Tenneco PPAP Guidelines

(according to AIAG PPAP Fourth Edition)

version 1 – 2017-11-13

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

Main purpose of this manual is understanding by the Supplier, Tenneco PPAP & relevant documentation requirements.

For each PPAP element it will be explained how to fulfill our demands:

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)
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

As many other OEMs and Tier1 customers Tenneco also has addtional requirements which need to be fullfiled before approval (as per identified 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 in Tenneco Supplier Manual (https://suppliermanual.tenneco.com//) or by contacting respective plant representative or SDE.

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

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

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

Requirement	Submission Level				
	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

1. After receiving ePPAP 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 Global/European Terms and Conditions
   - 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 Portal. 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.

PPAP Status after Tenneco review

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).

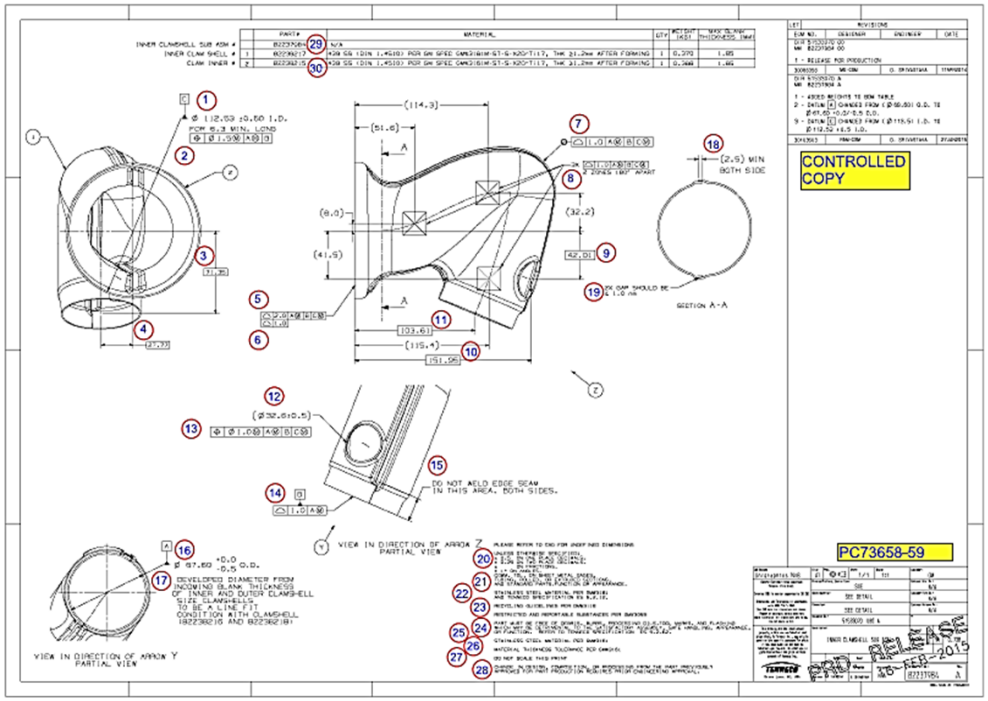
Interim Approval
Permits the shipment of material for production requirements on a limited time period or quantities.
Supplier is responsible for implementing containment actions to ensure that only acceptable material is being shipped to Tenneco. Additionally supplier has to prepare an action plan agreed with Tenneco. PPAP corrections are required to obtain a status „approved“ within agreed time frame.

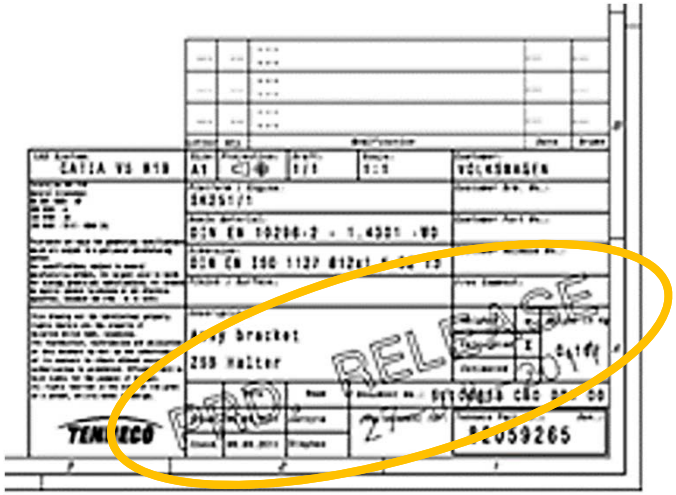
Returned
It means that PPAP submission does not meet Tenneco requirements. In such cases, the submission must be corrected to meet the requirements and obtain a status „approved“ within agreed time frame.

PPAP Requirements:
1.Design Records

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 are the latest available.
4. Make sure that on the drawing „production release“ stamp is present.
5. Upload ballooned drawing into section 1a of the APQP folder. If section 1b and 1c are not applicable upload a blank document stating “N/A”.

Examples below:





PPAP Requirements:
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.

Example below:

Not required/

Not applicable

PPAP Requirements:
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“.
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)

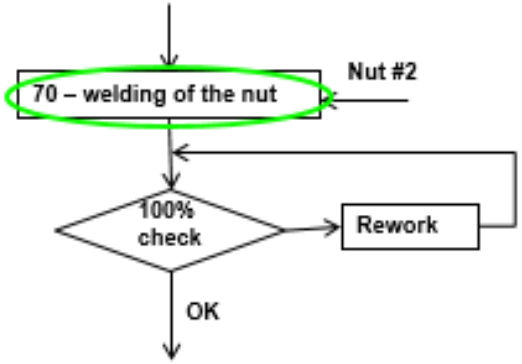
If supplier is responsible for the part/product design, completion and submission of dFMEA according to customer-specified requirements is required:

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)

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.
9. 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)

Example of PFD below:

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]

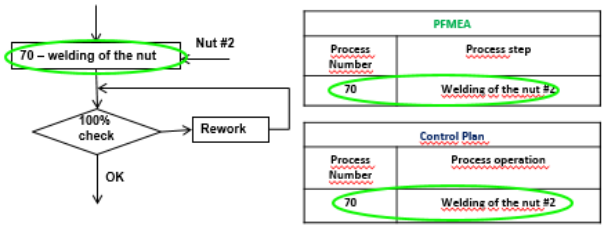
♦ OPERATION ● MOVE ▲ STORAGE ■ INSPECT

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)

Supplier shall develop a proces FMEA in accordance with, and compliant to, customer-specified requirments. Points which will be checked:

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)

Example of pFMEA below:

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

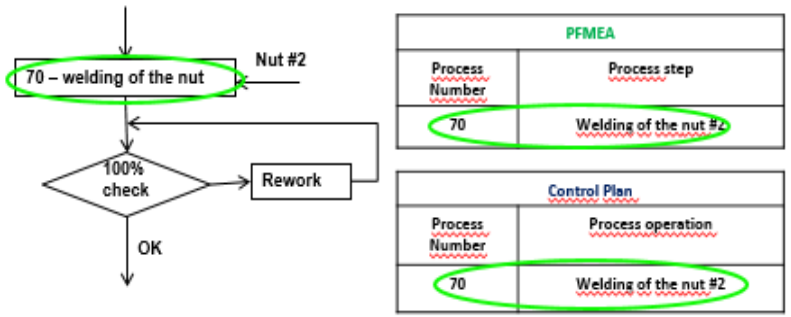
Item: [redacted] Process Responsibility: DEPARTMENT PROCESS ENGINEER FMEA Number: [redacted]
Model Year(s)/Vehicle(s): N/A Key Date: N/A Prepared By: [redacted]
Core Team: Reference Flowing Form FMEA Date (Orig.): 31-Jul-14 (Rev.) (Rev) 6-Dec-14

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						

PPAP Requirements: 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. 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.
8. Annual Revalidation should be a part of the Control Plan.
9. Control Plan should be uploaded into section 7 of TITAN PPAP C-folder.



PPAP Requirements: 7.Control Plan(CP)

Example of Control Plan below:

[redacted]

CONTROL PLAN

Prototype		GP-12		Pre-launch	X	Production	Key Contact at launch/Phone [redacted]	Date (Orig.) 7/31/2014	Revised By: SO	Date (Rev.) 4/1/2016
Control Plan Number	PC73659									
Part Number/Print Revision and Date [redacted]					A	2/16/15	Core Team Reference Flowing Form	Customer Engineering Approval/Date (If Req'd) N/A		
Part Name/Description [redacted]							Supplier/Plant Approval/Date N/A	Customer Quality Approval/Date (If Req'd) N/A		
Supplier/Plant [redacted]		Supplier Code [redacted]					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)			43PSS (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

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:

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.
4. Acceptance criteria:
    - Kappa value >0,75 → acceptable
    - Kappa value <0,75 → not acceptable and improvement plan needed

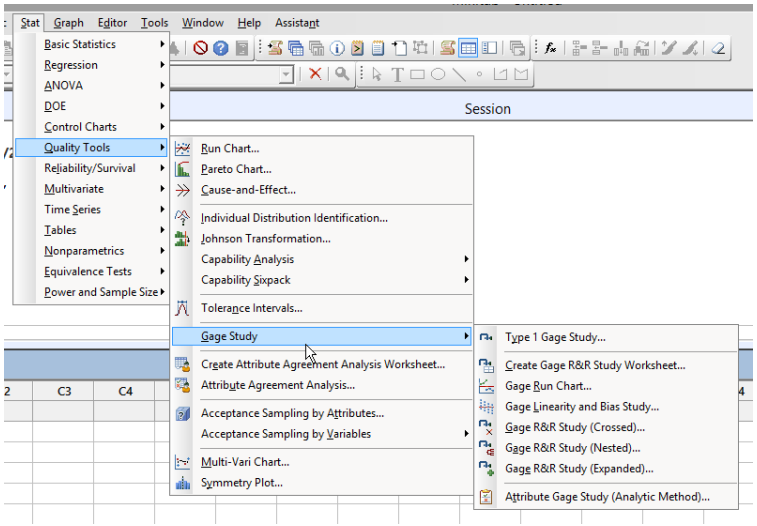
Elements to be checked:

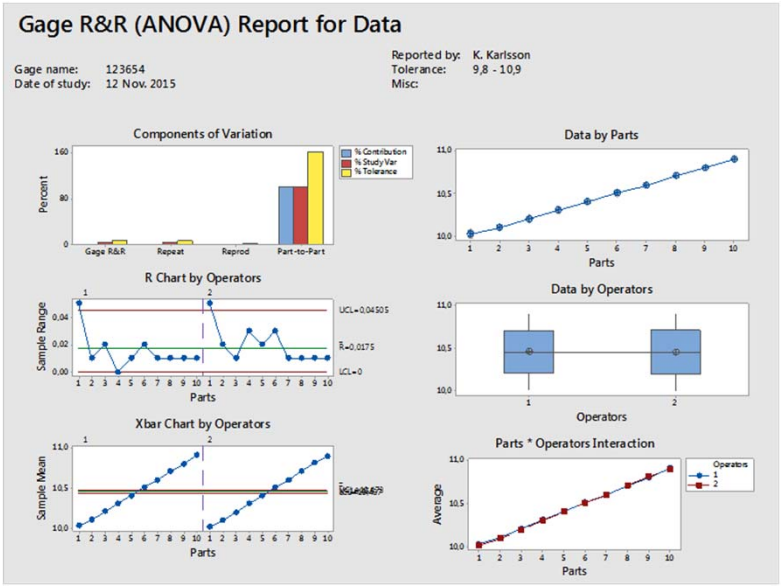
- Studies performed on all gages used on SC/CC features (as minimum, including on-line gages and testers)
- Work instruction for gauge and picture of gauge should be part of PPAP see chapter 17 Checking Aids
- Raw data available for each study

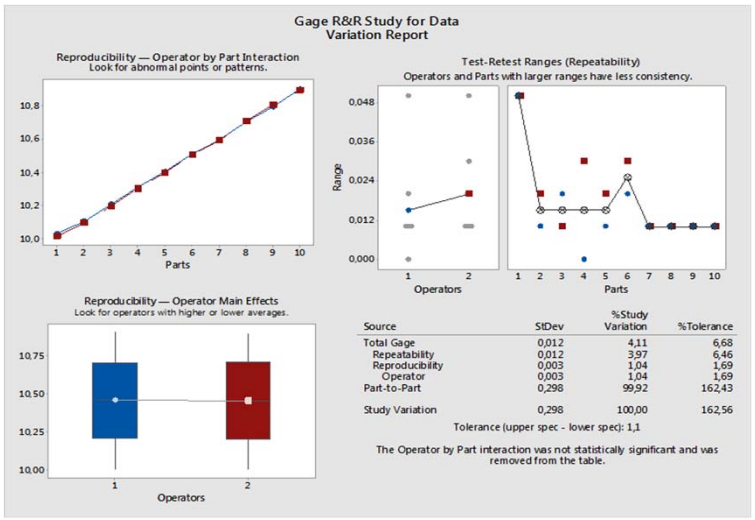
All studies should be uploaded into section 8 of TITAN PPAP C-folder.

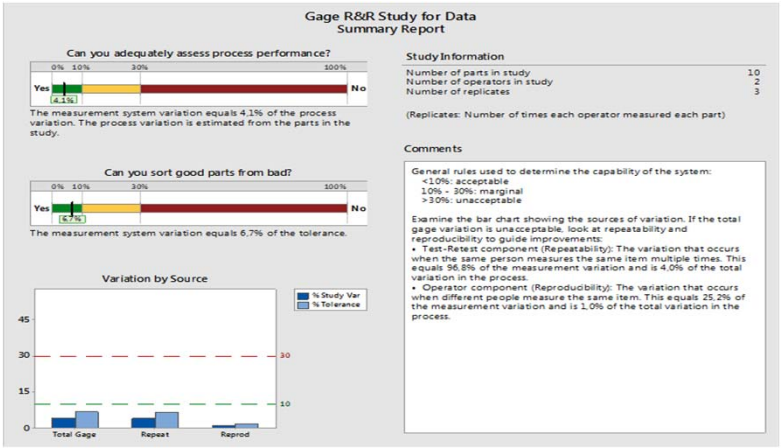
PPAP Requirements:
8.Measurement System Analysis

Example of MSA study generated with CAQ software:





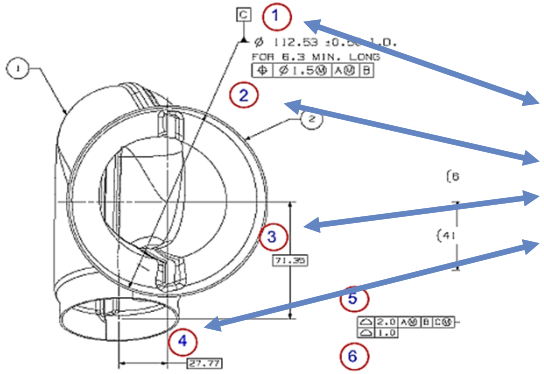




PPAP Requirements:
9.Dimensional Results

Supplier should be able to provide evidence that all measurements/test have been done in accordance with 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 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.
6. The measured parts are the parts which were submitted as PPAP Sample Parts.
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

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	

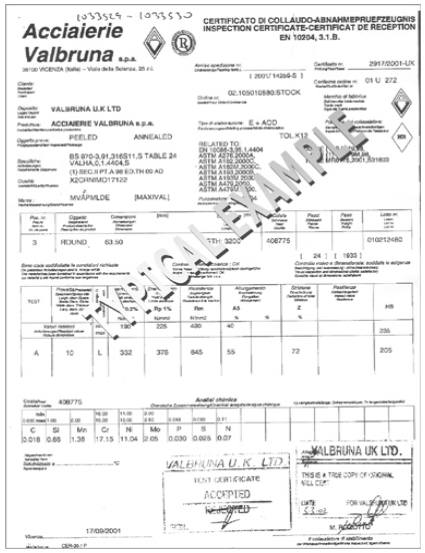
PPAP Requirements:
10.Records of Material / Performance Test Results

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. No data should be older than one year (prior to PPAP submission supplier should contact Tenneco representative, if material certificate is older)
3. Material certifications and results for product validation (for example tests results such as Weld Cut & Etch) or design validation testing should be attached here (section 10 of TITAN PPAP C-folder).

Examples of Material Certificate and Material test results attached:



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.

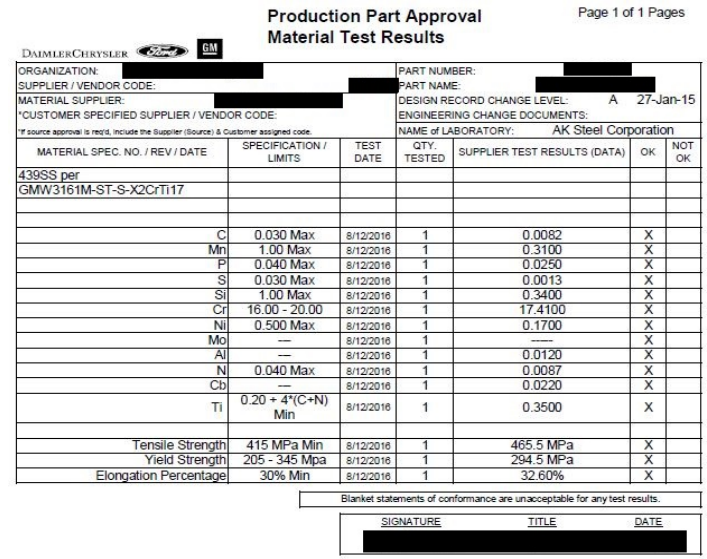
PEELED ANNEALED

B5 970-3-91,316S11,5 TABLE 24
VALHA,0,1,4404,S
(1) SEG.II PT.A 98 E.0.TH 00 AD
X2CRNIMO17102

MVIAPIVLDE [MAXIVAL]

ROUND 63.50 406775 010212480

VALBRUNA U.K. LTD.
TEST CERTIFICATE
ACCEPTED
REJECTED
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:
11.Initial Process Studies

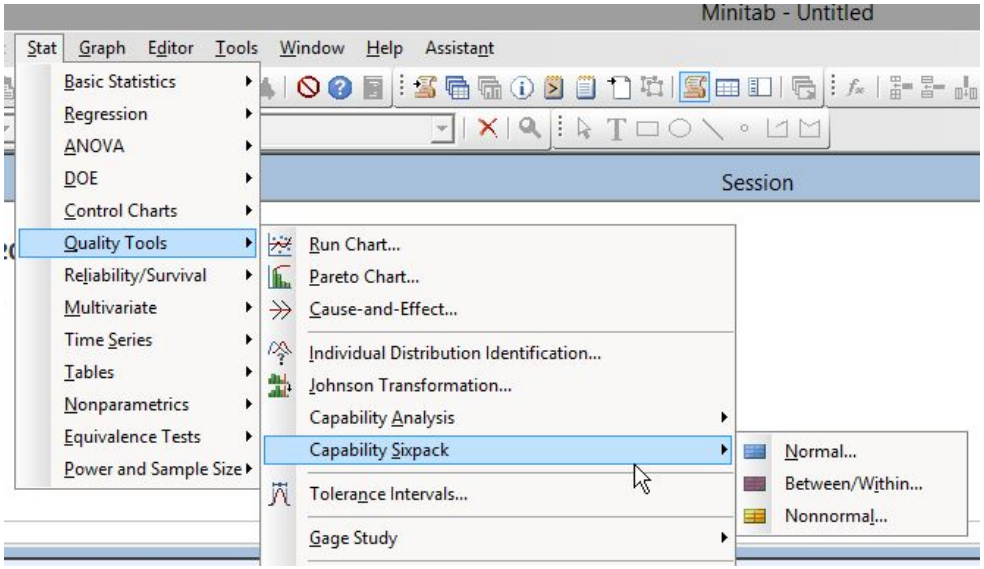
In case of identified critical, significant or pass through dimensions, supplier must perform a process capability study. If there are no critical features called out on the print, Tenneco reserves right to require initial process capability on other characteristics.

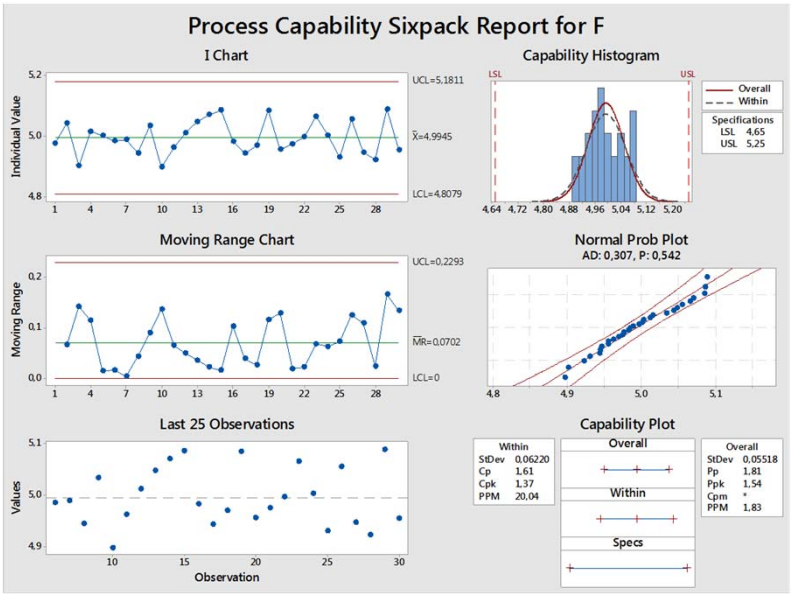
Elements to be checked:

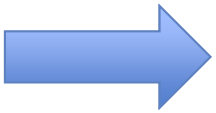
1. Sampling: for variable data a minimum 125 (or as agreed with Tenneco) readings from consecutive parts of the significant production run is required for the study.
2. Sampling: for attribute data a minimum 300 (or as agreed with Tenneco) readings from consecutive parts of the significant production 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.

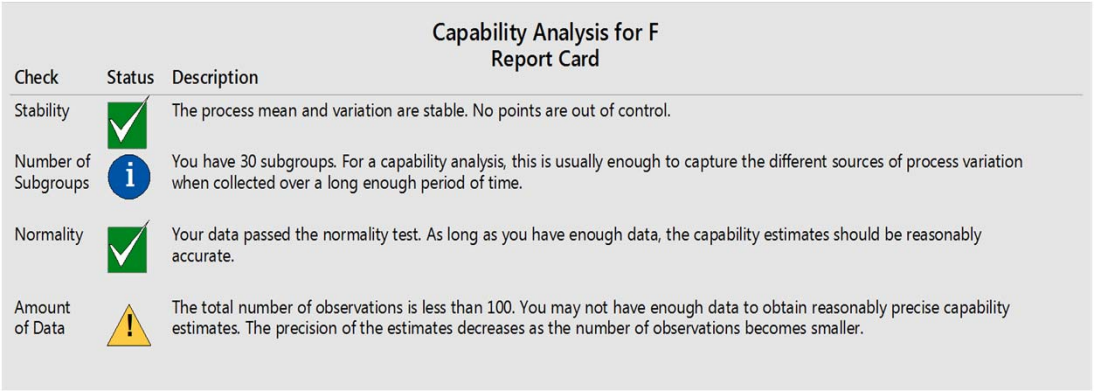
PPAP Requirements:
11.Intial Process Studies

Example of capability study generated with CAQ software:









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

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)

Appearance Approval Report shall be completed for each part, if the product/part has appearance requirements on the design records.

AAR is typically applied for parts with color, grain or surface appearance requirements.

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.

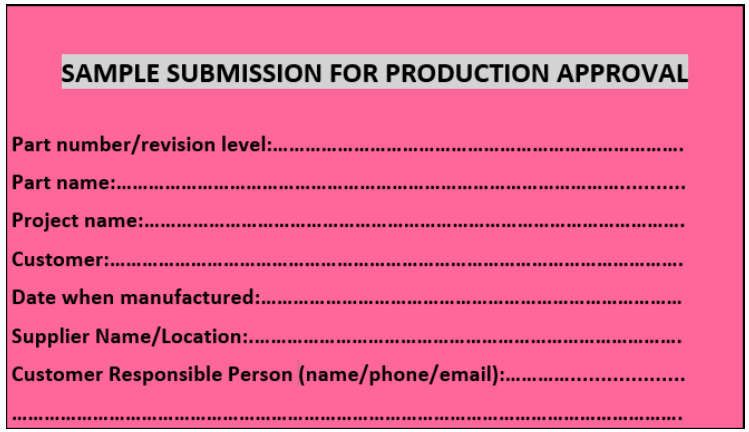
PPAP Requirements:
14.Sample Product Parts (PPAP samples)

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)



Into section 14 of TITAN PPAP C-folder supplier should upload shipment tracking information.

PPAP Requirements: 15.Master sample

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

This PPAP element is used in order to certify that all aspects of these aids comply with product requirements/specifications for testing as stated by the drawing.

Elements to be checked:

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. Master is visually color-coded as PASS (Green) or FAIL (Red)
4. MSA should be conducted for all gauges used according to Control Plan

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.

PPAP Requirements: 16.Checking Aids

Example of checking aid and gauge instruction:

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

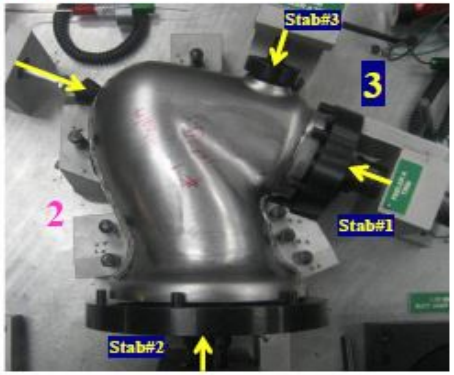
GAGE ID: PC73660/61#ST1

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

This section is for uploading any customer specific requirements which are called out on the print (coming from Ford, GM, Harley, etc.)

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

Not required/

Not applicable

PPAP Requirements:
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.

Electronic signatures are acceptable.

Ford Specific Parts

- Use the new Ford phased PSW format here
- The format will have a place to put APPC and MPPC numbers that are carried over from the Ford Capacity Form.
- The Run@Rate called out should be in sync with the APPC numbers and the cycle times that are reported on the capacity forms.

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

Enter actual weight in kilograms to four decimal places

Weight (kg)

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

Has customer-required Substances of Concern information been reported?

Choose proper answer based on available information

☐ Yes ☐ No ☐ n/a

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

Are polymeric parts identified with appropriate ISO marking codes?

Choose proper answer based on available information

☐ Yes ☐ No ☐ n/a

PPAP Requirements:
18.Part Submission Warant

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

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

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.

PPAP Requirements:
A1 thru A11 Tenneco specific requirements

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 30 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.

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

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 ePPAP 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

A3.APQP Tracker

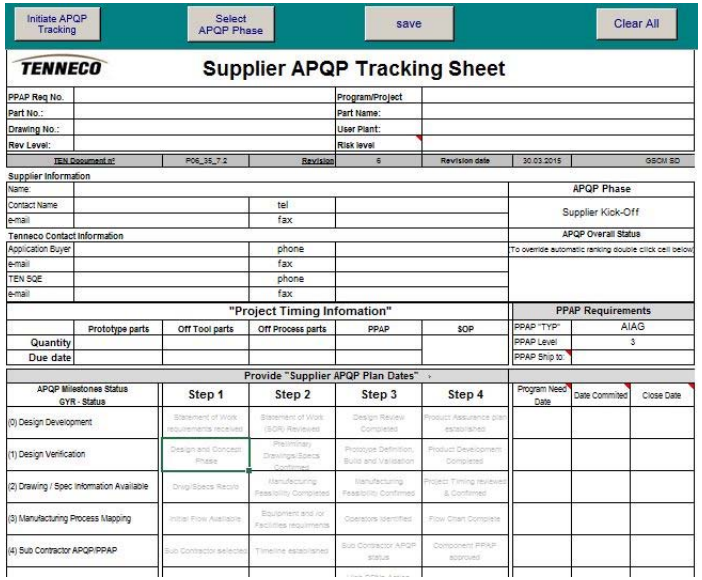
Suppliers are required to use the APQP Tracker Template to monitor the APQP steps.

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


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

Supplier Information

Name:				APQP Phase
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	$OP
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	Orig/Specs Recvd	Manufacturing Feasibility Completed	Manufacturing Feasibility Confirmed	Project Timing reviewed & Confirmed			
(3) Manufacturing Process Mapping	Initial Flow Available	Equipment and roll Facilities requirements	Operators Identified	Flow Chart Complete			
(4) Sub Contractor APQP/PPAP	Sub Contractor selected	Timeline established	Sub Contractor APQP status	Component PPAP approved			

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

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.

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 (it should be coordinate 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 documents should be uploaded into section A5 of TITIAN PPAP C-folder.

PPAP Requirements:
A1 thru A11 Tenneco specific requirements

A5.Packaging Plan Proposal

Examples of Packaging Plan Proposal:

Packaging Proposal Form — TENNECO Corporate Logistics

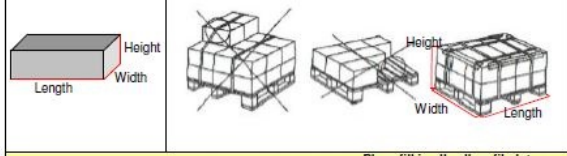
Supplier: [redacted]		Commodity	Targeted Tenneco SBU
		Steel Stampings & Tubing	Emmision Control
SUPPLIER RESPONSIBLE PERSON:			Related project:
Contact : [redacted]		Sub-commodity	GM SGE
Phone n° :		Stampings	
e-mail :			
Date of proposal:	Latest Update :	Date Approved	
TEN Document n°: P06_40_7.1	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

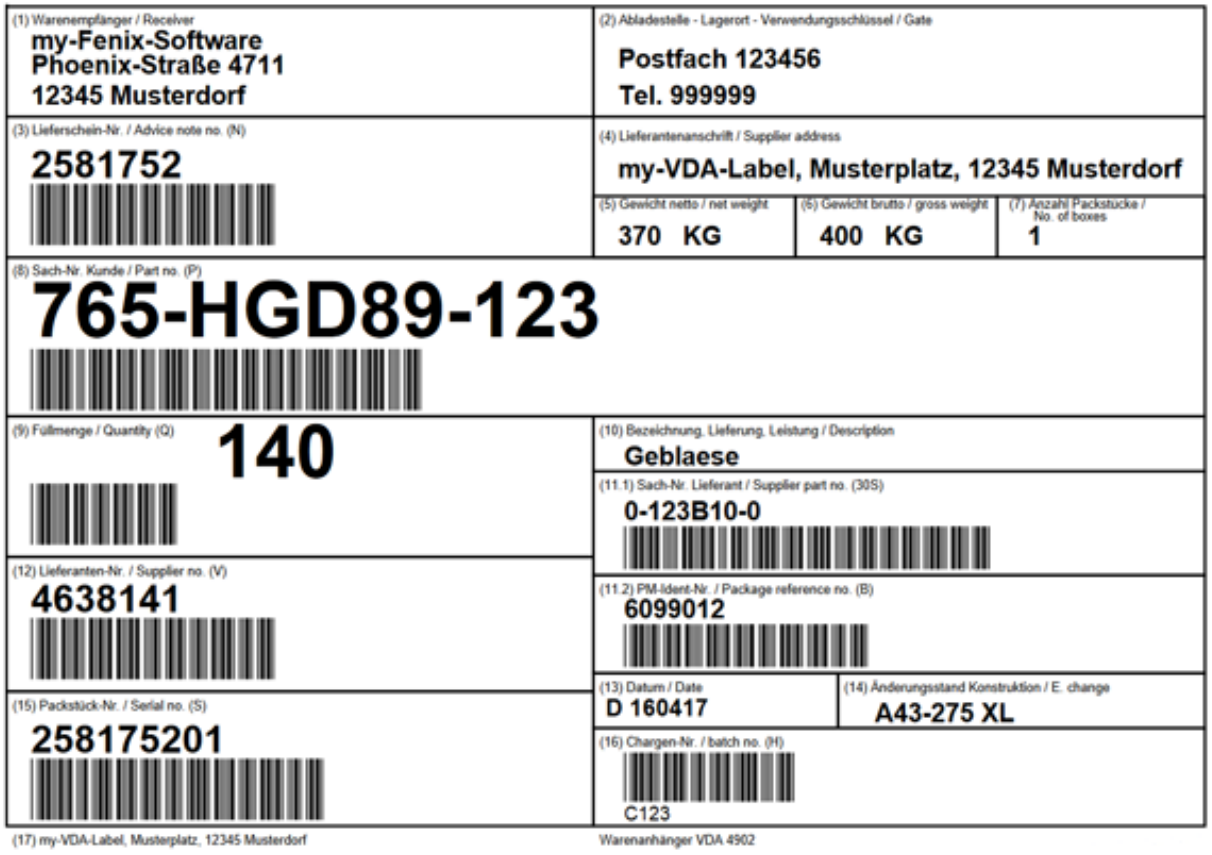
for additional info concerning Handling & Packaging Requirements see: ***Supplier Packaging Manual*** at www.tasupplier.com

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

PPAP Requirements:
A1 thru A11 Tenneco specific requirements

A5.Packaging Plan Proposal

Example of label below (VDA format):



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.

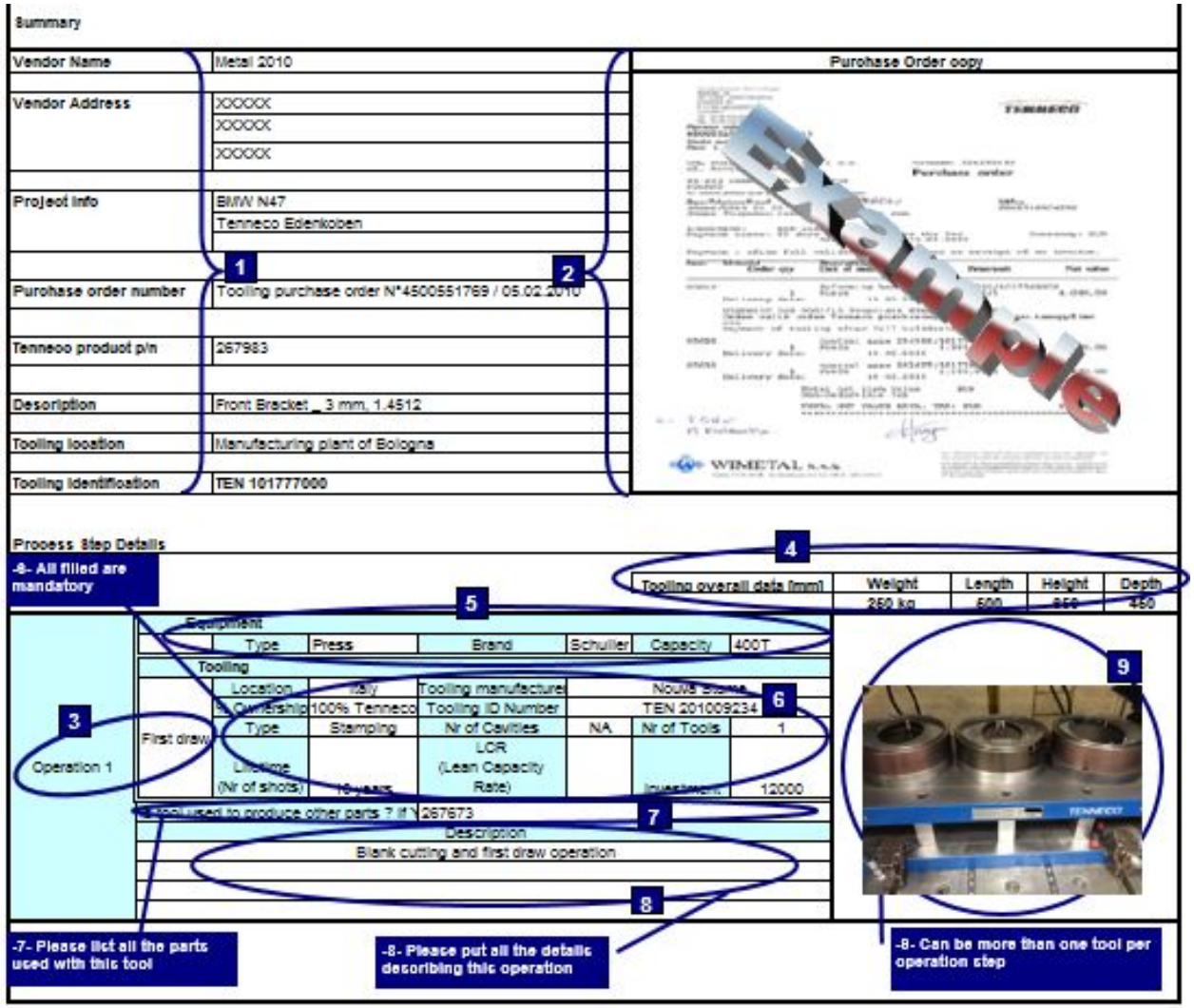
Further details can be found in chapter 5.3 of TSM.

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.

PPAP Requirements:
A1 thru A11 Tenneco specific requirements

A6.Vendor Tooling Registration Form

Example of VTRF below:



PPAP Requirements:
A1 thru A11 Tenneco specific requirements

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

If you still have some doubts and need more information please contact with respective Tenneco PPAP coordinator.