

Second Target Station Project: Interface Sheet Target Assembly & Process Systems



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Second Target Station Project

INTERFACE SHEET TARGET ASSEMBLY & PROCESS SYSTEMS

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1. INTRODUCTION

This document describes the key points of agreement within the interface between the Target Assembly [S.03.02] and Process Systems [S.03.09].

The general arrangement of piping and target connections is captured in drawings S03090200-J8U-8800-A10002 and S03090200-J8U-8800-A10003.

2. PRIMARY COOLING WATER

The characteristic of the primary flow of water to the Target Assembly is shown in Table 1

Table 1. Primary Water Flow

Description	Value
Type	De-Ionized, $1M\Omega\text{-cm}$ minimum
Nominal flow	$\geq 158 \pm 5 \text{ gpm}^a$
Low flow alarm ^c	135gpm
MPS trip, low flow ^c	110gpm
TPS trip, low flow ^c	70gpm
Nominal flow temperature	$32.2 \pm 1^\circ\text{C}$
MPS trip, return flow temperature ^c	55°C
TPS trip, return flow temperature ^c	65°C
Normal operating pressure	29psig ^b
ΔP , target assembly	$\leq 15 \text{ psi}$ (CFD: 13.58 psi)
Relief setpoint, water piping	$\leq 74\text{psig}^b$
MAWP, Target Assembly	125psia ^b
Relief setpoint, Target Assembly	110psig ^b
Target Assembly Water Volume (Shaft + Segments)	0.172m^3
Heat input (rejection)	430kW

^a Flow rate set at installation, shall not be below this value (may exceed)

^b Pressure at the target supply flange

^c For reference only. Managed in future Target Systems Controls Setpoints document.

3. COOLING WATER MECHANICAL CONNECTION

The flanges of the valve assembly and rotary union are attached to the process piping, but are not to be considered as pipe supports. The maximum loading permitted at the flange of the rotary union is given in Table 2. Note that the filter supplied at the inlet of the Target Assembly is designed and supplied by Process Systems; the pressure drop of the piping and filter is not included in the pressure estimate below.

Table 2. Primary Cooling Water Mechanical Connection

Description	Value
Supply connection	4" 150# raised face flange
Supply connection height ^d	7486mm $\pm$ 5mm
Supply connection angle ^c	90°
Supply Screen ^g	< 8mm
Return Connection	4" 150# raised face flange
Return connection height ^d	7777mm $\pm$ 5mm
Return connection angle ^c	90°
Radial pipe loads ^{a b}	$\leq 6.7kN$
Axial pipe loads ^{a b}	$\leq 10.2kN$
Moment imposed perpendicular to pipe axis ^{a b}	$\leq 0.42kNm$
Torque imposed along piping axis ^{a b}	$\leq 1.7kNm$
Radial motion of the pipe flange due to target rotation ^{e f}	$\leq 1mm$
Axial motion of the pipe flange due to target rotation ^{e f}	$\leq 0.5mm$

^a Maximum allowable imposed force and moment during load combinations defined in ASME-BPVC

^b Loads are defined *per flange*

^c Angle is defined relative to beam axis, when viewed from above (with the beam going from West to East, angles are clockwise; nozzles are pointing North)

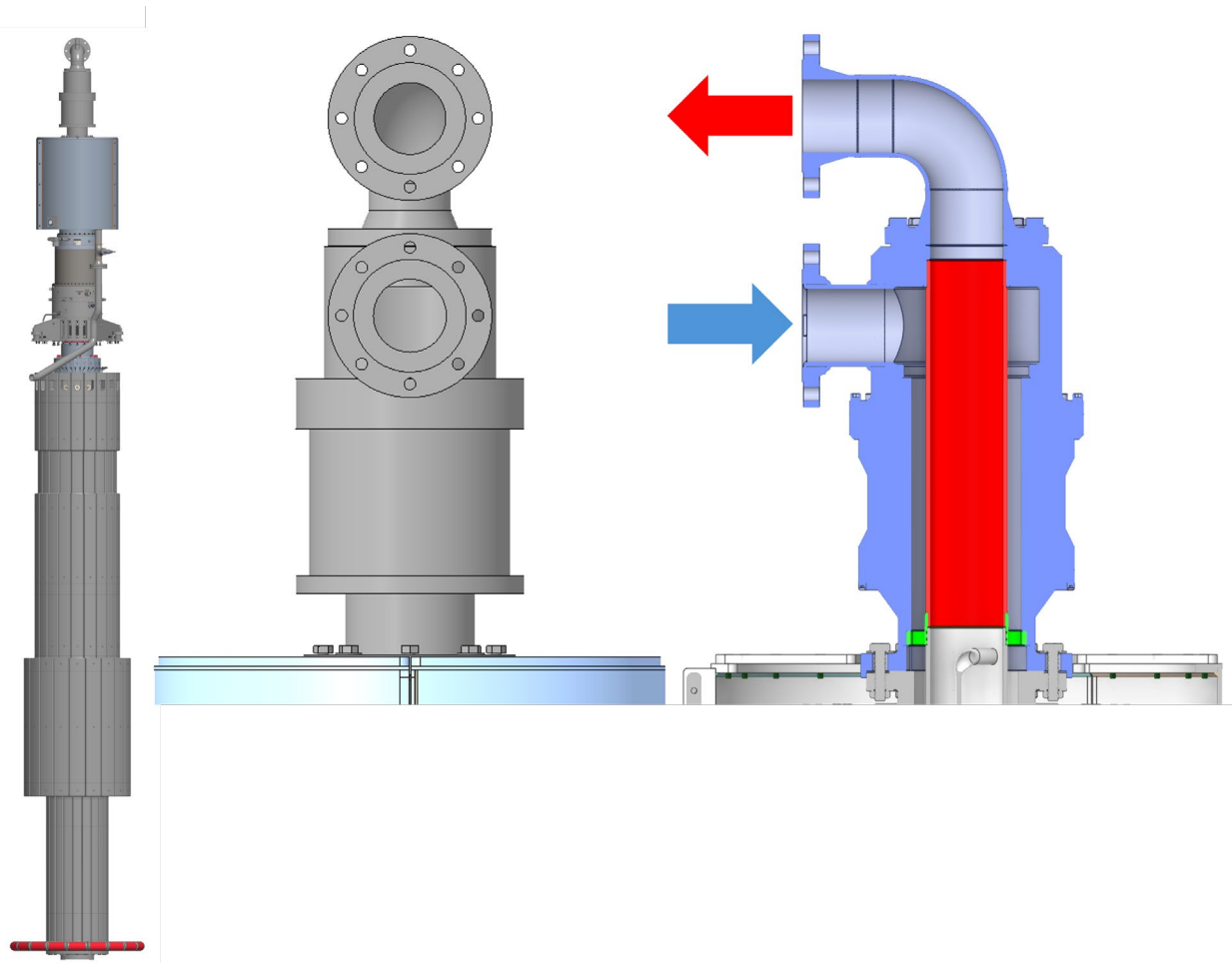
^d Distance relative to beam elevation

^e Motion due to imbalance, lash in bearings, etc. motion described in *free state*; the motion the flanges would undergo without external piping present. Loads specified shall not be exceeded in combination with specified motion.

^f Radial and axial refer to the target axis of rotation.

^g Inlet screen and gasket are provided and specified by [S.03.09]

Figure 1. Target Assembly Water Supply & Return Interface



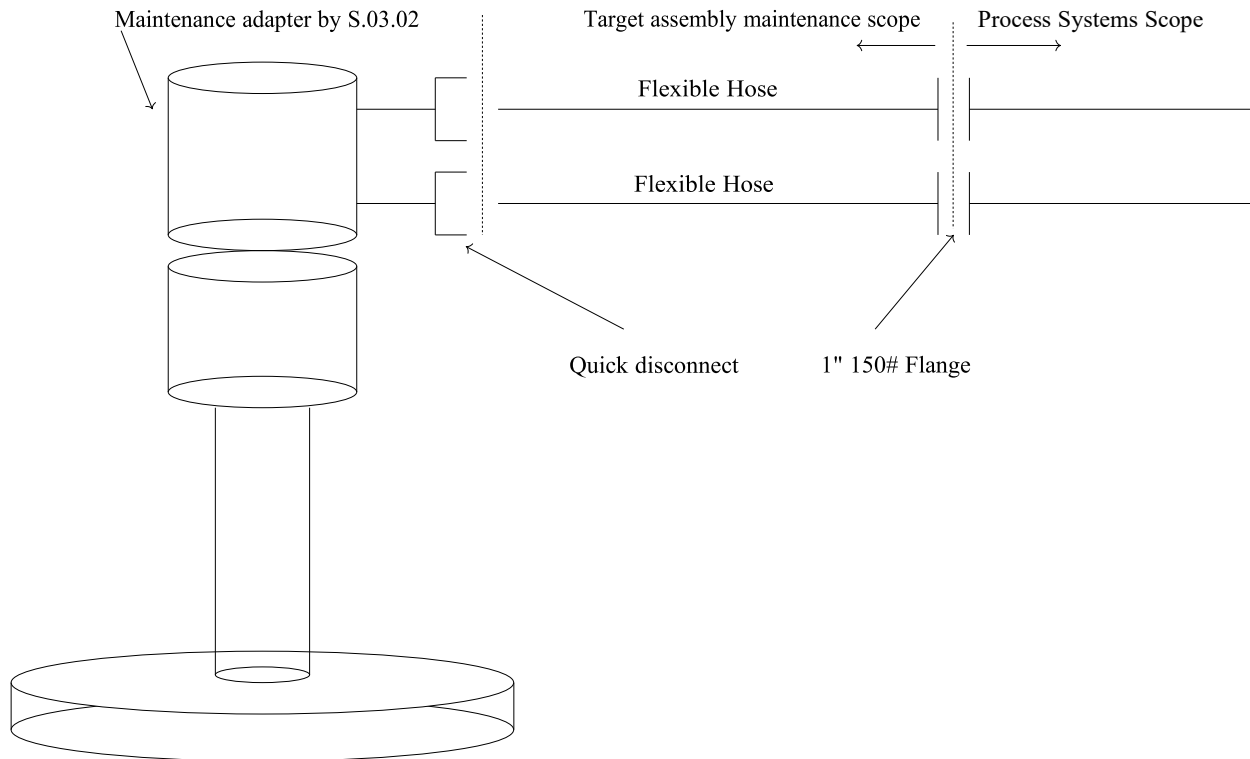
4. MAINTENANCE COOLING WATER

The target will receive cooling water during maintenance events to remove the decay heat from the target. The cooling water shall be as described in Table 3.

Table 3. Maintenance Water Flow

Description	Value
Type	De-Ionized, $1M\Omega\text{-cm}$ min
Nominal flow	≥ 5 gpm
Nominal flow temperature	$32.2\pm 1^{\circ}\text{C}$
Normal operating pressure	17 psig
Relief setpoint, water piping	≤ 74 psig
ΔP , target assembly	≤ 1 psi
Supply & Return connection	1" 150# raised face flange; on wall of Target Drive Room

Figure 2. Maintenance Cooling Water Connections



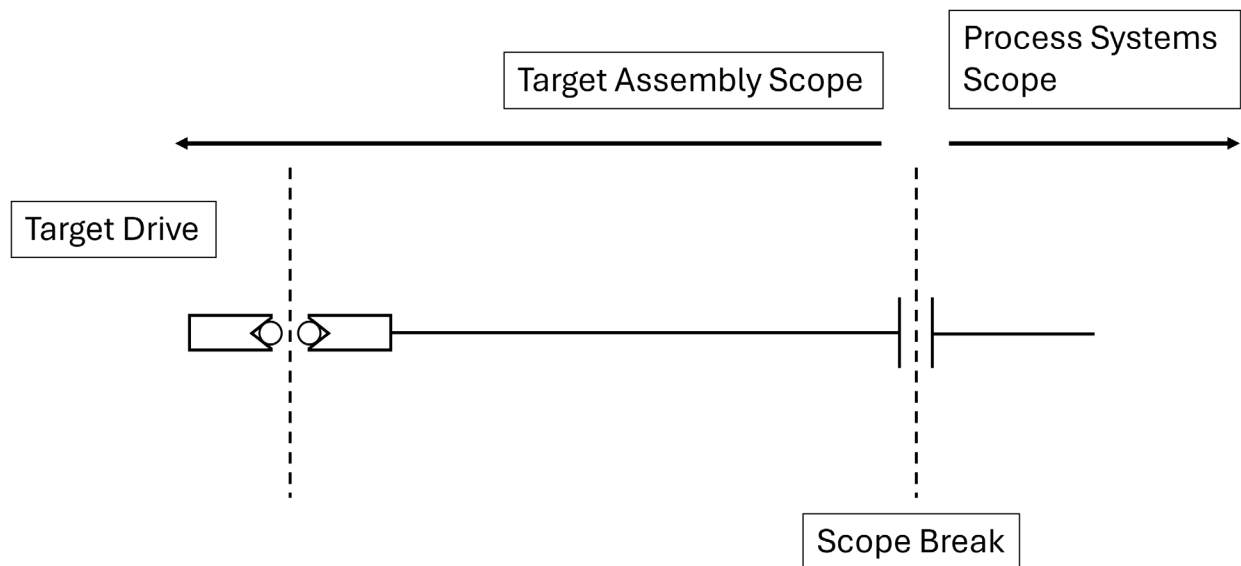
5. MAINTENANCE AIR COOLING

For maintenance blower requirements, see interface (S01020500-IST10209) between Target Assembly [S.03.02] and Vessel Systems [S.03.06].

6. MAINTENANCE SEGMENT PURGE DRAIN

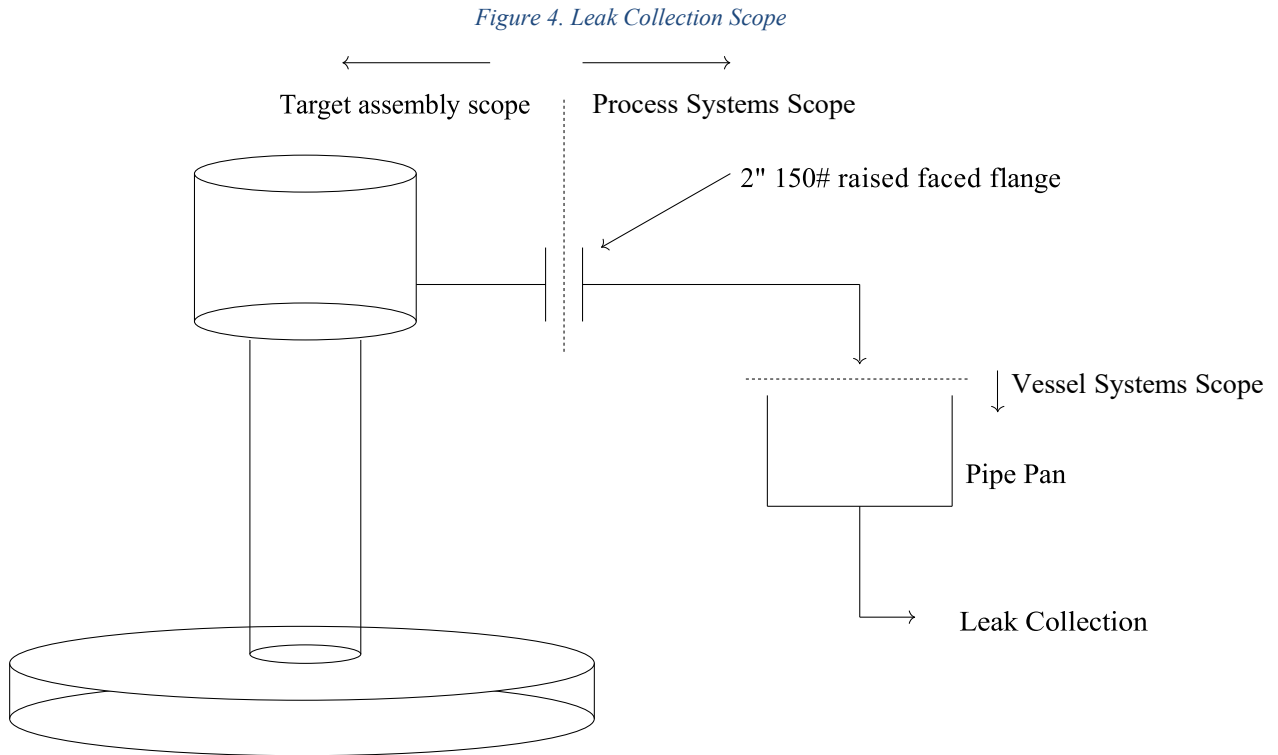
A drain connection shall be provided by Process Systems [S.03.09] to provide a drain for Segment water during the Target Segment blow-down procedure before Segment removal. The connection provided by Process Systems [S.03.09] is a 1" 150# raised face flange. Scope break shown in Figure 3. The supply pressure shall be provided within the CF [S.05.01] scope.

Figure 3. Segment Purge Drain Connection



7. DRIVE & VALVE ASSEMBLY DRAIN LINE

The Drive Assembly contains a shroud to capture any leaks (or ruptured relief devices) and direct them to the pipe pan of the Core Vessel. The drain lines routing water from the shroud to the pipe pan shall connect using 2" 150# raised face flange. Process Systems shall provide a flange and tubing to route the water from the shroud to the pipe pan.



8. ROTARY SEAL COVER GAS

Process Systems provides a cover gas to the primary rotary seal on the target drive. This seal separates vacuum from ambient and bearing grease (see Figure 5). The requirements for the cover gas are shown in Table 5.

Table 4. Rotary Seal Cover Gas Interface

Description	Value
Gas type	Helium
Mode of operation	Maintain pressure, monitor flow
Supply regulator pressure	7 psig
Supply connection	3/8" nom tube (supplied by S.03.09) to tube fitting (supplied by S.03.02)
Flow rate	0.015L/min

Figure 5. Seal Cover Gas Scope

