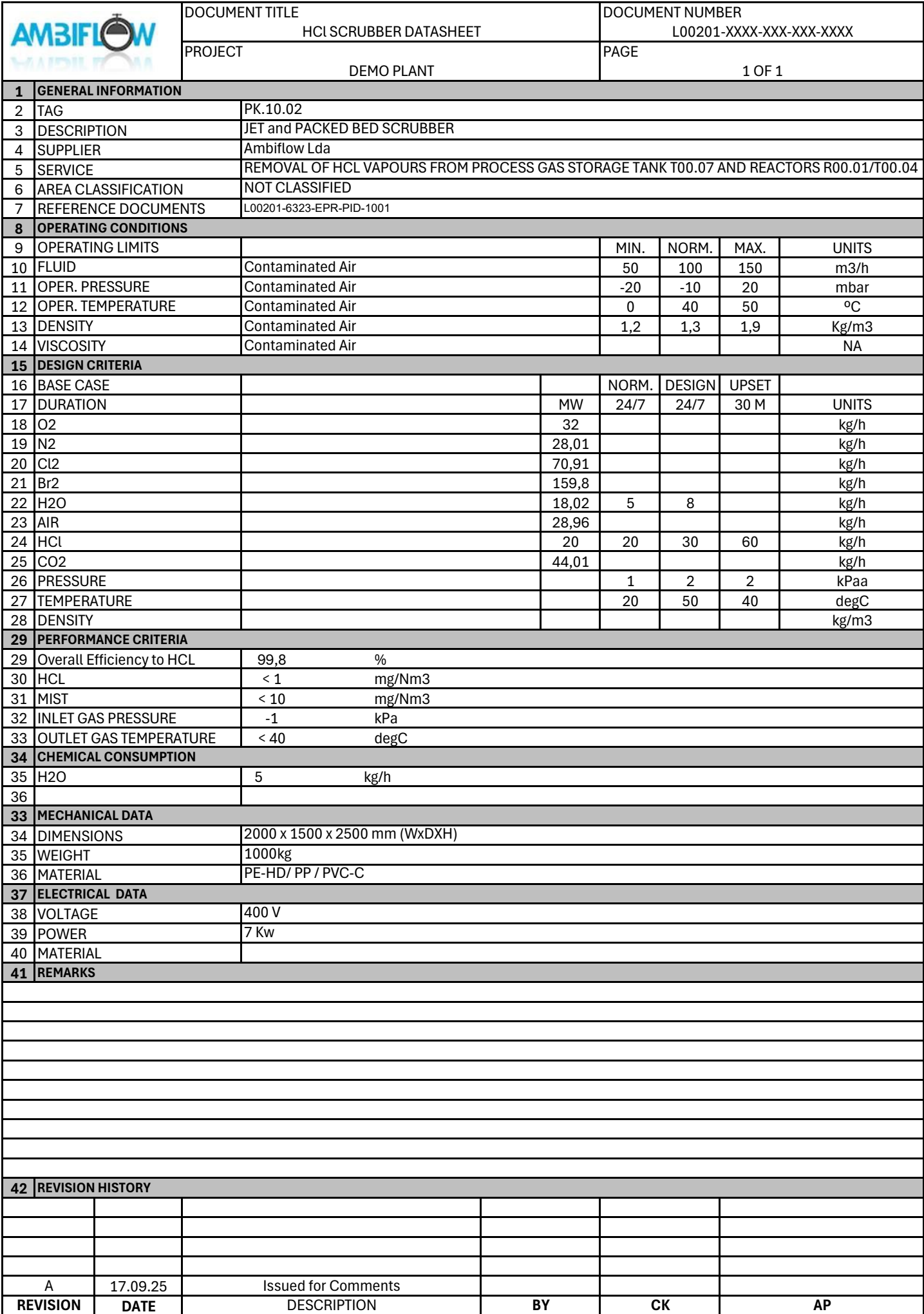


FICHA TÉCNICA STEG – FF1

HCI SCRUBBER DATASHEET



FICHA TÉCNICA STEG – FF3

Cl₂ SCRUBBER DATASHEET

Customer: Lifthium Energy			Project Name: Chlorine Electrolysis Demo Plant			Customer PO: 9203000185
Customer Project No.: N/A			Scrubber Datasheet			
Macrotek Project No.: 47194			Chlorine Scrubber			
Item	Rev	Title	Notes	UOM	Project Design Data	Notes
SECTION A - GENERAL						
A1	0	Project Description	-	text	Chlorine Electrolysis Demo Plant	
A2	0	Project Location	-	text	Portugal	
A3	0	Equipment Purpose	-	text	Removal of Cl2 from vent gas	
A4	0	Equipment Tag Number	-	text	V-1001	
A5	0	Equipment Description	-	text	Eductor scrubber / 2-stage packed bed scrubber	
A6	0	Number of Units	-	text	1	
A7	0	Duty (Continuous/Intermittent/Standby)	-	text	Continuous	
A8	0	Hazardous Area Classification	-	text	Not Classified	
SECTION B - CODES & STANDARDS						
B1	0	Vessel Design	-	text	Fabrication to CGSB 41-GP-22	
B2	0	Flanges	-	text	ASME B16.5 for piping flanges	
SECTION C - PROCESS						
C1	0	Process Inlet Conditions	-	-		
C2	0	Case 1 - Normal	-	-		
C3	0	Gas Flow Rate	-	kg/h	40.3	
C4	0	Gas Temperature	-	°C	32	
C5	0	Gas Pressure	-	kPa (g)	-0.5	
C6	0	Gas Composition	-	-		
C7	0	N2	-	kg/h	-	
C8	0	O2	-	kg/h	0.4	
C9	0	H2O	-	kg/h	0.4	
C10	0	Cl2	-	kg/h	39.6	
C11	0	Gas Density	-	kg/m3	2.7	
C12	0		-	-		
C13	0	Case 2 - Design	-	-		
C14	0	Gas Flow Rate	-	kg/h	50.4	
C15	0	Gas Temperature	-	°C	32	
C16	0	Gas Pressure	-	kPa (g)	-0.5	
C17	0	Gas Composition	-	-		
C18	0	N2	-	kg/h	-	
C19	0	O2	-	kg/h	0.5	
C20	0	H2O	-	kg/h	0.5	
C21	0	Cl2	-	kg/h	49.5	
C22	0	Gas Density	-	kg/m3	2.7	
C23	0		-	-		
C24	0	Case 3 - Process Upset (15 min max)	-	-		
C25	0	Gas Flow Rate	-	kg/h	47.8	
C26	0	Gas Temperature	-	°C	72.2	
C27	0	Gas Pressure	-	kPa (g)	-0.5	
C28	0	Gas Composition	-	-		
C29	0	N2	-	kg/h	7.4	
C30	0	O2	-	kg/h	0.4	
C31	0	H2O	-	kg/h	0.4	
C32	0	Cl2	-	kg/h	39.6	
C33	0	Gas Density	-	kg/m3	1.9	
C34	0		-	-		
C35	0	Performance	-	-		
C36	0	Gas Outlet Temperature	-	°C	40	
C37	1	Cl2 Outlet Concentration	-	mg/Nm3	1	
C38	1	Cl2 Removal Efficiency	-	% Removal	99.99997	
C39	0	Suction Pressure	-	kPa (g)	up to -1.2	
C40	0	Mist	-	mg/Nm3	10 (predicted)	
C41	0		-	-		
C42	0	Operating Parameters	-	-		
C43	0	Eductor Re-circulating Flow Rate	-	L/min	30-40	
C44	0	Packed Bed Scrubber Stage 1 Re-circulating Flow Rate	-	L/min	50	
C45	0	Packed Bed Scrubber Stage 2 Re-circulating Flow Rate	-	L/min	50	
C46	0	Re-circulating Liquid pH	-	pH	10	
C47	0	Re-circulating Liquid ORP	-	mV	100	
C48	0	Cooling Water Flow Rate	-	L/min	150-200	
C49	0	Estimated 18% NaOH Flow Rate	-	kg/h	374	
C50	0	Estimated 20%wt NaHSO3 Flow Rate	-	kg/h	291	
C51	0	Estimated Blowdown Flow Rate	-	kg/h	723	Estimated Composition: 9%wt NaCl, 11%wt Na2SO4
SECTION D - MECHANICAL DESIGN						
D1	0	Eductor Scrubber	-			
D2	0	General	-			
D3	0	Model #	-	text	MED-3	
D4	0	Diameter	-	inch	3" gas inlet pipe	
D5	0	Design / Fabrication	-			
D6	0	Vessel Material of Construction	-	text	FRP	
D7	0	Design Pressure	-	kPa (g)	5	
D8	0	Design Temperature	-	°C	80	
D9	0		-			
D10	0	Eductor Scrubber (Stage 1)	-			
D11	0	General	-			
D12	0	Model #	-	text	MP-12-6	
D13	0	Diameter	-	inch	12"	
D14	0	Design / Fabrication	-			
D15	0	Vessel Material of Construction	-	text	FRP	
D16	0	Design Pressure	-	kPa (g)	5	
D17	0	Design Temperature	-	°C	80	
D18	0	Internals	-			
D19	0	Packing Type	-	text	50mm HiFlow Rings	
D20	0	Packing Material	-	text	Glass Filled Polypropylene	
D21	0	Packing Height	-	feet	6	
D22	0	Liquid Distribution Type	-	text	Spray Nozzle	
D23	0	Packing Spray Nozzle Quantity	-	text	1	
D24	0	Mist Eliminator Type	-	text	N/A	
D25	0	Mist Eliminator Material	-	text	N/A	
D26	0	Mist Eliminator Removal Method	-	text	N/A	
D27	0	Mist Eliminator Wash Spray Wash Included	-	text	N/A	
D28	0		-			
D29	0	Eductor Scrubber (Stage 2)	-			
D30	0	General	-			
D31	0	Model #	-	text	MP-12-6	
D32	0	Diameter	-	inch	12"	
D33	0	Design / Fabrication	-			
D34	0	Vessel Material of Construction	-	text	FRP	
D35	0	Design Pressure	-	kPa (g)	5	

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FICHA TÉCNICA STEG – FF4

Cl₂ SCRUBBER DATASHEET

	Document Title		CHLORINE SCRUBBER SC-401 DATASHEET				Document Number		Y1021-SC-401-D5		
	Project Title		LIFTHIUM LiCl NS-01 SKID				Date:		16-Oct-25		
							Page:		1 of 1		
								Rev:		B	
General	Tag		P&ID		SC-401		Y1021-2004				
	Description		JET AND PACKED BED SCRUBBER								
	Service		REMOVAL OF CHLORINE GAS PRODUCED BY ELECTROLYSER								
	Area Classification		NOT CLASSIFIED								
	Supplier		NESI								
Operating Conditions	Operating Limits		Minimum		Operating		Design		Units		
	Fluid	CHLORINE GAS	0		47		60		L/hr		
	Pressure	CHLORINE GAS	N/A		-2		-5		inH2O(g)		
	Temperature	CHLORINE GAS	5		80		105		°C		
	Density	CHLORINE GAS	N/A								
	Viscosity		N/A								
Design Criteria					Operating		Design		Units		
	Cl2				0.076		0.095		kg/hr		
	H2O				0.009		0.011		kg/hr		
	O2				0.001		0.001		kg/hr		
Chemical Consumption	NaOH (Anhydrous)		0.136 kg/hr								
Performance Criteria	Outlet Chlorine Gas		<1 mg/Nm3								
	Inlet Gas Pressure		-2 inH2O(g)								
	Outlet Gas Temperature		Ambient								
Mechanical Data	Dimensions L x W x H (Scrubber Skid)		1.6m x 1.0m x 2.7m								
	Weight (Scrubber Skid)		600 kg								
	Materials of Construction		PFA, PVC-C, PVC								
Electrical Data	Voltage		230V								
	Power		430W (Note 1)								
Notes: Power requirements include centrifugal pump for hydroxide circulation and blower to provide negative pressure in system.											

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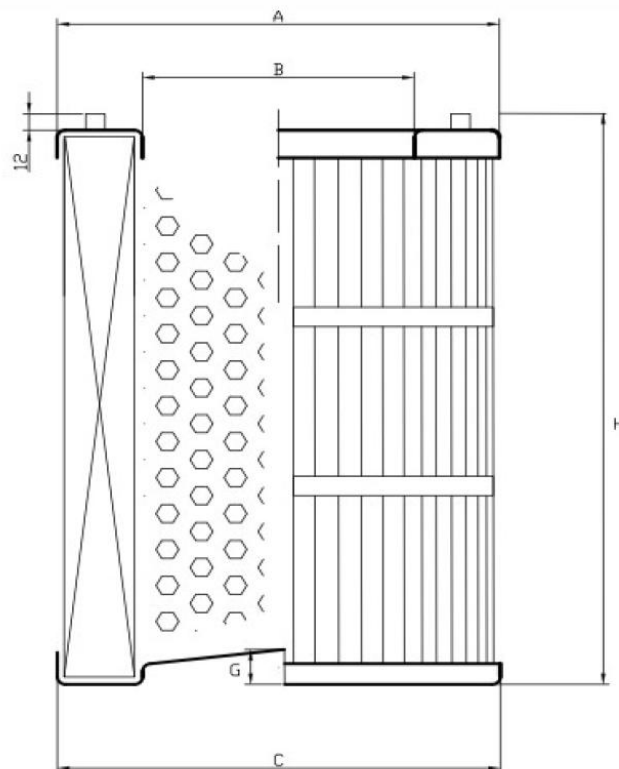
FILTER DATASHEET

DATA SHEET

Height (H):	418 mm
Top end cap diameter (A):	200 mm
Bottom end cap diameter (C):	200 mm
Mounting type:	Clamp
Top end cap opening diameter (B):	90 mm
Bottom end cap opening diameter (D):	---
Gasket: White silicone	10x12 mm / ±165x145 mm
Inner core:	Perforated sheet metal, 0.6 mm
Outer core:	Two polyester straps
Filter material:	Polyester
Filter surface area:	1.35 m ²
Note:	Metal components – stainless steel

FILTER MATERIAL

Composition:	100% polyester
Coating:	PTFE membrane
Weight:	240 g/m ²
Thickness:	0.59 mm
Airflow:	81 l/s/m ² – 200 Pa
Max. operating temperature:	120°C
Classification (BGIA DIN EN 1822:2009):	Class M / E11
Color:	White
Moisture resistance:	Very good – store the filter in its box



Filter application		Particulate air filters for general ventilation								EPA, HEPA and ULPA						
Test		EN 779:2012 evaluation of filter performance at 0,944 m³/s (or nominal flow)								EN 1822:2011 (Part 1 to 5) Evaluation of filter performance by nominal flow						
	Suitable for	Group designation	Filter classes	Test dust/aerosol	Final pressure drop in Pa	Average arrestance (A _{av}) compared with test dust in %	Average efficiency (E _{av}) for particles of 0.4 microns in %	Minimum efficiency for particles 0.4 microns in %	Previous: DIN EN 779:2003 (Predecessor: DIN 24185)	Filter classes	Test dust	Integral value of separation in the MPPS in %	Integral value of transmittance in the MPPS in %	Local value of separation in the MPPS in %	Local value of transmittance in the MPPS in %	Previous: DIN EN 1822:1998 (Predecessor: DIN 24184)
2 nd filter stage (fine filtration)	1 st filter stage (pre-filtration)	Coarse dust	G 1	ASHRAE dust (72% fine test dust ISO 12103-1:1997 A2 23% carbon black and 5% cotton linters)	250	50 ≤ A _{av} < 65		-	G 1							
			G 2		250	65 ≤ A _{av} < 80		-	G 2							
			G 3		250	80 ≤ A _{av} < 90		-	G 3							
			G 4		250	90 ≤ A _{av}		-	G 4							
	Fine dust	M	M 5	DEHS (Di-Ethyl-Hexyl-Sebacate) 0.2-3.0 µm	450	-	40 ≤ E _{av} < 60	-	F 5							
			M 6		450	-	60 ≤ E _{av} < 80	-	F 6							
		F	F 7		450	-	80 ≤ E _{av} < 90	35	F 7							
			F 8		450	-	90 ≤ E _{av} < 95	55	F 8							
			F 9		450	-	95 ≤ E _{av}	75	F 9							
	3 rd filter stage (final filtration)	Suspended dust	E	EPA: Efficient Particulate Air filter						E 10		≥ 85	≤ 15	-	-	H 10
										E 11		≥ 95	≤ 5	-	-	H 11
										E 12		≥ 99.5	≤ 0.5	-	-	H 12
			H	HEPA: High Efficiency Particulate Air filter						H 13	DEHS (Di-Ethyl-Hexyl-Sebacate)	≥ 99.95	≤ 0.05	≥ 99.75	≤ 0.25	H 13
										H 14	MPPS	≥ 99.995	≤ 0.005	≥ 99.975	≤ 0.025	H 14
										U 15	0.1-0.3 µm	≥ 99.9995	≤ 0.0005	≥ 99.9975	≤ 0.0025	U 15
										U 16		≥ 99.99995	≤ 0.00005	≥ 99.99975	≤ 0.00025	U 16
			U	ULPA: Ultra Low Penetration Air filter						U 17		≥ 99.999995	≤ 0.000005	≥ 99.9999	≤ 0.0001	U 17