



Part Submission Warrant

Part Name Eyelet Terminal - Loose Parts Cust. Part Number MU5T-14463-DB
Shown On Drawing No. MU5T-14463-DB Org. Part Number MU5T-14463-DB
Engineering Change Level B2 Dated 9/11/18
Additional Engineering Changes N/A Dated _____
Safety and/or Government Regulation ☐ Yes ☒ No Purchase Order No. N/A Weight (kg) .0088
Checking Aid No. N/A Checking Aid Engineering Change Level N/A Dated _____

ORGANIZATION MANUFACTURING INFORMATION

Royal Power Solutions 118532649
Supplier Name & Supplier/Vendor Code

125 Mercedes Drive
Street Address

Carol Stream IL 60188 USA
City Region Postal Code Country

CUSTOMER SUBMITTAL INFORMATION

NURSAN OTOMOTIV EOOD
Customer Name/Division

AKBAS, Gulcin
Buyer/Buyer Code

Automotive/ Various
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☒ Yes ☐ No

Submitted by IMDS or other customer format: 1271257646 / 1

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

REASON FOR SUBMISSION (Check at least one)

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

REQUESTED SUBMISSION LEVEL (Check One)

- ☐ Level 1 - Warrant only (and for designated appearance items, and 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 and 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 record requirements: ☒ Yes ☐ NO (If "NO" - Explanation Required)

Mold / Cavity / Production Process Stamping

DECLARATION

I 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 57600 / 8 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: _____

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☒ N/A

Organization Authorized Signature Ribota, Lidia Date 10/28/23

Print Name Ribota, Lidia Phone No. 847-873-3662 Fax No. _____

Title Quality Analyst E-mail LRibota@royaldie.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

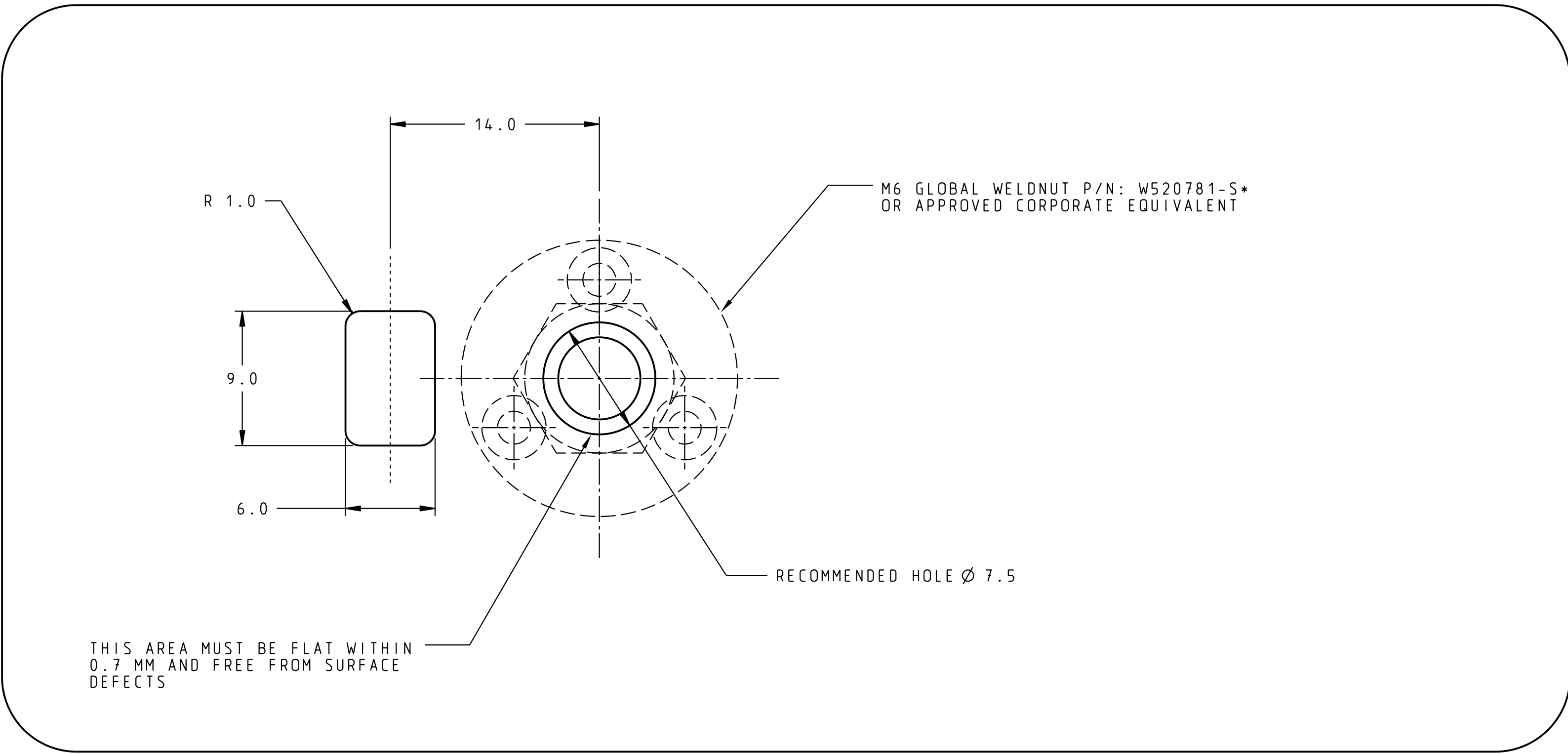
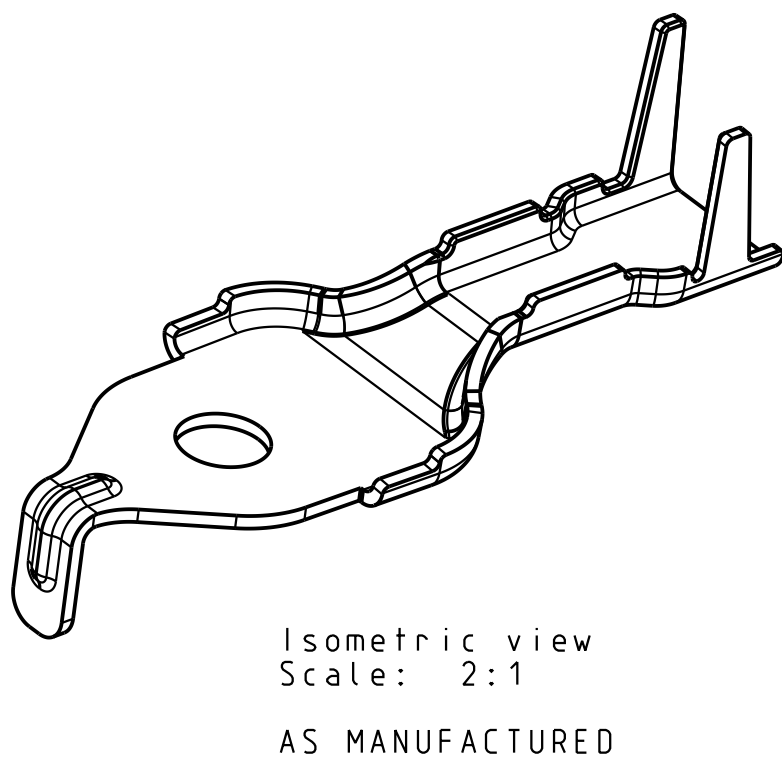
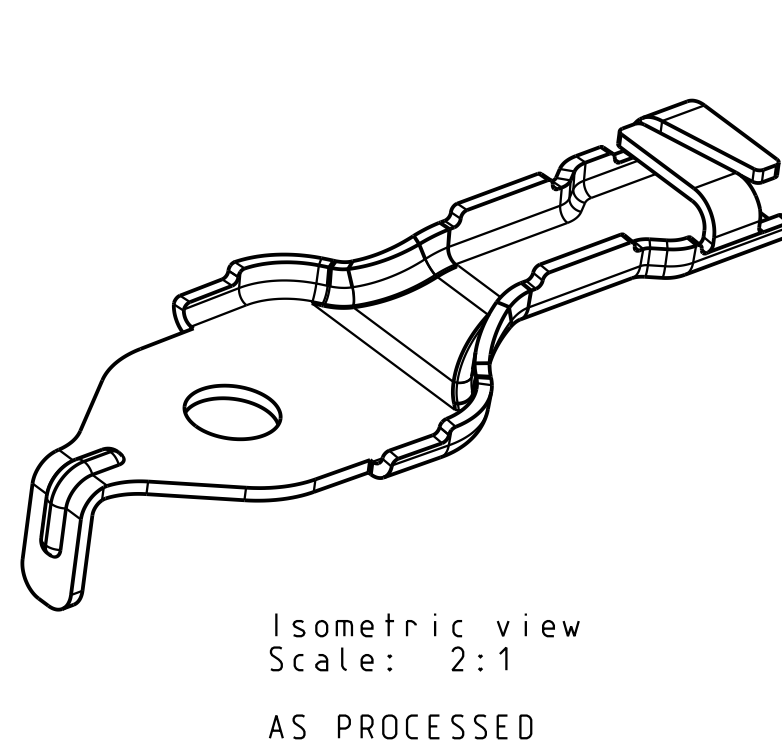
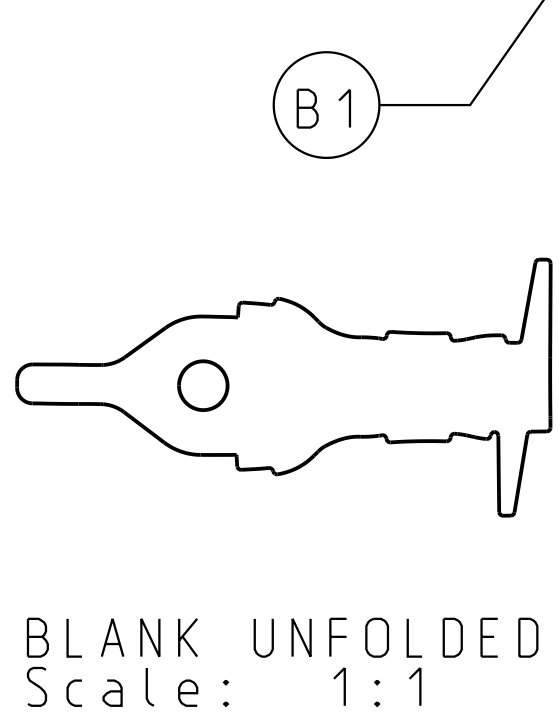
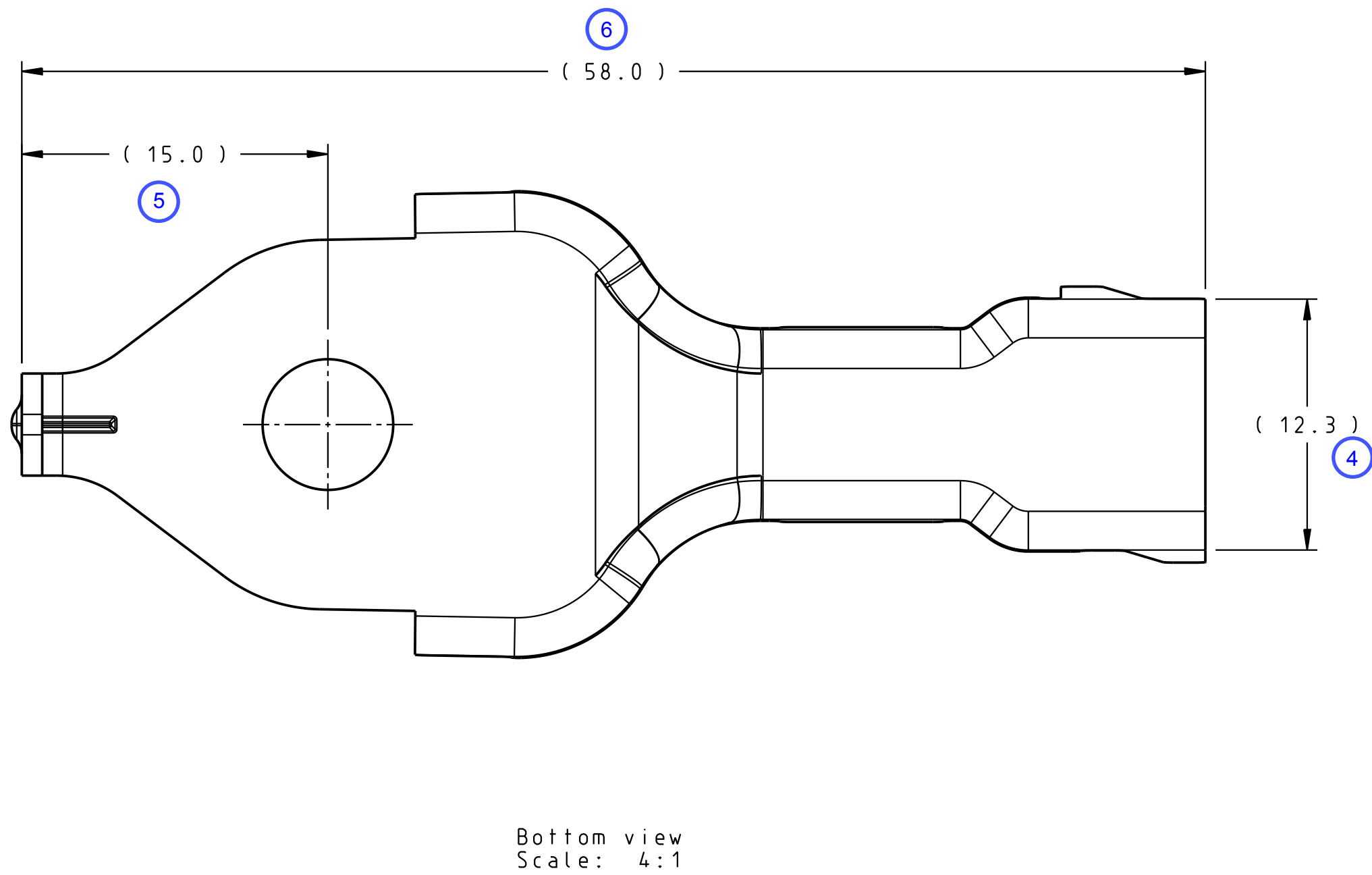
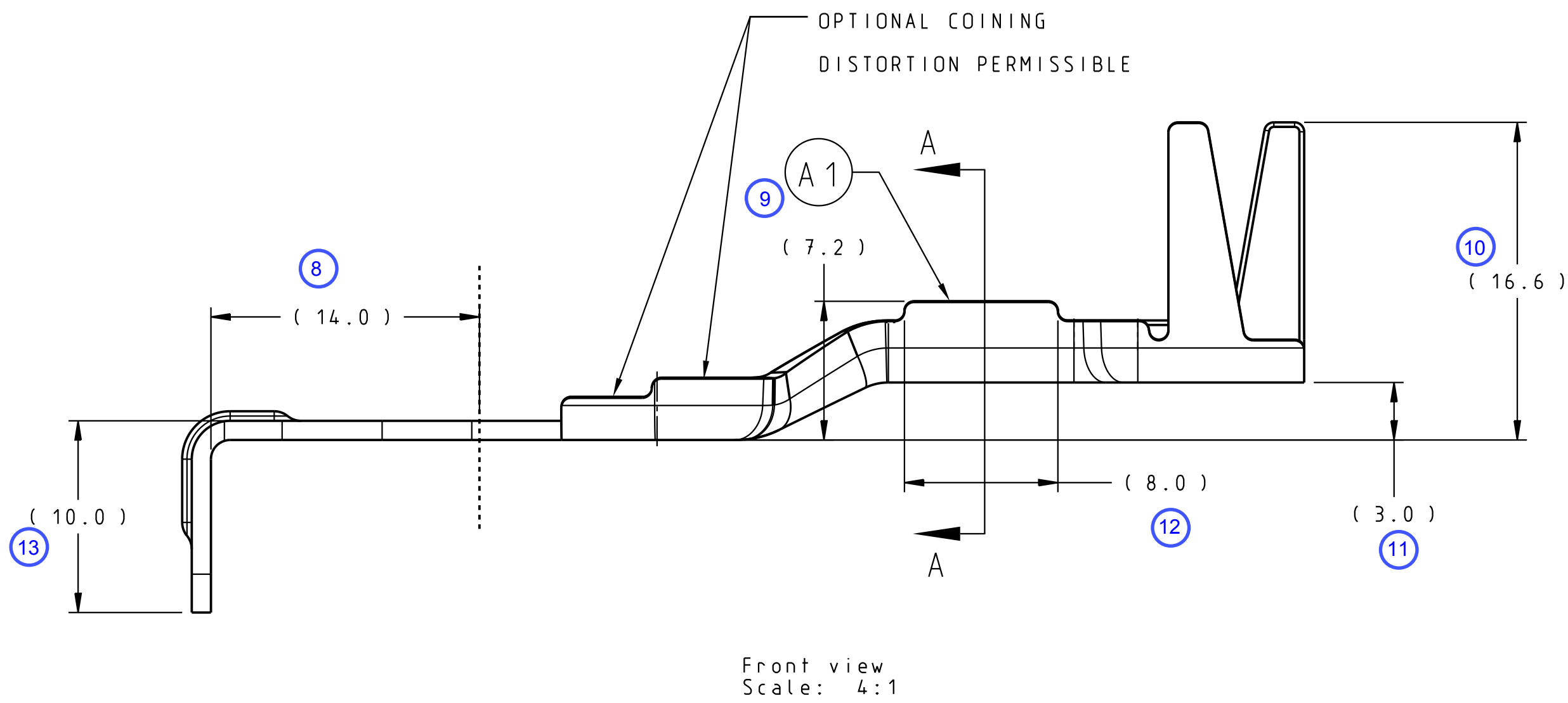
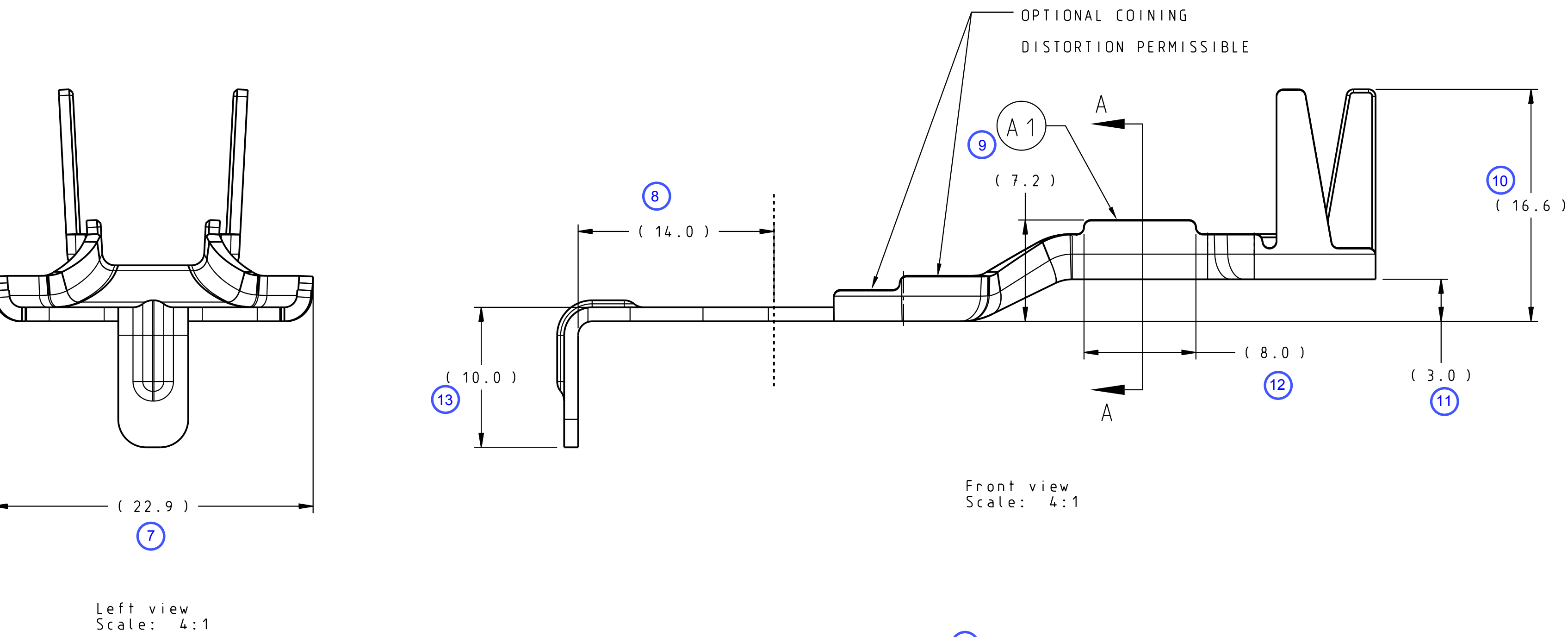
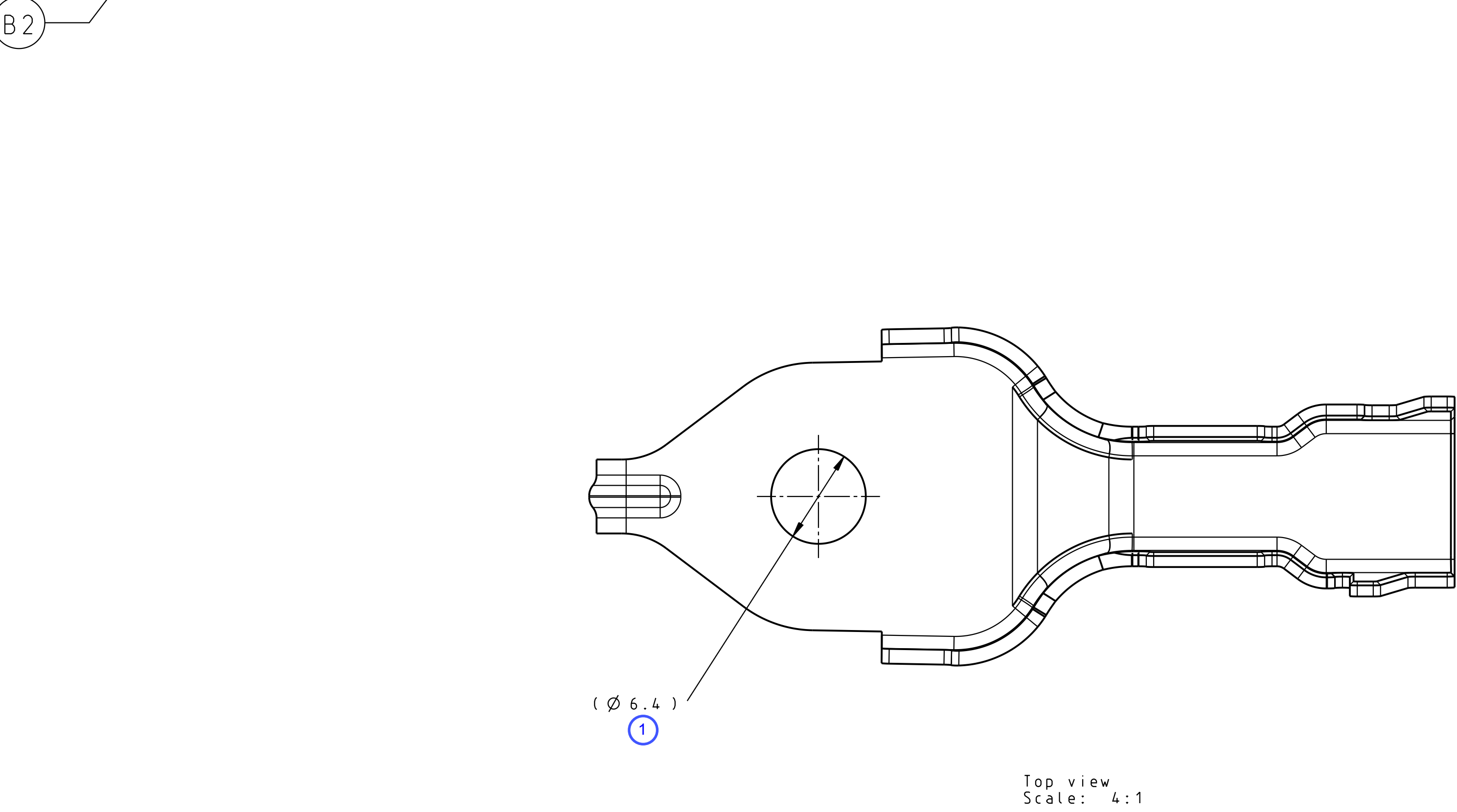
PPAP Warrant Disposition: ☒ Approved ☐ Rejected ☐ Other _____

Customer Signature [Signature] Date 02.11.2023

Print Name Nadiye BARUTÇU Customer Tracking Number (optional) _____

FORD PART NO.	SUPPLIER PART NO.	DESCRIPTION	GREASED Y/N	BASE MATERIAL	PLATING MATERIAL	PLATING THICKNESS	COPPER WEIGHT	TOTAL WEIGHT	MATERIAL THICKNESS	MATERIAL HARDNESS	MAX. AMBIENT TEMPERATURE	CONDUCTOR MIN/MAX CSA	FINISH ACID BATH WASH	INSULATION MIN/MAX O.D.	MATING PART	
															FORD PART NO.	SUPPLIER PART NO.
MU5T-14463-DB	NA	SONIC-EYELET TERMINAL-UNPLATED	N	UNS-C11000 UNS-C10200 UNS-C10910	N/A	N/A	9.0 G	9.0 G	1.00 ±0.25	1/2 HARD	125°C	0.35 - 20.0 (mm²)	POST STAMPING OF TERMINAL	1.70/4.04	N/A	N/A

TERMINAL CRIMP AND GRIP REFERENCE TABLE											
FORD PART NO.	WIRE TYPE/ SPECIFICATION (DESIGN INTENT)	BUNDLE SIZE (mm ²)	NUMBER OF WIRES	STRIP LENGTH (mm)	CONDUCTOR		INSULATION		NOTES	SUPPLIER PART NO.	
					BOND WIDTH (mm)	BOND HEIGHT (mm)	ICW (mm) ±0.10	ICH (mm) ±0.010	NOTES		
MU5T-14463-DB	ESB-M1L120-A or ESB-M1L123-A	(5.0-20.0)	5-20	10.0	3.5 MIN 7.0 MAX	SEE REFERENCE CHART	8.9 MIN 11.78 MAX	6.6 MIN 10.8 MAX		N/A	



- NOTES: UNLESS OTHERWISE SPECIFIED
- PARTS CONFORM TO THE ELECTRICAL CONNECTION SYSTEM DESIGN SPECIFICATION (SDS) VERSION 23.
 - DVP IS BASED ON EL-0176 VER 9 AND LEAR SPLICE TECHNOLOGY INFORMATION. PULL TEST AND PROCEDURE EST-460.
 - N.A.
 - SOLDER DIP REQUIRED AFTER WIRE ATTACHMENT PER ES-BU5T-14A121-A, SECTION 3.5 USING LEAD FREE SOLDER AS SAC305 OR EQUIVALENT.
 - 0.5 MAX CUT-OFF
 - GENERAL TOLERANCES: ±0.3MM ALL ONE PLACE, ±0.10MM ALL TWO PLACE DIMENSIONS, ±3.0 DEGREES ALL ANGULAR DIMENSIONS.
 - DENOTES DIMENSIONS CHECKED WITH LEAR GAGES G-22-B CHARTED.
 - ALL WELD TERMINATIONS SHALL COMPLY WITH USCAR-38 REV. DEC. 2009.

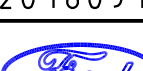
UNLESS OTHERWISE SPECIFIED GENERAL TOLERANCES WILL BE:

SIZE (MM)	FIXED±	CLOSURE±
0-10	0.20	0.32
10-16	0.25	0.40
16-25	0.32	0.50
25-40	0.40	0.63
40-63	0.50	0.80
63-100	0.63	1.00
100-160	0.80	1.25
160 & OVER - TO FIND FIXED N DIMENSIONAL TOLERANCES MULTIPLY BY 0.5%		

APPROVED
By KMD at 5:08 pm, Dec 04, 2018

REVISIONS			
ORIGINATOR	CHECKER	ENGR APP	MATL APP
RELEASE OF PART MUST-14463-DA			
AELE-E-12982958-484		20171130	
JWALOW11	MBAYDOUN	THURST	XXX
A1: RAISED WALL HEIGHT RELEASED MUST-14463-DB			
AELE-E-12982958-538		20180517	
JWALOW11	MBAYDOUN	MBAYDOUN	XXX
B1: REVISED CSA B2: REVISED CHART PART SUFFIX			
AELE-E-12982958-707		20180911	
JWALOW11	MBAYDOUN	MBAYDOUN	XXX

APPROVED
By ALD at 8:48 am, Nov 12, 2018

REFERENCE		N/A	
PART MUST COMPLY WITH RESTRICTED SUBSTANCE MANAGEMENT STANDARD WSS-M99P9999-A1 TO SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT			
DRAFTED IN ACCORDANCE WITH FORD MOTOR COMPANY ENGINEERING CAD AND DRAFTING STANDARDS VERSION 29		 3RD ANGLE PROJ DIMENSIONS ARE IN MILLIMETERS	
CAD TYPE	CAD LOC.	CAD FILE	DTMC
K-CATIAS	TcE	MUST-14463-D MUST-14463-D.DWG	:2(B) :4(B)
OPER. NO.	UNIT	DRAWING	IS MASTER
N/A	N/A	MUST-14463-DB	
DESIGN	DETAIL	TITLE	SHT 1 OF 1
JWALOW11	JWALOW11	TRMNL-EYLT TYP	
CHECKED	SAFETY		
MBAYDOUN	MFG USE		
SCALE	DATE	DIVISION	ESEE
4:1	20180911	PLANT	N/A
 FORD MOTOR COMPANY			

Production Part Approval Dimensional Test Results



ORGANIZATION: Royal Die & Stamping Co., Inc. SUPPLIER/VENDOR CODE:					PART NUMBER: MU5T-14463-DB PART NAME: Eyelet Terminal - Loose Parts							
INSPECTION FACILITY: Royal Die & Stamping Co., Inc. ADDITIONAL REMARKS:					DESIGN RECORD CHANGE LEVEL: B2 ENGINEERING CHANGE DOCUMENTS:							
ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)					REMARKS	OK	NOT OK
Material	C110	Attribute	10/26/23	1	Pass						X	
Note 1	Parts conform to the electrical connection system design specification (SDS) version 23.	Attribute	10/26/23	1	Pass						X	
Note 2	DVP is based on EL-0176 VER 9 and Lear splice technology information. Pull test and procedure EST-460	Attribute	10/26/23	1	Pass						X	
Note 3	N/A	Attribute	10/26/23	1	Pass						X	
Note 4	Solder dip required after wire attachment per ES-BU5T-14A121-A, section 3.5 using Lead free solder as SAC305 or equivalent.	Attribute	10/26/23	1	Pass						X	
Note 5	0.5 max cut-off	Attribute	10/26/23	1	Pass						X	
Note 6	General tolerances: +/-0.3mm all one place, +/- 0.10mm all two place dimensions, +/- 3.0 degrees all angular dimensions.	Attribute	10/26/23	1	Pass						X	
Note 7	Denotes dimensions checked with Lear gages G-22-B charted.	Attribute	10/26/23	1	Pass						X	
Note 8	All weld terminations shall comply with USCAR-38 REV. DEC. 2009.	Attribute	10/26/23	1	Pass						X	
1	Diameter 6.4 [Internal]	6.70 mm 6.10 mm	10/26/23	5	6.40	6.40	6.40	6.40	6.40		X	
2	Crimp width 13.5 [Internal]	13.80 mm 13.20 mm	10/26/23	5	13.35	13.37	13.36	13.35	13.36		X	
3	Tab width 5.0 [Internal]	5.30 mm 4.70 mm	10/26/23	5	4.95	4.95	4.96	4.97	4.96		X	
4	Width 12.3 [Internal]	12.60 mm 12.00 mm	10/26/23	5	12.44	12.46	12.45	12.45	12.44		X	
5	Diameter to tab 15.0 [Internal]	15.30 mm 14.70 mm	10/26/23	5	15.07	14.99	15.00	15.04	15.03		X	
6	Part length 58.0 [Internal]	Attribute	10/26/23	1	Pass					57.98, 57.99, 58.01, 57.00, 58.01	X	
7	Width 22.9 [Internal]	23.20 mm 22.60 mm	10/26/23	5	22.71	22.70	22.70	22.71	22.71		X	
8	Diameter to tab 14.0 [Internal]	14.30 mm 13.70 mm	10/26/23	5	14.19	14.20	14.21	14.18	14.19		X	
9	Height 7.2 [Internal]	7.50 mm 6.90 mm	10/26/23	5	7.23	7.22	7.24	7.23	7.22		X	
10	Crimp height 16.6 [Internal]	16.90 mm 16.30 mm	10/26/23	5	16.53	16.54	16.55	16.53	16.52		X	
11	Body to crimp 3.0 [Internal]	3.30 mm 2.70 mm	10/26/23	5	2.97	2.96	2.95	2.95	2.97		X	
12	Side tab width 8.0 [Internal]	Attribute	10/26/23	1	Pass					7.99, 7.99, 8.00, 8.01, 8.00	X	
13	Tab height 10.0 [Internal]	10.30 mm 9.70 mm	10/26/23	5	9.88	9.90	9.91	9.89	9.90		X	
14	Opening angle 6° [Internal]	9.00 Deg° 3.00 Deg°	10/26/23	5	6.83	6.95	6.90	6.89	6.90		X	
15	Opening 7.5 [Internal]	7.80 mm 7.20 mm	10/26/23	5	7.45	7.44	7.43	7.44	7.44		X	
16	Opening height 3.2 [Internal]	3.50 mm 2.90 mm	10/26/23	5	3.29	3.26	3.28	3.28	3.29		X	
17	Thickness 1.0 [Internal]	1.30 mm 0.70 mm	10/26/23	5	1.00	1.01	1.03	0.97	1.00		X	
18	Radius (0.9)	Attribute	10/26/23	1	Pass						X	

Production Part Approval Dimensional Test Results



ORGANIZATION: Royal Die & Stamping Co., Inc. SUPPLIER/VENDOR CODE:					PART NUMBER: MU5T-14463-DB PART NAME: Eyelet Terminal - Loose Parts			
INSPECTION FACILITY: Royal Die & Stamping Co., Inc. ADDITIONAL REMARKS:					DESIGN RECORD CHANGE LEVEL: B2 ENGINEERING CHANGE DOCUMENTS:			
ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)	REMARKS	OK	NOT OK

Blanket statements of conformance are unacceptable for any test results.

MARCH **CFG-1003**
2006

<u>SIGNATURE</u>	<u>TITLE</u>	<u>DATE</u>
Lidia Ribota	Quality Analyst	10/28/23



Royal Power Solutions
125 Mercedes Drive
Carol Stream, IL 60188
Tel (630) 766-2685
Fax (630) 766-0401

Process Flow Chart

Part No MU5T-14463-DB	Rev B2	Name Eyelet Terminal - Loose Parts		
Customer Nursan	Customer Part No MU5T-14463-DB	Rev B2	Rev Date	Customer Part Rev MU5T-14463-DB
FMEA MU5T-14463-DB-B2 - Approved		Control Plan 7293 - Production - Active - Primary		
Core Team Cliff Carlson, Kristine Daehler, Shawn Davenport, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Judy Lopez, Jason O'Neil, Miriam Sales, Dave Wiltfang				

Operation	Inspection Step	All Specifications
 20: Stamp - Finish Approved Workcenters:AIDA-4, AIDA-1, AIDA-5, AIDA-6	Receiving	A - Material Procurement
	Transport Tooling to Work Center	B - Transport Tooling to Work Center
	Transport Material to Work Center	C - Transport Material to Work Center
	Setup	D - Set-up Work Center
		Keyence setup instructions - Keyence program setup instructions
		D-A - Verify Correct Raw Material at Machine
		D-B - Verify Correct Tooling
		D-C - Verify Correct Machine Operating Parameters
		D-D - Verify All Safety Guards are Enabled
		D-E - Confirm All Setup Parts Have been Scrapped
	Quality First Piece	Visual 1 - Part Loose - See Print
		Keyence setup instructions - Keyence program setup instructions
		Visual Defect 1 - No Fractures on part
		Visual Defect 2 - No Slug Marks
		Visual Defect 3 - No Burrs
		Visual Defect 4 - No Slivers
		Visual Defect 5 - No expose Raw material
		D-E - Confirm All Setup Parts Have been Scrapped
		1 - Diameter 6.4 [Internal] (Target: 6.4mm)
		2 - Crimp width 13.5 [Internal] (Target: 13.5mm)
		3 - Tab width 5.0 [Internal] (Target: 5mm)
		7 - Width 22.9 [Internal] (Target: 22.9mm)
		8 - Diameter to tab 14.0 [Internal] (Target: 14mm)
		9 - Height 7.2 [Internal] (Target: 7.2mm)
		10 - Crimp height 16.6 [Internal] (Target: 16.6mm)
		11 - Body to crimp 3.0 [Internal] (Target: 3mm)
		13 - Tab height 10.0 [Internal] (Target: 10mm)

	14 - Opening angle 6° [Internal] (Target: 6Deg°)
	15 - Opening 7.5 [Internal] (Target: 7.5mm)
	16 - Opening height 3.2 [Internal] (Target: 3.2mm)
Operator - In-process Inspection	Visual 1 - Part Loose - See Print
	Keyence setup instructions - Keyence program setup instructions
	Visual Defect 1 - No Fractures on part
	Visual Defect 2 - No Slug Marks
	Visual Defect 3 - No Burrs
	Visual Defect 4 - No Slivers
	Visual Defect 5 - No expose Raw material
	1 [Internal OP] - Diameter 6.4
Quality - In-process Inspection	Visual 1 - Part Loose - See Print
	Keyence setup instructions - Keyence program setup instructions
	Visual Defect 1 - No Fractures on part
	Visual Defect 2 - No Slug Marks
	Visual Defect 3 - No Burrs
	Visual Defect 4 - No Slivers
	Visual Defect 5 - No expose Raw material
	2 - Crimp width 13.5 [Internal] (Target: 13.5mm)
	8 - Diameter to tab 14.0 [Internal] (Target: 14mm)
	10 - Crimp height 16.6 [Internal] (Target: 16.6mm)
	11 - Body to crimp 3.0 [Internal] (Target: 3mm)
	13 - Tab height 10.0 [Internal] (Target: 10mm)
	14 - Opening angle 6° [Internal] (Target: 6Deg°)
	15 - Opening 7.5 [Internal] (Target: 7.5mm)
	16 - Opening height 3.2 [Internal] (Target: 3.2mm)
Quality Last Piece	Visual 1 - Part Loose - See Print
	Keyence setup instructions - Keyence program setup instructions
	Visual Defect 1 - No Fractures on part
	Visual Defect 2 - No Slug Marks
	Visual Defect 3 - No Burrs
	Visual Defect 4 - No Slivers
	Visual Defect 5 - No expose Raw material
	1 - Diameter 6.4 [Internal] (Target: 6.4mm)
	2 - Crimp width 13.5 [Internal] (Target: 13.5mm)
	8 - Diameter to tab 14.0 [Internal] (Target: 14mm)
	9 - Height 7.2 [Internal] (Target: 7.2mm)

	10 - Crimp height 16.6 [Internal] (Target: 16.6mm)
	11 - Body to crimp 3.0 [Internal] (Target: 3mm)
	13 - Tab height 10.0 [Internal] (Target: 10mm)
	14 - Opening angle 6° [Internal] (Target: 6Deg°)
	15 - Opening 7.5 [Internal] (Target: 7.5mm)
	16 - Opening height 3.2 [Internal] (Target: 3.2mm)
Final Audit	H - Labels correct & cartons sealed properly
Transport to Final Location	I - Transport to Final Location
PPAP Layout	1 - Diameter 6.4 [Internal] (Target: 6.4mm)
	2 - Crimp width 13.5 [Internal] (Target: 13.5mm)
	3 - Tab width 5.0 [Internal] (Target: 5mm)
	4 - Width 12.3 [Internal] (Target: 12.3mm)
	5 - Diameter to tab 15.0 [Internal] (Target: 15mm)
	6 - Part length 58.0 [Internal]
	7 - Width 22.9 [Internal] (Target: 22.9mm)
	8 - Diameter to tab 14.0 [Internal] (Target: 14mm)
	9 - Height 7.2 [Internal] (Target: 7.2mm)
	10 - Crimp height 16.6 [Internal] (Target: 16.6mm)
	11 - Body to crimp 3.0 [Internal] (Target: 3mm)
	12 - Side tab width 8.0 [Internal]
	13 - Tab height 10.0 [Internal] (Target: 10mm)
	14 - Opening angle 6° [Internal] (Target: 6Deg°)
	15 - Opening 7.5 [Internal] (Target: 7.5mm)
	16 - Opening height 3.2 [Internal] (Target: 3.2mm)
	17 - Thickness 1.0 [Internal] (Target: 1mm)
	18 - Radius (0.9)
	Note 1 - Parts conform to the electrical connection system design specification (SDS) version 23.
	Note 2 - DVP is based on EL-0176 VER 9 and Lear splice technology information. Pull test and procedure EST-460
	Note 3 - N/A
	Note 4 - Solder dip required after wire attachment per ES-BU5T-14A121-A, section 3.5 using Lead free solder as SAC305 or equivalent.
	Note 5 - 0.5 max cut-off
	Note 6 - General tolerances: +/-0.3mm all one place, +/- 0.10mm all two place dimensions, +/- 3.0 degrees all angular dimensions.
	Note 7 - Denotes dimensions checked with Lear gages G-22-B charted.
	Note 8 - All weld terminations shall comply with USCAR-38 REV. DEC. 2009.
	Material - C110



FAILURE MODE AND EFFECTS ANALYSIS

(Process FMEA)

Part Name:	Eyelet Terminal - Loose Parts	Internal Part Number:	MU5T-14463-DB-B2	External Part Number:	MU5T-14463-DB
FMEA Date:	(Orig.) 6/27/18 (Rev.)	Key Date:		Prepared By:	Daehler, Kristine
Note:		Process Responsibility:	Lasseter, Vince	FMEA Number:	MU5T-14463-DB
Core Team:	Miguel Avila, Cliff Carlson, Kristine Daehler, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Miriam Sales, Dave Wiltfang		Model Year(s)/Vehicle(s):	Automotive/Various	

FMEA begins on page 2

FAILURE MODE AND EFFECTS ANALYSIS

(Process FMEA)

Part Name:	Eyelet Terminal - Loose Parts	Internal Part Number:	MU5T-14463-DB-B2	External Part Number:	MUJ5T-14463-DB
FMEA Date:	(Orig.) 6/27/18 (Rev.)	Key Date:		Prepared By:	Daehler, Kristine
Note:		Process Responsibility:	Lasseter, Vince	FMEA Number:	MU5T-14463-DB
Core Team:	Miguel Avila, Cliff Carlson, Kristine Daehler, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Miriam Sales, Dave Wiltfang		Model Year(s)/Vehicle(s):	Automotive/Various	

Part Name:	Eyelet Terminal - Loose Parts	Internal Part Number:	MU5T-14463-DB-B2	External Part Number:	E20085600-B2
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Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	S E V	C L S	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	O C C	Current Process Controls Detection	D E T	R P N	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	S E V	O C C	D E T	R P N
20 (A) Receiving Material Procurement Requirements	Non-Conforming Material	Material Un-available for Production	5		Supplier's Error	Purchase Order Specifications tied to part specific requirements.	1	Internal Inspection Review of Required Material Certificate - Material is Tagged " Approved for use" if Meets PO requirements.	3	15	None						
20 (B) Transport Tooling to Work Center	Unfit for use. Being Worked on.	Machine Downtime Waiting for tool to be Prepared.	3		Un-Planned Maintenance, Un-Coordinated Tool Room Work	Tooling Maintenance Schedule	1	Production Meetings	5	15	None						
20 (C) Transport Material to Work Center	Wrong Material	Unfit for use,Production Interruptions.	4		Die Setter / Set-up Error		2	MSO Requirements. Material is Tagged " Approved for use". Tags are turned in for traceability.	2	16	None						
20 (D) Set-up Work Center (D-A) Verify correct material at machine, (D-B) Verify correct tooling, (D-C) Verify correct machine operating parameters, (D-D) Verify all safety guards are enabled, (D-E) Confirm all setup parts have been scrapped, (D-F) Submit samples to QA for approval.	Work Center is not available	Delayed Production	5		Customer Gives Short Lead Time Due-Date, Production Schedule Conflicts, Unscheduleed Maintenance.	Production capacity report.	2	Production Forman plans Schedule allowing sufficient time. Customer is provided with lead time.	4	40	None						

Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	S E V	C L S	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	O C	Current Process Controls Detection	D E T	R P N	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	S E V	O C	D E T	R P N
20 Quality First Piece	Non conforming Samples Incapable Process. Diameter to tab 14.0 +/- 0.30.	Delayed Production, Lost Time, Wasted material.	5		Set-up Error, Operator Documentation Error	Die Setter Completion of Royal Die " Die Setter Course" - Basic Set-up Requirements Defined on Part Specific MSO.	2	1st Article Approval.	3	30	None						
20 In-Process Operator Inspection	Nonconforming Sample, Incapable Process. Diameter go/no go pin gage 6.40 +/- 0.30	Wasted Set-up, Material, Operator Time. Dissatisfied Customer	5		Process Error, Material Shortage or High Waste. Operator Error. Tooling malfunction.	Control plan in-process inspection, Die Setter and Operator Training.	2	Operator Quality Control Monitoring.	6	60	None						
20 In-Process Quality Monitoring	Non-Conforming Product, Production Interruption. Tab height 10.0 +/- 0.30	Wasted Set-up, Material, Operator Time. Dissatisfied Customer Containment requirements and corrective action measures Certification sort and expedited shipping changes Line down charges	5		Process Error, Material Shortage or High Waste. Operator Error. Tooling malfunction.	Control plan Quality in-process, Quality Control Training.	2	Process/Product Monitoring per Part Specific Control Plans.	6	60	None						
20 Quality Last Piece	Non Conforming Product. Slug Marks Body to crimp 3.0 +/- 0.30	Customer dis-satisfaction Containment requirements and corrective action measures Certification sort and expedited shipping changes Line down charges	5		Process Error, High Waste.	APQP Quality, Quality Control Training	2	Process/Product monitoring per Part Specific Control Plan.	6	60	None						
20 Final Product Output (H) Labels correct and cartons sealed properly	Nonconforming Product. Unidentified, Wrong count.	Shortage Customer dis-satisfaction Containment requirements and corrective action measures Certification sort and expedited shipping changes Line down charges	3		System Failure. Operator Error	Documented Manufacturing and Inspection Process.	2	Control Plan monitoring.	5	30	None						
20 (I) Transport to Final Location	Unidentified, Wrong Count, Damaged.	Damage and deformation of product Part contamination Wrong packaging Customer dis-satisfaction Containment requirements and corrective action measures Certification	3		Damaged through Handling or Transit. Operator Error	MSO Packaging Requirements, Ship/Rec Training on Handling Requirements.	3	Visual Inspection.	2	18	None						

Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	S E V	C L S	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	O C C	Current Process Controls Detection	D E T	R P N	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	S E V	O C C	D E T	R P N
		sort and expedited shipping charges Line down charges															

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Control Plan

Control Plan Number 7293	Control Plan Type Production	Part Number/Latest Change Level MU5T-14463-DB-B2	Date (Orig.) 6/18/18	Date (Rev.) 11/23/20
Key Contact/Phone Kris Daehler (630) 766-2685 EXT 129		Core Team Cliff Carlson, Kristine Daehler, Shawn Davenport, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Judy Lopez, Jason ONeil, Miriam Sales, Dave Wiltfang	Customer Engineering Approval Date (If Req'd)	
Part Name/Description MU5T-14463-DB-B2 (Eyelet Terminal - Loose Parts)		Organization/Plant Approval Date (If Req'd) 11/23/20	Customer Quality Approval Date (If Req'd)	
Organization/Plant Royal Die & Stamping Co., Inc. / Royal Power CS		Organization Code 3000403	Other Approval date (If Req'd)	

Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods				Reaction Plan
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	
20	Stamp - Finish Receiving	-	A		Material Procurement		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Material Certification	Notify Materials & Quality, follow procedure COP8 Notificar a Calidad y Materiales, seguir procedimiento COP8.
20	Stamp - Finish Transport Tooling to Work Center	-	B		Transport Tooling to Work Center		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Tool ID	Perform adjustments and/or corrections/Ajustar y corregir.
20	Stamp - Finish Transport Material to Work Center	-	C		Transport Material to Work Center		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.
20	Stamp - Finish Setup	-	D		Set-up Work Center		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.
		-	Keyence setup instructions	Keyence program setup instructions			Attribute				
		Read the instructions before running the Keyence program. Lea las instrucciones antes de ejecutar el programa Keyence.									
		-	D-A		Verify Correct Raw Material at Machine		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.
		-	D-B		Verify Correct Tooling		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.
		-	D-C		Verify Correct Machine Operating Parameters		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.
		-	D-D		Verify All Safety Guards		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheets	Perform adjustments and/or corrections/Ajustar y corregir.

Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods			Reaction Plan	
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.		Control Method
					are Enabled						
		-	D-E		Confirm All Setup Parts Have been Scrapped		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheet	Verify action has been completed/Verificación de acciones completas.
20	Stamp - Finish Quality First Piece	-	Visual 1	Part Loose - See Print			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		-	Keyence setup instructions	Keyence program setup instructions			Attribute				
		Read the instructions before running the Keyence program. Lea las instrucciones antes de ejecutar el programa Keyence.									
		-	Visual Defect 1	No Fractures on part			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		Pay close attention at transition from terminal body to crimps & between crimps.									
		-	Visual Defect 2	No Slug Marks			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		Must be free of Slug marks									
		-	Visual Defect 3	No Burrs			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		Part Must be free of Burrs									
		-	Visual Defect 4	No Slivers			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		Parts Must be free of slivers									
		-	Visual Defect 5	No expose Raw material			Attribute	Visual	5 each Setup/5 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		-	D-E		Confirm All Setup Parts Have been Scrapped		Attribute	Visual	1 each Set Up/ 1 cada Set Up	Checksheet	Verify action has been completed/Verificación de acciones completas.
		-	1	Diameter 6.4 [Internal]			6.10 / 6.70 mm	Keyence / Comparator	4 each Setup [4]/4 cada Setup [4]	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
		[Internal]									
		-	2	Crimp width 13.5 [Internal]			13.20 / 13.80 mm	Keyence / Comparator	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no

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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods			Reaction Plan	
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.		Control Method
											conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	3	Tab width 5.0 [Internal]		4.70 / 5.30 mm	Calipers	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	7	Width 22.9 [Internal]		22.60 / 23.20 mm	Keyence / Comparator	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	8	Diameter to tab 14.0 [Internal]		13.70 / 14.30 mm	Keyence / Comparator	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	9	Height 7.2 [Internal]		6.90 / 7.50 mm	Optical Projector	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	10	Crimp height 16.6 [Internal]		16.30 / 16.90 mm	Keyence / Comparator	4 each Set up [8x]/4 cada Setup [8x].	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	11	Body to crimp 3.0 [Internal]		2.70 / 3.30 mm	Optical Projector	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	13	Tab height 10.0 [Internal]		9.70 / 10.30 mm	Optical Projector	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
			[Internal]								
			-	14	Opening angle 6° [Internal]		3.00 / 9.00 Deg°	Optical Projector	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.
[Internal]											
-	15	Opening 7.5 [Internal]		7.20 / 7.80 mm	Optical Projector	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no			
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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20		
Part/ Process Number	Operation	Machine / Device	Characteristics				Special Char. Class	Methods			Reaction Plan	
			No.	Product	Process	Product / Process Specification Tolerance		Evaluation Measurement Technique	Sample Size / Freq.	Control Method		
											conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	16	Opening height 3.2 [Internal]			2.90 / 3.50 mm	Drop Indicator	4 each Set Up/4 cada Setup.	Checksheet	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
20	Stamp - Finish Operator - In-process Inspection	-	Visual 1	Part Loose - See Print			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
		-	Keyence setup instructions	Keyence program setup instructions			Attribute					
				Read the instructions before running the Keyence program. Lea las instrucciones antes de ejecutar el programa Keyence.								
		-	Visual Defect 1	No Fractures on part			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				Pay close attention at transition from terminal body to crimps & between crimps.								
		-	Visual Defect 2	No Slug Marks			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				Must be free of Slug marks								
		-	Visual Defect 3	No Burrs			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				Part Must be free of Burrs								
		-	Visual Defect 4	No Slivers			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				Parts Must be free of slivers								
		-	Visual Defect 5	No expose Raw material			Attribute	Visual	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
-		1 [Internal OP]	Diameter 6.4			6.10 / 6.70 [0.240" Go / 0.264" No Go]	Go/No-Go Gage	5 pcs every hour/5 piezas cada hora.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300		
20	Stamp - Finish Quality - In-	-	Visual 1	Part Loose - See Print			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics				Methods				Reaction Plan
			No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	
	process Inspection	-	Keyence setup instructions	Keyence program setup instructions			Attribute				
		Read the instructions before running the Keyence program. Lea las instrucciones antes de ejecutar el programa Keyence.									
		-	Visual Defect 1	No Fractures on part			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		Pay close attention at transition from terminal body to crimps & between crimps.									
		-	Visual Defect 2	No Slug Marks			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		Must be free of Slug marks									
		-	Visual Defect 3	No Burrs			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		Part Must be free of Burrs									
		-	Visual Defect 4	No Slivers			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		Parts Must be free of slivers									
		-	Visual Defect 5	No expose Raw material			Attribute	Visual	5 pcs every 2 Hours/5 piezas cada 2 horas.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		-	2	Crimp width 13.5 [Internal]			13.20 / 13.80 mm	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		[Internal]									
		-	8	Diameter to tab 14.0 [Internal]			13.70 / 14.30 mm	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		[Internal]									
		-	10	Crimp height 16.6 [Internal]			16.30 / 16.90 mm	Optical Projector	4 pcs every 2 hours (8)/4 piezas cada 8 horas (8)	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		[Internal]									
		-	11	Body to crimp 3.0 [Internal]			2.70 / 3.30 mm	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300

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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods			Reaction Plan	
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.		Control Method
				[Internal]							
		-	13	Tab height 10.0 [Internal]			9.70 / 10.30 mm	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
				[Internal]							
		-	14	Opening angle 6° [Internal]			3.00 / 9.00 Deg°	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
				[Internal]							
		-	15	Opening 7.5 [Internal]			7.20 / 7.80 mm	Optical Projector	4 pcs every 2 hours/4 piezas cada 2 horas	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
				[Internal]							
20	Stamp - Finish Quality Last Piece	-	Visual 1	Part Loose - See Print			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		-	Keyence setup instructions	Keyence program setup instructions			Attribute				
		Read the instructions before running the Keyence program. Lea las instrucciones antes de ejecutar el programa Keyence.									
		-	Visual Defect 1	No Fractures on part			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			Pay close attention at transition from terminal body to crimps & between crimps.								
		-	Visual Defect 2	No Slug Marks			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			Must be free of Slug marks								
		-	Visual Defect 3	No Burrs			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
		Part Must be free of Burrs									
		-	Visual Defect 4	No Slivers			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material
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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20		
Part/ Process Number	Operation	Machine / Device	Characteristics				Methods				Reaction Plan	
			No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method		
											sospechoso - En referencia al procedimiento QP-8300	
				Parts Must be free of slivers								
			-	Visual Defect 5	No expose Raw material			Attribute	Visual	5 Pcs upon job ends/5 pcs al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			-	1	Diameter 6.4 [Internal]			6.10 / 6.70 mm	Pin Gage	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	2	Crimp width 13.5 [Internal]			13.20 / 13.80 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	8	Diameter to tab 14.0 [Internal]			13.70 / 14.30 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	9	Height 7.2 [Internal]			6.90 / 7.50 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	10	Crimp height 16.6 [Internal]			16.30 / 16.90 mm	Optical Projector	4 piezas upon job completion [8]	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	11	Body to crimp 3.0 [Internal]			2.70 / 3.30 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	13	Tab height 10.0 [Internal]			9.70 / 10.30 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300
			[Internal]									
			-	14	Opening angle 6° [Internal]			3.00 / 9.00 Deg°	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300

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Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MUST-14463-DB-B2			Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods				Reaction Plan	
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method		
				[Internal]								
		-	15	Opening 7.5 [Internal]			7.20 / 7.80 mm	Optical Projector	4 pcs once run ends / 4 piezas al terminar corrida	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				[Internal]								
		-	16	Opening height 3.2 [Internal]			2.90 / 3.50 mm	Drop Indicator	4 pieces upon job completion [8]	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
				[Internal]								
20	Stamp - Finish Final Audit	-	H		Labels correct & cartons sealed properly		Attribute	Visual	Each Container/cada contenedor.	Checksheet	Suspect Material - Refer to procedure QP-8300/Material sospechoso - En referencia al procedimiento QP-8300	
20	Stamp - Finish Transport to Final Location	-	I	Transport to Final Location			Attribute			Component Verification		
				Move to Warehouse for customer shipping								
20	Stamp - Finish PPAP Layout	-	1	Diameter 6.4 [Internal]			6.10 / 6.70 mm	Pin Gage	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	2	Crimp width 13.5 [Internal]			13.20 / 13.80 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	3	Tab width 5.0 [Internal]			4.70 / 5.30 mm	Calipers	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	4	Width 12.3 [Internal]			12.00 / 12.60 mm	Calipers	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
-	5	Diameter to tab 15.0 [Internal]			14.70 / 15.30 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.			
		[Internal]										
-	-	6		Part length 58.0 [Internal]			Attribute	Optical Projector	2 Per Dimensional/2	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no	
Plex 10/26/23 9:49 AM												

Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20			
Part/ Process Number	Operation	Machine / Device	Characteristics				Special Char. Class	Methods			Reaction Plan		
			No.	Product	Process	Product / Process Specification Tolerance		Evaluation Measurement Technique	Sample Size / Freq.	Control Method			
									por Dimensional.		conformes, rechazar las piezas y notificar a técnico de ajuste.		
				[Internal]									
			-	7	Width 22.9 [Internal]			22.60 / 23.20 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	8	Diameter to tab 14.0 [Internal]			13.70 / 14.30 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	9	Height 7.2 [Internal]			6.90 / 7.50 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	10	Crimp height 16.6 [Internal]			16.30 / 16.90 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	11	Body to crimp 3.0 [Internal]			2.70 / 3.30 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	12	Side tab width 8.0 [Internal]			Attribute	Calipers	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	13	Tab height 10.0 [Internal]			9.70 / 10.30 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	14	Opening angle 6° [Internal]			3.00 / 9.00 Deg°	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]									
			-	15	Opening 7.5 [Internal]			7.20 / 7.80 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no	
Plex 10/26/23 9:49 AM													

Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20		
Part/ Process Number	Operation	Machine / Device	Characteristics				Special Char. Class	Methods			Reaction Plan	
			No.	Product	Process	Product / Process Specification Tolerance		Evaluation Measurement Technique	Sample Size / Freq.	Control Method		
											conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	16	Opening height 3.2 [Internal]			2.90 / 3.50 mm	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	17	Thickness 1.0 [Internal]			0.70 / 1.30 mm	Micrometer	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
				[Internal]								
		-	18	Radius (0.9)			Attribute	Optical Projector	2 Per Dimensional/2 por Dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 1	Parts conform to the electrical connection system design specification (SDS) version 23.			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 2	DVP is based on EL-0176 VER 9 and Lear splice technology information. Pull test and procedure EST-460			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 3	N/A			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 4	Solder dip required after wire attachment per ES-BU5T- 14A121-A, section 3.5 using Lead free solder as SAC305 or equivalent.			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 5	0.5 max cut-off			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 6	General tolerances: +/-0.3mm all one place, +/- 0.10mm all two place dimensions, +/- 3.0 degrees all angular dimensions.			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 7	Denotes dimensions checked with Lear gages G-22-B charted.			Attribute	Visual	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.	
		-	Note 8	All weld terminations shall comply with USCAR-38 REV.			Attribute	Visual	1 Per Dimensional/1	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no	

Plex 10/26/23 9:49 AM

Control Plan Number 7293			Control Plan Type Production			Part Number/Latest Change Level MU5T-14463-DB-B2		Date (Orig.) 6/18/18		Date (Rev.) 11/23/20	
Part/ Process Number	Operation	Machine / Device	Characteristics			Special Char. Class	Methods				Reaction Plan
			No.	Product	Process		Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	
				DEC. 2009.					por dimensional.		conformes, rechazar las piezas y notificar a técnico de ajuste.
		-	Material	C110			Attribute	Certification	1 Per Dimensional/1 por dimensional.	PPAP Layout	Nonconforming samples, Reject sample & notify setup/ Partes no conformes, rechazar las piezas y notificar a técnico de ajuste.



Royal Power Solutions
125 Mercedes Drive
Carol Stream, IL 60188
Tel (630) 766-2685
Fax (630) 766-0401

Study Results for Gage A16005995 (Digital Caliper) on 2/16/23

GAGE LOG INFORMATION

Gage Log No: 2618394
Gage ID: A16005995
Gage Log Type: Gage Study
Study Date: 2/16/23

Device Name:
Operators: 3
Operator Names: Huicochea, Vitaliano, Perez
Trials: 3
Samples: 10

CHARACTERISTIC & VARIATION

LSL: 19.8
USL: 20.2
Tolerance: .400000
Spec Description: Width 20.00
Part-to-Part Standard Deviation (σ_p): .000611
Measurement Standard Deviation (σ_m): .000051
Process Variation Standard Deviation (σ_t): .000613

K1: .590818
K2: .523136
K3: .314559
Average of All Ranges ($\bar{R}$): .000333
X Difference ($\bar{X}_{DIFF}$): .000334
Range of Part Average (R_p): .010000

MEASUREMENT UNIT ANALYSIS - GRR (Range Method)

GRR

Repeatability - Equipment
Variation (EV): .000197
Reproducibility - Appraiser
Variation (AV): .000171
GageR&R (GRR): .000261
Part Variation (PV): .003146
Total Variation (TV): .003156

Repeatability As % (EV/TV): 6.23
Reproducibility As % (AV/TV): 5.41
GRR % (GRR /TV): 8.26
% PV (PV / TV): 99.66
Distinct Levels: 17.02
GRR % of Tolerance/5.15: .34 %

Comments:



Royal Power Solutions
125 Mercedes Drive
Carol Stream, IL 60188
Tel (630) 766-2685
Fax (630) 766-0401

Study Results for Gage 1051 (Optical Projector) on 2/9/23

GAGE LOG INFORMATION

Gage Log No: 2615457
Gage ID: 1051
Gage Log Type: Gage Study
Study Date: 2/9/23

Device Name:
Operators: 3
Operator Names: Vitaliano, Carvajal, Lopez
Trials: 3
Samples: 10

CHARACTERISTIC & VARIATION

LSL: 8.5
USL: 8.6
Tolerance: .100000
Spec Description: Dim #18: Hole Diameter 8.50
Part-to-Part Standard Deviation (σ_p): .000611
Measurement Standard Deviation (σ_m): .000051
Process Variation Standard Deviation (σ_t): .000613

K1: .590818
K2: .523136
K3: .314559
Average of All Ranges ($\bar{R}$): .000333
X Difference ($\bar{X}_{DIFF}$): .000333
Range of Part Average (R_p): .010000

MEASUREMENT UNIT ANALYSIS - GRR (Range Method)

GRR

Repeatability - Equipment
Variation (EV): .000197
Reproducibility - Appraiser
Variation (AV): .000171
GageR&R (GRR): .000260
Part Variation (PV): .003146
Total Variation (TV): .003156

Repeatability As % (EV/TV): 6.23
Reproducibility As % (AV/TV): 5.40
GRR % (GRR /TV): 8.25
% PV (PV / TV): 99.66
Distinct Levels: 17.03
GRR % of Tolerance/5.15: 1.34 %

Comments:



Royal Power Solutions
125 Mercedes Drive
Carol Stream, IL 60188
Tel (630) 766-2685
Fax (630) 766-0401

Study Results for Gage 8C418060 (Vision Inspection System) on 2/17/23

GAGE LOG INFORMATION

Gage Log No: 2619239
Gage ID: 8C418060
Gage Log Type: Gage Study
Study Date: 2/17/23

Device Name:
Operators: 3
Operator Names: Martinez, Medrano, Perez
Trials: 3
Samples: 10

CHARACTERISTIC & VARIATION

LSL: 1.9
USL: 2.1
Tolerance: .200000
Spec Description: Window length 2.0
Part-to-Part Standard Deviation (σ_p): .000611
Measurement Standard Deviation (σ_m): .000051
Process Variation Standard Deviation (σ_t): .000613

K1: .590818
K2: .523136
K3: .314559
Average of All Ranges ($\bar{R}$): .000333
X Difference ($\bar{X}_{DIFF}$): .000333
Range of Part Average (R_p): .010000

MEASUREMENT UNIT ANALYSIS - GRR (Range Method)

GRR

Repeatability - Equipment
Variation (EV): .000197
Reproducibility - Appraiser
Variation (AV): .000171
GageR&R (GRR): .000260
Part Variation (PV): .003146
Total Variation (TV): .003156

Repeatability As % (EV/TV): 6.23
Reproducibility As % (AV/TV): 5.40
GRR % (GRR /TV): 8.25
% PV (PV / TV): 99.66
Distinct Levels: 17.03
GRR % of Tolerance/5.15: .67 %

Comments:



Checksheet 2219014 - Capability Study

Part MU5T-14463-DB-B2 Eyelet Terminal - Loose Parts	Operation Stamp - Finish	Inspection Step PPAP Layout	Workcenter M-008	SPC Checksheet Container Text		Job No
Date/Time 10/26/23 12:52 PM	Inspector Ribota, Lidia		Samples 6	Size 5	Note	
Tooling						
No	Specification	Target	Limits	Gage	Measurements	Note
2	Crimp width 13.5 [Internal]	13.50 mm	13.80 13.20		13.35 13.34 13.34 13.35 13.37	
					13.34 13.36 13.35 13.35 13.34	
					13.37 13.34 13.33 13.36 13.37	
					13.34 13.35 13.34 13.35 13.37	
					13.37 13.35 13.33 13.35 13.33	
					13.35 13.36 13.35 13.35 13.33	

Plex 10/26/23 12:53 PM



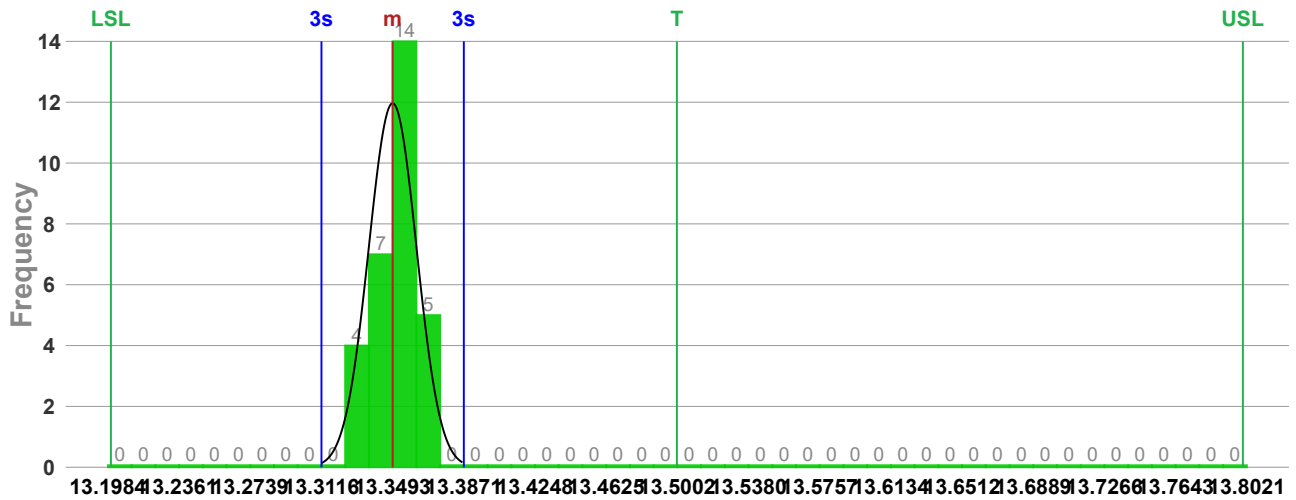
Capability Study - Histogram

Part	MU5T-14463-DB-B2 Eyelet Terminal - Loose Parts	Operation	Stamp - Finish	Inspection Mode	PPAP Layout	Workcenter	M-008
Containers				Job No			
Specification		Date Range		Samples		Sample Size	
2 - Crimp width 13.5 [Internal] (Target: 13.50 mm)	13.80 mm 13.20 mm	10/26/2023 - 10/26/2023		6		5	
Tooling							

Chart Statistics

Data	Specifications	Central Tendency	Dispersion	Distribution	Capability/Performance			Prediction
Min: 13.330	Tol.: 0.600	<u>Extended Limits</u>	<u>Extended Limits</u>	σ : 0.013	CR (1/Cp): 0.136	Pp: 7.952	ZU: 33.103	% Above: 0.000
Max: 13.370	USL: 13.800	UCLx: N/A	UCLr: N/A	+3 σ : 13.387	Cp (Tol/6 σ): 7.345	Ppk: 3.958	ZL: 10.969	% Below: 0.000
Mean: 13.349	Target: 13.500	EXDBar: 13.349	ERBar: 0.032	Mean: 13.349	Cpk: 3.656	kurt: -0.917	CPU: 11.034	% OoS: 0.000
Count: 30	LSL: 13.200	LCLx: N/A	LCLr: N/A	-3 σ : 13.312	σ_c (R/d2): 0.014	skew: 0.221	CPL: 3.656	% In Spec: 100.000
						d2: 2.326		

Histogram Chart





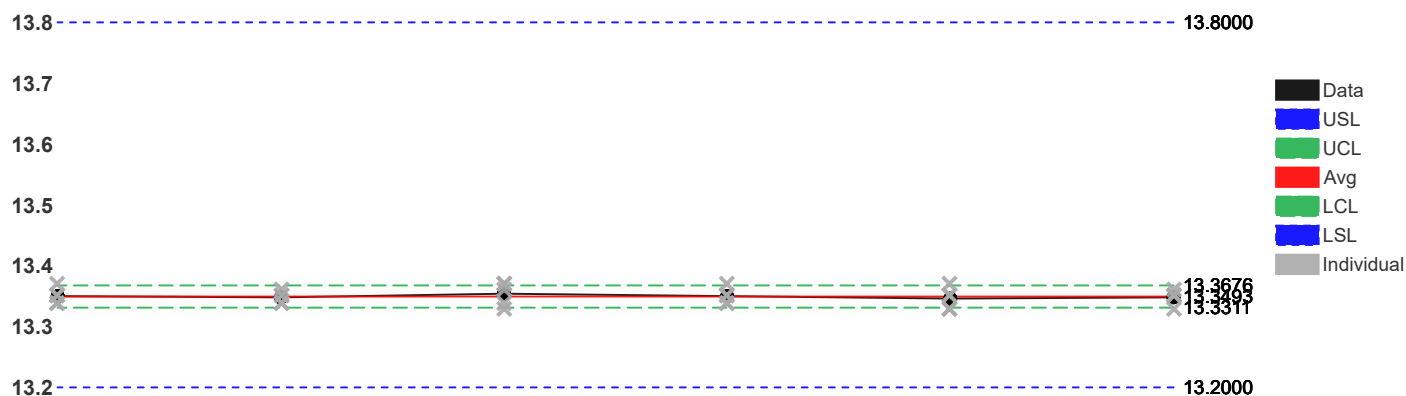
Capability Study - Xbar & Range Chart

Part MU5T-14463-DB-B2 Eyelet Terminal - Loose Parts	Operation Stamp - Finish	Inspection Mode PPAP Layout	Workcenter M-008
Containers		Job No	
Specification 2 - Crimp width 13.5 [Internal] (Target: 13.50 mm) 13.80 mm 13.20 mm	Date Range 10/26/2023 - 10/26/2023	Samples 6	Sample Size 5
Tooling			

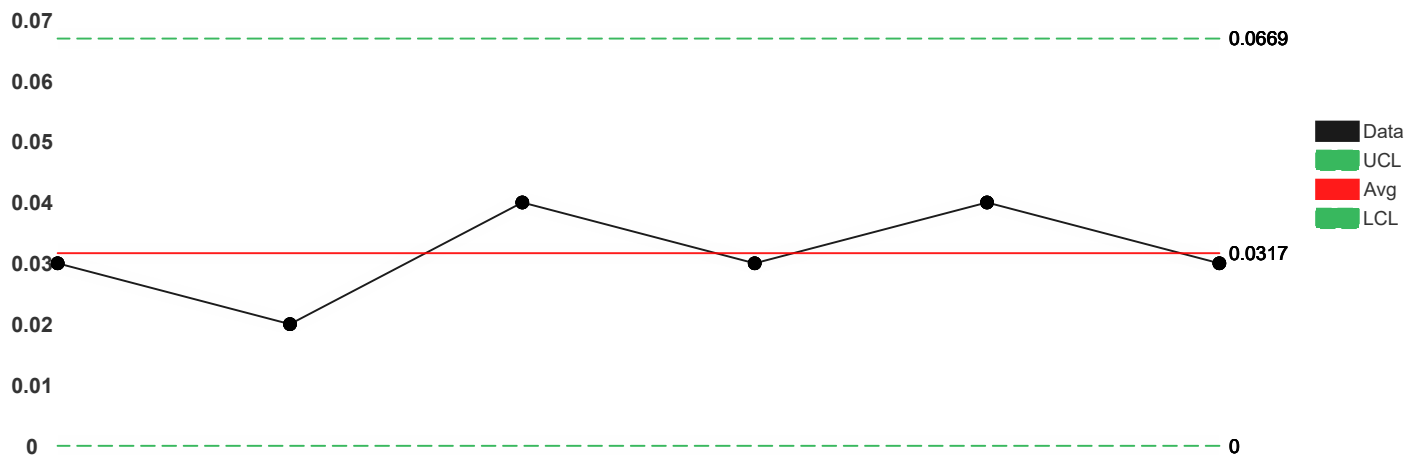
Chart Statistics

Data	Specifications	Central Tendency	Dispersion	Distribution	Capability/Performance			Prediction
Min: 13.330	Tol.: 0.600	<u>Extended Limits</u>	<u>Extended Limits</u>	σ : 0.013	CR (1/Cp): 0.136	Pp: 7.952	ZU: 33.103	% Above: 0.000
Max: 13.370	USL: 13.800	UCLx: 13.368	UCLr: 0.067	+3 σ : 13.387	Cp (Tol/6 σ): 7.345	Ppk: 3.958	ZL: 10.969	% Below: 0.000
Mean: 13.349	Target: 13.500	EXDBar: 13.349	ERBar: 0.032	Mean: 13.349	Cpk: 3.656	kurt: -0.917	CPU: 11.034	% OoS: 0.000
Count: 30	LSL: 13.200	LCLx: 13.331	LCLr: 0.000	-3 σ : 13.312	σ_c (R/d2): 0.014	skew: 0.221	CPL: 3.656	% In Spec: 100.000
						d2: 2.326		

X Bar Chart



Range Chart



CERTIFICATE OF TEST

Customer: Royal Power Solutions
125 Mercedes Drive
Carol Stream, IL 60188

Specification: ASTM B 152/B152M-19

Customer PO No: 041623

PMX Order No: 134498-1

Customer Part No: 0394X3.8101102P

PMX Bill of Lading: 00321338

Description: C11000 .0394 H020

Pallet | Tag No.: 882758 | P8G53A-BA

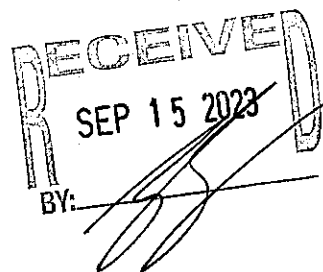
Chemical Composition (Wt %) Test Date 08/20/23 Method (See below**)

Element Cu
Spec Min. 99.9000
Spec Max. 100.000
Actual 99.9924

Dimensions	Units/Scale	Spec. Min.	Spec. Max.	Actual
Thickness	in	.0386	.0402	.0394
Width	in	3.807	3.813	PASS

Mechanical Properties		Test Date 09/02/23				
		Method	Units/Scale	Spec. Min.	Spec. Max.	Actual
Tensile Strength		ASTM-E8-16a	ksi	37.0	46.0	41.4
Yield Strength	(REF)	ASTM-E8-16a	ksi	NA	NA	38.7
Elongation	(REF)	ASTM-E8-16a	%	NA	NA	14
Hardness 1	(REF)	ASTM-E18-16	HRF	NA	NA	82
Hardness 2						
Grain Size	(REF)	ASTM-E112-13	mm	NA	NA	.045

Other Tests	Test Date	Method	Units/Scale	Spec. Min.	Spec. Max.	Actual
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We certify that these test results were obtained from samples of the material lots identified above. The test procedures and material production conform to chemical and mechanical requirements of applicable customer and ASTM specifications. This document may not be reproduced, except in full, without the written approval of PMX Industries, Inc. **Chemistry is analyzed according to methods ASTM-E1621 and/or ASTM-E-1251. Country of Melt and MFG:USA


Mary Pasker Laboratory Supervisor

09/13/23

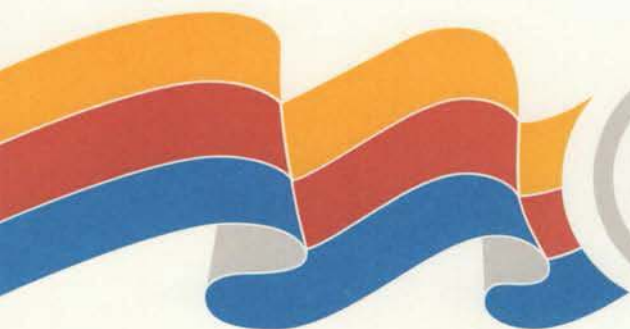
Date

PMX INDUSTRIES, INC. 5300 WILLOW CREEK DRIVE SW, CEDAR RAPIDS, IA 52404-4303

TEL: 319/368-7700 FAX: 319/368-7701 E-MAIL: Mary.Pasker@ipmx.com

ISO 9001:2015 REGISTERED

CERTIFICATE OF REGISTRATION



**Quality
System
Registrar**



Having been audited in accordance with requirements of

ISO 9001:2015 – ASQ/ANSI/ISO 9001:2015

SRI Quality System Registrar, 300 Northpointe Circle, Seven Fields, Pennsylvania, 16046, USA, hereby grants to:

PMX Industries, Inc.

Registration of the management system at its location:

**5300 Willow Creek Drive SW
Cedar Rapids, Iowa, 52404, USA**

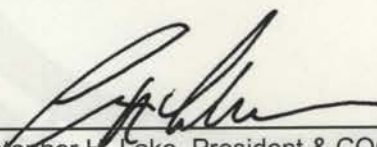
The conditions for maintaining this certificate of registration are set forth in the SRI registration agreements R20.3 and R20.4. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.

Scope of ISO 9001:2015 registration: "Manufacture and supply of copper, copper alloys, and brass sheet, strip, and ammunition cups."

Initial SRI Registration date: December 19, 1996

Current registration period: December 16, 2020 through December 15, 2023

Signed for SRI:


Christopher H. Lake, President & COO

Release Date: December 16, 2020
Certificate Number: 020899
Registration Number: 0739-01





CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

PMX Industries, Inc.
5300 Willow Creek Drive SW
Cedar Rapids, IA 52404

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

while demonstrating technical competence in the field of

TESTING

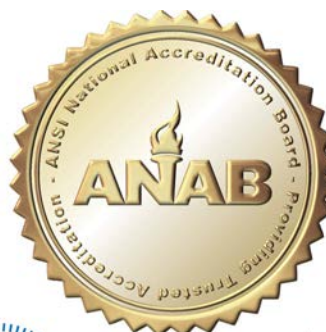
Refer to the accompanying Scope of Accreditation for information regarding the types of activities to which this accreditation applies

L1170-1

Certificate Number


ANAB Approval

Certificate Valid Through: 12/28/2022
Version No. 004 Issued: 01/06/2020



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



ANSI National Accreditation Board

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

PMX Industries, Inc.

5300 Willow Creek Drive SW
Cedar Rapids, IA 52404
Sean Clipperton 319-298-1453
sean.clipperton@ipmx.com

TESTING

Valid to: **December 28, 2022**

Certificate Number: **L1170-1**

Chemical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Optical Emission Spectrometry	ASTM E 1251	Copper Based Alloys	Thermo-Electron ARL-4460
X-Ray Spectrometry	ASTM E 1621	Copper Based Alloys	Thermo-Electron ARL-9900
Oxygen Analysis	ASTM E 1019	Copper Based Alloys	RO-416 LECO

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Micro Hardness (Vickers)	ASTM E 384	Copper Based Alloys	LECO LM-700 AT
Rockwell / Rockwell Superficial	ASTM E 18	Copper Based Alloys	A643T/B523T Wilson/Rockwell
Tension	ASTM E 345; ASTM E 8	Copper Based Alloys	MMHT-5K Tinius-Olsen
Preparation	ASTM E 3	Copper Based Alloys	
Conductivity	ASTM E 1004	Copper Based Alloys	Fischer Sigma Scope SMP 350
Surface Roughness	ASME B.46.1	Copper Based Alloys	SJ 210 Mitutoyo

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L1170-1.


Vice President





CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

PMX Industries, Inc.
5300 Willow Creek Drive SW
Cedar Rapids, IA 52404

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

TESTING

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to read 'R.D.L.', is positioned above a solid horizontal line.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 28 December 2022
Certificate Number: L1170-1



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

PMX Industries, Inc.
5300 Willow Creek Drive SW
Cedar Rapids, IA 52404
Sean Clipperton 319-298-1453
sean.clipperton@ipmx.com

TESTING

Valid to: **December 28, 2022**

Certificate Number: **L1170-1**

Chemical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Optical Emission Spectrometry	ASTM E 1251	Copper Based Alloys	Thermo-Electron ARL-4460
X-Ray Spectrometry	ASTM E 1621	Copper Based Alloys	Thermo-Electron ARL-9900 ARL-9800
Oxygen Analysis	ASTM E 1019	Copper Based Alloys	G6 Leonardo Bruker RO-416 LECO

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Micro Hardness (Vickers)	ASTM E 384	Copper Based Alloys	LECO LM-700 AT
Rockwell / Rockwell Superficial	ASTM E 18	Copper Based Alloys	A643T/B523T Wilson/Rockwell
Tension	ASTM E 8	Copper Based Alloys	MMHT-5K Tinius-Olsen
Conductivity	ASTM E 1004	Copper Based Alloys	Fischer Sigma Scope SMP 350
Surface Roughness	ASME B.46.1	Copper Based Alloys	SJ 210 Mitutoyo

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L1170-1.



R. Douglas Leonard Jr., VP, PILR SBU



CERTIFICATE



This is to certify that

Royal Power Solutions

125 Mercedes Drive
Carol Stream, IL 60188
United States of America

has implemented and maintains a **Quality Management System**.

Scope:

Design and manufacture of precision metal stampings. The assembly of components.

An audit, conducted and documented in a report, has verified that this quality management system fulfills the requirements of the following International Automotive Standard:

IATF 16949:2016

(with product design)

Certificate registration no.	269998 IATF 16
Issuing date	2021-11-17
This certificate is valid until	2024-11-16
Date of revision	2021-12-31
IATF No.	0434818



2-IAO-QMC-01001

For and on behalf of DQS

Brad McGuire
Managing Director, DQS Inc.

Michael Drechsel
Managing Director, DQS Holding GmbH

IATF Contract Office: DQS Holding GmbH, Konrad-Adenauer-Allee 8-10, 61118 Bad Vilbel, Germany
Issuing Office: DQS Inc., 1500 McConnor Parkway, Suite 400, Schaumburg, IL 60173 USA



CERTIFICATE



This is to certify that

Royal Power Solutions

125 Mercedes Drive
Carol Stream, IL 60188
United States of America

has implemented and maintains a **Quality Management System**.

Scope:

Design and manufacture of precision metal stampings. The assembly of components.

Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

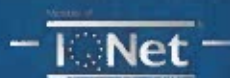
ISO 9001 : 2015

Certificate registration no.	269998 QM15
Date of original certification	2018-09-04
Date of revision	2021-12-31
Date of certification	2021-11-17
Valid until	2024-09-03



DQS Inc.

Brad McGuire
Managing Director



Accredited Body: DQS Inc., 1500 McConnor Parkway, Suite 400, Schaumburg, IL 60173 USA

Laboratory Scope

Royal Power Solutions (Carol Stream) Quality Laboratory is qualified to perform the following inspection, testing and calibration activities. All other activities are performed by accredited outside laboratories.

Inspection/Test/Calibration	Equipment Used	Method and/or Standard Used
First Piece Inspection	Micrometers, Calipers, Indicators, Plug/Pin sets, Optical Comparators/Projectors, Vision and Touch Probe systems (Micro-Vu/OGP/Keyence), Dynes Solution, Force Gages, torque driver/wrenches and Profilometer	QSP-4.10.101
In-process Inspection	Micrometers, Calipers, Indicators, Plug/Pin sets, Optical Comparators/Projectors, Vision and Touch Probe systems (Micro-Vu/OGP/Keyence), Dynes Solution, Force Gages, torque driver/wrenches and Profilometer	QSP-4.10.101
Quality Last Piece Inspection	Micrometers, Calipers, Indicators, Plug/Pin sets, Optical Comparators/Projectors, Vision and Touch Probe systems (Micro-Vu/OGP/Keyence), Dynes Solution, Force Gages, torque driver/wrenches and Profilometer	QSP-4.10.101
Calibrate Depth Micrometers	Jo Block Set, ID # 62444	QSP-4.11.118
Calibrate Drop Indicators	Jo Block Set, ID # 62444	QSP-4.11.110
Calibrate Digital Calipers	Jo Block Set, ID # 62444	QSP-4.11.116
Calibrate Dial Calipers	Jo Block Set, ID # 62444	QSP-4.11.114
Calibrate Height Gages	Jo Block Set, ID # 62444	QSP-4.11.111
Calibrate Outside Micrometers	Jo Block Set, ID # 62444	QSP-4.11.109
Calibrate Test / Drop Indicators	Jo Block Set, ID # 62444	QSP-4.11.114