

**BUCKET ELEVATOR KBE 60-80**

# **KBE 60/80 BUCKET ELEVATOR OPERATION AND MAINTENANCE MANUAL**

# **BUCKET ELEVATOR KBE 60-80**

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## BUCKET ELEVATOR KBE 60-80

### 1. Declaration of conformity

EC Declaration of Conformity	CE
Kongskilde Kongskilde Maskinfabrik A/S Skælskørvej 64 DK 4180 Sorø	
This is to declare that the machine ELEVATOR KBE 60-80 has been manufactured in accordance to provisions of the COUNCIL DIRECTIVE on the approximation of the laws of the Member States relating to machinery (98/37/EC).	
The elevator KBE 60-80 is an appliance designed for transportation of crop grains, seeds and granulates from one horizontal level to another one located at some height. Maximum capacity of the elevator KBE 20-40 is 180 tons per hour.	
Moreover, the appliance meets requirements of the following standards and codes: Regulation of the Danish Labour Surveillance Authority No BEK 561 of 24/06/1994 with further amendments in regulations No BEK No 669 of 07/08/1995 and BEK No 831 of 27/11/1998.	
Sorø, 05 <sup>th</sup> December 2007	

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### **2. Safety**

The elevator must be equipped with a safety switch to be locked with a key. The safety switch must be used when covers or inspection doors are being opened. The safety switch must be located on the elevator or within its operation area.

**ALL THE INSPECTION COVERS AND GUARDS MUST ALWAYS BE IN PLACE WHEN THE MACHINE IS RUNNING.**

Inspection doors and other guards must be opened or dismantled for repair, replacement of the elevator belt or buckets and adjustment of the belt. To perform such maintenance and repair operations the elevator belt must be started from time to time.

Therefore, authorised and competent staff must always carry out the operations. When any work inside the elevator body is in progress, the safety switch must be disconnected and access to it must be secured with a key lock.

Overload of the elevator results in emergency stop as the motor is incapable to carry the load. In case of overloads the safety switch is usually tripped. If so, the safety switch must be also disconnected before opening of inspection doors.

It is forbidden to use the electric motor to restart the clogged elevator by short on and off voltage pulses supplied to the motor in short time intervals as such attempts may lead to failure of the motor or the driving mechanism.

Safety rules and warning signs must always be observed. Warning signs must be kept clean. Damaged or lost warning signs must be repaired or replaced.

Only authorized persons with appropriate training are allowed to operate the elevator.

The working area of the machine must always be kept clean and tidy.

#### **Safety rules:**

The assembling team, the plant owner and operators must be familiar with and aware of the safety rules included into this manual as well as general safety rules effective at the workplace. All the safety rules must be strictly observed.

Any negligence to these issues may lead to serious occupational accidents whilst incorrect operation is often a reason for downtimes and decrease of the plant performance.

#### **Safety rules must always be obeyed:**

Read operation manuals, observe safety decals placed on the machine and follow all the applicable safety rules.

Never remove the safety decals, replace worn or damaged signs with new ones.

Learn how to operate the appliance in correct manner and never allow inexperienced persons to run the machine.

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If any functionality of the machine or operation of its parts is not fully clear contact the supplier or an authorized representative of the manufacturer to avoid any mistakes in the machine operation.

Wear always a helmet, safety goggles and protecting shoes during operation of the machine and the maintenance work in accordance to the general safety rules.

### **Be ready that something wrong may happen at any time:**

First-aid kit(s) should be placed in easy accessible, purposefully marked locations, clearly visible and known to anyone involved or staying within the vicinity.

Information board with emergency phone numbers (ambulance service and fire brigades) must be placed in visible locations.

Fire extinguishers should be available at hand.

Information with the list of persons authorized to operate the main power switch along with contact details of them must be placed at central locations.

### **Rotating parts of machinery pose hazards.**

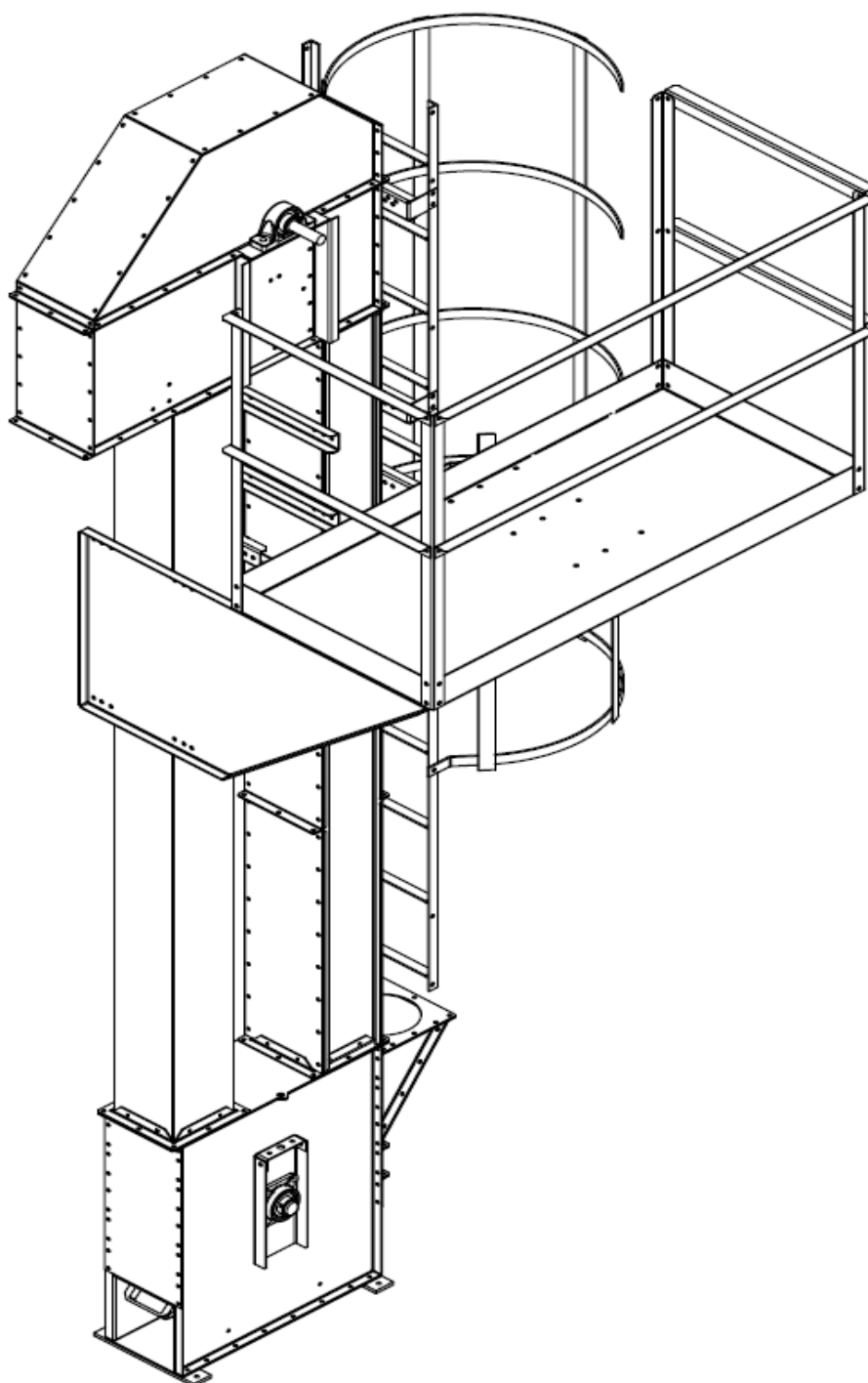
All the safety guards and covers should always be in place to prevent from accidental contacts between rotating parts of machinery and limbs of human bodies or loose clothes as such contacts may lead to heavy injuries.

During maintenance work all the electric circuits must be disconnected and reliably secured against accidental or unintentional reclosure. Switch the electric supply off and disable reclosure at as many levels as possible.

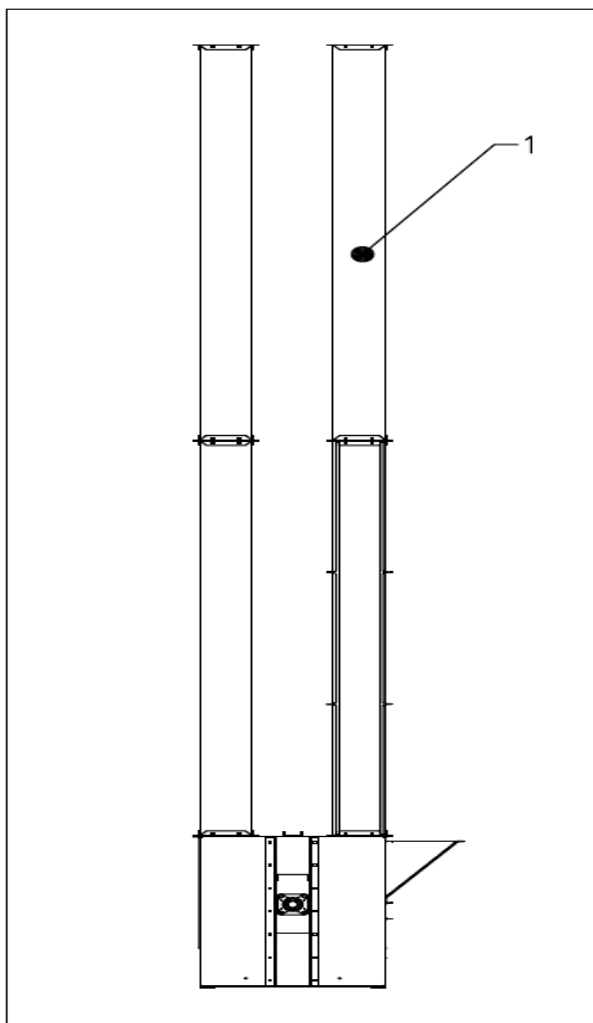
Clothes and overalls that are worn for maintenance work should be snug-fitting to the body.

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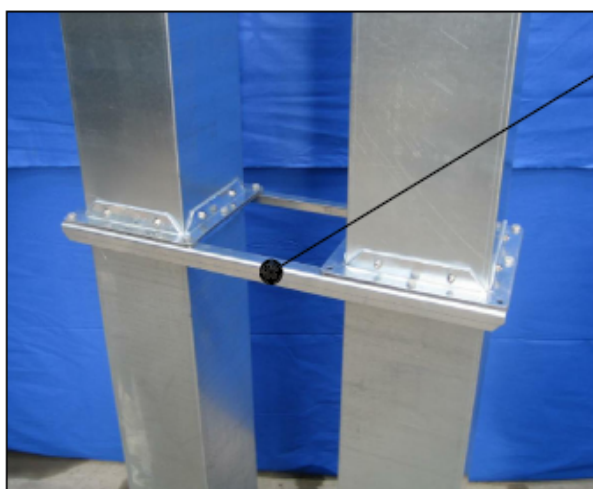
### 3. Assembly and installation



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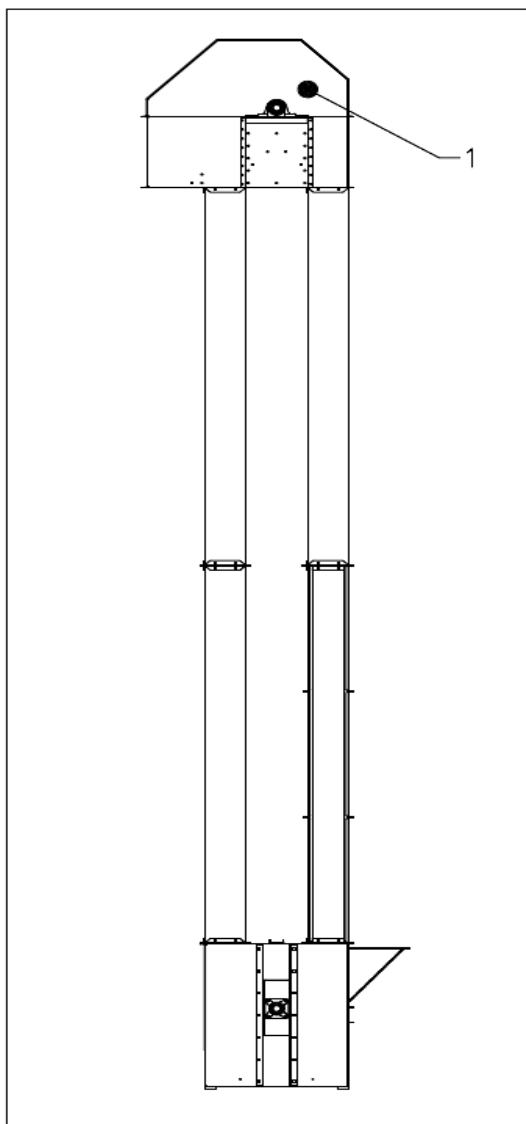


1. The elevator should be installed to the desired height. Long extension tubes are to be placed on the machine foot, for short ones it is the best to attach them to the elevator head. If any extension tube proves to be too long, it must be adjusted to the desired dimension. To do this, dismount its flange, cut off the tube and reinstall the flange (new holes for bolts must be drilled).
2. Two pieces of V-shaped reinforcements must be used to stiff every joint between tubes.
3. Mating flanges of joints must be placed precisely one over another.



1 – V-shaped reinforcements

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1. The upper section of the elevator (head) is fitted with bolts.

### Positioning of the machine

The elevator must be positioned vertically with maximum lateral deviation of  $\pm 6$  mm. Excessive deviation results in too much noise and premature wear of buckets.

The elevator must be reinforced in horizontal planes at every 5 m at least.

It is essential to fix the upper part (head) of the elevator from the both sides. If the total length of the machine exceeds 12 m, its load must be transferred to the support structure to release excessive loads to the body tubes.



1. The shackle to lift the upper section (head) of the elevator  
The shackle must be fitted to the elevator head in order to lift the head and attach the extension tubes from the bottom of the head and to place the elevator foot below the tubes.

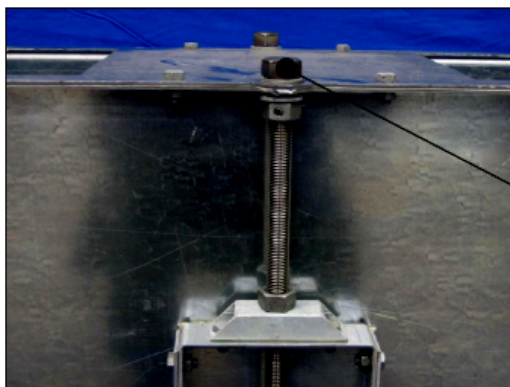


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### Assembly of the elevator – 1<sup>st</sup> method

1. Remove the cover of the uppermost segment.
2. Remove the cover of the inspection tube
3. Lift the bottom pulley fully above the support.
4. Mount the belt in elevator.
5. Snap the belt with the V-shaped profile.
6. Strain the belt

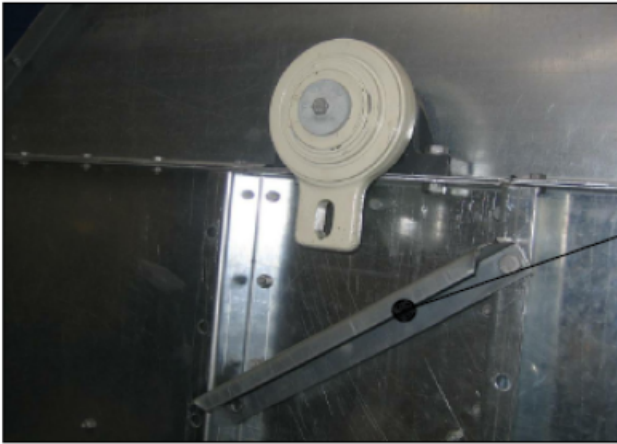


1. Install every fifth bucket to provide uniform load to the belt.
2. Install cover of the upper section.
3. Install cover of the inspection tube.

### Assembly of the elevator – 2<sup>nd</sup> method

1. Remove the cover of the uppermost segment of the elevator.
2. Remove the cover of the inspection tube
3. Lift the bottom pulley fully above the support.
4. Mount buckets to the belt with the belt lying on the shop floor.
5. Lift the belt with use of a crane.
6. Snap the belt ends with the V-shaped profile.
7. Strain the belt.

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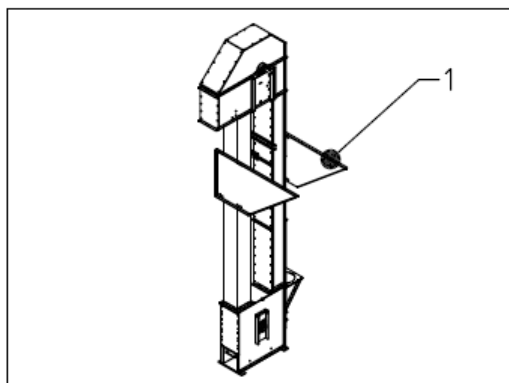
Switching the power supply on

1. All covers and guards must be in place and firmly fixed.
2. Loose and partly remove brackets that disable backstop.
3. Electric supply line must be installed by an authorized electrician.
4. Check direction of the material transportation. If correct, reinstall brackets that disable backstop of the material
5. Refit the cover
6. At start up pay attention whether the belt moves smoothly on pulleys and the machine works noiselessly.

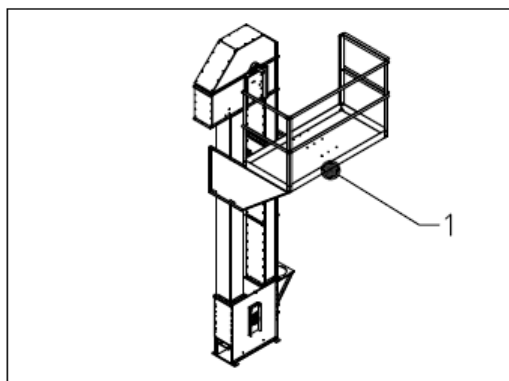


**Maintenance of the transmission gear: see the attached manual for the transmission gear.**

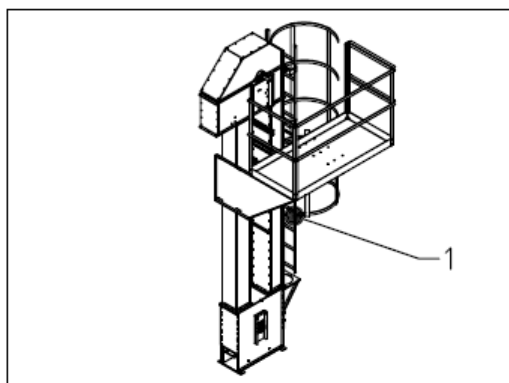
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1. Support structure of the service platform should be mounted 1200 - 1500 mm below the central line of the upper pulley shaft.



2. Mount the service platforms and railings.



3. Mount the ladder with the back protection

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### START UP

Prior to start up the elevator check the machine carefully with regard to the safety issues in order to avoid injuries caused by assembly and installation errors.

### REMEMBER!

Prior to check direction of the belt movement it is necessary to dismantle the mechanism that disables backflow of materials.

After completion of the checking procedure as described below, the blockade of the backflow flow must be reinstalled.



Loose and partly remove brackets that disable the backstop.



The guard for the backstop is installed along with the backstop itself after making sure that the transportation direction is correct.

### CHECK SUBSEQUENTLY THE FOLLOWING ITEMS:

- The extension tubes must be firmly fixed by means of reinforcing brackets.
- All the bolts and nuts in the elevator head and the bottom section along with the transmission gear must be reliably tightened.
- The elevator should be run at idle motion for a short time to check whether the belt moves in right direction. The belt must not be running to one side on the driving pulley or the bottom pulley. During the trial run all the personnel must stay within a safe distance from any moving parts.
- All covers, guards and inspection doors must be in place.
- Access of unauthorized persons to electric circuits, sockets, elevator structure or the service platform is disabled.
- Elevator foot and working area around it must be safe for the operator and other servicing staff.
- Electric system of the elevator equipment must be made in accordance to all the relevant regulations in force.

Components at the inlet and outlet of the material (loading hoppers, tube feeders, discharge chutes) that supply or evacuate material to and from the elevator should be installed in place prior to start the machine.

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OPERATION OF THE ELEVATOR SHOULD BE CHECKED UNDER LOADED CONDITION, THIS IS TO BE CARRIED OUT IN THE FOLLOWING WAY.

- Start with a little amount of the material and check operability of all the system components, e.g. tubes, container, chutes, etc.,

THEN TRY TO REACH THE DESIRED CAPACITY OF THE ELEVATOR BEING VIGILANT TO THE FOLLOWING ISSUES:

- a) the elevated material must be never fed back by return tubes,
- b) the belt must run on pulleys and rollers without slipping,
- c) elevator buckets must be filled with sufficient amount of the material,
- d) electric power consumption of the elevator motor must not exceed the rated value
- e) the elevator should operate with the designed capacity.

### **POST-TEST INSPECTION.**

It is recommended to recheck the following items after 6 – 8 hours of the test run.

- a) Bolts that fit buckets to the belt must be firmly tightened.
- b) Elevator belt must move inside the extension tubes with equal distance from the both side walls of tubes,
- c) The motor and the transmission gear must operate smoothly and with no problems.
- d) No oil leaks or overheating symptoms of the motor or the transmission gear must be spotted.
- e) Loose assembly and adjusting bolts must be correctly fitted.

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### **4. Instructions for operation**

#### **START UP OF THE ELEVATOR**

- run the machine idly for the first time, with no supply of the material.

#### **SHUTDOWN OF THE ELEVATOR**

- cut off supply of the material to the elevator and then let the machine run until all the supplied material is discharged. Only after having the elevator emptied its motor can be stopped.

#### **MAINTENANCE**

Maintenance operations include technical inspection of the machine. It is recommended to check the entire machine initially after 30 and 100 hours of operation and then after every 200 hours. Regular inspections and maintenance make it possible to prolong lifetime of the machine and reduce downtime periods.

The following components must be checked during the inspections and maintenance operations:

- a) The elevator belt must move centrally inside the extension tubes.
- b) Elevator buckets must be firmly fixed to the belt and fixing bolts should be tightened home.
- c) No missing or damaged buckets are allowed.
- d) For instructions on the transmission gear maintenance refer to its manual provided by the manufacturer of the mechanism.
- e) No missing or loose bolts are allowed, in particular at covers and guards.
- f) The control for flow speed adjustment should be in sound condition.

If the elevator is equipped with bearings that need manual greasing, the lubricant must be applied as needed. If possible, the grease should be applied when the elevator is in operation, otherwise promptly after the machine shutdown when the bearing still remain warm.



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### 5. Troubleshooting

Problem	Defect	Reason /remedy
The material is fed back via the return tube	(cf. operation with empty buckets)	
	The belt is loose	Strain the belt or have it shortened.
	Incorrect speed of the pulley	Check rotation speed of the motor.
	Damaged buckets	Replace buckets, find a reason for damages.
The belt slips on pulleys, smoulders or gets soft.	Too flat angle of the material discharge.	The recommended inclination angle of the discharge chute is 45° for dry and loose materials, for wet and compact materials the angle should be even higher.
	Elevator overload.	Check capacity of the machine, adjust supply of the material
	The lowermost pulley is not correct adjusted	Centre the pulleys
	Too low density of the material	Replace the buckets with perforated ones
The belt slips on pulleys, smoulders or gets soft.	Incorrect bucket type	
	The belt is slippery or pulleys are too hot	The belt is loose and must be strained
Belt running to one side	The belt or the lowermost pulley are not centred	Bearings of the driving pulleys are too hot.
		The belt is loose and must be strained
	Misalignment of the belt and driving pulleys	Misalignment of the lowermost pulley /check and align the pulley
		The material is collected around the lowermost pulley /clean the pulley
The motor stops (switches off)	Motor overload	Incorrect positioning of driving pulleys /check and reposition the pulley.
		Buckets are filled unequally /check and adjust the elevator inflow
Noise and vibrations	Bucket hit against inner walls of the extension tubes	Adjust material supply to the elevator
		Low voltage level
	Noisy operation of the motor	Foreign bodies inside the extension tubes
		Deformed or damaged buckets (see also <i>damaged buckets</i> )
Overheating of the transmission gear	Bearings on driving pulleys are misaligned	Damaged bearings of the motor or the pulleys /replace bearings.
		Low oil level in the transmission gear
	Bearings are hot	Buckets are filled unequally /Check and adjust supply /scooping
		Adjust /align the bearings.
Damaged buckets	Too little or too much oil	Damaged bearings /replace
	Incorrect lubricant (grease)	Adjust oil level
	The belt is loose	Check with the supplier
	Foreign bodies inside the extension tubes	Restrain the belt or replace
Buckets are insufficiently filled, reduced capacity	Insufficient supply of the material	Remove foreign bodies
		Check capacity of the elevator
		Obstacles at the elevator inlet

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Motor fails to start up	The material is fed back by the return extension tube	Incorrectly adjusted or damaged discharge chute for the material
	Incorrect belt speed	Incorrect belt speed
	Inlet clogged with the material	Oiled driving pulleys or the belt
	A bucket jammed or stuck in the elevator tube	Supply of the material was not stopped prior to the elevator shutdown
		Loose or damaged buckets /replace.



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### **6. Guarantee**

The guarantee covers defects caused by materials or by the manufacturing process of the delivered equipment. The guarantee is applicable provided that the equipment is operated and maintained in accordance to this manual and used for the intended purpose.

The guarantee terms assume repairs of defects and failures within the delivered equipment but explicitly exclude any implied or consequential loss, if any.

During the guarantee period, all repairs or replacement of defective components can be carried out solely under a preliminary consent and acceptance from the manufacturer.

With regard to the applied motors, terms of guarantees assumed by manufacturers of such motors are effective.

The guarantee period is defined by the relevant regulations in force.