Ford Motor Company
Customer-Specific Requirements

For Use With ISO/TS 16949:2002

Per ISO/TS 16949:2002, an "organization" is the manufacturing facility being registered to ISO/TS 16949:2002. 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 16949:2002.
In this document, the terms "organization" and " supplier" are interchangeable, both representing the company (or site) being registered to ISO/TS 16949:2002.

1. *Scope*

ISO/TS 16949:2002 and this document define the *fundamental* quality system requirements for Ford Motor Company suppliers as an alternative to **QS-9000 Third Edition**. After 14 December, 2006, QS-9000 registration will not longer be accepted by Ford Motor Company. This document contains the company-specific requirements supplemental to **Technical Specification, ISO/TS 16949:2002.** 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 16949:2002 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 16949:2002. However, they are eligible for registration to QS-9000 TE Supplement until December 14, 2006.
Semi-Conductor suppliers may register to ISO/TS 16949:2002, providing they meet the scope requirements. They may also be eligible to register to QS-9000 Semi-Conductor Supplement.
See the SQRTF (Supplier Quality Requirements Task Force) letter on QS-9000 supplements at https://web2.qpr.ford.com/sta/.
The QS-9000 supplements are available through AIAG: http://www.aiag.org/.

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

All **ISO/TS 16949:2002** requirements and the requirements of this document shall be addressed by the organization's quality system.

Similar to QS-9000, ISO/TS 16949 may have sanctioned interpretations (SIs). If there are

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any SIs for ISO/TS 16949, they would be available on http://www.iaob.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.iaob.org/)
- and include Ford Motor Company in the copyright statement.

Copies of this document are available from Ford Motor Company at https://web2.qpr.ford.com/sta/ and International Automotive Oversight Board at http://www.iaob.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 16949:2002**, Quality Systems - - Particular Requirements for the Application of ISO 9001:2000 for automotive production and relevant service part organizations

2.2 Automotive Certification Scheme for ISO/TS 16949:2002 – **Rules for achieving IATF recognition.**

2.3 **IATF Guidance to ISO/TS 16949**, available through AIAG.

2.4 **Quality System Assessment Checklist,** Checklist to ISO/TS 16949, available through AIAG

2.5 Ford Quality and Reliability Statement of Work (QRSOW), available on https://web2.qpr.ford.com/sta/.

2.6 Chrysler, Ford Motor Company, General Motors Corp. **Advanced Product Quality Planning and Control Plan** reference manual

2.7 Ford Motor Company Advanced Product Quality Planning Reporting Guidelines, available through FSP (Ford Supplier Portal) https://web2.qpr.ford.com/sta/.

2.8 Ford Motor Company **FMEA Handbook**, are available on FSP Library Services (subsection FMEA).

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.

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2.11 DaimlerChrysler, Ford Motor Company General Motors Corp. **Production Part Approval Process (PPAP)**.

2.12 Chrysler, Ford Motor Company, General Motors Corp. **QS-9000, Quality System Requirements**.

2.13 **ISO/IEC Guide 62:1996**

2.14 **MMOG (Material Management Operation Guideline)**, available through AIAG http://www.aiag.org/

2.15 MS-9000 (Materials Management System Requirements), available through Material Planning and Logistics https://web.fsli.ford.com/mpl/index.html on FSP (Ford Supplier Portal)

2.16 **Odette** (Volvo logistics requirements)

2.17 International Accreditation Forum **Application of ISO/IEC Guide 62**, issued December 4, 2001, effective July 1, 2002, available through http://www.iaf.nu/.

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

2.19 **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).

2.20 Q1: available on https://web2.qpr.ford.com/sta/

2.21 Craftsmanship training and requirements are available on http://www.globalcraftsmanship.ford.com/

2.22 VOPQUN-008 Quality Concern Reporting for North America available on FSP (Ford Supplier Portal).

2.23 VOP QUE-604 'Control of Quality and Purchased Parts and Assemblies', for Europe, available through Europe STA.

2.24 Global 8D system, available on FSP (https://web.quality.ford.com/g8d/)

The latest copies of **QS-9000, PPAP, APQP, SPC, MSA** and other related manuals are available from AIAG at 01-248-358-3003 and http://www.aiag.org/, and 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

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Supplier Portal)) by organizations shipping directly to Ford Motor Company (typically Tier 1). Lower tier organizations pursuing ISO/TS 16949:2002 registration may need to gain access to FSP (Ford Supplier Portal) through a Tier 1.

3 *Definitions*

Where inconsistent terminology exists between ISO/TS 16949:2002 and this document, this document shall take precedence. Otherwise the definitions from ISO/TS 16949:2002 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 16949:2002 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 Guidance on the Application of ISO/IEC Guide 62, issued December 4, 2001], 2.17 of this document.

3.5 *Customer*

For the purposes of ISO/TS 16949:2002, 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 16949:2002.

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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 *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.).

3.8 *Ford Motor Company*

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

3.9 *Ford Engineering*

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

3.10 *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.

3.11 *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 16949:2002, 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 16949:2002 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 16949:2002.

3.12 *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.

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3.13 *Process Approach*
A method to measure and improve organizational performance in terms of customer metrics and specifications.

3.14 *Quality Indices*
See Statistical Process Control reference manual.

3.15 *Shall*
A mandatory requirement.

3.16 *Should*
Indicates a mandatory requirement with some flexibility allowed in compliance methodology. Organizations choosing other approaches to satisfy a “should” must be able to show that their approach meets the intent of ISO/TS 16949:2002

3.17 *SIM*
Supplier Improvement Metrics – supplier performance measurements available through FSP (Ford Supplier Portal).

3.18 *Site*
An organization's (see definition 3.11) individual manufacturing location which has material / part input and part output.

NOTE Includes assemblers and Vehicle Assembly Plants

3.19 *SREA*
Supplier Request for Engineering Approval.

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

3.21 *Subcontractor*
Provider of production materials, or production or service parts, directly to an organization complying with ISO/TS16949:2002. Also included are providers of heat treating, painting, plating or other finishing services to organizations.

3.22 *Value-Added Production Processes*
Manufacturing activities or operations for which a customer would be willing to pay, if given the option.

3.23 *Final Customer*
Owner of the vehicle sold through commercial or private transaction.

3.24 *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.

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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 registered[1] to either QS-9000 or ISO/TS 16949. After 14 December, 2006, Ford Motor Company will only accept registrations to ISO/TS 16949.
Additional details are provided in Q1, see ***https://web2.qpr.ford.com/sta/.***
The Scope (section 1) of ISO/TS 16949:2002 (also see 4.1 of this document) specifies the types of organizations appropriate for an ISO/TS 16949:2002 registration.

The ISO/TS 16949:2002 Guidance and Checklist documents provide guidance in the implementation of ISO/TS 16949:2002.

* 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 16949:2002 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 16949:2002 and eligible for ISO/TS 16949:2002 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 16949:2002.

4.2 *Control of documents (ISO/TS 16949:2002 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).or as specified by Ford Motor Company.

Note: Engineering Standards may be obtained from Information Handling Services (at 1-800-716-3447) or Autoweb Communications Inc. (at 248-601-7155 and ***http://autoweb.net/)***. (North American telephone numbers)
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.

[1] Registrars acceptable for ISO/TS 16949 3rd party audits are listed on http://www.iaob.org/

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4.3 *Engineering Specifications* *(ISO/TS 16949:2002 cl. 4.2.3.1, 7.3.5)*

Heat Treating Specification

Organizations and subcontractors providing heat treated product and heat-treating services shall demonstrate compliance to Ford Motor Company Manufacturing Standard W-HTX, available through the standards providers listed in section 4.2 of this document. All heat-treating processes shall be assessed annually against Ford Heat Treat System Survey Guidelines available on ***https://web2.qpr.ford.com/sta/.***
The supplier shall maintain at the supplier site the survey reports and other evidence of compliance to W-HTX and make them available to STA upon request. Ford or supplier Heat Treat assessments or compliance to W-HTX does not relieve the supplier 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 16949:2002 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 16949:2002 cl. 5.2, 8.2.4, 8.5.1)*

The organization shall demonstrate enhanced customer satisfaction by meeting the

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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://web2.qpr.ford.com/sta/,*** unless otherwise approved by STA.

4.6 *Customer Representative* *(ISO/TS 16949:2002 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 16949:2002 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://web2.qpr.ford.com/sta/.*** 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://web2.qpr.ford.com/sta/.***

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 16949:2002 cl 5.6.2)*

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

4.9 *Training* *(ISO/TS 16949:2002 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 16949:2002 cl. 6.2.2.2, 6.3.1, 6.2.2, 6.2.2.1)*

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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 16949:2002 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.tcm.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 16949:2002 cl. 6.4.2)*

Product Cleanliness
Part dunnage is included in this requirement.

4.14 *Planning of Product Realization* *(ISO/TS 16949:2002 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 Quality and Reliability Statement of Work (available on ***https://web2.qpr.ford.com/sta/***)

The organization shall report APQP status including, at a minimum, the elements specified in the APQP Reporting Guidelines and forms – available on ***https://web2.qpr.ford.com/sta/*** (see ***2.7*** of this document)

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)

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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 16949:2002 cl. 7.1.2)*

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

4.16 *Customer related processes* *(ISO/TS 16949:2002 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 16949:2002 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 16949:2002 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 16949:2002 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 16949:2002 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.

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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– (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://web2.qpr.ford.com/sta/*** Q1 site assessment, ISO/TS 16949:2002 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

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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 16949:2002 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.

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4.22 *Design and Development Review* *(ISO/TS 16949:2002 cl. 7.3.4, 7.3.1, 7.3.6.1)*

The organization shall use FPDS (Ford Product Development System) (unless approved otherwise in writing by Ford Engineering) when reviewing product design and development stages. Information on FPDS is available through FSP (Ford Supplier Portal). on ***https://fsn.ford.com/pd.frames.html***

Product Development

For Inverted Delta (∇) parts, design responsible suppliers shall include Ford Engineering and Assembly / Manufacturing in FPDS 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 16949:2002 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 16949:2002 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 FPDS for additional information on prototype programs (*https://fsn.ford.com/pd.frames.html)*.

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

4.25 *Product Approval Process* *(ISO/TS 16949:2002 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.

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Consistent with Q1 Manufacturing Site Assessment Expectations, 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 16949:2002 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)..
Material reporting requirements for ELV are specified by WSS-M99P9999-A1.

4.27 *Subcontractor Development* *(ISO/TS 16949:2002 7.4.1.2)*

"Goal of supplier conformity with [ISO/TS 16949:2002]" may be met by either of the following:

4.27.1 Subcontractors to achieve accredited third party certification to ISO/TS 16949:1999 or ISO/TS 16949:2002, QS-9000, 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://web2.qpr.ford.com/sta/*** under "*Ford letter authorizing Tier 1 suppliers to audit subcontractors in support of QS-9000 Sanctioned Interpretation C9 and ISO/TS 16949:2002 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

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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 16949:2002 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 16949:2002 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 16949:2002 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 16949:2002 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.

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4.32 *Verification of Job Set-ups* *(ISO/TS 16949:2002 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 16949:2002 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.fsli.ford.com/mpl/index.html***

Key requirements are: compliance to MMOG (Material Management Operation Guideline), Odette, or MS-9000, as specified by regional requirements; including:

- annual certification
- 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.fsli.ford.com/mpl/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.fsli.ford.com/mpl/index.html***

4.35 *Measurement systems analysis* *(ISO/TS 16949:2002 cl. 7.6.1)*

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*A*ll 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 16949:2002 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 16949:2002 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 16949:2002 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 16949:2002 Rules. This step will place the organization's ISO/TS

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16949:2002 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 the 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).

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 16949:2002 cl. 8.2.2)*

The internal audits shall review all the organization's identified process (per 4.1a of ISO/TS 16949:2002). 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 16949:2002
- 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 16949:2002 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

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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 16949:2002 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 16949:2002 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 16949:2002 cl. 8.2.4.1)*

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A layout inspection and functional verification (to all engineering material and performance 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 16949:2002 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 at
http://www.globalcraftsmanship.ford.com/

4.44 *Control of Non Conforming Product* *(ISO/TS 16949:2002 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 2.24) 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 2.22 and VOP QUE-604 (Europe) reference 2.23

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.

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4.45 *Customer waiver* *(ISO/TS 16949:2002 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)., 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://web2.qpr.ford.com/sta/.***

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 16949:2002, 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 16949:2002, two implementation guidance documents are available through AIAG:
Reference 2.3 *IATF Guidance to ISO/TS 16949* and reference 2.4 *Quality System Assessment Checklist* of this document provide organizations with useful implementation information.

A vertical bar | and text in blue in the margin indicates areas update since the prior version.

Sections updated	Date updated
4.2, 4.20, 4.25, 4.45	25th November, 2003

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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

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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 MOST RECENT POINT 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	**IDENTIFY SPECIAL CAUSE** 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	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	**IDENTIFY AND CORRECT SPECIAL CAUSE** 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.

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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://web.keyinfo.ford.com/northamerica/manuals/secured/docs/FMEA-Handbook/Special.pdf

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

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