ZIEHL-ABEGG

Amendment of the original operating instructions
Regular maintenance and testing of ZAS elevator machines
ZAS0, ZAS1, ZAS2, ZAS3

A-TIA19_07-GB

ZAS0
ZAS1
ZAS2
ZAS3

Regular maintenance and testing of ZAS elevator machines

This service manual must be kept as part of the drive's inspection logbook!

Content

1 General information

1.1 Importance of service instructions for regular inspection and maintenance of ZAS elevator machines

Figure 1 - ZAS elevator machine

▷ These service instructions describe regular inspection and maintenance of ZAS0, ZAS1, ZAS2 and ZAS3 elevator machines.
▷ The service manual does not replace the original operating instructions of the elevator machine or frequency inverter!
▷ These service instructions for regular inspection and maintenance of ZAS elevator machines are a supplement to the original operating instructions.

ZAS0	Article No. 01008051-GB	A-TBA11_06-GB
ZAS1	Article No. 01009054-GB	A-TBA13_02-GB
ZAS2	Article No. 01008066-GB	A-TBA13_03-GB
ZAS3	Article No. 01008067-GB	A-TBA13_04-GB

▷ A current hardcopy version of the original operating instruction and this service manual must be available at the drive!

2 Safety instructions

2.1 Pictographs

Safety instructions are highlighted with warning triangles and are depicted according to the degree of hazard as follows.

	**Danger!** General hazardous area. Death or severe injury or significant property damage can occur if the corresponding precautions are not taken!
	**Attention!** Risk of moderate or minor injury if the corresponding precautions are not taken!
CAUTION!	**Attention!** Material damage is possible if the corresponding precautions are not taken!

	**Danger!** Danger by dangerous, electric voltage! Death or severe injury can occur if the corresponding precautions are not taken!

Information
Important additional information and advice for user.

2.2 Requirements placed on the personnel / due diligence

Danger!
▷ Installation, connection to the power supply and commissioning may only be performed by qualified service personnel! The relevant regulations must be observed!
▷ Persons entrusted with the planning, installation, commissioning and maintenance and servicing in connection with the elevator machine must have the corresponding qualifications and skills for these jobs. Based on their training, knowledge and experience as well as knowledge of the relevant standards, they must be able to judge the work transferred to them and be able to recognize possible hazards.
▷ In addition, they must be knowledgeable about the safety regulations, EU directives, rules for the prevention of accidents and the corresponding national as well as regional and in-house regulations. Personnel undergoing training, instruction, or on apprenticeship may only work on the elevator machine under the supervision of an experienced person. This also applies to personnel in general training.
▷ Comply with the legal minimum age.

2.3 General safety instructions

Danger!
▷ The elevator machine has attachment points: integrally cast eyelets or screwed-on eye bolts, eye plates or steel cable loops. The attachment points are designed exclusively for transporting the elevator machine including brake and traction sheave. Do not lift other loads such as bolted on components, ropes lying on top, etc. with the attachment points. Suitable lifting gear must be used.

Attention!
Warning of hand injuries!

▷ Risk of injury from reaching into the rope guard.
▷ Do not carry out any activities during operation.
▷ Only perform maintenance work on the drive when stopped.

▷ If the elevator machine is not energised, no electric torque is available. Releasing the brakes can cause uncontrolled acceleration of the elevator!

3 Inspection intervals and regular maintenance work

Information

▷ All maintenance and service work must be performed carefully and only by well-trained personnel.

The guarantee conditions include keeping the inspection intervals!

Measures	Intervals	Remarks
Check gear temperature	every three months	admissible 80 °C on the housing
Check gears for unusual noises	every three months	
Check oil level	every three months	Oil level according to marks on the dipstick.
Check gearbox for leaks	every three months	
First oil change after start-up	after 3 years	
Further oil changes	after another 6 years	
Clean bleeding screw	when changing the oil	
Clean drive	when changing the oil	
Operating brake Check brake liners	With speed control: Yearly	There maining thickness of the liner must be at least 3 mm.
Operating brake Check remaining stroke on brake bleeding device	With speed control: Yearly	Set remaining stroke.
Operating brake Check electromagnets	every year	
Safety brake Check air gap	Every six months	Air gap nominal value 0.6 ±0,1 mm maximum air gap after wear 0.8 mm
Check the micro switch Locking varnish must be undamaged.	every year	Check the distance between the setting screw for the micro switch and adjust if necessary.
Check the vicinity of the clutch for unusual wear articles	every year	Plastic particles indicate inadmissible wear of the elastic plastic buffer of the clutch.
Check rotation play of the clutch	after 5 years for the first time then annually	5 mm for a diameter of 360 mm at the motor hand wheel are admissible.
Replacement of the elastic plastic buffer	after 10 years	
Check rotation play of the traction sheave	Yearly (see chapter 4 “Flank clearance measurement”)	The permitted limit is 3 mm on a 260 mm radius on the traction sheave for comprehensive measurement of the flank clearance (see chapter 4.3 “Comprehensive flank clearance measurement”).
Check the traction sheave if worn out	every year	
Check distance cable protection	every year	
Visual inspection of the fastening screws of the gearbox, drive, brakes and traction sheave. Sealing varnish must be undamaged.	every year	
Visual inspection of the fitting of the nuts for the worm gear screw connections	every year	See chapter 5 “Visual inspection of nut fitting”.

Note: The fixing screws of the freaction sheave and the safety brake are marked by locking varnish. Loosening of the screws is therefore visually recognisable. If a screw should turn, it must be retightened with the prescribed torque, the old locking varnish removed and remarked.

☞ For further information on maintenance, refer to the ZAS operating instructions.

4 Flank backlash measurement

4.1 General information

The ZAS0, ZAS1, ZAS2 and ZAS3 are elevator machines with work gears. On these gears, the flank backlash of the gearing has to be monitored.

The flank clearance of the gearing is referred to as the rotation play of the traction sheave in the original operating instructions.

The check is necessary as wear occurs on the tooth flanks of the worm gear. The tooth width is reduced by wear and the clearance increases. This clearance is known as flank clearance and is a measure of the wear to the worm gear.

The flank clearance must be measured annually. There is a choice of a simplified or comprehensive measurement of the flank clearance. If the maximum permitted flank clearance is reached in the simplified measurement, the comprehensive measurement must then be performed.

CAUTION!

Attention!
If the flank clearance exceeds the maximum permitted value, the elevator machine may no longer be used on safety grounds. An inadequate tooth width can lead to breakage.

4.2 Simplified flank clearance measurement

4.2.1 Requirements

▷ Move the empty car to the top floor.
▷ Check that the shaft doors and the car doors are closed.
▷ Switch on the recovery control.
▷ If necessary, reduce the return speed.
▷ Carefully lower the counterweight onto the buffer by moving the car further upwards at the return speed.
▷ Open the mechanical brake and leave it open.

4.2.2 Procedure

▷ Turn the hand wheel until you feel a resistance.
▷ Select a reference point, e.g. the edge of a brake liner, and make marking 1 at this point on the brake drum.
▷ Turn the hand wheel in the opposite direction until you feel a slight resistance. Now make marking 2, also at the reference point location on the brake drum.
▷ The traction sheave should not move during this process.
▷ The distance S between marking 2 and marking 1 on the brake drum shows the size of the flank clearance.
▷ Repeat the process several times to make sure that the stop positions at both ends are precisely defined.
▷ Check whether the size of the flank clearance is within the appropriate tolerance, as shown in the following table.

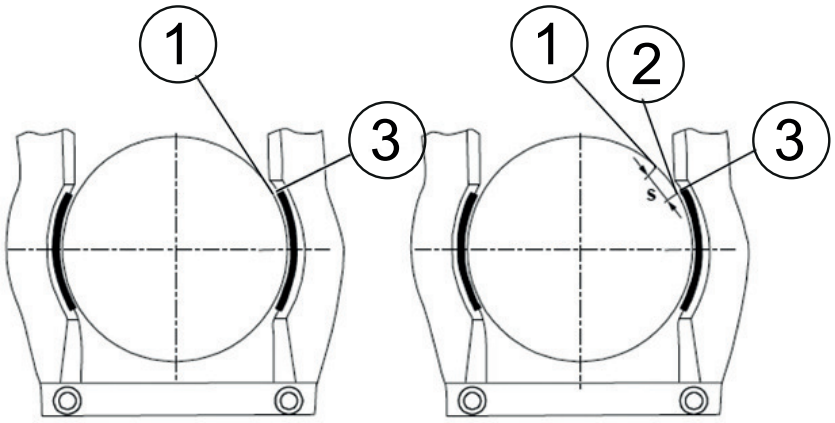

Figure 2
1 Marking 1
2 Marking 2
3 Reference point

Maximum permitted flank clearance for simplified measurement

Drive	Gear	Brake drum diameter in mm	Gear ratio	Number of teeth Worm gear	Number of turns Worm	Maximum permitted flank clearance S in mm
ZAS0	SWG0	220	51:1	51	1	32
ZAS0	SWG0	220	39:1	39	1	25
ZAS0	SWG0	220	49:2	49	2	16
ZAS1	SWG1	220	51:1	51	1	32
ZAS1	SWG1	220	40:1	40	1	25
ZAS1	SWG1	220	33:1	33	1	21
ZAS1	SWG1	220	50:2	50	2	16
ZAS1	SWG1	220	39:2	39	2	12
ZAS1	SWG1	220	27:2	27	2	9
ZAS2	SWG2	260	46:1	46	1	35
ZAS2	SWG2	260	38:1	38	1	29
ZAS2	SWG2	260	28:1	28	1	21
ZAS2	SWG2	260	45:2	45	2	17
ZAS2	SWG2	260	35:2	35	2	13
ZAS2	SWG2	260	27:2	27	2	10
ZAS3	SWG3	280	46:1	46	1	37
ZAS3	SWG3	280	38:1	38	1	31
ZAS3	SWG3	280	28:1	28	1	23
ZAS3	SWG3	280	45:2	45	2	18
ZAS3	SWG3	280	35:2	35	2	14
ZAS3	SWG3	280	27:2	27	2	11

If the limit value is reached when checking using the simplified flank clearance measurement, a comprehensive flank clearance measurement must be performed.

We recommend noting the result of the measurement in the elevator documentation.

4.3 Comprehensive flank backlash measurement

4.3.1 Tools required

- Dial gauge
- Screw clamp
- Flat wrench, size 10 mm
- Light

4.3.2 Requirements

▷ the ropes are removed from the traction sheave
▷ operating brake (drum brake) closed, thus arresting the worm shaft
▷ safety brake open
▷ gearbox temperature must be approx. 20 °C to 25 °C

4.3.3 Procedure

1. Attach a suitable measuring stop to the traction sheave, e.g. screw clamb
2. Put a marking on the measuring stop (measuring point). This marking acts as the measuring point for the dial gauge
3. Measure the outer diameter of the traction sheave D_a and the distance *a* from the outer diameter of the traction sheave to the measuring point.
4. Fix a dial gauge with magnetic holder to the gearbox housing and attach the dial gauge at the measuring point, see Figure 3 - Structure of the measurement.

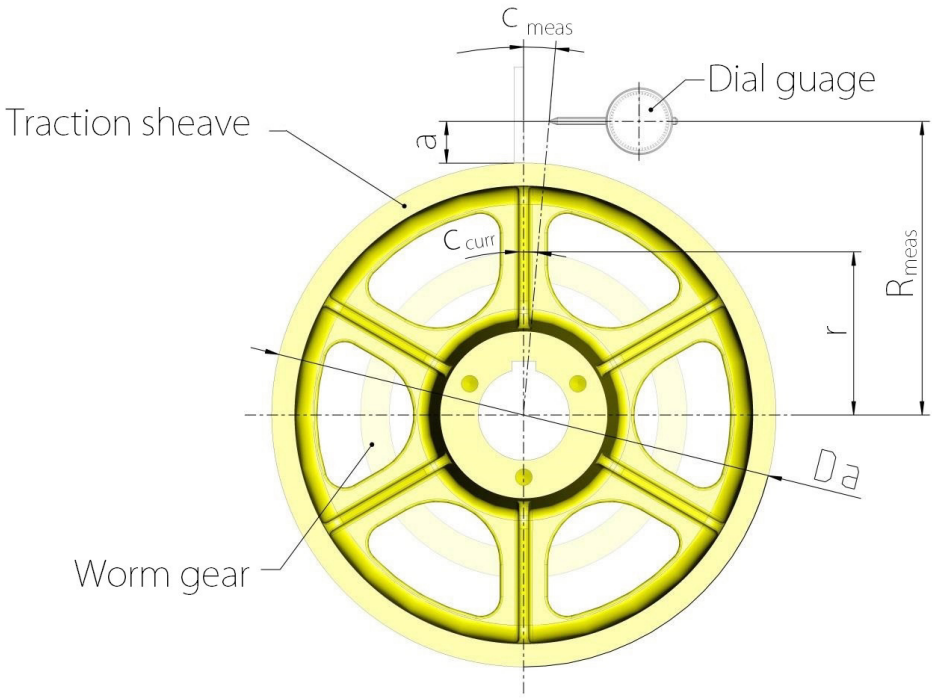

Figure 3 - Structure of the measurement

5. The traction sheave is moved manually by the rim in one direction with around 20 N to 50 N of force until a stop is detected. This stop point is the reference for the measurement. The traction sheave is then moved in the other direction until it reaches a stop again. The measured value corresponds to the backlash c_{meas}.
6. Perform a total of at least 6 measurements, evenly spaced around the circumference (c_{meas_1} - c_{meas_6}).
7. The largest measured value C_{meas} is then used to calculate the current flank backlash c_{curr}, see “4.3.6 Calculation of current flank backlash”.
8. The calculated flank backlash c_{curr} is crucial for determining the maximum wear.
   The flank backlash c_{curr} must be less than the maximum permitted flank backlash c_{max}!
9. For the flank backlash measurement an additional optical evaluation of the gear teething is mandatory. Therefore the name plate cover has to be unscrewed. With a suitable light the teething can be observed. Now the worm wheel should be moved by means of the hand wheel for one turn to observe possible pitting on one side of each tooth. After that the process should be

repeated for the other side of each tooth. If very distinctive pitting is visible the maximum permitted flank backlash c_{max} of 3 mm is to be limited to 2.2 mm, see Figure 4 - distinctive pitting.

Figure 4 - distinctive pitting

4.3.4 Measured values:

D_a	Outer diameter of traction sheave in mm
a	Distance from outer diameter of traction sheave to measuring point in mm
$R_{meas} = \frac{D_a}{2} + a$	Measurement radius in mm
c_{meas}	Measured clearance in mm relative to measurement radius

4.3.5 Table values:

c_{max}	Maximum permitted flank clearance
r	Reference radius in mm for the maximum permitted flank clearance and the current flank clearance

4.3.6 Calculation of current flank clearance:

$$c_{curr} = \frac{r}{R_{meas}} * c_{meas}$$

c s_{max}

4.3.7 Maximum permitted values:

Drive	**Gear**	**s_{max} in mm**	**r in mm**
ZAS0	SWG0	3	260
ZAS1	SWG1		
ZAS2	SWG2	2.2*	
ZAS3	SWG3		

* if very distinctive pitting

4.3.8 Measuring report

System:	
Elevator:	
Gear type:	
Gear serial number:	
Year of construction:	
Gear ratio:	
Number of trips:	
Measuring instrument:	
Measurement performed by:	
Measurement performed on:	

Measured values:

Outer diameter of traction sheave	D_a		mm
Distance from outer diameter to measuring point	a		mm
Measuring radius	$R_{meas} = \frac{D_a}{2} + a$		mm
Measured clearance, measurement 1	c_{meas_1}		mm
Measured clearance, measurement 2	c_{meas_2}		mm
Measured clearance, measurement 3	c_{meas_3}		mm
Measured clearance, measurement 4	c_{meas_4}		mm
Measured clearance, measurement 5	c_{meas_5}		mm
Measured clearance, measurement 6	c_{meas_6}		mm
Largest measured clearance from all 6 measurements	c_{meas}		mm

Calculation of current flank clearance:

Reference radius	r	260	mm
Current flank clearance **< 3 mm.** **< 2.2 mm.***	$c_{curr} = \frac{r}{R_{meas}} * c_{meas}$		mm

* if very distinctive pitting

5 Visual inspection of nut fitting

Requirement

Using the documentation provided on site and any adhesive labels attached to the gearbox, check whether one of the following measures has been completely and successfully carried out.

- 3 x Brief check of screw connection on worm gear in line with A-TIA19_04
- 2 x Torque check on screw connection on worm gear in line with A-TIA19_05
- Repair of screw connection on worm gear in line with A-TIA 19_06

If this has not been done, first complete the series of tests that has been started with the brief check or torque check.

Procedure

▷ Disconnect the elevator system from the power supply using the main switch, secure it against being switched back on and check that there is no voltage.
▷ Do not activate the manual hand release!

Inspection goal:
Identification of loose nuts.

Inspection goal:
Visually check that all nuts are tightly fitted on the worm gear.

If the visual check of the nut fitting reveals a loose nut (as shown in the figure “Incorrect nut fitting”), contact ZIEHL-ABEGG SE. See back page for contact details.

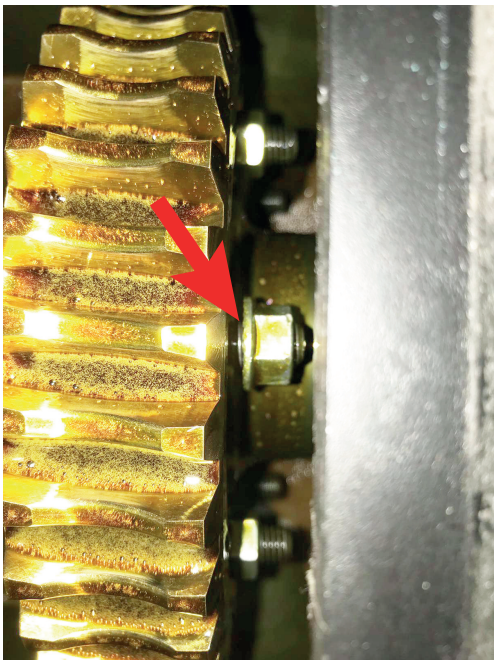

Figure 4 - Incorrect nut fitting

Attention!
If a nut fitting is incorrect, shut down the system. Contact the ZIEHL-ABEGG SE customer service. See back page for contact details.

We recommend noting performance of the check and its results in the elevator documentation.

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