

Elevator calculation acc. EN81

Elevator data

Nominal load	Q	kg	1200	
Car weight	F	kg	1400	(1220 - 2631kg)
Counterweight	G	kg	2000	(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		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	
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)
 1.9963 <= 2.0935
 Traction 150% nominal load, below, not moving
 1.6619 <= 2.0935
 Rope pressure k < permissible rope pressure
 1.70 < 2.00 N/mm²

Conditions according to EN81-1 or -20:
 Load 125% 1.5119 <= 2.2726 (1)
 Emergency stop 1.6669 <= 1.8625 (4)
 with deceleration [m/s²]0.500
 Blocked car 14.106 > 5.1648 (4)

Real safety factor > Minimum safety factor for ropes
 24.31 > 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 = 24.3 > 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 200.45D Gearless synchronous
Machine version ZAtop *

Traction sheave	mm	320
/122/14.0/8x8/HK45		
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/s², 3 m, 28622 J, 264 W)
207 V brake, with hand release, microswitch

Machine load data in the installation

Typical motor operating power	kW	9.2
Typ. operating current 34.9 A, Start. Current	58.7 A at acceleration	0.80 m/s ²
Start. Current	55.6 A at acceleration	0.7 m/s ²
Average power losses	2.03 kW =	7303.08 kJ/h
Output speed	rpm	191
Load torque	Nm	688.7 (eff. 462.4)
Inertia of installation	kgm ²	31.02
240 Starts per hour	, 50 % required duty cycle at elevator operation	
Max. static load pulleys	19621 N,	pulley speed 1.60 m/s

Selected ZIEHL-ABEGG motor

Motor type SM200.45D-20 - gearless

	Nameplate data	(Operating
data)		
Rated voltage	V	360
Rated frequency	Hz	32 (31.8)
Rated torque	Nm	710 (688.7)
Rated speed	rpm	192 (191.0)
Rated output power	kW	14.3 (13.8)
Rated current	A	36 (34.9)
Maximum torque	Nm	1200 (1200)
Current at maximum torque	A	74 (74)
Inertia of motor	kgm ²	0.350
Possible acceleration	m/s ²	1.30
(MKmax=480.0 Nm)		
Without cooling	(80)	
Dimension sheet A-M-6665, Motor construction type	IMB3	
Motor with encoder ECN 1313-2048Endat		

Selected frequency inverter

Inverter ZAdyn 4CS040, Rated inverter current 40 A
mains current 25.8 A, 400 V, 17.0 kW, Max. 1.24 m/s²
Radio interference filter, integrated ; Line reactor, integrated

Brake resistance separate BR50-3 (or Recuperation: ZArec4C 026 + BR14A)

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