Quality Assurance Requirements

Grenadier Project

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1. Scope

1. These Quality Assurance Requirements (hereinafter referred to as “QAR”) describes the minimum requirements of CARRARO for the GRENADIER Project to be met by the Supplier and its quality management system and the rights and obligations regarding the quality assurance for the supply of the Products and the performance of the Services.
2. The aim of this QAR is to secure and constantly improve the quality of the respective Products, to optimize cooperation between the Parties and jointly exceed the constantly increasing market demands in respect to quality and reliability.
3. The Supplier shall develop a “Zero-Defect Strategy” and take all necessary actions in order to achieve a “Zero-Defect” target.

2. General Requirements

2.1. Sub-supplier Management

1. Sub-suppliers have a significant impact on the quality of the final Products. Therefore, the Supplier shall have and maintain an effective supplier management system, including the development and the monitoring of these sub-suppliers.
2. The Supplier shall extend the requirements of this QAR to its sub-suppliers and all subsequent steps in the value chain.
3. For the avoidance of doubt, if CARRARO pledges the Supplier to use a specific sub-supplier within a certain Product, the supplier shall bear full responsibility for the performance of the sub-supplier. If special agreements are required, the Supplier shall notify all involved parties in order to negotiate a separate agreement.
4. If the Supplier engages sub-suppliers in the development and manufacture of the Products, it shall undertake to facilitate audits by CARRARO or by CARRARO’s authorized representatives. Irrespective of that, the Supplier shall bear responsibility for optimizing known weaknesses on the part of its sub-suppliers.

2.2. Product Safety Representative

1. In terms of product safety and conformity, the Supplier shall implement the requirements of IATF 16949 section 4.4.1.2.
2. The Supplier shall appoint a Product Safety Representative (“PSR” or “PSB”) who acts as a central point of contact to CARRARO concerning product safety and conformity related issues and fulfils all requirements and task according to the above-mentioned documents.
3. One PSR shall be designated per Supplier’s production location/plant.
4. The Supplier will deploy this requirement throughout the supply chain without exception.

2.3. Audits by CARRARO

1. CARRARO or its authorized representative shall be entitled to conduct audits of the Supplier's quality management system and processes. CARRARO shall have a comprehensive right of information in this regard, extending to the overall processes entailed in the development and production of the Products being supplied.

2. The Supplier shall, in connection with any such audit, grant access to all locations and premises, inspection sites, warehouses as well as inspection of any documents relevant to quality. The costs for the conduction of such an audit shall be the responsibility of each respective party.
3. CARRARO shall make the results of an audit available to the Supplier in writing.
4. Any potential improvements or deviations shall be jointly evaluated, and corresponding measures agreed.
5. Responsibility for optimizing weaknesses shall rest with the Supplier. CARRARO shall be entitled to participate in the optimization.
6. The Supplier shall provide CARRARO with documented verification regarding the implementation and effectiveness of respective optimizations.

3. Pre-Series Requirements

3.1. Advanced quality planning

1. The Supplier shall set up and implement a preventive quality planning and develop this further, so it is suitable for ensuring quality requirements during each phase of the product lifecycle, from the first prototypes or samples until end of production.
2. The Supplier shall prepare a detailed project schedule together with CARRARO and comply with this schedule (in compliance with AIAG APQP).
3. The Supplier is responsible for preparing appropriate and required documents including, but not limited to, 'QFD' analyses, feasibility studies, control plans, 'FMEA' studies derived from the quality assurance and measurement concepts, process flow diagrams, inspection plans including test equipment and gauges, concept for equipment, resource scheduling, maintenance and packaging, capability studies for special characteristics and personnel qualification plans.
4. The Supplier undertakes to use and comply with all new, competitive technologies and development planning processes, considering the technical conditions. The Supplier shall contribute its experience from the start of the Project.

3.2. Relevant Standards & Triggers for Sampling

1. The Supplier shall apply the Production Part Approval Process (AIAG PPAP).
2. The attached *"Trigger Matrix"* describes in detail the triggers for the start of a PPAP process, these are amongst others:

    - new Products to be supplied;
    - changes to Products being supplied;
    - modification of production locations, manufacturing or test processes;
    - long-term production stoppage of more than 12 months;
    - use of new, modified or replacement tools;
    - change of sub-suppliers of supplied parts; and
    - on justified request by CARRARO.

The required submission level for the PPAP is defined by CARRARO Standard 8-00002.

3.3. Capability Studies

1. For special product and process characteristics (identified by S or C) the Supplier shall evaluate the machine and process capabilities.
2. The evaluations shall be conducted based on the AIAG SPC Manual.
3. The aim is to achieve the following capabilities.
    - A ***machine capability or short-term process capability*** of **Cm/Cmk ≥2.00**;
      A machine capability study is a short term study and refers exclusively to the ability of a machine to produce parts. A machine capability study includes the following steps:
        i. manufacturing of representative number of parts (minimum 50) in a continuous uninterrupted production run;
        ii. measurement of the part characteristic(s);
        iii. Calculation of capability indices.
    - A ***preliminary process capability*** of **Pp/Ppk ≥2.00**
      A preliminary process capability study is a short term study where the interest is in evaluating inherent process variation; many factors such as tools, operators, environment etc. don't change appreciably during the study. A preliminary capability study includes the following steps:
        i. Selection of at least 10 subgroups. The preferred size of the subgroup is 5.
        ii. Measure part characteristics and record the results along with production sequence;
        iii. Statistical evaluation of the data: statistical distribution and stability;
        iv. Calculation of process capability and performance indices.
    - A ***long-term process capability*** of **Cp/Cpk ≥ 1.67**
      A long-term process capability study allows effects of many factors in the process such as operators, raw material, tools etc. A long-term capability study includes following steps:
        i. Selection of at least 20-25 subgroups. The preferred size of the subgroup is 5.
        ii. Measure part characteristics and record the results along with production sequence;
        iii. Statistical evaluation of the data: statistical distribution and stability;
        iv. Calculation of process capability and performance indices.
4. Deviations from these requirements must be agreed upon by the Parties in writing.
5. The Supplier shall evaluate the required machine and process capabilities continuously during all phases of the product lifecycle.
6. If the required machine and process capabilities can't be met, then the Supplier shall implement suitable temporary containment action, such as a 100% testing or sorting of

the Products prior to shipment to CARRARO, so that no defective Products are delivered to CARRARO.

7. The Supplier shall inform CARRARO about these measures including an action plan. CARRARO may request the extension of the containment action in case that the capabilities are not achieved, or justified objection are raised.

3.4. Measurement Process Capabilities

1. The Supplier shall assess test processes based on the AIAG MSA Manual.
2. Unless otherwise agreed, the Supplier shall undertake to incorporate testing equipment provided or used by any sub-supplier into its quality management system, just as it would do with its own testing equipment.

3.5. Material Data

1. The Supplier shall submit material and substance information for all its Products using the International Material Data System (“IMDS” - https://www.mdsystem.com/).
2. The Supplier shall regularly reassess the material and substance information in case of changes in the Product or legal requirements.
3. CARRARO may engage external suppliers, who, in the name of CARRARO, collect, evaluate and update material data in IMDS. The Supplier shall cooperate fully with such suppliers.

3.6. Production Part Approval Process (“PPAP”) and Sample Submission

1. The Supplier shall provide the initial sample documentation according to the requested submission level and according to CARRARO Standard 8-00002.
2. The Supplier shall supply such documentation at a time agreed by the Parties or, at the latest, at the same time as the corresponding samples are delivered.
3. In case of deviations from specification, the Supplier shall inform CARRARO as soon as possible, and not after the PPAP and sample submission. The Supplier shall include all relevant information, so CARRARO can assess the deviation and accept or reject it. This information shall include a complete 8D report concerning the correction of the deviation.
4. Missing, incorrect, incomplete or delayed documentation without any explanation and action plan may affect the supplier evaluation. In such a case, the documents and samples may not be processed and may lead to subsequent delays. The Supplier shall pay to CARRARO such amount as will reimburse CARRARO for costs incurred by CARRARO arising out of or in connection with such missing, incorrect, incomplete or delayed documentation.

4. Series Production Requirements

4.1. Quality Targets

1. CARRARO reserves the right to define product-specific quality targets with the Supplier.
2. For reasons of product liability, CARRARO expects a delivery quality compliant with the specifications, with the goal of achieving a zero-defect rate.

3. If the Supplier deviates from the zero-defect objective, the Supplier shall initiate and specify all required steps to ensure a significant improvement of the quality situation.
4. In the case of transgressions over a longer period or major deviations, joint targets and problem-solving measures or projects shall be agreed upon between the Parties.

4.2. Complaint Processing and Reporting

1. The Supplier and CARRARO shall immediately notify each other when becoming aware of a potential safety, quality or delivery issue.
2. In case of process disruptions or quality problems at the Supplier or a quality complaint by CARRARO, the Supplier shall issue to CARRARO an 8D report containing a report containing at least information about:
    - the isolation and marking (potentially) of defect parts (at its premises and at the CARRARO facilities) and how it is ensured, that no potentially defect parts are further used;
    - the initiation of immediate actions to ensure deliveries to CARRARO;
    - the analysis of the root causes of the defect;
    - the initiation of improvement measures; and
    - the evaluation of such measures' effectiveness.
3. The Supplier shall report immediate actions to CARRARO within 24 hours.
4. The Supplier shall send the 8D report to CARRARO within 10 working days of the detection of the defect. The 8D report is only closed with the acceptance of CARRARO.
5. The Supplier shall carry out the analysis for the parts returned from the field in a time agreed by the Parties.

4.3. Traceability

1. The Supplier undertakes to set up a traceability system and to assure this system for every Product (by means of production and material batches).
2. If an error is identified in respect of a Product, it must be possible to trace the error to limit the quantities of defective Products.

4.4. Requalification

1. Product and processes shall be subjected to a regular and planned requalification.
2. The scope and frequency of requalification shall be planned by the Supplier and be specified in the Control Plan (as defined in IATF 16949 and agreed between the Parties). Complexity and criticality shall be taken into consideration:
    - All Products shall be subject to a requalification test minimum every three years.
    - Products with safety related characteristics shall be subject for a requalification at least annually.
3. The Supplier shall conduct a full dimensional and material inspection and functional tests in accordance with the control plan and, in doing so, shall consider applicable customer specifications.

4. The result of any such dimensional and material inspection must be reported to CARRARO upon request.
5. Any deviations from this obligation must be made in writing between the Supplier and CARRARO.

4.5. Deviation Approval / Concessions

1. In case of a deviation in production, the supplier shall inform CARRARO in writing about:
    - the occurred deviation;
    - the potential risks when using the parts;
    - the initiated measures to correct the deviation; and
    - the time frame for the correction to be effective.
2. CARRARO shall assess any deviation notified under paragraph 4.5(1) of this QAR and approve or reject the relevant deviation in writing.
3. Any approval under paragraph 4.5(2) of this QAR shall only be valid for a certain period or a certain number of parts, as specified in the relevant approval.
4. Products delivered on basis of such an approval shall be marked separately by the Supplier to be identifiable during production and field use.