CHRYSLER Ford GM

Part Submission Warrant

Part Name: Eyelet Terminal - Reeled Parts
Cust. Part Number: HU5T-14463-AGA
Shown On Drawing No.: HU5T-14463-AGA
Org. Part Number: R8687
Engineering Change Level: A1
Dated: 10/8/21
Additional Engineering Changes: N/A
Dated:
Safety and/or Government Regulation: ☐ Yes ☒ No
Purchase Order No.: N/A
Weight (kg): .0164
Checking Aid No.: N/A
Checking Aid Engineering Change Level: N/A
Dated:

ORGANIZATION MANUFACTURING INFORMATION

Royal Power Solutions (00-525-8322)
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

Ford
Application

MATERIALS REPORTING

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

Submitted by (IMDS) or other customer format: 1166630687 / 1 10/17/2022

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

REASON FOR SUBMISSION (Check at least one)

- ☒ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Disprepancy
- ☐ Tooling Inactive less than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Additional Location
- ☐ 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 48000 / 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
Date: 10/19/22
Print Name: Yeverino, Liliana
Phone No.: 630-766-2685
Fax No.:
Title: Quality Assurance Services Technician
E-mail: Liliana.Yeverino@royalpowersolutions.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

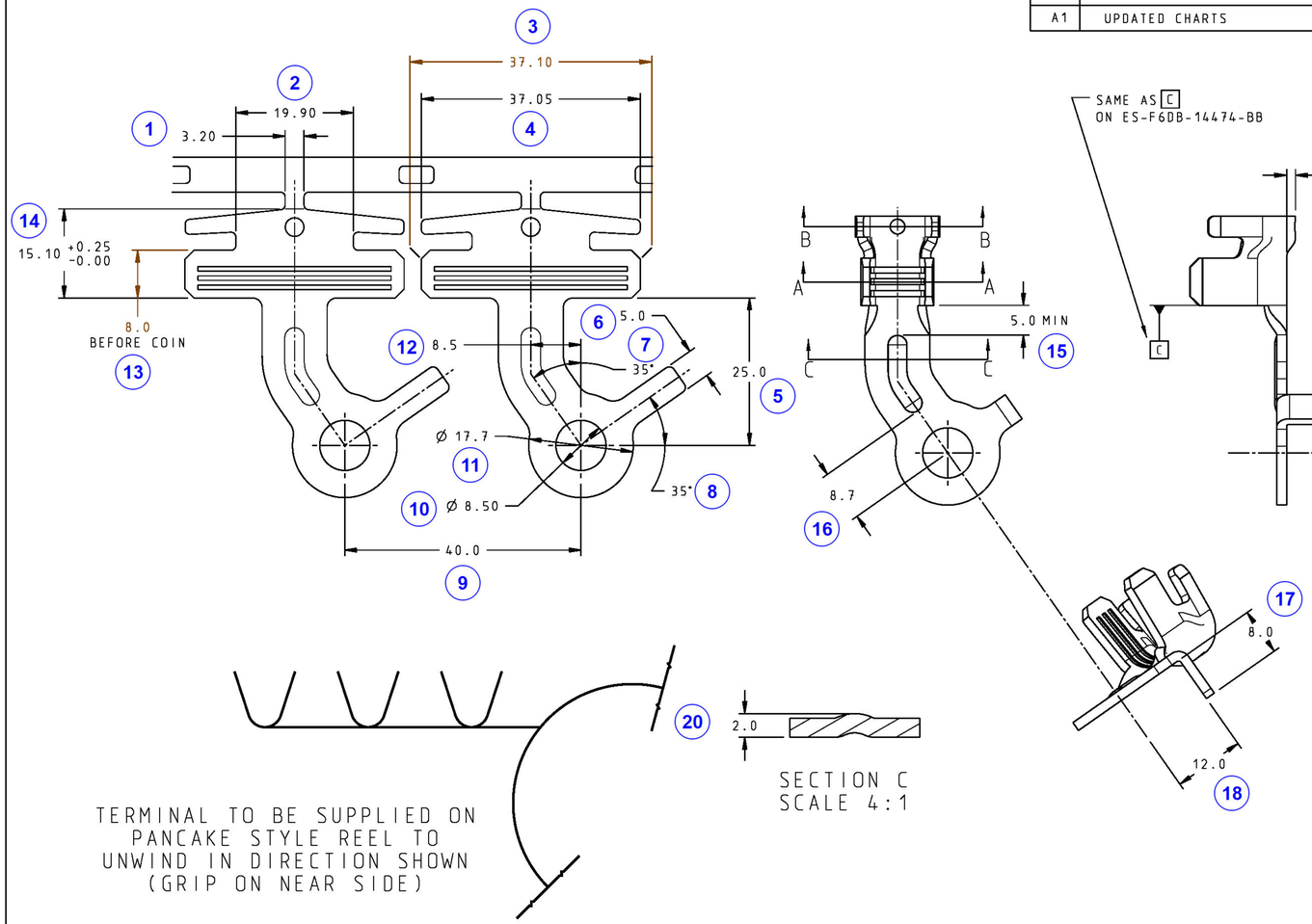
Customer Signature
Date:
Print Name
Customer Tracking Number (optional):

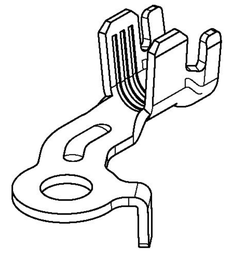
TERMINAL INFORMATION																
FORD PART NO.	SUPPLIER PART NO.	DESCRIPTION	GREASED Y/N	BASE MATERIAL	PLATING MATERIAL	PLATING THICKNESS	COPPER WEIGHT	TOTAL WEIGHT	MATERIAL THICKNESS	MATERIAL HARDNESS	MAX AMBIENT TEMPURATURE	CONDUCTOR MIN/MAX CSA	INSULATION MIN/MAX OD	MATING PARTS		
														FORD PART NO.	SUPPLIER PART NO.	DESCRIPTION
HU5T-14463-AGA	R8687	TRMNL-EYLT TYP	N	C194	TIN	0.001 MIN	TBD	TBD	1.63	H04	125°C	23.0/35.3	7.90/12.83	N/A	N/A	N/A

TERMINAL CRIMP & GRIP REFERENCE TABLE								
FORD PART NO.	WIRE TYPE/ SPECIFICATION (DESIGN INTENT)	WIRE SIZE	STRIP LENGTH (mm)	CONDUCTOR CRIMP INFO		INSULATION CRIMP INFO		NOTES
				C.C.W.(mm) (+/-0.10)	C.C.H.(mm) (+/-0.10)	I.C.W.(mm) (+/-0.10)	I.C.H.(mm) (+/-0.10)	
HU5T-14463-AGA		4 GA	11.5	10.85	6.65	13.20	11.00	SEE NOTE 6
HU5T-14463-AGA		2 GA	11.5	10.85	7.65	13.20	13.00	SEE NOTE 6
HU5T-14463-AGA		25mm²	11.5					SEE NOTE 7
HU5T-14463-AGA		35mm²	11.5	10.97	8.20	13.60	12.50	SEE NOTE 6

A1

REV	DESCRIPTION	DATE	APP.
0	RELEASED FOR PRODUCTION	8-9-2016	ERIK
A1	UPDATED CHARTS	10-8-2021	TONY





GENERAL NOTES:

1) PARTS CONFORM TO THE ELECTRICAL CONNECTION SYSTEM DESIGN SPECIFICATION (SDS) VER. 20 EL0176
2) -GRIP PER FORD TERMINAL WIRE GRIP SPEC: ES-F6DB-14474-BB (F GRIP)
   -PARTS COMPLY WITH ES-D8AB-1293-A
3) N/A
4) TOLERANCES
   UNLESS OTHERWISE SPECIFIED
   X.X = ±0.5
   X.XX = ±0.3
   ANGLES = ±3°
5) 0.2mm MAX RADIUS PERMISSIBLE ON EDGES AND FILLETS SHOWN AS SHARP FOR STAMPING PART
6) CRIMP VALUES ARE RECOMMENDATIONS. HARNESS SUPPLIER HAS CRIMP DEVELOPMENT RESPONSIBILITY
7) HARNESS SUPPLIER HAS CRIMP DEVELOPMENT RESPONSIBILITY

LTRS	REVISIONS			
ORIGINATOR	CHECKER	ENGR APP	MATL APP	
RELEASED HU5T-14463-AGA AELE-E-11795249-559 20160822				
JSZALAY	TDUNLAP	THURST		
A1 UPDATED CHARTS AELE-E-14139368-139 20211008				
JSZALAY	TDUNLAP	THURST		

APPROVED
By ALD at 10:37 am, Dec 20, 2021

RECEIVED
ccarlson , 2/24/2022, 11:14:13 AM

Royal Die & Stamping Co., Inc.
125 Mercedes Dr., Carol Stream, IL 60188 USA (630) 766-2685 FAX 0401

SCALE: 2:1	MATERIAL: SEE CHART	DESIGNED: JSZALAY	
CHECKED TONY		DATE 8-9-2016	
CUSTOMER ROYAL		REV: A1	
		DIE NO. TBD	
TITLE TRMNL-EYLT TYP		PART NUMBER R8687	

P08BA
Royal Die & Stamping Co., Inc.
125 Mercedes Dr., Carol Stream, IL 60188 USA (630) 766-2685 FAX 0401
ROYAL DIE PART NUMBER: R8687
ROYAL DIE NUMBER:

REFERENCE M8 ANTI-ROTATION EYELET TERMINAL			
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 28.1			3RD ANGLE PROJ DIMENSIONS ARE IN MILLIMETERS
CAD TYPE K-CATIA5	CAD LOC. TCE	CAD FILE HU5T-14463-AG-DWG-01	DTM IS MASTER
OPER. NO. -----	UNIT MM	DRAWING HU5T-14463-AGA	
DESIGN JSZALAY	DETAIL JSZALAY	TITLE TRMNL-EYLT TYP	SHT 1 OF 1
CHECKED ADUNLAP	SAFETY -----		
SCALE 2:1	DATE 20160809	DIVISION	
		PLANT	

FORD MOTOR COMPANY

Production Part Approval
Dimensional Test Results

CHRYSLER Ford GM

ORGANIZATION: Royal Die & Stamping Co., Inc. SUPPLIER/VENDOR CODE:	PART NUMBER: R8687 PART NAME: Eyelet Terminal - Reeled Parts
INSPECTION FACILITY: Royal Die & Stamping Co., Inc. ADDITIONAL REMARKS:	DESIGN RECORD CHANGE LEVEL: A1 ENGINEERING CHANGE DOCUMENTS:

ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)	REMARKS	OK	NOT OK
Material	C194	Attribute	10/19/22	1	Pass		X	
Note 1	Parts conform to electrical connection system design specification (SDS) VER. 20 ELO176	Attribute	10/19/22	1	Pass		X	
Note 2	-Grip per Ford terminal wire grip spec: ES-F6DB-14474-BB (F GRIP) -Parts comply with ES-D8AB-1293-A	Attribute	10/19/22	1	Pass		X	
Note 3	N/A	Attribute	10/19/22	1	Pass		X	
Note 4	Tolerances Unless Otherwise Specified X.X = +/- 0.5 X.XX = +/- 0.3 Angle = +/- 3°	Attribute	10/19/22	1	Pass		X	
Note 5	0.2mm Max radius permissible on edges and fillets shown as sharp for stamping part	Attribute	10/19/22	1	Pass		X	
Note 6	Crimp values are recommendations. Harness supplier has crimp development responsibility	Attribute	10/19/22	1	Pass		X	
Note 7	Harness supplier has crimp development responsibility	Attribute	10/19/22	1	Pass		X	
Plating	Tin	Attribute	10/19/22	1	Pass		X	
1	Carrier holder width 3.20	3.50 mm 2.90 mm	10/19/22	5	3.22 3.22 3.20 3.21 3.22		X	
2	Crimp holder width 19.90	20.20 mm 19.60 mm	10/19/22	5	19.95 19.96 19.95 19.94 19.96		X	
3	Crimp length 37.10	37.40 mm 36.80 mm	10/19/22	5	37.10 37.10 37.10 37.10 37.10		X	
4	Insulation length 37.05	37.35 mm 36.75 mm	10/19/22	5	37.11 37.12 37.11 37.10 37.11		X	
5	Dia to crimp 25.0	25.50 mm 24.50 mm	10/19/22	5	25.06 25.01 25.03 25.05 25.06		X	
6	Tab Width 5.0	5.50 mm 4.50 mm	10/19/22	5	5.02 5.01 5.00 5.00 5.01		X	
7	Angle 35º	38.00 Deg° 32.00 Deg°	10/19/22	5	35.18 35.22 35.19 35.34 35.29		X	
8	Angle 35º	38.00 Deg° 32.00 Deg°	10/19/22	5	35.66 35.79 35.82 35.77 35.79		X	
9	Dia to dia 40.0	40.50 mm 39.50 mm	10/19/22	5	39.92 39.98 39.95 39.92 39.95		X	
10	Diameter 8.50	8.80 mm 8.20 mm	10/19/22	5	8.55 8.56 8.55 8.56 8.55		X	
11	Outside diameter 17.7	18.20 mm 17.20 mm	10/19/22	5	17.72 17.71 17.72 17.73 17.72		X	
12	Hole Location 8.5	9.00 mm 8.00 mm	10/19/22	5	8.56 8.55 8.59 8.57 8.56		X	
13	Crimp side width 8.0	8.50 mm 7.50 mm	10/19/22	5	8.02 8.01 8.02 8.02 8.01		X	
14	Crimp to ins 15.10	15.35 mm 15.10 mm	10/19/22	5	15.15 15.16 15.15 15.15 15.16		X	
15	Gusset Location 5.0 MIN	5.00 mm Min	10/19/22	5	5.32 5.66 5.69 5.72 5.81		X	
16	Hole to Gusset 8.7	9.20 mm 8.20 mm	10/19/22	5	8.98 8.99 8.97 8.98 8.99		X	
17	Tab Height 8.0	8.50 mm 7.50 mm	10/19/22	5	8.05 8.06 8.04 8.05 8.06		X	

Production Part Approval
Dimensional Test Results

ORGANIZATION: Royal Die & Stamping Co., Inc. SUPPLIER/VENDOR CODE:	PART NUMBER: R8687 PART NAME: Eyelet Terminal - Reeled Parts
INSPECTION FACILITY: Royal Die & Stamping Co., Inc. ADDITIONAL REMARKS:	DESIGN RECORD CHANGE LEVEL: A1 ENGINEERING CHANGE DOCUMENTS:

ITEM	DIMENSION / SPECIFICATION	SPECIFICATION / LIMITS	TEST DATE	QTY. TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)	REMARKS	OK	NOT OK
18	Tab Location 12.0	12.50 mm 11.50 mm	10/19/22	5	12.19 12.18 12.19 12.16 12.18		X	
19	Offset 1.5	2.00 mm 1.00 mm	10/19/22	5	1.32 1.45 1.33 1.42 1.43		X	
20	Gusset Height 2.0	2.50 mm 1.50 mm	10/19/22	5	2.12 2.12 2.12 2.12 2.12		X	
21	Crimp coin width 0.90 [2X]	1.20 mm 0.60 mm	10/19/22	10	0.98 0.99 0.97 0.99 0.98 0.99 0.97 0.98 0.99 0.98		X	
22	Crimp radius 3.75	4.05 mm 3.45 mm	10/19/22	5	3.80 3.80 3.80 3.80 3.80		X	
23	Wire evenness 0.30	0.30 mm Max	10/19/22	5	0.05 0.06 0.02 0.03 0.05		X	
24	Wire Crimp Width 12.30	12.60 mm 12.00 mm	10/19/22	5	12.38 12.36 12.35 12.38 12.36		X	
25	Ins coin width 0.90 [2X]	1.20 mm 0.60 mm	10/19/22	10	0.99 0.98 0.95 1.02 1.05 0.95 1.05 0.99 0.96 0.97		X	
26	Ins radius 4.70	5.00 mm 4.40 mm	10/19/22	5	4.50 4.50 4.50 4.50 4.50		X	
27	Ins evenness 0.30	0.30 mm Max	10/19/22	5	0.06 0.02 0.05 0.03 0.05		X	
28	Ins width 14.2	14.50 mm 13.90 mm	10/19/22	5	14.33 14.33 14.34 14.32 14.33		X	

Blanket statements of conformance are unacceptable for any test results.

MARCH **CFG-1003**

2006

SIGNATURE	TITLE	DATE
Liliana Yeverino	Quality Assurance Services Technician	10/19/22

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

Process Flow Chart

Part No	Rev	Name		
R8687	**A1**	**Eyelet Terminal - Reeled Parts**		
Customer Nursan Otomotiv EOOD	Customer Part No HU5T-14463-AGA	Rev A1	Rev Date 10/08/2021	Customer Part Rev HU5T-14463-AGA

Control Plan

9831 - Production - Active - Primary

Core Team

Miguel Avila, Cliff Carlson, Kristine Daehler, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Jason ONeil, Joe Axel Ruvalcaba, Miriam Sales, Dave Wiltfang

Operation	Inspection Step	All Specifications
20: Stamp - Finish Approved Workcenters:M-012, M-014, M-010	**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
		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 - 3 Serrations must be present at correct location - See Print
		Visual 2 - Small Diameter on insulation crimp must be present
		Visual 3 - Coin on wire and insulation crimps must be visually present
		Visual 4 - Rectangle in carrier - See Print
		Visual 5 - Single Carrier
		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
		Visual Defect 6 - No excessive Tool Marks
		Visual Defect 7 - No Bent Parts
		D-E - Confirm All Setup Parts Have been Scrapped
		6 - Tab Width 5.0 (Target: 5mm)
		10 - Diameter 8.50 (Target: 8.5mm)
		11 - Outside diameter 17.7 (Target: 17.7mm)
		16 - Hole to Gusset 8.7 (Target: 8.7mm)
		17 - Tab Height 8.0 (Target: 8mm)

	18 - Tab Location 12.0 (Target: 12mm)
	20 - Gusset Height 2.0 (Target: 2mm)
	23 - Wire evenness 0.30 (One-Sided Maximum: 0.3mm)
	24 - Wire Crimp Width 12.30 (Target: 12.3mm)
	27 - Ins evenness 0.30 (One-Sided Maximum: 0.3mm)
	28 - Ins width 14.2 (Target: 14.2mm)
Operator - In-process Inspection	Visual 1 - 3 Serrations must be present at correct location - See Print
	Visual 2 - Small Diameter on insulation crimp must be present
	Visual 3 - Coin on wire and insulation crimps must be visually present
	Visual 4 - Rectangle in carrier - See Print
	Visual 5 - Single Carrier
	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
	Visual Defect 6 - No excessive Tool Marks
	Visual Defect 7 - No Bent Parts
	10 [OP] - Diameter 8.50
	6 - Tab Width 5.0 (Target: 5mm)
	17 - Tab Height 8.0 (Target: 8mm)
	20 - Gusset Height 2.0 (Target: 2mm)
	24 - Wire Crimp Width 12.30 (Target: 12.3mm)
	28 - Ins width 14.2 (Target: 14.2mm)
Quality - In-process Inspection	Visual 1 - 3 Serrations must be present at correct location - See Print
	Visual 2 - Small Diameter on insulation crimp must be present
	Visual 3 - Coin on wire and insulation crimps must be visually present
	Visual 4 - Rectangle in carrier - See Print
	Visual 5 - Single Carrier
	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
	Visual Defect 6 - No excessive Tool Marks
	Visual Defect 7 - No Bent Parts
	16 - Hole to Gusset 8.7 (Target: 8.7mm)
	18 - Tab Location 12.0 (Target: 12mm)

	23 - Wire evenness 0.30 (One-Sided Maximum: 0.3mm)
	24 - Wire Crimp Width 12.30 (Target: 12.3mm)
	27 - Ins evenness 0.30 (One-Sided Maximum: 0.3mm)
	28 - Ins width 14.2 (Target: 14.2mm)
Quality Last Piece	Visual 1 - 3 Serrations must be present at correct location - See Print
	Visual 2 - Small Diameter on insulation crimp must be present
	Visual 3 - Coin on wire and insulation crimps must be visually present
	Visual 4 - Rectangle in carrier - See Print
	Visual 5 - Single Carrier
	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
	Visual Defect 6 - No excessive Tool Marks
	6 - Tab Width 5.0 (Target: 5mm)
	10 - Diameter 8.50 (Target: 8.5mm)
	16 - Hole to Gusset 8.7 (Target: 8.7mm)
	17 - Tab Height 8.0 (Target: 8mm)
	18 - Tab Location 12.0 (Target: 12mm)
	20 - Gusset Height 2.0 (Target: 2mm)
	23 - Wire evenness 0.30 (One-Sided Maximum: 0.3mm)
	24 - Wire Crimp Width 12.30 (Target: 12.3mm)
	27 - Ins evenness 0.30 (One-Sided Maximum: 0.3mm)
	28 - Ins width 14.2 (Target: 14.2mm)
Final Audit	H - Labels correct & cartons sealed properly
Transport to Final Location	I - Transport to Final Location
PPAP Layout	1 - Carrier holder width 3.20 (Target: 3.2mm)
	2 - Crimp holder width 19.90 (Target: 19.9mm)
	3 - Crimp length 37.10 (Target: 37.1mm)
	4 - Insulation length 37.05 (Target: 37.05mm)
	5 - Dia to crimp 25.0 (Target: 25mm)
	6 - Tab Width 5.0 (Target: 5mm)
	7 - Angle 35º (Target: 35Deg°)
	8 - Angle 35º (Target: 35Deg°)
	9 - Dia to dia 40.0 (Target: 40mm)
	10 - Diameter 8.50 (Target: 8.5mm)
	11 - Outside diameter 17.7 (Target: 17.7mm)

		12 - Hole Location 8.5 (Target: 8.5mm)
		13 - Crimp side width 8.0 (Target: 8mm)
		14 - Crimp to ins 15.10 (Target: 15.1mm)
		15 - Gusset Location 5.0 MIN (One-Sided Minimum: 5mm)
		16 - Hole to Gusset 8.7 (Target: 8.7mm)
		17 - Tab Height 8.0 (Target: 8mm)
		18 - Tab Location 12.0 (Target: 12mm)
		19 - Offset 1.5 (Target: 1.5mm)
		20 - Gusset Height 2.0 (Target: 2mm)
		21 - Crimp coin width 0.90 [2X] (Target: 0.9mm)
		22 - Crimp radius 3.75 (Target: 3.75mm)
		23 - Wire evenness 0.30 (One-Sided Maximum: 0.3mm)
		24 - Wire Crimp Width 12.30 (Target: 12.3mm)
		25 - Ins coin width 0.90 [2X] (Target: 0.9mm)
		26 - Ins radius 4.70 (Target: 4.7mm)
		27 - Ins evenness 0.30 (One-Sided Maximum: 0.3mm)
		28 - Ins width 14.2 (Target: 14.2mm)
		Material - C194
		Plating - Tin
		Note 1 - Parts conform to electrical connection system design specification (SDS) VER. 20 ELO176
		Note 2 - -Grip per Ford terminal wire grip spec: ES-F6DB-14474-BB (F GRIP) -Parts comply with ES-D8AB-1293-A
		Note 3 - N/A
		Note 4 - Tolerances Unless Otherwise Specified X.X = +/- 0.5 X.XX = +/- 0.3 Angle = +/- 3°
		Note 5 - 0.2mm Max radius permissible on edges and fillets shown as sharp for stamping part
		Note 6 - Crimp values are recommendations. Harness supplier has crimp development responsibility
		Note 7 - Harness supplier has crimp development responsibility
	Production Workcenter Audit	Audit #1 - Verify Red Bin is at workcenter and used accordingly
		Audit #2 - Raw Material and/or Component Serial Numbers used correct in Control Panel
		Audit #3 - Product Packaging
		Audit #4 - Parts at workcenter are Labeled as made
		Audit #5 - Lubrication specified on shop order
		Audit #6 - Part Picture in Plex
		Audit #7 - Scrap Label
		Audit #8 - Inspection Frequency

Royal POWER SOLUTIONS

FAILURE MODE AND EFFECTS ANALYSIS (Process FMEA)

Part Name:	**Eyelet Terminal - Reeled Parts**	**Internal Part Number:**	**R8687-A1**	**External Part Number:**	**HU5T-14463-AGA**
FMEA Date:	**(Orig.) 9/2/16 (Rev.)10/18/22**	**Key Date:**		**Prepared By:**	**Daehler, Kristine**
Note:		**Process Responsibility:**	**Lasseter, Vince**	**FMEA Number:**	**R8687-A1**
Core Team:	**Pedro Aldaco, Jeffrey Chojnacki, Kristine Daehler, Shawn Davenport, James Dawson, Jesus Guillen, Nathaniel Hollin, Jamie Houmard, Ryan Javan, Steven Krass, Vince Lasseter, Josh McGargill, Jonathan Perez, Chad Scheve, Roberto Valencia, Robert Winter**	**Model Year(s)/Vehicle(s):**	**Automotive/Various**		

FMEA begins on page 2

Royal POWER SOLUTIONS

FAILURE MODE AND EFFECTS ANALYSIS (Process FMEA)

Part Name:	**Eyelet Terminal - Reeled Parts**	**Internal Part Number:**	**R8687-A1**	**External Part Number:**	**HU5T-14463-AGA**
FMEA Date:	**(Orig.) 9/2/16 (Rev.)10/18/22**	**Key Date:**		**Prepared By:**	**Daehler, Kristine**
Note:		**Process Responsibility:**	**Lasseter, Vince**	**FMEA Number:**	**R8687-A1**
Core Team:	**Pedro Aldaco, Jeffrey Chojnacki, Kristine Daehler, Shawn Davenport, James Dawson, Jesus Guillen, Nathaniel Hollin, Jamie Houmard, Ryan Javan, Steven Krass, Vince Lasseter, Josh McGargill, Jonathan Perez, Chad Scheve, Roberto Valencia, Robert Winter**		**Model Year(s)/Vehicle(s):**		**Automotive/Various**

Part Name:	**Eyelet Terminal - Reeled Parts**	**Internal Part Number:**	**R8687-A1**	**External Part Number:**	**HU5T-14463-AGA**

Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	SEV	CLS	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	OCC	Current Process Controls Detection	DET	RPN	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	SEV	OCC	DET	RPN
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						

Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	SEV	CLS	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	OCC	Current Process Controls Detection	DET	RPN	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	SEV	OCC	DET	RPN
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, Unscheduled Maintenance.	Production capacity report.	2	Production Forman plans Schedule allowing sufficient time. Customer is provided with lead time.	4	40	None						
20 Quality First Piece	Non-conforming Samples Incapable Process, Tab Location 12.00 +/- 0.5 out of spec. Diameter 8.50 +/- 0.3 out of spec.	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. Tab Width 5.00 +/- 0.5 out of spec. Wire Width 12.30 +/- 0.3 out of spec.	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. Hole to Gusset 8.70 +/- 0.5 out of spec.	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 Tab Height 8.00 +/- 0.5 out of spec. Tab Location 12.00 +/- 0.5 out of spec.	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						

Process Function/ Requirements	Potential Failure Mode	Potential Effects of Failure	SEV	CLS	Potential Causes/ Mechanisms of Failure	Current Process Controls Prevention	OCC	Current Process Controls Detection	DET	RPN	Recommend Action(s)	Responsibility & Target Completion Date	Action Results				
													Actions Taken	SEV	OCC	DET	RPN
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 sort and expedited shipping changes Line down charges	3		Damaged through Handling or Transit. Operator Error	MSO Packaging Requirements, Ship/Rec Training on Handling Requirements.	3	Visual Inspection.	2	18	None						

Control Plan

Control Plan Number	Control Plan Type	Part Number/Latest Change Level	Date (Orig.)	Date (Rev.)
9831	**Production**	**R8687-A1**	**9/2/16**	**10/18/22**

Key Contact/Phone **Kris Daehler (630) 384-5529**	Core Team **Miguel Avila, Cliff Carlson, Kristine Daehler, James Dawson, Brendan Durkin, Nathaniel Hollin, Vince Lasseter, Jason ONeil, Joe Axel Ruvalcaba, Miriam Sales, Dave Wiltfang**	Customer Engineering Approval Date (If Req'd)
Part Name/Description **R8687-A1 (Eyelet Terminal - Reeled Parts)**	Organization/Plant Approval Date (If Req'd) **10/18/22**	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	Control Plan Type	Part Number/Latest Change Level	Date (Orig.)	Date (Rev.)
9831	**Production**	**R8687-A1**	**9/2/16**	**10/18/22**

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	Material Certification	Notify material manager & quality immediately - Refer to procedure COP8
20	Stamp - Finish Transport Tooling to Work Center	-	**B**		Transport Tooling to Work Center		Attribute	Visual	1 each Set Up	Tool ID	Perform adjustments and/or corrections
20	Stamp - Finish Transport Material to Work Center	-	**C**		Transport Material to Work Center		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
20	Stamp - Finish Setup	-	**D**		Set-up Work Center		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
		-	**D-A**		Verify Correct Raw Material at Machine		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
		-	**D-B**		Verify Correct Tooling		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
		-	**D-C**		Verify Correct Machine Operating Parameters		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
		-	**D-D**		Verify All Safety Guards are Enabled		Attribute	Visual	1 each Set Up	Checksheet	Perform adjustments and/or corrections
		-	**D-E**		Confirm All Setup Parts Have been Scrapped		Attribute	Visual	1 each Set Up	Checksheet	Verify action has been completed

Control Plan Number	Control Plan Type	Part Number/Latest Change Level	Date (Orig.)	Date (Rev.)
9831	Production	R8687-A1	9/2/16	10/18/22

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 Quality First Piece	-	**Visual 1**	3 Serrations must be present at correct location - See Print			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**Visual 2**	Small Diameter on insulation crimp must be present			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				Hole diameter must be burr & sliver free							
		-	**Visual 3**	Coin on wire and insulation crimps must be visually present			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**Visual 4**	Rectangle in carrier - See Print			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**Visual 5**	Single Carrier			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				See Print							
		-	**Visual Defect 1**	No Fractures on part			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				Pay close attention at transition from terminal body to crimps & between crimps.							
		-	**Visual Defect 2**	No Slug Marks			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				Must be free of Slug marks							
		-	**Visual Defect 3**	No Burrs			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				Part Must be free of Burrs							
		-	**Visual Defect 4**	No Slivers			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
				Parts Must be free of slivers							
		-	**Visual Defect 5**	No expose Raw material			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**Visual Defect 6**	No excessive Tool Marks			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**Visual Defect 7**	No Bent Parts			Attribute	Visual	5 each Setup	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**D-E**		Confirm All Setup Parts Have been Scrapped		Attribute	Visual	1 each Set Up	Checksheet	Verify action has been completed

Control Plan Number			Control Plan Type		Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)	
9831			Production		R8687-A1		9/2/16		10/18/22	
			Characteristics				Methods			
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**6**	Tab Width 5.0			4.50 / 5.50 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**10**	Diameter 8.50			8.20 / 8.80 mm	Pin Gage	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**11**	Outside diameter 17.7			17.20 / 18.20 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**16**	Hole to Gusset 8.7			8.20 / 9.20 mm	Optical Projector	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**17**	Tab Height 8.0			7.50 / 8.50 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**18**	Tab Location 12.0			11.50 / 12.50 mm	Optical Projector	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**20**	Gusset Height 2.0			1.50 / 2.50 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**23**	Wire evenness 0.30			0.30 mm Max	Optical Projector	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**24**	Wire Crimp Width 12.30			12.00 / 12.60 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**27**	Ins evenness 0.30			0.30 mm Max	Optical Projector	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
		-	**28**	Ins width 14.2			13.90 / 14.50 mm	Calipers	3 each Set Up	Checksheet	Nonconforming samples, Reject sample & notify setup
20	Stamp - Finish Operator - In-process Inspection	-	**Visual 1**	3 Serrations must be present at correct location - See Print			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 2**	Small Diameter on insulation crimp must be present			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
				Hole diameter must be burr & sliver free							
		-	**Visual 3**	Coin on wire and insulation crimps must be visually present			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 4**	Rectangle in carrier - See Print			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 5**	Single Carrier			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
				See Print							
		-	**Visual Defect 1**	No Fractures on part			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300

Control Plan Number			Control Plan Type	Part Number/Latest Change Level		Date (Orig.)	Date (Rev.)
9831			Production	R8687-A1		9/2/16	10/18/22

				Characteristics			Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
				Pay close attention at transition from terminal body to crimps & between crimps.							
		-	**Visual Defect 2**	No Slug Marks			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
				Must be free of Slug marks							
		-	**Visual Defect 3**	No Burrs			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
				Part Must be free of Burrs							
		-	**Visual Defect 4**	No Slivers			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
				Parts Must be free of slivers							
		-	**Visual Defect 5**	No expose Raw material			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual Defect 6**	No excessive Tool Marks			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual Defect 7**	No Bent Parts			Attribute	Visual	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**10 [OP]**	Diameter 8.50			8.20/8.80 [0.323"/0.346"]	Go/No-Go Gage	5 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**6**	Tab Width 5.0			4.50 / 5.50 mm	Calipers	3 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**17**	Tab Height 8.0			7.50 / 8.50 mm	Calipers	3 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**20**	Gusset Height 2.0			1.50 / 2.50 mm	Calipers	3 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**24**	Wire Crimp Width 12.30			12.00 / 12.60 mm	Calipers	3 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**28**	Ins width 14.2			13.90 / 14.50 mm	Calipers	3 pcs every hour	Checksheet	Suspect Material - Refer to procedure QP-8300
20	Stamp - Finish Quality - In-process Inspection	-	**Visual 1**	3 Serrations must be present at correct location - See Print			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 2**	Small Diameter on insulation crimp must be present			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				Hole diameter must be burr & sliver free							
		-	**Visual 3**	Coin on wire and insulation crimps must be visually present			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 4**	Rectangle in carrier - See Print			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 5**	Single Carrier			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				See Print							
		-	**Visual Defect 1**	No Fractures on part			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				Pay close attention at transition from terminal body to crimps & between crimps.							

Control Plan Number			Control Plan Type		Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)		
9831			Production		R8687-A1		9/2/16		10/18/22		
			Characteristics				Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**Visual Defect 2**	No Slug Marks			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				Must be free of Slug marks							
		-	**Visual Defect 3**	No Burrs			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				Part Must be free of Burrs							
		-	**Visual Defect 4**	No Slivers			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
				Parts Must be free of slivers							
		-	**Visual Defect 5**	No expose Raw material			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual Defect 6**	No excessive Tool Marks			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual Defect 7**	No Bent Parts			Attribute	Visual	5 pcs every 2 Hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**16**	Hole to Gusset 8.7			8.20 / 9.20 mm	Optical Projector	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**18**	Tab Location 12.0			11.50 / 12.50 mm	Optical Projector	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**23**	Wire evenness 0.30			0.30 mm Max	Optical Projector	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**24**	Wire Crimp Width 12.30			12.00 / 12.60 mm	Calipers	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**27**	Ins evenness 0.30			0.30 mm Max	Optical Projector	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**28**	Ins width 14.2			13.90 / 14.50 mm	Calipers	3 pcs every 2 hours	Checksheet	Suspect Material - Refer to procedure QP-8300
20	Stamp - Finish Quality Last Piece	-	**Visual 1**	3 Serrations must be present at correct location - See Print			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 2**	Small Diameter on insulation crimp must be present			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				Hole diameter must be burr & sliver free							
		-	**Visual 3**	Coin on wire and insulation crimps must be visually present			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 4**	Rectangle in carrier - See Print			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual 5**	Single Carrier			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				See Print							

Control Plan Number			Control Plan Type		Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)		
9831			Production		R8687-A1		9/2/16		10/18/22		
			Characteristics				Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**Visual Defect 1**	No Fractures on part			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				Pay close attention at transition from terminal body to crimps & between crimps.							
		-	**Visual Defect 2**	No Slug Marks			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				Must be free of Slug marks							
		-	**Visual Defect 3**	No Burrs			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				Part Must be free of Burrs							
		-	**Visual Defect 4**	No Slivers			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
				Parts Must be free of slivers							
		-	**Visual Defect 5**	No expose Raw material			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**Visual Defect 6**	No excessive Tool Marks			Attribute	Visual	5 Pieces upon job completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**6**	Tab Width 5.0			4.50 / 5.50 mm	Calipers	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**10**	Diameter 8.50			8.20 / 8.80 mm	Pin Gage	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**16**	Hole to Gusset 8.7			8.20 / 9.20 mm	Optical Projector	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**17**	Tab Height 8.0			7.50 / 8.50 mm	Calipers	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**18**	Tab Location 12.0			11.50 / 12.50 mm	Optical Projector	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**20**	Gusset Height 2.0			1.50 / 2.50 mm	Calipers	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**23**	Wire evenness 0.30			0.30 mm Max	Optical Projector	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**24**	Wire Crimp Width 12.30			12.00 / 12.60 mm	Calipers	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300

Control Plan Number			Control Plan Type			Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)	
9831			Production			R8687-A1		9/2/16		10/18/22	
			Characteristics				Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**27**	Ins evenness 0.30			0.30 mm Max	Optical Projector	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
		-	**28**	Ins width 14.2			13.90 / 14.50 mm	Calipers	3 pcs upon Job Completion	Checksheet	Suspect Material - Refer to procedure QP-8300
20	Stamp - Finish Final Audit	-	**H**		Labels correct & cartons sealed properly		Attribute	Visual	Each Container	Checksheet	Suspect Material - Refer to procedure 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**	Carrier holder width 3.20			2.90 / 3.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**2**	Crimp holder width 19.90			19.60 / 20.20 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**3**	Crimp length 37.10			36.80 / 37.40 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**4**	Insulation length 37.05			36.75 / 37.35 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**5**	Dia to crimp 25.0			24.50 / 25.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**6**	Tab Width 5.0			4.50 / 5.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**7**	Angle 35º			32.00 / 38.00 Deg°	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**8**	Angle 35º			32.00 / 38.00 Deg°	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**9**	Dia to dia 40.0			39.50 / 40.50 mm	Pin Gage	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**10**	Diameter 8.50			8.20 / 8.80 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**11**	Outside diameter 17.7			17.20 / 18.20 mm	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup

Control Plan Number			Control Plan Type			Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)	
9831			Production			R8687-A1		9/2/16		10/18/22	
			Characteristics				Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**12**	Hole Location 8.5			8.00 / 9.00 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**13**	Crimp side width 8.0			7.50 / 8.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**14**	Crimp to ins 15.10			15.10 / 15.35 mm	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**15**	Gusset Location 5.0 MIN			5.00 mm Min	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**16**	Hole to Gusset 8.7			8.20 / 9.20 mm	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**17**	Tab Height 8.0			7.50 / 8.50 mm	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**18**	Tab Location 12.0			11.50 / 12.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**19**	Offset 1.5			1.00 / 2.00 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**20**	Gusset Height 2.0			1.50 / 2.50 mm	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**21**	Crimp coin width 0.90 [2X]			0.60 / 1.20 mm	Optical Projector	5 per dimensional (2)	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**22**	Crimp radius 3.75			3.45 / 4.05 mm	Pin Gage	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**23**	Wire evenness 0.30			0.30 mm Max	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**24**	Wire Crimp Width 12.30			12.00 / 12.60 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**25**	Ins coin width 0.90 [2X]			0.60 / 1.20 mm	Optical Projector	5 per dimensional (2)	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**26**	Ins radius 4.70			4.40 / 5.00 mm	Pin Gage	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**27**	Ins evenness 0.30			0.30 mm Max	Optical Projector	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup

Control Plan Number			Control Plan Type			Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)	
9831			Production			R8687-A1		9/2/16		10/18/22	
			Characteristics				Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
		-	**28**	Ins width 14.2			13.90 / 14.50 mm	Calipers	5 per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Material**	C194			Attribute	Certification	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Plating**	Tin			Attribute	Certification	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 1**	Parts conform to electrical connection system design specification (SDS) VER. 20 ELO176			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 2**	-Grip per Ford terminal wire grip spec: ES-F6DB-14474-BB (F GRIP) -Parts comply with ES-D8AB-1293-A			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 3**	N/A			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 4**	Tolerances Unless Otherwise Specified X.X = +/- 0.5 X.XX = +/- 0.3 Angle = +/- 3°			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 5**	0.2mm Max radius permissible on edges and fillets shown as sharp for stamping part			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 6**	Crimp values are recommendations. Harness supplier has crimp development responsibility			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
		-	**Note 7**	Harness supplier has crimp development responsibility			Attribute	Visual	1 Per Dimensional	PPAP Layout	Nonconforming samples, Reject sample & notify setup
20	Stamp - Finish Production Workcenter Audit	-	*							Verification	
		-	**Audit #1**		Verify Red Bin is at workcenter and used accordingly		Verify Red Bin is at workcenter and used accordingly	Visual	As Required	Verification	Notify Supervisor
				Suspect, Rejected and Setup parts must be placed in the Red Bin.							
		-	**Audit #2**	Serial Numbers of Raw Material and/or Components used must match serial numbers loaded in Control Panel			Serial Numbers of Raw Material and/or Components used must match serial numbers loaded in Control Panel	Visual	As Required	Verification	Notify Supervisor
				Serial Numbers of Raw Material and/or Components used must match serial numbers loaded in Control Panel							
		-	**Audit #3**	Parts must be packaged per the job sheet requirements			Parts are packaged per the shop order requirements	Visual	As Required	Verification	Notify Supervisor
				Parts are packaged per the shop order requirements							
		-	**Audit #4**	Parts at workcenter are Labeled as made			Part must be labeled once container is complete	Visual	As Required	Verification	Notify Supervisor

Control Plan Number				Control Plan Type		Part Number/Latest Change Level		Date (Orig.)		Date (Rev.)	
9831				Production		R8687-A1		9/2/16		10/18/22	
				Characteristics			Methods				
Part/ Process Number	Operation	Machine / Device	No.	Product	Process	Special Char. Class	Product / Process Specification Tolerance	Evaluation Measurement Technique	Sample Size / Freq.	Control Method	Reaction Plan
				Part must be labeled once container is complete							
		-	**Audit #5**	Lubrication must be specified on shop order			Lubrication must be specified on shop order	Visual	As Required	Verification	Notify Supervisor
				Lubrication must be specified on shop order							
		-	**Audit #6**	Part Picture must be in Plex			Part Picture must be in Plex	Visual	As Required	Verification	Notify Supervisor
				Part Picture must be in Plex							
		-	**Audit #7**	Scrap Label			Scrap Label Must be present where applicable	Visual	As Required	Verification	Notify Supervisor
		-	**Audit #8**		Inspection Frequency		Parts inspected per control Plan	Visual	As Required	Verification	Notify Supervisor

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 5/13/22

GAGE LOG INFORMATION

Gage Log No:	2474549	**Device Name:**	7242-6464-W6
Gage ID:	1051	**Operators:**	3
Gage Log Type:	Gage Study	**Operator Names:**	Vitaliano, Perez, Yeverino
Study Date:	5/13/22	**Trials:**	3
		Samples:	10

CHARACTERISTIC & VARIATION

LSL:	3.05	**K1:**	.590818
USL:	3.15	**K2:**	.523136
Tolerance:	.100000	**K3:**	.314559
Spec Description:	Dimple Distance	**Average of All Ranges($\overline{R}$):**	.000666
Part-to-Part Standard Deviation (σ_p):	.001222	**X Difference ($\overline{X}_{DIFF}$):**	.000667
Measurement Standard Deviation (σ_m):	.000101	**Range of Part Average(R_p):**	.020000
Process Variation Standard Deviation (σ_t):	.001226		

MEASUREMENT UNIT ANALYSIS - GRR (Range Method)

GRR

Repeatability - Equipment Variation (EV):	.000393	**Repeatability As % (EV/TV):**	6.23
Reproducibility - Appraiser Variation (AV):	.000341	**Reproducibility As % (AV/TV):**	5.41
GageR&R (GRR):	.000521	**GRR % (GRR /TV):**	8.25
Part Variation (PV):	.006291	**% PV (PV / TV):**	99.66
Total Variation (TV):	.006313	**Distinct Levels:**	17.03
		GRR % of Tolerance/5.15:	2.68 %

Comments:

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

Study Results for Gage 15156081 (Digital Caliper) on 5/16/22

GAGE LOG INFORMATION

Gage Log No:	2475614	**Device Name:**	
Gage ID:	15156081	**Operators:**	3
Gage Log Type:	Gage Study	**Operator Names:**	Yeverino, Huerta, Huicochea
Study Date:	5/16/22	**Trials:**	3
		Samples:	10

CHARACTERISTIC & VARIATION

LSL:	0.5	**K1:**	.590818
USL:	0.5	**K2:**	.523136
Tolerance:	.000000	**K3:**	.314559
Spec Description:	Wire Crimp Width 7.1	**Average of All Ranges($\overline{\overline{R}}$):**	.000333
Part-to-Part Standard Deviation (σ_p):	.000611	**X Difference ($\overline{X}_{DIFF}$):**	.000333
Measurement Standard Deviation (σ_m):	.000051	**Range of Part Average(R_p):**	.010000
Process Variation Standard Deviation (σ_t):	.000613		

MEASUREMENT UNIT ANALYSIS - GRR (Range Method)

GRR

Repeatability - Equipment Variation (EV):	.000197	**Repeatability As % (EV/TV):**	6.23
Reproducibility - Appraiser Variation (AV):	.000171	**Reproducibility As % (AV/TV):**	5.40
GageR&R (GRR):	.000260	**GRR % (GRR /TV):**	8.25
Part Variation (PV):	.003146	**% PV (PV / TV):**	99.66
Total Variation (TV):	.003156	**Distinct Levels:**	17.03
		GRR % of Tolerance/5.15:	.00 %

Comments:

Checksheet
2013854 - Capability Study

Part	Operation	Inspection Step	Workcenter	SPC Checksheet Container Text	Job No
R8687-A1 Eyelet Terminal - Reeled Parts	**Stamp - Finish**	**PPAP Layout**	AIDA-5		

Date/Time	Inspector	Samples	Size	Note
10/19/22 7:38 AM	Yeverino, Liliana	6	5	

Tooling

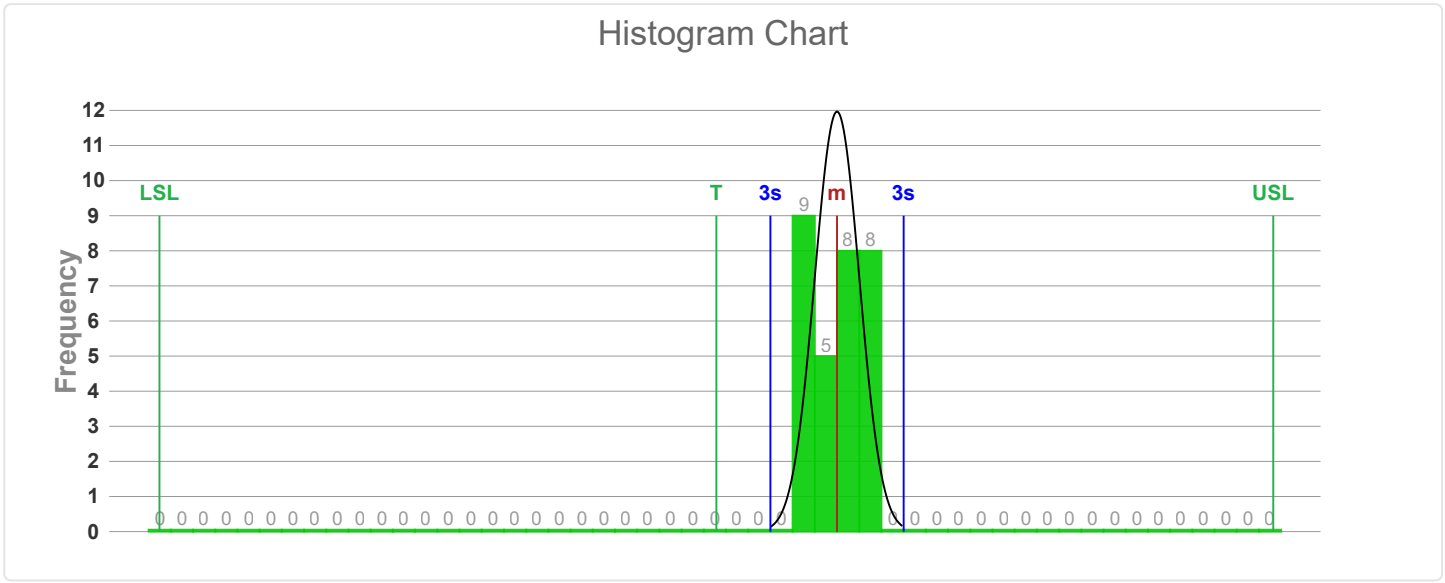
No	Specification	Target	Limits	Gage	Measurements	Note
24	Wire Crimp Width 12.30	12.30 mm	12.60 12.00		12.35 12.36 12.35 12.38 12.37	
					12.38 12.35 12.36 12.37 12.38	
					12.37 12.35 12.38 12.36 12.35	
					12.38 12.35 12.36 12.37 12.38	
					12.35 12.38 12.36 12.37 12.35	
					12.37 12.37 12.35 12.38 12.37	

Capability Study - Histogram

Part	Operation	Inspection Mode	Workcenter
R8687-A1 Eyelet Terminal - Reeled Parts	**Stamp - Finish**	**PPAP Layout**	**AIDA-5**
Containers		Job No	
Specification 24 - Wire Crimp Width 12.30 (Target: 12.30 mm) 12.60 mm 12.00 mm	Date Range 10/19/2022 - 10/19/2022	Samples 6	Sample Size 5
Tooling			

Chart Statistics

Data	Specifications	Central Tendency	Dispersion	Distribution	Capability/Performance			Prediction
Min: 12.350	Tol.: 0.600	Extended Limits	Extended Limits	σ: 0.012	CR (1/Cp): 0.129	Pp: 8.359	ZU: 18.220	% Above: 0.000
Max: 12.380	USL: 12.600	UCLx: N/A	UCLr: N/A	+3σ: 12.401	Cp (Tol/6σ): 7.753	Ppk: 6.548	ZL: 28.299	% Below: 0.000
Mean: 12.365	Target: 12.300	EXDBar: 12.365	ERBar: 0.030	Mean: 12.365	Cpk: 6.073	kurt: -1.586	CPU: 6.073	% OoS: 0.000
Count: 30	LSL: 12.000	LCLx: N/A	LCLr: N/A	-3σ: 12.329	σc (R/d2): 0.013	skew: -0.058	CPL: 9.433	% In Spec: 100.000
						d2: 2.326		



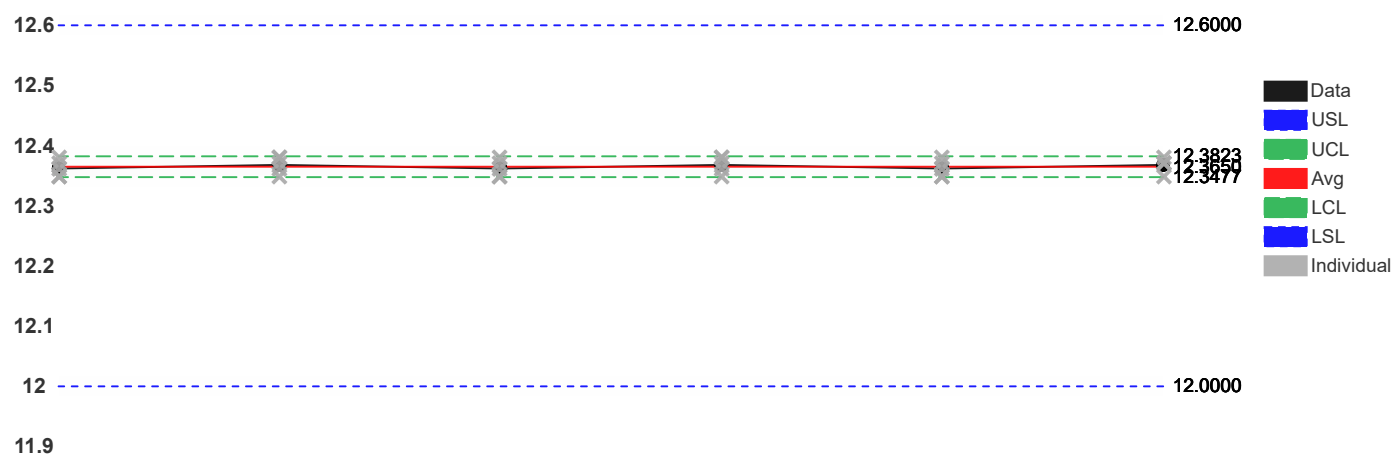
Capability Study - Xbar & Range Chart

Part	Operation	Inspection Mode	Workcenter
R8687-A1 Eyelet Terminal - Reeled Parts	**Stamp - Finish**	**PPAP Layout**	**AIDA-5**
Containers		Job No	
Specification 24 - Wire Crimp Width 12.30 (Target: 12.30 mm) 12.60 mm 12.00 mm	Date Range 10/19/2022 - 10/19/2022	Samples 6	Sample Size 5
Tooling			

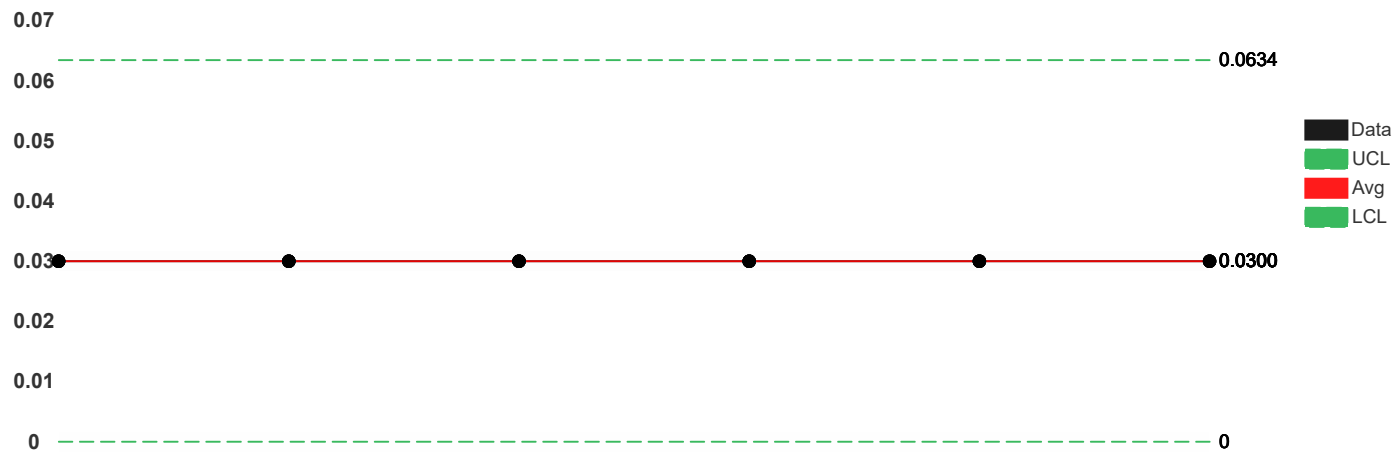
Chart Statistics

Data	Specifications	Central Tendency	Dispersion	Distribution	Capability/Performance			Prediction
Min: 12.350	Tol.: 0.600	Extended Limits	Extended Limits	σ: 0.012	CR (1/Cp): 0.129	Pp: 8.359	ZU: 18.220	% Above: 0.000
Max: 12.380	USL: 12.600	UCLx: 12.382	UCLr: 0.063	+3σ: 12.401	Cp (Tol/6σ): 7.753	Ppk: 6.548	ZL: 28.299	% Below: 0.000
Mean: 12.365	Target: 12.300	EXDBar: 12.365	ERBar: 0.030	Mean: 12.365	Cpk: 6.073	kurt: -1.586	CPU: 6.073	% OoS: 0.000
Count: 30	LSL: 12.000	LCLx: 12.348	LCLr: 0.000	-3σ: 12.329	σc (R/d2): 0.013	skew: -0.058	CPL: 9.433	% In Spec: 100.000
						d2: 2.326		

X Bar Chart



Range Chart



wieland

Wieland Metal Services, LLC
180 Alexandra Way
Carol Stream, IL,60188

****

CERTIFICATE OF CONFORMANCE

****

WMS Order Number#:	326003
WMS Item#:	209669
WMS Item Description:	BR-CU19400-0.064-H04-Electro Tin-COIL--2.355-
Customer Name:	ROYAL DIE & STAMPING
Cust Part#:	064X2.3551944TP

Cust PO#:	37076-12
Quantity / UOM:	2240 / LB
Date Shipped:	18-JUL-22

Lot Number#	Heat#	Mill Coil#	Num of Pieces#	Ship Qty / UOM	Ship Date	Country of Origin#
04-867803	N6054.0001	501254433 10068873	2	2240 / LB	18-JUL-22	DE

Class: Chemical	Spec Min	Spec Max	Result	UOM
Cu	97.00000		97.50000	%
Fe	2.10000	2.60000	2.30000	%
P	.01500	.15000	.02100	%
Pb	.00000	.03000	.03000	%
Zn	.05000	.20000	.12000	%
Class: Dimenson	**Spec Min**	**Spec Max**	**Result**	**UOM**
Coil ID	16.00	16.00	16.00	inch
Coil OD	38.00	50.00	47.50	inch
Class: Mechanic	**Spec Min**	**Spec Max**	**Result**	**UOM**
Tensile	63.00	70.00	65.00	KSI
Class: Physical	**Spec Min**	**Spec Max**	**Result**	**UOM**
Conductivity % IACS	59.0		71.4	%
Class: Size	**Spec Min**	**Spec Max**	**Result**	**UOM**
Gauge	.06300	.06500	.06400	inch
Width	2.3520	2.3580	2.3550	inch
Class: Hardness	**Spec Min**	**Spec Max**	**Result**	**UOM**
Rockwell B	20.0		74.0	B
Class: Plating	**Spec Min**	**Spec Max**	**Result**	**UOM**
Plating Thickness	40.0	100.0	70.0	micro inch
Underplate Thickness 1	30.0	80.0	57.5	micro inch
Class: Shape	**Spec Min**	**Spec Max**	**Result**	**UOM**
Camber	.0000	.1250	.0620	inch

* UNLESS OTHERWISE IS NOTED, THE CHEMICAL ANALYSIS DATA ON THIS CERTIFICATE OF CONFORMANCE IS OF THE BARE BASE METAL AS PROVIDED FROM OUR SUPPLIER. WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HERE IN HAS BEEN MADE TO CONFORM TO SPECIFICATION OR REQUIREMENTS OF YOUR ORDER.

DATE
7/18/22

RECEIVED
JUL 19 2022

APPROVED BY
Hieter, Tim

BY: .....

Certificate US21/819944551.00

The management system of

Wieland Metal Services, LLC

457 Warwick Industrial Drive
Warwick, RI 02886, United States

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities

Distribution and Secondary Processing of Aluminum, Copper and Steel Alloy Flat Rolled, Tube and Bar Products.

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.

This certificate is valid from 18 January 2022 until 18 January 2025 and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 60 days before the expiration date.
Issue 2. Certified since July 2021.
The organisation was previously certified by a different body against ISO 9001 since 19 January 2010.

The audit leading to this certificate commenced on 25/10/2021.
Previous issue certificate validity date was until 18/01/2022.

This is a multi-site certification.
Additional site details are listed on subsequent pages.

Authorized by:

Dan Seal
Technical Accreditation Manager,
Knowledge Solutions
SGS North America, Inc.
201 Route 17 North, Rutherford, NJ 07070, USA
t (201) 508-3000 f (201) 935-4555 www.us.sgs.com

This certificate remains the property of SGS and shall be returned upon request.

Wieland Metal Services, LLC

ISO 9001:2015

Issue 2

Additional facilities

150 Lackawanna Avenue, Parsippany, NJ 07054, United States
Scope: The Warehousing, Processing and distribution of Metal Materials.

180 Alexandra Way , Carol Stream, IL 60188, United States
Scope: Slitting and coating.

2081 McCrea Street, Alliance, OH 44601, United States
Scope: Slitting and coating.

5100 S Archibald Ave, Ontario, CA 91762, United States
Scope: Slitting.

Calle La Griega #117, Parque Industrial Queretaro, Santa Rosa Jauregui, 76220, Mexico
Scope: The Warehousing, Processing and distribution of Metal Materials.

Centro Industrial Rio Canas Carretera 175 Lote #29 Caguas, 00725, Puerto Rico
Scope: Slitting.

Certificate US21/819944552

The management system of

Wieland Metals, Inc

567 Northgate Parkway
Wheeling, 60090, United States

has been assessed and certified as meeting the requirements of

ISO 9001:2015

For the following activities:

Manufacture of Copper and Copper Alloy Strip Products

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization.

This certificate is valid from 20 January 2022 until 20 January 2025
and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 60 days before the expiration date.
Issue 2. Certified since July 2021.
Certified since 31 January 2007 by former Certification Body.

The audit leading to this certificate commenced on 08/11/2021.
Previous issue certificate validity date was until 20/01/2022.

Authorized by:

Dan Seal
Technical Accreditation Manager,
Knowledge Solutions
SGS North America, Inc.
201 Route 17 North, Rutherford, NJ 07070, USA
t (201) 508-3000 f (201) 935-4555 www.us.sgs.com

This certificate remains the property of SGS and shall be returned upon request

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 IATF16
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

2017-03-09

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

Royal Power Solutions
Powering Great Connections

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