



Power Systems Inc.

Document No:

OI 742-02

Revision:

D

Title: **Quality Control Requirements For Rantec Suppliers**

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### 1 Purpose

This document establishes basic Rantec Power Systems Inc. Quality Control requirements for the Rantec Suppliers (Seller) necessary to ensure that the supplier/services purchased from the Seller meet the required quality levels.

### 2 Scope

This instruction applies to Rantec Power Systems Inc. procurement activities and Rantec Suppliers.

### 3 Supplier Responsibility & Applicable Requirements

It is the Seller's responsibility to comply with the requirements stated herein. **Sellers are required to meet both the General requirements, Section 6, and the pertinent specific purchased product requirements section (one of sections 7 thru 12).** The Section (paragraph) pertaining to these requirements are as follows:

Section 6 General Requirements

Section 7 Electronic Components

Section 8 Sub-Assemblies (i.e. Magnetics assemblies, CCAs, etc.)

Section 9 PWBs (PCBs)

Section 10 Custom Metal Fabricated Parts

Section 11 Hardware & Wire

Section 12 Chemicals

### 4 Reference Documents

### 5 Definitions

**Seller:** means the vendor/supplier or distributor performing the work/supplying materials, parts assemblies, subassemblies, and systems or services pursuant to the purchase order.

**Buyer:** means Rantec Power Systems Inc. (subsequently referred to as Rantec), issuing the purchase order (physically or electronically) which invokes this document.

**FOD:** Foreign Object Debris

**ESD:** Electrostatic Discharge

**MSL:** Moisture Sensitivity Level. For all non-hermetic SMD packages subject to bulk solder reflow processes during PCB assembly, including plastic encapsulated or moisture permeable packages, a MSL number should be assigned indicating the part's storage needs. Reference J-STD-020 and J-STD-033.

### 6 General Requirements

The general requirements described in this section apply to Sellers for all Purchase Orders.

#### 6.1 **Conflicting or Unclear Requirements**

The supplier shall notify Rantec buyer to resolve any unclear or conflicting requirement(s) in Rantec Drawings, design data (i.e. Gerber or solid works data), or purchase order. This requirement includes any process incompatibility with specified design criteria. Supplier shall not proceed until clarification or resolution is obtained from Rantec.

#### 6.2 **Change Notification Policy – Manufacturer Specified Product**

When Rantec procures from manufacturer with design authority (i.e. Rantec procures to manufacturer's data sheet (specification) or procures "off the shelf" standard product), the manufacturer shall notify Rantec of design, process, material, supplier, or manufacturing facility changes that may affect "form, fit, function" or compatibility with next level processing including industry recognized soldering or cleaning processes.



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### 6.3 **No Change Policy – Rantec Specified Product**

For purchased items that must conform to Rantec design data, (i.e. drawing, SCD, specification, Gerber or solid works data), including product manufactured from supplier assembly documentation developed from Rantec design data; no change to design, processes or material shall be implemented by the supplier without written approval from Rantec Power Systems Inc.

### 6.4 **Counterfeit Parts Prevention**

All suppliers or distributors shall guard against the use of and delivery of “counterfeit” parts or components to Rantec. The supplier shall ensure that only new materials are used in products ultimately delivered to Rantec Power Systems Inc. A “counterfeit” part is defined as: “A part falsely represented in some manner, e.g., manufacturer, part number, date code, lot code, reliability level, markings, used, etc.”

For product to be delivered to Rantec, the supplier shall only use components, parts and material directly from the Original Equipment Manufacturer (OEM) or a Franchised Distributor of the OEM. Only the part manufacturer described in the part data sheet or specification shall be selected for delivery to Rantec. Any departure from the manufacturer called out in the part documentation shall require written approval from Rantec prior to delivery.

In addition to certifying product delivered complies with purchasing order or agreements, a certificate of conformance establishing Traceability to the OEM or its Franchised Distributor shall accompany the shipment of electronic parts and assemblies with electronic parts to Rantec.

Electronic parts may not be purchased from Brokers (non-OEM or a non-Franchised Distributor of the OEM) without written consent from Rantec. Written consent will require testing verification that the non-OEM part proposed is equivalent to the part called out by the part data sheet or specification.

### 6.5 **Supplier Quality System**

The supplier’s quality system shall be appropriate to achieve specified product quality requirements as well as requirements not stated by Rantec but necessary for intended use of the supplied product, where known. The supplier shall maintain a quality system that performs sufficient inspection and tests; as well as identify, control and prevent unintended use of nonconforming product ensuring product conforms to applicable drawings and specifications. Rantec Power Systems Inc. reserves the right to review supplier’s quality system by on-site surveillance.

### 6.6 **Supplier Personnel Qualification**

Qualification and training level of supplier personnel shall be appropriate to achieve product quality requirements as specified as well as non-stated requirements necessary for intended use of product. If applicable, specific personnel qualification requirements will be included in the purchase order or sub-contract.

### 6.7 **Certificate of Conformance (C of C)**

A certificate of conformance (C of C) must be delivered with each shipment. The C of C shall state the parts or material delivered comply with the requirements contained in the following, as applicable:

- Purchase order,
- Specification,
- Drawing,
- Supplier Data Sheet as mutually agreed between the supplier and Rantec.

The C of C must also certify the components, parts or material delivered are in fact from the Original Equipment Manufacturer (OEM) or the OEM’s Franchised Distributor identifying the Original Manufacturer as the source of the component, parts or material. When an OEM’s Franchised Distributor supplies the parts to Rantec, the Franchised Distributor’s C of C must also state the parts delivered are traceable to the Original Manufacturer. The C of C must be signed by someone, (typically in the supplier’s Quality Assurance department or someone designated by the supplier’s organization), authorized to certify compliance.

### 6.8 **Hazardous Material**

Components, parts and material delivered to Rantec shall be free of compounds containing mercury, beryllium, cadmium, and chromium. The materials listed in Table A-1 of Appendix A, are banned from use in product delivered to Rantec. The materials listed in Table A-2 of Appendix A, are restricted and shall be disclosed to Rantec prior to actual delivery. (See Appendix A)



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#### **6.9 Nonconformance Notification**

The Seller shall notify the Buyer if there may be a nonconformance to form, fit, function, or issue with usability or reliability problem with product or material that has already been delivered. Seller shall not knowingly ship non-conforming material or product without written authorization from Rantec.

#### **6.10 Failure Analysis and Corrective Action Requirement**

The Seller agrees to conduct failure analysis, investigation of root cause and corrective action for parts, materials or assemblies delivered that have failed during Rantec testing or failed at Rantec's customer or field use. Seller shall provide timely replies to Rantec Non-conforming Material Report (NCMR), Corrective Action Request (CAR), or Supplier or Outside Lab Failure Analysis Request (SOLFAR). Non-response or late responses will adversely affect the suppliers rating and may limit approval status for future business with Rantec Power Systems Inc.

#### **6.11 Right of Access - Surveillance**

The Buyer, customer, and regulatory agencies shall have the right of entry to Seller premises and access to applicable processes and areas of all facilities at any level of the supply chain to perform assessments necessary to ensure conformance to the requirements stated herein. The Buyer may conduct a survey and/or perform surveillance of the Seller's quality control system to evaluate the degree of ability to comply with these and other applicable requirements

#### **6.12 Seller Flow – Down Requirements**

The Seller shall flow down to Seller's sub-tier suppliers the applicable requirements contained herein. These should include the same requirements required of the Seller by this document.

#### **6.13 Preservation and Packaging**

All parts and material intended for Buyer shall be protected against the usual hazards of ESD, corrosion, contamination, deterioration, or other spoilage at the Seller's facility and in transit. All material intended for Buyer shall be packed with suitable protection so as to prevent damage through handling, during storage at the Seller, in transit, and during storage at Buyer's facility before use. The Seller's handling, preservation, packaging and delivery processes shall contain provisions to prevent FOD.

#### **6.14 Shipping Method/Carrier**

Seller shall use shipping method or carrier as stated in Purchase order. Seller departure from shipping method/carrier as stated in Purchase Order releases Rantec (Buyer) from payment of shipping costs.

#### **6.15 Control of Records**

The Supplier shall retain objective written evidence of hardware conformance to Purchase Order requirements for each shipment. All such records are subject to review and/or audit by Rantec. The following shall be retained for a period of 10 years if it is generated during the build of the part(s):

1. Inspection and test records used to determine item conformance.
2. Reports/certifications of chemical and/or physical analysis/test records that assure conformance to applicable specifications.
3. First Article Inspections/Tests (FAITs)
4. Special process certifications.

#### **6.16 First Article Inspection/Test**

When indicated on the Purchase Order, Seller shall perform First Article Inspection (FAI) and furnish a First Article Inspection Report, to include actual dimensions, characteristics, test results, and verification of drawing notes in accordance with the drawing and/or specifications required by the Purchase Order. Material certifications and any special process certifications shall be submitted as part of the FAI documentation package. A copy of the FAI Report is to be included in the shipment and all first article pieces shall be identified as such in the shipment to Rantec.

## **7 Electronic Components**

Resistors, capacitors, ICs, diodes, transistors, optocoupler, PWMs, controllers, FETs, transorbs, LEDs, fuses connectors, electrical contacts & pins, solid state relays, etc.

#### **7.1 Plating & Tin finishes – Tin Whisker mitigation**

When tin-plating with no lead (Pb) is used, only Matte-tin finish, preferably with a nickel underplate is allowed. In the matte tin finish there shall not be bright tin and no brighteners shall be used. When Rantec drawing is specified, the finish requirement specified on the Rantec Drawing takes precedence.



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### 7.2 **Solderability**

Solderability is the ability of a metal to be wetted (wetted: formation of a relatively uniform, smooth, unbroken and adherent film of solder to a basis metal) by molten solder.

The to-be-soldered-to surfaces of product delivered to Rantec Power Systems Inc. such as components, discrete devices, sub-assemblies, transformers, inductors and PWBs, shall be able to meet appropriate solderability testing as specified in J-STD-002 Category 3.

### 7.3 **Traceability (Date Codes/Lot Numbers)**

The Seller shall provide date of manufacture date code(s) and, if applicable, lot numbers on the Seller's component body (when feasible), packing slip, reel, container or packaging.

### 7.4 **Moisture Sensitivity Level (MSL):**

For all non-hermetic SMD packages subject to bulk solder reflow processes during PCB assembly, including plastic encapsulated or moisture permeable packages, when the MSL number for the part is known by the Seller, Rantec requests the MSL number be indicated on the reels, packing slip, or packaging container.

## 8 **Sub-assemblies**

Transformers, Inductors, chokes, coil/core assemblies, Circuit Card Assemblies (CCAs), pin header assemblies, relay assemblies, connector assemblies, filter assemblies.

### 8.1 **Soldering Assemblies – Tin Whisker Mitigation**

When soldering assemblies such as circuit card, magnetic, or filter assemblies to be delivered to Rantec Power Systems Inc., tin/lead solder with Pb content greater than 3% shall be used. Lead free solder shall not be used.

### 8.2 **Solderability**

Solderability is the ability of a metal to be wetted (wetted: formation of a relatively uniform, smooth, unbroken and adherent film of solder to a basis metal) by molten solder.

The to-be-soldered-to surfaces of product delivered to Rantec Power Systems Inc. such as components, discrete devices, sub-assemblies, transformers, inductors and PWBs, shall be able to meet appropriate solderability testing as specified in J-STD-002 Category 3.

### 8.3 **Soldering Acceptance Criteria**

Soldered assemblies (e.g. Magnetics, Circuit Card Assemblies, connector assemblies, etc.) shall meet the acceptance criteria of IPC-A-610 Class 3.

### 8.4 **Age Control**

The Seller shall maintain a system for age control items where acceptability or usability of the item is limited by maximum age. The system shall include a method of identifying and controlling such items.

## 9 **Printed Circuit Boards (PCBs, PWBs)**

Printed circuit boards, printed wiring boards, "metal" PWBs, coil boards.

### 9.1 **PWB Design Requirement**

PWBs shall be designed to meet the requirements of IPC-2221 Class 3, Level C

### 9.2 **PCB Fabrication Requirement**

PWB fabrication shall be in accordance with IPC- 6012 Class 3.

### 9.3 **Thru-hole Copper Plating Thickness**

On all thru-holes with plating, the copper plating thickness shall be greater than 0.0010 inch.

### 9.4 **PWB Thickness and Condition**

Overall thickness includes all plating and is measured from metal to metal. Remove all burrs and break sharp edges.

### 9.5 **Cross-section / micro-section**

Upon Buyer request, PWB Seller shall be able to provide a cross-section / micro-section of a PWB taken from an area of the board (not the panel) for use in evaluation and analysis of inner layer structure.



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**9.6 PWB Conductor Width**

The finished PWB conductor widths shall meet the Rantec design data (drawing or gerber data).

**9.7 PWB Inner layer thickness**

The finished PWB inner layer dielectric thickness shall meet Rantec design data (Gerber data and Drawing).

**10 Custom Metal Fabricated Parts**

Chassis, base plates, heat sinks, covers, enclosures, customer assembly tools and fixtures.

**10.1 Burrs and sharp edges**

Fabricated parts shall be free of all burrs and sharp edges.

**10.2 Helical Wire Insert Requirements**

When using tanged helical wire inserts, after installation of the helical wire insert the tang must be removed. Tangs left inside can be a source of FOD and/or cause interference when installing screws.



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### 10.3 Cleanliness

Parts shall be cleaned adequately to remove any visual evidence of residues or contaminants. All surfaces shall be free of contaminants introduced during deburring, polishing or other processing.

## 11 Hardware & Wire

Screws nuts, bolts, bobbins, insulation/sleeving, spacers, wire.

### 11.1 Preference for Domestic Specialty Metals

Compliance to Defense FAR Supplement (DFARS) 252.225-7014, Alt 1, is required for this purchase order or any delivery to Rantec of product containing "Specialty Metals" as defined by DFAR 252.225-7014, Alt 1. This requirement, DFARS 252.225-7014, Alt 1; must be flowed down into subcontracts and purchase orders at every tier. Seller shall not knowingly ship non-DFARS conforming material or product without written authorization from Rantec Power Systems Inc.

## 12 Chemicals

Adhesives, Coatings, Encapsulants, epoxies, bonding/staking material, solvents, alcohol, cleaning agents, chromate coatings, etc.

### 12.1 Shelf Life – Age Controlled Material

The supplier shall identify all materials that have definite characteristics of quality degradation with age and/or environment. The supplier shall affix this information directly on the material container and include it on the certification (C of C) document. This information shall indicate the date useful life was initiated and the date at which life will be expended. When environment is a factor in determining useful life, the identification shall include storage conditions or requirements. A minimum of 75% of the applicable shelf life shall remain upon receipt of the material by Rantec or the material is subject to rejection and return to the supplier for replacement.

### 12.2 PentaBDE and OctaBDE

Products delivered to Rantec Power Systems Inc. shall not contain concentrations of Pentabromodiphenyl ether (PentaBDE) or Octabromodiphenyl ether (OctaBDE) higher than 0.1% by mass. The supplier shall disclose to Rantec the existence of these materials contained in the product prior to actual delivery.

### 12.3 European Union Restriction on Hazardous Substances (RoHS) Listed Materials

Products delivered to Rantec Power Systems Inc. shall not contain materials listed in the European Union (EU) Directive 2002/95/EC (RoHS) in concentrations beyond allowable de minimus amounts including 0.1% by weight in homogeneous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) and 0.01% by weight in homogeneous materials for cadmium. Homogeneous material means a material that can not be mechanically disjointed into different materials. This requirement applies to all materials listed in the EU directive as amended.

### 12.4 European Union Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Products delivered to Rantec Power Systems Inc. shall not contain materials identified as Substances of Very High Concern (SVHC) by the European Chemicals Agency pursuant to EU Regulation (EC) No. 1907/2006 in concentrations above 0.1% by weight in homogeneous materials. Because of the evolving nature of that regulation, suppliers are advised to consult the current SVHC list at [www.echa.europa.eu](http://www.echa.europa.eu).



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### Approval Block

Function/Responsibility	Name	Signature	Date
Materials Manager	D. Martin	<i>D. Martin</i>	
Operations Manager	J. Severn	<i>J. Severn</i>	
Quality Manager	P. Ryan	<i>P. Ryan</i>	6/27/07

### Revision History

Rev	Description of Change	Author	Effective Date
A	Initial Release	P. Ryan	6/28/07
B	Amend Appendix A, edit section 12.2, add sections 12.3 and 12.4		
C	Added Cleanliness Clause 10.3	M. Freiwald	7/9/09
D	Added Control of Records Clause 6.15. Amended Change Notification Policy Clause 6.2 to include "supplier or manufacturing facility". Amended Right of Access Clause 6.11 to include "and areas of all facilities at any level of the supply chain". Added First Article Inspection/Test Clause 6.16.	M. Freiwald	11/11/09



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**Appendix A**

**Table A-1 Unallowable (banned) Materials**

Hazardous Material	Chemical Abstracts Service (CAS) Number
1,1,1-Trichloroethane (Methyl Chloroform)	71-55-6
1,4-Dioxane	123-91-1
2-Aminonaphthalene	91-59-8
2,4-Dichlorophenoxyacetic Acid	94-75-7
2,4,5-Trichlorophenoxyacetic Acid	93-76-5
Acetaldehyde	75-07-0
Acrylonitrile	107-13-1
Anthracene*	120-12-7
Arsenic and Arsenic Compounds	7440-38-2 & Various
Asbestos (all forms)	Various
Benzene	71-43-2
Benzidine	92-87-5
Cadmium and Cadmium Compounds <sup>†</sup>	7440-43-9
Carbon Tetrachloride	56-23-5
Chlorodiphenyls	11097-69-1, 53469-21-9
Chloroform	67-66-3
Class 1 Ozone Depleting Compounds (i.e. CFCs, HCFCs, etc.)	Various
Cyanides	57-12-5 and Various
Dichloro -Diphenyl -Trichloroethane (DDT)	50-29-3
Dimethylaminoazobenzene	60-11-7
Ethylene Glycol	107-21-1
Ethylene Oxide	75-21-8
Formaldehyde	50-00-0
Hexabromocyclododecane (including isomers)*	3194-55-6 and Various
Hydrazine	302-01-2
Hydrofluoric Acid	7664-30-3
Halons (multiple forms)	Various
Iron Carbonyl	13463-40-6
Mercury and Mercury Compounds <sup>†</sup>	7439-97-6
Methyl Bromide	74-83-9
Methylene bis (2-Chloroaniline)	101-14-4
Methylene Chloride (Dichloromethane)	75-09-2
Naphthalene	91-20-3
Nickel Carbonyl	13463-39-3
Pentachlorophenol	87-86-5
Picric Acid	88-89-1
Phenol	108-95-2
Polybrominated Biphenyls (PBB) <sup>†</sup>	Various
Polychlorinated Biphenyls (PCB)	1336-36-3
Polybrominated Diphenyl Ethers (PBDE) <sup>†</sup>	Various
Sodium Dichromate*	10588-01-9
Tetrachloromethane	56-23-5
Trichloroethylene (TCE)	79-01-6
Bis (tributyltin) oxide*	56-35-9
Vinyl Acetate	108-05-4
Vinyl Bromide	593-60-2
Vinyl Chloride	75-01-4



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**Appendix A (continued)**

**Table A-2 Restricted Materials (must disclose to Rantec)**

1,2-Dichloroethane	75-34-3
2-Ethoxyethanol	110-80-5
2-Methoxyethanol	109-86-4
2-Nitropropane	79-46-9
4,4-Dimethylaniline	121-69-7
4,4-Methylenedianiline (MDA)*	101-77-9
4-Nitrosodiphenylamine	156-10-5
Alkanes, Chlorinated Paraffins*	Various
Anhydrous Ammonia	7664-41-7
Barium and Barium Compounds	7440-39-3
Benzyl Butyl Phthalate*	85-68-7
Beryllium and Beryllium Compounds (1)	7440-41-7
Bromine and Bromine Compounds	7726-95-6
Calcium Hypochlorite	7778-54-3
Carbon Disulfide	75-15-0
Catechol	120-80-9
Chlorine	7782-50-5
Chromium and Chromium Compounds	7440-47-3 & 1333-82-0 & Various
Cobalt Dichloride*	7646-79-9
Crystalline Silica	14464-46-1
Dibutyl Phthalate*	84-74-2
Diocetyl Phthalate*	117-81-7
Ethyleneimine	151-56-4
Hexachlorobenzene	118-74-1
Hexavalent Chromium†	Various
Hydrochloric Acid	7647-01-0
Lead and Lead Compounds (3)†	Various
Lithium and Lithium Compounds	Various
Man-made Vitreous Fibers (MMVFs)	Various
Methyl Isobutyl Ketone	108-10-1
Isocyanates (multiple forms)	Various
Nitric Acid	7697-37-2
Nickel and Nickel Compounds (2)	7440-02-0 & Various
Perfluorocarbons	Various
Propylene Oxide	75-56-9
Pyridine	110-86-1
Selenium and Selenium Compounds	7782-49-2
Silver and Silver Compounds (3)	7440-22-4
Styrene	100-42-5
Sulfur Hexafluoride	2551-62-4
Sulfuric Acid	7664-93-9
Tetrachloroethylene (Perchloroethylene)	127-18-4
Toluene	108-88-3
Trichloroisocyanuric Acid	87-90-1

\*Listed in EU REACH Regulation, see section 12.4 above

†Listed in EU RoHS Directive, see section 12.3 above

Note (1): Except in alloy form with less than 5% Beryllium

Note (2): Except in alloy form

Note (3): Except in solder