and
 - (2) Testing methods and test equipment for each function, and
 - (3) Expected pass and fail test results for each function, and
 - (4) Methods of documenting and storing test results, and
 - (5) Categorization of equipment based on test results consistent with the R2 Equipment Categorization, and
 - (e) Quality assurance plans to ensure the effectiveness of tests, including:
 - (1) Methods to verify the accuracy of test methods and testing equipment, and
 - (2) Measurements to monitor the quality of reusable equipment and components, and
 - (3) Management of equipment or components that fail testing to prevent their unintended use, and
 - (4) Verification of assigned categories with the test results for each test performed on each unit, and
 - (5) Verification that data from the prior user has been sanitized in accordance with Appendix B, and
 - (f) Product return policy and plan appropriate to the final destinations of the equipment and components being reused.
- (3) An R2 Facility shall test, repair, and refurbish Controlled Equipment and components within one year of receipt from suppliers, or evaluate and inventory Controlled components for future use in repairing other equipment.

¹² Due to changes over time, accepted quality management system standards are maintained on the SERI website www.SustainableElectronics.org. Standards which may currently be used to meet this requirement include RIOS, ISO 9001. QMS Certification is required by a Certification Body accredited by an International Accreditation Forum (IAF) member organization.

Sustainable Electronics Reuse and Recycling (R2) Standard

- (4) The R2 Facility shall implement and execute the R2 Reuse Plan to produce functional equipment for reuse and manage non-functional equipment for materials recovery. The R2 Facility shall:
- (a) Ensure data is sanitized on the equipment or components being tested in accordance with Appendix B – Data Sanitization, and
 - (b) Ensure workers are competent in testing the functionality of the electronic equipment and effective test methods, and
 - (c) Test, repair, clean, refurbish and configure equipment and components according to the R2 Reuse Plan to determine the functional category in accordance with the R2 Equipment Categorization, and
 - (d) Ensure Functional equipment and components are safe to reuse by executing the product safety plans, and
 - (e) Generate and maintain records of test results for each function tested for each unique identifier assigned, and
 - (f) For equipment or components that do not meet a functioning product category in the R2 Equipment Categorization when tested:
 - (1) Identify the equipment or components as nonconforming products, and
 - (2) Repair the equipment or component and repeat testing after repair, or
 - (3) Harvest the reusable components, or
 - (4) Evaluate the equipment in accordance with Core Requirement 6 to continue processing.
 - (g) For equipment or components that meet a functioning product category in the R2 Equipment Categorization when tested:
 - (1) Identify equipment, at a minimum, with the functional, cosmetic, and data sanitization category after processing, and
 - (2) Execute the quality assurance plans to confirm the R2 Equipment Category assigned to Functioning products.
 - (3) Based on the new category assigned after test and/or repair, evaluate the equipment in accordance with Core Requirement 6 to continue processing.

Appendix D – Specialty Electronics Reuse

General Principle: *Specialty electronics often require sophisticated test equipment and simulations to test functionality and often cannot be tested by specialty electronics refurbishers. In order to promote reuse, the controls outlined below are designed to facilitate legitimate reuse of untested specialty electronics.*

- (1) An R2 Facility certified for processing specialty electronics shall also be certified for Appendix C - Test and Repair.
- (2) An R2 Facility shall use competent technicians that shall:
 - (a) Test all specialty electronics for which the R2 Facility has the capability to test according to Appendix C – Test and Repair, and
 - (b) For specialty electronics which the R2 Facility does not have the technical capability to test,
 - (1) Verify and document from the prior user that the specialty electronics was removed from operation with no known defects in functionality, and
 - (2) Verify all specialty electronics are free of physical damage, physical defects, corrosion, and missing parts, and
 - (3) Verify the part number(s) and serial number(s) are accurate, and
 - (4) Verify data on the specialty electronics was destroyed by the source in accordance with Appendix B, or the specialty electronics cannot store data that needs to be destroyed, and
 - (5) If the specialty electronics fail any of these verifications:
 - (A) Harvest the reusable components and conform to this Appendix D for each component, and
 - (B) Mark the Evaluation Stage category for the remaining equipment and components, and process according to Core Requirement 6.
 - (6) If the specialty electronics pass all verifications:
 - (A) Track individual specialty electronics with a unique identifier, and
 - (B) Handle, package, and store all specialty electronics to protect it from physical and electrical damage, and
 - (C) Label all specialty electronics with the R2 Facility’s name and contact information for warranty returns and recycling, and
 - (D) Identify the specialty electronics as Verified Specialty Electronics according to the R2 Equipment Categorization.
- (3) Verified Specialty Electronics may be stored indefinitely for reuse as long as they continue to have a positive resale value and market for reuse. Otherwise, they must be processed in accordance with the requirements of this standard.
- (4) To sell Verified Specialty Electronics, an R2 Facility shall:
 - (a) Limit sales only to a customer’s request for specific part numbers(s), and
 - (b) List each unique identifier and part numbers for the equipment sold on the sales receipt or other commercially-accepted records consistent with the customer’s request for specific part numbers(s), and
 - (c) Demonstrate customers accept the following terms on the purchase order:
 - (1) Equipment is inspected but not tested, and
 - (2) Customer accepts the equipment without testing, and
 - (3) Customer will return all equipment that is not working for a refund, and

Sustainable Electronics Reuse and Recycling (R2) Standard

- (4) Customer will only sell the equipment to an end-user and provide to the R2 Facility, upon request, records that demonstrate the equipment was sold to an end-user, and
 - (A) Provide for returns of the specialty electronics for any reason at no cost to the end-user, and
 - (B) Offer lifetime free return of the specialty electronics for recycling.

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Appendix E – Materials Recovery

General Principle: *An R2 Facility engaged in any materials recovery operations from basic dismantling of equipment to mechanical processing shall maintain processes for the recovery of materials for recycling and the proper management of Focus Materials in the process of recovery.*

- (1) For materials recovery activities that involve shredding (excluding enclosed hard drive shredders), breaking, cutting, melting, or chemical processing of Focus Materials or items containing Focus Materials, and where a hazardous substance may be released as a result of the activity, the following additional EH&S requirements shall apply and be incorporated into the R2 Facility's EHSMS program:
 - (a) Establish wash facilities for decontamination, clean areas for eating and drinking, and transition areas from materials recovery areas to clean areas to prevent transfer of contamination, and
 - (b) Prohibit food and drink in materials recovery areas unless ongoing industrial hygiene (IH) records show no detectable risk, and
 - (c) Prohibit work clothes and shoes from being taken home by workers unless ongoing industrial hygiene (IH) records show no detectable risk, and
 - (d) Implement procedures for cleaning and caring for personal protective equipment, and
 - (e) Implement cleaning procedures to regularly remove contaminants from equipment and work areas consistent with the Focus Materials processed, and
 - (f) Implement procedures for control of hazardous energy (lockout/tagout) in equipment and processes, and ensure workers are trained and competent, and
 - (g) Ensure physical safety guards are in use on mechanical equipment, and
 - (h) Perform pre-use safety inspections of equipment before use in accordance with the manufacturer's specifications and do not use equipment that has failed the inspection, and
 - (i) Implement an industrial hygiene monitoring program, including air, noise, and wipe sampling to monitor applicable risks at a frequency consistent with past results and current trends of the results;
 - (j) Risks associated with mechanical separation processes shall be reevaluated at least annually, and
 - (k) Air quality shall be periodically monitored for mercury in material recovery areas where electronic equipment with fluorescent lamps is dismantled or lamps are removed.
 - (l) Implement a medical monitoring program to establish baseline and regularly evaluate worker exposures to mercury, lead, or other toxic substances consistent with hazards in the materials recovered and trends in monitoring results, and

Removal of FMs

- (2) The R2 Facility shall ensure that adequate controls are maintained in any disassembly areas to minimize the risk of environmental, health or safety incidents during dismantling operations such as battery removal.
- (3) Prior to shredding or materials recovery of equipment or components, FMs (as well as print cartridges) shall be removed using safe and effective¹³ mechanical processing or manual dismantling, with two exceptions:
 - (a) Items containing mercury may be processed using methods designed to safely and effectively capture mercury if:
 - (1) Workers are protected from the potential risks of handling mercury, and

¹³ See Core Requirement 3 for a discussion of "safe and effective" practices and controls.

Sustainable Electronics Reuse and Recycling (R2) Standard

- (2) The materials recovery occurs in facilities that meet all applicable regulatory requirements to receive and process mercury, and
- (3) Processing demonstrates mercury recovery.
- (b) CRTs, batteries, and circuit boards contained in equipment or components destined for materials recovery need not be removed prior to shredding and/or materials recovery if:
 - (1) Workers are protected from hazards by technology designed to safely and effectively process equipment or components containing these FMs, and
 - (2) The shredding and/or materials recovery occurs in facilities that meet all applicable regulatory requirements to receive and process these FMs, and
 - (3) Processing demonstrates effective recovery of these FMs.

Processing, Recovery, and Treatment of FMs

- (4) An R2 Facility shall send removed FMs to processing, recovery, or treatment facilities that meet all applicable regulatory requirements to receive the FMs, and that use technology designed and operated to safely and effectively manage the FMs. This shall include:
 - (a) For items containing mercury – mercury retorting or other legal methods, excluding incineration, and
 - (b) For circuit boards – removal of batteries and mercury, and processing for metals recovery, unless the R2 Facility can demonstrate conformance to the requirements in requirement 3(a) or (b), above, and
 - (c) For items containing polychlorinated biphenyls (PCBs) – technology specifically designed for PCB destruction or disposal, occurring in facilities that meet all applicable regulatory requirements, and that use technology designed to safely and effectively manage equipment or components containing these FMs.

Workforce and Environmental Protection

- (5) An R2 Facility shall conduct on an ongoing basis (e.g., as new types of materials are processed or new processes or equipment are used) a hazards identification and assessment of occupational health and safety, and environmental risks that exist or could reasonably be expected to develop at the facility. Such risks could result from any sources, including but not limited to emissions of and/or exposure to substances, noise, ergonomic factors, thermal stress, substandard machine guarding, cuts and abrasions, etc. The hazards identification and assessment shall be captured in writing and incorporated as a component of the recycler's EHSMS.

Assurances for Environmental Incidents

- (6) An R2 Facility shall demonstrate adequate environmental pollution insurance, guaranteed reserves, or government guarantee to cover potential environmental incidents, per Core Requirement 9.

Continued Processing

- (7) An R2 Facility shall assign an R2 Equipment Category for each output stream from the materials recovery process.
- (8) Based on the new category assigned after materials recovery, the R2 Facility shall reevaluate the components or materials in Requirement 6 to continue processing.

Appendix F – Service Only

General Principle: When an R2 Facility performs service for a customer but does not own the equipment being serviced, and the equipment owner directs where any processed equipment, components, and Focus Materials are sent, the Appendix F – Service Only requirements shall be applied. These requirements are intended to enable contracted service arrangements and ensure that the same R2 requirements apply to all equipment, components and materials following the service activities.

- (1) When an R2 Facility performs service activities but does not own the equipment being serviced and the owner of the equipment manages the downstream recycling chain:
 - (a) The R2 Facility shall declare and document all service related activities in the R2 scope in accordance with Core Requirement 1, and
 - (b) The R2 Facility shall include the downstream R2 Facility selected by the customer in its audited activities under Appendix A – Downstream Recycling Chain, and
 - (c) All equipment, components, and materials received from the supplier must be processed and transferred downstream within three months of receipt, unless part of the contracted service is warehousing and storage. Warehousing and storage of negative value equipment or materials may not exceed one year from receipt, and
 - (d) An enforceable contract must be made between the supplier and the R2 Facility prior to receipt of any equipment, components, or materials that specifies:
 - (1) The services that shall be performed by the R2 Facility and the price for each service to be paid by the supplier, and
 - (2) The categories of returned equipment, components, and materials after processing by the R2 Facility in accordance with the R2 Equipment Categorization, and
 - (3) The supplier will select and transfer equipment, components and materials only to R2 Certified downstream facilities and disclose to the R2 Facility the name and location of each, and
 - (4) The supplier will arrange for the transfer of the equipment, components, and materials after processing, to an alternate R2 Facility, except for that portion which the supplier agrees may be managed by the R2 Facility, and
 - (5) The supplier will provide the R2 Facility commercially-accepted records of transfer of equipment, components and materials to each downstream, and
 - (6) A disclaimer of all liability of the R2 Facility for the returned equipment, components, and materials.
 - (e) All Core Requirements of the R2 Standard shall apply to the equipment, components, and materials while in the physical possession or control of the R2 Facility, and
 - (f) Detailed records of all services performed shall be maintained, and
 - (g) Prior to transferring equipment, components, or materials downstream, the R2 Facility shall:
 - (1) Identify each equipment and component with the functional, cosmetic, and data sanitization category, and
 - (2) Reference unique identifiers and categories for the equipment, components, and materials on the processing and shipping records.
 - (h) Detailed records of equipment, components, and materials transfers shall be maintained.

Appendix G – Brokering

General Principle: *The Brokering Process Requirements apply to an R2 Facility that sources equipment, components, or materials and controls the delivery directly to a downstream vendor or end user without physically receiving or processing the equipment in the R2 Certified facility. These requirements are intended to enable brokering activities, while ensuring that the same R2 requirements apply to all equipment, components and materials that are brokered.*

- (1) An R2 Facility undertaking brokering activities shall:
 - (a) Declare and document all brokering activities in the R2 scope in accordance with Core Requirement 1, and
 - (b) Include downstream vendors receiving brokered equipment, components, or Focus Materials in the R2 Facility's audited activities under Appendix A – Downstream Recycling Chain, and
 - (c) Maintain certification throughout the duration of its R2 certification, to a quality management system (QMS) standard that has been approved by SERI¹⁴ with a scope that includes the brokering activities to which this Appendix G applies.
- (2) For equipment, components and Focus Materials that are brokered, the R2 Facility shall:
 - (a) Identify and conform to all legal requirements in accordance with Core Requirement 4, and
 - (b) Manage the movement of all Controlled Equipment and FMs through their downstream recycling chain using the R2 Equipment Categorization, and
 - (c) Be responsible for transportation of the equipment, components, and materials in conformance with Core Requirement 10, and
 - (d) Ensure the security of data on the equipment and components in conformance with Core Requirement 7, and
 - (e) Conform to the throughput tracking requirements of Core Requirement 5, and
 - (f) Provide packaging requirements to the seller and/or transporter prior to shipment to conform to Core Requirement 10.
- (3) If no equipment, components, or Focus Materials ever pass through a facility of the broker, then:
 - (a) No insurance or financial instrument for closure is required for conformance to Core Requirement 9, and
 - (b) Conformance to Core Requirement 3 for EH&S Management System is not required.

¹⁴ Due to changes over time, accepted quality management system standards are maintained on the SERI website www.SustainableElectronics.org. Standards which may currently be used to meet this requirement include RIOS and ISO 9001. QMS Certification is required by a Certification Body accredited by an International Accreditation Forum (IAF) member organization.