ZAlift - 20160710 - calculation f8792077

ZIEHL-ABEGG SE
Künzelsau, Germany

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

Elevator data

Nominal load	Q		kg	630
Car weight	F		kg	750 (701 - 1057kg)
Counterweight	G		kg	1065 (50%)
Travelling speed	v	(V_3=)	m/s	1.00
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			5
Rope diameter	ds		mm	8
Rope weight	s		kg	32 (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
Undercutangle			deg	95
Undercutwidth	b		mm	5.90
Groove angle			deg	30

Sheave profile: circular undercut groove

Traction, rope pressure, rope safety

Traction empty,on top, accelerating (1.18)
1.7387 <= 1.8399
Traction 150% nominal load, below, not moving
1.6521 <= 1.8399
Rope pressure k < permissible rope pressure
6.14 < 9.00 N/mm²

Conditions according to EN81-1 or -20:

Load 125%	1.5042 <= 1.8582	(1)
Emergency stop	1.6396 <= 1.6759	(4)
with deceleration [m/s²]0.500		
Blocked car	14.643 > 3.4528	(4)

Real safety factor > Minimum safety factor for ropes
21.52 > 12
Rope safety factor according to EN81-1 or -20:
NEQUIV = 08.7 NEQUIVT = 06.7 NEQUIVP = 02.0
Pulleys >= 320 mm, pulleys NPR = 0 NPS = 2
Rope safety nue = 21.5 > 17.8 (minSF)

Rope certification EN81

Traction conditions are fulfilled.
Rope safety conditions are fulfilled.
ZAlift - 20160710 - Machine dimensioning f8792077

Mechanical drive data

Machine manufactured by Ziehl-Abegg
Machine type SM 200.20C Gearless synchronous
Machine version ZAtop *

Traction sheave	mm	320 /110/17.0/6x8/U95
Load output torque	Nm	361 (max. 396)
Real statical axle load	kg	1262 (max. 2440)

Brake data

brake Mayr ROBA-twinstop 350, 2x410, EU-BD 845 (ABV845 + ESV845)
Dual circuit disk brake, DC supply necessary
EC type-examination, release monitoring (298 Nm, 0.54 m/s², 1 m, 6281 J, 164 W)
2 x 410 Nm 207 V brake, without hand release

Machine load data in the installation

Typical motor operating power	kW	2.8
Typ. operating current 18.8 A, Start. Current 27.9 A at acceleration 0.60 m/s²		
Start. Current		29.4 A at acceleration 0.7 m/s²
Average power losses		0.66 kW = 2393.07 kJ/h
Output speed	rpm	119
Load torque	Nm	361.1(eff. 226.6)
Inertia of installation	kgm²	16.47

240 Starts per hour , 40 % required duty cycle at elevator operation
Max. static load pulleys 10447 N, pulley speed 1.00 m/s

Selected ZIEHL-ABEGG motor

Motor type SM200.20C-20 - gearless

		Nameplate data	(Operating data)
Rated voltage	V	360	
Rated frequency	Hz	28	(19.9)
Rated torque	Nm	330	(361.1)
Rated speed	rpm	168	(119.4)
Rated output power	kW	5.8	(4.5)
Rated current	A	16.5	(18.8)
Maximum torque	Nm	570	(570)
Current at maximum torque	A	34	(34)
Inertia of motor	kgm²	0.160	
Possible accelleration (MKmax=280.0 Nm)	m/s²	1.00	

Without cooling (83)

Dimension sheet A-M-6445 / A-M-6451, Motor construction type IMB3
Motor with encoder ECN 1313-2048Endat

Selected frequency inverter

Inverter ZAdyn 4CS017, Rated inverter current 17 A
mains current 11.6 A, 400 V, 7.6 kW, Max. 0.78 m/s², F_amax 1.63 (513 Nm)
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR17-3 (or Recuperation: ZArec4C 013)
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Elevator data

Elevator	630kg-1.00m/s-2:1-30m
Machine type	SM 200.20C
Traction sheave	320/110/17.0/6x8/U95
Inertia Traction sheave	0.727 kgm²

Brake data

Mayr ROBA-twinstop 350, 2x410, EU-BD 845 (ABV845 + ESV845), 35 ms, 60 ms, 90 ms
2 x 410 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:	4.80	0.05	0.69	0.14
2:	4.80	0.09	0.93	0.19
3:	1.72	0.12	0.99	0.23
4:	0.86	0.14	1.01	0.25
5:	-0.31	0.15	1.01	0.26
6:	-0.62	0.97	0.00	1.89

Stopping distance (without influence of traction)	0.320 m, empty up
Max. stopping distance (depending on traction)	0.972 m, empty up
Max. stopping distance (depending on traction)	0.476 m, full down
Max. stopping distance (inverter off, empty car)	0.310 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.108 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.096 m, full down
Max. test stopping distance (a= 2.000 m/s²)	0.356 m, empty up
Max. test stopping distance (a= 2.000 m/s²)	0.266 m, full down

We assume no liability for calculation results!