R2 2013 Responsible™ Recycling

Implementation Guide

This implementation guide is a starting point for recyclers working on their R2 Certification. It is not a "how-to" guide, but does provide useful examples, templates, and overview of the content of the R2 Standard.

The guide consists of modules dedicated to each Provision of the R2:2013 standard. The Implementation Guide is currently in production with modules posted to the site as they are completed. The implementation guide modules are to be used alongside the R2:2013 checklist, R2:2013 guidance and R2:2013 Standard, which can be found in the R2 Document Library: https://sustainableelectronics.org/r2-standard/r2-document-library

Finally, please refer to SERI's *Content Policy and Disclaimer at* https://sustainableelectronics.org/legal regarding your use of the Implementation Guide.

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Implementation Guide: Provision 1
Environmental, Health, and Safety Management System

General Principle *– An R2:2013 electronics recycler shall possess and use an Environmental, Health, and Safety Management System (EHSMS) to plan and monitor its environmental, health, and safety practices, including the activities it undertakes to conform to each requirement of the R2:2013 Standard. This EHSMS shall be certified to an accredited management system standard.*

Implementation

An environmental, health and safety management system (EHSMS) is the foundation upon which the R2 requirements rest. The EHSMS is the mechanism to continuously improve environmental, and health and safety performance. R2 requires certification to one of the following combinations of Environmental Health and Safety Standards:

- ISO 14001(Environmental) AND   OHSAS 18001(Health & Safety)
- ISO 14001(Environmental) AND   AS/NZS 4801 (Health & Safety)
- Recycling Industry Operating Standard (RIOS)

R2 requires the use of the most recent version of these standards. Please consult the housing bodies of these standards for information on the update timeline.

At its most basic level, the steps to successfully meet this requirement include:

1. Planning

First, determine the scope (R2:2013 Guidance, section 1.3) of your EHSMS certification. "Scope" defines the activities that are covered under the certification.   The R2:2013 Certification is facility specific and requires all electronics recycling related activities at that address to be included in the scope. If multiple businesses of the same or different owners/management, then all businesses performing electronics recycling related activities must be certified. R2 allows several "allowances" (R2:2013 Guidance, section 1.4) for provisions that do not apply to some recyclers.   Determine if any allowances apply to your organization. The table below includes examples of scope statements:

Type of Company	Example Scope Statement
Recycler	Full service end-of-life electronics recycling including collection, sorting, dismantling and data destruction
Refurbisher (IT Asset Recovery)	Maximizing the value of end of life electronic assets through collection, repair and refurbishment, data destruction and resale/repurposing of electronic assets.
ITAD (IT Asset Disposition)	Full service Asset Management including collection, repair and refurbishment, data destruction and recycling of electronic assets.
Broker	The purchase and resale of precious metal scrap, non-ferrous metal scrap, and tested working electronics.
Collector	Collect, sort, and prepare electronics for processing by downstream vendors.
Shredder	Shred electronics and separate materials into commodity streams.
Precious Metals Processor	Process circuit board fractions from electronics to recover gold, silver, palladium, and other precious metals.

2. **Develop, fully implement and review your selected EHSMS** (R2:2013 Guidance, section 1.6)

   2.1 - Select the Environmental Standard you will certify. This will be either RIOS or ISO 14001.

   2.2 - Select the Health & Safety Standard you will certify. This will be either RIOS, OHSAS 18001, or AS/NZS 4801.

   2.3 - Buy the standards you have selected or join as a member in the case of RIOS.

   - RIOS http://www.rioscertification.org/

   - ISO 14001   https://webstore.ansi.org/FindStandards.aspx?SearchString=ISO+14001%3a2015&SearchOption=0&PageNum=0&SearchTermsArray=null%7cISO+14001%3a2015%7cnull

   - OHSAS 18001:2007   https://shop.bsigroup.com/ProductDetail/?pid=000000000030148086&utm_campaign=MS-UPD-CERT-18001checklist-1301&utm_medium=0&utm_source=BSI&utm_content=-18001checklist

   - AS/NZS 4801   https://shop.standards.govt.nz/catalog/4801%3A2001(AS%7CNZS)/view

   2.4 - Build your EH&S management system according to the requirements of the selected standard(s). This will establish policies, document controls, procedures, training, records management, monitoring activities, management review, roles & responsibilities, etc.

   2.5 - Once your EH&S management system structure is established, then incorporate the requirements of R2. Some may choose to integrate the various provisions of R2 while building the EHS Management System.

   2.6 - To ensure that all R2 requirements are integrated into your EHS Management System, develop a "list of activities necessary to show conformance to each requirement of the R2 Standard." This could be a table that cross-references where in your EHSMS documentation the R2 provisions are met; or this could be integrated in an EHSMS manual; or it may be an R2 Manual that describes how each requirement is met in your management system. Each option should include the standard requirements and reference supporting documents (procedures, work instructions, forms, etc) and required records. Refer to the "R2 List of Activities for Conformance" template that can be downloaded using this link: https://sustainableelectronics.org/sites/default/files/R2%20List%20of%20Activities.docx

3. **Annual Audits**

The certification body audit will be auditing that you are actually "doing" what you stated in your documentation. Keep it mind the phrase ***"Say what you do - Do what you say - Prove It."*** For more information on the certification process, visit www.SustainableElectronics.org and click on the **R2 Tab**, and then **Getting Certified.**

4. **Goals and Objectives**

One component of the EHSMS is to develop goals (R2:2013 Guidance, section 1.7). Goals demonstrate continual improvement. Goals should be established as part of the EH&S standard(s) you selected. You should be working on goals throughout the year. When a goal is completed begin working on another goal. The time frame to complete a goal or the cost to complete a goal is not "scored" by the auditor, meaning you don't get "more points" for a goal that costs you $1M versus a goal that did not cost you anything. The purpose is to demonstrate continual improvement.

You can download sample goals using this link: https://sustainableelectronics.org/sites/default/files/Health%20%26%20Safety%20Goal%20Example_0.xlsx .

Summary

Best Practices

- Choose an accredited EHSMS – RIOS, or ISO 14001 and either OHSAS 18001 or AS/NZS 4801 (R2:2013 Guidance, section 1.2)

- Contact a Certification Body to get pricing on selected EHSMS certification and R2 certification.

- Develop a timeline for implementation and certification. Designate responsibilities.

- Determine and document your scope statement.

- Review if any "justifiable allowances" apply to your organization.

- Develop, fully implement and review the EHSMS.

- Develop an R2 Manual or List of Activities

- Develop environmental and health and safety goals. (Quality goals are also required for RIOS.)

Required Records

- Scope Statement

- R2 Manual or List of Activities

- Goals

- R2 License Agreement with SERI

- Selected EHSMS Certificate from an Accredited Certification Body (CB) after completion of CB audit.

Other Resources

Helpful Links:

- R2 Certification Process https://sustainableelectronics.org/r2-certification-process

- RIOS – Recycling Industry Operating Standard http://www.certifymerecycling.org/

- ISO 14001 – International Standard for Environmental Management System http://www.iso.org/iso/iso14000

- OHSAS 18001 - International Standard for Occupational, Health and Safety Management System http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/

- AS/NZS 4801 - Occupational Health and Safety Management Systems https://shop.standards.govt.nz/catalog/4801%3A2001(AS%7CNZS)/view

Templates

- Health and Safety Goals R2 Certification Process https://sustainableelectronics.org/sites/default/files/Health%20%26%20Safety%20Goal%20Example_0.xlsx

- R2 List of Activities https://sustainableelectronics.org/sites/default/files/R2%20List%20of%20Activities.docx

Frequently Asked Questions

Q: How will I be notified if SERI approves a new EHSMS?

In the future, if additional EHSMS standards are approved by SERI, they will be listed on the SERI website.

Q: How do I get authorization for a "justifiable allowance"?

Notify your accredited certification body during the quote process that your organization is requesting one or more of the allowances included in the R2 Code of Practice. The requested allowance will be written in to the contract and verified on-site by the certification body auditor.

Q: How many goals are required?

You should be working on one environmental goal and one health and safety goal. One goal may fit more than one category. For example, a goal to improve battery training could be both an environmental and health and safety goal if it reduces the likelihood of a fire, which has both environmental, and health and safety impacts.

Implementation Guide: Provision 2
"Reuse, Recover …" Hierarchy of Responsible Management Strategies

General Principle – *An R2:2013 electronics recycler shall develop and adhere to a policy for managing used and end-of-life electronic equipment that is based on a "reuse, recover…" hierarchy of responsible management strategies.*

Implementation

The R2 Standard requires a written policy (R2:2013 Guidance, section 2.1) for managing used and end-of life electronic equipment based on a Hierarchy of Reuse, Materials Recovery and Energy Recovery or Land Disposal (which is only allowed "if no reuse or recycling options are viable".) This written policy is usually integrated in other EH&S policies, but may be its own document as well.

The hierarchy is implemented in the operational procedures of each organization. Each step in the hierarchy is connected throughout the company's operations to maximize reuse and recycling. See attached "Sample R2 Reuse Hierarchy Flowchart" for an example of a typical implementation of Provision 2. Implementing the hierarchy typically includes the following:

1. Tech Cutline – technical specifications of equipment that is used to determine whether the equipment can be reused or should be recycled. Each organization should set minimum specifications of various electronics in accordance with resale opportunities. This is usually implemented in the sort or receive process.

2. Test – the capability to test a piece of equipment is dependent upon having the necessary tools and technical knowledge. This varies with each company. Specialty tools can be purchased for various electronics. The knowledge may require some research to determine the reparability and it may require outside resources.

3. Repair – When equipment fails testing, a determination if it can be economically repaired must be made. If equipment cannot be tested internally, then the path of equipment is reliant on the services of specialty providers. Prior to shipping such equipment to a refurbisher under "R2/Ready for Repair", the recycler is responsible for evaluating the practicality of repair, resale, and reuse of the equipment (R2:2013 Provision 6.c.3.A).

4. R2/Ready for Repair – Under Provision 6.c.3.A a recycler is required to determine if the electronics are in a condition to reuse; functional for the buyer's requirements; and revenue exceeds the costs to test/repair. Most issues occur with equipment that provides a very small profit margin. In addition, buyers of R2/Ready for Repair equipment must be qualified with due diligence to meet the Provision 6 and Provision 5 requirements. This is intended to be rigorous in order to prevent low value equipment from being sold under the guise of reuse. The R2 Standard has streamlined the qualification of refurbishers when using R2 Certified downstreams. The best strategy is to find R2 Certified refurbishers for equipment that you cannot economically test or repair in-house.

5. Recycling - If equipment cannot be reused, the next option is Materials Recovery where subset materials such as plastics, metals, and glass can be separated and recovered for use in replacing feedstock to manufacture new products.

6. Energy Recovery/Disposal - The final option in the Hierarchy Policy is Energy Recovery or Land Disposal which, as stated above, is only allowed "if no reuse or recycling options are viable". The R2 Guidance document currently lists three allowed exceptions. The cost to recycle a material cannot be considered in a "viability" determination.

Summary

Best Practices

- Develop a Hierarchy of Responsible Management Strategy Policy and supporting documents.

- Consider developing a document that defines which material is to be sent for resale and which material is to be sent for recycling. Commonly referred to as a "cut-line", assets that are above the cut-line get routed to technicians for potential resale screening; where-as items below the cut-line are routed for recycling/dismantling.

- Determine if Reuse activities will be implemented internally, by a qualified Refurbisher or a combination of both.

- Determine if Materials Recovery activities will be handled internally, by a qualified downstream vendor or a combination of both. For example, you may choose to dismantle computers on-site and recover components, but send whole CRTs to an approved downstream vendor.

- Outline in a table this information above to clearly define to employees and customers what happens to the equipment.

Required Records

- Auditors will be looking for the following to determine conformance to the Reuse, Recycle… Hierarchy:

- Sales records

- Shipping documents

- Other documents showing the flow of equipment to downstream vendors

Other Resources

Helpful Links:

- PACE Guideline on Environmentally Sound Material Recovery and Recycling of End-of-Life Computing Equipment   http://archive.basel.int/industry/compartnership/docdevpart/ppg21DraftGuidelineFinal-2011-03-15.pdf

- PACE Guideline on Environmentally Sound Testing, Refurbishment, and Repair of Used Computing Equipment http://archive.basel.int/industry/compartnership/docdevpart/ppg11DraftGuidelineFinal-2011-03-15.pdf

  Note: PACE is a multi-stakeholder partnership that will provide a forum for governments, industry leaders, non-governmental organizations and academia to tackle the environmentally sound management, refurbishment, recycling and disposal of used and end-of-life computing equipment.

Frequently Asked Questions

Q: Can CRT glass be used as Alternative Daily Cover (ADC) at a landfill and be considered "Recycling"?

No. Since both glass-to-glass recycling and lead smelting are still viable recycling methods, landfilling of CRT glass is a prohibited management strategy.

Implementation Guide: Provision 3
Legal Requirements

General Principle – *An R2:2013 electronics recycler shall comply with all applicable environmental, health and safety, and data security legal requirements and shall only import and export equipment and components containing Focus Materials in full compliance with all applicable importing, transit, and exporting countries' laws.*

Implementation

Identifying and complying with environmental, health & safety, data security and import/export legal requirements is an important provision of the R2 standard.

An essential first step in conforming to this provision is to develop a written compliance plan (R2:2013 Guidance, section 3.2), which clearly states:
- How you will identify, have access to, and stay current with applicable legal requirements, and
- How you will comply and maintain compliance?

Your written compliance plan should also cover the following topics:

1. Facility Compliance

Legal requirements for your facility may be required by international, national, regional and local regulations. You must identify and document all environmental, health & safety, and legal requirements at all levels that are applicable to your facility and business. Typically this includes an evaluation of Storm Water Regulations, Recycling regulations, Occupational Safety regulations, Data Privacy laws, etc.

Once legal requirements have been identified for your facility, develop a method of maintaining compliance. Consider what is needed to monitor compliance, complete reporting, training, and other specific requirements found in each regulation. It is always a good idea to identify who is responsible for each task. A combination of tools like monthly checklists, an EH&S compliance calendar and/or email reminders are typical for monitoring compliance.

2. Import/Export Compliance

Part of the Legal Requirements Plan (R2:2013 Guidance, section 3.4) should identify the method for ensuring that equipment and components containing focus materials are only shipped to and through countries that legally accept them, and that the shipments are in compliance with the recycler's exporting country. This includes ALL countries, not just non-OECD countries.

The R2 Guidance document includes a thorough discussion of required documentation demonstrating the legality of shipments (R2:2013 Guidance, section 3.3).

Keep in mind, that untested or non-functioning equipment or components containing FMs that are being sent for repair or refurbishment, still fall under this requirement. Additionally, the R2 certified recycler is responsible for maintaining evidence of the legality for imports/exports of downstream vendors too. Even if you don't import or export directly, you must be able to prove that it is legally done by any downstream vendor in your recycling chain.

3. Audit Compliance with Legal Requirements

The final step of the compliance plan is to audit your compliance with the identified legal requirements above. The R2 standard requires "periodic" audits. By definition an audit is formal and methodical. Audits are not casual evaluations of compliance. Additionally, the term periodic starts with annual compliance audits as a baseline. Once you have a good track record of compliance, you can increase the time between legal compliance audits.

A legal compliance audit includes a review of your list of legal requirements, as well as a facility-wide evaluation of actual compliance. The audit could include observation of compliance, (ex. forklift driver wearing seatbelt), inspection of records (ex. daily forklift inspection record), inspection of training records, required postings and regulatory reporting.   Any non-compliant activities found during the compliance audit should be addressed in your corrective action process.

The person conducting the audit must be competent to do so. You will be required to demonstrate the qualifications of the person who performed the compliance audit. Competence may be established through training and/ or experience. Outside parties may be used/needed if there are no in-house personnel qualified.

Summary

Best Practices

- Develop a Legal Compliance Plan

- Develop a list of applicable EH&S, Data Security and Import/Export Legal Requirements

- Identify all imports, including originating country and maintain documentation demonstrating legality of imports

- Identify all transit countries and maintain documentation demonstrating legality of transits

- Identify all exports, including direct exports and downstream exports, the receiving country and maintain documentation demonstrating legality of exports

- Determine method to maintain compliance (checklist, calendars, task lists, etc.)

- Determine competent personnel to audit compliance to legal requirements

- Determine frequency of legal compliance audit

- Ensure that all lists are kept up to date which means reviewing the lists at a regular frequency (annual review is generally the baseline) or as and updating them when regulations change.

Required Records

- List of applicable Environmental, Health and Safety Legal Requirements

- List of applicable Import, Transit and Export Requirements

- List of applicable Data Security Legal Requirements

- Documents demonstrating the legality of Imports, Transits and Exports

- Legal Compliance Audit Records

- Legal Compliance Auditor Competency Records

Resources

Links

General Information

- StEP - E-waste World Map and Regulations
http://www.step-initiative.org/step-e-waste-world-map.html

- Basel Country Fact Sheets
http://www.basel.int/Countries/Countryfactsheets/tabid/1293/Default.aspx

- OECD Decision - Transboundary Movements of Wastes Destined for Recovery Operations
http://www.oecd.org/env/waste/decisionofthecouncilconcerningthecontroloftransboundarymovementsof-
wastesdestinedforrecoveryoperationsc2001107final.htm

- Hong Kong – A Guide to the Control on Import and Export of Waste
http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/waste/guide_ref/files/ad-
vice_on_e-waste.pdf

- Canada - Overview of Potential Legal Requirements for Provinces
https://sustainableelectronics.org/sites/default/files/Overview%20of%20Potential%20Legal%20and%20
Other%20Requirements%20-%20Canada%20and%20Provinces.xlsx

- Understanding Import/Export Requirements
http://www2.mst.dk/Udgiv/publications/2016/01/978-87-93435-07-0.pdf

US-specific Information

- EPA Waste Regulations
http://www.epa.gov/epawaste/laws-regs/

- OSHA Regulations
https://www.osha.gov/law-regs.html

- Export Regulations
http://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear

- CRT Final Rule
http://www.epa.gov/osw/hazard/recycling/electron/index.htm

- List of companies approved to export CRTs for Recycling
https://www.epa.gov/hwgenerators/companies-approved-october-3-2017-export-cathode-ray-tubes-crts-
recycling

- List of companies approved to export CRTs for Reuse
https://www.epa.gov/hwgenerators/companies-exporting-cathode-ray-tubes-reuse

- International Waste Agreements – (US/Canada Bilateral Agreement and US/Mexico Bilateral Agreement)
http://www.epa.gov/osw/hazard/international/agree.htm

- DOT Regulations
https://www.fmcsa.dot.gov/regulations

Templates

- Facility Inspection Checklist.docx
  https://sustainableelectronics.org/sites/default/files/Facility%20Inspection%20Checklist.docx

- Import Export Requirements Summary List
  https://sustainableelectronics.org/sites/default/files/Import%20Export%20Requirements%20Summary%20List.xls

- Legal Compliance Plan
  https://sustainableelectronics.org/sites/default/files/Legal%20Compliance%20Plan.doc

- Basel Convention Country Fact Sheet (SAMPLE - Japan)
  https://sustainableelectronics.org/sites/default/files/Sample%20Basel%20Convention%20Country%20Fact%20Sheet%20Japan.pdf

- Competent Authority Letter (SAMPLE)
  https://sustainableelectronics.org/sites/default/files/Sample%20Competent%20Authority%20Letter.pdf

- U.S. EHS Legal Requirements Summary List
  https://sustainableelectronics.org/sites/default/files/U.S.%20EHS%20Legal%20Requirements%20Summary%20List_0.xls

Frequently Asked Questions

Q: Do I have to have a Competent Authority Letter for circuit boards going from an OECD country to an OECD country?

No, because circuit boards are considered a "Green Waste" per the Basel Convention requirements and therefore no Competent Authority Letter is required for shipments of circuit boards between an OECD to another OECD country.

Q: A Competent Authority letter from India states "Non-activated Glass Cullet". Does that mean it's free from phosphors and/or lead?

It means it has been processed to remove phosphors.

Implementation Guide: Provision 4
On-Site Environment, Health, and Safety

General Principle – *An R2:2013 electronics recycler shall use practices and controls at its facilities that protect worker and public health and safety and the environment under both normal and (reasonably foreseeable) exceptional circumstances.*

Implementation

The goal of Provision 4 is to protect the recycler's workforce, public health, and the environment (R2:2013 Guidance, section 4.1). This includes identifying and controlling EH&S hazards, having the technical capability to process (R2:2013 Guidance, section 4.2) material and maintaining good housekeeping standards (R2:2013 Guidance, section 4.3). These requirements should be incorporated with developing your Environmental, Health and Safety (EH&S) Management System required in Provision 1.

The first step is to identify the environmental aspects and health and safety hazards that exist or could reasonably be expected to develop at this facility based on material received and the processing technologies on-site. Check for the following:

- The environmental aspect assessment is consistent with ISO 14001/RIOS clauses
- The health and safety hazards identification (R2:2013 Guidance, section 4.4) is consistent with OHSAS 18001, AS/NZS 4801, or RIOS clauses.

Common health and safety hazards in recycling operations include:

- Spills (Acid from batteries, mercury relays, coolants, crt glass, cleaning chemicals, etc.)
- Fires or Explosions (usually related to batteries)
- Inhalation of hazardous substances/dust/fumes (respiratory protection)
- Noise
- Equipment – Hazardous Energy (balers, shredders, conveyers, etc.)
- Equipment – Moving Parts
- Falls from Heights
- Slips, Trips and Falls
- Sharp/Flying Objects (during Dismantling)
- Falling Objects (from Racking)
- Forklifts/Vehicles
- Ergonomics
- Heat Stress/Extreme Temperatures
- Confined Space

After aspects and hazards have been identified, the method to manage and control hazards (R2:2013 Guidance, sections 4.5, 4.7) must be determined. Controls typically include training, procedures, and work instructions where necessary. For example, if you use a Forklift in your operation you should develop operating rules, operator training, and operator qualification tests. There are many resources available online in most of these general topics. The control of aspects and hazards are consistent with the clauses for operational control in your environmental health and safety standards.

Results of your aspect and hazard identification and applicable regulations may determine that monitoring and sampling protocols (R2:2013 Guidance, section 4.8) are required. In the example of Forklift operations, a monitoring protocol would be implementing a daily pre-use inspection. Creating an inspection form, training forklift operators to use the form, and continually reviewing the completed checklists would satisfy this requirement.

Qualified personnel should determine what protection is needed for personnel (R2:2013 Guidance, section 4.9) and other visitors to the workplace, as well as controls in place to manage environmental aspects. This is usually determined through a job hazard assessment of each task.

R2:2013 Provision 4 also requires identification of emergency situations and exceptional circumstances. Emergency response plans (R2:2013 Guidance, section 4.11) should be developed, tested and updated as necessary considering the types of emergencies that may occur in your region. This may include spills, fires, earthquakes, tornados, etc. In addition, you should consider security incidents by employees or outside the facility that may require different responses rather than evacuation.

Provision 4 also identifies the different types of controls, including engineering controls, administrative controls, and personal protective equipment (PPE), the recycler must consider to ensure EH&S regulatory compliance and control of the identified EH&S risks. These controls are required to be implemented in order of the listed priority. Standard best practices require the use of engineering controls were feasible, over administrative or personal protective equipment. See examples below:

Engineering Controls:	**Administrative Controls:**	**Personal Protective Equipment (PPE)**
Dust Collection Systems	Training	Hard Hat
Forklifts	Rotating jobs to avoid repetitive injury	Safety Glasses
Pallet Jacks	Safety Signage	Goggles
Baler	Restricted Areas	Steel Toed Shoes
Gaylord Tipper	Work Instructions	Uniforms
Shredder	Procedures	Hearing Protection
Machine Guards	Forms	Aprons
Radiation Detector	Medical Monitoring	Face Shields
Jerome Meter (Mercury)	(blood or urine testing for heavy metals like lead and mercury)	Polypropylene Gloves
Noise Meter	Safety meetings	Cut Resistant Gloves
Loading Docks		Latex Gloves
Lift Gate		
Pallet Wrapper		
Conveyers		
Power Tools		

Summary

Best Practices

- Conduct an Aspect and Hazard Assessment

- Determine controls for Aspects and Hazards (Some controls may be required by regulations, including written programs for:
    - Emergency Action Plan
    - Fire Prevention Plan
    - Injury and Illness Prevention Program
    - Forklift Training Program
    - Heat Stress Program
    - Hearing Conservation Program
    - Respiratory Protection Program
    - Lead Program
    - LockOut TagOut Procedure
    - Hazard Communication Procedure

- Develop a Health and Safety Manual or Health and Safety program documents

- Determine required protection for workers and visitors

- Determine if monitoring and sampling is requiredImplement monitoring and sampling tasks to ensure that operational controls are working. For example, you may want to record the Magnehelic pressure gauge readings on a daily basis to determine if the Dust Collection System is working properly.

- Employ and/or contract competent personnel to promote health and safety and environmental protection(R2:2013 Guidance, section 4.10)

- Develop Emergency Procedures

- Train employees on EH&S hazards and control methods (R2:2013 Guidance, section 4.12).

Required Records
- Aspects/Hazards Evaluation (FootPrint)
- PPE Hazard Assessment or Job Hazard Assessment
- Monitoring and Sampling records
- Emergency Procedures
- Emergency Drill records

Resources

Links

Refer to applicable health and safety regulatory agency
- OSHA (USA) https://www.osha.gov
- STPS (Mexico)   http://www.stps.gob.mx/bp/index.html
- Canada http://www.labour.gc.ca/eng/health_safety/workplace/index.shtml

Templates

- Health and Safety Manual TOC
  https://sustainableelectronics.org/sites/default/files/4%20-%20Health%20and%20Safety%20Manual%20TOC.pdf

- PPE Hazard Assessment Form
  https://sustainableelectronics.org/sites/default/files/4%20-%20PPE%20Hazard%20Assessment%20Form.docx

Frequently Asked Questions

Q: Do we need to identify aspects/hazards for FMs that we normally do not receive?

Yes, aspects/hazards must be identified for FMs normally not received by a recycler because it would have to be stored on-site at the recycler's facility until such time that it is sent back or disposed of. There are bound to be impacts/risks associated with the storage of those FMs on the facility.

Recyclers often receive undesired materials including needles, used HCL, leaking lead acid batteries etc. despite their best efforts to prevent it. At a minimum, the recycler should consider this as a risk in their aspects/hazards evaluation and plan for the management of these materials. This might include a strategy of inspection before it is offloaded from a vehicle; quarantine of the materials; and maintaining supplies and work instructions to effectively manage these non-conforming materials. While you may not have a relationship with a downstream vendor for all the materials ahead of the event, you should plan for these possibilities with contact information of a company that can legally and responsibly manage it.

Implementation Guide: Provision 5
Focus Materials (FMs)

General Principle – *An R2:2013 electronics recycler shall manage – both on-site and in the selection of down-stream vendors – the Focus Materials that pass through its facility or control in a manner protective of worker health and safety, public health, and the environment. An R2 electronics recycler also shall perform due diligence on down-stream vendors to which it ships these materials.*

Implementation

R2:2013 requires the responsible management of Focus Materials throughout the recycling chain. Throughout the R2:2013 standard, various requirements are imposed on the need for qualification or "due diligence" of down-stream vendors. Typically more than one recycler will handle the equipment while it falls in the definition of Focus Materials. This is standard practice in the electronics reuse and recycling industry.

Due diligence is a systematic review of the risks of downstream vendors.   However, the process, application of requirements, and outcomes will vary by each vendor. As much as anyone tries to make the process exact, in the end judgments need to be made on the qualifications of each candidate. The information and templates with-in this document are templates meant to facilitate the process design for any company. These templates are a beginning. Each implementation should consider how to use these baselines to build a competent evaluation of downstream vendors.

Having a vendor complete a questionnaire is not an assessment of the vendor's conformance to the R2:2013 requirements. Any questionnaire must be followed by an evaluation of the evidence provided and a validation of that information. The outcome is intended to be a responsible recycling chain.

Summary
Best Practices
- A flow chart, or similar methodology, should be included as part of the plan and should reflect all subcon-tractors' and downstream vendors' facilities used for the entire audit period from receipt of each type of FM to the end processor.

- Tracking throughput shall extend for FMs through the entire Recycling Chain, not just through the R2 facility's own processing.

- Recyclers shall demonstrate there is a process in place for throughput tracking of FMs through the Recy-cling Chain.

Resources
Examples
- Example Certified R2 Recycler Checklist
  https://sustainableelectronics.org/sites/default/files/Certified%2BRecycler%2BChecklist.pdf
- Example Non-Certified Recycler Checklist
  https://sustainableelectronics.org/sites/default/files/Example%2BNon-Certified%2BRecycler%2BChecklist.pdf
- Example Non-Certified Refurbisher
 https://sustainableelectronics.org/sites/default/files/Non-Certified%2BRefurbisher%2BChecklist.pdf

Templates

- Downstream Certified Recycler Checklist
  https://sustainableelectronics.org/sites/default/files/2-Downstream%20R2-2013%20Certified%20Recycler%20Checklist.docx

- Downstream Non-Certified Recycler Checklist
  https://sustainableelectronics.org/sites/default/files/Downstream%20Non-R2-2013-Certified%20Recycler%20Checklist.docx

- Downstream Non-Certified Refurbisher Checklist
  https://sustainableelectronics.org/sites/default/files/Downstream%20Non-R2-2013-Certified%20Refurbisher%20Checklist.docx

- Downstream Data Destruction Vendor Checklist
  https://sustainableelectronics.org/sites/default/files/5-Downstream%20Data%20Destruction%20Vendor%20Checklist.docx

- Transport Checklist
  https://sustainableelectronics.org/sites/default/files/6-Transport%20Checklist.docx

Frequently Asked Questions

Q: How do I know which of the templates to use?

Consult the flowchart below:
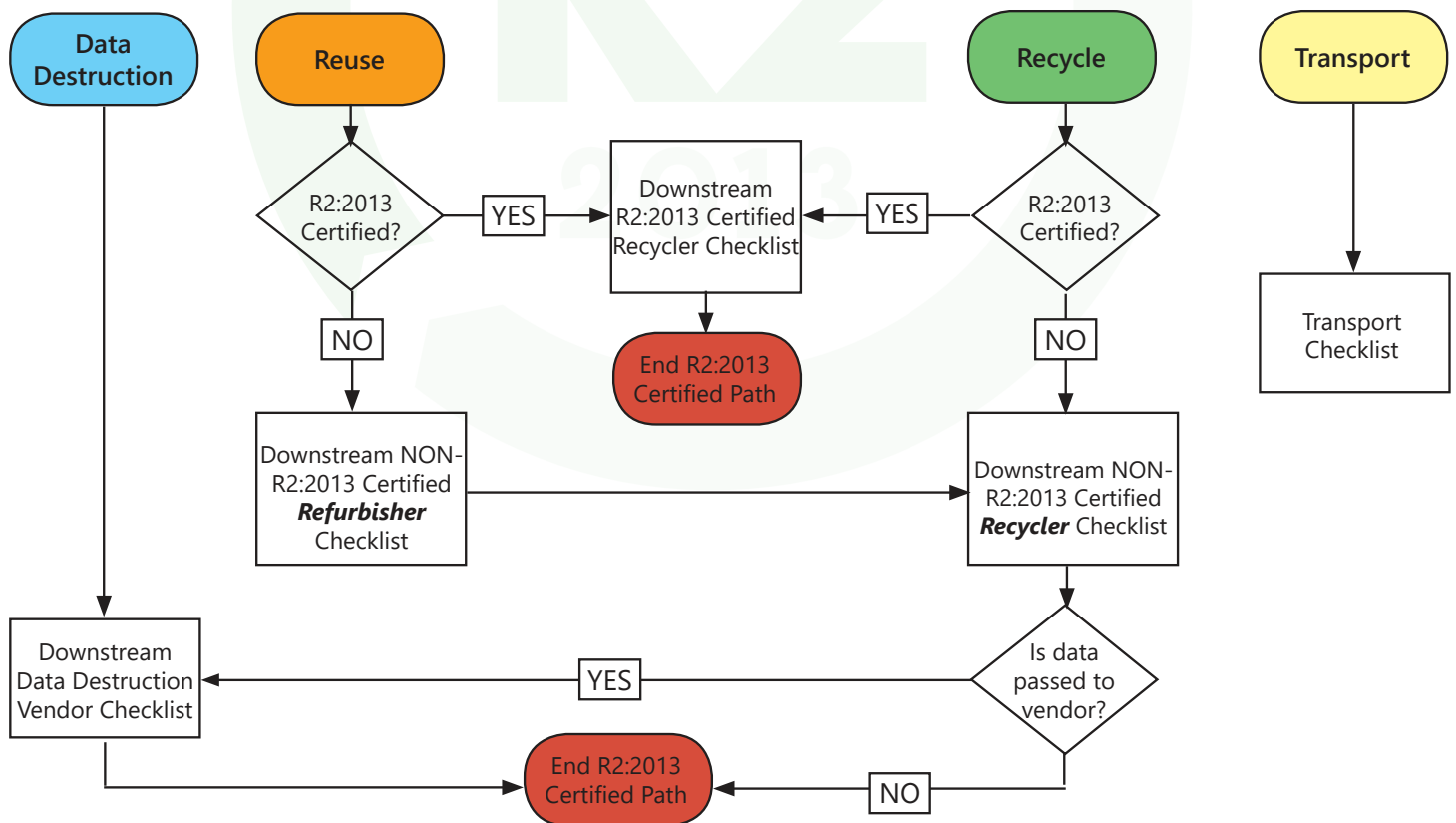
Implementation Guide: Provision 6
Reusable Equipment and Components

General Principle – *An R2:2013 electronics recycler shall repair and refurbish as needed, properly test, and adequately package equipment and components going to reuse to ensure continued use of the equipment and, ultimately, responsible recycling of Focus Materials.*

Implementation

Reuse is the preferred management strategy (based on Provision 2 - the R2 Hierarchy of Responsible Management Strategies), and the intent of Provision 6 is to maximize legitimate reuse, as well as to responsibly manage scrap components that do not have value on the reuse market.

Provision 6 defines essential requirements of legitimate refurbishment and reuse of used electronics. Requirements are specified for effective testing, data sanitization, labeling, storage, packaging and tracking of Reusable Equipment and components.

Key Concepts

Data Sanitization

This is not FORMATTING! It is not the same as overwriting the information. Know the difference!

Reusable equipment must be purged of any residual customer data to prevent theft. Processes for data sanitization must conform to the requirements of Provision 8, which also reference generally accepted data destruction standards. Not only do you need include Provision 8 requirements in your process, but you must also be sure to include a whole other standard specific to data sanitization. Many recycler's incorporate the NIST 800-88 Standard, but NAID and ADISA are acceptable substitutes. This includes security controls, records and verification.

Remember, that data sanitization applies to all electronics for reuse. Desktops, Laptops, Cell Phones, DVRs, Copiers, Tablets, Medical Equipment, Routers, etc. And don't forget those hard drives that you purchased to put into electronics for reuse.

Storage

Equipment for reuse should not be treated like recyclables. Don't throw it into Gaylords. Don't store it outside. Secure it from theft. Treat it with care to preserve the value. If it is not worth the level of care, than it will be hard to convince auditors that it is has a legitimate reuse market. There should be a clear difference in your facility between reusable electronics and recyclables.

Packaging

Much like storage, the manner of packaging used on reusable electronics should be clearly different than your recyclables. Packaging should protect the value of the electronics. Items thrown in a Gaylord are not indicative of reuse. DOA (dead on arrival) equipment is going to cost more to the business to replace. Reusable equipment is often packaged individually to protect it. In bulk transactions, it may be carefully palletized with protective packing material in between each. Again, it should be obvious to the auditor that the equipment is packaged for reuse, not recycling.

Labeling -

R2 recyclers are required to identify the type of reuse sales of equipment into one of three pre-defined descriptions:

1. **Tested for Full Functions, R2/Ready for Reuse**
2. **Tested for Key Functions, R2/Ready for Resale**
3. **Evaluated and Non-Functioning, R2/Ready for Repair**

The standard does not allow you to change these labels or substitute your own. It is intended to be consistent across all certified recyclers so that it can be easily identified by the auditor and customer. Where you do have some flexibility is where it is implemented. It may be written on the Bill of Lading (BOL), invoice, sales order, eBay Listing, etc. It must appear on at least one of these documents exactly as listed above, but is not required on all. It is not required on the actual equipment, but may be a good way to ensure your salesperson only sells the functioning equipment.

Records

Records of test results are imperative to documenting the functionality of each device. System specifications like processor speed, memory size, hard drive size, etc. are not records of testing. Pass or fail results for each test in the process must be recorded either manually or through software automation.

Other records required in reuse include records of data sanitization for each device; records of quality verifications; calibration of testing equipment; and detailed records of sales/shipment. If you are not capturing these details in your process you will not have the objective evidence when the auditor seeks it.

Sorting, Testing, and Evaluation

The reuse process may begin in the acquisition of electronics from customers. Refurbishers may purchase equipment from a list with the specific intent to reuse it based on technical specifications provided before purchase. At the very least, the decision to reuse begins in the sorting process.

The challenge for recyclers in sorting is to implement processes which effectively sort equipment into reuse or materials recovery channels. This usually requires personnel that are knowledgeable, even if not technical in knowledge. Posters with pictures of reusable equipment and specifications may be one way to help non-technical sorters.

This is an important step that if done wrong, may have direct impact on your financial return. Equipment that may be reused may be missed. Or equipment that cannot be reused will be sent for further evaluation, leading to additional costs in processing. Furthermore, equipment is often mishandled in the warehouse. Sometimes it is thrown into Gaylords, falls from pallets, or otherwise mistreated. This further erodes the reuse potential.

Effective reuse starts in the warehouse. Put into place procedures and training of workers that emphasizes the preservation of value. Handle equipment with care. Effectively sort the equipment to maximize reuse.

Sorting

Consider the following when evaluating equipment for potential reuse:
*   Physical condition of equipment
*   Type of equipment
*   Age of equipment
*   Technical cut-line
    - Market demands
    - Cost to test
    - Cost to repair

Testing & Evaluation Flowchart
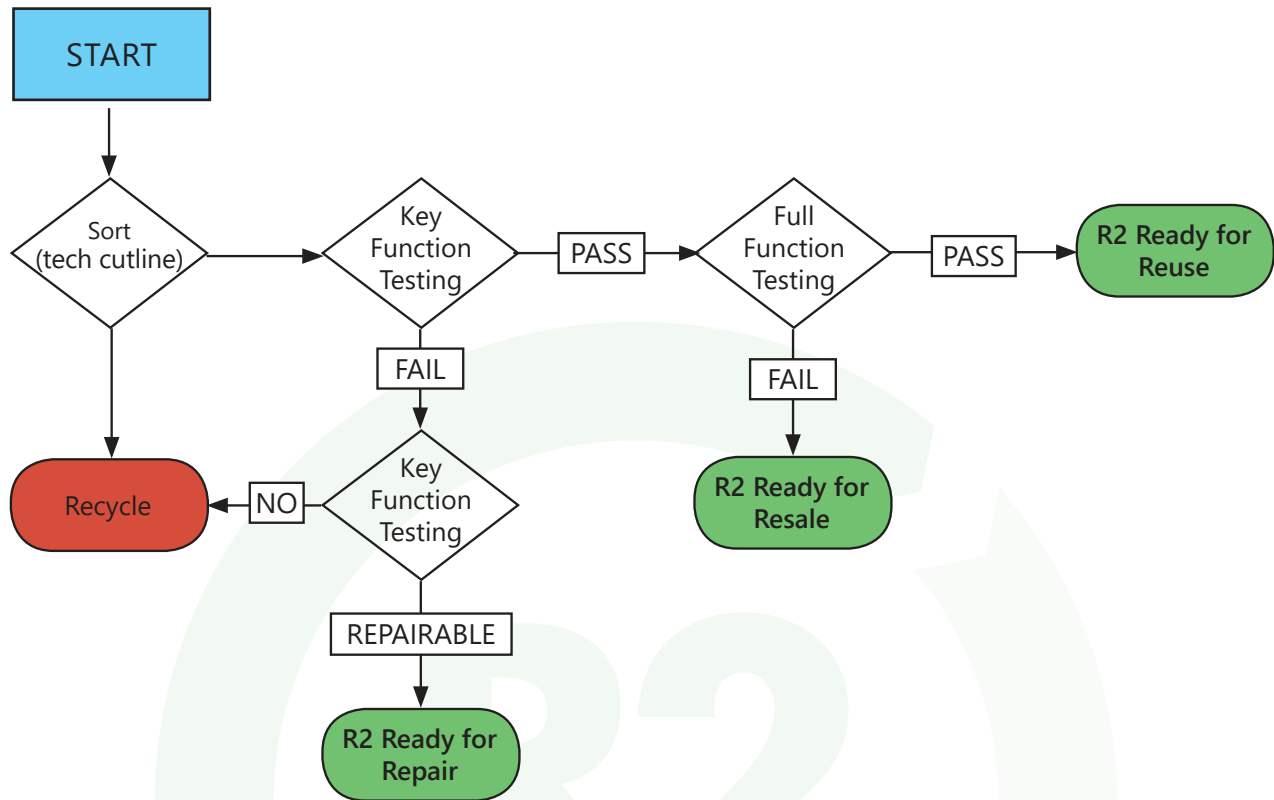
It is not acceptable to include older equipment with newer equipment and demand the buyer take the combined lot. This does not constitute equipment that has a viable reuse market.

Testing

Elements of effective testing include the following:

- Test should include results for specific functions, not combined grade or letter grade
- Test should be "Pass / Fail"
- "Fail" test should include failure reason
- Test results must be recorded and stored in and ordered system
- Test results must be retained after unit shipment or sale

Key Functions vs. Secondary Functions

Crucial to testing and classifying reusable equipment under R2 Provision 6 is clearly identifying the difference between "Key Functions" and "Secondary Functions" in a product. These vary based on the type of product, and due to the large amount of electronic products on the market, R2 does not provide specific functionality requirements for each type of product.

However, some basic guidance is provided: Key Functions are considered to be anything that is essential to the effective use of a device. Secondary Functions are non-essential, but desirable, functionality of a device. The R2 standard defines Key Functions as "the originally-intended functions of a unit of equipment or component, or a subset thereof, that will satisfactorily serve the purpose(s) of someone who will reuse it." Be very careful on the second part. It is not what the buyer wants, but what the end user expects. Key function equipment is not end-user ready. Additional processing is being performed by the buyer. This may include further testing or upgrades such as software loading.

The buyer wants it cheap and doesn't necessarily want to pay for testing or repair if the buyer is going to retest it by their own process. Even though the buyer does not require key functions to be working, you cannot reduce your level of testing below the R2 requirements or sell it with key functions not working.

Key functions must be tested and must be working at a minimum. Secondary functions are not essential to the use of the device. For example, perhaps the fax function does not work on a multi-function printer, but the print and scan functionality still works. Or the camera does not work on a smart phone. These may not be key functions of the device, so the device can be sold freely without the secondary functions working.

The examples below are representative of typical key functions. However, these may vary based on reuse purposes. It is the responsibility of the recycler to demonstrate a comprehensive list of key functions in line with the definition of Key Functions to meet 6.c.2 Tested for Key Functions, R2/Ready for Resale. When processing equipment for 6.c.1 Tested and Full Functions, R2/Ready for Reuse all key and secondary functions must work.

	KEY FUNCTION	SECONDARY FUNCTION
Desktop	Power supply, Motherboard/ CPU, hard drive, memory	USB Ports, peripheral ports, card reader, optical drive
Laptop	Power supply, Motherboard/ CPU, hard drive, memory, battery, screen, screen hinge	USB Ports, peripheral ports, card reader, optical drive, trackpad, keyboard
Cell Phone	Screen, battery, charging cable port (micro USB / Apple), cellular radio, SIM, storage, memory	SD card slot, fingerprint sensor, stylus, volume buttons

Quality Control

Quality Control is an essential requirement of reuse under Provision 6. A quality assurance plan is required under each of the three reuse scenarios. If you are certified to ISO 9001 or RIOS, quality controls are included in the requirements of these quality standards. If not certified, a specific Quality Assurance Plan is required by the R2 Standard. Effective quality controls should include the following best-practices:

Do:
- Test all equipment
- Calibrate testing equipment and verify it is working properly
- Perform random sampling to verify test results, by different personnel
- Periodically verify qualifications of testing personnel and quality assurance personnel

Don't
- Limit testing to visual inspection of equipment
- Limit testing to a random sampling of equipment
- Stop testing after failure /repair
- Harvest parts from non-working or untested units

Classifying Reusable Equipment

Tested and Full Funtion / R2 Ready for Reuse

R2 Ready for Reuse equipment is, for all intents and purposes, equipment that is functionally equivalent to new equipment. This must be verified through complete and effective testing of a device's functionality. All functions must be working. All software and drivers to make the equipment fully functional must be loaded and legally licensed. While minor scratches are allowable consistent with normal use, broken or missing pieces are not allowed on R2 Ready for Reuse electronics.

The example below illustrates the rigor of testing R2 Ready for Reuse equipment. All key and secondary functions must be working. Many full-time refurbishers utilize software programs to automate the testing of all functions and recording of the results.

Example: Laptop Computer

Key Functions

Key Functions	Test	Expected Results	Result
Power Adapter	Plug into laptop	Charges the battery	PASS
Motherboard / CPU	Power On self-test	No beeps, codes, or errors	PASS
Memory	Power On self-test	No beeps, codes, or errors	PASS
Hard Drive	Wipe drive	No failures or bad sectors	PASS
Screen	Inspect for defects	Less than 3 dead pixels, no cosmetic damage	PASS
Battery	Length of charge	Minimum 40 minutes	PASS
Screen hinge	Open / close laptop lid	Laptop screen stays open / closed at desired angles	PASS

Secondary Functions

Secondary Function	Test	Expected Results	Result
Optical Drive	Insert and play disc	Disc loads and plays	PASS
Floppy Drive	Insert and read from disk	Reads files on disk	PASS
USB ports	Plug in external keyboard	Recognized and functioning	PASS
Trackpad	Manual test	Cursor moves on screen	PASS
Keyboard	Manual test	Each key produces character on the screen	PASS

Product return plans are required for R2 Ready for Reuse sales. This equipment is often sold directly to end-users through online websites. These sales should include a limited warranty for functionality issues and physical damage. When sold directly to the end-user, technical support is often necessary and appropriate. It is not acceptable to sell the equipment "as-is" with no warranty or return provisions for the direct buyer.

Tested For Key Funtions / R2 Ready for Resale

R2 Ready for Resale equipment is usually sold to someone who will make it fully functional or ready for the end-user. The key functions of a R2 Ready for Resale product are working, but unlike units classified as "R2 Ready for Reuse" there may be non-essential functions that are not working. See the example below which allows for secondary functions to not be working.

Since R2 Ready for Resale equipment may be sold with secondary functions not working, a written disclosure of non-functioning components must be provided to the buyer. A testing report for the unit showing the tests that failed, or were not tested, will be acceptable in most cases.

Notes:

- All key functions must be tested and must be working to sell the equipment as R2 Ready for Resale. It is not acceptable to sell equipment as R2 Ready for Resale if a key function is not working. A common resale is equipment without a hard drive. It is acceptable to sell a device without the hard drive, provided that the device was tested with a hard drive to ensure the port is working, and the missing hard drive is disclosed to the buyer. Be careful though. At some point, too many missing components would not be justifiable as R2 Ready for Resale.

- Sometimes the customer requires less stringent testing than the R2 Standard. For example, the customer may only require a power on test. There is no exception to the minimum testing requirements under R2. In order to sell reusable equipment without restrictions, such as due diligence under 6.c.3, the minimum testing requirements of R2 must be met.

Example: Laptop Computer

Key Functions

Key Functions	Test	Expected Results	Result

Power:
   --Adapter
   --Battery (if included)
*Non-working batteries should be removed and managed as an FM)
	Plug into laptop
	Length of charge
		Charges the battery
		Minimum 40 minutes
			PASS
			PASS (if included)

Motherboard / CPU	Power On self-test	No beeps, codes, or errors	PASS
Memory	Power On self-test	No beeps, codes, or errors	PASS
Hard Drive	Wipe drive	No failures or bad sectors	PASS
Screen	Inspect for defects	Less than 3 dead pixels, no cosmetic damage	PASS
Battery (if included)	Length of charge	Minimum 40 minutes	PASS
Screen hinge	Open / close laptop lid	Laptop screen stays open / closed at desired angles	PASS

Secondary Functions

Secondary Function	Test	Expected Results	Result
Optical Drive	Insert and play disc	Disc loads and plays	FAIL
Floppy Drive	Insert and read from disk	Reads files on disk	FAIL
USB ports	Plug in external keyboard	Recognized and functioning	PASS
Trackpad	Manual test	Cursor moves on screen	PASS
Keyboard	Manual test	Each key produces character on the screen	PASS

Product return plans are also required for R2 Ready for Resale. Since this equipment is often sold to another company to finish the process and make the equipment ready for end-users, the provisions of this plan are usually different. Typical product return plans for R2 Ready for Resale equipment ensure that equipment arrives in the condition and functionality as it is advertised. However, it would not be guaranteed to be in pristine condition or fully functional. Technical support is not typical in these types of sales. R2 Ready for Resale equipment is often sold in bulk and sometimes exported. You should consider and plan for how to handle quality issues that occur in a foreign destination.

Evaluated and Non-Functioning / R2 Ready for Repair

In order to maximize reuse of electronics to extend their useful life, the R2 Standard does allow for the sale of reusable equipment with the proper controls in place. R2 Ready for Repair equipment is NOT sold to end-users. It is sold to qualified refurbishers with the skills and tools to test and repair the equipment.

Prior to selling R2 Ready for Repair equipment, a recycler must meet specific requirements. It is not acceptable to simply pass along all LCD televisions, for example, to a downstream refurbisher who specializes in televisions. You have the responsibility to sort the equipment into reusable and recyclable channels.

1. You must evaluate the equipment to ensure it is in good condition. Physically damaged equipment, such as cracked LCD screens, make most equipment not worth the cost of repair.

2. You must evaluate whether the equipment has the functionality consistent with reuse. For example, a Pentium III desktop with PS2 ports is usually not reusable because the technology is to old for current functionality requirements.

3. You must evaluate the sales price of each unit to conclude that it is likely to be reused. For example, a desktop that sells for $10 US will likely be discarded if any failures are determined. This is not indicative of reuse.

4.   You must qualify buyers of R2 Ready for Repair equipment with written due diligence.

Qualifying buyers can be very resource intensive. Therefore, selling R2 Ready for Repair equipment is not usually viable in retail markets, like online sales websites. These transactions are usually well established relationships with other companies who specialize in specific products. For example, you may have relationships with companies that test and repair printers, or televisions, or laptops. There are a few key requirements to keep in mind.

1. R2 Certified refurbishers are qualified to receive R2 Ready for Repair equipment without any further due diligence.

2. Non-R2 Certified refurbishers must demonstrate their qualifications to test and repair each specific type of equipment.

3. Non-R2 Certified refurbishers must meet the recycling requirements under Provision 5.e, which includes a full EH&S Management System.

4. Non-R2 Certified Refurbishers may only sell tested and working equipment. They may not sell non-working equipment to another vendor.

5. All buyers of R2 Ready for Repair equipment must test and refurbish the equipment to meet the requirements of R2 Ready for Reuse or R2 Ready for Resale requirements. You are essentially outsourcing the work to a vendor that is meeting these requirements for you.

These requirements for R2 Ready for Repair equipment are intentionally strict. It can only be legitimate if the outsourcing of testing meets the same requirements the R2 Certified recycler is responsible for meeting. Non-R2 Certified refurbishers must be sophisticated enough to qualify to the R2 Provision 6 requirements. A friend or local shop often do not qualify as a buyer of R2 Ready for Repair equipment.

The example below illustrates the difference in R2 Ready for Repair equipment from the R2 Ready for Reuse and R2 Ready for Resale categories. If any key function does not PASS, it would fall into this restricted category for resale.

Example: Laptop Computer
Key Functions

Key Functions	Test	Expected Results	Result
Power Adapter	Plug into laptop	Charges the battery	PASS
Motherboard / CPU	Power On self-test	No beeps, codes, or errors	PASS
Memory	Power On self-test	No beeps, codes, or errors	FAIL
Hard Drive	Wipe drive	No failures or bad sectors	FAIL
Screen	Inspect for defects	Less than 3 dead pixels, no cosmetic damage	PASS
Battery (if included)	Length of charge	Minimum 40 minutes	FAIL
Screen hinge	Open / close laptop lid	Laptop screen stays open / closed at desired angles	PASS

Secondary Functions

Secondary Function	Test	Expected Results	Result
Optical Drive	Insert and play disc	Disc loads and plays	FAIL
Floppy Drive	Insert and read from disk	Reads files on disk	FAIL
USB ports	Plug in external keyboard	Recognized and functioning	PASS
Trackpad	Manual test	Cursor moves on screen	PASS
Keyboard	Manual test	Each key produces character on the screen	PASS

Summary

Best Practices

- Determine if Reuse activities will be handled on-site, by a qualified Refurbisher or a combination of both.
- If Reuse activities will be handled on-site, determine what material will be tested and which of the three categories the material fall into:
    1. Tested and Full Function, R2/Ready for Reuse
    2. Tested for Key Functions, R2/Ready for Resale
    3. Evaluated and Non-Functioning, R2/Ready for Repair

- Develop testing work instructions for each type of equipment/component tested to include the key functions, acceptable tests of the key functions, and expected results of the tests.
- Power on is not a test of Key Functions.

- Develop a written Quality Assurance Plan

- Develop a written Product Return Plan

- If Reuse activities will be handled off-site, by a qualified Refurbisher, conduct due diligence on the Refurbisher to ensure they meet the requirements of Provision 6 if the Refurbisher is not R2 Certified. If outsourcing Data Destruction, the refurbisher must also meet the requirements under Provision 8.

- Conduct Provision 5 "due diligence on buyers of "Evaluated and Non- Functioning, R2/Ready for Repair" material that are not R2 Certified.

- Conduct Provision 3 "exporting compliance" on buyers of "Evaluated and Non- Functioning, R2/Ready for Repair" material.

- Do not sell parts or equipment for repair to unqualified buyers.

- Determine if "collectible" or "specialty" electronics exceptions apply to your equipment. This is meant to maximize reuse, but not meant to be a normal management strategy. Detailed records must be maintained to demonstrate conformance to the limitations of this exception.

Expected Records

The following list is representative of records an auditor will look for to document conformance.

- Function Test Results
- Manually completed forms
- Automated software test reports
- Test results stored in inventory software records
- Quality Assurance records
- Calibration records of test equipment
- Records of testing software updates
- Records of verification of test results
- Training records
- Competency records (tests, evaluations, personal certifications, etc)
- Disclosure of non-working function, cosmetic defects, and missing components, if applicable
- Sales listings
- Sales order
- Test reports provided to the customer
- Product Return Plan
- Records to demonstrate conformance to Provision 6.c.3.B (ex. Contracts, bill of ladings, audit reports)
- Total annual sales of reusable equipment and components (if selling collectible or specialty electronics)
- Due Diligence records for buyers of "Evaluated and Non- Functioning, R2/Ready for Repair" equipment.
- Export compliance records for buyers of "Evaluated and Non- Functioning, R2/Ready for Repair" equipment when it is exported.

Resources

Links

- PACE Guideline on Environmentally Sound Testing, Refurbishment, & Repair of Used Computing Equipment
  http://archive.basel.int/industry/compartnership/docdevpart/ppg11DraftGuidelineFinal-2011-03-15.pdf

Templates

- Sample Testing Report
  https://sustainableelectronics.org/sites/default/files/REDACTED_testing_document.pdf

- Ready for Reuse Checklist
  https://sustainableelectronics.org/sites/default/files/6.c.1%20RAM%20R2-Ready%20for%20Reuse%20Checklist.docx

- Ready for Resale Checklist (Desktop)
  https://sustainableelectronics.org/sites/default/files/6.c.2%20Desktop%20R2-Ready%20for%20Resale%20Checklist.docx

- Ready for Resale Checklist (Laptop)
  https://sustainableelectronics.org/sites/default/files/6.c.2%20Laptop%20R2-Ready%20for%20Resale%20Checklist.docx

- Ready for Resale Checklist (Generic)
  https://sustainableelectronics.org/sites/default/files/6.c.2%20Generic%20Ready%20for%20Resale%20Checklist.docx

- Evaluation for Repair Form
  https://sustainableelectronics.org/sites/default/files/6.c.3%20Evaluation%20for%20Repair%20Form.docx

Frequently Asked Questions

Q: Can I sell my refurbished computers on Amazon or EBay?

Yes if they meet the R2/Ready for Reuse or R2/Ready for Resale requirements of Provision 6. Although possible, it is unlikely to sell R2/Ready for Repair equipment on these sites because you would need to qualify the buyer under Provision 6.c.3. Do not sell items "For parts only" or "As-is" on these sites.

Q: Can I sell R2 Ready for Reuse computers without a hard drive?

No. A device must have all components and be fully-functional to be classified as R2 Ready for Reuse. A computer without a hard drive may be sold as R2 Ready for Resale if it was tested and passed with a hard drive that was removed after testing. See definitions above.

Q: If I sell full-functioning devices on eBay, do I have to audit the people I sell them to?

No, if by "full-functioning" it meets the requirements of R2 Ready for Reuse in Provision 6.c.1.

Q: Do I have to test components I sell on eBay?

Yes, if they contain Focus Materials. This would include things like batteries, optical drives, floppy drives, keyboards, mice, hard drives, LCD panel, etc.

Q: Do I have to test equipment if I'm just selling it for parts?

   Yes, if the equipment contains Focus Materials.

Q: When labeling equipment going for reuse, do we have to use "R2" in our labels?

   The physical equipment does not need to be labeled with the required descriptions in Provision 6.c. However, the commercial documentation for each sale must identify the transaction as one of the three descriptions required. This is intended so the auditor may consistently identify and follow the correct requirements for each type of reuse sales transaction. The commercial documentation of each reuse sale must identify the transaction with one of the following three categories:

   1. **Tested for Full Functions, R2/Ready for Reuse;**
   2. **Tested for Key Functions, R2/Ready for Resale;**
   3. **Evaluated and Non-Functioning, R2/Ready for Repair**

   **Note: The word "R2" has to appear in the listing.

Q: If a supplier (upstream customer) certifies that equipment is working when it is sold to an R2 Certified company, does the R2 Certified Company have to test it before it can resell it as R2 Ready for Reuse or R2 Ready for Resale?

   The R2 Company is still responsible for meeting the requirements. It may be possible with very detailed qualification and control of supplier processing. The supplier will have to be meeting the Provision 6 and 8 requirements on behalf of the R2 Company. Additional quality controls would need to be implemented accordingly. While possible, this is unlikely to be implemented with the rigor necessary unless the supplier was R2 Certified as well.

Implementation Guide: Provision 7
Tracking Throughput

General Principle – *An R2:2013 electronics recycler shall maintain business records sufficient to document the flow of equipment, components, and materials that pass through its facility.*

Implementation

Tracking throughput is the most important provision in the R2 Standard that demonstrates that the Recycler is actually shipping to qualified downstream vendors. It also demonstrates that the Recycler is processing and not accumulating or mismanaging material (R2:2013 Guidance, section 7.1).

All material under the scope of the R2 certification needs to be tracked both inbound and outbound, at a minimum. Focus materials (FMs) are required to be tracked through final processor. However, non-focus materials only need to be tracked to the first-tier downstream vendor.

Tracking records for inbound material may include inventory software, receiving reports and customer provided documentation (R2:2013 Guidance, section 7.2). Tracking records for outbound material may include bills of lading, invoices and downstream acknowledgements of receipt.

There are multiple methods of tracking throughput (R2:2013 Guidance, section 7.3). The best method is dependent on your type of operations:
- Recyclers typically track by weight
- Refurbishers typically track in units/serial numbers.

Your organization may need a hybrid method that tracks both weight and unit/serial numbers.

If a Recycler generates a mass balance report, the auditor may ask to see the supporting documents that add up to the amounts on the mass balance report. For example if a Recycler shows it shipped out 100,000 lbs. of circuit boards, the auditor will ask to see corresponding bills of lading that add up to 100,000 lbs. All downstream vendors for FMs listed on the bills of lading must match the Downstream Vendors that have been qualified by Provision 5. Trial/Sample loads are not allowed as a method to qualify a downstream, vendors. All downstream vendors must be qualified prior to the first shipment. All Transporters listed on the bills of lading must match the Transporters that have been qualified by Provision 11.

An R2 Certified facility is required to maintain at least 3 years of records tracking its throughput. Records need to be accessible and readily retrievable. A R2 Certified recycler should be able to provide these records, along with a complete list of the names and locations of all downstream vendors that handle focus materials, to their auditor, as well as to any clients at their request.

Summary

Best Practices
- Determine the best unit of measure for tracking (For example, weight is a typical tracking measurement for recycling, whereas serial/identification numbers are tracking typical measurement for reusable items)
- Determine the method to track material (software, excel spreadsheet, bar coding, etc.)
- Determine your beginning inventory (physical count may be needed)

- Add inbound material for the selected time frame
- Subtract outbound material for the selected time frame
- Determine your ending inventory (will be the beginning inventory number for the next time period)

Required Records

Tracking Throughput Records (may include any of the following)

- Mass Balance Report
- Inventory Reports
- Contracts
- Bills of Lading
- Invoices
- Sales orders
- Purchase orders
- Non-Disclosure Agreements (if desired)

Resources

Templates

- Sample Acknowledgement of Receipt
  https://sustainableelectronics.org/sites/default/files/7%20-%20Acknowledgement%20of%20Receipt.pdf

- Sample Mass Balance Report
  https://sustainableelectronics.org/sites/default/files/7%20-%20Mass%20Balance%20Report.xls

- Sample BOL with Import Permission
  https://sustainableelectronics.org/sites/default/files/7%20-%20Sample%20BOL%20with%20Import%20Permission.pdf

Frequently Asked Questions

Q: Are mass balance worksheets a requirement for R2 certification?

No, mass balance worksheets are not a mandatory requirement of R2. It is only one method that can be used by recyclers to show how material moves through the facility during a specific period. If a mass balance is used, it should include weights of all materials received and weights of all materials that left the facility and the destination of those materials. The calculation should also account for material diverted for resale/reuse. Material leaving the facility for a specific period should be the control total for identifying and balancing the FM material flow.

Q: Do we need to get Bills of Lading (BOLs) or manifests for all vendors handling FMs below a R2 certified vendor?

The requirement is to get BOLs up to the 1st Tier of Downstream Vendors. It is certainly encouraged by the R2 Standard to get sample BOLs from other tiers to ensure satisfactory due diligence but BOLs and manifests for every shipment of FM across the tiers beyond the 1st tier is not mandatory per the R2 Standard.

Implementation Guide: Provision 8
Data Destruction

General Principle – *An R2:2013 electronics recycler shall be responsible for data destruction of all media it handles using generally-accepted data destruction procedures.*

Implementation

Data Destruction ensures that customer data is protected and destroyed. There are many methods of data destruction including sanitization, degaussing and physical destruction (R2:2013 Guidance, section 8.1). R2:2013 requires adherence to the NIST 800-88 Guidelines for Media Sanitization. Generally-accepted standards and guidelines such as NAID, ADISA, or DMS:2008 are also satisfactory.

Identification of Media and Media Containing Equipment

To conform with R2:2013 data destruction requirements, determine the different types of media containing equipment and media your organization handles and determine how employees will be trained to identify data storage devices during the receiving and sorting processes (R2:2013 Guidance, section 8.2). Data storage devices are anything with some type of storage media, such as:

CD ROMs / DVDs	Desktop / Laptop computers
Solid State Drives	DVRs (i.e. "Tivo" type devices)
Hard Drives	Mobile phones
Floppy Disks	Servers
Data Tapes	Tablets
Video Tapes	Copiers and imaging devices
Flash Memory (USB sticks, SD cards, etc.)	High-end printers
Internal storage chips	

Documented Data Destruction Procedures

A Recycler is required to document methods of data destruction for each type of media containing equipment and media. Data Destruction procedures should include detailed instructions to successfully destroy the data on the particular device (R2:2013 Guidance, section 8.5). Methods of data destruction will vary by device type. For example, solid-state memory devices (such as those used in mobile devices and more modern "thin and light" laptops), require different wiping and destruction procedures than traditional spinning-disk hard drives. Additionally, data storage on phones or mobiles are physically smaller than laptop or desktop storage, meaning those devices necessitate a smaller shred size for effective destruction. Consider regularly-updated visual work instructions used at sorting stations, describing which types of devices contain data.

Data Destruction Training

Employees must be trained on Data Destruction procedures and records of employee training maintained (R2:2013 Guidance, section 8.6). Qualified personnel are required to administer all trainings and evaluate employee competency. All training procedures should be documented.

Data Destruction Process Validation

Independent validation of your data destruction processes is required to ensure successful destruction (R2:2013 Guidance, section 8.7).   Validation requires documented evidence that demonstrates a PROCESS consistently and effectively produces an outcome that conforms to established criteria and quality controls.

Review and validation of data destruction procedures should include: validation of the procedures, effectiveness of employee training, calibration, maintenance of equipment, and Performance of data destruction methods. Reviews should specifically include competency evaluations of employees, attempts at data recovery from sanitized devices, verification of calibration schedules, and verification of data sanitization records.

Other types of validation may include: Periodic Media Recovery Checks, and detailed internal audit of data destruction process.

Data Destruction Security Controls

Security controls should be in effect from at the time you take possession of the data bearing media to the time the data has been destroyed. Security controls should consider physical security (locked trailers, locked bins, cages, locked rooms), monitoring (cameras, key fobs), chain of custody (transportation to facility, transportation to downstream vendor, if data is still present) and personnel qualifications (background checks). The level of security used in all of your procedures should be relevant to the most sensitive type of equipment you are processing. For example: If HIPAA material is the most sensitive material, but only accounts for 10% of a facility's volume, all security must be designed around meeting requirements for HIPAA.

Data Destruction Process Management of Change

It is important to note that as data storage devices evolve, data destruction methods will also change and data destructions practices must be reviewed and modified. Determine how you will stay up-to-date with the newest technology and data destruction methods. Regularly assess the types of material coming into your facility, and communicate changes in the composition of your incoming recycling stream to your employees. Sort and data destruction procedures should be revised and maintained up-to-date based on assessment results.

Summary

Best Practices

- Determine the different types of data containing devices your organization handles
- Determine if data destruction will be handled on-site or by a downstream vendor.
- If data destruction is handled on-site
    - Develop Data Destruction Procedures
    - Train Data Destruction Employees
    - Determine Validation Cycle
    - Conduct Validation
    - Maintain records
- If data destruction is handled by a downstream vendor
    - Determine how data is protected in transit to downstream vendor
    - Conduct due diligence on downstream vendor to ensure they meet Provision 8 requirements
    - Maintain destruction records

Required Records

- Data Destruction Records (internal or down-stream)
- Training Records of Data Destruction Employees
- Validation Records
- Downstream Vendor Due-Diligence Records

Resources

Links

- NIST Special Publication 800-88 Rev.1
  http://csrc.nist.gov/publications/nistpubs/800-88/NISTSP800-88_with-errata.pdf
- NAID (National Association for Information Destruction, Inc.)
  http://www.naidonline.org/nitl/en/certification.html
- ADISA (Asset Disposal and Information Security Alliance)
  http://adisa.global/

Templates

- Sample Data Destruction Procedure
  https://sustainableelectronics.org/sites/default/files/8%20-%20Data%20Destruction%20Procedure%20.docx
- Sample Validation Log
  https://sustainableelectronics.org/sites/default/files/8%20-%20Data%20Validation%20Log.xls

Implementation Guide: Provision 9

Storage

General Principle – *An R2:2013 electronics recycler shall store items and materials that may cause risk to worker health and safety or the environment if inappropriately stored, and equipment and components going to reuse, in a legal and appropriate manner.*

Implementation

Focus Materials

Proper storage of focus materials reduces environmental and worker health and safety risks (R2:2013 Guidance, section 9.1). Storing materials properly prevents spills, fires and releases to the environment, and prevents workers from being injured by falling material and inhalation of hazardous substances (R2:2013 Guidance, section 9.2).

To ensure conformance with this provision of the R2 Standard, begin by following these steps:

1. Determine any legal requirements related to the storage of focus materials. Keep in mind, that different jurisdictions have different requirements (local, state/provincial, federal).

2. Determine responsibilities for placing required labels on gaylords/boxes prior to placing material in it. Lack of proper labeling is a common finding in R2 and compliance audits.

3. Develop work instructions and training specific to the storage of focus materials. Consider how to identify the material. Do you want to label each Gaylord with a pre-printed label? Do you want to use a reusable placard?

4. Determine a method to maintain and review accumulation time limits. If you cannot store the material for more than one year, how will you know when the one year time limit is approaching? Who has been assigned responsibility for tracking accumulation time limits?

5. Determine training for storage area employees.

6. Determine preventative measures. Encourage all workers to be on the look-out for damaged/tipping pallets that could cause stacked palletized material to fall and injure workers. Taping leads of batteries to prevent fires and determine emergency response measures if a spill or fire occurs.

Note: In the US and other countries, focus materials may be considered universal waste. In some states, all e-waste is considered universal waste. In others, it may just be batteries and fluorescent tubes. For a list of US state universal waste regulations, click here.

Best Practices for Storage of Focus Materials

Focus Material Type	Storage Best Practices
Unbroken CRTs	Clearly labeled as required by law and internal procedures. Store in a building or container designed to minimize releases; and Store in accordance with legal time-frames and storage quantities.
Broken CRTs	• Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Batteries – Primary Lithium "Button" Cell	• Protect terminal ends to prevent coming in contact with other batteries and metals (ex. taping) • Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Batteries – Ni-Cad, Alkaline, NiMH, Li-Ion	• Protect terminal ends to prevent coming in contact with other batteries and metals (ex. taping) • Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Batteries – Sealed Lead Acid	• Protect terminal ends to prevent coming in contact with other batteries and metals (ex. Taping or cardboard between layers) • Store on a skid with secondary containment (in the even of leaking acid) • Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Leaking Batteries	• Double bag the leaking battery in plastic bags • Store in a separate 5 gallon bucket • Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Fluorescent Tubes	• Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Broken Fluorescent Tubes	• Double bag the broken fluorescent tubes in plastic bags • Store in a separate 5 gallon bucket or drum • Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
PCBs	• Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.
Circuit boards	• Clearly labeled as required by law and internal procedures. • Store in a building or container designed to minimize releases; and • Store in accordance with legal time-frames and storage quantities.

Reusable Equipment & Components

Proper storage of reusable equipment and components ensures material destined for resale will not be damaged during storage on-site or during shipment.

To ensure conformance with this provision of the R2 Standard determine by type of material how reusable equipment and components should be protected and stored.   Considerations include:

1. Packaging guidelines – how many in a box/pallet?

2. Can material be stacked?

3. Should units be shrink wrapped?

4. What are the customer's requirements for packaging?

5. Is material sensitive to heat, moisture, shaking?

6. Are there any legal requirements related to packaging? Ex. Can batteries be shipped with the units or separate? Can batteries be shipped via air transport?

Summary

Best Practices for Focus Materials

-   Store FMs inside. (Protected outside storage is permissible if allowed by law and the area is secure from unauthorized access. Review Stormwater regulations for requirements of outside storage.)
-   Develop work instructions and training specific to storage. Applicable regulations may require training on storage, labeling and accumulation time limits on wastes. (Example – U.S. universal waste regulations, fire codes, OSHA) Determi

Best Practices for Reusable Equipment

-   Develop visual work instructions for storage by material type. For example:

    - How high can material be stacked? You could include photo of flat panel monitors that are
       shrink wrapped on a skid with a base of 4 units, stacked no more than four units high.
    - What is the distance you'll keep between rows of gaylords or pallets?
    - How much can the racking hold, does it have the weight limit posted?
    - When are gaylords or pallets too damaged to be reused

Required Records

-   Inspection Records (if required by law)
-   Reporting Records (if required by law)

Resources

Links

-   US EPA Universal Waste Regulations
    http://www.epa.gov/epawaste/hazard/wastetypes/universal/index.htm
-   US CRT Regulations
    http://www.epa.gov/osw/hazard/recycling/electron/index.htm
-   Fedex Packing instructions for Lithium Ion batteries
    http://www.fedex.com/us/services/pdf/LithiumBattery_Overview.pdf

Templates

- Sample Battery Control Procedure
  https://sustainableelectronics.org/sites/default/files/9%20-%20Battery%20Control%20Procedure.pdf

- Sample Storage Procedure
  https://sustainableelectronics.org/sites/default/files/9%20-Storage%20Procedure%20%28US%29.doc

- Blank Sample Universal Waste Label
  https://sustainableelectronics.org/sites/default/files/9-%20UW%20Label%20Photo_Blank.pdf

Implementation Guide: Provision 10
Security

General Principle – *An R2:2013 electronics recycler shall employ security measures appropriate for the equipment it handles and customers it serves.*

Implementation

The security requirements of Provision 10 have a direct impact on a Recycler's ability to conform to several other provisions of the R2 Standard. Proper security measures prevent theft of material and data security breaches (R2:2013 Guidance, section 10.1).

Security is more than locks and cameras. Security extends from the moment you take possession of the material to the moment you release material into another's custody. Security includes physical security, monitoring of activities, transport security, chain-of-custody, and personnel qualifications (R2:2013 Guidance, section 10.2).

It is important to document the type of material you process (value, potential risk, data bearing) and the type of customers you serve (government, medical, bank) (R2:2013 Guidance, section 10.3). Consider conducting a security risk assessment of your facility and operations and assess the vulnerabilities (physical, administrative technological). Review contractual language to determine what security requirements are mandated by customer requirements. Ensure you understand if you are taking on data liability per legal requirements (Ex. HIPPA, Sarbanes Oxley) and understand what security is required for these legal requirements.

Based on the security risk assessment, determine appropriate security controls for the facility, materials and equipment, and data contained on equipment. Design and implement controls to mitigate vulnerabilities (authorization, termination, monitoring, etc.). All security controls should be documented in a written Security Program.

A Security Program should contain the following:

- Communication requirements for notifying clients, regulatory officials, and the public about any security breaches.

- Disclosure laws relevant to the facility.

- Processes to maintain security upon pickup or delivery (Is material that requires extra security tagged? Is material immediately moved to a secure area?)

- Controls while at the facility (physical, transport, chain-of-custody, personnel qualifications, monitoring)

- Responsibilities and authorities for security requirements. (Who has access to that secure area?)

Train employees on the security program and ensure monitoring of controls is built into the system.

Example Controls for a Security Program

Physical Security

- Fencing
- Gates
- Security Guard
- Limited Entrances/Exits and Keypads
- Metal Detectors and Wands,
- Secure rooms/storage
- Cameras and CCTV recordings
- Badges
- Motions Sensors and Alarms

Monitoring

- Hourly/Daily walk around Inspections
- Continual monitoring of cameras
- Weekly/Monthly function inspections of cameras, recording devices, playbacks, locks, motion sensors
- Yearly testing with alarm company

Transport

- Locked cabs and trailers
- Locked bins/storage units
- Qualification and Background checks on drivers
- Instructions to not leave material unattended

Chain of Custody

- Qualification and Background checks on outsourced activities such as packaging, labor and transport
- Security measures for off-site/downstream shredding of data containing devices

Personnel

- Employment history verification
- Criminal background screening
- Drug screening

Summary

Best Practices

- Written Security Program
- Training on the Security Program and the importance of security
- Evaluation of Security Program at planned intervals looking for threats and opportunities for improvement.

Required Records

- Monitoring records of security
- Data Breach notifications

Resources

Links

- HIPAA Security Rule
  http://www.hhs.gov/hipaa/for-professionals/security/laws-regulations/
- Sarbanes-Oxley Compliance Checklist
  https://correlog.com/support-public/SOX-Compliance.pdf Templates

Templates

- Sample Security Control Plan
  https://sustainableelectronics.org/sites/default/files/10%20-%20%20Security%20Control%20Plan.xls
- Sample Security Risk Assessment
  https://sustainableelectronics.org/sites/default/files/10%20-%20%20Security%20Risk%20Assessment.xls
- Sample Security Inspection Checklist
  https://sustainableelectronics.org/sites/default/files/10%20-%20Monthly%20Security%20Inspection%20Checklist.doc
- Sample Security Program
  https://sustainableelectronics.org/sites/default/files/10%20-%20Security%20Program.doc