

Elevator calculation acc. EN81-1

Elevator data

Nominal load	Q	kg	1600	
Car weight	F	kg	1800	(1739 - 2274kg)
Counterweight	G	kg	2600	(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		10	
Rope diameter	ds	mm	8	
Rope weight	s	kg	77	(0.258 kg/m)
Compensation rope weight	su	kg	77	
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	150	(number of grooves 10)
Groove distance		mm	14.0	Minimum distance
Angle of wrap minimum	min.	deg	180	
Undercutangle		deg	100	
Undercutwidth	b	mm	6.13	
Groove angle		deg	30	

Sheave profile: circular undercut groove

Traction, rope pressure, rope safety

Traction empty, on top, accelerating
1.7862 <= 1.9023

Traction 150% nominal load, below, not moving
1.6265 <= 1.9023

Rope pressure k < permissible rope pressure
8.51 < 9.00 N/mm²

Conditions according to EN81-1 or -20:

Load 125% 1.4771 <= 1.9110 (1)

Emergency stop 1.6165 <= 1.6333 (4)

with deceleration [m/s²]0.500

Blocked car 15.092 > 3.6518 (4)

Real safety factor > Minimum safety factor for ropes
23.28 > 12

Rope safety factor according to EN81-1 or -20:
NEQUIV = 13.0 NEQUIVT = 10.0 NEQUIVP = 03.0

Pulleys >= 320 mm, pulleys NPR = 0 NPS = 3

Rope safety nue = 23.3 > 20.5 (minSF)

Rope certification EN81

Traction conditions are fulfilled.
Rope safety conditions are fulfilled.

Mechanical drive data

Machine manufactured by Ziehl-Abegg

Machine type SM 210.60 Gearless synchronous

Machine version ZAtop *

Traction sheave mm 320 /150/14.0/10x8/U100

Load output torque Nm 834 (max. 1000)

Real statical axle load kg 3123 (max. 4500)

Rope pull admissible only in direction of motor foot!

Brake data

brake Mayr ROBA-twinstop 1000, 2x1200 Nm, EU-BD 1014/1

Dual circuit disk brake, DC supply necessary

(689 Nm, 0.99 m/s², 2 m, 25677 J, 316 W)

2 x 1200 Nm 207 V brake, with hand release, microswitch

Machine load data in the installation

Typical motor operating power kW 12.4

Typ. operating current 41.7 A, Start. Current 69.4 A at acceleration 0.80 m/s²

Start. Current 65.9 A at acceleration 0.7 m/s²

Average power losses 2.46 kW = 8852.4 kJ/h

Output speed rpm 191

Load torque Nm 834.8 (eff. 617.7)

Inertia of installation kgm² 40.87

240 Starts per hour, 50 % required duty cycle at elevator operation

Max. static load pulleys 26264 N, pulley speed 1.60 m/s

Selected ZIEHL-ABEGG motor

Motor type SM210.60-20 - gearless

	Nameplate data		(Operating data)	
Rated voltage	V	360		
Rated frequency	Hz	32	(31.8)
Rated torque	Nm	850	(834.8)
Rated speed	rpm	192	(191.0)
Rated output power	kW	17.1	(16.7)
Rated current	A	42.5	(41.7)
Maximum torque	Nm	1450	(1450)
Current at maximum torque	A	83	(83)
Inertia of motor	kgm ²	0.500		
Possible acceleration	m/s ²	1.19		

(MKmax=630.0 Nm)

Cooling FB020-4EW.W6.A5 (1~230V_30W) (70)

Dimension sheet A-M-6670, Motor construction type IMB3

Motor with encoder ECN 1313-2048Endat

Selected frequency inverter

Inverter ZAdyn 4CS050, Rated inverter current 50 A

mains current 30.0 A, 400 V, 19.7 kW, Max. 1.19 m/s²

Radio interference filter, integrated ; Line reactor, integrated

Brake resistance separate BR50-3 (or Recuperation: ZAreC4C 026 + BR25-3)