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TENNECO PPAP GUIDELINES FOR SUPPLIERS

DEC 2, 2019

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WHAT IS PPAP AND WHEN IS IT REQUIRED?

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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

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- 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. Measurment Systems Analysis Studies (MSA)

PURPOSE AND SCOPE CONTINUED

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- Each PPAP element will be explained in detail:
  9. Dimensional Results
  10. Records of Material / Performance Test Results
  11. Intial 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 Compliane with Customer-Specific Requirements
  18. Part Submission Warrant (PSW)/Bulk Material Checklist

TENNECO SPECIFIC REQUIREMENTS

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Tenneco addtional requirements to be fullfiled. (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://suppliermanual.tenneco.com//) or by contacting the respective plant representative or Supplier Development Specialist.

ABBREVIATIONS AND TERMS

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

PPAP SUBMISSION LEVEL

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- 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

PPAP SUBMISSION LEVEL

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Retentions/Submission Requirements - Table 4.2 (from AIAG PPAP Fourth Edition hand book)

	Submission Level				
Requirement	Level 1	Level 2	Level 3	Level 4	Level 5
1. Designed Records	R	S	S	*	R
a)for proprietary components/details	R	R	R	*	R
b)for all other components/details	R	S	S	*	R
2. Engineering Change Documents	R	S	S	*	R
3. Customer Engineering Approval	R	R	S	*	R
4. Design FMEA	R	R	S	*	R
5. Process Flow Diagrams	R	R	S	*	R
6. Process FMEA		R	S	*	R
7. Control Plan	R	R	S	*	R
8. Measurement Systems Analysis (MSA)	R	R	S	*	R
9. Dimensional Results	R	S	S	*	R
10. Material, Performance Test Results	R	S	S	*	R
11. Initial Process Studies	R	R	S	*	R
12. Qualified Laboratory Documentation	R	S	S	*	R
13. Appearance Approval Report (AAR)	S	S	S	*	R
14. Sample product parts	R	S	S	*	R
15. Master Sample	R	R	R	*	R
16. Checking Aids	R	R	R	*	R
17. Records of Compliance With Customer-Specific Requirements	R	R	S	*	R
18. Part Submission Warrant (PSW)	S	S	S	S	R
Bulk Material Checklist	S	S	S	S	R

S= The organization shall submit to the customer and retain a copy of records or documentation items at appropriate locations.

R= The organization shall retain at appropriate locations and make available to the customer upon request.

*= The organization shall retain at appropriate locations and submit to the customer upon request.

SUPPLIER PPAP RESPONSE IN TITAN

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1. After receiving ePPAP Requests from Tenneco, suppliers are required to log onto the TITAN portal and review carefully the following:
   a) PPAP Request details and PPAP c-folder documents related to the PPAP
   b) Tenneco Global and/or Regional Terms and Conditions
   c) Tenneco Standard PPAP/APQP Process Guidelines and Requirements
2. Initial Response (First PPAP Response) is required within **3 working days** after receiving the ePPAP 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.
3. Document Sharing takes place via **C-Folder in TITAN PPAP Request**. Suppliers are not allowed to use the c-folder for any other purposes, except for the specific PPAP and product launch related processes.
4. 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.
5. Suppliers are required to have all documents uploaded into TITAN and PPAP Samples at Tenneco Plant no later than the PPAP due date. Acceptable samples can be delivered prior to completed documentation in Titan, with goal of Documentation and samples both submitted no later than due date to the Tenneco Plant.

PPAP STATUS AFTER TENNECO REVIEW

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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).

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” 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“ within agreed time frame.

PPAP REQUIREMENTS:
1.DESIGN RECORDS

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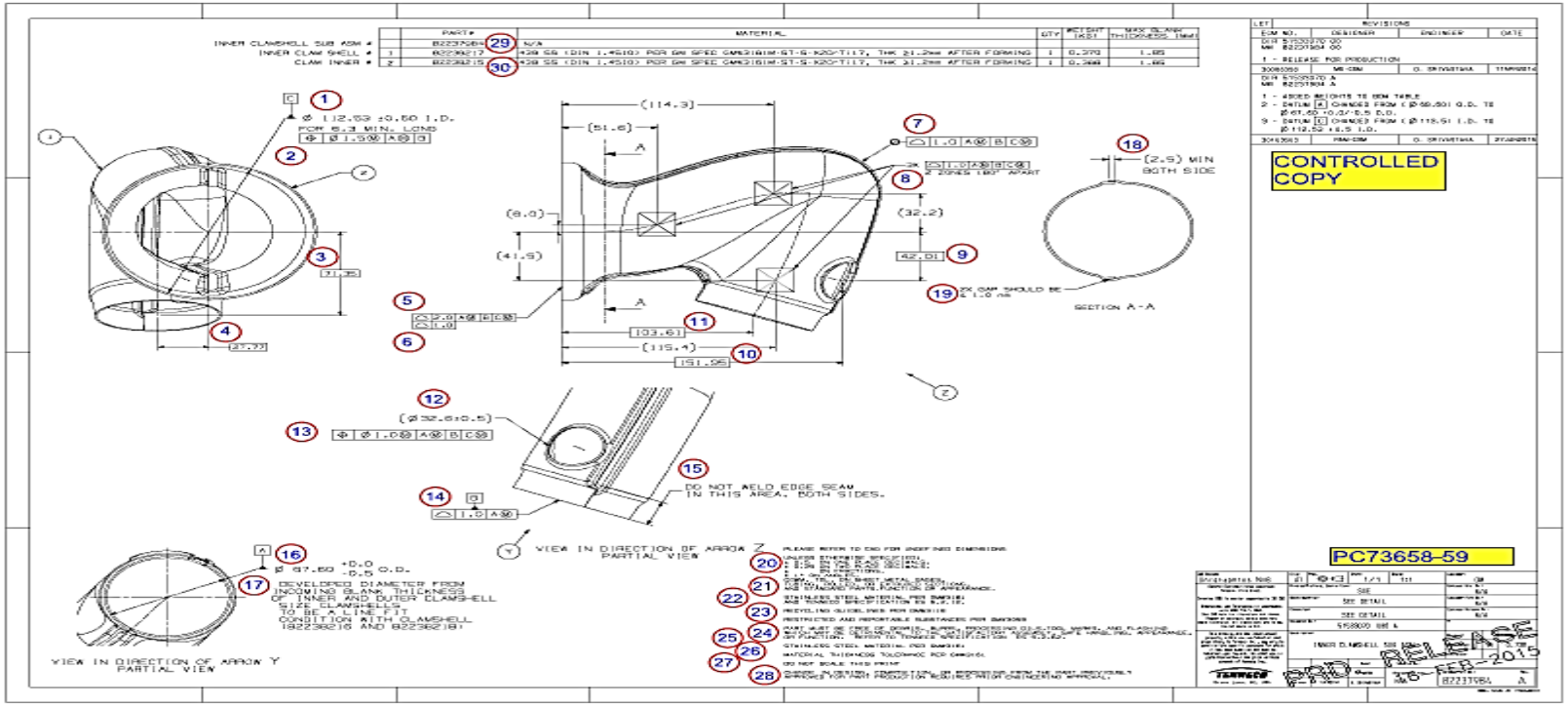
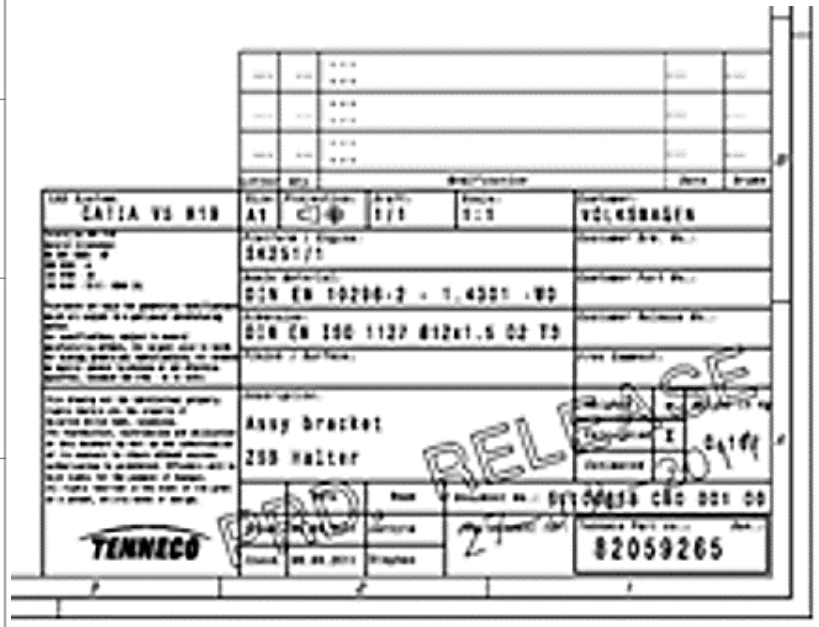
1. Fully “ballooned” drawing (all dimensions, notes, specs) must be submitted as part of a PPAP for every submission level where Dimensional Results are required.
2. All balloons must match with numbers used in Dimensional Results report.
3. Check if drawing number and revision level <u>are the latest available</u>.
4. Make sure that on the drawing “production release” stamp is present.
5. 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:





PPAP REQUIREMENTS:
2.ENGINEERING CHANGE DOCUMENTS

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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.

Example below:

Not required/

Not applicable

PPAP REQUIREMENTS: 3.CUSTOMER ENGINEERING APPROVAL

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

Example below:

Not required/

Not applicable

PPAP REQUIREMENTS: 4.DESIGN FMEA (DFMEA)

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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.

PPAP REQUIREMENTS:
5.PROCES FLOW DIAGRAM (PFD)

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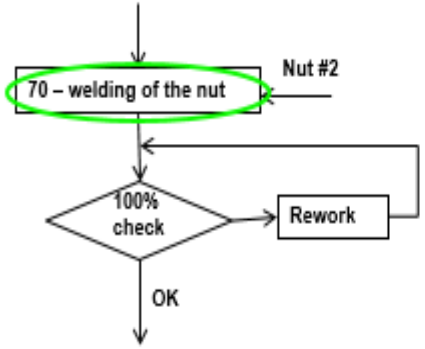
Process Flow Diagram is a way to visualize a process and must meet specified customer needs. After review, it should be clear what the process includes:

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



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

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

PPAP REQUIREMENTS: 5.PROCES FLOW DIAGRAM (PFD) (CONTINUED)

- 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		

PPAP REQUIREMENTS: 6.PROCES FMEA(PFMEA)

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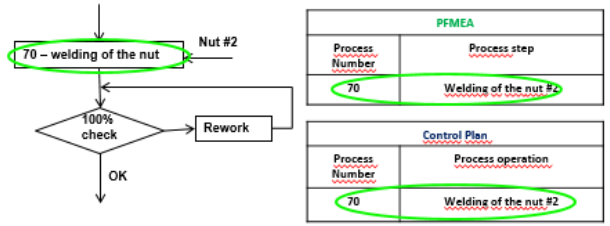
Supplier shall develop a process FMEA in accordance with, and compliant to, customer-specified requirments.
Requirements:

1. pFMEA must be done according to AIAG FMEA handbook in terms of severity, detection and occurance ratings (the latest version available at www.aiag.org).
2. The rankings must be equal to or higher than the Tenneco dFMEA rankings for particular items from the drawing.
3. Critical Characteristics should have severity: 9-10; Significant Characteristics: should have severity: 7-8; Pass Through Characteristics: should have severity 5 at least. All above should be indicated in PFMEA.
4. If severity level is greater than 8, an error proofing (Poka-Yoke) is required unless Tenneco approves in writing alternative solution.
5. 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. In any case pFMEA should be available for Tenneco representative review at supplier location.
7. Part number and revision level should match with the latest drawing. Items with highest RPN/severity level must be covered with actions.
8. Link between PFMEA, Process Flow and Control Plan (same step numbers, names and processes) is confirmed.
9. PFMEA should be uploaded into section 6 of TITAN PPAP C-folder.



PPAP REQUIREMENTS: 6.PROCES FMEA(PFMEA)

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Example of pFMEA below:

Page 1 of 23

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

FMEA Number [redacted]

Item: [redacted] Process Responsibility DEPARTMENT PROCESS ENGINEER Prepared By [redacted]

Model Year(s)/Vehicle(s): N/A Key Date N/A FMEA Date (Orig.) 31-Jul-14 (Rev.) (Rev) 6-Dec-14

Core Team: Reference Flowing Form

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						

PPAP REQUIREMENTS: 7.CONTROL PLAN(CP)

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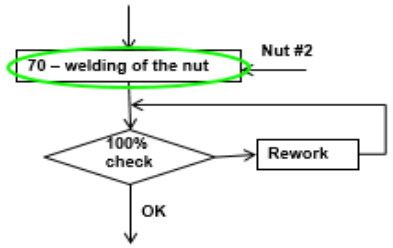
Supplier must have a control plan that defines all methods used for process control and complies with customer-specified requirments. Elements which will be checked:

1. One-to-one match of 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. All part characteristics and notes provided on the drawing are listed in the Control Plan
4. Controls must be clearly defined (what, how, by what, when/how often will be measured and where records will be stored).
5. If work instructions are linked to the Control Plan - they are included in the PPAP package; “control in accordance with internal procedure” is not acceptable.
6. Control Plan reflects all special and PTC characteristics defined on the drawing.
7. Part number and revision level should match with the latest drawing and refer to Tenneco part information.
8. Welding quality verification shall be included as applicable
9. Any planned rework must be part of the control plan.
10. Annual Revalidation should be a part of the Control Plan.
11. 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

PPAP REQUIREMENTS: 7.CONTROL PLAN(CP)

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Example of Control Plan below:

[redacted]

Page 1 of 4

CONTROL PLAN

Prototype	GP-12	Pre-launch	X	Production	Key Contact at launch/Phone [redacted]
Control Plan Number	PC73659				
Part Number/Print Revision and Date	[redacted] A 2/16/15	Core Team	Reference Flowing Form		
Part Name/Description	[redacted]				
Supplier/Plant	[redacted]	Supplier Code	[redacted]		

Date (Orig.) 7/31/2014	Revised By: SO	Date (Rev.) 4/1/2016
Customer Engineering Approval/Date (If Req'd) N/A		
Supplier/Plant Approval/Date N/A	Customer Quality Approval/Date (If Req'd) N/A	
Other Approval/Date (If Required) N/A	Other Approval/Date (If Req'd) N/A	

Part / Process Number	Process Name / Operation Description	Machine, Device, Jig, Tools for Mfg.	Characteristics			Special Char. Class	Methods					Reaction Plan
			No.	Product	Process		Product / Process Specification / Tolerance	Evaluation Measurement Technique	Sample Size	Sample Freq.	Control Method	
1	INSPECT INCOMING COIL STEEL FROM SUPPLIER		1	CORRECT MATERIAL			SSF06717875-439	REVIEW MATERIAL CERTIFICATION	ONCE	EACH COIL, IF A MATERIAL ISSUE OCCURS	VENDOR RESPONSIBILITY	TAG COIL "REJECT", MOVE COIL TO REJECT MATERIAL AREA, NOTIFY PURCHASING
6	VERIFY STAGED COIL (OPERATOR)		1	CORRECT MATERIAL (PRINT CALL OUT)			43955 (DIN 1.4510) GMW3161M-ST-S-X2CrTi17	VISUAL - STEEL TAG TO ROUTER	ONCE	EACH COIL	INSPECTION SHEET	STOP PRODUCTION, CONTAIN PARTS, NOTIFY TEAM LEADER
			2	CORRECT MATERIAL (AS SEEN ON STEEL TAG)			SSF06717875-439	VISUAL - VERIFY TO ROUTER FOR MATERIAL CALL OUT	ONCE	EACH COIL	VULCAN LABEL SCAN SYSTEM	STOP PRODUCTION, CONTAIN PARTS, NOTIFY TEAM LEADER
10	TRANSFER 2-OUT WITH PC73658				SETUP OF MACHINE		SEE SETUP INSTRUCTIONS	VERIFY TO PARAMETERS ON SETUP INSTRUCTION		EACH SETUP	FIRST PIECE APPROVAL	ADJUST AND RESET MACHINE
			A		LEAD CHECK		INCH 0.050 / 0.065	MICROMETER	ONCE (4 LOCATIONS)	RECORD AT SET-UP, BEGINNING OF SHIFT AND AFTER ANY MACHINE ADJUSTMENTS	INSPECTION SHEET	ADJUST AND RESET MACHINE, VALIDATE FIRST PIECES
			B		FEED DISTANCE (PITCH) PRESS SETTINGS		INCH (PRES 337 - 7.83) (PRESS 333 - 7.80)	VISUAL	ONCE	RECORD AT SET-UP, BEGINNING OF SHIFT AND AFTER ANY MACHINE	INSPECTION SHEET	ADJUST AND RESET MACHINE, VALIDATE FIRST PIECES
			C		SENSOR SETTINGS		MUSTBE ON/OFF WITH CORRECT WINDOWS PER SET-UP SHEET	VISUAL	ONCE	RECORD AT SET-UP, BEGINNING OF SHIFT AND AFTER ANY MACHINE ADJUSTMENTS	INSPECTION SHEET	ADJUST AND RESET MACHINE, VALIDATE FIRST PIECES

PPAP REQUIREMENTS: 8.MEASUREMENT SYSTEM ANALYSIS

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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

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 picture of gauge should be part of PPAP see chapter 17 Checking Aids
- Raw data available for each study - All studies should be uploaded into section 8 of TITAN PPAP C-folder.

PPAP REQUIREMENTS: 8.MEASUREMENT SYSTEM ANALYSIS

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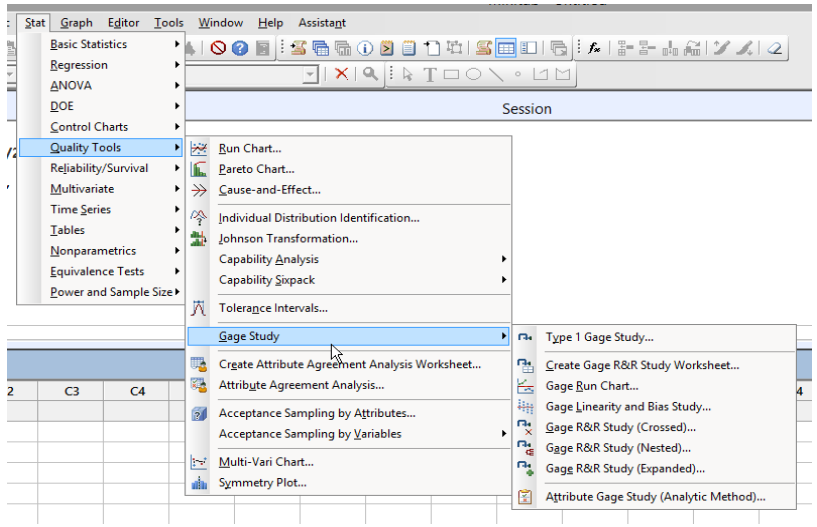
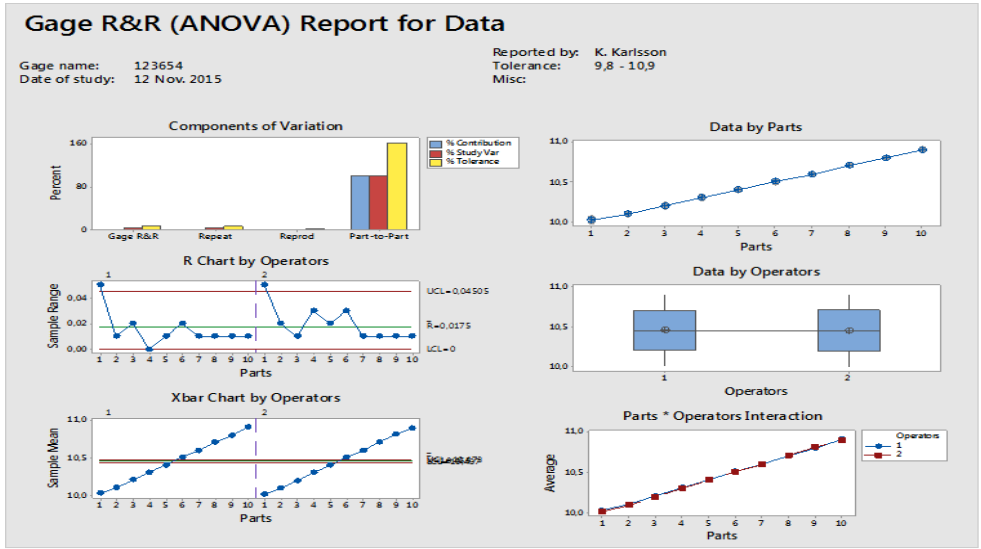
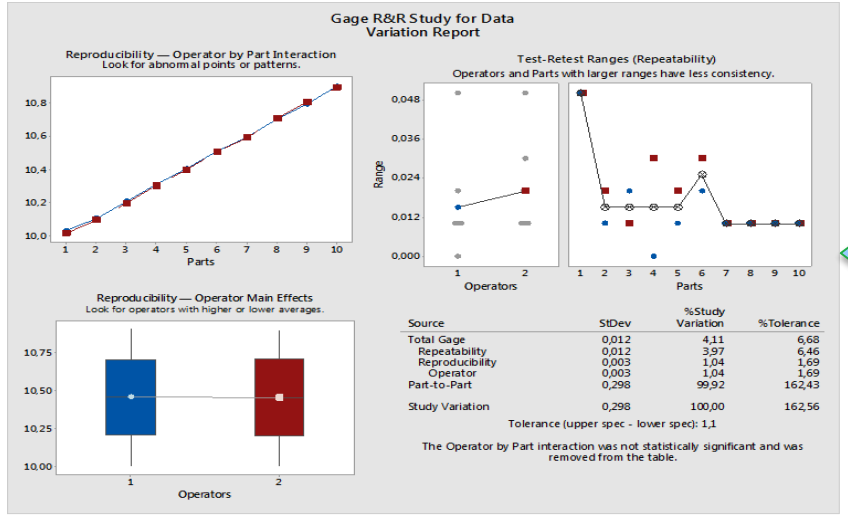
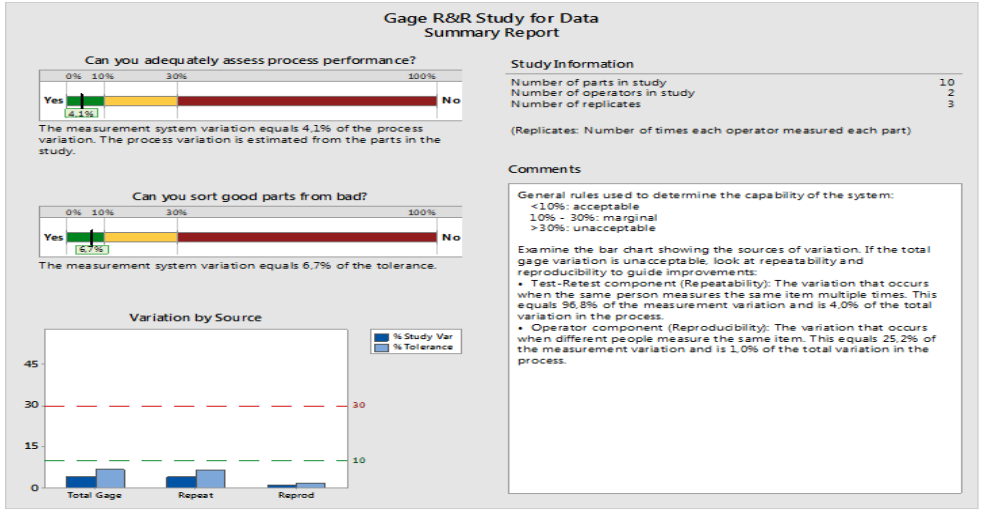
Example of MSA study generated with CAQ software:









PPAP REQUIREMENTS: 9.DIMENSIONAL RESULTS

TENNECO

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.

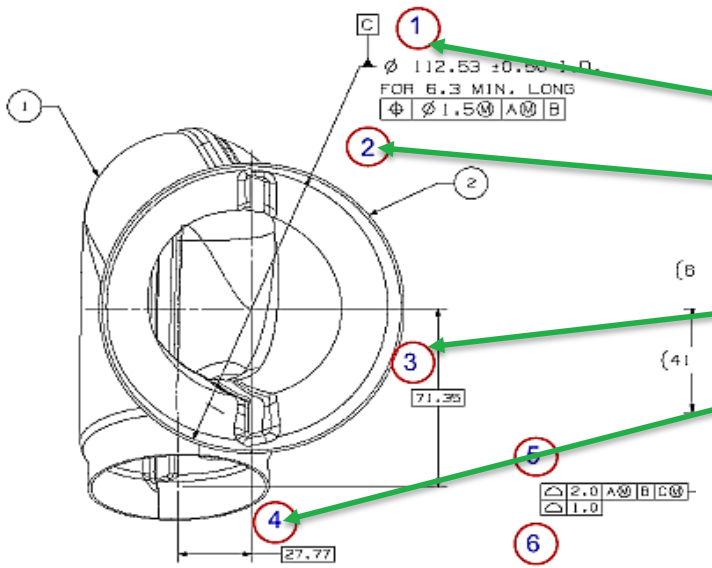
Elements to be checked:

1. The Dimensional Results must correlate with ballooned drawing including all characteristics including specifications and notes.
2. Each data point must indicate: “in spec/out of spec”, “ok/nok” and/or “pass/fail”.
3. The report must include only measured values - ranges are not allowed.
4. All PPAP samples are measured; in case of multiple cavity tool – 1 part per cavity, as minimum.
5. Base for the measurments is 2D drawing.

PPAP REQUIREMENTS: 9.DIMENSIONAL RESULTS - CONTINUED

TENNECO

6. 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.
7. All the supported documents as datum system for CMM, measurment 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)

PPAP REQUIREMENTS: 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	

PPAP REQUIREMENTS: 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:
    I. Alignment acc. which reference system
    II. Best Fit
    III. Other
    IV. Amount of points taken per measurement
    V. Method of calculation for the results (e.g. average, minimum, maximum, .. etc)
4. Software:
    I. Which software was used and with which revision level.

PPAP REQUIREMENTS:
10.RECORDS OF MATERIAL / PERFORMANCE TEST RESULTS

TENNECO

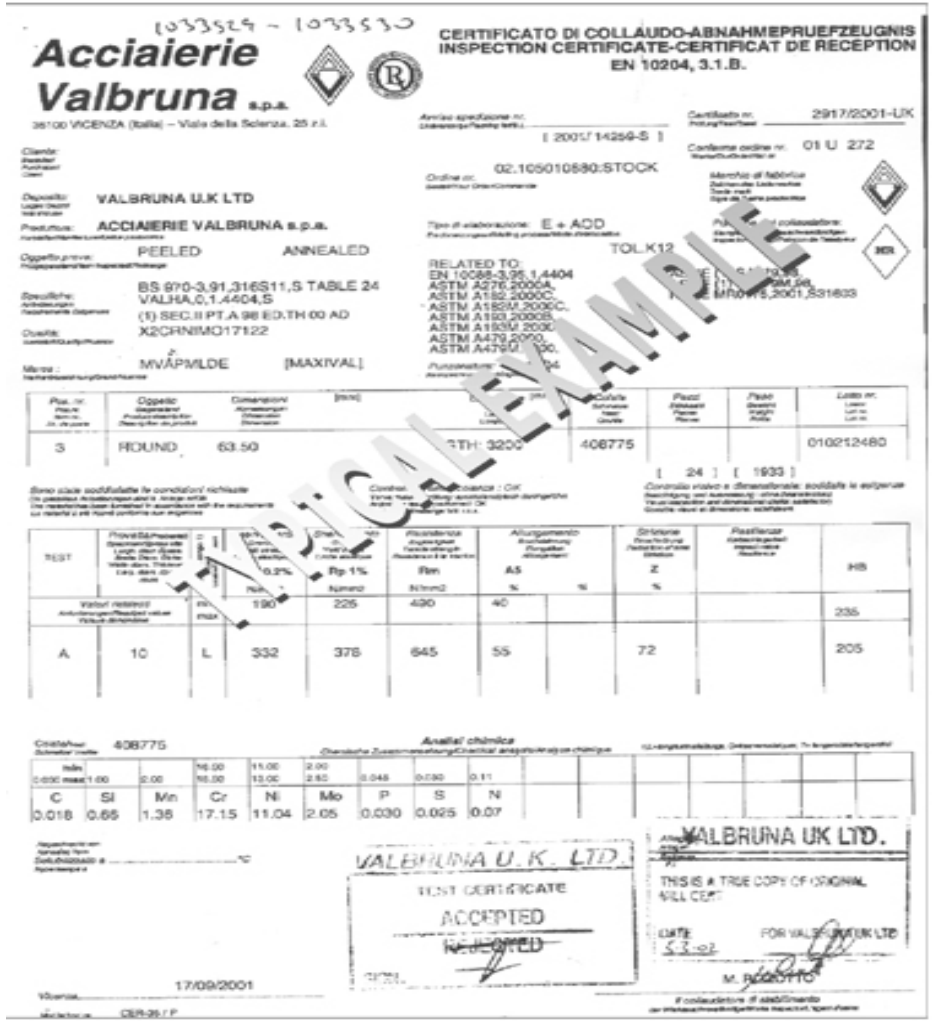
Supplier should have records of material and/or performance test results for tests specificed on design records or Control Plan.

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.
3. Material certificate must contain the chemical composition and mechanical properties of the material as per drawing.
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...

PPAP REQUIREMENTS:
10.RECORDS OF MATERIAL / PERFORMANCE TEST RESULTS

TENNECO



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
MVÅPMLDE [MAXIVAL]

Pos.	Oggetto	Dimensioni	Colata	Pezzi	Peso	Lotto
3	ROUND	63.50	408775			010212480

TEST			Rp 1%	Rm	A5	Z		HB
			N/mm2	N/mm2	%	%		
Valori richiesti	min	190	225	430	40			235
	max							
A	10	L	332	378	645	55	72	205

Analisi chimica

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.
TEST CERTIFICATE
ACCEPTED
REJECTED

VALBRUNA UK LTD.
THIS IS A TRUE COPY OF ORIGINAL
FOR VALBRUNA UK LTD
M. ROSSITO

17/09/2001

Production Part Approval
Material Test Results

Page 1 of 1 Pages

DaimlerChrysler Ford GM

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]		

PPAP REQUIREMENTS:
10. RECORDS OF MATERIAL / REACH & ROHS

TENNECO

If required by customer: (see Section from Tenneco Global Supplier Manual below)

- Supplier 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 Manual, Section 9.2.1 & 9.2.2 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.

PPAP REQUIREMENTS: 11.INITIAL PROCESS STUDIES

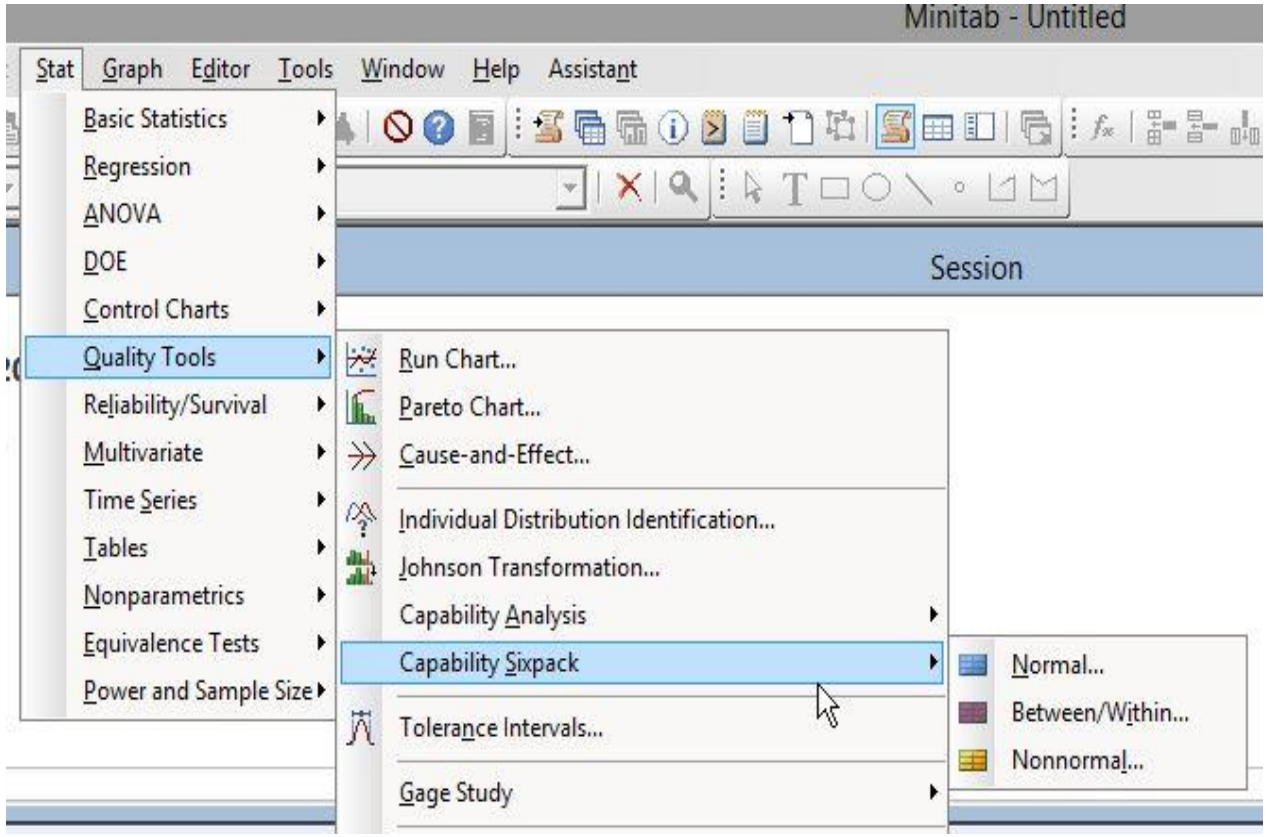
TENNECO

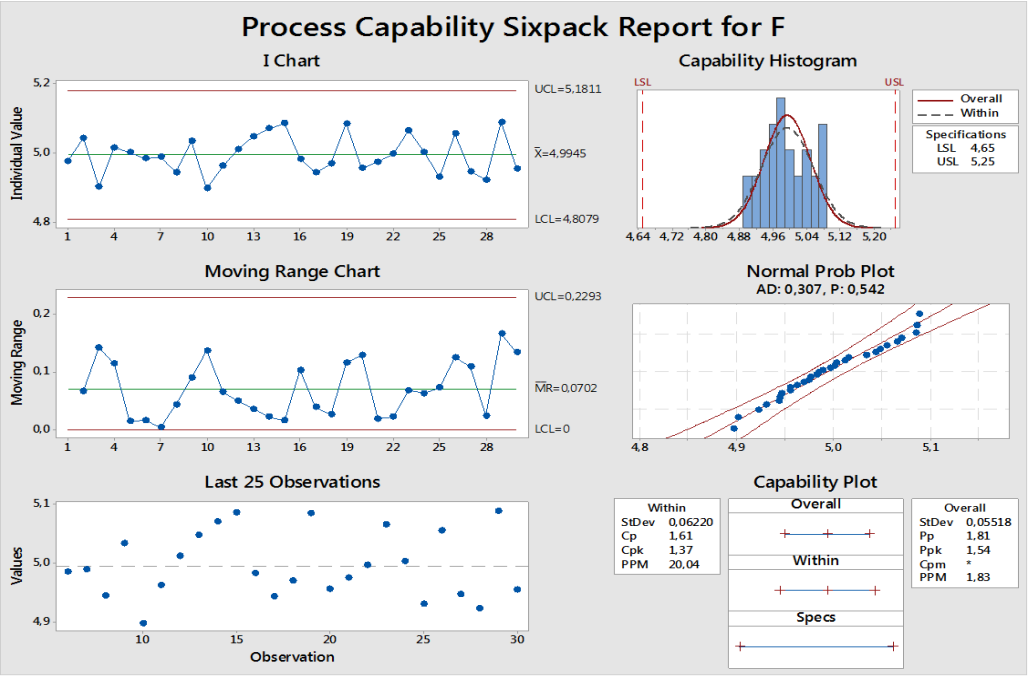
In case of identified critical, significant or pass through dimensions, supplier must perform a process capability study. If there are no critical features called out on the print, Tenneco reserves the right to require initial process capability on other characteristics.

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 performerd 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.

PPAP REQUIREMENTS:
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.

PPAP REQUIREMENTS: 12.QUALIFIED LABORATORY DOCUMENTATION

TENNECO

- 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.

PPAP REQUIREMENTS: 13.APPEARANCE APPROVAL REPORT (AAR)

TENNECO

- 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.

PPAP REQUIREMENTS:
14.SAMPLE PRODUCT PARTS (PPAP SAMPLES)

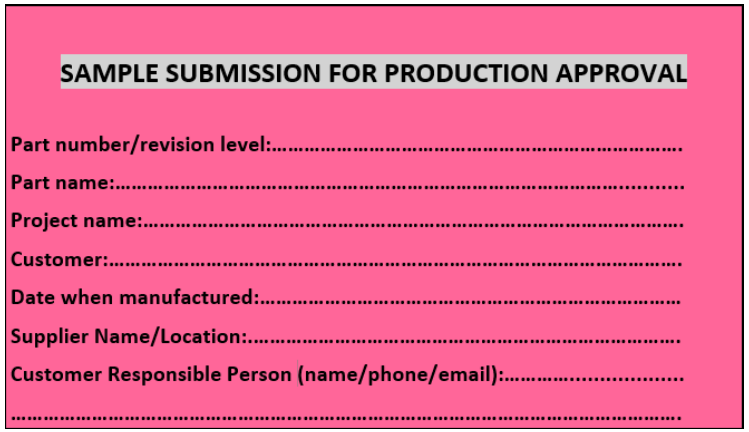
TENNECO

- 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 Tenneco Supplier Manual, section 4.3.2.15):

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)


SAMPLE SUBMISSION FOR PRODUCTION APPROVAL

Part number/revision level:……

Part name:……

Project name:……

Customer:……

Date when manufactured:……

Supplier Name/Location:……

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.**

PPAP REQUIREMENTS: 15.MASTER SAMPLE

TENNECO

- Supplier should retain master sample from the PPAP run.
- The master sample shall be identified as such, and shall show the customer approval date on the sample (picture of master sample with identification tag should be provided in this folder).
- 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. Date of PPAP Warrant signed off

(Example label)

Into section 15 of TITAN PPAP C-folder supplier should upload picture of the Master Sample, including label.

PPAP REQUIREMENTS: 16.CHECKING AIDS

TENNECO

- 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.

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 Print
6. Gauge Certification by approved lab
7. Picture of Part in Gauge

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

PPAP REQUIREMENTS: 16.CHECKING AIDS

Example of checking aid and gauge instruction:

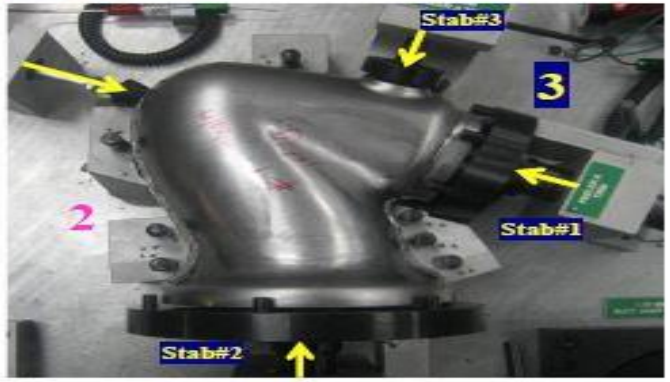
GAGE INSTRUCTIONS — **PC73660/61**
Department 36 — **OPERATION 10**

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

2. **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

PPAP REQUIREMENTS:
17.COMPLIANCE WITH CUSTOMER-SPECIFIC REQUIREMENTS

TENNECO

- 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.

- If none are called out, upload a blank document saying “Not required/Not applicable”.

Not required/

Not applicable

PPAP REQUIREMENTS: 18.PART SUBMISSION WARRANT

TENNECO

- 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.
- 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.

PPAP REQUIREMENTS:
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

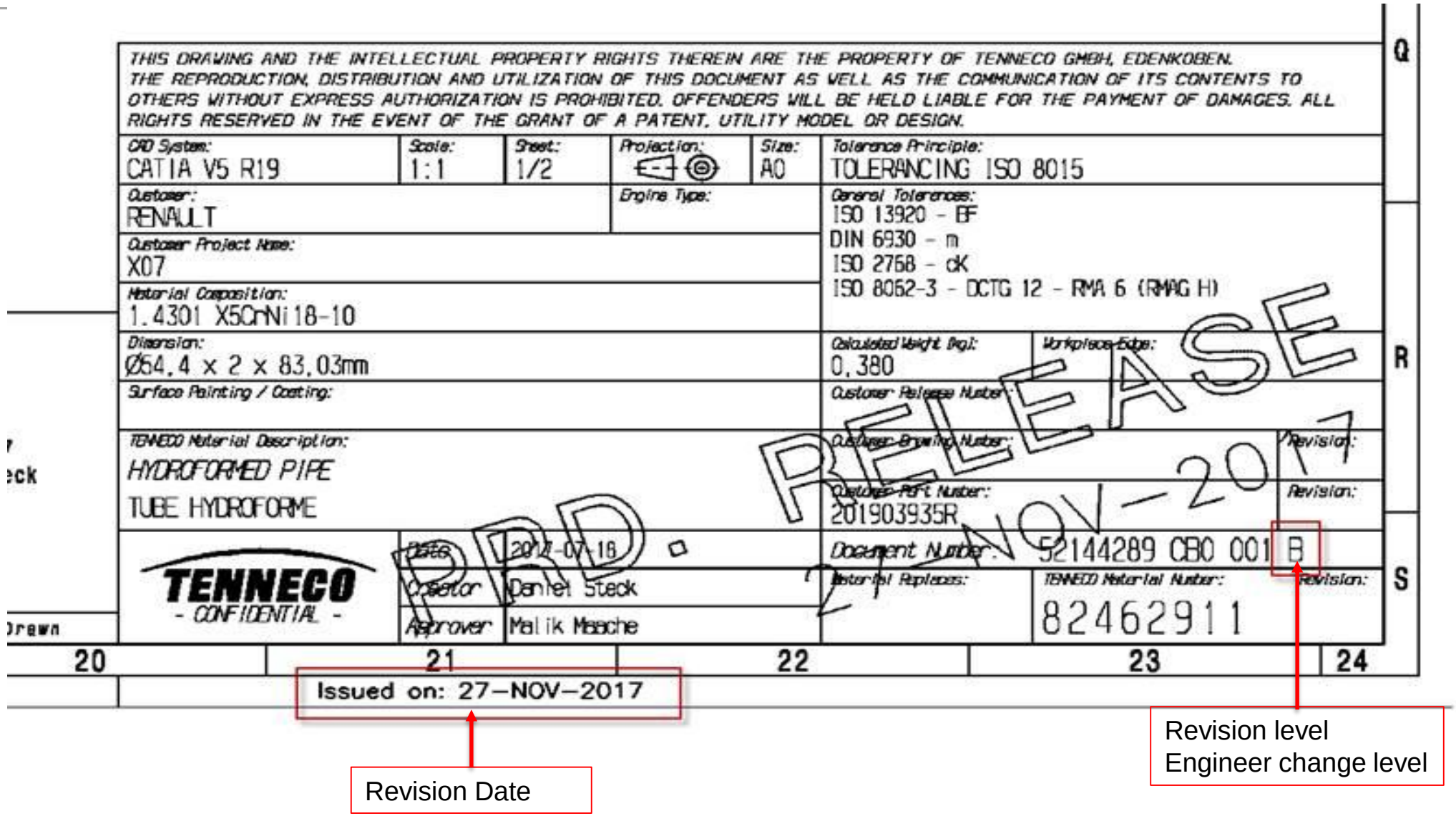
Has customer-required Substances of Concern information been reported? ☐ Yes ☐ No ☐ n/a

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

PPAP REQUIREMENTS:
18.PART SUBMISSION WARRANT – FOR EUROPE ONLY



PPAP REQUIREMENTS:
18.PART SUBMISSION WARRANT – FOR NORTH AMERICA ONLY

TENNECO

LET	DRAWING REVISIONS		
ECM NO.	DESIGNER	ENGINEER	YYYY-MM-DD
DIR 52161691 00 MM 82469369 00 1 - INITIAL RELEASE			
30161934	KJM-CSM	B. HERWAT	08AUG2017
A - SECTION C 34 WAS 35, 2X 21 WAS 2X 19.6 SECTION D 34 WAS 34.9, 2X 21.1 WAS 2X 19.8 ADDED ⌓ | Ⓤ | A | B | C 2 PLACES			
30197964	R. SINKEVITCH	B. HERWAT	2019-03-18

THIS DRAWING AND THE INTELLECTUAL PROPERTY WITHIN ARE CONFIDENTIAL AND PROPRIETARY TO TENNECO INC., MAY ONLY BE USED FOR THE SPECIFIC PURPOSES FOR WHICH IT HAS BEEN SUPPLIED AND MUST BE RETURNED UPON REQUEST. NO OTHER USE IS PERMITTED WITHOUT PRIOR WRITTEN CONSENT OF TENNECO INC.

CAD System: NX11	Scale: 1:1	Sheet: 1/1	Projection:	Size: A0	Tolerance Principle: ASME Y14.5-2009
Customer: GENERAL MOTORS			Engine Type: Gasoline		General tolerances:
Customer Project Name: Y2XX					
Material Composition: 439 SS PER GM SPEC GMW3161M-ST-S-X2CrTi17					2D Drawing is master supported by 3D CAD
Dimension: T:0.8mm				Calculated Weight (kg): 0.277	Workpiece Input
Surface Painting / Coating:				Customer Release Number:	
TENNECO Material Description: OUTLET HEAT SHIELD - RH				Customer Drawing Number:	Revision:
				Customer Part Number: BDHB4536	Revision: 004
TENNECO - CONFIDENTIAL -	Date: 2019-03-18			Document Number: 52161691 UB0 001 A	
	Creator: Robert Sinkevitch			Material Replaces:	TENNECO Material Number: 82469369 Revision: A
	Approver: Brett Herwat				

PRD-RELEASE 05-APR-2019

Issued on: 05-APR-2019

Revision Date (Production Release)

Revision Level for Engineering Change

PPAP REQUIREMENTS:
18.PART SUBMISSION WARANT

TENNECO

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.

PPAP REQUIREMENTS:
18.PART SUBMISSION WARANT

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)

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

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 in Tenneco Supplier Manual (https://suppliermanual.tenneco.com//) or by contacting respective plant representative or SDE.

TENNECO

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 (see chapter 4.2.3.1 of TSM).

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).

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.

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

- **A1. Launch Containment**

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

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

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

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

Expectation is that the supplier demonstrate *Available Output per day > Req'd good parts to support next process (MCR)*.

Tenneco requires a working standard as follow:

- Daily capacity is based on 20hours per day. A “week” is defined as 5 days: Monday morning through Friday night. All capacity increase requests will be quoted.
- LCR = Least Capacity Rate = Estimated Annual Volume divided by 240 days
- MCR = Maximum Capacity Rate = LCR x 120%, plus any additional capacity that may be required

The Capacity Verification Form can be found in PPAP request under Tenneco PPAP/APQP Document Templates.

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

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

A3.APQP Tracker

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

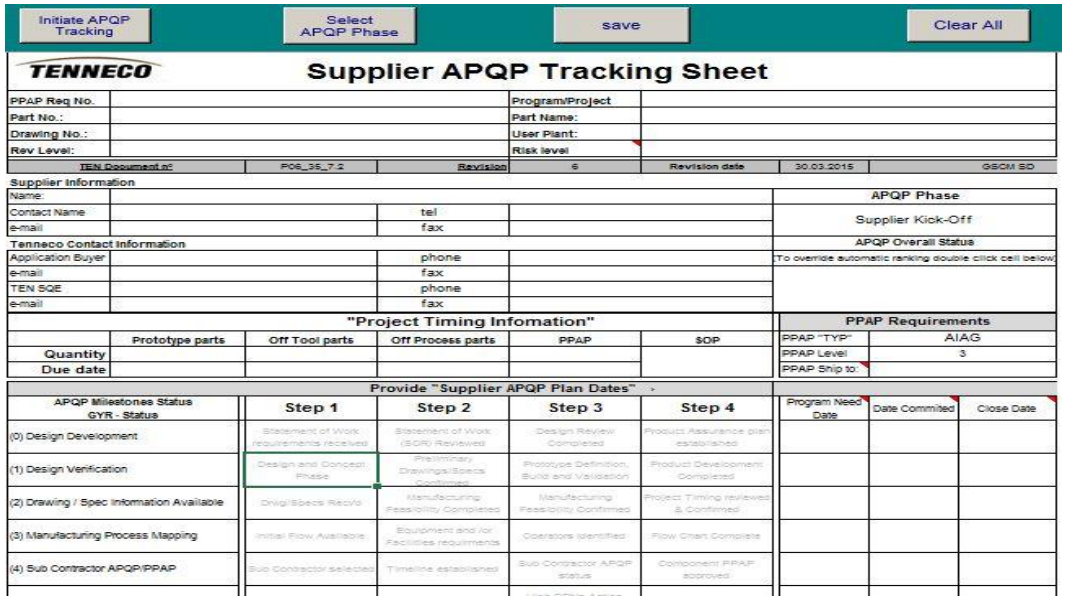
This template contains progress status of both the required documentation and APQP milestones.

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 n°	P06_35_7.2	Revision	6	Revision date	30.03.2015	GSCM SD	

Supplier Information					APQP Phase
Name					Supplier Kick-Off
Contact Name		tel			
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"						PPAP Requirements	
	Prototype parts	Off Tool parts	Off Process parts	PPAP	SOP	PPAP "TYP"	AIAG
Quantity						PPAP Level	3
Due date						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 Recv'd	Manufacturing Feasibility Completed	Manufacturing Feasibility Confirmed	Project Timing reviewed & Confirmed			
(3) Manufacturing Process Mapping	Initial Flow Available	Equipment and /or Facilities requirements	Operators identified	Flow Chart Complete			
(4) Sub Contractor APQP/PPAP	Sub Contractor selected	Timeline established	Sub Contractor APQP status	Component PPAP approved			

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

A4.IMDS Documentation

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

Using the IMDS, it is possible to meet the obligations placed on automobile manufacturers, and thus on their suppliers, by national and international standards, laws and regulations.

Only the components of end customers whom are members of IMDS community can be uploaded into the IMD system. The list of members - www.mdsystem.com

The components data must be uploaded into IMDS database as early as possible but not later than PPAP due date to be sure the MDS (Material Data Sheet) report is available on time.

Elements to be checked:

1. The MDS report is uploaded into C-folder.
2. The MDS is approved (MDS status „accepted“).
3. If the same MDS ID number is written on PSW.

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

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

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.

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 TSM.

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

A5.Packaging Plan Proposal

Examples of Packaging Plan Proposal:

Packaging Proposal Form — TENNECO Corporate Logistics

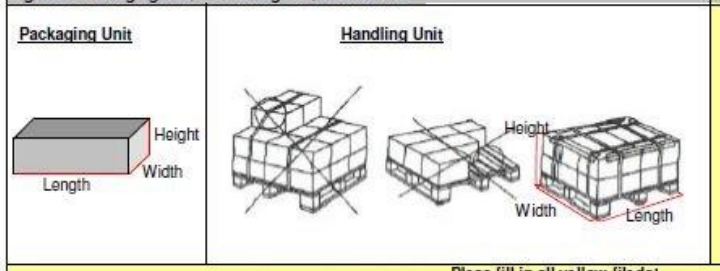
Supplier: [redacted]		Commodity	Targeted Tenneco SBU
		Steel Stampings & Tubing	Emmision Control
SUPPLIER RESPONSIBLE PERSON:			Related project:
Contact : [redacted]		Sub-commodity	
Phone n° :		Stampings	GM SGE
e-mail :			
Date of proposal:	Latest Update:	Date Approved	
TEN Document n°: P06_40_7.1	Revision	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 (empty Box)	lbs		5.5	
Packaging Unit material			PLASTIC	
Internal Dunnage weight	lbs		16	
Internal Dunnage material			PLASTIC LID	
Internal Corrosion Protection	if required		N/A	
Weight (empty Pallet)	lbs		45	
Pallet material			PLASTIC	
Number of parts per Packaging Unit			20	
Number of Handling Units per Layer			6	
Number of Packaging Units per Handling Unit			24	
Complete Handling Unit weight	lbs		637	
How are Packaging Units secured to pallet?			PLASTIC WRAP	
Is packaging assumed to be returnable?			YES	
2. Packaging Volumes				

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!

for additional info concerning Handling & Packaging Requirements see: ***Supplier Packaging Manual*** at www.tasupplier.com

Supplier Submittal Authorization:	[redacted]
Date:	12/10/2014
Tenneco Approval:	
Date:	

A5.Packaging Plan Proposal

Example of label below (VDA format):

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

A5.Packaging Plan Proposal FOR NA CA PLANTS NEW PROCESS AND FORM

Packaging Proposal Form

TENNECO

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	Tare Weight: 2.51 lbs	12	5	Green Processing	1215-07	Grey
		Hand Held Tote				Buckhorn	SW151208	
		35lb. Grs. Wgt. Capacity				Monoflo	NRSO1215-07CS	
Optional *With Plant and PKG ENG. Approval*	P4	15"x 12"x 9.5" Tote	Tare Weight: 3.47 lbs	12	4	Green Processing		Grey
		Hand Held Tote				Buckhorn	SW151210	
		35lb. Grs. Wgt. Capacity				Monoflo	NRSO1215-09CS	
First Option	P7	24"x 15"x 7.5" Tote	Tare Weight: 4.11 lbs	6	5	Green Processing	2415-7	Grey
		Hand Held Tote				Buckhorn	SW241508	
		35lb. Grs. Wgt. Capacity				Monoflo	NRSO2415-07CS	
Optional *With Plant and PKG ENG. Approval*	P8	24"x 15"x 9.5" Tote	Tare Weight: 5.3 lbs	6	4	Green Processing		Grey
		Hand Held Tote				Buckhorn	SW241510	
		35lb. Grs. Wgt. Capacity				Monoflo	NRSO2415-09 CS	
Optional *With Plant and PKG ENG. Approval*	P9	24"x 15"x 14.5" Tote	Tare Weight: 6.87 lbs	6	3	Green Processing		Grey
		Hand Held Tote				Buckhorn	SW241515	
		35lb. Grs. Wgt. Capacity				Monoflo	NRS 2415-14 CS	
First Option	P14	24"x 15"x 11.5" Tote	Tare Weight: 5.4 lbs	6	3	Green Processing	2415-11	Grey
		Hand Held Tote				Buckhorn	SW241511	
		35lb. Grs. Wgt. Capacity				Monoflo	NRSO2415-11 CS	

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

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

TENNECO

A5.Packaging Plan Proposal FOR NA CA PLANTS – NEW PROCESS AND FORM

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.

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

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.

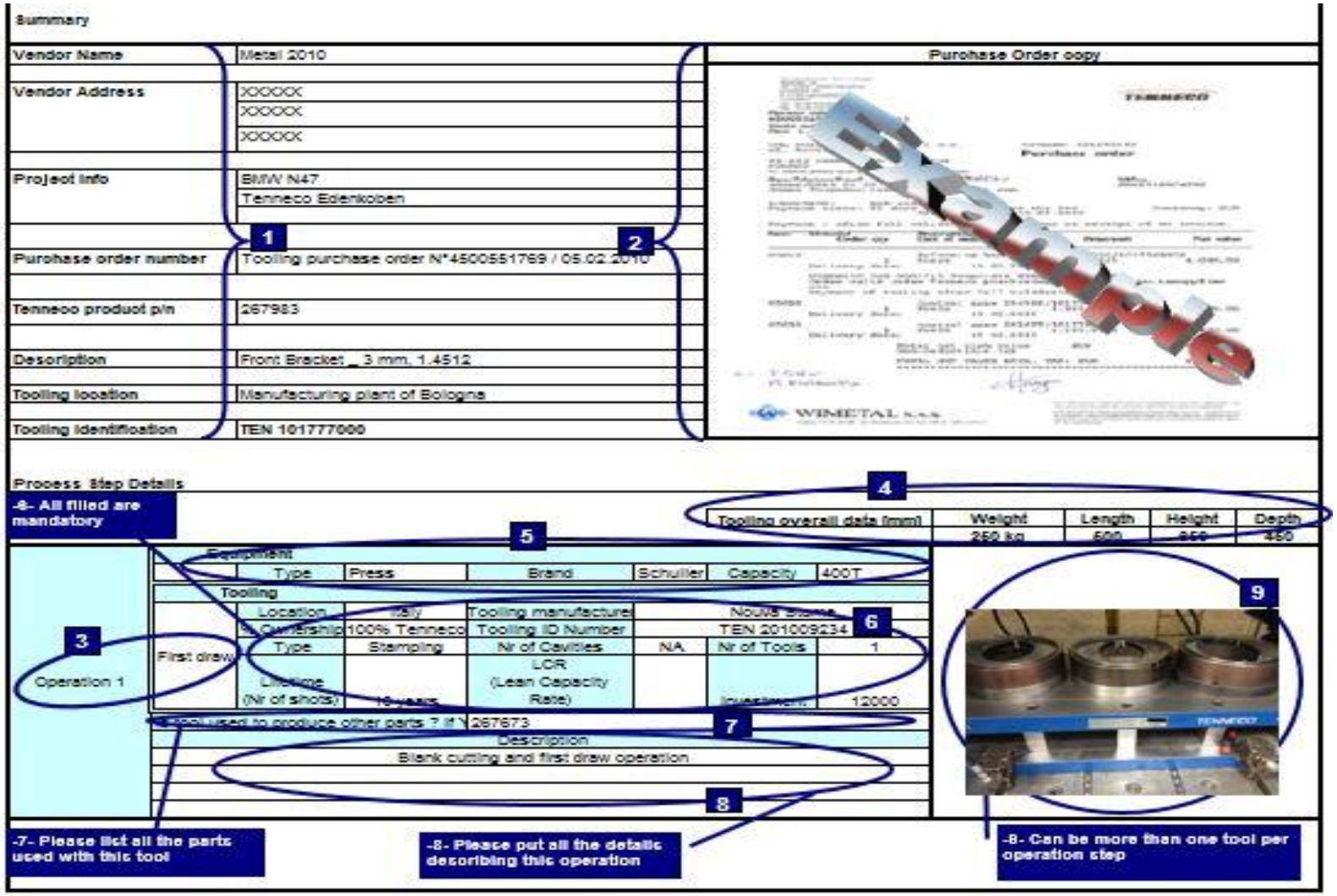
Further details can be found in chapter 5.3 of TSM.

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.

TENNECO

A6.Vendor Tooling Registration Form

Example of VTRF :



Summary

Vendor Name	Metal 2010
Vendor Address	XXXXX XXXXX XXXXX
Project info	BMW N47 Tenneco Edenkoben
Purchase order number	Tooling purchase order N°4500551769 / 05.02.2010
Tenneco product p/n	267983
Description	Front Bracket _ 3 mm, 1.4512
Tooling location	Manufacturing plant of Bologna
Tooling identification	TEN 101777000

Purchase Order copy

Example

Process Step Details

-9- All filled are mandatory

Tooling overall data (mm)	Weight	Length	Height	Depth
	250 kg	500	350	450

Equipment

Type	Press	Brand	Schuller	Capacity	400T

Tooling

	Location	Italy	Tooling manufacturer	NOVIS Stamp		
	% Ownership	100% Tenneco	Tooling ID Number	TEN 201009234		
First draw	Type	Stamping	Nr of Cavities	NA	Nr of Tools	1
	Lifetime (Nr of shots)	10 years	LCR (Lean Capacity Rate)		Investment	12000
Is tooling used to produce other parts ? If Y			267673			

Description

Blank cutting and first draw operation

Operation 1

1 2 3 4 5 6 7 8 9

-7- Please list all the parts used with this tool

-8- Please put all the details describing this operation

-8- Can be more than one tool per operation step

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

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)

PPAP REQUIREMENTS:
A1 THRU A11 TENNECO SPECIFIC REQUIREMENTS

TENNECO

A11.Other Specified Requirement

Supplier must provide bill of material of the part(s) delivered to Tenneco.

- If the supplier delivers an assembly to Tenneco, all parts included in the assembly must be part of the Bill of Material.
- Values for gross and net weight must be determined by weighing the components.

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;
- Gross Weight single components in kg and four decimal places;
- Net Weight single components in kg and four decimal places;

Note – Utilize the template in TITAN

If there are any other customer/region/plant specific requirements, they should be uploaded into this folder (e.g. CQI standards – section A11 of TITAN PPAP C-folder).

PPAP REQUIREMENTS: 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):* *Material Grade acc. Drawing (5):**	Materialbezeichnung alternativer Werkstoff (6):* *Material Grade Alternative Material (6):**	Fügeverfahren gem. Zeichnung (7): *Technology acc. Drawing (7):*	Brutto Gewicht in kg (8): *Gross 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							

PPAP REQUIREMENTS: BOM EXAMPLE (BOTTOM HALF)

TENNECO

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 or Program Buyer, in NA you may also contact your Supplier Development Specialist.

CUSTOMER SPECIFICS REQUIREMENTS - CSR

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. Reference page 62.

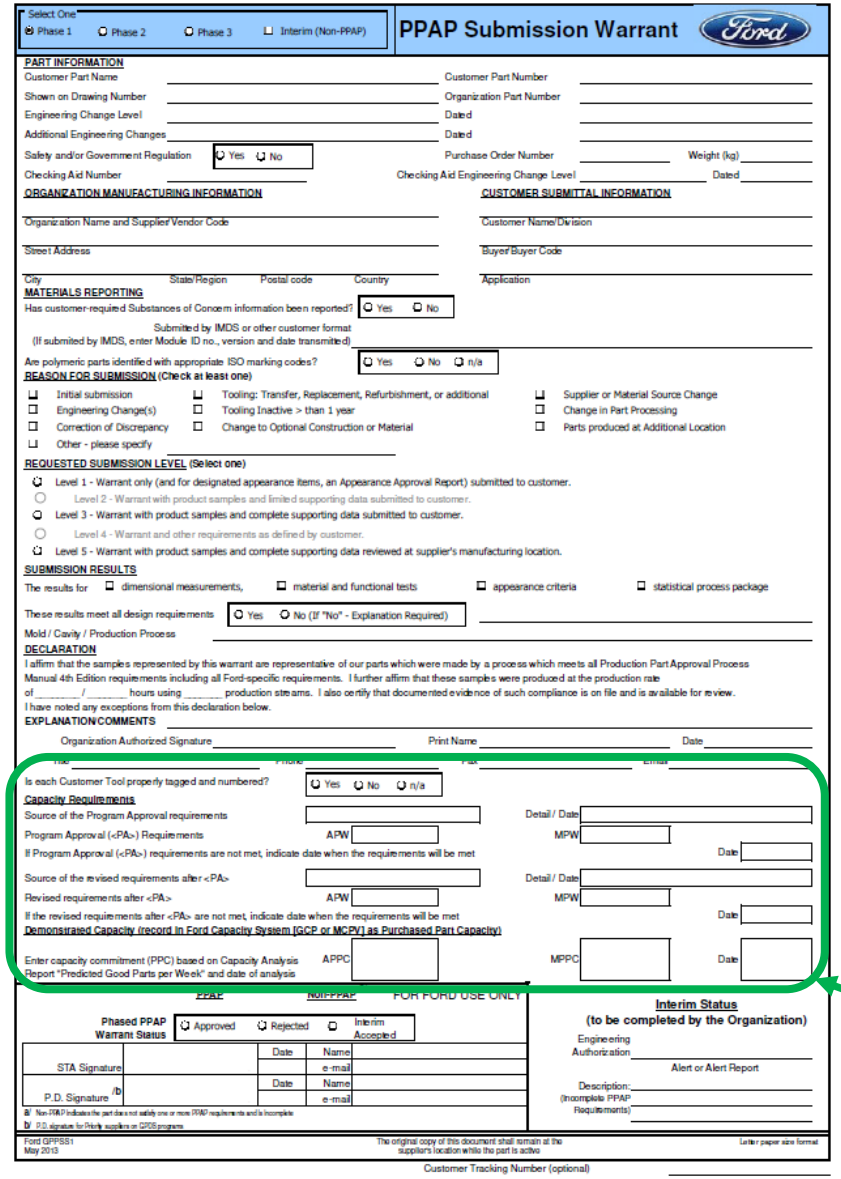
- Capacity Analysis – Use the Ford Capacity Form current revision must be used - correct template included in with TITAN PPAP request.
  The Run@Rate called out should be in sync with the APW / MPW & APPC / MPPC values and the cycle times that are reported on the capacity Ford capacity analysis. Reference page 63.

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

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

CUSTOMER SPECIFICS REQUIREMENTS - CSR

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 or Q2GS 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

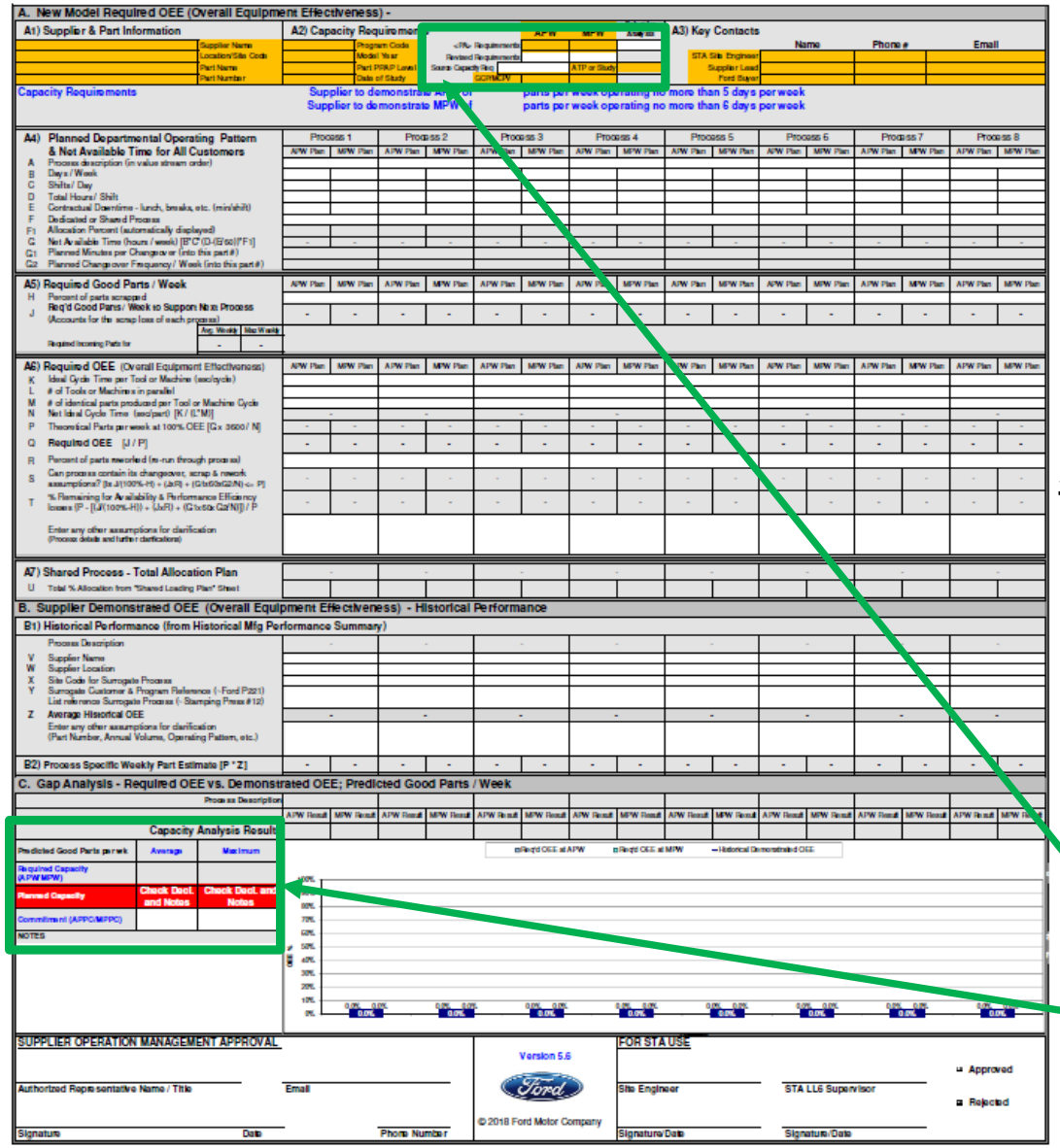
NOTE: If you have questions - contact your Tenneco SDS or Program Buyer for Clarificaton

- 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**

CUSTOMER SPECIFICS REQUIREMENTS - CSR

TENNECO



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.

CUSTOMER SPECIFIC REQUIREMENTS - CSR

TENNECO

DAIMLER

Beurteilung: Serienreifer Prozess / Assessment: Series released process

Sachnummer / Part number:	82220870	Benennung / Designation:	ASSY Bracket DPF OUTLET
Lieferant / Supplier:	Paul Hafner GmbH	Farbe / Color:	

Konstruktionsstand / Design status:

vorgestellt / presented:	n/a	aktuell / current:	D

Bei Elektronikkomponenten / For electronic devices:

Hardwarestand / Hardware status:	n/a	Softwarestand / Software status:	n/a
Diagnosestand / Diagnosis status:	n/a		

	in Ordnung (grün) OK (green)	bedingt in Ordnung (gelb) conditionally OK (yellow)	nicht in Ordnung (rot) not OK (red)
Maschinen / Anlagen / Vorrichtungen Machines / Facilities / Fixtures	Serie am Produktionsstandort vom Lft. abgenommen; Fähigkeit nachgewiesen Series approved by suppl. at production site, capability demonstrated ☑	Serie am Produktionsstandort und keine Qualitätsbeeinträchtigungen in der Serie zu erwarten Series at production site, no quality deterioration can be expected for series ☐	Serie nicht am Produktionsstandort oder Qualitätsbeeinträchtigungen zu erwarten Series not at production site, or quality deterioration to be expected ☐
Verkettung Logistik Interlinking logistics	Serie Series ☑	Nicht Serie, aber keine Qualitätsbeeinträchtigungen in der Serie zu erwarten Not series, but no quality deterioration to be expected for series ☐	Qualitätsbeeinträchtigungen zu erwarten Quality deterioration to be expected ☐
Taktzeit / Stückzahl Cycle time / Quantity	Serientaktzeit ohne Sondermaßnahmen Production cycle time w/o special actions	Serientaktzeit dauerhaft erreichbar mit Sondermaßnahmen Production cycle time is permanently achievable with special actions	Serientaktzeit mit Sondermaßnahmen nicht erreichbar Production cycle time with special actions is not achievable

DAIMLER

Beurteilung: Serienreifes Teil / Self-assessment production standard

Sachnummer / Part number:	82220870	Benennung / Designation:	ASSY Bracket DPF OUTLET
Lieferant / Supplier:	Paul Hafner GmbH	Farbe / Color:	

Konstruktionsstand / Design status:

vorgestellt / presented:	n/a	aktuell / current:	D

Bei Elektronikkomponenten / For electronic devices:

Hardwarestand / Hardware status:	n/a	Softwarestand / Software status:	n/a
Diagnosestand / Diagnosis status:	n/a		

	in Ordnung (grün) OK (green)	bedingt in Ordnung (gelb) conditionally OK (yellow)	nicht in Ordnung (rot) not OK (red)
Werkzeuge Tools	Serienwerkzeug abgenommen Standard production tools approved ☑	Serienwerkzeug optimiert Standard production tools optimized ☐	Kein Serienwerkzeug No standard production tools ☐
Maß Dimension	Maßlich i.O. keine Nacharbeit Dimensionally OK no rework ☑	Maßlich i.O. mit Nacharbeit durch Lieferant oder unkritische Werte n.i.O. (Abweichenzulässig) Dimensionally OK, rework by supplier or not critical dimensions OK (action authorization) ☐	Maßlich n.i.O. Dimensionally not OK ☐
Oberfläche/Struktur Farbe/Narbung Suface/Structure Color/Grain	i.O. keine Einfallstellen keine Welligkeit OK no sunk spots no waviness ☑	Gerade noch akzeptabel entspricht Grenzmuster Daimler Just acceptable corresponds to Daimler boundary sample ☐	Grobe Abweichung / Fehler bzw. nicht zu beurteilen Large deviations / defects or not assessable ☐
Werkstoff Material	Serienwerkstoff DBL erfüllt Production material, DBL met	Kein Serienwerkstoff oder andere Verarbeitung oder DBL nicht erfüllt Abweichenzulässig liegt vor; kein oder unvollständiges Materialdatenblatt / IMDS No production material or other processing or DBL not met,	Kein Serienwerkstoff DBL nicht erfüllt / nachgewiesen No production material, DBL not met / not demonstrated

For DAIMLER programs

- Self assessment sheets for product and process shall be submitted with PPAP

For Daimler Programs

- Test equipment list

Prüfmittelliste (produktspezifisch) **Test equipment list (product specific)**					Stand: Status:		Datum: Date:
Lieferant / Produktionsstandort: **Supplier/ Production site:**					**Kunde:** **Customer:**		
Kennummer / DUNS-Code: ID / DUNS-Code:					Kennummer: ID:		
Berichts-Nr. / Report No.: Index:					Berichts-Nr./ Report no.: Index:		
Benennung / Designation:					Benennung / Designation:		
Sachnummer / Part no.:					Sachnummer / Part no.:		
Zeichnungsnummer: Drawing no.:					Zeichnungsnummer: Drawing no.:		
Stand / Datum: Status / Date:					Stand / Datum: Status / Date:		
Ref. Nr.: Ref. No.:	PMÜ - Nummer Test equipment control no.	Benennung Designation	Überwachungspflicht Control obligation	Kalibrierintervall Calibration interval	letzte Kalibrierung Last calibration	Kalibrierdienstleister Calibration service	Freigabestatus Approval status