	SECTION 22: DESIGNATED CONTROL CHARACTERISTICS / [Pc] PROCESS CAPABILITY STUDIES	Ref: TM-QA-DO-06-329-E
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PURPOSE: To define the requirements and responsibilities for designating critical and special characteristics, developing the characteristic matrix, and determining need for process capability application and study.

SCOPE: Applies to all part characteristics as shown per the Inspection Standard, PFMEA, and Control Plan


DEFINITIONS:

- 1) **STANDARD CHARACTERISTIC** - A product characteristic for which reasonably anticipated variation is unlikely to significantly affect a product's safety, compliance with government (regulatory) regulations, or fit/function. These do not require any special designation.
- 2) **SIGNIFICANT or SPECIAL CHARACTERISTIC (SC)** - A product, process, or test requirement that is important to customer satisfaction and for which quality planning actions are included in the Control Plan.
- 3) **CRITICAL CHARACTERISTIC (CC)** - A product requirement or process parameter that can affect compliance with government regulations, vehicle safety, or product function, requiring specific supplier assembly or shipping monitoring and is included in the Control Plan.
- 4) **BLUEPRINT / DESIGN CHARACTERISTIC (BP)** - A product characteristic as defined by print or drawing such as diameters, lengths, hole sizes, etc.
- 5) **ENGINEERING SPECIFICATIONS (ES)** - A product characteristic contained in the engineering drawing but not usually expressed in dimensional tolerances such as test procedures, reliability checks, material specifications, etc.
- 6) **PROCESS CHARACTERISTIC (PC)** - A process characteristic used to categorize conditions and parameters within which the process must function such as temperature, time, speed, etc.
- 7) **IN PROCESS CHARACTERISTIC (IP)** - A process characteristic established in the intermittent steps that further develop the process. These are not defined by drawing or the initial process flow chart but are identified in process layouts.
- 8) **DUE DILIGENCE** - The degree of attention or care expected of the supplier to apply adequate and proper self recognition and control of all characteristics based upon internal product / process knowledge and history

REQUIRED DOCUMENT:

SUPPLIER CRITICAL CHARACTERISTIC IDENTIFICATION MATRIX – TMI APPENDIX 22A

EXPLANATION: Designated Control Characteristics (commonly referred to as “Special or Critical Characteristics”) are part characteristics that significantly affect the safety, appearance, fit, function, or workability of TMI's completed assembly. These items are to be identified in the PFMEA and Control Plan by the [Pc] symbol. Below are guidelines for designating [Pc] characteristics:

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Dimensional items	Should be [Pc] if...	Critical to part fit on completed TMI assembly / Item is a good representation of overall part dimensional accuracy and tendency
Functional items		Customer operation effort related (HVAC outlets, luggage release cable, etc.)
Appearance items	Should not be [Pc] because...	This is an attribute item and is typically controlled through 100% inspection.
Reliability / Performance items		The control requirements are specified on the part drawing.

At minimum, all regulatory and / or safety items designated as “Delta S” items shall be considered “Critical Designated Control Characteristics”.


Any designated characteristic shown as [Pc] in the drawing and / or Inspection Standard requires application of statistical measures for capability assessment and control. Submission of capability studies will be required as proof of process control.

TMI’s expectation is that the supplier will practice and apply DUE DILIGENCE when designating significant and critical characteristics based upon their internal product and process knowledge and history. The supplier should recognize those items omitted from drawing and / or standard that highly impact regulatory requirements or part fit and function requirements and automatically propose and list those items to TMI in the “Critical Characteristic Matrix”.

NOTE: Omission of characteristic designation by TMI does not relieve the supplier from control responsibility for those characteristics.

RESPONSIBILITIES:


- 1) The supplier must determine and designate special, critical, and standard characteristics for each part and process.
- 2) The supplier shall propose the product [Pc] items in the initial draft of the Inspection Standard. All indicated [Pc] items should be negotiated between the supplier, TMI plant QC, and TMI Design. Part drawings should be revised to indicate all critical characteristics in the following production trial stages if possible.

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- 3) The supplier must develop a DESIGNATED CHARACTERISTIC MATRIX (Appendix 22A) for submission to TMI QC with the PFMEA and MQC / CP. When completing the characteristic matrix, the supplier must enter the following information:
- A) Complete the header with required supplier general information
 - B) Enter process number (step in Process Flow Chart where characteristic control is applied)
 - C) Enter process name
 - D) Enter the characteristic level using the definitions above and symbols as follows:
 - a) CC = Critical characteristic
 - b) SC = Special or significant characteristic
 - c) PC = Standard characteristic
 - E) Enter the characteristic type using the guideline below:
 - a) BP = Characteristic designated by print or drawing
 - b) ES = Characteristic designated by Engineering Standard
 - c) IS = Characteristic designated by Inspection Standard only
 - d) PC = Characteristic designated by process requirements only
 - F) Enter the item controlled (i.e. temperature, speed, width, etc.)
 - G) Enter the specific control level for the specified item (i.e. 300° +/- 10°, 45rpm, 25 +/-2mm)
 - H) Enter the operation or manufacturing station number(s) where characteristic is applied. The home process is listed first with any downstream operations affected by the characteristic being controlled listed afterwards.
- 4) Prior to mass production, the supplier must analyze the stability and capability of the processes which contribute to variation in the “Designated Control Characteristics” as designated by the [Pc] symbol in the part drawing, Inspection Standard, or process control plan.
- 5) For all items designated as [Pc], the supplier shall complete and submit short term process capability studies with dimensional data to TMI plant QC for review prior to submission for provisional approval. Short term capability (referred to as Ppk) must be calculated on 20 minimum subgroups of 3 – 5 samples each unless otherwise negotiated with TMI plant QC. TMI’s expectation is a stable process at a Ppk of 1.67 or greater.

NOTE: TMI recommends that the supplier use the AIAG supplemental manual “Statistical Process Control” as a reference for conducting process capability studies.

- 6) The supplier should conduct long term process capability studies as part of their continuous improvement activities, and an initial long term study should be submitted to TMI plant QC within 45 days after SOP as part of the Final Approval Request process unless otherwise negotiated. Followup long term studies may be requested at any time during the program life. Long term studies should be conducted with a minimum of 50 subgroups of 3 – 5 samples each unless negotiated with TMI plant QC. TMI’s expectation is a stable process at a Cpk of 1.33 or greater.
- 7) At any point a process is found to be out of control (evidence of special cause variation found), TMI expects the supplier to conduct 100% inspection of all parts since last in-control point.

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- 8) Submission of short term (Ppk) capability studies must be completed before Provisional Approval is granted by TMI QC.
- 9) Submission of long term (Cpk) capability studies will be required by TMI QC in support of request for Final Approval.

REVISION	REVISION DATE	SECTION	REVISION DESCRIPTION
0	08/09/04	ALL	Initial Release