ZAlift - 20161219 - calculation d3293120

ZIEHL-ABEGG SE
Künzelsau, Germany

Elevator calculation acc. EN81-1 d32 Date: 26/04/2017

Elevator data

Nominal load	Q		kg	1600
Car weight	F		kg	1800 (1710 - 2274kg)
Counterweight	G		kg	2600 (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			10
Rope diameter	ds		mm	8
Rope weight	s		kg	77 (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	150 (number of grooves 10)
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)
1.7873 <= 1.9023
Traction 150% nominal load, below, not moving
1.6749 <= 1.9023
Rope pressure k < permissible rope pressure
8.51 < 9.00 N/mm²

Conditions according to EN81-1 or -20:

Load 125%	1.5211 <= 1.9110	(1)
Emergency stop	1.6854 <= 1.7154	(4)
with deceleration [m/s²]0.500		
Blocked car	14.475 > 3.6518	(4)

Real safety factor > Minimum safety factor for ropes
23.28 > 12
Rope safety factor according to EN81-1 or -20:
NEQUIV = 13.0 NEQUIVT = 10.0 NEQUIVP = 03.0
Pulleys >= 320 mm, pulleys NPR = 0 NPS = 3
Rope safety nue = 23.3 > 20.5 (minSF)
Rope certification EN81

Traction conditions are fulfilled.
Rope safety conditions are fulfilled.

ZAlift - 20161219 - Machine dimensioning d3293120

Mechanical drive data

Machine manufactured by Ziehl-Abegg
Machine type SM 210.60 Gearless synchronous
Machine version ZAtop *

Traction sheave	mm	320 /150/14.0/10x8/U100
Load output torque	Nm	908 (max. 1000)
Real statical axle load	kg	3084 (max. 4500)

Rope pull admissible only in direction of motor foot!

Brake data

brake Mayr ROBA-twinstop 1000, 2x1200 Nm, EU-BD 1014/1
Dual circuit disk brake, DC supply necessary
(749 Nm, 0.88 m/s², 1 m, 11246 J, 316 W)
2 x 1200 Nm 207 V brake, with hand release, microswitch

Machine load data in the installation

Typical motor operating power	kW	7.8
Typ. operating current 30.6 A, Start. Current		44.4 A at acceleration 0.60 m/s²
Start. Current		46.7 A at acceleration 0.7 m/s²
Average power losses		1.67 kW = 6020.82 kJ/h
Output speed	rpm	119
Load torque	Nm	908.5(eff. 626.7)
Inertia of installation	kgm²	40.38

240 Starts per hour , 40 % required duty cycle at elevator operation
Max. static load pulleys 25507 N, pulley speed 1.00 m/s

Selected ZIEHL-ABEGG motor

Motor type SM210.60-20 - gearless

		Nameplate data	(Operating data)
Rated voltage	V	360	
Rated frequency	Hz	20	(19.9)
Rated torque	Nm	850	(908.5)
Rated speed	rpm	120	(119.4)
Rated output power	kW	10.7	(11.4)
Rated current	A	28	(30.6)
Maximum torque	Nm	1450	(1450)
Current at maximum torque	A	55	(55)
Inertia of motor	kgm²	0.500	
Possible accelleration	m/s²	1.06	

(MKmax=630.0 Nm)
Without cooling (80)
Dimension sheet A-M-6670, Motor construction type IMB3
Motor with encoder ECN 1313-2048Endat

Selected frequency inverter

Inverter ZAdyn 4CS032, Rated inverter current 32 A
mains current 22.3 A, 400 V, 14.7 kW, Max. 1.06 m/s²
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR25-3 (or Recuperation: ZArec4C 026 + BR25-3)