Base Load Power Hub (BLPH)

Technical Data Sheet for H2 Storage Vessels - V-25001 A-F

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BREMBANA&ROLLE

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Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
01	Approved for Construction (AFC)
02	Approved for Construction (AFC)
03	Approved for Construction (AFC)

HOLDS LIST

No.	Description
1	
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Rev	DESIGN DATA							
	Design Conditions	Internal	40	Bar (g)	at	-10 / 80	°C	
		..External	FV	Bar	at	-10 / 80	°C	
		Volume	101.2	m^3				
	Dimension (Nominal)		2.8 ID x 15.5 T/T	m				
	Minimum Design Metal Temp		-29	°C (MDMT)	at	0	Bar (g)	
	Operating Conditions	Internal	30	Bar (g)	at	20	°C	
	Corrosion Allowance		0	mm				
	Liquid Specific Gravity		Negligible					
	PWHT Required		Per ASME Sect VIII Div 2	☑ Service PWHT	Yes			
	Radiography Requirements		Full (100%)					
	Shop Hydrotest Pressure		57.2 Bar (g) per Code and Pressure Equipment Directive 2014/68/UE					
	Field Hydrotest Pressure		57.2 Bar (g) per Code and Pressure Equipment Directive 2014/68/UE					
	Painting Per		123A90-DDL-MAT-SP-60006					
	Insulation		N/A	mm				
	Fireproofing		N/A	mm				
	Erection Weight		58700	Kg				
	Empty Weight		58700	Kg (Start-Up Ready) - Estimated				
	Operating Weight		58900	Kg - Estimated				
	Test Weight		160400	Kg				
	Vessel Designed For Wind		1 Year Return, 3 sec. gust = 35 m/sec, 100 Year Return, 3 sec. gust = 45 m/sec					
	Vessel Designed For Earthquake		N/A					
	Moment At POS	Wind:	132800/45000	N-M (Transverse/Longitudinal)				
	Shear Force At POS	Wind:	77000/26000	N (Transverse/Longitudinal)				
	Moment At POS	Earthquake:	0	N-M (Operating)	0	N-M (Empty)		
	Shear Force At POS	Earthquake:	0	N (Operating)	0	N (Empty)		

Rev	DESIGN CODE & MATERIAL SPECIFICATIONS					
	Construction Code	**2021 ASME Section VIII Div.2 class 2**	Code Stamp ☑ Yes	National Board Registration ☑ Yes		
	Materials for Pressure Components and Parts Welded to Pressure Components.					
	Shell and Heads	SA-516 60 (HIC)				
	Standard ANSI Weld Neck and LWN Flanges	SA-350 LF2 CL.1				
	Fittings	(n.a.) General Note VM-8				
	Self Reinforcing & Special Forgings	SA-350 LF2 CL.1				
	Nozzle Necks	(if any) SA-333 6				
	Shell Attachments	Plate (Including Wear Plate)	SA-516-60			
		Pipe	(if any) SA-333 6			
		Structural Shapes	(if any) S275 J2			
	Materials for Parts Not Welded to Pressure Components:					
	Saddles	A/SA-516 60				
	Plate	A/SA-516-60				
	Pipe	(if any) SA-333 6				
	Pressure Bolting	SA-193-B7 / SA-194-2H				
	Internal Bolting	(if any) A-193 Gr B6 / A-194 Gr 6				
	Internal Piping	Carbon Steel				
	Other Internals	Carbon Steel				
	Gaskets	**Pressure Gaskets**	SW 316 S.S. Graphite filled C/W 316 S.S. Inner Ring & Epoxy Coated C.S. outer ring			
		Non-pressure Gaskets	n.a.			

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Rev	GENERAL NOTES

VM-1. All materials shown on this data sheet are to be furnished and installed by the Vessel Supplier unless otherwise noted.

VM-2. Substitutions of materials will not be allowed without ROSETTI MARINO prior approval. This approval can only be obtained at the time Vessel Supplier submits his quotation.

VM-3. The inside diameter of manholes shall be equal to the size specified in the table of connections for 18" (450 mm) and smaller size manholes. Manholes size 20" (500 mm) and larger may have a minimum inside diameter 25 mm less than the nominal size listed in the table of connections.

VM-4. Manholes and handholes shall be furnished with blind flange, bolts and gasket. Each manhole shall be provided with a davit or hinge and internal manhole grip.

VM-5. Internal ladder rungs shall be provided below the manway.

VM-6. Vessel Supplier to provide vessel grounding lugs .

VM-8. In addition to meeting Code requirements for fittings, piping fittings shall be made from a material specification listed for plate, forging, or pipe pressure components on page 1 of this data sheet.

VM-9 Regarding pressure retaining parts, vendor is allowed to propose equivalent/similar material, according to other international Codes, i.e. DIN/EN or other internationally recognized CODE, provided that Carbon Equivalent value (CEQ) is 0,35.max

VM-10 Total number of vessels is 6 (six) – V-25001 A/B/C/D/E/F

VM-11 For hydrogen vessel fatigue design, Contractor should expect that the number of full charge/discharge cycles (from full to empty) will be 180 during the year. In other words, it is expected that:
Fuel cell will utilise the full hydrogen inventory from the storage vessels 180 times per year (full discharge).
Electrolyser will fully recharge the hydrogen vessels (from empty to full) 180 times per year (full charge)

WM-13 Max hardness in base metal shall be 235 HV10
Steel shall be HIC resistant to ISO 15156-2
Impact testing shall be at -46°C for base metal and weld metal in H2 service regardless of MDMT
Phosphorus maximum to be 0.015% (from EIGA 121/14)
Max strength 355Mpa yield
max CE of 0.35 should ideally be by product analysis not ladle analysis

VM-14 H2 physical properties at 15°C and 30 barg

Pressure	30	Bar (g)
Temperature	15	°C
Inlet Density	2.58	Kg/m³
Compressibility factor (Z)	1.01	
Viscosity	0.0086	cP
Specific heats Ratio (Cp/Cv)	1.42	
Molecular Weight	2	

VM-15 Area Classification Zone 1 IIB T1 + H2

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Rev	TABLE OF CONNECTIONS

General Notes for Table of Connections:

A. Connections shown in sketch are diagrammatic only. For true location see plan view, end view or orientation below.
B. Unless otherwise noted the dimensions from the face of flange to inside of the vessel shall comply with Table 4 of doc. no. 123A90-DDL-MAC-50026:
C. All pressure connections are to be flanged.
D. Elevations in the table are reference T.L. to the centre of the nozzles.
E. Dimension "A" is the distance from the reference tangent line to the face of flange for nozzles on heads.
F. Flanges over 24" shall be per ASME B16.47 Series B.
G. All flange faces shall have a smooth finish.
H For specific notes to TABLE OF CONNECTIONS see next page.

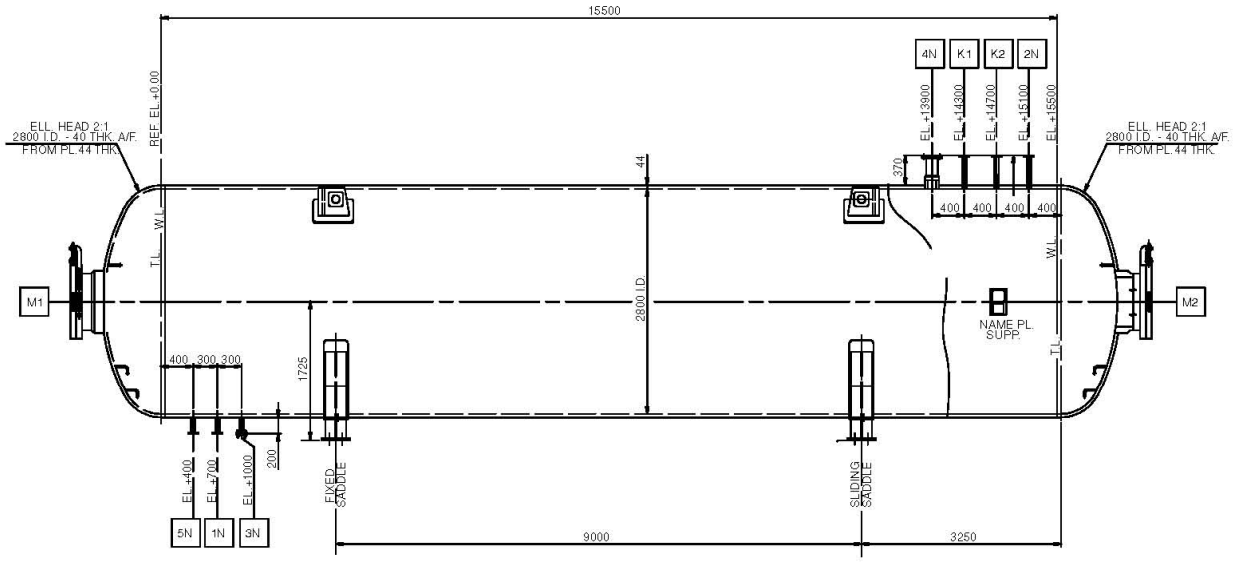
Mark	Size	Rating	Type/Face	Service	Elevation	Dim"A"	Specific Notes
1N	1"	300#	LWN/RF	Hydrogen Inlet	700		
2N	1"	300#	LWN/RF	Hydrogen Outlet	15100		
3N	1"	300#	LWN/RF	Drain with Blind	1000		1
4N	4"	300#	LWN-SR/RF	PSV Connection	13900		
5N	1"	300#	LWN/RF	Nitrogen Purging	400		
K1	1"	300#	LWN/RF	Pressure Transmitter (ESD)	14300		
K2	1"	300#	LWN/RF	Pressure Transmitter (CTRL)	14700		
M1	24"	300#	LWN SR/RF	Manhole C/W Davit		1050	1 See general note VM3
M2	24"	300#	LWN SR/RF	Manhole C/W Davit		1050	1 See general note VM3

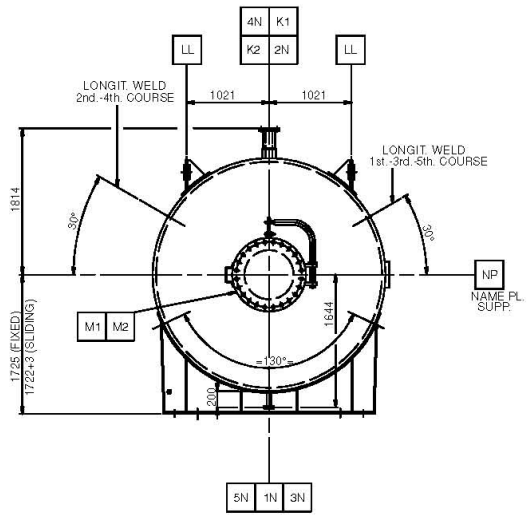
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Rev	SPECIFIC NOTES TO TABLE OF CONNECTIONS (All Notes Listed Hereunder Shall Apply Only If Called For By Number In The Table Of Connections)
	1 Supply blind flange, bolts and gasket. 2 Elevation is given to the face of flange. 3 Nozzle size listed is minimum inside diameter of nozzle neck. 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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Rev	VESSEL SKETCH

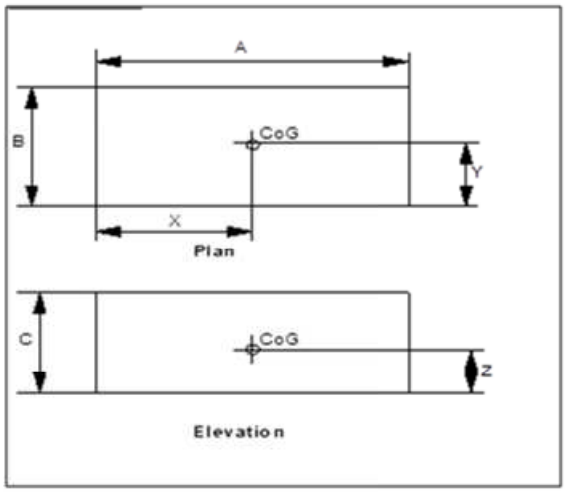




WEIGHT DATA (kg)

			Areas for Input by Supplier	
Dry Weight	(I)	58620	Kg
Content	(II)	260	Kg
Operating Weight	(I+II)	58880	Kg
Auxiliaries' weight, included in (I) (specify under notes)			Kg
Test weight, i.e. filled with water			Kg
Transport Weight			

CENTRE OF GRAVITY (CoG) DATA FOR INSTALLED DRY CONDITION



Overall dimensions		
A =	17600	mm
B =	2940	mm
C =	3605	mm

CoG location		
X =	8850	mm
Y =	1444	mm
Z =	1690	mm

NOTES

WEIGHTS AND CoG STATUS (TICK OFF AS APPROPRIATE)

☐ Estimated	☑ Calculated
☐ Catalogue data	☐ Weighed