FABRICATION OF NEW MAGNET POLE SHIELDS FOR THE 80 keV NEUTRAL BEAM LINES FOR DIII–D*

H.J. Grunloh, C.B. Baxi, J.L. Busath, R.W. Callis, H.K. Chiu, M. DiMartino,
R.M. Hong, J.A. Leuer, W.C. Martin, E.E. Reis, R.H. Ryder, and R. Tao
General Atomics, P.O. Box 85608, MS 13-250, San Diego, CA 92186-5608 USA
Corresponding author: grunloh@fusion.gat.com

In September 2003, a water leak emanating from a magnet pole shield in one of the 80 keV neutral beam lines halted DIII–D physics experiments. Investigation showed that impingement of the diverted charged particle beam on the copper shield plate initiated melting and a through-wall crack that propagated through a brazed stainless steel cooling line. A subsequent survey of all pole shields in the four neutral beam lines found that similar damage was present in eight of the other twelve shields but to a lesser extent. The decision was made to arrest the crack propagation in damaged shields and to begin fabrication of new pole shields, which will be installed during the long torus opening of 2005–2006.

A summary is presented of the physical damage that was found in the shields and the assessments that were conducted to determine the cause of the damage. The custom tooling that was developed and then utilized inside the beam lines to arrest crack propagation in the shields is also presented. Modifications to the design of the shields were made to minimize stress concentrations and were implemented in the new pole shields. A method was devised to fabricate the serpentine cooling tubes that are brazed into matching grooves in the shields. This presentation includes descriptions of the shield design modifications and the procedures that were employed to successfully complete the fabrication of the new pole shields.

Topical Category: 10) Heating and current drive

Preference: Poster

Principal Author:
H.J. Grunloh
General Atomics
P.O. Box 85608
MS 13-250
San Diego, CA 92186-5608 USA
grunloh@fusion.gat.com
phone: 858-455-3294
fax: 858-455-2838

*This work was supported by the U.S. Department of Energy under DE-FC02-04ER54698.