TS-SSC 92-082

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DCA320 Production Summary

DCA320 is the tenth SSC 50 mm aperture collider dipole magnet to be built and tested at Fermilab. Its assembly followed the baseline as stated in the 50 mm Collider Dipole Magnet Requirements and Specifications Book[1] (the Yellow Book). This report will summarize the production history of DCA320 and note any major discrepancies from the baseline design, however it is not a complete discussion of all "Discrepancy Reports". A number of references will be made to DCA320's Specific Data Summary Traveler (SDST) and to the Fermilab Advanced Magnet R&D group's technical note series.

The coils for magnet DCA320 were built with all kapton insulation. The inner coil insulation system consisted of a butt wrap layer of 1 mil kapton LT film over a 50% overlap layer of 1 mil kapton H film. The outer coil insulation system consisted of a 50% overlap layer of 1 mil kapton LT film over a 50% overlap layer of 1 mil kapton H film. (For a more complete description of the assembled coils see the production report for DCA321.) The inner coils used were designated 15M-50-1021, and 15M-50-1022, and the outer coils were designated 15M-50-2022 and 15M-50-2023. The kapton insulation was torn at the return end during sizing. It was repaired. Also during sizing some foreign material was found on the coils and shorts to the sizing apparatus were discovered and repaired. (See DR's 440, 447,448.) The averages of the azimuthal measurements, taken in three inch sections along the length of the inner coils, were 7.3 and 4.1 mils relative to the steel master block, with standard deviations of 1.3 and 1.4 mils. Azimuthal measurements of the outer coils resulted in averages of -7.8 (2022) and -8.6 mils (2023) with standard deviations of 1.0 and 0.7 mils. The inner coils were measured with the automatic coil sizing machine while the outer coils were sized with the semi-automatic method (2022 was sized twice, 2023 was sized three times). These azimuthal sizes (with the inclusion of a 5 mil shim on the outer coils) provided adequate final (pre-cold test) prestresses in the desired ranges (8-12 kpsi for the inner coils and 6-10 kpsi for the outer coils). The SDST should be consulted for details.

The initial keying of DCA320 resulted in a turn to turn short in 15M-50-1022. (See DR480 and TS-SSC 92-044.) The collared magnet was disassembled and the short repaired. The collaring of magnet DCA320 on 4-3-92 went smoothly. A prestress history plot can be found in the SDST, along with a memo indicating the position of the 2 collar gauge packs relative to the maximum and minimum of the summed azimuthal size of the inner coils. The collar gauges indicate that the maximum inner (outer) coil stresses were about 15 kpsi (12 kpsi) and the final stresses after collaring were in the range of 9.5-10 kpsi (6-8 kpsi). Voltage tap 15D on 15M-50-1021 was lost shortly after keying.

The stainless steel magnet shell was welded between May 6 and May 12, 1992. The yoke packs on DCA320 were configured with 4 approximately 12 foot

long packs, with 99% packing factor, sandwiched between monolithic packs.

A plot of the measured end forces can be found in the SDST. The final force was approximately 1500 pounds.

A change in the electrical wiring configuration was made for this magnet. See DR 517.

A vacuum leak was found at the return end access port cover during leak checking. It was repaired by welding. See DR 522.

As part of an R&D effort to control shield shape, support ribs were added to the 20 K shield. DR's 528,529 and 531 should be consulted for details. The platinum temperature sensor #6 was lost. There were some out of tolerance measurements of the tube alignments, as has been seen on previous magnets.

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[1] 50 mm Collider Dipole Magnet Requirements and Specifications, E.G. Pewitt ed., 8-16-91.

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Alternate End Part Materials in FY92 Short Models TS-SSC 92-083 R. Bossert 10-6-92

Below is a list of all coils from FY92 which contained end parts other than the "baseline" machined G-10:

Coil No.	Magnet No.	Date comp.	Material Used	Notes	Cable Insulation Used
1M-50-126 Inner Coil	None	8/16/91	Stycast on Return End Coated Aluminum lead end key (polyphenylene sulfide)	Stycast only on key, spacer #3 and saddle. Other parts filled in with G-10. Coil was not sectioned	1/2 lap H film Butt lap glass tape
1M-50-127 Inner Coil	None	9/6/91	Spaulding RTM (102) on return end Coated Aluminum on lead end key (epoxy ester)	Spaulding RTM only on key and saddle. Other parts filled in with G-10. Coil was not sectioned	1/2 lap H film Butt lap glass tape
SSCL outer coil. No FNAL number.	None	9/10/91	RTM "Cryorad" on Return end Saddle. Outer Coil.	RTM part only on return end saddle. Other parts will be filled in with G-10. Coil was sectioned and delivered to F. Nobrega.	Cryorad adhesive Insulation ?
1M-50-128 Inner coil	None	9/20/91	Spaulding RTM (101) on return end Coated Aluminum on lead end key. (Dupont polyimide varnish)	Spaulding RTM only on key and saddle. Other parts filled in with G-10. Coil was not sectioned.	1/2 lap H film Butt lap glass tape
1M-50-129 Inner coil	None	10/1/91	Amoco Torlon machined by VMS on return end. Coated Alum. on lead end key.	All return end parts are Torlon Coil was potted and sectioned.	1/2 lap H film 1/2 lap H film w/adh (2290) on one side.
1M-50-130 Inner coil	DSI340	10/15/91	Green Tweed Arlon (PEEK) machined by VMS on return end. Coated aluminim on lead end key	All return end parts are Arlon. Coil was potted and sectioned.	2/3 lap H film 1/2 lap H film w/adh (2290) on one side.
1M-50-131 Inner coil	DSI340	11/12/91	Machined G-10 on all parts except coated aluminum keys on both ends.		2/3 lap H film 1/2 lap H film w/adh (2290) on one side.
1M-50-135 Inner coil	DSA330	1/20/92	Spaulding RTM (101) on return end	Spaulding RTM only on key and saddle. Other parts filled in with G-10.	1/2 lap H film Butt lap LT film w/ adh (2290) on one side.
1M-50-136 Inner coil	DSA330	1/23/92	Spaulding RTM (101) on return end	Spaulding RTM only on key and saddle. Other parts filled in with G-10.	1/2 lap H film Butt lap LT film w/ adh (2290) on one side.
1M-50-143 Inner coil	DSA333	9/10/92	Amoco Torlon machined by VMS on return end.	Magnet cold tested at FNAL.	1/2 lap H film Butt lap LT film w/ adh (2290) on both sides
1M-50-144 Inner coil	DSA333	9/15/92	Amoco Torlon machined by VMS on return end.	Magnet cold tested at FNAL.	1/2 lap H film Butt lap LT film w/ adh (2290) on both sides
1M-50-147 Inner coil	DSA334	8/15/92	RTM "Cryorad" on return end key and saddle.	Magnet cold tested at FNAL. Parts supplied by F. Nobrega. Other parts filled in with G-10.	1/2 lap Apical NP film Butt lap NP film w/ adh (Cryorad) on both sides
1M-50-246 Outer coil	DSA334	8/20/92	RTM "Cryorad" on return end key and saddle.	Magnet cold tested at FNAL. Parts supplied by F. Nobrega. Other parts filled in with G-10.	1/2 lap Apical NP film Butt lap NP film w/ adh (Cryorad) on both sides