PROCEDURAL INSTRUCTION

7.01.VA.0003 FIRST ARTICLE INSPECTION SUPPLIER

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1 OBJECTIVE AND PURPOSE

This procedural instructions (VA) describes the framework for carrying out and documenting the First Article Inspection (FAI) between Rheinmetall Electronics GmbH (RME) and the supplier of a product.

1.1 LIST OF ABBREVIATIONS

Abbreviation	Explanation
CDR	Critical Design Review
CID	Configuration Identification Document
CoC	Certificate of Compliance
DPD	Digital Product Definition requirements
FAI	First Article Inspection
FAIR	FAI-Report
ACTUAL-LU	LU with details of the parts actually installed
CID	Configuration Identification Document
CMP	Configuration Management Plan
LU	List of parts subject to monitoring
PA	Prüfanweisung (engl. Test Instruction)
PCBA	Printed Circuit Board Assembly
PDR	Preliminary Design Review
PQM	Project Quality Manager
PRR	Production Readiness Review
QAA	Quality Assurance Agreement
RME	Rheinmetall Electronics GmbH
SCM	Supply Chain Manager
TARGET-LU	LU with details of the permissible parts
UAN	Sub-contractor (2nd tier supplier)
VA	Procedural instruction
VDD	Version Description Document

2 GENERAL POINTS

The process instruction describes the execution of the First Article Inspection at suppliers in addition to the RME process *7.01.PB.0007 First Article Inspection*.

2.1 DEFINITIONS

Critical unit	Unit (e.g. function, part, software, feature, process) that has a significant impact on production realisation and use, including in aspects such as safety, performance, form, fit, function, manufacturability, durability etc. and that requires specific actions to ensure that it is adequately addressed. Examples include safety-critical units, fracture-critical units, task-critical units, key features and safety-related maintenance tasks.
Design features	Dimensional, visual, functional, material and mechanical specifications or characteristics that describe and constitute the design of the product according to the requirements specified in the drawings or DPD. These features may be measured, inspected, tested or proved to demonstrate compliance with the design requirements. The dimensional specifications include positional information for the manufacturing process (e.g. target machining or forging/casting dimensions for forgings and castings, as well as the preparation of welded/brazed joints required for acceptance of the finished joint). Material specifications or characteristics may include machining parameters and sequences specified in the drawing or DPD (e.g. temperature for heat treatment, class of fluorescent penetrants, ultrasonic tests, sequence of welds and heat treatments). These ensure the intended features which cannot be otherwise specified.
Digital Product Definition requirements (DPD)	Requirements on any digital files that describe the physical or functional requirements, directly or by reference, including files that describe the design and acceptance criteria of the product. Examples of a DPD include the following: • The digital definition and two-dimensional (2D) drawing sheets with complete dimensional specifications; • A three-dimensional (3D) data model and simplified or reduced content 2D drawing sheets • The 3D model with design features specified in text form • • All other files that define a product in its entirety.
First articles	First articles are products (systems, assemblies or individual parts) that have been manufactured using the tools and processes intended for series production under series production conditions before the start of series production.
First Article Inspection (FAI)	Planned, complete, independent and documented inspection and verification process to ensure that a product has been manufactured using the prescribed production processes in accordance with the technical drawings, DPD, planning, order, technical specifications and/or any other applicable design document. The English abbreviation FAI is used through the process and associated documents.

First Article Inspection Report (FAIR)	Forms and document set for a part number, sub-assembly or assembly, including the associated results of the first article inspection.
Key feature	A feature or special characteristic whose change has a significant influence on fit, performance, service life or manufacturability of a product and requires specific measures to control changes (cf. 9100 and 9110).
IST-LU	The assignment of serial numbers for parts of a product manufactured in-house is carried out by the person responsible for integration. In the case of third-party deliveries, the supplier must provide the actual LU (German: IST-LU) for his share.
Product	Any intended result of a product realisation process, including, in the context of the European Standard, finished parts, sub-assemblies, assemblies, forgings and castings.
Qualified tool	Universal (not part-specific) calibrated monitoring and measuring instrument (e.g. good/scrap part gauges, thread gauges, radius gauges) that is used to validate the product design features which are clearly specified and can be traced on the basis of calibration records.
SOLL-LU	All parts of a scope of supply to be monitored (i.e. with manufacturer's part number, serial number and construction status) are summarized in the list of monitored parts (target LU, German: SOLL-LU). In the case of third-party deliveries, the supplier must provide the target LU for his share.
Special tools	Product-specific tool [e.g. inspection equipment, program of a coordinate measuring device (KMG)] that has been manufactured specifically to validate the design features of a product.

2.2 RESPONSIBILITY

The supplier is responsible for the correct implementation and accuracy of the first article inspection. In the case of subcontracting by the supplier, the supplier is responsible for passing on and fulfilling the quality requirements. This includes the proper documentation of the first article inspection as well as the preparation of the first article inspection report.

Project Purchasing at RME is responsible for the contractual agreement of the RME quality requirements with the supplier as well as the commissioning of the FAIs according to the specifications of the Project Quality Manager.

The Project Quality Manager (PQM) determines which material an FAI is required for and defines its quality requirements. It is also the PQM's responsibility to decide whether an FAI has been successfully carried out and series production can be released.

Furthermore, it is the responsibility of the PQM to determine whether a first article inspection part can be used as series material or whether it is to be stored as a reference article or used as the last part of a series (to use up the reference article).

2.3 REASON FOR THE FIRST ARTICLE INSPECTION

Within the scope of inspection planning, it is determined which material a first article inspection (FAI) is required for. The FAI must be carried out before the start of series production/beginning of the first series

batch. In the case of longer interruptions in production and changes to the product or production process which are essential in their nature, the first article inspection must be repeated in full or in part. Essential is the loss or replacement of previously acquired knowledge or other factors important for a qualitative product. An FAI that has already been carried out must be repeated under the following conditions:

- **Change of equipment**
  This includes, for example, new acquisition and relocations of tools, devices, production machines, measuring/testing devices, gauges, data carriers within the approved (inspected) production site. However, the repetition of the FAI is only necessary if validated production or test equipment is affected by the change.
- **Design changes**
  This concerns, for example, changes in standards, materials and approved documents.
- **Process changes**
  This concerns, for example, production planning, production procedures, process data including inspections and inspection procedures.
- **Personnel changes**
  This concerns significant changes in the personnel who carry out production, machining, assembly and inspection work and who are entrusted with the supervision or management of this work. In the case of equal or higher qualifications, the change of personnel does not have to be reported.
- **Changes in the production site**
  This concerns changes in the approved/cleared production site.
- **Change of supplier**
  This refers on the one hand to a change of supplier for bought-in parts, and on the other hand to changes in the subcontractor of the RME supplier, which concerns the change of individual production steps in the sense of this chapter.
- **Interruption of production**
  Following an interruption of production lasting more than 12 months.

The supplier is obliged to inform Purchasing and Quality Assurance at RME in good time in writing if one or more factors occur.

3 PROCEDURE FOR THE FIRST ARTICLE INSPECTION

The first article inspection can take place within the following organisational framework:

- Carrying out the first article inspection including assessment of the production process.
- Carrying out the first article inspection without assessment of the production process.
- First article inspection on a document basis without assessment of the production process and without assessment of the first article.

The decision of the organisational framework must be determined by the PQM before procurement and communicated to the supplier in writing.

3.1 CARRYING OUT THE FAI PRELIMINARY MEETING WITH THE SUPPLIER

Before the first article inspection is actually carried out, the prerequisites (chapter 3.2) and the contents of the FAI must be agreed with the supplier. For this purpose, the PQM contacts the supplier as soon as the FAI has been commissioned. During the preliminary meeting, the PQM and the supplier determine the framework conditions of the first article inspection and its contents. The coordination is based on the identified product-specific features (chapter 3.1.2) and the special production processes and functional tests (chapter 3.1.3). The inspection and/or conformity certificates must then be requested accordingly by the supplier and verified within the scope of the FAI. The following topics must be agreed with the supplier during the preliminary meeting and specified on form *7.01.F.0036 FAI preliminary meeting*:

- Subject of the FAI (exact product designation, material number, state of construction, purchase order, status of drawing set)
- Reason for and type of first article inspection (complete or partial e.g. in the case of repeat inspection)
- Necessity of assessing the production facility
- Quantity marking and later use of the first articles
- Place of assessment of the first articles
- Language of the proof documents
- FAI date
- Requirements for communication (communication matrix)
- Prerequisites for carrying out the FAI that are not fulfilled at the time of the preliminary meeting
- Product-specific features and their proofs
- Special production processes and/or functional tests and their proofs

If technical change requests are indicated by the supplier, these must be communicated to Purchasing and requested by means of an official change request. The communication matrix must be adhered to.

In cases where a larger number of similar products are to undergo first article inspection at the supplier's premises, agreements may be made that certain proofs are valid for several FAIs. The contents of this agreement must be recorded (see template *7.01.F.0036 FAI preliminary meeting*) and signed by both parties. The protocol is part of the subsequent FAI scope and an initial prerequisite for the first article inspection.

3.2 INITIAL PREREQUISITES FOR CARRYING OUT A FIRST ARTICLE INSPECTION

Carrying out a first article inspection is linked to certain initial prerequisites which are coordinated between the project and the supplier. However, at least the following prerequisites must be fulfilled before the FAI can be carried out:

- Contract or commissioning is available for the FAI
- Drawing sets and all material requirements have been released
- The specification with all the necessary requirements has been released (in the case of development orders)
- As far as necessary (for development orders): RME approval of the design (PDR, CDR)
- As far as necessary: verification has been completed

- As far as necessary: qualification has been completed
- Production documents have been released
- All the proof documents required in the contract or commissioning (REACH, RoHS, Safety Statement etc.) are available
- First articles have been constructed
- Supplier's internal PRR has been completed and passed (production control plan, inspection plan, PAs are available)
- FAI preliminary meeting has taken place and been signed off by the supplier

The PQM checks whether the initial prerequisites for the product concerned have been fulfilled (if applicable) and, if necessary, has the project provide appropriate proofs (e.g. contract, commissioning, qualification certificates already submitted etc.). All the necessary prerequisites for the FAI that are not fulfilled at the time of the preliminary meeting must be named by the PQM during the preliminary meeting and be noted as a necessary requirement on the form *7.01.F.0036 FAI preliminary meeting*. The FAI cannot be carried out until all the initial prerequisites have been fulfilled.

The supplier notifies the PQM of the readiness for first article inspection and provides all the necessary proofs at least 2 weeks (10 working days) before implementation. The PQM ensures that all the prerequisites have been fulfilled and the proofs provided have been accepted by the Industrial Engineering department.

If changes occur or new findings arise for the FAI, it may be necessary to repeat the preliminary meeting and define the requirements again. In this case, a new report according to the template *7.01.F.0036 FAI preliminary meeting* must be prepared and replaces the old report.

3.3 CARRYING OUT THE FIRST ARTICLE INSPECTION

The supplier is responsible for the initial prerequisites for the first article inspection being met and sends the PQM all the necessary proofs at least 2 weeks (10 working days) before the FAI is carried out. As soon as the PQM, working together with the technical specialist department (e.g. design engineer), has checked and accepted the proofs, he/she informs the supplier that the actual first article inspection can begin.

The FAI is based on the contents agreed with the supplier at the preliminary meeting. The supplier is in charge of carrying out and documenting the first article inspection. In order to simplify verification, the supplier notes in the first article inspection report the RME specifications used (drawings, specifications, etc.) as well as the corresponding reference of the proof (attachment number + page number) for each requirement and sends the pre-filled first article inspection report together with the proofs to the PQM. The PQM checks whether all requirements have been taken into account (in accordance with the specifications from the preliminary meeting) and whether the RME specifications used correspond to the currently valid status in SAP. If necessary, the PQM participates in the FAI at the supplier's premises together with representatives of the technical department (e.g. design engineer).

If essential production processes are subcontracted or critical components are supplied, the subcontractors (name, address, identification if available) must be documented in the first article inspection report. The required proofs (see specifications at the preliminary meeting) of the subcontracted services or supplies must be requested by the supplier from the subcontractor and submitted for the FAI. The first article inspection report must list all subcontractors and suppliers, as well as the subcontracted parts or operations with the status from the respective proofs.

If intermediate tests are carried out during the manufacture of the first article which cannot be repeated or covered by comparable tests during the final acceptance of the first article, the proofs of first article inspection must be submitted to prove that these tests were carried out by qualified personnel and with verified or

calibrated measuring and test equipment. If applicable, the test certificates for delivered parts (e.g. X-ray inspections of castings or test reports of electronic assemblies) must also be submitted.

A summary of the evaluation of the first article inspection shall be provided on the cover sheet of the first article inspection report (see template *7.01.F.0038 First article inspection report*) by the PQM. After the PQM has completed the evaluation and made a decision about series release, the first article inspection report is signed by the supplier, the PQM and a representative of the Industrial Engineering department.

3.3.1 CHECKING THE REQUIRED PROOFS (FAI ON DOCUMENT BASIS)

For each first article inspection, complete proof of all product-specific features must be provided for the respective first article from series production. This also includes verification and qualification certificates as well as declarations of conformity, RoHS certificates or REACH declarations. Furthermore, a first article must be manufactured under series conditions for each FAI, which is inspected by the PQM and additionally by the technical department if required. Here, the visual appearance, possible damage (e.g. due to incorrect packaging or transport) and the correct type plate are to be checked in particular. In addition, the PQM checks whether the configuration of the first article matches the target specifications (e.g. bill of material) from the purchase order. If there are any deviations between the purchase order and the valid material specifications in SAP, this must be clarified with Project Purchasing. If necessary, the PQM also checks whether the proofs for special production processes and functional tests are available and valid. The exact requirements are determined individually for each material in advance (see chapter 3.1.3 and 3.1.4).

3.3.1.1 PRODUCT-SPECIFIC FEATURES

The PQM checks the proofs of conformity (e.g. test protocol, test certificate etc.) for each feature specified during the preliminary meeting for completeness and correctness. In the case of more complex test protocols or qualification certificates, the corresponding specialist department (e.g. design engineer or Safety Manager) should support the check. The supplier must be able to prove that he or his sub-supplier has fulfilled all the product-specific features in accordance with the RME specification. The point is only accepted by the PQM once all proofs are available.

3.3.1.2 SPECIAL PRODUCTION PROCESSES AND FUNCTIONAL TESTS

Comparable to the product-specific features, the PQM checks the proofs for the previously defined special production processes and functional tests. The supplier is obliged to prove the suitability and capability of the production and testing processes. If available, the RME specifications must be taken into account. The type of verification is determined with the PQM during the preliminary meeting. The point is only considered as fulfilled once all proof documents are available and have been accepted by the PQM.

3.3.1.3 COORDINATION OF THE INSPECTION CERTIFICATE FOR SERIES DELIVERY

The definition of the certificate type for the series delivery results from the definition in the material master in SAP. If the material has not been registered in SAP, the PQM determines which certificate of proof is required for the delivery.

The supplier issues a certificate of proof with the first article and sends it together with the FAI documents. The PQM checks whether the certificate meets the requirements of the underlying standard. Especially in the case of the acceptance test certificate according to DIN EN 10204 3.1/3.2, it must be ensured that the

supplier is aware of the specific tests and test features that are to be verified in the certificate with each delivery. If necessary, this can be agreed in advance with the technical department.

If the test certificate meets the requirements, the PQM notes on the FAI cover sheet that the test certificate has been coordinated.

Note:

The test certificate is determined during the inspection planning workshop (see *7.01.P.0005*). Changes in certificate types can be carried out using the MM02 transaction in the Quality Management tab in plant 4010 (Purchasing).

If a CoC has been selected in the material master without further details of content, the specifications of DIN EN ISO/IEC 17050 must be applied.

3.3.1.4 APPEARANCE OF FIRST ARTICLES

The appearance of the first article must be checked by the supplier e.g. for damage, paint scratches etc. The result of the check and evaluation must be part of the FAI documents that the supplier sends to RME. Furthermore, meaningful images of the first article must be sent digitally, which, in addition to the external appearance, also show the attachment of the type plate and, if necessary, further markings (e.g. laser warning notices) on the first article. On the basis of the images and the supplier's assessment, the PQM evaluates whether the external appearance can be accepted. If necessary, he requests support from the technical department for this.

If a physical inspection of the first articles is planned, the evaluation based on images is omitted (see 3.5.2).

3.3.1.5 CONFIGURATION OF FIRST ARTICLES

The configuration status of the first article must be documented in the form of LU lists and bills of material, configuration identification document (CID) and, in the case of software, by the version description document (VDD) as well. The documentation can either be prepared by RME if commissioning is in accordance with a drawing or by the supplier in the case of a development order. Furthermore, the actual configuration (ACTUAL-LU) must be documented and correspond to the specifications of the target configuration (TARGET-LU). If RME is responsible for the TARGET specifications of the configuration ("Build to print"), the configuration status of the first article must comply with the valid material specifications from SAP. Especially for drawing parts, it must also be checked whether the commissioned drawing versions correspond to the valid RME specifications according to SAP. The PQM checks whether the documents to prove the configuration are available and whether these correspond to the target specifications.

The PQM checks the results and proofs for completeness and correctness and makes the decision in the first article inspection report whether the respective points are fulfilled or must be rejected. If the inspection points are not applicable, the PQM ticks the "Not required" box on the FAI cover sheet.

3.3.2 ASSESSMENT OF THE FIRST ARTICLE

In addition to the documentary evidence, the external appearance of the first article is also assessed by RME. This can either be done at the supplier's premises or the material must be sent to RME for the first article inspection. The article must be examined in particular for visible damage or recognisable deviations from the drawings (e.g. paint damage, scratches on lenses, helicoils used, compliance with IPC specifications etc.). Furthermore, the marking of the first article with the correct label or type plate and, if required, warning notices (e.g. laser warning notices) must be checked. The assessment of the first article can either be carried

out by the PQM or a specialist department named by him/her (e.g. goods receipt inspector). The point is considered fulfilled if the appearance of the first article corresponds to the desired series production status.

3.3.3 ASSESSMENT OF THE PRODUCTION PROCESS

The necessity of an assessment results from the FAI category of the respective material and is determined by the PQM during FAI planning (see chapter 3.1.1). If necessary, the PQM may also decide to carry out an assessment even if the FAI category would not require it. The supplier is informed during the preliminary meeting whether on-site assessment is carried out or not.

It is not necessary to re-assess each material as long as the production facility and the production process are the same for the different materials and the last assessment was less than one year ago. The planning and preparation for the visit to the production facility shall be done in consultation with the supplier. During the visit to the production facility, the following sub-processes shall be assessed and evaluated:

- **TP1 Goods receipt**
- **TP2 Production environment**
- **TP3 Production**
- **TP4 Quality assurance**
- **TP5 Outgoing goods inspection**

The evaluation is carried out with the aid of the evaluation template *7.01.F.0037 Assessment of production process* and is part of the overall evaluation of the first article inspection. On the cover sheet of the first article inspection report, the PQM enters the percentage achieved of the overall evaluation in accordance with the evaluation template. The documentation of the evaluation must be attached to the first article inspection report.

3.3.4 DEALING WITH NON-CONFORMITIES

If deviations from the inspection points are found during the FAI, these must be documented as **residual points** and assigned to the inspection point accordingly (FAI Report). On the basis of defects found, the supplier is obliged to determine the causes and initiate corrective measures to remedy the situation. Every measure must be documented in the FAI report, addressed to a measure holder and contain a due date. If measures have been defined that are to be carried out by RME, FuEM must be generated for this purpose and measures must be addressed internally to the respective specialist department. The PQM ensures that all measures have been implemented by the end of the FAI and notes this on the FAI Report. The effectiveness of the measures initiated is verified by producing a defect-free article under series conditions. Articles already produced may be released for use by means of a special release under certain conditions (see *7.01.P.0010*).

If it is foreseeable while the FAI is being carried out that the non-conformities found cannot be corrected to a satisfactory result, the PQM can make the decision to conclude the first article inspection with open residual points. In this case, release for series production cannot be granted (see 3.5.5).

3.3.5 EVALUATION OF THE FIRST ARTICLE INSPECTION

The first article inspection is successful (series release granted) if

- all preconditions are fulfilled (see chapter 3.4.)

- all the required inspection points on the cover sheet of the first article inspection report have been accepted
- if necessary, the production process has been assessed and the overall evaluation is at least 80% and
- all the residual points have been eliminated.

After the evaluation has been completed, the PQM decides whether release for series production:

- is granted or
- is not granted

If series release is granted, this may also be subject to conditions. In this case, the conditions must be documented on the first article inspection report. Possible conditions can be, for example, a limited release for a limited period of time or for a specific project or the re-testing of specified production processes.

If the conditions for the successful completion of the first article inspection are not met, release for series production cannot be granted. After consultation with the project, the PQM decides whether the first article inspection is to be repeated. Alternatively, another supplier can be selected (*3.P.0002*) or release for series production can be waived in principle. If no series delivery is to take place, additional quality assurance measures (including further tests) must be defined by the PQM (compare chapter 2).

CHANGE RECORD

Issue:	Description of change
2023-02-24	Complete revision of the procedural instruction