GENERAL QUALITY MANAGEMENT REQUIREMENTS

AIXTRON SE

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General Quality Management Requirements

1 Purpose

This quality management requirements (QMR) applies to all products and services supplied by the Supplier to AIXTRON. This QMR does not replace any requirement of ISO 9001 in its current version, but rather describes AIXTRON's expectations of the generally formulated requirements in ISO 9001 to ensure a common understanding between AIXTRON and the supplier.

2 General requirements

The supplier is generally obliged to set up and apply a certified quality management system in accordance with ISO 9001, as amended.

If the Supplier is not currently certified according to ISO 9001, he undertakes to conclude a separate agreement with AIXTRON on applicable quality processes (topics from ISO 9001).

The Supplier is obliged to submit its currently valid certificate to AIXTRON on its own responsibility and independently and to inform AIXTRON immediately of any changes.

Irrespective of certification in accordance with ISO 9001, the supplier undertakes to apply the tools and methods specified in chapter 3 and sub-chapters for its processes and procedures to ensure continuous improvement of all products, processes, operating procedures and services.

In addition, AIXTRON has created further product and general requirements in the form of company standards (CS) and technical work instructions (WI). The documents relevant for the suppliers can be found on the exchange drive (EDE) in the "Public" folder. The supplier is obliged to inform himself regularly about changes.

3 Quality Core Tools

In the following chapters, quality tools are described to ensure implementation a "zero-defect strategy". These basic quality core tools are in line with ISO 9001 standard. AIXTRON expects its suppliers to implement these quality core tools in a mandatory and effective manner. AIXTRON assesses the implementation of the individual Quality Core Tools at the supplier as part of the supplier evaluation. The result of the supplier evaluation has an influence on the awarding of new components for delivery by the supplier.

In the event of any uncertainties or comments regarding these tools, the supplier can get in touch with his respective contact person within the Supplier quality department at AIXTRON.
If no direct contact person is known, questions and topics can be sent to the e-mail address general-sq@aixtron.com.

3.1 Visual catalog

Visual catalogues are to be used by suppliers where a visual inspection of product characteristics takes place.
The term "visual catalog" refers to a methodical approach that describes the graphic documentation of possible defects. This documentation can exist as a stand-alone document or be embedded in other documents (e.g. instructions of any kind). It is important here to initiate the methodical recording at the start of the development phase of new components and to continue it throughout the entire product life cycle. The used images must be of an appropriate high quality so that potential and/or existing defects are recognizable to everyone. In addition, the defect recorded on the image must be highlighted by means of a marker and brief description. It is important to check this documentation regularly and update it if necessary. In addition, this documentation serves as a training basis for all employees who work with these components, processes and operating procedures in their daily business. If explicitly requested by AIXTRON, suppliers shall provide the current documents of the Visual Catalogue (via EDE, in the 'Visual Catalogue' folder).

3.2 Work instructions

Work and test instructions are an important part of structuring and standardizing processes. All activities that are required to carry out a task as part of a production process and cannot be represented by a drawing must be described in the form of instructions. Instructions are structured as step-by-step descriptions and, if necessary, include all requirements for tools, equipment, resources, etc. Work and test instructions must be checked and updated at regular intervals and in the event of deviations in the product. The instructions are also a training document. It must be ensured that appropriate evidence is kept.

3.3 Process flow diagram

A process flow diagram is used to visualize logical process and test steps. The process flow diagram is the basis for all further activities relating to process management and represents a structured procedure for identifying risks and bottlenecks. In addition, a process flow diagram is a further tool for identifying the origin and consequences of errors in the event of deviations.

3.4 Main, critical and special characteristics

AIXTRON defines the so-called main, critical and special characteristics for its components on the drawings. The basis is the company standard CS 0117. These features are defined based on their importance for the function and the fit with other components. The supplier must ensure that process-critical characteristics are identified.
Depending on the classification, the supplier must ensure that all the above-mentioned characteristics are documented with the manufactured and delivered component in accordance with CS 0117.
In addition to the requirement in CS 0117, the Supplier undertakes to archive the records for main characteristics and to make them available within one working day at the request of AIXTRON.

The reports must contain at least the following data:

- order
- SAP article number
- Drawing/document number/index no.
- Identification number
- Material

All test reports, measurement protocols and similar documents must be stored and archived exclusively on AIXTRON's EDE drive.

3.5 Feasibility analysis

In principle, suppliers are obliged to check the manufacturability of the products and services requested by AIXTRON. The aim of the manufacturability analysis is to compare and evaluate the existing requirements with the capabilities and skills of the existing manufacturing process.
Deviations and ambiguities must be coordinated and, if necessary, documented in advance of a positive commitment. In such a case, the respective purchaser who sent the RFQ (Request for Quotation) must be contacted to initiate clarification and coordination.
By signing the feasibility study, the supplier declares that the requested product can be manufactured in accordance with the requirements specified by AIXTRON.
AIXTRON provides a template for this purpose. The document is available on the AIXTRON homepage, AIXTRON Suppliers: Purchasing :: AIXTRON. If AIXTRON does not explicitly require a declaration of manufacturability, the supplier must nevertheless ensure that the requirements have been checked and can be met.

3.6 Release of components

3.6.1 Initial release

As part of the development of new components or the relocation of series components, AIXTRON orders a so-called initial sample. These initial sample components must always be manufactured under series production conditions on series production systems.

In most cases, AIXTRON provides a First Sample Report (FSR) as a template. In this FSR, the necessary test areas are defined in which the supplier confirms the conformity of the component with drawings, specifications and other associated documents in a comprehensible manner with corresponding evidence (e.g. measurement report).

Based on the evidence submitted in the FSR, AIXTRON will make a decision on the use of the goods and document this in the FSR cover sheet.

The document is available on the AIXTRON homepage, AIXTRON Suppliers: Quality :: AIXTRON.

The following usage decisions have been made:

Decision	Explanation	Consequence
Accepted	FSR and product accepted	Released for series production
Accepted with Condition	FSR and product partially acceptable due to deviations	Existing deviations do not jeopardize further use. With the next production/delivery, a resubmission of the failed tests with new samples is required after implementation of the corrective measures.
Rejected	FSR and product not accepted	The component does not meet the requirements and further use is excluded. The component must be newly manufactured and resampled.

If AIXTRON does not order an initial sample, the supplier must ensure that an internal qualification including documented release has been carried out. Re-approval during/after long-term interruptions

3.6.2 Re-release during/after long-term interruptions

If the production of components has not taken place for longer than 24 months, AIXTRON can order new initial samples for the re-release of components. This is to ensure that the required product quality is still guaranteed after such a long interruption. The procedure corresponds to chapter 3.6.1.

3.7 Robust measuring method

Robust measurement method means that the right measurement tool and the right procedure for the attributes to be measured are implemented. If the measurement method is developed by the supplier, the supplier must demonstrate repeatability and reproducibility. The definition and/or development of the measurement procedure must take place at the same time as the development of the component, so that the above-mentioned verifications can be recorded in the pre-series phase and are verified and approved at the transition to series production.

3.8 Risk assessment

As part of a risk assessment, AIXTRON expects a comprehensive identification, analysis and monitoring of potential risks across the entire material flow that may affect the product using risk assessment tools. The risk assessment always begins at the start of development and is regularly reviewed and updated. If the supplier delivers the component according to his own design and drawing, the design risks must also be considered in the risk analysis. AIXTRON recommends the method of FMEA (Failure Mode Effective Analysis) according to e.g. AIAG & VDA FMEA manual.

3.9 Traceability of products

Traceability or the traceability system ensures the identification of material, individual and assembly components throughout the material flow. The purpose of in-depth traceability is to ensure that if problems occur, other potentially affected components can be quickly identified. In addition, traceability facilitates the faster identification of the origin and cause of defects and the initiation of appropriate measures. AIXTRON has its own component traceability requirements, which are described in Company Standard (CS) 0024. In the event that CS 0024 is not required for the component or is not applicable, the supplier must implement and maintain its own traceability system.

3.10 Production control system

Appropriate quality checks must be set up for each production step carried out or production stage reached to ensure that errors are not processed further and that consequential costs and effects of errors are avoided. The quality inspection is carried out via a production control system in the logical sequence (see also chapter 3.3). Quality controls may also include monitoring of process parameters. Tests on products must always be presented with the test method and test frequency as well as a reaction plan in the event of deviations.

3.11 Management of subcontractors

To safeguard supply chains, it is essential to manage all partners involved. It is therefore necessary to develop a method for managing outsourced components and/or services. This system includes a release procedure, product and process qualification as well as key performance indicators to monitor the performance of external partners. These key figures should at least include delivery and quality performance.

4 Change management

AIXTRON has introduced a systematic approach to managing changes of all kinds. This system is referred to at AIXTRON as "Change Management". An account has been set up for necessary external changes at its suppliers. In addition, a matrix with change categories and a change request template have been defined to control the processes. The change notification must be sent to ChangeNotification@aixtron.com. Both documents are available on the AIXTRON homepage, AIXTRON Suppliers: Quality :: AIXTRON.

In accordance with the Change Matrix, Supplier shall obtain AIXTRON's written approval before making any changes to specifications, designs and manufacturing processes that may affect the functionality and reliability of AIXTRON's products.

The following overview explains the classification of components mentioned in the change matrix

Classification of the component	Explanation
Standard parts	simple parts manufactured according to specific and agreed standards, e.g. screws, washers, nuts
Catalog parts	OEM parts for which data sheets or specifications have been agreed, e.g. sensors
Catalog parts - critical components	OEM parts for which data sheets or specifications have been agreed and which are identified by AIXTRON as process-critical, e.g. MFC
Drawing-related - non-critical	all parts supplied based on AIXTRON drawings
Drawing-related - critical	all supplied parts based on AIXTRON drawings that are identified by AIXTRON as process critical, e.g. reactor parts

5 Supplier process audit

AIXTRON reserves the right to audit the components manufactured for AIXTRON and the necessary processes at the Supplier's premises after prior notice and, if necessary, with AIXTRON customers. The Supplier shall grant access to AIXTRON representatives for this purpose. This does not release the Supplier from its quality responsibility and liability.

The Supplier is obliged to ensure that AIXTRON is authorized to audit the subcontractor as well, if necessary.

6 Supplier evaluation

Controlling and monitoring the supply chain is a decisive factor for AIXTRON's success. For this reason, AIXTRON regularly evaluates relevant performance parameters.
Various criteria from the following areas are taken into account

- Purchasing
- Logistics
- Communication
- Risk and ESG
- Quality

If the specified targets are not achieved, the supplier is obliged to draw up an action plan, which is then accompanied and monitored by AIXTRON.

7 AIXTRON Product and Product Readiness (APPR)

To improve the maturity level of developed components and services, AIXTRON has established a method for managing product and process qualification. The method is called AIXTRON Product and Process Readiness (abbreviation APPR). This method focuses on prevention and advance planning and is based on the well-known APQP (Advanced Product Quality Planning) principle

The APPR process is divided into four main elements. Each element consists of various requirements that are checked in advance, planned if necessary and implemented. A description of the individual sub-elements is contained in the APPR document. The APPR is a template prepared by AIXTRON and is made available to the supplier by AIXTRON if an application is required. All requirements in this APPR are mandatory, unless otherwise agreed with the responsible Supplier Quality Engineer of AIXTRON. If no direct contact person is known, questions and topics can be sent to the e-mail address general-sq@aixtron.com.

The status of the APPR will also be reviewed at regular intervals by AIXTRON's Supplier Quality Engineer.

The document is available on the AIXTRON homepage, AIXTRON Suppliers: Quality :: AIXTRON.

7.1 Product qualification

Product qualification ensures that the properties and functions of a component as defined in the respective specifications are achieved. All the necessary modules for this are recorded in the APPR within element 3. The result is 100% compliance of the manufactured component with the requirements. (see also chapter 3.6.1)

7.2 Process qualification

Process qualification includes all requirements that reduce production deviation and thus ensure the reproducibility of the manufactured component. The requirements and methods necessary for this are described in element 4 of the APPR. The final process release takes place after implementation of all requirements and the delivery performance during a defined period and/or manufactured quantity, which are monitored with the KPIs for complaints and special releases.

8 Management of non-conformities

8.1 Special release

If deviations are detected before delivery, they must be agreed with the AIXTRON quality department. An application for special release can be submitted for this purpose.
Applications will be sent to the following addresses:

AIXTRON SE Purchase orders: quality@aixtron.com
AIXTRON Ltd Purchase orders: uk-qa@aixtron.com

The following information must be transmitted so that clear identification and traceability can be guaranteed:

- Order number
- Delivery no.
- SAP article no.
- Drawing/Document No./Index
- Identification number
- Quantity concerned

The deviation must be clearly described and documented (e.g. with images). Corrective measures must be taken to ensure that the error does not occur again in the future. Without the corrective actions, AIXTRON cannot approve a special release. If the component is regardless delivered, a complaint and rejection will be issued.

The document is available on the AIXTRON homepage, AIXTRON Suppliers: Quality :: AIXTRON.

8.2 Complaint management

In the event of non-conformities detected during the initial sample inspection, incoming goods inspection, assembly and/or by customers, a complaint report is created and sent to the supplier.

In order to minimize the damage caused by the complaint, AIXTRON expects a prompt response from its suppliers within one working day in order to agree and coordinate the necessary immediate measures with AIXTON.

AIXTRON expects a statement for each complaint report. AIXTRON has two types of reports.
All reports must be sent to the following addresses:

AIXTRON SE Complaint: inbox8D@aixtron.com
AIXTRON Ltd Complaint: uk-inbox8D@aixtron.com

8.2.1 Quality report

The quality report is requested as standard in response to a complaint report sent by AIXTRON. The quality report is due within 10 working days of receipt of the complaint report. The quality report includes at least the cause and the short-term measures to prevent recurrence.

8.2.2 8D Report

If certain criteria are met, AIXTRON requires an 8D report. The required feedback deadlines are:

8D phase	Definition of the phases	Deadlines[1)]
D1-D3	Team definition, problem description, immediate measures	2 working days
D4 - D5	Root cause analysis, Planned long-term shutdown measures	10 working days
D6 - D8	implemented corrective measures including proof of effectiveness, preventive measures, Completion of the 8D report	The action plan may not normally exceed 30 days. If more time is required, coordination with AIXTRON's Supplier Quality Department must take place.

1) If necessary, other deadlines can be agreed via a separate QAA (quality assurance agreement).

The review and final evaluation of the quality reports and 8D reports is the responsibility of the AIXTRON quality department.

For justified complaints, AIXTRON reserves the right to charge the costs and expenses incurred by AIXTRON and its customers to the party responsible.

Both documents are available on the AIXTRON homepage, AIXTRON Suppliers: Quality :: AIXTRON.

8.3 Repairs

AIXTRON also orders repairs and/or maintenance from its suppliers. The defective component is returned to the supplier. The supplier carries out the repairs and returns the repaired product with the provided purchase order (47000xxxxx). For each repair, AIXTRON expects a detailed repair report documenting the work performed and listing replacement material.

All reports must be sent to the following addresses:
AIXTRON SE Purchase order: inbox8D@aixtron.com
AIXTRON Ltd Purchase order: uk-inbox8D@aixtron.com