

IDM UID <b>XP4UPL</b>
VERSION CREATED ON / VERSION / STATUS <b>27 Mar 2023 / 2.0 / Approved</b>
EXTERNAL REFERENCE / VERSION

## Design Report

# Arrangement 5 - PHBD Baking Heat Exchanger (26PHBD-HX-1900) Equipment Summary

This document provides a summary of PHBD Baking Heat Exchanger (26PHBD-HX-1900)

Approval Process			
	<i>Name</i>	<i>Action</i>	<i>Affiliation</i>
<i>Author</i>	Basili L.	27 Mar 2023:signed	IO/DG/CNST/PLD/MID/TCWS
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<i>Reviewers</i>	Berruyer F.	04 Apr 2023:recommended	IO/DG/CNST/PLD/MID/TCWS
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	Ghirelli N.	06 Apr 2023:recommended	IO/DG/CNST/PLD/MID/TCWS
	Ricou E.	28 Mar 2023:recommended	IO/DG/CNST/PLD/MID/TCWS
	Van hove W.	30 Mar 2023:recommended	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...		

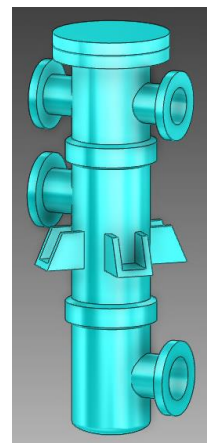
<i>Change Log</i>			
<b>Arrangement 5 - PHBD Baking Heat Exchanger (26PHBD-HX-1900) Equipment Summary (XP4UPL)</b>			
<i><b>Version</b></i>	<i><b>Latest Status</b></i>	<i><b>Issue Date</b></i>	<i><b>Description of Change</b></i>
v1.0	Signed	13 Mar 2023	
v2.0	Approved	27 Mar 2023	New version to implement comments from reviewers

**OPERATIONAL NARRATIVE**

The baking heat exchanger is used to cool down the system fluid inventory and structures following baking. The average cool down rate is 7 °C/h.

**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>	<b>Heat Exchanger</b>
<i>Type:</i>	NEU vertical
<i>Approx. Footprint:</i>	1.2 m x 1.2 m
<i>Approx. Height:</i>	3.7 m without supports
<i>Approx. Weight:</i>	≈ 5000 kg
<i>Approx Volume:</i>	0.745 m <sup>3</sup>
<i>Service Fluid:</i>	Demineralized 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>	Steel Platform. Adequate anchoring to be designed by supplier
<i>Component configuration</i>	Hanging in steel platform
<i>Design Life Time:</i>	20 years
<i>Special Attributes:</i>	

WBS: IBED System

PBS: 26PHBD

Functional Reference: 26PHBD-HX-1900

GBS: 11-L4-04

**REFERENCE DOCUMENTS**

Sizing calculation: ITER\_D\_PAVZLW\_v3.3

PID: ITER\_D\_SNJ3LL\_v4\_2

**ENVIRONMENTAL CONDITIONS**

<i>Dose Rate:</i>	≤ 0.1 kGy/h
<i>Integrated Dose Rate 20yrs:</i>	1 kGy
<i>Magnetic Field:</i>	84 mT
<i>Normal temperature</i>	12 – 35 °C
<i>Normal Humidity</i>	≤ 65 %
<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 %

**DESIGN CODES AND SHIPPING**

<i>French Law Pressure Category / Nuclear Class:</i>	ESPN / IV / N3
<i>Fluid Type / Fluid group</i>	Gas/Group 2
<i>Conformity Assessment Module:</i>	Cat IV / module G
<i>Related Codes:</i>	ASME Code Sec VIII Div 2/ TEMA
<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>	Conventional Load (CTL) Oversea packing per ASME NQA-q Level C, DAP at ITER site

## HX-1900 – Baking Heat Exchanger

**PARAMETERS**

Parameter	Shell side	Tube side
Fluid Name	CCWS-1	IBED
Inlet Temperature (°C)	31	70
Outlet Temperature (°C)	35.62	60.34
Inlet Pressure (MPa,a)	0.4	4.4
HX Mass flow (kg/s)	300	143.5
Allowable Pressure Drop (MPa)	0.2	0.1
Fouling resistance (m <sup>2</sup> K/W)	0.0001	5e-05
Heat Duty (kW)	5804	
Design Pressure (MPa,a)	5	5
Design Temperature (°C)	270	270
Number pass per shell	1	2
Thermal insulation thickness (mm)	50	50

**NOZZLE SCHEDULE**

I.D.	DN / Schedule	Service
N1	DN 300 / 80S	Inlet tube side
N2	DN 300 / 80S	Outlet tube side
N3	DN 350 / 80S	Inlet shell side
N4	DN 350 / 80S	Outlet shell side
N8	DN 25 / 40S	To drain

## 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.

