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EXTERNAL REFERENCE / VERSION

Report

Arrangement 5 - CVBD Regenerative Heat Exchanger(26CVBD-HX-5746) Equipment Summary

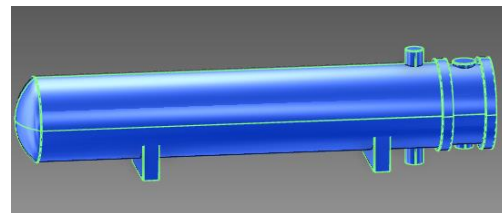
This document provides a summary of CVBD Regenerative Heat Exchanger(26CVBD-HX-5746)

Approval Process			
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Document Security: Internal Use			
RO: Lioce Donato			
Read Access	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 - CVBD Regenerative Heat Exchanger(26CVBD-HX-5746) Equipment Summary (8SM6E5)			
<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	In Work	13 Mar 2023	The first version for review.
v1.1	Signed	13 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 is updated to be realistic value.

OPERATIONAL NARRATIVE

CVBD Regenerative Heat Exchanger recovers heat from let-down to return of the circuit of IBED (Integrated loop of Blanket, ELM-VS, and Divertor) PHTS (Primary Heat Transfer System) during plasma and baking operation.

**Disclaimer:**

- 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>	Shell & Tube Heat exchanger
<i>Number of equipment:</i>	1
<i>TEMA Type:</i>	NFU (Horizontal)
<i>TEMA Class:</i>	Class R
<i>Approx. Footprint:</i>	1.1 m x 4.5 m
<i>Approx. Height:</i>	1.0 m
<i>Approx. Weight:</i>	11 000 kg (wet)
<i>Approx. volume:</i>	1.5 m ³
<i>Service Fluid:</i>	Demineralized Water
<i>Material (Shell, tube, tubesheet, channel):</i>	304L or 316L with composition requirement: cobalt <0.20 wt%, Niobium < 0.1 wt% and Tantalum < 0.05 wt%.
<i>Anchoring system</i>	Structure / Bolting
<i>Component configuration</i>	Alone
<i>Design Life Time:</i>	20 years

ENVIRONMENTAL CONDITIONS

<i>Integrated Dose Rate 20yrs:</i>	≤ 100 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: 26CVBD-HX-5746

REFERENCE DOCUMENTS

Sizing calculation: ITER_D_WEP5KL_v2.2

PID: ITER_D_XGXS95_v2.4

DESIGN CODES AND SHIPPING

<i>French Law Pressure Category / Nuclear Class:</i>	ESPN / IV / N3
<i>European Law:</i>	PED
<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-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

CVBD – Regenerative Heat Exchanger (26CVBD-HX-5746)

SIZING PARAMETERS

(Case 1 – Max duty case)

Parameter	Shell side	Tube side
Fluid	Demineralized water	Demineralized water
Inlet Temperature (°C)	45	240
Outlet Temperature (°C)	203	84.2
Inlet Pressure (MPa,a)	4.0	4.0
HX Mass flow (kg/s)	5	5
Allowable Pressure Drop (MPa)	0.15	0.02
Fouling resistance (m ² K/W)	3E-05	4E-05
Heat Duty (kW)	3344	
Design Pressure (MPa,a)	5.0	5.0
Design Temperature (°C)	270	270
Number pass per shell	2	2
Inlet Nozzle size	DN150 / SCH 80S	DN200 / SCH 80S
Outlet Nozzle size	DN150 / SCH 80S	DN200 / SCH 80S
Thermal insulation thickness (mm)	50	50

(Case 2 – Max flow case)

Parameter	Shell side	Tube side
Fluid	Charging water	Letdown water
Inlet Temperature (°C)	50	70
Outlet Temperature (°C)	61.3	58.7
Inlet Pressure (MPa,a)	1.50	4.26
HX Mass flow (kg/s)	45	45
Allowable Pressure Drop (MPa)	0.15	0.02
Fouling resistance (m ² K/W)	3E-05	4E-05
Heat Duty (kW)	2135	

Notes:

1. The exchanger shall be sized to fulfil both Case 1 and Case 2.
2. Approximate footprint is based on 3d model approved configuration.
3. Nozzles are butt-welded to piping.
4. 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.
5. 26CVBD-HX-5746 is installed at the upstream of 26CVBD-HX-5116.

