BOGE DRUCKLUFTSYSTEME

Heat recovery for screw compressors

Heat exchanger integrated or external available					S 31-2 SLF 30	S 40-2 SLF 40	S 50-2 SLF 51	S 60-2 S 61-2 SF 60-2 SLF 61	S 75-2 SLF 75	S 90-2	S 100-2 S 101 SF 100-2 SLF 101	S 125 SLF 125	S 150 S 151 SF 150	S 180	S 220 SLF 221	S 271 SL 270 SLF 271	S 341 SL 341 SL 340	SL 431	SL 481
Heat exchanger integrated only			C 15 CD 15	C 20 CF 20 CD 20	C 25 CF 25 CD 25	C 30 CF 30 CD 30													
Heat exchanger mounted external		CL 10 CLD 10-	CL 15 CLD 15-	CL 20 CLD 20-															
nur im Unterbautrocknergehäuse				S 20-2	S(F) 24-2	S(F) 29-2													
Heat exchanger only external						SLDF 30	SD 40-2 SLDF 40	SD 50-2	SD 60-2 SD 61-2 SDF 60-2	SD 75-2	SD 90-2	SD 100-2 SD 101 SDF100-2	SD 125	SD 150 SDF 150					
Drive motor	kW	7,5	11	15	18,5	22	30	37	45	55	65	75	90	110	132	160	200	250	315	355

Heat recovery

for frequency controled screw compressors, the complete heat quantity is only available at 100% utilisation

80 % of the supplied electric energy to the compressor, can be transfered to heat and are available for heat recovery.

Heat quantity HeatRec [Q]	**kW**	**6,1**	**8,9**	**12,1**	**14,9**	**17,8**	**24,2**	**29,9**	**36,3**	**44,4**	**52,5**	**60,6**	**72,7**	**88,8**	**106,6**	**129,2**	**161,5**	**201,9**	**254,4**	**286,7**
Heat recovery with plate heat exchanger (integrated) water IN 20°C and water OUT 70°C (delta T 50K).= BOGE Duotherm BPT																				
Water quantity delta T 50K	m³/h	0,10	0,15	0,21	0,26	0,31	0,42	0,51	0,63	0,76	0,90	1,04	1,25	1,53	1,83	2,22	2,78	3,47	4,38	4,93
Pressure loss	bar	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
Heat recovery with plate heat exchanger (integrated) water IN 40°C and water OUT 65°C (delta T 25K).= BOGE Duotherm BPT																				
Water quantity delta T 25K	m³/h	0,21	0,31	0,42	0,51	0,61	0,83	1,03	1,25	1,53	1,81	2,08	2,50	3,06	3,67	4,44	5,56	6,94	8,75	9,86
Pressure loss	bar	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Heat recovery with safety heat exchanger (external) water IN 20°C and water OUT 55°C (delta T 35K).= BOGE Duotherm BSW																				
Water quantity delta T 35K	m³/h					0,44	0,60	0,73	0,89	1,09	1,29	1,49	1,79	2,18	2,62	3,17	3,97	4,96	6,25	7,04
Pressure loss	bar					0,1	0,1	0,1	0,1	0,1	0,1	0,2	0,2	0,2	0,2	0,3	0,3	0,4	0,4	0,4

Cost savings

Cost savings for 1000 Bh	€	753 €	1.104 €	1.506 €	1.857 €	2.208 €	3.011 €	3.714 €	4.517 €	5.520 €	6.524 €	7.528 €	9.033 €	11.041 €	13.249 €	16.059 €	20.074 €	25.093 €	31.617 €	35.632 €
Cost savings for 5000 Bh	€	3.764 €	5.520 €	7.528 €	9.284 €	11.041 €	15.056 €	18.569 €	22.584 €	27.602 €	32.621 €	37.639 €	45.167 €	55.204 €	66.245 €	80.297 €	100.372 €	125.464 €	158.085 €	178.160 €

Current average heating oil price pro 100 liter heating oil = **85,80 €** 24.03.2011

Input:	€	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €	0,858 €

Heat value per liter heating oil 35,5 MJ/l = 9,861 kWh/l

Heating efficiency 0,7

Price per liter heating oil €/ l

Usable heat quantity Heat recovery Q(kW)

$$\text{Cost saving} = \frac{Q(\text{kW}) \times 1000(\text{h})}{0{,}7 \times 9{,}861(\text{kWh/l})} \times \text{price}(€/\text{l})$$

Calculations example

1 kWh = 860 kcal = 3,6MJ

1 m³/h = 1000 l/h

Water flow $Vw = \frac{Q\ (kW) \times 860\ (kcal)}{\Delta T\ (K)}$ (l/h)

Temperature difference $\Delta T = \frac{Q\ (kW) \times 860\ (kcal)}{Vw\ (l/h)}$ (K)

Example

SLF 75 with BPT, 44.4 kW useful heat capacity at 100% (In frequency ranges proportionally less). Customer is option: Water inlet 20°C and water outlet 70°C, water flow see formula (44,4kW x 860 / delta T 50K = 763 liter/h) Customer has a pump capacity of 1m ³ / h, water flow has to be curbed, otherwise the desired 70 ° C will not be reached. Frequency controlled compressors should have a regulation, eg frequency-controlled pump.

24.03.2011