

BY ACCEPTING A TTL PURCHASE ORDER YOU AGREE TO COMPLY WITH THESE SUPPLEMENTAL QUALITY REQUIREMENTS (SQR) IN ADDITION TO ANY TTL DRAWING, SPECIFICATION AND PURCHASE ORDER REQUIREMENTS. QUALITY REQUIREMENTS ARE PRIORITIZED IN THE FOLLOWING ORDER: (1) TTL DRAWINGS AND SPECIFICATIONS (2) TTL PURCHASE ORDERS (3) TTL SUPPLEMENTAL QUALITY REQUIREMENTS



FAA CRS No: TT0R129Y • PMA No: PQ2318NM

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SUPPLIER QUALITY REQUIREMENTS

1. RIGHT OF ENTRY

All tiers of the supply chain must allow right of entry to TTL, applicable government representatives, or regulatory agencies (FAA, NTSB, OSHA, etc.) to inspect its quality system, facilities, technical data, and any manufactured articles and witness any tests necessary to determine that the article conforms to specified requirements.

TTL will not use (or will discontinue using) any supplier (including sub-tier suppliers) that does not allow right of entry to TTL, applicable government representatives, or regulatory agencies.

2. SUPPLIER CONTROL

All tiers of the supply chain must be approved by TTL and listed on the TTL Approved Supplier List (TASL). The TTL supply chain is defined below and categorized into three (3) levels based on the service provided. **Use of an unapproved or unlisted supplier is cause for rejection and potentially negative impact on your quality score.**

Level	Service Type	Audit Criteria
I	<ul style="list-style-type: none"> • Top Tier • Casting • Forging 	<p>On-site: every 3 years;</p> <p>Mail-in: annually</p>
II	<ul style="list-style-type: none"> • Special Process (NADCAP accredited) • Raw Material (Mill Source or Distributor) • Sub-tier Manufacturing (e.g. machining, part mark, hand finish) whose work <u>is not verified</u> by top tier at incoming inspection. 	<p>Mail-in performed annually.</p>
III	<ul style="list-style-type: none"> • OEM details • Calibration Services, Testing • Sub-tier Manufacturing (e.g. machining, part mark, hand finish) whose work <u>is verified</u> by top tier at incoming inspection. 	<p>Audit not required but supplier must still be listed on TASL.</p>

For special circumstances, the supplier may request in writing to TTL, to use a special process supplier that is not NADCAP accredited. Non-NADCAP accredited suppliers are treated as a Level I supplier and as a result involve more oversight by TTL. TTL prefers to use NADCAP accredited suppliers and therefore any costs associated with approving non-NADCAP accredited special process suppliers may be at the expense of the requestor.

If an unapproved or unlisted supplier is used in the manufacture or process of a TTL part, metallurgical testing at an independent (3rd party) laboratory and/or increased dimensional inspection may be required to validate that unapproved supplier's process. Any required testing or additional inspection will be communicated by TTL to the supplier. The supplier will be responsible for both the cost of the part and the actual testing.

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3. COMMUNICATION WITH SUB-TIER SUPPLIERS

You are required to communicate all applicable contractual requirements to your sub-tier supplier(s) including TTL drawings and specifications (also known as design data), TTL purchaser order requirements, and this Supplier Quality Requirements document.

4. SUPPLIER CHANGE IN NAME, LOCATION, QUALITY MANAGEMENT OR OWNERSHIP

You are required to notify TTL whenever there is a change in manufacturing location, significant turnover of skilled labor, management or ownership as soon as it is feasible but before the next shipment of parts to TTL.

Such changes may require an additional on-site or mail-in audit as well as a new or delta first article.

5. BILL OF MATERIALS (BOM)

When applicable, the BOM table is located on the TTL drawing and identifies the details needed to manufacture or assemble the part. Suppliers may procure or manufacture the necessary details based on the following requirements:

5.1. Procure Option

When available, details can be procured if listed on the BOM and traceable to the FAA approved manufacturer of that detail. Objective evidence must be provided to TTL showing traceability to the FAA approved manufacturer (i.e. packing list, Certificate of Conformity, FAA Form 8130-3).

Alternate part number(s) may not be procured unless listed on the BOM.

5.2. Manufacture Option – Details can be manufactured when listed on the BOM and a drawing is provided by TTL. Manufactured details must conform to the drawing provided by TTL.

6. IDENTIFICATION AND TRACEABILITY

Parts shipped to TTL must be properly identified and fully traceable to the raw material. It is the responsibility of the supplier to establish and maintain a system that will allow any part to be traced to the manufacturing job from which it was created, through all of the manufacturing processes, and back to the raw material master heat lot.

6.1. Identification

6.1.1. Part Marking

Part marking (content and method) must be performed in accordance with the applicable TTL drawing. Marking must be clear and legible otherwise it may be subject to rejection.

6.2. Traceability

6.2.1. Lot Control

When lot control is specified on the TTL drawing, the supplier is responsible for assigning a lot number that will ensure proper traceability to the manufacturing job and ultimately to the raw material.

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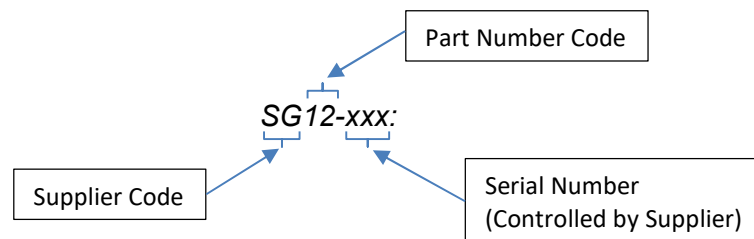
SUPPLIER QUALITY REQUIREMENTS

6. IDENTIFICATION AND TRACEABILITY (Continued)

6.2.2. Serialization

When serialization is specified on the TTL drawing, TTL will assign a unique base number that consists of the supplier code and part number code which helps identify the supplier and part number respectively. The unique base number will be noted on each TTL purchase order but it is the supplier's responsibility to maintain the serial number sequence to prevent duplication.

Example:



TTL recommends that the first serial number starts with -051.

6.2.3. Assemblies

Assemblies must be part marked in accordance with the applicable TTL drawing. Each detail used to construct the assembly must be traceable to the assembly by its serial number or lot number when serialization or lot control is required by TTL drawing. When details are not serialized or lot controlled then the supplier is responsible for maintaining traceability by the manufacturing job number or similar means.

7. MANUFACTURING PROCESS CONTROL

When TTL requires manufacturing process control it will be identified by a part number and process specific Fixed Process Plan (FPP). This will be noted on the TTL drawing as "Fixed process planning required for xxx", where xxx is the name of the process requiring a FPP. However, TTL may request a FPP even if it is not specified on the TTL drawing.

The supplier is responsible for providing TTL with the initial release and all subsequent revisions to a FPP. TTL's approval of a supplier's FPP does not absolve the supplier of the responsibility to review and approve their own manufacturing plans and to provide articles that conform to design data.

The supplier has the option to manufacture articles prior to TTL approval of any FPP's (for example, to prove out the first production run or to prove out any process changes), however, this is done at risk by the supplier. **Submitting parts to TTL without approved FPP's is cause for rejection and a potential negative impact on your quality score.**

FPP that contains proprietary information for specific processes may be withheld, but this information must be available for review at the supplier's facility by TTL or regulatory authorities upon request.

TTL Engineering and Quality Assurance approve the FPP by stamping the FPP and via electronic signature. A printed copy of TTL's approval is provided to the supplier.

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7. MANUFACTURING PROCESS CONTROL (Continued)

The supplier FPP must include (at a minimum) the following information:

- supplier name,
- TTL part number and revision,
- notation that the manufacturing plan is fixed or frozen or that changes require customer approval (i.e. 'Frozen Plan', 'Changes Require Customer Approval'), and
- traveler revision letter or revision date.

8. QUALIFICATION OF PERSONNEL



All personnel must be properly trained and qualified to perform their tasks. Certain functions require personnel to be certified to a national standard (i.e. welder qualification per AWS D17.1 or NDT per NAS-410). The supplier may not perform those functions for TTL where the work must be performed by qualified and (when applicable) certified personnel.

9. INSPECTION REQUIREMENTS

Unless otherwise specified by TTL design data or the TTL Quality Manager, the supplier is required to inspect all features identified on the TTL drawing and provide TTL with a copy of their final inspection results with each shipment of parts.

9.1. Critical and Key Characteristics

TTL drawings identify critical and key characteristics as follows:

- Critical characteristics are identified with a 
- Key characteristics are identified with a 

The supplier is required to perform and document 100% inspection of all critical and key characteristics. For critical characteristics, serialized parts must have individual results recorded by serial number. Key characteristics must be checked 100% however, individual results recorded by serial number is not required.

TTL will not MRB accept a nonconforming critical characteristic, therefore the supplier has three options:

- rework to conform to TTL drawing and specification requirements,
- request a repair (via RMRA) along with a proposed repair scheme for TTL approval, or
- scrap.

9.2. All Other Characteristics

Suppliers are required to inspect all other features in accordance with an industry standard sampling plan (i.e. Zero Acceptance Number Sampling Plans, ANSI/ASQC Z1.4, or equivalent) except the acceptable defect rate is zero. If the supplier identifies a nonconformance then all parts from the manufacturing lot must be inspected for that nonconforming feature.

10. SURFACE ROUGHNESS INSPECTION METHOD

Surface finish callouts of 32Ra or less must be measured by direct measurement (profilometer or equivalent). The supplier is not permitted to accept parts by visual inspection or comparison to a known standard unless the area is inaccessible to direct measurement.

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11. GEAR INSPECTION

Unless otherwise specified on the TTL design data or purchase order, the supplier must sample inspect in accordance with their sampling plan or 10% of the manufacturing lot, whichever is greater.

The supplier must provide a copy of all gear charts to TTL. Each chart must identify the part number and serial or lot number. For parts that are not serialized or lot controlled, the supplier's manufacturing job number can be used.

12. CERTIFICATIONS

The supplier is responsible for providing TTL with their Certificate of Conformance (CoC) and all sub-tier certifications with each shipment of parts. The certificate of conformance must contain the following minimum information

- Supplier Name,
- Part Number and Revision,
- Serial or Lot Number (if applicable),
- TTL Purchase Order Number, and
- Applicable process specification and revision or a statement certifying that the work was performed in accordance with purchase order requirements.

13. FIRST ARTICLE

The supplier is required to perform First Article Inspection (FAI) in accordance with AS9102 (latest revision). The First Article Inspection Report (FAIR) should be documented using the AS9102 format however, a similar format may be used. Regardless of the format, a complete, partial, or recurrent FAI must be performed as required per AS9102.

FAI's may be performed by the supplier or by a TTL approved 3rd party inspection source.

A copy of the AS9102 standard can be purchased at www.sae.org.

14. SOURCE INSPECTION

Source inspection is required when specified on the TTL purchase order. Source inspection is performed by a TTL inspector unless the supplier has been granted source inspection authority and provided a TTL source inspection stamp. Source inspection may be required at the supplier's facility and/or at one or more of their sub-tier suppliers.

When TTL performs source inspection the supplier must give TTL enough advance notice to allow for resolution of any scheduling issues and purchasing airline tickets. For US Government contracts, the supplier must allow for right of entry of any government source inspectors.

When TTL performs source inspection, the TTL source inspector will require the following minimum information:

- Finished parts for source inspection
- TTL purchase order
- TTL drawing

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- Manufacturing traveler

14. SOURCE INSPECTION (Continued)

- Supplier FAIR and any test results (if applicable)
- Supplier Certificate of Conformance
- Final Inspection results

The TTL source inspector will communicate any additional requirements prior to source inspection but may request additional information at the time of source inspection.

When source inspection is complete it will be documented on the TTL Source Inspection form QF-7.4.3-1. This completed source inspection document must be included with the shipment to TTL.

Source inspection for US Government contracts will differ slightly from TTL Source Inspection. Source inspection requirements for US Government contracts will be communicated to the supplier by the TTL Quality Manager.

15. FAA CONFORMITY

FAA Conformity inspections are mandated by the FAA whenever a part must be verified for conformity to applicable TTL design data.

When FAA conformity is required it will be noted on the TTL purchase order or TTL will notify the supplier in writing at a later date. All tiers of the supply chain must allow for right of entry to the FAA and TTL to perform conformity inspection.

TTL will notify the supplier to schedule the conformity including the possibility of conformity at sub-tier suppliers. If sub-tier suppliers are involved then you are responsible for contacting the sub-tier supplier about the conformity.

16. REQUEST FOR MATERIAL REVIEW ACTION (RMRA)

Suppliers do not have MRB authority and as a result, any request to deviate from TTL requirements (drawing, specification, purchase order, supplemental quality requirements) will require a Request for Material Review Action (RMRA) which must be documented on form QF-8.3-1.

The RMRA must be completed in its entirety, including root cause and corrective action, and submitted to the TTL Engineering Manager or Quality Manager for review and disposition. The RMRA is not a blanket acceptance of future deviations and must be limited by purchase order and quantity.

When approved, TTL will provide an electronically signed RMRA which must be included with the deviated parts, and kept separate from conforming parts, before it can be shipped to TTL.

17. SUPPLIER QUALITY ESCAPE

TTL defines a Supplier Quality Escape as a part released from the supplier's quality system that does not conform to the TTL drawing, specification, purchase order, or SQR and was not submitted under a RMRA.

The supplier is required to notify TTL after discovering that a part escaped their quality system. The supplier may initially notify TTL by email but must follow up with a formal notification, including root

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cause and corrective action, using TTL's Supplier Quality Escape Notification form QF-7.4.1-3.

18. PROPER DISPOSAL OF NONCONFORMING PARTS

When the supplier is responsible for disposing nonconforming parts, they must be properly mutilated before disposal. Effective mutilation is accomplished by one or more of the following methods: grinding, burning, removal of a major integral feature, permanent distortion of articles, cutting a significant size hole, melting, cutting into many small pieces, or removing all identification (part number, lot or serial number, cage code, etc.).

Refer to FAA Order 8120.11 (located at www.faa.gov), for more information.

19. PACKAGING AND PRESERVATION

Unless otherwise specified on the TTL purchase order, drawing, or specification, suppliers are responsible for using best commercial practices to adequately package and preserve parts to prevent damage, deterioration, or Foreign Object Debris (FOD).

TTL discourages the use of 'egg crates' or similar packaging as these have proven to provide inadequate protection from damage resulting from part-to-part contact.

18. RETURN POLICY

TTL reserves the right to return parts that do not conform to TTL drawing, specification, SQR, or purchase order requirements.

19. RECORD RETENTION

Suppliers and their sub-suppliers are responsible for maintaining all pertinent manufacturing and quality records for a minimum of ten (10) years.

20. TERMS AND DEFINITIONS

20.1. Critical Characteristic

A feature (e.g. dimensional, hardness) whose failure could result in a direct hazardous effect.

20.2. Design Data

All necessary drawings, specifications, and other technical information that show the part configuration and information on dimensions, tolerances, materials, and processes.

20.3. Key Characteristics

A feature (e.g. dimensional, hardness) pertinent to the assembly with its mating part or next higher assembly and/or a required inspection in the OEM technical data.

20.4. Supplier

For the purpose of this SQR, it is a top-tier supplier that receives a purchase order from TTL. This is not to be confused with a sub-tier supplier who performs work for the top-tier supplier.

21. SUPPLIER CONTRIBUTIONS AND ETHICAL BEHAVIOR REQUIREMENTS

21.1. Contribution to product conformity

The supplier is required to assure that personnel are trained and experienced to perform their tasks and that the equipment and resources needed to complete those tasks are available.

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21.2. Contribution to product safety

Supplier shall support product safety by ensuring vigorous management of critical items, such as key characteristics, critical characteristics, the use of only Approved Supplier or other special requirements. This also includes all the requirements within this Supplier Quality Requirements publication.

21.3. Importance of ethical behavior

All personnel within the organization shall be committed to the highest standards of ethics and business conduct. This includes complying with the law, honoring commitments, acting in good faith, being accountable, not engaging in unfair or unethical business practices, avoiding activities that may be perceived as a conflict of interest, etc.

All requirements under section 21 (§ 21.1, 21.2, and 21.3) must be flowed down along the entire sub-tier supplier chain.

Any concerns regarding product conformity, product safety, or ethical behavior shall be communicated to TTL's Quality Manager for quick and efficient resolution.

Revision	Description	CO #
IR	Initial Release	1022
A	Added 21. (21.1 thru 21.3): Supplier Contributions and Ethical Behavior requirements. Removed the revision at the acknowledgement of Acceptance of Terms	1259