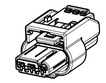
APPLICABLE COMPONENTS

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



ISOMETRIC VIEW
SCALE 1:1

"FORD PART NUMBER" PIN OUT CHART

1	2	3	TOTAL OPEN	TOTAL BLOCKED	FORD PART NUMBER	SUPPLIER PART NUMBER	
			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	M1
1			2	1	EU5T-14A464-AJA-001	6189-8099	

TERMINAL HOLE POSITION

CHARTED BLOCKED CAVITY CONFIGURATIONS WITH A CAVITY NUMBER LISTED INDICATE BLOCKED TERMINAL POSITIONS

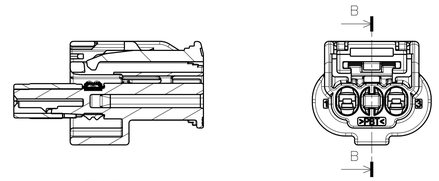
CHARTED BLOCKED CAVITY CONFIGURATIONS WITHOUT A CAVITY NUMBER LISTED INDICATE OPTEN TERMINAL POSITIONS

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

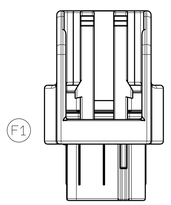
H1 H2 L1 L2 B2

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



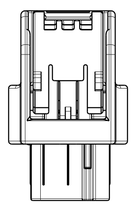
SECTION J-J

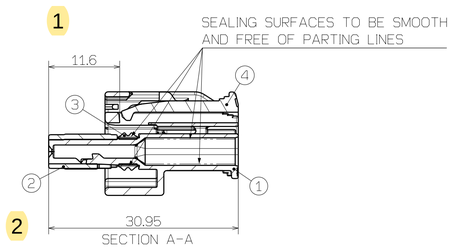
FLASHED OVER CAVITY CONFIGURATION:
EU5T-14A464-ABA-001 SHOWN
(EU5T-14A464-ACA-001 HAS CENTER CAVITY FLASHED OVER)
(EU5T-14A464-EAB-001 HAS CENTER CAVITY FLASHED OVER)
(EU5T-14A464-ACA-002 HAS CAVITY 1 FLASHED OVER)
H3 L1 L2



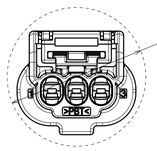
F1

OPTION WITHOUT CPA

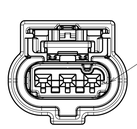




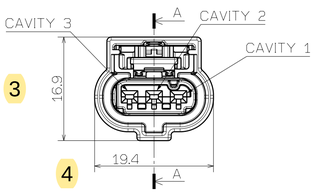
SECTION A-A
VIEW SHOWN WITH TPA
IN STAGED POSITION

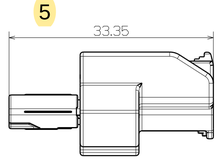


Φ22.63
MINIMUM THROUGH
DIMENSION HOLE
(1mm CLEARANCE)



M10 TPA CAVITY ID
FORMAT CHANGE
EX. 2M WAS M2

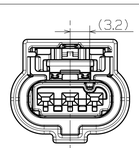




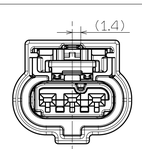
VIEW SHOWN WITH TPA
IN PRE-STAGE POSITION

NOTE:

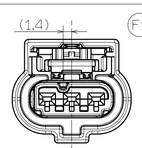
6 1. PARTS CONFORM TO THE ELECTRICAL CONNECTION SYSTEM DESIGN SPECIFICATION (SDS) REV. 21, DATED JUN 2011.
7 2. PARTS CONFORM TO THE LATEST LEVEL OF USCAR 2, REV5 DATED NOV 2007. FOR COMPONENT TEMPERATURE CLASS 4. FOR PERFORMANCE CRITERIA AND EXCEPTIONS SEE SUMITOMO DVP&R. D1 B2
8 3. MAXIMUM MATING FORCE 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.
14 9. --REMOVED--
15 F2 B4 10. --REMOVED--
16 H4 F4 11. --REMOVED--



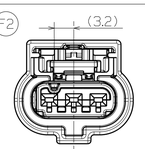
KEY A
EU5T-14A464-EAB
EU5T-14A464-AFA



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

OPER. NO.	UNIT	DRAWING	
-----	mm	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

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: FOW120A03FB-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) M49	M50	M51	M52	M56	M57	M58	M59	OK	NOT OK
1	11.60		-0.30	0.30	12/14/18	8	11.55	11.53	11.54	11.56	11.54	11.53	11.53	11.56	O	
2	30.95		-0.30	0.30			30.92	30.89	30.88	30.92	30.91	30.88	30.88	30.92	O	
3	16.90		-0.30	0.30			16.81	16.80	16.80	16.81	16.81	16.80	16.80	16.81	O	
4	19.40		-0.30	0.30			19.41	19.40	19.40	19.41	19.40	19.40	19.40	19.42	O	
5	33.35		-0.30	0.30			33.27	33.31	33.28	33.25	33.25	33.31	33.30	33.25	O	
1	11.60	FRANKLIN PRODUCTION	-0.30	0.30			11.52	11.48	11.49	11.51	11.46	11.45	11.48	11.49	O	
2	30.95		-0.30	0.30			30.94	30.90	30.90	30.94	30.94	30.93	30.90	30.94	O	
3	16.90		-0.30	0.30			16.84	16.80	16.81	16.83	16.83	16.80	16.80	16.82	O	
4	19.40		-0.30	0.30			19.44	19.43	19.44	19.44	19.43	19.42	19.43	19.44	O	
5	33.35		-0.30	0.30			33.36	33.35	33.29	33.26	33.25	33.26	33.26	33.29	O	

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. (32) 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

6	correct	EU5T-
7	correct	EU5T-
8	correct	EU5T-
9	correct	EU5T-
10	correct	EU5T-
11	na	
12	correct	
13	na	
14	na	
15	na	

Blanket statements of conformance are unacceptable for any test results.

MARCH 2006

CFG-1003

SIGNATURE	TITLE	DATE
Melissa Manley	PPAP Operator	12/14/2018

'TORAY'

Innovation by Chemistry

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

Grade:	5108X01B BLACK
Lot:	R29702
Date:	11/09/18

Certification of Properties

Test	Method	Unit	Specification	Result
Visual	.	.	Same as Std.	Good
Color	.	.	Same as Std.	Good
MFR	ISO 1133	g/10 min.	8~14	12.5
Tensile strength	ISO 527	MPa	Min. 42	48.2
Tensile elongation	ISO 527	%	Min. 14	26.2
Flex strength	ISO 178	MPa	Min. 70	76.0
Flex modulus	ISO 178	MPa	Min. 1,700	2,177
Charpy - notched	ISO 179	kJ/m2	Min. 5	8.3

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

Original lot - R29576

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

PROCESS FLOW DIAGRAM

KEY CONTACT/DEPT. LOC. Debbie Gillenwater /-QA Dept.

PRODUCT : Molded Component Parts

PROCESS: Injection Molding Group 1
Supplier/Loc. SEWS-Scottsville#5
Mfg. Sup.: Alan Bomar
Prepared By: John Fraim

4/18/2018	Update Operation sequence #'s. Remove Automatic bulk / Non bulk packaging and labeling operation (moved to FRK).	R. Gonzalez, L. Roth, P. Keith, A. Davidson
4/3/2014	Update process - Packing	L. Roth
3/30/2011	Update process - Packing	L. Roth
1/25/2008	Update process 101	J Fraim
9/27/2005	Update Information	D Karleskint
8/25/2005	Update Information	J Fraim , J Saylors
1/25/2005	Update Information	J Fraim L Roth, J Renfrow, D Gillenwater
4/7/2004	Update information	D Gillenwater, G Smith, J Renfrow
3/13/2001	Update Information	T. Gravil, R. Ramsey, D.Lyons
2/06/2001	Update Information	T.Gravil
1/8/2000	ISSUED WITH FORMAT CHANGES	T.Day
6/04/1999	ISSUED WITH FORMAT CHANGES/UPDATED INFRO	T.Gravil, D. Lyons, T. Nall, K. Cantrell
DATE	CHANGE POINTS	CORE / DEVELOPMENT TEAM
ISSUE/REVISION HISTORY		

SUPPLIER APPROVALS;
General Plant Manager
Quality Manager
Other Approvals
CUSTOMER APPROVALS:(IF REQUIRED)

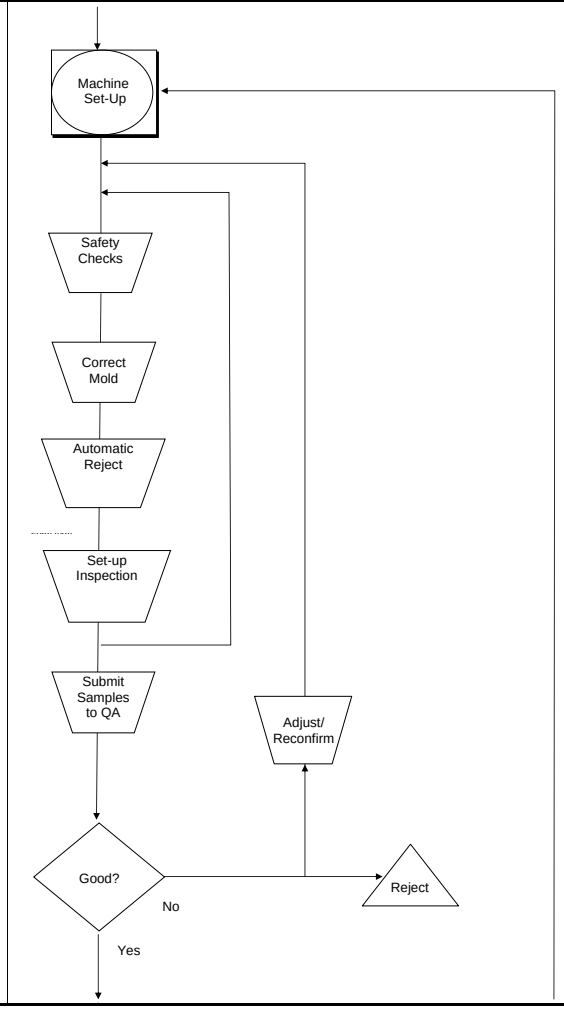
PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION/ INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
010	Receive Raw Material	Purchased Raw Material	Visual Comparison Against Packing List Shipping-Receiving
	Reject for non-conformance	Good? No → Reject	Notify Quality Assurance Red Tag Procedure & Return to Vendor
0020	Quality Assurance Receiving Inspection	Yes → QA Receiving Inspection	
	Packaging, Identification, Visual Inspection, # Characteristics		Per QA Inspection Instruction Sheet-Receiving
	Reject for non-conformance	Good? No → Reject	Red Tag Procedure/Return to Vendor
0030	Raw Material Storage	Yes → Material Storage	
	Raw Material Inventory Assessment	Raw Material Inventory Assessment	

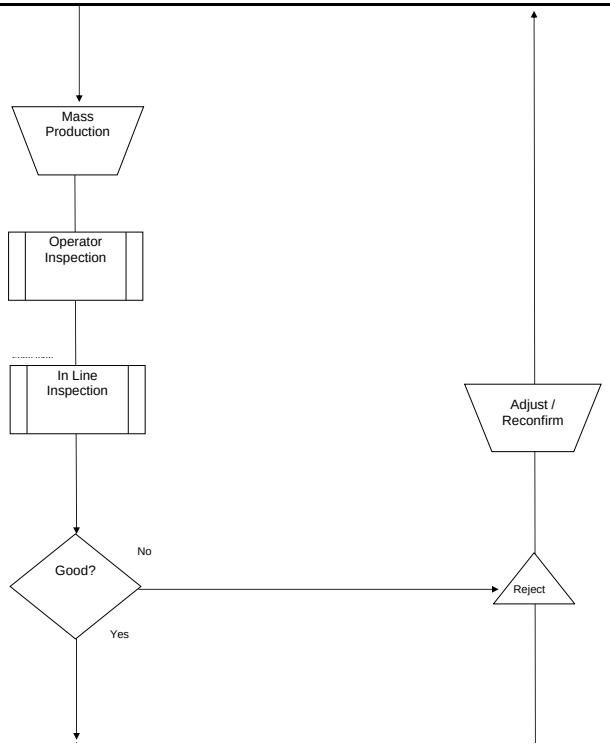
PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION / INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
	Material Staging	Deliver to Raw Material Staging Area	
0040	Raw Material Loading	MATERIAL LOADING	Injection Molding Machine

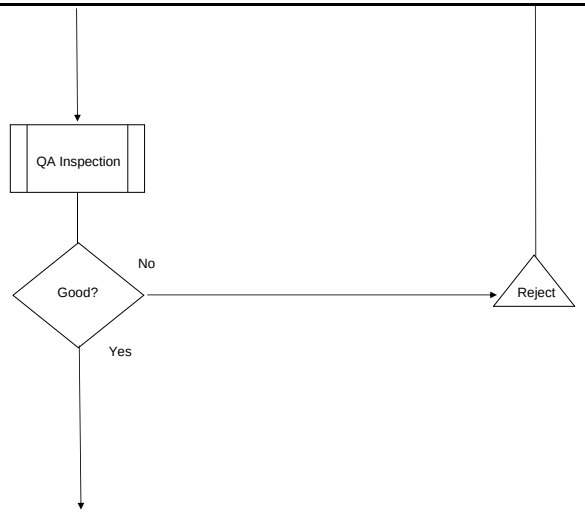
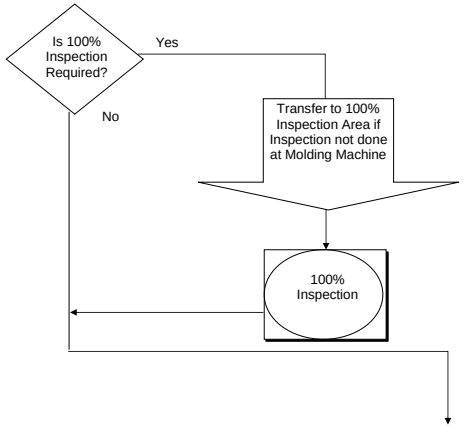
PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION / INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
0050	Set-up Injection Molding Machine		
	Raw Material Mold Numbers Process Parameters Regrind Ratio Raw Material Dryers		Per Shop Order Per Applicable Standard
			# Part Dimension / Function
	Reject for non-conformance		Make Adjustments, Reverify Parts, Mold Sent to Maintenance or Stop Production if applicable

PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION / INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

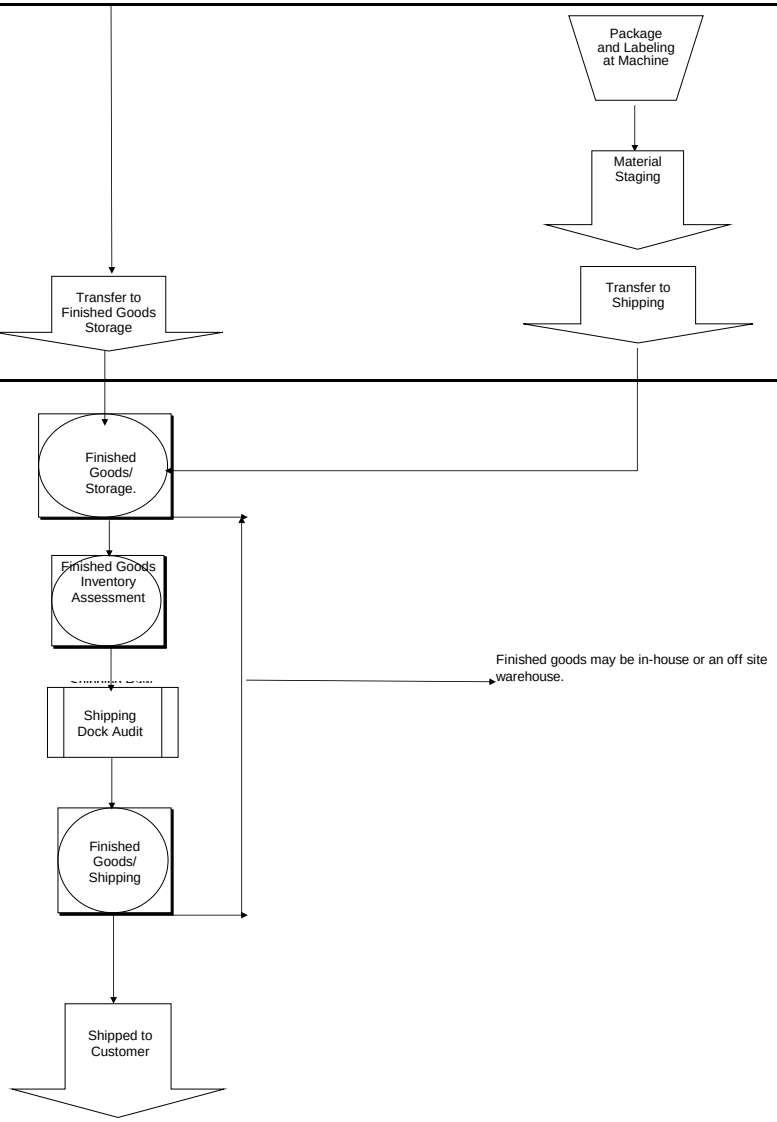
OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
0060	Mass Production Injection Molding		Per Shop Order Per Applicable Standard

PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION / INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
0070	Quality Assurance Inspection Reject for non-conformance		# Part Dimension / Function / Visual Notify Manufacturing Leader /QA Eng. Reject Tag Procedure
	Material Staging for Inspection 100% Inspection (when applicable)		Visual Inspection

PART AS ASSY'D | PART AS RECD | OPERATION | INSPECTION | OPERATION / INSPECTION | DECISION | STORAGE | DELAY | TRANSPORTATION | OPERATION STEP | OPERATOR

OPER #	OPERATION DESCRIPTION	PROCESS FLOW	KEY CHARACTERISTICS
0080	Material Staging for Bulk Packaging / Labeling		Per Packaging Style and Shop Order
	Packaging and Labeling at Machine		
0090	Transfer Packaged Parts to Storage		
0100	Finished Goods Storage		
0110	Finish Goods Inventory Assessment		
0120	Finished Goods Dock Audit (weekly) Random		Quantity Identification
0130	Finished Goods Shipping		Shipping Label



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

PROCESS RESPONSIBILITY: Alan Bomar, John Saylors

SUPPLIER APPROVALS;

Division Manager : **A. Bomar**

Quality Manager: **L. Roth**

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***

DATE ISSUE/REVISION HISTORY	CHANGE POINTS	CROSS FUNCTIONAL TEAM
4/18/2018	Modify process number sequence. Remove packaging process (moved to FRK). Update 0050, 0060, 0080 processes	R. Gonzalez, L. Roth, P. Keith, A. Davidson
8/11/2017	Corrected missing RPN calaculation for 0120	J Fraim
12/16/2016	Add scattered part control #8/#0060	L. Roth
7/18/2014	Update SC's to match control plan	L. Roth, J. Fraim, D. Gillenwater
5/6/2014	Add material dryer alarm, add Central Feed interlock, review section 0050	L. Roth, C. Threlkel, P. Keith
4/3/2014	Delete runnering in 0080	L. Roth
11/14/2013	review process, update detection ratings	J Fraim, L Roth, D Gillenwater
8/11/2011	Update for Setup	L. Roth
9/21/2010	Update for Setup	L. Roth
6/18/2010	Update to include mold gates and mold balance as cause of failure, and lance/clip breakage as failure mode. Added robot settings for damage, added damage to inline check, etc	D Gillenwater, J. Fraim, L. Roth, D. Duncan, A. Davidson, S. Tsutsui, J. Saylors

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						
		3. 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.
0040	Raw Material Loading	1. Incorrect Raw Material	* Discoloration of Parts * Brittle Parts * Impaired function of Part * Customer Complaint	7		Material handler selected incorrect raw material Mislabeled material 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. D- * Barcode system * 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 * Brittle Parts-Part breakage * Parts out of dimension	3		Set-up operator failed to set correct process parameters : Oven Temp. Moisture Content Drying time	2	P- 1. Machine is interlocked not to operate if dryer is off. P - 2. Central Feed Dryer will alarm if power goes off. P - 3. Set-up operator verifies and visually confirms correct process parameters. D - 1. Parameters are reconfirmed by coordinator/leader and operator.	4	24	NONE						
0050	Set-up Injection Molding Machine	1. Incorrect Raw Material	* Parts out-of-specification * Discoloration of Parts * Brittle Parts * Impaired function of Part * 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. D -1. Barcode system will detect wrong material . 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 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. 2.Set-up Associate instructions (shop order) & visual confirmation. 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) Short Shot Discoloration of Parts Brittle Parts Impaired function of Part 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. 2. Set-up Associate instructions (shop order) & visual confirmation. D - 1. Setup verify against Mold Book Condition Sheet & record on Condition Sheet Form 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. 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 against Mold Book Condition Sheet & record on Condition Sheet Form. 2.Engineering validation of injection function changes per internal robust test procedure. **3. Metal detector checks at SOP/EOP (as applicable)**	**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. 2.Utilize soft drop conveyors. 3.Confirmation of Set-up of auxiliary equipment. 4.PM for robot clamp. 5.Utilization of pick and place robots where applicable. D-1. Set-up operator visual confirms first 10 shots. 2.Molding operator checks last shot each basket and QA check at each SOP per GA003 & Inspection Standard. 3.Leader/ coordinator reverification of robot settings.	**5**	45	NONE						
				3		Machine Wear 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. 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. 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 SOP per GA003 & Inspection Standard. 3.Engineering validation of injection function changes per internal robust test procedure. 4. Metal detector checks at SOP/EOP (as applicable)	**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 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.						

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.
		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.						
0060	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. 2. Metal detector alarm (as applicable).	**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.						
0070	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.						

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.
		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 (**Inspector**) 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.						
0080	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 Box Label	Wrong Part delivered to internal customer Customer Complaint / Dissatisfaction	5		Molding operator failed to place correct label on bag / box	3	P- To generate label requires to scan shop order against mold book and machine. D- 1. Set up confirms mold number and part number are correct. 2. QA confirmation against CPC	**5**	75	NONE						
		2. Incorrect Quantity	Impact assembly/packing process Cause inventory variation			Set up failed to correctly set lot quantity		P- Lot quantity set in machine memory. D- 1. Lot quantity confirmed each SOP by set up. Details are recorded on the set up condition check sheet. 2. Bags are 100% counted by machine.									

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.
0090	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						
0100	Finished Goods Storage	1. Incorrect Storage Location	Wrong Part delivered to customer 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. D- Weekly audit and inventory assessment.	**5**	30	NONE						
0110	Finished Goods Inventory (Shipping)	1. Finished Goods Shortage	Inj. Molding scheduled production interrupted & intermittent leading to: *Parts shortage *Customer part shortage & assembly line shutdown *Customer part delivery performance degraded. * Customer complaint	3		BPCS SYSTEM not 100% dependable	2	P- Inventory Control System. D - Manual inventory taken, Operator manual / visual inventory.	**5**	30	NONE						
0120	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, confirming 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						
0130	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						
		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 Connector Manufacturing Group (CMG)		Key Contact/Phone L. Roth /D. Gillenwater (270) 237-5419 x 8555 or 8563	Date (Orig.) 8/9/2010	Date (Rev.) 4/18/2018
Part Number/Latest Change Level Various		Core Team L. Roth, P. Keith, A. Davidson, R. Gonzalez	Customer Engineering Approval/Date (If Req'd.)	
Part Name/Description Various, Connector Molding		Supplier/Plant Approval/Date L. Roth	Customer Quality Approval/Date (If Req'd.)	
Supplier/Plant Sumitomo Electric Wiring Systems	Supplier Code	Other Approval/Date (If Req'd.) A. Bomar	Other Approval/Date (If Req'd.)	
Revision History:		8/9/10 Reviewed process, minor changes in bold 9/21/10 Added Set-up Checksheet at Setup 3/30/11 Modified Section 0090 8/11/11 Modified Section 0060, other minor changes in bold. 9/15/11 Added Annual Layouts, other updates in bold 3/6/12 Updated for Resin Concentrate Mix Process, Resin loading process 11/27/12 Updated special characteristics designations, Added Packing Scale Setup 4/3/14 Remove references to annealing process, color concentrate and 10T machine. 5/6/14 Review material loading section 0050, updated references to bag/gaylord/silo 5/29/14 Clarify 0020, Sample Size / Frequency 7/18/14 Match special characteristics with FMEA, update 0130. 12/3/14 Add QA Hold Procedure to section 0060 & 0080 1/11/16 Add Connector ID sheet in Control Method for item 090, Manual Packing / Labeling 4/18/18 Update Part/Process numbers sequence. Remove packaging process (moved to FRK)		

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 No Damage Dry Material Correct Part Number & all appropriate documentation	Visual Inspection & comparison to packing list	Per container	Each Receipt	* SRW-RECFLOW * Electronic Data Scan		Notify S&R Coordinator, Q.A.
0020	Quality Assurance Receiving Inspection		20	Plastic Resin	Receiving Inspection	IC	* Correct color & type * Correct Part Number * No Damage * No contamination * Material Certification	* Visual comparison to box/skid label * Visual check of packaging * Review of Material Cert.	Per QRW-RAINBOW SQA Sample Plan	Each Incoming Shipment	Q.A. Inspection Instruction Sheet, Material Certifications		* Notify SQA Coordinator, QA Leader or QA Manager. * Return to Supplier * Issue PIR to Supplier * Reject / Hold Procedure
		Melt Flow Tester				IC	* Melt Flow (As applicable per IISRP)	* MFR Test	Each Lot	Each Lot			
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

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.		
0040	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 *** Line Side Dryer as alternate method**
	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. (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
	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, * 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 * P - Chart	Adjust Dryer, dry material and requalify.
								Dewpoint meter	Each unit	Monthly	Monthly PM	

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.		
0050	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
	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 **and/or** Electronic Data Entry	Notify Leader, Coordinator / Above Manufacturing Coordinator Reject Tag Procedure QA Hold Procedure **TWI Procedure Backtrack/Recall Procedure Change/Defect Control Validation (RB)** *** Manual Data sheets as alternate method**
				Dimensional		C, C# (IC, SWS)	Per Q.A. Inspection Instruction Sheet	Per Q.A. Inspection Instruction Sheet	One Shot	SOP checksPer QAW - GA003		
0060	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

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.		
0070	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 and/or Electronic Data Entry	Notify QA Leader, Coordinator / Above Manufacturing Coordinator -Reject Tag Procedure -QA Hold Procedure **-TWI Procedure** **Backtrack / Recall 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 No Excessive Flash 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**
0080	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
0090	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
0100	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
0110	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**
0120	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
0130	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

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.		
	Annual Layouts			Per Customer Drawing			Per Customer Drawing	Per Customer Requirements	Per Customer Request	Per Customer Request	Customer PPAP	Notify QA Engineer/QA Manager

CPK DATA (SV5 PRODUCTION)

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03FB--B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: **1780-B**

Tested by/Date: Mary Jo Mackin 2/27/19
Design Rec. Change level/date:
EU5T-14A464-EAB N1 2/18/2019
Eng. Change Documents: NA

CAVITY #:	SV5						Franklin					
M73-M88	11.20 +0.3 -0.3		13.50 +0.3 -0.3				11.20 +0.3 -0.3		13.50 +0.3 -0.3			
1	11.23		13.51				11.24		13.49			
2	11.23		13.50				11.24		13.49			
3	11.23		13.49				11.24		13.50			
4	11.24		13.50				11.24		13.51			
5	11.23		13.49				11.24		13.48			
6	11.23		13.51				11.24		13.49			
7	11.23		13.49				11.24		13.49			
8	11.23		13.47				11.23		13.49			
9	11.23		13.48				11.23		13.49			
10	11.23		13.47				11.23		13.48			
11	11.23		13.49				11.23		13.48			
12	11.22		13.48				11.23		13.50			
13	11.23		13.48				11.23		13.49			
14	11.23		13.48				11.23		13.49			
15	11.22		13.47				11.23		13.48			
16	11.23		13.48				11.24		13.49			
17	11.23		13.49				11.23		13.49			
18	11.23		13.49				11.23		13.51			
19	11.23		13.50				11.24		13.50			
20	11.24		13.48				11.23		13.49			
21	11.24		13.50				11.23		13.48			
22	11.24		13.49				11.24		13.50			
23	11.24		13.48				11.24		13.49			
24	11.24		13.49				11.24		13.50			
25	11.23		13.48				11.24		13.50			
26	11.23		13.48				11.24		13.50			
27	11.23		13.48				11.24		13.50			
28	11.23		13.48				11.24		13.48			
29	11.23		13.49				11.24		13.49			
30	11.23		13.48				11.23		13.50			

CPK DATA (SV5 PRODUCTION)

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03FB--B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: **1780-B**

Tested by/Date: Mary Jo Mackin 2/27/19
Design Rec. Change level/date:
EU5T-14A464-EAB N1 2/18/2019
Eng. Change Documents: NA

CAVITY #:	SV5						Franklin					
M73-M88	11.20 +0.3	11.20 -0.3	13.50 +0.3	13.50 -0.3			11.20 +0.3	11.20 -0.3	13.50 +0.3	13.50 -0.3		
31	11.22		13.50				11.23		13.49			
32	11.23		13.50				11.23		13.48			
33	11.22		13.48				11.23		13.51			
34	11.22		13.50				11.24		13.50			
35	11.23		13.48				11.23		13.48			
36	11.22		13.49				11.23		13.48			
37	11.22		13.47				11.23		13.48			
38	11.23		13.47				11.23		13.49			
39	11.23		13.48				11.24		13.50			
40	11.22		13.47				11.23		13.49			
41	11.23		13.47				11.23		13.51			
42	11.22		13.48				11.23		13.51			
43	11.23		13.47				11.23		13.50			
44	11.23		13.47				11.24		13.49			
45	11.23		13.47				11.23		13.48			
46	11.23		13.47				11.24		13.51			
47	11.23		13.49				11.24		13.49			
48	11.23		13.49				11.23		13.50			
49	11.24		13.47				11.23		13.48			
50	11.23		13.48				11.23		13.49			
51	11.23		13.49				11.24		13.49			
52	11.23		13.49				11.23		13.49			
53	11.23		13.48				11.24		13.50			
54	11.23		13.48				11.24		13.49			
55	11.22		13.48				11.24		13.50			
56	11.22		13.48				11.23		13.49			
57	11.23		13.49				11.23		13.49			
58	11.23		13.49				11.24		13.48			
59	11.22		13.49				11.23		13.49			
60	11.24		13.50				11.23		13.49			

CPK DATA (SV5 PRODUCTION)

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03FB--B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: **1780-B**

Tested by/Date: Mary Jo Mackin 2/27/19
Design Rec. Change level/date:
EU5T-14A464-EAB N1 2/18/2019
Eng. Change Documents: NA

CAVITY #:	SV5						Franklin					
M73-M88	11.20 +0.3	11.20 -0.3	13.50 +0.3	13.50 -0.3			11.20 +0.3	11.20 -0.3	13.50 +0.3	13.50 -0.3		
61	11.23		13.49				11.23		13.50			
62	11.23		13.48				11.23		13.49			
63	11.23		13.49				11.23		13.49			
64	11.23		13.49				11.23		13.50			
65	11.23		13.49				11.23		13.50			
66	11.24		13.48				11.23		13.49			
67	11.23		13.49				11.23		13.50			
68	11.23		13.49				11.23		13.49			
69	11.23		13.49				11.23		13.48			
70	11.23		13.48				11.23		13.50			
71	11.24		13.49				11.24		13.49			
72	11.23		13.48				11.24		13.49			
73	11.24		13.48				11.24		13.50			
74	11.24		13.49				11.24		13.49			
75	11.24		13.49				11.23		13.49			
76	11.24		13.48				11.23		13.50			
77	11.23		13.48				11.24		13.50			
78	11.23		13.50				11.24		13.49			
79	11.23		13.48				11.23		13.49			
80	11.23		13.49				11.24		13.48			
81	11.23		13.48				11.24		13.50			
82	11.23		13.49				11.23		13.49			
83	11.24		13.49				11.23		13.50			
84	11.23		13.48				11.23		13.50			
85	11.23		13.48				11.24		13.49			
86	11.23		13.49				11.24		13.50			
87	11.23		13.50				11.24		13.48			
88	11.23		13.50				11.24		13.48			
89	11.23		13.48				11.24		13.49			
90	11.23		13.50				11.23		13.49			

CPK DATA (SV5 PRODUCTION)

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03FB--B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: **1780-B**

Tested by/Date: Mary Jo Mackin 2/27/19
Design Rec. Change level/date:
EU5T-14A464-EAB N1 2/18/2019
Eng. Change Documents: NA

CAVITY #:	SV5						Franklin					
M73-M88	**11.20** +0.3	-0.3	**13.50** +0.3	-0.3			**11.20** +0.3	-0.3	**13.50** +0.3	-0.3		
91	11.23		13.48				11.23		13.50			
92	11.23		13.49				11.23		13.48			
93	11.23		13.48				11.23		13.51			
94	11.23		13.50				11.23		13.49			
95	11.24		13.48				11.23		13.50			
96	11.23		13.48				11.24		13.49			
97	11.23		13.48				11.23		13.49			
98	11.24		13.48				11.24		13.50			
99	11.23		13.49				11.24		13.51			
100	11.23		13.49				11.23		13.50			

average	11.23	13.49	11.23	13.49
minimum	11.22	13.47	11.23	13.48
maximum	11.24	13.51	11.24	13.51
range	0.02	0.04	0.01	0.03
std dev	0.01	0.01	0.00	0.01
LSL	**10.90**	**13.20**	**10.90**	**13.20**
NOM	**11.20**	**13.50**	**11.20**	**13.50**
USL	**11.50**	**13.80**	**11.50**	**13.80**
CPK	16.67002256	10.15758357	17.79984585	11.40190232

TPA TO HOUSING FUNCTION DATA

Specification: **SEE BELOW**

ORGANIZATION: SUMITOMO ELECTRIC WIRING SYSTEMS (PLT.5)
PART Name/Desc: **FOW120A03FB--B**
PART NO (s): **6189-7459, 6189-7676**
Mold #: **1780-B**

Tested by/Date: Mary Jo Mackin 2/27/19
Design Rec. Change level/date:
EU5T-14A464-EAB N1 2/18/19
Eng. Change Documents: NA

PRE-ASSEMBLED STATUS TO ASSEMBLED STATUE (WITH TERMINALS) FORCE SPEC: 60 N MAX

SV5

CAVITY # →	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	32.0	34.8	38.6	31.8	37.3	35.9	39.0	34.2	34.2	37.2	30.2	31.9	34.4	34.4	33.8	40.9
2	36.6	36.6	36.3	35.4	33.5	35.5	35.1	39.9	38.3	36.6	33.9	31.7	37.4	35.8	34.9	35.4

AVERAGE 35.4
MIN 30.2
MAX 40.9

FRANKLIN

CAVITY #	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	36.5	34.9	36.8	32.5	32.1	32.2	34.2	33.5	32.5	33.5	34.6	32.0	32.6	36.2	34.6	34.8
2	39.5	35.5	34.8	34.1	35.0	31.8	34.2	30.1	33.4	34.4	33.7	33.2	30.5	34.4	34.9	34.9

AVERAGE 34.0
MIN 30.1
MAX 39.5

ASSEMBLED STATUS TO PRE-ASSEMBLED STATUS (INTIAL) FORCE SPEC: 60 N MAX

SV5

CAVITY # →	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	32.5	33.4	32.3	32.6	30.9	33.8	31.1	32.3	34.2	33.1	33.8	33.1	33.8	32.9	32.1	31.5
2	31.0	34.1	33.7	30.1	33.2	33.1	31.2	33.7	31.3	33.3	35.1	32.2	29.8	31.7	31.3	31.2

AVERAGE 32.5
MIN 29.8
MAX 35.1

Franklin

CAVITY #	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	31.8	30.3	30.7	30.0	29.3	30.5	28.6	28.7	26.8	29.0	29.8	28.5	26.4	27.3	30.3	28.0
2	30.7	32.9	29.6	33.3	31.4	32.0	30.0	30.6	30.6	32.4	31.4	28.9	32.2	29.6	28.9	29.8

AVERAGE 30.0
MIN 26.4
MAX 33.3

ASSEMBLED STATUS TO PRE-ASSEMBLED STATUS (SECOND) FORCE SPEC: 18 N MIN

SV5

CAVITY # →	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	30.5	30.0	29.5	31.0	28.7	31.5	29.4	31.2	38.4	27.4	31.1	30.3	27.2	28.9	28.2	30.3
2	25.2	25.5	31.2	24.0	29.9	30.4	29.4	31.7	26.9	28.4	29.7	30.3	28.2	30.0	26.3	25.0

AVERAGE 29.2
MIN 24.0
MAX 38.4

Franklin

CAVITY #	M73	M74	M75	M76	M77	M78	M79	M80	M81	M82	M83	M84	M85	M86	M87	M88
1	30.1	29.6	29.7	27.5	27.5	30.3	28.1	27.0	25.1	29.8	29.3	26.2	25.6	25.3	27.7	27.6
2	29.6	29.8	28.9	30.5	29.1	28.5	28.8	28.3	29.1	28.9	29.4	27.2	28.4	28.1	27.0	27.1

AVERAGE 28.3
MIN 25.1
MAX 30.5

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

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:

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**

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

Measurement Unit Analysis	% Total Variation (TV)	% Tolerance
Repeatability - Equipment Variation (EV) EV = R bar x K1 = **0.004136** Trials K1: 2 0.8862; 3 0.5908	% EV = 100 [EV / TV] = **2.9%**	% EV = 100 [EV / (Tol / 6)] = **4.1%**
Reproducibility - Appraiser Variation (AV) AV = $\sqrt{[(\text{X bar Diff} \times K2)^2 - (EV^2 / n \times r)]}$ = **0.008335** Appraisers 2 3; K2 0.7071 0.5231 Note: If a negative value is calculated under the square root sign, AV defaults to zero. n = number of parts r = number of trials	% AV = 100 [AV / TV] = **5.9%**	% AV = 100 [AV / (Tol / 6)] = **8.3%**
Repeatability and Reproducibility (GRR) GRR = $\sqrt{(EV^2 + AV^2)}$ = **0.009305**	%GRR = 100 [GRR / TV] = **6.6%**	% GRR = 100 [GRR / (Tol / 6)] = **9.3%**
Part Variation (PV) PV = Rp x K3 = **0.140521** 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] = **99.8%**	% PV = 100 [PV / (Tol / 6)] = **99.6%**
	In MSA4, for % Tolerance, PV = SQRT [(Tol / 6)^2 - (GRR)^2]	
	ndc = 1.41(PV/GRR) = **21.3**	ndc = 1.41(PV/GRR) = **15.1**
Total Variation (TV) TV = $\sqrt{(GRR^2 + PV^2)}$ = 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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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 Instron Tester	QAW - INSERTRETPROC QAW - InstronOperation	Inspection Data Sheet 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 Instron Tester	QAW - INSERTRETPROC QAW - InstronOperation	Inspection Data Sheet 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			

CERTIFICATE

This is to certify that

Sumitomo Electric Wiring Systems Inc.

US Components Division

Scottsville Plant 5
2687 Old Gallatin Road
Scottsville, KY 42164
United States of America

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

Scope:
The design and manufacture of connectors, molded parts, and terminals.

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.	10001349 IATF16
Main certificate registration no.	10003837 IATF16
Issuing date	2018-08-21
This certificate is valid until	2021-08-20
IATF No.	0324716

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., 1130 West Lake Cook Road, Suite 340, Buffalo Grove, IL 60089 USA

2017-03-09

Annex to certificate registration no.: 10001349 IATF16
IATF-No.: 0324716

Sumitomo Electric Wiring Systems Inc.

US Components Division

Scottsville Plant 5
2687 Old Gallatin Road
Scottsville, KY 42164
United States of America

2-IAO-QMC-01001

Remote Location	Scope
10001667 **Sumitomo Wiring Systems, Ltd.** **1820 Nakanoike, Mikkaichi-cho** **Suzuka-shi** **Mie-ken 513-8631** **Japan**	Product Design and Production Equipment Development.
10003837 **Sumitomo Electric Wiring Systems, Inc.** **1018 Ashley Street** **Bowling Green, KY 42102** **United States of America**	Management Review, Policy Making, Purchasing, Quality System Management, and Strategic Planning.
10004404 **Sumitomo Electric Wiring Systems, Inc.** **SEWS Detroit** **27360 Drake Road** **Farmington Hills, MI 48331** **United States of America**	Product Design, Purchasing, Testing, and Warranty Management.
10004405 **SWSUSA-El Paso** **7500 Viscount Drive, Suite 192** **El Paso, TX 79925** **United States of America**	Customer Service.
10004406 **SWSUSA-Novi Office** **39555 Orchard Hill Place, Suite L60** **Novi, MI 48375** **United States of America**	Contract Review.
10013991 **Sumitomo Electric Wiring Systems Inc.** **120 Industrial Drive** **Scottsville, KY 42164** **United States of America**	Warehousing.

Extended Manufacturing Site	Scope
10012558 **Sumitomo Electric Wiring Systems Inc.** **796 Smith Grove Rd.** **Scottsville, KY 42164** **United States of America**	Manufacture of terminals.
10015246 **Sumitomo Electric Wiring Systems Inc.** **265 Garvin Lane** **Franklin, KY 42134** **United States of America**	Manufacture of connectors and molded parts.

This annex (edition: 2018-08-21) is only valid in connection with the above-mentioned certificate.

2017-03-09

CERTIFICATE

This is to certify that

Sumitomo Electric Wiring Systems Inc.

US Components Division

Scottsville Plant 5
2687 Old Gallatin Road
Scottsville, KY 42164
United States of America

with the organizational units/sites as listed in the annex

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

Scope:
The design and manufacture of connectors, molded parts, and terminals.

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.	10001349 QM15
Date of original certification	1998-09-29
Date of certification	2018-08-21
Valid until	2021-08-20

DQS Inc.

Brad McGuire
Managing Director

Annex to certificate
Registration No. 10001349 QM15

Sumitomo Electric Wiring Systems Inc.

US Components Division

Scottsville Plant 5
2687 Old Gallatin Road
Scottsville, KY 42164
United States of America

Remote Location	Scope
10001667 **Sumitomo Wiring Systems, Ltd.** **1820 Nakanoike, Mikkaichi-cho** **Suzuka-shi** **Mie-ken 513-8631** **Japan**	Product Design and Production Equipment Development.
10003837 **Sumitomo Electric Wiring Systems, Inc.** **1018 Ashley Street** **Bowling Green, KY 42102** **United States of America**	Management Review, Policy Making, Purchasing, Quality System Management, and Strategic Planning.
10004404 **Sumitomo Electric Wiring Systems, Inc.** **SEWS Detroit** **27360 Drake Road** **Farmington Hills, MI 48331** **United States of America**	Product Design, Purchasing, Testing, and Warranty Management.
10004405 **SWSUSA-El Paso** **7500 Viscount Drive, Suite 192** **El Paso, TX 79925** **United States of America**	Customer Service.
10004406 **SWSUSA-Novi Office** **39555 Orchard Hill Place, Suite L60** **Novi, MI 48375** **United States of America**	Contract Review.
10013991 **Sumitomo Electric Wiring Systems Inc.** **120 Industrial Drive** **Scottsville, KY 42164** **United States of America**	Warehousing.

Extended Manufacturing Site	Scope
10012558 **Sumitomo Electric Wiring Systems Inc.** **796 Smith Grove Rd.** **Scottsville, KY 42164** **United States of America**	Manufacture of terminals.
10015246 **Sumitomo Electric Wiring Systems Inc.** **265 Garvin Lane** **Franklin, KY 42134** **United States of America**	Manufacture of connectors and molded parts.

This annex (edition: 2018-08-21) is only valid in connection with the above-mentioned certificate.