

ITER Test Program

Mohamed A. Abdou

Presented to ITER US Home Team
Project Review Meeting, November 14,
1995

Introductory Remarks

- First meeting for TBWG was held in Garching July 1995. It was very well attended (Director, Deputy Director, 4 members from JCT, and 3 members from each party).

"The *TBWG* agrees to provide documentation concerning the Test Blanket Program (TBP). Such documentation should include requirements, including those placed on the ITER device by the needs of the TBP as well as those placed on the Test Blanket Program by the ITER device [GDRD], design descriptions of all proposed test articles [DDD], a plan for implementation of the test program, interface documents, and additions to the ITER Work Plan as required by the TBP."

Schedule

- Due 1 October 1995- Response of party delegations including requirements and justification (GDRD, Section 1 DDD) and proposals for test program
- TBWG2 to be held on October 16-18, 1995 - Cancelled
- Due 15 December 1995 - Initial draft of DDD Section 2

U. S. Progress

The U.S. TBWG Has Provided ITER JCT the U.S. Versions of a Test Blanket Program GDRD, a Test Blanket System DDD Section 1, Liquid Breeder and Solid Breeder Test Blanket Program Proposals. The Documentation Followed the Format Established by the Project.

The Required Changes to the GDRD Include:

- A New Section (5.19) Concerning U.S. Test Blanket System Requirements
- Modifications of Existing GDRD Document to Reflect the Test Blanket Requirements Placed on the ITER Device
 - Operational (Burn Duration and Earlier Testing)
 - Functional (Vacuum, Shielding, Safety, Thermal and Mechanical Loads)
 - Configurational (Integration with Ports, Vacuum Vessel, and Facilities)

The DDD Encompasses Both a Lithium-Cooled, Liquid Breeder and a Helium-Cooled, Solid Breeder Blankets.

Test Blanket System- Definition

The "Test Blanket System" is defined to include:

- Test Blanket Article
- Mounting Assembly
- Shielding/Vacuum Closure
- Unique Remote Handling Equipment
- Cooling Systems
- Tritium Processing Systems
- Unique Facilities (e.g., Hot Cell)

Test Blanket System Functional Requirements

- Intrinsic Functional Requirements
 - Adequate Breeding and Extraction of Tritium
 - Production and Efficient Extraction of High Grade Heat
- ITER-Related Functional Requirements
 - Adequate Neutronic Shielding
 - Provide Vacuum/Safety Boundary
 - Conform to Safety Requirements
 - Meet Applicable Thermal and Mechanical Load Requirements
 - Minimal Impact on ITER Operations and Availability
 - Compatible with Plasma/Material Interactions

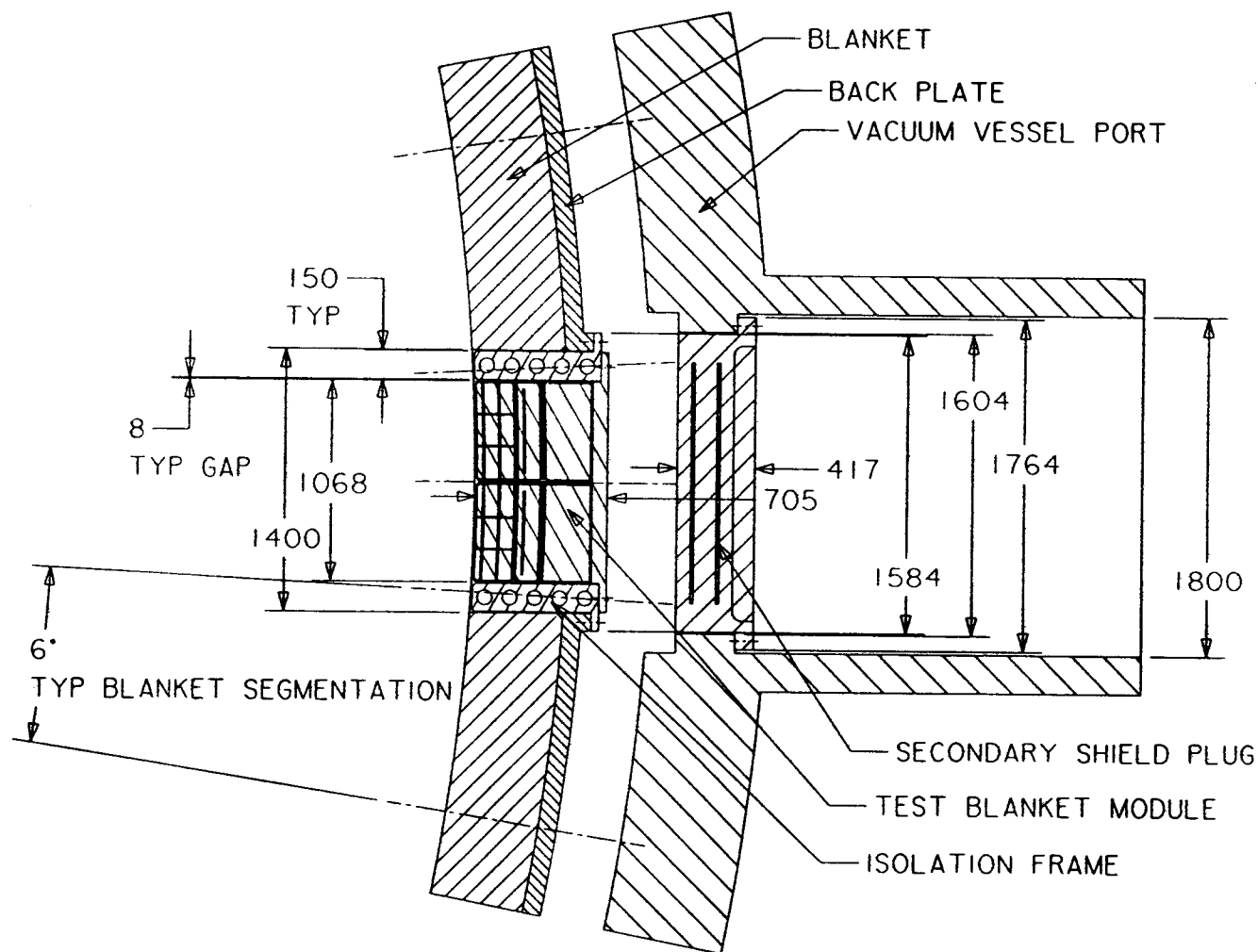
Test Blanket System Configuration Requirements

- Test Blanket First Wall Is Exposed to Plasma
 - Recessed for Reduced Plasma Erosion and Disruption Effects
 - Imposes Higher Surface Heat Loads and Erosion On Adjacent Shielding Blanket Modules
- Frame Is Used Around Test Article
 - Neutronic Isolation
 - Thermal Isolation
- Test Blanket Modules Are Attached to backplate
 - Backplate Needs to Be Reinforced Locally
- Shield/Vacuum Vessel Plug Is Attached to ITER Vacuum Vessel
 - Flanges and Sealing Provisions To Be Added
- Ancillary Equipment Will Be Located Close to Test Port

Design Integration Into ITER Test Port

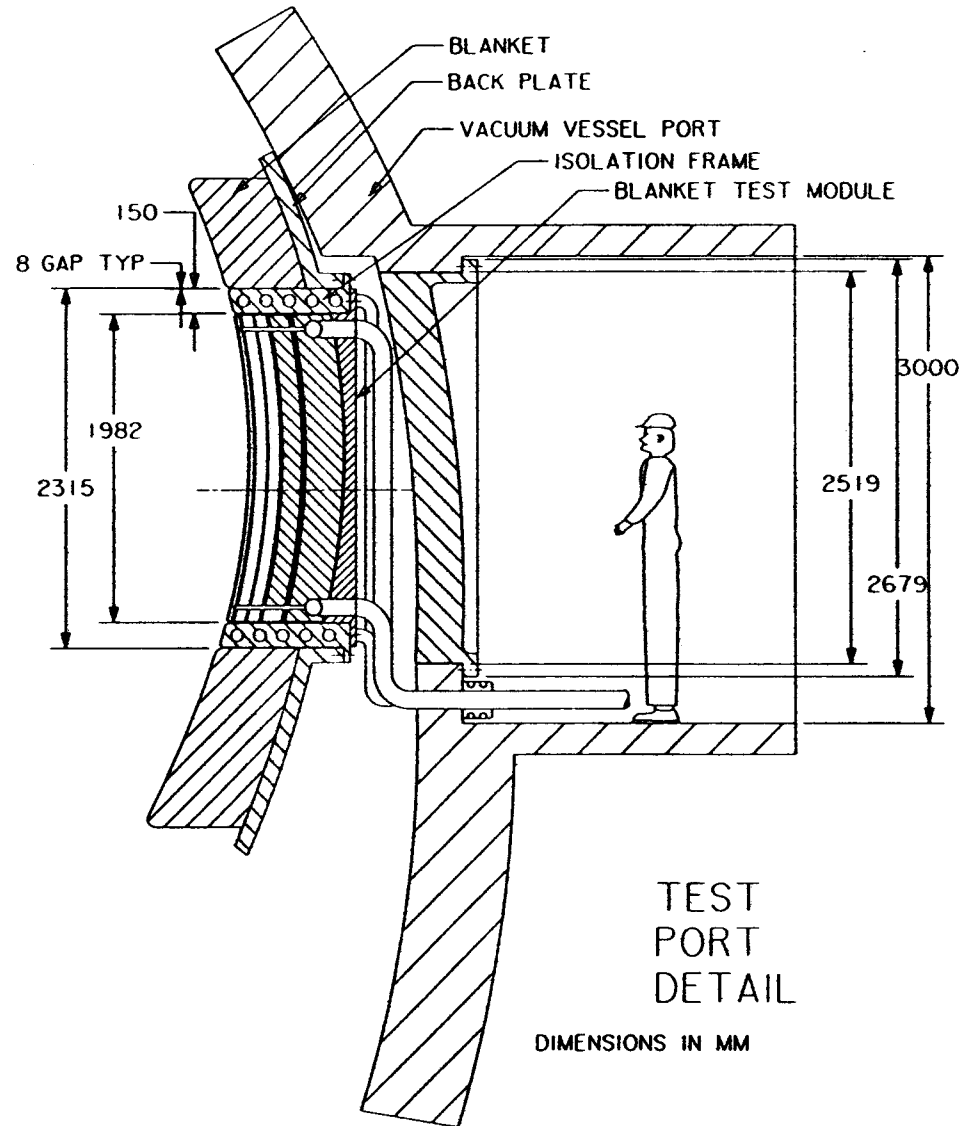
- Employ Buffer Frame Around Test Article
- Recess Test Blanket First Wall
- Attach Main Portion of Test Article To Backplate
 - Direct transfer of loads to shielding blanket backplate
 - Dimensional control of radial position and gaps (predictable shielding)
- Shield/Vacuum Boundary Attached to Vacuum Vessel
 - Establish Vacuum/Safety boundary near VV inner wall
 - Complete shielding requirements
- Test Articles Installed and Removed Through Test Ports
 - Use dedicated remote handling equipment

General Port Arrangement Plan View



TEST PORT - MIDPLANE CROSS-SECTION
PLAN VIEW - DIMENSIONS IN MM

General Port Arrangement Elevation View



Isometric View of General Arrangement of Test Blanket Remote handling and Ancillary Equipment

