

IDM UID XP4UPL
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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)

<i>Approval Process</i>			
	<i>Name</i>	<i>Action</i>	<i>Affiliation</i>
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	Van hove W.	30 Mar 2023:recommended	ORNL - Oak Ridge National Laborator...
<i>Approver</i>	Liocce D.	07 Apr 2023:approved	IO/DG/CNST/PLD/MID/TCWS
<i>Document Security: Internal Use</i>			
<i>RO: Liocce Donato</i>			
<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...		

Change Log

Arrangement 5 - PHBD Baking Heat Exchanger (26PHBD-HX-1900) Equipment Summary (XP4UPL)

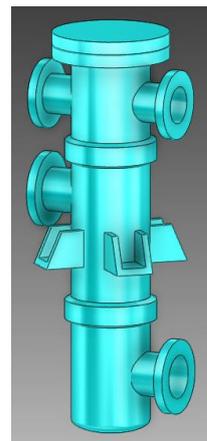
<i>Version</i>	<i>Latest Status</i>	<i>Issue Date</i>	<i>Description of Change</i>
v1.0	Signed	13 Mar 2023	
v2.0	Approved	27 Mar 2023	New version to implement comments from reviewers

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>	Heat Exchanger
<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 ³
<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 ² 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.

