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EXTERNAL REFERENCE / VERSION

Report

Arrangement 5 - CVNB degasifier Skid(26CVNB-SFU-5401) Equipment Summary

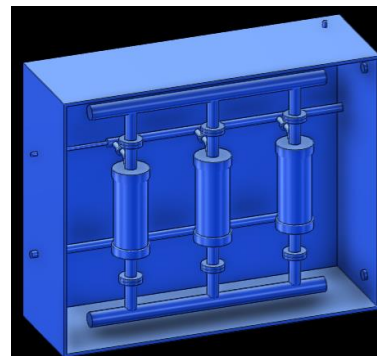
This document provides a summary of CVNB degasifier Skid(26CVNB-SFU-5401)

Approval Process			
	<i>Name</i>	<i>Action</i>	<i>Affiliation</i>
<i>Author</i>	Kanda K.	03 Apr 2023:signed	IO/DG/CNST/PLD/MID/TCWS
<i>Co-Authors</i>	West S.	03 Apr 2023:signed	IO/DG/CNST/PLD/MID/TCWS
<i>Reviewers</i>	Berruyer F. Ciampichetti A. Gao J. Ghirelli N. Ricou E. Van hove W.	04 Apr 2023:recommended 05 Apr 2023:recommended 03 Apr 2023:recommended	IO/DG/CNST/PLD/MID/TCWS IO/DG/CNST/PLD/MID/CMW IO/DG/CORP/FPD/PCD/CAL IO/DG/CNST/PLD/MID/TCWS IO/DG/CNST/PLD/MID/TCWS ORNL - Oak Ridge National Laborator...
<i>Approver</i>	Lioce D.	07 Apr 2023:approved	IO/DG/CNST/PLD/MID/TCWS
Document Security: Internal Use RO: Lioce Donato			
<i>Read Access</i>	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 & Contracts Division (PCD), AD: Auditors, p...		

<i>Change Log</i>			
Arrangement 5 - CVNB degasifier Skid(26CVNB-SFU-5401) Equipment Summary (8U6URM)			
<i>Version</i>	<i>Latest Status</i>	<i>Issue Date</i>	<i>Description of Change</i>
v0.0	In Work	10 Mar 2023	
v1.0	Signed	12 Mar 2023	The first version for review.
v2.0	Signed	27 Mar 2023	Updated based on the reviewer's comment.
v2.1	Signed	29 Mar 2023	Updated based on the reviewer's comment. The native word file with revision track with respect to the first version is attached.
v2.2	Approved	03 Apr 2023	Allowable pressure drop at water side is corrected.

OPERATIONAL NARRATIVE

CVNB degasifier skid is a set of membrane degasifier which extract dissolved oxygen in the primary water of NBI (Neutral Beam Injector) PHTS (Primary Heat Transfer System) during plasma operation.

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- Contents of this document have been assembled, reviewed and approved as for Information Only,
- 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>	Membrane degassing unit
<i>Number of equipment:</i>	1 unit (50% x 2 degasifier)
<i>Type:</i>	Membrane Contractor with Vacuum Sweep Nitrogen
<i>Service Fluid:</i>	Demineralized Water
<i>Sweep gas</i>	Nitrogen
<i>Approx. Footprint:</i>	2.7 m x 1.0 m (entire skid)
<i>Approx. Height:</i>	2.2 m (entire skid)
<i>Approx. Weight:</i>	4 000 kg (wet)
<i>Service Fluid:</i>	Water
<i>Material Notes:</i>	304L / 316L with composition requirement: cobalt <0.20 wt%, Niobium < 0.1 wt% and Tantalum < 0.05 wt%.
<i>Anchoring system</i>	Platform / Bolting
<i>Component configuration</i>	Assembly mounted on skid
<i>Design Life Time:</i>	20 years

ENVIRONMENTAL CONDITIONS

<i>Integrated Dose Rate 20yrs:</i>	≤ 10 Gy
<i>Magnetic Field:</i>	≤ 35 mT
<i>Normal temperature</i>	5 – 35 °C
<i>Normal Humidity</i>	40 – 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 %

WBS: Chemical & Volume Control System

PBS: 26CVBD / GBS: 14-L4-21

Functional Reference: 26CVNB-SFU-5401

REFERENCE DOCUMENTS

Sizing calculation: ITER_D_WVZ79G_v7.1
PID: ITER_D_XJ36P5_v2.4

DESIGN CODES AND SHIPPING

<i>French Law Pressure Category / Nuclear Class:</i>	ESPN / II / N3
<i>European Law:</i>	PED
<i>Fluid Type / Fluid group</i>	Gas / Group 2
<i>Conformity Assessment Module:</i>	II, module A2
<i>Construction Codes:</i>	ASME VIII Div2
<i>Safety Class:</i>	SIC-1
<i>Quality Class:</i>	QC-1
<i>Seismic Class:</i>	SC1 (S)
<i>Fire:</i>	Eurocode 2h
<i>Shipping Information:</i>	Oversea packing per ASME NQA-1 Level C, DAP at ITER site

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PARAMETERS

Parameter	Value
Water Inlet Temperature (°C)	38
Design Temperature (°C)	100
Water Inlet Pressure (MPa, abs)	0.56
Water side Design Pressure (MPa, abs)	0.8
Nominal mass flowrate per unit (kg/s)	20
Allowable Pressure Drop, water side (kPa)	50
Dissolved oxygen removal efficiency	80%
Back pressure at gas side (kPa, abs)	15
Sweeping nitrogen flow rate (Nm ³ /h) *	1.75
Thermal insulation thickness (mm)	50

PROCESS CONNECTIONS

I.D.	DN / Schedule	Service
1	80 / 40S	Inlet
2	80 / 40S	Outlet
3	25 / 40S	Nitrogen supply
4	50 / 40S	Vacuum outlet

* standard conditions 1 atm, 0 °C

Notes:

1. Approximate footprint is based on 3d model approved configuration.
2. All nozzle connections to the skid are butt-welded. Connections to the degasifier cells can be flanged.
3. Supplier may offer different configuration of degasifier cell (e.g. 34% x 3 cells), as far as footprint and height of skid are respected. Scope of the supplier is for the complete skid with degasifier cells, support frame and connecting piping.
4. Volume of one degasifier cell is assumed as 102 L. Supplier to confirm the offered cell's volume is not exceeding 102 L. If Supplier confirm the offered cell's liquid volume is not exceeding 40 L, degasifier cells are subject to PED only, not ESPN, and shall be CE marked under PED.
5. Support shall be accounted in the vendor estimate. The approximate clearance between tank bottom and floor is 1.0 m.
6. Minimum documentation shall include: Quality plans, Manufacturing & inspection plans, Procedures, Calculation note (where design is involved), Working instructions, Special process qualifications (if applicable), Operator qualifications, As-built drawings, Contractor release note, Certificate of conformity, Material certification and inspection documents according to EN 10204 Type 3.1 (or equivalent) traceable to the component part and equipment.
7. Expected water quality of water is as below. Note that the oxygen concentration in the table is the target concentration at the outlet of the degasifier.

Parameter	NBI PHTS
Conductivity @25°C, μS/ cm	<= 0.1
pH @25 °C	6.5 - 7.5
Sodium, ppb	<= 5
Chloride, ppb	<= 5
Hydrogen***, ppb	<= 100
Catalyzed Hydrazine****, ppb	-
Ammonia****, ppb	-
Oxygen, ppb	<= 10
ORP@25 °C, mV	(-400) - (-100)
Iron*****, ppb	<= 10
Copper*****, ppb	<= 10

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8. Total concentration of dissolved species to be removed is as below:

Dissolved gas	At inlet of degasifier unit	At exit of degasifier unit
Oxygen	50 ppb	<10 ppb

9. P&ID for degasifier is as below:

