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EXTERNAL REFERENCE / VERSION

## Design Report

# Arrangement 5 - PHNB Pressurizer (26PHNB-PZ-5000) Equipment Summary

This document compiles the main relevant information for the equipment identified in the document title

This document support activities for the preparation of Arrangement 5

<i>Approval Process</i>			
	<i>Name</i>	<i>Action</i>	<i>Affiliation</i>
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<i>Document Security: Internal Use</i> <i>RO: Lioce Donato</i>			
<i>Read Access</i>	<b>LG: Arrangement 5 Cost Estimation, LG: USDA Arrangement 5, LG: Management, GG: IO DDGs (and Senior Advisors), AD: IO_Director-General, AD: External Management Advisory Board, AD: OBS - Project Control Office (PCO), AD: IDM_Controller, AD: OBS - Procurement &amp; Contracts Division (PCD), AD: Auditors, p...</b>		

*Change Log*

**Arrangement 5 - PHNB Pressurizer (26PHNB-PZ-5000) Equipment Summary (8RCSJM)**

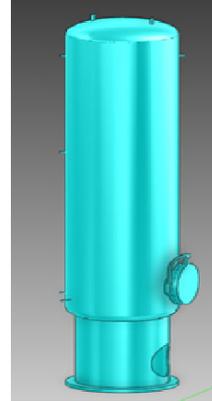
<i>Version</i>	<i>Latest Status</i>	<i>Issue Date</i>	<i>Description of Change</i>
v1.0	Signed	13 Mar 2023	
v1.1	Approved	28 Mar 2023	Update to incorporate reviewers comments

**OPERATIONAL NARRATIVE**

PHNB Pressurizer is partially filled tank with nitrogen atmosphere, which provides means to control the pressure in the NBI (Neutral Beam Injector) PHTS (Primary Heat Transfer System) during transients.

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May not be used for purchasing, fabrication or construction,  
May not be used as verified input to any document (may be used as unverified assumption).

**PHYSICAL ATTRIBUTES**

<i>Commodity Type:</i>	<b>TANK (GAS PRESSURIZER)</b>
<i>Type:</i>	Vertical Vessel (installed onto the slab)
<i>Approx. Footprint:</i>	1.6 m x 1.6 m
<i>Approx. Height:</i>	5.7 m (skirt/support excluded) 7.0 m with support
<i>Internal diameter</i>	1.362m
<i>Approx. Weight:</i>	72 000 kg (full)
<i>Tank Volume:</i>	7.9 m <sup>3</sup>
<i>Service Fluid:</i>	Water + Nitrogen
<i>Material Notes:</i>	304L with additional requirement Co < 0.2 w%, Nb < 0.1 w%, Ta < 0.05 w%
<i>Anchoring system</i>	Embedded Plate Welding or Bolting
<i>Component configuration</i>	Alone
<i>Design Life Time:</i>	20 years

WBS: Primary Heat Transfer System

PBS: 26PHNB

GBS: 11-L4-04

**REFERENCE DOCUMENTS**

Sizing calculation: XF9LCC

PID: XH2WUB

**DESIGN CODES AND SHIPPING**

<i>French Law Pressure Category / Nuclear Class:</i>	ESPN / IV / N3
<i>European Law:</i>	Pressure Equipment Directive (2014/68/EU)
<i>Fluid Type / Fluid group</i>	Gas/ Group 2
<i>Conformity Assessment Module:</i>	IV, module G
<i>Construction Codes:</i>	ASME VIII Div2
<i>Safety Class:</i>	SIC-2
<i>Quality Class:</i>	QC-1
<i>Seismic Class:</i>	SC1 (S)
<i>Fire:</i>	Eurocode 2h
<i>Shipping Information:</i>	Heavy Exceptional Load (HEL)

**ENVIRONMENTAL CONDITIONS**

<i>Integrated Dose Rate 20yrs:</i>	≤ 100 Gy
<i>Magnetic Field:</i>	≤ 30 mT
<i>Normal temperature</i>	5 – 35 °C
<i>Normal Humidity</i>	20 – 60 %
<i>Normal Pressure relative to atm:</i>	-0.14 kPa
<i>Accidental Temperature</i>	130 °C
<i>Accidental Pressure relative to atm:</i>	-5 to +100 kPa
<i>Accidental Humidity</i>	100 %

## PHNB – Pressurizer (26PHNB-PZ-5000)

NOZZLE SCHEDULEPARAMETERS

Parameter	Value
Nominal Temperature (°C)	38
Design Temperature (°C)	100
Nominal Pressure (MPa)	0.35
Design Pressure (MPa)	2.6
Nominal mass flowrate (kg/s)	2.0
Thermal insulation thickness (mm)	25

I.D.	DN / Schedule	Service
N1	100 / 40S	Surge Line
N2	25/40S	Mixing line
N3	N.A	Thermowell 1”1/4 ISO 228
N4	25/40S	N2 charging line
N5	50/40S	Venting line
N6	15/40S	Level measurement
N7	15/40S	Level measurement
N8	15/40S	Level measurement
N9	15/40S	Level measurement
N10	15/40S	Level measurement
N11	15/40S	Level measurement
N12	15/40S	Level measurement
N13	15/40S	Level measurement
N14	40/40S	Pressure Relief Line
N15	600/TBD	Manway
N16	15/40S	Level measurement
N17	15/40S	Level measurement
N18	15/40S	H2 sampling line

## Notes:

1. Approximate footprint is based on 3d model approved configuration.
2. All nozzles are butt welded.
3. Support shall be accounted in the vendor estimate. The approximate clearance between tank bottom and floor is 1.5 m.
4. Fire: The equipment shall be insulated with fire resistant insulation against a Eurocode 2h fire. The insulation is included in the scope. The insulation thickness shall be sufficient to limit the metal temperature under the insulation to 226 °C. The uninsulated support structures shall be assumed to be at 400 °C. The supplier shall demonstrate resistance to the fire.

