



Manufacturing Routing Report

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C MCWF C-1 SE141-103-1 MODULAR COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING						
Sub ID 0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1							
Operation Sub: 0 / Seq: 10 (Firmed)	Resource 730-WHITE TEAM, ENGINEERING Manufacturing Planning, QA planning, Production Support IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev					
			Dwg Count: 0		Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0		
Operation Sub: 0 / Seq: 20 (Firmed)	Resource 825-FINAL INSPECTION - PLANTS 1 & Final Inspection Prepare part for source inspection. Review and complete QA data package per QAP and the requirements of the product specification NCSX-CSPEC-141-03-05 September 23, 2004. Contact CFT to review data package prior to notifying source inspection. IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1					
			Dwg Count: 1		Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0		
Operation Sub: 0 / Seq: 30 (Firmed)	Resource 831-SOURCE INSPECTION - FINAL Source Inspection IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1					
			Dwg Count: 1		Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0		
Operation Sub: 0 / Seq: 40 (Firmed)	Resource 425-SHIPPING - PLANTS 1 & 2 Package and Ship Weigh the finished part and metal stamp the value in pounds on the casting in the area marked on the customer drawing. Part must be protected and wrapped in plastic prior to inserting into the crate. Part is to be shipped to PPPL in Princeton, NJ per QAP shipping address. Crate must be marked/stenciled per the MTM drawing. IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1					
			Dwg Count: 1		Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0		
Sub ID 1	Part ID SE141-116-MODULAR COIL WINDING FORM TYPE-C	Qty 1	Drawing ID / Rev / Parent Sub:0 Op:20							



Manufacturing Routing Report

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING						
Operation Sub: 1 / Seq: 10 (Firmed)	Resource 820-RECEIVING INSPECTION Receive customer supplied material. Verify the receipt of quality documentation for the casting. Check off IDC noting receipt of material and receipt of quality documentation. Certification: METALTEK QA DATA PACKAGE Part Number: SE141-116 Part Description: PRODUCTION WINDING FORM TYPE-C IDC Count : 1	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2					
Piece # 10 (F)	Part ID SE141-116 WINDING FORM TYPE-C C-1 CASTING CUSTOMER SUPPLIED MATERIAL FROM METALTEK. DATA PACKAGE REQUIRED.			Qty 1.0	Drawing ID / Rev					
			Dwg Count: 1	Pgm Count: 0		QAP Count: 3	NDT Count: 0	WPS Count: 0		
						Vendor	Dimensions			
								QAP Count: 0		

Operation Sub: 1 / Seq: 20 (Firmed)	Resource 161-40FT MITSU Setup the machining fixture on the rotary table. Load casting into the machining fixture with the initial pickup pads facing up. Indicate the pickup pads and orient the casting for machining. Rough machine the top flange face and the outer periphery leaving .25" +.060/-.000". The outside surfaces of the flange will serve as qualifiers for the next operation. Record the qualifier dimensions on the IDC. Install the lifting holes per the MTM drawing. Rough machine the top side of the "T" section leaving .25" +.060/-.000". Remove the casting from the machining fixture and flip over with the bottom flange facing up. Re-load into the machining fixture. Pickup the qualifiers and orient the casting for machining. Rough machine the bottom flange face leaving .25" +.060/-.000". Rough machine the poloidal break leaving a minimum of .25" of stock per side. Install temporary shim filling in the poloidal break and hold together with temporary c-clamps. Rough machine the bottom side of the "T" section leaving .25" +.060/-.000". Finish machine both sides of the entire casting with the exception of the "T" section. This section will be finished machined in the next operation.	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2					
			IDC Count : 1	Dwg Count: 1	Pgm Count: 1	QAP Count: 0	NDT Count: 0	WPS Count: 0		

Operation Sub: 1 / Seq: 40 (Firmed)	Resource 805-INPROCESS INSPECTION - PLANT Perform an in-process inspection of the magnetic permeability of the material using the Severn Permeability Indicator Gage. Inspect a minimum of (8) points on the rough machined flange face and an additional (8) points on the rough machined "T" section. Record the upper and lower range values on the IDC's. Values that exceed 1.02 must be documented with a non-conformance record and dispositioned prior to continuing.	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2					
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Manufacturing Routing Report

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING	
IDC Count : 1 Dwg Count: 1 Pgm Count: 0 QAP Count: 0 NDT Count: 0 WPS Count: 0					
Operation Sub: 1 / Seq: 70 (Firmed)	Resource 125-U5 - NORTH Finish machine the "T" section and wings. Run a probe pass to inspect the surface for stock. Remove the casting from the machining fixture and flip over with the bottom flange facing up. Re-load the casting into the machining fixture. Pickup the qualifiers and orient the casting for machining. Finish machine the "T" section and wings. Run a probe pass to inspect the surface for stock.	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2
IDC N/A IDC Count : 0 Dwg Count: 1 Pgm Count: 0 QAP Count: 0 NDT Count: 0 WPS Count: 0					
Operation Sub: 1 / Seq: 80 (Firmed)	Resource 161-40FT MITSU Setup the machining fixture with the casting installed. Machine the inspection fiducials per the MTM drawing. Finish machine the poloidal break to drawing requirements. Remove the casting from the machining fixture.	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2
IDC N/A IDC Count : 0 Dwg Count: 1 Pgm Count: 1 QAP Count: 0 NDT Count: 0 WPS Count: 0					
Operation Sub: 1 / Seq: 90 (Firmed)	Resource 805-INPROCESS INSPECTION - PLANT Inspect the magnetic permeability of the entire casting using the Severn Permeability Indicator Gage. All as cast surfaces must be inspected on a 6" x 6" grid. Record range of actual values on IDC. All machined surfaces must be inspected on a 2" x 2" grid. Record range of actual values on IDC. Permeability measurements shall be per supplementary requirements S24 of ASTM A703/A703M and S1 of ASTM A800/800M except the results will be expressed as relative permeability (μ) rather than ferrite content (FN). Values that exceed 1.02 must be documented with a non-conformance record and dispositioned prior to continuing.	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2
IDC Count : 2 Dwg Count: 1 Pgm Count: 0 QAP Count: 0 NDT Count: 0 WPS Count: 0					
Operation Sub: 1 / Seq: 100 (Firmed)	Resource 810-LIQUID PENETRANT INSPECTION PT 100% of the part as-cast surfaces as well as finished machine surfaces. During the inspection also perform a visual inspection of the casting surface per ASTM A802/A802M and accept per the same. Include reference to ASTM A802 on the certification. Specification: ASTM A903/A903M Method: ASTM E165 Acceptance Criteria: ASTM A903/A903M Level II for as cast surfaces Acceptance Criteria: ASTM A903/A903M Level I for machined surfaces including the entire "T" section (high stress areas) Certification: MTM certification to include the information per Supplementary Requirements S1 of ASTM A903/A903M MTM NDT Cert: LPI CERTIFICATION	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2
IDC N/A IDC Count : 0 Dwg Count: 1 Pgm Count: 0 QAP Count: 1 NDT Count: 0 WPS Count: 0					
Operation Sub: 1 / Seq: 110 mttravl.r.qrp	Resource 818-MQS CONTRACTOR X-RAY	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2

W:65707/1-0 /Inc Matl /Inc Legs

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING		
(Firmed)	The "T" areas defined as "High Stress" are to be RT 100%.					
	Hand sketch a layout of all film locations on sheet (1) of the customer drawing SE141-116 rev. 2 to maintain shot and film traceability.					
	Specifications: ASTM A703/A703M Supplementary Requirement S5					
	Procedure/Method: ASTM E94 and ASTM E142 (use of a wire penetrameter may be necessary instead of the hole type to ensure objective 1% of thickness resolution/sensitivity)					
	Acceptance Criteria: Thickness < 2" ASTM E446 comparative plates					
	Acceptance Criteria: Thickness > 2" but < 4.5" ASTM E186 comparative plates					
	Scan RT certification, and hand sketched map and link in QAP to this operation.					
	Certification: RADIOGRAPHIC INSPECTION Map(s): CUSTOMER DRAWING Rev: Part Number: SE141-116 Part Description: WINDING FORM TYPE-C Material Type: 316 SST Material Thickness: VARIES Serial Number: C-1					
	IDC Count : 0	Dwg Count: 1	Pgm Count: 0	QAP Count: 7	NDT Count: 0	WPS Count: 0
Operation Sub: 1 / Seq: 120 (Firmed)	Resource 815-CMM - GANTRY - PLANT 2	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-116 / 2	
	Setup and inspect the part 100% per the drawing requirements. Refer to PS593. Surface profile dimensions are to be taken on a 2" x 2" grid for machined surfaces and 4" x 4" grid for as cast surfaces. Record dimensions as required per the IDC's.					
	IDC Count : 103	Dwg Count: 1	Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0
Operation Sub: 1 / Seq: 130 (Firmed)	Resource 105-DEBURR PLT 1 LOW BAY	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1	
	Clean the casting thoroughly to remove all coolant, oil, tapping fluid etc... Rinse the part thoroughly and wipe down with isopropyl alcohol to remove any residue or film.					
	Install the poloidal break shim assembly and accompanying hardware and insulation per the assembly drawing.					
	IDC N/A	IDC Count : 0	Dwg Count: 1	Pgm Count: 0	QAP Count: 0	NDT Count: 0
					WPS Count: 0	
Operation Sub: 1 / Seq: 140 (Firmed)	Resource 805-INPROCESS INSPECTION - PLANT	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1	
	Perform electrical resistance test.					
	Wire all of the bolts together. Set one jumper directly on casting flange and one on the bolts. Record resistance between the bolt combination and the casting in kohms on IDC.					
	Set one jumper on the poloidal joint midplane and one on each of the bolts. Record range of resistance in kohms on IDC.					
	IDC Count : 2	Dwg Count: 1	Pgm Count: 0	OAP Count: 0	NDT Count: 0	WPS Count: 0

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING					
Sub ID 2	Part ID SE141-078-POLOIDAL BREAK SHIM ASSEMBLY	Qty 1	Drawing ID / Rev / Parent Sub:1 Op:130						
Operation Sub: 2 / Seq: 10 (Firmed)	Resource 800-RECEIVING RECEIVE CUSTOMER SUPPLIED CASTING IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-078 / 1				
Piece # 10 (F)	Part ID SE141-078-02 CASTING TO BE OF SAME MATERIAL AS WINDING FORM CASTING. MATERIAL TEST REPORTS REQUIRED WITH SHIPMENT. Material Certification: TEST REPORTS			Qty 1.0	Drawing ID / Rev	Vendor	Dimensions	QAP Count: 0 NDT Count: 0 WPS Count: 0	QAP Count: 1
Operation Sub: 2 / Seq: 20 (Firmed)	Resource 141-10 HC-100 IN. MACHINE THE SHIM COMPLETE PER THE DRAWING AND CNC PROGRAM.S IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-078 / 1				
				Dwg Count: 1	Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0	
Operation Sub: 2 / Seq: 30 (Firmed)	Resource 110-ASSEMBLY - RIGGING ASSEMBLE ALL OF THE INSULATING SLEEVES INTO THE SHIM AND BOND USING LOCTITE 411. IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-078 / 1				
				Dwg Count: 1	Pgm Count: 0	QAP Count: 0	NDT Count: 0	WPS Count: 0	
Sub ID 3	Part ID SE141-078-03-INSULATING SLEEVE			Qty 7	Drawing ID / Rev / Parent Sub:2 Op:30				
Operation Sub: 3 / Seq: 10 (Firmed)	Resource 800-RECEIVING RECEIVE MATERIAL IDC N/A IDC Count : 0	QtyPer 7.00	StartQty 7.00	EndQty 7.00	Drawing ID / Rev SE141-078 / 1				
Piece # 10 (F)	Part ID INSULATING SLEEVES 1.75" DIA. X 2.25" LONG G11CR PER NEMA LI I - 1998 C OF C REQUIRED WITH SHIPMENT Certificate of Conformance:			Qty 7.0	Drawing ID / Rev	Vendor	Dimensions	QAP Count: 0 NDT Count: 0 WPS Count: 0	QAP Count: 1
Operation mttravlr.qrp	Resource	QtyPer	StartQty	EndQty	Drawing ID / Rev				W:65707/1-0 /Inc Matl /Inc Legs

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING
Sub: 3 / Seq: 20 (Firmed)	108-TOOL ROOM - PLANT 1 MACHINE PER THE DRAWING FOR A SLIP FIT WITH MATING DETAIL. IDC N/A IDC Count : 0	7.00 7.00 7.00	SE141-078 / 1	
		Dwg Count: 1	Pgm Count: 0	QAP Count: 0 NDT Count: 0 WPS Count: 0

Sub ID 4	Part ID MISC. HARDWARE AND INSULATION	Qty 1	Drawing ID / Rev / Parent Sub:1 Op:130
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Operation Sub: 4 / Seq: 10 (Firmed)	Resource 800-RECEIVING RECEIVE MATERIAL NOTIFY CFT AND FORWARD MATERIAL TO CFT. IDC N/A IDC Count : 0	QtyPer 1.00	StartQty 1.00	EndQty 1.00	Drawing ID / Rev SE141-103 / 1				
Piece # 10 (F)	Part ID SE141-103-4 INSULATING SHEET TYPE-C G11CR PER NEMA LI I - 1998 C OF C REQUIRED WITH SHIPMENT Certificate of Conformance: Part Number: SE141-103-4 Part Description: INSULATING SHEET			Qty 2.0	Drawing ID / Rev	Vendor	Dimensions		QAP Count: 0 NDT Count: 0 WPS Count: 0
									QAP Count: 3
Piece # 20 (F)	Part ID SE141-103-5 INSULATING SLEEVE G11CR PER NEMA LI I - 1998 C OF C REQUIRED WITH SHIPMENT Certificate of Conformance: Part Number: SE141-103-5 Part Description: INSULATING SLEEVE			Qty 14.0	Drawing ID / Rev	Vendor	Dimensions		QAP Count: 3
									QAP Count: 3
Piece # 30 (F)	Part ID DS141-036 STUD 1.375-6 UNC-2A X 9 LG MANUFACTURED COMPLETE PER DRAWING. MATERIAL CERTIFICATION REQUIRED WITH SHIPMENT Material Certification: TEST REPORTS Part Number: DS141-036 Part Description: STUD			Qty 7.0	Drawing ID / Rev DS141-036 / 0	Vendor	Dimensions		QAP Count: 3
									QAP Count: 3
Piece # 40 (F)	Part ID DS141-038 INSULATING WASHER			Qty 14.0	Drawing ID / Rev DS141-038 / 0	Vendor	Dimensions		

Workorder 65707/1.0	Part ID SE141-103-1-MOD COIL WINDING FORM ASSEMBLY TYPE-C	Qty 1	Drawing ID / Rev SE141-103 / 1	Engineer WHITE/KEVIN BOWLING
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MANUFACTURE PART COMPLETE PER DRAWING
C OF C FOR MATERIAL REQUIRED WITH SHIPMENT
DIMENSIONAL REPORT REQUIRED WITH SHIPMENT.
Certificate of Conformance:
Dimensional Report:
Part Number: DS141-038
Part Description: INSULATING WASHER

QAP Count: 4

Piece #	Part ID	Qty	Drawing ID / Rev	Vendor	Dimensions
50 (F)	DS141-060 NUT 12 PT HEX 1.375-6 UNC - 2B MANUFACTURE COMPLETE PER DRAWING MATERIAL CERTIFICATION REQUIRED WITH SHIPMENT. Material Certification: Part Number: DS141-060 Part Description: NUT	14.0	DS141-060 / 0		

QAP Count: 3

Piece #	Part ID	Qty	Drawing ID / Rev	Vendor	Dimensions
60 (F)	DS141-079 FLAT WASHER MANUFACTURE COMPLETE PER DRAWING. MATERIAL CERTIFICATION REQUIRED WITH SHIPMENT Material Certification: Part Number: DS141-079 Part Description: FLAT WASHER	14.0	DS141-079 / 0		

QAP Count: 3