

# RM0042AB

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## Restricted Materials and Environmental Compliance Requirements

September 21, 2010



**Restricted Materials and Environmental  
Compliance Requirements (RM0042)**

**REVISION HISTORY**

Rev	ECO #	Description	Approver(s)	Date
AB	78308	<ul style="list-style-type: none"> <li>Updated and expanded definitions</li> <li>Added Supplier Environmental Commitment section</li> <li>Added Table 2 Restricted Substances and associated guidance</li> <li>Added Table 3 Declarable Substances and associated guidance</li> <li>Changed preferred declaration format to Jig 101</li> <li>Deleted RoHS exemptions table, included link instead</li> </ul>	Scott Canonico Gio Ghisletti Eddie Khong Matt McKinney Stephen Lord	09/21/2010
AA	73645	Original document	Bright Wang Carol Finger Chee Meng Ooi Chris Cederquist Cindy Pitrat Doug Powell Gary Pimple Gary Camic Stephen Lord	02/26/2009

**Important Legal Note:** The information contained herein is intended to assist those companies supplying Advanced Energy Industries with electronic components, assemblies and material in complying with the EU's RoHS Directive and other environmental regulations. It also includes very specific requirements for our Suppliers. Certain information herein is simplified guidance based on complex and changing legislation, and does not constitute legal advice. The RoHS Directive and other applicable laws themselves should always be read and understood (as they constitute the law), in contrast with the information contained herein, which is intended to be informative, but has no legal authority. You should refer to the applicable laws themselves for a full statement of the legal requirements, and in the case of any doubt seek independent advice, including your own legal counsels' recommendations.

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## **Restricted Materials and Environmental Compliance Requirements (RM0042)**

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## Restricted Materials and Environmental Compliance Requirements (RM0042)

### 1.0 Introduction

#### 1.1 Document Owner

The Corporate Environment Health and Safety (EHS) Department is responsible for this manual. Any changes to it must be approved by the Director, EHS and Sustainability.

#### 1.2 Purpose

This manual provides product EHS compliance requirements and guidelines to Advanced Energy's supply base. As a part of Advanced Energy's regulatory compliance strategy, suppliers are required to:

- Meet Advanced Energy Industries environmental compliance requirements as specified in this manual,
- Comply with all applicable legal and regulatory requirements, and
- Provide accurate, timely and appropriate disclosures and/or reporting related to these requirements.

#### 1.3 Scope

The Advanced Energy Restricted Materials and Environmental Compliance Requirements manual identifies the requirements and standards for the elimination of hazardous substances from Advanced Energy products, and for the disclosure of certain material content. The standard applies to all parts, materials, components and/or products supplied to Advanced Energy, whether finished, semi-finished, or unfinished.

#### 1.4 Deviations

**Any deviation from the requirements outlined in this manual requires written authorization from the Advanced Energy EHS Department.** Advanced Energy considers unauthorized deviations as a serious violation of supplier agreements, which could result in corrective actions including removal from the Advanced Energy Approved Vendor List (AVL)

**Suppliers shall communicate any conflicts between Advanced Energy drawings and the specifications and requirements of this manual.**

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### 2.0 Definitions

- 2.1 Article: An object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition.
- 2.2 Backward Compatible: Lead-free component that can be manufactured or assembled in a lead bearing environment without any detrimental functional and reliability effects.
- 2.3 BGA: Ball Grid Array
- 2.4 BOM: Bill of Material
- 2.5 China RoHS: Management Methods for Controlling Pollution by Electronic Information Products (Ministry of Information Industry Order #39). Jointly promulgated by Ministry of Information Industry, national Development and Reform Commission, Ministry of Commerce, General Admission of Customs, General Administration of Industry and Commerce, General Administration of Industry and Commerce, General Administration of Quality Administration, Inspection and Quarantine, and State Environmental Protection Administration on February 28, 2006, and effective on March 1, 2007.
- 2.6 Copy Exact (CE): An Advanced Energy Industries process to notify and/or obtain approval from our customers on Enterprise Change Orders (ECO).
- 2.7 Enterprise Change Order (ECO): Used to document, plan, control, and approve any changes made to documents, end-item configurations, processes, materials, etc. A record of the ECO will be maintained at Advanced Energy permanently.
- 2.8 EU: European Union
- 2.9 EU RoHS: European Union (EU) Restriction of Hazardous Substances Directive 2002/95/EC, as amended.
- 2.10 Homogenous material: A material that cannot be mechanically disjointed into different materials: homogenous materials are materials of uniform composition throughout. Ceramics, glass, metals, alloys, plating, board, resins, coatings are examples. The term “mechanically disjointed” means that the material can be, in principle, separated by a mechanical action such as unscrewing, cutting, crushing, grinding and abrasive processes.

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### *Examples:*

A plastic component is a “homogenous material” provided it is made with a single polymer grade and is not coated with another material, nor has any other material attached to it.

An electrical component, such as a resistor, could consist of a variety of homogenous materials, including ceramic, the lead frame alloy, and the plating to the lead frame. Each is considered homogenous material.

- 2.11** iNEMI: International and North America Electronics Manufacturing Initiative
- 2.12** Intentionally added: Deliberate use of a substance in the formulation of a material/part where its continued presence is desired to provide a specific characteristic, appearance or quality. If a material is intentionally added at any point in the supply chain it must consistently be treated as intentionally added thru the final product assembly. Also, any catalysts or processing aids that are introduced during the manufacturing process and remain as part of the product are always considered intentional additions.
- 2.13** Materials: Chemical compounds and formulated substances that are supplied for the production of parts. Examples of materials are: plastics/resins, metals, coatings, paint, adhesives, etc.
- 2.14** MCV: Maximum Concentration Value
- 2.15** MPN: Manufacturer Part Number
- 2.16** MOTS: Modified Off-The-Shelf
- 2.17** Not present: Substances is not detectable with standard analytical methods
- 2.18** Not used: As applied to a restricted material, this means no utilization, whether incorporated into the material/part or utilized in the manufacturing process, at any point the supply chain.
- 2.19** OTS: Off-The-Shelf
- 2.20** Parts: Mechanical parts, electrical devices, or assemblies. Included are sub-parts, components, and/or products which are supplied to Advanced Energy Industries for use in their products.

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- 2.21** PCB: Printed Circuit Board
- 2.22** PPM: Parts Per Million (mg/kg)
- 2.23** REACH: REACH stands for Registration, Evaluation, and Authorization of Chemicals. It is a European Community Regulation (EC No 1907/2006) that has been in effect since June, 2007. The key points of REACH are:
- Applies to chemical substances and articles (objects, such as electronic equipment) manufactured or imported into the EU
  - Affects everyone in the supply chain - manufacturers, importers and their customers
  - Requirements can be triggered by exceeding chemical substance import quantity thresholds (e.g., 1 tonne/year) or substance concentration threshold (0.1% w/w in an article)
- 2.24** REACH Candidate List of Substances of Very High Concern (also, “Candidate List”): List of substances for authorization, as published by the European Chemicals Agency
- 2.25** RoHS : Restrictions on Use of Certain Hazardous Substances
- 2.26** RoHS CoC: Restriction of Hazardous Substances Certificate of Compliance. A RoHS CoC is an authorized legal statement from a Supplier to Advanced Energy Industries stating whether its products comply with given environmental laws or standards. Advanced Energy strongly prefers and encourages a RoHS CoC in the form of the standardized IPC1752-2 format.
- 2.27** SCB: Supplier Call Back
- 2.28** Substance: A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition
- 2.29** WEEE: Waste Electronic and Electrical Equipment

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## **Restricted Materials and Environmental Compliance Requirements (RM0042)**

### **3.0 APPLICABLE DOCUMENTS**

#### **3.1 Advanced Energy Documents**

- 3.1.1 RM0002 Advanced Energy Industries Workmanship Standards
- 3.1.2 RM0006 Hybrids Manufacturing Standards Manual
- 3.1.3 RM0011 Logistics Reference Manual
- 3.1.4 RM0013 Mechanical Fabrication Specification Manual
- 3.1.5 SP0027 Advanced Energy Industries Copy Exact Policy
- 3.1.6 FP0381 Substance Disclosure for PRC (China RoHS)
- 3.1.7 QF0511 SQE Restricted Materials Audit Checklist

#### **3.2 Laws and Regulations**

- 3.2.1 Directive 2002/95/EC RoHS (Restrictions on the use of Certain Hazardous Substances)
- 3.2.2 Directive 2002/96/EC WEEE (Waste Electrical and Electronic Equipment)
- 3.2.3 Directive 2000/53/EC ELV (End of Life Vehicle)
- 3.2.4 Directive 1999/77/EC Restrictions for Dangerous Substances and Preparations
- 3.2.5 Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

#### **3.3 Industry Standards**

- 3.3.1 JIG 101, Joint Industry Guide, Material Composition Declaration for Electromechanical Products, Ed. 3.0
- 3.3.2 JESD201, Environmental Acceptance requirements for Tin Whisker Susceptibility on Tin and Tin Alloy Surface Finishes
- 3.3.3 JESD22A121.01, Test Method for Measuring Whisker Growth on Tin and Tin Alloy Surface Finishes
- 3.3.4 JP002, Current Tin Whiskers Theory and Mitigation Practices Guidelines

#### **3.4 National Standards**

- 3.4.1 SJ/T11364-2006 Marking for Control of Pollution Caused by Electric Information Products
- 3.4.2 GB 18455-2001 Packaging Recycling Marks

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### **4.0 SUPPLIER ENVIRONMENTAL COMMITMENT**

It is Advanced Energy's policy to:

- Comply with applicable environmental laws and regulations;
- Measure and continually improve our environmental performance; and
- Conserve natural resources, including materials, energy, and water.

We expect our suppliers to implement programs to do the same.

### **5.0 Restricted and Declarable Substances**

Restricted and declarable substances are outlined in the following three tables. Table 1 addresses RoHS substances, which have unique Advanced Energy compliance requirements. Note that a number of exemptions exist from RoHS substance restrictions. Table 2 contains general content restrictions; there are no exemptions. Thresholds in both Table 1 and Table 2 apply to concentrations in homogeneous materials (see definitions).

Table 3 lists substances for which Advanced Energy requires supplier disclosures (declarations) of use. These substances are NOT restricted from use according to this manual. However, their presence in products can trigger compliance requirements, so declaration is very important. The concentration threshold for substance declaration is 1000 ppm (0.1% w/w) of the entire item.

Further information about these substances and legal references to requirements can be found in JIG 101 "Joint Industry Guide, Material Composition Declaration," published at <http://CE.org/JIG>.

#### **Table 1 – Restricted Substances – RoHS**

These threshold values (or Maximum Concentration Values) will apply to each "homogenous material" within a component.

Compliance requirements relative to RoHS substances for products designated as RoHS compliant are located in section 6.0 of this manual.

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## Restricted Materials and Environmental Compliance Requirements (RM0042)

Substance	Threshold (by weight)	Exemptions	Example uses
Cadmium/Cadmium compounds	75 ppm	<ul style="list-style-type: none"> <li>See RoHS <a href="#">Annex</a></li> <li>Products NOT designated as RoHS compliant are exempt from this restriction</li> </ul>	Surface coating, stabilizer, pigment, batteries
Chromium VI compounds	1000 ppm	<ul style="list-style-type: none"> <li>See RoHS <a href="#">Annex</a></li> <li>Products NOT designated as RoHS compliant are exempt from this restriction</li> </ul>	Anti-corrosive, pigment, surface treatment
Lead/Lead compounds	1000 ppm	<ul style="list-style-type: none"> <li>See RoHS <a href="#">Annex</a></li> <li>Products NOT designated as RoHS compliant are exempt from this restriction</li> </ul>	Solder, resin stabilizer, metal alloy, batteries, among other uses
Mercury/Mercury compounds	1000 ppm	<ul style="list-style-type: none"> <li>See RoHS <a href="#">Annex</a></li> <li>Products NOT designated as RoHS compliant are exempt from this restriction</li> </ul>	Lamps, thermostats, resin stabilizer, batteries, among other uses
Polybrominated Biphenyls (PBBs)	1000 ppm	None	Flame retardant
Polybrominated Diphenylethers (PBDE)	1000 ppm	None	Flame retardant

**Table 2 – Restricted Substances**

These threshold values (or Maximum Concentration Values) will apply to each “homogenous material” within a component.

Substance	Threshold (by weight)	Exemptions	Example uses
Asbestos	Not present	None	Not expected in parts delivered to AE. Used as a flame resistant material.
Azocolorants	Intentionally added	None	Leather dyes. Plastic colorants.
Cobalt dichloride (CoCl <sub>2</sub> ); CAS No. 7646-79-9	1000 ppm	None	Not expected in parts delivered to AE. Indicator of water intrusion/contamination
Dibutyltin (DBT) compounds	1000 ppm as tin	None	Stabilizer for PVC, curing catalyst for silicone and polyurethane adhesives and sealants
Dimethyl fumarate; CAS No. 624-49-7	0.1 ppm	None	Not expected in parts delivered to AE. Biocide
Formaldehyde; CAS No. 50-00-0	Not used	None	Not expected in parts delivered to AE. Used in some resins, textile finishing agent
Hexabromocyclododecane (HBCDD) and all major diastereoisomers	1000 ppm	None	Flame retardant, especially in expanded polystyrene (EPS)
Ozone depleting substances (Class I and Class 2)	Not used	None	Not expected to be used in production of parts delivered to AE.

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Substance	Threshold (by weight)	Exemptions	Example uses
			Previously used in cleaning applications
Perchlorates; CAS No. 7791-03-9	0.006 ppm	None	Not expected in parts delivered to AE. Used in some coin cell batteries
Perfluorooctane sulfonate (PFOS)	Not used	None	Not expected to be used in production of parts delivered to AE. Used in photolithographic chemicals
Phenol,2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl); CAS No. 3846-71-7	Intentionally added	None	Adhesives and plastics
Polychlorinated Biphenyls (PCBs) and Terphenyls (PCTs)	50 ppm or Intentionally added	None	Not expected in parts delivered to AE. Historically used as dielectric fluids in transformers, capacitors, and coolants
Polychlorinated Naphthalenes (more than 3 chlorine atoms)	Not used	None	Not expected in parts delivered to AE. Wire insulator, rubber and plastic additive, lubricant
Radioactive Substances	Not present	None	Not expected in parts delivered to AE.
Refractory Ceramic Fibers	Not present	None	Insulation
Shortchain Chlorinated Paraffins (C10 – C13)	Not present	None	PVC plasticizer, flame retardant
Tri-substituted organostannic compounds	Not used or present	None	Stabilizer, pigment, paint
Tributyl Tin Oxide (TBTO); CAS No. 56-35-9	Not used or present	None	Coating materials, biocide

### **Table 3 – Declarable Substances**

The following substances are subject to disclosure requirements. *It is important to note that their use is not currently restricted or banned from Advanced Energy parts/products per this manual.*

Article 33 of the EU REACH (Regulation (EC) No 1907/2006) requires importers of articles containing a substance included in the [Candidate List](#) at a concentration above 0.1% (w/w) to provide information to industrial or professional users. “REACH Substances” listed below are those most likely to be contained in electronic products, such as those produced by Advanced Energy. Substances on the REACH Candidate List are also declarable, but not expected in parts delivered to AE. REACH substances included in Tables 1 and 2 are not duplicated in the table below.

Supplier disclosure of “Additional Declarable Substances” facilitates future part/product selection and compliance with anticipated regulatory requirements.

Threshold concentration for all declarable substances is 1000 ppm (0.1%), by weight of the entire item as delivered to AE (part or product). There are no exemptions.

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REACH Substances	Example Uses
Bis (2-ethylhexyl) phthalate (DEHP); CAS No. 117-81-7	Plasticiser used in a wide range of PVC and other polymer applications
Benzyl butyl phthalate (BBP); CAS No. 85-68-7	Plasticizer
Dibutyl phthalate (DBP); CAS No. 84-74-2	Plasticizer
Diisobutyl phthalate (DIBP); CAS No. 84-69-5	Plasticizer
Additional Declarable Substances	Example uses
Antimony/Antimony Compounds	Solder alloy, doping agent, used in flame retardant formulations,
Arsenic/Arsenic Compounds	Doping agent, gallium arsenide is a semiconductor material
Beryllium/Beryllium Compounds	Doping agent, ceramics
Bismuth/Bismuth Compounds	Lead-free solder
Brominated Flame Retardants (excluding those listed in Table 1 or Table 2)	Flame retardant in plastic resins
Diarsenic pentoxide; CAS No. 1303-28-2	Used in glass production
Diarsenic trioxide; CAS No. 1327-53-3	Used in glass production
Phthalates (other than those listed above)	Plasticizers
Selenium/Selenium Compounds	Anti-microbial, photoconductor, photovoltaic
Vinyl Chloride Polymer (PVC)	Resin, cable insulation

## 6.0 ROHS COMPLIANCE REQUIREMENTS (TABLE 1 SUBSTANCES)

### 6.1 Introduction to Supplier Requirements

6.1.1 For assemblies designated by Advanced Energy as RoHS compliant, all parts and materials supplied to Advanced Energy shall be free from hazardous and controlled substances as listed in European Union (EU) RoHS Directive 2002/95/EC, as amended

### 6.2 RoHS Part / Material Identification

Advanced Energy has elected to identify RoHS compliant parts and materials with 8-digit part numbers (non-RoHS compliant parts have 7-digit part numbers). The following information provides guidance on the acceptability of providing RoHS components as part of assemblies or as individual components being purchased by AE or its Suppliers.

6.2.1 Advanced Energy will review documentation for all parts and assemblies with 8-digit part numbers for compliance with European Union RoHS Directive 2002/95/EC, as amended. Once Advanced Energy determines that a part is compliant, a corresponding flag will be set in AE's SAP system.

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- 6.2.2 For specified RoHS compliant custom assemblies (mechanical and electrical), the assembly will have an 8-digit part number AND an Advanced Energy Industries RoHS logo or “RoHS Compliant” statement on the drawing (see AE RoHS Logo below).



- 6.2.3 As RoHS requirements have been implemented worldwide, some leaded parts (i.e., not RoHS compliant) have been discontinued, necessitating substitutions of lead-free for leaded parts. All changes to an Approved Vendor List (AVL) **must be done via a Supplier Call Back** (SCB), including substitutions of lead-free for leaded parts. Requests to update and AVL received by Advanced Energy via SCB will be processed through the standard Enterprise Change Order (ECO) process.

*NOTE: Advanced Energy Industries is continuing to update and convert legacy part numbers and drawings to conform with these standards. In some cases, drawings for custom assemblies that are not designated as RoHS compliant (noted with RoHS logo or text) utilize 8-digit part numbers. Demonstration of RoHS compliance is not required for 8-digit part numbers in custom assemblies, where the custom assembly is not designated as RoHS compliant on the drawing.*

- 6.2.4 Contact the Component Engineering Department / Supplier Quality Engineering Department at Advanced Energy Industries for any questions and/or concerns relative to the dynamic and changing environment around RoHS and lead-free materials and their impact on business conducted with Advanced Energy.

### 6.3 RoHS Certificate of Compliance Requirements

- 6.3.1 Advanced Energy Industries Suppliers are required to provide written documentation certifying RoHS compliance (i.e., a RoHS Certificate of Compliance) for the products / assemblies they provide. This requirement applies to electronic components or subassemblies; mechanical components or subassemblies; custom fabrications; accessories including power cords, adapters, or fittings; printed materials and labels; and any item intended to become part of an Advanced Energy product. Suppliers must be able to

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provide upon request, objective evidence that they have verified compliance for all of the materials used to manufacture the item, and content of the end item.

- 6.3.2 In the case of the RoHS 2002/95/EC Directive, a RoHS Certificate of Compliance states that the products do not contain any of the six restricted substances above the permitted maximum concentration values (MCV's).
- 6.3.3 A RoHS Certificate of Compliance is required for custom or Modified Off-The-Shelf (MOTS) RoHS parts / material / assembly. For Off-The-Shelf components, proof of compliance can be accomplished with a component data sheet or supplier web site link.
- 6.3.4 A general Certificate of Compliance or Certificate of Conformity that AE Suppliers may be using for other purposes will not meet this requirement.
- 6.3.5 For the first **three (3)** shipments to Advanced Energy, on any RoHS compliant part or material, a Supplier must provide a RoHS Certificate of Compliance with each shipment. Additionally, a RoHS Certificate of Compliance must be electronically emailed to [rohs@aei.com](mailto:rohs@aei.com) and [fareports@aei.com](mailto:fareports@aei.com) at the time of each shipment. This requirement does not supersede any First Article requirement or obligation (this additional requirement for our RoHS suppliers is due to the velocity and timing of AE design engineering programs; RoHS prototype materials may end up in AE designed Concept & Feasibility products that are shipped to OEM's). First Article submissions will need an additional RoHS Certificate of Compliance at time of such submission.
- 6.3.6 At a minimum, RoHS Certificates of Compliance must include the following header information:
- Date
  - Company Name
  - Contact Name and/or Authorized Representative
  - Contact Name and/or Authorized Representative Title
  - Contact Name and/or Authorized Representative Email address
  - AE Part Number
  - Part Name
  - Part Revision
  - MFG Part Number (if applicable)
  - MFG Site Location & Address

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- Weight of Part

And the following certification elements:

- Statement of compliance to the European Directive (EU) 2002/95/EC, as amended,
- List of EU RoHS exemptions utilized, and
- Signature (may be electronic) and title of authorized certifier.

### **6.4 RoHS Substance Declaration**

6.4.1 Advanced Energy encourages that substance declarations be made in formats similar to the Example Declaration Forms provided at Annex E of JIG 101 “Joint Industry Guide, Material Composition Declaration,” Ed. 3.0 (see <http://CE.org/JIG>). Alternate formats may also be accepted.

6.4.2 Declarations for RoHS compliant items shall list all the homogenous materials that contain RoHS restricted substances above the threshold concentration (listed in Table 1). The declaration shall include the substance name and concentration (PPM or %, by weight).

6.4.3 Any RoHS substances that are contained in parts and materials purchased by a supplier and are in turn incorporated into supplier’s products must be disclosed, whether intentionally added or not.

6.4.4 Additional documentation, submitted with the RoHS Certificate of Compliance in order to validate a RoHS supplier’s part or material is RoHS compliant, is highly encouraged. AE requires that a RoHS supplier be able to provide upon request proof of compliance, such as:

- raw material RoHS test report,
- third party RoHS testing report,
- sub-supplier certification, or
- internal x-ray fluorescence (XRF) analysis

### **6.5 Supplier Management for RoHS**

6.5.1 The Supplier shall maintain documentation and/or test data that demonstrates compliance to this policy. This includes sub-tier Suppliers who are managed by our primary Suppliers.

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6.5.2 For an Advanced Energy supplied Bill of Material (where the materials and approved vendors are specifically listed) for a RoHS assembly, the Supplier shall, at a minimum, research each of the components on the BOM for “RoHS compliance”. The Supplier shall maintain supporting documentation that is available from the component / material manufacturer (e.g., datasheets, drawings, RoHS Certificate of Compliance). The Supplier shall, at a minimum, request and maintain a RoHS Certificate of Compliance for raw materials (sheet metal, plastics, etc) purchased from their sub-tier suppliers.

6.5.3 The Supplier is responsible for using third party analytical testing, at Supplier’s cost, to obtain the measurement of materials content, upon request by Advanced Energy, when:

- Internal testing is not sufficient,
- The validity of a sub-tier supplier’s declaration is uncertain, or
- A claim exists that disputes the existing data.

Recognized sample preparation and test standards must be used. Test reports must be kept on file and made available on request. Advanced Energy can provide direction on who can provide such services.

6.5.4 The Supplier must maintain purchasing history documentation for purchased RoHS parts and material used in RoHS assemblies that are procured by Advanced Energy.

6.5.5 The Supplier must evaluate, validate, and segregate incoming RoHS material from their sub-tier suppliers and/or component manufacturers.

6.5.6 Data records for proof of compliance of all purchased RoHS material must be retained by each supplier in the supply chain, including the source of each homogenous material, for a minimum of four (4) years after the sale of the product.

### **6.6 EU RoHS Exemptions**

6.6.1 As of this writing, exemptions are published in the [Annex](#) to the consolidated RoHS Directive (English version).

6.6.2 Advanced Energy recognizes exemptions that are approved by the EU Technical Adoption Committee. It is the Supplier’s responsibility to ensure that any legally permissible exemptions are assessed and any resulting

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## **Restricted Materials and Environmental Compliance Requirements (RM0042)**

changes to RoHS compliance are communicated in writing to Advanced Energy Industries via a Supplier Call Back (SCB). An updated RoHS Certificate of Compliance must be sent within 14 days of adoption. Advanced Energy Industries requirements for RoHS compliance will be revised as legislative requirements evolve.

- 6.6.3 EU RoHS exemptions on any materials must be accurately communicated to Advanced Energy Industries by our Suppliers by selecting the exemptions (via IPC form) or listing exemptions on a company's own RoHS Certificate of Compliance. Advanced Energy must have knowledge if a homogenous material or component is EU RoHS compliant with an exemption. This particular information is critical for Advanced Energy and our customers.

### **6.7 RoHS Change Control**

- 6.7.1 All suppliers must follow and adhere to Advanced Energy Industries' policy on Copy Exact (**SP0027**).
- 6.7.2 The Copy Exact policy of Advanced Energy Industries applies to any change, including changes in AE's supply chain and engineering design, as well as manufacturing, testing, and packaging of our products.
- 6.7.3 With respect to Environmental Compliance, any changes to the material composition of a RoHS part or assembly or changes to any processes that may affect the composition of the final product must be approved by Advanced Energy. All such changes are subject to the Advanced Energy Copy Exact policy.
- 6.7.4 Any approved RoHS material, assembly, and/or supply chain change by Advanced Energy Industries will require the supplier to resubmit a RoHS Certificate of Compliance at the correct revision level.

### **6.8 Marking / Packaging of RoHS Compliant Materials**

- 6.8.1 All marking/packaging requirements for RoHS material can be found in Logistics Reference Manual, **RM0011**. Please review these important requirements prior to any RoHS shipment to Advanced Energy.
- 6.8.2 In general, all RoHS parts and materials purchased by Advanced Energy should have the outer packaging boxes marked with 'RoHS' labels or markings indicating parts or materials enclosed are RoHS compliant.

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### **6.9 Other General Requirements**

- 6.9.1 Suppliers must fully understand and meet Advanced Energy Industries RoHS specifications as noted in drawings, other reference documents, and bills of materials before shipping any RoHS compliant parts or materials to Advanced Energy Industries.
- 6.9.2 Suppliers must be in a position to ship RoHS compliant parts and materials and products in regular production to satisfy Advanced Energy Industries purchase orders.
- 6.9.3 Suppliers must ensure quality and reliability of RoHS compliant parts and materials that are equal-to or better-than pre-RoHS.
- 6.9.4 Suppliers must ensure supplier process integrity to prevent contamination between pre-RoHS and RoHS compliant parts and materials.
- 6.9.5 Each supplier, directly supplying parts or materials to Advanced Energy, will have a documented process for obtaining, storing, creating, distributing, auditing, & controlling changes to records documenting RoHS compliance.

## **7.0 RESTRICTED SUBSTANCES COMPLIANCE REQUIREMENTS (TABLE 2 SUBSTANCES)**

- 7.1 The Supplier shall maintain documentation and/or test data that demonstrate compliance with substance restrictions listed in Table 2, and furnish them to AE upon request. This includes sub-tier Suppliers who are managed by AE's primary Suppliers.
- 7.2 For an Advanced Energy Industries supplied Bill of Material (where the materials and approved vendors are specifically listed), the Supplier shall, at a minimum, research each of the components on the BOM for compliance. The Supplier shall maintain supporting documentation that is available from the component / material manufacturer (e.g., datasheets, drawings, material disclosures, etc.).
- 7.3 Compliance demonstration and test data shall be retained by each supplier in the supply chain, including the source of each homogenous material, for a minimum of four (4) years after the last delivery of the item to AE.

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### **8.0 SUBSTANCE DECLARATIONS (TABLE 3 SUBSTANCES)**

- 8.1** Substances listed in Table 3 are subject to disclosure requirements. It is important to note that their use is not currently restricted or banned from Advanced Energy parts and materials per this manual.
- 8.2** REACH substances listed in Table 3 are those most likely to be contained in electronic products. In addition to those substances listed, suppliers are expected to be familiar with the REACH [Candidate List](#) of Substances of Very High Concern for authorization, as published by the European Chemicals Agency. All substances on the Candidate List are declarable to Advanced Energy, regardless of whether they are specifically listed in Table 3.
- 8.3** Substance declarations should be made in formats similar to the Example Declaration Forms provided at Annex E of JIG 101 “Joint Industry Guide, Material Composition Declaration,” Ed. 3.0 (see <http://CE.org/JIG>). Alternate formats may also be accepted.
- 8.4** Declarations should be submitted to [rohs@aei.com](mailto:rohs@aei.com).

### **9.0 SUPPLIER ENVIRONMENTAL COMPLIANCE AUDITS**

- 9.1** Audits for compliance with this manual will be conducted by the Advanced Energy Industries Supplier Quality Engineering group. All suppliers are subject to audit.
- 9.2** Audits conducted by Advanced Energy Industries SQE may include primary suppliers and sub-tier suppliers at multiple levels.
- 9.3** Supplier Audits will assess the following management systems but are not limited to:
- Management support for environmental compliance
  - Product design processes
  - Supplier management
  - Inspection processes
  - Manufacturing and assembly lines
  - Warehouse and inventory management
  - Compliance measurement
  - Training
  - Material Review Board and rework
  - PCBA Checklist (for PCBA suppliers only)

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- 9.4** Please contact your designated Advanced Energy Supplier Quality Engineer for more details and information on Supplier Audits, and to request a copy of **QF0511** Supplier Environmental Compliance Audit Report.

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