

Elevator calculation acc. EN81

## Elevator data

Nominal load	Q	kg	1200	
Car weight	F	kg	1400	(1287 - 1899kg)
Counterweight	G	kg	2000	(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 PAWO F7			
Number of ropes	z		8	
Rope diameter	ds	mm	8	
Rope weight	s	kg	61	(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 8)
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 (1.18)  
 $1.7675 \leq 1.9023$   
 Traction 150% nominal load, below, not moving  
 $1.6619 \leq 1.9023$   
 Rope pressure  $k <$  permissible rope pressure  
 $8.15 < 9.00 \text{ N/mm}^2$

Conditions according to EN81-1 or -20:

Load 125%  $1.5119 \leq 1.9110$  (1)  
 Emergency stop  $1.6669 \leq 1.7154$  (4)  
 with deceleration  $[m/s^2] 0.500$   
 Blocked car  $14.106 > 3.6518$  (4)

Real safety factor  $>$  Minimum safety factor for ropes  
 $24.31 > 12$

Rope safety factor according to EN81-1 or -20:  
 NEQUIV = 13.0 NEQUIVT = 10.0 NEQUIVP = 03.0  
 Pulleys  $\geq 320$  mm, pulleys NPR = 0 NPS = 3  
 Rope safety  $nue = 24.3 > 20.5$  (minSF)  
 Rope certification EN81

Traction conditions are fulfilled.  
 Rope safety conditions are fulfilled.

**Mechanical drive data**

Machine manufactured by Ziehl-Abegg

Machine type SM 200.45D Gearless synchronous

Machine version ZAtop \*

Traction sheave	mm	320 /122/14.0/8x8/U100
Load output torque	Nm	688 (max. 799)
Real statical axle load	kg	2369 (max. 3600)

**Brake data**

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

Dual circuit disk brake, DC supply necessary

(568 Nm, 0.59 m/s<sup>2</sup>, 1 m, 11180 J, 264 W)

207 V brake, with hand release, microswitch

**Machine load data in the installation**

Typical motor operating power	kW	5.8
Typ. operating current	23.3 A, Start. Current	35.4 A at acceleration 0.60 m/s <sup>2</sup>
Start. Current		37.4 A at acceleration 0.7 m/s <sup>2</sup>
Average power losses	1.27 kW =	4564.43 kJ/h
Output speed	rpm	119
Load torque	Nm	688.7(eff. 462.4)
Inertia of installation	kgm <sup>2</sup>	31.02

240 Starts per hour , 50 % required duty cycle at elevator operation  
 Max. static load pulleys 19621 N, pulley speed 1.00 m/s

**Selected ZIEHL-ABEGG motor**

Motor type SM200.45D-20 - gearless

	Nameplate data	(Operating data)
Rated voltage	V	360
Rated frequency	Hz	( 19.9)
Rated torque	Nm	( 688.7)
Rated speed	rpm	( 119.4)
Rated output power	kW	( 8.6)
Rated current	A	( 23.3)
Maximum torque	Nm	( 1200 )
Current at maximum torque	A	( 50 )
Inertia of motor	kgm <sup>2</sup>	0.350
Possible acceleration	m/s <sup>2</sup>	1.30

(MKmax=480.0 Nm)

Without cooling (76)

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 17.5 A, 400 V, 11.5 kW, Max. 1.30 m/s<sup>2</sup>

Radio interference filter, integrated ; Line reactor, integrated

Brake resistance separate BR25-3 (or Recuperation: ZAreC4C 013)