



Service Factors

Table 1	Factor for driven machine			f1			
Driven machines	Effective daily operating period under load in hours			Driven machines	Effective daily operating period under load in hours		
	0.5	>0.5-10	>10		0.5	>0.5-10	>10
Waste water treatment				Conveyors			
Thickeners (central drive)	–	–	1.2	Bucket conveyors	–	1.4	1.5
Filter presses	1.0	1.3	1.5	Hauling winches	1.4	1.6	1.6
Flocculation apparatus	0.8	1.0	1.3	Hoists	–	1.5	1.8
Aerators	–	1.8	2.0	Belt conveyors 150 kW	1.0	1.2	1.3
Raking equipment	1.0	1.2	1.3	Belt conveyors 150 kW	1.1	1.3	1.4
Combined longitudinal and rotary rakes	1.0	1.3	1.5	Goods lifts	–	1.2	1.5
Pre-thickeners	–	1.1	1.3	Passenger lifts	–	1.5	1.8
Screw pumps	–	1.3	1.5	Apron conveyors	–	1.2	1.5
Water turbines	–	–	2.0	Escalators	1.0	1.2	1.4
Pumps				Rail travelling gears	–	1.5	–
Centrifugal pumps	1.0	1.2	1.3				
Positive-displacement pumps				Frequency converters	–	1.8	2.0
1 piston	1.3	1.4	1.8				
> 1piston	1.2	1.4	1.5	Reciprocating compressors	–	1.8	2.0
Dredgers							
Bucket conveyors	–	1.6	1.6	Cranes			
Dumping devices	–	1.3	1.5	Slewing gears	1.0	1.4	1.8
Caterpillar travelling gears	1.2	1.6	1.8	Luffing gears	1.0	1.1	1.4
Bucket wheel excavators				Travelling gears	1.1	1.6	2.0
as pick-up	–	1.7	1.7	Hoisting gears	1.0	1.1	1.4
for primitive material	–	2.2	2.2	Derricking jib cranes	1.0	1.2	1.6
Cutter heads	–	2.2	2.2				
Traversing gears	–	1.4	1.8	Cooling towers			
Plate bending machines	–	1.0	1.0	Cooling tower fans	–	–	2.0
				Blowers (axial and radial)	–	1.4	1.5
Chemical industry				Food industry			
Extruders	–	–	1.6	Cane sugar production			
Dough mills	–	1.8	1.8	Cane knives	–	–	1.7
Rubber calendars	–	1.5	1.5	Cane mills	–	–	1.7
Cooling drums	–	1.3	1.4	Beet sugar production			
Mixers for				Beet cosettes macerators,	–	–	1.2
uniform media	1.0	1.3	1.4	Extraction plants, Mechanical			
non-uniform media	1.4	1.6	1.7	refrigerators, Juice boilers,	–	–	1.4
Agitators for media with				Sugar beet washing machines,			
uniform density	1.0	1.3	1.5	Sugar beet cutters	–	–	1.5
non-uniform density	1.2	1.4	1.6				
non-uniform gas absorption	1.4	1.6	1.8	Paper machines			
Toasters	1.0	1.3	1.5	of all-kind	–	1.8	2.0
Centrifuges	1.0	1.2	1.3	Pulper drives	On request		
Metal working mills				Centrifugal compressors	–	1.4	1.5
Plate tilters	1.0	1.0	1.2				
Ingot pushers	1.0	1.2	1.2	Cableways			
Winding machines	–	1.6	1.6	Material ropeways	–	1.3	1.4
Cooling bed transfer frames	–	1.5	1.5	To- and fro system			
Roller straighteners	–	1.6	1.6	aerial ropeways	–	1.6	1.8
Roller tables				T-bar lifts	–	1.3	1.4
continuous	–	1.5	1.5	Continuous ropeways	–	1.4	1.6
intermittent	–	2.0	2.0				
Reversing tube mills	–	1.8	1.8	Cement industry			
Shears				Concrete mixers	–	1.5	1.5
continuous	–	1.5	1.5	Breakers	–	1.2	1.4
crank type	1.0	1.0	1.0	Rotary kilns	–	–	2.0
Continuous casting drivers	–	1.4	1.4	Tube mills	–	–	2.0
Rolls				Separators	–	1.6	1.6
Reversing blooming mills	–	2.5	2.5	Roll crushers	–	–	2.0
Reversing slabbing mills	–	2.5	2.5				
Reversing wire mills	–	1.8	1.8				
Reversing sheet mills	–	2.0	2.0				
Reversing plate mills	–	1.8	1.8				
Roll adjustment drives	0.9	1.0	–				

1.Design for power rating of driven machine P₂

*) Designed power corresponding to max. torque

**) Load can be exactly classified, for Instance.

***) A check for thermal capacity is absolutely essential

2. The listed factors are empirical values. Prerequisite for their application is that the machinery and equipment mentioned correspond to generally accepted design and load specifications. In case of deviations from standard conditions, please refer to us.

3. For driven machines which are not listed in this table, please refer to us.



Table 2 Thermal factor f4					
Without auxiliary cooling or with fan cooling					
Ambient temperature	Operating cycle per hour (ED) in %				
	100	80	60	40	20
10 °C	1.11	1.31	1.60	2.14	3.64
20 °C	1.00	1.18	1.44	1.93	3.28
30 °C	0.88	1.04	1.27	1.70	2.89
40 °C	0.75	0.89	1.08	1.45	2.46
50 °C	0.63	0.74	0.91	1.22	2.07

Table 4 Factor for altitude f6					
Without auxiliary cooling or with fan cooling					
Factor	Altitude (metres above MSL)				
	up to 1000	up to 2000	up to 3000	up to 4000	up to 5000
f6	1.0	0.95	0.90	0.85	0.80

Table 3 Thermal factor f5					
For cooling with cooling coil, or with fan and cooling coil					
Ambient temperature	Operating cycle per hour (ED) in %				
	100	80	60	40	20
10 °C	1.05	1.23	1.50	2.03	3.41
20 °C	1.00	1.17	1.43	1.93	3.25
30 °C	0.93	1.09	1.33	1.79	3.02
40 °C	0.87	1.02	1.24	1.68	2.83
50 °C	0.81	0.95	1.16	1.56	2.63

Table 5 Factor for altitude f7					
For cooling with cooling coil, or with fan and cooling coil					
Factor	Altitude (metres above MSL)				
	up to 1000	up to 2000	up to 3000	up to 4000	up to 5000
f7	1.0	0.98	0.96	0.94	0.92

Table 6 Oil supply factor for vertical gear units. For horizontal gear units f8 = 1.0, and in case of forced lubrication f8 = 1.05 f8									
Gear unit type	Oil supply	Sizes 4 ... 12			Sizes 13 ... 18				
		Without auxiliary cooling	With fan	With cooling coil	With fan and cooling coil	Without auxiliary cooling	With fan	With cooling coil	With fan and cooling coil
H2.V, H3.V H4.V	Dip lubrication	0.95	*	0.95	*	*	*	*	*
	Forced lubrication	1.15	*	1.05	*	1.15	*	1.05	*
B2.V, B3.V B4.V	Dip lubrication	0.95	0.95	0.95	0.95	*	*	*	*
	Forced lubrication	1.15	1.10	1.10	1.10	1.15	1.10	1.10	1.10

Table 7 Thermal capacity factor for gear units without auxiliary cooling f9				
Gear unit type	Place of installation			
	n 1/min	Small confined spaces Wind velocity ≥ 0.5 m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
H1	750	0.68 - 0.26 x a1 x a2	0.79 - 0.27 x a1 x a2	1.00
	1000	0.70 - 0.79 x a1 x a2	0.84 - 0.85 x a1 x a2	1.14 - 0.81 x a1 x a2
	1500	0.72 - 2.50 x a1 x a2	0.89 - 2.60 x a1 x a2	1.25 - 2.60 x a1 x a2
H2	750	0.70 - 0.08 x a1 x a2	0.79 - 0.21 x a1 x a2	1.00
	1000	0.76 - 1.00 x a1 x a2	0.87 - 1.40 x a1 x a2	1.12 - 1.30 x a1 x a2
	1500	0.83 - 4.10 x a1 x a2	0.96 - 4.60 x a1 x a2	1.25 - 4.20 x a1 x a2
H3	750	0.76	0.81 - 0.06 x a1 x a2	1.00
	1000	0.83 - 1.20 x a1 x a2	0.90 - 1.36 x a1 x a2	1.11 - 1.30 x a1 x a2
	1500	0.93 - 4.70 x a1 x a2	1.00 - 4.80 x a1 x a2	1.27 - 5.10 x a1 x a2
H4	750	0.78	0.83	1.00
	1000	0.85	0.91 - 1.60 x a1 x a2	1.10 - 2.40 x a1 x a2
	1500	0.97 - 10.0 x a1 x a2	1.03 - 12.5 x a1 x a2	1.27 - 14.0 x a1 x a2
B2	750	0.66 - 0.09 x a1 x a2	0.77 - 0.14 x a1 x a2	1.00
	1000	0.69 - 0.70 x a1 x a2	0.81 - 0.77 x a1 x a2	1.08 - 0.64 x a1 x a2
	1500	0.74 - 3.20 x a1 x a2	0.88 - 3.30 x a1 x a2	1.20 - 2.90 x a1 x a2
B3	750	0.73	0.80 - 0.05 x a1 x a2	1.00
	1000	0.79 - 0.63 x a1 x a2	0.87 - 0.81 x a1 x a2	1.10 - 0.73 x a1 x a2
	1500	0.86 - 2.40 x a1 x a2	0.95 - 2.60 x a1 x a2	1.23 - 2.80 x a1 x a2
B4	750	0.77	0.82	1.00
	1000	0.83	0.88	1.09 - 0.29 x a1 x a2
	1500	0.92 - 1.70 x a1 x a2	0.99 - 2.20 x a1 x a2	1.24 - 2.60 x a1 x a2

For factor f9<0.5, please refer to us!

Table 8 Thermal capacity factor for gear units with fan f10				
Gear unit type	Place of installation			
	n 1/min	Small confined spaces Wind velocity ≥ 0.5 m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
H1	750	0.97 - 0.05 x a1 x a2	0.97 - 0.04 x a1 x a2	1.00
	1000	1.18 - 0.33 x a1 x a2	1.20 - 0.33 x a1 x a2	1.23 - 0.32 x a1 x a2
	1500	1.53 - 1.00 x a1 x a2	1.53 - 0.95 x a1 x a2	1.56 - 0.94 x a1 x a2
H2	750	0.95 - 0.07 x a1 x a2	0.96 - 0.06 x a1 x a2	1.00
	1000	1.16 - 0.65 x a1 x a2	1.17 - 0.63 x a1 x a2	1.21 - 0.55 x a1 x a2
	1500	1.54 - 2.40 x a1 x a2	1.55 - 2.40 x a1 x a2	1.58 - 2.20 x a1 x a2
H3	750	0.89 - 0.29 x a1 x a2	0.91 - 0.25 x a1 x a2	1.00
	1000	1.06 - 1.30 x a1 x a2	1.08 - 1.20 x a1 x a2	1.17 - 0.93 x a1 x a2
	1500	1.38 - 4.20 x a1 x a2	1.40 - 4.10 x a1 x a2	1.48 - 3.70 x a1 x a2
B2	750	0.95	0.96	1.00
	1000	1.13 - 0.15 x a1 x a2	1.14 - 0.16 x a1 x a2	1.19 - 0.19 x a1 x a2
	1500	1.47 - 0.95 x a1 x a2	1.48 - 0.92 x a1 x a2	1.52 - 0.95 x a1 x a2
B3	750	0.94	0.96	1.00
	1000	1.13 - 0.17 x a1 x a2	1.14 - 0.18 x a1 x a2	1.18 - 0.25 x a1 x a2
	1500	1.48 - 1.40 x a1 x a2	1.49 - 1.40 x a1 x a2	1.52 - 1.40 x a1 x a2

For factor f10<0.5, please refer to us!

“*” On request.



Table 9 Thermal capacity factor for gear units with cooling coil f₁₁				
Gear unit type	n 1/min	Place of installation		
		Small confined spaces Wind velocity ≥ 0.5m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
H1	750	0.87	0.91	1.00
	1000	0.97 - 0.02 x a ₁ x a ₂	1.03 - 0.05 x a ₁ x a ₂	1.16 - 0.10 x a ₁ x a ₂
	1500	1.15 - 0.19 x a ₁ x a ₂	1.22 - 0.23 x a ₁ x a ₂	1.39 - 0.33 x a ₁ x a ₂
H2	750	0.88	0.91	1.00
	1000	1.01	1.06 - 0.08 x a ₁ x a ₂	1.17 - 0.24 x a ₁ x a ₂
	1500	1.27 - 0.79 x a ₁ x a ₂	1.33 - 0.88 x a ₁ x a ₂	1.47 - 1.10 x a ₁ x a ₂
H3	750	0.89	0.91	1.00
	1000	1.04	1.07	1.18 - 0.38 x a ₁ x a ₂
	1500	1.38 - 0.78 x a ₁ x a ₂	1.34 - 1.10 x a ₁ x a ₂	1.47 - 1.60 x a ₁ x a ₂
B2	750	0.86	0.90	1.00
	1000	0.98	1.02	1.15 - 0.09 x a ₁ x a ₂
	1500	1.14	1.19 - 0.05 x a ₁ x a ₂	1.38 - 0.37 x a ₁ x a ₂
B3	750	0.88	0.91	1.00
	1000	1.03	1.06	1.17 - 0.18 x a ₁ x a ₂
	1500	1.28 - 0.35 x a ₁ x a ₂	1.32 - 0.48 x a ₁ x a ₂	1.46 - 0.84 x a ₁ x a ₂

For factor f₁₁ < 0.5, please refer to us!

Table 10 Thermal capacity factor for gear units with fan and cooling coil f₁₂				
Gear unit type	n 1/min	Place of installation		
		Small confined spaces Wind velocity ≥ 0.5m/s	Large halls, workshops Wind velocity ≥ 1.4 m/s	In the open Wind velocity ≥ 4.0 m/s
H1	750	0.98	0.98	1.00
	1000	1.19 - 0.09 x a ₁ x a ₂	1.20 - 0.09 x a ₁ x a ₂	1.22 - 0.09 x a ₁ x a ₂
	1500	1.56 - 0.31 x a ₁ x a ₂	1.56 - 0.30 x a ₁ x a ₂	1.57 - 0.29 x a ₁ x a ₂
H2	750	0.97	0.98	1.00
	1000	1.19 - 0.25 x a ₁ x a ₂	1.20 - 0.25 x a ₁ x a ₂	1.22 - 0.25 x a ₁ x a ₂
	1500	1.59 - 1.06 x a ₁ x a ₂	1.59 - 1.00 x a ₁ x a ₂	1.61 - 1.00 x a ₁ x a ₂
H3	750	0.94	0.95	1.00
	1000	1.14 - 0.46 x a ₁ x a ₂	1.15 - 0.47 x a ₁ x a ₂	1.20 - 0.48 x a ₁ x a ₂
	1500	1.51 - 2.10 x a ₁ x a ₂	1.52 - 2.00 x a ₁ x a ₂	1.57 - 2.00 x a ₁ x a ₂
B2	750	0.97	0.98	1.00
	1000	1.17 - 0.08 x a ₁ x a ₂	1.18 - 0.08 x a ₁ x a ₂	1.21 - 0.12 x a ₁ x a ₂
	1500	1.55 - 0.47 x a ₁ x a ₂	1.55 - 0.47 x a ₁ x a ₂	1.58 - 0.52 x a ₁ x a ₂
B3	750	0.97	0.97	1.00
	1000	1.17 - 0.08 x a ₁ x a ₂	1.18 - 0.10 x a ₁ x a ₂	1.21 - 0.19 x a ₁ x a ₂
	1500	1.56 - 0.84 x a ₁ x a ₂	1.57 - 0.85 x a ₁ x a ₂	1.60 - 0.92 x a ₁ x a ₂

For factor f₁₂ < 0.5, please refer to us!

Table 11													Size factor													a1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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Table 12 Transmission ratio factor a₂													
i	H1SH	i	H2SH	i	H3SH	i	H4SH	i	B2SH	i	B3SH	i	B4SH
1.25	13.000	6.3	1.800	22.4	0.320	100	0.020	5	3.500	12.5	0.950	80	0.110
1.4	12.000	7.1	1.600	25	0.310	112	0.015	5.6	2.800	14	0.850	90	0.100
1.6	10.000	8	1.400	28	0.270	125	0.012	6.3	2.400	16	0.800	100	0.090
1.8	8.500	9	1.100	31.5	0.230	140	0.009	7.1	1.900	18	0.750	112	0.080
2	8.000	10	0.890	35.5	0.190	160	0.007	8	1.600	20	0.700	125	0.070
2.24	7.000	11.2	0.740	40	0.170	180	0.004	9	1.350	22.4	0.650	140	0.060
2.5	6.500	12.5	0.630	45	0.160	200	0.002	10	1.200	25	0.550	160	0.050
2.8	6.000	14	0.530	50	0.110	224	0	11.2	1.100	28	0.450	180	0.040
3.15	3.500	16	0.450	56	0.080	250	0	12.5	0.950	31.5	0.380	200	0.030
3.55	3.300	18	0.370	63	0.050	280	0	14	0.850	35.5	0.330	224	0.020
4	2.900	20	0.330	71	0.045	315	0	16	0.800	40	0.300	250	0.010
4.5	2.100	22.4	0.320	80	0.040	355	0	18	0.750	45	0.270	280	0
5	1.600	25	0.310	90	0.035	400	0			50	0.200	315	0
5.6	1.600	28	0.270	100	0.020	450	0			56	0.150	355	0
				112	0.015					63	0.130	400	0
										71	0.120		
										80	0.110		
										90	0.100		

Note: Gear units installed in open field will avoid direct sunshine by equipping a shelter.