Base Load Power Hub (BLPH)

RESTRICTION ORIFICE

INSTRUMENT DATA SHEETS

Document Number: 1724001690-IN-DS-00004

Document Class: 2

03	20/01/2025	Accepted for Construction (AFC)	MZ	GA	GO
02	13/11/2024	Accepted for Construction (AFC)	MZ	GA	GO
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00	04/10/2024	Issue for Review (IFR)	MZ	GA	GO
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

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

HOLDS LIST

No.	Description
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GENERAL NOTES:

1) This datasheet is to be read in conjunction with following documents:
    - Project Datasheets 123A90-DDL-IN-DS-40054;
    - General Arrangement Drawings - Restriction Orifice 1724001690-IN-DA-00003;
    - Calculation Sheets - Restriction Orifice 1724001690-IN-CA-00005.
2) Ambient Temperature Min: -8.4 °C, Norm: 10.5 °C, Max: +25.0 °C.
3) The orifice bore sizing calculation is based on ISO 5167 and when not applicable e.g. for sonic flow R.W. Miller can be used. The sizing and thickness calculation is reviewed by Buyer. Restriction orifice plates is mounted between piping flanges. The surface finish matches the flange surface finish.
4) Restriction orifice is single stage or single stage multi-hole or multi-stage type depending upon requirement.
5) Single stage multi-hole restriction orifice is used to abate the noise generated by single stage orifice due to high velocity through restriction orifice plate, bore which offers restriction from incoming fluid.
6) All flanges in ASME B31.3 and ASME B31.12 are Raised Face type.
7) Material test certificates MTCs are provided by Manufacturer for all valves, tubing & fittings. MTCs shall include EN 10204 3.1 certification for all metallic materials.
8) Orifice plate is permanently marked with Orifice plate information with sizing details, dimensional and material details.
9) Orifice tag number, material, direction of flow, nominal diameter and bore diameter are permanently stamped on the orifice plate handle (on upstream side).
10) Vendor to ensure that the noise is within 85 dBA in orifice sizing and selection.
11) Maximum flow run case: "Emergency Fire Blowdown", as per 123A90-DDL-PR-RE-80030_01 "Relief, Vent and Blowdown Report", rev01.
12) Minimum temperature run case: "Low Temperature depressurization case", as per 123A90-DDL-PR-RE-80030_01 "Relief, Vent and Blowdown Report", rev01.

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GENERAL	1	Tag Number			25-RO-005			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001A) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80015			
	4	Line Number			4"-HY-142-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.19907			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg – 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-007			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001B) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80016			
	4	Line Number			4"-HY-167-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.19907			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg - 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-010			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001C) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80017			
	4	Line Number			4"-HY-171-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.19907			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg - 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-013			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001D) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80018			
	4	Line Number			4"-HY-175-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.19907			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg - 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-016			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001E) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80019			
	4	Line Number			4"-HY-180-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.199			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg - 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-019			
	2	Service			HYDROGEN FROM STORAGE VESSEL (V-25001F) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80020			
	4	Line Number			4"-HY-184-03HSS-N			
	5	Line Size	Line Schedule		4"		Thk (mm) = 3.05	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	2047		1300
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			10 mm			
	27	Bore Diameter			4.22 mm (26 holes)			
	28	Beta Ratio			0.199			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			2047 kg/h			
	31	Differential Pressure @ Full scale			30 barg - 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			4" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-022			
	2	Service			HYDROGEN FROM H2 TANKS			
	3	P&ID Number			123A90-DDL-PR-PID-80014			
	4	Line Number			1"-HY-144-03HSS-N			
	5	Line Size	Line Schedule		1"		Thk (mm) = 3.38	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		HYDROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	Note 11		Note 12
	15	Flow Operating			kg/hr	119		90
	16	Upsteam Pressure			barg	30		28
	17	Temperature			°C	25		-8.4
	18	Density			kg/m^3	2.5		2.63
	19	Compressibility Factor			-	1		1
	20	Viscosity			cP	0.01		0.01
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.3		1.3
	23	Molecular Weight			2			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			6 mm			
	27	Bore Diameter			5.19347 (1 hole)			
	28	Beta Ratio			0.19492			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			119 kg/h			
	31	Differential Pressure @ Full scale			30 barg – 15.9115 barg = 14.0885 bar			
	32	Choking Pressure Ratio			0.5457			
ORIFICE FLANGES	33	Size			1" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			25-RO-024			
	2	Service			HYDROGEN FROM ELECTROLYZER (A-20000) TO HYDROGEN VENT HEADER			
	3	P&ID Number			123A90-DDL-PR-PID-80013			
	4	Line Number			1"-HY-143-03HSS-N			
	5	Line Size	Line Schedule		1"		Thk (mm) = 3.38	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		NITROGEN		GAS	
	8	Design Pressure	Min.	Max.			40 barg	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units			
	15	Flow Operating			kg/hr	30 (*)	30	
	16	Upsteam Pressure			barg	2 (*)	8	
	17	Temperature			°C	25 (*)	25	
	18	Density			kg/m^3	3.4 (*)	10.2	
	19	Compressibility Factor			-	1 (*)	1	
	20	Viscosity			cP	0.018 (*)	0.018	
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.4 (*)	1.4	
	23	Molecular Weight			28			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE MULTIHOLES (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			6 mm			
	27	Bore Diameter			4.26 mm (1 hole)			
	28	Beta Ratio			0.16013			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			30 kg/h			
	31	Differential Pressure @ Full scale			2 barg – 0.5770 barg = 1.423 bar			
	32	Choking Pressure Ratio			0.5277			
ORIFICE FLANGES	33	Size			1" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			300#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

(*) = sizing case

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GENERAL	1	Tag Number			50-RO-001			
	2	Service			SEA WATER BY-PASS PUMP P-50001A			
	3	P&ID Number			123A90-DDL-PR-PID-80021			
	4	Line Number			1"-SWS-146-01SD-E			
	5	Line Size	Line Schedule		1"		Thk (mm) = 3.38	
	6	Line Material			ASTM A790 UNS S32760			
PROCESS CONDITIONS	7	Fluid	State		SEA WATER		LIQUID	
	8	Design Pressure	Min.	Max.			7.6 barg	
	9	Design Temperature	Min.	Max.			100°C	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	@ Max. Flow	@ Norm. Flow	@ Min. Flow
	15	Flow Operating			lt/hr		0.85	
	16	Upsteam Pressure			barg		5.60	
	17	Temperature			°C		22	
	18	Density			kg/m^3		1025	
	19	Compressibility Factor			-		N/A	
	20	Viscosity			cP		1	
	21	Vapour Pressure			bar		0.02	
	22	Specific Heat Ratio Cp/Cv			-		1.33	
	23	Molecular Weight			18			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE CONCENTRIC TYPE			
	25	Material			25% CR SDPLX			
	26	Thickness			3 mm			
	27	Bore Diameter			0.12976 mm (1 hole)			
	28	Beta Ratio			0.00487			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale						
	31	Differential Pressure @ Full scale						
ORIFICE FLANGES	32	Size			1" (Flanges are Out of scope of Vendor's supply)			
	33	Rating			150#			
	34	Type			Flanged			
	35	Facing			RF			
	36	Flange Material			ASTM A182 Gr. F55			
	37	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	38	Taps Type	Quantity		-		-	
	39	Taps Size	Connection		-		-	
	40	Taps Orientation			-			
PURCHASE	41	Manufacturer			Tecnomatic Flow Elements Srl			
	42	Model			ORI			
	43	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			50-RO-002			
	2	Service			SEA WATER BY-PASS PUMP P-50001B			
	3	P&ID Number			123A90-DDL-PR-PID-80021			
	4	Line Number			1"-SWS-147-01SD-E			
	5	Line Size	Line Schedule		1"		Thk (mm) = 3.38	
	6	Line Material			ASTM A790 UNS S32760			
PROCESS CONDITIONS	7	Fluid	State		SEA WATER		LIQUID	
	8	Design Pressure	Min.	Max.			7.6 barg	
	9	Design Temperature	Min.	Max.			100°C	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units	@ Max. Flow	@ Norm. Flow	@ Min. Flow
	15	Flow Operating			lt/hr		0.85	
	16	Upsteam Pressure			barg		5.60	
	17	Temperature			°C		22	
	18	Density			kg/m^3		1025	
	19	Compressibility Factor			-		N/A	
	20	Viscosity			cP		1	
	21	Vapour Pressure			bar		0.02	
	22	Specific Heat Ratio Cp/Cv			-		1.33	
	23	Molecular Weight			18			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE CONCENTRIC TYPE			
	25	Material			25% CR SDPLX			
	26	Thickness			3 mm			
	27	Bore Diameter			0.12976 mm (1 hole)			
	28	Beta Ratio			0.00487			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale						
	31	Differential Pressure @ Full scale						
ORIFICE FLANGES	32	Size			1" (Flanges are Out of scope of Vendor's supply)			
	33	Rating			150#			
	34	Type			Flanged			
	35	Facing			RF			
	36	Flange Material			ASTM A182 Gr. F55			
	37	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	38	Taps Type	Quantity		-		-	
	39	Taps Size	Connection		-		-	
	40	Taps Orientation			-			
PURCHASE	41	Manufacturer			Tecnomatic Flow Elements Srl			
	42	Model			ORI			
	43	Purchase Order Number			4791_OS			

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GENERAL	1	Tag Number			80-RO-001			
	2	Service			HYDROGEN FROM STORAGE VESSEL TO FUEL CELL			
	3	P&ID Number			123A90-DDL-PR-PID-80012			
	4	Line Number			1"-HY-163-01HSS-N			
	5	Line Size	Line Schedule		1"		Thk (mm) = 3.38	
	6	Line Material			ASTM A312 Gr.TP316/316L			
PROCESS CONDITIONS	7	Fluid	State		NITROGEN		GAS	
	8	Design Pressure	Min.	Max.			10	
	9	Design Temperature	Min.	Max.			80	
	10	Base Pressure	Base Temperature					
	11	Critical Pressure						
	12	Permanent Pressure Loss Across Meter						
	13	Entrained Gas / Liquid (% Mass)						
	14				Units			
	15	Flow Operating			kg/hr	30		
	16	Upsteam Pressure			barg	2		
	17	Temperature			°C	25		
	18	Density			kg/m^3	3.4		
	19	Compressibility Factor			-	1		
	20	Viscosity			cP	0.018		
	21	Vapour Pressure						
	22	Specific Heat Ratio Cp/Cv			-	1.4		
	23	Molecular Weight			28			
ORIFICE PLATE	24	Type			RESTRICTION ORIFICE CONCENTRIC TYPE (Chocked Flow)			
	25	Material			AISI 316/316L			
	26	Thickness			6 mm			
	27	Bore Diameter			4.26646 mm (1 hole)			
	28	Beta Ratio			0.16012			
	29	Drain or Vent Hole			N/A			
	30	Flow Full Scale			30 kg/h			
	31	Differential Pressure @ Full scale			2 barg – 0.5770 barg = 1.423 bar			
	32	Chocked Pressure Ratio			0.5277			
ORIFICE FLANGES	33	Size			1" (Flanges are Out of scope of Vendor's supply)			
	34	Rating			150#			
	35	Type			Flanged			
	36	Facing			RF			
	37	Flange Material			ASTM A182 Gr. F316/316L			
	38	Gasket Material			(Gaskets are Out of scope of Vendor's supply)			
	39	Taps Type	Quantity		-		-	
	40	Taps Size	Connection		-		-	
	41	Taps Orientation			-			
PURCHASE	42	Manufacturer			Tecnomatic Flow Elements Srl			
	43	Model			ORI			
	44	Purchase Order Number			4791_OS			

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