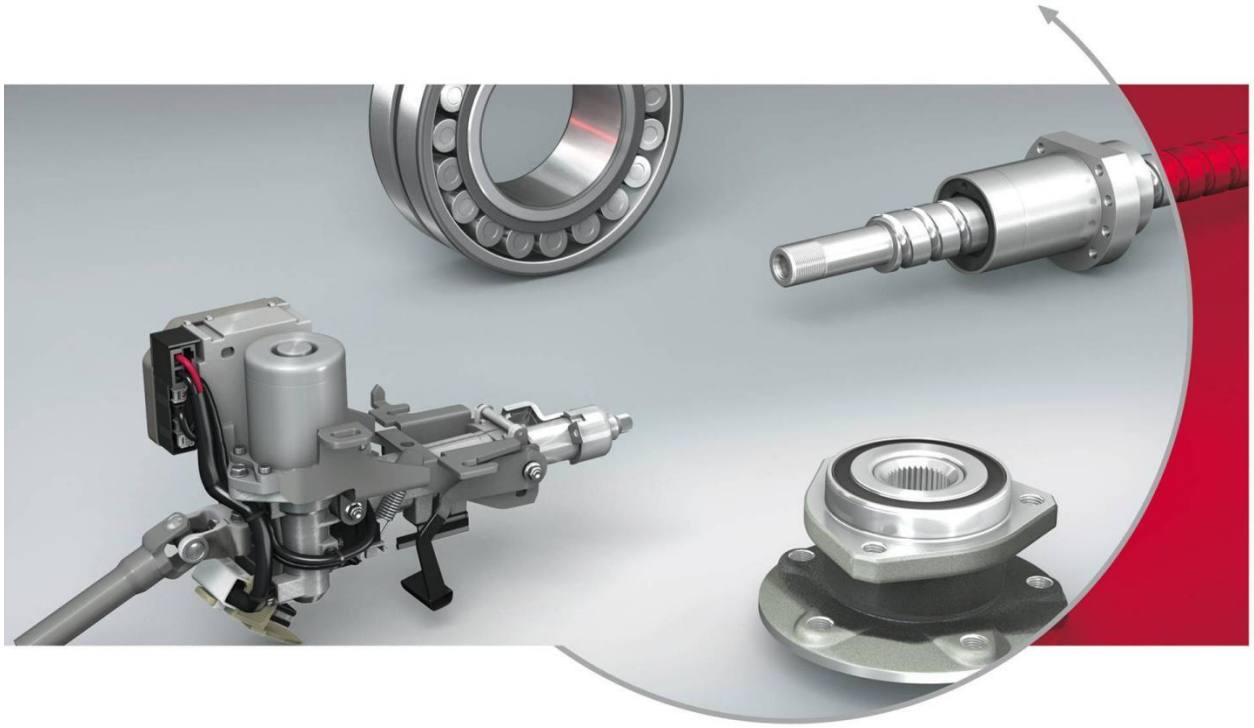
NSK Europe Ltd.



SUPPLIER QUALITY ASSURANCE MANUAL SUPPLEMENTARY

to NSK Q001 and Q002

Revision 2

March 2017

NSK Europe Ltd.

Belmont Place • Belmont Road • Maidenhead • Berkshire SL6 6TB • UK • Tel. +44 (0) 1628 509800 • Fax +44 (0) 1628 509808 • www.nskeurope.co.uk
Registered Office: Belmont Place, Belmont Road, Maidenhead, Berkshire, SL6 6TB, UK • Co. Reg No. 2223191 • VAT No. GB 613 8153 56

NSK Vision

We strive for Customer Satisfaction, continual improvement and No.1 in Total Quality. Our approved supplier partnerships are an inherent element to achieving and maintaining success.

NSK Globally and NSK Europe Ltd adheres to the strictest policies of corporate responsibility, care for the environment and customer quality requirements. NSK expects that suppliers to NSK shall observe the same ethos and ethical approaches.

Quality Policy Statement

Operating within a culture of continual improvement, NSK Europe Ltd is committed to the development of its Management System in order to satisfy the needs of our Customers and those of the Business. The NSK Quality Management system is based upon the requirements of ISO 9001, IATF 16949, VDA, and references ISO 14001, OHSAS 18001 standards and Customer Specific requirements.

References

This supplier manual provides the framework for satisfying NSK Europe Ltd; quality requirements and references the NSK Q001, NSK Q002, the NSK Green Procurement Standard, and NSK format documents and engineering standards including purchase specifications.

Guidance for APQP, SPC, MSA, FMEA, PPAP, can be found in the latest versions of the AIAG (Automotive Industry Action Group) manuals also referenced is VDA. (Verband Der Automobilindustry)

Supplier Quality Management System Requirements

NSK mandates approved suppliers must maintain a quality management system that meets as a minimum ISO 9001 and encourages IATF 16949 certification, ISO 14001 and NSK specific requirements referenced in this manual. NSK strives to ensure that it provides quality products to specification maintaining quality, cost and delivery performance at the highest level.

The supplier quality management system shall include recognition of and supporting records of new product introductions, APQP activity, project management systems and records.

Supplier Manufacturing Feasibility

The Supplier shall investigate, confirm and document the manufacturing feasibility of the proposed products in the contract review process, including risk analysis and assessment of capacity. (Run at Rate and manufacturing capacity studies)

Work Instructions

The Supplier shall prepare documented work instructions for all employees having responsibility for the operations that impact quality and these should be available at the point of use.

Verification of Job Set-ups

Job set-ups shall be verified whenever performed, such as initial run of job, material changeover or job change. Work instructions shall be available for set-up personnel.

The Supplier shall use statistical methods of verification when applicable.

Production Scheduling

The Supplier shall have the capability to accept orders via EDI, email or Purchase order unless otherwise approved by NSK Procurement. Production shall be scheduled in order to meet NSK requirements. NSK will work with Suppliers on shipping methods and carriers.

Supplier Approval

Suppliers to NSK are selected and approved by the NSK supplier approval process.

Supplier approval is typically based on proven technical ability to supply products and services to the agreed quality, cost and delivery requirements. The following steps define the approval process.

Steps to Approval:

- Confidentiality (Non-Disclosure Agreement) signed and agreed.
- Supplier assessment and initial quality questionnaire (self-assessment) completed and reviewed.
- Audit of the quality management system observing the requirements of ISO 9001, IATF 16949 and VDA 6.3 as appropriate.
  - Complete NES Q6102 assessment and / or
  - Complete potential analysis VDA 6.3 (P1) standard and / or
  - Complete a process audit VDA 6.3 (P5~P7) standard.
- Review results and any improvement actions defined.
- Addition to the NSK Europe approved supplier list and communication to supplier's their status and scope of approval, subject to product approval.

Special, Safety and Critical Characteristics

Customer specific and NSK safety critical and critical / special characteristics will be managed by the Suppliers and process capability assured or 100% inspection by effective measurement systems and associated records retained.

The Supplier is responsible for developing the necessary controls to ensure process capability for all key features and special characteristics to be manufactured and measured.

Process development, controls and measurements systems will demonstrate full capability by submitting SPC data, gauge R&R studies to meet NSK and customer specific requirements.

Please note the NSK and customer characteristics are displayed on drawings and must link to Control Plans; SPC data must be a suitable sample size to meet plant and or customer specific requirements.

Process Capability

Capability studies are required on those dimensions identified as special characteristics with a minimum sample size of 125 or as otherwise stated by NSK.

The proposed production methods and route should be used for parts verified as part of an ISIR (Initial Sample Inspection Report) submission. Material certification for bearing rings and rolling elements should also be submitted.

Process Capability Study	Capability Indices
Machine capability index › Short term study	Cmk > 1.67
Process capability index › Long term study, stable process › For SC and CC	 Cpk > 1.33 Cpk > 1.67
Process performance index › Long term study of non-stable process	Ppk > 1.33

All dimensions identified on the drawing should be verified with a minimum sample size of 10 pieces.

NSK – Supplier Documentation Requirements

Process FMEA

A Process FMEA shall be completed on the process route for all bearing components and this must be made available to NSK on request.

Control Plan

Quality assurance process flow chart and control plan. Process control plans shall be developed and defined for each product and state as a minimum the following details: Prototype, pre-production, production (Mass production) phase. This process flow and control plan documentation is an output from APQP activities, project management and new product development.

The process design should be established by a cross functional team as an output of quality planning, APQP and new project / product introductions.

General Control Plan Elements

- Control plan number, issue date and revision number, company name and site, process step numbers, process / operation description.
- Product control: Product related special characteristics, and safety critical characteristics, and specification / tolerance shall be clearly identified and controls defined on the plan
- Process control: Process parameters, process related special characteristics, and defined machines, jigs fixtures and tools for manufacturing.

Measurement Systems Analysis

Evidence of measurement systems capability for all agreed significant characteristics listed on the design drawing and control plan, associated records shall be maintained.

Initial Sample Inspection Reports (ISIR)

Where processes are being used for the first time to produce any particular NSK product / component or bearing size, then ISIR is required at pre-production stage.

When a bearing size is being produced for the first time for NSK using existing processes then ISIR is required at the production stage.

Part Submission Warrant (PSW) and PPAP requirements

PPAP documentation and part submission warrants may be requested by NSK for some products for OEM customers. This will be requested by NSK at the time of ordering and a default level 3 PPAP applies and must include IMDS submission on the PSW. (Ref: AIAG PPAP manual latest revision)

Process Change Documents

A Process Change Request (PCR) shall be submitted by the supplier for any proposed changes to the agreed process flow, control plans, Material source changes and manufacturing location changes.

Types of Process Change	Level of Application
1. Major changes of material (such as changes in material manufacturer or raw material procurement)	NSK Approval
2. Changes in critical control processes such as casting, forging, heat treatment, welding, plating, rubber vulcanizing, surface treatment, etc.(including renewal of seal dies and plastics)	NSK Approval
3. Changes in production place or subcontractor 2nd tier supplier	NSK Approval
4. Major changes in equipment, control items, control standards, etc. as specified on the Production Process Control List (machining, assembling, etc.)	NSK Approval
5. Changes in inspection methods for finished products	NSK Approval

Traceability

Traceability of components / product back to raw material (lot, cast/heat number) is required. Relevant documentation and records should be maintained as evidence. NSK reserve the right to request, review and audit these records at any time.

Supply of Initial Production Samples (Safe Launch Process)

Initial samples are used to verify the production process; and shall be produced at the intended production site using the production control plan, tooling, processes, materials, operators, feeds/speed, cycle times and other parameters that affect product quality.

Submitted samples must be clearly identified and labelled as “Samples”. Any of the following criteria would result in the need for samples to be submitted:

- New product (ISIR must be submitted with samples provided for all prototype, pre-production builds and at the start of main production).
- Following a drawing, specification, or material change, including a change of material or sub-contractor source.
- New tools (e.g. dies, moulds). Single cavity tools must be re-evaluated when combined with additional cavities.
- Following a major tooling or equipment refurbishment or re-arrangement.
- Change in manufacturing location utilising either new or relocated tooling or equipment.
- Following a Stop shipment order.

It is mandatory for capability information to be provided with the first three shipments on significant characteristics.

Non-Conforming Product

Containment & Segregation

If following shipment the supplier discovers that non-conforming product may have been sent, the supplier will notify the receiving plant's Quality Representative immediately. Corrective and preventive actions will be required.

Note: Cost of Poor Quality (COPQ)

NSK will endeavour to recover any consequential costs of poor quality products supplied to NSK by their suppliers.

Root Cause & Corrective Actions

The Supplier shall undertake suitable investigations to identify the root cause. The Quality Representative of the receiving plant will send a corrective action workflow to the supplier for completion. Other appropriate documentation contained within the supplier's quality system may be used if agreed.

NSK Europe requires suppliers to have a disciplined approach to Quality / Delivery concern management. The use of 'Quality Tools' such as:

Fish-bone diagrams (Ishikawa), Capability Studies, Designs of Experiments and PFMEA/DFMEA review, is encouraged. Countermeasure corrective actions should be reviewed across similar products/processes to prevent similar concerns arising.

Use of the **NSK standard 8 discipline** approach and document format is required from suppliers. This document and supporting guidelines are available from the NSK supplier web portal and / or your NSK quality representative.

Preventive Action / Mistake Proofing

NSK Europe encourages suppliers to employ preventive techniques such as SPC and Poka Yoke / Mistake Proofing in their processes.

Concessions

In principle, NSK does not accept products that do not meet the specified quality levels. Where there is a possibility that the non-conformance does not preclude its use in production and the feature does not affect our customer expectations of quality, the supplier shall contact the relevant Quality Representative and declare the deviation prior to shipment.

The non-conformance shall be evaluated and where suitable, a numbered concession permit shall be raised. If sanctioned, the concession reference number must be cited on all documentation and packaging used in the shipment the NSK receiving location.

A corrective action report (CAR), describing cause and countermeasure for the circumstance is required with all requests for concession.

The Supplier shall also be responsible for informing the relevant NSK Quality Representative whenever there is reason to suspect that parts previously supplied, may not be in accordance with the order / contract.

NSK concession cards are available on request from NSK Quality Representative (NSK Europe IMS ID number 44069).

NSK will not provide a concession for SC or CC features.

Supplier Quality Representative

NSK Europe requires the suppliers to nominate a Quality Representative and deputy to be identified. Any subsequent changes made should be reported to the Quality Representative of the NSK receiving plant.

Green Procurement Standard

NSK adheres to the highest standards of corporate responsibility and environmental care. NSK expects that their suppliers make every effort to manage business in line with all legal and regulatory requirements and adopt the ethos of NSK.

NSK Globally publishes and maintains a Green Procurement Standard; this is normally highlighted in purchase specifications and will be made available to Suppliers and 2nd tier suppliers as necessary. The content of the NSK Green Procurement Standard should be recognised by Suppliers and any responses and declarations requested from the supplier as defined in purchase specifications and on drawings provided to NSK in timely fashion.

NSK Europe adheres to legal and regulatory compliance inclusive of REACH, ROHS and environmental legislation and supports the IMDS data base.

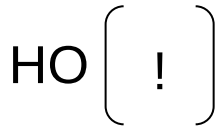
Statutory and Regulatory Requirements

NSK undertakes to pass down all statutory and regulatory requirements and special product and process characteristics to suppliers.

NSK requires suppliers to cascade and communicate all applicable requirements down the supply chain to the point of manufacture.

Note: NSK Plant Specific Requirements may be additional to this supplement and will be communicated separately.

i.e. Typical identifiers for special characteristics



Safety Critical Characteristic

Important Special Characteristic

Revision Dates	Revision Number	Details of change	Who
March 2016	1	Initial release	EQA
March 2017	2	Update to reflect IATF 16949 standards from ISO TS 16949 and additional text reference IATF Clause 8.4.3.1 Statutory and Regulatory Requirements	EQA