

Ford Motor Company Customer-Specific Requirements

For Use With ISO/TS 16949

Per ISO/TS 16949, an "organization" is the manufacturing facility being registered to ISO/TS 16949. The subcontractor is the manufacturing facility directly contracted by the organization to ship product to the organization in support of a Ford Motor Company contract.

A subcontractor hired by the organization to perform services not directly related to a Ford Motor Company contract (e.g. floor cleaning or grass cutting) is not impacted in any way by the subcontractor development or other subcontractor requirements stated in ISO/TS 16949.

In this document, the terms "organization" and "supplier" are interchangeable, both representing the company (or site) being registered to ISO/TS 16949.

1. Scope

ISO/TS 16949 and this document define the *fundamental* quality system requirements for Ford Motor Company suppliers. This document contains the company-specific requirements supplemental to **Technical Specification, ISO/TS 16949**. These supplemental requirements shall be included in the scope of the registration/certification audit in order to be recognized as satisfying the Ford Motor Company supplier criteria for third-party certification by an IATF recognized and contracted certification body.

ISO/TS 16949 is applicable to manufacturing sites of suppliers to Ford Motor Company (production and service parts and materials), and to assemblers of production parts or materials supplying to Ford Vehicle Assembly Plants.

Tooling & Equipment suppliers to Ford Motor Company are not eligible to be registered to ISO/TS 16949. Registration to ISO 9001 is acceptable.
Semi-Conductor suppliers may register to ISO/TS 16949, providing they meet the scope requirements.

Service parts and materials applicability does not include aftermarket or remanufactured parts (See Definitions, organizations).

All **ISO/TS 16949** requirements and the requirements of this document shall be addressed by the organization's quality system.

ISO/TS 16949 sanctioned interpretations are available on
<http://www.iatfglobaloversight.org/>.

The US English language version of this document shall be the official version for purposes of third party registration.

Any translations of this document shall:

- be for reference only,

- reference the English (AIAG) version as the official language,
- be acceptable only if translated by organizations authorized by TS 16949 Oversight (see <http://www.iatfglobaloversight.org/>)
- and include Ford Motor Company in the copyright statement.

Copies of this document are available from Ford Motor Company at <https://web.qpr.ford.com/sta/FordspecTS2nd.pdf> and International Automotive Oversight Board at <http://www.iatfglobaloversight.org/>.

2. **References**

Note: unless otherwise noted, all references listed throughout these Ford Specific Requirements refer to the latest edition.

- 2.1** International Automotive Task Force **ISO/TS 16949**, Quality Systems - - Particular Requirements for the Application of ISO 9001 for automotive production and relevant service part organizations
- 2.2** Automotive Certification Scheme for ISO/TS 16949 – **Rules for achieving IATF recognition.**
- 2.3** **IATF Guidance to ISO/TS 16949**, available through AIAG.
- 2.4** Ford Engineering Statement of Work (ESOW), available on <https://web.gfss.ford.com/>
- 2.5** Chrysler, Ford Motor Company, General Motors Corp. **Advanced Product Quality Planning and Control Plan** reference manual
- 2.6** Ford Motor Company Advanced Product Quality Planning Reporting Requirements, available through FSP (Ford Supplier Portal) <https://web.qpr.ford.com/sta/APQP.html>
- 2.7** Ford Engineering CAD and Drafting Standards (FECDS) Ford internal link <http://www.fecds.ford.com/>. External suppliers: standards are available as specified in section 4.2 below.
- 2.8** Ford Motor Company **FMEA Handbook**, are available on FSP Library Services (subsection FMEA) through https://us.library.covisint.com/LibraryServices/secured?cmd=MY_DOCUMENTS&action=docdetails&nodeID=2112
- 2.9** Chrysler, Ford Motor Company, General Motors Corp. **Measurement Systems Analysis** reference manual
- 2.10** Chrysler, Ford Motor Company, General Motors Corp. **Statistical Process Control (SPC)** reference manual.
- 2.11** DaimlerChrysler, Ford Motor Company General Motors Corp. **Production Part Approval Process (PPAP)**.
- 2.12** **ISO/IEC 17021:2006 “Conformity assessment — Requirements for bodies providing audit and certification of management systems”**

- 2.13 MMOG (Material Management Operation Guideline)**, available through AIAG
<http://www.aiag.org/>
- 2.14 IAF GD 8:2007 "Informative Guidance on the Transition to ISO/IEC 17021 Accreditation from ISO/IEC Guide 62 and ISO/IEC Guide 66"**
- 2.15**
- 2.16 VDA (Verband der Automobilindustrie) Volume 4 Part 1 'Quality Assurance prior to Serial Application - Partnership/Processes/Methods'**
- 2.17 ISO/IEC 17025:1999** General Requirements for the Competence of Calibration and Testing Laboratories, available through ISO
<http://www.iso.ch/iso/en/ISOOnline.frontpage> (search for "17025" in the standards search).
- 2.18** Q1: available on <https://web.qpr.ford.com/sta/Q1.html>.
- 2.19** Craftsmanship training and requirements are available through Product Development Engineering.
- 2.20** A summary of VOPQUN-008 Quality Concern Reporting for North America available on FSP (Ford Supplier Portal https://portal.covisint.com/portal/public/_l:en/tp/fsp), in particular available on <https://web.qpr.ford.com/sta/VOPQUN008.html>.
- 2.21** VOP QUE-604 'Control of Quality and Purchased Parts and Assemblies', for Europe, available through Europe STA.
- 2.22** Global 8D system, available on FSP (<https://web.quality.ford.com/g8d/>)
- 2.23 CQI-9 "Special Process: Heat Treat System Assessment"**, available through AIAG
<http://www.aiag.org/>
- 2.24 Ford Specific CQI-9 Requirements**
https://web.qpr.ford.com/sta/CQI-9_Ford_Specific_requirements.xls

The latest copies of **ISO/TS 16949, PPAP, APQP, SPC, MSA** and other related manuals are available from AIAG at 01-248-358-3003 and <http://www.aiag.org/>, and may be available through Carwin Continuous (UK) at 44-1708-861333.

Additional references are listed as requirements in section 4.

Some hypertext links within this document may only be accessible on FSP (Ford Supplier Portal) by organizations shipping directly to Ford Motor Company (typically Tier 1). Lower tier organizations pursuing ISO/TS 16949 registration may need to gain access to FSP (Ford Supplier Portal) through a Tier 1.

3 Definitions

Where inconsistent terminology exists between ISO/TS 16949 and this document, this document shall take precedence. Otherwise the definitions from ISO/TS 16949 apply to this document.

3.1 Active Part

An active part is one currently being supplied to the customer for original equipment or service applications. The part remains active until tooling scrap authorization is given by the appropriate customer activity. For parts with no customer-owned tooling or situations where multiple parts are made from the same tool, written confirmation from Ford Engineering and the Buyer is required to deactivate a part.

3.2 Aftermarket Parts

Replacement parts not procured or released by Ford Motor Company for service part applications which may or may not be produced to original equipment specifications.

3.3 Capacity verification

A verification methodology to demonstrate that an organization can meet the capacity planning volume requirements as defined in the Purchasing Request for Quote (RFQ)

3.4 Consulting

For the purpose of ISO/TS 16949 and supporting documents, consulting is the provision of training, documentation development, or assistance with implementation of quality systems to a specific customer. If these activities are open to the public, advertised, and not customer specific, they are considered training rather than consulting. Other products, processes or services may be offered directly or indirectly, provided they do not compromise confidentiality or the objectivity or impartiality of its certification process or decisions [refer to [IAF GD 8:2007 "Informative Guidance on the Transition to ISO/IEC 17021 Accreditation from ISO/IEC Guide 62 and ISO/IEC Guide 66"](#)], 2.14 of this document.

3.5 Customer

For the purposes of ISO/TS 16949, references to "customer" in this document shall be interpreted as the entity, e.g. Ford Motor Company, which is both purchasing and receiving product from the organization complying with ISO/TS 16949.

3.6 Ergonomics

Ergonomics is the evaluation of the design of a product or process to assure compatibility with the capabilities of human beings. Analysis of motion refers to capabilities of people with respect to tasks (e.g. lifting, twisting, reaching) to prevent or relieve problems of strain, stress, excessive fatigue, etc. Factors involved include anatomical dimensions of the worker, placement of products to be worked upon, placement of buttons/switches, physical loads imposed on the worker, and environmental effects such as noise, vibration, lighting and space.

3.7 Ford Motor Company

The names "Ford Motor Company" or "Ford" refer to the corporate entity comprising all brands under Ford Motor Company.

3.8 Ford Engineering

Ford Motor Company Product Development Engineering, including Program and non-Program Engineering organizations.

3.9 Gauge families

Gauge families are measurement devices of the same type, make, and model that are used in a similar environment (temperature, humidity, range, method of measurement, etc.).

3.10 Global Product Development System

GPDS is the Ford single common Product Creation Process. GPDS *has replaced* FPDS and is applicable to all regions and brands. GPDS

Awareness Training is available at the Ford Supplier Portal

<https://fsp.covisint.com> under Frequently Used Applications. Select "Ford Learning Institute" then "GPDS Awareness Training"

3.11 Initial Process Study

Initial Process Studies are conducted to obtain early information on the performance of new or revised processes relative to internal or customer requirements. In many cases, initial process studies should be conducted at several points in the evolution of new processes (e.g. at the equipment or tooling subcontractor's plant, and after installation at the organization's plant). These studies should be based on variables data evaluated using statistically valid methods.

3.12 Organization

Facility adding manufacturing value to production materials: providers of production or service parts, or heat treating, plating, painting or other finishing services, directly to Ford Motor Company.

Note 1: For the purposes of registration under ISO/TS 16949, the "organization" is the entity normally referred to by Ford as the "supplier". Ford Motor Company will continue to use that term when negotiating with the organization.

Note 2: To avoid additional confusion, although the term "supplier" is used by ISO/TS 16949 to indicate "subcontractor", Ford Motor Company will continue to use the term "subcontractor" in its normal usage.

Note 3: "Design responsible Suppliers" also provide engineering services. Program specific Engineering Statement of Work defines engineering responsibilities.

Note 4: Sequencing warehouses and other facilities not adding *manufacturing* value to the product are not eligible for stand-alone registration to ISO/TS 16949.

3.13 PPM (Part Per Million quality metrics)

A method of stating the performance of a process in terms of actual nonconforming material. PPM data can be used to prioritize corrective actions.

3.14 Process Approach

A method to measure and improve organizational performance in terms of customer metrics and specifications.

3.15 Quality Indices

See Statistical Process Control reference manual.

3.16 Shall

A mandatory requirement.

3.17 Should

A recommendation.

3.18 SIM

Supplier Improvement Metrics – supplier performance measurements available through FSP (Ford Supplier Portal

<https://portal.covisint.com/portal/public/!en/tp/fsp>).

3.19 Site

An organization's (see definition 3.12) individual manufacturing location which has material / part input and part output.

NOTE Includes assemblers and Vehicle Assembly Plants

3.20 SREA

Supplier Request for Engineering Approval.

3.21 STA

Supplier Technical Assistance – Ford Motor Company's team dedicated to assist in the development of supplier processes.

3.22 Subcontractor

Provider of production materials, or production or service parts, directly to an organization complying with ISO/TS16949. Also included are providers of heat treating, painting, plating or other finishing services to organizations.

3.23 Value-Added Production Processes

Manufacturing activities or operations for which a customer would be willing to pay, if given the option.

3.24 Final Customer

Owner of the vehicle sold through commercial or private transaction.

3.25 8D Process

A disciplined process which addresses problem solving in a methodical and analytical method, addressing root causes to eliminate the source(s) of the concern.

4 **Requirements**

Third-Party Registration Requirements

Unless waived in writing by Ford Motor Company, "tier 1 suppliers"* to Ford Motor Company for production or service parts or services shall be third party registered¹ to ISO/TS 16949. Additional details are provided in Q1, see <https://web.gpr.ford.com/sta/Q1.html>. The Scope (section 1) of ISO/TS 16949 (also see 4.1 of this document) specifies the types of organizations appropriate for an ISO/TS 16949 registration.

The ISO/TS 16949 Guidance provides suggestions in the implementation of ISO/TS 16949.

* Note: In this context, "Tier 1 supplier" refers to an organization's manufacturing site directly contracted by Ford Motor Company to ship product directly to a Ford Motor Company facility.

4.1 *Scope of Quality Manual (ISO/TS 16949 cl. 4.2.2)*

While it is technically feasible to register only one part of an organization's facility (one product line or area) to ISO/TS 16949, this type of limited scope is not permitted for the demonstration of capable quality systems in Q1. For Q1, the entire facility (producing automotive products for customers subscribing to ISO/TS 16949 and eligible for ISO/TS 16949 registration) must be registered. Different customer specifics may apply to each product line, but all automotive manufacturing lines must meet the requirements of ISO/TS 16949.

4.2 *Control of documents (ISO/TS 16949 cl. 4.2.3)*

Where the organization uses Ford documents / instructions or other documents of external origin, the organization ensures that the appropriate revision level is used – this is either the most current version available from FSP (Ford Supplier Portal <https://portal.covisint.com/portal/public/!en/tp/fsp>) or as specified by Ford Motor Company.

Note: Engineering Standards may be obtained from the following sources:

Information Handling Services
Mail Stop C102, 15 Inverness Way East, Englewood, CO 80112-5776 USA
e-mail info@ihs.com, web site <http://www.ihs.com/>
Telephone: North America: 1-800-716-3447, global: 1-303-397-2896,

Trubiquity.
1688 Star Batt Drive, Rochester Hills, MI 48309 USA
Telephone: USA 1-248 601-7160 Please see the web site for other regional telephone numbers
email: learnmore@trubiquity.com, web site <http://www.trubiquity.com/>.

¹ Registrars acceptable for ISO/TS 16949 3rd party audits are listed on <http://www.iatfglobaloversight.org/>

ILI Infodisk Inc. North America
610 Winters Avenue Paramus NJ 07652
Telephone: North America 1-201-986-1131
e-mail uspubsales@saiglobal.com, web site: <http://www.ili-info.com/>.

ILI Index House, Outside North America
Ascot House, Berks, SL5 7EU, United Kingdom
Telephone: +44(0) 1344 636400
email: standards@saiglobal.com, web page <http://www.ili.co.uk/en/>

If any standards are not available through the above sources, organizations should contact Ford Engineering, or for organizations with Ford Intranet access, <http://www.rlis.ford.com/cgi-bin/standards/iliaccess.pl/> may provide a more complete inventory.

The heat treat standard HTX is available through HIS Global Engineering Documents <http://www.global.ihs.com> or 1-800-854-7179 (US only).

4.3 Engineering Specifications (ISO/TS 16949 cl. 4.2.3.1, 7.3.5)

Heat Treat Assessment Requirements

Organizations and suppliers providing heat treated product and heat-treating services shall demonstrate compliance to CQI-9 "Special Process: Heat Treat System Assessment" Second Edition and Ford Specific CQI-9 requirements (available through https://web.qpr.ford.com/sta/CQI-9_Ford_Specific_requirements.xls). Compliance with CQI-9 and Ford Specific CQI-9 requirements will ensure compliance to Ford's heat treat standard W-HTX. For reference, W-HTX is available through the standards providers listed in section 4.2 of this document; CQI-9 is available through AIAG <http://www.aiag.org/>.

CQI-9 Special Process: Heat Treat System Assessment

- All heat-treating processes at each supplier and organization manufacturing site shall be assessed annually (at all tier levels), using the CQI-9 "Special Process: Heat Treat System Assessment" (HTSA) Second Edition, available through AIAG, <http://www.aiag.org/> and Ford Specific CQI-9 requirements (available through https://web.qpr.ford.com/sta/CQI-9_Ford_Specific_requirements.xls). Assessments must also be conducted following any heat treat process and/or heat treat equipment changes. All heat treat processes are to be assessed, including all heat treat processes listed in CQI-9 as well as brazing and sintering, as noted in Ford Specific CQI-9 requirements. Where items in the CQI-9 heat treat assessment are identified as being "not satisfactory" or "needs immediate action" the organization shall address the root causes in an action plan. This action plan must also have a risk containment action that immediately protects all components being shipped to Ford, regardless of tier level. Where "needs immediate action" is assessed, containment action is required.
- The heat treat assessment can be either 1st or 2nd party, but must be conducted by a qualified assessor.

Note: A qualified assessor is one that is knowledgeable in heat treat processes. This knowledge can be acquired through education, training, or work experience. The organization or heat treat supplier should develop specific criteria for this heat treat process knowledge.

The organization shall maintain the 2 prior annual assessment reports and related

information at the organization's site and make them available to STA upon request. Heat Treat assessments conducted by the organization, heat treat suppliers, or Ford demonstrating compliance to CQI-9 and Ford Specific CQI-9 requirements do not relieve the organization of full responsibility for the quality of supplied product.

To reduce the risk of embrittlement, heat-treated steel components shall conform to the requirements of Ford Engineering Material Specification WSS-M99A3-A, also available per section 4.2 of this document.

4.4 Control of Records (ISO/TS 16949 cl. 4.2.4)

Production part approvals, tooling records, purchase orders and amendments shall be maintained for the length of time that the part (or family of parts) is active for production and service requirements plus one calendar year unless otherwise specified by Ford Motor Company (see Definitions, 3.1).

NOTE: All Ford Motor Company purchase orders/amendments are included in this requirement.

Organization purchase orders/amendments for Ford-owned tooling are also included in this requirement.

Records of inspection shall be maintained for each customer specification, unless waived in writing by STA. The actual test result (variable or attribute) shall be recorded. Simple pass/fail records of inspection are not acceptable for variable measurements.

Production inspection and test records (e.g. control charts, inspection and test results) shall be retained for one calendar year after the year in which they were created.

Records of internal quality system audits and management review shall be retained for three years.

Retention periods longer than those specified above may be specified by an organization in its procedures.

Specified retention requirements may be revised at the direction of Ford Motor Company Office of General Counsel.

These requirements do not supersede any regulatory requirements.

4.5 Customer focus (ISO/TS 16949 cl. 5.2, 8.2.4, 8.5.1)

The organization shall demonstrate enhanced customer satisfaction by meeting the continuous improvement requirements of Q1, as demonstrated in the organization's QOS (Quality Operating System).

The organization shall use the QOS Assessment in the development of its QOS – the QOS Assessment is available on <https://web.qpr.ford.com/sta/3219741.pdf>, unless otherwise approved by STA.

4.6 Customer Representative (ISO/TS 16949 cl. 5.5.2.1)

The organization shall notify Ford Motor Company Supplier Technical Assistance within 10 working days of any changes to senior management responsible for Quality or company ownership.

4.7 Management Review (ISO/TS 16949 cl 5.6, 5.1)

The organization management shall hold monthly QOS (Quality Operating System) performance meetings as specified in the Q1 Manufacturing Site Assessment available on <https://web.qpr.ford.com/sta/Q1.html>. The results of these QOS reviews shall be integral to the senior management reviews.

Note: the frequency of the Manufacturing Site Assessments is specified by the Q1 requirements, available on <https://web.qpr.ford.com/sta/Q1.html>.

Note: the management review need not be held as one meeting, but may be a series of meetings, covering each of the metrics monthly.

4.8 Management Review Input (ISO/TS 16949 cl 5.6.2)

Management review input must also include the Q1 Manufacturing Site Assessment results

4.9 Training (ISO/TS 16949 cl. 6.2.2.2, 6.2.2.3, 6.2.2.4)

The organization shall ensure that only trained and qualified personnel are involved in all aspects of the manufacture or design (as appropriate) of Ford Motor Company parts. The training shall include the appropriate Ford systems.

Ford training opportunities are available through Ford Supplier Learning Institute <https://web.fsli.ford.com/>.

Personnel are to be trained to the current processes and requirements, e.g. trained to the published version of process requirements. Records of training are to be maintained for 3 years from the date of the training.

4.10 Provision of resources (ISO/TS 16949 cl. 6.2.2.2, 6.3.1, 6.2.2, 6.2.2.1)

When considering a request for quote, the organization must account for and be able to apply all necessary resources (trained personnel and equipment) to complete the purchase requirements to Ford's satisfaction.

4.11 *Plant, Facility and Equipment Planning (ISO/TS 16949 cl. 6.3.1, 7.3.3.2, 5.1.1)*

Manufacturing Flow

The organization shall have evidence of Lean manufacturing implementation plans as defined in the link below and in the Q1 Manufacturing Site Assessment.

Information on Ford Lean manufacturing principles is available through
<https://web.lean.ford.com/>

4.12 *Contingency Plans (ISO/TS cl 6.3.2)*

The Organization shall notify the Ford receiving plant, the buyer and the STA engineer within 24 hours of organization production interruption. The nature of the problem shall be communicated to Ford and immediate actions taken to assure supply of product to Ford.

Note: production interruption is defined as an inability to meet the Ford specified production capacity volume.

4.13 *Cleanliness of Premises (ISO/TS 16949 cl. 6.4.2)*

Product Cleanliness

Part dunnage is included in this requirement.

4.14 *Planning of Product Realization (ISO/TS 16949 cl. 7.1, 7.3.1, 4.2.1d, 7.3.4.1, 5.4.1, 5.4.2)*

Appropriate to the supplier's responsibilities, the organization shall meet the requirements of the Engineering Statement of Work (available on
<https://web.qfss.ford.com/>)

For all supplier sites with parts launching under the Global Product Development System (GPDS).

Effective 30th January, 2008, the Advanced Product Quality Planning form version 3.2 or 3.1 (Pan Brand) is replaced by Supplier APQP/PPAP Readiness Assessment – Schedule A, see <https://web.qpr.ford.com/sta/APQP.html> and <https://web.qpr.ford.com/sta/GPDSSupplierEngagement.html> on Ford Supplier Portal.

Note: There may be vehicle programs already underway where the APQP versions 3.1 and 3.2 Pan Brand (see <https://web.qpr.ford.com/sta/FPDSLlaunch.html>) are currently in use and this should continue unless otherwise authorized by Ford STA.

When the organization is also sourced with the production of prototypes, effective use should be made of data from prototype fabrication to plan the production

process. Specific requirements and supporting data, Percent Inspection points that Satisfy Tolerance (PIST) and Percent Indices which are Process Capable (PIPC) may be required by Supplier Technical Assistance to support prototype vehicle evaluations. See the Glossary of this document for definitions of these terms.

4.15 Acceptance Criteria (ISO/TS 16949 cl. 7.1.2)

For additional information, see Tables A and B of this document.

4.16 Customer related processes (ISO/TS 16949 cl. 7.2.1)

Ford requires all manufacturing sites to report all materials per WSS-M99P9999-A1, as noted in PPAP, Ford Specific Instructions.
These requirements are detailed on FSP (environmental)..

4.17 Review of requirements related to the product – supplemental (ISO/TS 16949 cl. 7.2.2.1)

The customer authorization for waiving formal review may be obtained from the Buyer, and when appropriate, Ford Engineering.

4.18 Manufacturing Feasibility (ISO/TS 16949 cl. 7.2.2.2)

Manufacturing feasibility reviews, e.g. APQP appendix E, shall include all supplier and Ford Engineering organizations, as appropriate.
Product volume change requests from Ford Motor Company increasing volume by 20% or more over the previously verified volume capability shall require full volume feasibility studies. (APQP appendix E, or capacity verification may be required).

4.19 Customer communication - supplemental (ISO/TS 16949 cl. 7.2.3.1)

Assistance in C3P or legacy data system compatibility with Ford CAD systems is available through <https://web.c3p.ford.com/index.html>

4.20 Multidisciplinary approach (ISO/TS 16949 cl. 7.3.1.1, 7.3.3.2)

FMEA and Control Plan Approvals

- Process FMEA(s) and Control plan(s) for inverted delta component(s) require Ford Engineering & STA approval.

- Design FMEA(s) for inverted delta component(s) prepared by design responsible suppliers require Ford Engineering approval.
- All FMEA and control plan approvals are required prior to PPAP submission, regardless of PPAP level.

Approval of revisions to these documents after initial acceptance per the above is also required.

Ford reserves the right to require approval of FMEA and/or control plans for any part from any supplier.

FMEAs

The organization shall prepare documented process FMEAs for all the Ford parts it manufactures.

Where the organization is responsible for design, the organization shall prepare documented design FMEAs for all Ford parts it designs.

FMEAs may be written for families of parts, where typically the only difference in the parts is dimensional, not form, application or function. However, in all cases, use of family process FMEAs shall be approved by STA and use of family design FMEAs shall be approved by Ford Engineering.

Suppliers are to provide copies of FMEA documents to Ford Motor Company upon request.

Suppliers shall comply with the Ford FMEA Handbook requirements see FSP Library Services <https://portal.covisint.com/portal/public/:en/tp/fsp> – (subsection FMEA). Suppliers complying with the Ford FMEA Handbook will meet the FMEA and related requirements of the Q1 Manufacturing Site Assessment. .

Control Plans

All Ford Motor Company parts shall have Control Plans (or Dynamic Control Plans – DCP if required by Powertrain). See <https://web.qpr.ford.com/sta/Q1.html> Q1 site assessment, ISO/TS 16949 Annex A, and AIAG APQP for Control Plan requirements, and APQP Appendix G for DCP information.

Design and process controls shall focus on prevention rather than detection and correction.

Repaired and/or reworked product shall be re-inspected in accordance with the Control Plan and/or documented procedure.

Supplier Notification Change of Monitoring of Special Characteristics

When data from control charts and ES tests indicate a high degree of capability, the organization may request a revision to the testing and inspection requirements for parts with Special Characteristics (see Glossary). Ford Engineering and Supplier Technical Assistance approval of a revised Control Plan will authorize the revision. Approval shall be obtained prior to implementing the change. The same approach shall be used to replace finished product inspection/testing with upstream controls. The organization shall submit requests for approval via the SREA (Supplier Request for Engineering Approval).

4.20.1 Control Item (▽) Fasteners

The following control shall be included in the Control Plan for fasteners that are Control Items:

4.20.1.1 Material Analysis - Heat-Treated Parts

Prior to release of metal from an identified mill heat, a sample from at least one coil or bundle of wire, rod, strip, or sheet steel

shall be analyzed and tested to determine its conformance to specifications for chemical composition and quenched hardness. A sample from each additional coil or bundle in the heat shall be tested for either chemical composition or quenched hardness. The results shall be documented and referenced to the steel supplier's mill heat number.

This requirement applies to both purchased material and material produced by the organization.

Note: external material test facilities used shall meet the requirements specified in section 4.36 of this document (*Laboratory Requirements*).

4.20.1.2 *Material Analysis - Non Heat-Treated Parts*

The identification of each coil or bundle of wire, rod, strip, or sheet steel shall be visually checked to determine that the mill heat number agrees with the steel supplier's mill analysis document and applicable specifications. Each coil or bundle shall be tested for hardness and other applicable physical properties.

4.20.1.3 *Lot Traceability*

Lot Traceability shall be maintained.

4.21 *Special Characteristics (ISO/TS 16949 cl. 7.3.2.3, 7.2.1.1)*

Symbols

The organization is to contact Ford Engineering to obtain concurrence for the use of Ford Motor Company special characteristics symbols defined in the glossary of this document .

For internal use, the organization may develop its own special characteristics symbols.

Ford Designated Special Characteristics

Critical Characteristic (∇) Parts

Ford designated Control Item Parts are selected products identified by Ford Engineering, concurred by Ford manufacturing and identified on drawings and specifications with an inverted delta (∇) preceding the part and/or material number. Control Item products have Critical Characteristics (refer to the Glossary of this document) that may affect safe vehicle operation and/or compliance with government regulations. Unique symbols identifying safety and regulatory characteristics on components designed by other companies (e.g. Mazda) are equivalent to the inverted delta (∇) symbol. Examples are the Mazda "A" and "AR" symbols or special fastener base part numbers beginning with "W9" which are to be treated as inverted delta.

Critical Characteristics for fasteners may be designated by methods defined in Ford Engineering Fastener Specifications available through Ford Global Materials and Fastener Standards, or the specification providers listed in 4.2 of this document.

Other Special Characteristics

Significant, High Impact and Pass Through Characteristics are described in the glossary of this document.

4.22 Design and Development Review (ISO/TS 16949 cl. 7.3.4, 7.3.1, 7.3.6.1)

The organization shall use **GPDS (Global Product Development System)** (unless approved otherwise in writing by Ford Engineering) when reviewing product design and development stages. Information on **GPDS** is available through FSP (Ford Supplier Portal <https://fsp.covisint.com> under Frequently Used Applications).

Product Development

For Inverted Delta (∇) parts, design responsible suppliers shall include Ford Engineering and Assembly / Manufacturing in **GPDS** milestone design reviews, as appropriate.

Where feasible, design responsible suppliers shall include Ford Engineering and Ford Assembly and/or Manufacturing in design reviews for all Ford parts.

4.23 Design and Development Verification (ISO/TS 16949 cl. 7.3.5)

The organization shall perform design verification to show conformance with the appropriate Ford Vehicle Design Specification(s) (VDS) and System Design Specification(s) (SDS). Verification methods shall be recorded with the test results. VDSs and SDSs are available from Ford Engineering.

4.24 Prototype Program (ISO/TS 16949 cl. 7.3.6.2)

The organization is responsible for the quality of the parts it produces and for any subcontracted services, including subcontractors specified by Ford Motor Company. This applies to all phases of product development, including prototypes. Individual Statements of Work may specify alternate responsibilities. See **GPDS** for additional information on prototype programs on Ford Supplier Portal.

The organization shall request Ford Motor Company confirmation of the need for a prototype program control plan.

4.25 Product Approval Process (ISO/TS 16949 cl. 7.3.6.3,)

Production Part Approval Process

The organization shall comply with the AIAG Production Part Approval Process (PPAP) manual.

The organization is responsible for managing PPAP for all tiers of subcontractors per the Q1 requirements.

Subcontractors are to meet all requirements of PPAP.

For organizations with a Ford designated PPAP level 2 through 5, any PPAP package submitted to Ford shall contain the subcontractor PPAP information or have the subcontractor PPAP information available for review.

PPAP level 1 organizations are not required to submit PPAP packages to Ford, unless specifically requested by Ford.

Consistent with Q1 Manufacturing Site Assessment Expectations https://web.qpr.ford.com/sta/Q1_Site_Assessment_Evaluation_Matrix.xls, section 4 (PPAP and run-at-rate review), all design changes, including those proposed by subcontractors, shall have written approval per PPAP prior to production implementation.

Per PPAP, all organization initiated design change requests shall be made via WERS, unless the organization or subcontractor does not have access to WERS.

Process change requests and design requests without WERS shall be managed using the SREA process.

All proposed design and process changes, including any changes of or at supplier site(s) must be submitted to Ford for approval prior to implementation per the SREA process.

Full PPAP approval by STA will not be granted if the part is under WERS Alert. Only when the Alert has been cleared can full STA approval be given.

"Run-at-Rate" When specified by Ford, PPAP "run-at-rate" requirements are met by demonstrating "Production verification", Phase 2 of Phased PPAP implementation. Contact Supplier Technical Assistance for the Phased PPAP methodology.

4.26 Regulations (ISO/TS 16949 cl. 7.4.1.1)

Applicable regulations shall include international requirements for export vehicles as specified by Ford Motor Company, e.g. plastic part marking (E-4 drafting standard – WSS-M99P9999-A1 and European End of Life of Vehicle (ELV) –available on FSP (Ford Supplier Portal <https://portal.covisint.com/portal/public/:en/tp/fsp>).. Material reporting requirements for ELV are specified by WSS-M99P9999-A1.

4.27 Subcontractor Development (ISO/TS 16949 7.4.1.2)

"Goal of supplier conformity with [ISO/TS 16949]" may be met by either of the following:

4.27.1 Subcontractors to achieve accredited third party certification to ISO/TS 16949, or the current version of ISO 9000.

4.27.2 Successful assessments of the subcontractor by an STA approved 2nd party auditor. The frequency of these reviews shall be appropriate to the subcontractor impact on customer satisfaction.

Details of subcontractor development assessments acceptable to Ford are available on

https://web.qpr.ford.com/sta/Ford_QS_C9_interp.pdf under "Ford letter authorizing Tier 1 suppliers to audit subcontractors in support of QS-9000 Sanctioned Interpretation C9 and ISO/TS 16949 7.4.1.2"

Ford or supplier second party assessment or third party certification of

subcontractors does not relieve the organization of full responsibility for the quality of supplied product from the subcontractor.

Although all subcontractors must be assessed per this section, subcontractor improvement efforts shall focus on those subcontractors with the highest impact on Supplier Improvement Metrics (SIM).

Upon request, the organization shall make available to Ford a list of its subcontractors. The subcontractor list shall be updated at least twice annually.

4.28 Customer approved sources (ISO/TS 16949 cl. 7.4.1.3)

When required by the contract with Ford, subcontractor approval shall be obtained from the Ford Motor Company buyer, and concurred by Supplier Technical Assistance.

4.29 Incoming Product Quality (ISO/TS 16949 cl. 7.4.3.1)

The organization shall have incoming quality measures and shall use those measures as key indicators of subcontractor quality management, unless waived in writing by Supplier Technical Assistance.

Any incoming quality inspection shall be commensurate with the risk and quality impact of each subcontractor.

Refer to the Q1 Manufacturing Site Assessment requirements.

Note: "measures" include chemical, dimensional, certifications, and electrical measurements.

The organization may add other parameters as appropriate.

Note: the functional approval requirement on the PPAP PSW form provides a mechanism to validate incoming subcontractor product functionality prior to acceptance.

4.30 Scheduling subcontractors (ISO/TS 16949 cl. 7.4.3.2)

In support of Ford's expectation of 100% on-time delivery, the organization shall also require 100% on-time delivery from subcontractors.

In-house premium freight expenses related to subcontractor late deliveries should be monitored and shall be minimized.

4.31 Job (Work) Instructions (ISO/TS 16949 cl. 7.5.1.2)

Operators shall use the most current work instructions, unless otherwise authorized in writing.

Note: refer to section 4.2 of this document.

4.32 Verification of Job Set-ups (ISO/TS 16949 cl. 7.5.1.3)

Set-Up Verification requirements include manual tooling exchanges. Records of job all set-up verifications shall be maintained for 1 year.

4.33 Preventive Maintenance (ISO/TS cl 7.5.1.4)

The organization shall have a documented system for preventive maintenance. This shall include a timely review of planned maintenance activities and a documented action plan to address any backlog. Action plans are to be included in the Management Review process.

Records of maintenance are to be maintained for 1 year.

Note: Predictive maintenance should be used wherever possible, be based on appropriate statistical techniques, and consider cost of quality prior to implementation.

4.34 Identification and traceability, preservation, storage and inventory (ISO/TS 16949 cl. 7.5.3, 7.5.4, 7.5.5, 7.5.5.1)

The organization shall meet all logistics requirements as specified by Material Planning and Logistics (MP&L). MP&L requirements are available on the web page <https://web.mpl7.ford.com/mplbox/index.html>

-

Key requirements are: compliance to MMOG (Material Management Operation Guideline), including:

- annual assessment
 - adherence to Ford delivery rating requirements
 - part identification and tracking
 - lot traceability through shipping (lot traceability shall include subcontracted components of an assembly/module that are associated with compliance to any FMVSS requirement)
 - prevention of damage or deterioration
 - maintenance of returnable dunnage and
 - use of Ford packaging requirements form 1121R (and maintenance of packaging screens P1 and DAIA in MS3 and CMMS3), available through <https://web.mpl7.ford.com/mplbox/index.html>.
- In all cases, if unsure of the MP&L requirements, contact the delivery analyst for the supplier site. The analyst contact information is available through SIM.

Note: physical part identification is not required unless indicated on the design record.

The inverted delta symbol (∇) shall precede the Ford Motor Company part number in accordance with the Packaging Guidelines for Production Parts and Shipping Parts/Identification Label Standard, both available through Ford Supplier Network MP&L page <https://web.mpl7.ford.com/mplbox/index.html>

4.35 Measurement systems analysis (ISO/TS 16949 cl. 7.6.1)

All gauges used for checking Ford components/parts per the control plan shall have a gauge R&R performed in accordance with the appropriate methods described by the latest AIAG Measurement Systems Analysis Manual (MSA) to determine measurement capability.

Any measurement equipment not meeting the specifications stipulated in the MSA must be approved by STA.

Use of family gauge studies per the MSA is permissible and must be approved by STA

Variable gauge studies should utilize 10 parts, 3 operators and 3 trials.
Attribute gauge studies should utilize 50 parts, 3 operators, 3 trials.
Effective attribute gauge study samples include parts within specification and parts outside specification for each criterion being measured and within the expected range of manufacturing variability.

4.36 Laboratory Requirements (ISO/TS 16949 cl. 7.6.3, 7.6.3.2)

Commercial/independent laboratory facilities shall be approved by the organization prior to use. The acceptance criteria should be based on the latest ISO/IEC 17025 (or national equivalent), and shall be documented. Alternative methods or criteria shall be approved in writing by Supplier Technical Assistance.

4.37 Statistical tools and concepts (ISO/TS 16949 cl. 8.1.1, 8.1.2)

The organization shall use the latest edition of the following references as appropriate:

AIAG SPC for manufacturing process controls
AIAG MSA for measurement equipment management.
VDA Volume 4, Part 1 *Quality Assurance prior to Serial Application*

Initial Process Studies

The choice of the capability index used for initial process studies - Cpk (predictive), or Ppk (historical) – shall be based solely on the nature of the process data collected (See AIAG PPAP and SPC manuals).

It is recommend that both indices be determined for stable processes. When used together, the indices assist in the determination of sources of variation.

4.38 Customer Satisfaction (ISO/TS 16949 cl. 8.2.1.1, 5.2)

Certification Body/Registrar Notification

The organization shall notify its certification body/registrar of record in writing within five (5) working days if Ford Motor Company places the site on Q1 Revocation.

This notification of the registrar will constitute a "customer claim" as defined by the ISO/TS 16949 Rules. This step will place the organization's ISO/TS 16949 certification on probation.

Both Ford Motor Company and the registrar must agree with the organization's plan and actions to reinstate the certification within 90 days, or as agreed in writing between Ford and the registrar, otherwise the certificate will be cancelled (rescinded).

Note: Reinstatement of Q1 from Revocation requires at least 6 months of acceptable performance. If the registrar and STA agree that the organization has successfully implemented corrective and preventive actions, addressing all the issues which led to the Revocation, the ISO/TS 16949 probation may be lifted. However, the site may still be under Q1 Revocation, accumulating the required 6 months of acceptable performance data.

If either the Registrar or STA cannot accept the site performance to plan as sufficient to lift the probation, then probation may be extended with approval from STA.

The organization shall monitor performance and customer satisfaction metrics (as defined by Q1) and updates to Ford requirements on FSP (Ford Supplier Portal <https://portal.covisint.com/portal/public/!en/tp/fsp>).

It is strongly recommended that the organization review their performance status on SIM at least weekly. (Some information is updated daily on SIM)

At least twice per year, the organization shall communicate customer satisfaction metrics to all employees who affect the quality of Ford Motor Company parts.

4.39 Internal Quality Audits (ISO/TS 16949 cl. 8.2.2)

The internal audits shall review all the organization's identified process (per 4.1a of ISO/TS 16949). This review shall be conducted at least annually.

Internal Auditor Qualifications

Internal quality management system auditors shall be qualified per 4.39.1 or 4.39.2 below.

4.39.1 Be trained and evaluated in the following areas:

- The Technical Specification ISO/TS 16949
- Related core tools (e.g. APQP, SPC, MSA, FMEA, PPAP)
- Applicable customer-specific requirements, and
- The automotive process approach to auditing.

And, as part of the training, participates in practice sessions equivalent to one audit day in:

- Case study audits, and/or
- Auditing role plays/simulations, and/or
- On-site audits.

Core tools and customer specifics can be taught by company or industry recognized experts/specialists.

- 4.39.2** Or, have conducted at least 5 internal ISO/TS 16949 internal audits during the prior 24 months under the supervision of an auditor trained as specified in 4.39.1 . The audits will need to have covered all requirements of the technical specification and all processes directly impacting Ford part quality at least once over the 5 or more audits.

Internal Auditor Trainer Qualifications

- 4.39.3** The training listed in 4.39.1 above shall be conducted by trainer(s) who have themselves successfully met the requirements of 4.39.1 or 4.39.2.
- 4.39.4** Process and Product audits may be conducted by appropriate process specialists from the affected areas without full quality management auditor training.

4.40 *Monitoring and measurement of manufacturing processes* *(ISO/TS 16949 cl. 8.2.3.1, 7.1.2, 7.5, 7.5.2)*

Tables A and B of this document detail requirements for the qualification of Product Characteristics, and Process and Product Monitoring.

All process controls shall have a goal of reduction of variability, using 6-sigma or other appropriate methods.

The Statistical Process Control Manual in ref. 2.10 of this document provides additional guidance where tool wear impacts variability.

All process metrics are to be traceable to Ford requirements.

4.41 *Monitoring and measurement of product* *(ISO/TS 16949 cl. 8.2.4, 8.3.4)*

Engineering Specification (ES) Test Performance Requirements

The goal of ES testing is to confirm that the design intent has been met. ES test failure shall be cause for the organization to stop production shipments immediately and take containment actions. The organization shall immediately notify Ford Engineering, STA and the using Ford Motor Company facility of test failure, suspension of shipments, and identification of any suspect lots shipped. After the root cause(s) of ES test failure are determined, corrected, and verified, the organization may resume shipments. Suspect product shall not be shipped without sorting or reworking to eliminate the cause of failure.

These ES requirements apply equally to subcontractors.

Product Validation Engineering Specification testing frequency requirements shall be clearly noted in the Control Plan and PFMEA. Any revisions to these frequencies require Ford Engineering approval and STA concurrence.

Ford reserves the right to require the use of an independent third party inspector to ensure that only compliant product is shipped to Ford facilities.

4.42 *Layout Inspection and Functional Testing (ISO/TS 16949 cl. 8.2.4.1)*

A layout inspection (to all engineering dimensional requirements) shall be performed annually.

The measurements shall be documented on the Production Part Approval – Dimensional Results form CFG-1003 or equivalent. Reference AIAG PPAP Manual.

4.43 *Appearance Items (ISO/TS 16949 cl. 8.2.4.2)*

Where the manufacturing process(es) or environment could affect the craftsmanship of the product, the organization shall implement processes and measures such as Ford Global Craftsmanship. These processes and measures shall be implemented into the control plan and APQP reporting.

Appearance approval requirements are specified in PPAP, Ford customer specific requirements.

Further details on Global Craftsmanship may be found on the Ford Supplier Portal.

4.44 *Control of Non Conforming Product (ISO/TS 16949 cl. 8.3, 8.5.2, 8.5.3)*

The organization shall have processes and systems in place to prevent shipping of non conforming product to any Ford Motor Company facility.

Any non-conforming product or process output shall be analyzed using the 8D methodology to ensure root cause correction and problem prevention, unless an alternate methodology is approved in writing by Supplier Technical Assistance.

Customer Concerns

Organizations shall respond to Quality Rejects (QRs) with an 8D that includes an immediate containment measure, and the results of root cause analysis within 5 business days or as specified by the receiving plant.

In all cases, containment must be implemented immediately or as specified by the receiving plants

A full 8D study (per the global 8D requirements – reference 2.22) is required within 10 business days or as specified by the receiving plant or STA.

Guidance on issuance and management of QRs is available through VOPQUN-008 (North America), reference 2.20 and VOP QUE-604 (Europe) reference 2.21

Returned Product Test/Analysis

The organization shall have a documented system for internal notification, analysis and communication of all Ford receiving plant returns.

The organization shall communicate the results of analysis to the responsible Ford and organization work groups.

Ford receiving plant PPM shall be communicated to all organization plant team members.

The organization shall develop a system to monitor Ford receiving plant concerns.

The organization shall also implement corrective actions to prevent future Ford plant

concerns.

Returned product test results are to be included in the monthly QOS report as part of the Management Review.

4.45 Customer waiver (ISO/TS 16949 cl. 8.3.4)

Ford Motor Company authorization of product differing from Ford specifications is managed by WERS (Worldwide Engineering Release System), limited to the quantity or time period approved in the WERS alert.

Information on WERS is available through FSP (Ford Supplier Portal <https://portal.covisint.com/portal/public/!en/tp/fsp>), followed by a search on "WERS".

The WERS help desk can also provide information on WERS.

Please call 1 313 845 2972 or request help via email: hwers@ford.com

Ford approval is required before the use or implementation of a non conforming or changed process. Such process change authorization is obtained through the Supplier Request for Engineering Approval (SREA) process available on <https://web.qpr.ford.com/sta/SREA.html>.

Note: although process change approval may be obtained through the SREA process, the part must still meet all PPAP requirements prior to shipping any parts from the changed process.

4.46 Automotive certification scheme for ISO/TS 16949, Rules for Achieving IATF Recognition

Certification bodies contracted by IATF shall have exclusive rights for certification recognized by IATF participating organizations.

Certification rules are available per reference 2.2 of this document.

4.47 Guidance for implementation of ISO/TS 16949

While consultants offer very valuable services to aid with the implementation of ISO/TS 16949, guidance is available through AIAG:

Reference 2.3 *IATF Guidance to ISO/TS 16949*

Text in red and a vertical bar in the margin indicate areas updated since the prior version.

Sections updated	Date updated
4.2, 4.20, 4.25, 4.45	25 th November, 2003
4.3	30 th October, 2006
Updated for CQI-9 2 nd edition and GPDS, various sections, eliminated references to QS-9000 and MS-9000.	December, 2007
Eliminated reference to the Quality System Assessment Checklist, aligned "should" definition with that of ISO/TS 16949	February, 2008
Added compliance to CQI-9 Ford specifics	April 2008
Removed all references to specific editions of ISO/TS 16949 and ISO 9001	August 2009

Table A - Qualification of All Product Characteristics

Suppliers shall select the appropriate methods (e.g. AIAG MSA, SPC) to control all dimensions and other characteristics of their products. For characteristics not controlled with SPC, but requiring control, one or more of the following methods should be selected:

- Product Qualification for attributes characteristics using the tables below
- Product audits performed on a regular basis
- Periodic layout and laboratory tests

The following provide suggested sample sizes; use of other sample sizes requires the concurrence of STA. Consultation with STA regarding sample sizes is especially recommended for the monitoring of the special characteristics listed in the glossary of this document.

SAMPLE SIZE RECOMMENDATIONS FOR PRODUCT QUALIFICATION

Condition	I	II
Minimum sample per lot*	200	50
Provision to switch to the other condition:	Allowed to switch to Condition II, if, within the previous 20 consecutive lots, no sample has any nonconforming units.	Required to switch to Condition I if any sample group has any nonconforming units.

* Sample size will not change with lot size; if the lot size is equal to or smaller than the sample size, inspect 100%. A lot is not to exceed eight hours or one day's production, whichever is smaller.

The initial application of product qualification is to use Condition I. When nonconforming units are found, the following actions are required:

PRODUCT QUALIFICATION

SAMPLE RESULTS	ACTIONS ON PROCESS	ACTIONS ON LOT
No nonconforming units	Continue to operate	Accept
One or more nonconforming units	Find root causes(s) and correct process	Sort 100% since last OK lot

Table B - Ongoing Process and Product Monitoring

The table below shall be used to make disposition on product produced by a process for which SPC is in use. After process stability has been demonstrated and capability has been calculated, the most recent point on the control chart and the historical process capability indices (Cpk/Cp) may be used to determine appropriate actions.

ONGOING PROCESS AND PRODUCT MONITORING

Control Chart Interpretation and Reaction

The <u>MOST RECENT POINT</u> indicates that the process:	ACTIONS ON THE PROCESS OUTPUT		
	Based on the Historical Process Capability (Cpk)*		
	Less than 1.33**	1.33 - 1.67	Greater than 1.67
Is in control	100% inspect	Accept product Continue to reduce product variation	
Has gone out of control with a reduced likelihood of out of specification parts. All individuals in the sample are within specification.	100% inspect	<div style="border: 1px solid black; padding: 5px; text-align: center;">IDENTIFY SPECIAL CAUSE</div> Apply lessons learned to improve similar processes	
Has gone out of control with an increased likelihood of out of specification parts. All individuals in the sample are within specification.	100% inspect	<div style="border: 1px solid black; padding: 5px; text-align: center;">IDENTIFY AND CORRECT SPECIAL CAUSE</div> Inspect 100% since the last in-control point. Accept product Continue to reduce process variation.	
Has gone out of control and one or more individuals in the sample are outside specification.	100% inspect	<div style="border: 1px solid black; padding: 5px; text-align: center;">IDENTIFY AND CORRECT SPECIAL CAUSE</div> 100% inspect product produced since the last in-control sample	

* For parts with tooling prior to January 1, 1990, these categories are: Cpk less than 1.0. Cpk 1.00 - 1.33, and Cpk greater than 1.33.

** Unless superseded by a Control Plan.

This table applies only when stability and capability have been demonstrated and special causes are rigorously identified and eliminated. Otherwise, the supplier shall implement 100% inspection.

Glossary

Ongoing Process Monitoring

Refer to tables A and B above:

- Table A Ongoing Process and Product Monitoring
- Table B Qualifications of all Product Characteristics

Percent Indices which are Process Capable (PIPC)

The number of characteristics, which are process capable, divided by the total number of characteristics being checked, multiplied by 100.

Percent Inspection Points which Satisfy Tolerance (PIST)

PIST is the number of conforming inspection checks divided by the total number of checks made, times 100.

System Design Specification (SDS)

A compilation of performance metrics for a system or subsystem. Performance metrics are measurable characteristics derived from customer expectations.

Special Characteristics and Symbols

The definitions of the following characteristics are provide in the Ford FMEA characteristics module, available through _

https://us.library.covisint.com/LibraryServices/secured?cmd=MY_DOCUMENTS&action=docdetails&nodeID=2112

Characteristic	Symbol
SIGNIFICANT CHARACTERISTIC – (SC) (Not Relating to Safety or Legal Considerations)	None
CRITICAL CHARACTERISTIC – (CC) (With Safety or Legal Consideration)	∇
High Impact (HI) Characteristics	None
Operator Safety Characteristics (OS)	None