**ZAlift - 20170315 - calculation ZA-145537**

**ZIEHL-ABEGG SE**
**Künzelsau, Germany**

**Elevator calculation acc. EN81-20/50 egd Date: 05.05.2017**

**Elevator data**

| | | | | |
|---|---|---|---|---|
| Nominal load | Q | | kg | 1275 |
| Car weight | F | | kg | 1400 (864 - 2278kg) |
| Counterweight | G | | kg | 2038 (50%) |
| Travelling speed | v | (V_3=) | m/s | 1,60 |
| Travel distance | H | | m | 45,0 |
| 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 | 92 (0,258 kg/m) |
| Compensation rope weight | su | | kg | 185 |
| Car cable weight | HK | | kg | 22 |
| 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
1,8390 <= 2,0935
Traction 150% nominal load, below, not moving
1,5731 <= 2,0935
Rope pressure k < permissible rope pressure
1,80 < 2,00 N/mm²

Conditions according to EN81-1 or -20:
Load 125% 1,4399 <= 2,2726 (2)
Emergency stop 1,5628 <= 1,8625 (2)
with deceleration [m/s²]0,500
Blocked car 10,689 > 5,1648 (4)

Real safety factor > Minimum safety factor for ropes
22,97 > 12
Rope safety factor according to EN81-1 or -20:
NEQUIV = 08,5 NEQUIVT = 06,5 NEQUIVP = 02,0
Pulleys >= 320 mm, pulleys NPR = 0 NPS = 2
Rope safety nue = 23,0 > 17,6 (minSF)
Rope certification EN81

Traction conditions are fulfilled.
Rope safety conditions are fulfilled.

**ZAlift - 20170315 - Machine dimensioning ZA-145537**

**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 | 627 (max. 799) |
| Real statical axle load | kg | 2553 (max. 3600) |

**Brake data**

brake Warner ERS VAR07 SZ800/800, 2x800 Nm, EU-BD 819/2
Dual circuit disk brake, DC supply necessary
(518 Nm, 0,66 m/s², 3 m, 25534 J, 264 W)
207 V brake, with hand release, microswitch

**Machine load data in the installation**

| | | |
|---|---|---|
| Typical motor operating power | kW | 9,6 |
| Typ. operating current 31,8 A, Start. Current 56,0 A at acceleration 0,80 m/s² | | |
| Start. Current | | 52,7 A at acceleration 0.7 m/s² |
| Average power losses | | 1,85 kW = 6654,34 kJ/h |
| Output speed | rpm | 191 |
| Load torque | Nm | 627,5(eff. 480,5) |
| Inertia of installation | kgm² | 33,73 |

240 Starts per hour , 50 % required duty cycle at elevator operation
Max. static load pulleys 21816 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 | ( 627,5) |
| Rated speed | rpm | 192 | ( 191,0) |
| Rated output power | kW | 14,3 | ( 12,6) |
| Rated current | A | 36 | ( 31,8) |
| Maximum torque | Nm | 1200 | ( 1200 ) |
| Current at maximum torque | A | 74 | ( 74 ) |
| Inertia of motor | kgm² | 0,350 | |
| Possible accelleration (MKmax=480,0 Nm) | m/s² | 1,34 | |

Without cooling (87)
Dimension sheet A-M-6704, Motor construction type IMB3
Motor with encoder ECN 1313-2048Endat

**Selected frequency inverter**

Inverter ZAdyn 4CS032, Rated inverter current 32 A
mains current 23,2 A, 400 V, 15,2 kW, Max. 0,85 m/s²
Radio interference filter, integrated ; Line reactor, integrated
Brake resistance separate BR50-3 Attention! (or Recuperation: ZArec4C 026 + BR14A)