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1.0 PURPOSE

- 1.1 The objective of this document is to convey to Carolina Precision Technologies suppliers, and potential suppliers, the quality requirements and contractual conditions that must be met when providing goods and/or services to Carolina Precision.
- 1.2 The purpose of this document is to provide clear guidelines about when to apply this standard, rules about how to specify the standard, and clarification of the terminology.
- 1.3 The intent of this specification is to establish criteria for all items supplied to Carolina Precision and/or manufactured by Carolina Precision.

2.0 SCOPE

- 2.1 This standard establishes quality requirements and workmanship standards to enhance print and purchase order requirements flowed down by Carolina Precision and its customers.
- 2.2 This document also brings clarity to characteristics that are normally evaluated subjectively, (i.e., burrs, surface finish, plating, cleanliness, etc.) and to standardize Carolina Precision's approach to Product Quality.
- 2.3 This document is applicable to all Carolina Precision suppliers that provide products, processes or services that form part of, or contribute to, a deliverable end item.
- 2.4 This document supplements the engineering drawings and purchase order requirements. In the event of conflict, purchase order requirements and engineering drawings shall take precedence.

3.0 DEFINITIONS


- 3.1 **F.O.D. (Foreign Object Debris):** Parts, product or purchased items are to be free of F.O.D. This includes loose packaging materials, food, dirt, excessive processing compounds, materials, or residue.
- 3.2 **PO:** Purchase Order

4.0 PROCUREMENT & COMMUNICATION

- 4.1 The Carolina Precision P.O., together with referenced drawings, specifications and this document shall define all Carolina Precision requirements applicable.
- 4.2 As a Carolina Precision Supplier, it is your responsibility to ensure that all clauses, terms, and conditions are specified or referenced within the PO and this document is understood and complied with. All flow down requirements are required to be flowed down to any of your suppliers.
- 4.3 Failure to meet all quality clauses and requirements defined or referenced may result in rejection of the items or services you supply and can affect your supplier approval Status.
- 4.4 All written and verbal communications with Carolina Precision are to be through the purchaser noted on the P.O.

5.0 QUALITY REQUIREMENTS

Text located on the purchase order for specific customer required criteria supersedes these requirement(s).


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5.1 Certification Requirements

5.1.1 Certifications are required and must be included with shipment.

5.1.2 All certifications must be easy to read. The information printed on the certification must include, but is not limited to, the following. (Requirements applicable ONLY to raw material suppliers are noted).

- Carolina Precision Purchase Order Number
- Weight of material being shipped (Raw Material)
- Date shipped.
- Material type and size (**Raw Material**)
- Applicable spec (ASTM, AMS, Government, etc.) and class along with revision at time of PO receipt.
- Customer specification (when requested). Full compliance with our customer's specifications is required. Copies of our customer's specs are available to you upon request to ensure compliance.
- DFARS compliance when requested on the purchase order. (**Raw Material**)
- Heat number: (**Raw Material**)
- Tensile strength: (**Raw Material**)
- Hardness (where applicable): (**Raw Material**)
- Certification that the material does not come in contact with mercury. (Disclaimers, such as "To the best of our knowledge" and "We believe the information herein to be true" are not acceptable).
- Acts of malpractice or fraud & falsification will result in purchase order contractual action and will also be subject to federal criminal prosecution for violations of law under Title 18 of the U.S. Code, Chapter 47, Section 1001. Certifications must include the following or similar statement.
- The recording of false, fictitious, or fraudulent statements or entries on this document may be punishable as a felony under Federal Statutes
- Original mill certificate (**Raw Material**) is required with shipments.
- Indication of RoHS, REACH and California Proposition 65 compliance for raw material, processes used, or services performed.

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5.2 Foreign Object Debris

Supplier shall develop and maintain a Foreign Object Debris/Damage (FOD) prevention program to prevent introduction of foreign objects into any product delivered under our purchase order. Supplier shall perform a periodic self-assessment of such FOD prevention practices, including their supplier's and subcontractor's FOD prevention programs. Product supplied shall be FOD-Free.

5.3 Quality System Requirements

5.3.1 Suppliers are requested to maintain a quality system that, at a minimum, complies with an international quality management standard as appropriate to the product being sold or process being utilized (latest revision at time of Purchase Order). Examples of these standards are AS9100, ISO9001, AS9120, NADCAP, ISO17025, A2LA. Our PO will indicate any specific quality system requirements from our customers.

5.3.2 Suppliers must notify Carolina Precision Technologies in writing within 5 working days of any changes in Quality System status, including extensions or reductions in scopes of approval, third party and/or regulatory quality approvals that are either gained or withdrawn. The supplier's loss of certification or failure to notify Carolina Precision Technologies of their loss of certification could result in being disapproved as a supplier.

5.4 Record Retention

5.4.1 Suppliers shall retain quality records for a minimum of (30) years from the date of shipment, unless a longer period is otherwise specified. Quality records include the following but not exhaustive list: Approved Certificates of Conformity, Test Reports, Raw Material Certifications, Special Process Certifications, First Article Inspection Reports (FAIR), Route Cards/Travelers, and Calibration Records. This data shall be made available to Carolina Precision Technologies upon request, within 2 business days, at no extra charge. Records shall be appropriately identified in accordance with customer, regulatory and company-defined requirements. Storage facilities shall provide environmental conditions to prevent deterioration or damage and to prevent loss. Records in storage shall be protected from unauthorized access.


5.4.2 Records shall be disposed by irreversible destruction methods such as shredding, or "erasure"/reformatting for electronic/magnetic media.

5.5 Calibration System

5.5.1 Calibration of measuring and test equipment used for product acceptance shall be traceable to established international or national measurement standards (e.g., BSI, NIST, UKAS, etc.).

5.6 Inspection System

5.6.1 Suppliers shall develop inspection procedures and maintain records of inspection. Records shall include evidence of inspection for all attributes (e.g., first article inspection, acceptance test data) of products / processes supplied to Carolina Precision Technologies, show the product has been inspected and/or tested during all stages of manufacturing, identify the name of the individual (i.e. with stamps, etc.) who certified the results, and where applicable include the results of the inspections and tests. Unless otherwise required by material/process specification or customer specific flow downs on this purchase order suppliers are permitted to inspect sample

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quantities using an AQL 1.0 C=0 normal inspection sampling plan. Text located on the purchase order for specific customer required inspection criteria supersedes this requirement.

5.7 Product/Process/Location Changes

- 5.7.1 The Carolina Precision Technologies buyer must be notified in writing prior to any changes in product, manufacturing location, or process definition that were not requested by Carolina Precision Technologies, in writing. Notification shall describe the change or changes that are being proposed. Carolina Precision Technologies must approve the product, manufacturing location or the process change before the Supplier forwards the product. As applicable, the supplier is also required to submit a new full or delta first article inspection report, if the change(s) affect any of the existing approved first article inspection report characteristics.
- 5.7.2 Additionally, when requested, supplier will provide test specimens for our customers design approval, inspection/verification, investigation, or auditing

5.8 Government Regulations

- 5.8.1 Products procured under this purchase order may be subject to (DPAS) Government rated contracts, therefore, when applicable, supplier is required to follow all provisions of the Defense Priorities and Allocations System regulation (15 CFR 700).
- 5.8.2 Seller is advised that its performance of this Purchase Order may involve the use of or access to articles, technical data or software that is subject to export controls under 22 U.S.C. 2751 - 2796 (Arms Export Control Act), 22 CFR 120-130 (International Traffic in Arms Regulations), 50 U.S.C. 2401 - 2420 (Export Administration Act) and 15 CFR 768 - 799 (Export Administration Regulations) and their successor and supplemental laws and regulations.

5.9 Counterfeit Part Prevention


- 5.9.1 The seller's counterfeit prevention procedures shall meet the requirements of SAE AS6174. If suspect/counterfeit parts are furnished under this purchase order or are found in any of the goods delivered the seller shall be required to disclose the source of the suspect/ counterfeit parts to Carolina Precision Technologies. The Seller shall promptly replace such suspect/counterfeit parts with parts acceptable to Carolina Precision Technologies and the Seller shall be liable for all costs, including but not limited to Carolina Precision Technologies internal and external costs, relating to the removal and replacement of said parts.
- 5.9.2 Carolina Precision Technologies reserves all contractual rights and remedies to address grievances and detrimental impacts caused by suspect/counterfeit parts.

5.10 Right of Access

- 5.10.1 We also require that, upon request, you provide Carolina Precision Technologies, our customer or regulatory agency, with access to the applicable areas of facilities and to applicable documented information, at any level of the supply chain.

5.11 Supplier Control

- 5.11.1 Suppliers are responsible for ensuring that the applicable requirements of this purchase order are imposed on lower tier procurements for raw material,

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components or process services being used in the manufacture of products or services being provided.

5.11.2 You, the supplier, also warrant that all goods and services sold to Carolina Precision Technologies have been produced, sold, delivered, and furnished in strict compliance with all applicable laws and regulations including EEO and Affirmative Action, to which they are subject.

5.12 Nonconforming Product

5.12.1 Suppliers shall ensure that non-conforming products are identified, segregated, and properly dispositioned as required per supplier's procedures. Only product that conforms to specified requirements shall be shipped to Carolina Precision Technologies. Any reworked materials or processes shall be re-inspected and/or tested prior to shipment.

5.12.2 Carolina Precision Technologies does not maintain design authority for any products we produce and therefore disposition authority is not granted to our suppliers.

5.12.3 Non conformances Affecting Shipped Products- Suppliers are required to notify the Carolina Precision Technologies Buyer within 24 business hours of discovering any nonconformance that exists or is suspected of existing on products that have previously been shipped to Carolina Precision Technologies. This notification shall include the following information:

- Affected Part number(s), process(es) and name(s)
- Description of the nonconforming condition and the affected requirement (Both requirement and actual condition)
- Quantities, dates, purchase order number(s) affected.
- Lots, batch numbers, serial numbers or date codes as applicable of the affected lot.


5.13 Awareness

- Suppliers are required to ensure that their personnel are aware of:
- Their contribution to product or service conformity.
- Their contribution to product safety.
- The importance of ethical behavior

5.14 Special Processes

A special process is defined as a production process, the results of which cannot be fully verified by subsequent inspection and testing of the product and where, for example, processing deficiencies may become apparent only after the product is in use. Accordingly, continuous monitoring and/or compliance with documented procedures are required to ensure that the specified requirements are met. Examples of special processes are: anodizing, electropolish, plating, and heat treatment. Supplier equipment and personnel performing special processes are required to be qualified and records are to be maintained by the Supplier, and available to Carolina Precision Technologies upon request.

6.0 CAROLINA PRECISION SUPPLIED MATERIAL AND DOCUMENTATION

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- 6.1 As a Carolina Precision supplier, you are responsible for evaluating damage due to transport at time of receipt of Carolina Precision supplied materials and for the appropriate controls and periodic inspection of Carolina Precision supplied material during storage, handling and processing.
- 6.2 Strict segregation and control of Carolina Precision material is required by your organization. No material substitution is permitted without prior Carolina Precision written approval.

7.0 SOURCE INSPECTION

- 7.1 Carolina Precision may elect to conduct source inspection of items at your facility before shipping. Source inspection may be applied to a greater or lesser degree at the discretion of Carolina Precision’s Quality Manager. When source inspection is applicable, Carolina Precision will provide your organization with advance notice.
- 7.2 The acceptance of an item at your facility by Carolina Precision is not to be interpreted as final acceptance by Carolina Precision.

8.0 PACKAGING/DELIVERY

- 8.1 The supplier shall package parts as received from Carolina Precision Technologies to protect the product from damage and for safety in handling during the shipping process. Contact Carolina Precision Technologies for further packaging instructions if the original packaging cannot be used.
- 8.2 Documents such as pack lists, certificates, certificates of conformance and all other documentation must accompany shipments.

9.0 NONCONFORMANCES & CORRECTIVE ACTION

- 9.1 Supplier Corrective Action Requests (SCARs) will be used by Carolina Precision as a means of advising you of an observed nonconformance and to request corrective action, as required.
- 9.2 Your response to a SCAR is expected within 10 working days, unless otherwise specified on the SCAR. Should additional time be required, you are requested to inform Carolina Precision of the reason for the extension and the estimated date of completion.
- 9.3 Within your response you are to identify the corrective action taken to eliminate the cause of the discrepancy in addition to the repair or rework action required to resolve the item rejected. The effect on items already delivered must also be addressed within your response.
- 9.4 Records of outstanding SCARs are maintained by Carolina Precision’s Quality department and shall be used in the process of evaluating suppliers. Failure to provide timely and corrective action to a SCAR can adversely affect your Supplier Approval Status.

10.0 SUPPLIER AUDIT

- 10.1 Carolina Precision reserves the right to audit Supplier’s facilities and those of Supplier’s subcontractors.
- 10.2 Supplier is required to provide Carolina Precision access to facilities, equipment and all other areas essential to the audit, including those concerned with all phases of manufacturing, testing, packaging, and shipping as they apply to supplied items.
- 10.3 In the event that an audit reveals a significant deficiency in the Supplier’s processes or procedures, Supplier shall promptly provide Carolina Precision with a plan of corrective action and a closure.

11.0 SUPPLIER WORKMANSHIP

11.1 Raw Material

11.1.1 All raw materials will be delivered free from defects which include:

11.1.2 Excessively bent or twisted bar stock

11.1.3 Damage such as large dents or pockets of missing material

11.1.4 Rust

11.2 Machined Parts

11.2.1 Burr and Edge Terminology

11.2.1.1 **Burr**- a non-functional piece of material extending from the parent surface of a part. A burr can be sharp, ragged projection, firmly adhered, or a loosely hanging projection.

11.2.1.2 Burr Related Terms and Types

11.2.1.2.1 **Extruded Burr** – Readily seen raised material generally caused by the drilling of a malleable material. This type of burr does NOT exhibit evidence of material that can break away. See Figure 1.

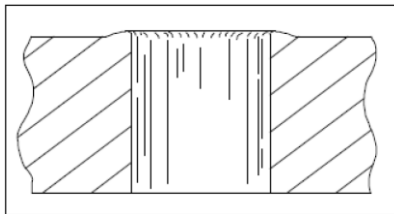


Figure 1

11.2.1.2.2 **Feathered Burr** - Loose burr generally found on an edge where two dissimilar surface finishes meet. See Figure 2.

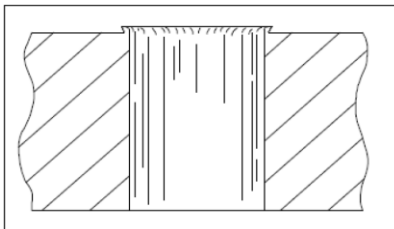


Figure 2

11.2.1.2.3 **Doughnut Burr** – Loose piece of rolled material that tends to flatten and blend itself into the adjacent material. See Figure 3

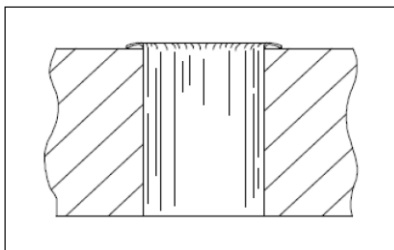


Figure 3

11.2.1.2.4 **Sliver Burr** – Loose sliver of material attached to the edge of a feature. This type of burr generally forms on edges adjacent to a milled or turned surface. See Figure 4.

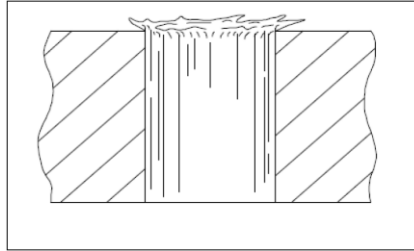


Figure 4

11.2.1.2.5 **Hinged Burr** – Loose material typically formed in holes and features located on surfaces that have been milled. See Figure 5.

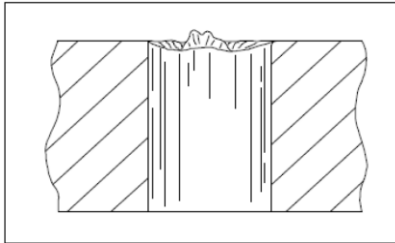


Figure 5

11.2.1.2.6 **Crowned Burr** – Loosely attached material typically formed around a hole that has been countersunk. See Figure 6.

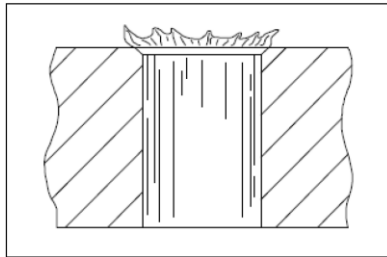


Figure 6

11.2.1.2.7 **Rolled Burr** - Similar to a hinged burr, this type of burr forms in holes and features that are located on surfaces that have been milled or turned. See Figure 7.

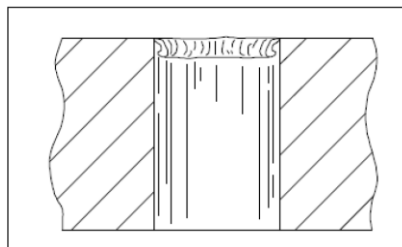


Figure 7

11.2.1.2.8 **Chamfer** – A machined inclined surface cut at an edge.

11.2.1.2.9 **Corner** – The intersection of three or more edges.

11.2.1.2.10 **CR.XXX (Controlled radius)** – Any size radius that falls between the smallest and the largest radius allowed by the stated tolerance. Note: the part contour must be a fair curve with no reversals. Additionally, radii taken at all points on the part contour shall neither be smaller than the specified minimum limit nor larger than the maximum limit. Example: CR .025 ± .010 – A fair curve with no reversals that lies within the shaded region. See Figure 8.

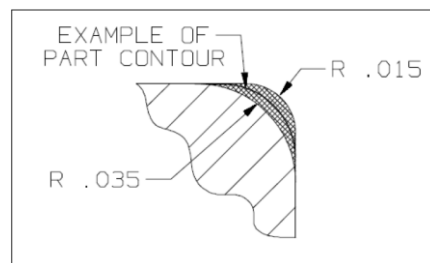


Figure 8

11.2.1.2.11 **C/R (Chamfer/Radius)** – Any combination of angles or radii that fall inside an area formed by the largest chamfer and the smallest radius as allowed by the stated tolerance.

11.2.1.2.12 **Edge** – The intersection of two surfaces.

11.2.1.2.13 **Edge Break** - The amount of material removed at the theoretical intersection of two surfaces. An edge break is typically identified as a uniform chamfer or radius.

11.2.1.2.14 **R.XXX Max.** – Any combination of angles and radii that fall between a .000" radius and the specified maximum radius. Example: R .030 Max – Any combination of angles and radii that fall within the shaded area. See Figure 9.

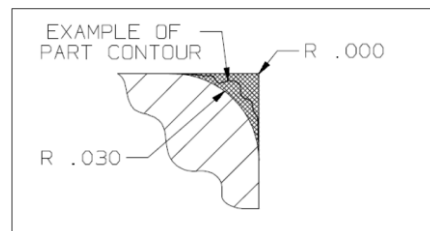


Figure 9

11.2.1.2.15 **R.XXX ± .xxx** – Any combination of angles and radii that fall between the smallest and largest radius allowed by the stated tolerance.

11.2.1.2.16 **Secondary Burr** – Often after a primary de-burring operation such as countersinking or chamfering, a small burr will be generated at

the intersection of the countersink or chamfer surfaces and the original part surfaces.

11.2.1.2.17 **Sharp Edges** - Edges that can readily cut or tear. To clearly illustrate what is meant, the following three classes of sharp edges are defined:

- **Class 1:** for thin materials (.010" thick or less), a burr-free edge with a radius, chamfer, or edge break less than $t/10$, where t is the material thickness.
- **Class 2:** for materials (greater than .010" thick), a burr-free edge with a radius, chafer, or edge break less or equal to 0.001".
- **Class 3:** for normal commercial use, any edge that would cut hands, containers, or nearby components in normal handling. Sharp edges in this class include burr-laden edges as well as burr free edges that can cut.

11.2.2 Burr/Edge Requirements

11.2.2.1 All burrs including feathered, doughnut, sliver, hinged, crowned, and rolled burrs shall be removed to a C/R .015" max unless otherwise specified on the engineering drawing.

11.2.2.2 Any external sharp edges will be removed to a C/R .015" max unless otherwise specified on the engineering drawing.

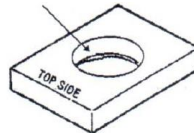
11.2.2.3 All print tolerances and finish requirements must be maintained AFTER de-burring is completed.

11.2.2.4 Direction of Viewing at 10x Magnification

Frequently, easily detectable burrs may be overlooked when viewing in a single direction. It is good practice to view components from varying directions and angles when inspecting for burrs. In general, parts should not be viewed looking straight down but should be viewed with the line of sight between 30° to 60° to the edge or surface being inspected. See Figure 10.



Burr may not be visible when viewed from one side only



Burr may be apparent when viewed from one side only

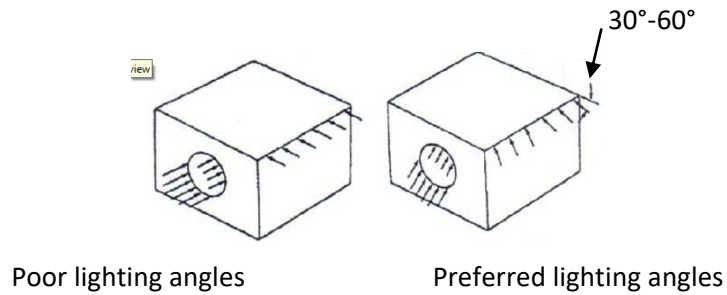


Varying the viewing angle aids in detecting burrs

Figure 10


11.2.3 Proper Lighting

Accurate visual interpretation of burrs requires proper and sufficient lighting. Similar to the line-of-sight viewing of work pieces, lighting should also be at an angle of 30° to 60° to the surface being inspected. Intensity, type, color and angle of lighting used shall be uniform in intensity and color. Lighting which is dull, non-functioning or a different color is to be replaced. See Figure 11.



Lighting Angles

Figure 11

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Revision History

Date	Rev	Reason for Revision	Approval
4/20/2020	A	Original Release under new global document numbering system. (Previously QSF-8.5-12 and QMF-089)	On File
5/27/2022	B	<p>Removed fields in beginning and end of form that were required to be filled in. These fields are not needed as document will now reside on our website.</p> <p>Section 6.1.4 changed from: ... you are to contact Carolina Precision's Quality department and request a concession for the requirement(s) before shipment of an item or order. Changed to you ... you are to contact Carolina Precision's Quality department and obtain an approval on for the requirement(s) before shipment of an item or order.</p> <p>Section 14.0 added California Proposition 65 to requirements</p>	On File
4/11/2023	C	<p>Section 3 Definitions revised. Removed the following as it is not in the appropriate place for our suppliers</p> <p>3.2 Repair: Product is fixed so it is suitable but does not meet specification.</p> <p>3.3 Rework: Product is fixed to meet customer specification.</p> <p>3.4 Use-As-Is: Product being used with non-conformities that does not violate "Form, Fit and Function".</p> <p>Section 4.1 Removed Purchasing, or management, are the only authorized individuals to issue or revise PO's. Removed this as it belongs in a purchasing procedure not a supplier quality agreement.</p> <p>Changed section 11.2.2.4 to define magnification level at 10X</p> <p>Section 11.3 removed as the requirement defined is specific to a singular customer and not applicable to our entire customer base.</p>	On File