DCA317 Production Report

TS-SSC 92-051
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DCA317 is the seventh SSC 50 mm aperture collider dipole magnet built 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 DCA317 and any discrepancies from the baseline design. References will be made to the Fermilab Advanced Magnet R&D Group's technical note series (TS-SSC's), and to the discrepancy reports (DR's).

More detailed information on all assembly and testing steps may be found in the Specific Data Summary Traveller and the Traveller for this magnet. Note: Not all DR's pertaining to DCA317 are referenced in this report. However, an attempt is made to cite all cases in which repairs had to be made or parts modified.

Coil Winding and Inspection: During cable insulation, the cable for inner coil 15M-50-1007 collapsed in at least one place. The recommendation not to use this cable was overridden by the SSCL [1]. On outer coil 15M-50-2008, the b-stage resin content was outside the normal tolerance range. This was due to a vendor error. The limit was raised from 20% to 24% for the duration of that lot of glass tape insulation [2].

Coil winding began on August 21, 1991.

During sizing of 15M-50-1007, a metal chip causing a short was found and removed [3].

The lead end saddle of 15M-50-2016 was cut .100" too short. During assembly, the resulting gap was filled in with green putty [4].

Collared Coil Assembly: During assembly, a generic memo was issued to reject all kapton ground wrap with holes, punctures, indentations, tears, fractures, or foreign matter [5]. Several problems of this type were detected. Processing continued in several cases in which there were "dark spots" on the kapton not apparently due to actual damage, and in one case an indentation was allowed to pass after high-potting the area [6].

During collar pack installation, three wires of the lead end strain gage pack needed to be spliced [7].

The magnet was first keyed without incident on October 14, 1991. No pole shims were used. The return end clamp was installed on October 17 without incident. When the lead end clamp was installed on October 24, a turn to turn short in 15M-50-1007, the upper inner coil [8]. The investigation into this short, and the repairs made on the coil, are reported in TS-SSC 91-207 and TS-SSC 91-233 [9,10]. The cause of the short was never determined, but repairs made near the short location made it possible to install the end clamp without bringing back the short.

During reinstallation of the collar packs, metal flakes were found in the collar half packs [11]. On outer coil 15M-50-2016, the pole turn near the preform lead had to be repaired because it had separated from the second turn near the key [12].

DCA317 was keyed for the second time on December 17, 1991. Approximately 7' of one of the key lengths had to be installed by hand, because the key had been inadequately mounted [13].

The return and lead end clamps were installed on December 23 and December 26, 1991. There was some extra saddle material at the return end, which was cut off. At the lead end the extra material was left on, and a gap was allowed between the end clamp collets and the collar laminations [14].

The harmonics of the collared coil assembly were measured on January 17, 1992, using the BNL B2 Mole system.

Adjustments to the radial splice block at the lead end were necessary to get the j-splice to fit [15].

Yoking and Shell Welding: Shell welding took place on January 21 through January 24, 1991 without incident.

Final Assembly and Cryostatting: The shell was somewhat out of round at the ends after welding, and for this reason the end plates had to be modified and some shell material had to be ground away, so that the end plates could fit onto the shell [16].

The MLI blanket was cut too short due to a misunderstanding over drawings, and a "flow of parts" memo was put in place to prevent this from reoccurring [17].

As usual, the end domes did not have the correct radius [18].

The helium return line support bracket had to be tack welded into position because the mounting bolt was sheared off [19].

Several wires had to be repaired before shipping the magnet [20].

The magnet was delivered to MTF on March 17,1992, and quench testing began on March 29, 1992.

Summary: Other than the repaired turn to turn short in 15M-50-1007, the source of which was never determined, DCA317 had no major problems during assembly. It has no major special features of which we are aware.

References

1. DR 57.
2. DR 84.
3. DR 198.
4. DR 199.
5. DR 216.
6. DR 206, 215, 226.
7. DR 237.
8. DR 267.
9. TS-SSC 91-207, "DCA317 Turn to Turn Short", S. Delchamps, October 25, 1991.
10. TS-SSC 91-233, "DCA317 Turn to Turn Short II", S. Delchamps, December 3, 1991.
11. DR 276.
12. DR 341.
13. DR 359.
14. DR 365.
15. DR 381.
16. DR 413.
17. DR 457.
18. DR 425.
19. DR 463, still open.
20. DR 482.