

DCA313 Production Report

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DCA313 is the third 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 (the "Yellow Book.") This report will summarize the production history of DCA313 and any relevant discrepancies from the baseline design. Particular attention will be made to describe anomalies that are judged to have a possible influence on performance. References will be made to the Specific Data Summary Traveler (SDST) and to the Fermilab Advanced Magnet R&D Group's technical note series. Notes in the latter series are indicated by the prefix TS-SSC.

DCA313 is the first "GD" magnet. General Dynamics production personnel assumed primary responsibility for construction under the observation of Fermilab personnel.

Coil winding and Inspection

Upper Inner Coil 15M-50-1008 : A strand popped out of the cable matrix at the first turn. Cable tension machine was turned off during winding. Some strands were exposed in the cable and repaired. A metallic chip caused a measurement error and was removed [1,2,3,4].

Lower Inner Coil 15M-50-1009 : Some metal chips were found on the coil retainers. Torn insulation was repaired [5,6,7].

Upper Outer Coil 15M-15-2008 : There were several cases of torn B-stage and Kapton which were repaired. Power to the tension machine was bumped off during winding. A chip was found on the parting plane [8,9,10,11,12].

Lower Outer Coil 15M-15-2009 : Metal chips and burrs were found on retainers. There was a case of torn B-stage and a separation was found between windings 14 and 15 [13,14].

Collared Coil Assembly

Voltage tap 14B on the lower inner coil is open. Tap 18B opened after collaring, either during keying or subsequent handling. New procedures were implemented to prevent reoccurrence. Metal chips were found in some collar packs [15,16,17]. The axial distance from the end can and insulator was larger than expected [18,19]. Criteria for determination of whether the end can is "on" was modified [20]. Voltage tap 19B on the lower inner coil was open [21].

Yoking and Shell Welding

An incomplete weld was found along skin key and filled in [22].

Final Assembly and Cryostatting

Torquing of the return end bushing screws was not performed as per the bullet preloading procedure because the end plate was warped during welding of the extension tube [23,24]. After tack welding the return end cap extension assembly, bullet gauge 1A was shorted [25]. The positions of several flanges relative to the lead end beam tube were found to be out of tolerance due to temporary fixturing [26,27].

References

1. DR073
2. DR076
3. DR087
4. DR089
5. DR095
6. DR099
7. DR111
8. DR084
9. DR085
10. DR091
11. DR092
12. DR110
13. DR103
14. DR104
15. DR123
16. DR127
17. DR139
18. DR156
19. DR165
20. TS-SSC 91-159
21. DR224
22. DR300
23. DR265
24. TS-SSC-218
25. DR286
26. DR349
27. DR350