ZIEHL-ABEGG SE
Künzelsau, Germany

Elevator calculation acc. EN81-20/50 f87 Date: 5/10/2017

1000.16

Elevator data

Nominal load	Q		kg	800
Car weight	F		kg	1000 (790 - 1242kg)
Counterweight	G		kg	1400 (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			6
Rope diameter	ds		mm	8
Rope weight	s		kg	38 (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
Sheave width			mm	110 (number of grooves 6)
Groove distance			mm	17.0 Standard
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)
1.9359 <= 2.0935
Traction 150% nominal load, below, not moving
1.6267 <= 2.0935
Rope pressure k < permissible rope pressure
1.57 < 2.00 N/mm²

Conditions according to EN81-1 or -20:
Load 125% 1.4839 <= 2.2726 (1)
Emergency stop 1.6160 <= 1.8625 (4)
with deceleration [m/s²]0.500
Blocked car 16.190 > 5.1648 (4)

Real safety factor > Minimum safety factor for ropes
19.87 > 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 = 19.9 > 17.6 (minSF)
Rope certification EN81

Traction conditions are fulfilled.
Rope safety conditions are fulfilled.

ZAlift - 20160710 - Machine dimensioning f8792075

Mechanical drive data

Machine manufactured by Ziehl-Abegg

Machine type	SM 200.30C Gearless synchronous		
Machine version	ZAtop *		
Traction sheave		mm	320 /110/17.0/6x8/HK45
Load output torque		Nm	454 (max. 499)
Real statical axle load		kg	1646 (max. 2440)

Brake data

brake Mayr ROBA-stop-R 400, 2x500, EU-BD 766 (ABV766/2 + ESV766/1)
Dual circuit disk brake, DC supply necessary
EC type-examination, release monitoring (375 Nm, 0.46 m/s², 4 m, 22906 J, 184 W)
2 x 500 Nm 207 V brake, without hand release

Machine load data in the installation

Typical motor operating power	kW	5.9
Typ. operating current 23.4 A, Start. Current 39.0 A at acceleration 0.80 m/s²		
Start. Current		37.0 A at acceleration 0.7 m/s²
Average power losses		1.34 kW = 4816.66 kJ/h
Output speed	rpm	191
Load torque	Nm	454.2(eff. 296.0)
Inertia of installation	kgm²	21.47

240 Starts per hour , 40 % required duty cycle at elevator operation
Max. static load pulleys 13735 N, pulley speed 1.60 m/s

Selected ZIEHL-ABEGG motor

Motor type SM200.30C-20 - gearless

		Nameplate data	(Operating data)
Rated voltage	V	360	
Rated frequency	Hz	32	(31.8)
Rated torque	Nm	475	(454.2)
Rated speed	rpm	192	(191.0)
Rated output power	kW	9.6	(9.1)
Rated current	A	24.5	(23.4)
Maximum torque	Nm	820	(820)
Current at maximum torque	A	50	(50)
Inertia of motor	kgm²	0.240	
Possible accelleration (MKmax=450.0 Nm)	m/s²	1.35	

Without cooling (63)
Dimension sheet A-M-6445 / A-M-6452, Motor construction type IMB3

Motor with encoder ECN 1313-2048Endat

Selected frequency inverter

Inverter ZAdyn 4CS023, Rated inverter current 23 A
mains current 17.9 A, 400 V, 11.8 kW, Max. 0.92 m/s², F_amax 1.77 (678 Nm)
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR25-3 (or Recuperation: ZArec4C 013)
ZAlift - 20160710 - f8792075

Elevator data

Elevator	800kg-1.60m/s-2:1-30m
Machine type	SM 200.30C
Traction sheave	320/110/17.0/6x8/HK45
Inertia Traction sheave	0.727 kgm²

Brake data

Mayr ROBA-stop-R 400, 2x500, EU-BD 766 (ABV766/2 + ESV766/1), 30 ms, 60 ms, 115 ms
2 x 500 Nm 207 V brake, 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/s²]	s [m]	v [m/s]	t [s]
1:	4.81	0.05	0.69	0.14
2:	4.81	0.09	0.93	0.19
3:	1.68	0.12	0.98	0.22
4:	0.84	0.15	1.01	0.25
5:	-0.75	0.18	0.99	0.28
6:	-1.50	0.51	0.00	0.94

Stopping distance (without influence of traction)	0.350 m, empty up
Max. stopping distance (depending on traction)	0.505 m, empty up
Max. stopping distance (depending on traction)	0.346 m, full down
Max. stopping distance (inverter off, empty car)	0.207 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.095 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.092 m, full down
Max. test stopping distance (a= 2.000 m/s²)	0.233 m, empty up
Max. test stopping distance (a= 2.000 m/s²)	0.213 m, full down

We assume no liability for calculation result