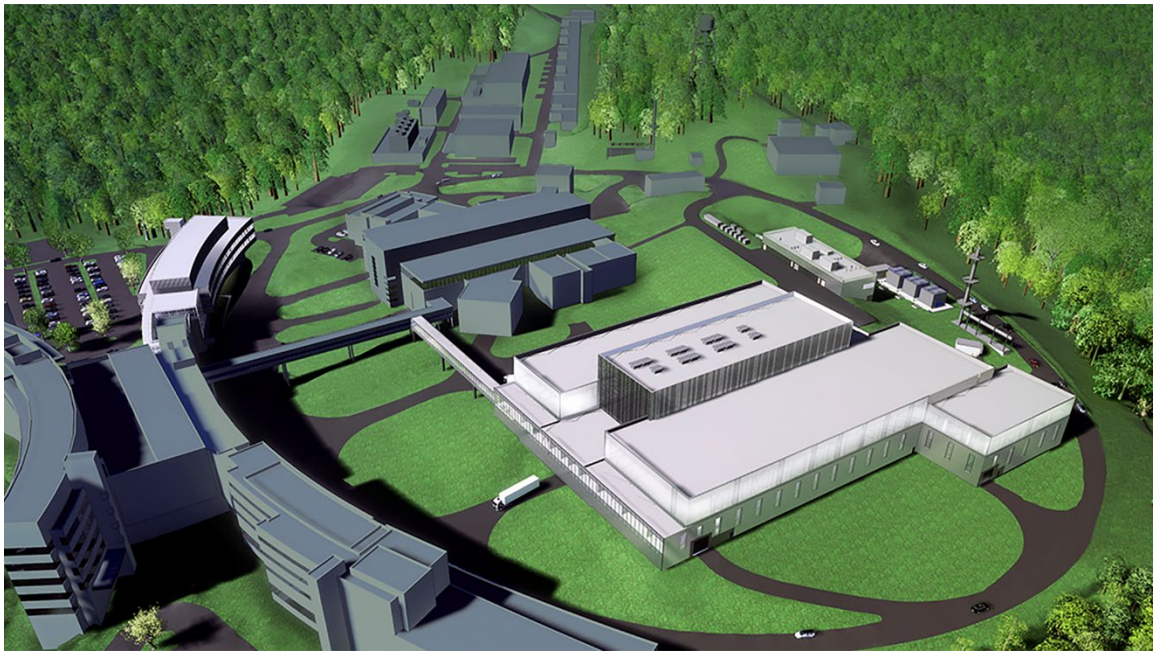
Second Target Station Project: Interface Sheet - Vessel Systems (S.03.06) to Moderator Reflector Assembly (S.03.04)



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January 2025

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Second Target Station Project

INTERFACE SHEET – VESSEL SYSTEMS (S.03.06) TO MODERATOR REFLECTOR ASSEMBLY (S.03.04)

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CONTENTS

1. PURPOSE

This document defines the interface between Target System's Vessel Systems (VS) and Moderator Reflector Assembly (MRA). Requirements derived from this document will be included in the System Design Requirements for VS and MRA.

2. SCOPE

The scope of this document is the complete definition for the interface between VS and MRA.

1. INTERFACING PARTS OR COMPONENTS

No.	Components (MRA)		Components (VS)	
	Name	Functional reference Number	Name	Functional reference Number
1	Moderator Reflector Assembly	S03040000-M8U-8800-A10000.asm	Vessel Systems	S03060000-M8U-8800-A10000.asm
2				
3				
4				

3. ACRONYMS AND DEFINITIONS

ICD	Interface Control Document
IS	Interface Sheet
MRA	Moderator Reflector Assembly
SSC	Structure, System or Component
STS	Second Target Station
WBS	Work Breakdown Structure
VS	Vessel Systems
CV	Core Vessel

4. DOCUMENTS APPLICABLE TO THE INTERFACING SSCS

Ref	Document Titles	Document Control System Location
[1]	Interface Sheet for Target Assembly, Moderator Reflector Assembly, and Vessel Systems	S01020500-IST10205-R0A

5. INTERFACE DEFINITION

5.1 TECHNICAL DESCRIPTION OF THE INTERFACE

VS consists of the Core Vessel (CV), Core Vessel internal shielding, and Nozzle Extensions. MRA consists of the moderator reflector assembly weldment (including water pipes), MRA mounting hardware and MRA utility pipe tie-downs. The VS components that interface with MRA include the Core Vessel and the Core Vessel shielding. The subsequent sections define the interfaces between VS and MRA.

5.2 INTERFACE DATA

5.2.1 MRA Access

The MRA is housed in the center of the CV, surrounded by CV shielding. A single MRA removable shield block has been designed that resides directly above the MRA within the CV. In order to access the MRA for an MRA change out event, the MRA access hatch in the CV lid is removed and the MRA removable shield block is pulled vertically out of the CV. The sizing of the MRA access hatch must allow for the vertical removal of the MRA shield block and the MRA. Once these two components are removed, a clear line of site from above the CV to the MRA is established. A side utility hatch has also been included in the CV lid to allow for additional access the MRA utility jumper lines during MRA removal and installation. The VS components that require removal in order to access the MRA are designed to be removed during a single 8 hour shift.

5.2.2 Cooling Water Interface

The MRA design includes 5 water supply and 1 water return pipes that terminate as flanged connections sitting above the CV shielding stack inside the CV. These flanged water lines are connected via jumper lines to flanged utility nozzles located in the side wall of the CV. The jumper lines will include a flexible section and a transition section to match the MRA flange size with the utility nozzle flange size. Enough flex will be designed into the lines to allow for expected deviations in flange locations and thermal expansion effects. Design and procurement of the jumper lines and gaskets is part of Vessel Systems Scope. MRA is responsible for supplying the water lines that are integrated into the MRA, and communicating the supply and water needs to Process Systems. The water line details are show in Table 1, and a CAD model of the lines is shown in Figure 1.

Table 1: Supply and return water line details for all Vessel Systems water cooled components

Item	MRA Connection	CV Utility Nozzle Connection	CV Utility Nozzle ID Number
MRA Return	1.5'' SCH40 Flange	2'' SCH40 Flange	25
MRA Backbone Supply	1.25'' SCH40 Flange	1.5'' SCH40 Flange	34
MRA Upper Premoderator Supply	0.75'' SCH40 Flange	1'' SCH40 Flange	35
MRA Lower Premoderator Supply	0.75'' SCH40 Flange	1'' SCH40 Flange	36
MRA Upper Reflector Supply	0.75'' SCH40 Flange	1'' SCH40 Flange	37
MRA Lower Reflector Supply	0.75'' SCH40 Flange	1'' SCH40 Flange	38

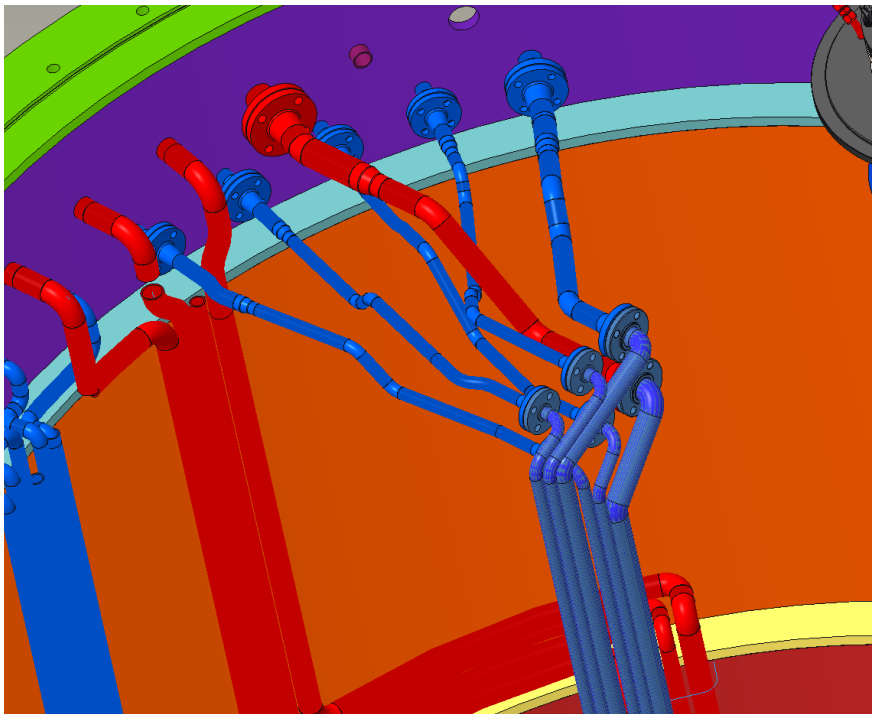

Figure 1: Utility jumper lines connecting the MRA flanged water lines to the CV utility nozzles

5.2.3 MRA Alignment and Support

The MRA will be supported and aligned via three canoe sphere assemblies located on the top of the Layer 1 CV shielding. The canoe spheres will be procured and installed by MRA. The CV shielding will be machined as necessary to allow for canoe sphere mounting. The canoe sphere mounting details are outlined in Interface Sheet S01020500-IST10205 [1].

5.2.4 MRA Clearance Management

The physical clearance for the MRA assembly within the Core Vessel is handled in Interface Sheet S01020500-IST10205 [1], a three way interface sheet between Target Assembly, MRA and VS.

5.2.5 MRA Utility Line Tie-Downs

It will be necessary to secure the water and hydrogen transfer lines to the CV shielding in order to limit line deflections in a seismic event, and to ensure that the lines remain in position during removal and installation of the MRA removable shield block. MRA is responsible for the design, procurement and installation of the utility line tie-downs. Vessel Systems is responsible for providing the necessary features in the CV shield stack to allow for installation of the utility line tie-downs. Once the utility line tie-downs are designed details will be added to this section to solidify the interface.