

FABRICATION AND REPAIR OF ION SOURCE COMPONENTS IN THE 80 KeV NEUTRAL BEAM LINES FOR DIII-D*

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After eight years of operation, leaks began to develop in critical components of the ion sources of the 80 KeV neutral beam lines in DIII-D. Operational adjustments were made that seemed to remedy the problems, but five years later leaks began occurring again, this time with greater frequency. Failures occurred in the stainless steel bellows and molybdenum rails of the grid rail modules as well as in the Langmuir probes. Failure analyses identified several root causes of the leaks and operational adjustments were again made to mitigate the problems, but the rash of failures depleted the program's supply of spare grid rail modules and probes and removed one of the ion sources from regular operation.

Fifteen years after their original fabrication, the ion source components were no longer commercially available. In 2001 a program was initiated to fabricate new grid rail modules, including new molybdenum grid rails, bellows, and stainless steel grid rail holders, as well as new Langmuir probes. In parallel, components removed from service due to leaks were to be repaired with new rails and bellows and returned to service. An overview of the root causes of the service failures is offered, details of the repair processes are described, and a summary and evaluation of the fabrication procedures for the new molybdenum rails, grid modules, and Langmuir probes are given.

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