

File: PS22020 LT VST 60MW bio 2eko

model CEC60

1	Size	2510	x	8000	mm	Type	NEN	Ver		Connected in	1	parallel	1	series				
2	Surf/Unit (gross/eff/finned)				2638,9 /	2570,3 /			m²	Shells/unit	1							
3	Surf/Shell (gross/eff/finned)				2638,9 /	2570,3 /			m²									
4																		
5	Simulation	PERFORMANCE OF ONE UNIT																
6			Shell Side		Tube Side		Heat Transfer Parameters											
7	Process Data		In	Out	In	Out	Total heat load				kW		8769,8					
8	Total flow	kg/s	203,33		42,96		Eff. MTD/ 1 pass MTD				°C		12,59 / 12,58					
9	Vapor	kg/s	0	0	41,5773	38,4149	Actual/Reqd area ratio - fouled/clean				1 /		1,14					
10	Liquid	kg/s	203,33	203,33	1,3827	4,5451												
11	Noncondensable	kg/s	0	0	0	0	Coef./Resist.		W/(m² K)		m² K/W		%					
12	Cond./Evap.		0	0	3,1624	0	Overall fouled		271,2		0,00369							
13	Temperature	°C	27	37,3	56	32,13	Overall clean		310,3		0,00322							
14	Dew / Bubble point	°C			61,01	-169,81	Tube side film		353,1		0,00283		76,79					
15	Quality		0	0	0,968	0,894	Tube side fouling		3771,4		0,00027		7,19					
16	Pressure (abs)	bar	4	3,89552	1,02825	1,01409	Tube wall		14055,2		0,00007		1,93					
17	DeltaP allow/cal	bar	0,5	0,10448	0,02	0,01416	Outside fouling		5000		0,0002		5,42					
18	Velocity	m/s	0,44	0,44	14,93	12,37	Outside film		3126,8		0,00032		8,67					
19																		
20	Liquid Properties						Shell Side Pressure Drop								bar	%		
21	Density	kg/m³	997,94	995,41	987,74	996,87	Inlet nozzle				0,0095		9,09					
22	Viscosity	mPa s	0,8561	0,6877	0,503	0,7635	Inlet space Xflow				0,01962		18,77					
23	Specific heat	kJ/(kg K)	4,191	4,188	4,186	4,19	Baffle Xflow				0,0468		44,78					
24	Therm. cond.	W/(m K)	0,6031	0,6164	0,6388	0,6098	Baffle window				0,00362		3,46					
25	Surface tension	N/m			0,0669	0,0709	Outlet space Xflow				0,01832		17,53					
26	Molecular weight		18,01	18,01	18,01	18,03	Outlet nozzle				0,00666		6,38					
27	Vapor Properties						Intermediate nozzle											
28	Density	kg/m³			1,07	1,2	Tube Side Pressure Drop				bar	%						
29	Viscosity	mPa s			0,0184	0,018	Inlet nozzle				0,00021		1,42					
30	Specific heat	kJ/(kg K)			1,098	1,023	Entering tubes				0,00056		3,77					
31	Therm. cond.	W/(m K)			0,025	0,0239	Inside tubes				0,01276		86,65					
32	Molecular weight				28,46	29,83	Exiting tubes				0,00045		3,03					
33	Two-Phase Properties						Outlet nozzle								0,00076		5,14	
34	Latent heat	kJ/kg			2375,7	2429	Intermediate nozzle											
35																		
36	Heat Transfer Parameters						Velocity / Rho*V2								m/s	kg/(m s²)		
37	Reynolds No. vapor				28709,58	27032,06	Shell nozzle inlet				1,09		1184					
38	Reynolds No. liquid		17799,04	22155,43	34,91	75,6	Shell bundle Xflow				0,44		0,44					
39	Prandtl No. vapor				0,81	0,77	Shell baffle window				0,33		0,33					
40	Prandtl No. liquid		5,95	4,67	3,3	5,25	Shell nozzle outlet				1,09		1187					
41	Heat Load		kW		kW		Shell nozzle interm											
42	Vapor only		0	0	0	0					m/s		kg/(m s²)					
43	2-Phase vapor		0		-983,2		Tube nozzle inlet				13,98		216					
44	Latent heat		0		-7465,1		Tubes				14,93		12,37					
45	2-Phase liquid		0		-321,4		Tube nozzle outlet				16,39		359					
46	Liquid only		8769,8		0		Tube nozzle interm											
47																		
48	Tubes				Baffles		Nozzles: (No./OD)											
49	Type		Plain	Type	Single segmental						Shell Side		Tube Side					
50	ID/OD	mm	/	Number	7		Inlet	mm	1 /	508	1 /	1902						
51	Length act/eff	mm	8000 /	Cut(%d)	33,27		Outlet		1 /	508	1 /	1600						
52	Tube passes		1	Cut orientation	H		Other	/			/							
53	Tube No.			Spacing: c/c	mm	1000	Impingement protection						None					
54	Tube pattern		60	Spacing at inlet	mm	894,48												
55	Tube pitch	mm	42	Spacing at outlet	mm	897,48												
56	Insert		None															
57	Vibration problem		No / No					RhoV2 violation				No						