Princeton Plasma Physics Laboratory
Procedure

Procedure Title: **Modular Coil Fabrication-Winding Form Preparation Activities**

Number:	Revision:	Effective Date: May 20, 2005
D-NCSX-MCF-001	**01**	Expiration Date: *(2 yrs. unless otherwise stipulated)*

Procedure Approvals

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RLM: Larry Dudek	Larry Dudek Digitally signed by Larry Dudek DN: CN = Larry Dudek, C = US, O = PPPL, OU = FOM Division Date: 2005.05.20 09:12:12 -04'00'	Date: 5/20/2005

Responsible Division: **NCSX Project**

Procedure Requirements
Designated by RLM

LABWIDE:

X	Work Planning Form # **WP-1188 & 1138** (ENG-032)		Lockout/Tagout (ESH-016)
	Confined Space Permit (5008,SEC.8 Chap 5)		Lift Procedure (ENG-021)
	Master Equip. List Mod (GEN-005)	**X**	ES&H Review (NEPA, IH, etc.) **NEPA 1283**
	RWP (HP-OP-20)		Independent Review
	ATI Walkdown	**X**	Pre-Job Brief
X	Post-job Brief *		

D-SITE SPECIFIC:

X	D-Site Work Permit (OP-AD-09)		Door Permit (OP-G-93)
	Tritium Work Permit (OP-AD-49)		USQD (OP-AD-63)
X	Pre-Job Brief (OP-AD-79)		T-Mod (OP-AD-03)
	** DCA/DCN (OP-AD-104) # _____	_____	

* Required for installations involving internal vacuum installations, critical lifts, and for the initial installation of repetitive work.

** OP-AD-104 was voided by procedure ENG-032. However, DCA's that were open at the time of adoption of ENG-032 are still considered valid for work approval purposes.

REVIEWERS (designated by RLM)	**Rec'd/ Incorp. Comments**
Accountable Technical Individual. **……J. Chrzanowski**	
Test Director	
Independent Reviewer	
D-Site Shift Supervisor	
Dimensional Control Coordinator …….. **Brent Stratton**	**X**
NCSX Field Supervisors…….**Tom Meighan, Steve Raftopoulos**	X
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Project Engineer for Stellerator Systems (WBS 1) Manager**……Brad Nelson (ORNL)**	
WBS Manager for Modular Coils (WBS14).. ……**Dave Williamson (ORNL)**	**X**
Quality Assurance/Quality Control. ……**Judy Malsbury**	X
Maintenance and Operations Division	
Energy Conversion System/Motor Control Division	
Engineering ……..	
Environmental Restoration & Waste Management Division	
Environmental, Safety & Health**……Jerry Levine**	**X**
Industrial Hygiene**…….. Bill Slavin**	**X**
Health Physics**……**	
RLM ……..**Larry Dudek**	

TRAINING (designated by RLM)

No training required _____ Instructor **Jim Chrzanowski**

Personnel (group, job title or individual name)	Read Only	Instruction **Pre-job Briefing**	Hands On
Lead Tech.		**X**	
Technicians performing task		**X**	
Field Supervisors		**X**	
Quality Control Representative		**X**	
Training Rep.			
RLM **Larry Dudek**			

RECORD OF CHANGE

Revision	Date	Description of Change
00	11/22/04	Initial release
01	5/19/05	Changes were based upon field experiences during the manufacturing of the TRC. Technical improvements as well as additional comments from reviewers are included. Changes are noted with side bar.

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1 Scope

1.1 Introduction

The Modular Coil Manufacturing Facility is divided into 5 workstations. Each workstation has a specific set of tasks that will be performed as part of the overall fabrication process. The fabrication procedures will address the manufacturing, inspection, test and QC inspection points for a specific workstation.

- **Station No. 1…** **Winding Form Preparation** & Post VPI Activities
- Station No. 2… Winding Station / Molding and VPI Preparation [TRC coil prep &
- Winding operations]
- ***Deleted Reference to Station 3***
- Station No. 4… Winding Station C/ Molding and VPI Preparation
- Station No. 5… VPI and Autoclave Activities
- Station No. 7… Coil Testing Facility [Reference only]

1.2 Scope

This procedure prepares each Modular Coil Winding Form (MCWF) or Twisted Racetrack Coil winding form (TRC) for winding. It includes:

- Mounting the winding form to the turning fixture
- Verification of electrical integrity of poloidal break
- Installation of measurement monuments
- Winding Form inspection and measurements
- Installation of clamp studs
- Cleaning of winding form
- Installation of winding clamps
- Installation of the inner cladding plates

1.3 Identification of winding form being prepared:

Station Number: _____ (Location where work will be performed)

Winding Form Type: _____ [Type A, B, C or Twisted Racetrack Coil (TRC)]

MC Winding Form ID No: _____

Modular Coil Identification Number: _____

2 Applicable Documents

2.1 NCSX-MIT/QA-142-01:
All applicable documents associated with this procedure, are identified in the MIT/QA Plan, document number **NCSX-MIT/QA-142-01**.

2.2 NCSX-PLAN-CMFOP-00:
All Modular Coil work processes are governed by the "Coil Manufacturing Facility Operations Plan", document number **NCSX-PLAN-CMFOP-00**.

2.3 **D-L-NCSX-983** Lifting Modular Coil Castings

2.4 **D-L-NCSX-984** Lifting Modular Coil Assemblies

2.5 **D-NCSX-MCF-005** Dimensional Control & Metrology for the NCSX MC

2.6 **D-NCSX-PLAN-MCWDC** Modular Coil Dimensional Control Plan

3 Safety Requirements:

All work will be performed in a safe manner in accordance with the PPPL Environmental, Safety and Health Manual **ES&H 5008** and the "Integrated Safety Management" (ISM) policy.

3.1 Job Hazard Analysis:

A JHA will be generated for each workstation, identifying existing or potential workplace hazards and to evaluate the risk of worker injury or illness associated with job tasks. (Reference document **ESH-004 "Job Hazard Analysis**") The IH representative will review the JHA's for accuracy as well as completeness. It will be reviewed with all activity participants at the Pre-Job briefings.

4 Prerequisites and Conditions

4.1 Pre-Job Briefing:

A pre-job briefing will be held, describing the processes and safety issues prior to starting any part of this procedure. Attendance shall be documented via training sign-in sheet.

Pre job Briefing complete: _____ _____
MC Field Supervisor Date

4.2 Daily Operations Startup and Shutdown:

Each working day, it is required to complete and initial the daily operations startup log to ensure that the station is ready to commence work activities for the day. The signoff log is located in the Daily Station Log. See section 6.1 and 6.2 for details.

4.3 Torque Values:

The following torque values shall be used for securing hardware unless otherwise specified in the procedure. (Low carbon steel hardware)

3/8-16UNC …… 18 ft-lbs	3/8-24UNF …… 19 ft-lbs	½-13 UNC …… 38 ft-lbs
½ -20 UNF …… 40 ft-lbs	5/8-11 UNC…. 83 ft-lbs	5/8-18 UNF… 95 ft-lbs
¾-10 UNC..…… 105 ft-lbs	¾-16 UNF ……. 102 ft-lbs	1-8 UNC … 236 ft-lbs
1-14 UNF …….. 212 ft-lbs	1 1/4 UNC …… 432 ft-lbs	1 ½-6 UNC …...732 ft-lbs

5 Materials and Parts for Station No. 1

The following materials and/or equipment will be used with this procedure. MSDS's for chemicals will be located in a notebook in the winding facility.

General Description	Material	Reference Document/Product No.
Cladding	Copper	Drawing list to be added as addendum for each coil type as drawings are approved
Solvent	Chlorine-Free Degreaser	CRC Product No. 03185 [MSDS #05032]
Solvent	Acetone	MSDS# 00561
Studs for coil clamp to casting stud	Stainless steel grade 316	3/8-16 UNC x 2.5 inches long
Mold release	Release agent dry lubricant	"Miller-Stephenson" -PTFE MS122DF
MC Turning Fixture	Equipment	Drawing no. SE144-008
Rolled Ring Assembly	Fixture	Drawing no. SE144-007
Casting to Ring Assy. Fixture	Fixture	Drawing no. SE144-050

Weld stud alignment fixture	Fixture	Drawing no. SE144-085
Stud Welder unit	Equipment- TRW Nelson	Model no. 101 Series 4500
Supports and hardware for MC mounting casting to turning rings	Fixture	See drawing SE144-050
Supports and hardware for TRC mounting casting to turning rings	Fixture	See drawing SE144-200
Cladding insulation	Kapton-Type HN adhesive back	0.00325 inch thick
Cement- for adhering cladding	Adhesive cement	3M Product no.CA40H
Adhesive accelerator for cement	Accelerator	3M Pronto Surface Activator
Winding clamps	Equipment	Drawing SE144-080
RTV sealer for poloidal break	Sealant	RTV108
Alcohol	Ethanol	MSDS
Severn Gauge	Equipment	Permeability indicator # 6424

6 Fabrication Process

This fabrication procedure is to be used as guide to complete the preparation of the winding form for coil winding. Deviation from this procedure for processes that DO NOT effect the design of the coil can be made with the concurrence of the MC Field Supervisor. These deviations shall be documented in the procedure and initialed by the MC Field Supervisor prior to implementing the deviations. Deviations that may effect the design of the coil requires a Request for Deviation "RFD" approval. The RFD must be approved prior to proceeding. Procedure changes need to be incorporated into the document via "Minor Procedure Changes" or "Revisions".

6.1 Daily Startup Activities:

6.1.1 Check all daily supplies needed:
6.1.2 Turn on the Turning Fixture power switch to verify operation.
6.1.3 Check stud welder for operation [Only if being used that day]
6.1.4 Check station for cleanliness
6.1.5 Check that the day's travelers and procedures are in their document holder.
6.1.6 Date and initial daily Startup Log located at the back of Station Log Book.

6.2 Daily Shutdown Activities:

6.2.1 Turn off power to Turning Fixture.
6.2.2 Turn off stud welder and secure for off hours.
6.2.3 Clean entire workstation area.
6.2.4 Verify that all Traveler and data sheet information is complete.
6.2.5 The Lead Technician shall verify that the Station's Log Book has been completed and signed for the day.
6.2.6 Cover the Modular coil casting with plastic tarp.
6.2.7 Date and initial daily Shutdown log located at the back of Station Log Book

6.3 Transport of Winding Form to the Modular Coil Mfg. Facility (MCMF):

6.3.1 Transport a MCWF or TRC from its storage area to the MCMF using lift procedure D-L-NCSX-983.
6.3.1.1 Position the winding form on the floor supported by wooden blocks.

6.4 Verification of the Electrical Properties of the Poloidal Break

The electrical integrity of the poloidal break needs to be verified, via a megger test, prior to mounting the MCWF into the support ring. [See Figure 1- Typical Poloidal Break] [Not required for TRC]

6.4.1 Test Criteria

- **Test Voltage:** 250 volts -

- ***Acceptance criteria*** for this test: **>500 k-ohms**

- The Test Director for this test is: _____

6.4.2 Safety Requirements & Conditions
The following safety and prerequisites shall be used for performing test of the Poloidal break.

6.4.2.1 Technicians and engineers performing these tests shall be familiar with the hazards and work procedure to minimize accidents that may occur.

6.4.2.2 There shall be present a second person, "safety watch" monitoring the operator, and capable of removing the power in case of an accident. This person shall be CPR qualified.

Qualified CPR Member: _____ Recert. Date: _____

6.4.2.3 During the test, the "Test Area" shall be roped-off and suitable "danger high voltage" signs and flashing lights displayed.

Test Director Verify: _____

6.4.2.4 The test operator shall stand on an electrical safety mat during the test operation.

6.4.2.5 Approved rubber electrical safety gloves shall be worn by test members during grounding operations which occur once the test has been completed, and the test equipment turned off.

6.4.2.6 Upon completion of test and before the components are declared safe to touch, (dielectric joint) being tested shall be properly discharged using a "Ground Hook". After a minimum period of 10 seconds, while the ground hook is still in place, attach a ground cable to the casting and poloidal mid-plane. The ground hook may be removed once the ground cable is in place.

6.4.3 Testing of Mid-Plane Insulation:

6.4.3.1 Electrically connect (jumper) the poloidal joint mid-plane to the modular coil for this test.

6.4.3.2 Measure the insulation resistance between the mid-plane plate and each bolt. The test results shall be in compliance with the requirements noted in Section 6.4.1.

Mid-Plane to Each Bolt- Megger Test Results

Test Components	Voltage Level Volts	Resistance k-Ohms	Remarks
Bolt 1 to Mid	**250**		
Bolt 2 to Mid	**250**		
Bolt 3 to Mid	**250**		
Bolt 4 to Mid	**250**		
Bolt 5 to Mid	**250**		
Bolt 6 to Mid	**250**		
Bolt 7 to Mid	**250**		

Equipment ID Number:_____ Calibration Date: _____

Megger Results: ***Acceptable:*** **_____** ***Unacceptable:*** **_____**

Test Director Signoff: _____ Date: _____

Quality Control Witness: _____ Date: _____

Remarks:

6.4.4 Testing of Bolt Insulation

6.4.4.1 Electrically connect (jumper) together all of the bolts and the modular coil winding form for this test.

6.4.4.2 Measure the insulation resistance between the electrically connected (jumpered) combination and the mid-plane. The test results shall be in compliance with the requirements noted in Section 6.4.1.

Mid-Plane to Bolts & Winding Form- Megger Test Results

Test Components	Voltage Level Volts	Resistance k-Ohms	Remarks
Mid-plane to Bolts & WF	**250**		

Equipment ID Number:_____ Calibration Date: _____

Megger Results: ***Acceptable:*** **_____** ***Unacceptable:*** **_____**

Test Director Signoff: _____ Date: _____

Remarks:

6.4.5 If the test results were within the test criteria identified in section 6.4.1 proceed to section 6.5.

6.4.6 If the test results are unacceptable, the field supervisor shall review the test results with NCSX project management to determine corrective action. All corrective actions shall be performed under the direction of the Field Supervisor. Once completed repeat the electrical tests. All corrective actions shall be documented and added to the RUN copy.

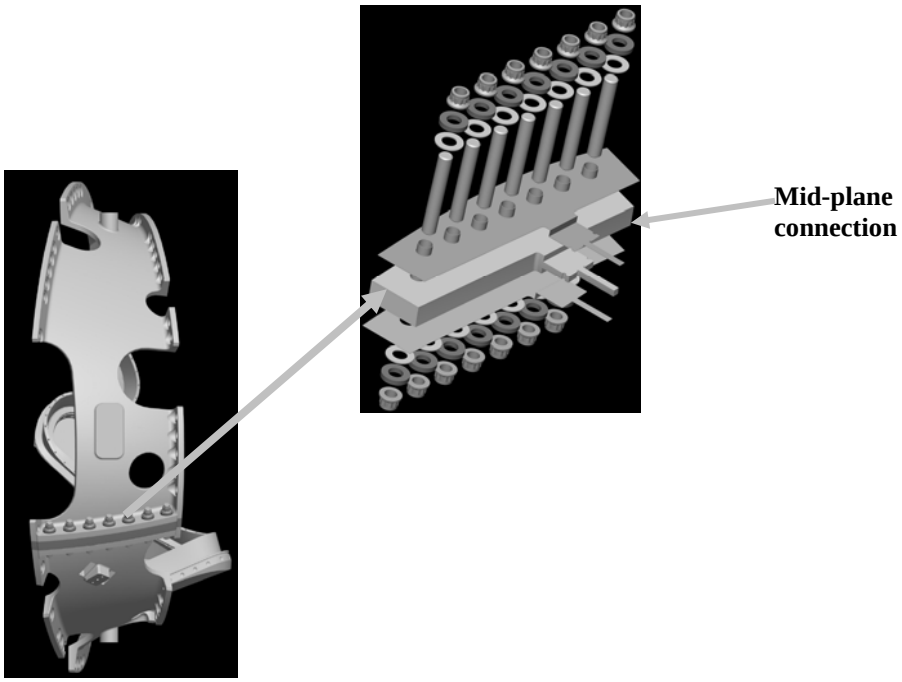

Figure 1- Typical Poloidal Break

6.5 **Mount WF to Support Ring Assembly:**
[Reference drawing SE-144-050]

6.5.1 Mount the appropriate support brackets to the casting that will allow the winding form (MCWF) to be joined with the Turning Fixture support ring. (Figure 2-Mounting support brackets to casting)

Note: Each coil type (A, B, C, TRC) have different support brackets that will join the MCWF to Turning Fixture support rings.

6.5.2 Position the MCWF with lower support brackets into the assembly fixture [station 1a]. (Figure 3-Position Casting in Assy. Fixture) [Note: the TRC will not be assembled in the assembly fixture]

6.5.3 Position a support ring into the assembly fixture around the casting, and secure the winding form and support ring together with support brackets. Note the orientation of the ring in relation to the lifting beam and pivot locations. (Figure 4- Install Support Ring)

6.5.4 Secure the support/lifting beam to the joined MCWF and ring support [MCWFA}. (Figure 5-Install Lifting Beam)

6.5.5 Verify that all hardware has been torqued [see section 4.3 for torque values] and that the MCWFA is ready for transport to the Station No. 1b Turning Fixture.

Verified:

Lead Technician: _____ Date: _____

Field Supervisor: _____ Date: _____

Figure 2-Mounting support brackets to casting

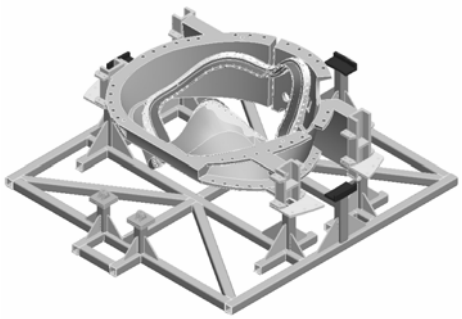

Figure 3-Position Casting in Assy. Fixture

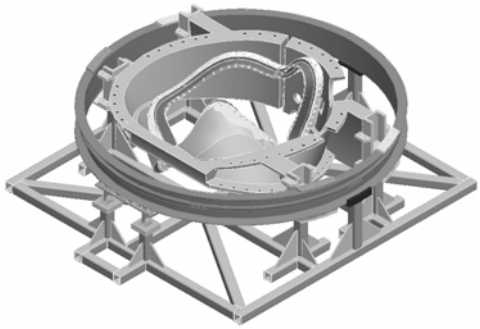

Figure 4- Install Support Ring

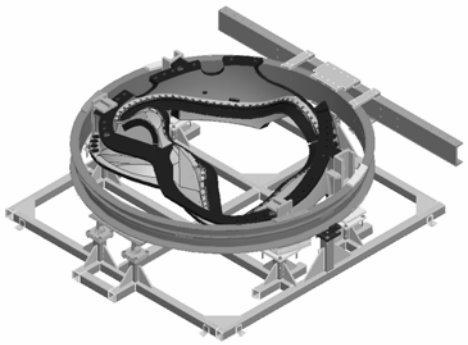

Figure 5-Install Lifting Beam

Figure 6-Rotate Casting/Ring Assembly

6.6 Install MCWFA in Turning Fixture:

6.6.1 Using lift procedure D-L-NCSX-984, carefully raise the MCWFA until it is in the vertical position. (Figure 6-Rotate Casting/Ring Assembly) Transport and install MCWFA into the Station No. 1 turning fixture. Secure the MCWFA to the turning fixture.

Verified by: _____ Date: _____
Field Supervisor

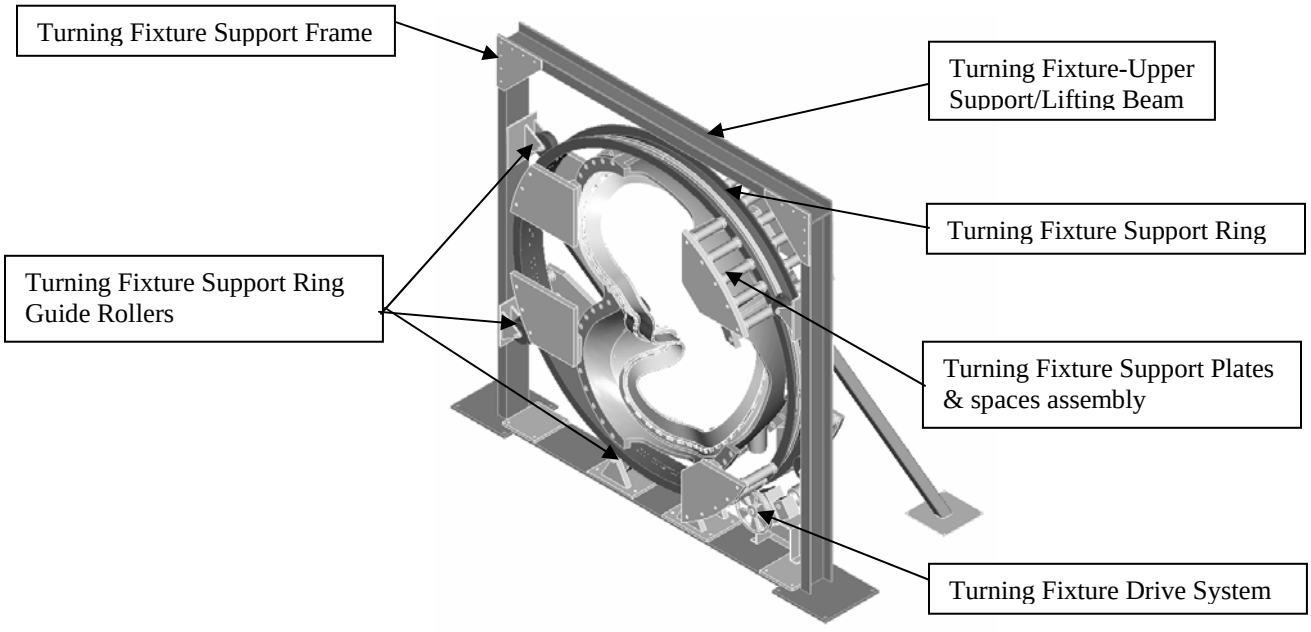

Figure 7- Turning Fixture

6.6.2 Install the upper guide rollers, and align all guide rollers to the support ring.

6.6.3 Verify that the support ring gear rack is engaged with the drive unit.

Verified by: _____ Date: _____
Lead Technician

6.6.4 Verify that the upper support/lift beam is in proper position and secured with appropriate hardware that is torqued to the proper value.

Verified by: _____ Date: _____
Lead Technician

6.6.5 Remove the upper support plates between the support ring and lift beam. This operation must be verified prior to operating turning fixture. Figure 8- Upper Support Plates

Verified by: _____ Date: _____
Lead Technician

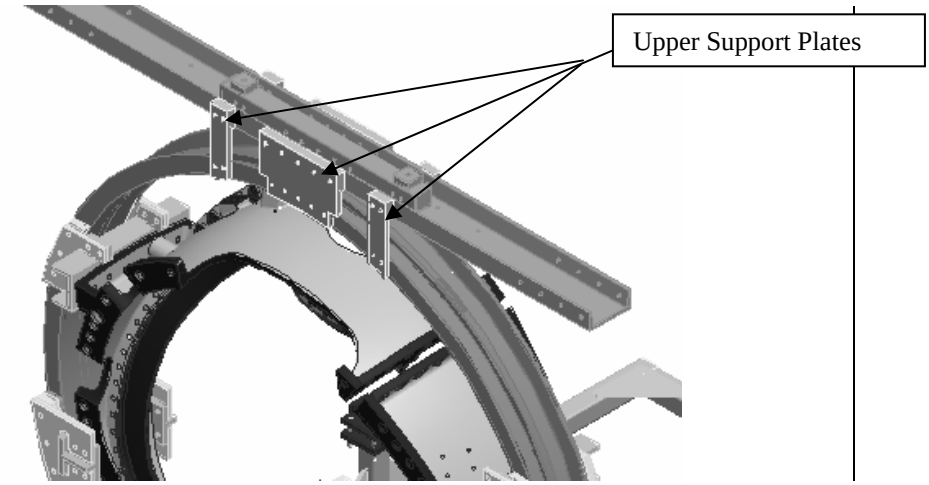

Figure 8- Upper Support Plates

6.6.6 To ensure proper alignment and operation of the turning fixture, rotate the MCWFA a full revolution using the foot-pedal control. Re-adjust the alignment rollers as required. Alignment of MCWFA to the turning fixture is complete.

Verified by: _____ Date: _____
Lead Technician

6.7 Visual Inspection

Perform a visual inspection of the casting. Look for any obvious defects or damage as a result of shipment.

Inspection Findings:

Inspection Performed by: _____ Date: _____

6.8 Cleaning/inspecting Tapped Holes

Inspect the tapped holes in the MCWF for evidence of metal chips or oil residue. Using a bottlebrush, clean cotton rags and "Chlor-Free Degreaser"; thoroughly clean any chips or oil residue remaining from the casting manufacturing process. After cleaning, check each threaded hole using a **brass or bronze** thread plug or bolt. Re-tap and clean as required RECORD FINDINGS.

Tapped Hole Inspection Findings:

Verified by: _____ Date: _____
Lead Technician

6.9 Identification Numbers:

6.9.1 Identify the ID number of each clamp location. Using a "Sharpie" felt pen write the clamp number directly onto the top of the septum next to the tapped holes. The clamp location numbers will be provided on the coil winding form drawings. See Figure 11- Mold Release and Masked Surfaces

6.9.2 Identify each coil side of the MCWF with either an "A" or "B". This information will be provided from the coil drawings. Use large stick on letters that can be clearly seen.

6.10 Additional Measurement Monuments:

6.10.1 The metrology group shall determine whether additional monuments are required on the MCWF. These monuments will be used by the metrology group for measuring the location of the winding surfaces and coil turns. If required, the location and method for attaching will be determined by the metrology group and documented per procedure D-NCSX-MCF-005.

Additional monuments are required: YES_____ NO_____

Verified by: _____ Date: _____
Metrology Representative

6.10.2 If required, the installation of additional monuments has been completed.

Installation completed and inspected by:

Field Supervisor: _____ Date: _____

QC Representative: _____ Date: _____

6.11 Dimensional Inspection

6.11.1 Using metrology equipment (Romer arm) thoroughly measure the MCWF machined winding surfaces, flange surfaces, and bolt holes using procedure D-NCSX-MCF-005.

6.11.2 Procedure D-NCSX-MCF-005 describes the use of the "Romer" measuring arm plus the measurements and techniques that will be used. All data will be attached to the back of this procedure.

Measurements taken by: _____ Date: _____

Summary of Results:

Measurements completed and verified by:

Field Supervisor: _____ Date: _____

QC Representative: _____ Date: _____

Once approved, proceed to section 6.12

6.12 Seal Poloidal Break

6.12.1 Wipe the outside surface of the poloidal break seams using a clean cloth with Chlor-free degreaser and ethanol. Do not saturate the cloth.

6.12.2 Seal the poloidal break seams using RTV 108 sealant. Apply sealant over all seams that will be inside of the Bag mold. Smooth the RTV with putty knife. This seal is required for successful VPI operations.

Poloidal Break Sealed:

Verified by: _____ Date: _____
Lead Technician

6.13 Installation of Clamp Studs

Install the stainless steel studs for the winding clamps on each side of the castings. All welding shall be performed by weld certified individuals and requirements of ES&HD 5008, Section 9 Chapter 15 for safe welding must be followed.

6.13.1 Notify the ESU and obtain a flame permit prior to starting welding operation.

Lead Technician verify: _____ Date: _____

Fire Watch: _____

6.13.2 On some castings, due to the geometry of the winding form, it may be necessary to add stud adapters directly to the casting prior to the installation of studs. These adapters shall be Tig welded directly to the casting. See Figure 9- Typical Stud Adapters

6.13.3 Stud Adapters are required for this casting: YES: _____ No: _____

Verified by: _____ Date: _____
Lead Technician

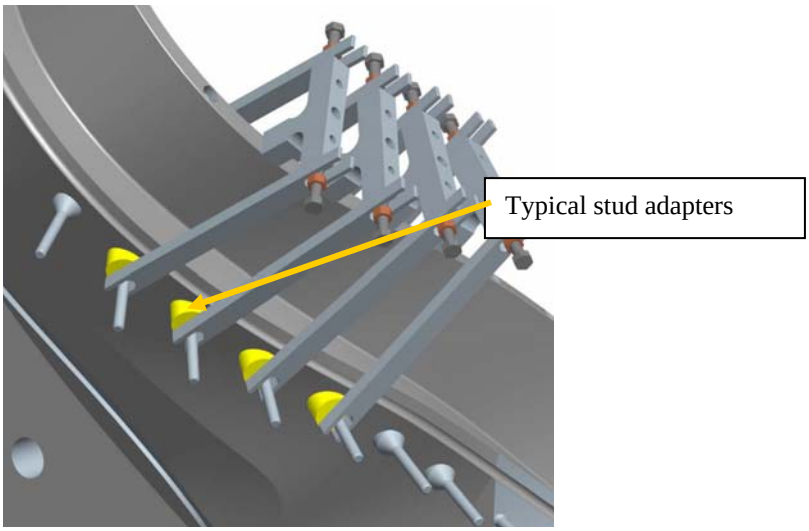

Figure 9- Typical Stud Adapters

6.13.4 Stud adapters have been installed. These need to be QC inspected prior to installing the studs.

Inspection and acceptance of welded stud adapters complete . **Q.C. Weld Inspector: _____ Date: _____**

6.13.5 Position the stud alignment fixture onto the casting using the tapped hole in the septum to secure the fixture in place. Check the orientation of the fixture to the casting prior to welding.

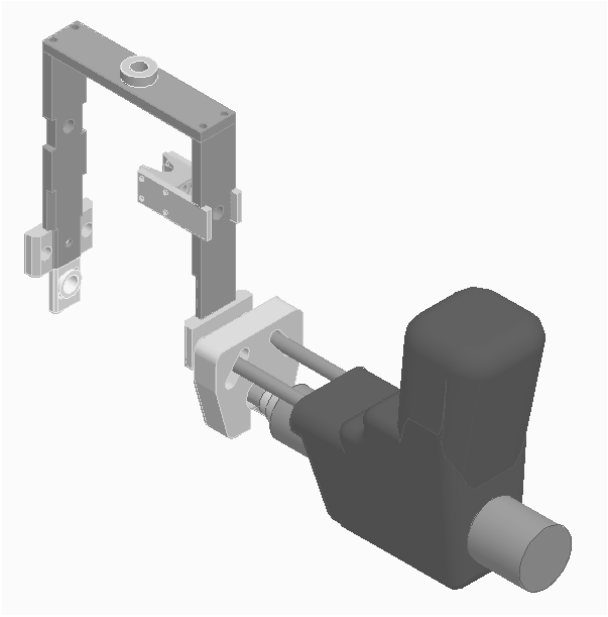

Figure 10- Stud Weld Fixture

6.13.6 Using the stud welder, weld grade 316 stainless steel studs on each side of the winding. Studs shall be positioned per appropriate coil drawings. In some inaccessible locations it may be necessary to use shorter studs and they may need to be TIG welded into position.

Stud Welder Settings:
Stud Weld Model: TWR Nelson Series 4500 Model 101
Time: approximately 3.5 seconds
Current: 5.75 amps

6.13.7 After welding, remove the alignment fixture and clean the weld. Remove all excess weld material.

6.13.8 Repeat process for each clamp position, until all studs have been installed.

6.13.9 Permeability Check: Each stud and weld shall be checked with a calibrated Severn permeability indicator to verify that the relative magnetic permeability is below the acceptance criteria. If the permeability exceeds the acceptance criteria the stud must be removed and replaced and/or the Field Supervisor must approve the variation via a non-conformance report (NCR).

Acceptance Criteria: 1.02μ.

Stud Weld permeability verified by: _____ Date: _____
Lead Technician

6.13.10 Each welded stud shall be inspected by a QC weld inspector (100% inspection). Welded studs rejected by QC will be removed, surface cleaned and replaced with a new stud. Attach all QC inspection reports to procedure.

Welding performed by: _____ Date: _____

_____ _____

Inspection and acceptance of welded studs complete
.
Q.C. Weld Inspector: _____ Date: _____

Summary of Results: [Add additional QC reports to back of procedure]

6.14 Cleaning:

Using CRC Industrial "Chlor-Free Degreaser and clean cotton cloths thoroughly clean (wipe down) the entire MCWF. Then wipe surface using Ethanol and clean cloths.

Lead Technician verify: _____ Date: _____

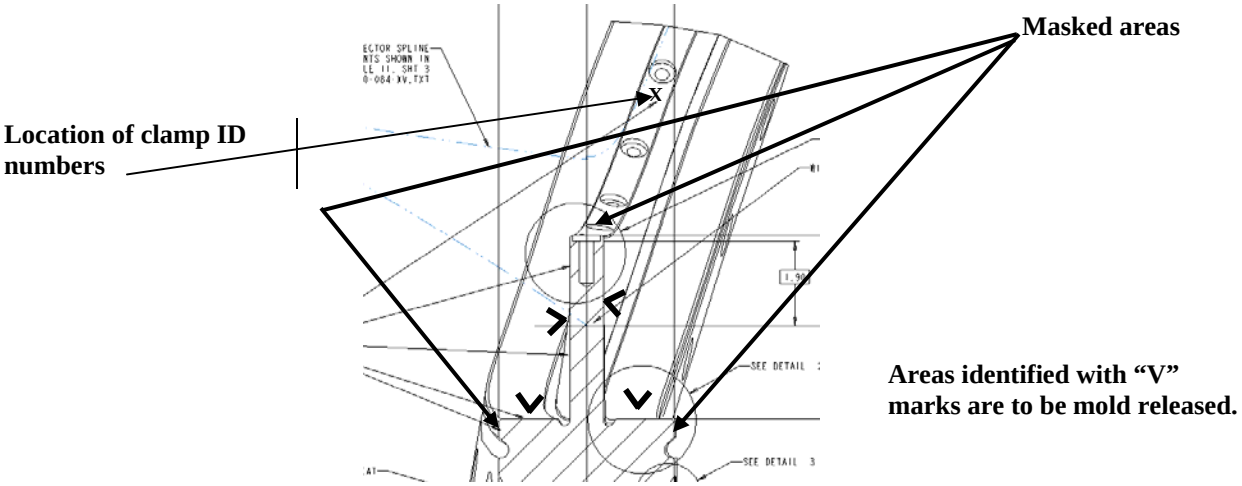

Figure 11- Mold Release and Masked Surfaces

6.15 Mold Release:

Mask the surfaces identified in Figure 9 with masking tape. Apply (3) coats of mold release ("Miller-Stephenson"-PTFE MS122DF) to the winding surfaces. Allow each coat to dry to the touch prior to applying the next coat. Figure 11- Mold Release and Masked Surfaces identifies the surfaces to be coated and masked.

Lead Technician verify: _____ Date: _____

6.16 Winding clamps

Mount the top tee section of the winding clamps to the MCWF as shown in Figure 12- Winding Clamps The clamps are located approximately every 3 inches along the entire length of the MCWF. Secure the winding clamp tee to the top of the septum using the appropriate hardware. Use the (2) side bars to assist in the positioning of the top section, but do not leave in place.

Installation of winding clamp tees is complete:

Lead Technician verify: _____ Date: _____

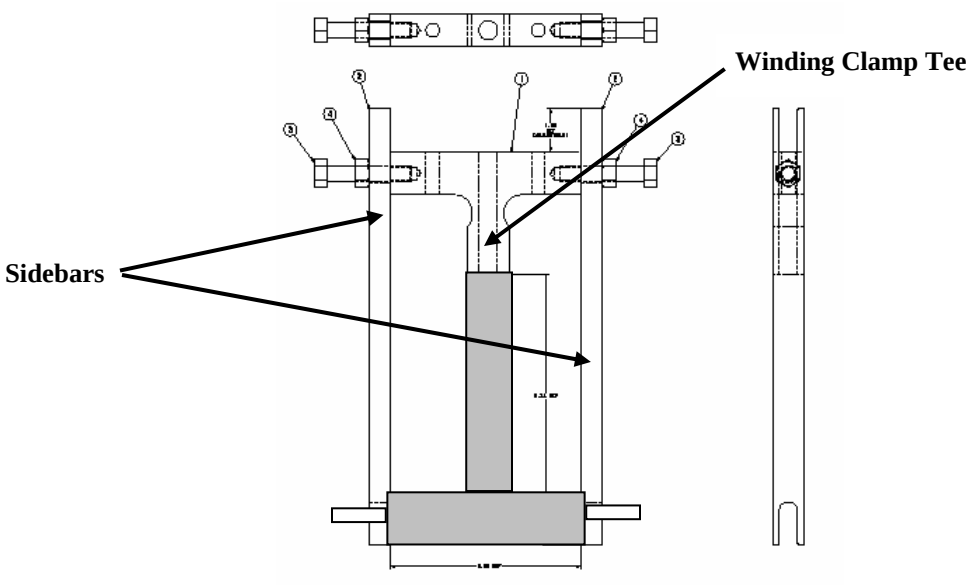

Figure 12- Winding Clamps

6.17 Inner wall copper cladding

6.17.1 Cladding Preparation:

6.17.1.1 Select the inner wall copper cladding being used for the coil type being manufactured. [Parts shall be deburred prior to use] Clean the copper plates with CRC Industrial "Chlor-Free Degreaser and clean cotton cloths. EXTREME CARE must be taken during handling of the cladding because of the potential for sharp edges. It is recommended that Kevlar gloves be used if possible during this installation.

6.17.1.2 Apply (1) layer of adhesive backed Kapton tape (0.00325 in. thick) to the backside of the cladding that is facing the winding surfaces.

6.17.2 Cladding Installation:

6.17.2.1 Fitup each section of copper cladding to the inner wall using the cladding mapping drawings. Customizing of each section of copper cladding will be required. (Figure 13- Inner Copper Cladding)

6.17.2.2 Once the cladding has been fit, remove and re-clean if necessary. Check that there are no sharp edges or burrs.

6.17.2.3 Secure the insulated cladding to the winding form winding surfaces using 3M adhesive cement #CA40H. Apply a minimal quantity [drop] to the back of the cladding per Figure 13- Inner Copper Cladding. A small quantity may also be applied to the backside of the vertical cladding if required to hold pieces in place.

6.17.2.4 Prior to placing the cladding in its final position, apply [spray] 3M Accelerator "Pronto Surface Activator" to small area of MCWF where the adhesive on the cladding will mate with the winding form.

6.17.2.5 Place the cladding into position and hold in place for 5 seconds. Then continue with remaining cladding pieces.

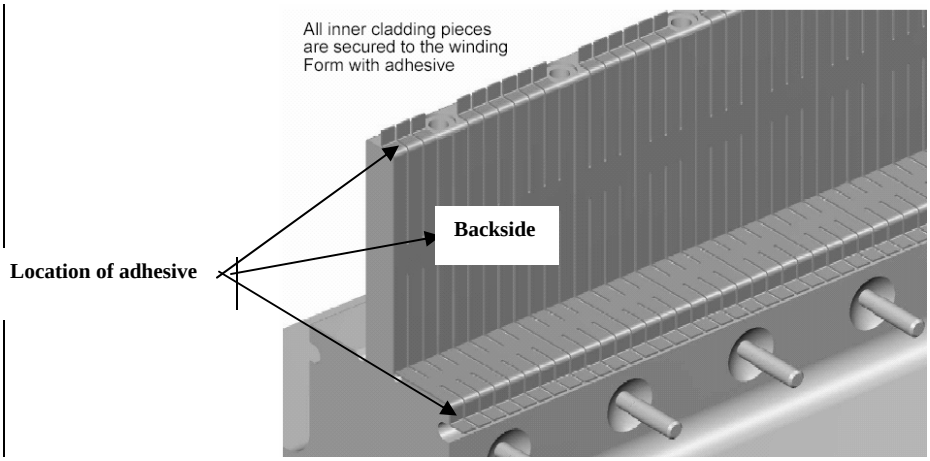

Figure 13- Inner Copper Cladding

6.17.2.6 During the installation of the cladding, continue to verify that the cladding is electrically isolated from the winding form using a multi-meter. Once all of the cladding has been installed, verify that each section of cladding is electrically isolated from its adjacent piece.

Equipment Name & ID Number: _____ Calibration Date: _____

Installation of the Inner Copper Cladding is complete and integrity of dielectric break is verified:

Lead Technician: _____ Date: _____

Field Supervisor: _____ Date: _____

Quality Control: _____ Date: _____

6.18 Dimensional Inspection

6.18.1 Once the copper cladding has been installed, remeasure the cladding surface using metrology equipment (Romer arm) and procedure D-NCSX-MCF-005. Include all results in the MC traveler package.

Measurements taken by: _____ Date: _____

Summary of Results:

Verification that measurements were completed: **Field Supervisor: _____ Date: _____** **QC Representative: _____ Date: _____**

6.19 Lead Terminal Block

6.19.1 Mount the G-11CR terminal lead base to the outside of the casting per the coil drawings.

Terminal lead base installed: **Lead Technician: _____ Date: _____**

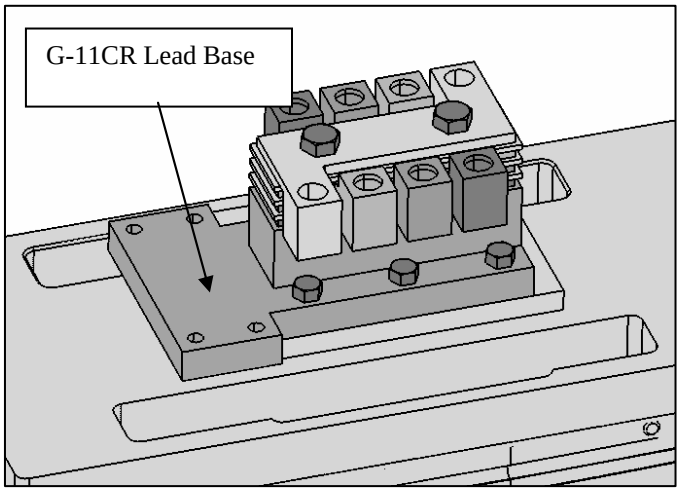

Figure 14- Lead Block

DELETED ASSEMBLY OF LEAD BLOCK AND TESTING

7 Station No. 1 MCWF Preparation Completion:

7.1 Document Verification:

Verify that all pertinent data on the procedure and data sheets have been completed.

7.2 Field Package:

Ensure that all data sheets, photographs, QC inspection sheets, etc are included in the Field Package.

7.3 Approval:

Prior to releasing a modular coil from one station to the next it is required that the all-responsible individuals sign the release indicating that all processes at that station have been satisfactorily completed. The release will include signatures from the Station Lead Technician, Field Supervisor and the QC representative.

All winding form preparation activities have been satisfactorily completed.

Lead Technician: _____ Date: _____

Field Supervisor: _____ Date: _____

QC shall verify completion of documentation:

Quality Control Representative: _____ Date: _____

The winding form is ready for transfer to the next station:

DELETED START-UP AND SHUTDOWN LOGS