

AC-6011E Supplier Quality Manual V9

SECTION 1 : General

1 TM4 Business priorities

This manual defines the minimum quality requirements for TM4 suppliers to ensure that the product complies with TM4 customers, regulatory and safety requirements.

2 Définitions

Supplier : The term "Supplier" refers to the contractual part of TM4's suppliers and their subcontractors. In some cases, the supplier can also be the manufacturer.

TM4 Partner : When a partner signs a license agreement with TM4, the partner shall ensure that quality control over their outsourced processes meets all TM4 requirements. The control over such processes does not absolve the partner and their subcontractors of the responsibility of product conformity to all TM4 requirements. This includes costs incurred by TM4 as a result of non-quality or incidents including delivery disruptions.

3 General contact information

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4 Language, acronyms and abbreviations

Unless otherwise specified, all quality documentation (inspection reports, CFC, etc.) shall be in English to ensure consistent communication through the supply chain. All other communication should be in French when possible.

Acronyms and abbreviations

Item	Description
AIAG	Automotive Industry Action Group
APQP	Advanced Product Quality Planning
CAD machine control	Computer-Aided Design machine control
CSA	Coating System Assessment
CSC (critical)	Critical Safety Characteristic
CSP	Contrôle statistique des procédés
ELV/IMDS	End-Of-Life Vehicle/ International Material Data System
FAI	First Article Inspection
FMEA	Failure Mode and Effects and criticality Analysis
IPC	Formerly the Institute for Interconnecting and Packaging Electronic Circuits, now the Association Connecting Electronics Industries
MKC (major)	Major Key Characteristic
MSA	Measurement System Analysis
NADCAP	National Aerospace and Defense Contractors Accreditation Program
NIST	National Institute of Standards and Technology
PFMEA	Process Failure Mode and Effect Analysis
P/N	Product Number
PO	Purchase Order
PPV	Production Part Verification
PPM	Parts Per Million
PRI	Performance Review Institute
PSA	Plating System Assessment
R&R	Repeatability and Reproducibility
Rx	Radiographic examination
S/N	Serial Number
SPC	Statistical Process Control

5 Suppliers General Requirements

Subject	Requirement
Purchase Order	The supplier shall perform contract and record reviews to ensure that all relevant documentation, requirements and revisions are available and understood. VERBAL contractual agreements or instructions are not permitted.
Non-disclosure agreement	The supplier must have signed a non-disclosure agreement with TM4 and the supplier is responsible for obtaining a similar agreement with his subcontractors. This requirement is not applicable for non-critical components. Verification of such agreement may be performed by TM4 at any time.
Standard References	The supplier shall have up-to-date documentation on their quality system and related policies to ensure compliance with the minimum quality requirements defined in this supplier quality manual and the requirements in the purchase orders. It is also their responsibility to get specific documents that does not belong to TM4
Documentation and data control	<p>The supplier shall control all documents and records relating to the purchase order, including technical drawings, specifications, engineering changes, work instructions, manufacturing processes, manufacturing operation sheets, scheduling and quality control plans, as applicable.</p> <p>The supplier shall establish and maintain a control system for products supplied to TM4 to ensure proper distribution of all related quality documents. Manufacturing documents must be maintained for 10 years</p>
Record control and retention	<p>The supplier shall maintain records of inspections, dispositions, test results and corrective actions to prove that these operations have been performed.</p> <p>The supplier shall maintain complete records of traceability of serialized parts produced when serial numbers are required by technical drawings or purchase orders.</p> <p>For non-serialized parts, the supplier shall maintain records for each lot produced. The records shall be traceable to the lot no. and/or heat code when applicable.</p>
Identification and traceability	Marking of finished products shall be performed in accordance with the TM4 instructions <i>IN6024E, Mechanical parts identification</i> , or <i>SQ-6013B-007, Direct part marking and tracking system</i> . Supplier is responsible to have the last revision of these documents
Control equipment for measures and tests and inspection costs	<p>The supplier shall establish and maintain a calibration system for its measuring and testing equipment in compliance with one or more of the following standards: ISO 17025, ISO 10012, MIL-STD-45662, ISO/IEC Guide 25, ANSI Z540-1.</p> <p>Furthermore, calibration equipment and gauges shall be in compliance with & traceable to the National Institute of Standards and Technology (NIST).</p> <p>Inspection costs, including outsourcing, calibration fees, purchasing of measuring equipment and gauges are the responsibility of the supplier.</p> <p>If the supplier cannot inspect any of the requested characteristics, he must submit an <i>SQ5021B, Request for deviation</i> form to TM4.</p>
Statistical techniques (SPC and sampling)	The supplier shall implement a statistical process control (SPC) program for all key characteristics identified CSC or MKC on TM4 technical drawings when a PPAP level 3 is demanded. If the supplier develop its own sampling procedures, they need to be in accordance to ISO 2859/1 and notify TM4
Access to supplier facilities	TM4 personnel shall have the right of entry to supplier facilities, access to personnel, procedures & records, quality-system documentation, and the right to verify product or service conformance with the purchase order requirements; including the authority to request corrective actions, product-validation evaluations or investigations.
Quality Impact	The supplier is obligated to inform TM4 on any problem that will cause an impact on the quality or delivery of the TM4 purchase orders
Part Repair	Suppliers are not authorized to repara parts. If this repair could have an impact to the part quality the supplier must inform TM4

SECTION 2 : Purchasing Quality Management

6 Supplier Selection, qualification and approbation

6.1 Qualification and approbation

Supplier are selected according to the following table

	IATF6949	ISO9001	QA System	CFC	Explanation
PPAP Parts					Parts that need a PPAP approbation level according to the standard TS16949 or IATF 16949. Please follow the link to determine the part approbation level
FAI Parts					Parts that will need a First Article Inspection
Assembly Services					Parts assembled with TM4 systems
INV-I Parts					Any part that will need an incoming inspection
Calibration					Instrument that need a periodic calibration

Color Code

Ideal	
Mandatory	

Supplier must have written documentation about their quality system and policies to assure the conformity with the minimal quality requirements

6.1.1 Certified supplier

The supplier shall have valid TS16949 certification. .

6.1.2 Preferred supplier

The supplier shall have at least a valid ISO 9001 or process specific certification.

6.1.3 Approved suppliers

After a supplier initial quality evaluation by TM4. The supplier will change its status from conditional to approved.

6.1.4 Conditional supplier (new)

For any new supplier, TM4 will conduct a follow up of parts received to verify supplier quality. For PPAP or FAI parts supplier, a visit or an evaluation will be made. For INV-I parts a FAI will be made. Until this verification is conducted the supplier is considered as a conditional supplier

6.1.5 Supplier under probation

On experiencing issues with an approved supplier, TM4 will alert the supplier that they are on probation and must follow a corrective action plan in order to eventually have their approved status re-instated. If after 6 months of probation TM4 is not satisfied, the supplier may be disqualified.

6.1.6 Disqualified supplier

After a decision by TM4 management, a supplier may be disqualified.

6.2 Supplier Selection and Initial Verification

For a new supplier that will need an evaluation of the quality system or when a major change in the customer requirements is done, the form AC-6022 Visit Report must be filled. An In-Place evaluation could be done before the supplier evaluation or when needed. Suppliers that were working with TM4 before 2017 are considered approved by TM4 without the form AC-6022 Visit Report filled.

6.3 TM4 approved suppliers list

Every product, material or services in a TM4 final product must be bought in the MRB supplier list. The use of TM4 designated sources, including tool & gauge suppliers, does not relieve the supplier of the responsibility of ensuring the quality of the products purchased by TM4.

6.4 Supplier Quality Performance Evaluation

Supplier will be evaluated with three key indicators, every indicator have a different weight to calculate the final supplier scorecard. Every indicator will have different matrix evaluation according to TM4 standards.

- 50% - Quality
- 35% - OTD (On Time Delivery)
- 15% - Service Level

6.4.1 Product Quality

This KPI is recorded every month for every critical supplier. The indicator will be calculated taking in account the number of shipments vs the number of non-conformity reports as follows:

$$Quality = 100\% - \left(\frac{NCR\ Quantity}{Incoming\ quantity} \times 100 \right)$$

Quality indicator will give a value between 1 and 100. Actions to be taken are defined according to the following table:

Score	Action
>90%	No Action is required. NCRs will be recorded and stored for future reference
80-90%	Actions will be demanded to the supplier to correct the non-conformities
<80%	Action to follow closely the supplier will be taken

6.4.2 On Time Delivery (OTD)

On-Time delivery indicator allows to qualify the supplier shipments. KPI is calculated as follows:

$$OTD = \left(\frac{Number\ of\ shipments\ not\ on\ time}{Number\ of\ shipment\ on\ time} \times 100 \right)$$

A shipment is good if it arrives 5 days before and 3 days after the shipment day.

6.4.3 Service Level

Service level is evaluated for every supplier used for a three month period. Three criteria are taken in consideration to calculate the Service Level indicator

- Action Plan Replies
- Purchase Orders follow up
- Flexibility

Score will be given according to the following matrix:

Composantes Criteria	N/A	Good	Acceptable	Inadequate	Not Acceptable
Action Plan Replies	Supplier did not have a action plan request	- Supplier reply within 10 working day to the action plan. - Corrective actions are taken intermediately - Corrective actions are effective to avoid problem recurrence	- Supplier reply after a follow up to the action plan. - Corrective actions are done partially - Corrective action are sometimes effective to avoid problem recurrence	- Supplier reply after a lot of follow up to the action plan - Corrective actions are minor - Corrective action are rarely effective to avoid problem recurrence	- Supplier will not reply to the action plan. - Corrective actions are not taken - Corrective action are not effective to avoid problem recurrence
Purchase orders follow up	No shipping to do	- Supplier confirm all of the shipping dates - All shipments are in time - If there is a delay in the shipment the supplier will inform in advance	- Supplier confirm most of the shipping dates - Some shipments are in time If there is a delay in the shipment the supplier sometimes will inform in advance	- Supplier confirm some of the shipping dates - Most of the shipments are not in time - If there is a delay in the shipment the supplier will seldom inform in advance	- Supplier does not confirm the shipping dates. - All of the shipments are not in time - If there is a delay in the shipment the supplier will never inform in advance
Flexibility	Does not Apply	- Supplier is very flexible to change requests	Supplier is flexible to change requests	- Supplier is not that flexible to change requests.We need a good reason and put some preassure	- Supplier is not flexible to change requests
Score	Is not taken in account for the score	100%	70%	40%	0%

SECTION 3 : QUALITY CONTROL AND ASSURANCE

7 Control of non-conforming products

7.1 General

TM4 shall accept only materials that meet all the specified purchase order requirements. Shipping of non-conforming materials to TM4 shall lower the supplier performance scorecard. Measures will be taken to ensure the supplier's future product conformance and control.

The supplier is also responsible for their subcontractors' conformance to the P.O. requirements.

7.2 Request for Deviation

An *SQ-5021B, Request for deviation* form must be completed for any engineering changes to a product under development or production. **No e-mail or verbal requests will be accepted.**

7.3 Non-Conformity related to critical problems

If a non-conformity have serious implications and cause and stop building, the supplier and TM4 must find quick solution to the problem. The supplier could be required to be present at TM4 installations to analyse the situation.

8 Supplier corrective action request

TM4 could send a form *SQ-5030, Corrective Action Plan* to analyse and find the root cause of the problem. This will ensure that the supplier will take the corrective and preventive actions to solve the problem.

When a corrective action is required by TM4, the supplier shall complete and submit the report within 10 days with documented evidence confirming that the corrective action has been implemented. The response will be evaluated as part of the performance review and will affect the global supplier performance rating.

9 Quality Control Plan and Process

9.1 Key Characteristics

Supplier must have a Statistic Control for the CSC Safety characteristics as demanded in the document *SQ-6013 Quality Control Planning and SPC*

Key characteristics are characteristics marked "CSC" (critical) or "MKC" (major) or any manufacturing process parameter which can affect safety or compliance with regulations, fit, form, function, performance or subsequent processing of products. These are often the minimum quality control requirements for the product.

These key characteristics must be controlled throughout the product manufacturing process to ensure its conformity as defined in the *SQ-6013B-00 2, Product inspection* instructions.

The supplier shall develop his own internal quality control plan that will include at least the requirements of TM4. A quality control plan must be available for each product, at each step of the process.

9.2 Process Control

The supplier must inform TM4 of any change or modification in the parts manufacturing process.

SECTION 4 : DOCUMENTS

10 Documents needed with the shipment

10.1 Parts documents and Shipping approval

Supplier is responsible to follow the requirement indicated in the document "Quality Requirements" joint to the purchase order. All part shipment must be approved by TM4 in written. Shipping approval must follow the following steps

1. Supplier finish part manufacturing and make the final inspection
2. Supplier must send the documents as required in the document "Quality Requirements" to the buyer for approval
3. TM4 will analyse the documents and will inform the supplier if the parts could be shipped
4. After the reception of the shipment approval the supplier will send the parts

10.2 Special process control and tests

For TM4, the following processes are managed as special processes as defined in the ISO 9000 standard:

- Non-destructive test (NDT)
- Radiographic inspection (X-rays)
- Destructive test
- Welding
- Heat treatment
- Plating
- Coating
- Balancing
- Leak and pressure test
- Adhesive
- EDM
- Others

The supplier is responsible for ensuring he complies with the requirements of the applicable specifications defined on the engineering technical drawing and all of the relevant attachments.

All dimensions are to be taken after special processes meaning that the part is inspected to ensure final dimensional conformity.

10.3 Material certification/raw material

When demanded, Material certification is compulsory **with each shipment** and shall include the following information:

- Material description
- Chemical composition of material
- Raw material source
- Mechanical and/or chemical properties
- Heat code number, batch or lot number as applicable to ensure full traceability
- Expiry date/lifespan (applies to perishables)

10.3.1 Substitution de matériels

The use of a substitute material is not permitted unless:

- Such material is authorized by the engineering technical drawing/model or by material specification
- The original material is no longer used by TM4 nor specified in TM4's requirements.
- *Request for deviation* is approved by TM4.

10.4 FAI – First Article Inspection

The instruction *SQ-6013B-005, First article inspection (FAI)* must be applied when required the purchase order. The form *SQ5043B, First article inspection report (FAI)* must be filled by the supplier

10.5 Certificate of conformance (AC-5011B)

This certificate is applicable to certified suppliers. The objective of issuing this document is to ensure full traceability with all applicable processes and test results for each serial number or lot delivered to TM4. When the supplier does not have an appropriate system and process in place to ensure traceability of the product, the supplier must include at least one (1) original of the *AC-5011B, Suppliers certificate of conformance* (not the test result report) attached to the packing slip, with each shipment.

The certificate of conformance must, at a minimum, include the following:

- Indication of partial or complete shipment
- Part or assembly number and revisions
- Supplier name
- Supplier number (provided by TM4)
- Lot number (see requirements in paragraph 25)
- TM4 P.O. number
- Last P.O. revision date
- Quantity shipped
- Packing slip number
- Inspection report number
- Supplier request for deviation number (if applicable)
- Serial number(s) (if applicable)
- Description of raw material used

It must also include: All applicable specifications, with revisions and/or amendment status, and a statement to the effect that the products listed have been inspected in accordance with TM4 purchase orders, technical drawings and specifications.

For casting and forging products, the supplier shall state the tooling number (pattern), the manufacturing data sheet and heat/casting code numbers of the parts being shipped.

The certificate of conformance must be signed by a supplier's authorized quality representative with the following information clearly identified on the certificate: the signatory's title and position or designation.

10.6 Dimensional inspection report

The *SQ-6013B-002, Product inspection* instructions must be applied when required in the purchase order.

SECTION 5 : Specific Requirements

11. Specific Requirements

Subject	Requirement	
	Normal Parts	PPAP Parts
Non-destructive testing (NDT)	Copy of certification and employee competence cards shall be made available and communicated to TM4 for our records.	The supplier shall be certified by a valid independent organization for all non-destructive testing (NDT). The personnel must have a level I or II training; procedures and techniques require approval by a certified level III if necessary.
Radiographic inspection (X-rays)	<p>All new aluminum castings shall be tested in accordance with ASTM E94 and E155 to validate the specific grade of the first lot of a new model or for any modification of the cast technique. When X-rays are required, X-ray films or electronic photos and X-ray reports shall be attached to the PPV report.</p> <p>The supplier shall be certified by a valid independent organization to do X-Ray testing. The personnel must have a level I or II training; procedures and techniques shall be approved by a certified level III.</p> <p>Copy of certification and employee competence cards shall be made available and communicated to TM4 for our records.</p>	
Welding	<p>All welding shall be performed by a supplier qualified by the CWB (Canadian Welding Bureau) or by an equivalent organization. The supplier shall also be certified for CSA W47.1 or W47.2 standards or equivalent and welding must be performed and supervised by qualified personnel. All certification copies and employee competence cards shall be made available and communicated to TM4 for our records.</p> <p>Documented welding methods used on our products must be approved by a welding engineer, qualified by the CWB and provided to TM4 for PPV validation.</p> <p>Welding repairs on any product are not permitted without having submitted an <i>SQ-5021B, Request for deviation</i> form to TM4, and having received TM4's approval. In this case, the supplier may propose a repair method to be approved by TM4 before proceeding.</p>	
Heat Treatment	After heat treatment, the supplier shall verify the hardness in accordance with ASTM E10-07 or ASTM E18-07 standards. Results shall be recorded on the final inspection report or on the Material certificate report.	Applicability and effectiveness of a heat treatment process must be determined utilizing the CQI-9 Special Process: Heat Treat System Assessment (HTSA) published by AIAG. This self-assessment shall be completed on an annual basis and shall include all actions taken. These records shall be maintained and made available to TM4 for review.
Plating		Applicability and effectiveness of the plating process shall be based on the CQI-11 Special Process: Plating System Assessment (PSA) published by AIAG. This self-assessment shall be completed on an annual basis and shall include all actions taken. Records shall be maintained and made available to TM4 for review.
Coating		Applicability and effectiveness of the coating process shall be based on the CQI-12 Special Process: Coating System Assessment (CSA) published by AIAG. This self-assessment shall be completed on an annual basis and shall include all actions taken. Records shall be maintained and sent to TM4 for revision.
Balancing	When a product or subassembly balancing test, as defined in ISO 1940-1 and ISO 1940-2 standards	
Leak test and pressure test	When a product or subassembly leak test or pressure test is successful the supplier must include a certificate with the parts serial numbers	
Threaded holes	All threaded holes must be 100% controlled with calibrated thread plug gage Go and No-go (2.5 turns maximum for no-go). All threaded holes must be class 2, unless otherwise specified on the technical drawing.	
Visual inspection	All parts shall be visually inspected to ensure that the complete manufacture, markings and surface finish meet the requirements and to detect any potential non-conformance (see the <i>SQ-8005B, Visual inspection and cleanliness of products</i>).	

Casting	<p>The use of recycled materials or materials containing a percentage of recycled material must be submitted to and approved by the engineering department of TM4, through an <i>SQ5021B, Request for deviation</i> form.</p> <p>All aluminum sand castings shall conform to the latest revision of the ASTM B26 standard.</p> <p>All aluminum permanent castings shall conform to the latest revision of the ASTM B108 standard.</p> <p>All aluminum die castings shall conform to the latest revision of the ASTM B85 standard.</p>	
Tooling	<p>Tooling quality control: Unless specified in the purchase order or on the drawing, a material or special process certificate is not necessary for tooling quality control, but an <i>SQ-5058B, Inspection report</i> may be used.</p> <p>All tools purchased by TM4 remain the property of TM4. The supplier must maintain and communicate at least, once a year, a Production tooling list. The form <i>SQ-5048B, Production tooling cost breakdown</i> list may be used.</p> <p>Types of tooling include manufacturing tooling, testing, inspection and test equipment.</p> <p>TM4 tools shall be permanently and clearly engraved so that ownership of each tool is easily visible.</p>	
Quality control of prototype product	<p>Specific quality control for a prototype product shall be defined by TM4's engineering department on a case-by-case basis and documented on the <i>SQ-5024B, Control Plan</i> for prototype product as required. These requests will be included as specific notes on the TM4 purchase order.</p>	
Technical drawing and CAD	<p>Only products manufactured according to technical drawings approved by TM4 will be accepted. TM4 technical drawings take precedence over any supplier/manufacturer manufacturing drawings.</p> <p>Also, TM4 2D technical drawings specifications override 3D files. The 3D file will be provided only to support castings, models, tools and components. All components must comply with the 2D technical drawing.</p> <p>Technical drawings identified as "Preliminary – Do not use for production" must be used only for quotation purposes, not for product manufacturing.</p>	
Part Approbation Process		<p>PPAP part approbation process must be conducted within a PPAP. Part production will be considered approved when the PSW is signed by TM4. the supplier must assure that people in the approbation process have all the qualifications required according to all the standards. If the supplier uses tiers-suppliers, it will be responsible of their quality and the performance evaluation.</p>
Electronic Products	<p>All products must meet the specified applicable specifications and IPC standards</p> <p>Aging control of electronics components: The supplier shall deliver only parts manufactured within seven (7) years before the shipment date. An <i>SQ-5021B, Request for deviation</i> form shall be completed for parts exceeding this time.</p>	<p>Applicability and effectiveness of the Soldering Process shall be based on the CQI-17 Special Process: Soldering System Assessment published by AIAG. This self-assessment shall be completed on an annual basis and shall include all actions taken. Records shall be maintained and sent to TM4 for revision.</p> <p>Also suppliers must follow the requirements in ANSI/ESD S20.20-2014 Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) and IPC/JEDEC-9704A-2012 Printed Circuit Assembly Board Strain Gage Test Guidelines</p>
Metric fasteners	<p>All metric fasteners supplied to TM4 shall meet ISO 898-1 requirements unless otherwise specified on an <i>SQ-5021B, Request for deviation</i>. Fasteners M5 grade and above must be marked as per this standard. For fasteners < M5, we will accept grades 8.8 and 10.9, no matter what the item description is on the purchase order. Packaging from the manufacturer will show original information or this information will be transferred if re-packaged (Manufacturer's name, item number, item description, lot number and grade). The certificate of conformance shall be supplied upon request from TM4.</p>	
Bulk material and short-life material	<p>Information must be provided on product materials likely to deteriorate over time due to storage or transport conditions. The supplier/manufacturer shall indicate on the package label the date of original manufacture of the product, shelf-life or expiry date. All products having a limited shelf-life must still have 75 % or more of remaining shelf-life at the time of delivery.</p>	
Appearance approval report & graining validation	<p>The instruction <i>SQ-6013B-006, Appearance and graining validation</i> must be applied when required in the purchase order.</p>	
ELV/IMDS	<p>When the ELV/IMDS is a requirement, the supplier must follow the <i>SQ-6013B-001, ELV/IMDS</i> Instruction and complete the <i>SQ-5046B, ELV/IMDS data report</i> form in the TM4 APQP Toolkit.</p>	

Handling, storage, packaging, preservation and delivery	Details of TM4 requirements are specified in the SQ-6013B-003, Product preservation instruction.
Qualified Laboratory	Supplier must be ISO/CEI 17025 or national equivalent
