

ZAlift - 20160710 - calculation f8792074

ZIEHL-ABEGG SE
Künzelsau, Germany
f87 Date: 5/10/2017

Elevator calculation acc. EN81-20/50

1000.16

Elevator data

Nominal load	Q	kg	1000	
Car weight	F	kg	1200	(987 - 1382kg)
Counterweight	G	kg	1700	(50%)
Travelling speed	v	(V_3=) m/s	1.60	
Travel distance	H	m	30.0	
Suspension / (roping)	is		2 : 1	
Machine at the top, above				
Shaft efficiency	etaS	%	82	
Number of pulleys	(ball bearing)		3	
Type of rope	WOLF F 819 S-FE			
Number of ropes	z		7	
Rope diameter	ds	mm	8	
Rope weight	s	kg	45	(0.215 kg/m)
Compensation rope weight	su	kg	0	
Car cable weight	HK	kg	15	
Rope span weight	R	kg	0	
Min. rope breaking load	B	N	30500	
Traction sheave diameter	Dtr	mm	320	(ZA01007199)
Sheave width		mm	112	(number of grooves
7)				
Groove distance		mm	14.0	Minimum distance
Angle of wrap minimum	min.	deg	180	
V-groove angle		deg	45	

Sheave profile: V-groove with min. 50 HRC

Traction, rope pressure, rope safety

Traction empty, on top, accelerating (1.33)
1.9598 <= 2.0935
Traction 150% nominal load, below, not moving
1.6414 <= 2.0935
Rope pressure k < permissible rope pressure
1.64 < 2.00 N/mm²

Conditions according to EN81-1 or -20:
Load 125% 1.4943 <= 2.2726 (1)
Emergency stop 1.6358 <= 1.8625 (4)
with deceleration [m/s²]0.500
Blocked car 16.611 > 5.1648 (4)

Real safety factor > Minimum safety factor for ropes
19.00 > 12

Rope safety factor according to EN81-1 or -20:
NEQUIV = 08.5 NEQUIVT = 06.5 NEQUIVP = 02.0
Pulleys >= 320 mm, pulleys NPR = 0 NPS = 2
Rope safety nue = 19.0 > 17.6 (minSF)
Rope certification EN81

Traction conditions are fulfilled.
 Rope safety conditions are fulfilled.
ZAlift - 20160710 - Machine dimensioning f8792074

Mechanical drive data

Machine manufactured by Ziehl-Abegg
 Machine type SM 200.40C Gearless synchronous
 Machine version ZAtop *

Traction sheave	mm	320 /112/14.0/7x8/HK45
Load output torque	Nm	561 (max. 660)
Real statical axle load	kg	2002 (max. 3300)

Brake with overexcitation

Brake data

brake Warner ERS VAR07 SZ800/800, 2x800, ABV826/1 + ESV826
 Dual Circuit disk brake, 207/103 V DC, fast acting rectifier necessary
 EC type-examination, release monitoring (463 Nm, 1.02 m/s², 2 m, 16604 J, 168 W)
 2 x 800 Nm 207/103 V brake, with overexcitation, without hand release

Machine load data in the installation

Typical motor operating power	kW	7.6
Typ. operating current 30.0 A, Start. Current	47.2 A at acceleration	0.80 m/s ²
Start. Current	45.0 A at acceleration	0.7 m/s ²
Average power losses	1.65 kW =	5955.75 kJ/h
Output speed	rpm	191
Load torque	Nm	561.7 (eff. 377.5)
Inertia of installation	kgm ²	26.11

240 Starts per hour , 40 % required duty cycle at elevator operation
 Max. static load pulleys 16678 N, pulley speed 1.60 m/s

Selected ZIEHL-ABEGG motor

Motor type SM200.40C-20 - gearless

	Nameplate data	(Operating
data)		
Rated voltage	V	360
Rated frequency	Hz	32 (31.8)
Rated torque	Nm	600 (561.7)
Rated speed	rpm	192 (191.0)
Rated output power	kW	12.1 (11.2)
Rated current	A	32 (30.0)
Maximum torque	Nm	1000 (1000)
Current at maximum torque	A	59 (59)
Inertia of motor	kgm ²	0.310
Possible acceleration	m/s ²	1.33

(MKmax=600.0 Nm)

Without cooling (58)

Dimension sheet A-M-6453 / A-M-6460, Motor construction type IMB3

Motor with encoder ECN 1313-2048Endat

Selected frequency inverter

Inverter ZAdyn 4CS032, Rated inverter current 32 A
mains current 21.5 A, 400 V, 14.2 kW, Max. 1.26 m/s^2 , $F_{amax} 1.92$ (976 Nm)
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR25-3 (or Recuperation: ZArec4C 013)
ZAlift - 20160710 - f8792074

Elevator data

Elevator	1000kg-1.60m/s-2:1-30m
Machine type	SM 200.40C
Traction sheave	320/112/14.0/7x8/HK45
Inertia Traction sheave	0.783 kgm ²

Brake data

Warner ERS VAR07 SZ800/800, 2x800, ABV826/1 + ESV826, 100 ms, 125 ms, 150 ms
2 x 800 Nm 207/103 V brake, with overexcitation, without hand release

Calculation of unintended movement (EN81-1/A3)

Values of elevator controller

Detection distance	0.050 m
Dead time	50 ms
V Detector	0.000 m/s

without short-circuit motor braking

	a [m/s ²]	s [m]	v [m/s]	t [s]	
1:	5.49	0.05	0.74	0.13	
2:	5.49	0.09	1.02	0.18	
3:	1.74	0.20	1.19	0.28	
4:	0.87	0.22	1.20	0.30	
5:	-0.67	0.23	1.19	0.31	
6:	-1.34	0.77	0.00	1.20	

Stopping distance (without influence of traction)	0.405 m, empty up
Max. stopping distance (depending on traction)	0.767 m, empty up
Max. stopping distance (depending on traction)	0.478 m, full down
Max. stopping distance (inverter off, empty car)	0.293 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.132 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.117 m, full down
Max. test stopping distance (a= 2.000 m/s ²)	0.322 m, empty up
Max. test stopping distance (a= 2.000 m/s ²)	0.271 m, full down

We assume no liability for calculation results!