

Special Characteristics Communication and Agreement

Lead / Support roles and timing for each stage	1. DFMEA and potential special characteristics Type ONLY in Yellow Boxes	1A. PFMEA & Special Characteristics Agreement Type ONLY in Green Boxes	Special Characteristics for:																															
	Ford PD engineer / Supplier	Supplier/ Ford PD	2021 2.7L Nano		Eaton / Kearney NE		JT4E-6507-BA																											
Program: 2021 2.7L Nano	Part Number: JT4E-6507-BA	Engineering Release Number: NE01-E-14249175-000	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: bhrude2@ford.com	Date: 9/7/2021																												
Supplier Name/Plant: Eaton / Kearney NE	Design Lead Brand: Ford	Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date																													
Supplier SIM Code: E304C	Ford Customer Plant: Lima Engine Plant	Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date																													
Part / System Name: INT VALVE		Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date																													
Special Characteristics Approvals required at UNV2 / UPV2 / PA as per FAP 03-111																																		
<p>Key: For Special Characteristic definitions refer to Ford FMEA Handbook.</p> <table border="0"> <tr> <td>From DFMEA:</td> <td>From PFMEA:</td> <td colspan="5"></td> </tr> <tr> <td>YC Sev 9-10. Potential CC.</td> <td>CC Sev 9-10 (Part). Critical Characteristic.</td> <td>SC Sev 5-8 AND Occ 4-10. Significant Characteristic.</td> <td colspan="4"></td> </tr> <tr> <td>YS Sev 5-8 and may require special control to maintain process capability. Potential SC.</td> <td>OS Sev 9-10 (Process). Operator Safety.</td> <td>HI Sev 5-8 AND Occ 4-10. High Impact Characteristic.</td> <td colspan="4"></td> </tr> </table> <p>Special Characteristic Totals: Note 1: Automatic calculation of totals (for guidance only). Note 2: Count of SCs may be less than count of YSs</p> <table border="0"> <tr> <td>YC 0</td> <td>YS 34</td> <td>CC 0</td> <td>OS 0</td> <td>SC 9</td> <td>HI 0</td> <td></td> </tr> </table>							From DFMEA:	From PFMEA:						YC Sev 9-10. Potential CC.	CC Sev 9-10 (Part). Critical Characteristic.	SC Sev 5-8 AND Occ 4-10. Significant Characteristic.					YS Sev 5-8 and may require special control to maintain process capability. Potential SC.	OS Sev 9-10 (Process). Operator Safety.	HI Sev 5-8 AND Occ 4-10. High Impact Characteristic.					YC 0	YS 34	CC 0	OS 0	SC 9	HI 0	
From DFMEA:	From PFMEA:																																	
YC Sev 9-10. Potential CC.	CC Sev 9-10 (Part). Critical Characteristic.	SC Sev 5-8 AND Occ 4-10. Significant Characteristic.																																
YS Sev 5-8 and may require special control to maintain process capability. Potential SC.	OS Sev 9-10 (Process). Operator Safety.	HI Sev 5-8 AND Occ 4-10. High Impact Characteristic.																																
YC 0	YS 34	CC 0	OS 0	SC 9	HI 0																													
Special Characteristics Communication and Agreement for all UN content required to support UN design and development is required by UNV2. The remaining UN content not required to support UN design and development is required by <PA>. Special Characteristics Communication and Agreement for all UP content is required by UPV2.																																		
Stage 1. DFMEA					Stage 1A. PFMEA																													
#	Characteristic Description	Specification & Tolerance	DFMEA Class	PFMEA Class	Process Control Method																													
1	cup runout	1mm to A	YS	Other	Operator checks at set-up and in process																													
2	keeper groove, stem thickness at bottom of groove	4.1 - 4.3 mm	YS	Other	Gage 1 per hour and record in data log at operation and check xbar and R on 10 pieces per pallet at pre audit																													
3	keeper groove chamfer	0.05 - 0.25 mm x 43 - 47 deg	YS	Other	Tool controlled with keeper groove depth, checked at change over by quality with automated optical comparator																													
4	Keeper Groove Spacing	3.975 - 4.025 mm	YS	Other	Checked by quality lab at change over with an automated optical comparator, tooling controlled																													
5	Keeper Groove Spacing	1.975 - 2.025 mm	YS	Other	Checked by quality lab at change over with an automated optical comparator program, tooling controlled																													
6	Back Angle1 Gage Height	3.22 - 3.62 mm	YS	Other	Evidence log, record gage reading every two hours																													
7	Back Angle2 Gage Height	4.0 - 4.5 mm	YS	Other	Evidence log, record gage reading every two hours																													
8	Tip Chamfer, Upper Angle	58 - 62 deg	YS	Other	Tool controlled, checked at change over by quality with automated optical comparator																													
9	Tip Chamfer, Lower Angle	13 - 17 deg	YS	Other	Tool controlled, checked at change over by quality with automated optical comparator																													
10	Tip Chamfer, Length	0.13 - 0.63 mm	YS	Other	Tool controlled, checked at change over by quality with automated optical comparator																													
11	Tip Flat Dia	5.09 mm min	YS	Other	Tool controlled, checked at change over by quality with automated optical comparator																													

Special Characteristics Communication and Agreement

Lead / Support roles and timing for each stage	1. DFMEA and potential special characteristics	Type ONLY in Yellow Boxes	1A. PFMEA & Special Characteristics Agreement	Type ONLY in Green Boxes	Special Characteristics for:																														
	Ford PD engineer / Supplier	Supplier/ Ford PD	2021 2.7L Nano Eaton / Kearney NE JT4E-6507-BA																																
Program: 2021 2.7L Nano	Part Number: JT4E-6507-BA	Engineering Release Number: NE01-E-14249175-000	Design Lead Brand: Ford	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021																												
Supplier Name/Plant: Eaton / Kearney NE				Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date																												
Supplier SIM Code: E304C				Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date																												
Part / System Name: INT VALVE		Ford Customer Plant: Lima Engine Plant		Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date																												
Special Characteristics Approvals required at UNV2 / UPV2 / PA as per FAP 03-111																																			
<p>Note: approvals may be electronic: complete the approval block above to identify the approvers, and include "/s/" ahead of the name typed into the "signature" box to indicate electronic approval and approve in e-mail with this file as an attachment.</p> <table border="1"> <tr> <td>Key: For Special Characteristic definitions refer to Ford FMEA Handbook.</td> <td>From DFMEA: YC YS</td> <td>From PFMEA: CC OS</td> <td>Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude</td> <td>Name: Benjamin Rhude</td> <td>e-mail: brrhude2@ford.com</td> <td>Date: 9/7/2021</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Ford STA Engineer Approval/Date: Signature</td> <td>Name: Horia Tugulan</td> <td>e-mail: htugulan@ford.com</td> <td>Date</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Ford Craftsmanship/Sys Engr'g Approval/Date: Signature</td> <td>Name: Cressel Smith</td> <td>e-mail: csmi840@ford.com</td> <td>Date</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Supplier Plant Quality Manager Approval/Date: signature</td> <td>Name: Don Russell</td> <td>e-mail: drusse25@ford.com</td> <td>Date</td> </tr> </table>								Key: For Special Characteristic definitions refer to Ford FMEA Handbook.	From DFMEA: YC YS	From PFMEA: CC OS	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021				Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date				Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date				Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date
Key: For Special Characteristic definitions refer to Ford FMEA Handbook.	From DFMEA: YC YS	From PFMEA: CC OS	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021																													
			Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date																													
			Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date																													
			Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date																													
<p>Special Characteristic Totals: Note 1: Automatic calculation of totals (for guidance only). Note 2: Count of SCs may be less than count of YSs</p> <table border="1"> <tr> <td>YC 0</td> <td>YS 34</td> <td>CC 0</td> <td>OS 0</td> <td>SC 9</td> <td>HI 0</td> <td></td> <td></td> </tr> </table>								YC 0	YS 34	CC 0	OS 0	SC 9	HI 0																						
YC 0	YS 34	CC 0	OS 0	SC 9	HI 0																														
<p>Special Characteristics Communication and Agreement for all UN content required to support UN design and development is required by UNV2. The remaining UN content not required to support UN design and development is required by <PA>. Special Characteristics Communication and Agreement for all UP content is required by UPV2.</p>																																			
Stage 1. DFMEA					Stage 1A. PFMEA																														
#	Characteristic Description	Specification & Tolerance	DFMEA Class	PFMEA Class	Process Control Method																														
12	Seat Face - Angle	45.50 - 46.00 deg	YS	Other	Inspect each chuck at 1st hour of shift, at wheel change and change over and track in data log CHECK LAST PIECE PRIOR TO TOOL CHANGE AND CHANGE OVER																														
13	Seat Face - Runout	0.050 mm to A	YS	SC	Inspect 3 consecutive pieces at the operation and xbar and R, once per shift																														
14	Seat Face - Roundness	0.008 mm	YS	Other	Inspect one piece on each chuck every 2 hours and at wheel changes and change overs collected in metrology data log																														
15	Head Dia	32.38 - 32.62 mm	YS	Other	Audit 10 pieces per pallet xbar and R, measuring devices at operation for operators to monitor the process, form is checked on comparator at change over and is recorded in changeover log																														
16	Underhead Runout	0.28 mm to A	YS	Other	Gage evidence log, record 1 every two hours																														
17	Underhead Thickness- gage line to face	1.57 - 1.83 mm	YS	SC	Inspect 3 consecutive pieces at the operation and xbar and R, once per shift																														
18	Head Fillet Radius	5.35 - 7.35 mm	YS	Other	Tooling controlled, inspected at set up																														
19	Head Back Angle 1	23 - 27 deg	YS	Other	Tooling controlled, inspected at set up																														
20	Head Back Angle 2	10 - 14 deg	YS	Other	Tooling controlled, inspected at set up																														
21	Stem Dia	5.430 - 5.448 mm	YS	SC	Inspect 3 consecutive pieces at the operation and xbar and R, once per shift and ring gaged 100%																														

Special Characteristics Communication and Agreement

Lead / Support roles and timing for each stage	1. DFMEA and potential special characteristics	Type ONLY in Yellow Boxes	1A. PFMEA & Special Characteristics Agreement	Type ONLY in Green Boxes	Special Characteristics for:																														
	Ford PD engineer / Supplier	Supplier/ Ford PD	2021 2.7L Nano Eaton / Kearney NE JT4E-6507-BA																																
Program: 2021 2.7L Nano	Part Number: JT4E-6507-BA	Engineering Release Number: NE01-E-14249175-000	Design Lead Brand: Ford	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021																												
Supplier Name/Plant: Eaton / Kearney NE				Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date																												
Supplier SIM Code: E304C				Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date																												
Part / System Name: INT VALVE		Ford Customer Plant: Lima Engine Plant		Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date																												
Special Characteristics Approvals required at UNV2 / UPV2 / PA as per FAP 03-111																																			
<p>Note: approvals may be electronic: complete the approval block above to identify the approvers, and include "/s/" ahead of the name typed into the "signature" box to indicate electronic approval and approve in e-mail with this file as an attachment.</p> <table border="1"> <tr> <td>Key: For Special Characteristic definitions refer to Ford FMEA Handbook.</td> <td>From DFMEA: YC YS</td> <td>From PFMEA: CC OS</td> <td>Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude</td> <td>Name: Benjamin Rhude</td> <td>e-mail: brrhude2@ford.com</td> <td>Date: 9/7/2021</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Ford STA Engineer Approval/Date: Signature</td> <td>Name: Horia Tugulan</td> <td>e-mail: htugulan@ford.com</td> <td>Date</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Ford Craftsmanship/Sys Engr'g Approval/Date: Signature</td> <td>Name: Cressel Smith</td> <td>e-mail: csmi840@ford.com</td> <td>Date</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Supplier Plant Quality Manager Approval/Date: signature</td> <td>Name: Don Russell</td> <td>e-mail: drusse25@ford.com</td> <td>Date</td> </tr> </table>								Key: For Special Characteristic definitions refer to Ford FMEA Handbook.	From DFMEA: YC YS	From PFMEA: CC OS	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021				Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date				Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date				Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date
Key: For Special Characteristic definitions refer to Ford FMEA Handbook.	From DFMEA: YC YS	From PFMEA: CC OS	Ford D & R Engineer Approval/Date: /s/ Benjamin Rhude	Name: Benjamin Rhude	e-mail: brrhude2@ford.com	Date: 9/7/2021																													
			Ford STA Engineer Approval/Date: Signature	Name: Horia Tugulan	e-mail: htugulan@ford.com	Date																													
			Ford Craftsmanship/Sys Engr'g Approval/Date: Signature	Name: Cressel Smith	e-mail: csmi840@ford.com	Date																													
			Supplier Plant Quality Manager Approval/Date: signature	Name: Don Russell	e-mail: drusse25@ford.com	Date																													
<p>Special Characteristic Totals: Note 1: Automatic calculation of totals (for guidance only). Note 2: Count of SCs may be less than count of YSs</p> <table border="1"> <tr> <td>YC 0</td> <td>YS 34</td> <td>CC 0</td> <td>OS 0</td> <td>SC 9</td> <td>HI 0</td> <td></td> <td></td> </tr> </table>								YC 0	YS 34	CC 0	OS 0	SC 9	HI 0																						
YC 0	YS 34	CC 0	OS 0	SC 9	HI 0																														
<p>Special Characteristics Communication and Agreement for all UN content required to support UN design and development is required by UNV2. The remaining UN content not required to support UN design and development is required by <PA>. Special Characteristics Communication and Agreement for all UP content is required by UPV2.</p>																																			
Stage 1. DFMEA						Stage 1A. PFMEA																													
#	Characteristic Description	Specification & Tolerance		DFMEA Class	PFMEA Class	Process Control Method																													
22	Stem Straightness	0.01 mm		YS	Other	Audit 15 pieces recorded in audit log																													
23	Keeper Groove Location- gage line to undercut	93.79 - 94.09 mm		YS	SC	Overall length, tip to keeper groove, face to gageline will be measured at the process and recorded on xbar and R, once per shift (3 consecutive pieces). The variation of these three operations will contribute to the capability of the gage line to keeper groove. Gage line to keeper groove dimension will be measured at audit (10 pieces per pallet) and recorded on xbar and R																													
24	Surface Finish	Ra 0.3 max		YS	SC	Inspect at audit 10 pieces per hour and record data																													
25	Surface Finish	Rpm 1.0 max		YS	SC	Inspect at audit 10 pieces per hour and record data																													
26	Tip Surface Finish	Ra 0.8 max, 0.25 cutoff		YS	Other	1 piece at 1st hour of shift record in data log																													
27	Tip Runout	0.018 mm to A		YS	Other	X bar and r 10 pieces done at pre audit, record pass/fail 1 piece every hour, 5 piece set-up inspection approval																													
28	Material	SAE J775-UNS S65007		YS	Other	Material verification stem material at eddy current before tip harden op																													
29	Tip Hardness	50-57 HRC past keeper grooves, 17.3-21.3mm from tip		YS	Other	Hardness checked after first coil IMR 1 piece per machine at start of shift, IMR 1 piece per machine after 2nd coil CHECK LAST PIECE PRIOR TO TOOL CHANGE AND CHANGE OVER Safe launch (ERA in response to valve tip fractures): micro indentation checks every hour, core microhardness checks 3 times per shift. Batch and hold parts																													

Special Characteristics Communication and Agreement