

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

Large Hadron Collider
Magnet Division Specification

Proc. No.: LHC-MAG-R-1030

Issue Date: December 20, 2002

Rev. No.: A

Rev. Date: December 20, 2002

Title: LHC D3 Yoke Assembly & Collaring

Prepared by: Signature on File

LHC Project Engineer: Signature on File

Cognizant Engineer: Signature on File

Production Section Head: Signature on File

Production Representative: Signature on File

Electrical Engineer: Signature on File

Q. A. Approval: Signature on File

ES&H Review: Signature on File

REVISION RECORD

Rev.	Date	Page	Subject	Approval
A	3/11/03		Initial Release	

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 2 of 17

technicians performing these specific tests shall rigorously follow all the safety requirements listed as well as those prescribed by the BNL ES&H Standard.

3.2.5 Hypot and impulse testing pose a Class "C" electrocution hazard. At least two properly trained technicians must be present to perform this testing. When testing, a trained technician shall be stationed at any point where the item under test is accessible to unauthorized people, and barriers shall be set up. Signs shall be posted reading "DANGER HIGH VOLTAGE" and warning lights shall be turned on.

3.2.6 All lifting and handling operations requiring overhead crane operations shall be performed by holders of valid Safety Awareness Certificates. They shall also be instructed in the use of the appropriate lifting devices by the Cognizant Engineer or Technical Supervisor.

4 Procedure:

NOTE

The following precautions shall be followed to minimize the possibility of debris entering the coil assembly:

- **Before beginning assembly, make sure that the area is clean; that the floor is swept and cleared of unnecessary clutter.**
- **Lockout the overhead door during collar assembly operations. Limit overhead crane use above the collaring assembly except where necessary.**
- **Limit nearby activities that are unrelated to the collaring operation.**

4.1 Record the coil serial numbers, and their respective locations in the traveler.

4.2 Weigh Crates and Inspect Yoke Laminations.

4.2.1 Verify cleanliness of inspection table. Unload crate onto inspection table.

NOTE

Verify that all pinned yoke assemblies have been sorted for loose pins and "eyelash" burrs as well as individually cleaned on all outside surfaces with a clean tack cloth. All accepted laminations must be stacked in crates that have been vacuum cleaned inside so that they are completely chip free. All rejected yoke laminations must be cleared from the collaring area. The loose chips generated by the culling process must be removed and the area subsequently cleaned.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 3 of 17

- 4.2.2 Zero the scale. Transfer 236 laminations onto scale and record weight and material heat number in traveler. Also, record weight on an index card and staple to crate.
- 4.2.3 Repeat for a total of (6) large and (2) small crates w/special (lead end) lams.
- 4.3 Run Programs
 - 4.3.1 Enter crate weights and enter coil data into the Lamination Weights Program. Proceed to the next step in the program and record the resulting crate weights and the assigned crate placements in traveler.
 - 4.3.2 Proceed to the next step in the program and record the number of pairs to be removed (along the crate number from which they are removed). Record corrected crate weights.
 - 4.3.3 Re-enter crate weights into lamination weights program. Record crate weights and the assigned placement in the traveler. Continue to last step in lamination weights program and print summary. Place summary in traveler packet.
- 4.4 Stack Lower Yoke Half
 - 4.4.1 Mark rails with stack lengths.

CAUTION

Eye protection shall be worn while drilling

- 4.4.2 Drill and tap laminations for use at L.E. and N.L.E. (the strip heater mounting boards will be secured to these laminations). Remove all chips before stacking.
- 4.4.3 Before loading the laminations onto the contact tooling, vacuum clean the tooling surfaces thoroughly.
- 4.4.4 Stack lamination pairs of the lower yoke (alternating left and right positioning) onto the lower contact tooling. At lead end of cold mass, locate (22) pairs of lead end laminations, (box SPC/Lower/L.E.). Position laminations according to incremental stack length determined by lamination program.
- 4.4.5 Proceeding from the Lead End and working towards the Non-Lead End, stack and “fluff” laminations to incremental stack length.
- 4.4.6 After stacking the lower yoke half, vacuum clean the ID, midplane, and edges of the laminations along the entire length.

4.5 Prepare Lower Coil

NOTE 1

Cut standard, lead end, and non-lead insulators as required per the assembly drawing. Note that all modified standard insulators go at the non-lead end.

NOTE 2

Insulators shall be installed such that the orientation of the part number, which distinguishes front from rear, alternates down the length of the magnet.

- 4.5.1 Place lower coil in the prep table stands. Position coil with the midplane down. Clean and inspect the coil O.D. Vacuum and wipe with a tack rag.
- 4.5.2 Install .002" x 3.0" Kapton adhesive tape to coil O.D. at each quadrant. Trim to flush with coil pole turn.
- 4.5.3 Apply one layer of .002" Kapton tape to the ends of the coil in the area of the pole to achieve the same build up in this area as in the area covered by the Kapton in 4.5.2
- 4.5.4 Clamp quench protection resistor heater holders to each end of the prep table.

NOTE

The quench protection resistor is a stainless steel ribbon that is sandwiched between two layers of Kapton tape. The stainless steel ribbon is plated with copper for 24.5 inches and is un-plated for 5 inches. This pattern is repeated along the entire roll.

- 4.5.5 Verify that strip heater has been cleaned before assembly, and that the completed heaters are wiped clean before taping them to the coil surface. Secure the end of the quench protection resistor to the lead end holder with masking tape.
- 4.5.6 Roll out quench protection resistor along the entire length of one side of the coil. Center the quench protection resistor plated areas evenly over each coil end. Tape quench protection resistor to the non-lead end holder and cut from roll.
- 4.5.7 Repeat for the other side.
- 4.5.8 Position the quench protection resistor along the centerpost area with a gap of .020 inch. Secure the quench protection resistor to the coil O.D along the centerpost using .0005 in x .5 in. Kapton tape every 12 inches.

NOTE

Be sure the Kapton tape is not wrinkled and that the quench protection resistor does not extend into the centerpost area.

- 4.5.9 Apply two layers of kapton tape to the ends of the coil in the area of the pole to achieve the same radial build up in this area as in the area covered by the quench protection resistors.
- 4.5.10 Install the stainless steel pressure plates to each coil end saddle with a 6-32 x ½ inch pan head screw. If necessary, drill and re-tap threaded holes in end saddles using care not to drill too deep. Leave one screw loose on each saddle until after collaring is complete.
- 4.5.11 Rotate the lower coil to the midplane up position.
- 4.5.12 Before installing the lower coil insulators, vacuum clean each of them.
- 4.5.13 Begin installing straight section insulators starting from the lead end. Evenly space the insulators with a .030-.050 inch gap between them. Secure each insulator with an ultem shim support and ultem FH screw. Check for proper fit of the Kapton coil midplane caps.
- 4.5.14 In conjunction with the previous step, slide the G-10 coil pole shims into place. Install the special notched shim at lead end at the proper orientation.
- 4.5.15 Cut the last straight section insulator to fit against the pole spacer at the non-lead end. Be sure that this modified insulator includes the threaded hole for the coil shim support.
- 4.5.16 Measure the length of straight section insulators on the coil and note length. Transfer this measurement to the yoke laminations, starting from the first straight section yoke lamination at the lead end to the non-lead end and mark yoke. Place (2) non-lead end insulators (centerpost removed) between this mark and the last yoke lamination. Scribe the outside of the insulator and cut off excess.
- 4.5.17 Vacuum clean the insulator ID along the entire magnet length. Prior to installing lower coil, verify that there is no debris in lower collar assembly, (lower coil is the shorter OAL). Vacuum and tack rag if necessary.
- 4.6 Install Lower Coil
 - 4.6.1 Verify that the coil and beam tube lifting beam is free of dust and chips before

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 6 of 17

raising it over the lower yoke stack. Make sure that all lifting slings are wiped clean. Avoid dragging slings over the floor or draping them over dirty surfaces.

- 4.6.2 Before installing the lower coil into the lower yoke half, vacuum clean the OD of the coil.
- 4.6.3 Using 12010007-1 lifting beam with steel cables, pick up second standard insulator from the lower yoke plus seven (7) others that align with cables on the beam (remove the ultem shim retainers at these locations). Lift and install lower coil into the yoke half.
- 4.6.4 Install lead end insulators, with mill step located at mid-plane. The segment with the one rounded corner is located such that this corner rests against the pole lead as indicated. Use care not to tear or wrinkle the quench protection resistor.
- 4.6.5 Install the modified (shortened) non-lead end insulator (centerpost removed) and the full size non-lead insulator (centerpost removed). The modified insulator is placed against the straight section insulators.

NOTE

Critical inspections follow !

- 4.7 Inspect Lower Coil
 - 4.7.1 Verify azimuthal coil match is within .001”.
 - 4.7.2 Verify ramp box aligned to the end of the lead end pole spacer and that first and last standard insulators are banked hard against coil pole spacers.
 - 4.7.3 Verify that insulator gaps are .030 - .050 inch. Readjust as required.
 - 4.7.4 Verify that all straight section insulators (12010009) are installed correctly and no 12010063 NLE insulators are in straight section region.
 - 4.7.5 Verify that all G-10 coil shims are in their position
 - 4.7.6 Verify that all Ultem coil shim supports (12010066) are installed and the Ultem FH screws adequately tightened.
 - 4.7.7 Verify that notched coil shim at the LE on pole lead side has notch toward LE and notched area facing cable.
 - 4.7.8 Verify that the first straight section insulator at the lead end is pushed firmly against

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 7 of 17

the rear face of the coil pole spacer (Datum [-A-]).

4.7.9 Verify that the G-10 coil shims have approximately a 1/32" gap between them.

4.7.10 Verify that the last shims on both sides are trimmed to fit.

4.7.11 Verify that there is no debris in lower coil assembly. Vacuum and tack rag, if necessary.

NOTE

Shims may be secured in place (2-3 PLS ea) using 12010181-02 adhesive Kapton (.0005" thick). No more than 1" of tape on ID and OD of coil is allowed at each tape location. No wrinkles allowed.

4.8 Install Beam Tube

4.8.1 Record serial number of beam tube in traveler. The serial number is marked or engraved onto the tube by the supplier. Before installation, clean the beam tube thoroughly.

4.8.2 Verify that the lifting beam is free of dust and chips before raising it over the lower yoke stack. Make sure that all lifting slings are wiped clean. Avoid dragging slings over the floor or draping them over dirty surfaces.

4.8.3 Move insulated beam tube to lower collar assembly. Check once again that all lower coil insulators and coil shims are in place, and that the proper coil shim supports are installed and all 10-32 ultem screws are secured.

4.8.4 After installing the lower coil into the lower yoke half and installing the coil shims plus shim supports, vacuum clean the ID of the coil.

4.8.5 Install beam tube into lower coil, making sure that the beam tube bumpers are oriented properly and that the beam tube is properly positioned longitudinally within the coil.

NOTE

Beam tube shall be orientated so that the tie wrap is located at the non-lead end.

4.9 Upper Coil Preparation

4.9.1 Verify Cleanliness

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 8 of 17

- 4.9.2 Verify upper coil and lower coils have been paired together per engineer's instructions.
- 4.9.3 Place upper coil in the prep table stands. Position coil with the midplane down.
- 4.9.4 Install .002" x 3.0" Kapton adhesive tape to coil O.D. at each quadrant. Trim to flush with coil pole turn.
- 4.9.5 Apply one layer of .002" Kapton tape to the ends of the coil in the area of the pole to achieve the same build up in this area as in the area covered by the Kapton in 4.9.4.
- 4.9.6 Clamp quench protection resistor heater holders to each end of the prep table.
- 4.9.7 Clean and inspect the coil O.D. Vacuum if necessary. Wipe with a tack rag.

NOTE

The quench protection resistor is a stainless steel ribbon that is sandwiched between two layers of Kapton tape. The stainless steel ribbon is plated with copper for 24.5 inches and is un-plated for 5 inches. This pattern is repeated along the entire roll.

- 4.9.8 Secure the end of the quench protection resistor to the lead end holder with masking tape.
- 4.9.9 Verify that strip heater has been cleaned before assembly, and that the completed heaters are wiped clean before taping them to the coil surface. Secure the end of the quench protection resistor to the lead end holder with masking tape.
- 4.9.10 Roll out quench protection resistor along the entire length of one side of the coil. Center the quench protection resistor plated areas evenly over each coil end. Tape quench protection resistor to the non-lead end holder and cut from roll.
- 4.9.11 Repeat for the other side.
- 4.9.12 Position the quench protection resistor along the centerpost area with a gap of .020 inch. Secure the quench protection resistor to the coil O.D along the centerpost using .0005 in x .5 in. Kapton tape every 12 inches.

NOTE

Be sure the Kapton tape is not wrinkled and that the quench protection resistor does not extend into the centerpost area.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 9 of 17

- 4.9.13 Apply two layers of kapton tape to the ends of the coil in the area of the pole to achieve the same radial build up in this area as in the area covered by the quench protection resistors.
- 4.9.14 Install the stainless steel pressure plates to each coil end saddle with a 6-32 x 1/2 inch pan head screw. If necessary, drill and re-tap threaded holes in end saddles using care not to drill too deep. Leave one screw loose on each saddle until after collaring is complete.
- 4.9.15 Rotate the upper coil to the midplane up position. Before installing the upper coil insulators, vacuum clean each of them. Also vacuum clean the upper coil OD.
- 4.9.16 Begin installing straight section insulators starting from the lead end. Evenly space the insulators with a .030-.050 inch gap between them. Secure each insulator with an ultem shim support and ultem FH screw. Check for proper fit of the Kapton coil midplane caps.
- 4.9.17 In conjunction with the previous step, slide the G-10 coil pole shims into place. Install the special notched shim at lead end at the proper orientation.
- 4.9.18 Cut the last straight section insulator to fit against the pole spacer at the non-lead end. Be sure that this modified insulator includes the threaded hole for the coil shim support.
- 4.9.19 Measure the length of straight section insulators on the coil and note length. Transfer this measurement to the yoke laminations, starting from the first straight section yoke lamination at the lead end to the no-lead end and mark yoke. Place (2) non-lead end insulators (centerpost removed) between this mark and the last yoke lamination. Scribe the outside of the insulator and cut off excess.

4.10 Install Upper Coil

NOTE

Critical inspections follow !

4.10.1 Inspect Upper Coil

4.10.2 Verify that the ramp box is aligned to the end of the lead end pole spacer and that the first and last standard insulators are banked hard against the coil pole spacers.

4.10.3 Verify that insulator gaps are .030 - .050 inch. Readjust as required

4.10.4 Verify that all straight section insulators (12010009) are installed correctly and no 12010063 NLE insulators are in straight section region.

4.10.5 Verify that all G-10 coil shims are in their position.

4.10.6 Verify that all ultem coil shim supports (12010066) are installed and the ultem FH screws adequately tightened.

4.10.7 Verify that notched coil shim at the LE on pole lead side has notch toward LE and notched area facing cable.

4.10.8 Verify that the first straight section insulator at the lead end is pushed firmly against the rear face of the coil pole spacer (Datum [-A-]).

4.10.9 Verify that the G-10 coil shims have approximately a 1/32" gap between them.

4.10.10 Verify that the last shims on both sides are trimmed to fit.

4.10.11 Verify that there is no debris in upper coil assembly. Vacuum and tack rag, if necessary.

4.10.12 Before installing the upper coil (with insulators) onto the beam tube, vacuum clean the ID of the coil.

NOTE

Shims may be secured in place (2-3 PLS ea) using 12010181-02 adhesive Kapton (.0005" thick). No more than 1" of tape on ID and OD of coil is allowed at each tape location. No wrinkles allowed.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 11 of 17

- 4.11 Install Upper Clamp Halves
- 4.11.1 Install upper halves of clamps at (11) locations and rotate coil 180 degrees so that the mid-plane is facing down. Be careful not to disturb the position of the insulators and other components. Reinstall anti roll pins and remove Velcro straps.
- 4.11.2 Verify that the lifting beam is free of dust and chips before raising it over the lower yoke stack. Make sure that all lifting slings are wiped clean. Avoid dragging slings over the floor or draping them over dirty surfaces.

CAUTION

When attaching lifting tongs use caution not to damage mid-plane.

- 4.11.3 Attach lifting fixture to upper coil. Check the Kapton tape on the lifting tong blades, if damaged replace the tape.
- 4.11.4 Attach first lifting tong to the 2nd standard insulator at the LE, (1" from NLE of insulator).
- 4.11.5 Attach (7) remaining clamping tongs 1" from NLE of the 10th, 18th, 26th, 34th, 42nd, 50th and 58th insulators.
- 4.11.6 Lower lifting beam over the upper coil assembly and attach cables to the eight lifting tongs.
- 4.11.7 Remove rollover halves so coil can be removed.
- 4.11.8 Install upper coil half onto lower coil half and beam tube. The upper coil must be aligned with the lower coil at lead end pole spacer within .030". Then disengage the lifting tong blades.
- 4.11.9 Install lead end insulators, with mill step located at mid-plane. The segment with the one rounded corner is located such that this corner rests against the pole lead as indicated. Use care not to tear or wrinkle the quench protection resistor. Hold in position with a few lead end yoke laminations.
- 4.11.10 Install the modified non-lead end insulator and the full size non-lead insulator at the non-lead end. The modified insulator is placed against the straight section insulators.

- 4.12 Assemble the Upper Yoke Half
 - 4.12.1 Stack the lamination pairs of the upper yoke half according to lamination crate positioning program to match bottom yoke halves. Check for loose shear pins while stacking laminations. Set aside any yoke assemblies with loose shear pins.
 - 4.12.2 Install modified laminations for temperature sensors in the middle of the upper yoke stack. See drawing for location.
 - 4.12.3 After installing the upper yoke laminations, wipe the OD of the laminations with a clean tack cloth along their entire length.
 - 4.12.4 Position collaring keys on bed of collaring press insertion table.
- 4.13 Locate Stop Blocks
 - 4.13.1 Locate LVDT'S blocks at (16) locations.

NOTE

Reference identification markings on LVDT blocks and mounting surface for proper location.

- 4.13.2 Install (2) collaring stop blocks (12010006 – AF, SHT2-2) at each end of the press.
- 4.13.3 Check for debris and install shims at each corner of the press as noted below:

- S.E. .005”
- N.E. .019”
- N.W. .019”
- S.W. No Shims

Install shims under stop blocks.

- 4.14 Loading Cold Mass
 - 4.14.1 Load magnet assembly into the press. Check for proper positioning per OPM.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 13 of 17

4.15 Pre-Collaring Electrical Tests

CAUTION

Be sure the "Hypot", yoke, and beam tube are grounded at all times. Failure to observe this caution may result in electrocution.

4.15.1 Perform a coil-to-coil hypot check at 3 kV, following RHIC-MAG-R-7242.

NOTE

The leakage current must be less than 50 μ a.

4.15.2 Electrically connect all the main coil leads together.

4.15.3 Perform a Hypot check between the main coils and the yoke at 5 kV, attaching the grounded lead of the Hypot tester to the yoke, quench protection resistors, and beam tube following RHIC-MAG-R-7242.

NOTE

The leakage current must be less than 50 μ a.

4.15.4 Attach computer printouts of pre-assembly electrical test data to the traveler.

4.16 Preparation for Electrical Testing During Collaring

4.16.1 With the coils connected in series, connect a Digital Volt Meter (DVM) across each coil and measure resistance and record in the traveler.

NOTE

DVM's are to remain in place during coil collaring. Changes in excess of 63% of the initial reading must be brought to the attention of the Cognizant Engineer.

4.17 Check Lead End Laminations

4.17.1 Align lead end laminations with standard laminations using straight edge.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 14 of 17

- 4.18 Activate Systems And Begin Collaring.
- 4.18.1 Press and hold second hand button, then press “begin collaring process” button. Ram cylinder pressure should rise to 250 PSI. (when pressure is reached continue collar button will flash).
- 4.18.2 On AMTEX computer – move mouse to acquire data and click left mouse button – press control.
- 4.18.3 After data is acquired press and hold second hand button and press continue collar button (pressure will go up in 200 PSI intervals). After each pressure bump, “continue collar” button will flash before continuing, acquire data on AMTEX monitor must be pressed before continuing.
- 4.18.4 Verify that LVDT’S are within .004” from side to side.
- 4.18.5 Continue collar process until a key-way opening of .300” is achieved, if key-way of .300” is reached before 3116 PSI or not reached by a maximum pressure of 4350 PSI, contact supervisor.
- 4.19 Key Insertion

CAUTION 1

Do not place hands or foreign objects near keyways.

CAUTION 2

Eye protection shall be worn when tapping keys.

- 4.19.1 Activate the “control lockout” key switch. This prevents accidental operation.
- 4.19.2 Manually insert keys into key-ways. Be sure that beveled edge of key faces center of cold mass. Keys should protrude past cold mass approximately ¼” at each end and not protrude radially beyond yoke OD.

NOTE

Light tapping under pressure is acceptable to seat keys.

- 4.19.3 Prior to removing system pressure stop concurrent electrical test data collection and record data in the traveler.
- 4.19.4 Press end collaring.

4.19.5 Unlock the “control lockout” on press.

NOTE

Before removing keyed assembly, mark top portion of LE LAM to identify up direction, (for coil traceability), magnet serial number and part number w/rev using a permanent type marker.

4.19.6 Verify all stop blocks are removed after press is opened.

4.20 Final Inspection and Preparation

4.20.1 Inspect cold mass:

- Coils positioned properly.
- No saddle damage.
- Leads are positioned properly.

4.20.2 Tighten coil end saddle screws

4.20.3 Unload Press

4.21 Post-Collaring Electrical Tests

4.21.1 Measure coil temperature. Measure voltage drops across coil at 1 amp DC, following RHIC-MAG-R-7320. Complete the measurements of inductance and quality factor (Q) following RHIC-MAG-R-7228.

4.21.2 Perform an ohmmeter check of the resistance between the two coils, following RHIC-MAG-R-7243. Verify that the resistance is at least 20 mega-ohms.

CAUTION

Be sure the "Hypot", yoke, and beam tube are grounded at all times. Failure to observe this caution may result in electrocution.

4.21.3 Perform a coil-to-coil hypot check at 3 kV, following RHIC-MAG-R-7242.

NOTE

The leakage current must be less than 50 μ a.

4.21.4 Electrically connect the main coil leads together.

- 4.21.5 Perform a hypot check between the main coils and the yoke at 5 kV, attaching the grounded lead of the Hypot tester to the yoke, quench protection resistors, and beam tube following RHIC-MAG-R-7242.

NOTE

The leakage current must be less than 50 μ a.

CAUTION

Be sure the "Impulse Tester", yoke, and beam tube are grounded at all times. Failure to observe this caution may result in electrocution.

- 4.21.6 Perform an impulse test of the individual coils at 2 KV, following RHIC-MAG-R-7318.
- 4.21.7 Reconnect the coils in series as per RHIC-MAG-R-7320.
- 4.21.8 Perform an impulse test of the series connected coils at 2 KV, following RHIC-MAG-R-7318.
- 4.21.9 Measure coil temperature. Measure voltage drops across each coil at 1 amp DC, following RHIC-MAG-R-7320. Complete the measurements of inductance and quality factor (Q) following RHIC-MAG-R-7228.
- 4.21.10 Attach computer printouts of post assembly electrical test data to the traveler.
- 4.21.11 Attach Sling. Attach lifting beam with ice tongs 25-1797.01-5 to cold mass. Lift cold mass and place on padded 2 x 4's. Disconnect lifting beam and ice tongs. Manually roll cold mass 90 degrees clockwise, view looking at lead end and move cold mass to next work station.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

LHC-MAG-R-1030A

Page 17 of 17

5 Quality Assurance Provisions

5.1 The Quality Assurance provisions of this procedure require that the technician shall be responsible for performing all assembly operations in compliance with the procedural instructions contained herein and the recording of the results on the production traveler.

5.2 The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with RHIC- MAG-Q-1004.

5.3 Measuring and test equipment used for this procedure shall contain a valid calibration label in accordance with RHIC-MAG-Q-1000.

6 Preparation for Delivery:

N/A