BS EN 9103:2014

BSI Standards Publication

Aerospace series — Quality management systems — Variation management of key characteristics

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National foreword

This British Standard is the UK implementation of EN 9103:2014. It supersedes BS EN 9103:2005 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ACE/1, International and European Aerospace Policy and Processes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 75661 0

ICS 03.120.10; 49.020

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 9103

December 2014

ICS 03.120.10; 49.020

Supersedes EN 9103:2005

English Version

Aerospace series - Quality management systems - Variation management of key characteristics

Série aérospatiale - Systèmes de management de la qualité - Management de la variation des caractéristiques clefs

Luft- und Raumfahrt - Qualitätsmanagementsystems - Management der Veränderung der Haupteigenshaften

This European Standard was approved by CEN on 29 November 2014.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 9103:2014) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2015, and conflicting national standards shall be withdrawn at the latest by June 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 9103:2005.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Rationale

This standard was revised to coincide with the updated information presented in the International Aerospace Quality Group (IAQG) 9100-series standards (i.e., 9100:2009, 9110:2009). All other changes made to standard requirements or methods presented herein were editorial in nature.

Foreword

To assure customer satisfaction, the aviation, space, and defence industry organizations must produce and continually improve safe, reliable products that meet or exceed customer and regulatory authority requirements. The globalization of the industry, and the resulting diversity of regional/national requirements and expectations, has complicated this objective. End-product organizations face the challenge of assuring the quality of, and integrating, product purchased from suppliers throughout the world and at all levels within the supply chain. Industry suppliers and processors face the challenge of delivering product to multiple customers having varying quality expectations and requirements.

The aviation, space, and defence industry established the International Aerospace Quality Group (IAQG) for the purpose of achieving significant improvements in quality and safety, and reductions in cost, throughout the value stream. This organization includes representation from companies in the Americas, Asia/Pacific, and Europe.

This document standardizes requirements for “Key Characteristic” (KC) identification, control, documentation, and approval for the industry. The establishment of common requirements, for use at all levels of the supply-chain by organizations, should result in improved quality and safety, and decreased costs, due to the elimination or reduction of organization-unique requirements and the resultant variation inherent in these multiple expectations.

INTRODUCTION

General

This standard establishes variation management requirements for KCs. The standard also specifies general requirements and provides a process to achieve those requirements.

The standard requires a thorough assessment of the applicable production/maintenance process with the primary goals being to control and minimize variation in characteristics generated by the process.

Specifically, the standard requires:

- Understanding process elements that affect KCs.
- Disciplined determination of process KCs using appropriate analysis tools for variation control and reduction to satisfy customer requirements.
- Control and capability assessment to ensure variation is well understood.
- Process Control Documents (PCDs) or equivalent documentation that defines specific control of KCs and manufacturing/maintenance process parameters.

This standard does not:

- Require rejection of any part that conforms to engineering specification.
- Inhibit shipment or use of product during production process capability assessment.

Although the 9103 standard is focused on variation control of KCs for production and maintenance activities, this process can also be used as a model for other characteristics, such as those that affect cost and delivery.

Application

This standard was created to provide for a uniform process for the identification, control, documentation, and approval of KCs when contractually invoked at any level or as guidance within the aviation, space, and defence industry in the control of Critical Items (CIs). This standard can be invoked as a stand-alone requirement or used in conjunction with 9100-series standards (i.e., 9100, 9110).

1 Scope

This standard is primarily intended to apply to new parts and products, but can also be applied to parts currently in production. The standard shall be applicable to all production processes that influence the variation of KCs, as well as maintenance processes in which KCs are identified. It applies to assemblies and all levels of parts within an assembly, down to the basic materials including castings and forgings, and to organizations that are responsible for producing the design characteristics of the product.

It does not apply to lab-scale, pilot, or pre-production processes. However, particular management of some KCs might be required using other methods than those described in the standard, during these phases of a programme, when required by the customer or deemed appropriate by the organization (e.g., Engineering department requirement).

The variation control process begins with product definition, typically an engineering drawing or specification which identifies KCs, and leads to a variation management program for those KCs. This process may also be used for producer-identified KCs.

Producers and their subcontractors shall be responsible for flow down of the requirements of the applicable revision of this standard to subcontractors, who produce design characteristics, and for ensuring that KCs conform to customer requirements.

1.1 Purpose

This standard is designed to drive the improvement of manufacturing and maintenance processes through adequate planning and effective management of KC variation. The KC focus is intended to improve confidence for part features whose variation has a significant influence on to end-product form, fit, performance, service life, and producibility.

NOTE Control of a product or process KC per this standard does not constitute, nor imply, acceptance of the resulting product. If variation management, under this standard, is to be part of an acceptance decision, the requirements must be specified in the applicable product acceptance plan or contract.

1.2 Convention

The following conventions are used in this standard:

- The words "shall", "will", or "must" indicate mandatory requirements.
- The word "should" indicates a requirement with some flexibility allowed in compliance methodology.
- Producers choosing other methods to satisfy a "should" shall be able to show that their approach meets the intent of the requirements of this standard.
- Words "typical", "example", "for reference", "may", or "e.g." indicate suggestions given for guidance only.
- "NOTES" are used for additional clarification.
- Words or phrases with specific meaning pertaining to this document are defined in Clause 3, Terms and Definitions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AS 9100, *Quality management systems — Requirements for aviation, space and defence organization*

AS 9102, *Aerospace first article inspection requirement*

AS 9110, *Quality management systems — Requirements for aviation maintenance organization*

ISO 9000:2005, *Quality management systems — Fundamentals and vocabulary*

2.1 Related publications

The following publications are provided for information purposes only and are not a required part of this SAE Aerospace Technical Report.

ISO 9001:2008, *Quality management systems — Requirements*

ISO 9004:2009, *Managing for the sustained success of an organization — A quality management approach*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000 and the following apply.

3.1
Critical Item (CI)
those items (e.g., functions, parts, software, characteristics, processes) having significant effect on the product realization and use of the product; including safety, performance, form, fit, function, producibility, service life, etc.; that require specific actions to ensure they are adequately managed. Examples include safety CIs, fracture CIs, mission CIs, KCs, and maintenance tasks critical for safety.

3.2
customer
the organization which identifies CIs and/or provides part or system KCs via engineering drawings, specifications, or purchase order/contract requirements. For example, a customer may be an internal engineering department for a company which has design authority, in addition to the external customer who specifies system KCs.

3.3
Key Characteristic (KC)
an attribute or feature whose variation has a significant influence on product fit, performance, service life, or producibility; that requires specific action for the purpose of controlling variation (reference 9100 and 9110).

This definition is further explained as follows:

KCs for a part, subassembly, or system are those selected geometrical, material properties, functional, and/or cosmetic features; which are measurable, whose variation control is necessary in meeting customer requirements and enhancing customer satisfaction.

Process KCs are those selected measurable characteristics of a process whose control is essential to manage variation of part or system KCs.

Substitute KCs may be identified when a customer-defined KC is not readily measurable within the production/maintenance setting and other characteristics may need to be controlled to ensure conformance.

NOTE Design output can include identification of critical items that require specific actions to ensure they are adequately managed. Some CIs shall be further classified as KCs because their variation needs to be controlled.

3.4
Key Characteristic (KC) owner
the person or function that defines the KCs and recognizes the reasons for the selection of the KCs. Typically, these responsibilities are held by internal/external customer design, quality, manufacturing, or maintenance engineering and are identified by a cross-functional team.

3.5
Key Characteristic (KC) process owner
the person or function that uses KC data to maintain and improve the process.

3.6
Process Control Document (PCD)
a written description of manufacturing/maintenance plan developed to control variation in KCs. It is a living document and is updated to reflect the addition/deletion of KCs.

3.7
Producer
an organization that performs any process affecting the manufacture or maintenance of the part/product.

3.8
Special cause
variation caused by a source that is not part of the constant system or process.

NOTE Also commonly referred to as 'assignable cause'.

4 General requirements

4.1 This clause defines general requirements which shall be met regardless of the variation management methodology applied.

NOTE Further detailed guidelines are provided in Annex A.

4.2 Variation management activities shall be performed on identified KCs and processes until they are in control and the required process capability has been established. Appropriate monitoring methodology should then be implemented to ensure continued performance.

4.3 The producer shall maintain appropriate documentation of KCs and manufacturing or maintenance process elements that influence variation in KCs as well as their control techniques and measurement methods. This documentation shall be developed when any of the following occurs:

a) Customer defines a CI or product/process KC.

b) Lower level or substitute KCs are required to control variation of higher level KCs.

c) Analysis performed as part of a process improvement activity to meet quality objectives required by 9100/9110 standard results in the identification of a KC or process.

NOTE PCD shown in Annex B in one acceptable method of documentation.

4.4 If Statistical Process Control (SPC) is chosen as the method of control for the KC, the following requirements shall be met:

a) Process capability shall be established for KCs. The process capability index (e.g., Cp and Cpk) shall be calculated only when the process is shown to be stable and in statistical control, using appropriate statistical methods and/or appropriate control charts.

b) The process shall be capable (i.e., with Cpk > 1.33) or as specified by the customer.

NOTE A KC is considered capable, if its Cpk meets or exceeds 1.33. Other comparable measures of process capability may be used. If the process does not meet capability requirements, the producer may have several options as described in this sub-clause.

c) When similar KCs from different products are combined on the same control chart (e.g., a part, product family, or process output control approach), the characteristics shall have similar variability and be traceable to the specific part or product.

d) When process capability is used to justify reduced frequency of inspection, the process capability (probability of nonconformance) shall be determined using recognized industry statistical methods.

NOTE Evidence of sufficient process control may include, but not be limited to procedures and records of configuration control of process inputs, elements or characteristics that affect conformance of products to specifications, or SPC methods with a process control plan; and audit records showing that the process is consistently practiced as defined (see Clause 4.3).

e) Processes that cease to be in control and/or capable and the product feature is under a reduced inspection plan, normal end-item inspection shall resume for acceptance of the product feature until the cause has been identified, corrected and process capability and control are re-established.

4.5 As applicable, other variation control methods (e.g., tooling, control of process KCs, standard processes, mistake proofing) shall be used to ensure process control and capability. Measurable evidence shall demonstrate that the controls are effective.

4.6 Focusing on KCs does not relieve the producer from meeting all drawing characteristics, specifications, and other customer requirements and/or invoked standards.

4.7 In some cases, it may be impossible or prohibitively expensive to meet the stability and capability requirements of this clause. These exceptions shall be documented by the producer and may require customer approval.

5 Process model

This clause describes a model that may be used in fulfilling the requirements of this standard and is presented for illustration and clarity.

The model consists of several stages, starting with the definition of product/process related KCs and/or identification of CIs, whose control is achieved through KCs variation management, and ending with the monitoring of product manufacturing or maintenance process performance. Further detailed guidance is provided in Annex A; other methods or processes may be employed to achieve compliance. The producer, in either case, shall show compliance with the requirements defined in Clause 4 has been achieved and the method by which compliance was obtained (see Figure 1).

6 Notes

6.1 A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

Stages	Insights
Stage 1 Review Required Performance, Key Characteristics, and Critical Items	Review of CIs and/or product KCs should be through a cross-functional team and encompass product, process, and customer requirements in the consideration of a suitable manufacturing or maintenance control method.
Stage 2 Planning a Manufacturing or Maintenance Process	By consideration of the KCs, a process shall be designed to be capable of meeting today's needs and future aspirations. Without this foresight, the level of variation inherent in the process may become a limiting factor to meeting customer expectations and the cost efficient operation of that process.
Stage 3 Operate the Process on a Trial Basis to Generate Data	Operate the process ensuring the data collection method has been planned to provide information about the variation of process parameters and resulting product variation relevant to the KCs. Without careful consideration of the process variation at this stage, later analysis of data could miss vital information as to the 'real' process performance.
Stage 4 Analyze Data for Action	Skilled interpretation of the data shall provide evidence of the process performance and therefore, product variation. Informed decisions based on objective information can help to prevent 'surprises' in the hands of the manufacturer, maintainer, and more importantly - the customer.
Stage 5 Take Action from Study of Process Performance	Information generated is of minimal use to improving process performance and product quality, unless acted upon in a controlled and appropriate manner. This too needs careful consideration to identify isolated incidents and avoid process tampering to prevent more uncertainties being introduced.
Stage 6 Continue to Monitor the Process	Monitoring those KCs of the process or product that are critical to satisfying customer expectations can help show when there is improvement. Monitoring continued performance is vital to know when undesirable variation may occur, before it is detrimental to the customer.
Stage 7 Process Change Management No Yes	Whatever the reason for considering a process change (e.g., natural process degradation, changing customer requirements, improvement), any decision shall be substantiated with data to enable the implementation of an effective action plan.

Figure 1 — Preferred model for key characteristic variation management

Annex A
(normative)

Guidelines to meeting requirements for variation management of key characteristics

A.1 Stage 1: Review required performance, key characteristics, and critical items

A.1.1 The producer should establish an appropriate cross-functional team, which has an understanding of the producer's manufacturing or maintenance processes. The cross-functional team should review customer requirements and the required performance, including the following:

- Customer identified KCs for the product.
- CIs whose method of control may require determining additional KCs and ensuring their variation shall be managed.
- Any other product/process requirements that demand attention because of their importance or risk of not being achieved.

A.1.2 CIs, KCs, and their required performance should be documented on the 'Critical Items List' and PCD or equivalent.

A.1.3 Stage 1 Outputs:

- Documentation of customer identified CIs and KCs.
- Updated PCD or equivalent.

A.2 Stage 2: Planning a manufacturing or maintenance process

A.2.1 The producer should define a manufacturing or maintenance process by developing a new or by reviewing an existing process flowchart. This includes the identification of those elements that influence the control of CIs and variation of KCs. Knowledge of existing process and customer capability requirements should be considered.

A.2.2 The producer should perform cause effect analysis to identify any process KCs. If substitute KCs are used, the producer should demonstrate association of substitute KCs with customer defined CIs and KCs. The producer should establish a minimum acceptable capability ratio for each KC.

A.2.3 The producer should identify a process owner for each KC. The process owner shall be responsible to maintain and improve the process performance that generates the KC.

A.2.4 A disciplined review of each process generating KCs should be conducted to identify sources of variation and potential risks; plans should be developed to manage those risks.

A.2.5 Detailed work instructions and measurement instructions should be developed to manage sources of variation.

A.2.6 The producer should update the PCD or equivalent after completing activities for this stage (see Annex B, "Process Control Document Example").

A.2.7 Stage 2 Outputs:

- Flow chart of the manufacturing or maintenance process or equivalent documentation.
- Cause/effect analysis.
- Key process parameters and their reference to applicable KCs.
- Process KCs.
- Substitute KCs and association with customer defined KCs.
- Identification of the process owner.
- Potential sources of variation.
- Work instructions.
- Measurement instructions.
- Updated PCD or equivalent.

A.3 Stage 3: Operate the process on trial basis to generate data

A.3.1 The producer should create a data collection plan(s) for all KCs that reflect the sources of variations. The plan specifies who, what, where, frequency, and how many parts shall be included and under what conditions the data shall be collected. The producer should determine the type of control chart to be used.

A.3.2 The producer manufactures parts according to previously defined work instructions. The trial parts should be manufactured in a representative production environment.

A.3.3 The producer should collect data on control charts, according to the data collection plan. Any deviation to this plan should be documented.

A.3.4 A production process verification [often referred to as a First Article Inspection (FAI)] may be performed at this stage (reference 9102).

A.3.5 The producer should update the PCD or equivalent, as required.

A.3.6 Stage 3 Outputs:

- Data collection plan.
- Control chart.
- Updated PCD or equivalent.

A.4 Stage 4: Analyze data for action

A.4.1 As applicable, the producer shall review control charts to determine if the process is stable. The producer should calculate process capability and provide evidence to demonstrate statistical reasoning and justification, in addition to the calculation method. The process capability index (e.g., Cp and Cpk) is calculated only when the process is stable.

A.4.2 If the process is not stable, the producer should investigate to determine the root cause using suitable problem resolution tools. Investigation results should be documented.

A.4.3 If the process is stable, but the capability does not meet the customer requirements; the producer should prioritize common cause sources of variation, to identify the most influential source(s). Subsequent investigation should determine root cause(s) of this variability. The producer shall implement measures to reduce the common cause variation, until the capability meets customer requirements.

If the capability meets customer requirements, then no further action needs to be taken on the process and the PCD or equivalent should be finalized. In cases where a process is in a state of control, but doesn't fulfil customer process capability requirements, the producer shall redesign the process to ensure the required probability of conformance.

A.4.4 Process KCs should be re-evaluated based on understanding of the observed process behaviour to determine if any KCs should be added or do not apply.

A.4.5 The producer should update the PCD or equivalent; reference to associated documentation should be included.

A.4.6 Stage 4 Outputs:

- Process capability, including calculation method.
- Investigation results of out-of-control points.
- Investigation results of sources of variation.
- New or revised KCs identified.
- Updated PCD or equivalent.

A.5 Stage 5: Take action from study of process performance

A.5.1 When a process is not stable and the special cause is known, corrective action should be taken to remove permanently or minimize the cause. The effectiveness of corrective action taken should be verified.

A.5.2 When a process is not capable or the special cause continues to be present, the producer investigates gage variation. If a measurement systems analysis has already been performed, the producer verifies the results.

A.5.3 If a process is stable, but still not capable; the producer should investigate centring of the process.

A.5.4 If a process continues to be stable, but not capable; the producer should take appropriate action(s) on sources of variation that influence the process performance.

A.5.5 If after performing the previous action(s), the process is not stable or capable, the producer should implement a product/process protection plan; until such time that the process is proven stable and capable.

A.5.6 A production process verification (often referred to as FAI) may be performed at this stage (reference 9102), unless it has been performed previously in Stage 3 and the process is unchanged.

A.5.7 Whenever actions are taken that change the manufacturing or maintenance process, the producer should take appropriate action in Stages 2 through 5.

A.5.8 The PCD or equivalent should be finalized as soon as the process is stable and capable.

A.5.9 Stage 5 Outputs:

- Corrective action documentation for out-of-control points.
- Measurement system analysis.
- Corrective action documentation for sources of variation.
- Product/process protection plan.
- Updated PCD or equivalent.

A.6 Stage 6: Continue to monitor the process

A.6.1 When a KC is meeting capability requirements, then the producer shall periodically verify that the process remains in control and capable. The producer should continue to measure process performance to identify opportunities for process improvement through variation reduction. If learning from monitoring the process results in a change in the method of production/maintenance, the producer shall proceed to Stage 7.

A.6.2 The producer should continually review business indicators, as appropriate; to ensure that valid producer KCs have been identified. This may result in eliminating some producer KCs and adding others. All additional producer defined KCs shall follow the requirements of this standard from Stage 2 and beyond.

A.6.3 Stage 6 Outputs:

- Ongoing controls on KCs.
- Ongoing analysis of business indicators.
- Updated PCD or equivalent.

A.7 Stage 7: Process change management

A.7.1 The producer should document any planned change to the manufacturing or maintenance process.

A.7.2 The producer should follow the requirements of Stage 1 through 5 prior to implementing any planned change to the approved manufacturing or maintenance process, as related to the affected KCs.

A.7.3 Stage 7 Outputs:

- Process change documentation.
- Updated PCD or equivalent.

Annex B
(normative)

Process control document example

The Process Control Document (PCD) defined and shown (see Figure B.1) in Annex B is the preferred method of fulfilling the documentation requirements of this standard, any other equivalent method of documentation may be accepted.

1. Process Control Document Number – Enter the PCD number used for tracking. It may be made of any combination of letters and/or numbers.

2. Part Number / Part Family / Latest Change Level – Enter the number of the assembly or part number being controlled. The process designation/specification number and part family can be entered into this block, if applicable. Enter the latest engineering change level.

3. Part Name / Description – Enter the name and description of the part / process being controlled.

4. Producer / Plant – Enter the name and description of the part / process being controlled.

5. Supplier Code – Enter the identification number as defined by the customer. For example, this could be Producer Code, Vendor Identification Code, Manufacturing Identification Number, Maintenance Identification Number, etc.

6. Process Owner – Enter the name of the person who uses KC data to maintain and improve the process.

7. Date (Original) – Enter the date that the original PCD was compiled; usually the end of Stage 1.

8. Date (Rev) – Date that the PCD was revised.

9. Flow Chart Created? – Answer YES or NO.

10. Producer Approval and Date – Enter the person(s) name that is responsible for producing and approval of the manufacturing or maintenance plan, and the date signed.

11. Customer Approval and Date – Obtain the approvals from customer organizations [e.g., Engineering, Supplier Quality Assurance (SQA), if required.

12. KC No. – Enter the uniquely identified KC number for that characteristic.

13. KC Name – Enter the name of the KC (e.g., Diameter, Temperature).

14. Process ID – Identify type of manufacturing or maintenance process by its unique producer specific number or name.

15. Operation Number – Enter the operation number from the work instruction.

16. Work Instruction No. / Change Level – Enter the work instruction number and applicable change level.

17. Minimum Requirement of Cp and Cpk – Enter the customer requirement for Cp and Cpk or the minimum, as determined by the producer.

18. Origin of KC – Enter the source for the KC from the following: Customer Identified, Producer, or Producer Manufacturing/Maintenance Generated.

19. Sources of Variation Identified? – Answer YES, if a study has been adequately performed and can be supported; otherwise, answer NO.

20. Risk(s) Mitigation Specified – Answer YES, if there was a need and the risk analysis complete; otherwise, answer NO.

21. Preliminary Process Capability Study – This section identifies details of the preliminary capability study. The study could be based on historical information or new study conducted specific to the subject part. Historical study may also be referenced; however, it may need to be produced, upon request.

22. Hist/New – Enter HIST for historical study and NEW for new study.

23. Date – Enter when the study was conducted (Month/Year).

24. Gage – Enter type of gage.

25. Gage Number – Enter the number of the gage.

26. MSA % – Enter the results of the Measurement System Analysis study. Depending on the type of analysis, enter the appropriate percentage, categories, or probability.

27. N – Enter the number of observations that were made for the KC being studied. This is commonly called sample size. Mandatory entry, if Field 22 response is "NEW".

28. Freq. – Enter the frequency of the observations that were made. Mandatory entry, if Field 22 response is "NEW".

29. Type of Control Chart – Enter abbreviation for the control chart [e.g., Average and Range Chart (X and R), Individual and Moving Range (IX-bar and MR)]

30. Stable – Enter YES, if the control chart shows the process is stable; and NO, if there are out-of-control conditions or non-random indications.

31. Calculations – Enter the calculations for the mean (X-bar), standard, deviation (S, or R/d2) Cp and Cpk. If the process is not stable, then enter N/A (Not Applicable) for Cp and Cpk.

32. Action from Study – If there are any actions required from the study, enter YES; otherwise, enter NO.

33. Ongoing Monitoring Method(s) – Identifies the method(s) used to monitor the process and specifies the frequency of monitoring:

- Type – Enter the method of monitoring the process (e.g., control charts).
- Frequency – Enter the frequency of data collection.
- Capability Review Freq. – Enter the time period or part quantity manufactured after which the process capability performance is re-evaluated (e.g., time period, part quantity).

9103 PROCESS CONTROL DOCUMENT									Page 1 of 2
1. Process Control Document Number				6. Process Owner			7. Date (Original)	8. Date (Rev)	9. Flow Chart Created? YES / NO
2. Part Number / Part Family / Latest Change Level					10. Producer Approval and Date			11. Customer Approval and Date	
3. Part Name / Description					Name:			Name:	
4. Producer / Plant		5. Supplier Code			Name:			Name:	
STAGE 1							STAGE 2		
12. KC No.	KEY CHARACTERISTIC(S)				17. Minimum Requirement of Cp and Cpk		18. Origin of KC	19. Sources of Variation Identified? YES / NO	20. Risk(s) Mitigation Specified? YES / NO
	13. KC Name	14. Process ID	15.Operation Number	16. Work Instruction No. / Change Level	Cp	Cpk			

Figure B.1 — Process control document example *(1 of 2)*

9103 PROCESS CONTROL DOCUMENT															Page 2 of 2		
1. Process Control Document Number				2. Part Number / Part Family / Latest Change Level				7. Date (Original)		8. Date (Rev)							
STAGE 3								STAGE 4						STAGE 5	STAGE 6		
12. KC No.	21. Preliminary Process Capability Study							29. Type of Control Chart	RESULTS OF STUDY					32.Action from Study YES / NO	33. Ongoing Monitoring Method(s)		
	22. Hist / New	23. Date	24. Gage	25. Gage Number	26. MSA %	27. N	28. Freq.		30. Stable YES / NO	31. Calculations					Control Chart / Other		Capability Review Freq.
										Mean	Standard Deviation	Cp	Cpk		Type	Frequency	

Figure B.1 — Process control document example *(2 of 2)*

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