

Elevator calculation **acc. EN81-20/50**

Elevator data

Nominal load	Q	kg	630	
Car weight	F	kg	750	(732 - 1112kg)
Counterweight	G	kg	1065	(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 PAWO F7			
Number of ropes	z		5	
Rope diameter	ds	mm	8	
Rope weight	s	kg	38	(0.258 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	40600	
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	105	
Undercutwidth	b	mm	6.35	
Groove angle		deg	30	

Sheave profile: circular undercut groove

Traction, rope pressure, rope safety

Traction empty, on top, accelerating (1.23)
1.8323 <= 1.9763
Traction 150% nominal load, below, not moving
1.6642 <= 1.9763
Rope pressure k < permissible rope pressure
7.93 < 9.00 N/mm²

Conditions according to EN81-1 or -20:
Load 125% 1.5163 <= 1.9715 (1)
Emergency stop 1.6592 <= 1.6724 (4)
with deceleration [m/s²]0.500
Blocked car 12.202 > 3.8869 (4)

Real safety factor > Minimum safety factor for ropes
28.40 > 12

Rope safety factor according to EN81-1 or -20:
NEQUIV = 17.2 NEQUIVT = 15.2 NEQUIVP = 02.0
Pulleys >= 320 mm, pulleys NPR = 0 NPS = 2
Rope safety nue = 28.4 > 22.8 (minSF)

Rope certification EN81

Traction conditions are fulfilled.

Rope safety conditions are fulfilled.

ZAlift - 20160710 - Machine dimensioning f8792079

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/U105

Load output torque Nm 373 (max. 396)

Real statical axle load kg 1268 (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 (308 Nm, 0.49 m/s², 3 m, 17850 J, 164 W)

2 x 410 Nm 207 V brake, without hand release

Machine load data in the installation

Typical motor operating power kW 4.6

Typ. operating current 29.6 A, Start. Current 47.5 A at acceleration 0.80 m/s²

Start. Current 45.2 A at acceleration 0.7 m/s²

Average power losses 1.1 kW = 3959.06 kJ/h

Output speed rpm 191

Load torque Nm 373.4 (eff. 229.0)

Inertia of installation kgm² 16.64

240 Starts per hour, 40 % required duty cycle at elevator operation

Max. static load pulleys 10449 N, pulley speed 1.60 m/s

Selected ZIEHL-ABEGG motor

Motor type SM200.20C-20 - gearless

	Nameplate data	(Operating
data)		
Rated voltage	V 360	
Rated frequency	Hz 43	(31.8)
Rated torque	Nm 330	(373.4)
Rated speed	rpm 258	(191.0)
Rated output power	kW 8.9	(7.5)
Rated current	A 25	(29.6)
Maximum torque	Nm 570	(570)
Current at maximum torque	A 50.5	(50.5)
Inertia of motor	kgm ² 0.160	
Possible acceleration	m/s ² 0.94	
(MKmax=280.0 Nm)		
Without cooling	(92)	

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

Selected frequency inverter

Inverter ZAdyn 4CS032, Rated inverter current 32 A
mains current 16.7 A, 400 V, 11.0 kW, Max. 0.94 m/s², F_{amax} 1.53 (570 Nm)
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR25-3 (or Recuperation: ZArec4C 013)
ZAlift - 20160710 - f8792079

Elevator data

Elevator	630kg-1.60m/s-2:1-30m
Machine type	SM 200.20C
Traction sheave	320/110/17.0/6x8/U105
Inertia Traction sheave	0.727 kgm ²

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/s ²]	s [m]	v [m/s]	t [s]	
1:	5.14	0.05	0.72	0.14	
2:	5.14	0.09	0.97	0.19	
3:	1.76	0.13	1.03	0.22	
4:	0.88	0.15	1.05	0.24	
5:	-0.39	0.16	1.05	0.25	
6:	-0.78	0.86	0.00	1.59	

Stopping distance (without influence of traction)	0.344 m, empty up
Max. stopping distance (depending on traction)	0.861 m, empty up
Max. stopping distance (depending on traction)	0.459 m, full down
Max. stopping distance (inverter off, empty car)	0.277 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.103 m, empty up
Max. test stopping distance (v= 0.150m/s)	0.093 m, full down
Max. test stopping distance (a= 2.000 m/s ²)	0.309 m, empty up
Max. test stopping distance (a= 2.000 m/s ²)	0.245 m, full down

We assume no liability for calculation results!