

Rev. 2.4











Service, emission and alarm check report

Plant informati	on:	Required action:	<u>-</u>	
Project Nr.: Company:	25110 Atlantsolia		ОК	Not OK
City: Country:	Hafnarfjordur Iceland	1) Process and Vacuum Pumps	V	Г
Days of visit:	3-4/9	2) Valves and Instrumentation	_	✓
Year of visit:	2015	3) Absorption System	~	Γ
Purpose of visit:	Contractual Service - 1/1 Yearly	4) Adsorption System	₹	Γ
Engineer Henrik H	lansen	5) Control System	~	Γ-
_	99 86 09	6) Electrical System	V	_
	ansen@coolsorption.com	7) Emission from unit	V	
Webpage:	Cool Sorption	Summary of required actions	:	
Service E-mail:	servicedept@coolsorption.com	2)		
Recommendation	ons and predictions	3)		
4 Years to	o carbon change	4)		
1 Years to	pump/motor change/overhaul			
N/A Years to	Glycol/Oil change/refilling	5)		
2 Years to	SCADA/PLC system revamp	6)		
N/A = Not App	plicable			
Recommendation	on for additional services	7)		
┌ Training	1			
┌ Addition	nal service visit	Estimated maintenance cost (12 month	for the	next
☐ Manuals	5	▽ 0 - 15.000 EU	R	
☐ Hotline		₩ 15.000 - 30.000 EU	R	
☐ Onsite \$	Survey	「 30.000 - 60.000 EU	R	
☐ Quotatio	on for recommended spares	F 60.000+ EU	R	



Cool Sorp	tion - Life Cycle Contractual Ser			Date: 3-4/9 2015	Name: Henrik Ha	ansen	
Rev. 2.4	Terminal	Service inspection sheet Vapour Recovery Unit					
O N/A	1 ок		2 d / Fixed	Up for rep	3 placement ct visit	Must repaired	be
	Insp	ection (of Opera	ation			
Filter no.		V110		V130			
Opening of purge air		130	mbar(a)	130	mbar(a)		
Time of air equalizatio	n(850mbar)	25	sec.	25	sec.		
Balancing Step (only v	valid for 3 bed)	NA	mbar(a)	NA	mbar(a)		
Purge air flow		*6,5	m³/h	<u>*6,5</u>	m³/h		
Filter temperatures (b (Obtained at end of ad	ottom/middle/top) Isorption period)	8/11	°C _	11/11	°C		
Lowest final pressure	-	43	mbar(a)	44	mbar(a)		
Pressure increase after	r 10 min.	3	mbar(a) _	3	mbar(a)	<u> </u>	
Drain		0	liter _	0	liter		
	ace the hand valve and	Valv					
		· · ·					
Inspection of modulation	ng valves	1	ı	By-pass val	ves (vacuui	m pump)	2
Inspection of on / off v	alves	* 1	I	Drain evacu	ation fan		0
Non return valves		1	,	Automatic d	rip tee, dra	in valve	0
Visual inspection of saf	ety valves	4	r	Manual drip	tee, drain	valve	1
Safety valve replaced		-					
Safety valve must be re	eplaced no later then:	_					
Safety valve to be over	rhauled / calibrated by	Cool Sorpti	on?		Yes	No	
* Considder to have the replacement. It was found that the bevacuum pump. a ø7 m Installed ø7,5 mm, fou The SV311 is in need of	by-pass valve has a mix m plate has been teste and OK!	ssing orrificed on the ur	e, this shou	ld be fixed	in order to	secure fast i	i



Cool Sorption - Life Cycle Servic Project 25110 Contractual Service - 1/1	3-4/9 Henrik Hansen			
Terminal Rev. 2.4	Service inspection sheet Vapour Recovery Unit			
0 1	2 3 4 d / Fixed Up for replacement Must be at next visit repaired / cleaned			
Absorb	ent Line			
Coupling if direct driven Magnetic Coupling Oil level Press in 0,15 bar(g)	Constant flow valve Press out 2 bar(g) et pump no. 1 Press out 2,8 bar(g) Flow out NA m³/h			
Quality of	Absorbent			
Absorbent volumenm ³	Last import of absorbent date Due time to absorbent change date			
Expected optimal operating time with the current abso	rbent level amount: <u>0</u> Days			
Remarks: often replacement - OK.				

Absorbent Line

3

Cool Sorp Project 25110	tion - Life Cy Contractual	cle Service Service - 1/1 Y		Date: 3-4/9 2015	Name: Henrik Ha	nsen	
Rev. 2.4	Terminal		Service inspection sheet Vapour Recovery Unit				
0 N/A	1 ок	Replaced	/ Fixed	Up for re	3 placement xt visit	4 Must be repaired / cleaned	
	Rotary	y Vane Vacı	uum Pu	ımp no.	1		
Oil quality (smell, cold Oil filter Oil level Rupture disc Heat element disconn		2 I		ter es (closed) nock out po		1 2 0 1	
Operational observa	itions:						
Suction pressure when End pressure at closed Suction filter size Air filter last changed Measured data at:			date	Type of oi Temperation Operation Operation 8,85	ure of oil time time /day	VE-101 75 14216 h 8,6 h 244 mbar(a) SP250	
Vibrations measure	ment:		3			31 230	
Measuring point no. 1 Measuring point no. 2 Measuring point no. 3 Measuring point no. 4	mm/s mm/s mm/s mm/s	3					
Remarks:			4	3	200	2	
Refilled 6 liters of oil i	nstead of 5, up to	upper level in le	vel glas, t	his due to s	several low le	evel alarms on the oil	

vacuum pump. If this alarm continues to come a new level swtich is recommended. *pre heat pressure changed from 800 mbara to 132 mbara - installed orifice ø7,5 mm.



Cool Sorption - Life Cyc	le Service	26	Date:	Name:		
			3-4/9 2015	Henrik Ha	nsen	i
			!			
Terminal Rev. 2.4	Service inspection sheet Vapour Recovery Unit					
0 1 N/A OK	Replace	2 d / Fixed	Up for re	3 placement xt visit	Must repaired	be
Flectric	: / Meası	ırina Fa	uinmen	+		
	_		- -		-6	
Check / Cal. of HC-analyzer	reference NA NA	1. Re	eading	Keading	after cal.	Unit gC₄H₁₀/Nm³ ppm
Inspection of SCADA PC Inspection modem (eWON, Secomea, K56) Inspection in low voltage switch board Inspection in high voltage switch board	1 1 1	Inspection Inspection	of I/O state of pneuma			0 1 0
Remarks: New calibration gas (C4H10 0,9Vol%) is no	eeded for ne	kt service!				
Vapour System			Measur	ing Inst	ruments	
Non return valve Overpressure / Vacuum relief valve Flame arrester Remarks:	1 1 1	Pressure Indicators (PI) Pressure Transmitters (PT) Temperature Indicators (TI) Temperature Transmitters (TT) Flow Indicators (FI) Flow Transmitters (FT)				
	YEA	RLY				
Inspection	/ calibratio	n of modu	lating val	ves		
				ct model	Check press transmitter v of desorption	value at end
Input / Output PCV-221 4 mA (0%) 0		<u>'-314</u> 0	A Sele	ct model	PT221	46 🔽
8 mA (25%) 25		5,4			PT211	46 マ 51 マ
12 mA (50%) 50,4 16 mA (75%) 74,6		5,4			PT231 X select	51 1
20 mA (100%) 97,1		9,5	 		X select	
Remarks: Auto tune performed on modulating valve	s.				- 10-00	
Alarm Check		Ś	Da	ata Back	-up	
Alarm check carried out Alarm check not carried out Last date for alarm check 04.09.1	<u>15</u>		nts 1 test o of SCADA	Version: Version: computer H		
Remarks:			of SCADA		ogram licens	se



Co	ool Sorpt	ion - Life Cycle Services	Date:	Name:
Rev. 2.4	-	-	3-4/9	Henrik Hansen
Project	25110	Contractual Service - 1/1 Yearly	2015	20

Findings

During the visit the following has been done / observed:

Purge air system was clocked up, it is highly recommended to replace the hand valve and flow meter for this system in order for it to work propperly again and ease adjustment if needed. This should be part os customers maintenance plan to check this flow frequently.

Some of the valves that hasn't been replaced yet is in need of replacement soon, especially LS315 absorbent inlet valve that is not working propperly. This could in worst case leed to flooding of the VRU from the tanks.

SV311 safety valve is in need of check up / replacement. It is highly recommended to buy a spare valve for easy replacement at agreed upon certain intervals. At least have this valve tested 1 time pr. year.

Both absorbent pumps are in need of an overhaul, especially P301 inlet pump. These are leaking oil from seals.

P301 will need refilling of oil ASAP.

Filled the vacuum pump with 1 extra liter of oil to reach high level in oil glas, this in order to check if the VRU still gets low level oil alarms - if it does it is highly recommended to replace the level switch in the pump.

It is recommended to change all gaskets and bolts at next service to fix the small oil leaks from the pump. If you buy 10 liters of oil for the pump, you will have spares for the next 2 services on site.

Installed orifice before AV291 by-pass valve, in order to lower the vacuum for pre-heating of the vacuum pump. This could have been the problem for keeping temperature up in vacuum pump during the winter.

Please give as much feed back as possible on this - if some problems still occurs we will need to prepare for heat tracing an insulation for the pump, if not before, then no later than next service.

Pi301 0-6 barg is in need of replacement.

FIS305 needs to be replaced, bearing is not OK instide and needle hangs from time to time - tried to lubricate, but problems remains from time to time.

Please replace silicagel bag inside to prevent for more moist inside the flow switch.

Air silencers in pneumatic panel was clocked up, will need to be replaced ASAP. These has been removed for now in order to prevent problems with valves not opening or closing as they should.

Have in mind the IO modules has been replaced with newer models that will still fit the system, but if CPM brakes down, the whole system will need to be replaced.

Checked up and adjusted pre-heat system online - this should also help to avoid further problems in the winter.

The issues below needs attention / action from the costumer:

Order parts for purge air system.

Order valves needed and new safety valve.

Order parts for absorbent pumps.

Order parts needed for vacuum pump at next service.

Order pressure gage (0-6 barg - Pi305)

Order new FIS305 and have silicagel bags on site for replacement at service (and in between if needed). Order air silencers for pneumatic panel.

The issues below needs attention / action from ACS:

Quote above needed parts upon request from customer.



Rev. 2.4				e Service		Date: 3-4/9	Name: Henrik Ha	nsen		
<u>Project</u>	25110 Contractual Service - 1/1 Yearly 2015									
Engineer's Timesheet										
Day	Date	Leave Base	Arrive Site	Depart Site	Arrive Base	Travel Time	Hours Worked	Over Time	Milage	
Mon		2000		0.10		00:00	00:00	0		
Tues						00:00	00:00	0		
Wed						00:00	00:00	0		
Thur	3/9	07:30	07:45	17:00	17:15	00:30	09:15	2,25		
Fri	4/9	07:30	07:45	14:30	14:45	00:30	06:45	0		
Sat						00:00	00:00	0		
Sun						00:00	00:00	0		
		12.	···	ed spare					2	
							-	Dellar		
Qty			Material	Description	n / Type			Price pr. pcs:	Total in EUR	
Qty			Material	Description	n / Type				EUR 0	
Qty			Material	Description	on / Type				O O	
Qty			Material	Description	on / Type				0 0 0	
Qty			Material	Description	on / Type				0 0 0 0	
Qty			Material	Description	on / Type				0 0 0 0	
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Qty			Material	Description	on / Type				0 0 0 0 0 0	
Qty			Material	Description	on / Type				0 0 0 0 0	
Qty			Material	Description	on / Type				0 0 0 0 0 0 0	
Qty			Material	Description	on / Type				0 0 0 0 0 0 0	
Qty			Material	Description	on / Type				0 0 0 0 0 0 0	
Qty			Material	Description	on / Type				EUR 0 0 0 0 0 0 0 0 0 0 0 0 0 0	

Time Sheet 11



Co	ool Sorpti	on - Life Cycle Services	Date:	Name:
Rev. 2.4			3-4/9	Henrik Hansen
Project	25110	Contractual Service - 1/1 Yearly	2015	

Emission test report

Purpose and background:

The purpose with the service visit was to control the VRU-plants emission and monitor VRU operation for any functional problems

Measuring instruments:

For measuring VRU-plants emission, we use:

One Dräger Polytron IR Ex gas analyser, ranged and calibrated for 0-1.70 vol % (0-41q/Nm³) Pressure transmitter PT211, installed in the suction line of the vacuum pump

Calibration:

Before initializing the measurement period, an engineer from Cool Sorption Denmark has calibrated the gas analyser with a certificated calibrating gas, containing 0.90% butane (21.7q.HC/Hm³)

Explanation of the measurement:

The red curve shows the emission from the VRU in $q.HC/Nm^3$. the scale is shown on the left side of the paper

The blue curve shows the suction pressure from the vacuum pump in mbar(a)

Results (ACS)

The following HC emission value represents the mean value for the one "worst case scenario" that has been hand picked from the entire measuring period.

1 Hour Period	Average outlet concentration [g.HC/Nm³]
03.09.15 at 18:25 - 19:25	0.95

Emission result shows that the VRU is well below the required legal / design limit of:

35q.HC/Nm3

The following HC emission value represents the mean value for the entire measuring period.

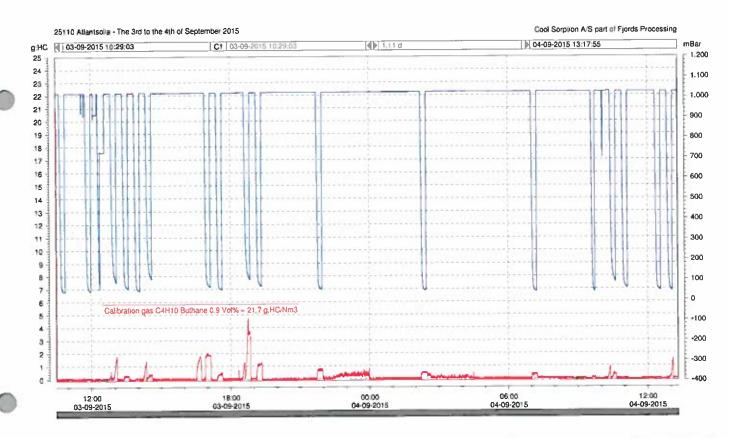
24 Hour Period	Average outlet concentration [g.HC/Nm ³]
03.09.15 at 12:00 - 12:00	0.12

Emission result shows that the VRU is well below the required legal / design limit of:

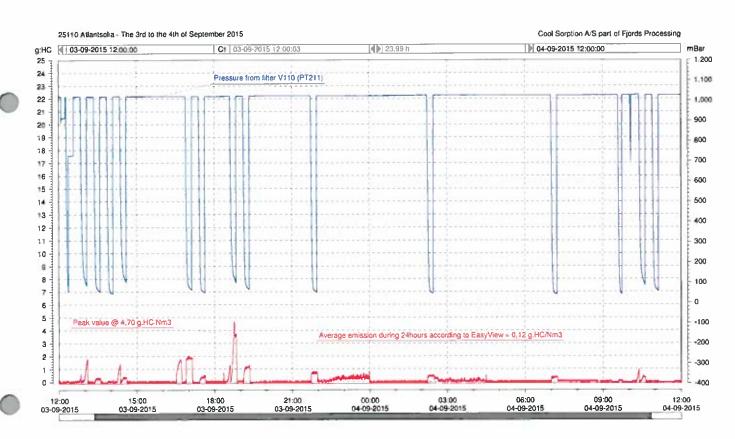
35q.HC/Nm3

Remarks:

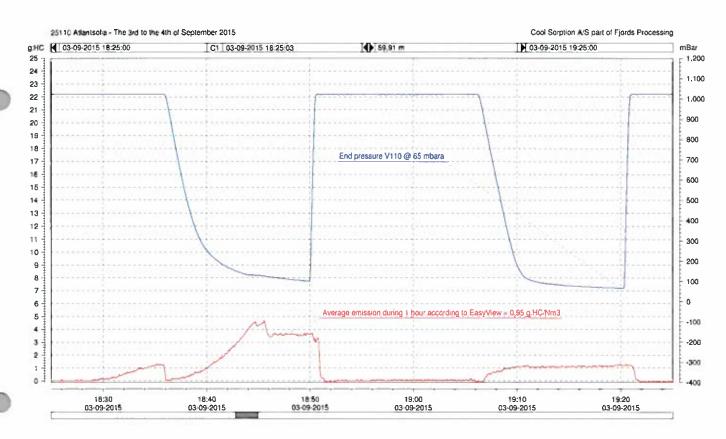
Nice and low emissions - still a tendency of higher emissions from filter V130! Otherwise the VRU is running good.



	Color	Label	Ave		224		
001		g HC-Nm3	0,13	- Carl	- 25		
002		mBar(a)	890,45				



	Color	Label	Ave	Max	
001		g HC-Nm3	0,12	4,70	
002		mBar(a)	907.79	1.027.50	



	Color	Label	Ave	Max
001		g HG.Nm3	0.95	4,70
002		mBar(a)	648,38	1.022,50

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Cause			Con Table Williams					Description of the party of the party of	And the second s	A STANSON OF STANSON OF STANSON		A Trial Standard Trial		And the County of the County o	The print of the land of the land	Natural States Control of States of States States of Sta	OF CASAN TRANSPORT	And the second second second		Alam Duron Sangara Seath (SED)					College of the Colleg	The state of the s	o require the Variation of		H. Al A P. I	10 hr i	op: alann. mitte int n-group n-group n-group	transplante of the contract of
	1		P. CHR2		PA-3QS			GA-301	1.4+107	1.A-3%		[.A.1]4 [.A.1]4 [.A.1]5		PA+211 PA-211		PA-231 PA-24	PA+21	I'A «2A)	PA-90)						TA+131 TA+132		TA:365					
Ja-in-group exter poruble with slaym-present esophing Action	USA- Activated device		A 2 2		2		2	2 2	2	2		2 2			2 A 2	2 2 A	1	2							1 1		2 2					
me : Bod VIII0. mlet/outlet/purge & suction valves	AV 111,112 211,214	H	A A		1	Ш	,	1 4				1 1		1.		1 1	A		1,	1	\pm	#			11			#			\pm	
ne : Bed VI30, infetAntlet/parge & metion valves	AV 131,132,231,234		11.			Ш		1 1	1	1		x x		11			1	1	1		\pm			1.1.	1.	•			\pm	Ш		H
ne : Bed VI10, Equalizing valve AV212 ne : Bed VI30. Equalizing valve AV232	AV 212 AV 232	\parallel	##	H	##	H	#					#	+	#	#	##		##	#	3	#			1	4 1		\parallel	#	\parallel			
en : By-pass Valve for Vacuum pump	AV 262		X 1						1			3 3		111		X X			1	T.					1 1	•		#	#			П
nc: Aboorbeas Supply Valve, (1994 Storage Task nc: Abovebeas falled Valve to Abovebea ser: Abovebeas outled Valve from Aboorbea nc: Abovebeas Reserve Valve, to Sen age Task	AV 302 I.V 315 AV 321 AV 322		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1	111	1	3 A 3 3 5 3 1 1		1		1 1 P		1 1 1		1 1				2 2				1	1 1	1	1 1					
p : Vacuum pump p : Keiting element for Vacuum pump	P 361 37: 261		1 1		3				·	3		1 1		111	A A	L X	x	T.		н					1 1	1						
p - Abusybenii Inlei pump to Abusyber P101	P 301		3 3				1	На		1		1 1		2 7		11	1	1		Н			H,	1	1 1	1	1 1					
: Almorbent outlet gump from Absorber V\$10	P 321		X X					. 11	1	1				1 1 1	•	E X	i	x		34					1 1		1 1					
em only ant Test Cruficate Date: non.by: Spect: Vapour Recovery Unit (VRU).			describes																													
colect: Yapour Recovery Link (VRU), -type: Carbon Yaruman Advorption (CVA) -Rotary Vanc pump- interior: Reykja-tik, Island											Alarm check made by Henrik Hansen - Cool Sorption 4th of September 2015 Title : Safe Guarding CSA Order No. : IS 25110																					
Cool Sorption A/S, Smedda	nd 6, 2600 Glostrup	Cool Sorption AN, Smedeland 6, 2600 Glostrup, Denmark Phone : +45 43 47 45												1		T					1	A		nstr. :			9(00	_	Date	: 07.0	19.0	