

INTERFACE CONTROL DOCUMENT TITLE AND APPROVAL PAGE

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ICD Number: ICD-12-14-3-0002 VV Insulation

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Impacted WBS Elements: WBS-121, WBS-123, WBS-14, WBS 3

Type of Interface: Mechanical/Envelope Interface

Description of Interface: The Vacuum Vessel (VV) includes a layer of insulation around the port extensions which aids in regulating the VV temperature during bake out and operation. An insulation layer on the Modular Coil (MC) face protect the MCs from excessive thermal loading. This ICD defines the requirements for this insulation and the clearances required between the VV and the MC.

Record of Revisions

Revision Numbl	Description	Date
0	Initial issue	12/16/2004
1	Remove insulation from VV body	5/24/06

Approvals

WBS Manager:	WBS Manager:
WBS Manager	
Project Engineer:	Project Engineer:
Systems Engineering Support Manager:	

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(Use Continuation Sheets as Necessary to Include the Following Applicable Information)

Scope of Interface:

This interface impacts the design of the VV, the Heating and Cooling Distribution System, Diagnostics, the Cryostat structure, and the MC design.

Equipment and Responsibility List:

Vacuum Vessel (WBS 121) Goranson
Vacuum Vessel Insulation (WBS 122) Goranson
Heating and Cooling Distribution System (WBS123) Goranson
Modular Coil (WBS14) Williamson
Diagnostics (WBS 3) Johnson
Cryostat (WBS 6) Gettlefinger

Related ICDs:

ICD-1203-361-01

Notes and Abbreviations:

Interface Block Diagrams:

Installation/Operation Information:

Insulation blankets are installed on the front face of the MC coils. This insulation must lie within a nominal contour 0.38 inches from the surface of the MC, the goal being to permit maneuvering of the VV into the MC structure without damage to the insulation.

The port extensions extending out through the MC structure are covered by layers of insulation which are nominally 1.5 inches thick. Regions outside the MC structure are covered by layers which are nominally 2 inches thick. The port extensions must maintain a clearance of 1.0 inches to the MC structure during bakeout when the VV is at 350 C and the MC structure is cooled to 80 K. The insulation mounting must be done after installation of electrical heaters and thermocouples onto the port extensions, and before installation of the MC shell boot seals, and may be installed before or after welding of the extensions onto the VV, at the discretion of the installers.

The insulation around the VV body and around the vertical ports (Port 12) is installed after installation of the VV inside the MC and consists of back fill fill with granular (pellet) insulation. The port 12 insulation lies between the port wall and a sheet metal standpipe mounted between the MC shell and the Cryostat ceiling. The goal is to thermally isolate the VV coolant tubes from the vertical port and prevent undue heating of its flange during bake out. Diagnostics and thermocouples must be installed first.

VV thermal loads through insulation:

Load to MC cooling system during 350 C bakeout	3.3 kW
Load to cryostat cooling system during 350 C bakeout	16.4 kW
Load to MC cooling system during MIE 150 C bakeout	2.0 kW
Load to cryostat cooling system during MIE 150 C bakeout	13 kW
Load to MC cooling system during standby	1.5 kW
Load to cryostat cooling system during standby	6.7 kW

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(Use Continuation Sheets as Necessary to Include the Following Applicable Information)

Other Pertinent Information:

Reference documents:

VV Local Thermal Analysis	NCSX-CALC-121-001
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NCSX Vacuum Vessel Heat Balance Analysis	NCSX-CALC-123-003
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NCSX Vacuum Vessel Heating/Cooling Distribution System Thermo-hydraulic Analysis	NCSX-CALC-123-002
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