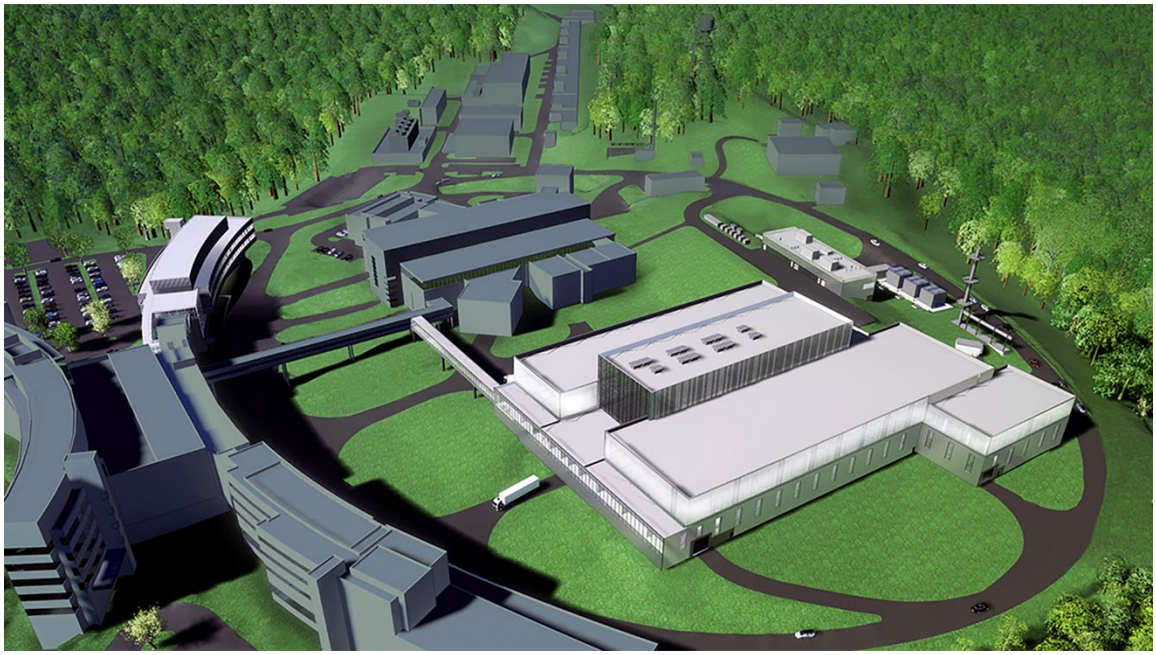
Second Target Station Project: Interface Sheet for Cryogenic Moderator System and Vessel Systems



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March 2025

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Second Target Station Project

INTERFACE SHEET – INTERFACE SHEET FOR CRYOGENIC MODERATOR SYSTEM AND VESSEL SYSTEMS

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March 2025

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00	Initial Release

CONTENTS

1. PURPOSE

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

2. SCOPE

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

1. INTERFACING PARTS OR COMPONENTS

No.	Components (CMS)		Components (VS)	
	Name	Functional reference Number	Name	Functional reference Number
1	Cryogenic Moderator System	S03030000-M8U-8800-A10000.asm	Vessel Systems	S03060000-M8U-8800-A10000.asm
2				
3				
4				

3. ACRONYMS AND DEFINITIONS

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

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

CMS consists of the Hydrogen System and the Helium Refrigeration System. VS consists of the Core Vessel (CV), Core Vessel internal shielding, and Nozzle Extensions. The majority of the Hydrogen System and the entirety of the Helium Refrigeration System are located far from the monolith; however, the Hydrogen Transfer Line which transports liquid hydrogen between the Hydrogen Coldbox and the Moderator Reflector Assembly (MRA) penetrates the Core Vessel and is adjacent to Core Vessel internal shielding. The function of the hydrogen transfer line is critical to the safety of the facility as the primary and secondary vent path to transport hydrogen away from the primary radionuclide inventory of the STS facility; therefore, protection of the transfer line from falling objects and seismic events is critical. The subsequent sections define the interfaces between CMS and VS.

5.2 INTERFACE DATA

5.2.1 Core Vessel Penetration

The CMS Hydrogen Transfer Line must penetrate the core vessel boundary just below the core vessel lid flange. The CV penetration shall consist of an 8” tube welded to an ISO200 flange, such that the hydrogen transfer line can pass through the boundary while providing a vacuum seal and pressure seal up to the CV MAWP. The CMS will provide a mating ISO200 flange which is attached to the outer diameter of the transfer line via a bellows to allow for flange fit up. Note, the penetration is grossly oversized, and the nominal hydrogen transfer line center is offset from the penetration centerline such that the hydrogen transfer line can be displaced to allow for MRA insertion and removal without contacting the penetration.

5.2.2 CMS Clearance Management

In general, the CMS Hydrogen Transfer Line will run above the Core Vessel internal shielding within the core vessel; however, any shielding in the vicinity of the CMS transfer line should maintain at least 1” nominal clearance and should be restrained to prevent contact with the transfer line.

5.2.3 CMS Transfer Line Supports

It will be necessary to secure the CMS hydrogen transfer lines to the CV or CV shielding in order to limit line deflections in a seismic event. CMS is responsible for the design, procurement and installation of the transfer line supports. Vessel Systems is responsible for providing the necessary features in the CV shield stack to allow for installation of the transfer line supports. Once the transfer line supports are designed, details will be added to this section to solidify the interface.

5.2.4 CMS Transfer Line Welding Access

Upon installation of a new MRA, the existing CMS transfer line must be welded to the MRA transfer line in situ in the Core Vessel. The Core Vessel MRA lid hatches shall be designed to provide access for welding when removed and any CV shielding which would interfere with welding access shall be designed to be removable.