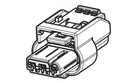
| APPLICABLE COMPONENTS | | | | | | |
|---|---|---|---|---|---|---|
| ITEM | DESCRIPTION | MANDATORY (YES/NO) | TERMINAL CAVITY MIN/MAX OD | PLATING/MATERIAL | FORD COMPONENT PART NO. | SUPPLIER COMPONENT PART NO. |
| 1 | TRCB837 / 1.2mm (APPLICABLE CAVITIES 1-3) | NO | 0/3.5x4.5 | REFERENCE TRC | N/A | N/A |
| 2 | WIRE SEAL | NO | N/A | SILICONE | HU5T-10C930-JA | A-0611-H (M6) |
| 3 | WIRE SEAL | NO | N/A | SILICONE | HU5T-10C930-HA | A-0611-G (J1) (M7) |
| 4 | WIRE SEAL | NO | N/A | SILICONE | HU5T-10C930-GA | A-0611-F (M8) |
| 5 | SEAL PLUG | NO | N/A | SILICONE | AU5T-10C930-CA | A0412 (M9) |

| "FORD PART NUMBER" PIN OUT CHART | | | | | | |
|---|---|---|---|---|---|---|
| | | | 3 | - | EU5T-14A464-EAB-000 | 6189-7458 (L3) |
| | 2 | | 2 | 1 | EU5T-14A464-EAB-001 | 6189-8023 |
| | | | 3 | - | EU5T-14A464-ABA-000 | 6189-7660 (H1) (H2) (K1) |
| | 2 | | 2 | 1 | EU5T-14A464-ABA-001 | 6189-7814 |
| | | | 3 | - | EU5T-14A464-ACA-000 | 6189-7661 |
| | 2 | | 2 | 1 | EU5T-14A464-ACA-001 | 6189-7815 |
| 1 | | | 2 | 1 | EU5T-14A464-ACA-002 | 6189-8022 (L3) |
| | | | 3 | - | EU5T-14A464-AJA-000 | 6189-7678 |
| 1 | | | 2 | 1 | EU5T-14A464-AJA-001 | 6189-8099 (M1) |
| 1 | 2 | 3 | TOTAL OPEN | TOTAL BLOCKED | FORD PART NUMBER | SUPPLIER PART NUMBER |
| TERMINAL HOLE POSITION | | | | | | |
| CHARTED BLOCKED CAVITY CONFIGURATIONS WITH A CAVITY NUMBER LISTED INDICATE BLOCKED TERMINAL POSITIONS | | | | | | |
| CHARTED BLOCKED CAVITY CONFIGURATIONS WITHOUT A CAVITY NUMBER LISTED INDICATE OPTEN TERMINAL POSITIONS | | | | | | |

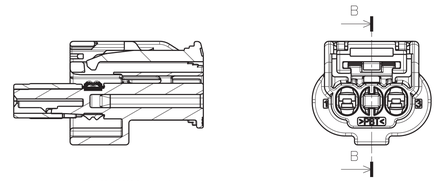
| CONNECTOR ASSEMBLY CHART | | | | | |
|---|---|---|---|---|---|
| ASSEMBLY PART NO.'S | | | | MATING COMPONENT | |
| FORD COMPONENT PART NO. | SUPPLIER COMPONENT PART NO. | MAX TEMP | VIBRATION CLASS | FORD COMPONENT PART NO. | SUPPLIER COMPONENT PART NO. |
| EU5T-14A464-EAB | 6189-7458 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-VB | 6189-7459 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-ABA-000 | 6189-7660 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-ACA-000 | 6189-7661 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-AFA | 6189-7675 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-AGA | 6189-7676 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-AHA | 6189-7677 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-AJA-000 | 6189-7678 | 150° C | V3 | TBD | TBD (M1) |
| EU5T-14A464-EAB-001 | 6189-8023 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-ABA-001 | 6189-7814 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-ACA-001 | 6189-7815 | 150° C | V3 | TBD | TBD |
| EU5T-14A464-ACA-002 | 6189-8022 | 150° C | V3 | TBD | TBD |
| EU5T-14A46-AJA-001 | 6189-8099 | 150° C | V3 | TBD | TBD (M1) |

(H1) (H2) (L1) (L2) (B2)

| ITEM | PIA DESCRIPTION | COLOR | FORD COMPONENT PART NO. | SUPPLIER COMPONENT PART NO. | MATERIAL/SPEC NO. | RECYCLING CODE | WEIGHT | NUMBER OF ITEMS REQUIRED | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FEMALE HOUSING KEY A | BLACK | N/A | 6185-5160 | PBT/WSS-M99P23-B | PBT | 2.45g | 1 | | | | 1 | | | | | | | |
| 1 | FEMALE HOUSING KEY B | BLACK | N/A | 6185-5161 | PBT/WSS-M99P23-B | PBT | 2.45g | | 1 | | | | 1 | | | | | | |
| 1 | FEMALE HOUSING KEY C | BLACK | N/A | 6185-5304 | PBT/WSS-M99P23-B | PBT | 2.45g | | | 1 | | | | 1 | | | | | (E1) |
| 1 | FEMALE HOUSING KEY D | BLACK | N/A | 6185-5305 | PBT/WSS-M99P23-B | PBT | 2.45g | | | | 1 | | | | 1 | | | | |
| 1 | FEMALE HOUSING KEY A (FLASH OVER) | BLACK | N/A | 6185-5610 | PBT/WSS-M99P23-B | PBT | 2.45g | | | | | | | | | 1 | | | |
| 1 | FEMALE HOUSING KEY C (FLASH OVER) | BLACK | N/A | 6185-5439 | PBT/WSS-M99P23-B | PBT | 2.45g | | | | | | | | | | 1 | | |
| 1 | FEMALE HOUSING KEY D (FLASH OVER) | BLACK | N/A | 6185-5442 | PBT/WSS-M99P23-B | PBT | 2.45g | | | | | | | | | | | 1 | |
| 1 | FEMALE HOUSING KEY D (FLASH OVER) | BLACK | N/A | 6185-5609 | PBT/WSS-M99P23-B | PBT | 2.45g | | | | | | | | | | | 1 | 1 |
| (M2) 2 | FEMALE TPA KEY A | NATURAL | N/A | 6910-8184 | PBT/WSS-M99P23-B | PBT | 0.32g | 1 | | | | 1 | | | | 1 | | | |
| (M3) 2 | FEMALE TPA KEY B | LIGHT GRAY | N/A | 6910-8185 | PBT/WSS-M99P23-B | PBT | 0.32g | | 1 | | | | 1 | | | | | | (E2) |
| (M4) 2 | FEMALE TPA KEY C | BROWN | N/A | 6910-8186 | PBT/WSS-M99P23-B | PBT | 0.32g | | | 1 | | | | 1 | | | 1 | | |
| (M5) 2 | FEMALE TPA KEY D | GREEN | N/A | 6910-8187 | PBT/WSS-M99P23-B | PBT | 0.32g | | | | 1 | | | | 1 | | | 1 | 1 |
| (G1) (C1) 3 | PERIMETER SEAL | GREEN | N/A | 7135-0699 | HS = 30 | VMQ | 0.08g | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 (E3) |
| 4 | CPA | NATURAL | N/A | 6910-7263 (B1) | PBT/WSS-M99P23-B | PBT | 0.52g | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 | (E4) |

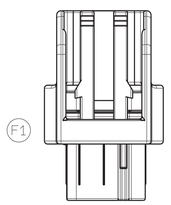


ISOMETRIC VIEW
SCALE 1:1

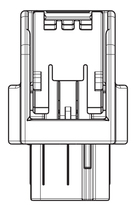


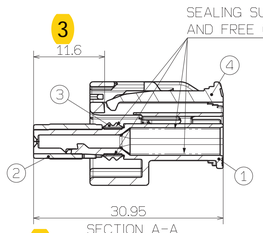

SECTION J-J

FLASHED OVER CAVITY CONFIGURATION:
EU5T-14A464-ABA-001 SHOWN
(EU5T-14A464-ACA-001 HAS CENTER CAVITY FLASHED OVER)
(EU5T-14A464-EAB-001 HAS CENTER CAVITY FLASHED OVER)
(EU5T-14A464-ACA-002 HAS CAVITY 1 FLASHED OVER)
(H3) (L1) (L2)

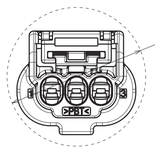


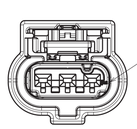
OPTION WITHOUT CPA

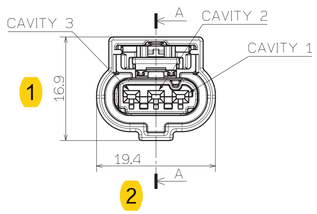


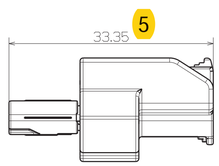



SECTION A-A
4 VIEW SHOWN WITH TPA IN STAGED POSITION



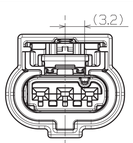



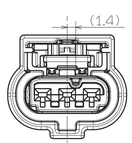

VIEW SHOWN WITH TPA IN PRE-STAGE POSITION

NOTE:

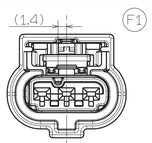
6 1. PARTS CONFORM TO THE ELECTRICAL CONNECTION SYSTEM DESIGN SPECIFICATION (SDS) REV. 21, DATED JUN 2011.
7 2. PARTS CONFORM TO THE LATEST LEVEL OF USCAR 2, REV5 DATED NOV 2007.
(D1) (B2) FOR COMPONENT TEMPERATURE CLASS 4.
FOR PERFORMANCE CRITERIA AND EXCEPTIONS SEE SUMITOMO DVP&R.
8 3. MAXIMUM MATING FORCE FULLY POPULATED WITH
Sn TERMINALS IS 18.0 (N)
Ag TERMINALS IS 13.8 (N)
9 4. TERNIMAL EXTRACTION TOOLS: 23730003
10 5. SEALING SURFACES AS IDENTIFIED ON THIS DRAWING ARE SMOOTH AND FREE OF PARTING LINES.
11 6. CONNECTOR IS RATED AS ERGONOMIC CLASS 2 (HAND GRASPED) BASED ON USCAR-25 REV 1. CONNECTOR PUSH SURFACE AREA IS 192.25mm².
12 7. N/A
13 8. FOR INTERFACE VIEWS PLEASE SEE EWCAP
120-S-003-1-Z01
120-S-003-1-Z02
(B3) FOR HEADER BLADE INFORMATION SEE EWCAP DRAWING EWCAP-001.
(F2) (F4) 14 9. --REMOVED--
(H4) (F4) 15 10. --REMOVED--
16 11. --REMOVED--



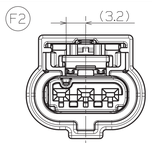

KEY A
EU5T-14A464-EAB
EU5T-14A464-AFA




KEY B
EU5T-14A464-VB
EU5T-14A464-AGA




KEY C
EU5T-14A464-ABA
EU5T-14A464-AHA




KEY D
EU5T-14A464-ACA
EU5T-14A464-AJA

| GENERAL TOLERANCES | | |
|---|---|---|
| OVER | LESS THAN | |
| | 10 | ±0.2 |
| 10 | 50 | ±0.3 |

EU5T-14A464-AJA
EU5T-14A464-AHA
EU5T-14A464-AGA
EU5T-14A464-AFA
EU5T-14A464-ACA
EU5T-14A464-ABA
EU5T-14A464-VB

| LTRS | REVISIONS | | | |
|---|---|---|---|---|
| ORIGINATOR | CHECKER | ENGR APP | MATL APP | |
| RELEASED<br>AELE-E-11783930-274 | | | 20130108 | |
| J.LANZOTTI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| REMOVED EU5T-14A464-EAA, VA<br>B1 UPDATED SUMITOMO PART NUMBERS<br>B2 UPDATED TEMPERATURE CLASS<br>B3 REMOVED NOTE<br>B4 ADDED NOTE<br>RELEASED EU5T-14A464-EAB, VB<br>AELE-E-11783930-304 | | | 20131113 | |
| J.LANZOTTI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| C1 CORRECTED PERIMETER SEAL COLOR<br>AELE-E-11783930-317 | | | 20140108 | |
| J.LANZOTTI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| D1 UPDATED NOTE 2<br>AELE-E-11783930-326 | | | 20140314 | |
| J.LANZOTTI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| E1 WAS 2.8g<br>E2 WAS 0.33g<br>E3 WAS 0.5g<br>E4 WAS 0.5g<br>E5 WAS 4.13g<br>AELE-E-11783930-329 | | | 20140416 | |
| J.LANZOTTI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| RELEASED EU5T-14A464-ABA, ACA, AFA, AGA, AHA, AJA<br>F1 ADDED VIEW<br>F2 REMOVED NOTE<br>F3 WEIGHT WAS 3.37g<br>F4 ADDED NOTE 11<br>AELE-E-11783930-338 | | | 20140730 | |
| J.SANKARI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| G1 WAS BROWN<br>AELE-E-11783930-345 | | | 20141007 | |
| J.SANKARI | M.SPENCER | J.PITTENGER | SUMITOMO | |
| H1 ADDED EU5T-14A464-ABA-00 TO -001<br>H2 ADDED EU5T-14A464-ACA-00 TO -001<br>H3 ADDED VIEW OF FLASH OVER CAVITY<br>H4 REMOVED NOTE 11<br>AELE-E11783930-368 | | | 20150612 | |
| J.KIM | N.TANIGAWA | J.PITTENGER | SUMITOMO | |
| J1 WAS AU5T-14603-EA<br>AELE-E-11783930-379 | | | 20151001 | |
| J.KIM | N.TANIGAWA | J.PITTENGER | SUMITOMO | |
| K1 UPDATED PIN OUT CHART<br>AELE-E-11783930-402 | | | 20160208 | |
| J.KIM | N.TANIGAWA | J.PITTENGER | SUMITOMO | |
| L1 ADDED EU5T-14A464-EAB-001<br>L2 ADDED EU5T-14A464-ACA-002<br>L3 UPDATED BCON CHART<br>AELE-E-11783930-428 | | | 20170913 | |
| D.IRISH | W.LYONS | J.PITTENGER | SUMITOMO | |
| M1 ADDED EU5T-14A464-AJA-000 TO -001<br>M2 WAS 6910-7259<br>M3 WAS 6910-7260<br>M4 WAS 6910-7529<br>M5 WAS 6910-7530<br>M6 WAS DU5T-10C930-GAA / A0419B<br>M7 WAS DU5T-10C930-YA / A0419C<br>M8 WAS AU5T-10C930-BA / A0419<br>M9 WAS AU5T-10C930-CA / A0412<br>M10 UPDATED TPA CAVITY ID FORMAT<br>AELE-E-11783930-468 | | | 20180710 | |
| R.THOMAS | F.MAGDA | J.PITTENGER | SUMITOMO | |

SEWS

SEWS RELEASE LEVEL: PRODUCTION
APPLICATION

SEWS DRAWING / PART NUMBER: SEE CHART
WEIGHT (g): SEE CHART (E5) (F3)

REFERENCE: 3WAY SEALED FEMALE 1.20mm

PART MUST COMPLY WITH MATERIAL SPECIFICATION WSS-M99P9999-A1
TO HELP SAFEGUARD HEALTH, SAFETY AND THE ENVIRONMENT

DRAFTED IN ACCORDANCE WITH FORD MOTOR COMPANY ENGINEERING CAD AND DRAFTING STANDARDS CURRENT AT INITIAL RELEASE

3RD ANGLE PROJ
DIMENSIONS ARE IN MILLIMETERS

| CAD TYPE | CAD LOC. | CAD FILE | |
|---|---|---|---|
| CATIA | METAPHASE | PRT EU5T-14A464-EAB<br>DWG EU5T-14A464-EAB | DTMC IS MASTER |
| OPER. NO. ----- | UNIT mm | DRAWING: EU5T-14A464-EAB | |
| DESIGN JL | DETAIL JL | TITLE: SLV ASY WIR CONN FEM | SHT 1 OF 1 |
| CHECKED MS | SAFETY ----- | | |
| SCALE 2:1 | DATE 20121012 | DIVISION | |
| | | PLANT | |

Ford Motor Company

DRW SIZE A1/2

# SUMITOMO ELECTRIC WIRING SYSTEMS, INC. PROCESS F.M.E.A

***PROCESS RESPONSIBILITY:*** Alan Bomar, John Saylors, Nacki Fujita

| DATE | ISSUE/REVISION HISTORY | CHANGE POINTS | CROSS FUNCTIONAL TEAM |
|---|---|---|---|
| 12.16.16 | Add scattered part control #8/#0060 | | L. Roth |
| 7.18.14 | Update SC's to match control plan | | L. Roth, J. Fraim, D. Gillenwater |
| 5.6.14 | Add material dryer alarm, add Central Feed interlock, review section 0050 | | L. Roth, C. Threlkel, P. Keith |
| 4.3.14 | Delete runnering in 0080 | | L. Roth |
| 11.14.13 | review process, update detection ratings | | J Fraim, L Roth, D Gillenwater |
| 8.11.11 | Update for Setup | | L. Roth |
| 9.21.10 | Update for Setup | | L. Roth |
| 6/18/2010 | Update to include mold gates and mold balance as cause of failure, and lance/dip breakage as failure mode. Added robot settings for damage, added damage to | | D Gillenwater, J. Fraim, L. Roth, D. Duncan, A. Davidson, S. Tsutsui, J. Saylors |
| 8.11.17 | Corrected missing RPN calaculation for 0120 | | J Fraim |

SUPPLIER APPROVALS;
Division Manager : A. Bomar 8.11.17
Quality Manager: L. Roth 8.11.17
Other Approvals:
CUSTOMER APPROVALS:(IF REQUIRED)

Other Approvals:
CUSTOMER APPROVALS:(IF REQUIRED)

ITEM: ***INJECTED MOLDING COMPONENTS***
MODEL / VEHICLE: ***All***
F.M.E.A. # ***SV5 #1***
PREPARED BY: ***LEROY ROTH***

| NUMBER | PROCESS FUNCTION | POTENTIAL FAILURE MODE | POTENTIAL EFFECT(S) OF FAILURE | SEV | CLASS | POTENTIAL CAUSE(S)/ MECHANISM(S) OF FAILURE | OCCUR | CURRENT PROCESS CONTROLS | DETEC | R.P.N. | RECOMMENDED ACTION(S) | RESPONSIBILITY &TARGET COMPLETION DATE | ACTIONS TAKEN | SEV | OCC | DET | R.P.N. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0010 | Raw Material Receiving | 1. Incorrect Raw Material Quantity Received | Raw Material shortage causing interruption to Inj. Molding scheduled production, leading to: *Parts shortage *Customer part delivery performance degraded. | 4 | | Incorrect quantity shipped by Supplier | 2 | P-Supplier confirms material quantity or weight, and creates packing list. D - Receiving Associate confirms BOL against Packing List (confirms each unit). Material is barcode scanned into system against open Purchase Order | 6 | 48 | NONE | | | | | | |
| | | 2. Incorrect Raw Material Part Number Received | Raw Material shortage causing interruption to Inj. Molding scheduled production, leading to: *Parts shortage *Customer part delivery performance degraded. | 4 | | Incorrect material part number shipped by Supplier | 2 | P-Supplier confirms material quantity or weight, and creates packing list. D - Receiving Associate confirms BOL against Packing List (confirms each unit). Material is barcode scanned into system against open Purchase Order | 6 | 48 | NONE | | | | | | |
| | | 2. Damaged Containers | Material rejected, insufficient material for production. Component produced from contaminated material. * Quality problem * Customer complaint | 4 | | Improper Handling at point of origin and / or transportation. Improper Packaging | 2 | P- Packaging is designed to prevent damage. D -Receiving associate visually confirms container for damage. | 6 | 48 | NONE | | | | | | |
| 0020 | Quality Assurance Receiving Inspection | 1. Raw Material Out of Specification | * Delay Scheduled Production * Brittle Parts * Customer part delivery performance degraded. * Customer compliant | 7 | IC | Insufficient Supplier Process Controls | 2 | P- Supplier tests each lot of material for proper mechanical and chemical properties. D- *SQA Receiving associate verifies Material cert to standard, and test Melt Flow each PBT lot. **(IC)** * Molding machine monitors detect process variation *QA Lab verifies product function each run. | 5 | 70 | Raw Material is confirmed to meet spec by material supplier and Melt Flow testing. QA Receiving Inspection. Molding Machine monitors will detect material variations, and QA tests the function of each part to confirm it meets the specification. No other correction action needed. | | | | | | |
| | | 2. Incorrect Raw Material Color | * Delay Scheduled Production * Customer part delivery performance degraded. * Customer compliant | 3 | | Mislabeled Raw Material Container | 2 | P- Supplier confirms and matches color per their in process controls. D- QA Receiving associate visually confirms per shipment / lot referencing master samples. | 7 | 42 | NONE | | | | | | |
| 0030 | Material Storage | 1. Improper storage | *Difficulty in locating raw material *Raw material degradation | 2 | | *Incorrect storage location *Improper storage method | 2 | Scanning system assign each part number to a specific warehouse location, controlling inventory and FIFO | 5 | 20 | NONE | | | | | | |

| NUMBER | PROCESS FUNCTION | POTENTIAL FAILURE MODE | POTENTIAL EFFECT(S) OF FAILURE | SEV | CLASS | POTENTIAL CAUSE(S)/ MECHANISM(S) OF FAILURE | OCCUR | CURRENT PROCESS CONTROLS | DETEC | R.P.N. | RECOMMENDED ACTION(S) | RESPONSIBILITY &TARGET COMPLETION DATE | ACTIONS TAKEN | SEV | OCC | DET | R.P.N. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0050 | Raw Material Loading | 1. Incorrect Raw Material | * Discoloration of Parts<br>* Brittle Parts<br>* Impaired function of Part<br>* Customer Complaint | 7 | | Material handler selected incorrect raw material<br>Mislabeled material<br>Mixed material | 2 | P- Shop order specifies required raw material. Barcode system confirms raw material part number when assigned to machine. Material received COA is confirmed to material spec.<br>D- * Barcode system<br>* Visual confirmation of Raw Material ID against shop order each Set-up and Each shift. | 2 | 28 | Barcode system 100% confirms that the correct material is loaded at the machine and visual material ID checks are conducted each set-up and shift start. No other action is needed. | | | | | | |
| | Material Drying (if required) | Material not dried correctly | * Burn mark, or weld line<br>* Brittle Parts-Part breakage<br>* Parts out of dimension | 3 | | Set-up operator failed to set correct process parameters :<br>Oven Temp.<br>Moisture Content<br>Drying time | 2 | P- 1. Machine is interlocked not to operate if dryer is off.<br>P - 2. Central Feed Dryer will alarm if power goes off.<br>P - 3. Set-up operator verifies and visually confirms correct process parameters.<br>D - 1. Parameters are reconfirmed by coordinator/leader and operator. | 4 | 24 | NONE | | | | | | |
| 0060 | Set-up Injection Molding Machine | 1. Incorrect Raw Material | * Parts out-of-specification<br>* Discoloration of Parts<br>* Brittle Parts<br>* Impaired function of Part<br>* Customer Complaint | 5 | | Set-up Associate used incorrect raw material. | 2 | P- 1. Barcode system confirms raw material matches shop order. Any mismatch prevents printing of labels.<br>D -1. Barcode system will detect wrong material .<br>2. Verify against Mold Book Condition Sheet & record on Condition Sheet Form and P chart. Confirmed with Material color codes & barrel colors. | 5 | 50 | NONE | | | | | | |
| | | | | 5 | | Setup Operator selected incorrect central feed system raw material. | 2 | P - 1: Central Feed System interlocks prevent incorrect material feed<br>D -1: Barcode scan | 5 | 50 | NONE | | | | | | |
| | | 2. Incorrect Mold placed in Machine | Incorrect Part Manufactured | 2 | | Set-up Associate failed to use correct Mold | 2 | P-1. Barcode scan mold book to machine, any mismatch prevents printing of labels.<br>2.Set-up Associate instructions (shop order) & visual confirmation.<br>D - Verify against Mold Book Condition Sheet & record on Condition Sheet Form, Mold set up book and Critical check sheet | **5** | 20 | NONE | | | | | | |
| | | 3. Improper Machine Process Parameters | Parts out-of-specification (Dim. & appearance)<br>Short Shot<br>Discoloration of Parts<br>Brittle Parts<br>Impaired function of Part<br>Customer Complaint | 4 | | Set-up Associate failed to set correct process Parameters | 3 | P-1. Engineering established parameters selected by setup and automatically uploaded to machine.<br>2. Set-up Associate instructions (shop order) & visual confirmation.<br>D - 1. Setup verify against Mold Book Condition Sheet & record on Condition Sheet Form<br>2. Leader/coordinator reverifies machine screen conditions match set up conditions. | **5** | 60 | NONE | | | | | | |

| NUMBER | PROCESS FUNCTION | POTENTIAL FAILURE MODE | POTENTIAL EFFECT(S) OF FAILURE | SEV | CLASS | POTENTIAL CAUSE(S)/ MECHANISM(S) OF FAILURE | OCCUR | CURRENT PROCESS CONTROLS | DETEC | R.P.N. | RECOMMENDED ACTION(S) | RESPONSIBILITY &TARGET COMPLETION DATE | ACTIONS TAKEN | SEV | OCC | DET | R.P.N. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 4. Parts out-of-specification (Set-Up appearance checks): Broken pins, Damaged mold pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines, Robot Damage and other visual defects.<br><br>Confirmation of parts for contamination/grease/oil | Inj. Molding scheduled production interrupted.<br>Impaired function of Part<br>Customer<br>Compliant/Dissatisfaction | 3 | | Machine Parameters (Over adjustment & under adjustment, limited range)<br>Material Instability<br>Age of Mold<br>Incorrect Mold Design<br>Gate size, location, wear (affects material flow) or Combination of above.<br>Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance.<br>2.Confirmation system for molding set-up parameters.<br>3.Set-up Operator instructions (shop order) & visual confirmation per CPC.<br>4.Confirmation of correct gate size, location, wear<br>D- 1.Verify against Mold Book Condition Sheet & record on Condition Sheet Form.<br>2.Engineering validation of injection function changes per internal robust test procedure. | **5** | 45 | SEWS strictly controls processing parameters and tolerance levels and tool condition. | | | | | | |
| | | | | 3 | | Improper Robot settings | 3 | P-1. Setup confirms robot setting per condition sheet.<br>2.Utilize soft drop conveyors.<br>3.Confirmation of Set-up of auxiliary equipment.<br>4.PM for robot clamp.<br>5.Utilization of pick and place robots where applicable.<br>D-1. Set-up operator visual confirms first 10 shots.<br>2.Molding operator checks last shot each basket and QA check at each SOP per GA003 & Inspection Standard.<br>3.Leader/ coordinator reverification of robot settings. | **5** | 45 | NONE | | | | | | |
| | | | | 3 | | Machine Wear<br>Improper cleaning at changeover or machine PM. | 2 | D- Set-up operator verifies & visually confirms machine clean each Mold change/Set-up per work instructions.<br>Maintenance PM Mold Schedule | 6 | 36 | NONE | | | | | | |
| | | | | 5 | | Damaged or broken pins due to Age/condition of Mold | 2 | P- Maintenance PM Mold, QA Confirmation function SOP/EOP, Operator each lot visual check, Mold condition settings. | **5** | 50 | SEWS maintains molds and follows strict PM schedule. Parts are also confirmed functionally to detect for out of spec parts due to broken molds. | | | | | | |
| | | 5. Parts out-of-specification (QA appearance checks) Broken pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines and other visual defects | Inj. Molding scheduled production interrupted.<br>Impaired function of Part<br>Customer<br>Compliant/Dissatisfaction | 3 | IC / SWS / IM | Machine Parameters (Over adjustment & under adjustment, limited range)<br>Material Instability<br>Age of Mold<br>Incorrect Mold Design<br>Gate size, location, wear (affects material flow) or Combination of above.<br>Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance.<br>2.Confirmation system for molding set-up parameters.<br>3,Set-up Operator instructions (shop order) & visual confirmation per CPC.<br>4.Confirmation of correct gate size, location, wear<br>D- 1.Verify against Mold Book Condition Sheet & record on Condition Sheet Form.<br>2..QA Visual Inspection per CPC and QA IIS at SOP per GA003 & Inspection Standard.<br>3.Engineering validation of injection function changes per internal robust test procedure. | **5** | 45 | SEWS strictly controls processing parameters and tolerance levels and tool condition. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | | |

| NUMBER | PROCESS FUNCTION | POTENTIAL FAILURE MODE | POTENTIAL EFFECT(S) OF FAILURE | SEV | CLASS | POTENTIAL CAUSE(S)/ MECHANISM(S) OF FAILURE | OCCUR | CURRENT PROCESS CONTROLS | DETEC | R.P.N. | RECOMMENDED ACTION(S) | RESPONSIBILITY &TARGET COMPLETION DATE | ACTIONS TAKEN | SEV | OCC | DET | R.P.N. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6. Parts out-of-specification (QA function checks) : terminal insertion, terminal retention, retainer insertion, retainer retention, engagement with mating parts ( clip, etc.). Hinge, Clip/lock, or Lance damage-(where Applicable) | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | IC / SWS / IM | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel, screw, nozzle type,etc) | 2 | P- 1. Condition adjustment restricted to engineering. 2. Confirmation system for molding set-up parameters. D-1.Verify against Mold Book Condition Sheet & record on Condition Sheet Form. 2.QA Functional testing each SOP per GA003 & Inspection Standard 3. Engineering validation of injection function changes per internal robust test procedure. | 5 | 30 | SEWS strictly controls processing parameters and tolerance levels. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | |
| | | 7. Parts out-of-specification (QA Dimension Checks) | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Complaint / Dissatisfaction | 4 | C# / SWS | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design | 2 | P- Confirmation system for molding set-up parameters. Set-up Operator instructions (shop order) & visual confirmation per CPC. D- Verify against Mold Book Condition Sheet & record on Condition Sheet Form. 2. QA Dimensional measurement each SOP per GA003 & Inspection Standard | 6 | 48 | SEWS strictly controls processing parameters and tolerance levels. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | |
| | | **8. Mixed Parts** | **Mixed Parts delivered to the customer Customer Complaint / Dissatisfaction** | **5** | | **Trapped or scattered parts / start-up shots remaining in molding machine.** | **3** | **P - 1: Process Change System for evaluating chute/conveyor changes for potentially scattered parts. D -1: Set up checks at each change over.** | **5** | **75** | **SEWS performs checks of each machine prior to each SOP to ensure start up shots/previous product is not scattered in machine.** | | | | | |
| 0070 | Mass Production Injection Molding | 4. Parts out-of-specification (Operator appearance checks): Broken pins, Damaged mold pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines, Robot Damage and other visual defects. Confirmation of parts for contamination/grease/oil | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance. 2.Confirmation system for molding set-up parameters. 3.Set-up Operator instructions (shop order) & visual confirmation per CPC. 4.Confirmation of correct gate size, location, wear D- 1.Verify parts against CPC. | 6 | 54 | SEWS strictly controls processing parameters and tolerance levels and tool condition. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | |
| | Inline Inspection | 1. Parts out-of-specification (In-Line Roving Patrol) Broken pins, Damaged mold pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines, Robot Damage and other visual defects. Confirmation of parts for contamination/grease/oil | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance. 2.Confirmation system for molding set-up parameters. 3.Set-up Operator instructions (shop order) & visual confirmation per CPC. 4.Confirmation of correct gate size, location, wear D- 1.Verify parts against CPC. | 5 | 45 | SEWS strictly controls processing parameters and tolerance levels and tool condition. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | |

| NUMBER | PROCESS FUNCTION | POTENTIAL FAILURE MODE | POTENTIAL EFFECT(S) OF FAILURE | SEV | CLASS | POTENTIAL CAUSE(S)/ MECHANISM(S) OF FAILURE | OCCUR | CURRENT PROCESS CONTROLS | DETEC | R.P.N. | RECOMMENDED ACTION(S) | RESPONSIBILITY &TARGET COMPLETION DATE | ACTIONS TAKEN | SEV | OCC | DET | R.P.N. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0080 | Quality Assurance Inspection Injection Molding | 5. Parts out-of-specification (QA appearance checks) Broken pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines and other visual defects | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | IC / SWS / IM | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance. 2.Confirmation system for molding set-up parameters. 3.Set-up Operator instructions (shop order) & visual confirmation per CPC. 4.Confirmation of correct gate size, location, wear D- 1.Verify against Mold Book Condition Sheet & record on Condition Sheet Form. 2..QA Visual Inspection per CPC and QA IIS at MOP/EOP per GA003 & Inspection Standard. 3.Engineering validation of injection function changes per internal robust test procedure. | 5 | 45 | SEWS strictly controls processing parameters and tolerance levels and tool condition. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | | |
| | | 6. Parts out-of-specification (QA function checks) : terminal insertion, terminal retention, retainer insertion, retainer retention, engagement with mating parts ( clip, etc.). Hinge, Clip/lock, or Lance damage-(where Applicable) | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | IC / SWS / IM | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel, screw, nozzle type,etc) | 2 | P- 1. Condition adjustment restricted to engineering. 2. Confirmation system for molding set-up parameters. D-1.Verify against Mold Book Condition Sheet & record on Condition Sheet Form. 2.QA Functional testing each MOP/EOP per GA003 & Inspection Standard 3. Engineering validation of injection function changes per internal robust test procedure. | 5 | 30 | SEWS strictly controls processing parameters and tolerance levels. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | | |
| | | 7. Parts out-of-specification (QA Dimension Checks) | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Complaint / Dissatisfaction | 4 | C# / SWS | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design | 2 | P- Confirmation system for molding set-up parameters. Set-up Operator instructions (shop order) & visual confirmation per CPC. D- Verify against Mold Book Condition Sheet & record on Condition Sheet Form. 2. QA Dimensional measurement each MOP/EOP per GA003 & Inspection Standard | 6 | 48 | SEWS strictly controls processing parameters and tolerance levels. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | | |
| | Material Staging for 100% Inspection (where applicable) | 1. Incorrect Storage Location | Wrong Part/Mixed Parts delivered to customer Compliant/Dissatisfaction | 3 | | Material Handler failed to place product in correct location. | 2 | P- Material Handler verifies correct location per electronically scanning Part number into system (BPCS) | 5 | 30 | NONE | | | | | | |
| | 100% Inspection (where applicable) | 1. Parts out-of-specification (Sorter) Broken pins, Damaged mold pins, Flash, Voids, Sinks, Short Shot, Holes, Weld Lines, Robot Damage and other visual defects. Confirmation of parts for contamination/grease/oil | Inj. Molding scheduled production interrupted. Impaired function of Part Customer Compliant/Dissatisfaction | 3 | | Machine Parameters (Over adjustment & under adjustment, limited range) Material Instability Age of Mold Incorrect Mold Design Gate size, location, wear (affects material flow) or Combination of above. Flow variation due to change of injection function components (barrel,screw, nozzle type,etc) | 3 | P- 1.Monthly PM by machine maintenance. 2.Confirmation system for molding set-up parameters. 3.Set-up Operator instructions (shop order) & visual confirmation per CPC. 4.Confirmation of correct gate size, location, wear D- 1.Verify parts against CPC / TWI. | 5 | 45 | SEWS strictly controls processing parameters and tolerance levels and tool condition. QA also verifies part dimension and function at the start and end of production. No other action needed. | | | | | | |
| 0090 | Automatic Bulk Packaging / Labeling | 1. Incorrect Bag / Box Label | Wrong Part delivered to customer Customer Complaint / Dissatisfaction | 5 | | Packaging operator failed to place correct label on bag / box | 3 | P- Barcode packing and labeling system. D - QA operator visually confirms once per shift per check sheet. | 5 | 75 | NONE | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2. Mixed Parts | Mixed Parts delivered to the customer<br>Customer Complaint / Dissatisfaction | 5 | | Packing operator error when pulling partials and overage from bins and placing into bag / box. | 3 | Partials and overage are scanned to the box being packed to confirm the correct part is packed. | **5** | 75 | NONE | | | | | | |
| | | 3. Incorrect Quantity | Wrong quantity delivered to customer<br>Customer Complaint / Dissatisfaction | 3 | | Incorrect set up or bag count. | 3 | P- Parts are 100% counted by machine.<br>D - Operator weighs 100% of bags. Each bag scanned to box to confirm correct quantity of bags. | 5 | 45 | NONE | | | | | | |
| 0100 | Material Staging for Non-Bulk Packing / Labeling | 1. Incorrect Storage Location | Delay in locating material, possible delay of shipment. | 3 | | Material Handler failed to place product in correct location. | 2 | P- Each part is assigned to a specific location though barcode scan system. | **5** | 30 | NONE | | | | | | |
| | Packaging and labeling at Machine | 1. Incorrect Bag / Box Label | Wrong Part delivered to customer<br>Customer Complaint / Dissatisfaction | 5 | | Packaging operator failed to place correct label on bag / box | 3 | P- Barcode packing and labeling system, QA operator visually confirms once per shift per check sheet. D- Bags are 100% weighed by machine. | **5** | 75 | NONE | | | | | | |
| 0110 | Transfer packaged parts to storage | 1. Incorrect Storage Location | Delay in locating material, possible delay of shipment. | 3 | | Material Handler failed to place product in correct location. | 2 | D - Material Handler verifies correct location per electronically scanning Part number into system (BPCS) | **5** | 30 | NONE | | | | | | |
| 0120 | Finished Goods Storage | 1. Incorrect Storage Location | Wrong Part delivered to customer<br>Customer Complaint / Dissatisfaction | 3 | | Material Handler failed to place product in correct location. | 2 | D - Material Handler verifies correct location per electronically scanning Part number into system (BPCS) | **5** | 30 | NONE | | | | | | |
| | | 2. Deterioration of packaging. | Damaged to box, potential delay of shipment. | 3 | | Environmental conditions, handling errors. | 2 | P- Climate controlled warehouse, FIFO barcode controlled, monthly shelf life assessment.<br>D- Weekly audit and inventory assessment. | **5** | 30 | NONE | | | | | | |
| 0130 | Finished Goods Inventory (Shipping) | 1. Finished Goods Shortage | Inj. Molding scheduled production interrupted & intermittent leading to:<br>*Parts shortage<br>*Customer part shortage & assembly line shutdown<br>*Customer part delivery performance degraded.<br>* Customer complaint | 3 | | BPCS SYSTEM not 100% dependable | 2 | P- Inventory Control System.<br>D - Manual inventory taken, Operator manual / visual inventory. | **5** | 30 | NONE | | | | | | |
| 0140 | Finished Goods Dock Audit- (Weekly) Random box per skid) | 1. Incorrect Part in box. | Customer Complaint / Dissatisfaction | 3 | | Operator failed to verify shipping label present, clear, correct and legible | 2 | P- Packing Barcode Scanning operation, confimming inventory label to shipping label. D - Operator visually confirms per instructions | **5** | 30 | NONE | | | | | | |
| | | 2. Incorrect Quantity in box and / or Damaged Box | Customer Complaint / Dissatisfaction | 3 | | Shipping Operator failed to verify no damaged boxes & correct quantity shipped. | 2 | D - Operator visually checks for damage & scans label / verifies correct quantity acceptance. | **5** | 30 | NONE | | | | | | |
| | | 3. Incorrect AIAG Label (where Applicable) | Customer Complaint / Dissatisfaction | 3 | | Operator failed to verify AIAG label present, clear, correct and legible | 4 | D - Operator electronically scans Box Label number to Print AIAG part number, includes cross verification system | **5** | 60 | NONE | | | | | | |
| 0150 | Shipping Finished Goods | 1. Missing Box Label | Possible delayed shipment or shortage or parts. | 3 | | Operator failed to verify shipping label is present, clear, correct and legible | 2 | D - Operator visually checks for damage & scans label / verifies correct quantity acceptance. | **5** | 30 | NONE | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2. Damaged Boxes | Customer Complaint / Dissatisfaction | 3 | | Shipping Operator failed to verify no damaged boxes shipped. | 2 | D - Operator visually checks for damage & scans label / verifies correct quantity acceptance. | 5 | 30 | NONE | | | | | | |
| | | 3. Incorrect AIAG Label (where Applicable) | Customer Complaint / Dissatisfaction | 3 | | Operator failed to verify AIAG label present, clear, correct and legible | 3 | P - Operator electronically scans Box Label number to Print AIAG part number. | 5 | 45 | NONE | | | | | | |

☐ Prototype ☐ Pre-Launch ☑ Production

# CONTROL PLAN

| | | | | |
|---|---|---|---|---|
| Control Plan Number<br>Connector Manufacturing Group (CMG) | | Key Contact/Phone<br>L. Roth/D. Gillenwater (270) 237-5419 x 8555 or 8563 | Date (Orig.)<br>8/9/2010 | Date (Rev.)<br>1/11/2016 |
| Part Number/Latest Change Level<br>Various | | Core Team<br>L. Roth, P. Keith, J Fraim, A. Davidson | Customer Engineering Approval/Date (If Req'd.) | |
| Part Name/Description<br>Various, Connector Molding | | Supplier/Plant Approval/Date<br>L. Roth 1.11.16 | Customer Quality Approval/Date (If Req'd.) | |
| Supplier/Plant<br>Sumitomo Electric Wiring Systems | Supplier Code | Other Approval/Date (If Req'd.)<br>A. Bomar 1/11/16 | Other Approval/Date (If Req'd.) | |
| Revision History: | | 8.9.10: Reviewed process, minor changes in bold<br>9.21.10: Added Set-up Checksheet at Setup<br>3.30.11: Modified Section 0090<br>8.11.11: Modified Section 0060, other minor changes in bold.<br>9.15.11: Added Annual Layouts, other updates in bold<br>3.6.12: Updated for Resin Concentrate Mix Process, Resin loading process<br>11.27.12: Updated special characteristics designations, Added Packing Scale Setup<br>4.3.14: Remove references to annealing process, color concentrate and 10T machine.<br>5/6/14: Review material loading section 0050, updated references to bag/gaylord/silo<br>5/29/14: Clarify 0020, Sample Size / Frequency<br>7/18/14: Match special characteristics with FMEA, update 0130.<br>12/3/14: Add QA Hold Procedure to section 0060 & 0080<br>1/11/16 Add Connector ID sheet in Control Method for item 090, Manual Packing / Labeling | | |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE SIZE | SAMPLE FREQ. | CONTROL METHOD | |
| 0010 | Raw Material Receiving | N/A | 10 | Plastic Resin | Material Receiving | | Correct color & type<br>No Damage<br>Dry Material<br>Correct Part Number & all appropriate documentation | Visual Inspection & comparison to packing list | Per container | Each Receipt | * SRW-RECFLOW<br>* Electronic Data Scan | Notify S&R Coordinator, Q.A. |
| 0020 | Quality Assurance Receiving Inspection | | 20 | Plastic Resin | Receiving Inspection | | * Correct color & type<br>* Correct Part Number<br>* No Damage<br>* No contamination | * Visual comparison to box/skid label<br>* Visual check of packaging | Per QRW-RAINBOW SQA Sample Plan | Each Incoming Shipment | Q.A. Inspection Instruction Sheet, Material Certifications | * Notify SQA Coordinator, QA Leader or QA Manager.<br>* Return to Supplier<br>* Issue PIR to Supplier<br>* Reject / Hold Procedure |
| | | | | | | IC | * Material Certification | * Review of Material Cert. | | | | |
| | | Melt Flow Tester | | | | IC | * Melt Flow (As applicable per IISRP) | * MFR Test | Each Lot | Each Lot | | |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE | | CONTROL METHOD | |
| | | | | | | | | | SIZE | FREQ. | | |
| 0030 | Material Storage (Resin & Raw Materials) | N/A | 30 | Correct Location | Material Storage | | * Correct Location | * Electronic Label Scan | Each Container | Each Receipt | Electronic Label Scan | Notify Leader, Q.A., Coordinator as needed Reject / Hold Procedure |
| | Silo | N/A | | Correct Location | Material Storage | | * Correct Silo | Visual confirmation of Silo Label / BOL/PL | Each Reciept | Each Receipt | * Visual | Notify PC Manager |
| | Inventory Assessment Audit (Non-Silo material) | | | Material Condition, Location | Inventory Assessment Audit | | No Damage, No missing labels, Proper storage condition, FIFO | Visual Inspection | Sample of raw material in warehouse | Weekly | Weekly Stock Assessment Sheet, SQA Inventory Audit | Notify: Shipping Receiving Leader, Supervisor & Q.A. If needed Reject / Hold Procedure |
| 0050 | Material Delivery to Manufactuing (Assign Gaylord / Bags) | Fork Truck | 50 | Correct Material | Assign Gaylord / bag to Hopper / Surge Bin | | Correct Location / Loader (as applicable) | Compare raw material RPN # to RPN # on Loader (scan) | Each Container | Each material transfer | * Electronic scan, * Material Handling Log | Notify: Mfg. Coor., Supervisor & Q.A. if needed Reject / Hold Procedure |
| | Material Delivery to Manufacturing: (Assign Silo lot to Surge Bin) | Silo | | Correct Materials | Assign Silo to Hopper/ Surge Bin | | Assign Material to Correct Location / Loader (as applicable) | Compare raw material RPN # to RPN # on surge bin (scan) | Each Receipt | Each Receipt | *Electronic scan | Notify: Mfg. Coor., Supervisor & Q.A. if needed Reject / Hold Procedure |
| | Material Pre-drying (as applicable) | Off-line Loader / Pre-dryer | | Dried Material | Pre-Drying (When applicable) | | Drying Temperature set correctly. | Visual | Each unit | Monthly | PM Record | Notify Maintenance Manager |
| | | Central Dryer | | | | | Drying Temperature set correctly. | Visual | Each unit | Each Shift | * Checksheet *** Alarm if power off** | Notify Maintenance |
| | Loading Material (To transport barrel/buggy) | Material Barrel / Buggy | | Correct Material | Raw Material Loading to Barrel / Buggy | | (Barrel/Buggy): Per Shop Order Match Raw Material RPN number to appropriate barrel / buggy.<br><br>(Central Feed): Per Shop Order, match raw material RPN number to dummy Barrel Label. | * Verify per shop order. * Per applicable Work Instruction | Each container | Material Change / Each material transfer | * Electronic scan, * Material Handling Log | Notify: Mfg. Coor., Supervisor & Q.A. if needed Reject / Hold Procedure |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE | | CONTROL METHOD | |
| | | | | | | | | | SIZE | FREQ. | | |
| | Move Material to Molding Machine | | | Correct Material | Transfer Raw Material to Molding Machine | | Correct Material Part Number/Type per scan | Scan Shop Order against material tag per applicable work instruction. | Each container | Each Mold Set-up / Material transfer | * Electronic Scan,<br>* P- Chart | Notify Leader / Coordinator |
| | Machine Side Drying (where applicable) | Machine Resin Dryers | | Dry Material | Drying (When applicable) | | Set temperature per condition sheet. | Visual | Once | Each Mold Set-up / Each Shift | * Controller Condition Check sheet<br>* P - Chart | Adjust Dryer, dry material and requalify. |
| | | | | | | | | Dewpoint meter | Each unit | Monthly | Monthly PM | |
| 0060 | Set-Up Injection Molding Machine | Molding Machine | 60 | | Set Machine Parameters | | Process Parameters | Per Mold # Condition | Each Mold Set-up | Each Mold Set-up | Controller Check Sheet, Set-Up Operator Check Sheet | Notify Leader / Coordinator |
| | Safety Checks | | | | Safety Checks | | Complete Safety Checks | Per Mold # Condition | Each Mold Set-up | Each Mold Set-up | Setup Operator Checksheet | Notify Leader / Coordinator |
| | Correct Mold | Mold | | | Correct Mold | | Per Shop Order | Visual per Shop Order | Each Mold Set-up | Each Mold Set-up | Setup Operator Checksheet | Notify Leader / Coordinator |
| | Add Regrind Material to Virgin Material | Regrind Material (when applicable) | | | Add Regrind Material to Virgin Material | | Set Mix Ratio per Mold # Condition Sheet. | Per Mold # Condition | Each Mold Start-up | Each Mold Start-up | Operator Daily Checksheet | Notify Leader / Coordinator |
| | Automatic Machine Reject | Machine | | | Automatic Machine Reject | | First 8 Shots for Molding Machines | Per Restart Verification Procedure Work Instruction & Machine Automatic Count Setting | Each Mold Start-up | Each Mold Start-up | Controller Check Sheet | Notify Leader / Coordinator |
| | Set-up Validation | | | | Set-up Inspection | | No Weld Line, Short Shot, Broken Mold Pin Damage, Excessive flash | Per Critical Check Sheet / Applicable Work Instruction | 10 Shots | Each Mold Start-up | Process Sheet | Notify Leader / Coordinator |
| | Engineering Validation | | | | Validation of injection function process | | Engineering validation of any change to machine injection function (barrel/screw/ nozzle type / etc) | Per QAW - ROBUSTTEST | 20 shots | Each change | QAF-RobustTest | Notify QA Leader, Coordinator / Above |
| | Start Up Samples | | | | Collect QA Start-up Samples | | One shot | Per GA-003 | One shot | Each Mold Start-up | GA-003, QA Inspection Data Sheet. | Notify Leader / Coordinator |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE | | CONTROL METHOD | |
| | | | | | | | | | SIZE | FREQ. | | |
| | Quality Assurance Inspection Fit & Function, Visual, Dimensional | Magnifier Light, Profile Projector, Caliper, Micrometer, Force Gage, Mating Parts, Various jigs as required | 60 | Connector Visual, Fit & Function | Quality Assurance Inspection | C (IC, SWS, IM) | Per Q.A. Inspection Instruction Sheet | Per Q.A. Inspection Instruction Sheet | One Shot | SOP checks Per QAW - GA003 | Q.A. Inspection Instruction Sheet, Data Sheets, Electronic Data Entry | Notify Leader, Coordinator / Above Manufacturing Coordinator |
| | | | | Dimensional | | C, C# (IC, SWS) | Per Q.A. Inspection Instruction Sheet | Per Q.A. Inspection Instruction Sheet | One Shot | SOP checksPer QAW - GA003 | | Reject Tag Procedure **QA Hold Procedure** |
| 0070 | Mass Production Inj. Molding | Mold, Machine | 70 | Molded Parts | Mass Production Inj. Molding | | Per Mold Condition Sheet | Visual | Each Lot | Each lot | Process Sheet | Notify Leader / Coordinator |
| | Operator Inspection | | | Molded Parts | Operator Inspection | | Per Critical Position Checksheet | Visual | 1 shot per lot | Each lot | Process Sheet | Notify Leader / Coordinator / Q.A. Leader / Above |
| | Inline Inspection | | | Molded Parts | 100% Roving Inspection | | No Short Shot, Weld Line, Flash, Damage, Broken pin or other defects | Visual per Critical Position Checksheet and / or applicable Work Instruction | 1 shot per machine | Roving Floor Patrol | Process Sheet | Notify Coordinator / Leader, QA Leader. Follow Reject Tag Procedure |
| 0080 | Quality Assurance Inspection Fit & Function, Visual, Dimensional | Magnifier Light, Profile Projector, Caliper, Micrometer, Force Gage, Mating Parts, Various jigs as required | 80 | Connector Visual, Fit & Function | Quality Assurance Inspection | C (IC, SWS, IM) | Per Q.A. Inspection Instruction Sheet | Per Q.A. Inspection Instruction Sheet | One Shot | Per QAW - GA003 | Q.A. Inspection Instruction Sheet, Data Sheets, Electronic Data Entry | Notify QA Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure **QA Hold Procedure** |
| | | | | Dimensional | | C, C# (IC, SWS) | Per Q.A. Inspection Instruction Sheet | Per Q.A. Inspection Instruction Sheet | One Shot | Per QAW - GA003 | | |
| | Material Staging for 100% Inspection (Where Applicable) | Cart | | Molded Parts | Material Staging for 100% Inspection | | Correct Location | Visual | Each Container | As needed / required | Electronic Scanning System | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure |
| | 100% Internal Inspection (When Applicable) | Under Light | | Molded Parts | 100% Inspection | | No Short Shot<br>No Excessive Flash<br>No defects | Visual, Per Critical Position Checksheet / Applicable work instruction | Each piece per Lot | As needed / required | CPC / Daily Inspection Log | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure **QA Hold Procedure** |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE | | CONTROL METHOD | |
| | | | | | | | | | SIZE | FREQ. | | |
| 0090 | Automatic Bulk Packaging / Labeling | Weigh Scale | 90 | Molded Parts | Setup Packing Scale | | Setup Scale | Set up scale per M1W-SCALESETUP | Per W/I | Each SOP, Each new Shop Order | Record confimation on Changeover Checksheet | Notify Manufacturing Coordinator |
| | Automatic Bulk Packaging / Labeling | Weigh Scale, Label Printer, Scanner | | Molded Parts | Automatic Bulk Packaging | | Correct Number of Parts, No mixed parts | Automatic Machine Count, verify correct weight/quantity | Each Container | Each bag | Electronic Scanning System, Packing Log | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure |
| | Manual Packing / Labeling | Weigh Scale | | Molded Parts | Setup Packing Scale | | Setup Scale | Set up scale per W/I M1W-SCALE SETUP MAN PACK | Per W/I | Each SOP, Each new Shop Order | Record confimation on Changeover Checksheet | Notify Manufacturing Coordinator |
| | Manual Packing / Labeling | Weigh Scale, Label Printer, Scanner | | Molded Parts | Manual Bulk Packaging | | Correct Number of Parts, No mixed parts | Verify correct weight/quantity | Each Container | Each bag | Electronic Scanning System, Packing Log, **Connector ID Sheet.** | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure |
| 0100 | Packaging & Labeling at Machine | Traveller label, Boxes, Plastic Bags | 100 | Molded Parts | Packaging & Labeling at Machine | | Per shop Order | Visual | Each container | As Needed | Process Sheet, Electronic Scanning System | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure |
| | Material Staging (Parts not going to Packing Process | Cart | | Molded Parts | Material Staging for Non-Bulk Packing / Labeling | | Correct staging location | Visual per Location | Each Container | As Needed | Electronic Scanning System | Notify Q.A. Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure |
| 0110 | Transfer packaged parts to storage | Fork Truck / Cart | 110 | Molded Finished Product | Transfer packaged parts to storage | | Correct Location | Electronic Scanning System | Each container | As needed | Electronic Scanning System | Notify Q.A. Leader, Coordinator / Above Shipping Supervisor Reject Tag Procedure |

| PART / PROCESS NUMBER | PROCESS NAME / OPERATION DESCRIPTION | MACHINE, DEVICE, JIG, TOOLS FOR MFG. | CHARACTERISTICS | | | SPECIAL CHAR. CLASS | METHODS | | | | | REACTION PLAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO. | PRODUCT | PROCESS | | PRODUCT / PROCESS SPECIFICATION / TOLERANCE | EVALUATION / MEASUREMENT TECHNIQUE | SAMPLE | | CONTROL METHOD | |
| | | | | | | | | | SIZE | FREQ. | | |
| 0120 | Finished Goods Storage. | Material Racks | | Molded Finished Product | Finished Goods Storage | | Correct Location | Electronic Scanning System | Each container | As needed | Electronic Scanning System | Notify Q.A. Leader, Coordinator / Above Shipping Supervisor Reject Tag Procedure |
| 0130 | Finished Goods Inventory Assessment | | 130 | Correct Inventory Quantities | Inventory | | Correct Quantities | Inventory Assessment | As needed | As needed | Electronic Scanning System, Inventory | Notify PC Management |
| | | | | Correct Packing | Product Audit (QA) | | Confirm Packing, Damage | Visual Evaluation | Sample of FG Inventory | Weekly | SQA Inventory Audit - SV6 | Notify Leader, Coordinator / Above Reject Tag Procedure **QA Hold Procedure** |
| 0140 | Shipping Product Audit (S/R) | | 140 | Finished Product Audit | Product Audit | | No box damage, Skid correctly stacked Labels attached, Correct Label content | Visual Evaluation | Sample of FG Inventory | Weekly | Warehouse Stock Assessment Checklist | Notify Leader, Coordinator / Above Shipping Supervisor Reject Tag Procedure |
| 0150 | Shipping Finished Goods | Fork truck | 150 | All Finished Goods | Shipping Finished Goods | | Correct Quantity / Labels, Skid correctly stacked, Correct P.O. number, Correct Carrier | Electronic Scanning System, Visual | Each container | As needed | Electronic Scanning System | Notify Leader, Coordinator / Above Shipping Supervisor Reject Tag Procedure |
| | Annual Layouts | | | Per Customer Drawing | | | Per Customer Drawing | Per Customer Requirements | Per Customer Request | Per Customer Request | Customer PPAP | Notify QA Engineer/QA Manager |

# Sumitomo Electric Wiring Systems, Inc

## Gage R&R Study

05/29/2018 

**Study Date:** 6/2/2017 12:00:00 AM
**Gage ID:** 08381913
**Gage Desc:** 0 - 200 Caliper
**Appraisers:** 3 **Trials:** 3 **Parts:** 10
**Study Type:**
**MSA Version:** 4

**Company Part No.:** Mold 268
**Part No.:**
**Part Desc:** HW09-RET-06F
**Characteristic:** Length
**Specification Limits:** **Min** 19.6 **Max** 20.2

☑ Approved **Pp (or Ppk) Target** **6-Sigma Proc Variation**

| | Appr A: Tabitha Whitney | | | Appr B: Toni Robinson | | | Appr C: Eric Skaggs | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 20.06 | 20.06 | 20.05 | 20.07 | 20.08 | 20.08 | 20.09 | 20.09 | 20.09 |
| 2 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 | 20.03 |
| 3 | 19.65 | 19.64 | 19.65 | 19.64 | 19.64 | 19.64 | 19.65 | 19.65 | 19.65 |
| 4 | 20.05 | 20.04 | 20.05 | 20.08 | 20.08 | 20.08 | 20.08 | 20.08 | 20.08 |
| 5 | 19.76 | 19.77 | 19.76 | 19.74 | 19.75 | 19.75 | 19.77 | 19.77 | 19.77 |
| 6 | 20.04 | 20.04 | 20.03 | 20.05 | 20.04 | 20.05 | 20.05 | 20.05 | 20.05 |
| 7 | 20.03 | 20.02 | 20.02 | 20.05 | 20.06 | 20.08 * | 20.09 | 20.09 | 20.09 |
| 8 | 19.64 | 19.65 | 19.65 | 19.6 | 19.59 | 19.6 | 19.64 | 19.64 | 19.64 |
| 9 | 20.06 | 20.07 | 20.08 * | 20.06 | 20.06 | 20.05 | 20.07 | 20.07 | 20.07 |
| 10 | 19.63 | 19.64 | 19.65 * | 19.64 | 19.63 | 19.65 * | 19.65 | 19.65 | 19.65 |

| | Std. Dev. | % Contribution | % TV | % Tol | | |
|---|---|---|---|---|---|---|
| **Repeatability (EV):** | 0.004136 | 0.1% | 2.9% | 4.1% | **R bar:** | 0.007000 |
| **Reproducibility (AV):** | 0.008335 | 0.4% | 5.9% | 8.3% | **UCL-R:** | 0.018060 |
| **Appraiser x Part (INT):** | | | | | **Study Variation:** | 0.140829 |
| **GRR:** | **0.009305** | **0.4%** | **6.6%** | **9.3%** | **Total Variation (TV):** | 0.140829 |
| **Part-to-Part (PV):** | 0.140521 | 99.6% | 99.8% | 99.6% | **Tolerance/6 (Tol):** | 0.100000 |
| | **number of distinct categories:** | | 21.3 | 15.1 | | |

* Limit of individual R's (range values). An (*) is used to identify those sets of measurements that have a Range value that exceeds the UCL-R limit value. Correct by repeating those readings using the same appraiser and part or discard the values and recalculate the study results and the value UCL-R.

**Comments:**

Approved By: E Skaggs Date: 6/2/17

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# GRR Analysis Sheet

**Study Date:** 6/2/2017 12:00:00 AM
**Gage ID:** 08381913
**Gage Desc:** 0 - 200 Caliper
**Appraisers:** 3 **Trials:** 3
**Study Type:** Long-AIAG 4

R bar A = 0.011000 X bar A = 19.896000
R bar B = 0.010000 X bar B = 19.897667
R bar C = 0.000000 X bar C = 19.912000
R bar = **0.0070000** X bar Diff = **0.016000**

**Company Part No.:** Mold 268
**Part No.:**
**Part Desc:** HW09-RET-06F
**Characteristic:** Length
**Specification Limits:** 19.6 20.2
**6 Sigma Process Variation:**
**Pp (or Ppk) Target:**

Rp = **0.446667** Tol/6 = **0.100000**

| Measurement Unit Analysis | % Total Variation (TV) | % Tolerance |
|---|---|---|
| **Repeatability - Equipment Variation (EV)**<br>EV = R bar x K1<br>= **0.004136**<br>Trials K1: 2 0.8862; 3 0.5908 | % EV = 100 [ EV / TV ]<br>= **2.9%** | % EV = 100 [ EV / (Tol / 6)]<br>= **4.1%** |
| **Reproducibility - Appraiser Variation (AV)**<br>AV = $\sqrt{[(\text{X bar Diff} \times K2)^2 - (EV^2 / n \times r)]}$<br>= **0.008335**<br>Appraisers 2 3; K2 0.7071 0.5231<br>Note: If a negative value is calculated under the square root sign, AV defaults to zero.<br>n = number of parts<br>r = number of trials | % AV = 100 [ AV / TV ]<br>= **5.9%** | % AV = 100 [ AV / (Tol / 6)]<br>= **8.3%** |
| **Repeatability and Reproducibility (GRR)**<br>GRR = $\sqrt{(EV^2 + AV^2)}$<br>= **0.009305** | %GRR = 100 [GRR / TV ]<br>= **6.6%** | % GRR = 100 [GRR / (Tol / 6)]<br>= **9.3%** |
| **Part Variation (PV)**<br>PV = Rp x K3<br>= **0.140521**<br>Parts K3: 2 0.7071; 3 0.5231; 4 0.4467; 5 0.4030; 6 0.3742; 7 0.3534; 8 0.3375; 9 0.3249; 10 0.3146 | % PV = 100 [ PV / TV ]<br>= **99.8%** | % PV = 100 [ PV / (Tol / 6)]<br>= **99.6%** |
| | In MSA4, for % Tolerance, PV = SQRT [(Tol / 6)^2 - (GRR)^2] | |
| | ndc = 1.41(PV/GRR)<br>= **21.3** | ndc = 1.41(PV/GRR)<br>= **15.1** |
| **Total Variation (TV)**<br>TV = $\sqrt{(GRR^2 + PV^2)}$<br>= 0.140829 | If the 6 sigma process variation is known, then TV = [6 sigma process variation] / 6.00 and PV = SQRT[(TV^2) - (GRR)^2]. | |

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DaimlerChrysler Ford GM

# Production Part Approval
# Dimensional Test Results

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS
SUPPLIER/VENDOR COI

NAME OF INSPECTION FACILITY:
Sumitomo Electric Wiring Systems Plt. 5

PART NUMBER: 6189-7459, 6189-7676
PART NAME: FOW120A03F-B-B
DESIGN RECORD CHANGE LEVEL: EU5T-14A464-EAB M10 07/10/18
ENGINEERING CHANGE DOCUMENTS: NA

| ITEM | DIMENSION / SPECIFICATION | SPECIFICATION / LIMITS | | TEST DATE | QTY. TESTED | ORGANIZATION MEASUREMENT RESULTS (DATA) | | | | | | | | OK | NOT OK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.90 | -0.30 | 0.30 | 8/23/18 | 8 | 16.83 | 16.81 | 16.81 | 16.83 | 16.82 | 16.81 | 16.80 | 16.82 | O | |
| 2 | 19.40 | -0.30 | 0.30 | | | 19.47 | 19.46 | 19.45 | 19.45 | 19.45 | 19.45 | 19.43 | 19.47 | O | |
| 3 | 11.60 | -0.30 | 0.30 | | | 11.52 | 11.51 | 11.53 | 11.53 | 11.54 | 11.53 | 11.52 | 11.49 | O | |
| 4 | 30.95 | -0.30 | 0.30 | | | 30.94 | 30.95 | 30.93 | 30.97 | 30.92 | 30.89 | 30.95 | 30.94 | O | |
| 5 | 33.35 | -0.30 | 0.30 | | | 33.38 | 33.39 | 33.40 | 33.39 | 33.42 | 33.42 | 33.41 | 33.41 | O | |
| 6 | | | | | | | | | correct | | | | | | |
| 7 | | | | | | | | | correct | | | | | | |
| 8 | | | | | | | | | correct | | | | | | |
| 9 | | | | | | | | | correct | | | | | | |
| 10 | | | | | | | | | correct | | | | | | |
| 11 | | | | | | | | | correct | | | | | | |
| 12 | | | | | | | | | na | | | | | | |
| 13 | | | | | | | | | correct | | | | | | |
| 14 | | | | | | | | | na | | | | | | |
| 15 | | | | | | | | | na | | | | | | |
| 16 | | | | | | | | | na | | | | | | |

NOTE:

1. PARTS CONFORM TO THE ELECTRICAL CONNECTION SYSTEM DESIGN SPECIFICATION (SDS) REV. 21. DATED JUN 2011.
2. PARTS CONFORM TO THE LATEST LEVEL OF USCAR 2. REV5 DATED NOV 2007. FOR COMPONENT TEMPERATURE CLASS 4. FOR PERFORMANCE CRITERIA AND EXCEPTIONS SEE SUMITOMO DVP&R.
3. MAXIMUM MATING FORCE FULLY POPULATED WITH
   Sn TERMINALS IS 18.0 (N)
   Ag TERMINALS IS 13.8 (N)
4. TERNIMAL EXTRACTION TOOLS: 23730003
5. SEALING SURFACES AS IDENTIFIED ON THIS DRAWING ARE SMOOTH AND FREE OF PARTING LINES.
6. CONNECTOR IS RATED AS ERGONOMIC CLASS 2 (HAND GRASPED) BASED ON USCAR-25 REV 1. CONNECTOR PUSH SURFACE AREA IS 192.25mm².
7. N/A
8. FOR INTERFACE VIEWS PLEASE SEE EWCAP
   120-S-003-1-Z01
   120-S-003-1-Z02
   FOR HEADER BLADE INFORMATION SEE EWCAP DRAWING EWCAP-001.
9. --REMOVED--
10. --REMOVED--
11. --REMOVED--

GENERAL TOLERANCES
OVER | LESS THAN

EU5T
EU5T
EU5T
EU5T
EU5T

Blanket statements of conformance are unacceptable for any test results.

MARCH 2006 **CFG-1003**

prepared by

| SIGNATURE | TITLE | DATE |
|---|---|---|
| Cindy Meador | PPAP Operator | 8/23/2018 |

TORAY
Innovation by Chemistry

Toray Resin Company, 821 W. Mausoleum Road, Shelbyville, Indiana 46176

| | |
|---|---|
| Grade: | 1401X34-TLGR1 SG249T |
| Lot: | R29145 |
| Date: | 07/22/18 |

| Certification of Properties | | | | |
|---|---|---|---|---|
| Test | Method | Unit | Specification | Result |
| Visual | . | . | Same as Std. | Good |
| Color | . | . | Same as Std. | Good |
| MFR | ISO 1133 | g/10 min. | 3.2~4.8 | 3.9 |
| Tensile strength | ISO 527 | MPa | Min. 49 | 56.0 |
| Tensile elongation | ISO 527 | % | Min. 19 | 49.8 |
| Charpy - notched | ISO 179 | kJ/m2 | Min. 2 | 3.6 |

**For the ship date, please see the BOL. For the ship quantity, please see the BOL.**

Toray Resin Company certifies the above results are in accordance with our Quality Management System

## RETAINER TO HOUSING INSERTION FORCE DATA

Specification: **SEE BELOW**

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03F-B-B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-17-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/18
Eng. Change Documents: NA

### tpa insertion with terminal 60 n max

| CAVITY # → | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23.2 | 24.4 | 21.8 | 22.1 | 18.7 | 28.7 | 20.8 | 26.3 | 24.4 | 25.6 | 23.4 | 21.5 | 20.6 | 23.3 | 23.1 | 22.9 |
| | | | | | | | | | | | | | | | | |

AVERAGE 23.2
MIN 18.7
MAX 28.7

### initial retention 60 n max

| CAVITY # → | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 24.9 | 20.9 | 25.1 | 28.9 | 19.6 | 19.8 | 18.5 | 21.5 | 19.7 | 19.7 | 19.5 | 20.3 | 20.0 | 24.9 | 21.5 | 31.3 |
| | | | | | | | | | | | | | | | | |

AVERAGE 22.3
MIN 18.5
MAX 31.3

## RETAINER TO HOUSING FUNCTION DATA

Specification: SEE BELOW

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03F-B-B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-17-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/18
Eng. Change Documents: NA

### tpa insertion with out terminal 15 n min

| CAVITY # → | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 27.8 | 28.9 | 25.4 | 26.8 | 24.5 | 28.6 | 18.9 | 27.2 | 31.5 | 27.6 | 24.8 | 26.4 | 22.0 | 21.1 | 24.5 | 28.6 |
| | | | | | | | | | | | | | | | | |

AVERAGE 25.9
MIN 18.9
MAX 31.5

### second retention 18 n min

| CAVITY # → | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20.7 | 24.2 | 22.0 | 21.3 | 23.0 | 19.6 | 18.5 | 24.1 | 21.1 | 19.1 | 22.2 | 24.0 | 20.1 | 23.9 | 20.1 | 19.8 |
| | | | | | | | | | | | | | | | | |

AVERAGE 21.5
MIN 18.5
MAX 24.2

### TEMP TO EXTRACTION 25 N MIN

| CAVITY # → | M9 | M10 | M11 | M12 | M13 | M14 | M15 | M16 | M17 | M18 | M19 | M20 | M21 | M22 | M23 | M24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 25.5 | 27.2 | 25.0 | 27.9 | 25.2 | 27.4 | 26.0 | 25.3 | 25.6 | 26.7 | 26.9 | 26.8 | 30.2 | 28.8 | 27.5 | 27.4 |
| | | | | | | | | | | | | | | | | |

AVERAGE 26.8
MIN 25.0
MAX 30.2

# CPK DATA

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: FOW120A03F-B-B
PART NO (s): 6189-7459, 6189-7676
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-16-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/2018
Eng. Change Documents: NA

CAVITY #:↓

| ALL CAVITIES | 13.50 +.30 -.30 | 11.20 +.30 -.30 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.44 | 11.26 | | | | | | | |
| 2 | 13.42 | 11.26 | | | | | | | |
| 3 | 13.40 | 11.26 | | | | | | | |
| 4 | 13.44 | 11.25 | | | | | | | |
| 5 | 13.41 | 11.26 | | | | | | | |
| 6 | 13.43 | 11.25 | | | | | | | |
| 7 | 13.41 | 11.26 | | | | | | | |
| 8 | 13.45 | 11.26 | | | | | | | |
| 9 | 13.44 | 11.26 | | | | | | | |
| 10 | 13.41 | 11.26 | | | | | | | |
| 11 | 13.42 | 11.25 | | | | | | | |
| 12 | 13.43 | 11.26 | | | | | | | |
| 13 | 13.42 | 11.26 | | | | | | | |
| 14 | 13.40 | 11.25 | | | | | | | |
| 15 | 13.43 | 11.25 | | | | | | | |
| 16 | 13.41 | 11.25 | | | | | | | |
| 17 | 13.43 | 11.25 | | | | | | | |
| 18 | 13.41 | 11.25 | | | | | | | |
| 19 | 13.41 | 11.26 | | | | | | | |
| 20 | 13.41 | 11.25 | | | | | | | |
| 21 | 13.45 | 11.26 | | | | | | | |
| 22 | 13.40 | 11.26 | | | | | | | |
| 23 | 13.42 | 11.25 | | | | | | | |
| 24 | 13.40 | 11.26 | | | | | | | |
| 25 | 13.44 | 11.24 | | | | | | | |
| 26 | 13.44 | 11.24 | | | | | | | |
| 27 | 13.43 | 11.24 | | | | | | | |
| 28 | 13.45 | 11.24 | | | | | | | |
| 29 | 13.44 | 11.24 | | | | | | | |
| 30 | 13.45 | 11.24 | | | | | | | |

# CPK DATA

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: FOW120A03F-B-B
PART NO (s): 6189-7459, 6189-7676
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-16-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/2018
Eng. Change Documents: NA

CAVITY #:↓

| ALL CAVITIES | 13.50 +.30 -.30 | 11.20 +.30 -.30 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 31 | 13.42 | 11.24 | | | | | | | |
| 32 | 13.42 | 11.24 | | | | | | | |
| 33 | 13.41 | 11.24 | | | | | | | |
| 34 | 13.45 | 11.24 | | | | | | | |
| 35 | 13.45 | 11.24 | | | | | | | |
| 36 | 13.40 | 11.25 | | | | | | | |
| 37 | 13.45 | 11.26 | | | | | | | |
| 38 | 13.42 | 11.26 | | | | | | | |
| 39 | 13.45 | 11.25 | | | | | | | |
| 40 | 13.42 | 11.25 | | | | | | | |
| 41 | 13.43 | 11.26 | | | | | | | |
| 42 | 13.42 | 11.27 | | | | | | | |
| 43 | 13.41 | 11.26 | | | | | | | |
| 44 | 13.42 | 11.26 | | | | | | | |
| 45 | 13.44 | 11.26 | | | | | | | |
| 46 | 13.41 | 11.26 | | | | | | | |
| 47 | 13.45 | 11.25 | | | | | | | |
| 48 | 13.42 | 11.26 | | | | | | | |
| 49 | 13.40 | 11.26 | | | | | | | |
| 50 | 13.44 | 11.25 | | | | | | | |
| 51 | 13.42 | 11.27 | | | | | | | |
| 52 | 13.44 | 11.27 | | | | | | | |
| 53 | 13.42 | 11.26 | | | | | | | |
| 54 | 13.44 | 11.26 | | | | | | | |
| 55 | 13.46 | 11.26 | | | | | | | |
| 56 | 13.43 | 11.23 | | | | | | | |
| 57 | 13.46 | 11.27 | | | | | | | |
| 58 | 13.42 | 11.27 | | | | | | | |
| 59 | 13.43 | 11.26 | | | | | | | |
| 60 | 13.46 | 11.28 | | | | | | | |

# CPK DATA

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: FOW120A03F-B-B
PART NO (s): 6189-7459, 6189-7676
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-16-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/2018
Eng. Change Documents: NA

CAVITY #:↓

| ALL CAVITIES | 13.50 +.30 -.30 | 11.20 +.30 -.30 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 61 | 13.44 | 11.25 | | | | | | | |
| 62 | 13.45 | 11.24 | | | | | | | |
| 63 | 13.44 | 11.26 | | | | | | | |
| 64 | 13.41 | 11.25 | | | | | | | |
| 65 | 13.42 | 11.25 | | | | | | | |
| 66 | 13.44 | 11.25 | | | | | | | |
| 67 | 13.45 | 11.25 | | | | | | | |
| 68 | 13.42 | 11.24 | | | | | | | |
| 69 | 13.42 | 11.25 | | | | | | | |
| 70 | 13.41 | 11.26 | | | | | | | |
| 71 | 13.42 | 11.25 | | | | | | | |
| 72 | 13.42 | 11.25 | | | | | | | |
| 73 | 13.47 | 11.24 | | | | | | | |
| 74 | 13.41 | 11.24 | | | | | | | |
| 75 | 13.42 | 11.25 | | | | | | | |
| 76 | 13.40 | 11.24 | | | | | | | |
| 77 | 13.43 | 11.25 | | | | | | | |
| 78 | 13.41 | 11.25 | | | | | | | |
| 79 | 13.44 | 11.25 | | | | | | | |
| 80 | 13.41 | 11.25 | | | | | | | |
| 81 | 13.41 | 11.25 | | | | | | | |
| 82 | 13.41 | 11.25 | | | | | | | |
| 83 | 13.41 | 11.24 | | | | | | | |
| 84 | 13.45 | 11.25 | | | | | | | |
| 85 | 13.46 | 11.25 | | | | | | | |
| 86 | 13.42 | 11.25 | | | | | | | |
| 87 | 13.44 | 11.25 | | | | | | | |
| 88 | 13.43 | 11.25 | | | | | | | |
| 89 | 13.43 | 11.25 | | | | | | | |
| 90 | 13.44 | 11.25 | | | | | | | |

# CPK DATA

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: FOW120A03F-B-B
PART NO (s): 6189-7459, 6189-7676
Mold #: Representative Mold 1530-B

Tested by/Date: Christi Cornwell 8-16-18
Design Rec. Change level/date:
EU5T-14A464-EAB M10 7/10/2018
Eng. Change Documents: NA

CAVITY #:↓

| ALL CAVITIES | 13.50 +.30 -.30 | 11.20 +.30 -.30 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 91 | 13.45 | 11.25 | | | | | | | |
| 92 | 13.45 | 11.22 | | | | | | | |
| 93 | 13.43 | 11.25 | | | | | | | |
| 94 | 13.43 | 11.25 | | | | | | | |
| 95 | 13.46 | 11.24 | | | | | | | |
| 96 | 13.41 | 11.25 | | | | | | | |
| 97 | 13.44 | 11.24 | | | | | | | |
| 98 | 13.43 | 11.25 | | | | | | | |
| 99 | 13.44 | 11.24 | | | | | | | |
| 100 | 13.43 | 11.24 | | | | | | | |

| | | |
|---|---|---|
| **average** | 13.43 | 11.25 |
| **minimum** | 13.40 | 11.22 |
| **maximum** | 13.47 | 11.28 |
| **range** | 0.07 | 0.06 |
| **std dev** | 0.02 | 0.01 |
| | | |
| **LSL** | **13.20** | **10.90** |
| **NOM** | **13.50** | **11.20** |
| **USL** | **13.80** | **11.50** |
| | | |
| **CPK** | 4.429289788 | 8.711281317 |

# WORK INSTRUCTION

| AREA: | QUALITY ASSURANCE LAB |
|---|---|
| TITLE | LABORATORY SCOPE - SCOTTSVILLE (SV5, SV5-2, SV5-Franklin) |

| PURPOSE: | APPLICATION: |
|---|---|
| To summarize the testing capabilities available at Scottsville Plant (SV5, SV5-2, SV5-Franklin), and to clarify the equipment, tests performed, standards, recording method and reaction plan. | Scottsville (SV5, SV5-2, SV5-Franklin) |
| | **RULE ENFORCER:** QA Coordinator / Above |

## SV5 Tests Performed

| TESTS PERFORMED | EQUIPMENT USED | TEST METHODS / STANDARD | RECORDING METHOD | REACTION METHOD |
|---|---|---|---|---|
| Melt Flow Rate | Tinius Olsen Extrusion Plastometer | QRW - MELTFLOW | Melt Index Record | Reject Tag Procedure |
| Waterproof Test | Waterproof Tester | QAW - WATERPROOFTEST | Inspection Data Sheet | Reject Tag Procedure |
| Moisture Analysis (Reference Only) | Moisture Tester | F-A-SV5-010 | Moisture Test Data Sheet | Reject Tag Procedure |
| Insertion / Retention Test | Force Gage<br>Instron Tester | QAW - INSERTRETPROC<br>QAW - InstronOperation | Inspection Data Sheet<br>Data storage | Reject Tag Procedure |
| Dimensional Measurement | Profile / Caliper / Micrometer / Depth Gage / Keyence Measurement System | Inspection Instruction Sheet | Inspection Data Sheet | Reject Tag Procedure |
| Part Weight | Scale | Inspection Instruction Sheet | Inspection Data Sheet | Reject Tag Procedure |
| Freeze Test | Freezer | SWS Inspection Standard | Inspection Data Sheet | Reject Tag Procedure |

## SV5 - Franklin Tests Performed

| TESTS PERFORMED | EQUIPMENT USED | TEST METHODS / STANDARD | RECORDING METHOD | REACTION METHOD |
|---|---|---|---|---|
| Melt Flow Rate | Tinius Olsen Extrusion Plastometer | QRW - MELTFLOW | Melt Index Record | Reject Tag Procedure |
| Waterproof Test | Waterproof Tester | QAW - WATERPROOFTEST | Inspection Data Sheet | Reject Tag Procedure |
| Insertion / Retention Test | Force Gage<br>Instron Tester | QAW - INSERTRETPROC<br>QAW - InstronOperation | Inspection Data Sheet<br>Data storage | Reject Tag Procedure |

# WORK INSTRUCTION

| AREA: | QUALITY ASSURANCE LAB |
|---|---|
| TITLE | LABORATORY SCOPE - SCOTTSVILLE (SV5, SV5-2, SV5-Franklin) |

| | | | | |
|---|---|---|---|---|
| Dimensional Measurement | Caliper / Micrometer / Depth Gage / Keyence Measurement System | Inspection Instruction Sheet | Inspection Data Sheet | Reject Tag Procedure |
| Part Weight | Scale | Inspection Instruction Sheet | Inspection Data Sheet | Reject Tag Procedure |
| Freeze Test | Freezer | SWS Inspection Standard | Inspection Data Sheet | Reject Tag Procedure |

## SV5 (Building 2) Tests Performed

| TESTS PERFORMED | EQUIPMENT USED | TEST METHODS / STANDARD | RECORDING METHOD | REACTION METHOD |
|---|---|---|---|---|
| Hardness Test | Hardness Tester | H-A-001 | Hardness Test Data Sheet | Reject Tag Procedure |
| Dimensional Measurement | Profile / Caliper / Micrometer / Depth Gage / Nikon MM-400 | Inspection Instruction Sheet | Inspection Data Sheet | Reject Tag Procedure |
| Contact Force Test | Contact Force Gage | MSW-Force Gage | Inspection Data Sheet | Reject Tag Procedure |
| Dimensional Measurement | Profile / Keyence System / OGP / Caliper / Micrometer / Depth Gage / Slip Gages | SWS Inspection Standard | Inspection Data Sheet | Reject Tag Procedure |

## Equipment Calibrations

| | EQUIPMENT USED | TEST METHODS / STANDARD | RECORDING METHOD | REACTION METHOD |
|---|---|---|---|---|
| Calipers, Micrometers, Depth Gages, Weigh Scales, other process tools/jigs. | Certified Gages (Gage Blocks & Weights) | **Per Calibration Procedure** | Calibration Record and Gagetrak | Reject Tag Procedure |
| Keyence Microscope | Certified Gages | | | |
| Force Gages | Certified Weights | | | |
| Freezer | Certified Meter | | | |
| Melt Indexer | Outside Vendor | | | |
| Moisture Analyzer | Outside Vendor | | | |
| Water Pressure Gage | Outside Vendor | | | |
| Hardness Tester | Outside Vendor | | | |
| Optical Comparator (Profile) | Outside Vendor | | | |
| Keyence Measurement Scope | Outside Vendor | | | |
| OGP | Outside Vendor | | | |
| NIKON MM-400 | Outside Vendor | | | |
| INSTRON Tensile Tester | Outside Vendor | | | |