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Subject:	**Special Characteristic Classification Process**	**Revision:**	**~**

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Special Characteristic Classification Process

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Document Review and Revision Log

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1.0 Purpose:

The purpose of this standard is to facilitate and to harmonize the use of special characteristics within drawings and other documentation throughout Aerosonic and its supply base. It defines the management and handling of special characteristics to fulfill functional and regulatory requirements.

2.0 Scope:

This standard is applicable to all product and processes which enter development after the date of release of this document. It shall apply as applicable to existing programs at the time of release.

3.0 Responsibility:

The Quality Manager is responsible to ensure that requirements defined in this standard are implemented.

The Engineering Director is responsible to ensure that this standard is followed, monitored and observed during development.

The Design Engineer is responsible for ensuring this standard is applied to all engineering documentation associated with development for the assigned programs

The Manufacturing Engineer is responsible for ensuring this standard is applied to all engineering documentation associated with the production process for the assigned programs.

The Materials Manager and Supplier Quality Engineer are responsible to communicate this standard and enforce compliance at the supplier level as applicable.

4.0 References:

QCI 18.4 Statistical Process Control for Aerosonic Products
QCI 18.1 Rev C Sampling Inspection
AIAG Measurement System Analysis (MSA)

5.0 Procedure:

5.1 Characteristics Definitions

A characteristic is a dimension or a physical, chemical, electrical, mechanical or visual feature of part defined by design data. A characteristic must be measurable, either directly or indirectly, and either variable or attribute.
Attribute characteristics are qualitative data that is checked and results in conformance or non-conformance, pass or fail.
Variable characteristics are quantitative data which can be measured, and the result is an absolute measurement reading e.g. Millimeter, Inch, Newton, etc.
There are three types of special characteristics utilized per this standard and defined below:

5.1.1 Key Characteristic

A Key Characteristic (KC) is a feature of a material, process, or part (includes assemblies) whose variation within the specified tolerance has a significant influence on product fit, performance, service life, and/or manufacturability.

5.1.2 Critical Characteristic

A Critical Characteristic (CC) is a feature of a material, process, or part (includes assemblies) that, if missing or not conforming to the design data, quality requirements, or overhaul and maintenance documentation, would result in an unsafe condition (both internal and external), and/or a non-compliance with a regulatory requirement (legal or environmental).
These characteristics are designated in the D- and/or P- FMEA, and can have a causal relationship to the effect of potential failure modes rated 9-10 for severity.
The manufacturing process may have an influence on characteristics which can result in a CC and may require special control to maintain the required process capability and customer requirements.

5.1.3 Significant Characteristics

A Significant Characteristic (SC) is a feature of a material, process, or part - usually occurring at lower assembly levels - whose achievement of the specified requirement has a significant importance to achieving the desired final product fit, performance, service life, and/or manufacturability.
These characteristics are designated in the D- and/or P- FMEA and can have a causal relationship to the effect of potential failure modes rated 5-8 for severity, or where agreed by the cross-functional team, having severity rated less than 5.
The manufacturing process may have an influence on characteristics which can result in an SC and may require special control to maintain the required process capability and customer requirements.

5.2 Special Characteristic Determination/Identification

Special Characteristics should be identified by a cross functional team of Design, Quality, and Manufacturing Engineers during the design phase of product realization. They may be an output from FMEA activity; customer defined flow downs; or from continuous/process improvement activities. All chosen Special Characteristics shall be identified in accordance with this standard.

5.2.1 Key Characteristics

During the design phase of product realization, a review and determination of customer specified Key Characteristics and/or the need for internally specified Key Characteristics should be performed. During serial production, KCs may be identified from analysis performed as part of a process improvement activity to meet required quality objectives.

- All identified KCs shall be documented in the design drawing with a "KC#" designation next to the characteristic.
- A KC should be identified only after determining a significant benefit exists from controlling the characteristic to assure that the feature is at or very close to the specified dimension.
- A cost benefit analysis should be performed prior to identification of KCs to assure that the benefit obtained from this additional control exceeds the costs of the associated process control activity.
- These characteristics are designated in all applicable FMEAs and Process Control Plans.
- Identified KCs shall be flowed down to lower level assemblies and processes which contribute to the variation of the KC.

Note: Prior to release of this standard, KCs have been historically utilized and implemented in accordance with how Significant Characteristics are defined herein. Henceforth, all KCs identified on design drawings and within controlled documents with revision dates prior to the initial release date of this document, shall be treated as SCs per this standard. All previously identified KCs will be updated to SCs as a standard practice during regular engineering change request (ECR) activity.

5.2.2 Critical Characteristics

During the design phase of product realization, a review and determination of customer specified Critical Safety Items - that must be flowed down to the design data as Critical Characteristics - and/or the need for internally specified CCs due to safety, legal or environmental requirements should be performed.

- All identified CCs shall be documented in applicable design drawings with a "CC#" designation next to the characteristic.
- These characteristics shall be designated in all applicable FMEAs, and can have a causal relationship to the effect of potential failure modes rated 9-10 for severity.
- Critical Characteristic identification may be an output from FMEA/FMECA activity, and those items with a severity level of 9 or higher (For FMEAs) and/ or II or lower (for FMECA) should be considered for CC designation.
- A severity assessment per above does not automatically result in a CC determination. The determining factor in CC identification is the consequence of failure, not the probability that the failure or consequence would occur, and the final decision will be made by Design and Quality Engineering.

5.2.3 Significant Characteristics

During the design phase of product realization, a review and determination of the need for internally specified SCs should be performed. SC designation should focus on detail and assembly level attributes which cannot be verified at the final product level and are not eligible for sampling inspection or use-as-is dispositions.

- All identified SCs shall be documented in the design drawing with a "SC#" designation next to the characteristic.
- Significant Characteristic identification may be an output from FMEA activity, and those items with a severity level of 6 to 8 and an occurrence level greater than 5 may be considered for SC designation.
- A severity + occurrence assessment per above does not automatically result in a SC determination. The final decision will be made by Design and Quality Engineering based on all available data.

5.3 Control of Special Characteristics.

For new product released to production after the initial release of this document, all control methods for identified special characteristics shall be documented in a Process Control Plan Form 7-2300 for each end item PN where a Special Characteristic is designated, and be in accordance with the criteria below at a minimum. Existing special characteristics at the time of release of this document will continue to be controlled in accordance with QCI 18.1 Rev C.

5.3.1 Key Characteristics.

Variation management activities per QCI 18.4 shall be performed on identified Part KCs and process KCs until they are in control and the required process capability has been established. Monitoring methodology should then be implemented to ensure continued performance.

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

5.3.3.2 The process shall be deemed capable with a Cpk $\geq$ 1.33 or as specified by the customer.

5.3.3.3 Measurement equipment utilized to assess KCs shall be proven acceptable according to the AIAG manual Measurement Systems Analysis (MSA).

5.3.2 Critical Characteristics and Significant Characteristics

Neither CCs nor SCs are eligible for SPC or sampling inspection. All CCs and SCs are subjected to 100% inspection per QCI 18.1.

5.3.3 Vendor Supplied Items

The control criteria above are applicable to all suppliers to Aerosonic that provide items with special characteristics designated in their design drawings when invoked through purchase order requirements. If these criteria are not flowed down, then Aerosonic assumes the responsibility for the increased levels of inspection required.

6.0 Records:

All Engineering Drawings, FMEAs and Control Plans are stored in the Controlled Documents Folder on the LAN.
All SPC Data generated shall be stored in SPC DATA folder on the LAN \Q-C\Quality Documents\
All MSA results shall be stored in the MSA folder on the LAN at \Q-C\Quality Documents
All Inspection Results are stored on the LAN in \Q-C\ [Applicable Folder].