TENNECO

Monroe Ride Solutions

TRUST AND INTEGRITY
DELIVER RESULTS
ACCOUNTABILITY
INNOVATION
SUSTAINABILITY

PPAP & APQP PROCESS
SUPPLIER GUIDELINES & REQUIREMENTS

02/07/2025

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PPAP & APQP PROCESS GUIDELINES

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1. TITAN PPAP Response

- In TITAN system, APQP self-assessment is integrated into the PPAP Response, which is a pre-defined template corresponding to the steps of APQP milestone plan.
- Suppliers are required to use the APQP Tracker Template to monitor the APQP steps. This Template is used to determine the Program Need date for completion of each Phase of the APQP that will be entered into TITAN along with the completion step. The APQP Tracker Template contains progress statuses of both the required documentations and APQP milestones. ***The APQP Tracker is included in the zip file with the PPAP request and in the Supplier Requirements Manual. Review the Guidelines on the APQP Tracker Form.***

2. APQP Tracker

- APQP Tracker Template must be submitted on a regular bases: Monthly in general and weekly in the month before PPAP is due per the APQP Tracker Template Guidelines.
- The APQP Tracker will be uploaded into the c-folder for each update.
- When the Phase is completed per the APQP Tracker Template and all documents are uploaded into the c-folder that is associated with that Phase, **the Supplier will change the Phase to Complete in TITAN.** This will change the status of each C-folder attribute milestone to a level "5 – completed and Submitted"
- ***If the attribute is N.A. (not applicable) the Supplier must change that milestone to N.A. to indicate no documents were uploaded into the c- folder.***

PPAP & APQP PROCESS GUIDELINES

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2. APQP Tracker

- Suppliers must indicate truthfully the actual overall status of the product launch in each PPAP Response:
  - Overall status “GREEN” means PPAP preparation is on time;
  - “YELLOW” status means there are delays in individual PPAP & APQP elements, but such delays are recoverable;
  - “RED” status indicates PPAP is not expected to be on time and delays are not recoverable.

3. Review PPAP Request before initial submission (within 3 working days)

- After receiving PPAP Requests from Tenneco, suppliers are required to log onto the TITAN portal and review carefully the following:
  - PPAP Request details and c-folder documents related to the PPAP
  - Tenneco Terms and Conditions
  - Tenneco Standard PPAP/APQP Process Guidelines and Requirements
  - Ensure last 2D & 3D data are downloaded from the ePPAP request

4. Initial Response (First PPAP Response) is required within 3 working days

- Suppliers are required to submit the first PPAP response into TITAN system within 3 working days after receiving the PPAP Request. Tooling PO will not be issued to supplier until this initial response is submitted.
- This response is to answer the questions in TITAN “PPAP Request overall Status” and “Overall Status Red or Yellow due to” Response to these questions acknowledges acceptance to the PPAP request.

PPAP & APQP PROCESS GUIDELINES

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5. Document Sharing via C-Folder in TITAN Portal

- TITAN portal's c-folder is the web-based file-sharing platform between Tenneco and Suppliers for the PPAP and product launch processes. The platform is used for document sharing, design & development collaboration, as well as document depository for PPAP and product launch related processes.
- Suppliers are not allowed to use the c-folder for any other purposes, except for the specific PPAP and product launch related processes.

6. Submission of PPAP & APQP Required Documentation

- Whenever a document is assessed as 100% complete, suppliers are required to submit the completed documentation by uploading it electronically into the corresponding PPAP c-folder.
- Suppliers should not submit all documentation together in one action, documents need to be submitted when completed. Some documentation may require joint development between Tenneco and suppliers before completion and c- folder should be used as the tool for file sharing during the collaboration phase.
- Whenever a document is submitted into TITAN, suppliers must take care to upload it into the correct sub-c-folder and place it into the specific document placeholder slot. Each PPAP & APQP required document has its own individual placeholder under the corresponding PPAP c-folder and sub-c-folder.
- Suppliers are no longer required to send PPAP & APQP required documentation in hard copy or as a booklet to Tenneco. All documentation must be uploaded into TITAN c-folder in electronic format.
- Suppliers are required to have all documents uploaded into TITAN no later than the PPAP due date.

PPAP & APQP PROCESS GUIDELINES

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7. Submission of PPAP Sample Products

- When PPAP sample products are sent to Tenneco, suppliers are required to ensure Samples are shipped on time to ensure the samples arrive at the Tenneco Plant no later than the PPAP due date
- Sample products need to be received into Tenneco receiving plant no later than the PPAP due date.

8. PPAP Approval Conditions

- PPAP Approved: Indicates that part and submitted documentation meets all Tenneco requirements. Supplier is authorized to ship production quantities of the product, according to Tenneco‘s scheduling agreement (with this status supplier will not be able to remove or upload any documents in the c-folders).
- Official PPAP full approval will only be issued in TITAN portal when following conditions are met. Suppliers are recommended to actively pursue PPAP approval before the PPAP due date:
    - Required sample products are submitted to Tenneco’s receiving plant, and they are assessed as satisfactory by Tenneco
    - There are no outstanding items on PPAP Response. All required documentations and APQP milestones are self-assessed as “Completed” in the PPAP Response question list
    - Applicable PPAP & APQP documents are uploaded into the corresponding c-folder, and they are assessed as satisfactory by Tenneco

PPAP & APQP PROCESS GUIDELINES

9. PPAP Responses: Return or Interim-Approval

- Interim Approval
  - Permits the shipment of material for production requirements on a limited time period or quantities.
  - If an interim approval is due to Supplier PPAP issues, then supplier is responsible for implementing containment actions to ensure that only acceptable material is being shipped to Tenneco. Additionally supplier has to prepare an action plan agreed with Tenneco. PPAP corrections are required to obtain a status “Approved/Accepted” within agreed time frame.
- Returned
  - It means that PPAP submission does not meet Tenneco requirements. In such cases, the submission must be corrected to meet the requirements and obtain a status “Approved/Accepted“ within agreed time frame.
  - The PPAP will be returned with reason for return along with the date required for resubmission. In case of any question related to PPAP Approval Status, please contact the PPAP approver of the assigned Tenneco plant

PPAP & APQP PROCESS GUIDELINES

10. No Further Document Change or Resubmission after PPAP & APQP Process Completion

- Once a PPAP & APQP process is completed and approved the supplier will not be able to remove or upload any documents in the c-folders.

11. Retention & Submission of Required Documentation per PPAP Level

- Various PPAP / APQP required documents are needed for submission to Tenneco or for retention at supplier locations according to the PPAP level. For detail requirement on document retention and submission per PPAP level and the full question list with milestone statuses, please see item 12 & 13.

PPAP & APQP PROCESS GUIDELINES

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12. TENNECO PPAP & APQP Required Items and Milestones

	Document Retention/Submission Required => R/S *						Attribute's Milestone Statuses Drop-down Selection					
	PPAP Level =>	1	2	3	4	5	0	1=25%	2=50%	3=75%	4=100%	5
1a	Design Records of Saleable Product	R	S	S	*	R		Drwg/Specs Rec'd	Reviewed & Accepted	Manufacturability Review Completed	Manufacturing Feasibility Submitted	Completed & document uploaded/retained
1b	proprietary components/details	R	R	R	*	R		Drwg/Specs Rec'd	Reviewed & Accepted	Manufacturability Review Completed	Manufacturing Feasibility Submitted	Completed & Retained OR Not Applicable
1c	for all other components/details	R	S	S	*	R		Drwg/Specs Rec'd	Reviewed & Accepted	Manufacturability Review Completed	Manufacturing Feasibility Submitted	Completed & document uploaded/retained OR Not Applicable
2	Engineering Change documents, if any	R	S	S	*	R	pending					Completed & submitted/retained OR Not Applicable
3	Customer Engineering approval, if required	R	R	S	*	R	pending					Completed & submitted/retained OR Not Applicable
4	Design FMEA	R	R	S	*	R	pending					Completed & submitted/retained OR Not Applicable
5	Process Flow Diagrams	R	R	S	*	R		Initial Flow Available	Machines in Place	Operators Identified	Flow Chart Complete	Completed & document uploaded/retained
6	Process FMEA	R	R	S	*	R		Initial FMEA Available	High RPN's Identified	High RPNs Action Taken	Final FMEA Complete	Completed & submitted/retained
7	Control Plan	R	R	S	*	R		Initial Control Plan Available	Ties to PFMEA	Supports High RPN Action	Final Control Plan Complete	Completed & document uploaded/retained
8	Measurement System Analysis Studies	R	R	S	*	R		Aligned with Control Plan	MSA Plan Identified	Gauge R&R Acceptable	MSA Complete	Completed & submitted/retained

PPAP & APQP PROCESS GUIDELINES

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12. TENNECO PPAP & APQP Required Items and Milestones

	Document Retention/Submission Required => R/S *						Attribute's Milestone Statuses Drop-down Selection					
	PPAP Level =>	1	2	3	4	5	0	1=25%	2=50%	3=75%	4=100%	5
9	Dimensional Results	R	S	S	*	R	pending					Completed & submitted/retained OR Not Applicable
10	Material, Performance Test Results	R	S	S	*	R	pending					Completed & submitted/retained OR Not Applicable
11	Initial Process Studies	R	R	S	*	R	pending					Completed & submitted/retained
12	Qualified Laboratory Documentation	R	S	S	*	R	pending					Completed & submitted/retained OR Not Applicable
13	Appearance Approval Report (AAR), if applicable	S	S	S	*	R	pending					Completed & submitted/retained OR Not Applicable
14	Sample Product	R	S	S	*	R	pending					Completed & submitted/retained
15	Master Sample	R	R	R	*	R	pending					Completed & retained OR Not Applicable
16	Checking Aids	R	R	R	*	R	pending					Completed & retained OR Not Applicable
17	Records of Compliance With Customer Specific Requirements	R	R	S	*	R	pending					Completed & submitted/retained OR Not Applicable
18	Part Submission Warrant (PSW)	S	S	S	S	R	pending					Completed & submitted/retained
19	Bulk Material Checklist	R	R	R	*	R	pending					Completed & retained OR Not Applicable

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12. TENNECO PPAP & APQP Required Items and Milestones

	Document Retention/Submission Required => R/S *						Attribute's Milestone Statuses Drop-down Selection					
	PPAP Level =>	1	2	3	4	5	0	1=25%	2=50%	3=75%	4=100%	5
A1	Launch Containment Plan	S	S	S	S	S		Launch Containment timing understood	Launch Containment Plan Reviewed with receiving plant	Launch Containment Plan Completed	Launch Containment Plan Approved	Completed & Uploaded to cFolders
A2	Capacity Planning/Verification	S	S	S	S	S		Mat'l Available for Trial	Capacity Planning Section Completed	Capacity Evaluation Section Completed	Capacity Verification Section Completed	Completed & Uploaded to cFolders
A3	TPSO Checklist	S	S	S	S	S		25% of TPSO Actions Completed	50% of TPSO Actions Completed	75% of TPSO actions Completed	100% of TPSO Actions Completed	Completed & Uploaded to cFolders
A4	IMDS Documentation	S	S	S	S	S		Significant Mat'l Identified	Part Weight and Content Complete	IMDS Paperwork Completed	IMDS Submitted	Completed & Uploaded to cFolders
A5	Packaging Plan Proposal - Approval	S	S	S	S	S		Packaging Plan Proposed	Packaging Mat'l Available	Std &Alternative packaging Trial Completed	Std & Alternative Packg Plan Approved	Completed & Uploaded to cFolders
A6	Vendor Tooling Registration Form	S	S	S	S	S		Tooling Purchase Order Received	Tool Cost Line-up Provided	Tool Cost Detail and Photos Provided	Tool Audit Approved	Completed & Uploaded to cFolders OR Not Applicable
A7	Manufacturing Review Form	S	S	S	S	S		25% of MFG Review Completed	50% of MFG Review Completed	75% of MFG Review Completed	100% of MFG Review Completed	Completed & Uploaded to cFolders
A8 - A11	Other Specified Requirements	S	S	S	S	S		Additional Requirements identified by Tenneco	Additional Requirements communicated and understood by Supplier	Additional Requirements in process	Additional Requirements Completed	Completed & Uploaded to cFolders OR Not Applicable

PPAP & APQP PROCESS GUIDELINES

13. Submission Definitions – to be used with TITAN system

NOTE: Industry standards as identified in the AIAG published guidelines are to be followed. This document identifies the Tenneco defined processes that meet these guidelines.

# on ATTRIB	# on Doc in c-folder	TITLE	CONTENT TO BE ENTERED – NOTE: Should set up a folder so multiple documents (i.e., revisions) can be entered	SUPPLIED BY: All documents need to be entered into the c-folders by the supplier once PPAP request has been acknowledged:
10		PPAP submission overall	Supplier timing indicated with Red, Yellow or Green status – Suppliers should enter this field within 3 days of receipt of the PPAP invitation to keep this invitation visible.	Supplier
20		Status / R or Y due to	If Red or Yellow chosen above, enter explanation of why in this area	Supplier
30		Date PPAP samples sent to Tenneco	Date PPAP samples are shipped to the Tenneco facilities. The Samples must arrive at Tenneco Plant on or before the date that PPAP is required to be submitted. Properly labeled samples per the Supplier Quality Manual.	Supplier
40	1a	1A) Design Records of saleable product	This is the Tenneco Drawing that was submitted by the buyer at PPAP invitation – Supplier to cross reference to ensure they are using the latest drawing	Buyer with PPAP invitation; Supplier to verify correct revision
60	1c	1C) For all other components / details	Any other PPAPs from sub suppliers, etc. This would need to be a folder submission (i.e. – folder would say Supplier PPAPs, there could be sub folders by products)	Supplier
70	2	2) Engineering change documents (if any)	Any deviations or ECMs that are not complete at the time of PPAP – if there are deviations or ECMs, a PPAP can receive only interim approval. If there are dimensions out of specification that require engineering review, only an interim can be given.	Supplier must have deviation number from Tenneco prior to submission for known issues; Tenneco PPAP approvers should add deviation # to notes in "tendering text"
80	3	3) Customer Engineering approvals (if required)	In the case of a material change, most customers want to have sign off rights for acceptance of the PPAP – Ford specifically requires this option – contact the Business Unit before processing any PPAP s for material changes	Supplier to provide any customer signed documents

PPAP & APQP PROCESS GUIDELINES

13. Submission Definitions – to be used with TITAN system

# on ATTRIB	# on Doc in c-folder	TITLE	CONTENT TO BE ENTERED – NOTE: Should set up a folder so multiple documents (i.e., revisions) can be entered	SUPPLIED BY: All documents need to be entered into the c-folders by the supplier once PPAP request has been acknowledged:
90	4	4) Design FMEA	If the supplier is Design Responsible, they are to provide the dFMEA; if Tenneo or Tenneco's Customers are design responsible, there should be evidence that Tenneco Engineering signed off on the severity levels of the pFMEA in lieu of a dFMEA	Supplier
100	5	5) Process flow diagram	A graphical or verbal description of the steps in the process that a part goes through	Supplier
110	6	6) Process FMEA	A pFMEA template that contains both product and process characteristics, how they are measured and how they are controlled. Must utilize the latest template from AIAG identifying prevention and detection columns. Any Tenneco designated significant characteristics are to be so designated on this document. Actions should be evidenced of what was done to respond to the highest Risk, along with the resultant REDUCED RPNs.	Supplier
120	7	7) Control Plan	A step-by-step review of all process checks that are made to ensure the product meets all Tenneco specifications.- must include an annual parts validation and if the supplier is a heat treat, plater, coater, or welder must include an annual Special Process Audit (CQI–) see supplier development of you have questions about these audits. If applicable, product validation testing is to be required on the control plan.	Supplier
130	8	8)Measurement System Analysis Studies	For each measurement devise identified on the control plan, there needs to be Gage R&R submitted - if R&R is not possible (torque testing, yield fatigue, there should be a statement of how the measurement is assured.). If PPAP is for a Ford Motor Company application, the gage R&R study is required to be in Mini-Tab using the ANOVA methodology. Contact plant quality rep if there are any questions.	Supplier

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13. Submission Definitions – to be used with TITAN system

# on ATTRIB	# on Doc in c-folder	TITLE	CONTENT TO BE ENTERED – NOTE: Should set up a folder so multiple documents (i.e., revisions) can be entered	SUPPLIED BY: All documents need to be entered into the c-folders by the supplier once PPAP request has been acknowledged:
140	9	9)Dimensional Results	A copy of the numbered, or "ballooned" drawing used to define dimensional requirements, plus a record of the six-piece layout of all design record, specifications and notes including a 10-piece weight measurement – any non-conforming dimensions should have corrective action with resultant acceptable results, or an engineering approved deviation - DRs with Deviations may only grant an interim approval; supplier should re-PPAP when corrective action has been taken.. NOTE: Functional gauge results are not acceptable. For multiple cavity moulds used to produce the product, one sample must be taken from each cavity/mold.	Supplier
150	10	10) Material / Performance Test Results	Material certifications and results for Product Validation or Design Validation testing should be attached here – no data should be more than a year old (12 months)	Supplier
160	11	11) Initial Process Studies	Process control studies (capability requirements – PpK Studies) taken from the initial production run (minimum quantity – 300 pcs **unless specified by Customer (Tenneco)–** if critical characteristics are identified on part drawing, must meet capability requirements or show 100% sort with action plan to become capable. If no critical or significant characteristics are called out on the print this needs to be part of the discussion during the Mfg Review if a capability study is required; also discussion regarding the 300 pc run. Summary document will be used to show capability.	Supplier
170	12	12) Qualified Laboratory Documentation	If inspection / testing was performed by an external laboratory, the results must be presented on that laboratories letterhead or the normal report format must include the tests performed, date(s) of the tests and the standards used to run the tests. If tests are performed internally, the scope of the lab must be included showing the laboratory is qualified. This includes metrology labs (calibration labs). If the supplier is TS certified, these should be available, if registered to ISO these may need to be developed.	Supplier

PPAP & APQP PROCESS GUIDELINES

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13. Submission Definitions – to be used with TITAN system

# on ATTRIB	# on Doc in c-folder	TITLE	CONTENT TO BE ENTERED – NOTE: Should set up a folder so multiple documents (i.e., revisions) can be entered	SUPPLIED BY: All documents need to be entered into the c-folders by the supplier once PPAP request has been acknowledged:
180	13	13) Appearance Approval Report -= A.A.R. (If Applicable)	If designated on the design record (Tenneco drawing or specification) as an "Appearance Item" a separate AAR must be entered in this file. The form is available in the AIAG manual.	Supplier
190	14	14) Sample Product	Copy of the shipment documentation or tracking number of the PPAP parts.	Supplier
200	15	15) Master Sample	A photo of the sample, clearly marked as the master sample should be in this folder. If a master sample is not required, the concession by Tenneco must be in this folder.	Supplier
210	16	16) Checking Aid(s)	Any part specific checking aids used to establish the conformity of the product should be defined and show how they are maintained (protected from damage). These may be mylars, mating parts, etc. Gauge certifications may be added here. If gauges are certified by an outside source, these results may be entered here.	Supplier
220	17	17) Records of Compliance with Customer Specific Requirements	The results of any customer specific requirements may be entered here.	Supplier
230	18	18) Parts Submission Warrant (PSW)	A copy of the actual supplier signed PSW – no blank spaces left – must show part weight to 4 decimal places – explanation for each line item is available in the current edition AIAG manual for PPAP. NOTE: If parts are for Ford, must enter the Ford Phased PPAP warrant here. Run @ Rate information stated on PSW must match the R&R data worksheet.	Supplier
240	19	19) Bulk Material Checklist	If submitted as bulk material – rolled steel is most common – refer to current AIAG PPAP manual for detail and example of the checklist.	Supplier
250	A1	A1) Launch Containment Plan	Supplier adds the Launch Containment Plan for plant approval prior to PPAP.	Supplier

PPAP & APQP PROCESS GUIDELINES

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13. Submission Definitions – to be used with TITAN system

# on ATTRIB	# on Doc in c-folder	TITLE	CONTENT TO BE ENTERED – NOTE: Should set up a folder so multiple documents (i.e., revisions) can be entered	SUPPLIED BY: All documents need to be entered into the c-folders by the supplier once PPAP request has been acknowledged:
260	A2	A2) Capacity Planning/Verification	This form has 3 tabs – 1) Capacity Planning 2) Capacity Evaluation 3) Capacity Verification (Verification completed after PPAP and as required) If final customer is Ford, must have both Phase 1 (Run at Rate) and Phase 3 which is Capacity Analysis. Need to state when the 300 piece production run was manufactured.	Supplier
270	A3	A3) TPSO Checklist	TPSO is used for on-site verification. SQE may still use for tracking even if on-site verification is not completed. If not being used then this folder will be empty.	SQE to supply
280	A4	A4) IMDS -Documentation	Supplier is to upload the IMDS PDF document in this file. IMDS entry number to be placed on PPAP Warrant. This is standard unless excluded by Tenneco.	Supplier
290	A5	A5) Packaging plan proposal / approval	Submitted packaging plan.	Supplier / Tenneco Plant
300	A6	A6) Vendor Tooling Registration Form.	Template in APQP template section of PPAP that must be completed, with photos. PPAP can not be approved without this information.	Supplier
310	A7	Manufacturing Review Form	Add the Manufacturing Review Check-sheet. If the check-sheet is a family of parts then place check-sheet in the lead p/n folder and reference in the other PPAP c-folders the Lead P/N – PPAP request number to find the MFG Review form	Supplier/SQE
320 -350	A8-A11	Other Specified Requirement	To be used for other specified requirements requested by Tenneco which may be defined in the Tendering Text field in the “Information from Purchaser” TAB area of the PPAP.	Supplier
			If the Supplier has a proprietary process and PFMEA, CP or Flow can only be reviewed on-site then a statement must be made in these folders to state that documents are not uploaded due to the proprietary nature of their process.	

WHAT IS PPAP AND WHEN IS IT REQUIRED?

PPAP (Production Part Approval Process) – evidence that all customer engineering design records and specification requirments are properly understood by the supplier and that the manufacturing process has the capability to produce consistently meeting these requirements during an actual production run at the quoted production rate.

Suppliers may be requested for PPAP submission based on the following but not limited to:

1. New Part/Product or New Tool
2. Engineering Changes to design records,
3. Tooling Transfer, Replacement, Refurbishment
4. Correction of Discrepancy
5. Material change
6. Sub-supplier change
7. Change in Part Processing
8. Material Source Change
9. Supplier Manufacturing location change

PURPOSE AND SCOPE

- Purpose: Explanation of Tenneco Supplier's PPAP Requirements.

- Scope: Tenneco PPAP & relevant documentation.

- Each PPAP element will be explained in detail:
    1. Design Records
    2. Engineering Change Documents
    3. Customer Engineering Approval
    4. Design FMEA (dFMEA)
    5. Process Flow Diagram (PFD)
    6. Process FMEA (pFMEA)
    7. Control Plan (CP)
    8. Measurement Systems Analysis (MSA)
    9. Dimensional Results
    10. Records of Material / Performance Test Results
    11. Initial Process Studies
    12. Qualified Laboratory Documentation
    13. Appearance Approval Report (AAR)
    14. Sample Product Parts (PPAP samples)
    15. Master sample
    16. Checking Aids
    17. Records of Compliance with Customer-Specific Requirements (CQI's)
    18. Part Submission Warrant (PSW)/Bulk Material Checklist

TENNECO SPECIFIC REQUIREMENTS

Tenneco addtional requirements to be fullfiled for PPAP submission. (Identified by Tenneco Purchasing). These requirements are listed below:

A1. Launch Containment Plan
A2. Capacity Verification (as required)
A3. APQP Tracker
A4. IMDS Documentation
A5. Packaging Plan Proposal
A6. Vendor Tooling Registration Form
A7. Manufacturing Review Form (nothing is required in this section)
A8. Process Change Notice (used only for PPAP'd due to a Process Change)
A9. Conflict of Minerals (if applicable)
A10. Subcontractors/Suppliers PPAP
A11. Other Specified Requirement (as required)

Detailed information about each item can be found @ https://www.tenneco.com/suppliers or by contacting the respective plant representative or Supplier Quality Engineer.

ABBREVIATIONS AND TERMS

A2LA	American Association for Laboratory Accreditation
AIAG	Automotive Industry Action Group
APQP	Advanced Product Quality Planning
CC	Critical Characteristic
CP	Control Plan
Cpk	The capability index for a stable process - sigma is based on subgroup variation
CQI	Continuous Quality Improvement (examples CQI-15 Welding / CQI-12 Coating)
FMEA	Failure Mode and Effect Analysis
GRR	Gauge Repeatability & Reproducibility
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories
MSA	Measurement System Analysis
PCN	Process Change Notification
PFD	Process Flow Diagram
PPAP	Production Part Approval Process
Ppk	The performance index – sigma is based on total variation
PTC	Pass Through Characteristics
RFQ	Request for Quote
RPN	Risk Priority Number
SC	Significant Characteristic
SDE	Supplier Development Engineer
SQE	Supplier Quality Engineer
TSM	Tenneco Supplier Manual

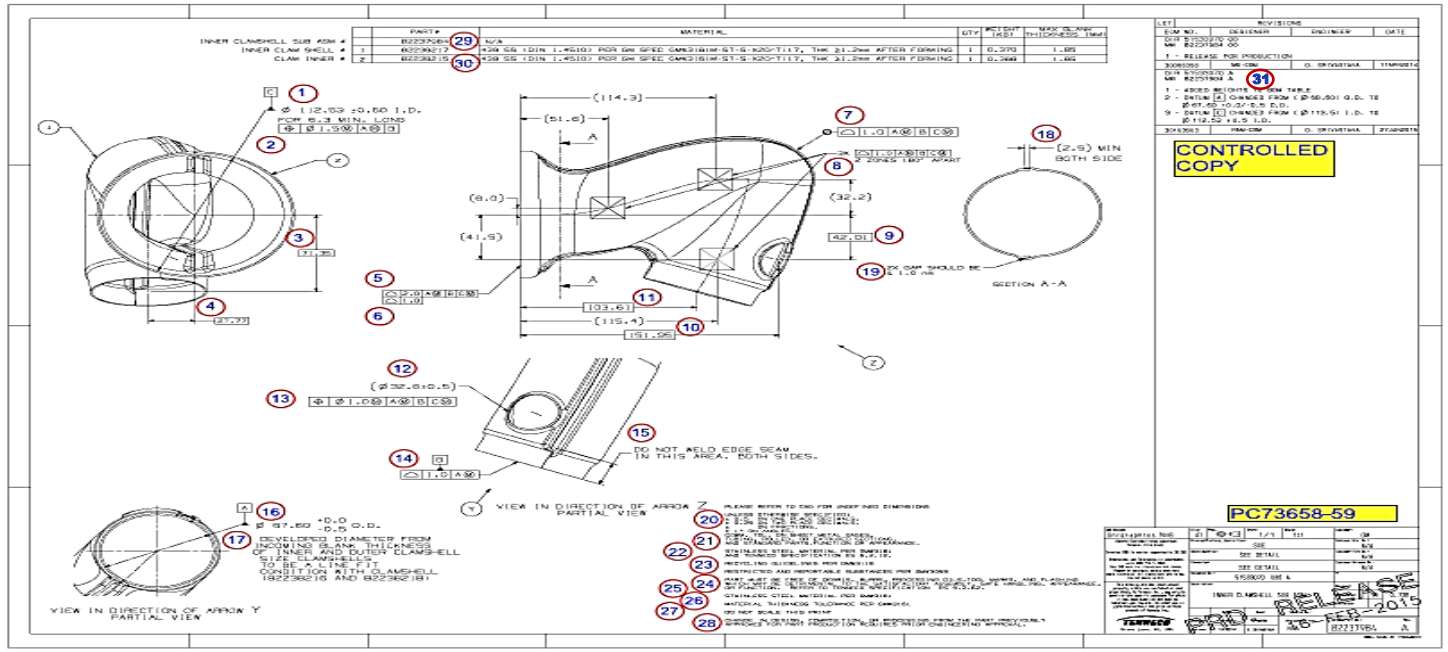
PPAP SUBMISSION LEVEL

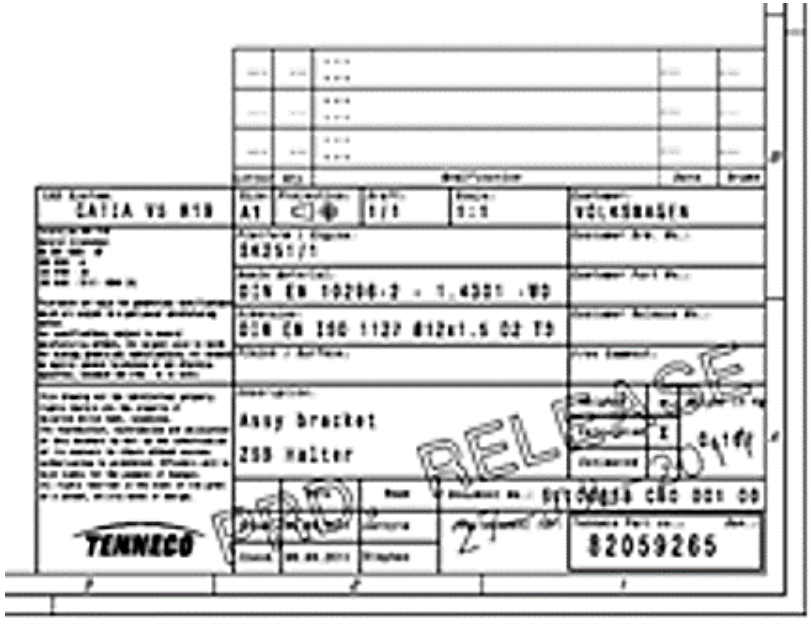
- PPAP levels differ only on the document Submission vs Retention. Hence it is the responsibility of the supplier to keep updating all the necessary documents at their end per Level 3 requirements and ensure it is readily available for Tenneco upon request within 48 hours.

- PPAP Submission Levels:
  - Level 1: PSW only (and for designated appearance items, an Appearance Approval Report)
  - Level 2: PSW with sample products and limited supporting documents
  - Level 3: PSW with sample products and complete supporting documents (standard submision level)
  - Level 4: PSW and requirements as defined by the customer
  - Level 5: PSW with sample products and complete supporting documents available for review at supplier location

1.DESIGN RECORDS

1. Fully “ballooned” drawing (all dimensions, notes, specs and tables) must be submitted as part of a PPAP for every submission level where Dimensional Results are required.
2. Where Customer Specific Requirements are noted, a statement needs to be provided confirming that their product conforms to that Customer Specific Requirements
3. All balloons must match with numbers used in Dimensional Results report.
4. Check, if the drawing number and revision level match with what is in the ePPAP Request.
5. Make sure that on the drawing “production release” stamp is present.
6. Upload ballooned drawing in Section 1a of the APQP folder. If Sections 1b and 1c are not applicable upload a blank document stating “N/A”. Examples below:





2.ENGINEERING CHANGE DOCUMENTS

1. Supplier shall have authorized engineering change documents for those changes not yet recorded in the design record but incorporated in the product, part or tooling e.g. supplier change requests, specifications updates, sub assembly drawings.
2. If there are any deviations that are not corrected at the time of PPAP and/or if there are dimensions out of specification but covered by approved deviation, only interim approval can be given.
3. If no changes required, please upload into PPAP submission one page document saying “Not required/Not applicable”.
4. Any approved engineering change or deviations should be uploaded into section 2 of TITAN PPAP C-folder.

3.CUSTOMER ENGINEERING APPROVAL

1. If specified by the customer (OEM), supplier should have evidence of customer engineering approval.
2. In most cases this section will be left blank. However a single page document should be uploaded into PPAP submission saying “Not required/Not applicable”.

Not required/

Not applicable

3. Elements from this paragraph should be uploaded into section 3 of TITAN PPAP C-folder.

   Example below:

4.DESIGN FMEA (DFMEA)

If supplier is responsible for the part/product design, completion and submission of dFMEA according to customer-specified requirements is required

1. Design FMEA should be done according AIAG FMEA handbook (the latest version available at www.aiag.org).
2. If the supplier does not want to upload the dFMEA due to confidentiality, a cover page confirming that the FMEA was done according to AIAG standard and/or listed RPN levels (at least top 10) can be submitted instead.
3. In any case dFMEA should be available for Tenneco representative to review at supplier location.
4. During review following points will be checked: part number and revision level (it should match with the latest drawing), items with highest RPN/severity level must be covered with actions.
5. When there is a design step where the Severity = 5 - 8 AND an Occurrence = 4 - 10, this step must be highlighted in the pFMEA for team focus. Also, if Severity = 9 or 10 this design step must be highlighted in the pFMEA for team focus.
6. If Tenneco is responsible for the design, this section will be left blank. However a single page document can be uploaded into PPAP submission stating “not required/not applicable“.
7. Elements from this paragraph should be uploaded into section 4 of TITAN PPAP C-folder.

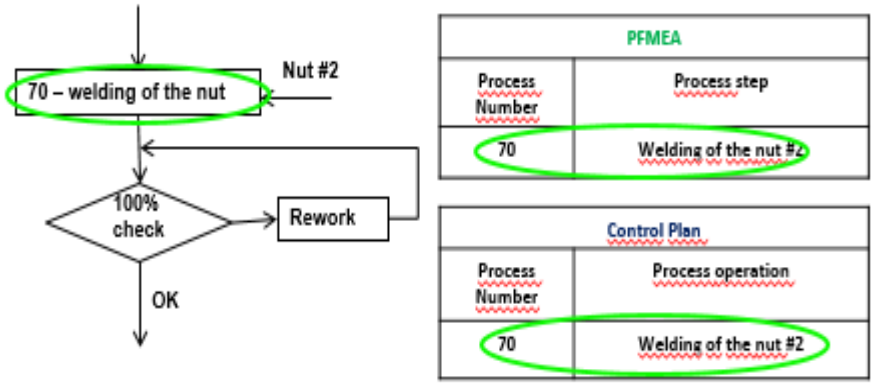
5.PROCES FLOW DIAGRAM (PFD)

Process Flow Diagram is a way to visualize a process and must meet specified customer needs. After review, it should be clear what the process includes:

1. Each step in the process, (receiving of raw material, part manufacturing, inspections and checks, assembly, packaging, shipping).
2. If there are any production steps done externally (outsourced operations).
3. If there are any abnormal handling processess such as rework, offline activities (measurement, inspection, handling) and scrapping.
4. If there are any transport or storage of semi-finished products.
5. In which step of production processess are put together, sub-assembly or the addition of materials occurs (e.g. the welding nut #2 is added on during welding)
6. Which operations contains special characteristics (Critical, Significant, Manufacturing) and Pass Through Characteristics (PTC).
7. Part number and revision level should match the latest drawing.
8. Link between PFMEA, Process Flow and Control Plan

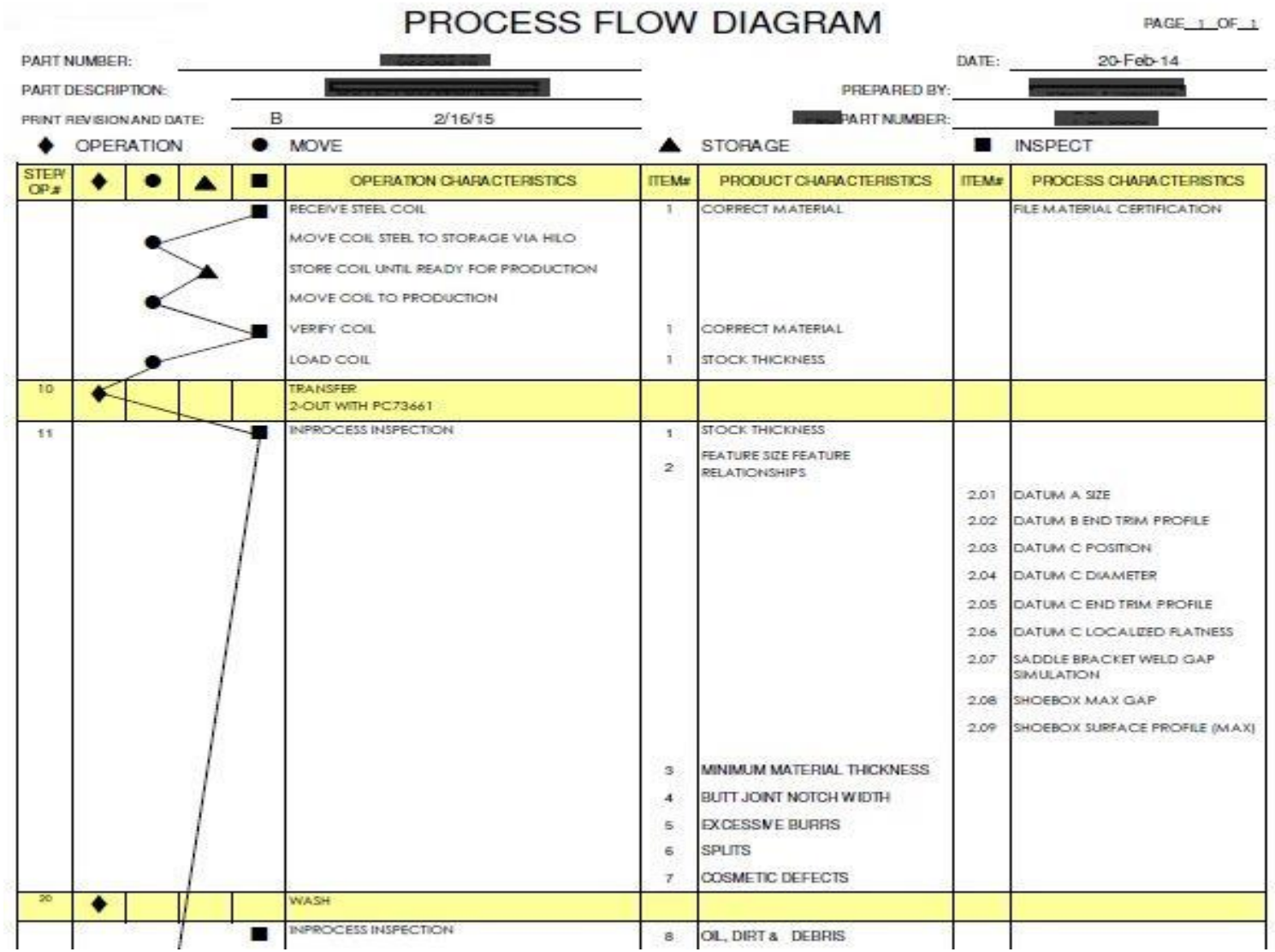
(same step numbers, names and processes) is confirmed.

PFD should be uploaded into section 5 of TITAN PPAP C- folder



5.PROCES FLOW DIAGRAM (PFD)

- This is an example of a PFD.
- Content and flow is important.
- Supplier can use their own format.



PROCESS FLOW DIAGRAM

PAGE 1 OF 1

PART NUMBER: [redacted]
PART DESCRIPTION: [redacted]
PRINT REVISION AND DATE: B 2/16/15
DATE: 20-Feb-14
PREPARED BY: [redacted]
[redacted] PART NUMBER: [redacted]

◆ OPERATION ● MOVE ▲ STORAGE ■ INSPECT

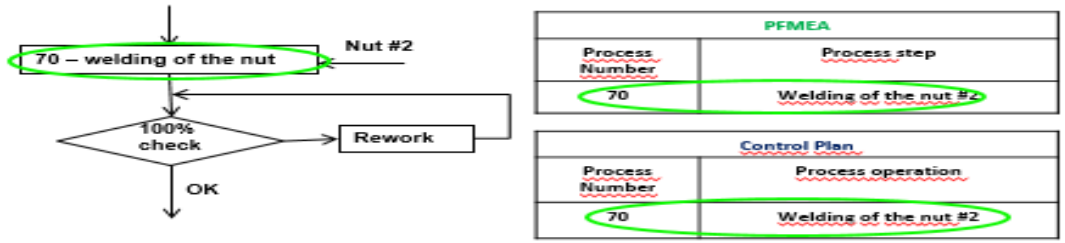
STEP/ OP.#	◆	●	▲	■	OPERATION CHARACTERISTICS	ITEM#	PRODUCT CHARACTERISTICS	ITEM#	PROCESS CHARACTERISTICS
				■	RECEIVE STEEL COIL	1	CORRECT MATERIAL		FILE MATERIAL CERTIFICATION
		●			MOVE COIL STEEL TO STORAGE VIA HILO				
			▲		STORE COIL UNTIL READY FOR PRODUCTION				
		●			MOVE COIL TO PRODUCTION				
				■	VERIFY COIL	1	CORRECT MATERIAL		
		●			LOAD COIL	1	STOCK THICKNESS		
10	◆				TRANSFER 2-OUT WITH PC73661				
11				■	INPROCESS INSPECTION	1	STOCK THICKNESS		
						2	FEATURE SIZE FEATURE RELATIONSHIPS		
								2.01	DATUM A SIZE
								2.02	DATUM B END TRIM PROFILE
								2.03	DATUM C POSITION
								2.04	DATUM C DIAMETER
								2.05	DATUM C END TRIM PROFILE
								2.06	DATUM C LOCALIZED FLATNESS
								2.07	SADDLE BRACKET WELD GAP SIMULATION
								2.08	SHOEBOX MAX GAP
								2.09	SHOEBOX SURFACE PROFILE (MAX)
						3	MINIMUM MATERIAL THICKNESS		
						4	BUTT JOINT NOTCH WIDTH		
						5	EXCESSIVE BURRS		
						6	SPLITS		
						7	COSMETIC DEFECTS		
20	◆				WASH				
				■	INPROCESS INSPECTION	8	OIL, DIRT & DEBRIS		

6.PROCESS FMEA(PFMEA)

Supplier shall develop a process FMEA in accordance with, and compliant to, customer-specified requirments.
Requirements:

1. pFMEA must be done according to AIAG & VDA FMEA Handbook per Customer Specific Requirements in terms of severity, detection and occurance ratings (the latest version available at www.aiag.org).
2. If available at the supplier, the rankings must be equal to or higher than the Tenneco dFMEA severity rankings for particular items from the drawing.
3. Refer to Tenneco Supplier Requirement Manual section 5.10 for more information such as Critical and Pass Through Characteristics.
4. In any case pFMEA should be available for Tenneco representative review at supplier location.
5. The link between PFMEA, Process Flow and Control Plan (same step numbers, names and processes) is confirmed.
6. PFMEA should be uploaded into section 6 of TITAN PPAP C-folder.

If the supplier does not want to upload the pFMEA due to confidentiality, a cover page confirming that the FMEA was done according to AIAG standard and/or with listed RPN levels (at least top 10) can be submitted instead same as pFMEA



6.PROCESS FMEA(PFMEA) - PER AIAG FORMAT

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Example of pFMEA below:

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: [redacted] Process Responsibility: DEPARTMENT PROCESS ENGINEER FMEA Number: [redacted]

Model Year(s)/Vehicle(s): N/A Key Date: N/A Prepared By: [redacted]

Core Team: Reference Flowing Form FMEA Date (Orig.) 31-Jul-14 (Rev.) (Rev) 6-Dec-14

Op # / Optional Reference #	Op Name	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s) / Mechanism(s) of Failure	Current Process Controls Prevention	Occur	Current Process Controls Detection	Detect	RPN	Recommended Action(s)	Responsibility & Target Completion Date	Action Results: Actions Taken	Sev	Occ	Det	RPN
	RECEIVE INCOMING COIL STEEL FROM SUPPLIER	CORRECT MATERIAL	INCORRECT MATERIAL	PREMATURE FAILURE, UNABLE TO PRODUCE PART TO PRINT	5		MISLABELED COIL	SUPPLIER PROCESS CONTROLS, COMPUTERIZED TRACKING SYSTEM	2	SUPPLIER PROVIDED STEEL CERTIFICATION	8	80	NONE						
					5		INCORRECT STEEL (MATERIAL PROPERTIES) SHIPPED FROM SUPPLIER	SUPPLIER PROCESS CONTROLS, COMPUTERIZED TRACKING SYSTEM, STEEL CERTIFICATION VERIFICATION PROGRAM	2	SUPPLIER PROVIDED STEEL CERTIFICATION, CERT VERIFICATION	8	80	NONE						
	VERIFY STAGED COIL (OPERATOR)	CORRECT MATERIAL	INCORRECT MATERIAL	PREMATURE FAILURE, UNABLE TO PRODUCE PART TO PRINT	5		MISLABELED COIL, LABELS SWITCHED AFTER RECEIPT	SUPPLIER PROCESS CONTROLS, COMPUTERIZED TRACKING SYSTEM	2	VERIFICATION TO ROUTED MATERIAL, CONTROL PLAN INSPECTION	8	80	NONE						
					5		INCORRECT STEEL (MATERIAL PROPERTIES) SHIPPED FROM SUPPLIER	SUPPLIER PROCESS CONTROLS, COMPUTERIZED TRACKING SYSTEM, STEEL CERTIFICATION VERIFICATION PROGRAM	2	SUPPLIER PROVIDED STEEL CERTIFICATION, CERT VERIFICATION	8	80	NONE						
					5		INCORRECT COIL LOADED	SUPPLIER'S COIL IDENTIFICATION TAGS	2	CONTROL PLAN, CHECK SHEET, IN PROCESS INSPECTION	7	70	NONE						

6.PROCESS FMEA(PFMEA) – PER AIAG AND VDA

Example of pFMEA below:

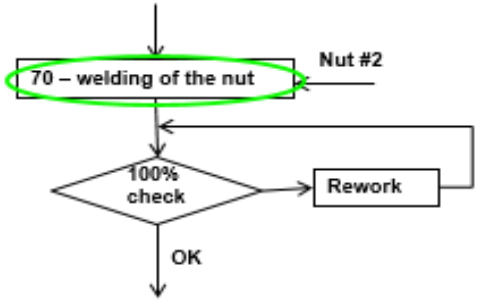
PLANNING AND PREPARATION (STEP 1)							
Company Name	Acme Automotive	Subject	PX123 Manual Column Assembly				
Manufacturing Location	Plant 6 , Saginaw, Michigan	PFMEA Start Date	19-Mar-2018	PFMEA ID Number	654321		
Customer Name	Jackson Industry	PFMEA Revision Date	25-Sep-2018	Process Responsibly	B Black		
Model Year(s)/Program(s)	2020PX123	Cross Functional Team	See Team List	Confidentlally Level	Confidential		

STRUCTURE ANALYSIS (STEP 2)				FUNCTION ANALYSIS (STEP 3)				FAILURE ANALYSIS (STEP 4)						
1. Process Item System, Subsytem, Part Element or Name of Process	2. Process Step Station No	2. Process Step Name of Focus Element	3. Process Work Element 4M Type	1. Function of the Process Item Function of System, Subsystem, Part Element or Process		2. Function of the Process Step and Product Characteristic (Quantitative value is option)	3. Function of the Process Work Element and Process Characteristic	1. Failure Effects (FE) to the Next Higher Element and/or End User		erity (S) of FE	2. Failure Mode (FM) of the Focus Element	3. Failure Cause (FC) of the Work Element	Current Prevention Control (PC) of FC	Occurrence (O) of FC
Electric Motor Assy Line	30	Sintered Bearing Press-in Process	Man	Supplier Plant	Assembly of shaft into pole housing assembly	Press in sintered bearing to acieve axial position in pole housing to max gap per print	Machine presses sintered bearing into the pole houising seat until the defined axial position	Supplier Plant	Clearnace too small to assemble shaft without potential damage	8	Axial position of sintered bearing is not reached	machine stops before reaching final position	Force adjusted aacording to data sheet	5
Electric Motor Assy Line	30	Sintered Bearing Press-in Process	Machine	Ship-to Plant	Assemby of motor to vehicle door			Ship-to Plant	Assembly of motor to door requires additional insertion force with					
Electric Motor Assy Line	30	Sintered Bearing Press-in Process		End User	Window raises and lowers			End User	comfort closing time too long					
										8	Axial position of sintered	machine stops before	Force adjusted aacording to	5

7.CONTROL PLAN(CP)

Supplier must have a control plan that defines all methods used for process control and complies with customer-specified requirments. Elements which will be checked:

1. Link the operation numbers between Process Flow Chart and PFMEA.
2. The whole production process is included - incoming of raw material, manufacturing process, in-process controls, final inspection, packaging, product and contamination audits, revalidation and rework (if applicable).
3. Controls must be clearly defined (what, how, by what, when/how often will be measured and where records will be stored). Pre-production Control Plans (Safe Launch), must be developed which include characteristics inspection method, and exit criteria.
4. If the Control Plan has a link to a work instructions, this works instruction needs to be submitted together with the Control Plan. Statements like “control in accordance with internal procedure” is not acceptable.
5. Control Plan must reflect all special characteristics as defined on the drawing.
6. Part number and revision level should match with the latest drawing and refer to Tenneco part information.
7. Welding quality verification shall be included as applicable.
8. Any planned rework must be part of the control plan.
9. Annual Revalidation should be a part of the Control Plan.
10. Control Plan is uploaded into section 7 of TITAN PPAP C-folder.



PFMEA	
Process Number	Process step
70	Welding of the nut #2

Control Plan	
Process Number	Process operation
70	Welding of the nut #2

7.CONTROL PLAN(CP)

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Example of Control Plan below:

CONTROL PLAN

(1) ☐ Prototype ☐ Pre-Launch ☐ Production ☐ Safe Launch

Page _____ of _____

(If Safe Launch is included in Pre-Launch or Production Control Plan, check both boxes)

Control Plan Number (2)		Key Contact/Phone (7)	Date (Orig.) (9)	Date (Rev.) (10)
Part Number/Latest Change Level (3)			Customer Engineering Approval/Date (If Req'd.) (11)	
Part Name/Description (4)		Supplier/Plant Approval/Date (8)	Customer Quality Approval/Date (If Req'd.) (12)	
Supplier/Plant (5)	Supplier Code (6)	Other Approval/Date (If Req'd.) (13)	Other Approval/Date (If Req'd.) (13)	

PART/ PROCESS NUMBER	PROCESS NAME/ OPERATION DESCRIPTION	MACHINE, DEVICE, JIG,TOOLS FOR MFG.	CHARACTERISTICS			SPECIAL CHAR. CLASS	METHODS		SAMPLE			REACTION PLAN	
			NO.	PRODUCT	PROCESS		PRODUCT/PROCESS SPECIFICATION/ TOLERANCE	EVALUATION/ MEASUREMENT TECHNIQUE	SIZE	FREQ.	CONTROL METHOD	ACTION	OWNER/ RESPONSIBLE
(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)		(24)	(25)	(26)

8.MEASUREMENT SYSTEM ANALYSIS

Supplier should complete MSA studies (e.g. Gage R&R) for all new or modified gages, measurement and test equipment. Gage studies shall comply with AIAG guidelines (MSA manual the latest version) and end-user customer specific requirements: **All measurement and test equipment called out on the Control Plan must have Gage R & R completed.**

1. Variable gauge studies should utilize: 10 parts (as a minimum), 2 operators and 3 trials.
2. Acceptance criteria based on variable gage R&R studies are (calculation with ANOVA):
   - < 10 % of tolerance →accepted
   - 10 - 30 % of tolerance → may be acceptable, contact Tenneco
   - > 30 % of tolerance → unacceptable
   - NDC (Number of Distinct Characteristics) > 5
3. Attribute gauge study should utilize: 30 pieces (as minimum, from entire tolerance range and 20% out of the spec), 3 operators, 3 trials. Acceptance criteria:
   - Kappa value >0.75 → acceptable
   - Kappa value <0.75 → not acceptable and improvement plan needed
4. Evidence of parts used (photos uploaded) and physical parts to be maintained for 3 months.

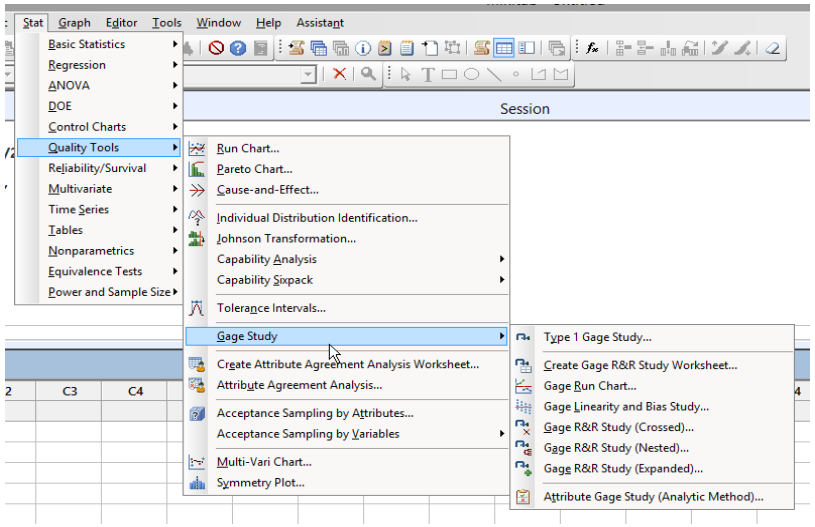
Elements to be checked:

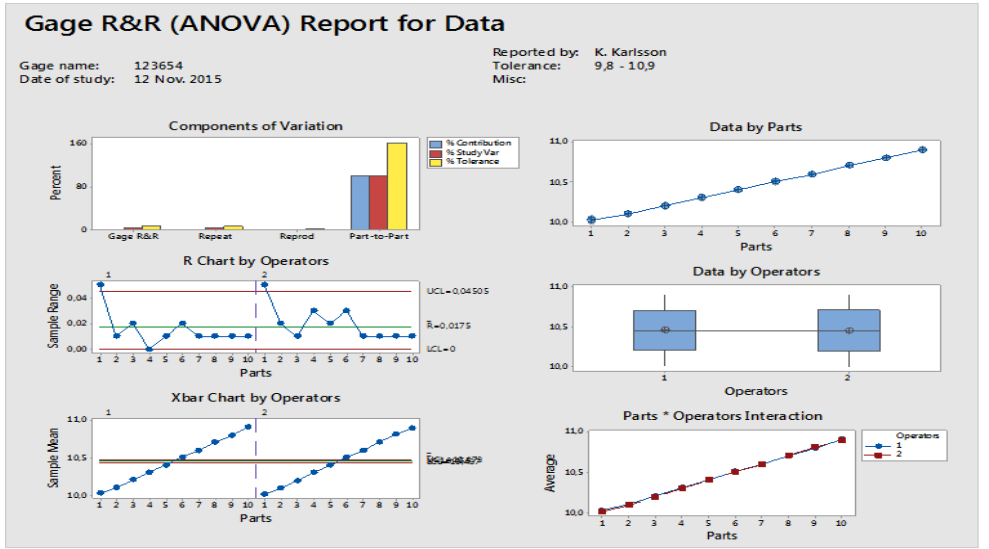
- Studies performed on all gages used on SC/CC features (as minimum, including on-line gages and testers)
- Work instruction for gauge and photos of gauge should be part of PPAP (see section16 Checking Aids).
- Raw data available for each study - All studies should be uploaded into section 8 of TITAN PPAP C-folder.

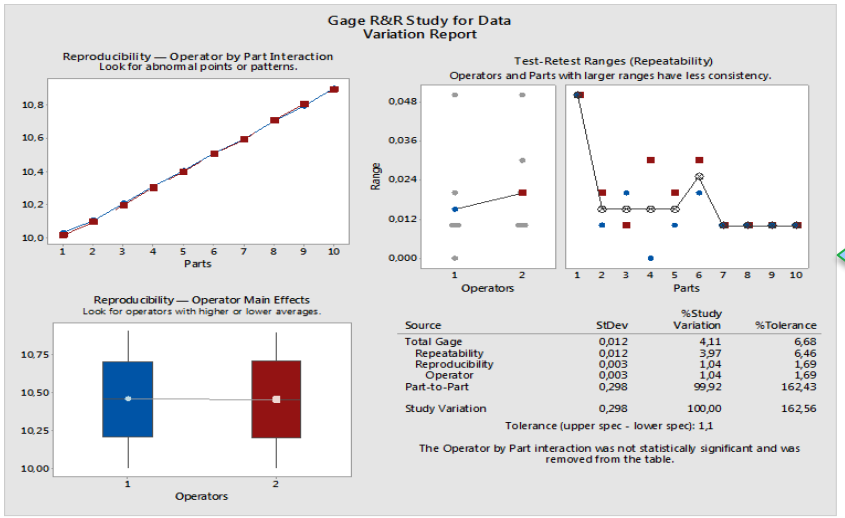
8.MEASUREMENT SYSTEM ANALYSIS

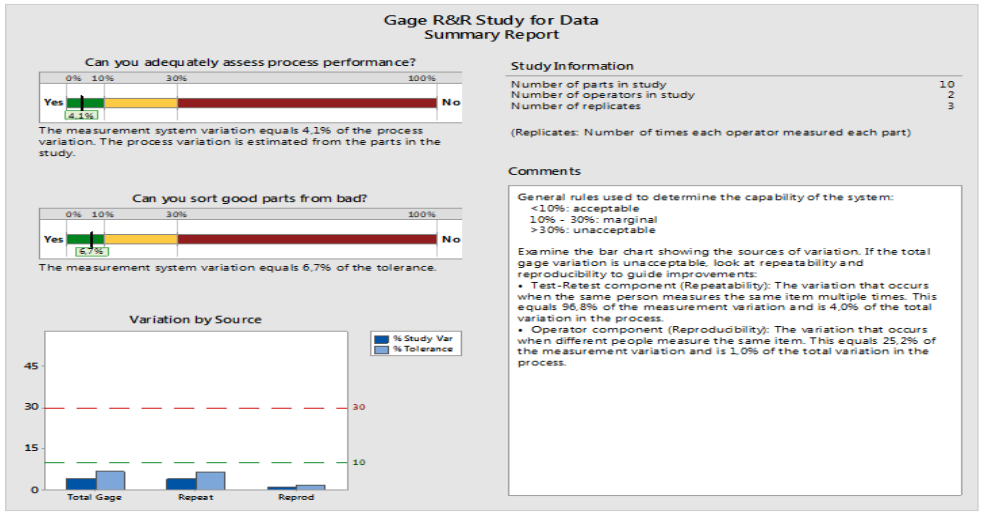
TENNECO

Example of MSA study generated with CAQ software:









9.DIMENSIONAL RESULTS

Supplier should be able to provide evidence that all measurements/test have been done in accordance with the Control Plan and results indicate compliance with specified requirments.

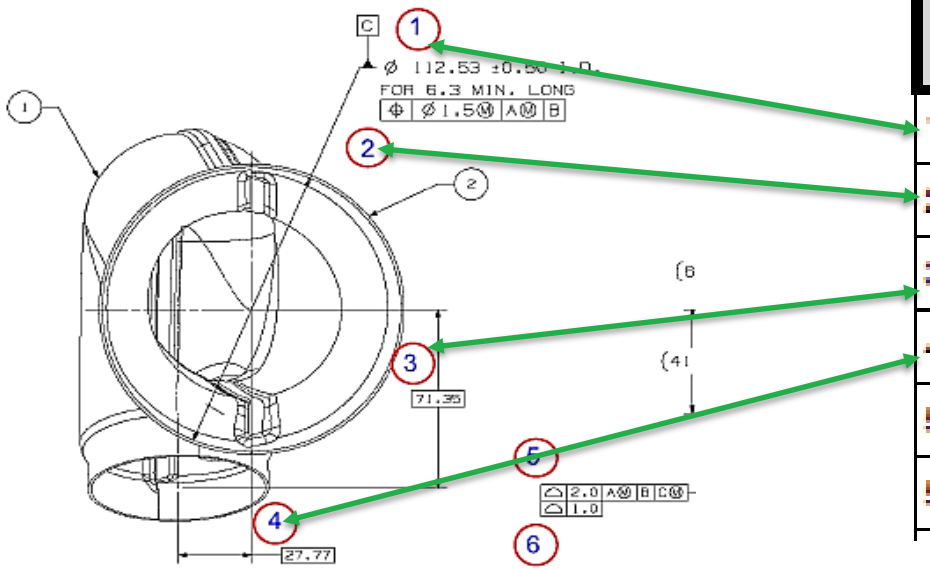
Elements to be checked:

1. The Dimensional Results must correlate with ballooned drawing including all characteristics, specifications, notes and all tables.
2. Each data point must indicate an evaluation result. Example: “in spec/out of spec”, “ok/nok” and/or “pass/fail”.
3. Must use appropriate measuring tools, refer AIAG guideline “The rule of tens”.
4. The report must include only measured values - ranges are not allowed.
5. All PPAP samples are measured; in case of multiple cavity tool – 1 part per cavity, as minimum.
6. Base for the measurements is 2D drawing and table callouts.

9.DIMENSIONAL RESULTS

7. The submitted PPAP Samples must be measured and numbered per the dimensional layout,
   - minimum number of parts laid out per the PPAP Request
   - or 1 per cavity of multiple cavity tools.

8. Datum system for CMM must be defined, measurement strategy (best fit not allowed), sketches, inspection points must accompany the Dimensional Reports and should be uploaded into section 9 of TITAN PPAP C-folder.



ITEM	DIMENSION / SPECIFICATION	
1B_6MM	Ø112.530 ±0.500	Diameter
2B_6MM	⌖ Ø1.500Ⓜ AⓂ B	True Position
3	-71.346 Y-BASIC	Y Coordinate
4	-27.767 Z-BASIC	Z Coordinate
5 Max	⌓ 2.000 AⓂ B CⓂ	Vector (Profile)
5 Min	⌓ 2.000 AⓂ B CⓂ	Vector (Profile)

9.DIMENSIONAL RESULTS

TENNECO

Example of Dimensional Results below:

Production Part Approval
Dimensional Test Results

Page 1

ORGANIZATION:	[redacted]	PART NUMBER:	[redacted]
SUPPLIER/VENDOR CODE:		PART NAME:	[redacted]
NAME OF INSPECTION FACILITY:	[redacted]	DESIGN RECORD CHANGE LEVEL:	A 021615
		ENGINEERING CHANGE DOCUMENTS:	

ITEM	DIMENSION / SPECIFICATION		SPECIFICATION / LIMITS		TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)						OK	NOT OK
1B_6MM	Ø112.530 ±0.500	Diameter	0.500	-0.500	18-Aug-2016	6	112.127	112.281	112.253	112.215	112.223	112.224	X	
2B_6MM	⌖ Ø1.500Ⓜ AⓂ B	True Position	1.500		18-Aug-2016	6	0.554	0.457	0.671	0.738	0.458	0.636	X	
3	-71.346 Y-BASIC	Y Coordinate			18-Aug-2016	6	-71.338	-71.338	-71.354	-71.356	-71.341	-71.353	Basic	
4	-27.767 Z-BASIC	Z Coordinate			18-Aug-2016	6	-27.743	-27.737	-27.802	-27.805	-27.753	-27.795	Basic	
5 Max	⌓ 2.000 AⓂ B CⓂ	Vector (Profile)	1.000	-1.000	18-Aug-2016	6	0.742	0.821	0.827	0.821	0.797	0.849	X	
5 Min	⌓ 2.000 AⓂ B CⓂ	Vector (Profile)	1.000	-1.000	18-Aug-2016	6	-0.259	-0.359	0.043	0.039	-0.342	0.043	X	
6 Max	⌓ 1.000	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	0.273	0.323	0.392	0.398	0.320	0.421	X	
6 Min	⌓ 1.000	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	-0.114	-0.135	-0.051	-0.067	-0.096	-0.058	X	
7 Max	⌓ 1.000 AⓂ B CⓂ	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	0.489	0.493	0.488	0.483	0.489	0.499	X	
7 Min	⌓ 1.000 AⓂ B CⓂ	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	-0.472	-0.477	-0.473	-0.467	-0.476	-0.466	X	
8 Max	⌓ 1.000 AⓂ B CⓂ	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	0.233	0.329	0.370	0.403	0.281	0.338	X	
8 Min	⌓ 1.000 AⓂ B CⓂ	Vector (Profile)	0.500	-0.500	18-Aug-2016	6	-0.355	-0.416	-0.007	0.013	-0.269	-0.008	X	
9	-42.230 Y-BASIC	Y Coordinate			18-Aug-2016	6	-43.036	-43.071	-43.179	-43.127	-43.051	-43.252	Basic	
10	152.645 X-BASIC	X Coordinate			18-Aug-2016	6	152.266	152.289	152.126	152.120	152.317	152.114	Basic	

9.DIMENSIONAL RESULTS

Supplier should provide a measurement strategy and upload with the dimensional results into the C-folder.

Minimum information needed:

1. Measuring System:
    1. Taktile
    2. Contactless
    3. CMM (Coordinate-measuring machine)
    4. Mobil Measuring equipment (Measuring arm, e.g. FARO, Romer, etc)
    5. Other
2. Orientation of Part for Measurement: **Parts are clampled only if print states – with Part Restrained**.
    1. A picture of the part showing the component in its measurement orientation.
    2. Additional information to support the clamping.
        I. (constraints must not distort the form of the part)
        II. (light magnets or light spring loaded clamps may be used)
3. Alignment of the Component:
    1. Alignment acc. which reference system
    2. Best Fit
    3. Other
    4. Number of points taken per measurement
    5. Method of calculation for the results (e.g. average, minimum, maximum, .. etc)
4. Software:
    I. Which software was used and with which revision level.

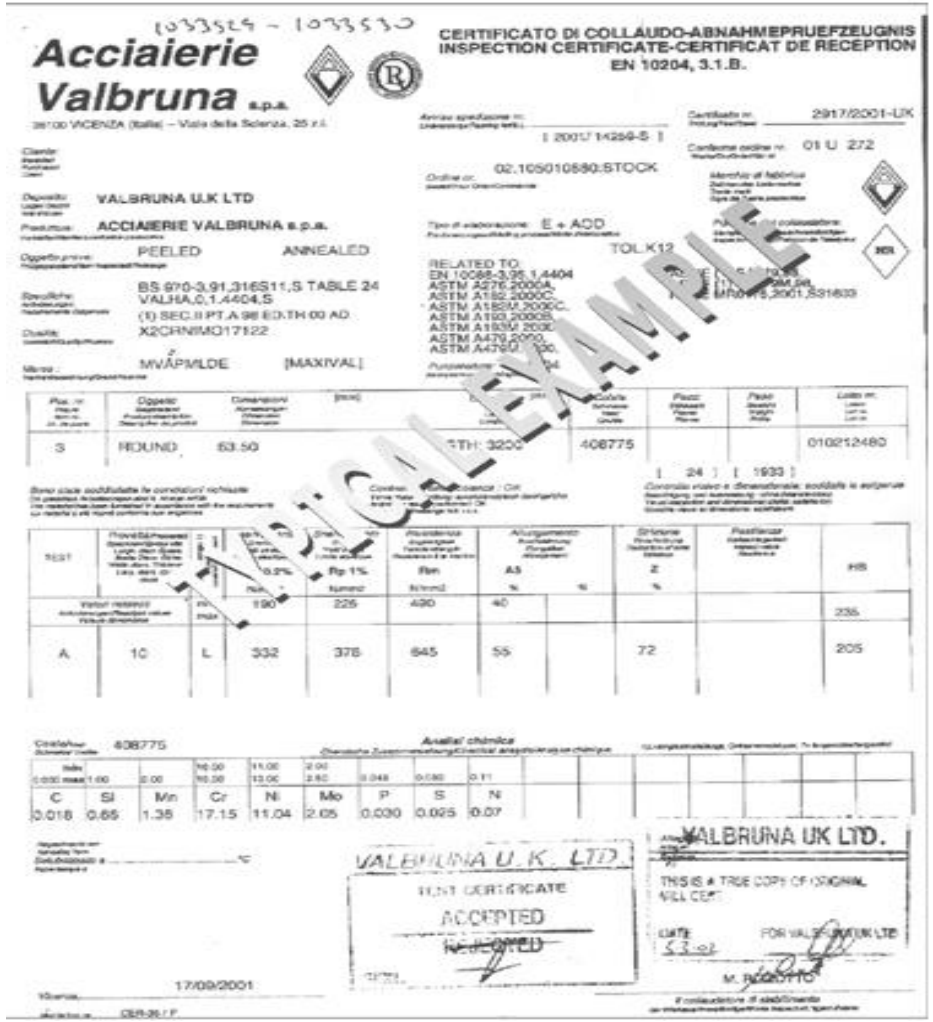
10.RECORDS OF MATERIAL / PERFORMANCE TEST RESULTS

Supplier should have records of material and/or performance test results for tests specified on design records or Control Plan.

Elements to be checked:

1. Part number and revision should match the drawing (for all submitted documents)
2. Material certificate must be in English or bilingual and according EN 10204 3.1
3. Material certificate must contain the chemical composition and mechanical properties of the material as per drawing and clearly identify the mill source.
4. No data should be older than one year (prior to PPAP submission supplier should contact Tenneco representative, if material certificate is older).
5. Material certifications and results for product validation
    1. Welding joints on the components weld seam metallography reports shall be attached
    2. All Weld seams shall be numbered and for each a report shall be attached, specification with limit and assessment OK/ NOK shall be included
    3. (for example tests results such as Weld Cut & Etch) or design validation testing should be attached here (section 10 of TITAN PPAP C-folder).
6. Examples of Material Certificate and Material test results attached: next slide...

10.RECORDS OF MATERIAL / PERFORMANCE TEST RESULTS



Acciaierie Valbruna s.p.a.

CERTIFICATO DI COLLAUDO-ABNAHMEPRUEFZEUGNIS
INSPECTION CERTIFICATE-CERTIFICAT DE RECEPTION
EN 10204, 3.1.B.

VALBRUNA U.K LTD
ACCIAIERIE VALBRUNA s.p.a.
PEELED ANNEALED
BS 970-3,91,316S11,S TABLE 24
VALHA,0,1.4404,S
X2CRNIMO17122

S	ROUND	63.50			408775			010212480	
A	10	L	332	378	645	55	72		205

C	Si	Mn	Cr	Ni	Mo	P	S	N
0.018	0.65	1.35	17.15	11.04	2.05	0.030	0.025	0.07

VALBRUNA U.K. LTD.
ACCEPTED
17/09/2001

VALBRUNA UK LTD.

TYPICAL EXAMPLE

Production Part Approval
Material Test Results

Page 1 of 1 Pages

DAIMLERCHRYSLER

ORGANIZATION: [redacted]	PART NUMBER: [redacted]
SUPPLIER / VENDOR CODE: [redacted]	PART NAME: [redacted]
MATERIAL SUPPLIER: [redacted]	DESIGN RECORD CHANGE LEVEL: A 27-Jan-15
*CUSTOMER SPECIFIED SUPPLIER / VENDOR CODE:	ENGINEERING CHANGE DOCUMENTS:
*If source approval is req'd, include the Supplier (Source) & Customer assigned code.	NAME of LABORATORY: AK Steel Corporation

MATERIAL SPEC. NO. / REV / DATE	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	SUPPLIER TEST RESULTS (DATA)	OK	NOT OK
439SS per						
GMW3161M-ST-S-X2CrTi17						
C	0.030 Max	8/12/2016	1	0.0082	X	
Mn	1.00 Max	8/12/2016	1	0.3100	X	
P	0.040 Max	8/12/2016	1	0.0250	X	
S	0.030 Max	8/12/2016	1	0.0013	X	
Si	1.00 Max	8/12/2016	1	0.3400	X	
Cr	16.00 - 20.00	8/12/2016	1	17.4100	X	
Ni	0.500 Max	8/12/2016	1	0.1700	X	
Mo	---	8/12/2016	1	-----	X	
Al	---	8/12/2016	1	0.0120	X	
N	0.040 Max	8/12/2016	1	0.0087	X	
Cb	---	8/12/2016	1	0.0220	X	
Ti	0.20 + 4*(C+N) Min	8/12/2016	1	0.3500	X	
Tensile Strength	415 MPa Min	8/12/2016	1	465.5 MPa	X	
Yield Strength	205 - 345 Mpa	8/12/2016	1	294.5 MPa	X	
Elongation Percentage	30% Min	8/12/2016	1	32.60%	X	

Blanket statements of conformance are unacceptable for any test results.

SIGNATURE	TITLE	DATE
[redacted]		

10. RECORDS OF MATERIAL / REACH & ROHS

If required with the PPAP request, Supplier needs to provide in each PPAP the compliance confirmation for REACH & RoHS, uploaded into section 10 of TITAN PPAP APQP-folder.

Tenneco and its suppliers are actively working towards compliance with European Union (EU) Regulation No. 1907/2006 concerning REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), and EU Directive 2002/95/EC, 2011/65/EU, 2015/863 regarding RoHS (Restriction of use of Certain Hazardous Substances, “RoHS Recast”) in Electrical and Electronic Equipment.

RoHS & REACH requirements apply to some products of certain of our OE Customers.

This means that suppliers that provide certain parts, components, assemblies and products will continue to be asked for part chemical content information.

As per our Tenneco Supplier Requirements Manual, Section 9. Regulatory Product Compliance

Suppliers are obligated to ensure that products supplied meet all regulations applicable to the suppliers' manufacture and sale of these products. The Tenneco Supplier Manual also requires that suppliers provide Tenneco with all the information and documentation necessary for Tenneco to comply with applicable regulations, including REACH and RoHS.

Tenneco is informing you to upload information related to your company's products and EU RoHS

(Restriction of Hazardous Substances "RoHS Recast") Directive 2002/95/EC, 2011/65/EU, 2015/863 and EUREACH

(Registration, Evaluation, Authorization and Restriction of Chemicals) Regulation No. 1907/2006.

RoHS:
Please use the RoHS compliance overview templates (link sheet) to confirm compliance with the RoHS regulations for the components on part number level that you deliver to Tenneco.

REACH: To confirm compliance with the REACH regulations please provide a copy of the REACH compliance certificate.

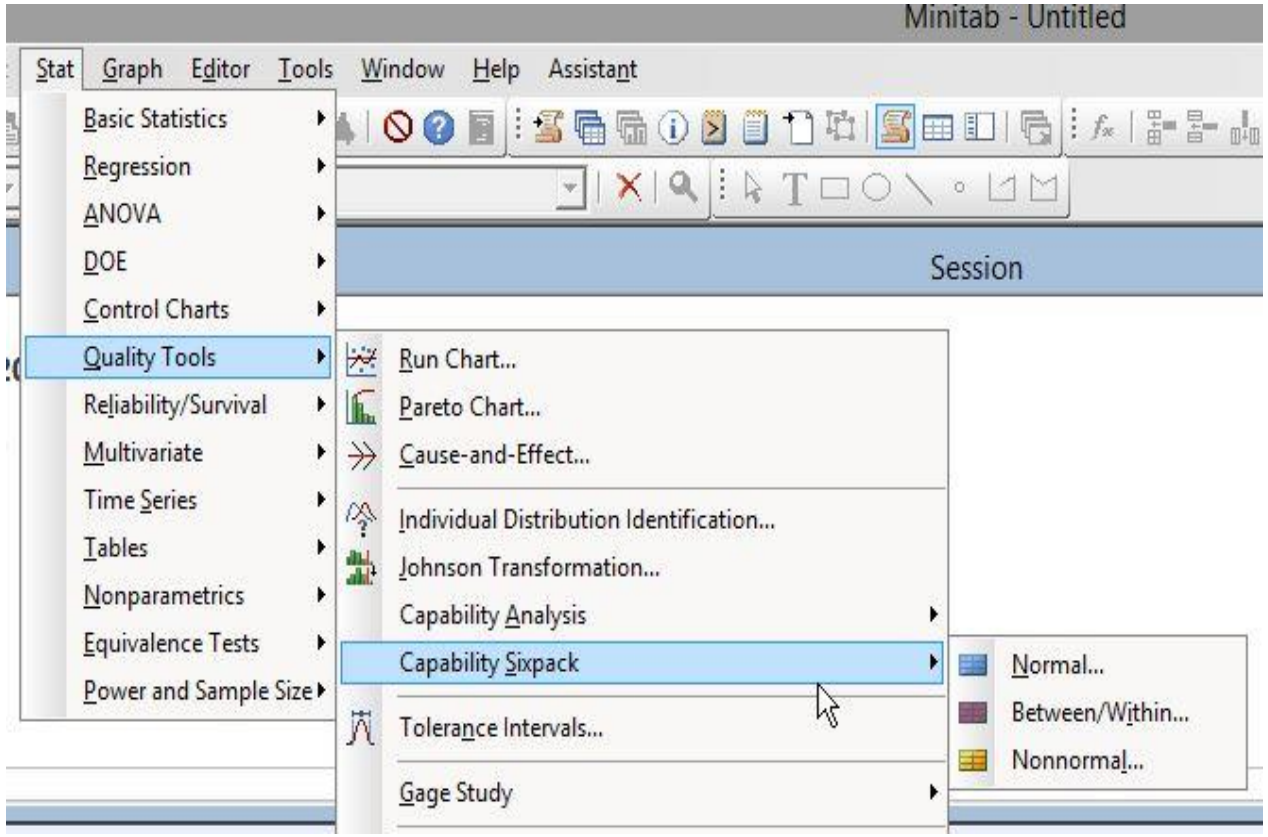
11.INITIAL PROCESS STUDIES

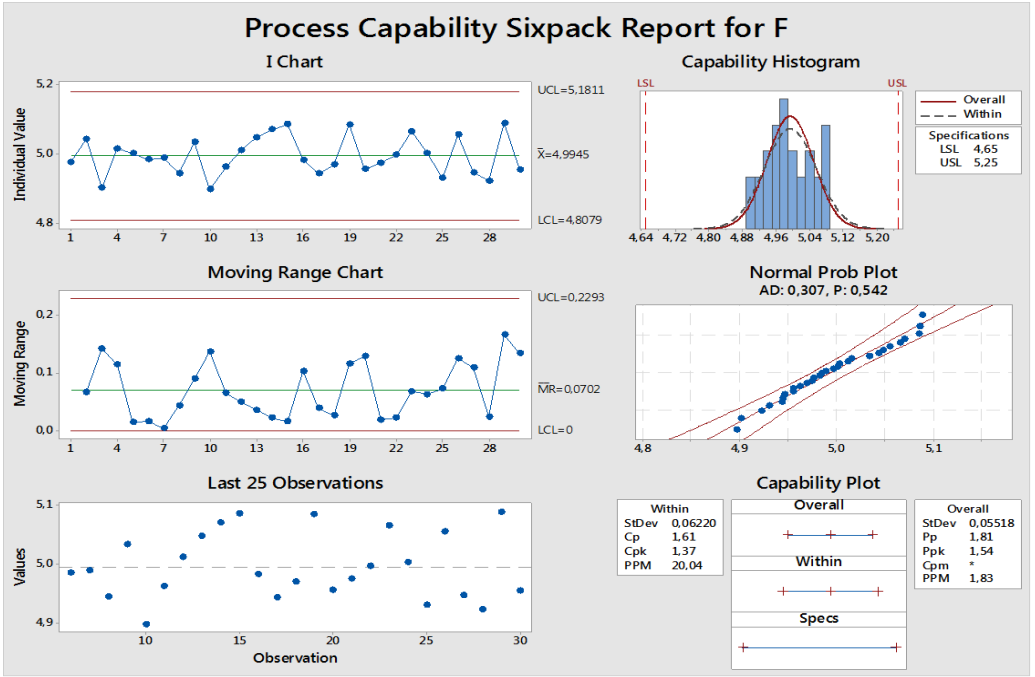
In case of identified critical, significant or pass through dimensions, supplier must perform a process capability study. If there are no critical features called out on the print, Tenneco reserves the right to require initial process capability on other characteristics.

Elements to be checked:

1. Sampling: for variable data a minimum 125 (or as agreed with Tenneco) readings from consecutive parts of the significant production run is required for the study.
2. Sampling: for attribute data a minimum 300 (or as agreed with Tenneco) readings from consecutive parts of the significant production is required for the study.
3. Normality test must be performed, and P-value must be greater than 0.05.
4. Raw data should be available for each study.
5. Acceptance criteria:
   - Index Cpk, Ppk > 1.67 -- process currently meets the acceptance criteria
   - 1,33 =< Index Cpk, Ppk => 1.67 -- process is not acceptable for Critical Characteristics, for another characteristics acceptable
   - Index Cpk, Ppk < 1.33 -- process does not currently meet the acceptance criteria
6. If process acceptance criteria are not meet for one or more characteristics containment (e.g. 100% inspection) and action plan is required.
7. Each cavity of a multiple cavity mold or multiple tool process, must have its own capability study.
8. All relevant documents should be uploaded into section 11 of TITAN PPAP C-folder.

11.INTIAL PROCESS STUDIES





Capability Analysis for F
Report Card

Check	Status	Description
Stability	✓	The process mean and variation are stable. No points are out of control.
Number of Subgroups	i	You have 30 subgroups. For a capability analysis, this is usually enough to capture the different sources of process variation when collected over a long enough period of time.
Normality	✓	Your data passed the normality test. As long as you have enough data, the capability estimates should be reasonably accurate.
Amount of Data	!	The total number of observations is less than 100. You may not have enough data to obtain reasonably precise capability estimates. The precision of the estimates decreases as the number of observations becomes smaller.

12.QUALIFIED LABORATORY DOCUMENTATION

- If testing is performed in a supplier's internal lab, they must provide a copy of their quality certification. The supplier should also provide documentation of the appropriate laboratory scope.

- If an external lab is used, the supplier should send a copy of the outside lab certification and the scope of accreditation (must be ISO 17025/A2LA certified or regional equivalent).

- All relevant documents should be submitted into section 12 of TITIAN PPAP C-folder.

13.APPEARANCE APPROVAL REPORT (AAR)

- Appearance Approval Report shall be completed for each part, if the product/part has appearance requirements on the design records**. <u>If AAR is not required, then upload sheet with statement indicating N/A (Not applicable)</u>**

- AAR is typically applied for parts with color, grain or surface appearance requirements. (Typically, exhaust components require an AAR report for polish/chrome/painted decorative exhaust tips that is signed-off by the customer).
- Parts to be evaluated in standardized condition such as: light intensity, control distance, control time etc. These conditions should be agreed with Tenneco and included in the report.
- If the AAR is requested, the samples should be submitted independently on PPAP level submission.
- All known failures related to supplier’s technology should be evaluated together with the supplier and approved by Tenneco in writing.
- Even though the appearance samples are agreed on, the launch containment should be focused on appearance to identify and evaluate unknown failures. The failures catalog should be developed by the supplier and shared with Tenneco for review and approval.

- Tenneco approved ARR/failure catalog should be uploaded into section 13 of TITAN PPAP C-folder.

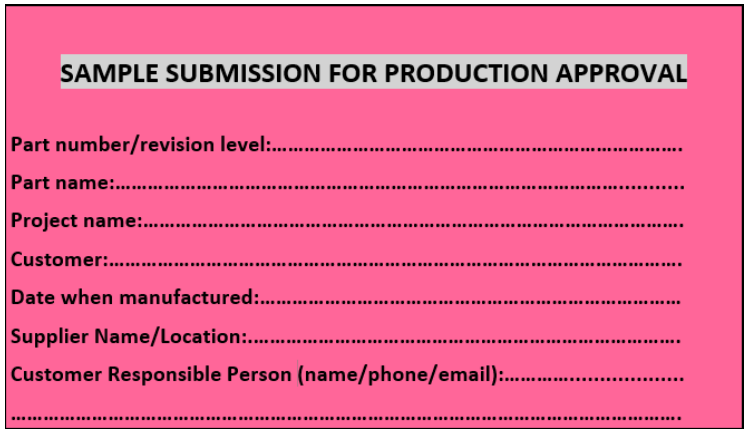
14.SAMPLE PRODUCT PARTS (PPAP SAMPLES)

- The supplier shall provide, either a minimum of 6 samples or 1 sample per cavity for multi-cavity processes unless otherwise directed by Tenneco in writing.

- These samples must be defined as PPAP samples on all shipping documents. The PPAP sample label must be placed on the container near the part number label. PPAP samples must arrive at the Tenneco facility on or before PPAP due date.
- PPAP sample label can be found in the Supplier Resource Center (www.Tenneco/Suppliers.com)

Each sample part must have a tag with following information listed below:

1. The part is identified as a PPAP Sample Part
2. Tenneco part number, revision level and part name
3. Project name and Customer
4. Date when manufactured
5. Supplier Name/Location
6. Customer Responsible Person (name/phone/email)



Into section 14 of TITAN PPAP C-folder supplier should upload shipment tracking information **such as UPS; DHL; FedEx; etc. tracking numbers.**

15.MASTER SAMPLE

- Supplier should retain master sample from the PPAP run.
- The master sample shall be identified as such, and a picture of master sample with identification tag should be provided in TITAN PPAP C-folder 15.
- One (1) master sample per cavity for multi-cavity processes should be retained, unless otherwise directed by Tenneco.

Master sample part must have a tag with following information listed below:

1. The part is identified as a Master Sample
2. Tenneco part number, revision level and part name
3. Project name and Customer
4. Date when manufactured
5. Equipment # and/or process used
6. Date of Supplier PPAP Warrant signed off

(Example label)

16.CHECKING AIDS

- This PPAP element is used in order to certify that all aspects of these **Part Specific checking** aids comply with product requirements/specifications for testing as stated by the drawing. This includes mylar templates used in verifying the part dimensions.

Elements to be checked/uploaded:

1. Procedure or description how the checking aid or control gage is used should be submitted here.
2. All used gauges should agree with part dimensional requirements.
3. Gage master samples are visually color-coded as PASS (Green) or FAIL (Red)
4. MSA should be conducted for all gauges used according to Control Plan
5. Gauge Drawing and/or Gauge 3D Model
6. Gauge Certification by approved lab
7. Picture of Part in Gauge

- ***List of control gauges with supportive documentation (calibration record within past year, gage instructions and photos) should be uploaded into section 16 of TITAN PPAP C-folder - "Checking Aids"***

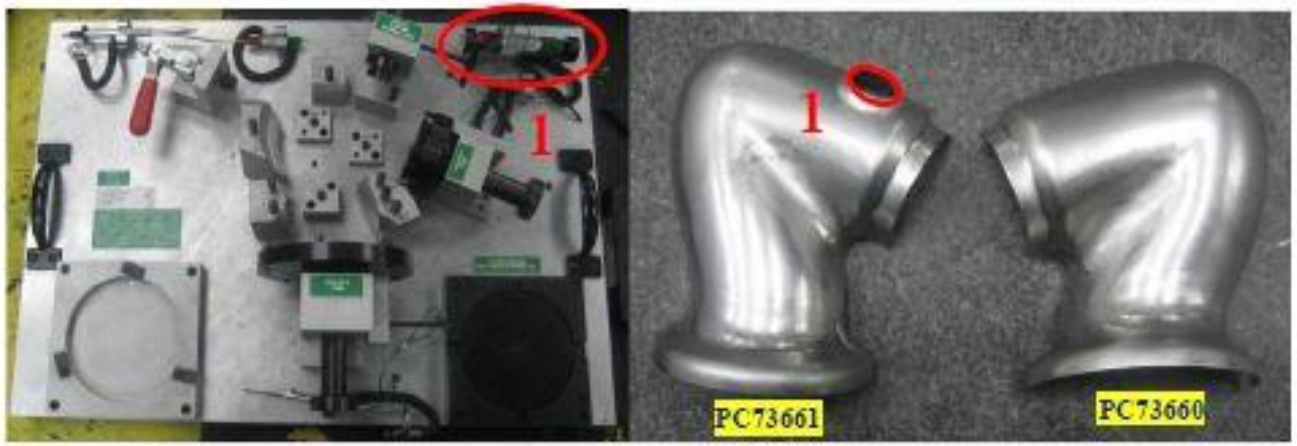
16.CHECKING AIDS

Example of checking aid and gauge instruction:

GAGE INSTRUCTIONS **PC73660/61**
Department 36 **OPERATION 10**

GAGE ID: PC73660/61#ST1

1. **Gage Components:** Three Stab Pins with Lock Pins, Two Go/No-Go Feelers, One Go/No-Go Plug, One Check Block, One Scribe, and One Flat Feeler.



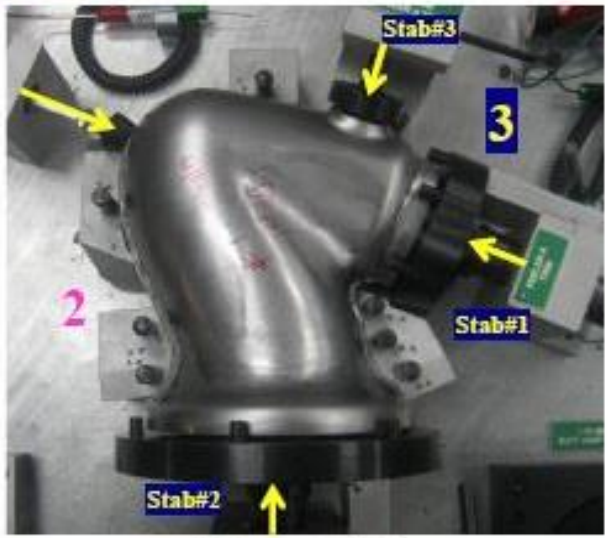
Photograph A

Photograph A

Instructions:

a. Check the size of the sensor port hole in the PC73661 with the 29.0/29.5mm Go/No-Go Plug. (Photograph A, Number 1)

b. Mate the PC73660 to the PC73661, and locate the assembly to the fixture. (Photograph B, Number 2)



Photograph B

17.COMPLIANCE WITH CUSTOMER-SPECIFIC REQUIREMENTS

- This section is for uploading any customer specific requirements which are called out on the print (coming from Ford, GM, Harley, etc.) and/or Tenneco.
- **Tenneco requires Special process CQI completed audits to be uploaded. CQI's should be within a year of last audit. For sub-supplier CQI's they can be entered here or in the sub-supplier ppap package but must be included in each ppap that lists them in the flow of material.**
- If there are any other customer/region/plant specific requirements, they should be uploaded into this folder (e.g. CQI standards – section 17 of TITAN PPAP C-folder).
- If none are in current process, upload a blank document stating, "Not required/Not applicable".

Not required/

Not applicable

18.PART SUBMISSION WARRANT

- Part Submission Warrant – is a document required for all newly tooled and/or revised product in which the supplier confirms that inspections and tests on production parts show conformance to Tenneco requirements. USE the AIAG Format, **unless otherwise specified by Tenneco**.
- A Part Submission Warrant MUST be properly and FULLY filled out - no blank spaces.
- If information is not required, then enter N/A.
- Weight recorded in kg and four decimal places.
- Purchase Order number will be the Scheduling Agreement Number for Tenneco.
- For “”Customer Name/Division” state “TENNECO”. (Do not add the specific plant)
- Electronic signatures are acceptable.
- PSW should be uploaded into section 18 of TITAN PPAP C-folder.
- In the next slides you will find how to fill in the details.

18.PART SUBMISSION WARRANT

TENNECO

Part Submission Warrant

Part Name	Part Description	Customer Part Number	Enter Customer Part #
Shown on Drawing No.	Drg Number	Organization Part #	Enter Your Part Number
Engineering Change Level	Enter Rev Level	Dated	Enter Rev Date
Additional Engineering Changes	List all authorized engineering changes not yet incorporated in the drawing but already applicable for the part	Dated	Enter Eng Changes dates
Safety and/or Government Regulation ☐ Yes ☐ No	"Yes" if indicated by drawing, otherwise "No"	Purchase Order No.	Enter number which can be found on PO
Checking Aid No.	If requested enter number of each checking aids	Checking Aid Engineering Change Level	If requested enter eng change level and date of it

Weight (kg): Enter actual weight in kilograms to four decimal places

Dated:

ORGANIZATION MANUFACTURING INFORMATION

Your Company Name
Organization Name & Supplier/Vendor Code

Company Street Address
Street Address

City | State | ZIP | Country
City | Region | Postal Code | Country

CUSTOMER SUBMITTAL INFORMATION

Name of the Customer
Customer Name/Division

Enter Your Buyer's Name
Buyer/Buyer Code

What Vehicles is this used on?
Application

MATERIALS REPORTING

Choose proper answer based on available information

Has customer-required Substances of Concern information been reported? ☐ Yes ☐ No ☐ n/a

Submitted by IMDS or other customer format: Enter "IMDS" or name of customer format

Choose proper answer based on available information

Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☐ No ☐ n/a

18.PART SUBMISSION WARRANT

REASON FOR SUBMISSION (Check at least one) Check the appropriate box or boxes. For bulk materials addtionally check "Other" and write "bulk material"

- ☐ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Discrepancy
- ☐ Tooling Inactive > than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Additional Location
- ☐ Other - please specify below

REQUESTED SUBMISSION LEVEL (Check one) First identify and then check appropriate submission level requested by Tenneco

- ☐ Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
- ☐ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
- ☐ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
- ☐ Level 4 - Warrant and other requirements as defined by customer.
- ☐ Level 5 - Warrant with product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS Check boxes for elements which are a part of PPAP submission

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package

These results meet all drawing and specification requirements: ☐ Yes ☐ NO (If "NO" - Explanation Required) If you check "No" explanation are needed

Mold / Cavity / Production Process If production will be done from more than one mold/cavity/production line such information should be enetred here.

18.PART SUBMISSION WARRANT

TENNECO

DECLARATION

I hereby affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of ____ / ____ hours. I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from this declaration below.

EXPLANATION / COMMENTS: Firstly enter number of pieces manufactured during significant production run. Secondly enter number of hours which were taken for significant production run. If declaration is not met, explanation is required in "Explanation/Comments" field.

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☐ n/a Check proper answer based on actual situation

Organization Authorized Signature — Supplier representative signature to confirm that all required documents are submitted and correct. Additionaly: date of signing, print name, title, phone and fax number, email. — Date

Print Name — Phone No. — Fax No.

Title — E-mail

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Customer Signature — **FOR TENNECO ONLY - LEAVE BLANK** — Date

Print Name — Customer Tracking Number (optional)

TENNECO SPECIFIC REQUIREMENTS

Tenneco addtional requirements for PPAP submission. These requirements are listed below:

- A1.Launch Containment Plan
- A2.Capacity Verification (as required)
- A3.APQP Tracker
- A4.IMDS Documentation
- A5.Packaging Plan Proposal
- A6.Vendor Tooling Registration Form
- A7.Manufacturing Review Form (nothing is required in this section)
- A8.Process Change Notice (used only for PPAP'd due to a Process Change)
- A9.Conflict of Minerals (if applicable)
- A10.Subcontractors/Suppliers PPAP
- A11.Other Specified Requirement (as required)

Detailed information about each item can be found at https://www.tenneco.com/suppliers or by contacting the respective plant representative or Supplier Development Specialist.

A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

A1.Launch Containment

Launch Containment is a mandatory process which ensures that Tenneco facility receives 100% defect free product. It begins when the supplier has been awarded the part and ships to the Tenneco facility (including sample parts shipped during pre-launch).

Elements to be checked:

1. Supplier needs to develop a Launch Containment Plan in AIAG Control Plan format (with field “Pre-launch” checked in the header)
2. Controls in Launch Containment phase should be at least doubled in comparison to serial production controls (preferable 100% control for defined characteristics)

Supplier will document and maintain containment results in alignment with the approved Control Plan in the form of an I-Chart. Upon request from Tenneco, the Supplier will need to provide the I-charts. Launch Containment Form Launch Containment will continue for a minimum of 90 days after initial shipment and no less than 10 shipments (low volume) after SOP (at discretion of Tenneco facility). For link to Launch Containment form see Supplier Resource Center .

If a problem is identified by the Tenneco receiving plant, the containment process will restart and must remain in effect until corrective actions are implemented and verified.

In any case Launch Containment should be uploaded into section A1 of TITAN PPAP C- folder.

A1. LAUNCH CONTAINMENT

- **A1. Launch Containment**

  The green Launch Containment label must be used to identify parts containers throughout launch phase.

The Launch Containment label can be found in the Supplier Resource Center (www.Tenneco.com).

A2. CAPACITY VERIFICATION

A2.Capacity Verification

The Capacity Verification will verify that the results of the supplier's actual manufacturing process meet the requirements for on-going quality and quoted tooling capacity. This process applies for existing tooled parts and new non-tooled parts. This evaluation is being performed during the first trial runs at supplier’s process

The supplier has to demonstrate that the installed capacity of the supplier is sufficient to support the weekly maximum capacity requirement by using the available production time.

Tenneco reserves the right to be present during these trial runs to witness and evaluate results.

Tenneco requires a working standard as follow:

- LCR = Least Capacity Rate = Estimated Annual Volume divided by 48 weeks
- MCR = Maximum Capacity Rate = LCR x 120%, plus any additional capacity that may be required

When Capacity Verification is performed by supplier as self assessment it should be uploaded into section A2 of TITAN PPAP C-folder.

The Tenneco Capacity Verification Template can be found in document package of the ePPAP request under Tenneco PPAP/APQP Document Templates or on the Supplier Resource Center.

A3. APQP TRACKER

TENNECO

Not required for PPAP, but should be used after Nomination until PPAP submission

A3. APQP Tracker

Suppliers are required to use the APQP Tracker Template to monitor the APQP steps.

This template contains progress status of both the required documentation and APQP milestones.

The APQP Tracker is included in the zip file with the PPAP request or can be found in the https://www.tenneco.com/suppliers

APQP Tracker must be submitted on a regular basis (monthly in general and weekly in the month before PPAP is due). APQP Phase also needs to be completed in Titan between Kick off and PPAP, when phases get completed.

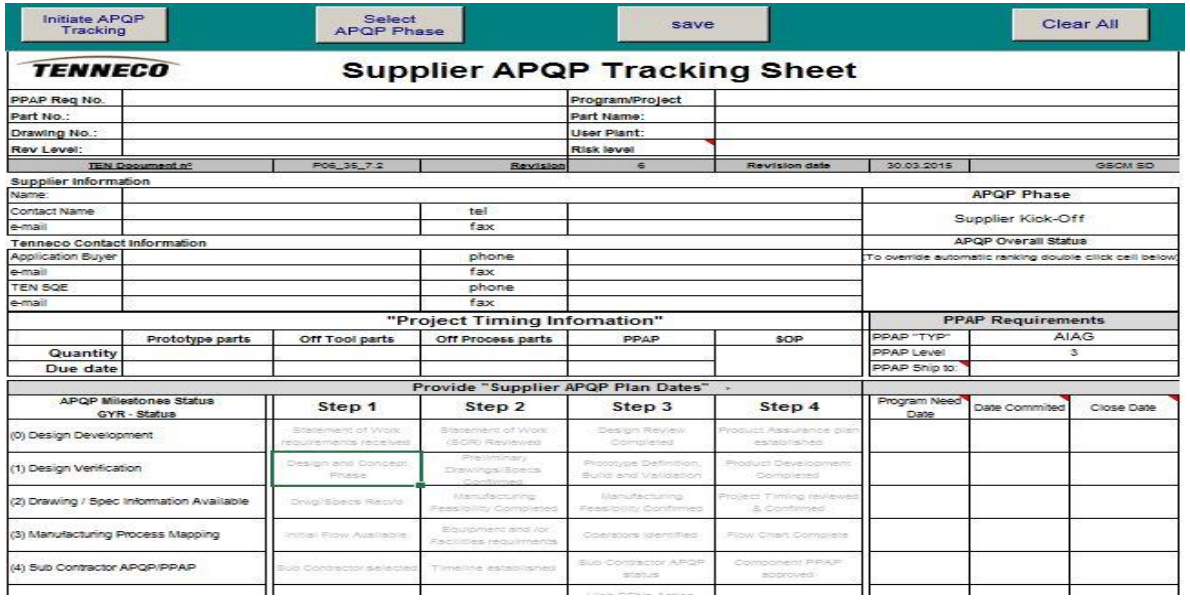
Suppliers must indicate truthfully the actual overall status of the product launch in each PPAP Response:

Overall status “GREEN” means PPAP preparation is on time

“YELLOW” status means there are delays in individual PPAP & APQP elements, but such delays are recoverable

“RED” status indicates PPAP is not expected to be on time and delays are not recoverable

Whenever updated or modified APQP tracker should be uploaded into section A3 of TITAN PPAP C-folder.



Initiate APQP Tracking | Select APQP Phase | save | Clear All

TENNECO

Supplier APQP Tracking Sheet

PPAP Req No.		Program/Project			
Part No.:		Part Name:			
Drawing No.:		User Plant:			
Rev Level:		Risk level			
TEN Document nr	P06_35_7.2	Revision	6	Revision date	30.03.2015

GBOM SD

Supplier Information				APQP Phase
Name:				
Contact Name		tel		Supplier Kick-Off
e-mail		fax		
Tenneco Contact Information				APQP Overall Status
Application Buyer		phone		To override automatic ranking double click cell below
e-mail		fax		
TEN SQE		phone		
e-mail		fax		

"Project Timing Infomation"

	Prototype parts	Off Tool parts	Off Process parts	PPAP	SOP
Quantity					
Due date					

PPAP Requirements	
PPAP "TYP"	AIAG
PPAP Level	3
PPAP Ship to:	

Provide "Supplier APQP Plan Dates"

APQP Milestones Status GYR - Status	Step 1	Step 2	Step 3	Step 4	Program Need Date	Date Commited	Close Date
(0) Design Development	Statement of Work requirements received	Statement of Work (SOR) Reviewed	Design Review Completed	Product Assurance plan established			
(1) Design Verification	Design and Concept Phase	Preliminary Drawings/Specs Confirmed	Prototype Definition, Build and Validation	Product Development Completed			
(2) Drawing / Spec Information Available	Drwg/Specs Recvd	Manufacturing Feasibility Completed	Manufacturing Feasibility Confirmed	Project Timing reviewed & Confirmed			
(3) Manufacturing Process Mapping	Initial Flow Available	Equipment and /or Facilities requirments	Operators Identified	Flow Chart Complete			
(4) Sub Contractor APQP/PPAP	Sub Contractor selected	Timeline established	Sub Contractor APQP status	Component PPAP approved			

A4. IMDS DOCUMENTATION

A4. IMDS Documentation

IMDS (International Material Data System) ensures that all materials used for automobile manufacturing are collected, maintained, analyzed and archived.

Tenneco IMDS / CAMDS Company ID Numbers				
Tenneco Business Unit	**APAC**	**EMEA**	**India**	**North America**
Clean Air:	222667	222668	222668	222669
Shanghai Tenneco Exhaust:	CA_3_4704			
Lingchuan (Chongqing) Exhaust:	CA_3_12977			
Tenneco China:	CA_3_21014			
(Dalian) Exhaust System:	CA_3_27281			
Forsun (Tianjin) Auto Parts:	CA_3_76052			
Chengdu Forsun Auto Parts:	CA_3_74893			
Automotive Industry (Guangzhou):	CA_3_21636			
(Suzhou) Emission System:	CA_3_88846			
FAW Forsun (Changchun) Auto Parts:	CA_3_34343			

The components data must be uploaded into IMDS database using the correct Tenneco Company ID number as soon as off tool parts are available, at least 2 weeks before ppap submission to be sure the MDS (Material Data Sheet) approved report is available on time.

Elements to be checked:

1. Verify the MDS report is uploaded into TITAN C-folder.
2. Verify the MDS report is checked by Tenneco for correct part number.
3. Verify the MDS is approved (MDS status “accepted“) by Tenneco Clean Air.
4. Verify the same MDS ID number is included on PSW.

Tenneco Approved MDS report should be uploaded into section A4 of TITAN PPAP C-folder.

A5.PACKAGING PLAN PROPOSAL

A5.Packaging Plan Proposal

Appropriate packaging to protect and preserve the quality of the product is to be considered during feasibility evaluation.

Supplier must use appropriate packaging, to assure that all products will arrive at Tenneco plants free of any damage and it can be transported, stored and used efficiently.

The packaging system needs to be approved by the Materials Group of the Tenneco receiving facility, as specified in the packaging plan (coordinated by PPAP reviewer). The signed off form must be uploaded into the c-folder. **You should email an excel copy to the receiving plant before the due date for plant approval.**

Labels should included following information: part number, revision level, PO number, supplier and customer addresses, batch number, number of pieces, production date.

Packaging proposal must include picture of the container showing how parts will be shipped during production.

Further details can be found in section 7.0 of TENNECO Supplier Requirements Manual.

All relevant docments should be uploaded into section A5 of TITIAN PPAP C-folder.

A5.PACKAGING PLAN PROPOSAL

A5.Packaging Plan Proposal

Examples of Packaging Plan Proposal:

Packaging Proposal Form

TENNECO Corporate Logistics

Supplier: [redacted]		Commodity	Targeted Tenneco SBU
		Steel Stampings & Tubing	Emmision Control
SUPPLIER RESPONSIBLE PERSON:			Related project:
Contact : [redacted]		Sub-commodity	
Phone n° :		Stampings	GM SGE
e-mail :			
Date of proposal:	Latest Update:	Date Approved	
TEN Document n°	P06_40_7.1	Revision 1	Revision date: 01 April 2007

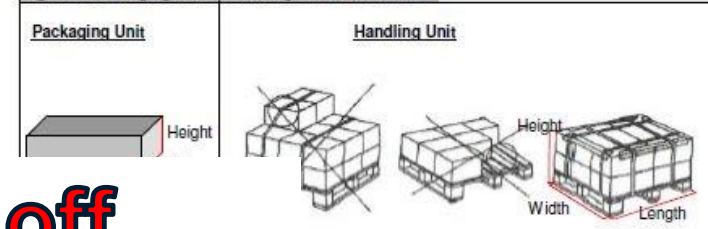
PACKAGING PROPOSAL CHECKLIST

☑ Standard ☐ Alternative Packaging	unit	Tenneco's proposal or existing Packaging	Please Complete Proposal Below	Tenneco Acceptance
1. Packaging/Part information				
1.1 Supplier Part Description				
Part Description			OUTER CLAMSHELL (F)	
Tenneco Part Number			82238216	
Supplier Part Number			PC73660	
Final Tenneco Plant Destination			TENNECO MARSHALL	
Annual Quantity			303,000 (Domestic)	
1.2 Part Weight				
Part Weight each	lbs		1.2	
1.3 Packaging weight, material, integrity				
Packaging group			Small Load Container (NA)	
Type / Name			PLASTIC TOTE	
Tenneco Packaging Code			P7	
Packaging Unit weight (emp				
Packaging Unit material				
Internal Dunnage weight				
Internal Dunnage material				
Internal Corrosion Protectio				
Weight (empty Pallet)				
Pallet material				
Number of parts per Packa				
Number of Handling Units p				
Number of Packaging Units				
Complete Handling Unit weig	lbs		637	
How are Packaging Units secured to pallet?			PLASTIC WRAP	
Is packaging assumed to be returnable?			YES	
2. Packaging Volumes				

Tenneco plant sign off required

2. Packaging Volumes			
2.1 Packaging Unit			
Length	Inch		24
Width	Inch		15
Height	Inch		8
Volume	cubic Inch	0	0.00000288
2.2 Pallet			
Length	Inch		48
Width	mm		45
Height	mm		6
Volume	m³	0	0.00001296
2.3 Overall Handling Unit (see Fig.1)			
Length	mm		48
Width	mm		45
Height	mm		38
Volume	m³	0	0.00008208
2.4 Labeling			
see Requirements in: ***Supplier Packaging Manual***			
2.5 Supplier Shipping Location Information			
Zip or Postal Code & City:			49507 GRAND RAPIDS, MI
Country:			USA

Figure 1: Packaging Unit & Handling Unit dimensions | **2.6 Foto of Packaging Proposal:**



Pleas fill in all yellow fileds!

rning Handling & Packaging Requirements see: ***Supplier Packaging Manual*** at www.tasupplier.com

zation: [redacted]

Date: 12/10/2014

Tenneco Approval:

Date:

A5.PACKAGING PLAN PROPOSAL

A5.Packaging Plan Proposal

Example of label below (VDA format):

A5.PACKAGING PLAN PROPOSAL

TENNECO

A5.Packaging Plan Proposal

Packaging Proposal Form

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WARNING: DO NOT CHANGE THE EXISTING INFORMATION ON THE FORM. INPUT ONLY THE INFORMATION REQUIRED (in *YELLOW* fields).

Supplier:				Commodity		Targeted Tenneco SBU	
				Select		Emmision Control	
SUPPLIER RESPONSIBLE PERSON:						Related project:	
Contact :				Sub-commodity			
Phone n° :				*Select*			
e-mail :		Supplier No:					
Date of proposal:		Latest Update:			Date Approved:		0-Jan-1900
TEN Document n°		P06_40_7.1		Revision	3	Revision date:	30 September 2019

PACKAGING PROPOSAL CHECKLIST

☑ Standard ☐ Alternative Packaging	unit	Tenneco's proposal or existing Packaging	Please Complete Proposal Below	Tenneco Acceptance
1. Packaging/Part information				
1.1 Supplier Part Description				
Part Description				
Tenneco Part Number				
Supplier Part Number				
Final Tenneco Plant Destination			Select	
Annual Quantity				
1.2 Part Weight				
Part Weight each	LB			
1.3 Packaging weight, material, integrity				
Packaging group			Returnable	
Type / Name			Select	
Tenneco Packaging Code			Select	

STD. PKG. Catalog_EXT VENDORS | EXT Vendor_Part Master | Part 1 (Enter Number) | Part 1 (ALT) | Part 2 (Enter Nu ...

Tenneco Returnable Packaging Options

Standard Pack	Tenneco ID	Size (Outside) L x W x D	Weights/Restrictions	Totes/Layer	Layers/Unit	Manufacturer	Manufacturer Model	Color
First Option	P3	15"x 12"x 7.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 2.51 lbs	12	5	Green Processing Buckhorn Monoflo	1215-07 SW151208 NRSO1215-07CS	Grey
Optional *With Plant and PKG ENG. Approval*	P4	15"x 12"x 9.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 3.47 lbs	12	4	Green Processing Buckhorn Monoflo	 SW151210 NRSO1215-09CS	Grey
First Option	P7	24"x 15"x 7.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 4.11 lbs	6	5	Green Processing Buckhorn Monoflo	2415-7 SW241508 NRSO2415-07CS	Grey
Optional *With Plant and PKG ENG. Approval*	P8	24"x 15"x 9.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 5.3 lbs	6	4	Green Processing Buckhorn Monoflo	 SW241510 NRSO2415-09 CS	Grey
Optional *With Plant and PKG ENG. Approval*	P9	24"x 15"x 14.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 6.87 lbs	6	3	Green Processing Buckhorn Monoflo	 SW241515 NRS 2415-14 CS	Grey
First Option	P14	24"x 15"x 11.5" Tote Hand Held Tote 35lb. Grs. Wgt. Capacity	Tare Weight: 5.4 lbs	6	3	Green Processing Buckhorn Monoflo	2415-11 SW241511 NRSO2415-11 CS	Grey

Skids/Lids	Tenneco ID	Size (Outside) L x W x D	Weights/Restrictions	Totes/Layer	Layers/Unit	Manufacturer	Manufacturer Model	Color
Required for	PP - TC	48"x 45" Straight Wall Foam Pallet	Gross Capacity: 7,000 lbs	N/A	N/A	Green Proc. Buckhorn	4845 PW48450622	Black

STD. PKG. Catalog_EXT VENDORS | EXT Vendor_Part Master | Part 1 (Enter Number) | Part 1 (ALT) | Part 2 (Enter Nu ...

A5.PACKAGING PLAN PROPOSAL

TENNECO

A5.Packaging Plan Proposal

Packaging Plan Proposal and Critical Elements

1) Initial proposal form template will be provided to "select" suppliers before sourcing
2) The newly formatted packaging proposal form includes two tabs for every part number supplied for a particular program and plant (Standard and Alternate).
3) For ALL part numbers awarded, all initial packaging proposal form line items must be filled out entirely for both all standard and alternative proposed packaging (i.e. returnable, expendable, Tenneco Owned Container or CHEP).
4) Tenneco preferred standard packaging configuration is always returnable (specifically hand held totes) for all applicable part sizes. Hand Held Totes are specified in the Tenneco Returnable Container Catalog.
5) Parts exceeding 23" in length are considered bulk items which require an approved expendable container or Tenneco owned bulk packaging (large collapsible container). Approved expendable containers are to be used as an alternative container only; not to be used unless approved by receiving Tenneco Plant.
6) A packaging proposal form for alternative packaging must also include standard cost for all approved alternative packaging proposals based on IMC Container costs.
   a) All Packaging proposal forms must include estimate of pack density, including part protection.
      i) The number of parts per Packaging Unit
      ii) The Number of Handling Units per Layer
      iii) The Number of Packaging Units per Handling Unit
7) Tabs listing carryover parts **MUST** be shaded in **BLACK** regardless of prior packaging proposal requests
8) Proposal forms must be **completed** prior to sourcing nomination. Where applicable, i.e. for overseas suppliers, complete one form for shipment from manufacture location to North American warehouse and a second form from your North American warehouse to Tenneco plant. Select "reply to all" to insure buyer, Plant Material Manager and Tenneco Packaging Engineer receive your completed forms; dates to be specified on initial request email for supplier packaging proposal form.
9) The naming convention in the subject heading in the initial packaging proposal form request cannot be changed by the supplier and must remain uniform throughout the process; [Supplier Name (Supplier Vendor Code)_Program Name_OEM Customer Name – Packaging Proposal Form for Tenneco Plant Name.xlsm]
10) Tenneco reserves the right to provide supplier counter proposal to initial packaging proposals from the supplier. This includes changes to pack specification to supplier proposed packaging or changes to supplier proposed container. Changes in cost per part must be submitted to Tenneco with 48hrs. In instances where Tenneco proposes changes to expendable packaging, the supplier has 72hrs to submit cost variances from original proposal. Packaging cost changes exceeding 2% must include detailed rationale for favorable or unfavorable cost changes.
11) PPAPs are not to be finalized until all standard packaging proposal forms and alternative packaging proposal forms are **approved**. Both standard and alternative packaging proposal forms must be approved by ALL plant MP&L using the parts
12) Once Standard and Alternative Packaging Proposal form approved, the supplier may then upload into TITAN as part of PPAP package for all applicable parts. Note: The Supplier is responsible for confirming an approved packaging proposal form for all the parts awarded in the final RFQ.
13) In instances where the supplier fails to adhere to the packaging procedures listed above, any associated cost that directly or indirectly impacting Tenneco will be considered a supplier non-conformance resulting supplier responsibility and supplier cost.

A6.VENDOR TOOLING REGISTRATION FORM

A6.Vendor Tooling Registration Form

This form contains various information such as product, tooling parts identification, location, and percentage ownership.

Suppliers, must furnish complete photographs, tooling drawings, including all details, inserts, consumables, etc. to Tenneco as part of the PPAP approval.

This form must be completed for all customer owned tooling and MUST include the Tooling ID Numbers. Tooling ID Numbers are supplied by the Tenneco Plant.

Further details can be found in section 6 of TENNECO Supplier Requirements Manual.

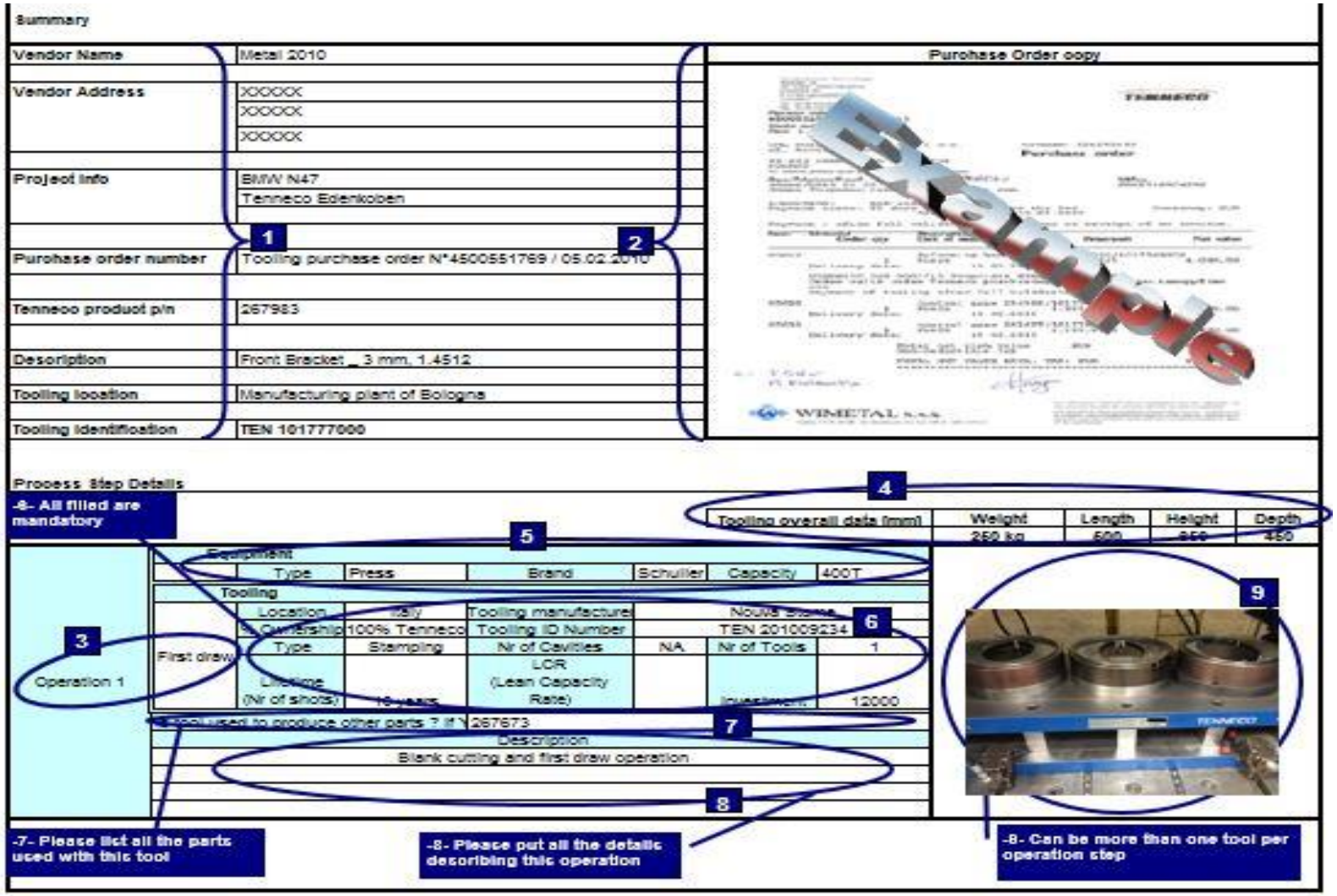
If TITAN is available in your region, this form shall be attached to the A6 section of TITAN PPAP C-folder, if TITAN is not available, contact the Tenneco plant for instructions.

The Vendor Tooling Registration template can be found on the Supplier Resource Center.

A6.VENDOR TOOLING REGISTRATION FORM

A6.Vendor Tooling Registration Form

Example of VTRF :



A7 THROUGH A10

A7.Manufacturing Review Form (*obsolete*)

This specific requirement has been replaced by APQP Kick Off Protocol and Technical Review. Nothing is required in this section (section A7 of TITAN PPAP C-folder).

A8.Process Change Notification

Supplier is requested to submit Tenneco Signed Process Change Notification when PPAP is due to a Process Change (section A8 of TITAN PPAP C-folder).

A9.Conflict of Minerals

This element is refering to Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. Question regarding usage of conflict minerals (tantalum, tin, gold or tungsten) originating in the Democratic Republic of the Congo and certain adjoining countries. Details regarding this point can be found in chapter 9.2 of TSM (section A9 of TITAN PPAP C-folder).

A10.Subcontractors/Suppliers PPAP Packages

Supplier has to uploaded PSW(s) (and other documention, if requested by Tenneco) for each sub component of the final assembly (section A10 of TITAN PPAP C-folder)

A11.OTHER SPECIFIED REQUIREMENT

TENNECO

A11.Other Specified Requirement

If the supplier delivers an **assembly** to Tenneco, all parts included in the assembly must be part of the Bill of Material.

Bill of material must contain at least:

- Positions Number as per drawing;
- Part Description as per drawing;
- Tenneco Part Number(s) as per drawing;
- Material Grade as per drawing or Tenneco accepted equivalent;
- Values for gross and net weight must be determined by weighing the components, in kg and four decimal places.

Note – EU suppliers utilize the template provided by Tenneco.

Note – EU suppliers must provide bill of material of the part(s) delivered to Tenneco.

In most cases this section will be left blank. However, a single page document should be uploaded into PPAP submission stating, “Not required/Not applicable”.

Not required/
Not applicable

BOM EXAMPLE (TOP HALF)

TENNECO

Werkstoffstückliste / Bill of materials		*Stand:* *Status:*	*Datum:* *Date:*
Lieferant/ *Supplier:*		**Projekt /** *Project:*	
Produktionsstandort/ *Production site:*		**ePPAP Nummer /** *ePPAP number:*	
Kunde/ *Customer:*			
Teilebezeichnung/ *Partname :*			
Sachnummer/ *Partnumber*			
Zeichnungsnummer/ *Drawing No.:*			
Stand, Datum/ *Status, Date:*			

Angaben allgemein Information general											**Zusätzliche Angaben (falls gefordert) Additional Information (if requested**					
Positionsnr. (1): *Position No.(1):*	Sachnummer ZSB Tenneco (2): *Part number (Sub)- Assembly Tenneco (2):*	Sachnummer Einzelteil Tenneco (3): *Part number Single component Tenneco (3):*	Benennung ZB und Einzelteil Tenneco (4): *Part Description (Sub)-Assembly and Single component Tenneco (4):*	Materialbezeichnung gem. Zeichnung (5):* *…rial Grade acc. Drawing (5):**	Materialbezeichnung alternativer Werkstoff (6):* *…rial Grade Alternati ve Material (6):**	Fügeverfahren gem. Zeichnung (7): *Technology acc. Drawing (7):*	Brutto Gewicht in kg (8): *…ss Weight in kg (8):*	Netto Gewicht in kg (9): *Weight in kg*								
20		82599423	Shell Mixer Lower	DIN EN 10088-2 1.4521 2B			0.8371	0.3175								
10		82599422	Shell Mixer Upper	DIN EN 10088-2 1.4521 2B			0.8452	0.3781								

BOM EXAMPLE (BOTTOM HALF)

Bestätigung Lieferant / Confirmation by supplier

Name:	Tel / *Phone:*			Bemerkungen / *Comments:*
Abteilung / *Department:*	Fax:			
Datum / *Date:*	E-Mail / *Email:*			Freigabe / *Approval:*

Legende/explanation:

(1) Die Positionsnummer muss dieselbe wie in der Zeichnung sein.
(1) The positionnumber must be the same as in the drawing.
(2) Hier ist die Materialnummer des Zusammenbaus anzugeben z.B. 82599421
(2) Here you have to fill the part number of the (sub)- assembly e.g. 82599421
(3) Hier sind die Sachnummern der Einzelteile anzugeben z.B. 82599423, 82599422
(3) Here you have to fill in the part numbers of the single components e.g. 82599423, 82599422
(4) Hier ist die Bezeichnung des ZB Bauteils sowie die Bezeichnung der Einzelteile gem. Zeichnung einzutragen z.B. ZB Mischerschalen, Mischerschale oben, Mischerschale unten.
(4) Here you have to fill the part describtion for the (sub)- assembly as well for the single components acc. Drawing e.g. Shell Mixer Assy, Schell Mixer upper, Shell Mixer Lower.
(5) Hier ist die Materialbezeichnung einzugeben die auf der Zeichnung angegeben ist z.B. DIN EN 10088-2 1.4521 2B
(5) Here you have to fill in the material describtion acc. Drawing e.g.DIN EN 10088-2 1.4521 2B
(6) Hier ist die Materialbezeichnung einzugeben, wenn ein von Tenneco freigebener alternativer Werrkstoff verwendet wird z.B. (AISI) 444, (JIS) SUS 444
(6) Here you have to fill in the material describtion if a Tenneco released alternative Material is used e.g. (AISI) 444, (JIS) SUS 444
(*) Es darf nur der Werkstoff angeben werden, der tatsächlich verwendet wird.
(*) Only the material that is actually used may be specified.
(7) Fügeverfahren z.B. Kleben, Schweißen gem. Zeichnung
(7) Joining technology e.g. glueing, welding acc. Drawing
(8) Hier ist das Brutto Gewicht in kg der Einzelteile und des ZB einzutragen. Dieses Gewicht ist durch wiegen zu ermitteln.
(8)Here you have to fill the gross weight in kg of the single components and the (sub)- assyembly. The weight should be determined by weighing.
(9) Hier ist das Netto Gewicht in kg der Einzelteile und des ZB einzutragen. Dieses Gewicht ist durch wiegen zu ermitteln.
(9)Here you have to fill the net weight in kg of the single components and the (sub)- assyembly. The weight should be determined by weighing.

PPAP REQUIREMENTS

If you still have any doubts or concerns, and need more information, please contact your respective Tenneco Plant PPAP coordinator, Buyer or Supplier Quality Engineer.

CUSTOMER SPECIFICS REQUIREMENTS – FORD- REF FOLDERS 18-A2

TENNECO

For NA Ford Programs

- PSW - Use the Ford phased PSW format current revision- correct template included in with TITAN PPAP request.

- The format will have areas to input - APW / MPW & APPC / MPPC - values that are carried over from the Ford Capacity Form.

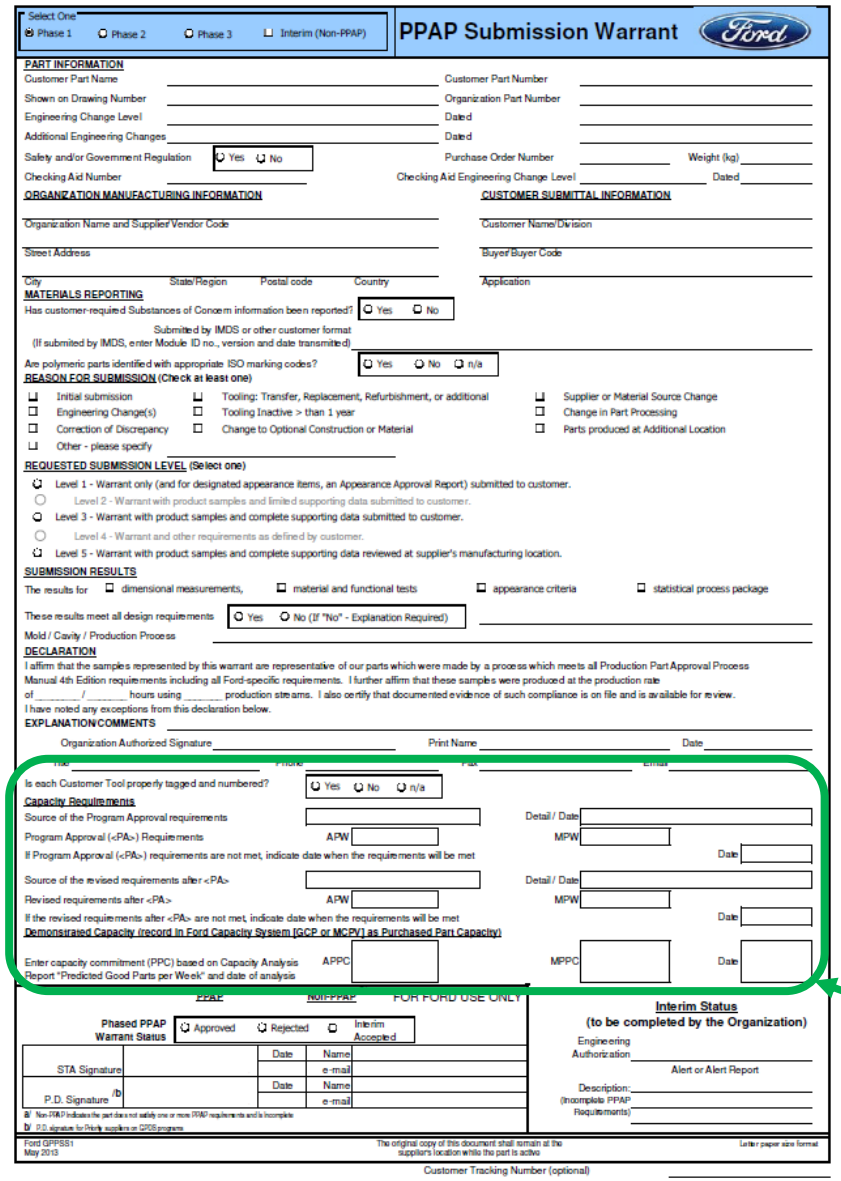
- Capacity Analysis – Use the Ford Capacity Form current revision must be used - correct template included in with TITAN PPAP request. APW = total volume divided by 47.2 weeks. The Run@Rate called out should be in sync with the APW / MPW & APPC / MPPC values and the cycle times that are reported on the capacity Ford capacity analysis.

- Attribute studies for Ford product requires a 50-piece study with 3 Team Members and 3 Trials.

For Europe if not defined, then the Tenneco Forms are used.

CSR FORD PSW- FOLDER 18

TENNECO



Select One: Phase 1 ● Phase 2 ○ Phase 3 ○ Interim (Non-PPAP)

PPAP Submission Warrant Ford

PART INFORMATION

Customer Part Name | Customer Part Number
Shown on Drawing Number | Organization Part Number
Engineering Change Level | Dated
Additional Engineering Changes | Dated
Safety and/or Government Regulation ○ Yes ○ No | Purchase Order Number | Weight (kg)
Checking Aid Number | Checking Aid Engineering Change Level | Dated

ORGANIZATION MANUFACTURING INFORMATION | **CUSTOMER SUBMITTAL INFORMATION**

Organization Name and Supplier/Vendor Code | Customer Name/Division
Street Address | Buyer/Buyer Code
City | State/Region | Postal code | Country | Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ○ Yes ○ No
Submitted by IMDS or other customer format (If submitted by IMDS, enter Module ID no., version and date transmitted)
Are polymeric parts identified with appropriate ISO marking codes? ○ Yes ○ No ○ n/a

REASON FOR SUBMISSION (Check at least one)

☐ Initial submission ☐ Tooling: Transfer, Replacement, Refurbishment, or additional ☐ Supplier or Material Source Change
☐ Engineering Change(s) ☐ Tooling Inactive > than 1 year ☐ Change in Part Processing
☐ Correction of Discrepancy ☐ Change to Optional Construction or Material ☐ Parts produced at Additional Location
☐ Other - please specify

REQUESTED SUBMISSION LEVEL (Select one)

○ Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
○ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
○ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
○ Level 4 - Warrant and other requirements as defined by customer.
○ Level 5 - Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location.

SUBMISSION RESULTS

The results for ☐ dimensional measurements, ☐ material and functional tests ☐ appearance criteria ☐ statistical process package
These results meet all design requirements ○ Yes ○ No (If "No" - Explanation Required)
Mold / Cavity / Production Process

DECLARATION

I affirm that the samples represented by this warrant are representative of our parts which were made by a process which meets all Production Part Approval Process Manual 4th Edition requirements including all Ford-specific requirements. I further affirm that these samples were produced at the production rate of _____ / _____ hours using _____ production streams. I also certify that documented evidence of such compliance is on file and is available for review. I have noted any exceptions from this declaration below.

EXPLANATION/COMMENTS

Organization Authorized Signature | Print Name | Date
Title | Phone | Fax | Email

Is each Customer Tool properly tagged and numbered? ○ Yes ○ No ○ n/a

Capacity Requirements

Source of the Program Approval requirements | Detail / Date
Program Approval (<PA>) Requirements | APW | MPW
If Program Approval (<PA>) requirements are not met, indicate date when the requirements will be met | Date
Source of the revised requirements after <PA> | Detail / Date
Revised requirements after <PA> | APW | MPW
If the revised requirements after <PA> are not met, indicate date when the requirements will be met | Date

Demonstrated Capacity (record in Ford Capacity System [GCP or MCPV] as Purchased Part Capacity)

Enter capacity commitment (PPC) based on Capacity Analysis Report "Predicted Good Parts per Week" and date of analysis | APPC | MPPC | Date

PPAP | NON-PPAP | FOR FORD USE ONLY

Phased PPAP Warrant Status ○ Approved ○ Rejected ○ Interim Accepted

		Date	Name
STA Signature			e-mail
P.D. Signature [b]		Date	Name
			e-mail

[a] Non-PPAP indicates the part does not satisfy one or more PPAP requirements and is incomplete
[b] P.D. signature for Priority suppliers on GPDS programs

Interim Status (to be completed by the Organization)

Engineering Authorization | Alert or Alert Report
Description: (Incomplete PPAP Requirements)

Ford GPPSS1 May 2013 | The original copy of this document shall remain at the supplier's location while the part is active | Letter paper size format

Customer Tracking Number (optional)

- **Ford Phased PSW Format**

  with APWF/MPW & APPC/MPPC Values from Ford Capacity Analysis for NA Ford Programs (Next Page)

INSTRUCTIONS:

- **All fields of this form are to be completed: either enter the appropriate value or enter N/A ("not applicable“)**
- **Pay attention to detail, all areas must be filled out and correct**
- **Complete the form by either typing (preferred) or clearly printing the required information.**

SPECIFIC POINTS TO NOTE WHEN COMPLETING THIS FORM

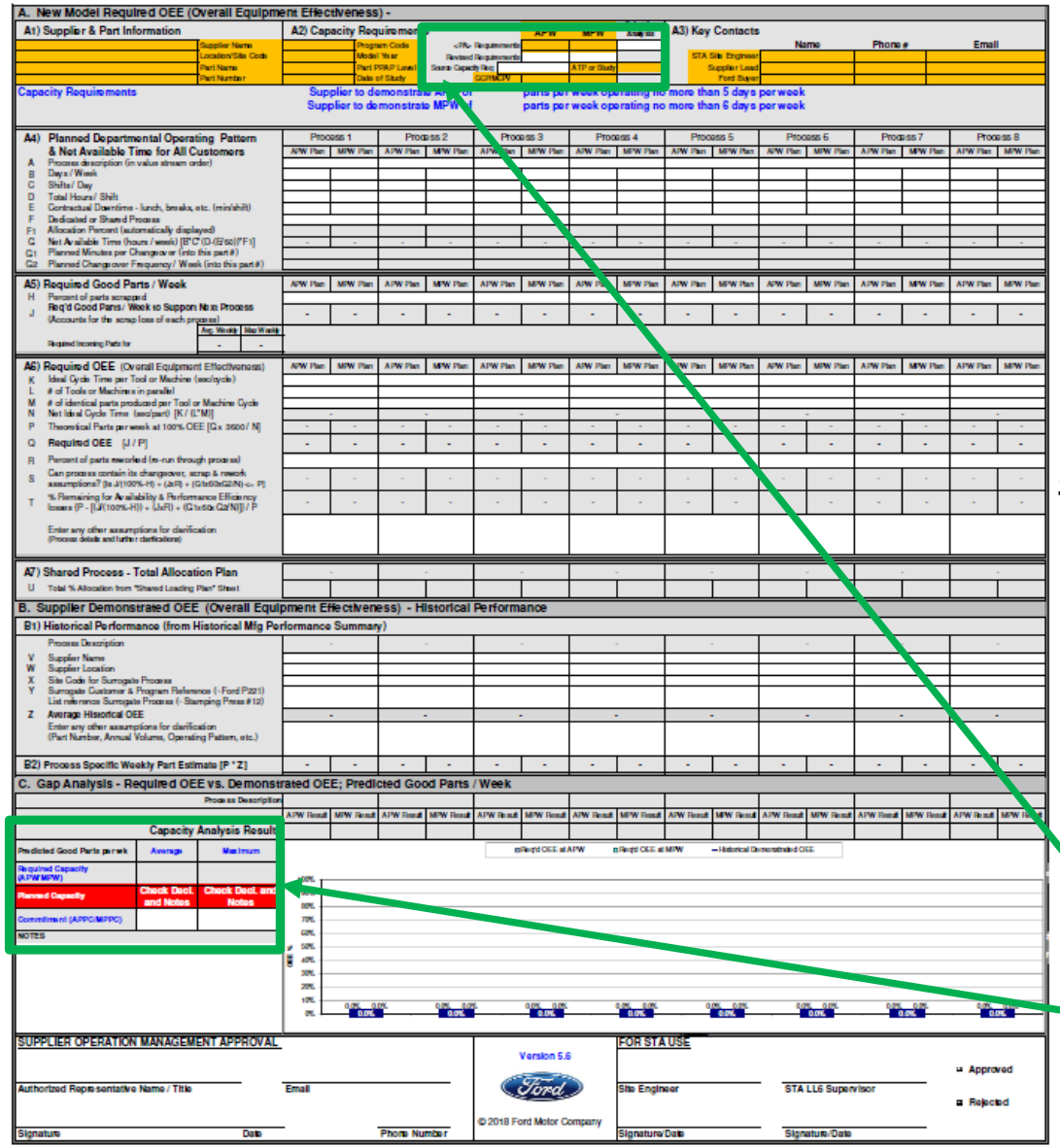
NOTE: If you have questions - contact your Tenneco SDS or Program Buyer for Clarificaton

- This is a Phased PSW – Phases ◉ Phase 1 ○ Phase 2 ○ Phase 3 ☐ Interim (Non-PPAP)

- Select the correct Phase at the top of the PSW Form

- **Complete PSW per instructions above.**
- **Enter the APW / MPW & APPC / MPPV Values from Capacity Analysis in the appropriate location -Green Bordered areas shown to the left**

CSR FORD CAPACITY- FOLDER A2



Ford Capacity Template – Capacity Planning Page

Full format includes: Correct Revision Level is available in PPAP Request – Tenneco Template File.

- Introduction Page
- Capacity Planning Page
- Shared Loading Page (s)
- Phase 0 PPAP (Run @ Rate) Page
- Phase 3 PPAP (Cap Ver) Page

SPECIFIC POINTS TO NOTE WHEN COMPLETING THIS FORM

NOTE: If you have any questions - contact your Tenneco SDS or Program Buyer for Clarificaton

Review Introduction Page prior to beginning then complete the following starting in order.

1/ Complete Capacity Planning page first.
2/ Complete Historical Mfg Performance Page
3/ Complete 1 individual Shared Loading page for each operation identified on Capacity planning page.
4/ Complete Phase 0 or Phase 3 as required for Phase stage.

When completed with Capacity Analysis transfer the APW / MPW & APPC / MPPV Values to the Ford Phase PSW form, Values found in Green bordered section of form at left.