VEONEER STANDARD

Special Characteristics Management

VS052

Distribution to: per VS0-02 list		
Author: Thierry Masson	Approved by: Brett Johnson, Christian Quellier	
Version: 3.0	Release date: 22-SEP-2023	Pages: 11

Table of Contents
VS052

Introduction

"The Veoneer Safety Systems Group existing as of June 1st, 2023, is herein referred to as "Veoneer".
Veoneer is a major global supplier to the world's automotive vehicle industry. To ensure the proper quality of our products and to fulfill functional and regulatory requirements, it is mandatory to manage special characteristics in a proper way.

1   Purpose

This Standard describes the handling of special characteristics within Veoneer, from identification, management, control and traceability through the entire product and process lifecycle.
One aspect of this standard relates to the compliance to IATF16949, advanced quality planning process (APQP, VDA MLA) and customer requirements regarding the management of special characteristics.

2   Acronyms and abbreviations

Veoneer widely used acronyms and abbreviations can be found on Vnet.

3   Scope

The standard is valid for all new designs. It is applicable to products designed according to Veoneer development processes.

4   Responsibility

The **VP RCS Global Engineering** is responsible to assign the personnel with responsibility and authority to manage special characteristics during the product development process. In case of multiple Engineering sites involved, the Lead Engineering site is taking this responsibility.

The **VP RCS Core Development** is responsible to assign the personnel with responsibility and authority to manage special characteristics during predevelopment and platform projects.

During the development, the **Project Cross functional team** is responsible for identifying special characteristics through FMEA analysis. **Project Quality Engineer** is responsible of the special characteristics list. In Serial Life, the responsibility of special characteristics is taking over by the **Serial Life team** (usually starting at TG3).

The **Plant Manager** is responsible to assign the personnel with responsibility and authority to manage special characteristics and related documentation during the manufacturing process development and serial production.

These assignments shall be documented.

The **Plant Quality Manager** is responsible to ensure that special characteristics are properly handled and that the requirements defined in this standard are implemented within the local Quality Management System. Any deviation on a special characteristic shall be analyzed and suspect material handled as appropriate.

The **Purchasing Manager/Director and Supplier Quality Manager/Director** are responsible to communicate and enforce this standard at the supplier level.

5 Definitions

5.1 Characteristic

Characteristic is a dimension or a physical, chemical, electrical, mechanical, or optical property or a product or material data. All characteristics must be measurable (through variable or attribute) directly or indirectly.

5.2 Attributive characteristics

Attributive characteristics are **qualitative** data, such as the ones used in a check operation, e.g., the presence of a required component, a go/no go gauge.

Other examples are characteristics that could be measured (i.e., could be treated as variable data), but where the results are recorded in a simple yes/no option, such as test result, a dimension checked with a go/no-go gage, etc. Once recorded, these characteristics could be further used to perform additional analysis such as trend charts, distributions, etc.

5.3 Variable characteristics

Variable characteristics are **quantitative** data, resulting from a measurement, for instance the diameter of a fixing hole, the bore sight of a camera, a current consumption, the torque of a fastening screw. Those characteristics can be continuously measured and expressed in physical units (m, A, V, Nm, …).

6 Special characteristics

Special characteristics are a subset of characteristics that need a special attention. A definition can be found in IATF 16949 standard, chapter 3: "classification of a product characteristic or manufacturing process parameter that can affect safety or compliance with regulations, fit, function, performance, requirements, or subsequent processing of product."

6.1 Special Characteristics sources

Special Characteristics are defined based on inputs coming from:

- governmental and legal requirements
- customer requirements
- customers envelop drawings.
- supplier specifications
- internal requirements:
  - Product Specification
  - MPS (Manufacturing Process Specification)
  - Cybersecurity requirements
  - output of FMEA (ref. VS104)
  - output of safety analysis (ref. VS132 Functional Safety Management)

The identification work of special characteristics shall be made in cross functional team effort.

6.2 Special Characteristics documentation

Different documents allow to ensure the traceability of Special Characteristics, including but not limited to:
- Specifications (customer, internal, towards supplier, business partners)
- Drawings
- FMEAs
- Control Plans
- Standard work instructions
- Test reports
- Capability reports
- Safety plans

To ease the management of Special Characteristics, a list is used to collect those characteristics that need to be highlighted during the product and process development, and during subsequent processing steps of the product (for instance during production). It is a mandatory document that shall be used for each product.

Since characteristics are shared between the functions, the special characteristics list may be accessed and managed by any member of the project cross-functional team, record retention shall be done in Veoneer Product Lifecycle Management system.

The special characteristics list shall be written in English or in dual language (local language and English).

This list shall be the master source and all other documents dealing with special characteristics shall take their information from it.

A template of a special characteristics list is shown in Appendix QPD052-B. This list is sometimes referred as "CC/SC list."

Besides the internal special characteristics list, OEM might request to use their own template in which mutual agreement shall be recorded. This list might be a subset of the

Veoneer internal list containing the characteristics that have a direct impact to the customer.

6.3 Distribution outside Veoneer

Distribution of the complete special characteristics list data outside of the Veoneer group (customer or supplier) is **strictly prohibited** but can be presented to the customer or the supplier and an extract can be provided according to the following:

- **Customer**: extract of special characteristics list related to Veoneer Product and/or Veoneer Process
- **Supplier**: extract of special characteristics list related to the supplied component

6.4 Classification of special characteristics

Among the different special characteristics, several classes could be considered:
- Characteristics affecting safety: occupant of vehicles, other road users, operators during manufacturing process, …
- Characteristics affecting regulation: restricted material usage, marking of the product, vehicle emissions, …
- Characteristics affecting both safety and regulation: functional safety, homologation, …
- Characteristics not safety nor regulation relevant but affecting crucial fit, form, and function: dimension impacting part mountability, etc.

An illustration of the classification is shown below using two typical examples of special characteristics, the Special Characteristics [SC] and Critical Characteristics [CC].

- A Critical Product / Process characteristic that may affect product integrity, user safety, operator safety and/or compliance with regulatory (governmental and legal) requirements shall be considered as a [CC] and be rated with a severity ranking of 9 or 10 in an FMEA.
- A Significant Product / Process characteristic that may affect a product form, fit, or function or has other valid reasons for specific control and documentation shall be considered as a [SC] and be rated with a severity ranking of 7 or 8 in an FMEA.

Examples:
- A firing current issued by a firing ASIC to trigger an airbag should be classified as [CC] as it might have impact on occupant safety.
- Dimensions that control features that fit to interface component at customer should be classified as [SC] (i.e., locating holes, etc.).

6.5 Symbols for special characteristics

These symbols shall be used within Veoneer as a standard.

OEM symbols shall be used for customer drawings or documents.

Correspondence between Customer and Veoneer symbols and requirements is managed in a symbols' reference list (see QPD 052 C Special Characteristics Symbol list) stored in Veoneer global standard database.

Table 1 takes here again the SC and CC example to show how they are shown within Veoneer.
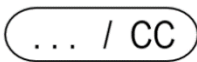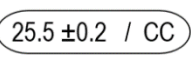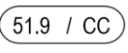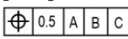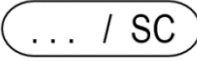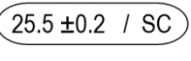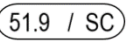
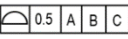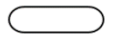| SPECIAL CHARACTERISTIC	SYMBOL FOR DIMENSIONS (on Engineering Drawings)	EXAMPLES FOR DIMENSIONS (on Engineering Drawings)	SYMBOL FOR TEXT & GD&T (on Engineering Drawings & Text-based Documents)	EXAMPLES FOR TEXT & GD&T (on Engineering Drawings)	CORRESPONDING OBSOLETE SYMBOLS
[CC] CRITICAL CHARACTERISTIC	(… / CC) • *In Eng. Drawing Field:* (Default CAD Text Font/Size)	(25.5 ±0.2 / CC) (51.9 / CC)	**[CC]** • *In Eng. Drawing Field:* (Default CAD Text Font; 6mm Text Size) • *In Text Documents:* (Default Text Font; Consistent Text Size)	• *In Eng. Drawing Field:* [CC] MATERIAL: .... ⊕ 0.5 | A | B | C | [CC] • *In Text Documents:* [CC] MATERIAL:	[C] CC
[SC] SIGNIFICANT CHARACTERISTIC	(… / SC) • *In Eng. Drawing Field:* (Default CAD Text Font/Size)	(25.5 ±0.2 / SC) (51.9 / SC)	**[SC]** • *In Eng. Drawing Field:* (Default CAD Text Font; 6mm Text Size) • *In Text Documents:* (Default Text Font; Consistent Text Size)	• *In Eng. Drawing Field:* [SC] INSURE FULL .... ⌂ 0.5 | A | B | C | [SC] • *In Text Documents:* [SC] 100% CHECK	[S] SC ◇ [2]

Table 1

7 Process flow

The picture below shows a high-level process flow, more details can be found in QPD 052 E Special Characteristics Training Module.

All the tasks described below shall be performed in cross functional team.

INPUT	ACTIVITY	OUTPUT
Product Specification, FMEA's (master, Design, Process, ...), product safety requirements master list, customer requirements, regulation ...	Collect information	Preliminary list of special characteristics
Preliminary list of special characteristics	Classify special characteristics	Initial classification special characteristics
Initial classification special characteristics	Reduce impact	Final list of special characteristics
Final list of special characteristics	Define monitoring and traceability systems	Test specifications, control plan, supplier requirements, drawing ...
Test specifications, control plan, supplier requirements, drawing ...	Control special characteristics	Reports and records ensuring traceability

7.1 Collect information.

In this phase, the team is gathering information from internal and external sources as described in 6.1 to establish a preliminary list of special characteristics.

7.2 Classify characteristics.

In this phase, the team will classify the characteristics according to the categories defined in chapter 6 and will generate a preliminary list of special characteristics.

Taking again the example of [SC] or [CC], the team will first consider them respectively as potential SC or potential CC based on their severity ranking in the FMEA. To illustrate this, the following notation in the FMEA will be used:
- [pSC] Potential Special Product / Process characteristic
- [pCC] Potential Critical Product / Process characteristic

7.3 <u>Reduce impact.</u>

In this phase, the team will work on the design to minimize the impact of the characteristics on the safety, regulation and other fit, form and function.
This step is an important one since monitoring and controlling special characteristics will have a cost impact. Therefore, every effort shall be made to optimize the design to minimize the number of special characteristics and the complexity to obtain and control them.

As an example, the [pCC] or [pSC] identified in the previous step (see 7.2) can only be confirmed as an [CC] or [SC] once the work performed by team will conclude that no design alternative can reduce the severity.

7.4 <u>Define monitoring and traceability systems.</u>

In this phase, the team will work on defining the systems used to monitor and ensure the traceability of the special characteristics. At this stage, it is mandatory to get involvement from manufacturing (internal and/or sub-suppliers).
A system shall be established to ensure traceability of special characteristics according to VS004.

In case of component supplied to Veoneer, the Measurement Agreement Sheet is a supplement to the special characteristics list. It must be part of the PPAP and shall be stored in PLM (or equivalent Product Lifecycle Management system). The Measurement Agreement Sheet (SQPS-052 Appendix D) shall contain all special characteristics relevant for the given component (refer to Veoneer Supplier Manual).

7.5 <u>Control and report</u>

The control of special characteristics shall be ensured at different phases of the product life.
All special characteristics shall be carried forward to a special characteristic list, a drawing, to a specification, a control plan and where applicable to the Standardized Work Instruction (SWI).

7.5.1 **During pre-development**

In the pre-development phase of a platform, some product special characteristics shall be defined. They should be linked to specific functions or requirements which are key for the unit functionality. The same inputs as the one listed in 6.1 shall be used to identify special characteristics.
The special characteristics identified during the platform development will be transferred to the customer projects. They are usually used as a basis to establish a preliminary list of special characteristics that will be extended as the product knowledge grows.
In case of parallel developments between the platform and customer projects, there shall be regular exchanges of special characteristic list between the two teams.

7.5.2 During development

Any opportunity to verify the special characteristics shall be used, especially during prototype builds, trial runs, preliminary testing, etc.

When performing the EPV process (see VS117), the target should be as well to verify as many special characteristics as possible.

All special characteristics shall be ultimately verified against requirements during Design Verification (DV) and / or Product Validation (PV), before PPAP.

During this development phase, it is important that the team is validating the relevance of the controlling system as well as providing feedback on the ability of meeting the special characteristics requirements.

7.5.3 During PPAP (Production Part Approval Process)

All special characteristics on the drawings, PFMEA, control plans and other documents (i.e., maintenance instruction, Standard Work Instructions, etc.) shall be referenced in the PPAP documentation, and proven capable and or error proof.

If a material is a special characteristic, then a material certificate shall be provided.

7.5.4 During serial production

All special characteristics   shall be verified during serial production according to the following method:
- Poka Yoke or error proof
- SPC
- 100 % automatic control
- Material and/or lot certificate
- Any other customer approved method

Frequency and sample size will be determined by the results of SPC, capability studies, and experience from similar processes. As experience grows on the process capability, the control method might be adjusted and both control plan and FMEA might be updated in accordance with the change management process as described in VS007 (see training material in QPD 052E).

8   References

- VS004   Veoneer Standard   Traceability
- VS007   Veoneer Standard   Change Management
- VS100   Veoneer Standard   Veoneer Product Development System
- VS104   Veoneer Standard   Failure Mode and Effects Analysis
- VS105   Veoneer Standard   Control Plan
- VS108   Veoneer Standard   Pre VPDS
- VS117   Veoneer Standard   Prototype Process
- VS132   Veoneer Standard   Functional Safety Management

- VS152 Veoneer Standard Requirements Engineering & Management
- SQPS 052 Appendix D Veoneer template Measurement Agreement sheet
- AIAG **A**utomotive **I**ndustry **A**ction **G**roup
- AIAG manual **A**dvanced **P**roduct **Q**uality **P**lanning
- AIAG manual **S**tatistical **P**rocess **C**ontrol (SPC)
- AIAG manual **P**roduction **P**art **A**pproval **P**rocess (PPAP)
- AIAG manual **F**ailure **M**odes **E**ffects **A**nalysis (FMEA)
- AIAG manual **M**easurement **S**ystem **A**nalysis
- IATF 16949 Automotive Quality Management System Standard
- VDA manual Maturity Level Assurance
- VDA 2 Production process and product approval
- VDA 5 Capability of Measurement Processes
- ISO26262:2018 Road Vehicles – Functional Safety

9 Appendices

- QPD 052 A Veoneer standard [CC]/[SC] summary
- QPD 052 B Veoneer template Special Characteristics list template
- QPD 052 C Veoneer Standard Special Characteristics Symbol list
- QPD 052 E Veoneer presentation Special Characteristics Training Module

10 Modification Index

Version #	Date / Author	Modification
1.0	01-Apr-2018 / R. Wallentin	First version
2.0	05-Jan-2021 / **Conny** Andersson; Williams Billiotte; Anastasia Sumatokhina; Alexandru Maftei; Kristofer Nemeth; Jang-Sik Yoon; Frederic Dacheux	Second version: scope extended to all type of special characteristics and not restricted to [CC]/[SC]
3.0	Thierry Masson	Updated to reflect organization changes after June1, 2023