



# 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 sub-tier supplier is the manufacturing facility directly contracted by the organization to ship product to the organization in support of a Ford Motor Company contract.*

*A sub-tier supplier 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 sub-tier supplier development or other sub-tier supplier 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, "Organization").

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/FordspecTS.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.

**References available through Automotive Industry Action Group, AIAG** <http://www.aiag.org/>

- 2.1** International Automotive Task Force **ISO/TS 16949**, Quality Management 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.**
- 2.4** CQI-9 Special Process: Heat Treat System Assessment
- 2.5** **CQI-15 Special Process: Welding System Assessment**
- 2.6** **CQI-19 Subtier Supplier Management Process Guideline**
- 2.7** Chrysler, Ford Motor Company, General Motors Corp. **Advanced Product Quality Planning and Control Plan** reference manual
- 2.8** Chrysler, Ford Motor Company, General Motors Corp. **Measurement Systems Analysis** reference manual
- 2.9** **MMOG/LE (Material Management Operation Guideline / Logistics Evaluation)**, available through AIAG <http://www.aiag.org/>
- 2.10** DaimlerChrysler, Ford Motor Company General Motors Corp. **Production Part Approval Process (PPAP).**
- 2.11** Chrysler, Ford Motor Company, General Motors Corp. **Statistical Process Control (SPC)** reference manual.

The latest copies of **ISO/TS 16949, CQI, 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 Adare LTD (UK) at +44 1926

## References available through Ford

- 2.12 Capacity Analysis Report available through Ford Supplier Portal ( [https://web.qpr.ford.com/sta/Capacity\\_Analysis\\_Report.xls](https://web.qpr.ford.com/sta/Capacity_Analysis_Report.xls) )
- 2.13 External Supplier APQP/PPAP Readiness Assessment (Schedule A) available through Ford Supplier Portal ( <https://web.qpr.ford.com/sta/APQP.html> )
- 2.14 Global 8D system, available on FSP ( <https://web.quality.ford.com/g8d/> )
- 2.15 Ford Engineering Statement of Work (ESOW), available from the Ford Design and Release Engineer
- 2.16 Ford Motor Company Advanced Product Quality Planning Reporting Requirements, available through FSP (Ford Supplier Portal) <https://web.qpr.ford.com/sta/APQP.html>
- 2.17 Ford Engineering CAD and Drafting Standards (FECDS) <https://team.extsp.ford.com/sites/C3PNGMethods/C3PNGMethods.html> .  
Other engineering standards are available as specified in section 4.1 below
- 2.18 Ford Specific CQI-9 Requirements [https://web.qpr.ford.com/sta/CQI-9\\_Ford\\_Specific\\_requirements.xls](https://web.qpr.ford.com/sta/CQI-9_Ford_Specific_requirements.xls)
- 2.19 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](https://us.library.covisint.com/LibraryServices/secured?cmd=MY_DOCUMENTS&action=docdetails&nodeID=2112)
- 2.20 **Minimum Automotive Quality Management System Requirements for Sub-tier Suppliers** available through Ford Supplier Portal ( <https://web.qpr.ford.com/sta/> )
- 2.21 Q1: available on <https://web.qpr.ford.com/sta/Q1.html> .
- 2.22 Special Process Assessments and Requirements [https://web.qpr.ford.com/sta/Ford\\_GTS.html](https://web.qpr.ford.com/sta/Ford_GTS.html)
- 2.23 A summary of VOPQUN-008 Quality Concern Reporting (Vehicle) and PTP07-150 (Powertrain) for North America available on FSP (Ford Supplier Portal <https://fsp.covisint.com> ), in particular available on <https://web.qpr.ford.com/sta/QR2NA.htm>

## References available through other groups such as International Standards Organization (ISO)

- 2.24 ISO/IEC 17021 “Conformity assessment — Requirements for bodies providing audit and certification of management systems”
- 2.25 IAF GD 8 “Informative Guidance on the Transition to ISO/IEC 17021 Accreditation from ISO/IEC Guide 62 and ISO/IEC Guide 66”

**2.26 VDA (Verband der Automobilindustrie) Volume 4 Part 1** 'Quality Assurance prior to Serial Application - Partnership/Processes/Methods'

**2.27 ISO/IEC 17025** 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).

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 contracted by 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 *APPC***

*Average Purchased Part Capacity: Capacity, is the organization's capacity commitment (in part count per week) to meet the Average Production Weekly capacity requirement and recorded in Ford's capacity planning systems GCP or MCPV.*

#### **3.4 *Average Production Weekly (APW)***

*Average Production Weekly; capacity requirement for sustained production based on a 5 day work week. Organizations: see the Capacity Planning Web Guide available through <https://web.fsp.ford.com/gtc/docs/capacityplan.pdf>*

#### **3.5 Capacity verification**

A verification methodology included in Ford's Phased PPAP to demonstrate that an organization can meet Ford's capacity requirements.

#### **3.6 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 "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.

### **3.7 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.

### **3.8 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.

### **3.9 Families of FMEAs (Failure Mode and Effects Analysis):**

Families of FMEAs are FMEAs for multiple parts where the parts are substantially similar in application, design, manufacture, requirements and specification. Examples include right and left mirrors, blue or black interior consoles for the same vehicle and application.

### **3.10 Families of Control Plans:**

Families of Control Plans are Control Plans for multiple parts where the parts are substantially similar in application, design, manufacture, requirements and specification. Examples include right and left mirrors, blue or black interior consoles for the same vehicle and application.

### **3.11 Final Capability Study**

Process capability study using mass production parts from the Capacity Verification full day's run.

### **3.12 Final Customer**

Owner of the vehicle sold through commercial or private transaction.

### **3.13 Ford Motor Company**

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

### **3.14 Ford Engineering**

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

### **3.15 Gauge families**

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

### **3.16 Global Product Development System**

GPDS is Ford's Product Creation Process and is applicable to all regions and brands. GPDS Awareness Training is available at the Ford Supplier Portal <https://fsp.covisint.com>, log into Ford Supplier Portal, and under Applications select “Ford Supplier Learning Institute (FSLI)” then search for “GPDS Awareness

Training”.

### **3.17 Initial Process Study**

Initial Process Studies are conducted to measure the performance of new or revised processes relative to internal or customer requirements based on a rational sampling plan from a significant production run. Initial process studies should be conducted at different points in the evolution of processes (e.g. on one manufacturing line or tool, then on the remaining manufacturing lines or tools and subsequently on any revised manufacturing lines or tools,). These studies provide the data to determine the process stability and control along with identifying the distribution (e.g. Normal or Uniform Distribution) for a statistically valid analysis.

### **3.18 Maximum Production Weekly (MPW)**

Maximum Production Weekly; capacity requirement based on a 6 day work week with no additional tooling, equipment or facilities. Organizations: see the Capacity Planning Web Guide available through <https://web.fsp.ford.com/gtc/docs/capacityplan.pdf>

### **3.19 MPPC**

Maximum Purchased Part Capacity: Capacity, is the organization's capacity commitment (in part count per week) to meet the Maximum Production Weekly capacity requirement and recorded in Ford's capacity planning systems GCP or MCPV.

### **3.20 Must**

A mandatory requirement

### **3.21 Organization**

Facility adding manufacturing value to production materials: providers of production or service parts, or of finishing services such as heat treating, plating, painting 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 "sub-tier supplier", Ford Motor Company will continue to use the term "sub-tier supplier" in its normal usage.

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

### **3.22 PPC**

Purchased Part Capacity: a term referring to both Average Purchased Part Capacity and Maximum Purchased Part Capacity.

### **3.23 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.

### **3.24 Process Approach**

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

metrics and specifications.

**3.25 Quality Indices**

See Statistical Process Control reference manual.

**3.26 Shall**

A mandatory requirement.

**3.27 Should**

A recommendation.

**3.28 SIM**

Supplier Improvement Metrics – supplier performance measurements available through FSP (Ford Supplier Portal <https://fsp.covisint.com>).

**3.29 Site**

An organization's (see definition 3.21) individual manufacturing location which has material / part input and part output.

NOTE: Includes assemblers and Vehicle Assembly Plants

**3.30 SREA**

Supplier Request for Engineering Approval.

**3.31 STA**

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

**3.32 Sub-tier Supplier**

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. Also known as “supplier” in ISO/TS 16949 certification terminology.

**3.33 Value-Added Production Processes**

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

**3.34 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***

To meet the requirements of Q1, organizations\* supplying to Ford Motor Company production or service parts or services shall be third party registered<sup>1</sup> to ISO/TS 16949.

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



Additional details are provided in Q1, see <https://web.gpr.ford.com/sta/Q1.html> .  
The Scope (section 1) of ISO/TS 16949 specifies the types of organizations appropriate for an ISO/TS 16949 registration.

*The ISO/TS 16949 Guidance Manual available through AIAG provides suggestions in the implementation of ISO/TS 16949.*

\* Note: In this context, "organization" refers to a manufacturing site contracted by Ford Motor Company to supply product to a Ford Motor Company facility.

#### **4.1 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://fsp.covisint.com> ).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](mailto: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](mailto:learnmore@trubiquity.com), web site <http://www.trubiquity.com/>).

ILI Infodisk Inc. North America  
610 Winters Avenue Paramus NJ 07652  
Telephone: North America 1-201-986-1131  
e-mail [uspubsales@sai-global.com](mailto:uspubsales@sai-global.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@sai-global.com](mailto:standards@sai-global.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/cqi-bin/standards/iliaccess.pl/> may provide a more complete inventory.

Ford Engineering Specifications may be available in Ford's CAD database, TeamCenter, contact the Ford PD engineer for details.

#### **4.2 Engineering Specifications (ISO/TS 16949 cl. 4.2.3.1, 7.3.5)**

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 Ford Supplier Portal <https://fsp.covisint.com> (Important Documents – RSMS Communication Package).



### ***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 any 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 nonconformance.

These ES requirements apply equally to sub-tier suppliers.

## **4.3 *Control of Records (ISO/TS 16949 cl. 4.2.4)***

### **Part Approval and contracts**

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).

**This requirement applies to all details of part approvals, tooling records, Purchase Orders, etc., not just the cover pages.**

### **Inspection and Measurement Records**

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.

### **Audits**

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

### **APQP**

**The organization shall maintain the final External Supplier APQP/PPAP Readiness Assessment (Schedule A) for the life of the part (production and service) plus one year as part of the PPAP record.**

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.

## **4.4 *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 implement a Quality Operating System as specified in the Q1

Manufacturing Site Assessment available through  
<https://web.qpr.ford.com/sta/Q1.html> .

#### **4.5 Customer Representative (ISO/TS 16949 cl. 5.5.2.1)**

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

#### **4.6 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.

#### **4.7 Management Review Input (ISO/TS 16949 cl 5.6.2)**

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

#### **4.8 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 product (new and existing). The training shall include the appropriate Ford systems.

Ford training opportunities are available through Ford Supplier Learning Institute <https://fsp.covisint.com> log into Ford Supplier Portal and then go to the Ford Supplier Learning Institute (FSLI) application. Additional training is available through <https://web.lean.ford.com/cqdc/default.asp>

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.

#### **4.9 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.

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

## **Capacity Reporting**

Whenever the organization reports Purchased Part Capacity (Average Purchased Part Capacity – APPC, or Maximum Purchased Part Capacity – MPPC) to Ford in demonstration of compliance to the APW/MPW capacity requirements, the organization shall use the Capacity Analysis Report to determine the values of APPC and MPPC reported.

Note: where equipment is not dedicated to the Ford part being reported for PPC, the shared loading plan must be used in the Capacity Analysis Report.

The Capacity Analysis Report is available through

[https://web.qpr.ford.com/sta/Capacity\\_Analysis\\_Report.xls](https://web.qpr.ford.com/sta/Capacity_Analysis_Report.xls).

Reporting of Purchased Part Capacity to Ford may include the following:

- Quarterly Reporting of PPC to Ford's capacity planning systems
- Responding to a Request for Quote
- Responding to a capacity study
- Capacity Verification associated with PPAP
- Any other Ford request for reporting Purchased Part Capacity

Note: for the APPC and MPPC to be acceptable, the APPC and MPPC must meet or exceed the required capacity - APW in a 5 day operating pattern and MPW in 6 day operating pattern respectively.

Personnel completing the Capacity Analysis Report (CAR) are required to have completed Capacity Analysis Report training available via

[https://web.lean.ford.com/cqdc/core\\_quality.asp](https://web.lean.ford.com/cqdc/core_quality.asp) and report training completion on the Capacity Analysis Report. (Training completion reporting available on version 5 CAR)

## **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/cqdc/core\\_quality.asp](https://web.lean.ford.com/cqdc/core_quality.asp)

### **4.11 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.

### **4.12 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)**

#### **Statement of Work**

Appropriate to the supplier's responsibilities, the organization shall meet the requirements of the Statement of Work(s). There may be an Engineering Statement of Work (available from the Ford Product Development Engineer), **an Assembly Statement of Work, a Manufacturing Statement of Work or other types available from the appropriate Ford organization.** See the Global Product Development System (GPDS) for specific timing.

#### **APQP**

**The External Supplier APQP/PPAP Readiness Assessment (Schedule A) is available**

through <https://web.qpr.ford.com/sta/APQP.html>

The organization shall submit completed Schedule As as specified in the Schedule A notification letter for each program (monthly and after any significant change in APQP status). This applies to priority and non-priority suppliers, see Supplier Engagement Process on <https://web.qpr.ford.com/sta/GPDSSupplierEngagement.html> . Even if the Supplier has not received a Schedule A notification letter for a program, but has New Tooled End Items (NTEIs) for a Ford program launch, the Supplier is still required to complete a Schedule A for each program milestone for all NTEIs and retain the final Schedule A in the PPAP file for the life of part (production and service) plus one year.

#### Prototypes

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.

The organization records the dimensional data per the Prototype Build Control Plan, reviews the measured characteristics with Ford PD Engineer and obtains approval on the results from the Ford PD Engineer with confirmed acceptance of parts. If prototype parts are not fully compliant to specification, Ford PD Engineering can approve use of the part with a WERS Alert.

The APQP/PPAP Evidence Workbook should be used to record prototype part data for Ford PD review. The APQP/PPAP Evidence Workbook is available through <https://web.qpr.ford.com/sta/APQP.html> .

#### Prototype Tooling

Within 30 days of Production Verification (PPAP Phase 2) completion the organization shall i) complete the "Prototype Disposal Request" form, which can be obtained through a request to fordtool@ford.com; and ii) submit the completed form to D&R supervisor for signature concurrence; iii) submit signed form to fordtool@ford.com for processing

### **4.13 Acceptance Criteria (ISO/TS 16949 cl. 7.1.2)**

For guidance on product monitoring and reaction plan techniques for product conformance to specification, see the references AIAG SPC and APQP , For ongoing process capability requirements, see Table A of this document.

### **4.14 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 appropriate Ford Organization (Ford Engineering, Purchasing, etc.).

### **4.15 Organization Manufacturing Feasibility (ISO/TS 16949 cl. 7.2.2.2)**

Manufacturing feasibility reviews for updated or new manufacturing processes or capacity increases requiring tooling or equipment shall be documented as specified on the Manufacturing Feasibility form (both initial feasibility and final feasibility) [https://web.qpr.ford.com/sta/Feasibility\\_Form.xls](https://web.qpr.ford.com/sta/Feasibility_Form.xls) , per the timing specified on <https://web.qpr.ford.com/sta/APQP.html> and shall include all appropriate supplier and Ford organizations.

#### **4.16 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>

#### **4.17 Multidisciplinary approach (ISO/TS 16949 cl. 7.3.1.1, 7.3.3.2)**

##### **FMEA and Control Plan Approvals**

##### **Approvals required for Inverted Delta parts**

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

##### **Approvals required for all parts where the Supplier is Design Responsible**

- Design FMEA(s) prepared by design responsible suppliers require Ford Engineering approval in writing.  
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.

##### **Design responsible organizations**

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

##### **Families of FMEAs**

FMEAs may be written for families of parts, where typically the only difference in the parts is dimensional, not form, application or function. The organization should obtain STA review and concurrence prior to use of family process FMEAs. The organization should obtain Ford PD review and concurrence prior to use of family design FMEAs.

##### **FMEA documentation**

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

##### **FMEA requirements**

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

##### **Special Characteristic traceability for build to print organizations**

For build to print organizations, the organization shall obtain from Ford DFMEA information (including potential Critical Characteristics - YCs and potential Significant Characteristics – YSs) to develop the PFMEA and special characteristics (CC, SC, HI and OS, as appropriate). The organization shall document special characteristics on the Special Characteristics Communication

and Agreement Form - SCCAF (FAF03-111-2) including where special characteristics are controlled at sub-tier suppliers, and obtain Ford approval. The SCCAF template is available through APQP/PPAP Evidence Workbook (through <https://web.qpr.ford.com/sta/APQP.html> )

This also applies to Ford-directed sub-tier suppliers without a Multi-Party Agreement.

#### **Documentation of Controls for Critical Characteristics**

Both build-to-print and design responsible organizations identify in the APQP/PPAP Evidence Workbook the special controls which prevent shipment of any nonconformance to Ford specified Critical Characteristics, regardless of the location of the special controls in the supply chain (tier 1 through tier N).

#### **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.

#### **Special Characteristic Traceability**

Special Characteristics and control approach are traceable from the DFMEA through the PFMEA and the SCCAF to the Control Plan and recorded in the APQP/PPAP Evidence Workbook.

#### **Ongoing Engineering Specification testing documentation**

Product Validation Engineering Specification and testing frequency requirements shall be clearly noted in the Control Plan and PFMEA. Any revisions to these frequencies require Ford approval through the Supplier Request for Engineering Approval (SREA)

#### **Pre-Launch Control Plans**

Pre-Launch Control Plans shall be completed and utilized during production of parts from <TT>/<Unit TT> until final process capability approval is achieved. Pre-Launch Control Plans contain enhanced control methodologies and frequencies to demonstrate conformance to requirements during the initial production runs and specify the measurement techniques and data collection requirements.

Note: the Production Control plan may be used for demonstration of Phase 3 with STA concurrence

#### **Submission of Pre-Launch Control Plan Data**

Suppliers providing parts to Ford Powertrain plants shall submit, to the Ford Powertrain Plant, the Pre-Launch Control Plan data for all <Unit TT> and <Unit PP> parts as specified by Ford.

#### **Focus on prevention**

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

Incoming inspection should be considered when developing control strategies to prevent the use of non-conforming incoming material.

#### **Reworked Product (ISO/TS 16949 cl. 8.3.2)**

Repaired and/or reworked product shall be re-inspected in accordance with the

Control Plan and/or documented procedure to ensure compliance to specification.

### **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).

- **Control Item ( ∇ ) Fasteners**

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

- **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 4.33 of this document (*Laboratory Requirements*).

- **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.

- **Lot Traceability**

Lot Traceability shall be maintained.

## **4.18 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 table below



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

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

The Special Characteristics definitions are available in the Ford FMEA Handbook.

### ***Ford Designated Special Characteristics***

#### **Critical Characteristic ( ∇ ) Parts**

Ford designated Control Item Parts are selected products identified by Ford Engineering, concurred by Ford/supplier manufacturing and identified on drawings and specifications with an inverted delta ( ∇ ) preceding the part. Control Item products have Critical Characteristics that may affect safe vehicle operation and/or compliance with government regulations. Unique symbols identifying safety and regulatory characteristics on components equivalent to the inverted delta ( ∇ ) symbol.

#### **Fasteners with Critical Characteristics**

For fasteners, base part numbers beginning with "W9" 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 4.1 of this document.

#### **Other Special Characteristics**

Significant and High Impact and Operator Safety Characteristics are described in the Ford FMEA Handbook.

### **4.19 *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) when reviewing product design and development stages. Information on GPDS is available through FSP (Ford Supplier Portal <https://fsp.covisint.com>) log into Ford Supplier Portal and then go to the Ford Supplier Learning Institute (FSLI) application.

### ***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.

#### **4.20 Design and Development Verification (ISO/TS 16949 cl. 7.3.5)**

The organization shall perform Design Verification (DV) to show conformance to the appropriate Ford Engineering requirements: Attribute Requirements List (ARL) and System Design Specification (SDS). Design verification methods shall be recorded with the test results and submitted to Ford Product Engineering for approval.

For organizations responsible for component level Design Verification (DV) testing, the organization shall have a documented Design Verification Plan and Report (DVP&R) that includes supplier/sub-tier supplier and Ford responsible test(s) as applicable. The supplier provides evidence of successful completion on all component level DV testing on the DVP&R. All tests and results must be approved by the Ford PD engineer. These requirements apply to all suppliers; regardless of the supplier's or part's PPAP submission level or design responsibility.

ARLs and SDSs are available from Ford Product Engineering.

#### **4.21 Prototype Programme (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 sub-tier suppliers 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.

This also applies to Ford-directed sub-tier suppliers without a Multi-Party Agreement.

#### **4.22 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 and Ford's Global Phased PPAP available through

[https://web.qpr.ford.com/sta/Phased\\_PPAP.html](https://web.qpr.ford.com/sta/Phased_PPAP.html) .

##### **Sub-tier supplier PPAP approval**

The organization is responsible for approving sub-tier supplier PPAP or equivalent part approval. The organization is responsible for the quality of product from all tiers of sub-tier suppliers per the Q1 requirements.

The organization is to ensure that sub-tier suppliers meet all requirements of PPAP. This also applies to Ford-directed sub-tier suppliers without a Multi-Party Agreement.

##### **Submission of Sub-tier supplier PPAP**

For organizations with a Ford designated PPAP level 3 or 5, any PPAP package submitted to Ford shall contain evidence of sub-tier supplier component part approvals. This evidence of component part approvals may be a summary (approved PSWs, a listing of PSW approvals or equivalent).

The organization is also to have the approved sub-tier supplier PPAP information available for review.

Ford reserves the right to request details of level 1 PPAP packages from suppliers, including associated sub-tier supplier PPAP submissions.

##### **Organization initiated changes**

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

Supplier initiated process change requests shall be managed using the SREA process. Supplier initiated design requests without WERS may use the SREA form as a template for submitting the proposed design change to the Ford Product Development Engineer. See <https://web.qpr.ford.com/sta/SREA.html>.

All changes require PPAP approval and functional trial approval or PPAP approval and functional trial waiver prior to shipping production quantities.

### **Supplier Request for Engineering Approval (SREA)**

#### **What the SREA represents**

An SREA represents only the plan for a proposed organization manufacturing process or sub-supplier change. The SREA must be approved prior to the organization implementing the change. SREA approval cannot be dependent on functional trial approval.

#### **SREA submission**

An SREA must be submitted to Ford and approval obtained prior to implementation of any organization initiated change (or change its sub-tier supplier(s)) affecting production manufacturing process/equipment, site/location after initial PPAP approval as specified in PPAP, section 3.

#### **SREAs for service parts**

Change requests associated with Service-Unique parts no longer used in Ford production should be processed via the applicable FCSD Service Part Deviation SREA process found via <https://web.srea.ford.com/> or <https://web.purinfo.ford.com/> through the Ford Supplier Portal. Contact your local FCSD STA engineer for further clarification.

#### **Approval to ship production quantities of parts**

Once implemented, the process changes require PPAP approval prior to shipment of parts to a Ford plant. After PPAP approval, the Ford plants require either a functional trial or waiver of a functional trial prior to granting authorization to the supplier to ship production quantities. Please contact the affected Ford plants for additional details. The Supplier Request for Engineering Approval (SREA) process and related material are available through <https://web.qpr.ford.com/sta/SREA.html>.

Note: although approval may be obtained through the SREA process for the plan for a change in a manufacturing process, the following are still required prior to shipping any parts from the changed process for production use:

- PPAP approval or Interim PPAP acceptance with authorized WERS Alert, and
- Approved or waived functional trial from each affected Ford plant

Full PPAP approval by STA will not be granted if the part or manufacturing process is under WERS Alert. Only when the issues have been addressed and the Alert eliminated can full PPAP approval be given. PPAP Interim Acceptance is required for production shipments of parts under a WERS Alert as stated in Ford's PPAP requirements, available through Ford Supplier Portal [https://web.qpr.ford.com/sta/Phased\\_PPAP.html](https://web.qpr.ford.com/sta/Phased_PPAP.html)

Service parts must comply with the latest edition of AIAG published PPAP.

## **4.23 Statutory and Regulatory Conformity (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://fsp.covisint.com>)..  
Material reporting requirements for ELV are specified by WSS-M99P9999-A1 under "Important Documents".

#### **4.24 Supplier Quality Management System Development (ISO/TS 16949 7.4.1.2)**

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

- Sub-tier suppliers to achieve accredited third party certification to ISO/TS 16949, or the current version of ISO 9000.
- Successful assessments of the Sub-tier suppliers by an STA approved 2nd party auditor. The frequency of these reviews shall be appropriate to the sub-tier supplier impact on customer satisfaction. Details of sub-tier supplier development assessments acceptable to Ford are available on [https://web.qpr.ford.com/sta/ISO TS 16949 supplier development.pdf](https://web.qpr.ford.com/sta/ISO_TS_16949_supplier_development.pdf) under " Ford letter authorizing Tier 1 suppliers to audit sub-tier suppliers in support of ISO/TS 16949 7.4.1.2 "

##### **Sub-tier supplier quality management system requirements**

- Where a sub-tier supplier is not third party certified to ISO/TS 16949, Ford reserves the right to require the organization to ensure sub-tier supplier compliance with the “Minimum Automotive Quality Management System Requirements for Sub-tier Suppliers” identified in 2.20 of this document. Evidence of effectiveness shall be based on having a defined process and implementation of the process including measurement and monitoring.
- Where any organization has sub-tier suppliers not third party certified to ISO/TS 16949, the organization is encouraged to require sub-tier supplier compliance with the “Minimum Automotive Quality Management System Requirements for Sub-tier Suppliers” identified in 2.20 of this document.

Ford or supplier second party assessment or third party certification of sub-tier suppliers does not relieve the organization of full responsibility for the quality of supplied product from the sub-tier supplier (including Ford-directed sub-tier suppliers without a Multi-Party Agreement).

Although all sub-tier suppliers must be assessed per this section, sub-tier supplier improvement efforts shall focus on those sub-tier suppliers with the highest impact on Supplier Improvement Metrics (SIM).

Upon request, the organization shall make available to Ford a list of its sub-tier suppliers. The sub-tier supplier list shall be updated at least twice annually.

##### **Sub-tier supplier Management Process**

Organizations are encouraged to apply the principles outlined in “CQI-19 AIAG Sub-tier Supplier Management Process Guideline” to all their sub-tier suppliers.

Additionally, Ford reserves the right to require the organization to apply the principles outlined in “CQI-19 AIAG Sub-tier Supplier Management Process Guideline” to address issues identified in the organization’s supplier development and management process. Ford will communicate the requirement to apply CQI-19 to the specifically selected organization(s) based on sub-tier supplier management issues attributed to the organization. Evidence of effectiveness shall be based on having a defined process and implementation of the process

including measurement and monitoring.

***Critical Characteristic Controls at the sub-tier suppliers***

For Critical Characteristics, the responsible organization ensures that sub-tier suppliers have controls in place to prevent shipment of non-conforming product at the location where the associated physical characteristics are manufactured by sub-tier suppliers. The sub-tier supplier controls for the Critical Characteristics are identified by the organization in the APQP/PPAP Evidence Workbook. This also applies to Ford-directed sub-tier suppliers without a Multi-Party Agreement.

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

When required by the contract with Ford, approval of the sub-tier supplier shall be obtained from Ford Motor Company. Please contact the Ford Buyer.

**4.26 Incoming Product Conformity to Requirements (ISO/TS 16949 cl. 7.4.3.1)**

The organization shall have incoming quality measures and shall use those measures as key indicators of sub-tier supplier quality management.

Any incoming quality inspection shall be commensurate with the risk and quality impact of each sub-tier supplier.

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.

**4.27 Supplier Monitoring (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 sub-tier suppliers. Any delay / risk should be communicated to the affected Ford customer.

Any premium freight expenses related to sub-tier suppliers for late deliveries should be monitored and shall be minimized.

These also apply to Ford-directed sub-tier suppliers without a Multi-Party Agreement.

**4.28 Work Instructions (ISO/TS 16949 cl. 7.5.1.2)**

Operators shall use the most current work instructions.

Note: refer to section 4.1 of this document.

Work instructions shall contain reaction plans for non-conformances showing the specific steps to be taken.

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

Set-Up Verification requirements include manual tooling exchanges.

Records of job set-up verifications shall be maintained for 1 year.

**4.30 Preventive and Predictive Maintenance (ISO/TS cl 7.5.1.4)**

The organization shall have a documented system for preventive maintenance. This

shall include a regular review of planned maintenance activities in the QOS 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.

Records of measurement equipment calibration are to be held for one calendar year or superseded, whichever is longer.

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

#### **4.31 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 in the Global Terms & Condition (GTC) web guides at

<https://web.fsp.ford.com/gtc/production/index.jsp?category=guides> and on MP&L-in-a-Box at

<https://comm.extsp.ford.com/sites/MPLB2B/Pages/MPLdefault.aspx>.

The organization must be assessed as level "A" on the Material Management Operation Guideline / Logistics Evaluation (MMOG/LE) to achieve and maintain Q1. Key requirements for MMOG/LE (Material Management Operation Guideline/Logistics Evaluation) compliance include:

- Annual MMOG/LE assessment completed and reported 1 May to 31 July each year
- Adherence to Ford production and service delivery rating requirements for all regions as stated in Q1
- part identification and tracking
- lot traceability throughout the value chain (lot traceability shall include subcontracted components of an assembly/module that are associated with compliance to any inverted delta requirement)
- Electronic communication with Ford and sub-tier suppliers
- Management and maintenance of the Ford DDL CMMS3 system
- Prevention of damage or deterioration of supplied products
- Use of the appropriate packaging forms and maintenance of the Ford DDL CMMS3 DAIA Packaging screen, as applicable. Packaging requirements and forms can be found in the packaging GTC Web Guides at <https://web.fsp.ford.com/gtc/production/index.jsp?category=guides>
- Management and maintenance of returnable dunnage. Returnable container requirements can be found in the GTC Web Guides at <https://web.fsp.ford.com/gtc/production/index.jsp?category=guides>

- Adequately trained personnel, as defined in MMOG/LE.

In all cases, if unsure of the MP&L requirements, contact the production and service delivery analyst for the supplier site, for each region. The analyst contact information is available through SIM.

##### ***Inverted delta part identification***

The inverted delta symbol ( ∇ ) shall precede the Ford Motor Company part number for parts with Critical Characteristics, in accordance with the Packaging Guidelines for Production Parts and Shipping Parts/Identification Label Standard, both available

through Ford Supplier Portal MP&L page  
<https://comm.extsp.ford.com/sites/MPLB2B/Pages/MPLdefault.aspx>

#### **4.32 Measurement Systems Analysis (ISO/TS 16949 cl. 7.6.1)**

##### **Gauging requirements**

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 system variability. **The Gauge R&R is to be completed using Ford parts.**

The control plan identifies which gauges are used for each measurement.

Any measurement equipment not meeting the MSA guidelines must be approved by STA.

##### **Family of gauges**

**Where multiple gauges of the same make, model, size, method of use and application (including range of use) are implemented for the same part, use of a single gauge R&R covering those multiple gauges (family of gauges) requires STA approval.**

##### **Parts and operators for Gauge R&R studies**

The production operators that are expected to use the gauge must participate in the MSA studies.

At a minimum:

**Variable gauge studies should utilize a minimum of 10 parts, 2 operators and 3 trials.**

Attribute gauge studies should utilize a minimum of 50 parts, 3 operators, 3 trials.

See the Ford PPAP customer specifics for details on attribute gauge measurement systems analysis requirements

[https://web.qpr.ford.com/sta/Ford\\_Specifics\\_for\\_PPAP.pdf](https://web.qpr.ford.com/sta/Ford_Specifics_for_PPAP.pdf)

#### **4.33 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.

Accreditation to ISO/IEC 17025 or national equivalent is not required.

#### **4.34 Identification of Statistical Tools (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*

##### **Process Capability**

**The capability index for reporting launch process capability and ongoing production process capability is Ppk (Performance Index) .**

See Ford's PPAP customer specifics for the launch process capability requirements.

[https://web.qpr.ford.com/sta/Ford\\_Specifics\\_for\\_PPAP.pdf](https://web.qpr.ford.com/sta/Ford_Specifics_for_PPAP.pdf)

See table A below for ongoing process capability requirements.



Ongoing process capability is to be maintained at  $Ppk \geq 1.33$ .  
The requirement for maintenance of ongoing process capability is to be included in the production Control Plan and the capability results recorded in the APQP/PPAP Evidence Workbook.  
The results of monitoring process capability are to be available to Ford upon request.

When investigating a process capability issue it is advisable to use multiple indices, e.g. Pp, Ppk, Cp, Cpk. When used together, the indices assist in the determination of sources of variation.

Table A - Ongoing Process and Product Monitoring

Control Chart Interpretation and Reaction

The Control Chart indicates that the process:	ACTIONS ON THE PROCESS OUTPUT Based on Process Capability (Ppk)	
	Less than 1.33	Equal to or Greater than 1.33
Is in control	100% inspect*	Accept product Continue to reduce product variation
Has gone out of control	<div style="border: 2px solid black; padding: 5px; display: inline-block;"><b>IDENTIFY SPECIAL CAUSE</b></div> 100% inspect* all product since the last in-control sample	

\*The 100% inspection methodology must ensure no non-conforming product is shipped to Ford and would typically include error proofing, such as a poka-yoke

Notes:

Capability requirements for product approval are listed in the PPAP Ford Customer Specifics, available through [https://web.qpr.ford.com/sta/Phased PPAP.html](https://web.qpr.ford.com/sta/Phased_PPAP.html) .

Critical Characteristics require controls which prevent the shipment of non-conforming product, regardless of the location in the supply chain (tier 1 through tier N) of the manufacture of the physical characteristic(s) associated with the Critical Characteristic and are recorded in the APQP/PPAP Evidence Workbook.

Statistical process control on product characteristics without continuous manufacturing process controls is not appropriate or sufficient for Critical Characteristics.

**4.35 Monitoring and Measurement (ISO/TS 16949 8.2.1)**

The pre-launch Control Plan defines the data collected prior to Production. The Production Control Plan defines the data collected during mass production. Ford reserves the right to request the data collected by the organization as defined in either the pre-launch or production Control Plans.

**4.36 Customer Satisfaction – Supplemental (ISO/TS 16949 cl. 8.2.1.1, 5.2)**

**Certification Body Notification**

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

This notification of the Certification Body will constitute a "customer claim" as defined by the ISO/TS 16949 Rules. This step will suspend organization's ISO/TS 16949 certification. However, a suspended certification is still acceptable for Q1 Capable Systems requirements.

Even though the Certification Body may request a status report from Ford on the

implementation of corrective actions to address the Q1 revocation, the Certification Body alone must determine whether or not to withdraw the ISO/TS 16949 certification within 90 days of suspension.

Note: Reinstatement of Q1 from Revocation requires at least 6 months of acceptable supplier performance. The ISO/TS 16949 certificate suspension can be lifted if the supplier's corrective actions have addressed the non-conformances leading to the certificate suspension, as determined by the Certification Body. Suspension can be lifted by the Certification Body even though the site remains under Q1 Revoked status, accumulating the required 6 months of acceptable performance data.

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

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

#### **4.37 Internal Audit (ISO/TS 16949 cl. 8.2.2)**

The internal audits shall review all the organization's identified processes (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 as stated below.

- 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

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

- 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 the section above. 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**

- The training listed above shall be conducted by trainer(s) who have themselves successfully met the requirements of this section.

- Process and Product audits may be conducted by appropriate process specialists from the affected areas without full quality management auditor training.

#### 4.38 **Manufacturing Process Audit** (ISO/TS 16949 cl. 8.2.2.2)

Ford reserves the right to require Special Manufacturing Process Requirements at the organization and sub-tier suppliers (where appropriate) for the following processes:

##### **Casting**

- Casting (W-CMS, Ford Global Casting Manufacturing Standard, Control of Casting Manufacturing Processes)

##### **Electrical**

- Electronics PCB Assembly Assessment
- Ford Electronics Manufacturing Requirements

##### **Plastic Molding**

- Plastic Molding (W-IMMS, Ford Global Plastic Molding Manufacturing Standard, Control of Plastic Injection Molding Processes)

##### **Welding**

- Welding (AIAG CQI-15 Special Process: Welding System Assessment)

Refer to [https://web.qpr.ford.com/sta/Ford\\_GTS.html](https://web.qpr.ford.com/sta/Ford_GTS.html) on Ford Supplier Portal for all these standards except CQI-15, which is available through AIAG.

##### **Heat Treat Assessment Requirements**

Organizations and suppliers providing heat treated product and heat-treating services shall demonstrate compliance to AIAG CQI-9 "Special Process: Heat Treat System Assessment" and Ford Specific CQI-9 requirements (available through [https://web.qpr.ford.com/sta/CQI-9\\_Ford\\_Specific\\_requirements.xls](https://web.qpr.ford.com/sta/CQI-9_Ford_Specific_requirements.xls)); CQI-9 is available through AIAG <http://www.aiag.org/>.

##### **CQI-9 Special Process: Heat Treat System Assessment**

- All heat-treating processes at each organization and sub-tier supplier manufacturing site shall be assessed annually (at all tier levels), using the AIAG CQI-9 "Special Process: Heat Treat System Assessment" (HTSA) and Ford Specific CQI-9 requirements. Assessments must also be conducted following any heat treat process and/or heat treat equipment changes or additions. 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 cause(s) for any affected tier level 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, immediate containment action is required and the action plan must include steps to address the root cause(s) within 30 days. Where "not satisfactory" is assessed the action plan must include steps to address the root cause(s) within 90 days. While individual CQI-9 assessments can be completed at any time during the calendar year, the organization must review that the individual assessments are current (less than 12 months old), meet the requirements above and enter the CQI-9 assessment status into GSDB Online during the month of August each year.

- The CQI-9 assessment status identifies the date that the organization validated that all individual CQI-9 assessments were completed for organization internal and sub-tier supplier heat treat processes within 12 calendar months.
- If all the organization and sub-tier supplier CQI-9 heat treat process assessments are less than one year old at the time of reporting, the organization enters "Yes" for the status reported in GSDB.
- If any of the organization or sub-tier supplier CQI-9 assessments is more than one year old at the time of reporting, the organization enters "No" for the status reported in GSDB.
- If there is no heat treat performed by the organization or any sub-tier supplier on parts for Ford (because heat treat is not required for the parts), then the supplier should indicate N/A (Not Applicable). Note: heat treat is defined as any of the processes listed in CQI-9 or the **Ford Specific CQI-9 requirements**.
- GSDB Online is accessible through <https://web.qsdb2.ford.com/GSDBeans/servlet/qsdbbeans.web.lib.GSDB>
- 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.  
 Evidence shall include a minimum of 5 years' experience in heat treating or combination of formal metallurgical education and heat treating experience totaling a minimum of 5 years. See AIAG CQI-9 "Special Process: Heat Treat System Assessment" (HTSA) for completed requirements.

The organization shall maintain the **2 prior annual CQI-9 assessment reports and related information** at the organization's site and make them available to STA upon request. Heat Treat assessments are conducted by the organization, heat treat suppliers, sub-tier suppliers or Ford. Demonstration of compliance to **CQI-9 and Ford Specific CQI-9 requirements does** 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 4.1 of this document.

#### **4.39 Monitoring and Measurement of Manufacturing Processes** (ISO/TS 16949 cl. 8.2.3.1, 7.1.2, 7.5, 7.5.2)

Table A of this document details the on-going process capability requirements.

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

The Statistical Process Control Manual in 2.11 of this document provides additional guidance where tool wear impacts variability.

All process metrics are to be traceable to Ford requirements.

#### **4.40 Monitoring and Measurement of Product** (ISO/TS 16949 cl. 8.2.4, 8.3.4)

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.

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

A layout inspection (to all dimensional requirements) shall be performed annually on at least 5 parts.

Where tooling has multiple cavities, tools or centers, parts are measured for the annual layout from every cavity, tool or center.

The measurements are to be documented on the APQP/PPAP Evidence Workbook (Prototype or Production Measurement Results section), available through <https://web.qpr.ford.com/sta/APQP.html>.

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

Appearance approval requirements are specified in PPAP, Ford customer specific requirements. [https://web.qpr.ford.com/sta/Ford Specifics for PPAP.pdf](https://web.qpr.ford.com/sta/Ford_Specifics_for_PPAP.pdf)

#### **4.43 *Control of Nonconforming Product (ISO/TS 16949 cl. 8.3, 8.5.2, 8.5.3)***

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

Any non-conforming product or process output should be analyzed using the 8D methodology to ensure root cause correction and problem prevention.

##### ***Customer Concerns***

Organizations shall respond to Quality Rejects (QRs) by:

Note: The clock starts once the notification has been sent to the organization

- Responding in 24 hours
  - Implementing containment in the Ford plant. The supplier and/or third party must follow local procedures and site rules while carrying out containment.
  - Providing certified stock
  - Delivering an 8D, beginning with Symptom and Emergency Response Actions (D0) through Interim Containment Actions (D3)
- Within 48 hours of notification by the Ford plant, notify Ford Service, if the quality issue is suspected of affecting any FCSD shipments
- Within 15 calendar days delivering the 8D or (six sigma) 6 panel with preliminary or verified root cause, and a plan to implement corrective and preventive actions with supporting data
- 

A summary of the Quality Reject Process for North America is available through <https://web.qpr.ford.com/sta/QR2NA.htm>

##### ***Returned Product Test/Analysis***

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

The organization shall communicate the results of analysis to the responsible Ford

and organization work groups and include the results in the associated 8D report. Ford plant PPM (Parts Per Million) shall be communicated to all organization plant team members.

The organization shall develop a system to monitor Ford plant and warranty concerns. The organization shall also implement corrective actions to prevent future Ford plant and warranty concerns.

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

#### **4.44 Customer Waiver (ISO/TS 16949 cl. 8.3.4)**

Ford Motor Company authorization of product differing from Ford specifications is managed by Worldwide Engineering Release System (WERS) , limited to the quantity of parts or time period approved in the WERS Alert. This is applicable to both prototype and production level parts.

PPAP submission and Interim PSW acceptance are required for production use of parts with a WERS Alert.

Alerts must contain the following:

- The specific PPAP requirements that are not completed
- The modified specifications(s) that the part satisfies
- The justification why the modified specification(s) is acceptable
- The containment plan to assure the quality of parts (e.g. extraordinary controls / inspection process / robust measurement systems)
- The period (typically in terms of days), the number of parts and the specific launch build event for which the Alert is effective

The WERS help desk can provide information on WERS via email:

[hwers@ford.com](mailto:hwers@ford.com)

WERS training is available through

<http://www.computerconfidenceinc.com/>

#### **4.45 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.

#### **4.46 Guidance for implementation of ISO/TS 16949**

While consultants may offer 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 <sup>th</sup> November, 2003
4.3	30 <sup>th</sup> October, 2006
Updated for CQI-9 2 <sup>nd</sup> 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
Clarifications to the Scope, Interim PPAP submissions, measurement systems, process capability, MMOG/LE requirements, critical characteristic controls and sub-supplier management in alignment with the updated APQP process	June 2013

## Glossary

### **System Design Specification (SDS):**

- 1) describes the system in terms of interfacing subsystems and systems,
- 2) Consolidates system-level requirements from a variety of documented sources; provides selected and summarized text and metrics from these sources,
- 3) Documents requirements developed by the team not captured elsewhere,
- 4) Provides a means to sort the same set of requirements by type, by sub-system, by interfacing sub-system, and by source,
- 5) Supports systems engineering and thinking,
- 6) Accommodates continuous improvement of requirements, standards, and metrics as they are developed and refined.

### **Special Characteristics and Symbols**

The definitions of the following characteristics are provided in the Ford FMEA Handbook, available through \_

[https://us.library.covisint.com/LibraryServices/secured?cmd=MY\\_DOCUMENTS&action=docdetails&nodeID=2112](https://us.library.covisint.com/LibraryServices/secured?cmd=MY_DOCUMENTS&action=docdetails&nodeID=2112)