

Elevator calculation acc. EN81

## Elevator data

Nominal load	Q	kg	1000	
Car weight	F	kg	1200	(1068 - 2387kg)
Counterweight	G	kg	1700	(50%)
Travelling speed	v	(V_3=) m/s	1.60	
Travel distance	H	m	40.0	
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		7	
Rope diameter	ds	mm	8	
Rope weight	s	kg	72	(0.258 kg/m)
Compensation rope weight	su	kg	0	
Car cable weight	HK	kg	20	
Rope span weight	R	kg	0	
Min. rope breaking load	B	N	40600	
Traction sheave diameter	Dtr	mm	320	
Sheave width		mm	122	(number of grooves 7)
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)

$$2.0108 \leq 2.0935$$

Traction 150% nominal load, below, not moving

$$1.6732 \leq 2.0935$$

Rope pressure  $k <$  permissible rope pressure

$$1.68 < 2.00 \text{ N/mm}^2$$

Conditions according to EN81-1 or -20:

Load 125% 1.5262  $\leq$  2.2726 (1)Emergency stop 1.6806  $\leq$  1.8625 (4)with deceleration [ $\text{m/s}^2$ ] 0.500Blocked car 10.425  $>$  5.1648 (4)Real safety factor  $>$  Minimum safety factor for ropes

$$24.71 > 12$$

Rope safety factor according to EN81-1 or -20:

$$\text{NEQUIV} = 07.0 \quad \text{NEQUIVT} = 04.0 \quad \text{NEQUIVP} = 03.0$$

Pulleys  $\geq$  320 mm, pulleys NPR = 0 NPS = 3Rope safety  $\nu_e = 24.7 > 16.4$  (minSF)

Rope certification EN81

Traction conditions are fulfilled.

Rope safety conditions are fulfilled.

**Mechanical drive data**

Machine manufactured by Ziehl-Abegg

Machine type SM 200.40D Gearless synchronous

Machine version ZAtop \*

Traction sheave mm 320 /122/17.0/7x8/HK45

Load output torque Nm 613 (max. 660)

Real statical axle load kg 2032 (max. 3600)

**Brake data**

brake Warner ERS VAR07 SZ800/800, 2x800 Nm, EU-BD 819/2

Dual circuit disk brake, DC supply necessary

(506 Nm, 0.87 m/s<sup>2</sup>, 2 m, 19502 J, 264 W)

207 V brake, with hand release, microswitch

**Machine load data in the installation**

Typical motor operating power kW 7.7

Typ. operating current 30.9 A, Start. Current 49.2 A at acceleration 0.80 m/s<sup>2</sup>Start. Current 46.9 A at acceleration 0.7 m/s<sup>2</sup>

Average power losses 1.81 kW = 6502.39 kJ/h

Output speed rpm 191

Load torque Nm 613.2(eff. 385.3)

Inertia of installation kgm<sup>2</sup> 26.81

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

Max. static load pulleys 16678 N, pulley speed 1.60 m/s

**Selected ZIEHL-ABEGG motor**

Motor type SM200.40D-20 - gearless

	Nameplate data	(Operating data)
Rated voltage	V 360	
Rated frequency	Hz 32	( 31.8)
Rated torque	Nm 600	( 613.2)
Rated speed	rpm 192	( 191.0)
Rated output power	kW 12.1	( 12.3)
Rated current	A 30	( 30.9)
Maximum torque	Nm 1000	( 1000 )
Current at maximum torque	A 57	( 57 )
Inertia of motor	kgm <sup>2</sup> 0.310	
Possible acceleration	m/s <sup>2</sup> 1.14	

(MKmax=400.0 Nm)

Cooling 2 x DP201 (1~230V\_20W) (58)

Dimension sheet A-M-6665, Motor construction type IMB3

Motor with encoder ECN 1313-2048Endat

**Selected frequency inverter**

Inverter ZAdyn 4CS032, Rated inverter current 32 A

mains current 23.1 A, 400 V, 15.2 kW, Max. 1.14 m/s<sup>2</sup>

Radio interference filter, integrated ; Line reactor, integrated

Brake resistance separate BR25-3 (or Recuperation: ZAreC4C 026 + BR14A)