

VACUUM PUMP UNIT SPECIFICATION		Rev.	Date	Made by	Checked	Approved
Tag #:	23P9052A/B	00	12/20/2025	CNSHCLI	cnshdlua	CNSHCLI
Customer:	Dongnan Dianhua Phase III					
Location:	Fujian ,china					
ALFA LAVAL project #:	xxxxxxx-CEFNE					
Customer project #:						
Enduser project #:						
Project:	AlfaVap NaOH-3E-900tpd					Page 1 of 3

# VACUUM PUMP UNIT SPECIFICATION

## 23P9052A/B

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Issue date:	12/20/2025	Rev. No.:	00			

Project: AlfaVap NaOH-3E-900tpd

# of equipment: 2

Tag #: 23P9052A/B

1	<b>Pump execution</b>		
2	The pump is driven by a three phase squirrel-cage motor, complete module and including:		
3	Suction side of vacuum pump: ANSI flange / Pressure side of vacuum pump: built-on ANSI flanged separator vessel		
4			
5			
6	<b>Operating conditions</b>		
7	Installation		<input checked="" type="checkbox"/> dusty atmosphere <input type="checkbox"/> indoor <input checked="" type="checkbox"/> exposed to wind <input checked="" type="checkbox"/> outdoor <input checked="" type="checkbox"/> exposed to rain <input checked="" type="checkbox"/> non hazardous area
8			
9	Ambient / room temperature	°C	min: 0 maxi: 40
10	Classified area		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
11	Operating time		24 h/day    360 d/year
12	Start-up number / day		
13			
14	<b>Site data</b>		
15	Low voltage motor voltage	V	380
16	Electrical grid frequency	Hz	50
17		Ph	3
18	Assumed installed power:	kW	15.0 approx., to be checked by vendor
19			
20	<b>Operating data</b>		
21	Medium		Air saturated with vapour vapor
22	Medium temperature	°C / °F	20 / 68
23a	Mass flow dry air ex condenser	kg/h / lb/h	29.52 / 65.08
23b	Mass flow vapor ex condenser	kg/h / lb/h	7.53 / 16.60
24	Suction volume	m³/h / CFM	441 / 259
25	Suction pressure	mbara / psia	80 / 1.15
26	Outlet pressure	mbara / psia	1013 / 14.7
27	Operating system (seal/ring water)		flow once through system, via Alfa Laval intercooler (plate heat exchanger)
28	Operating fluid		water
29	Service water inlet temperature (max.)	°C / °F	24 / 75.2
30	Cooling water consumption	m³/h / GPM	1.01 / 4.44 approx., to be checked by vendor
31			
32	<b>Pump</b>		
33	Operating principle		Fluid ring vacuum pump
34	Number of stages		
35	Pump rotation speed	rpm	<input type="checkbox"/> 1450 <input type="checkbox"/> 2900 <input checked="" type="checkbox"/> vendor <input type="checkbox"/> variable speed    no special requirement
36			
37	Painting (2)		epoxy coating has to be Vendor's standard Heavy Duty paint system for Alkali environment and be suitable for running at given medium and environmental conditions
38			
39			
40			
41	Shaft sealing		mechanical seal
42	Connections Pump inlet	DIN	<input checked="" type="checkbox"/> flanged <input type="checkbox"/> threaded
43	Pump outlet	DIN	<input checked="" type="checkbox"/> flanged <input type="checkbox"/> threaded
44	Seal water inlet on pump housing		<input type="checkbox"/> flanged <input type="checkbox"/> threaded
45	Seal water outlet on vessel		<input type="checkbox"/> flanged <input type="checkbox"/> threaded
46	Vessel overflow		<input type="checkbox"/> flanged <input type="checkbox"/> threaded
47	Vessel air outlet		pipe 180 degrees bended downwards
48	<b>Motor</b>		
49	Construction design		
50			
51	<b>Water separator vessel</b>		
52	Volume	liter	

ALL DATA HAVE TO BE VERIFIED DURING DETAILED ENGINEERING

- (1) to say "Yes" type "g"  to say "no", type "c"  in "Webdings" characters  
 (2) epoxy coating has to be suitable for running at given medium and environmental conditions

Plant: AlfaVap NaOH-3E-900tpd		
Tag #: 23P9052A/B		

1 <b>Material and construction</b>		
2 Housing and covers		AISI316 or eq.
3 Impeller		AISI316 or eq.
4 Shaft		AISI316 or eq.
5 Back plate		AISI316 or eq.
6 Mechanical seal		Carbon/Chrome steel/Viton
7 Pressure safety valve (if applicable)		
8 Drain / check valve		
9 Separator vessel		
10		

11		
12 <b>Tests</b>		
13 Hydraulic test		<input checked="" type="checkbox"/> internal test with manufacturer certificate
14 Balancing according to ISO 1940/1 (3)		<input checked="" type="checkbox"/> grade _____ manufacturer certificate
15 Performance test		<input checked="" type="checkbox"/> internal test with manufacturer certificate <input checked="" type="checkbox"/> Witnessed
16 according to standard:		ISO 9906 Level 2
17 number of pump to be tested		<input checked="" type="checkbox"/> All <input type="checkbox"/> 1 for each 10 pumps set
18 NPSH test All pumps of this item		<input type="checkbox"/> internal test with manufacturer certificate <input type="checkbox"/> Witnessed
19 according to standard:		ISO 9906 § 11.1.2.3 (NPSH3)
20 Vibration		<input checked="" type="checkbox"/> during performance test
21 Noise		<input checked="" type="checkbox"/> during performance test
22		

23		
24 <b>Scope of supply</b>		Vacuum pumps
25 pump	2	Tag no. should be engraved on pump nameplate
26 separator vessel	0	Tag no. should be engraved on vessel nameplate
27 pump seal	*	
28 seal pot	*	
29 sealing piping	*	
30 forced feed lube oil system		
31 type of coupling:		
32 coupling nr 1		
33 Drain valve mounted on pump		
34 anti cavitation connection	-	to be determined by vendor if necessary for given operating conditions. If needed, an anti-cavitation pipe can be foreseen between pump and separator vessel either an anti-cavitation safety valve mounted on the pump housing
35 drain check valve at pump center	0	
36 electrical motor	2	Brand: <input type="text" value="ABB"/> IP: <input type="text" value="55"/> Isol. class: <input type="text" value="F"/>
37 base plate for the above items	2	
38 anchor bolts set	2	
39 special tools	*	
40 noise	*	max. 80 dB(A) on 1.0m, or as low as reasonable achievable
41 agreement according to local regulation	*	
42 supplier documents	Y	
43 motor installation and alignment	Y	in supplier workshop
44 tests (see hereabove)	Y	
45 erection on site	N	
46 commissioning and start-up	opt	
47 Customer specifications applicable	Y	see below specifications which has to be taken fully into consideration
48 * Motor standard		specification #:
49 * Seismic specification		specification #:
50		
51 * General		specification #:
52		

(3) if blank, grade is G 6.3  
 \* = when applicable

## VACUUM PUMP DUTY DATA

### INPUT

Vapour load to condenser	14759 kg/h
Inerts fraction	0.2 %
<b>Outlet</b> vapour temp condenser (CAS)	<b>20 °C</b>

CHECK WITH THE MU COLLEAGUE THAT THE CAS CALCULATION HAS TAKEN INTO ACCOUNT SUB-COOLING AND INERT GAS FRACTION !!

Inlet pressure condenser (ALECS)	86.5 mbara
Pressure drop condenser hot side (CAS; 1 kPa = 10 mbar)	5.0 mbar
Length of suction pipe condenser to vacuum pump	10.0 m
Assumed pressure drop over piping	1.0 mbar
Assumed pressure drop over components in piping	1.0 mbar
Discharge pressure vacuum pump	1013 mbara

### CALCULATED

Mass flow dry air (total process + leakage)	29.52 kg/h
Inlet pressure vacuum pump	79.5 mbara
Required suction volume, all air + vapour	441 m <sup>3</sup> /h
Required suction volume, with condensation effect	80 m <sup>3</sup> /h
Require pipe internal diameter (minimum)	88 mm
Calculated power absorbed in pump	11 kW

## SERVICE WATER DATA

### INPUT

New (non-recycled) supply water temperature	24.0 °C
Total service water (new+recycled) flow (depends on pump size/type)	3.0 m <sup>3</sup> /h
<b>(check the supplier brochure to get a feeling for the flow, suggest 1 - 12 m<sup>3</sup>/h)</b>	
Recycling of water, %-age of total flow	0 %

### CALCULATED

Water temperature in ring and overflow	21.8 °C
Total service water (new+recycled) temperature	15.0 °C
New (non-recycled) supply water	2992 kg/h
Recycled water	0 kg/h
Condensate formed	8 kg/h
Water balance (=overflow)	1007 kg/h