

Zalift - 20181002 - calculation CG6993-92107

ZIEHL-ABEGG SE  
 Künzelsau, Germany  
 CG6993 Date: 11/6/2018

Elevator calculation acc. EN81

## Elevator data

Nominal load	Q	kg	1600	
Car weight	F	kg	1800	(1162 - 2945kg)
Counterweight	G	kg	2600	(50%)
Travelling speed	v	(V_3=) m/s	2.00	
Travel distance	H	m	70.0	
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	180	(0.258 kg/m)
Compensation rope weight	su	kg	314	
Car cable weight	HK	kg	35	
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	
V-groove angle		deg	45	

Sheave profile: V-groove with min. 50 HRC

## Traction, rope pressure, rope safety

Traction empty, on top, accelerating  
 $1.8325 \leq 2.0935$   
 Traction 150% nominal load, below, not moving  
 $1.5651 \leq 2.0935$   
 Rope pressure  $k <$  permissible rope pressure  
 $1.88 < 2.00 \text{ N/mm}^2$

Conditions according to EN81:

Load 125%  $1.4279 \leq 2.2726$  (1)  
 Emergency stop  $1.5586 \leq 1.7975$  (4)  
 with deceleration  $[m/s^2] 0.571$   
 Blocked car  $07.346 > 5.1648$  (4)

Real safety factor  $>$  Minimum safety factor for ropes  
 $22.01 > 12$

Rope safety factor according to EN81:  
 NEQUIV = 06.0 NEQUIVT = 04.0 NEQUIVP = 02.0  
 Pulleys  $\geq 320$  mm, pulleys NPR = 0 NPS = 2  
 Rope safety  $nue = 22.0 > 15.5$  (minSF)  
 Rope certification EN81

Traction conditions are fulfilled.  
 Rope safety conditions are fulfilled.

ZAlift - 20181002 - Machine dimensioning CG6993-92107

#### Mechanical drive data

Machine manufactured by Ziehl-Abegg  
 Machine type SM 210.60B Gearless synchronous  
 Machine version ZAtop \*  
 Traction sheave mm 320 /150/14.0/10x8/HK45  
 Load output torque Nm 805 (max. 1000)  
 Real statical axle load kg 3355 (max. 4500)  
 Rope pull admissible only in direction of motor foot!

#### Brake data

brake Mayr ROBA-twinstop 1000, 2x1200 Nm, EU-BD<sup>1</sup> 1014  
 Dual circuit disk brake, DC supply necessary  
 (665 Nm, 0.94 m/s<sup>2</sup>, 3 m, 42181 J, 316 W)  
 207 V brake, with hand release, microswitch

#### Machine load data in the installation

Typical motor operating power kW 15.2  
 Typ. operating current 54.5 A, Start. Current 97.8 A at acceleration 0.90 m/s<sup>2</sup>  
 Start. Current 88.2 A at acceleration 0.7 m/s<sup>2</sup>  
 Average power losses 2.97 kW = 10681.55 kJ/h  
 Output speed rpm 239  
 Load torque Nm 805.9 (eff. 607.4)  
 Inertia of installation kgm<sup>2</sup> 45.03  
 240 Starts per hour, 70 % required duty cycle at elevator operation  
 Max. static load pulleys 28590 N, pulley speed 2.00 m/s

#### Selected ZIEHL-ABEGG motor

Motor type SM210.60B-20 - gearless

	Nameplate data	(Operating data)
Rated voltage	V 360	
Rated frequency	Hz 43	( 39.8)
Rated torque	Nm 800	( 805.9)
Rated speed	rpm 258	( 238.8)
Rated output power	kW 21.6	( 20.1)
Rated current	A 54	( 54.5)
Maximum torque	Nm 1450	( 1450 )
Current at maximum torque	A 109	( 109 )
Inertia of motor	kgm <sup>2</sup> 0.500	
Possible acceleration	m/s <sup>2</sup> 1.13	
(M <sub>in</sub> max=630.0 Nm)		
Cooling FB020-4EW.W6.A5 (1-230V_30W) (88)		
Dimension sheet A-M-6706, Motor construction type IMB3		
Motor with encoder ECN 1313-2048Endat		

#### Selected frequency inverter

Inverter ZAdyn 4CS062, Rated inverter current 62 A  
 mains current 35.5 A, 400 V, 23.3 kW, Max. 1.13 m/s<sup>2</sup>  
 Radio interference filter, integrated ; Line reactor, integrated  
 Brake resistance separate BR100-3A Attention! (or Recuperation: ZAreC4C 026 + BR50-3)