

Elevator calculation acc. EN81

**Elevator data**

Nominal load	Q	kg	1000	
Car weight	F	kg	1200	(1019 - 2424kg)
Counterweight	G	kg	1700	(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		7	
Rope diameter	ds	mm	8	
Rope weight	s	kg	54	(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	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)  
 1.9795 <= 2.0935  
 Traction 150% nominal load, below, not moving  
 1.6520 <= 2.0935  
 Rope pressure k < permissible rope pressure  
 1.65 < 2.00 N/mm<sup>2</sup>

Conditions according to EN81-1 or -20:  
 Load 125% 1.5049 <= 2.2726 (1)  
 Emergency stop 1.6530 <= 1.8625 (4)  
 with deceleration [m/s<sup>2</sup>]0.500  
 Blocked car 13.843 > 5.1648 (4)

Real safety factor > Minimum safety factor for ropes  
 25.10 > 12

Rope safety factor according to EN81-1 or -20:  
 NEQUIV = 07.0 NEQUIVT = 04.0 NEQUIVP = 03.0  
 Pulleys >= 320 mm, pulleys NPR = 0 NPS = 3  
 Rope safety nue = 25.1 > 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	578 (max. 660)
Real statical axle load	kg	2011 (max. 3600)

### Brake data

brake Warner ERS VAR07 SZ800/800, 2x800 Nm, EU-BD 819/2  
Dual circuit disk brake, DC supply necessary  
(477 Nm, 0.97 m/s<sup>2</sup>, 2 m, 17485 J, 264 W)  
207 V brake, with hand release, microswitch

### Machine load data in the installation

Typical motor operating power	kW	7.6
Typ. operating current 28.9 A, Start. Current	46.6 A at acceleration	0.80 m/s <sup>2</sup>
Start. Current	44.3 A at acceleration	0.7 m/s <sup>2</sup>
Average power losses	1.7 kW =	6137.96 kJ/h
Output speed	rpm	191
Load torque	Nm	578.8 (eff. 380.4)
Inertia of installation	kgm <sup>2</sup>	26.34
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 ( 578.8)
Rated speed	rpm	192 ( 191.0)
Rated output power	kW	12.1 ( 11.6)
Rated current	A	30 ( 28.9)
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>	1.26
(MKmax=400.0 Nm)		
Without cooling	(71)	
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 21.6 A, 400 V, 14.2 kW, Max. 1.26 m/s<sup>2</sup>  
Radio interference filter, integrated ; Line reactor, integrated

Brake resistance separate BR25-3 (or Recuperation: ZArec4C 026 + BR14A)

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