

Supplier Quality Assurance Manual (SQAM)

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NSK Ltd.
Quality Assurance Division Headquarters

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1 Manual overview

1.1 Purpose

This manual is the quality assurance manual (Supplier Quality Assurance Manual) to summarize the necessary action items and activities for quality assurance in order to deliver "safety" and "service" to all customers and markets by NSK and the NSK Group (hereinafter referred to as NSK). We would like our suppliers to use this manual in order to achieve zero defective products delivered to NSK and stable product supply.

1.2 Scope

This applies to all products used for the NSK brand under the "Basic Transaction Contract" or "Purchase Specifications" that NSK exchanges with suppliers.

1.3 Organization of the manual

This manual consists of the following documents.

- Main text: NSK requirements for the quality of purchased items
- Attachment 1: Quality management procedure
- Attached material: Quality control forms

1.4 Basic concept for quality assurance

NSK requests that the products you purchase meet the quality requirements. The suppliers shall guarantee that the products meet the quality requirements for NSK.

1.5 Using the **manual**

The person in charge at NSK will specifically instruct the supplier about the quality control items, quality control procedures and quality control forms required. See the table in this manual 4 for submission destination the above procedures and forms.

When a NSK customer has a specific requirement, it is instructed in preference to this manual. Follow this manual unless instructed.

2 Quality Assurance Requirements

2.1 Laws and regulations

Secure compliance with laws and regulations in all operations and maintain the state to be able to prove the compliance. NSK will request when it is necessary to confirm that the delivered product complies with laws and regulations. Contact NSK immediately when you have any concerns about continuous business activities for the laws and regulations.

The supplier shall correctly take the records such as the manufacturing process, inspection process and reliability test including the Tier-N suppliers after the Tier-2 such as materials and parts. The supplier shall prevent data tampering in and provide the correct information.

2.2 International standard

2.2.1 Quality Assurance of Purchased Items

NSK aims to build a quality management system to our customers and international standard requirements such as the International Organization for Standardization (ISO). Our suppliers shall build a quality assurance system to the quality management system required by NSK.

2.2.2 Acquisition of International Standard Quality Management System Certification

Suppliers who deliver products for the automobile industry are required to obtain the certification of International Standards such as ISO 9001 for the construction of quality management system. Moreover, as the ultimate goal of acquiring IATF 16949 certification for the automobile industry, conform to the quality management system.

NSK audits whether the supplier's quality management system complies with IATF 16949. If there are any contents to be corrected in the audit, NSK requests improvement based on the corrective action plan.

Suppliers who deliver products for purposes except the automobile industry shall comply with International Standard Quality Management Systems (ISO 9001, Aerospace Industry AS9100, railway industry ISO / TS22163, etc.). NSK conducts audits based on International Standards as needed.

Third-party audits of International Standards shall be obtained the certification from the certification body which is the International Accreditation Forum (IAF). We may request you to submit the certificate to confirm the certification contents.

The suppliers shall demand to build a quality management system to the Tier-N suppliers of the materials and parts that they purchase, and they also need to monitor the conformity status.

2.2.3 Quality Assurance of Electrical accessories

The suppliers shall recommend quality assurance that a product complies with the requirements of the International Electrotechnical Commission (IEC), which is the international standard in the field of electrical and electronic technology and the IPC (Institute for Printed Circuits) which is the international standard in the field of electronics. The product specifications for the standards are as follows.

- Static Control (IEC 61340-5-1, RCJS-5-1 for Japan, ANSI/ESDS20.20for USA, and related standards)
- Soldering requirements (IPC J-STD-001, IPC-A-610, and additional standards for

- automotive applications)
- Printed Circuit Board management (IPC-A-600)
- Cable and Wire Harness requirements (IPC-A-620)

Comply with the latest version as above. For other IPC standards, select the standards to comply with according to the product specifications.

2.3 Product safety and management

For product safety, the supplier shall examine and evaluate the risks, secure the safety and prevent problems related to quality control in the manufacturing process and in the design stage, changes over time that will occur after shipment, including the effects from those changes and environmentally hazardous substances.

2.3.1 Green Procurement

For the product realization, it is essential that environmentally harmful substances shall not be contained. The supplier shall operate in accordance with the latest version of "NSK Green Procurement Standards" for the target environmentally hazardous substances, their management methods and means, etc.

2.3.2 Products / parts supply risk

The supplier shall contact NSK immediately when there is a possibility that product supply may be at risk due to natural disasters, human disasters such as fires and work accidents , **suspension of social infrastructure such as electricity, gas, and water, labor shortages** or cyber-attacks.

2.3.3 Quality control record

Organize quality control forms, lot management records, quality data for easily searching. Clearly indicate contents, storage periods and manage without any deteriorations, damages or losses. Moreover, the storage period shall be 15 years or more. However, if a NSK customer will request individually, plant-procured items are from the quality assurance department of plant, headquarters-procured items are from the Quality Assurance Division Headquarters.

2.4 Basic requirement related to Quality Assurance

2.4.1 Notification of Quality Assurance Responsible person

The suppliers shall notify NSK of the primary and secondary quality assurance responsible person in order to promote the matters for quality assurance related to the products purchased by NSK. Notify the changes immediately if any changes for the person in charge.

- The primary responsible person:

Quality Assurance executive is desirable as he/she is responsible for the Chief

Executive Officer at the Product Quality Assurance.

- The secondary responsible person:

Quality Assurance manager is desirable since he/she needs to conduct practical quality assurance works by plant or product type.

However, consult with the NSK contact person regarding the registration of the secondary responsible person when the quality assurance officer also serves as the quality assurance department manager.

- ※ Inform us the responsible person for the quality assurance responsible at trading company as the primary responsible person and the responsible person of the manufacturer as the secondary responsible person when trading companies that focus on the sale of goods such as products are the transaction window.

2.4.2 Notification of Environmental Management Responsible person

NSK is working to strengthen our environmental protection efforts in cooperation with our suppliers for reducing the environmental burden of the entire value chain. The suppliers shall notify the responsible person of environmental management in accordance with the "NSK Group Green Procurement Standards".

2.4.3 Quality Management System

Suppliers shall maintain the conformity state and the build of quality management system that the top management involved in quality assurance leads.

To build a quality management system, the quality assurance system and the quality control regulation system for the functions of the company organization including involved parties shall be established. Maintain the operational status of the quality management system and conduct continuous improvements.

2.4.4 Environmentally Harmful Substances Management

Supplier shall follow the environmental laws and regulations and NSK Group Green Procurement Standards such as the Restriction of Hazardous Substances Directive (RoHS), the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) Directive as well as the ELV Directive (End of Life Vehicle) for scrapped vehicles. The content state of environmentally harmful substances shall be managed by conducting regular sampling surveys and analyzes, including materials / products of the Tier-N suppliers delivered to NSK and the materials used in the process. Contact the NSK representative if you are not clear how to handle the reduction of environmentally harmful substances contained in the product.

2.4.5 Designated Critical Product Management

When the product had defect, NSK calls the life-threatening characteristics the designated critical products. We give the directions by the drawings or Required specifications when

NSK determines that it is necessary such as laws, regulations and the customer demands.

(1) Types of designated critical product

Items designated for products / parts

1) Designated critical safety product

For NSK customers, product defects, failures, or handling defects are designated at products that lead to serious accidents such as physical injury and vehicle fire.

- Designated components (指) (SHI) safety products (保) (S) (HC), critical functional characteristics (F), exhaust gas related (排) (HAI) etc.

2) Legally designated product (法) (SR)

Products that the Ministry of Land, Infrastructure, Transport and Tourism of Japan designated by the Road Trucking Vehicle Act

3) Specially designated product

Designated at the products that NSK had the necessary functions for special uses.

- Use: aircrafts, bullet trains, railroads, superchargers, nuclear reactors, submarines, surface ships etc.

4) Designated critical management product (⊕)

NSK designates products and parts that may lead to critical issues in the market for product defects or failures by the customer's application and importance.

- ※Suppliers shall reflect the critical products designated by NSK into the quality control document that suppliers manage. For details, see procedure 3.

(2) The management representative and his/her roles

Appoint the management representative (quality assurance department manager, etc.) when designated as critical supplier.

The management representative shall perform special management of designed critical products, plan and conduct the self-inspection of the implementation status and grasp the management status. Evaluate the competence (include degree of understanding), provide education and qualification for the purpose of maintaining and improving the skills of operator engaged in the process.

Follow the instructions of the NSK representative for the retention period of the quality record regarding designated critical products.

2.4.6 Management of Critical Control Process

NSK indicates processes that require key management for processes that lead to serious quality defects, processes that are difficult to find defects in post-processes, and processes that have serious quality issues as " (指) or (C)".

1) Special control required process

- a) In the post-process inspection, processes that quality confirmation is technically difficult and defects are difficult to find

- b) Processes that may cause fatal defects or processes that inspect fatal defects such as raw materials, cracks, and different materials
 - Heat treatment, welding, soldering, plating (things that require baking), etc.
 - c) Inspection processes that require qualification
 - Non-destructive test engineer qualification certification of Public standards such as magnetic particle testing, ultrasonic testing, eddy current testing, penetrant testing and radiographic testing. Or those regulated in each non-destructive inspection method standard.
- 2) Conditional management process
- In the post-process inspection, processes that are difficult to find defects and require more dense condition management than the general process.
- Plating, grease packing, adhesion, fitting press- fit, crimping, rubber vulcanization, cleaning, screw tightening, de-oiling, injection molding, casting, forging, painting, etc.
- 3) Defect occurrence process
- Process that serious quality defects (critical quality issues) occur (the Plant quality assurance department manager specifies in each case)
- ※Key management processes that NSK instructs shall be reflected in the quality control document that suppliers manage.



2.4.6.1 Special control required process audit and certification

Special control required process can lead to serious quality concerns, so suppliers are requested to regularly audit their internal processes and those of the Tier-N Suppliers. For special control required processes, NSK might request the supplier conduct a self-audit by CQI (Continuous Quality Improvement) and NSK conducts the audit if necessary.

Suppliers are also requested to provide specialized training and quality education to operators and inspectors engaged in the special control required process.

Create a certification system such as examinations, and periodically evaluate qualified personnel to understand and maintain their competence.

2.4.7 Management of critical characteristics




When NSK's customer or NSK determines that it is the important assurance item, it is instructed in the purchase specifications and drawings as the critical characteristic  or . For special characteristics instructed by NSK customers as unique requirements, indicate the symbols specified by the customer on drawings and specifications, and management items shall be specified individually.

For special characteristics uniquely requested by NSK customers, NSK writes customer-

specified symbols on drawings and specifications, and individually specifies control items.



※Special characteristics mean divisions for product characteristics or manufacturing process parameters that can affect safety, regulatory compliance, fit during installation, function, performance, requirements or further processing of the product.

The supplier shall conduct quality assurance for the items specified in the **critical** characteristics based on the concept of 100% inspection or 100% assurance (condition management, alternative characteristic management, etc.).

- **Critical** characteristics are  or , and also  characteristic (key characteristic) in aviation industry such as \oplus and \ominus .

2.4.8 Tier-N Supplier Management

Suppliers shall manage below in order to ensure quality when utilizing the Tier-N suppliers (the second or later suppliers from NSK's point of view) adopted as the suppliers of materials and parts used for product manufacturing and the outsourced processing.

- Verification of assurance level when the Nth suppliers deal with legally designated products  or 
- Quality management system audit for the Tier-N suppliers and grasping the conformity status
- Manufacturing process audit for the Tier-N suppliers
- Analysis measurement and process guarantee of contained environmentally harmful substances for the Tier-N suppliers
- Product acceptance inspection or performance tests for the Tier-N supplier
- Notification to NSK when registering or changing the Tier-N suppliers
- Process change management of the Tier-N suppliers
- BCP Continuous management of part supply for the Tier-N suppliers (business continuity plan: BCP))

2.4.9 Quality Control Requirement

2.4.9.1 Document Control of Specification, Drawing and Standards etc.

Documents such as NSK drawings (manufacturing drawings / working drawings) related to manufacturing and inspection, and purchase specifications shall be clearly state the classification of NSK's information security and lent to suppliers. Please manage according to the following classification of documents in addition to creating a ledger to manage the document handlings.

- Information classification definition and information example

	Classification	Definition	Storage method	Information example
↑ Confidential information ↓	Highly Confidential	Information that may cause extremely serious loss or disadvantage to NSK due to breach or leak	-Inside the facility where entry and exit are restricted and always locked -In folders where access is restricted, and history remains	-Manufacturing drawings -Purchase specifications issued by the HQ Dept. -NSK Customer information etc.
	Confidential	Information that may cause extremely serious loss or disadvantage to NSK due to breach or leak	-Inside the facility where entry and exit are restricted, and off-duty hours are locked -In folders where access is restricted	-This manual -Quality control forms -Working drawings -Purchase specifications issued by plant etc.
	Restricted	Information that may cause extremely serious loss or disadvantage to NSK due to breach or leak	-Inside the facility where entry and exit are restricted -In folders where only the person who has the permission can access	
	Public	Known information other than the above	—	-NSK Homepage information -NSK Group Green Procurement Standards etc.

For documents, the supplier shall create a management ledger, maintain and manage the latest version in the necessary places, and ensure to revise and abolish them. Please return the old drawings, specifications and samples promptly.

2.4.9.2 Management of Equipment and Measuring instruments

For production equipment and test equipment, the supplier shall create the ledger of the target equipment to be managed in order to maintain quality assurance, make a maintenance plan, and manage including the necessary usage environment to ensure the quality. In addition, determine and manage the replacement frequency of parts such as cutting tools and jigs tools used in the equipment. Establish and operate the daily inspection procedure and keep the inspection record. Moreover, grasp the changing tendency of equipment accuracy and setting conditions, plan regular inspections and prevent the occurrence of abnormalities. When dealing with a failure, cooperate between related departments. After securing the safety, conduct failure recovery, safety inspection, quality check, and keep records when repairing the failure. After each confirmation, resume production with the permission of the management representative. For test pieces prepared for quality confirmation, identify and label to prevent mixture and misuse.

Since measuring equipment is important on quality control, maintain a ledger of the target equipment to be controlled, label on the target equipment and keep a record of verification and calibration. All measuring instruments shall be inspected and recorded to maintain normal function (No damage, scratches, malfunction, etc.) before and after the work. Measuring instruments that are judged to be unusable during inspections and calibrations shall be quarantined or put a label as "unusable".

For calibration of measuring equipment, we request the use of external testing laboratories (for measuring equipment calibration contract suppliers, the international standard ISO / IEC17025 (general requirements regarding the capabilities of testing laboratories and calibration institutions)) or the Measurement Law traceability system: JCSS (Japan Calibration Service System) based on the Japanese Measurement Law.

When the suppliers calibrate the measuring equipment using the internal laboratory, the supplier shall ensure the calibration technique and environmental suitability, personnel competence, and measuring ability. The supplier shall also build a system that can guarantee the calibration in a traceable method.

When found the abnormality in the measuring instrument and had any concern about the impact on the products delivered to NSK, report to the NSK representative within 24 hours.

2.4.9.3 Management of operators and inspectors (Education and Training)

Operators and inspectors who have the necessary technical capabilities for manufacturing and inspecting products and parts shall be assigned. Conduct the necessary education and training in a systematic way, grant the qualification against their abilities and evaluate the competence (include degree of understanding) regularly. For operators and inspectors who were away from the relevant work for a long time, provide education and training before engaging in the work. Depending on the content of the inspection, evaluate the aptitude regularly.

For the finished goods shipment assurance suppliers (suppliers who guarantees the final quality by themselves and directly deliver the products to NSK customers), the Quality Assurance Department of the NSK contact may appoint or register full-time supplier inspectors.

2.4.9.4 Management of Materials, Parts and Products

Note about the environment (high temperature and humidity, dew condensation, load collapse, etc.) that causes quality deterioration of the materials, parts, and products used.

For the entire process from the acceptance of raw materials to the shipment, the supplier shall establish and manage the methods for identifying raw materials, steel materials, products, etc. in company regulations in appropriate ways. Moreover, identify the conditions of the products such as under inspection, uninspected, passed, failed, or waiting for judgment.

The supplier shall establish the procedure such as the place to put raw materials, steel materials and products, display, and how to place them, and ensure to conduct first-in first-out.

Moreover, the supplier shall employ (use) the materials after verifying whether if it has any effects on the product quality.

2.4.9.5 Management of NSK supplies

Materials and parts supplied from NSK shall be separated from your in-house procured parts and stored them with a label.

The supplier shall certainly manage the environment, identification, first-in first-out as with 2.4.9.4 section.

2.4.9.6 Management of Environmentally Harmful Substances

Judge by analysis whether complies with NSK Group Green Procurement Standards. The products and processes of the Tier-N suppliers shall be controlled the non-inclusion of environmentally harmful substances.

2.4.10 Management of Manufacturing Process

2.4.10.1 Production Preparation

Production preparation for new products, design changes or process changes is based on the production (mass production) preparation request form issued by NSK. It shall be created the Advanced Product Quality Planning and Control Plan (APQP) for guaranteeing the process to ensure the quality of the product and proceeded with production preparation.

2.4.10.2 Design FMEA

For products requested design development to suppliers from NSK, risk analysis by change point verification such as Design FMEA (Failure Mode and Effects Analysis), Quick DR and DRBFM (Design Review Based on Failure Mode) shall be conducted regardless of new design products or design changes.

2.4.10.3 Functional Assurance in Process

For the specifications designed by NSK, we may ask you to fill in the functional assurance confirmation checklist with the items to be guaranteed in the supplier's process. Suppliers shall fill in the assurance details of the process for the requirements and return it to the NSK representative.

2.4.10.4 Process FMEA

For the specifications required by NSK before starting production preparation, verify whether if there any issues in production and distribution in Process FMEA (Failure Mode and Effects Analysis)

2.4.10.5 Change Point Verification

When changing in 5M (Man, Machine, Method, Material, Measurement) + 1E (Environment), verify the change point and prevent defects.

·5M+1E means: The initial letters of the words affecting change points.

2.4.10.6 Quality Assurance Process Chart (Control Plan)

The necessary requirements are shown below since the Quality Assurance Process Chart is the most important document as the output of quality planning.

- (1) Describe the control method used for the management of the manufacturing process such as the work setup change verification method and check sheet. When having already introduced inspection machines such as failsafe device (poka-yoke) or checker in process control, the supplier shall describe it in the quality assurance process chart completely.
- (2) When starting and finishing the operations, check the validity for each of the initial, middle and final products.

- (3) The control monitoring method for critical control designated products shall be determined the inspection method and inspection frequency based on the process capability and managed by the Statistical Process Control (SPC) or the Control Chart.
- (4) When requested the critical control designated products, customer requirements shall be included in the Quality Assurance Process Chart.
- (5) When a nonconforming product is detected, or when the process is statistically unstable or statistically inadequate, follow the prescribed response plan. The process control requires basically complement assurance.
- (6) The Quality Assurance Process Chart can be created for each product and part to be delivered or for each product (family product group) produced using a common manufacturing process.

2.4.10.7 Problem extraction of prototype (the mass production) results

For preventing to occur problems after the transition to the mass production, submit the "prototype (mass production) report" including the prototype results to the NSK representative after extracting the problems in the specifications during the initial product management period in the mass production preparation stage.

2.4.10.8 Inspection Standards

The inspection standard shall clarify the concrete inspection procedure of the shipping quality (including reliability items) of products and parts delivered to NSK by the supplier. Assuming to ensure all specified points such as drawings and Quality Assurance Process Chart for the inspection items, the measurement method and measurement frequency of the measurement points shall be discussed with NSK before starting the mass production.

- (1) Set the inspection method in the following criteria based on the complete assurance of lots.
100% inspection shall be in principle for operation inspection and visual inspection of critical safety products.
- (2) Sampling inspections can be used for the following cases.
However, sampling inspections shall be ensured the lot determination.
 - 1) Cases such as the process is stable, the process capability fully satisfies the quality demands, and the quality assurance is as same as 100% inspection.
 - 2) In the case of inspections with the destruction of product
 - 3) In the case of analysis for material components (including environmentally harmful substances)

Keep a history using the recording method (check sheet, recording paper, etc.) set in the inspection standards. The suppliers shall maintain and manage to be able to submit the inspection report as soon as NSK requests.

For the finished goods shipping suppliers (suppliers who give the final quality assurance by themselves and directly deliver the products to the NSK customers), the quality assurance department of NSK's contact may require the suppliers to submit inspection reports regularly.

2.4.10.9 Limit Sample

For the products and parts that suppliers judge the characteristics by the sensory test, when judged ambiguous quality, the supplier shall create a limit sample using the right/ wrong judgment criteria in both companies and secure to maintain the quality. Limit samples agreed with both companies shall be managed in the way without any damage or stains and reducing temporal changes with as measuring instruments.

2.4.10.10 Measuring System Analysis (MSA)

In order to grasp the variation and improve the reliability of the measurement, the error to be occurred in the measurement shall be conducted Measurement Systems Analysis (MSA) such as gauge R & R analysis and crosstab method as example. The supplier shall guarantee the product by evaluating the bias of variation, straightness, stability, repeatability, and reproducibility.

2.4.10.11 Initial Sample Control

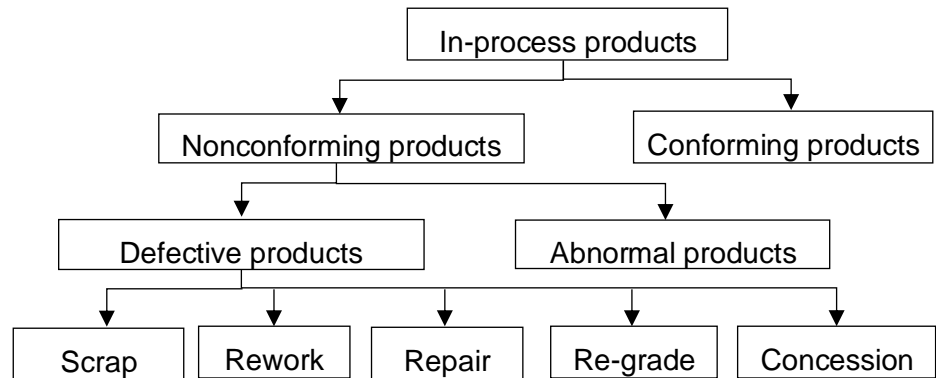
At the product development stage before starting mass production required by NSK, initial samples such as prototypes shall be managed by ensuring proper quality, stabilizing the manufacturing process at an early stage, and preventing the outflow of nonconforming products. Moreover, the initial sample means the product or product group produced during the production start-up stage to be relevant in the following items.

- New design product: Products produced by new design drawings
- Design change product: Products produced by design change drawings
- Process change product: Products produced in the change process
approved by process change procedure
- Nonconforming countermeasure products: Products produced after
conducting "permanent measures" including
normal production and market defects

The supplier shall submit a notice of the initial sample delivery and the notice when delivering the initial samples. Indicate and label on the actual product to be delivered, the delivery note, the inspection report, etc. that the above product is the initial sample.

2.4.10.12 Product Quality Classification

Nonconforming products are classified into "scrap" judged to out of specifications by the inspection standards defined in each process, or "abnormal product" which has a different phenomenon or condition. When nonconforming products occur, need to identify and isolate actual nonconforming products from the production process on the spot to prevent misuse and outflow to the post-process. The terms for nonconforming products are summarized below.



"Abnormality" means "when the phenomenon / state of the process such as product workmanship, work, facility and equipment, processing conditions, materials, etc. is different from usual". If continuing production, it may lead to the occurrence of critical defective products and the frequent occurrence and outflow of nonconforming products.

- When occurred a defect or phenomenon that does not normally occurs
- When the number of nonconforming products suddenly increased or extremely decreased than the normal occurrence number
- When equipment and jig tools deviate from the set conditions or management standards
- When the quality graph or process control record differs from the usual condition

The terms and definitions of NSK related to "process fluid parts" are shown below.

Term	Definition
Abnormal products	Products found in the "abnormal" state
Abnormal lot	All products that assumed to have been manufactured under the same conditions as "abnormal"
Confirming products	Individual product and part matched with the standards
Defective products	Individual product and part that unmatched with the standards
Nonconforming	Products and parts to be suspicious whether matched with

products	the standards (including abnormal products)
Re-grade	Products and parts that evaluate and analyze defect products
Encompassment (ripple range)	The act of limiting abnormal lots and removing abnormal lots from the line or collecting them from the external companied to ensure that they can be inspected or investigated.

Suppliers shall define terms and definitions such as nonconforming or abnormal products. The supplier shall contact NSK immediately when the suppliers classify the products and find that those products have been delivered to NSK. Follow the instructions from NSK for the product inspections and delivery.

2.4.10.13 Condition verification for conforming products

Suppliers shall grasp all necessary information without any omission to produce confirming products with guaranteed quality on the workplaces.

2.4.10.14 All Characteristics Inspection for Drawings (Layout Inspection)

When there is a possibility that the dimensions of the product and part may be changed by new design products, design changes or process change products, equipment or mold updates, etc., the supplier shall inspect all characteristics combined the product performance evaluation items described in the agreed drawings and submit the inspection results. Follow the instructions from NSK representative for the quantities to be inspected. Submit the inspection results for each cavity and core when using a multi-cavity mold.

Follow the instructions from NSK when the NSK representative specified the number of inspections.

2.4.10.15 Process Capability Management

Process capability is the ability related to quality in the stable process. Need to express the variation width of the product quality for the process standardized in 5M (Man, Machine, Material, Method and Measurement) + 1E (Environment) by " $\bar{x} \pm 3\sigma$ ".

For process capability, the supplier shall objectively and quantitatively judge the variation in the quality of the delivered products from the statistical data based on the capability of the manufacturing process. If something is missing, the supplier shall take corrective action. Based on this, when the process capability is still insufficient, discuss with the NSK representative. If the process capability is sufficient, use as the index of the quality control cycle to maintain it. See the procedure 22 for more details.

For the suppliers who guarantee the shipment of finished products (the suppliers

who guarantees the final quality by themselves and deliver the products directly to the NSK customers), the quality assurance department of the NSK representative may ask the suppliers to submit the process capability regularly.

2.4.10.16 Management for Wrapping, Packing and Style of Packing

The packaging and packaging style shall use the specification that does not occur any quality deterioration such as rust, scratches, and dents in order to guarantee the performance of products and parts after shipment. The supplier shall receive the approval from the NSK representative for the packing specifications before starting delivery.

Electrical components shall be delivered in a package that is protected against contamination and static electricity.

2.4.10.17 Lot and Traceability Management

For manufactured products and parts, the supplier shall obtain a lot number that the target range can be specified when nonconformity occurs and display the lot number on the delivered products and parts. Moreover, the supplier shall manage that the scope of tracking, search, cause investigation, countermeasures, etc. including the parts used in the product can be specified when nonconformities or market quality issues occurred.

For the suppliers who guarantee the shipment of finished products (the suppliers who guarantees the final quality by themselves and deliver the products directly to the NSK customers), the quality assurance department of the NSK representative may confirm the state of lot control to the suppliers directly.

2.4.10.18 Shipment Judgement for Mass-Produced Products

NSK requests the supplier to judge the advisability of shipping the product as a mass-produced product before starting mass production. The representative of quality assurance at the supplier shall organize all quality control forms related to mass production of products and parts, be based on the agreement of quality control forms with NSK and submit Part Submission Warranty (PSW) to the NSK representative.

2.4.10.19 Initial Production Control

Suppliers shall conduct initial production control of the products that have moved to the mass production.

The NSK representative instructs the period and contents of Initial production control if necessary.

The supplier shall release the initial production control if NSK confirmed that the

requirements for the initial flow management were met.

2.4.10.20 Handling of Nonconforming

Suppliers shall define the nonconforming products based on the Quality Assurance Process Chart.

When found nonconforming products, the suppliers shall stop the line, conduct emergency treatment, clearly identify and display the nonconforming product lots, and separate / isolate them from the production lines.

When already delivered nonconforming products to NSK or might have possibility to deliver, the supplier shall contact the NSK representative immediately with the details of the nonconformity and the lot numbers. NSK requests the suppliers to submit a report for measures to prevent recurrence of the occurrence for nonconforming products later.

The supplier shall deploy to other similar processes and similar products horizontally for recurrence preventions.

2.4.10.21 Concession Application

When the products and parts delivered to NSK are deviated from the required specifications at NSK, and NSK confirms that the result of risk analysis by the suppliers can be used, the supplier shall issue a concession application.

Concession applications are not accepted in principle for designated critical products and critical safety products.

2.4.11 Change Management

When changing including the Tier-N supplier such as product base materials, specifications, manufacturing and inspection process, process order and working conditions including rationalization, cost reduction, quality problem countermeasures, suppliers shall analyze the risk to prevent quality troubles in advance and manage changes.

When the change in the matters agreed with NSK occurs, the suppliers shall consult with the relevant departments at NSK and apply for the change to NSK's customers. Therefore, suppliers shall contact NSK before the plan for the change case is finalized. The supplier shall follow the instructions below for planning and application procedures related to specific changes.

2.4.11.1 Design change plan and application

When changing the design specifications due to VA / VE (Value Analysis / Value Engineering) proposals or quality issues countermeasures after starting mass production, suppliers shall analyze the risks in advance and confirm the validation for preventing quality issues.

The supplier shall apply for the change to the NSK representative before performing the design change and conduct changes after receiving approval.

Design changes are cases such as when making changes in the contents described in the drawings or purchase specifications that the supplier agreed with NSK, and when including changes in environmentally hazardous substances that affect the function and performance of the products for contents not described in the drawings or purchase specifications.

2.4.11.2 Process Change Plan and Application

Supplier shall perform risk analysis and validation check to prevent quality issues, when changing the process order of manufacturing process and inspection process such as rationalization and cost reduction activities including the Tier-N supplier, facilities and inspection equipment, work conditions and operators. When having possibility to implement process changes, the supplier shall contact the NSK representative at the stage of the change contents are undecided and confirm whether if the submission of process change plan is needed.

Moreover, the supplier shall submit the process change application to the NSK representative at the stage of the change contents are finalized.

Process changes are applicable when changes occur in the contents not described in the drawings or purchase specifications. Examples include changes in manufacturing location, changes in the Nth suppliers, changes in manufacturing methods and conditions, changes in materials, and changes in inspection methods.

2.4.11.3 Disclosure of Design and Manufacturing Control Contents

When requested by NSK, suppliers disclose information on changes (design changes, process changes, change details, design verification results, evaluation results, management details, DR (Design Review) results, cost variation, etc.).

Moreover, when NSK determines that it is necessary to implement a joint DR, please conduct including the Tier-N supplier. When NSK's customers require the implementation of joint DR with suppliers including the Tier-N suppliers, suppliers shall discuss with NSK and cooperate.

2.4.12 Supplier Audit

NSK requests audits to the suppliers. Suppliers shall check the quality control status of the Tier-N suppliers adopted by the supplier utilizing auditing.

2.4.12.1 Self Inspection and Internal Audit

Suppliers shall monitor the work in daily production activities for the recurrence prevention of defects and check by self-inspection whether the change points of 5M (Man, Machine, Material, Method and Measurement) + 1E (Environment) and

3H (Hajimete, Henko and Hisashiburi).

- 3H means: The initial letters of the words affecting change points.
 - Hajimete is the first product.
 - Henko is a product with design change and process change.
 - Hisashiburi is a product has been produced for the first time in several years.

Moreover, the supplier shall plan the internal audit by the annual plan at least once a year and promote the effectiveness evaluation of the quality management system and the improvement of corrective activities.

2.4.12.2 Quality Management System Audit

NSK conducts quality management system audits for the suppliers as needed. Especially for suppliers who deliver parts for automobile applications, we audit the conformity of the quality management system required by the international standard: IATF16949 utilizing in the automobile industry. For suppliers, please promote to build the quality management system as the ultimate goal to acquire IATF 16949 certification.

2.4.12.3 Manufacturing Process Audit

NSK conducts suppliers' "manufacturing process audit" as necessary. When NSK's customers request manufacturing process audits including the Tier-N suppliers, the supplier shall consult with NSK and cooperate.

2.4.12.4 Product Audit

NSK conducts "product audits" of products purchased from suppliers for automotive applications as necessary. Moreover, when the NSK representative requests regular product audits and results as required, the supplier shall report the results.

2.4.12.5 Other Audit

In addition to the above, NSK conducts "special control required process audits", "process change audits", "nonconformity recurrence prevention confirmation audits", and "special audits" including the Tier-N suppliers as necessary.

2.4.13 Quality Defects of Delivered Products

When suppliers discover defects in the products and parts delivered to NSK, or when recalls or critical quality issues occur, NSK requests measures to prevent recurrence. When occurring critical quality issues, NSK registers as the critical quality issues and requests the supplier to conduct quality improvement activities.

Moreover, for quality defects related to delivered products, suppliers shall guarantee all products until NSK approves the completion of countermeasures and deliver non-defective

products.

2.4.14 Supplier Quality Evaluation

NSK evaluates the quality performance for suppliers based on the regular evaluation point system.

When critical quality issues occur or when quality improvements are not proceeded, NSK registers them as specially focused suppliers and conducts improvement requests and audits for the quality control system and manufacturing process.

3 Outline of Quality Assurance Activities at NSK

3.1 NSK Product Development System “NPDS”

3.1.1 What is NPDS

NPDS is a mechanism to conduct "a series of operations related to product quality manufacturing from product development to mass production start-up" required in the commercialization process of NSK products, which is an acronym for NSK Product Development System.

3.1.2 Production Preparation Schedule by NPDS

Process	Order	Prototype		Production prototype	Mass production prototype	Mass production	
		Development Design	Prototype tool Prototype process	Off tool Prototype process	Off tool Off process	Initial production control	
Steering		◆TG1 Prototype meeting	◆TG2 Prototype result Evaluation meeting		◆TG2.5 Production prototype evaluation meeting	◆TG3 Mass production confirmation meeting	◆TG4 Initial production release meeting
	Bearing Actuator Precision product	◆DR3-1 Prototype meeting	◆DR3-2 Prototype result Evaluation meeting	◆DR4-1 QC Process meeting	◆DR4-2 Production prototype evaluation meeting	◆DR5 Mass production confirmation meeting	◆DR6 Initial production release meeting

NSK prepares for the production above according to the product development schedule including customers. NSK requests the suppliers to do their works according to the turning point of each production preparation.

※ As the turning point of production preparation, steering products are called TG (abbreviation of Tollgate), and bearings, actuators and precision machinery products are called DR (abbreviation of Design Review).

3.2 Milestone of NPDS

3.2.1 Product Design Development Period

~Prototype Meeting 【TG1】 【DR3-1】 ~

- 1) Purpose: Verify whether the product specifications meet the required performance in the temporary construction method and production process.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.
 - a) Advanced product quality plan APQP ... Procedure 7, Form 7-1
 - b) Risk Analysis Verification
 - Design FMEA ... Procedure 8, Form 8-1
 - Verification of change points due to changes in design Specifications
 - ... Procedure 9, Form 9-1
 - Verification of change points due to changes in Manufacturing process
 - ... Procedure 9, Form 9-2
 - c) Process design / Internal/ external production classification / production capability chart
 - ... Procedure11, Form 11-1
- 3) Evaluation of effectiveness: Satisfy the requested product specifications and verify whether production is possible.

When the required specifications are not satisfied, submit problems and improvement plans.

3.2.2 Product Design Development Period

~Prototype Result Evaluation Meeting 【TG2】 【DR3-2】 ~

- 1) Purpose: Verify whether the product specifications meet the required performance in the prototype form and the temporary production process.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.
 - a) Process FMEA ... Procedure12, Form 12-1
 - b) Quality Assurance Process Chart (Control Plan)
 - ... Procedure13, Form 13-1
 - c) Inspection standard ... Form 15-1
 - d) Delivery Package Application Form (When delivering in a special form)
 - ... Procedure 23, Form 23-1
 - e) Safety Data Sheet (SDS) ... Followed by Form Global Hazard System
 - f) Initial sample delivery advance notice ... Procedure 19, Format 19-1
 - g) Initial sample delivery notice ... Procedure 19, Format 19-2
 - h) Inspection report ... Procedure 16, Form 16-1
 - i) Prototype (Mass production) report ... Procedure 14, Form 14-1
- 3) Evaluation of effectiveness : Satisfy the requested product specifications and verify whether mass production is possible.

When the required specifications are not satisfied, submit problems and improvement plans.

3.2.3 Production Preparation Development Period

~QC Process Meeting 【DR4-1】 ~

- 1) Purpose: Use Off tool and verify whether the product specifications meet the required performance.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.
 - a) Management status notification for critical management process
... Procedure 4, Form 4-1
 - b) Delivery parts lot management method notification ... Procedure 24, Form 24-1
 - c) Initial product delivery notice ... Procedure 19, Form 19-1
 - d) Initial product delivery notification ... Procedure 19, Form 19-2
 - e) Prototype (Mass production) report ... Procedure 14, Form 14-1
 - f) Delivery Package Application Form ... Procedure 23, Form 23-1
- 3) Evaluation of effectiveness : Utilize the temporary process for Off tool and verify whether it is possible for product manufacturing to meet the required product specification. When the required specifications are not satisfied, submit problems and improvement plans.

3.2.4 Production Preparation Development Period

~Production Prototype Evaluation Meeting 【TG2.5】 【DR4-2】 ~

- 1) Purpose: Verify whether the product specifications meet the required performance using this mold and this production process.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.
 - a) Initial product delivery notice ... Procedure 19, Form 19-1
 - b) Initial product delivery notification ... Procedure 19, Form 19-2
 - c) Prototype (Mass production) report ... Procedure 14, Form 14-1
 - d) Drawing all characteristic inspection report ... Procedure 21, Form Optional
 - e) Process capability survey & Improvement plan ... Procedure 22, Form 22-1
 - f) Machinery capacity survey ... Procedure 22, Form 22-2
 - g) The Tier-N supplier usage notification form ... Procedure 5, Form 5-1
 - h) Measurement System Analysis (MSA)
 - Gauge R&R report ... Procedure 18, Form 18-1
 - Cross tab report ... Procedure 18, Form 18-2
 - i) Approval request of limit sample and reply form ... Procedure 17, Form 17-1
- 3) Evaluation of effectiveness: Utilize Off tool and this process and verify whether it is possible for product manufacturing to meet the required product specification. When the required specifications are not satisfied, submit problems and improvement plans.

3.2.5 Production Preparation Development Period

~Mass Production Transition Confirmation Meeting 【TG3】 【DR5】 ~

- 1) Purpose: Determine whether if moving to mass production.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.

- a) Manufacturing Process Audit (Product audit)
 - Required forms: Process FMEA, Quality Assurance Process Chart
 - b) Prototype (Mass production) report ··· Procedure 14, Form 14-1
 - c) Process capability survey & Improvement plan ··· Procedure 22, Format 22-1
 - d) Mass Production approval application PSW ··· Procedure 25, Form 25-1
- 3) Evaluation of effectiveness: Utilize Off tool and this process and verify whether it is possible for product manufacturing to meet the required product specification. When the required specifications are not satisfied, submit problems and improvement plans.

3.2.6 Mass Production Period

~Initial Production Control Cancellation Meeting 【TG4】 【DR6】 ~

- 1) Purpose: Cancel when confirmed that there is no problem with the initial production after the transition to mass production.
- 2) Procedure: The procedures and forms to be confirmed in this section are shown below.
 - a) Initial production control plan ··· Procedure 26, Form 26-1
 - b) Initial production control table ··· Procedure 26 Form 26-2
 - c) Process capability survey & Improvement plan ··· Procedure 22, Form 22-1
- 3) Evaluation of effectiveness: Utilize Off tool off process and verify whether it is possible for product manufacturing to meet the required product specification. When the required specifications are not satisfied, submit problems and improvement plans.

3.2.7 Mass Production Period

~Mass Production after cancellation of Initial Production Control~

- 1) Purpose: Requirements when issues or changes occur during mass production.
- 2) Implementation procedure: The procedures and forms required individually are shown below.
 - a) **Concession** application and reply form ··· Procedure 28, Form 28-1
 - b) Design Change Plan ··· Procedure 29, Form 29-1
 - c) Design Change Application ··· Procedure 29, Form 29-2
 - d) Process Change Plan ··· Procedure 30, Form 30-1
 - e) Process Change Application ··· Procedure 30, Form 30-2
 - f) VA / VE proposal ··· Procedure 31, Form 31-1
 - g) The Tier-N supplier usage notification form ··· Procedure 5, Form 5-1
 - h) Notification for supplier parts nonconformity occurrence /
Investigation measures request form ··· Procedure 6, Form 6-1
 - i) Nonconformity recurrence prevention measures report ··· Procedure 27, Form 27-1
8D report ··· Procedure 27, Form 27-3

Suppliers shall conduct the procedures to NSK in the prescribed form promptly each time the event occurs or when requested by NSK. Please confirm the next page for the prescribed form, submission timing and submission destination.

4 List of Quality control procedures and Quality control form submission destinations

Procedure number	Section of NPDS		Necessity of submission	IATF requirement	Start trading	Start development	Prototype tool Prototype Process	Off tool Prototype process	Off tool Off process	Start mass production	Initial production control	Mass production (include changes)	Submit to		Check column
	Contents of procedure	Form number											Plant Procured parts	HQ Procured parts	
					—	TG1 DR3-1	TG2 DR3-2	DR4-1	TG2.5 DR4-2	TG3 DR5	TG4 DR6	—	Plant Procured parts	HQ Procured parts	
1	Notification of Quality Assurance / Environmental Management managers	1-1	Mandatory		○							○	Plant	PDHQ	
2	Management and notification of environmentally harmful substances	*1	Mandatory		○							○	Plant	PDHQ	
3	Management of designated critical product	—	Mandatory					○				○	—	—	
4	Control status form of critical control process	4-1	Mandatory						○			○	Plant	QADHQ	
5	Usage notification of Tier-N supplier	5-1	Mandatory						○			○	Plant	PDHQ	
	Tier-N Supplier list	5-2	Mandatory						○			○	Plant	—	
6	Notification of supplier parts nonconformity occurrence/ Investigation measures request form	6-1	When event occurs						○	○	○	○	Plant	—	
	Steel acceptance ledger	6-2	When requested						○	○	○	○	—	—	
7	Advanced product Quality Plan (APQP)	7-1	When requested	○		○	○	○	○	○	○		Plant	PDHQ	
8	Design FMEA	8-1	When requested	○		○	○	○	○			○	Product design	QADHQ	
9	Verification of change points with the design specification changes	9-1	When requested			○						○	Product design	QADHQ	
	Verification of change points with the manufacturing process changes	9-2	When requested					○				○	Plant	QADHQ	
10	Function assurance confirmation	—	When requested			○	○	○	○	○		○	Product design	—	
11	Process setting / internal-external production classification / production capacity chart	11-1	When requested				○					○	Plant	QADHQ	
	Production Preparation Request Form (New products & Increased production products)	11-2	When requested				○						Plant	QADHQ	
	Production Preparation Request Form (Change products)	11-3	When requested									○	Plant	QADHQ	
	Production Discontinuation & Reduced Production Request Form	11-4	When requested									○	Plant	QADHQ	

Procedure number	Section of NPDS		Necessity of submission	IATF requirement	Start trading	Start development	Prototype tool Prototype process	Off tool Prototype process	Off tool Off process	Start mass production	Initial production control	Mass production (include changes)	Submit to		Check column
	Contents of procedure	Form number											Plant Procured parts	HQ Procured parts	
					—	TG1 DR3-1	TG2 DR3-2	DR4-1	TG2.5 DR4-2	TG3 DR5	TG4 DR6	—			
12	Process FMEA	12-1	When requested	○			○	○	○	○		○	Plant	QADHQ	
13	Control Plan	13-1	Mandatory				○	○	○	○		○	Plant	QADHQ	
14	Prototype (mass production) problem extraction	14-1	When event occurs					○	○	○			Plant	QADHQ	
15	Inspection standard	15-1	Mandatory				○					○	Plant	—	
16	Inspection record	16-1	Mandatory			○	○	○	○	○		○	Plant	QADHQ	
17	Approval request of limit sample and reply form	17-1	When event occurs						○			○	Plant	—	
	Limit Sample Management Slip	17-2	When event occurs						○			○	Plant	—	
18	Gauge R&R report	18-1	When requested	○					○			○	Plant	QADHQ	
	Cross tab report	18-2	When requested	○					○			○	Plant	QADHQ	
19	Initial product delivery advance notice	19-1	When requested			○	○	○	○	○		○	Plant	QADHQ	
	Initial sample delivery notice	19-2	When requested									○	Plant	QADHQ	
20	Actual parts identification when delivered product	20-1	When event occurs			○	○	○	○	○		○	Plant	QADHQ	
21	Drawing all characteristics inspection	—	When requested						○			○	Plant	QADHQ	
22	Process capability survey & Improvement report	22-1	When requested						○	○	○	○	Plant	QADHQ	
	Machinery capacity survey & Improvement report	22-2	When requested						○	○	○	○	Plant	QADHQ	
	Continuous Control Chart	22-3	When requested								○	○	Plant	QADHQ	
23	Delivery packaging application	23-1	When requested				○	○				○	Plant	QADHQ	
24	Delivery parts lot management method form	24-1	Mandatory							○		○	Plant	QADHQ	
25	Part Submission Warranty (PSW)	25-1	When requested	○						○		○	Plant	QADHQ	
26	Initial production control plan	26-1	When requested								○	○	Plant	QADHQ	
	Initial production control table	26-2	When requested								○	○	Plant	QADHQ	

Procedure number	Section of NPDS Contents of procedure	Form number	Necessity of submission	IATF requirement	Start trading	Start development	Prototype tool Prototype process	Off tool Prototype process	Off tool Off process	Start mass production	Initial production control	Mass production (include changes)	Submit to		Check column
					—	TG1 DR3-1	TG2 DR3-2	DR4-1	TG2.5 DR4-2	TG3 DR5	TG4 DR6	—	Plant Procured parts	HQ Procured parts	
27	Nonconformity recurrence prevention measures report	27-1	When event occurs									○	Plant	QADHQ	
	Notification of Nonconformity and Countermeasure Form	27-2	When event occurs									○	Plant	—	
	8D report	27-3	When event occurs									○	Plant	QADHQ	
28	Concession application and reply form	28-1	When event occurs									○	Plant	QADHQ	
29	Design Change Plan	29-1	When event occurs									○	Product design	QADHQ	
	Design Change Application	29-2	When event occurs									○	Product design	QADHQ	
30	Process Change Plan	30-1	When event occurs									○	Plant	PDHQ	
	Process Change Application	30-2	When event occurs									○	Plant	PDHQ	
31	VA/ VE Proposal	31-1	When event occurs									○	Plant	PDHQ	

*1 : Please use the form of the NSK Group Green Procurement Standard.

* The Procurement Div. HQs and Quality Assurance Div. HQs for products procured by the head office have different divisions in Japan and overseas.
 ・PDHQ (Procurement)・・・Japan: Procurement Div. HQs/ Overseas: Regional Procurement Div. HQs
 ・QADHQ (Quality Assurance)・・・Japan: Quality Assurance Div. HQs / Overseas: Regional Quality Assurance Div. HQs
 If you do not know where to contact NSK, please contact the division where instructs product delivery.