

OPERATING INSTRUCTIONS

Semi Mobile Crushing Station

Manual 6

Maintenance

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Annex 1: Lubrication plan

Annex 2: Control- and Maintenance plan

1 MAINTENANCE

1.1 Basic Safety Notes

**IMPORTANT**

Please note the information in the manual 1 "Use of machine according to intended purpose" and manual 2 "Basic safety requirements".

The supplied documentation of attachment parts (e.g. gearbox, motors etc.) supplements the following statements and should be understood as obligatory.

Make sure to adhere to the setting, maintenance and inspection activities and intervals plus data on replacement of parts and components contained in the operation manual. All those activities should be accomplished only by **qualified personnel** (skilled work force).

Qualified personnel (skilled work force) are persons who have been authorized by the responsible for maintaining the safety of the components/ plant, to perform such activities and to detect and avoid possible dangers as a result of their training, experience, instruction or familiarity with the relevant Standards, regulations, accident prevention measures and operating conditions.

**NOTE**

Data on lubrication points, lubricants, filling volume and frequency of lubrication may be found in the lubrication chart in Appendix 1.

Data on maintenance actions and frequencies may be found in the maintenance plan in Appendix 2.



During all work with or on the equipment the rules on the avoidance of wastes and the correct disposal or recycling of wastes shall be observed.

Substances like

- Hydraulic fluids
- Oils and greases
- Coolants
- Solvent-containing cleaning agents

required for installation, repair and maintenance work must not get into the soil or enter the sewage system.

These fluids must be collected in suitable vessels before they are disposed of properly.

**WARNING! OVERPRESSURE**

Prior to repair or maintenance, the equipment items and pressure lines to be opened must be relieved from pressure.

Work should be carried out only by skilled workers.

**CAUTION, HOT LIQUIDS AND VAPOURS**

Be careful when handling hot substances. Risk of skin burns and scalds.

**POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER****POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE**

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!

**DANGER FOR THE DRIFT STABILITY**

Suitable measures must be taken to ensure at any time that all repair and maintenance work can be safely accomplished without impairing the stability of the overall machine. If brakes are removed, additional fixtures (e.g. clamping devices) must be used that have the same effect.

**WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

**DANGER****CAUTION, SUSPENDED LOADS!**

Nominate only well-experienced persons for suspension of loads and for giving instructions to the crane operator. The person giving instructions to the crane operator must be positioned so that it is in sight contact with the crane operator or may communicate with him through a radiotelephone set.

When replacement of single parts or larger components is required, the parts must be safely fitted to the hoisting gear and handled so that all risks are excluded. Only suitable hoisting gears and load carrying attachments in technically sound condition and with sufficient hoisting capacity shall be used.

For handling of plant components only the provided suspension points and marked eyebolts shall be used.

Persons must not stay or work under suspended loads.

It is prohibited to transport persons together with the load or on the load suspension devices.

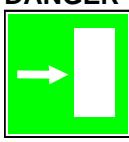
**DANGER****ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

Never use equipment parts for climbing.

When work in overhead positions is required, use only tested and approved equipment for protection against falling down.

In case of repair or maintenance work in elevated positions the workforce may fall down and suffer heavy injuries or even death.

Therefore, use only approved climbing aids and working platforms.

**DANGER****DANGER DUE TO BLOCKED ESCAPE ROUTES**

Keep escape routes free from all obstacles: never put down or store components in escape routes and observe the applicable safety rules.

**IMPORTANT**

Damage to the paint must be eliminated according to the paint specification after having finished maintenance works.

1.2 Ropes and Rope Fixtures

- Ropes must be kept under supervision while they are in operation and while they are not used. This is applicable not only to the ropes but also to the rope fixtures, rope connections and rope guides.
- In case of wire rope fixtures, the specified number of rope clips must not be reduced.

| Nominal size (rope) | Required torque for tightening [Nm] | Tensile force required in the rope clip thread [N] | Required number of wire rope clips |
|---------------------|-------------------------------------|----------------------------------------------------|------------------------------------|
| 5 | 2,20 | 2300 | 5 |
| 6,5 | 3,85 | 3200 | 5 |
| 8 | 6,60 | 4700 | 6 |
| 10 | 9,90 | 7100 | 6 |
| 13 | 36,30 | 15400 | 6 |
| 16 | 53,90 | 21000 | 6 |
| 19 | 74,47 | 28900 | 6 |
| 22 | 117,70 | 40800 | 7 |
| 26 | 161,70 | 47600 | 7 |
| 30 | 233,20 | 62300 | 8 |
| 34 | 325,60 | 79200 | 8 |
| 40 | 399,30 | 89800 | 8 |

1.3 Torques for Tightening of Bolts

| Bolt size | Bolt property class 10.9 Tightening moment to be applied M_A [Nm] | Bolt property class 8.8 Tightening moment to be applied M_A [Nm] |
|-----------|---------------------------------------------------------------------------|--------------------------------------------------------------------------|
| M8 | | 20 |
| M10 | | 40 |
| M12 | 100 | 70 |
| M16 | 250 | 170 |
| M20 | 450 | 300 |
| M22 | 650 | 450 |
| M24 | 800 | 600 |
| M27 | 1250 | 900 |
| M30 | 1650 | 1200 |
| M36 | 2800 | 2100 |

MA = Required torque for tightening with torque wrench

All torques for tightening are applicable to bolts with metric thread according DIN 13, nut with MoS₂ treated

1.4 Repair

1.4.1 Basic Safety Notes



DANGER

DANGER FOR THE STABILITY!

All repair work must be realized only at wind speeds up to maximum 5 m/s. During the repairs, the wind speed must not exceed 10 m/s!



DANGER

DANGER DUE TO UNINTENDED RE-START!

Prior to repair, the conveying routes affected and upstream conveyors of machines must be made empty. Suitable actions are required to ensure that such equipment cannot be started by mistake.

Starting of the electrical or hydraulic drives of the assembly groups that are being worked on, must be excluded.



DANGER

DANGER FOR THE STABILITY!

In case repair work technology makes it necessary to erect piles between ground level and machine, the load carrying capacity of soil must be calculated before the piles are erected (the permitted ground pressure need to be complied).

The piles must be erected on a ground level sufficiently able to take the maximum load.

The size of the piles must be selected according to the permitted ground pressure and the imposed load.

The piles must be secured against overturning.

In this process need to be ensured that the piles are positioned vertically and centrally under the support points.



DANGER

DANGER FOR THE STABILITY!

In case of using mobile lifting devices, the load carrying capacity of soil must be calculated before (the permitted ground pressure need to be complied).



DANGER

DANGER DUE TO OBJECTS FALLING DOWN!

For all repair works it is forbidden to stay under the repair area! This area has to be closed off across a large area.

Falling objects may cause severe bodily injury or loss of life.

**WARNING! RISK OF INJURIES CAUSED BY SPRING TENSION/CHAIN TENSION!**

When installing or removing components under mechanical stresses, persons might suffer injuries and equipment parts may become damaged or even destroyed.

Before performing work on such components suitable action should be taken to exclude such potential risks.

**RISK OF SQUEEZING-OFF LIMBS**

The conveying belt is always under tension, even while a belt conveyor is switched off. In the case of works where the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

**RISK OF SQUEEZING-OFF LIMBS**

For all belt-drive repair works suitable measures (e.g. belt clamps) have to be used to secure the conveyor belt against self-actuated movement.

**DANGER DUE TO MISSING OR NOT CORRECTLY INSTALLED SAFETY APPLIANCES**

After repair all safety devices must be checked for mounting and function and a start-up test without transported material must be realized!

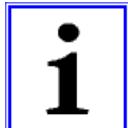
**DANGER FOR THE STABILITY!**

Repair works at

- Spherical bearings of the bridge segments
- Hoisting -and levelling cylinder
- Main carrying construction

As well as the disassembly of machine parts of the crawler drive notably affect the stability of the entire plant. That is why these works may only be carried out after having consulted the company FAM and only by qualified maintenance personnel.

Non-observance of this instruction may lead to damages at the plant, severe or even fatal injuries.

**IMPORTANT**

In case of repair where fitting bolts or fitting bolt connections are to be removed, the parts concerned shall be properly marked so that they can be re-installed in the correct positions!

If the fitting bolt connections have been removed, in the course of reassembly they should be replaced by new bolts with a thicker fitting shaft. Conjointly the holes should be bored to a larger size.

1.5 Apron Feeder AF 2200X15

1.5.1 Replacement of Drive Unit

**NOTE**

For documentation of the drive unit see Manual 7, Register 7.1.1.

**DANGER****DANGER****DANGER**

POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER

POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

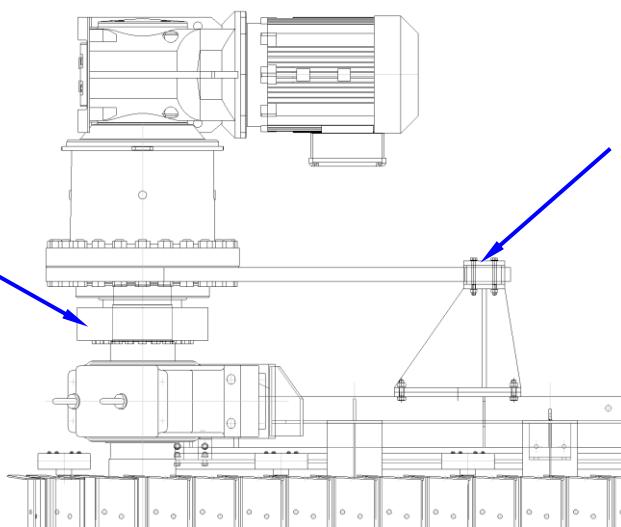
All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

Loosen the shrink disk

Loosen the cover of torque support

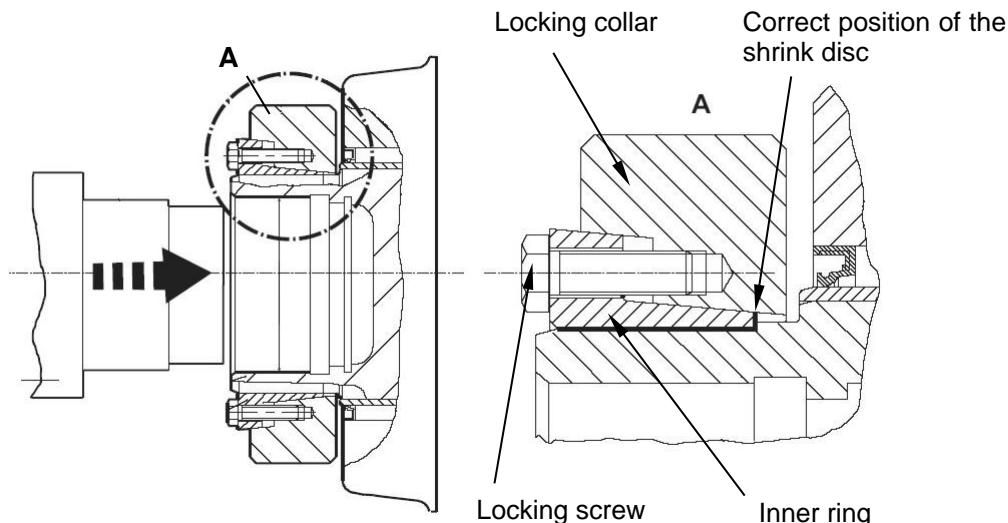


- Remove all cable connections from the drive unit.
- Use lifting eyes for suspension of the drive unit to the hoist gear and secure it against tilting over. When choosing the hoisting and slinging equipment, take account of the drive unit weight (approx. 2780 kg)!
- Loosen the locking screws of the shrink disc evenly and one after the other.
- Undo the fasteners of the torque support.
- Use a pulling device to carefully pull off the drive unit. If the locking collar does not come away from the inner ring automatically, it is possible to undo a few locking screws and screw them into the adjacent forcing threads.
- Pull the shrink disc off the hub, observing the following:
 - Any rust that may have formed between the hub and the end of the shaft must be removed beforehand.
- Lift the drive unit and put it safely down on the ground.

**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site for further disassembly.
- Re-assemble the unit in reversed order under observance of following instructions:
 - Degrease the hub and the shaft. The outside surface of the hub can only be greased in the area of the shrink disc seat.
 - Check the correct position of the shrink disc. The shrink disc is positioned correctly when it is in contact with the shaft shoulder.
 - Push carefully the drive unit at the hub onto the shaft. Perform the mounting operation slowly to allow the compressed air to escape around the outside of the shaft.
 - Tighten all locking screws at evenly spaced intervals until the front lateral surfaces of the locking collar and inner ring are in alignment.
 - Note the tightening torques.

**IMPORTANT**

For further information regarding assembly/disassembly of the drive unit please refer to the manufacturer documentation (see Assembly and Operating Instructions for the drive unit PHF072 KF157 DRE280S4).

For the bolt securing of the torque support a new split pin must be used! After reassembly the split pin ends must be bent open.

- Restore all electrical connections.
- Test operation of the equipment without conveyed material.

**IMPORTANT**

After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.

1.5.2 Replacement of Drive Shaft with Drive Sprockets

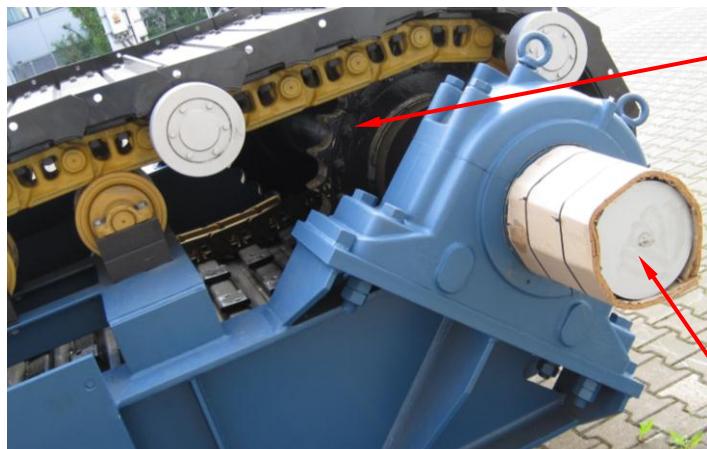


DANGER

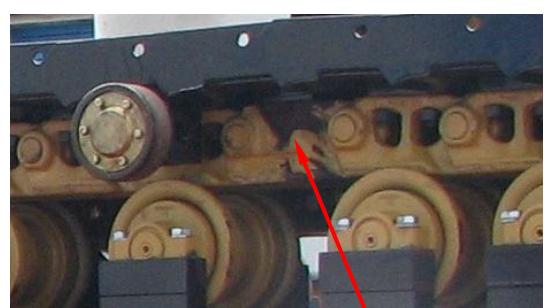
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

- Advance the chain in a way that the chain locks to be opened are positioned above the drive sprockets.



Driven sprocket wheel



Drive shaft

Chain lock

- Isolate the drive unit of apron feeder from power supply and secure it against unintended start-up.



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

Work may only be started after power cutoff. Otherwise there is a danger of squeezing-off limbs.

- Remove safety guards and attachment parts.
- Remove discharge hood and discharge box.
- Dismount the drive unit (see Chapter 1.5.1).
- Relieve the chain from tension (see Chapter 1.5.5).
- Sling the apron over the chain locks to a hoisting gear (approx. weight 128 kg) and secure against movement.
- Use a hoisting gear to secure the lower chain strands in the area of chain locks to be opened against falling down

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Open the chain locks by taking out the apron bolts and remove the apron.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Let down the lower chain strands and fix them in their position.
- Use a hoisting gear to lift carefully the upper chain strands and fix them in their position.
- Secure the driving shaft (approx. weight 1734 kg) by means of a hoisting gear.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Unscrew the bearing bolts and lift out the drive shaft by means of a hoisting gear.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site for further disassembly.
 - Pull off the bearing with auxiliary device.
 - Dismount the drive sprockets by loosening the taper key.
- Re-assembly of the components is performed in the reversed order under observance of following instructions:
 - Note the tightening torque of the bearing bolts M36 =2100 Nm
 - Re-installation of the aprons.
 - Tension the chain (see Chapter 1.5.4).

1.5.3 Replacement of Chain Strands



NOTE

For documentation of the chain strands see Manual 7, Register 7.1.2.



DANGER

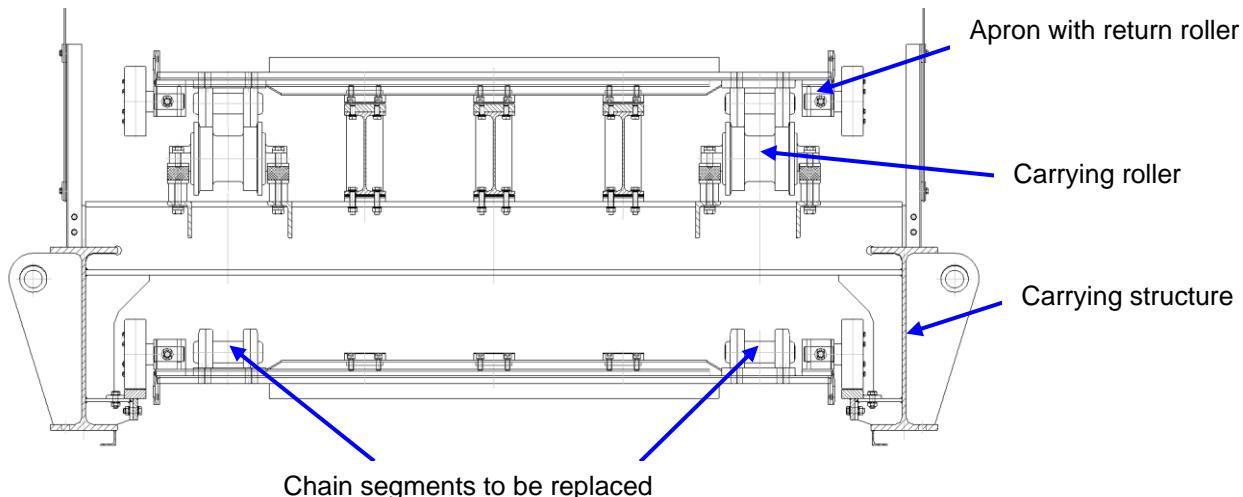
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.



NOTE

Each of the two chains of the apron feeder consists of two chain segments which are linked by chain locks. The following instruction describes the procedure of replacing two of the chain segments running side by side.



- Suspend protective guard of the take-up tumbler to a suitable hoisting gear and secure it. When selecting the chain hoists and slinging equipment, take account of the protective guard weight (180 kg).
- Dismount protective guard, lift it by means of the hoisting gear and put down safely on the ground.

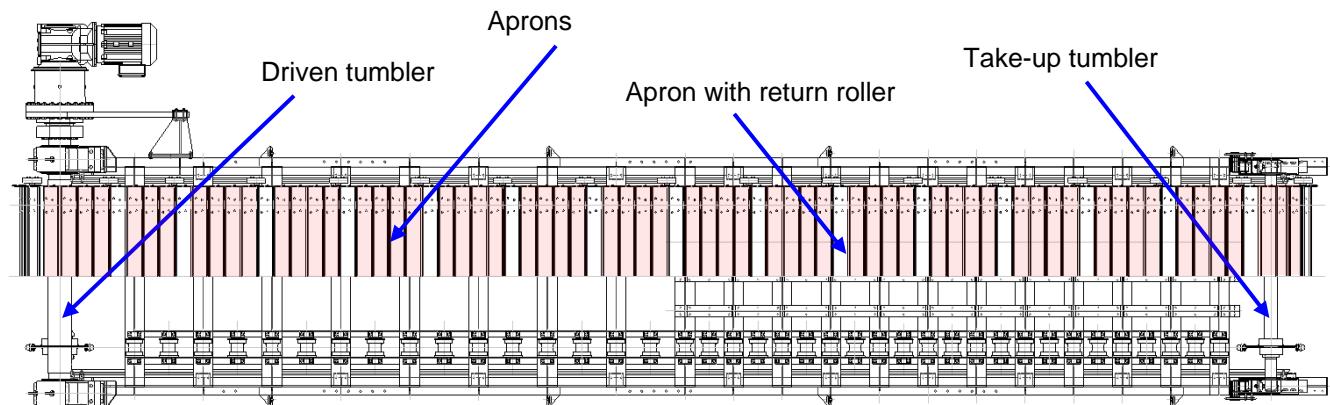


DANGER

CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Dismantle aprons except aprons with return rollers and aprons with chain locks.



- Move gradually the apron feeder as long as one apron with the chain link is positioned frontally at the reversal point of the chain at the take-up tumbler. The chain segments to be replaced are located in the lower run.
- Isolate the drive unit from power supply and secure it against unintended start-up.
- Use a hoisting gear to secure the lower run chain strand next to the chain lock to be opened.


WARNING

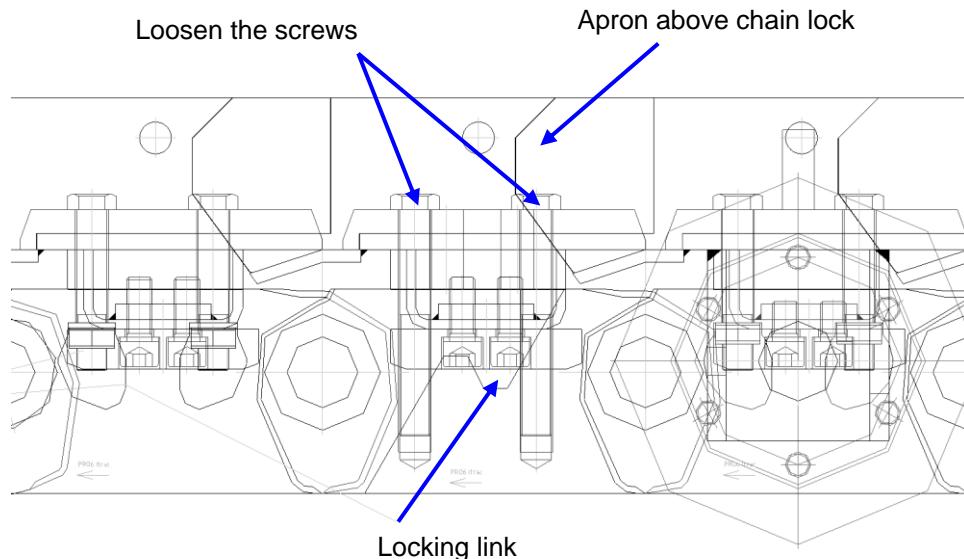
WARNING, DANGER OF SQUEEZING INJURIES

Opening and closing of the chain must be performed by an authorized specialist company.

- Relieve the chain from tension (see Chapter 1.5.5).


NOTE

Prior to chain opening, it is necessary to fix the take-up tumbler in its position. For this purpose, tighten again the fastening screws between the bearing block of the take-up tumbler and the carrying frame.



- Open the chain by undoing the screwed connection of the apron above the chain lock (weight 128 kg) and put down carefully the lower chain strand (lower run).
- Repeat this procedure with the other chain.
- Fasten the new chain strands to the ends of the old chains in the upper run.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

**HINWEIS**

Position the chain strands in a way so that plugs in the chain bolts face outwards.

- Sling the old chains (single mass 1200 kg) in the lower run to the hoisting gear.

- Move gradually the apron feeder in the conveying direction. In order to avoid damages of the carrying frame, the chain segments should run in the lower run over a beam (e.g., wooden beam) positioned at the take-up tumbler and be carefully pulled out by means of a hoisting gear.

**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Dismount step-by-step the aprons with return rollers from the lower chain strand (lower run) and fasten them on the new chain strand in the upper run.
- After the end position of the new chain strands has been reached, detach the old chain segments from the new ones at the chain lock.
- Bring the both chain strands in the upper and lower run together at the reversal point of the chain at the take-up tumbler using rope hoists and connect them with each other in the chain lock.
- After the new chain strands have been installed, it is possible to mount aprons (128 kg and 147 kg).
- Re-install protective guard of the take-up tumbler.
- Loosen the screwed connection between the bearing block of the take-up tumbler and the carrying frame.
- Tension the chain (see Chapter 1.5.4).



**When the conveyor moves, no persons shall be present on or in the apron feeder.
Note the higher risk of injuries.**

1.5.4 Setting Chain Pre-tension

**NOTE**

For information regarding chain tensioning refer to drawing no. 09136447.

**NOTE**

For documentation of the tensioning device see Manual 7, Register 7.1.3.

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

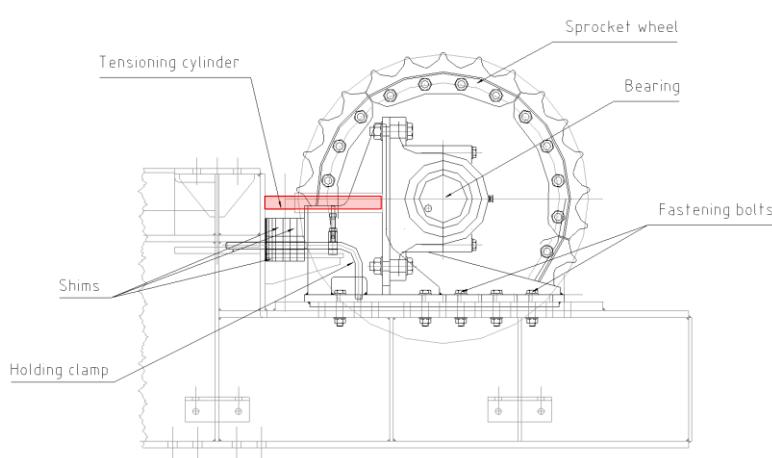
**IMPORTANT**

The tension of the apron chains can be adjusted by the take-up sprocket wheels stepwise.

This tension adjustment is effected by hydraulic cylinders.

The maximum admissible tension force on each side is 100 kN.

- Arrange the hydraulic cylinders in level of the bearing axis as shown in the drawing and pre-stress them slightly.



- Loosen the fastening bolts between take-up sprocket wheels and carrying frame (do not remove the fastening bolts).
- Before loosening the fastening bolts make sure that the tensioning cylinders provide sufficient initial tension in order to avoid jamming of the fastening bolts.
- Re-adjust as well the fastening bolts between take-up sprocket wheels and carrying frame.
- Shift the take-up sprocket wheel until the desired position is reached. Make sure that the take-up sprocket is shifted evenly and simultaneously on both sides in order to avoid jamming and tripping from the guide arrangement.
- Add or remove shim plates and secure them by means of holding clamps.
- Bolt together take-up sprocket wheels and supporting frame.
- Remove the hydraulic cylinders.
- Perform test operation of the apron feeder without conveyed material.

1.5.5 Relieving the Chain from Tension

**NOTE**

For documentation of the tensioning device see Manual 7, Register 7.1.3.

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

The chain can be relieved from tension by means of two hydraulic cylinders as follows:

- Position the tensioning cylinders in level of the bearing axis.
- Pre-stress slightly the tensioning cylinders.
- Loosen the fastening bolts between bearing block and carrying frame (do not take remove the screws).
- Before loosening the fastening bolts make sure that the tensioning cylinders provide sufficient initial tension in order to avoid jamming of the fastening bolts.
- If necessary, adjust the fastening screws between bearing block and carrying frame.
- Remove the shim plates.
- In order to fix the take-up tumbler tighten again the fastening screws between bearing block and carrying frame.
- Relieve the tensioning cylinders from tension and remove them.

1.5.6 Replacement of Gear Rim Segments

**DANGER**

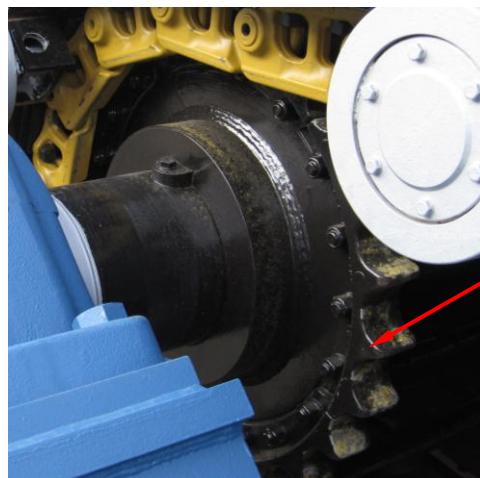
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

**NOTE**

Replacement of gear rim segments is performed at the take-up tumbler or at the driven tumbler.

- Remove protective gratings (on the left and right side)
- If necessary, remove protective hood of the take-up tumbler, note the protective hood weight (180 kg).
- Move the gear rim segment to be replaced so that it is not in engagement with the chain.



Gear rim segment

- Isolate the drive unit of apron feeder from power supply and secure it against unintended start-up.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Work may only be started after power cutoff. Otherwise there is a danger of squeezing-off limbs.

- Sling the apron strands to a hoisting gear and secure against movement.
- Undo the bolted connections between the gear rim segment and sprocket wheel.

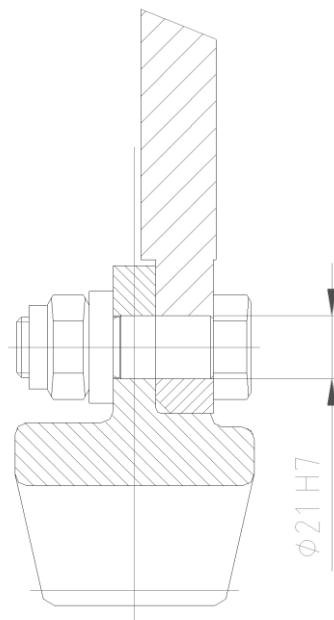
- Pull out the gear rim segment (approx. 11 kg) to the side and put it safely down.

**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Re-assembly of the components is performed in the reversed order under observance of following instructions:

- Ream the new gear rim segment in installed condition together with the chain wheel bore to Ø21 H7 (see sketch).

**IMPORTANT**

New screw connections must be used for the reassembly of the tooth segments!

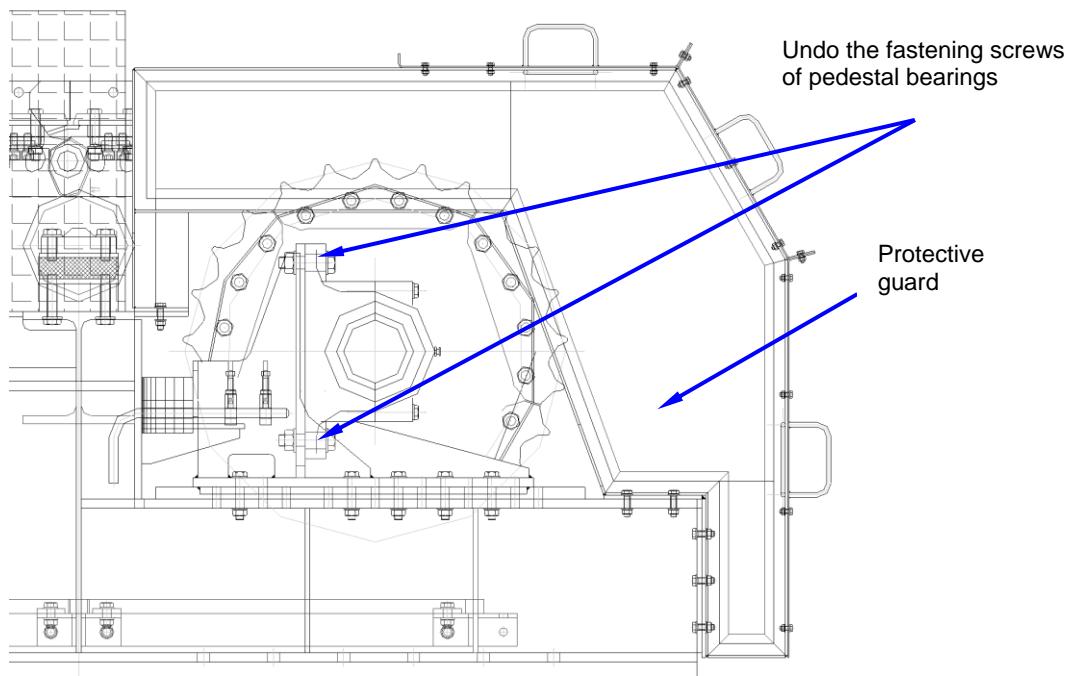
Tighten the fixing bolts M20x65 of the tooth segments with the prescribed torque of 165 Nm and lock the nuts by locknuts!

1.5.7 Removal of Take-up Tumbler Shaft

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.



- Remove protective guard taking into consideration the weight of the protective guard (180 kg).
- Move the apron feeder as far as one of the two aprons with the chain lock is positioned at the reversal point of the chain at the take-up sprocket.
- Isolate the drive unit from power supply and secure it against unintended start-up.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Work may only be started after power cutoff. Otherwise there is a danger of squeezing-off limbs.

- Completely relieve the chain from tension (see Chapter 1.5.5).
- Sling the apron above the chain locks to a hoisting gear (approx. weight 128 kg).
- Use a hoisting gear to secure the lower chain strands in the area of chain locks to be opened against falling down

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Open the chain locks by unscrewing the apron bolt connections, remove the apron.
- Put the lower chain strands (lower run) down on the ground.
- Use a hoisting gear to lift the upper chain strands (upper run) from the wheel sprockets and secure them against moving.
- Secure the take-up shaft with sprocket wheels including gear rims (total mass approx. 1095 kg) by means of a hoisting gear.
- Loosen fastening screws of pedestal bearings and use a hoisting gear to lift out and lower the take-up shaft.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site.
- Re-assembly is performed in the reversed order under observance of following instructions:
 - Note the tightening torque of the pedestal bearing bolts
 - Re-installation of the aprons.
 - Tension the chain (see Chapter 1.5.4)

1.5.8 Replacement of Feeder Aprons



NOTE

For information regarding apron replacing refer to drawing no. 09255162.



DANGER

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.



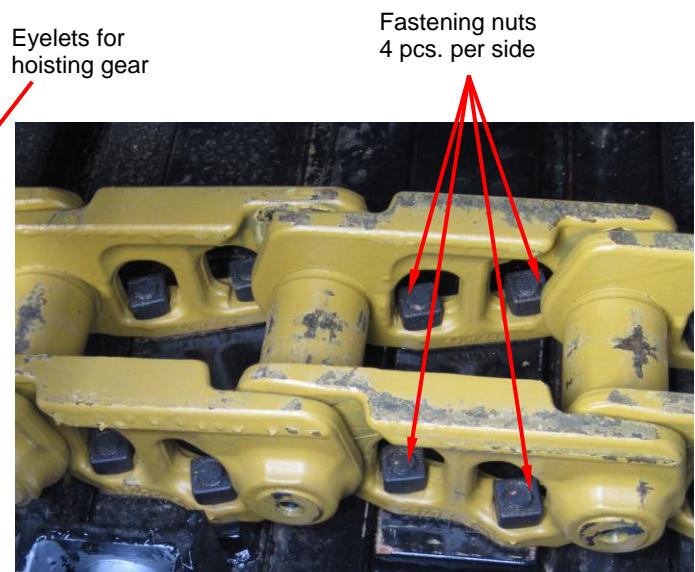
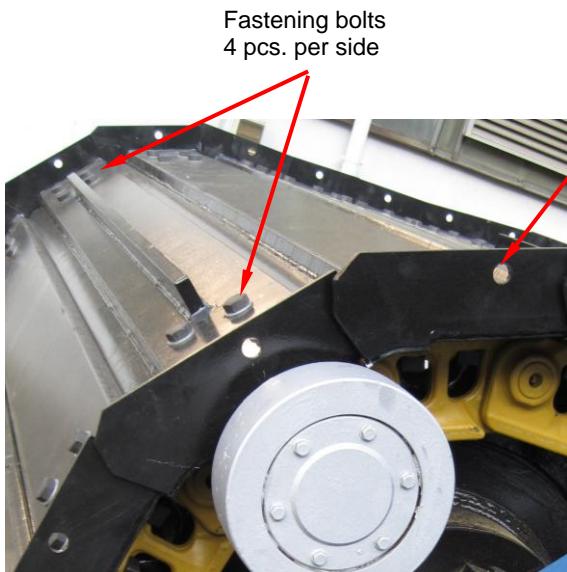
IMPORTANT

Replacement of feeder aprons is possible only directly on the drive or take-up tumbler in curved condition of the chain.

It is recommended to carry out replacement of aprons on the take-up tumbler to avoid disassembly of the discharge box.

When the discharge box is removed, replacement is also possible on the drive tumbler.

- Move the apron feeder as far as the apron to be replaced is positioned at the vertex of the take-up sprocket.
- Isolate the drive unit from power supply and secure it against unintended start-up.
- Sling the apron to a hoisting gear (weight approx. 128 or 147 kg), undo the fastening bolts and take out the apron.



**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

➤ Install the new apron as follows:

- Apply graphite lubricant to the bolt thread and to the lower side of head.
- Screw on the self-locking chain nuts so that the rounded edges are facing the chain member.
- Tighten the bolts (3/4"-16x99) with the specified torque of 320 ± 40 Nm.
- Re-tighten each bolt with another half a turn.



Tightening torque of the aprons must be documented during assembly.

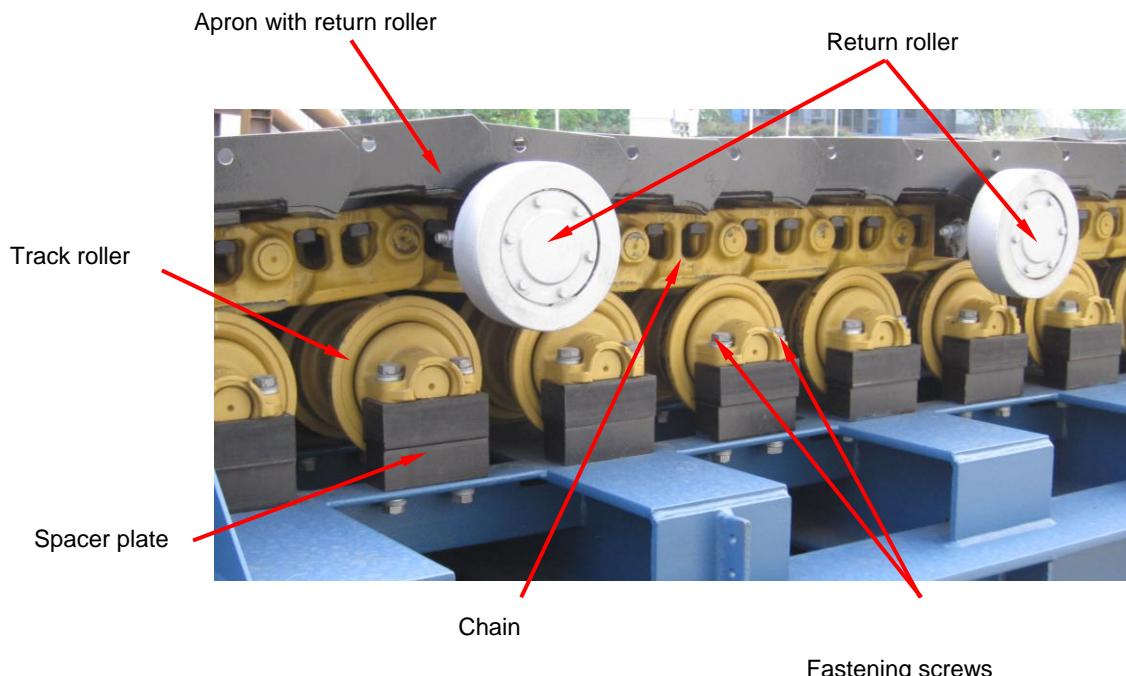
IMPORTANT

1.5.9 Replacement of Track Rollers



Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.



- Dismantle protective guards
- Remove aprons between two aprons with return rollers
- Move gradually the apron feeder as far as this assembly opening is positioned in the upper run above the track roller to be replaced.
- Isolate the drive unit from power supply and secure it against unintended start-up.



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

Work may only be started after power cutoff. Otherwise there is a danger of squeezing-off limbs.

- Relieve the chain from tension (see Chapter 1.5.5).

- Sling the chain strand in the work area to a hoisting gear and lift it until the track roller is free.



WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Support the chain by means of suitable devices and secure it in its position.
- Loosen fastening screws of the track roller.
- Sling the track roller (approx. 51 kg) to a hoisting gear.
- Loosen fastening screws of the spacer plates.
- Lift the track roller to some 2-3 mm.
- Draw out the spacer plates.
- Use the hoisting gear to pull out the track roller and lower it to the ground.



CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Re-assembly is performed in the reversed order under observance of following instructions:
 - Make sure to observe the torques for tightening of fixing parts.

1.5.10 Replacement of Return Rollers

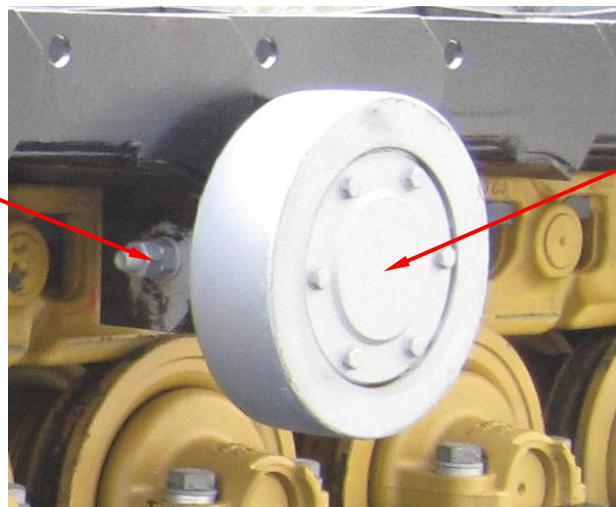
**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

- Dismantle protective guards
- Move the return roller to be replaced in the upper run.
- Isolate the drive unit from power supply and secure it against unintended start-up.

Undo the bolted connection



Return roller

- Undo the bolted connection and pull out the return roller (approx. weight 24 kg) to the side.
- Re-assembly is performed in the reversed order under observance of following instructions:
 - Make sure to observe the torques for tightening of the bolted connection.

1.5.11 Replacement of Wear Plates

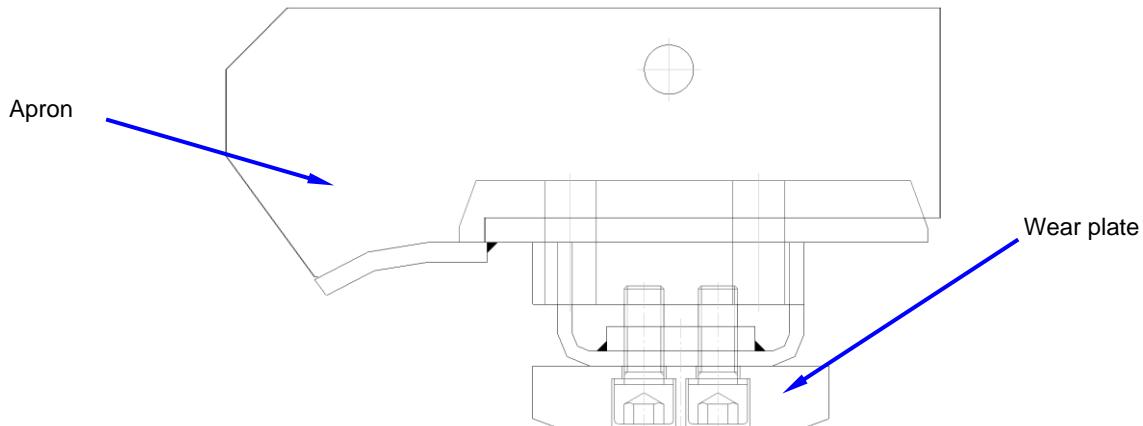


Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the apron feeder, the adjacent spillage conveyor and the impact crusher in a way preventing the machine from any undesired movements.

1.5.11.1 Replacement of apron wear plates

- Move the apron with defective wear plate out of the feeding zone and position it so that the bolted connection of the wear plate and apron gets accessible between track rollers.
- Isolate the drive unit from power supply and secure it against unintended start-up.



- Undo the bolted connection and take out the wear plate to the side.
- Re-assembly is performed in the reversed order under observance of following instructions:
 - Make sure to observe the torques for tightening of wear plates.

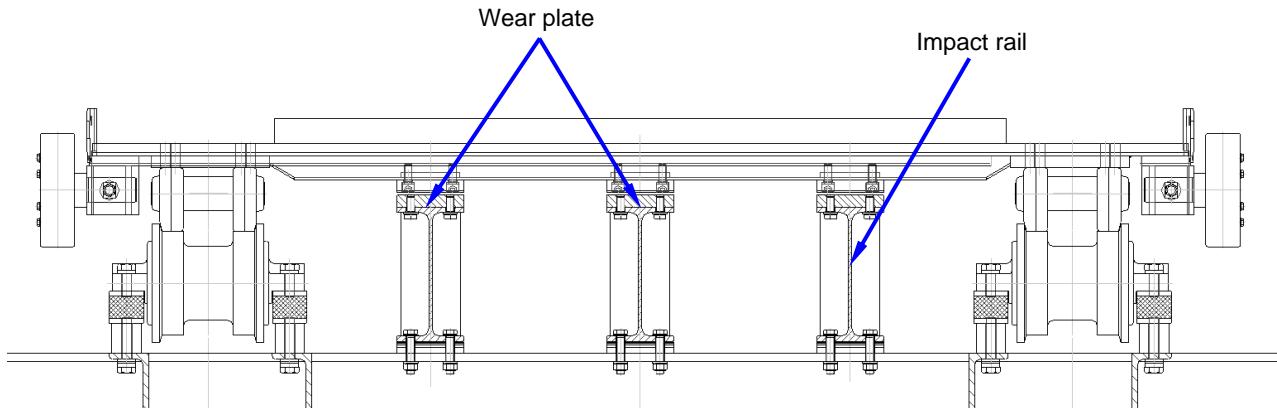
1.5.11.2 Replacement of wear plates of impact segments

- Dismantle the protective hood (180 kg) of the take-up tumbler as well as protective grating and lower them to the ground.



CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.



- Remove various aprons according to the length of wear plates to be replaced.
- Move this opening in the upper run so that it is positioned above the wear plates to be replaced.
- Isolate the drive unit from power supply and secure it against unintended start-up.
- Undo the fastening screws of the wear plates at the impact rail segment.
- Remove the wear plates.
- Re-assembly is performed in the reversed order under observance of following instructions:
 - Make sure to observe the torques for tightening the screws.

1.6 Spillage Conveyor KGF 2490x15,1

1.6.1 Replacement of Drive Unit



NOTE

For documentation of the geared motor see Manual 7, Register 7.2.



DANGER



DANGER



DANGER

POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER

POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.



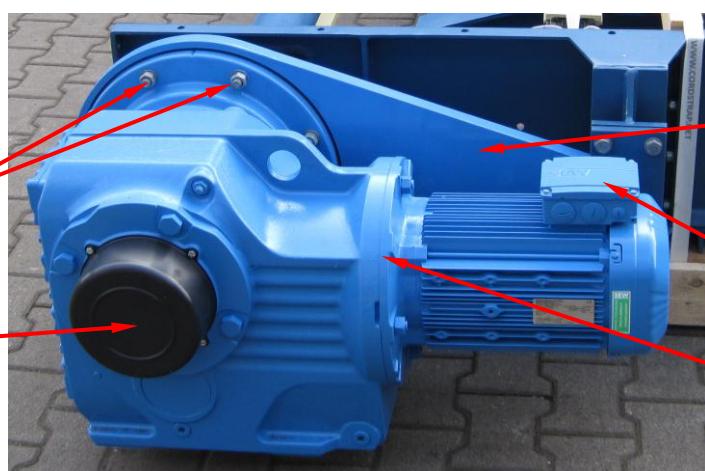
Screwed connections of gear flange and geared motor

Cover cap of shrink disk

Torque support KHF107

Electrical connections

Geared motor KHF107 DRE132M4



- Prior to disassembly, make sure that the drive unit is switched off and secured against unintended start-up.
- Disconnect all cables of the drive unit.
- Sling the drive unit to a suitable hoisting gear (approx. weight is 320 kg) and secure it against tilting over.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Remove the cover cap of the shrink disc
- Loosen the locking screws of the shrink disc evenly and one after the other (see Operating Instructions for the Gear Unit).
- Undo the fasteners of the torque support.
- Undo the screwed connections between the gear flange and geared motor
- Pull off carefully the geared motor and pull off the shrink disc (see Operating Instructions for the Gear Unit).
- Lift the drive unit and put it down on the ground.

**DANGER****CAUTION, SUSPENDED LOADS!**

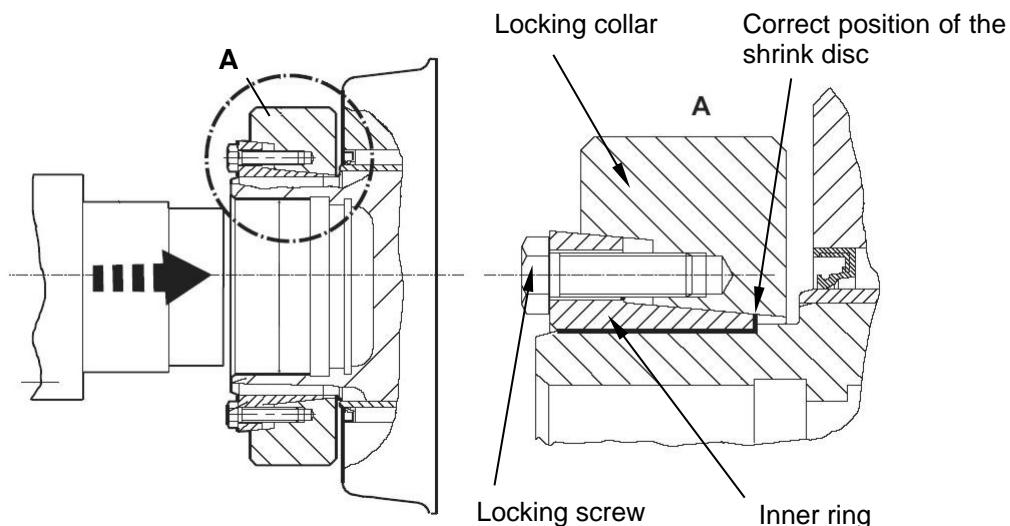
Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site for further disassembly.
- Re-assemble the unit in reversed order under observance of following instructions:
 - The torque for tightening of tensioning bolts is 59 Nm.

**IMPORTANT**

During re-assembly of the geared unit note the installation instructions for the shrink disc (see Assembly and Operating Instructions for the gear unit, chapter 4.7, type KHF107) and the cover cap of the shrink disc must be re-installed as well!

- Restore all electrical connections.

**IMPORTANT**

After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.

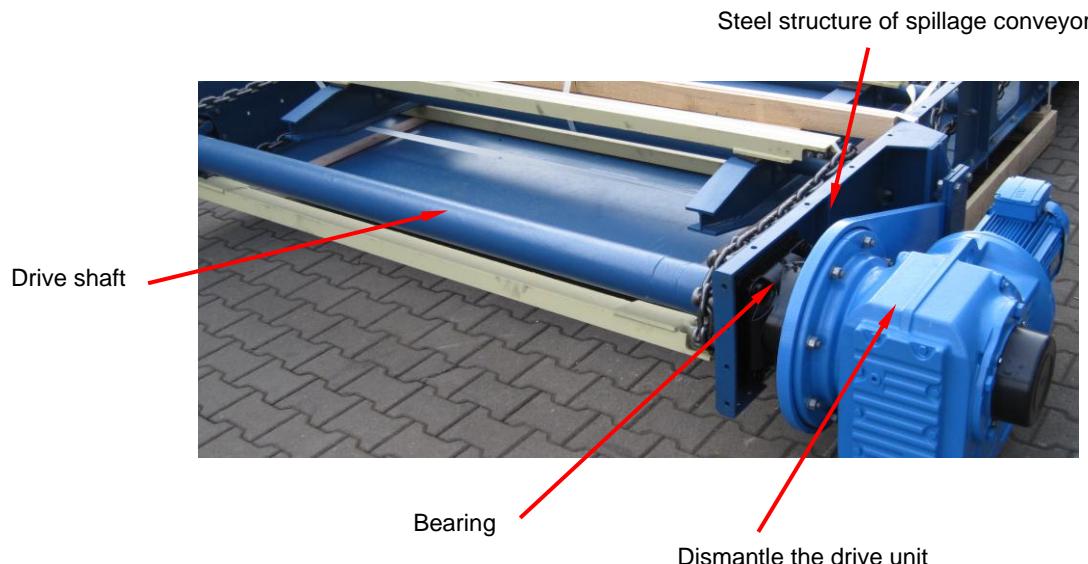
1.6.2 Replacement of Drive Shaft with Sprocket Wheels

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.

- Prior to disassembly, make sure that the drive unit is switched off and secured against unintended start-up.
- Dismantle the drive unit of spillage conveyor before taking out the drive shaft (see Chapter 1.6.1).



- Relieve the conveying chains from tension (see Chapter 1.6.6).
- Remove the cover of bearing.
- Secure the drive shaft (approx. 333 kg) by means of a hoisting gear (e.g. a chain hoisting tackle)

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Use the hoisting gear to lift out the drive shaft and to thread it out of the chain. If necessary, open the chains at the sprocket wheels.

**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site for further disassembly.
- Re-assemble the unit in reversed order under observance of following instructions:
 - Installation of drive unit (see Operating Instructions for geared motor).
 - Tensioning of chains after completion of all work (see Chapter 1.6.6).

1.6.3 Taking out Chain Segment / Scraper

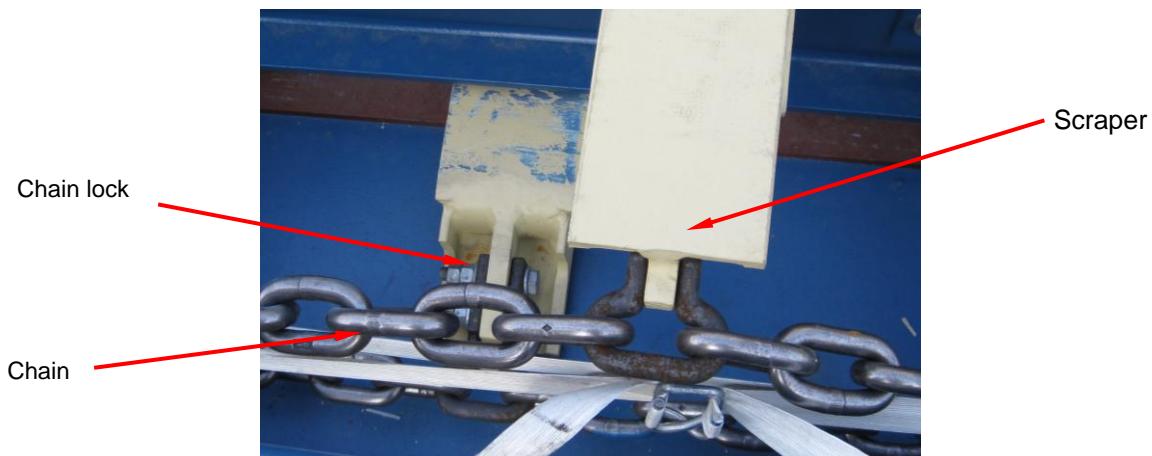


DANGER

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.

- Prior to disassembly, move the chain so that the chain segment to be replaced is positioned in the upper run.
- Switch off the drive unit and secure it against unintended start-up.



- Relieve the conveying chains from tension (see Chapter 1.6.6)
- Clamp the chains to the left and right of the segment to be replaced.
- Secure the scraper (weight approx. 33 kg) against falling down.



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Remove fastening bolts on the chain locks.
- After that, the scraper to be replaced or the chain segment (the chain lock on the opposite end of the segment to be replaced must also be opened) can be taken out.
- Re-assemble the unit in reversed order under observance of following instructions:
 - Tensioning of chains after completion of all work (see Chapter 1.6.6).

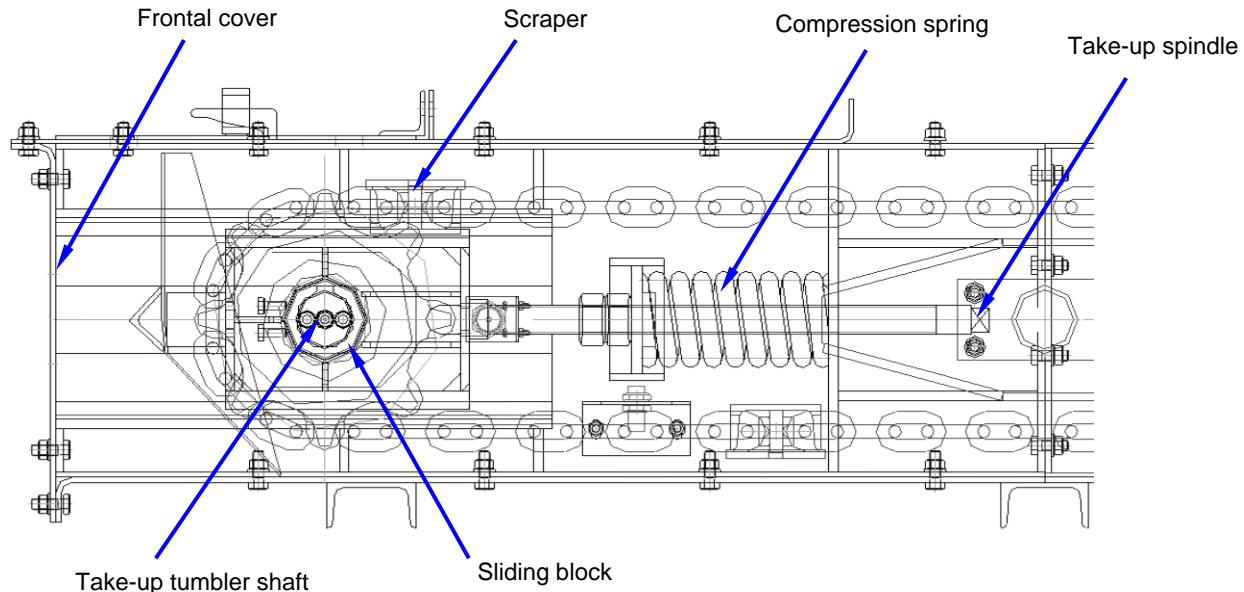
1.6.4 Replacement of Take-up Tumbler Shaft with Sprocket Wheels



Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.

- Remove the cover of the take-up station.
- Advance the conveyor chain in a way so that the chain disconnection point (scraper bow at the scraper beam) is positioned frontally at the take-up tumbler.
- Switch off the drive unit and secure it against unintended start-up.



- Sling the frontal cover of the steel structure to a hoisting gear and remove it.



CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Relieve the conveying chains from tension (see Chapter 1.6.6).
- Secure the chain strands on the both sides of scraper bow in their position.

- Secure the scraper against falling down (weight approx. 33 kg).

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- After removing the tensioning spindle from the tensioning-shaft bearing, the tensioning shaft with sliding blocks can be pushed towards the frontal side and removed from the steel structure.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Bring the components to the repair site for further disassembly.
➤ Re-assemble the unit in reversed order under observance of following instructions:
- Install all front-side covers.
 - Establish the connection between the tensioning shaft bearing and the tensioning spindle.
 - Close the chain and tension it after completion of all work (see Chapter 1.6.6).

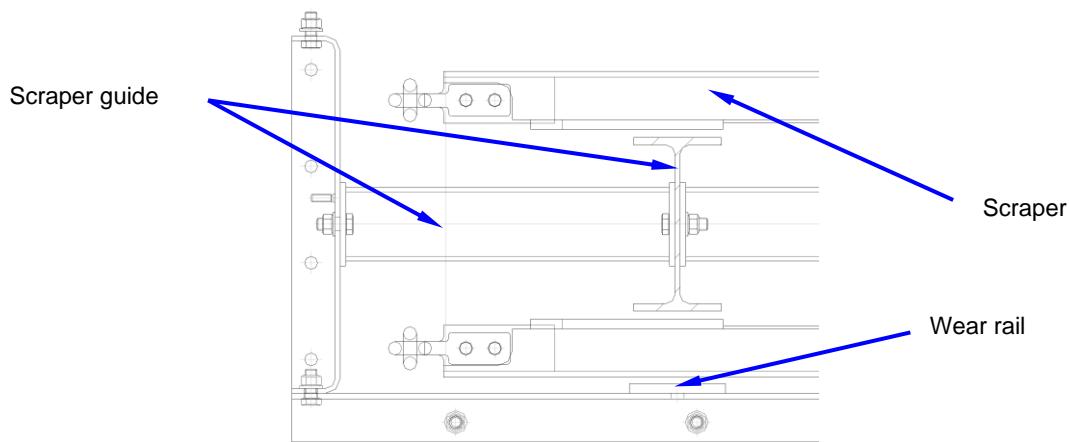
1.6.5 Replacement of Wear Rails



Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.

- Prior to disassembly, switch off the drive unit and secure it against unintended start-up.



- Relieve the conveying chains (see Chapter 1.6.6).
- Lift the scrapers and conveying chains in the zone of wear rails and scraper guide to be replaced by use of a suitable lifting device or by placing backing plates under the scrapers.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Once the fasteners are removed, the scraper guide and the wear rail may be taken out.
- Re-assemble the unit in reversed order under observance of following instructions:
 - Install the wear rails.
 - Install the scraper guide.
 - Once the work is completed, tension the chain (see Chapter 1.6.6).

1.6.6 Tensioning the Chain

**DANGER**

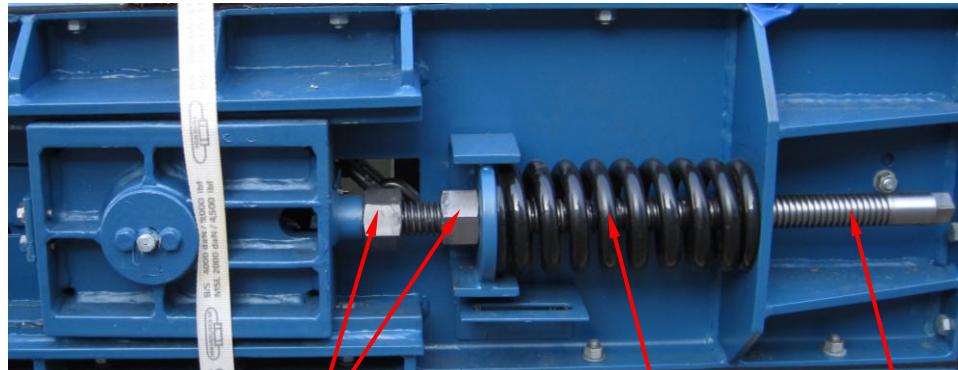
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the spillage conveyor, the adjacent apron feeder and the impact crusher in a way preventing the machine from any undesired movements.

- Tensioning of the chain and releasing of the tension is performed via take-up nuts at the take-up spindles.

**IMPORTANT**

Tensioning and releasing of the tension must be carried out evenly on both tensioning bearings in order to avoid jamming.



Take-up nuts

Compression spring

Take-up spindle

- After the lock nuts of the take-up spindle have been loosened, the take-up tumbler can be shifted by means of the tensioning screw.
- The correct chain tension force is reached if the determined distance dimension between compression spring and take-up frame is set (spring tension = 207 mm).
- Lock the lock nuts.
- Test operation of the equipment without conveyed material.

1.7 Impact Crusher PB 1822 PP

1.7.1 Replacement of Drive Unit

**NOTE**

For documentation of the drive unit see Manual 7, Register 7.3.1.

**DANGER****DANGER****DANGER**

POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER

POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

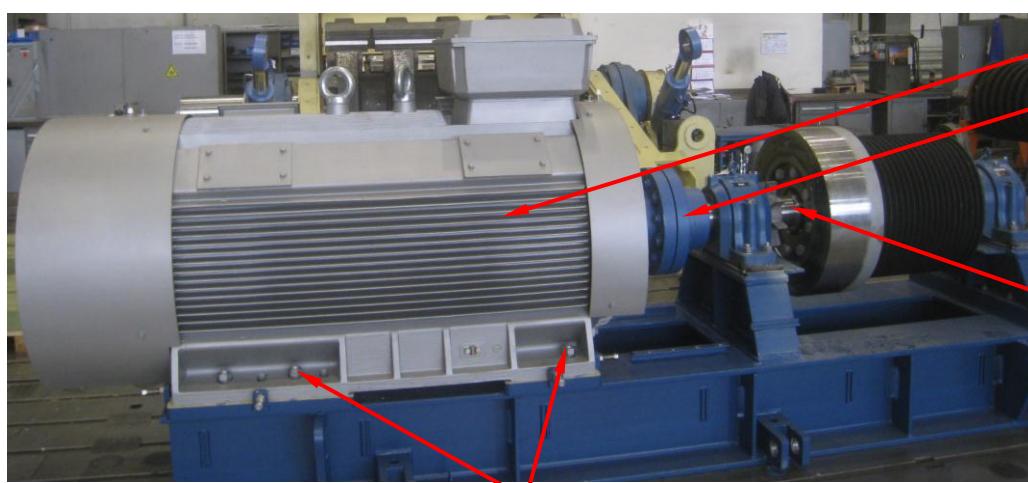
Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!



Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.



Motor 800 kW K8MR

Coupling RWN 450

V-belt pulley shaft

Undo fastening bolts

- Prior to disassembly, make sure that the drive unit is switched off and secured against unintended start-up.
- Remove all cable connections from the drive unit.
- Disassemble the motor (note the instructions of manufacturer!):
 - Suspend the motor (approx. weight 6400 kg) on a suitable hoisting gear.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Detach the coupling so that the motor is free.
- Undo the fastening bolts to the supporting structure.
- Lift the drive unit and put it safely down on the ground.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Disassemble the coupling.
 - Sling the coupling (weight 520 kg) to a suitable hoisting gear.
 - Remove the coupling from the V-belt pulley shaft.
- Bring the components to the repair site for further disassembly.
- Re-assemble the unit in reversed order under observance of following instructions:
 - Note the tightening torques.
 - Restore all electrical connections.

1.7.2 Opening the Crusher Housing

**NOTE**

For documentation of the hydraulic equipment see **Manual 7, Register 7.3.3.**

**NOTE**

The rear part of the housing may be hydraulically slewed back so that the interior space of crusher can be inspected and the blow bars can be replaced. When the rear part of the housing is slewed back, the distance between the flanges is about 2039 mm.

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

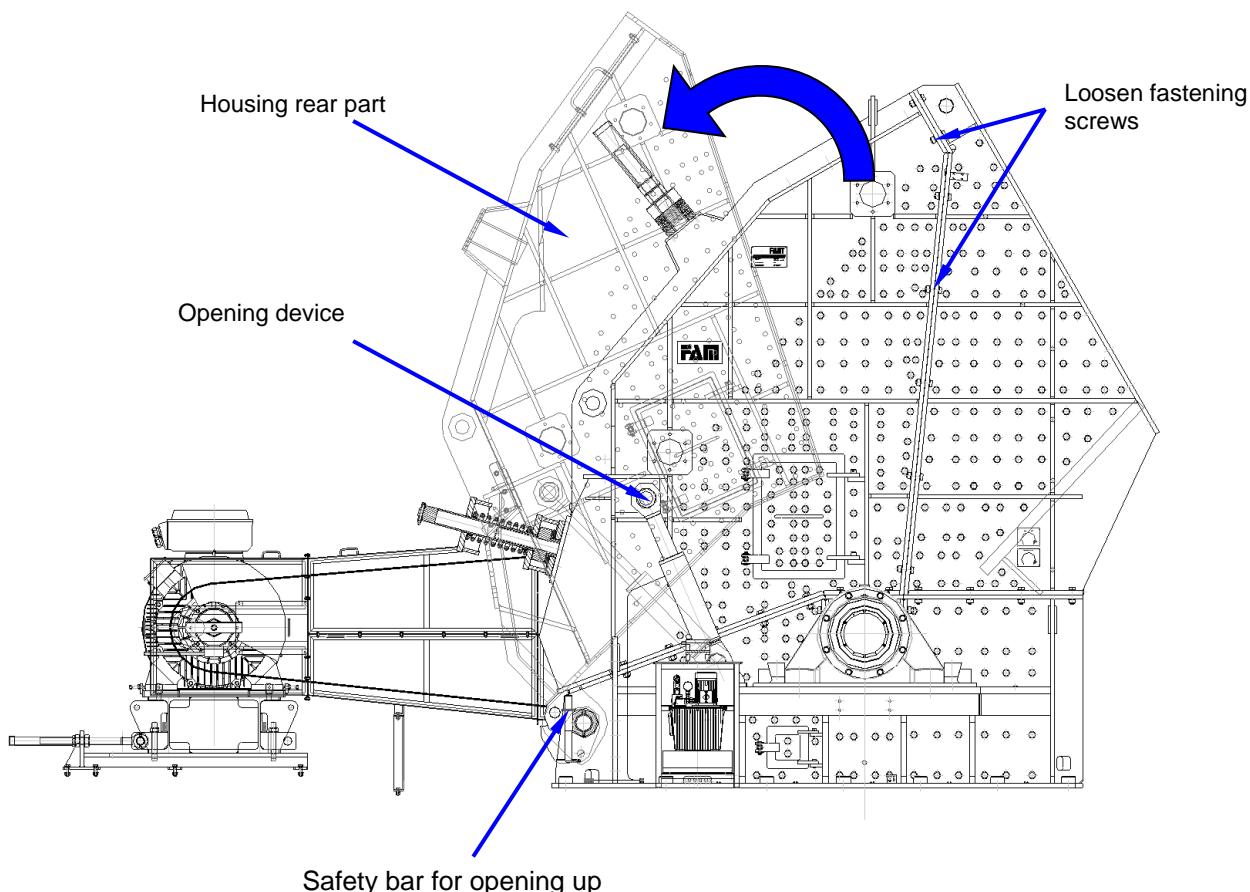
- The impact crusher must be electrically interlocked in such a way that the drive motor cannot be started when the rear part of housing is opened.
- Remove the fastening screws from the flanges between the fixed and moveable parts of the housing.
- Open the manual valve of hydraulic opening device so that the hydraulic cylinders can gradually fold back the rear part of the housing. Use the safety bar for opening-up to secure the housing part in this position.

**IMPORTANT**

When operating the hydraulic equipment, make sure that all doors and flaps are closed.

**DANGER**

The machine should be opened, only granting the sight contact of the operator to the crusher.



- After opening, use the rotor arresting bolt to secure the rotor (at the free shaft end).
- Closing of the housing rear part is performed in reversed order. Make sure that the housing flanges are clean.
- Install the hexagon head bolts.



After every fifth opening operation the locking nuts must be replaced by new items.

IMPORTANT

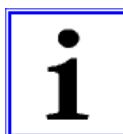
- Pull out the spring cotter so that the rotor arresting bolts can be removed and installed in their receptacle provided therefore. The inspection door in the hood should be opened. After that, install the spring cotter in the bore again.

1.7.3 Replacement of Blow Bars

**DANGER**

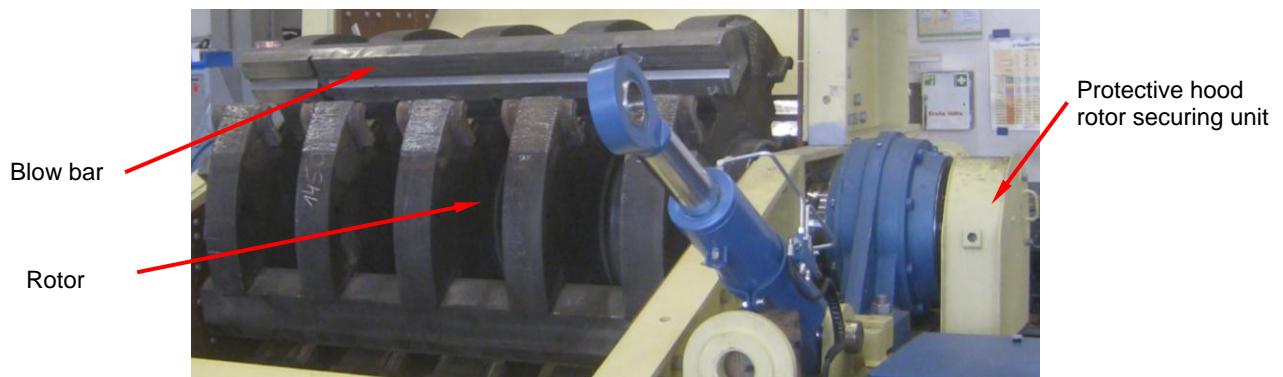
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

**IMPORTANT**

When replacing single blow bars, note that the blow bar on the opposite side must be replaced as well.

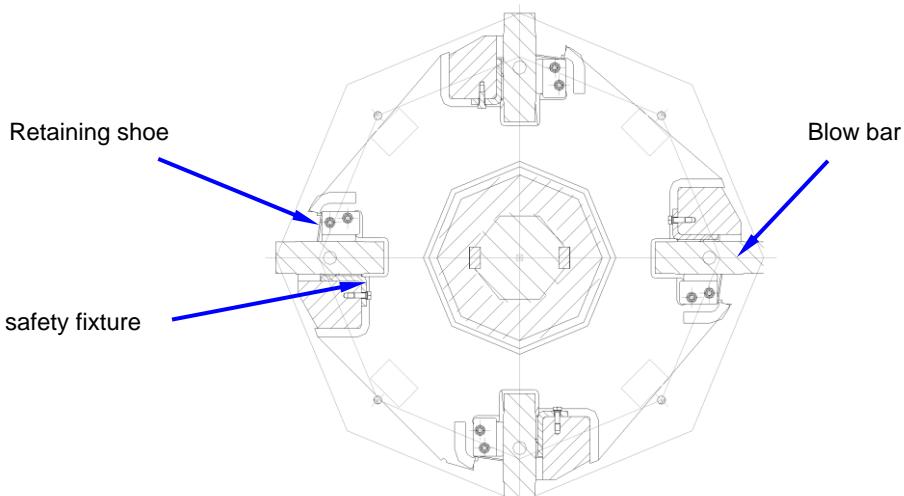
- Open the housing rear part (see Chapter 1.7.2)
- Rotate the rotor until the blow bar to be replaced reaches the angle of approx. 67,5 degrees relating to the rotor (11 o'clock position).
- Switch off the drive unit and secure it against unintended start-up.
- Use the rotor securing pin (at the free shaft end) to arrest the rotor.



- Undo the hexagon head bolts of both blow bar safety fixtures on the left and right side of the rotor and take them out together with the lock washers. Remove the lock plates.
- Remove both temperature sensors on bearing casing.

**IMPORTANT**

Before removing the blow bars, be sure to mark the positions of retaining shoes in the rotor with steel-stamp numbers, in order to keep the original arrangement when installing the new blow bars.



- Use the supplied auxiliary device for the blow bar disassembly as follows:
- Place the auxiliary device (approx. weight: 105 kg) above the blow bar (approx. weight: 825 kg). Install the pins on the left and right sides.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Remove the complete unit from the rotor and make sure that heavy oscillations are avoided.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Take out the rotor securing pin and rotate the rotor to 90° so that it adopts the next position. Replace the next blow bar.
- Repeat this procedure until the desired number of blow bars has been replaced.
- Re-assemble the unit in reversed order under observance of following instructions:



When installing the balanced blow bars, it must be ensured that the opposite blow bars have the same weight.

IMPORTANT



**After installation make sure that the blow bars do not contact with impact rockers.
If necessary, re-adjust the appropriate crushing gaps.**

IMPORTANT

1.7.4 Replacement of Impact Rockers

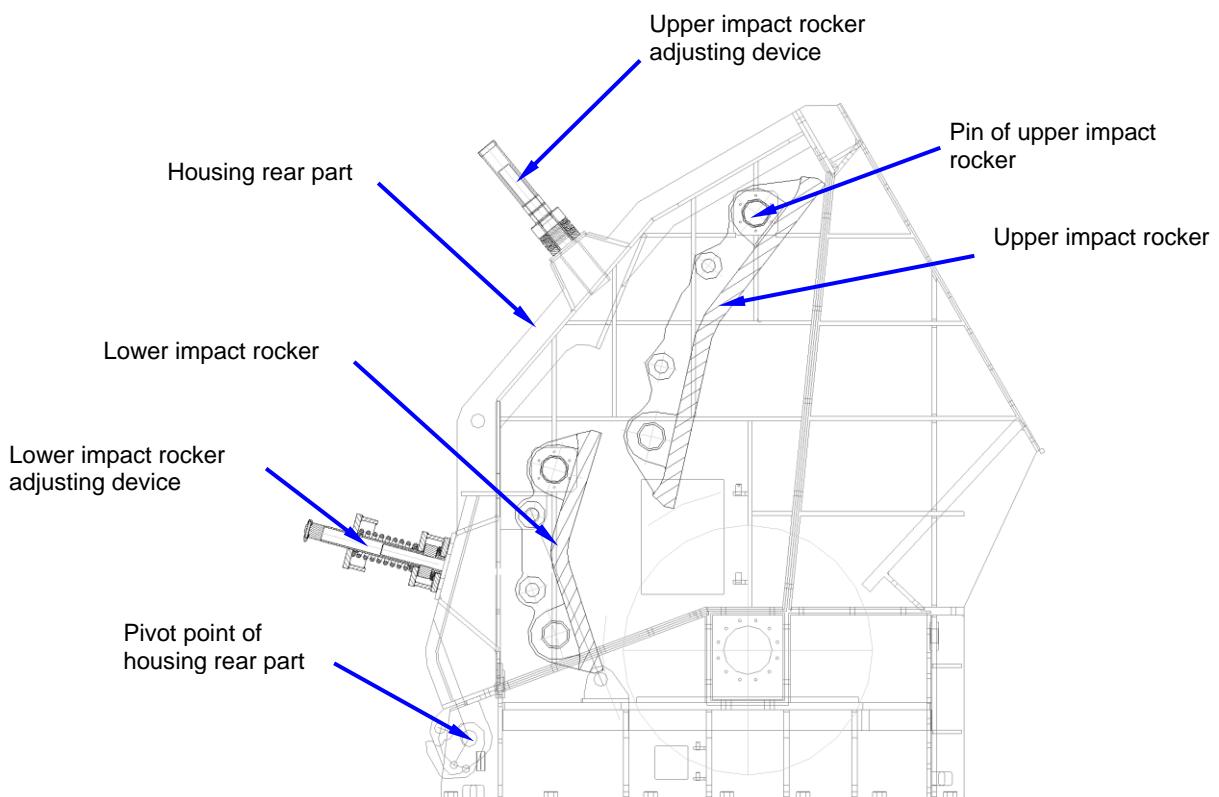
**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

**DANGER**

The machine should be opened, only granting the sight contact of the operator to the crusher.



- The rear part of housing must be removed before the impact rockers can be taken out:
- Remove the hexagon head bolts M 30 (46 mm across flats) from the flanges.
 - Sling the rear part of housing (weight approx. 10600 kg) to a suitable hoisting gear.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Remove the pin from the zone of pivot point of rear part, Ø120x450, followed by removal of the rear part of housing.

**DANGER****CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Remove the pin of the respective adjusting device, Ø100x620.

**IMPORTANT**

Note that the impact rockers must be laterally jammed beforehand to avoid oscillation.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Remove the bolts (M24 – 36 mm across flats) and the pins.
- Take out both pins Ø315x552 of the upper impact rocker suspension.
- Turn the impact rockers. The covers of bores must be replaced.

**CAUTION, SUSPENDED LOADS!**

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Re-assemble the unit in reversed order under observance of following instructions:

**IMPORTANT**

After installation make sure that the blow bars do not contact with impact rockers.
If necessary, re-adjust the appropriate crushing gaps.

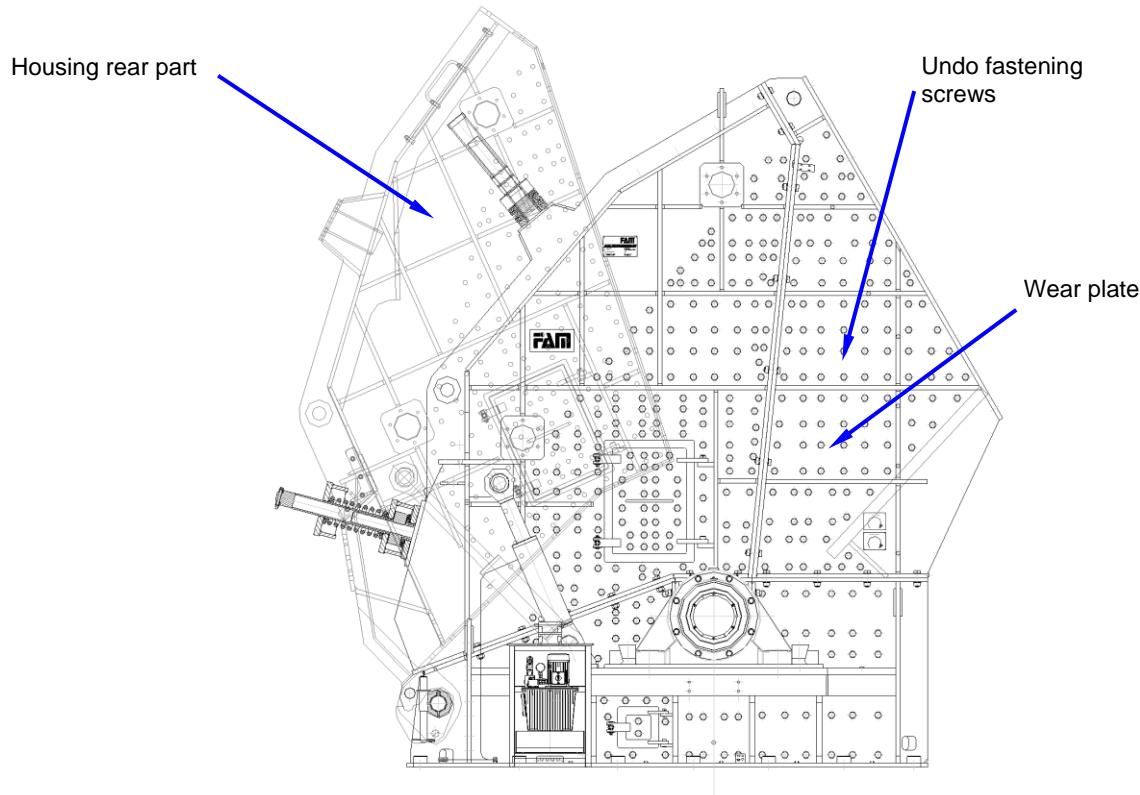
1.7.5 Replacement of Wear Plates

**DANGER**

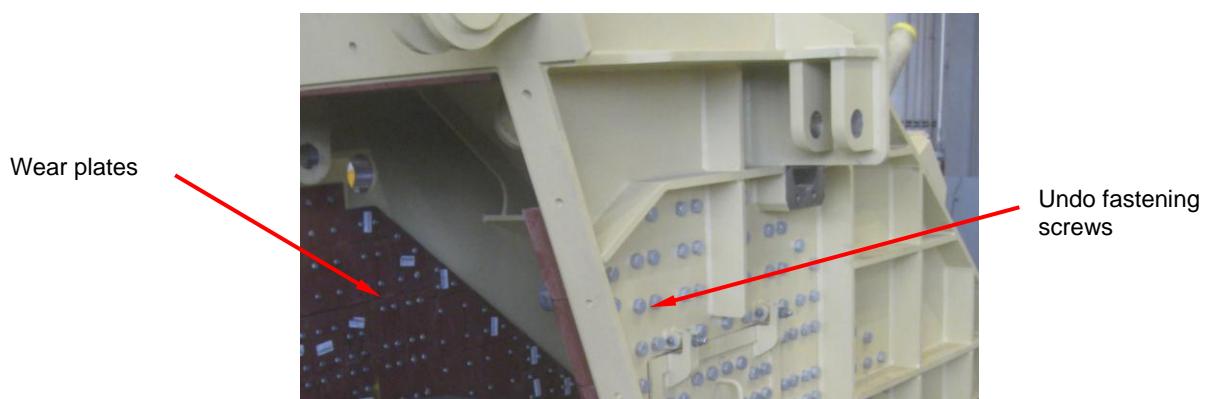
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

- Open the housing rear part (see Chapter 1.7.2)



- Use the rotor arresting bolt to secure the rotor (at the free shaft end)
- Undo the fastening screws between the wear plate and carrying frame



- When replacing the wear plates, note the following torques for tightening:
- Side wearing plates with hexagon head bolts M20 – torque for tightening 400 Nm
 - Side wearing plates with hexagon head bolts M30 – torque for tightening 1450 Nm
 - Side wearing plates with hexagon head bolts M36 – torque for tightening 2100 Nm

**IMPORTANT**

The housing wear plates installed in the area of crushing radius of the rotor are subject to severe wear. Therefore, these wear plates must be checked more frequently for tight fit and wear condition.

**IMPORTANT**

When re-installing, the hexagon head bolts must be inserted with a bolt securing adhesive (e.g. Loctite).

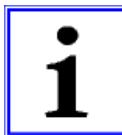
1.7.6 Adjustment of Crushing Gap

1.7.6.1 Principles

**DANGER**

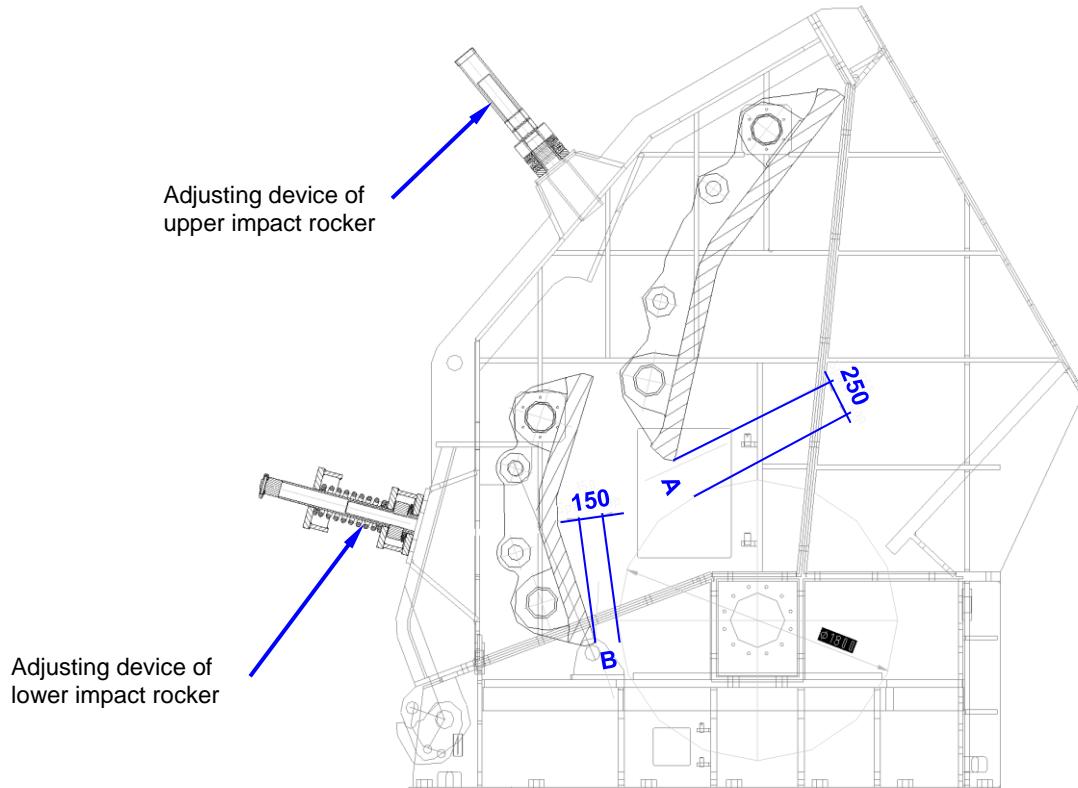
Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

**IMPORTANT**

Check the crushing result through regular analyses. Correct the gap width as appropriate in order to compensate wear.

The final grain size distribution can be varied by operating the adjustment spindles for correction of the gap existing between rotor and impact rockers.



1.7.6.2 Adjusting the crushing gap

The final grain size distribution can be varied by operating the adjustment spindles for correction of the gap existing between rotor and impact rockers.

**NOTE**

Coarse final grain size:
Fine final grain size:

Large crusher gap width
Small crusher gap width

The following values have been pre-set by the manufacturer:

Crusher gap A: 250 mm
Crusher gap B: 150 mm

**IMPORTANT**

Adjustment procedures must be carried out evenly to ensure the parallelism of impact rockers relative to the rotor axis!

**NOTE**

Depending on the material to be crushed, the crusher gap pre-set by the manufacturer may be required larger or smaller. The gap width actually required should be determined on site.

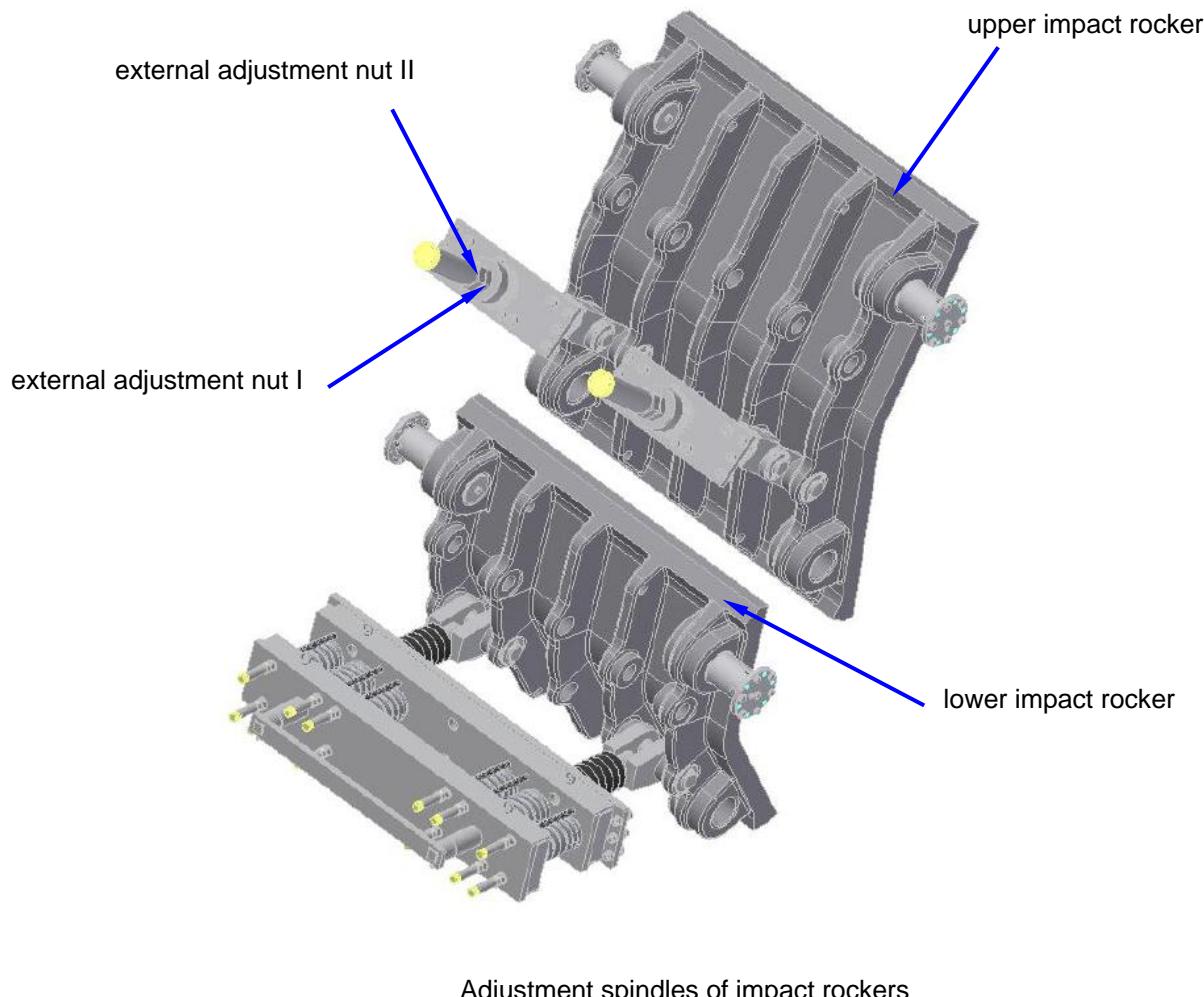
1.7.6.2.1 Increasing the gap

- With the machine at rest, evenly loosen the external adjustment nuts II on both adjustment spindles by one turn in counterclockwise direction.
- After that, tighten both external adjustment nuts I of both adjustment spindles gradually and evenly up to one turn in clockwise direction.

**IMPORTANT**

The thread of adjustment spindles has a pitch of 6 mm. One turn of adjustment nut corresponds to a correction of the impact rocker by some 10 mm.

- Repeat this operation in parallel on both adjustment spindles until the desired crushing gap is obtained.



1.7.6.2.2 Decreasing the gap

- With the machine at rest, evenly loosen the external adjustment nuts II on both adjustment spindles by one turn in counterclockwise direction.
- After that, loosen both external adjustment nuts I slowly and gradually up to one turn in counterclockwise direction.
- The mass centre of gravity of impact rockers has been designed so that they may slew in by themselves.



IMPORTANT

The thread of adjustment spindles has a pitch of 6 mm. One turn of adjustment nut corresponds to a correction of the impact rocker by some 10 mm.

- Repeat this operation in parallel on both adjustment spindles until the desired crushing gap is obtained.

1.7.6.2.3 Securing the new gap

- Once the desired gap width is reached in each single case, tighten the external adjustment nut I gradually and evenly and lock it with the external adjustment nut II.
- Operate the rotor by „HAND“ and check if the blow bars are free, t.i., they do not collide with other parts.

1.7.7 Pre-tensioning and Re-tensioning of V-belts

**NOTE**

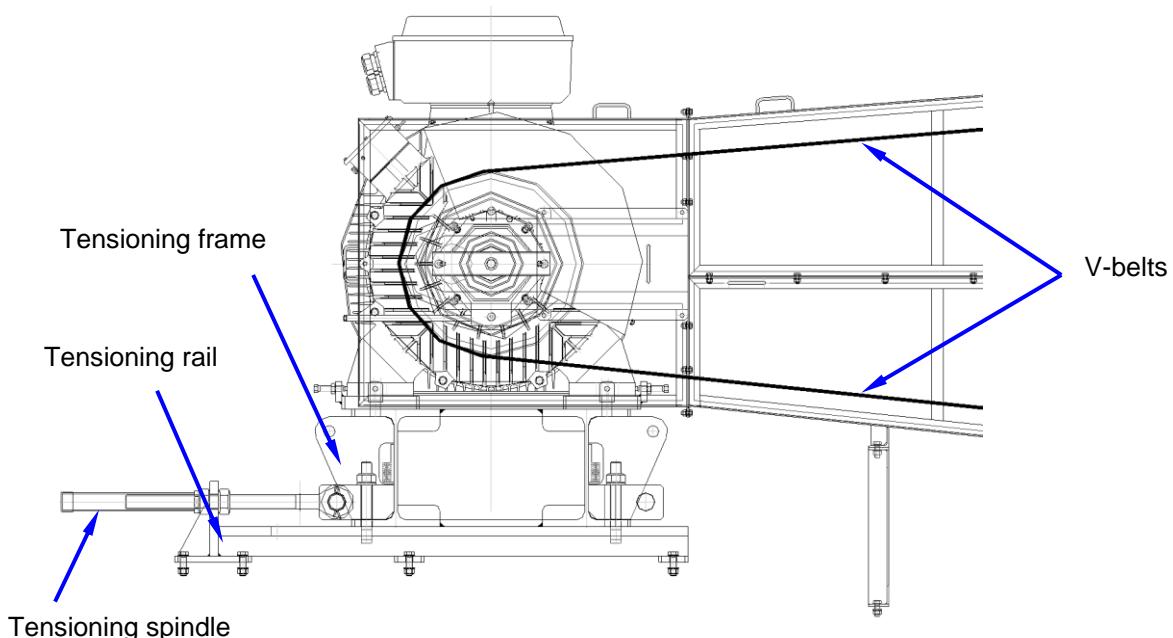
For documentation of the V-belts see Manual 7, Register 7.3.2.

**DANGER**

Prior to repair work, run the Semi mobile crushing station empty and put it out of operation.

Block the impact crusher, the adjacent apron feeder and the spillage conveyor in a way preventing the machine from any undesired movements.

- Use the rotor arresting bolt to secure the rotor (at the free shaft end).
- Undo the bolted connections between the tensioning frame and the sliding blocks of tensioning rails.



- The tensioning or relieving operation itself is made by means of the three outside tensioning spindles M48 (75 mm across flats). To avoid distortion of the tensioning frame, the tensioning spindles must be operated evenly.
- Mark the measuring distance „M“ (**1000 mm**) on the free V-belt.
 - Now tension the V-belts until the measuring distance „M“ of **1000 mm** set during **initial installation** increases to **1009 mm**. In this case the drive is under the correct tension.
 - If the drive must be **re-tensioned**, the V-belts must be relieved from tension again so that they can be re-measured in a tension-free condition. Mark the measuring distance „M“ (**1000 mm**) on the free back of V-belt. Now tension the V-belts until the measuring distance „M“ increases from **1000 mm** to **1006 mm**. Thus, the drive is re-tensioned correctly.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

During displacement of drive station note that distances are changing. The risk of bruising of limbs is present.

- After the tensioning operation, be sure that the six fastening bolts of tensioning frame are retightened with a torque of approx. 2100 Nm.

1.7.8 Checklist to Be Processed Prior to Start of Crusher

**NOTE**

Following inspections are required after completion of repair work and prior to start of impact crusher:

| Item No. | Inspection item | Date | Commissioning Fitter | Operator |
|----------|-------------------------------------------------------------------------|------|----------------------|----------|
| 1 | Check if all transport locks (marked red) are removed | | | |
| 2 | Check if rotor blocking pin is removed | | | |
| 3 | Check if housing is closed | | | |
| 4 | Verify correct bearing lubrication and greasing of all friction points | | | |
| 5 | Check the correct gap width | | | |
| 6 | Check if machine is clean and free from foreign objects | | | |
| 7 | Check if drive components are in true alignment | | | |
| 8 | Inspect the flexible coupling elements | | | |
| 9 | Check if sense of rotation of motor and rotor is correct | | | |
| 10 | Check if sense of rotation of hydraulic motor is correct | | | |
| 11 | Check if bolts are seated correctly | | | |
| 12 | Start the machine in no-load condition | | | |
| 13 | Note the operational sequence of machine start-up and machine shut-down | | | |

OPERATING INSTRUCTIONS

Belt Conveyor System

Manual 6 Maintenance

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Annex 1: Lubrication plan

Annex 2: Control- and Maintenance plan

1 MAINTENANCE

1.1 Basic Safety Notes

**IMPORTANT**

Please note the information in the manual 1 "Use of machine according to intended purpose" and manual 2 "Basic safety requirements".

The supplied documentation of attachment parts (e.g. gearbox, motors etc.) supplements the following statements and should be understood as obligatory.

Make sure to adhere to the setting, maintenance and inspection activities and intervals plus data on replacement of parts and components contained in the operation manual. All those activities should be accomplished only by **qualified personnel** (skilled work force).

Qualified personnel (skilled work force) are persons who have been authorized by the responsible for maintaining the safety of the components/ plant, to perform such activities and to detect and avoid possible dangers as a result of their training, experience, instruction or familiarity with the relevant Standards, regulations, accident prevention measures and operating conditions.

**NOTE**

Data on lubrication points, lubricants, filling volume and frequency of lubrication may be found in the lubrication chart in Appendix 1.

Data on maintenance actions and frequencies may be found in the maintenance plan in Appendix 2.



During all work with or on the equipment the rules on the avoidance of wastes and the correct disposal or recycling of wastes shall be observed.

Substances like

- Hydraulic fluids
- Oils and greases
- Coolants
- Solvent-containing cleaning agents

required for installation, repair and maintenance work must not get into the soil or enter the sewage system.

These fluids must be collected in suitable vessels before they are disposed of properly.



WARNING

WARNING! OVERPRESSURE

Prior to repair or maintenance, the equipment items and pressure lines to be opened must be relieved from pressure.

Work should be carried out only by skilled workers.



WARNING

CAUTION, HOT LIQUIDS AND VAPOURS

Be careful when handling hot substances. Risk of skin burns and scalds.



DANGER



DANGER

**POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER****POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE**

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!



DANGER

DANGER FOR THE DRIFT STABILITY

Suitable measures must be taken to ensure at any time that all repair and maintenance work can be safely accomplished without impairing the stability of the overall machine. If brakes are removed, additional fixtures (e.g. clamping devices) must be used that have the same effect.



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

**DANGER****CAUTION, SUSPENDED LOADS!**

Nominate only well-experienced persons for suspension of loads and for giving instructions to the crane operator. The person giving instructions to the crane operator must be positioned so that it is in sight contact with the crane operator or may communicate with him through a radiotelephone set.

When replacement of single parts or larger components is required, the parts must be safely fitted to the hoisting gear and handled so that all risks are excluded. Only suitable hoisting gears and load carrying attachments in technically sound condition and with sufficient hoisting capacity shall be used.

For handling of plant components only the provided suspension points and marked eyebolts shall be used.

Persons must not stay or work under suspended loads.

It is prohibited to transport persons together with the load or on the load suspension devices.

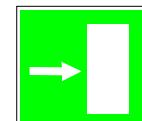
**DANGER****ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

Never use equipment parts for climbing.

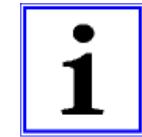
When work in overhead positions is required, use only tested and approved equipment for protection against falling down.

In case of repair or maintenance work in elevated positions the workforce may fall down and suffer heavy injuries or even death.

Therefore, use only approved climbing aids and working platforms.

**DANGER****DANGER DUE TO BLOCKED ESCAPE ROUTES**

Keep escape routes free from all obstacles: never put down or store components in escape routes and observe the applicable safety rules.

**IMPORTANT**

Damage to the paint must be eliminated according to the paint specification after having finished maintenance works.

1.2 Ropes and Rope Fixtures

- Ropes must be kept under supervision while they are in operation and while they are not used. This is applicable not only to the ropes but also to the rope fixtures, rope connections and rope guides.
- In case of wire rope fixtures, the specified number of rope clips must not be reduced.

| Nominal size (rope) | Required torque for tightening [Nm] | Tensile force required in the rope clip thread [N] | Required number of wire rope clips |
|---------------------|-------------------------------------|----------------------------------------------------|------------------------------------|
| 5 | 2,20 | 2300 | 5 |
| 6,5 | 3,85 | 3200 | 5 |
| 8 | 6,60 | 4700 | 6 |
| 10 | 9,90 | 7100 | 6 |
| 13 | 36,30 | 15400 | 6 |
| 16 | 53,90 | 21000 | 6 |
| 19 | 74,47 | 28900 | 6 |
| 22 | 117,70 | 40800 | 7 |
| 26 | 161,70 | 47600 | 7 |
| 30 | 233,20 | 62300 | 8 |
| 34 | 325,60 | 79200 | 8 |
| 40 | 399,30 | 89800 | 8 |

1.3 Torques for Tightening of Bolts

| Bolt size | Bolt property class 10.9 Tightening moment to be applied M_A [Nm] | Bolt property class 8.8 Tightening moment to be applied M_A [Nm] |
|-----------|---------------------------------------------------------------------------|--------------------------------------------------------------------------|
| M8 | | 20 |
| M10 | | 40 |
| M12 | 100 | 70 |
| M16 | 250 | 170 |
| M20 | 450 | 300 |
| M22 | 650 | 450 |
| M24 | 800 | 600 |
| M27 | 1250 | 900 |
| M30 | 1650 | 1200 |
| M36 | 2800 | 2100 |

MA = Required torque for tightening with torque wrench

All torques for tightening are applicable to bolts with metric thread according DIN 13, nut with MoS₂ treated

1.4 Repair

1.4.1 Basic Safety Notes



DANGER FOR THE STABILITY!

All repair work must be realized only at wind speeds up to maximum 5 m/s. During the repairs, the wind speed must not exceed 10 m/s!



DANGER DUE TO UNINTENDED RE-START!

Prior to repair, the conveying routes affected and upstream conveyors of machines must be made empty. Suitable actions are required to ensure that such equipment cannot be started by mistake.

Starting of the electrical or hydraulic drives of the assembly groups that are being worked on, must be excluded.



DANGER FOR THE STABILITY!

In case repair work technology makes it necessary to erect piles between ground level and machine, the load carrying capacity of soil must be calculated before the piles are erected (the permitted ground pressure need to be complied).

The piles must be erected on a ground level sufficiently able to take the maximum load.

The size of the piles must be selected according to the permitted ground pressure and the imposed load.

The piles must be secured against overturning.

In this process need to be ensured that the piles are positioned vertically and centrally under the support points.



DANGER FOR THE STABILITY!

In case of using mobile lifting devices, the load carrying capacity of soil must be calculated before (the permitted ground pressure need to be complied).



DANGER DUE TO OBJECTS FALLING DOWN!

For all repair works it is forbidden to stay under the repair area! This area has to be closed off across a large area.

Falling objects may cause severe bodily injury or loss of life.

**WARNING! RISK OF INJURIES CAUSED BY SPRING TENSION/CHAIN TENSION!**

When installing or removing components under mechanical stresses, persons might suffer injuries and equipment parts may become damaged or even destroyed.

Before performing work on such components suitable action should be taken to exclude such potential risks.

**RISK OF SQUEEZING-OFF LIMBS**

The conveying belt is always under tension, even while a belt conveyor is switched off. In the case of works where the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

**RISK OF SQUEEZING-OFF LIMBS**

For all belt-drive repair works suitable measures (e.g. belt clamps) have to be used to secure the conveyor belt against self-actuated movement.

**DANGER DUE TO MISSING OR NOT CORRECTLY INSTALLED SAFETY APPLIANCES**

After repair all safety devices must be checked for mounting and function and a start-up test without transported material must be realized!

**DANGER FOR THE STABILITY!**

Repair works at

- Spherical bearings of the bridge segments
- Hoisting -and levelling cylinder
- Main carrying construction

As well as the disassembly of machine parts of the crawler drive notably affect the stability of the entire plant. That is why these works may only be carried out after having consulted the company FAM and only by qualified maintenance personnel.

Non-observance of this instruction may lead to damages at the plant, severe or even fatal injuries.

**IMPORTANT**

In case of repair where fitting bolts or fitting bolt connections are to be removed, the parts concerned shall be properly marked so that they can be re-installed in the correct positions!

If the fitting bolt connections have been removed, in the course of reassembly they should be replaced by new bolts with a thicker fitting shaft. Conjointly the holes should be bored to a larger size.

1.5 Belt Conveyors U1 – U5

1.5.1 Replacement of Conveyor Belt



NOTE

For documentation of the conveyor belt refer to Manual 7, Register 4.



DANGER

RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

The conveyor belt must be constantly monitored for damages due to foreign substances. Any damage to the conveyor belt should be repaired as soon as possible. Minor damage can be repaired directly on the belt. Damage to the belt edges is also part of such immediate repairs.

More extensive damage to the conveyor belt must be eliminated by the removal of the damaged belt section.



IMPORTANT

Work to the conveyor belt, vulcanisation and improvement of the damaged location(s) are to be carried out by certified specialist contractors.

All connection and vulcanisation works must be executed by following precisely the instructions of the belt and fastening material manufacturer.

Replacement of conveyor belt

- Run the conveyor belt empty
- If emptying is not possible, remove material from the belt manually



DANGER



ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!

Maintenance personnel realizing cleaning work on the conveyor belt must use a catching safety belt and/or personal safety equipment for protection against falling!

Failure to observe this precaution could result in severe bodily injury or loss of life.

- Move the conveyor belt in such a way that the intended sectioning point is well accessible.
- Relieve the scrapers from tension and fold them back.
- Lift the inner belt cleaner from the belt and fix it
- Relieve the conveyor belt completely from tension (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disengage clamping plates with rubber sealings of the feeding hopper or, if necessary, remove them.
- Disassemble protective devices and covers to the extent required.
- Clamp the conveyor belt next to the intended sectioning point in both directions to prevent it from sliding.
- Align the belt coil with the new belt on two brackets with tubular axis to the belt axis

**Platform for the belt coil:**

It must be ensured that the platform is placed horizontally with a safe standing position.

IMPORTANT

- Disconnect the conveyor belt
- Attach the new conveyer belt of the same quality to the old belt ending.

**IMPORTANT**

Make sure that the running and the carrying sides are not mistaken when positioning the conveyor belt!

When installing the conveyor belt, it must be able to move freely in the direction of conveyance (running direction) over the carrying rollers as well as over all belt pulleys. For this purpose, it must be constantly checked, via visual inspection, that the conveyor belt cannot get jammed at any point or come into contact with sharp-edged parts of the frame structure!

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

When mounting the conveyor belt, make sure that hands, arms or other limbs are not between the conveyor belt and the carrying rollers or between the conveyor belt and the belt pulley!

- The installation of the conveyor belt may be carried out under observation of the instructions mentioned above. In case of different belt lengths, it may be necessary to install the conveyor belt in steps in order to ensure the vulcanising of the required belt joints. Here, it should also be ensured that, when making the conveyor belt endless from several individual lengths, a belt type test of each individual length must be carried out.
- The installed conveyor belt must be secured against sliding back.
- After the entire conveyor belt is positioned and braced firmly at one end, the other belt end is tightened until the conveyor belt tightly embraces all belt pulleys and rests evenly on the carrying rollers.
- After the other end is also safely connected, the conveyor belt can be made endless / vulcanized. For this purpose, see assembly instructions of the belt suppliers.
- Remove all devices (belt clamps) after production of the splice connection.
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
 - Before tensioning the conveyor belt, check again the ease of movement. The belt is then tensioned according to the instructions provided for the take-up station (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3).
 - Adjust the clamping plates with rubber sealings on the feeding hopper.
 - Adjust the scrapers (see the manufacturer's instructions).
 - Remove the inner belt cleaner fixation.

Overview:

| Material number / Designation | Weight/m | Conveyor |
|-----------------------------------------|----------|----------|
| 20109468 Fördergurt 2000.EP500/4-X-6:3 | 30,8 kg | U1 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U2 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U3 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U4 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U5 |

1.5.2 Relieving / Tensioning the Conveyor Belt

1.5.2.1 Spindle take-up station

**NOTE****Applicable to the conveyor U1****Tension the belt**

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the take-up pulley guard.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

No limbs must be within the range of movement of the take-up pulley between the take-up pulley and the take-up frame.

There is a risk that limbs may be squeezed off or crushed!

- Undo the lock nuts on both sides.
- Re-position the tensioning nuts on the take-up spindles evenly on both sides.

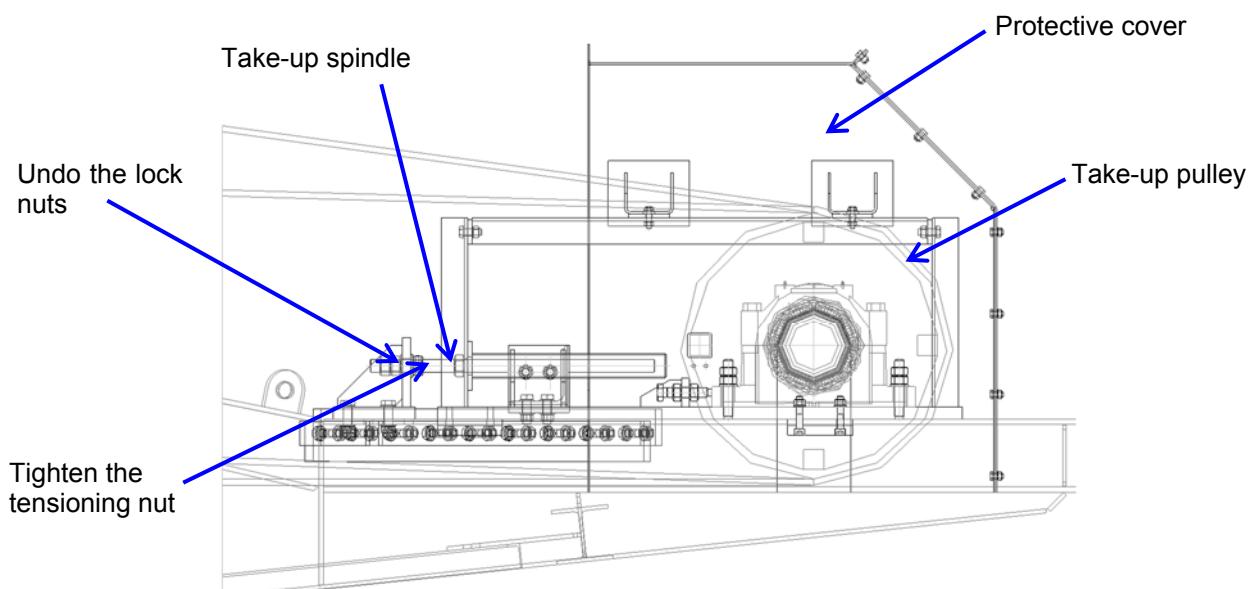


Figure 1: Take-up station U1

- Once the required tensioning force is reached (see Table 1), tighten the lock nuts. While tensioning the conveying belt, make sure that the take-up bearings cannot become jammed.
- Greater tensioning lengths require relocation of take-up yoke.

Table 1 Belt pre-tension U1

| Conveyor | Type of tensioning | Pre-tension at take-up pulley, nominal value [kN] | ☒ | Belt weight [kg/m] | Belt sag in case of idler spacing (lower run) 3 m [mm] | ☒ | formula for simplified calculation in case of other idler spacing | Belt sag nominal value [mm] |
|----------|--------------------|----------------------------------------------------------------|-------|-----------------------|---------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------|------------------------------------------|
| | | | ☒ | | | ☒ | | |
| U1 | by spindle | 79,3 | 39,65 | 29,7 | 8,3 | 0,9182 x (idler spacing) ² | | |

- ☒ by adjusting near take-up unit – half of the pre-tension
☒ factor = belt weight • 9.81 / (tension * 8)
belt sag = belt weight • 9.81 / (tension * 8) * idler spacing²



IMPORTANT

After completion of the tensioning operation (with regard to the pre-tension length), the belt sag in lower run must be checked!



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

When installing the components, note that distances are changing. The risk of squeezing the limbs is present.

Relieve the belt from tension

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the take-up pulley guard.
- Undo the tensioning nuts evenly on both sides until the belt is relieved from tension.

1.5.2.2 Motor-operated take-up pulley mounted on take-up carriage

**NOTE**

Applicable to the conveyors U2, U3, U4.

Tension the belt

- Run the conveyor belt empty
- Operate the rope winch to move the take-up carriage in the belt tensioning direction. The tensioning procedure is completed when the tensioning-force meter displays the set-point value (see Table 2)
- Check if the rope is properly placed on the rope sheaves.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

During the tensioning operation it must be ensured that the rope is properly pulled through all rope sheaves.

Be careful when attaching or threading the rope in the rope sheaves. There is a risk of squeezing off limbs!

All maintenance personnel must wear gloves!

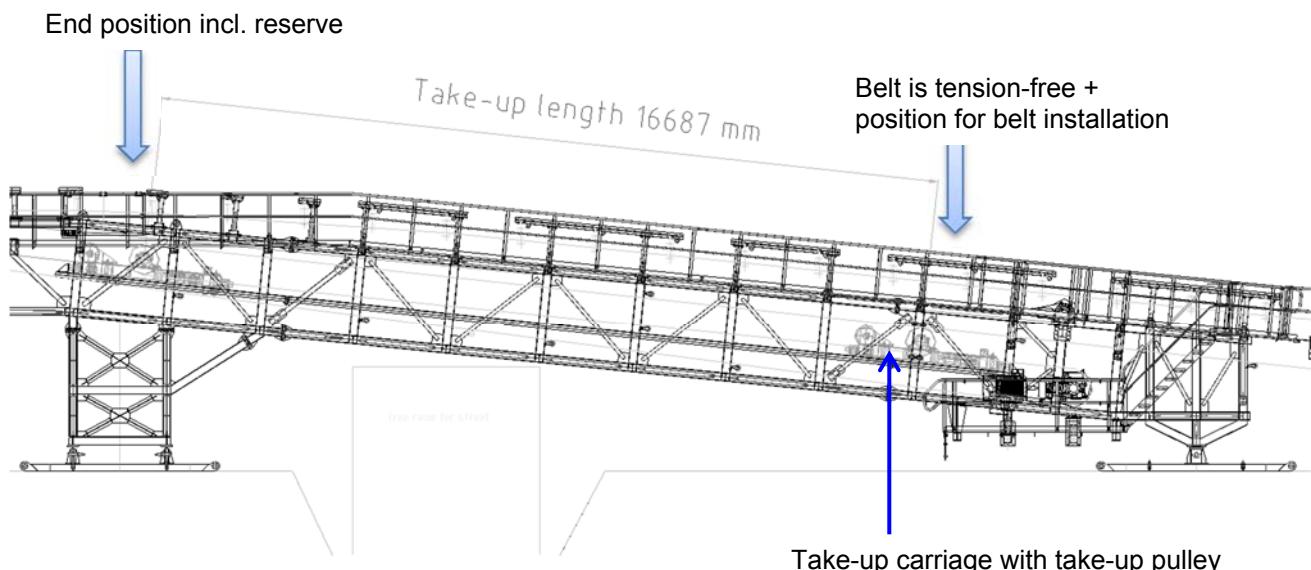


Figure 2: Example – take-up station U2



NOTE

A measuring device (rope guard) in the tension ropes constantly monitors the belt tension.

Table 2 Belt pre-tension U2-U4

| Conveyor | Type of tensioning | Pre-tension at take-up pulley, standstill [kN] | Check value empty [kN] | Operation | | Starting / braking | |
|-------------------------------------|--------------------|-------------------------------------------------------------|-------------------------------------|--------------------|--------------------|--------------------|--------------------|
| | | | | MIN [kN] | MAX [kN] | MIN [kN] | MAX [kN] |
| U2 | by winch | 98,4 | 78,9 | 56,0 | 90,0 | 34,0 | 114,0 |
| U3 (initial length – one drive) | by winch | 64,4 | 54,4 | 50,0 | 60,0 | 40,0 | 74,0 |
| U3 (final length – three drives) | by winch | 82,6 | 54,4 | 43,5 | 70,5 | 28,0 | 106,0 |
| U4 | by winch | 111,3 | 91,5 | 82,0 | 103,0 | 69,0 | 126,5 |

Relieve the belt from tension

- Run the conveyor belt empty
- Relieve the belt completely from tension by uncoiling the tensioning rope until the belt is free
- If necessary, pull the take-up carriage in the foremost position using appropriate hoisting devices
- Check if the rope is properly placed to the rope sheaves.



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

During the tensioning operation it must be ensured that the rope is properly pulled through all rope sheaves.

Be careful when attaching or threading the rope in the rope sheaves. There is a risk of squeezing off limbs!

All maintenance personnel must wear gloves!



IMPORTANT

When the maximum take-up length is reached, the belt needs to be shortened. If the dimension sinks below this value, the rope will not be properly wound on the rope drum anymore!

1.5.2.3 Weight-tensioned take-up pulley

**NOTE****Applicable to the conveyor U5.**

The conveying belt is tensioned via a weight-operated take-up station. This station ensures a constant tension of the conveying belt without any re-adjustment of the take-up system.

Relieving / tensioning the belt

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Lift and remove the take-up weight to relieve the belt from tension (use the middle mounting beam). See also section 1.5.4.6.
- Tensioning of the belt is performed in reversed order. Note following instructions:
 - Exact alignment of belt pulleys is necessary to ensure correct straight run of the conveying belt.

Table 3 Belt pre-tension U5

| Conveyor | Type of tensioning | nominal value at take-up pulley [kN] | take-up pulley GT.A630 [kN] | take-up sledge [kN] | ballast box [kN] | ballast mass [kN] |
|----------|--------------------|--------------------------------------|-----------------------------|---------------------|------------------|-------------------|
| U5 | by gravity | 38,1 | 7,95 | 4,4 | 5,5 | 20,25 |

**IMPORTANT**

When lifting the take-up frame with the dead weight box, ensure that it can be easily moved in the guiding rails on the entire take-up length.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

When installing the components, note that distances are changing. The risk of squeezing the limbs is present.

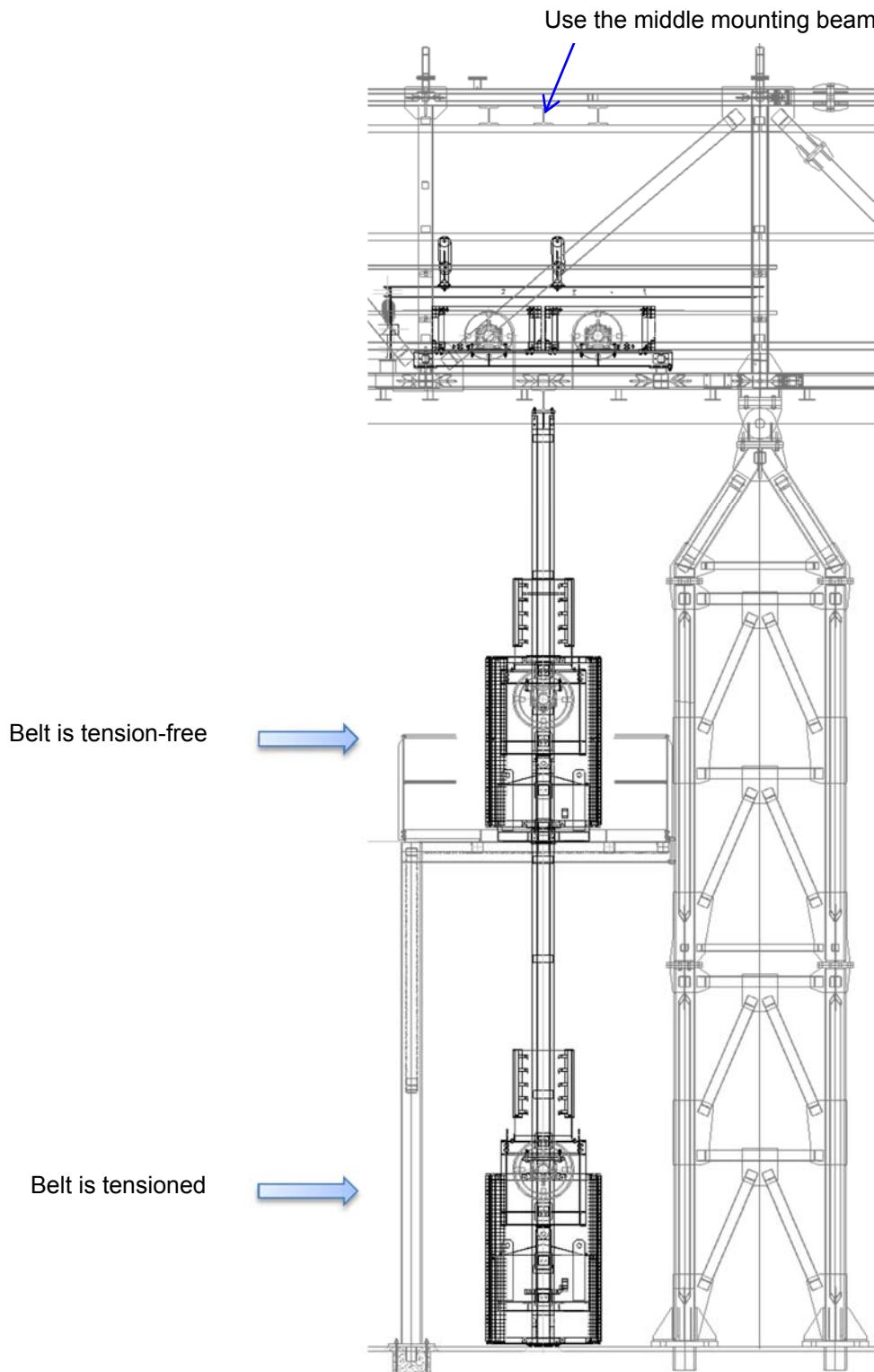


Figure 3: Take-up station U5

1.5.3 Repair Work at Conveyor Drives

1.5.3.1 Disassembly of drive unit



NOTE

For documentation of the conveyor drive units refer to Manual 7, Register 1.



DANGER



DANGER



DANGER

POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER

POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!

Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.

Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disconnect the supply cables of the drive unit
- Remove the protective cover of the flange coupling

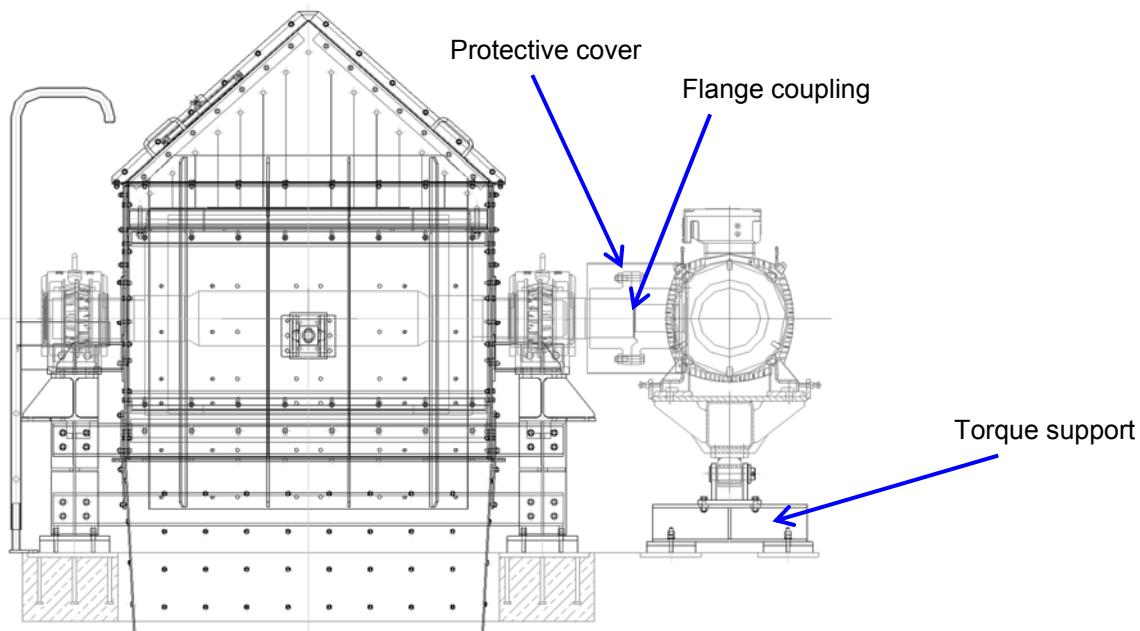


Figure 4 Example – Drive station U5

- Sling the drive unit (for weight and lifting lugs see dimension drawing of the drive unit in manual 7 register 1) to the suitable lifting device and secure it against tilting.
- Lift slightly the drive unit until the drive shaft and torque support are relieved.
- Undo the connecting elements of the flange coupling
- Undo the connecting elements of the torque support
- Pull off the drive unit along with simultaneous movement of the lifting device until the shaft is free.
- Hoist the complete drive unit and lower it onto a suitable means of transportation



DANGER

In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.



DANGER

CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Further transport to the service station and there possibly disassembly of the components
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
 - Note the tightening torques for bolted connections.

**IMPORTANT**

When installing the drive unit, note that the coupling halves must be in alignment and the coupling screws must be tightened with the following torque (screws and nuts are untreated or slightly oiled, $\mu=0,14$): 1050 Nm.

Re-mount all protective devices.

**IMPORTANT**

For information regarding assembly/disassembly of the drive unit components please refer to the manufacturers operating instructions in Manual 7, Register 7.1.

**IMPORTANT**

After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.

1.5.3.2 Replacement of a coupling half of the flange coupling

- Dismount the drive unit (see section 1.5.3.1)
- For disassembly of the coupling halves following tools are needed:
 - For each oil channel (3 for each coupling half with connection thread G1/4“) an oil pump with pressure gauge (min. 2 500 bar) or a motor pump with suitable number of independently closable connections
 - Suitable connections and pipes.
 - 1 suitable detaching device or retaining plate with retaining screws or threaded spindles with nuts (material of screws and spindles min. 10.9, material of nuts identical to that of the screws).
 - 1 suitable hydraulic cylinder with oil pump. Note displacement and pressure of the hydraulic cylinder (pressure of the cylinder only after consultation with FAM)



Observe manufacturer's instructions for using forcing-off/detaching device and pumps.

IMPORTANT

- Prior to detaching of the coupling half, the detaching device must be mounted as shown in Figure 5 or in a similar way

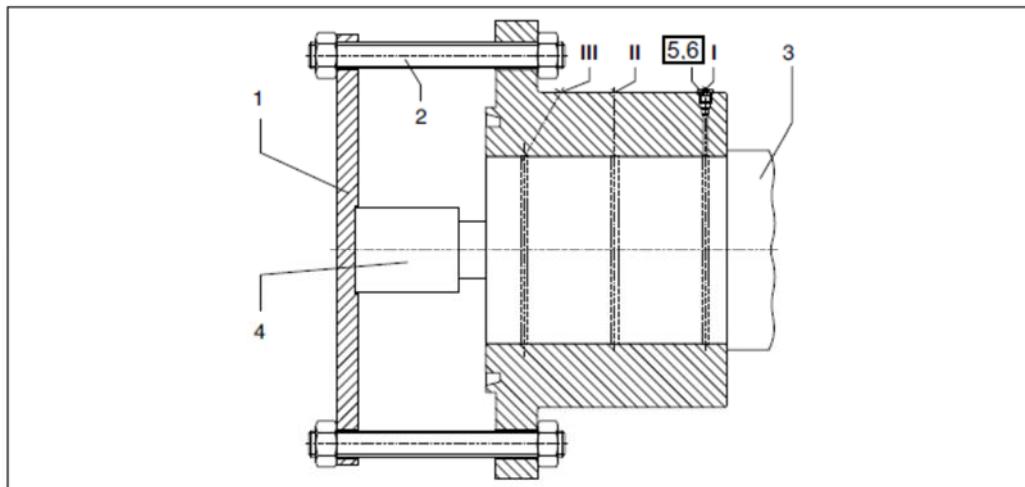


Figure 5: Disassembly of coupling halves

- Using suitable lifting tools, secure coupling halves and retaining device (weights see Figure 6 and Figure 7).
- Remove screw plugs (Figure 5, Pos. 5) from the oil channels.

- One oil pump must be bled, connected up to the oil channel, which is positioned underneath the largest external diameter (in Figure 5: oil channel III).
- Then apply pressure (see Oil pressures for the coupling halves 1 and 2) to the pump until oil emerges from the adjacent connection.

**IMPORTANT**

The maximum pressure must not be exceeded.

Oil pressures for coupling halves 1 and 2

Coupling half 1:

| | | |
|--------------------|---------------------------------------------------------|-----------|
| Oil channel IV, V: | max. permissible oil pressure for hydraulic hub removal | =1700 bar |
| | min. oil pressure for hydraulic hub removal | =1550 bar |
| Oil channel IV: | max. permissible oil pressure for hydraulic hub removal | =1400 bar |
| | min. oil pressure for hydraulic hub removal | =1300 bar |

Coupling half 2:

| | | |
|--------------------|---------------------------------------------------------|-----------|
| Oil channel I, II: | max. permissible oil pressure for hydraulic hub removal | =1450 bar |
| | min. oil pressure for hydraulic hub removal | =1350 bar |
| Oil channel III: | max. permissible oil pressure for hydraulic hub removal | =1700 bar |
| | min. oil pressure for hydraulic hub removal | =1600 bar |

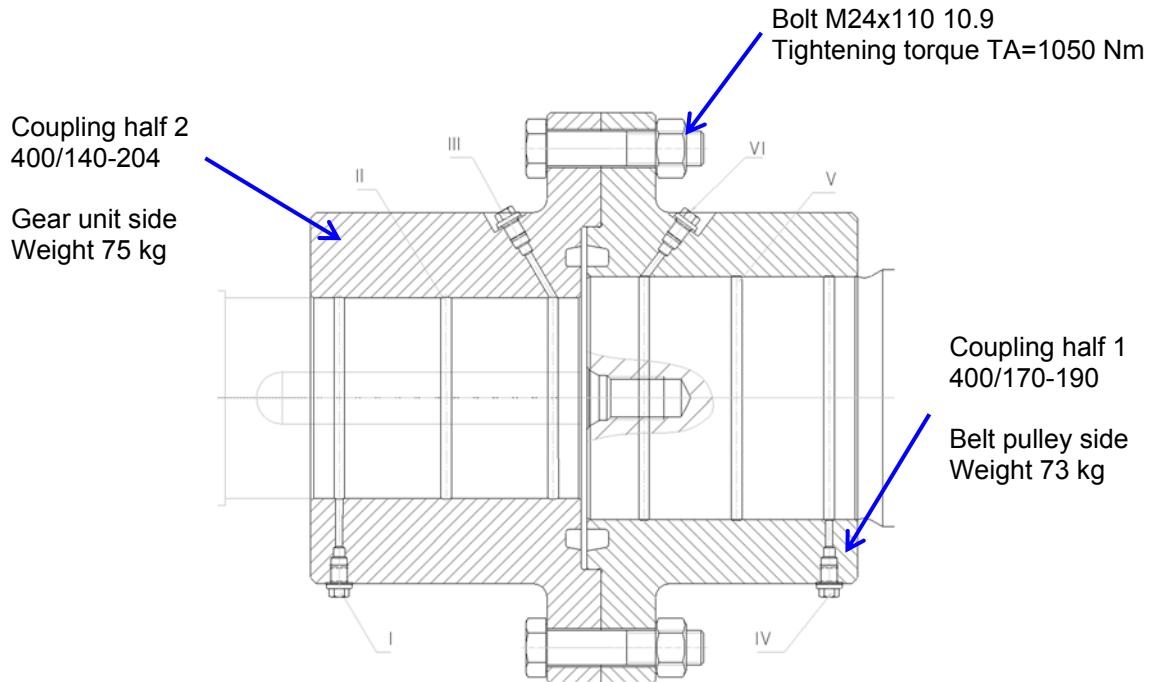


Figure 6: Flange coupling U1

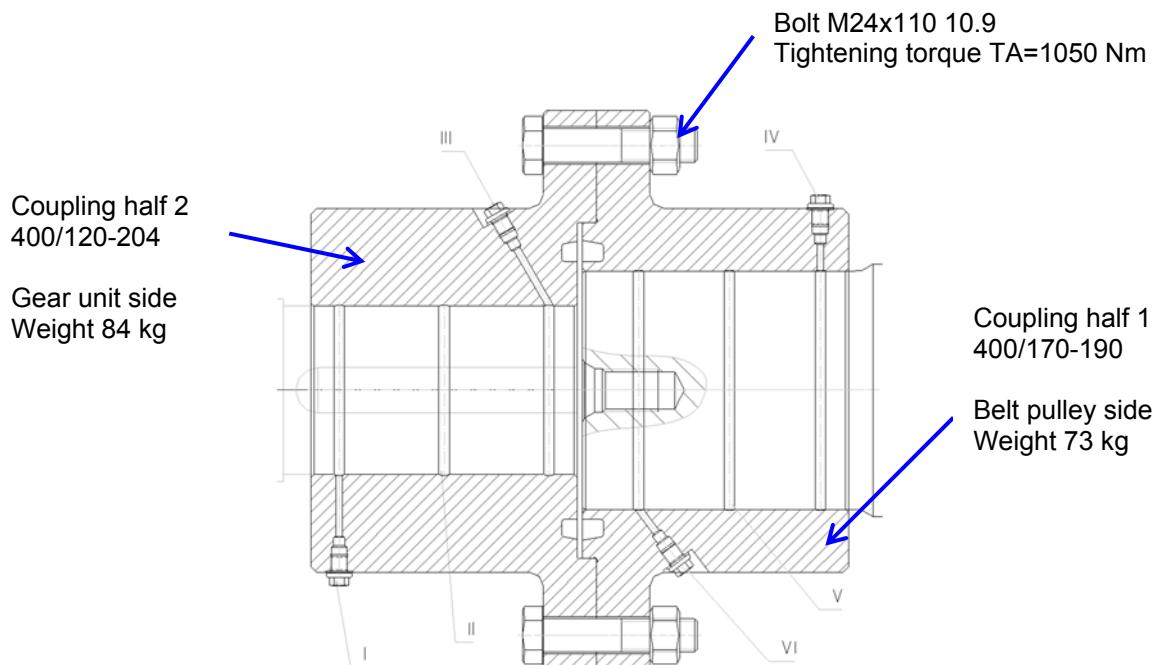


Figure 7: Flange coupling U2-U5

- Bleed the next oil pump and connect it up to the next oil channel (in Figure 5: oil channel II)
- Apply pressure (see Oil pressures for coupling halves 1 and 2) to the oil channel, until oil emerges from the adjacent oil channel (in Figure 5: oil channel I).
- Bleed the next oil pump and connect it up to the next oil channel (in Figure 5: oil channel I).
- Apply pressure (see Oil pressures for coupling halves 1 and 2) to the oil pump until a ring of oil emerges at both end faces.

**IMPORTANT****Note the sequence!**

During the entire operation the pressure must be maintained at a constant level on all the oil channels to which pressure is applied.

If, when pressure is applied, oil emerges to the extent that pressure cannot be maintained, a thicker oil type must be specified.

- Only when an unbroken ring of oil emerges from both end faces and a subsequent waiting period of approx. 30 minutes is over, pressure can be applied to the hydraulic cylinder to slide the coupling hub smartly off the shaft.

**IMPORTANT**

Note stroke of hydraulic cylinder! If re-adjustment is necessary, the end face of the hydraulic cylinder must stop between 2 oil channels.

- After detaching, the oil pumps and retaining device must be removed from the coupling hub.
- The hub bore and the shaft should be examined for damage and protected against rust. Damaged parts must be replaced.

Re-assembly of a flange coupling half

- At the beginning of the mounting operation sufficient hoisting gears must be available.
- Undo the plug screws G 1/4 from the coupling half (see Figure 5, Pos. 5) and thoroughly clean all parts and shaft ends. The parts to be joined must be absolutely dry and free from grease. The oil channels and the oil circulation grooves may not show any contaminations.

**IMPORTANT**

Under no circumstances lubricate the fitting surfaces with grease containing molybdenum sulphite (Molykote, etc.).

**DANGER**

Protection against burning is required due to hot parts. Wear protective clothing!
Avoid heat loss (determination during mounting process)!

- The coupling halves must be placed in warm condition:
 - Heat the coupling half 1 to approx. 255°C before shrink fitting.
 - Heat the coupling half 2 to approx. 245°C before shrink fitting.
- Protect seal rings (see Figure 5, Pos. 6) from heat.
- The warming up can be carried out inductively or in the oven.

**IMPORTANT**

The joining temperature must not exceed 300°C!

- The coupling must be quickly pulled onto the shaft until it is flush with the shaft front. Use suitable hoisting gears. Ensure that no fit seats are damaged.
- Secure the coupling hub on the shaft with a suitable face plate or holding device until it has cooled.
- The cooling of the joined parts must take place as even and slow as possible (use heat-insulating bases and cover the joint, if possible).
- After cooling of the coupling hub to the ambient temperature, the oil channels must be filled with clean oil (e.g. ISO VG 150) and closed with the plug screws G 1/4 for purposes of rust protection (see Figure 5, Pos. 5, 6).
- Tighten the connecting bolts of the coupling halves with the specified tightening torque of 1050 Nm.

1.5.4 Replacement of Belt Pulleys

1.5.4.1 Basic principles

**NOTE**

For documentation of the belt pulleys refer to Manual 7, Register 5.

**DANGER**

Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.

Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- If emptying is not possible, remove material from the belt manually

**DANGER**

ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!

Maintenance personnel realizing cleaning work on the conveyor belt must use a catching safety belt and/or personal safety equipment for protection against falling!

Failure to observe this precaution could result in severe bodily injury or loss of life.

Table 4: Weights of belt pulleys

| Belt conveyor | Weight Discharge pulley with drive [kg] | Weight Discharge pulley without drive [kg] | Weight Drive pulley [kg] | Weight Return pulley [kg] | Weight Take-up pulley [kg] | Weight Deflection pulley [kg] |
|---------------|-----------------------------------------|--------------------------------------------|--------------------------|---------------------------|----------------------------|-------------------------------|
| U1 | 2125 | | | | 1270 | |
| U2 | 1905 | | 1825 | 1015 | 1015 | |
| U3 | | 1905 | 1825 | 1015 | 1015 | |
| U4 | 1825 | | 1825 | 1015 | 1015 | |
| U5 | 1825 | | | 1015 | 795 | 2x 595 |

1.5.4.2 Disassembly of discharge pulley U1-U5

- Run the conveyor belt empty
- Relieve the scrapers from tension and fold them back.
- Relieve the conveyor belt completely from tension (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Secure the belt in the vicinity of discharge pulley against slipping (clamps or lifting)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the drive unit (U1 x1, U2 x2, U3 x0, U4 x1, U5 x1) to a suitable hoisting device, separate the flange coupling, dismount the drive unit (as per instructions in section 1.5.3.1) and lower it onto a suitable base.

**DANGER**

In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Remove obstructing parts of the cover (U5) and of the side walls of discharge box
- Position the baffle plate as far back as possible from the discharge pulley, if necessary, dismantle the baffle plate (see section 1.5.12)
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the discharge pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the discharge pulley (see its weight in Table 4)
- Put webbing slings around the discharge pulley, attach to the load suspension device and secure the discharge pulley against moving
- Loosen pedestal bearing screws of the discharge pulley
- Pull the discharge pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Further transport to the repair site, depositing on the pulley body

- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the discharge pulley.

**IMPORTANT**

Before tightening the bearing base screws, the discharge pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Re-installation of the drive unit (U1, U2, U4; U5), following the manufacturers' instructions (see Manual 7, Register 7.1).
- Tension the belt (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Adjust the scrapers.

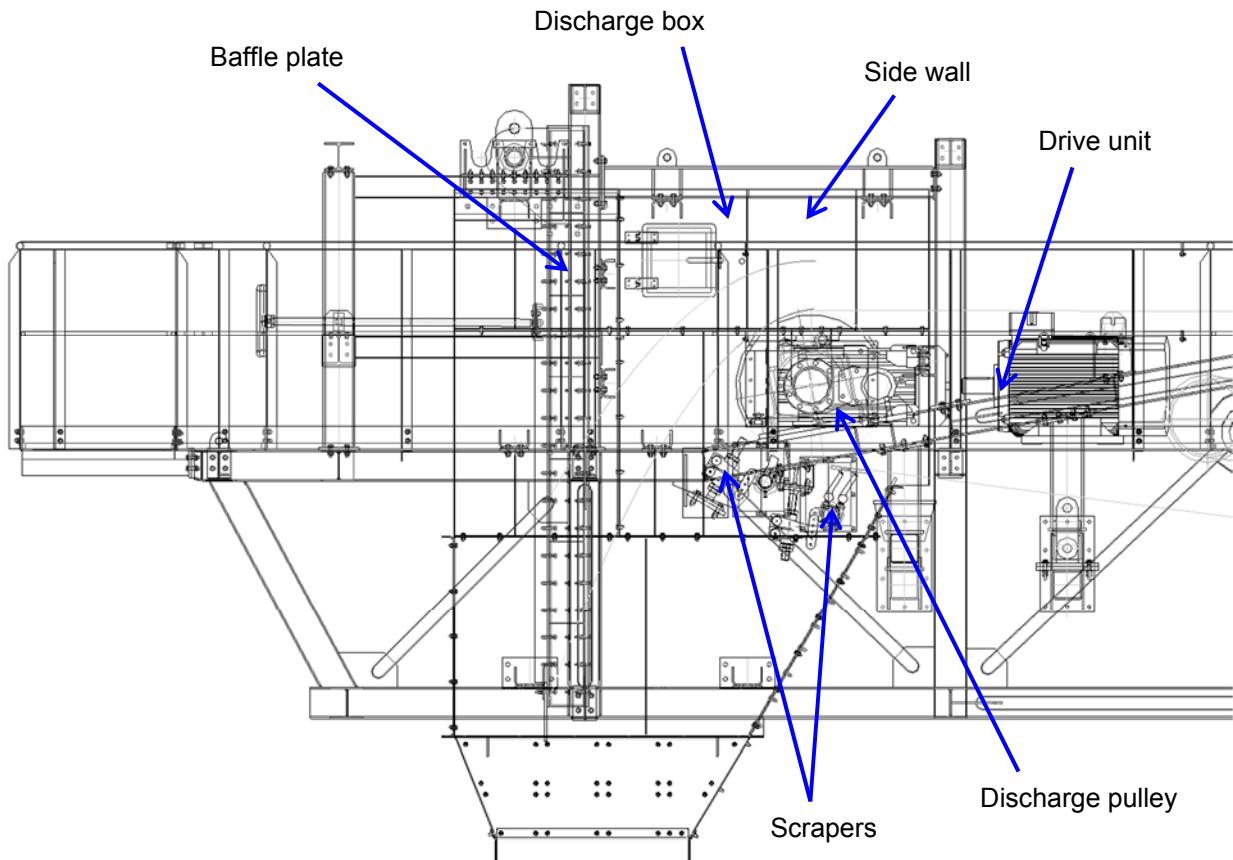


Figure 8: Example – Discharge station U2

1.5.4.3 Disassembly of drive pulley U2-U4

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (see section 1.5.2.2)
- Secure the belt in the vicinity of the drive pulley against slipping (clamps or lifting)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the drive unit to a suitable hoisting device, separate the flange coupling, dismount the drive unit (as per instructions in section 1.5.3.1) and lower it onto a suitable base.



In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- If necessary, remove auxiliary constructions which obstruct disassembly of the pulley.
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the drive pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the drive pulley (see its weight in Table 4)
- Put webbing slings around the drive pulley, attach to the load suspension device and secure the drive pulley against moving.
- Loosen pedestal bearing screws of the drive pulley
- Pull the drive pulley out of the conveyor belt, swing it out and lower it onto a suitable base.



In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the drive pulley.

**IMPORTANT**

Before tightening the bearing base screws, the drive pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Re-installation of the drive unit following the manufacturers' instructions (see Manual 7, Register 1).
- Tension the belt (see section 1.5.2.2)

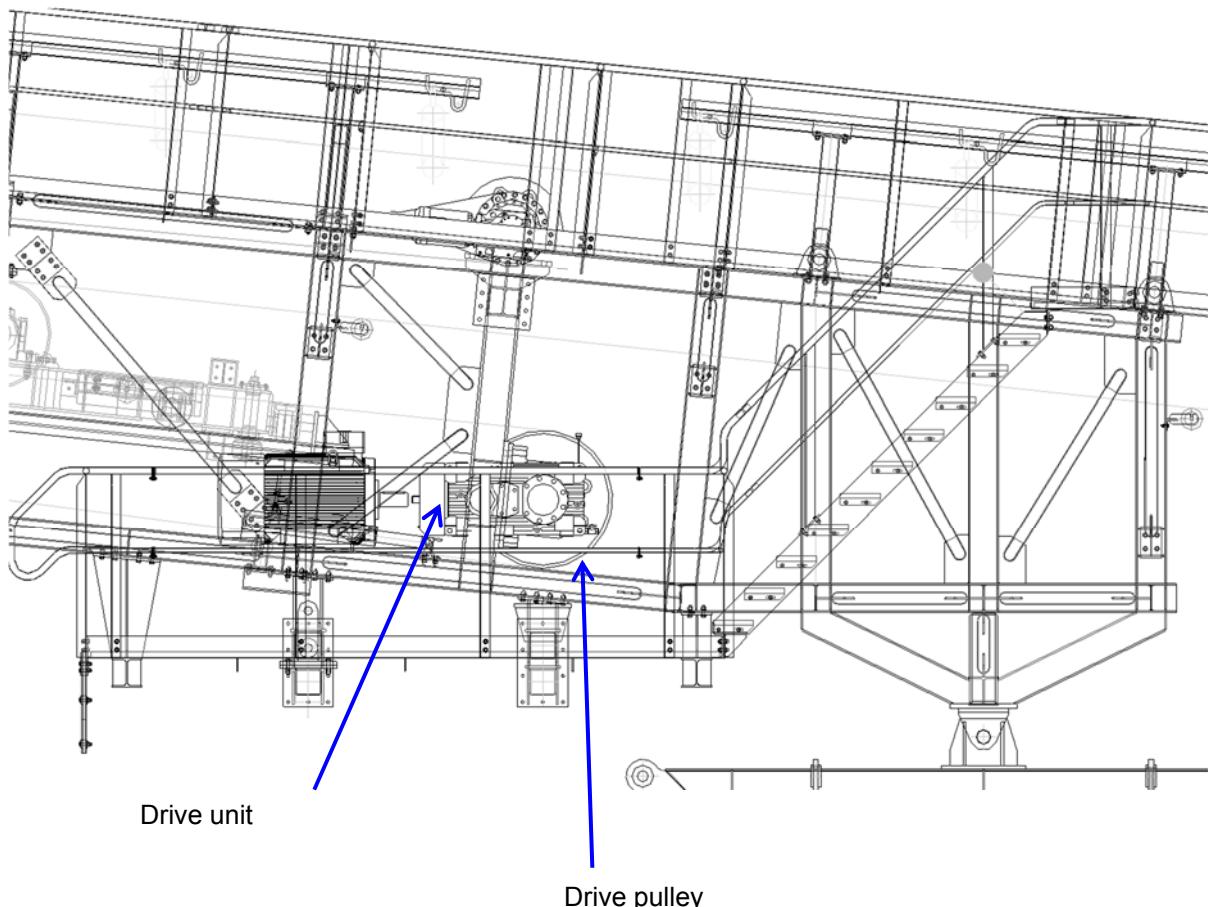


Figure 9: Example – Drive station U3

1.5.4.4 Disassembly of take-up pulley U1

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the protective hood of the take-up station (weight 220 kg) to a suitable hoisting gear and dismount it
- If necessary, remove the inner belt cleaner from the work space

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

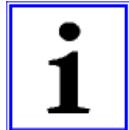
- If necessary, remove obstructing parts of the feeding box
- Relieve the belt from tension (see section 1.5.2.1) and shift the take-up frame as far as possible in the direction of drive pulley
- Remove the upper profile of the take-up frame
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the take-up pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the take-up pulley (see its weight in Table 4)
- Sling the take-up pulley to the load suspension device and secure it against moving
- If necessary, draw the belt sideways using assembly hoists
- Loosen pedestal bearing screws of the take-up pulley
- Pull the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Tension the belt (see section 1.5.2.1)
- If necessary, adjust the scrapers of the inner belt cleaner
- If necessary, adjust sealing plates and rubber seals of the feeding box

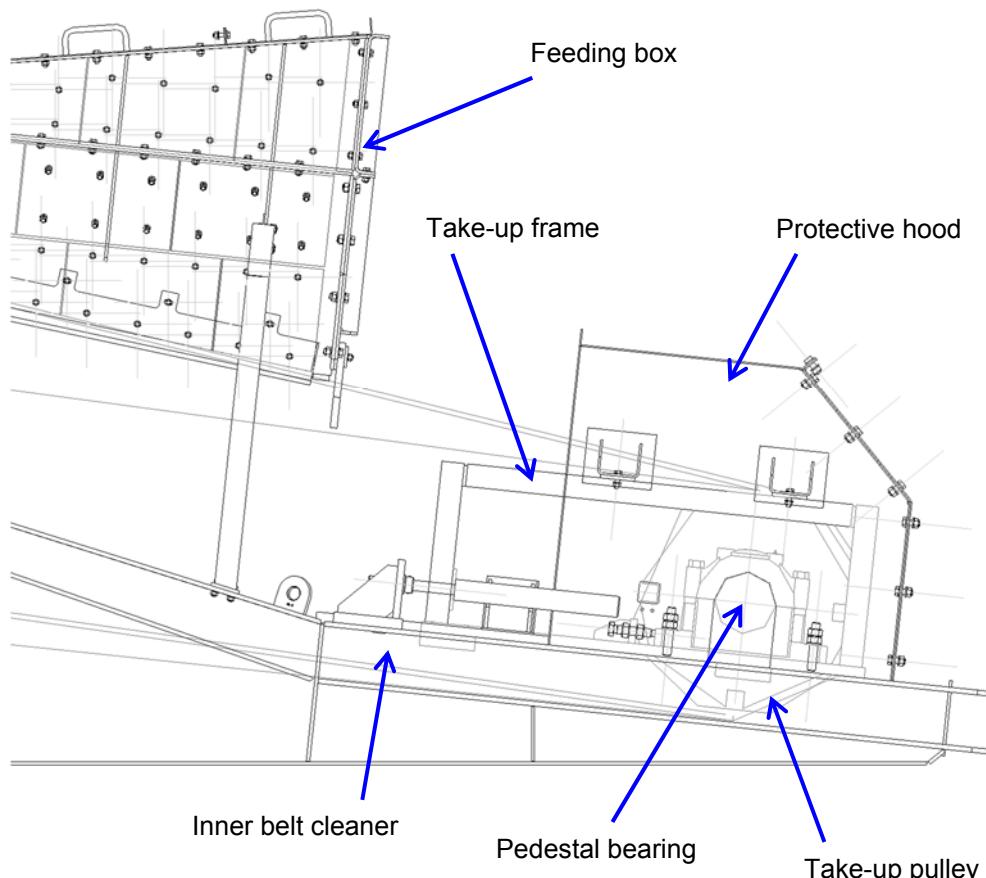


Figure 10: Take-up station U1

1.5.4.5 Disassembly of take-up pulley U2-U4, take-up station with tensioning carriage

- Run the conveyor belt empty
- Lift the inner belt cleaner from the belt and fix it
- Relieve the belt from tension (see section 1.5.2.2) and position therewith the tensioning carriage in a way providing access to the take-up pulley for its disassembly.

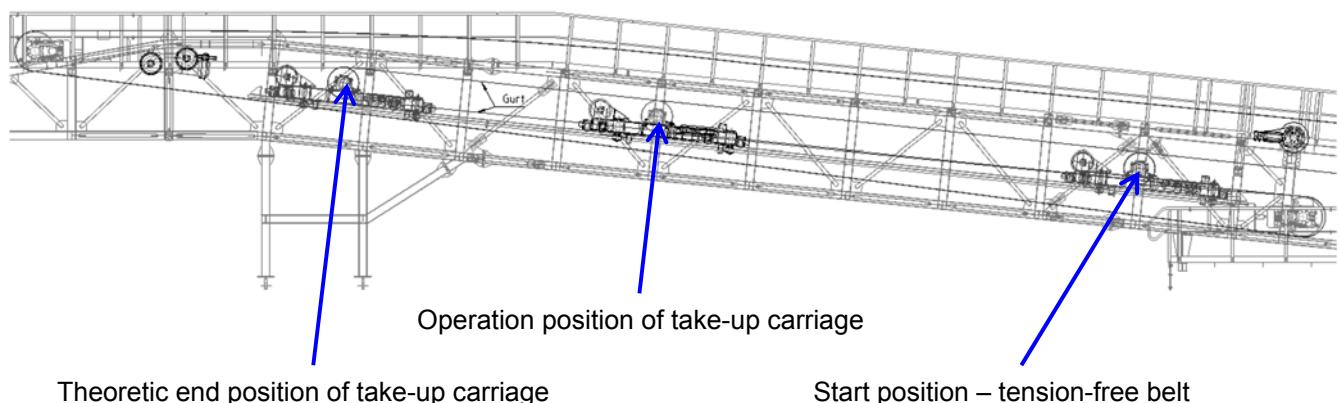


Figure 11: Example – Take-up station with tensioning carriage U2

- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the obstructing lateral diagonals.
- If necessary, dismantle railings and walkways above the take-up pulley to an extent required for the disassembly.
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the take-up pulley is free
- Secure the belt against slipping (clamps or lifting).
- Attach a suitable load suspension device (e.g. C-type crossbeam) to the hoisting gear and position it between the lifted belt and the take-up pulley (see its weight in Table 4)



WARNING

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Attach the take-up pulley to the load suspension device using slings and secure it against moving.
- Loosen pedestal bearing screws of the take-up pulley

- Pull the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Tension the belt (see section 1.5.2.2)
- Remove the inner belt cleaner fixation and, if necessary, adjust the scrapers of the inner belt cleaner at the tensioning carriage

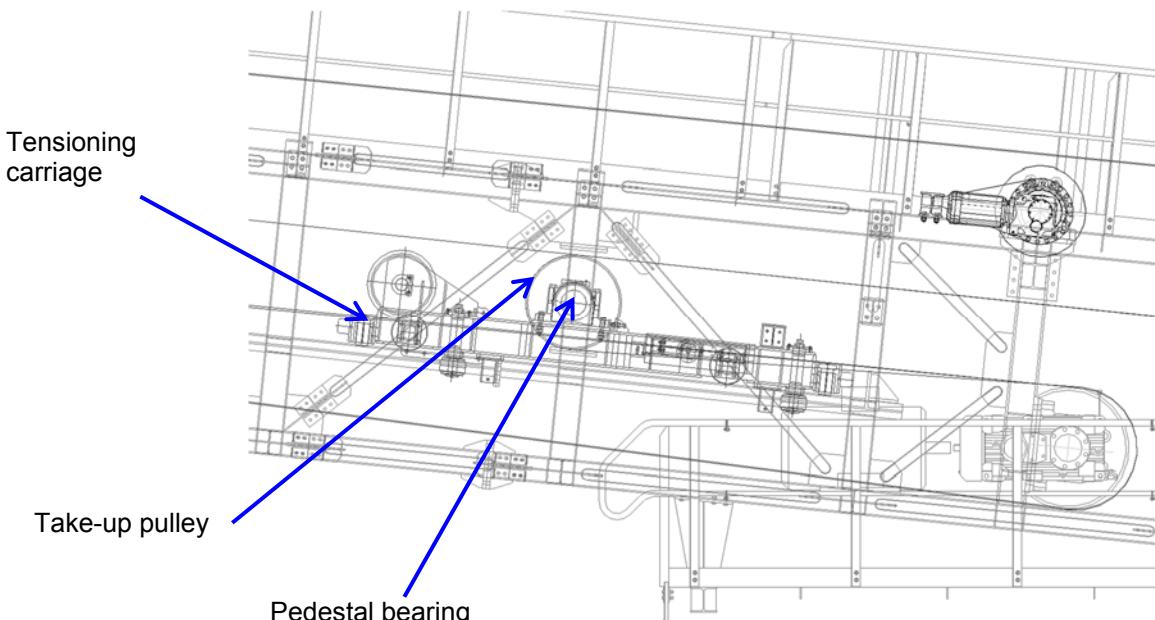


Figure 12 Tensioning carriage with take-up pulley

1.5.4.6 Disassembly of weight-tensioned take-up pulley U5

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disassembly of take-up pulley protection and other obstructing parts such as scraper of the take-up sledge.
- Lift carefully the take-up sledge with the dead weight box using a suitable hoisting device (e.g. forklift or chain hoist). This operation results in slow and careful relieving of the belt from tension.
- Set up a trestle on the ground and lower safely the dead weight box onto the trestle.
- Undo the connection between the take-up pulley frame and dead weight box.



CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Using a suitable hoisting device, lift the take-up sledge onto the service platform and let it down on a suitable base (secure the take-up sledge in this position against movement).
- Sling the take-up pulley (see its weight in Table 4) to a suitable hoisting device and secure against movement.
- Draw the belt sideways from the work area.



WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Loosen pedestal bearing screws of the take-up pulley
- Pull carefully the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.



In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body

- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Tension the belt (see section 1.5.2.3)
- If necessary, adjust the scrapers of the inner belt cleaner at the tensioning sledge

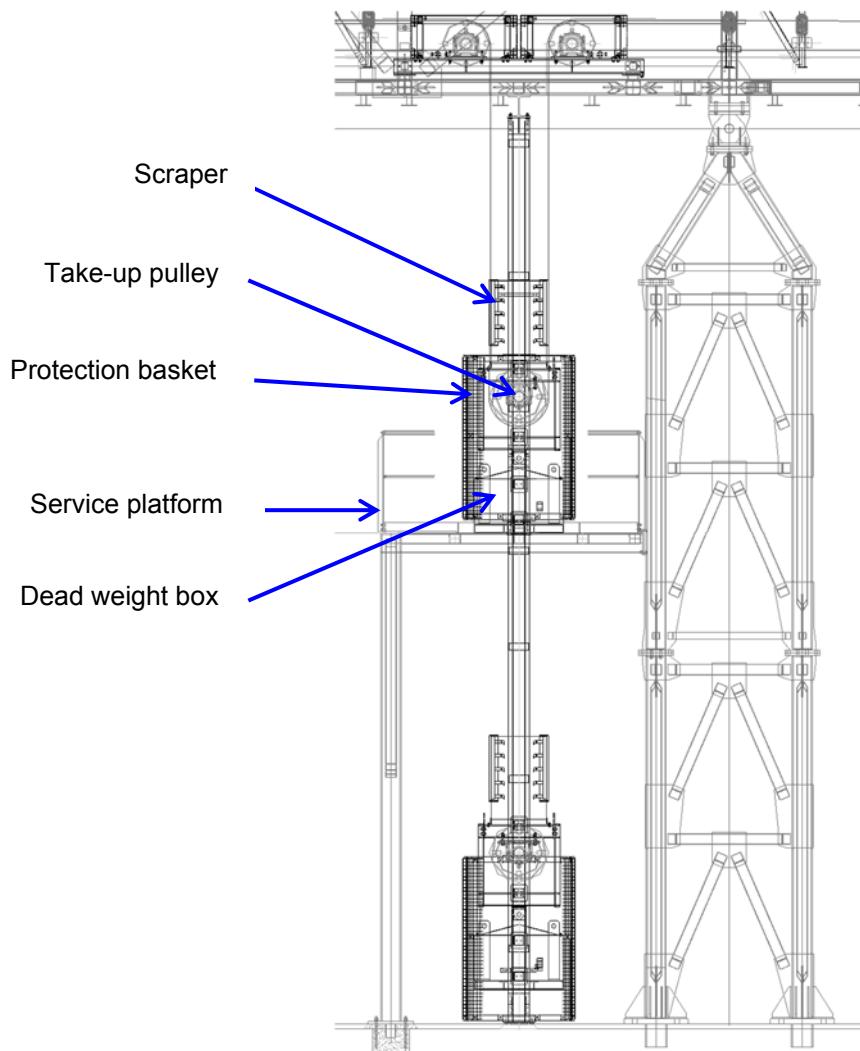


Figure 13: Take-up station U5

1.5.4.7 Disassembly of return pulley U2-U5

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the protection basket (max. weight 285 kg) to a suitable hoisting gear and dismount it.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the return pulley is free
- Secure the belt against slipping (clamps or lifting).
- Attach a suitable load suspension device to the hoisting gear and position it above the return pulley (see its weight in Table 4).
- If necessary, draw the belt sideways using assembly hoists
- Put webbing slings around the return pulley, attach to the load suspension device and secure the return pulley against moving.
- Loosen pedestal bearing screws of the return pulley
- Pull the return pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the return pulley.

**IMPORTANT**

Before tightening the bearing base screws, the return pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Tension the belt (U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)

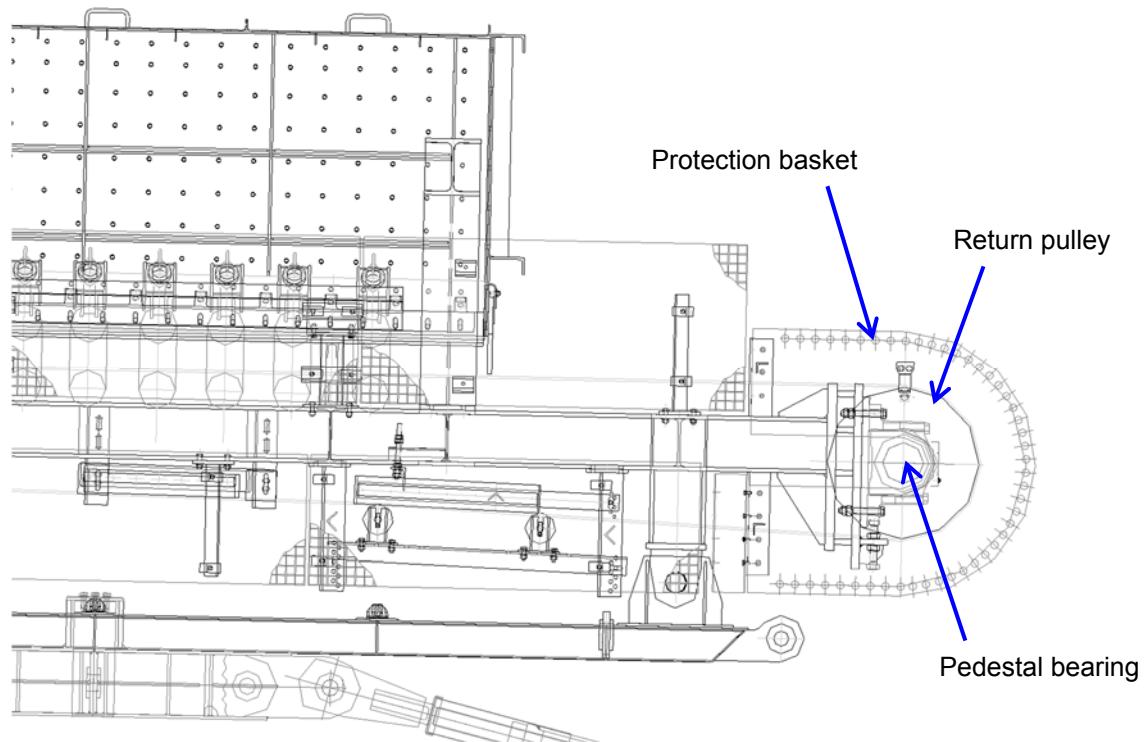


Figure 14: Example – Return station U2-U4

1.5.4.8 Disassembly of deflection pulley U5

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove protective devices to the extent required
- Relieve the conveyor belt completely from tension by careful lifting the take-up frame with the dead weight box (see section 1.5.2.3)
- Pull the freely hanging belt loop upwards and sideways into the carrying structure until the deflection pulley is free, then fix the belt.
- Attach a suitable load suspension device to the hoisting gear (use a mounting support) and position it above the deflection pulley designated for disassembly (see its weight in Table 4).
- Put webbing slings around the deflection pulley, attach to the load suspension device and secure the deflection pulley against moving.
- Loosen pedestal bearing screws of the deflection pulley
- Pull the deflection pulley laterally out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the deflection pulley.

**IMPORTANT**

Before tightening the bearing base screws, the deflection pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!

- Tension the belt (see section 1.5.2.3)

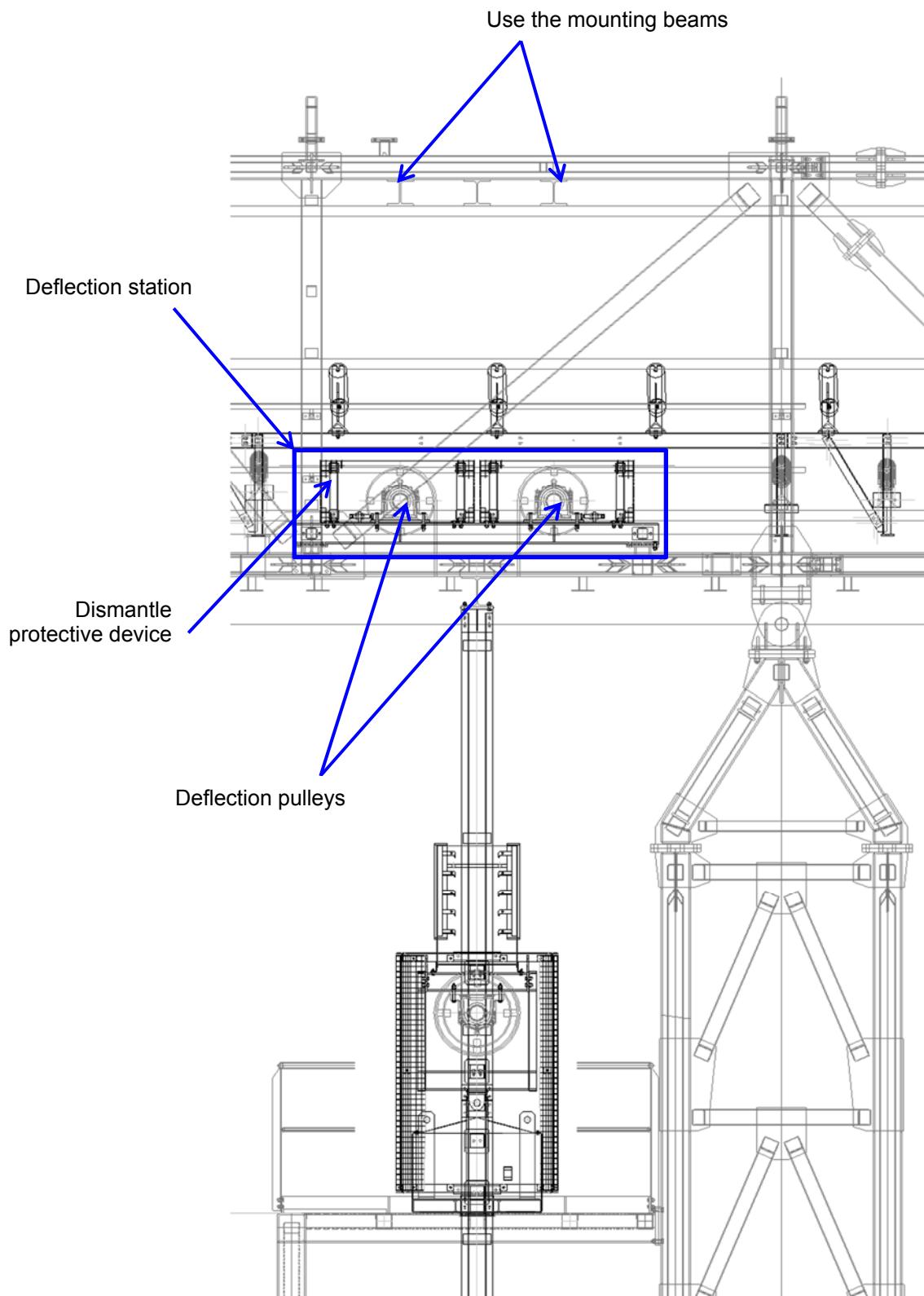


Figure 15: Deflection station U5

1.5.5 Elimination of Belt Misalignment



IMPORTANT

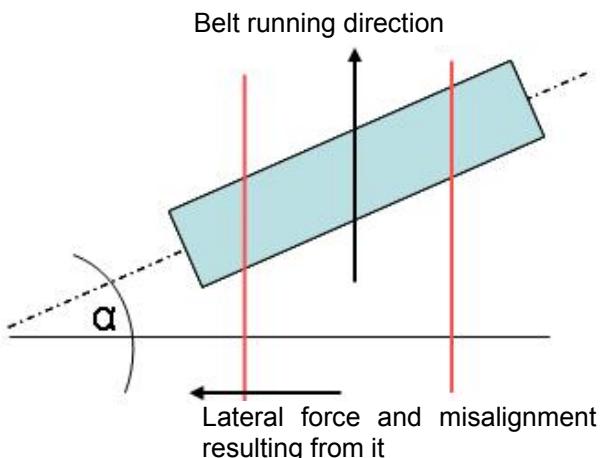
The requirement for a proper straight running is the exact alignment of all components.

Belt misalignment can be caused by material accumulations on idlers or pulleys. Before carrying out further works, this must be checked. Material accumulations must be removed.

The straight running of the belt is influenced by the corresponding setting of the carrying idlers and pulleys.

The following applies to carrying idlers:

- The belt always runs to the side it meets first.



The following applies in general:

- Even small adjustment angles (α) cause lateral movements.
- The shifting (influencing) is effected slowly. The conveyor belt must be monitored for a longer period of time to ensure that it does not move to the opposite side.
- Slanted pulleys achieve significantly stronger effects and are therefore often the cause for misalignment. Therefore, only the correct alignment and straight position should be checked. Adjustment for the steering of the belt should be avoided.
- Multi-part carrying idler stations are often equipped with a so-called camber of the two outer side rollers. In normal position, these rollers are aligned symmetrically askew to the running direction of the belt. If such stations are installed in the wrong direction, they cause misalignment. The direction of installation must be checked.
- Measures taken to eliminate misalignment must be recorded in order to have hints on possible causes for future problems so the initial condition can be restored.

1.5.6 Repair Work at the Tensioning Device U2-U4

1.5.6.1 Basic principles



Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.

Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.



RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

- If components of the tensioning device which affect the holding force, such as geared motor, cable drum etc., are scheduled for disassembly, the conveyor belt must be relieved from tension before start of the repair work, and the take-up carriage must be moved to the end position and secured against moving. The individual components can then be disassembled after they have been attached to a suitable hoist and the appropriate fastening screws have been loosened.
- Installation of the components is realised in the reversed order. In this connection, particular attention must be paid to the firm seating of the fastening elements. The pre-tension of the belt must be subsequently set by the equipment user!
- Re-install all protective devices.

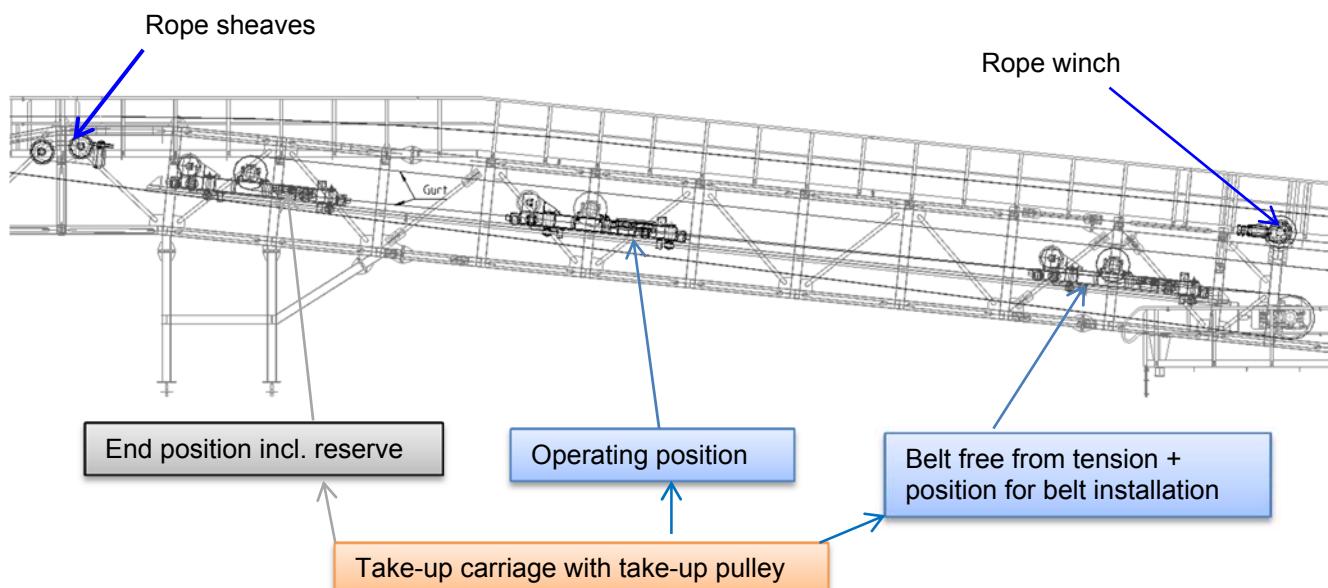


Figure 16: Take-up station U2-U4

1.5.6.2 Disassembly of geared motor

**NOTE**

For documentation of the geared motor refer to Manual 7, Register 2.

**DANGER****DANGER**

POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER

POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE

Only qualified electricians should carry out work on the power supply system.

Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.

Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.

All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disconnect the supply cables of the geared motor
- Undo the connecting elements of the torque support
- Sling the geared motor (weight approx. 420 kg) to a suitable lifting device (see operating manual) and secure it against movement
- Pull off the shrink disc (see operating manual)
- Pull off the geared motor from the shaft, swing it out and lower it onto a suitable base.

**DANGER**

In case of necessity, the geared motor may only be placed at locations where the load capacity for acceptance of its weight is provided. There, the geared motor must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Further transport to the service station and there possibly disassembly of the components
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
 - Note the tightening torques for the shrink disc.
 - Reconnect the supply cables of the geared motor
 - Tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).



For information regarding assembly/disassembly of the geared motor please refer to the manufacturers operating instructions in Manual 7, Register 2.

IMPORTANT



After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.

IMPORTANT

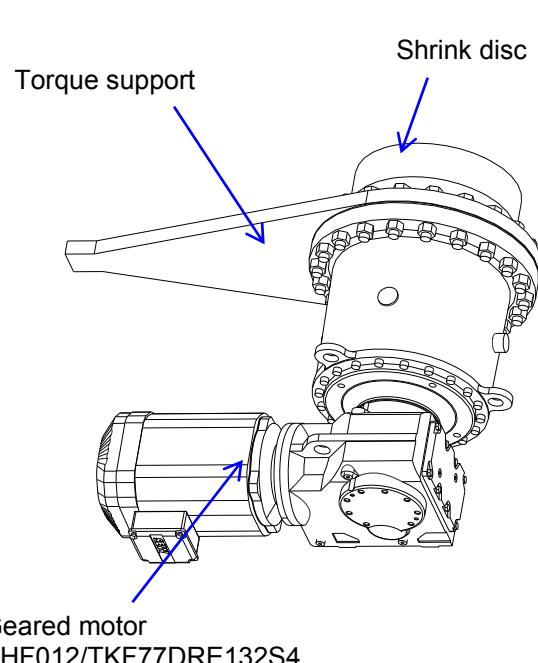
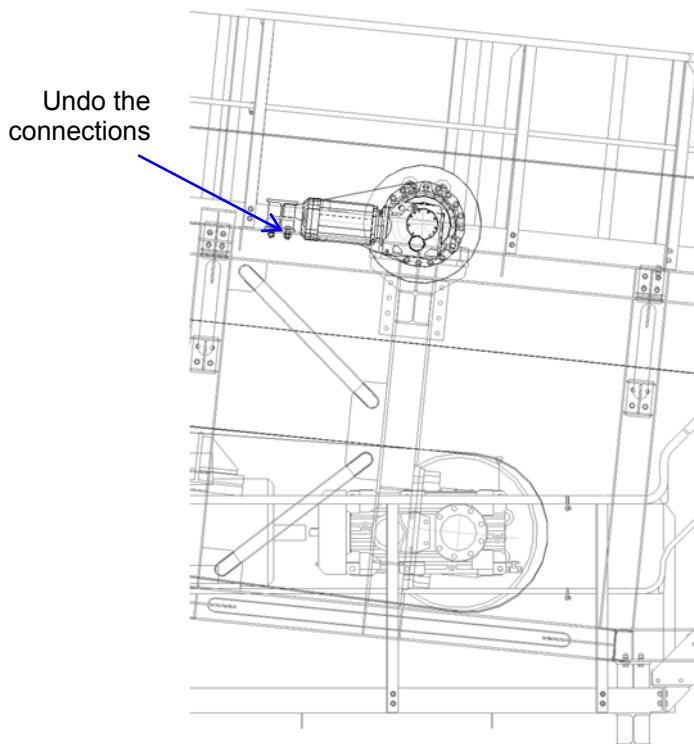


Figure 17: Example – take-up winch and geared motor U2

1.5.6.3 Replacement of take-up rope



For documentation of the take-up rope refer to Manual 7, Register 6.

- Relieve the belt from tension using the rope winch (slack rope).
- Move the take-up carriage into the end position "Belt free from tension (see Figure 16), secure the take-up carriage against shifting and take the winch out of operation.
- Loosen the take-up rope fixtures at the rope fixed points (see Figure 18).

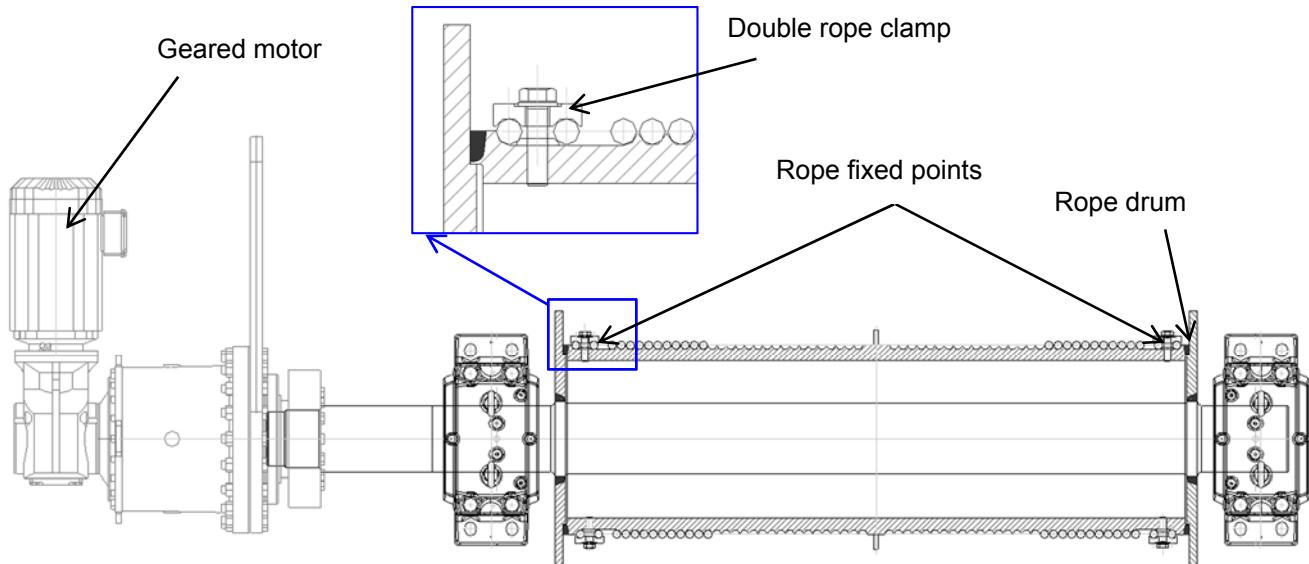


Figure 18: Rope winch

- Dismount the rope force measuring device between the horizontal rope sheaves.
- Unwind and remove the old rope from the rope drum.
- Reave a new rope according to the following scheme and Figure 19:
 1. Rope end descending underneath from the rope drum →
 2. towards both vertical rope sheaves in the front part: first up, then down →
 3. from bottom towards the rope sheave in the take-up carriage, turn upwards and →
 4. towards the horizontal rope sheaves →
 5. on the other side – backwards; the second rope end must be secured on the other rope drum side coming underneath

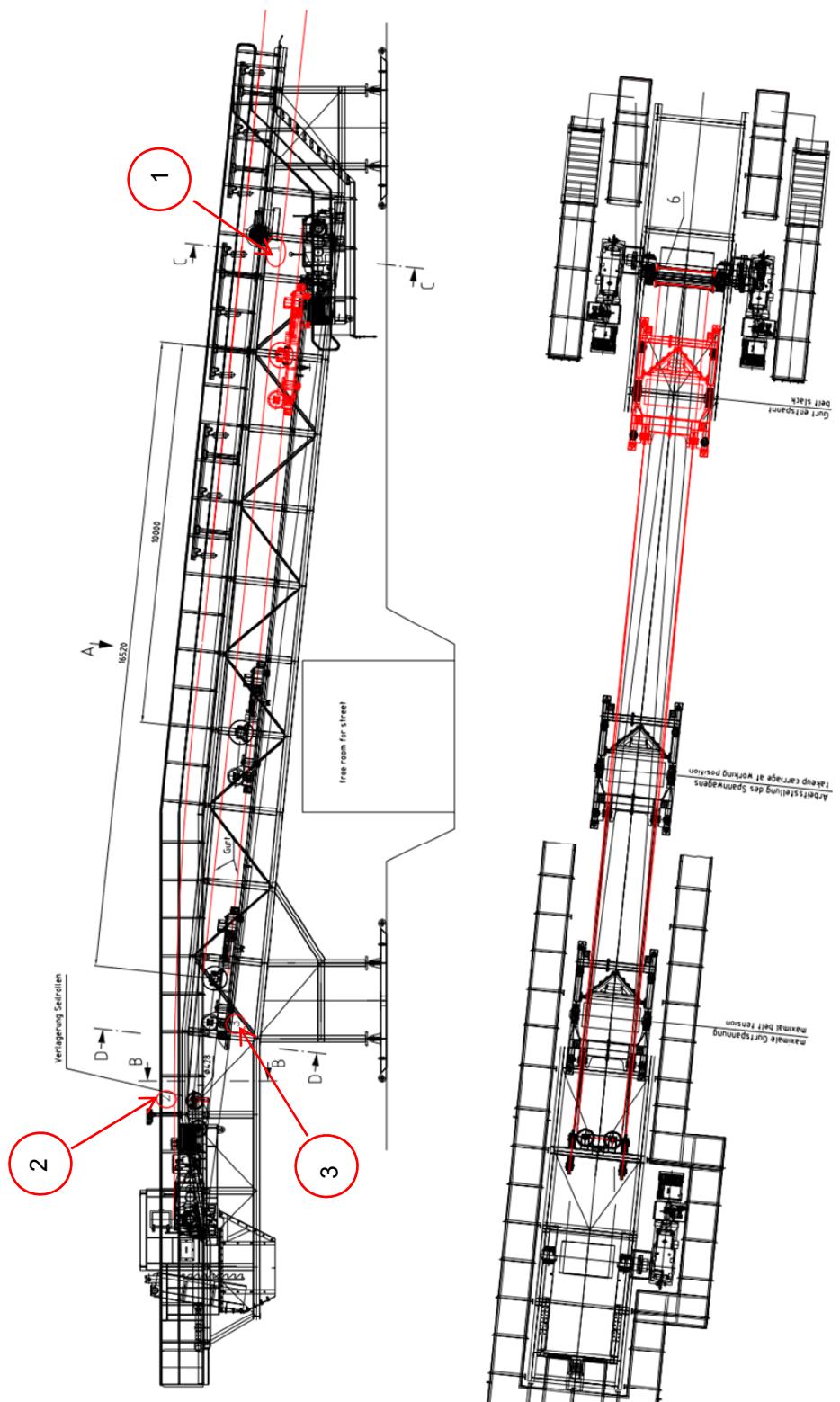
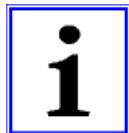


Figure 19: Rope scheme

**IMPORTANT**

When securing the new rope on the rope drum, note 3 safety windings!

- Re-install the rope force measuring device.
- Restore the pre-tension of the belt (see section 1.5.2.2)

1.5.6.4 Disassembly of rope sheaves



NOTE

Applicable to all rope sheaves.



DANGER



ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!

Maintenance personnel realizing work on the rope sheaves must use a catching safety belt and/or personal safety equipment for protection against falling!

Failure to observe this precaution could result in severe bodily injury or loss of life.

- Using the winch, relieve the rope from tension according to section **Fehler! Verweisquelle konnte nicht gefunden werden.** (slack rope) and take the winch out of operation.
- Lift the rope from rope sheave using a suitable hoisting device.
- Undo the rope sheave fastenings and take out the rope sheave (weight 48,5 kg).
- After re-installation of the rope sheaves, tension the belt using the winch.

Fastening of rope sheave

Rope sheaves

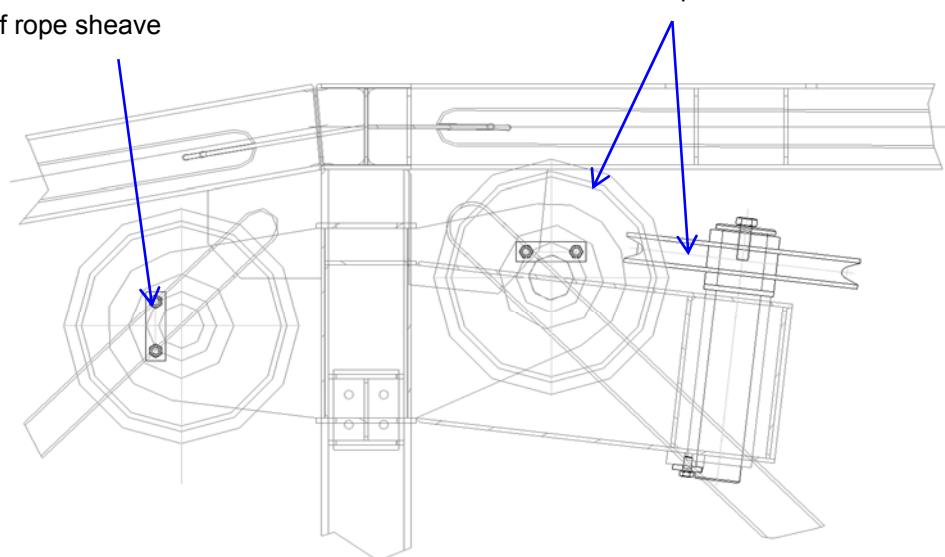


Figure 20: Rope sheaves Take-up station U2-U4

1.5.7 Replacement of Carrying Idler Garlands in Upper and Lower Run

**DANGER**

RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove obstructing parts (such as covers, safety guards, steel construction components etc.) to the extent required.
- Lift the conveyor belt with a suitable hoisting device.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Sling the carrying idler garland to a suitable lifting device or hoist, relieve the suspension and unhook it from the eyelets.
- Draw the carrying idler garland sideways out of the frame.
- Replace the defect carrying idlers by new ones.
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
 - Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
 - If applicable, tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

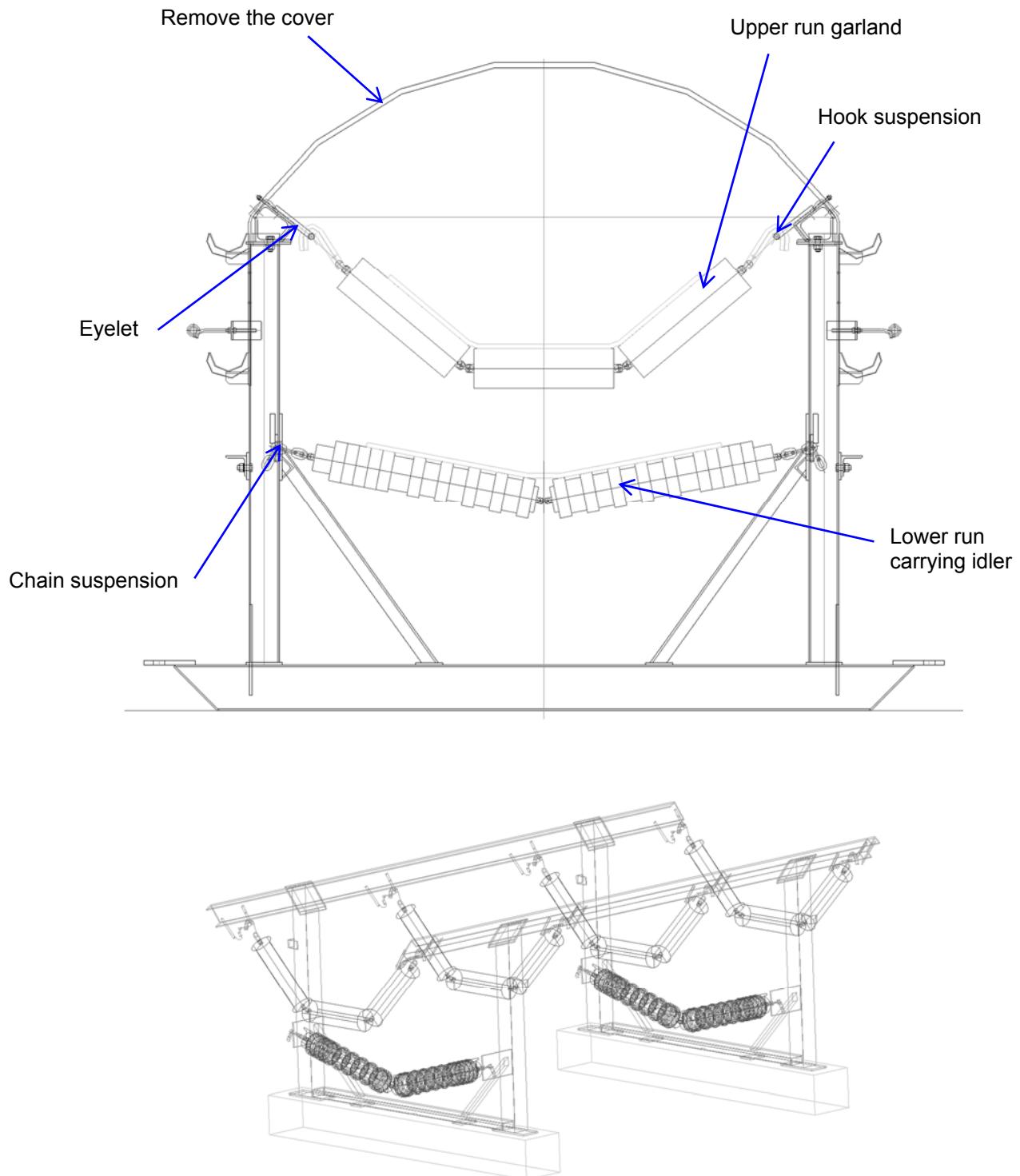


Figure 21: Example of carrying idler station

1.5.8 Replacement of Rigid Carrying Idlers in Upper and Lower Run

**DANGER**

RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove obstructing parts (such as covers, safety guards, steel construction components etc.) to the extent required.
- Lift the conveyor belt with a suitable hoisting device.

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

Replacement of a carrying idler

- For replacement of a single carrying idler the idler support need not to be dismantled.
 - When replacing only one idler in upper or lower run, the conveyor belt is locally raised so that the idler to be replaced could be removed from the conveyor laterally. For this, apply the lifting devices previously described. The belt in upper run must be locally free from material load.
 - Remove the carrying idlers (for weight refer to spare part catalogue) from the carrying idler support and deposit them safely.

Replacement of a carrying idler station

- Secure the carrying idler station with a suitable hoisting device. Ensure the following:
 - Protect the carrying idlers against falling, remove them from the idler support and deposit safely.
- Undo the bolted or clamped connection of the carrying idler station.
- Secure the carrying idler support against falling considering its own weight (max. weight 40 kg), swing it sideways out of the belt and remove. The support can be put down flatly.
- Further transport to the service station and there possibly disassembly of the components

- Re-assembly of the dismounted carrying idler station in reversed order under observance of following instructions:
- Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
 - Note the tightening torques for bolted connections.
 - If applicable, tension the belt (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

Rigid carrying idler in upper run

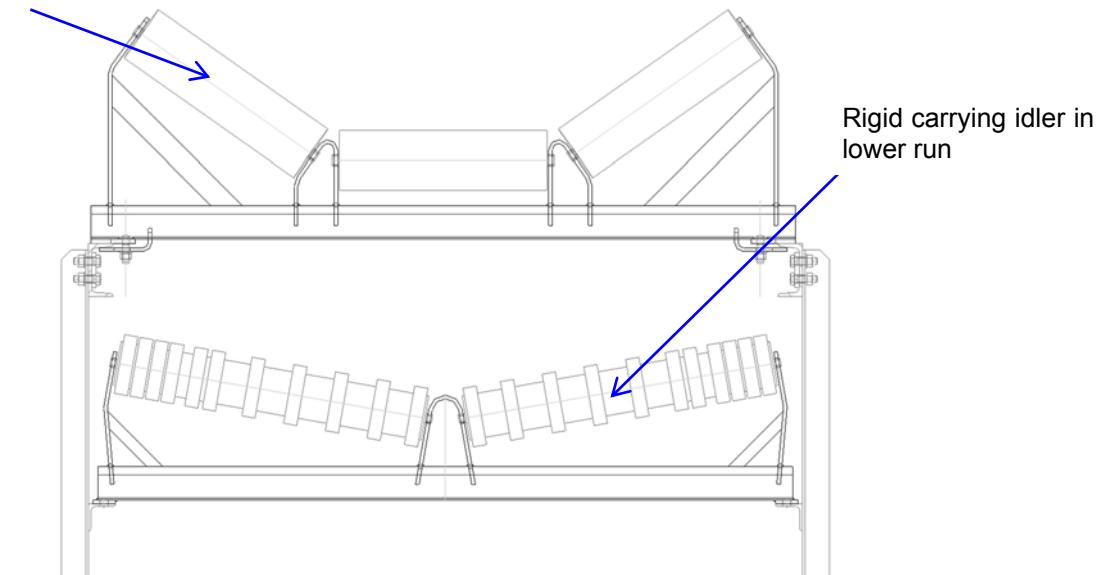


Figure 22: Example – Carrying idler station U5

1.5.9 Replacement of Carrying Idlers in Feeding Zone



RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

Replacement of carrying idlers in upper run

- Remove safety guards
- Open the lateral covers of the feeding hopper and, if required, dismantle the lateral sealings in order to provide free space between conveyor belt and feeding hopper.
- Using a suitable hoisting device, lift the belt from the carrying idler garland until the connection with supporting structure can be undone.



WARNING, DANGER OF SQUEEZING INJURIES

Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.

- Undo the connection pin – wedge
- Remove the washer.
- Let the carrying idler garland from both sides down onto the lower run of conveyor belt and pull it sideways out of the feeding frame.



CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Replace the defect carrying idlers by new ones.

Replacement of carrying idlers in lower run

- Remove safety guards
- Loosen the bolted connections of the lateral holders and remove the holders.
- Pull out the carrying idler sideways
- Replace the defect carrying idler by a new one.

- Re-assembly of the dismounted carrying idlers in reversed order under observance of following instructions:
 - Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
 - If applicable, tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

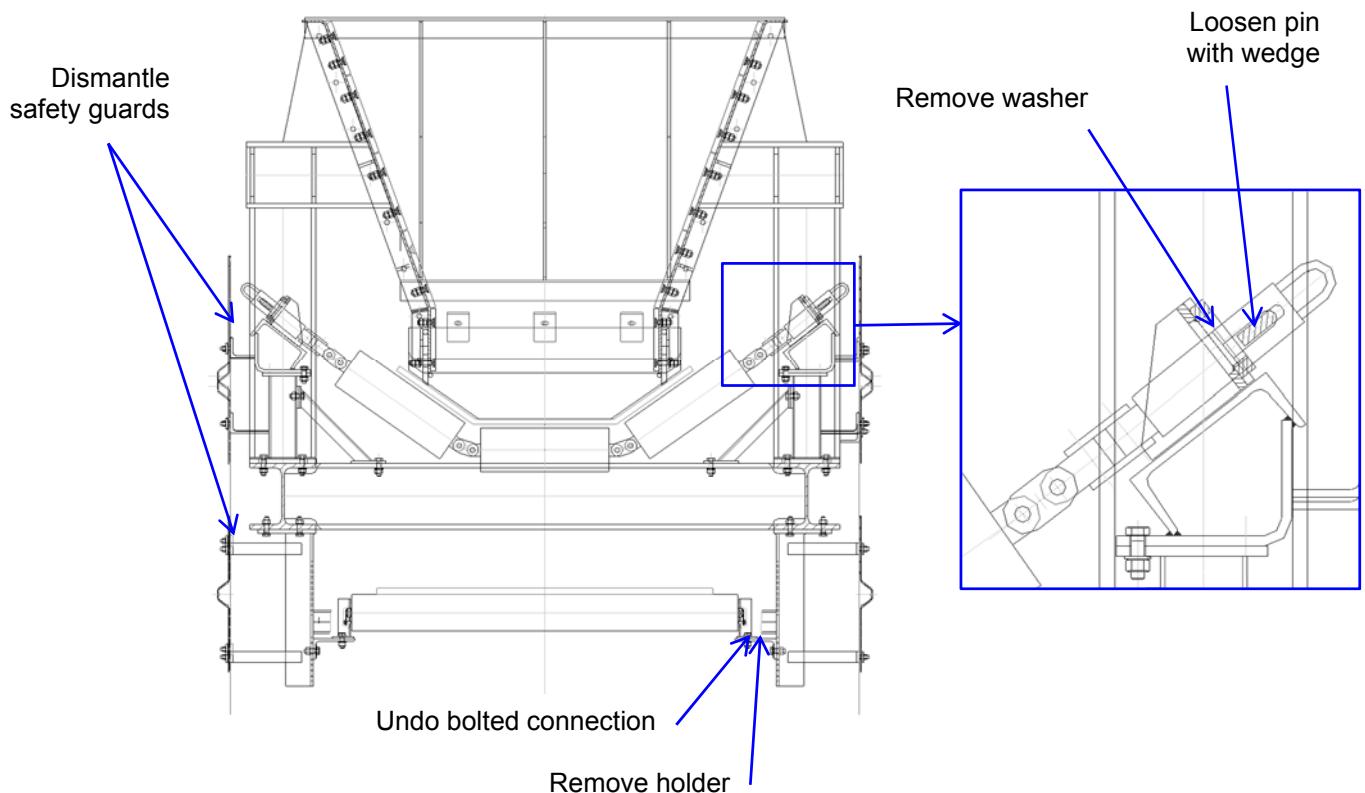


Figure 23: Example of carrying idler station in feeding zone

1.5.10 Replacement of Scraper Elements (External Belt Scrapers)

**NOTE**

For documentation of the scrapers refer to Manual 7, Register 6.

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

**NOTE**

The external belt scrapers are accessible from the side walls of the discharge chute.

- Relieve the scrapers from tension and fold them back.
- Remove rubber plates from both sides in order to get access to the belt scraper.
- Replace worn-out scraper elements according to the operating manual.
- Re-installation of the scraper is performed in reversed order.
- Adjust the scraper according to the operating manual.

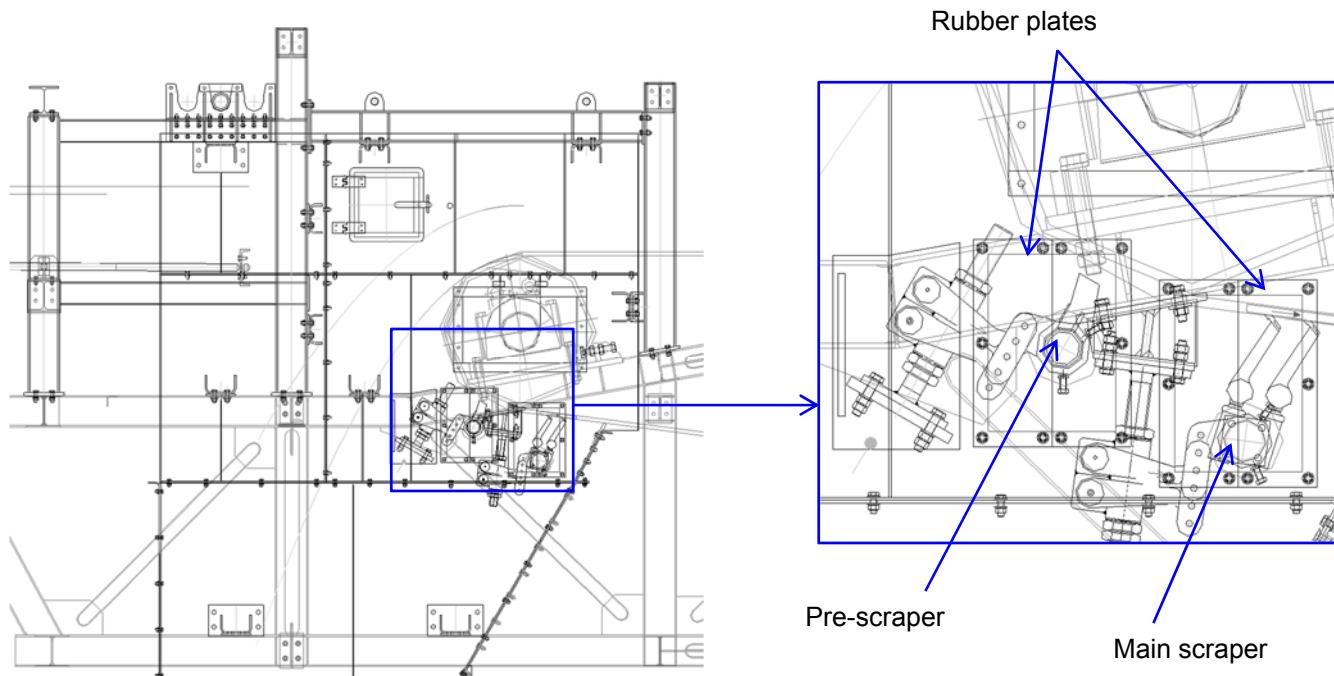


Figure 24: Example – Discharge station U2

1.5.11 Adjustment or Replacement of Feeding Chute Seals

**DANGER**

RISK OF SQUEEZING-OFF LIMBS

The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.

1.5.11.1 Lateral and rear seals

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

**IMPORTANT**

For seal replacement it might be necessary to relieve the conveying belt from tension. For re-adjustment the conveying belt must be under tension.

- Open the lateral coverings.
- Undo the fastening nuts, followed by replacement or re-adjustment of sealing strips so that the strips rest on the conveyor belt. Make sure that the rubber strips do not press down on the conveyor belt!
- When mounting a new rear seal, adapt its profile to the one of conveying belt as precisely as possible in order to ensure a good sealing effect.

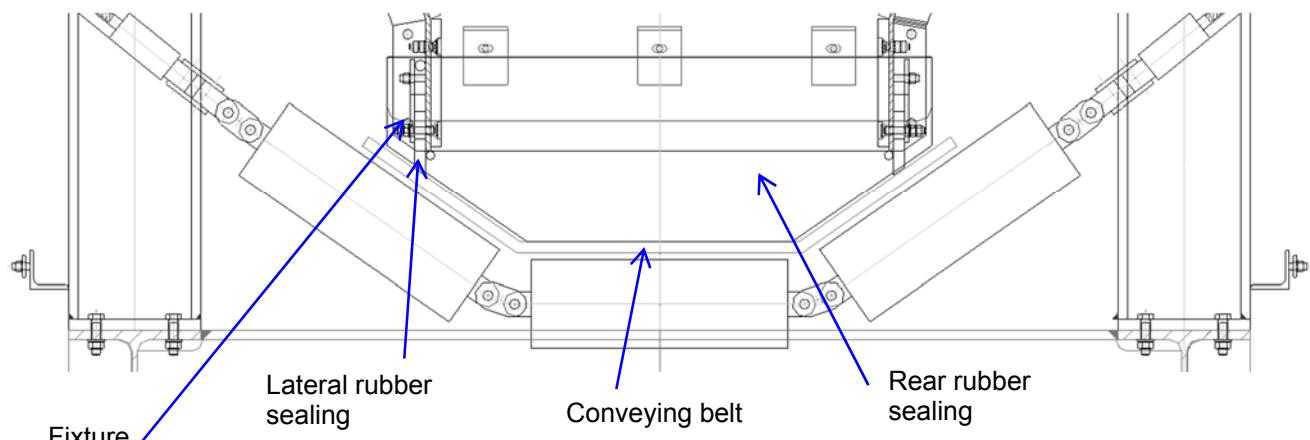


Figure 25: Example – Feeding station U2-U4

1.5.11.2 Replacement of rubber curtain

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If necessary, remove the covering of conveying belt provided in this area.
- For replacement of rubber curtain it is required to remove the fastening nuts of clamping plates. After that, the rubber curtain can be pulled off outwards.
- When mounting a new rubber curtain, adapt its profile to the one of conveying belt as precisely as possible in order to ensure a good sealing effect.
- Re-assembly of the dismounted components in reversed order under observance of following instructions:
 - Exact alignment of seals is necessary in order to ensure a proper sealing effect.

**WARNING****WARNING, DANGER OF SQUEEZING INJURIES**

When installing the components, note that distances are changing. The risk of squeezing the limbs is present.

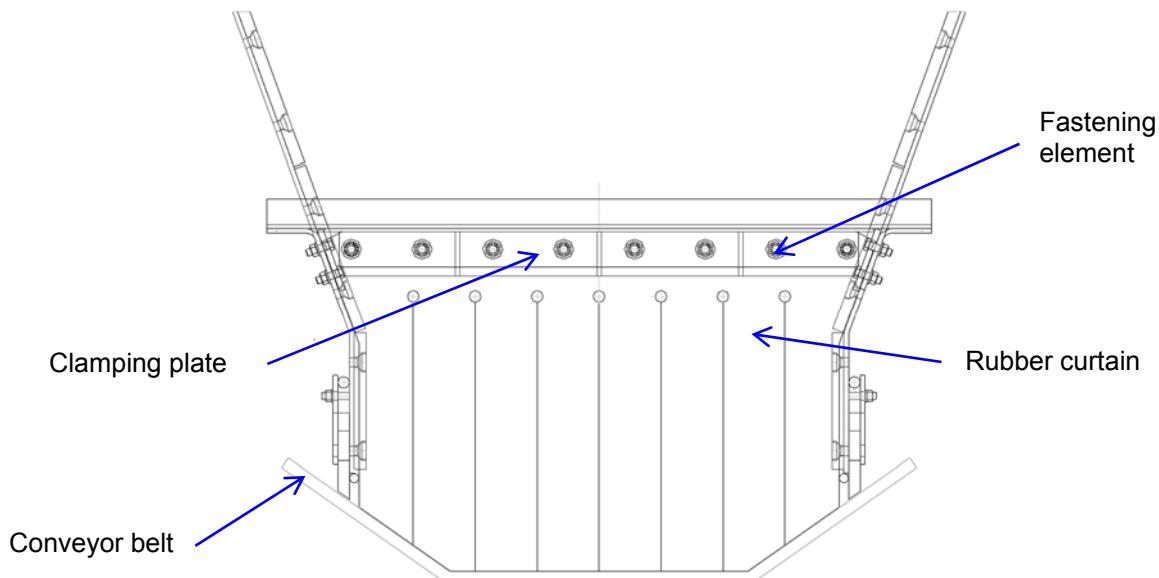


Figure 26: Example – Rubber curtain of feeding station U2-U4

1.5.12 Replacement of Wear Plates of Baffle Plate

**DANGER**

ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!

Maintenance personnel realizing work in the chutes and discharge boxes must use a catching safety belt and/or personal safety equipment for protection against falling!

Failure to observe this precaution could result in severe bodily injury or loss of life.

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If applicable (U5), dismount the roof of the discharge box
- Bring the baffle plate in the vertical position
- If necessary, remove material accumulations from the baffle plate.
- Use a suitable hoisting gear to secure the baffle plate (weight U1: 1010 kg, U2-U4: 1125 kg, U5: 360 kg) in its position on the shaft.
- Undo the connection baffle plate – adjusting spindle

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Be careful when undoing the connection of the baffle plate and the adjusting spindle! Due to the great weight of the baffle plate, it can be briefly set in motion. There is a danger of squeezing limbs in the connection angle between the baffle plate and the adjusting spindle.

- Undo the shaft fixture.
- Lift the baffle plate out of the discharge box and lower it safely on suitable trestles.

**DANGER**

The trestles with necessary load capacity must be secured against tilting.

Non-compliance with this instruction can cause severe injuries or lethal outcome of personnel.

- Remove the wear plates and replace them by new ones.

- Re-assembly of the dismounted parts and/or components is performed in reversed order.



New fasteners of the same quality must be used during the installation of the new wear plates!

IMPORTANT

- Bring the baffle plate back in the initial position

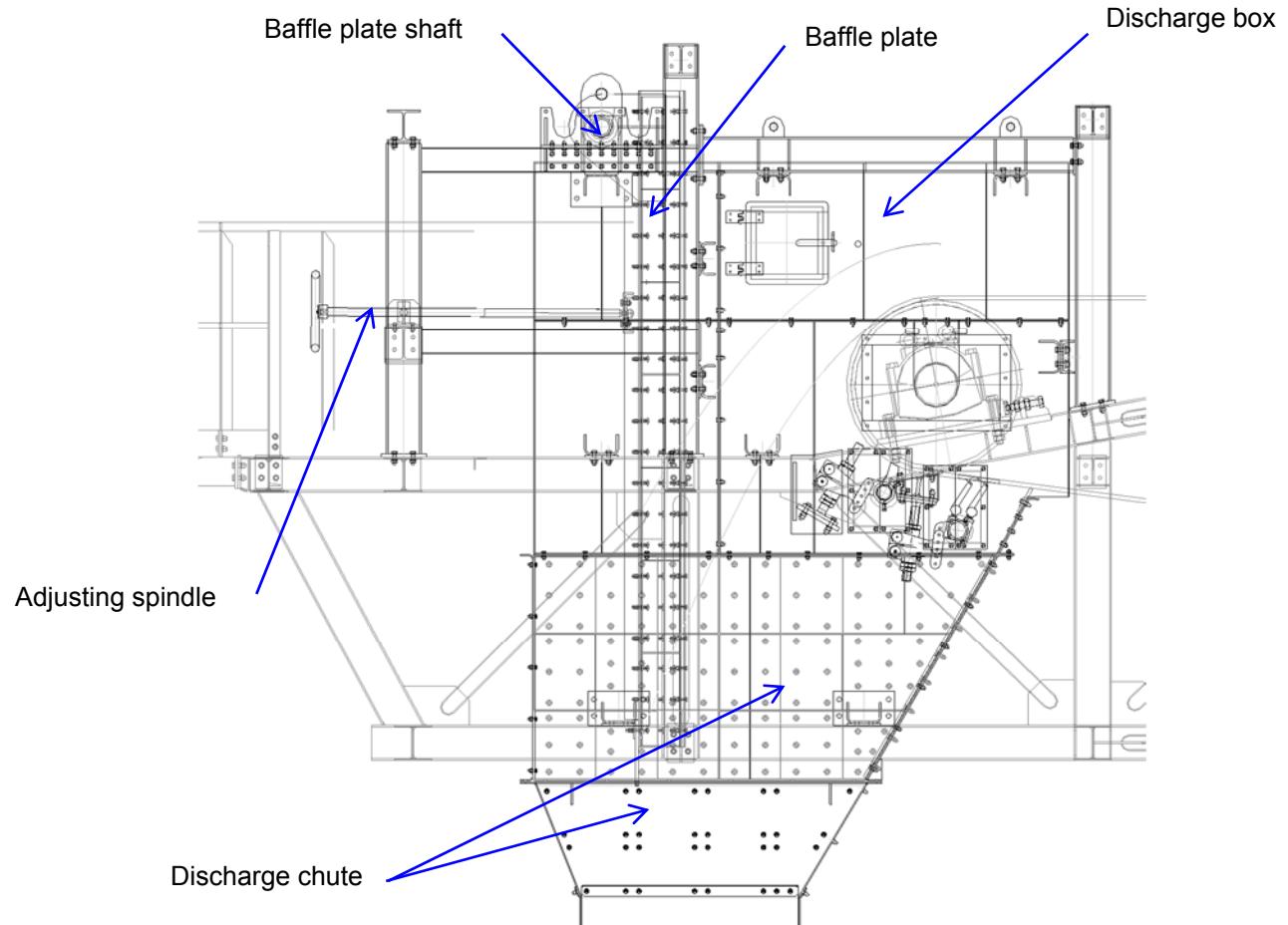


Figure 27: Example – Discharge station with baffle plate U2

1.5.13 Replacement of Wear Plates in Discharge Chute

**DANGER**

ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!

Maintenance personnel realizing work in the chutes and discharge boxes must use a catching safety belt and/or personal safety equipment for protection against falling!

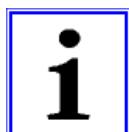
Failure to observe this precaution could result in severe bodily injury or loss of life.

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If necessary, remove material accumulations from the baffle plate and discharge box.
- Position the baffle plate with the adjusting spindle as far away from the drive pulley as possible or, if required, dismantle it (see section 1.5.12).

**WARNING**

WARNING, DANGER OF SQUEEZING INJURIES

Be careful when undoing the connection of the baffle plate and the adjusting spindle! Due to the great weight of the baffle plate, it can be briefly set in motion. There is a danger of squeezing limbs in the connection angle between the baffle plate and the adjusting spindle.

**IMPORTANT**

Wear plates in the lower part of the discharge chute U1-U4 can be reached from the next belt conveyor. For this purpose, it might be necessary to partially disassemble the feeding box.

Wear plates in the upper part of the discharge chute U1-U4 are also accessible from above.

Wear plates of the discharge chute U5 can only be replaced from above after removal of discharge hood and installation of a maintenance platform.

If necessary and possible, a part of the chute should be dismantled in order to facilitate the replacement work.

- Protect the belt against damage under the chute exit (planking)

**DANGER**

Planking with sufficient load capacity must be secured against slipping.

**DANGER**

During replacement of wear plates only one person carrying required number of new screws is allowed to work inside the chute.

If inside the chute the visibility is not sufficient, an additional lighting source must be provided.

- If necessary, scaffold the chute from outside.
- Secure the defective wear plates against falling, undo the screw connections outside and remove subsequently the wear plate (weight approx. 11,8 kg) by means of a suitable hoisting device.
- Deliver the new wear plates by means of the hoisting device and mount them in the discharge chute.

**IMPORTANT**

New fasteners of the same quality must be used during the installation of the new wear plates!

- Re-assembly of the dismounted parts and/or components is performed in reversed order.
- Remove the planking and, if available, the scaffolding.
- Bring the baffle plate in its original position.

1.5.14 Disassembly of Magnetic Separator

**NOTE**

Applicable to the electro-magnetic separator 452-130 installed at the belt conveyor U5

**NOTE**

For documentation of the magnetic separator refer to Manual 7, Register 8.

**DANGER**

Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.

Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- Switch off the drive unit of the magnetic separator and ensure that it cannot be switched on.
- Disconnect the power cables of the magnetic separator.
- Sling the roof (weight approx. 680 kg) to a suitable hoisting gear, dismount it and lower safely on the ground.

**DANGER**

CAUTION, SUSPENDED LOADS!

Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.

- Sling the magnetic separator (weight approx. 5050 kg) including the frame (weight approx. 1000 kg) through the lifting eyes to a suitable hoisting gear and secure against movement.
- Disconnect the plate flanges between the frame and supports.
- Lift the magnetic separator together with the frame from the supports and lower the unit onto a suitable transportation vehicle.

**DANGER**

In case of necessity, the magnetic separator may only be placed at locations where the load capacity for acceptance of its weight is provided. There, the magnetic separator must be secured against movement.

Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.

- Dismantle the suspension of the magnetic separator, place the frame on the supports and screw them together.
- Further transport of the magnetic separator to the service station and there possibly disassembly of the components (for further information refer to the Operating Instructions).
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
 - Note the tightening torques for bolted connections.
 - Check and, if necessary, adjust the height of the magnetic separator.

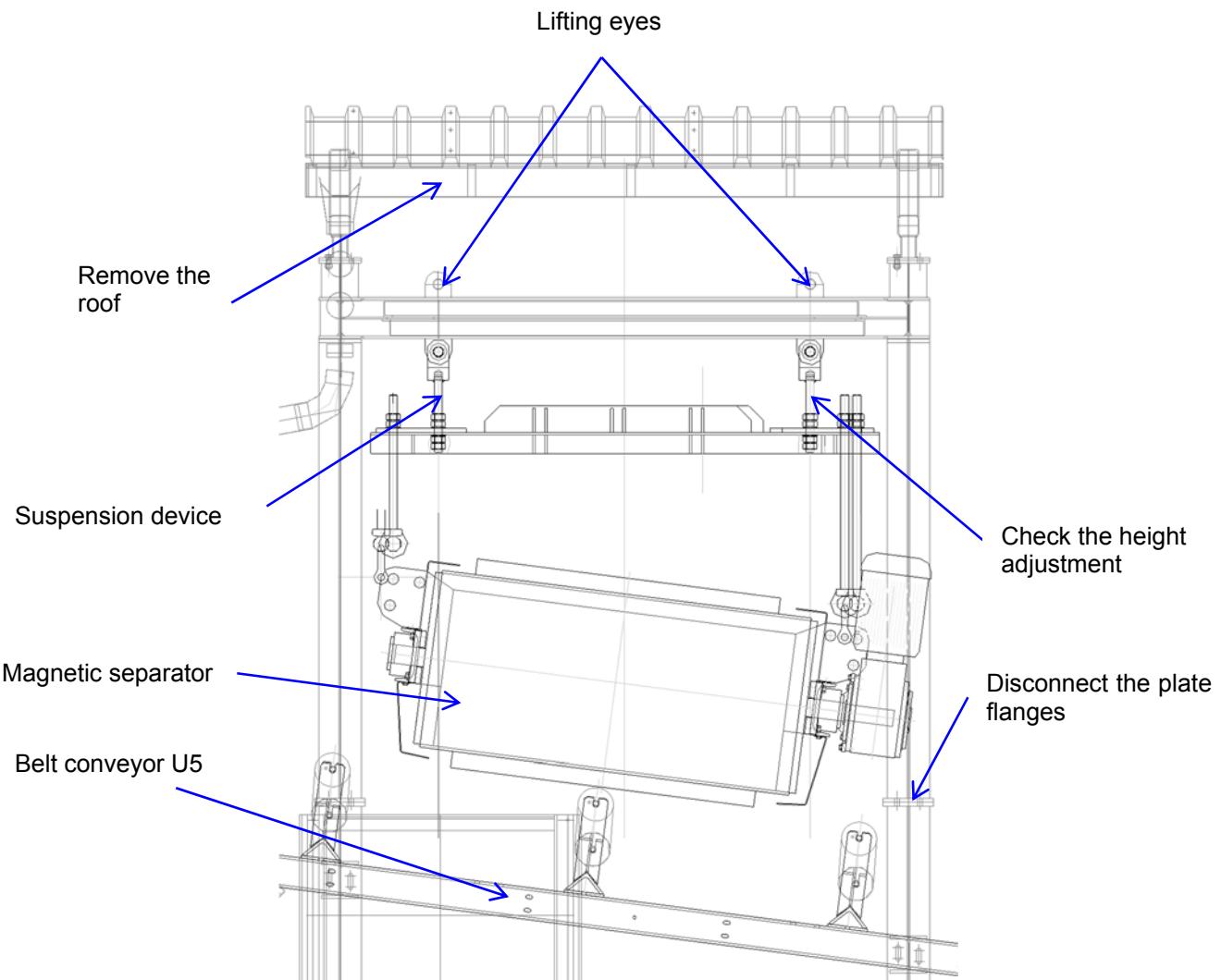


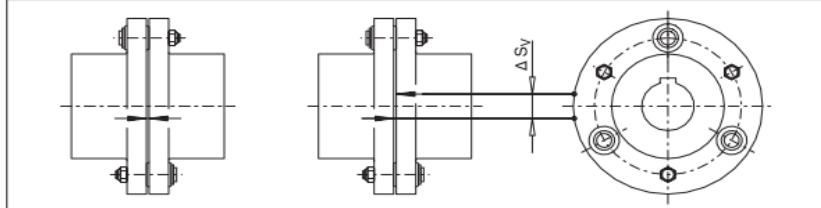
Figure 28: Magnetic discharge unit U5

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | | Actions / Notes | | | a | b | c | d | e | f | S |
| A | General maintenance | | | | | | | | | | | |
| | <> General visual inspection of all plant components | | daily | | | x | | | | | | |
| | <> Visual inspection for bulk material accumulations and dirt | | weekly (remove bulk material accumulations and dirt if necessary) | | | | x | | | | | |
| | <> Cleaning the surfaces of equipment items and electric components | | monthly | | | | | x | | | | |
| B | Steel structures and fasteners (bolts, nuts, pins etc.) | | | | | | | | | | | |
| | <> Check for corrosion | | every 6 months; Defects in the paint coating must be repaired under consideration of coating specification | | | | | | | | x | |
| | <> Check for: -- Deformation -- Loose joints of bolted, screwed and other connections -- Visual damage to welded connections | | every 6 months | | | | | | | | x | |
| | <> Check all fasteners like bolts, nuts, pins etc. for firm seating | | every 2 years | | | | | | | | | x |
| C | Local electrical appliances | | | | | | | | | | | |
| | <> Check for dirt | | monthly | | | | | | | x | | |
| | <> Check electrical connections for safe fixing / damage | | monthly | | | | | | x | | | |
| | <> Check for correct function | | monthly | | | | | | x | | | |
| D | Wear parts | | | | | | | | | | | |
| | <> Control of all rubber seals | | Seals are wear parts and must be controlled at regular intervals. Depending on the operating and ambient conditions, we recommend a monthly visual control. Worn | | | | | | | x | | |
| | <> Control of gearbox seals | | Seals are wear parts and must be controlled at regular intervals. Depending on the operating and ambient conditions, we recommend a monthly visual control. Worn | | | | | | | | x | |

Inspection and Maintenance Plan

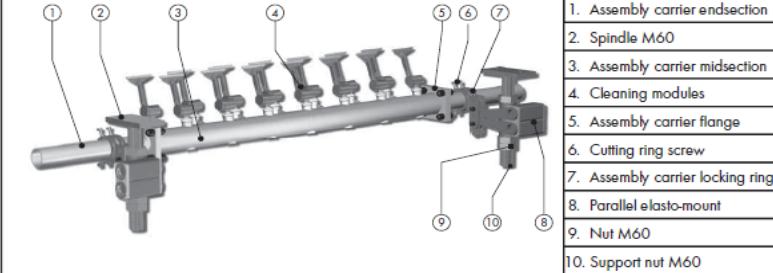
| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | a | b | c | d | e | f | S |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | | |
| Conveyor frame | | | | | | | | |
| 6 | Conveyor belt 2000.EP500/4-X-6:3 | see Manual 7 Register 7.4 | | | | | | |
| | <> Check for easy operation | daily visual inspection | x | | | | | |
| | <> Check if the running properties are correct | daily visual inspection | x | | | | | |
| | <> Check for damage | daily visual inspection; if necessary repair or replace the conveyor belt | x | | | | | |
| | <> Check if belt tension is correct | daily visual inspection; if necessary adjust belt tension | x | | | | | |
| 7 | Garlands, carrying idlers and carrying idler stations | see Manual 7 Register 7.12 | | | | | | |
| | <> Check idlers for early signs of failure | e.g. abnormally high noise or heavy vibrations | | x | | | | |
| | <> Check idlers for smooth running | if necessary, remove accumulation of conveyed material between carrying idler and carrying idler support or rather between carrying idler and conveying belt at the lower run | | x | | | | |
| | <> Check idler surface for contamination | remove adhering conveyed materials | | x | | | | |
| | <> Check carrying idlers for wear | Replace damaged carrying idlers Possible blockings or damages at the carrying idlers can occur because of: - blocking of the bearing due to penetration of dirt, conveying material or water or by means of oxidation - wear of the jacket pipe which could damage the belt due to holes and sharp edges at the idler jacket - wear of supporting rings and buffer rings - insufficient axial security device | | x | | | | |
| | <> Check fastenings of idler stations for tight fit | if necessary, re-tighten | | x | | | | |
| | <> Check the garland suspension | | | x | | | | |
| Discharge station | | | | | | | | |
| 8 | Discharge hood (1 pc) | | | | | | | |
| | <> Check visually the rubber scrapers for wear and adjustment | monthly visual inspection; - Replace if necessary | | x | | | | |
| | <> Check the rubber seals for wear or damage | visual check, if necessary readjust or replace | | x | | | | |
| | <> Check the wear plates for tightness and wear | monthly visual inspection and, if necessary, tighten nuts or replace worn-out plates | | x | | | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------|--------------|-------------------|------------|------------|-------------------|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | | a | b | c | d | e | f | S |
| 9 | Baffle plate (1 pc) | | | | | | | | | | | | | |
| | <> Check wear plates for tightness and wear | monthly visual inspection and, if necessary, tighten nuts or replace worn-out plates | | | | | | x | | | | | | |
| | <> Check the rubber seals for wear or damage | visual check, if necessary readjust or replace | | | | | | x | | | | | | |
| | <> Check visually if the bulk material hits the baffle plate at discharge point | monthly -- Re-adjust the baffle plate if necessary | Discharge station U1 | Baffle plate | Adjusting spindle | Hand wheel | Hand wheel | Adjusting spindle | | | | | | |
| | <> Lubricate the adjusting spindles | see lubrication plan | | | | | | | | | | | x | |
| 10 | Drive unit (1 pc) | see Manual 7 Register 7.1.1 | | | | | | | | | | | | |
| 10.1 | Gear unit B3SH09-A-RS (1 pc) | see Assembly and operating instructions BA 5010 for Gear units, chapter 10 | | | | | | | | | | | | |
| | <> Check oil temperatur | daily | | | | | | x | | | | | | |
| | <> Check for unusual gearunit noise | daily | | | | | | x | | | | | | |
| | <> Check oil level | monthly | | | | | | x | | | | | | |
| | <> Check gear unit for leaks | monthly | | | | | | x | | | | | | |
| | <> Test the water content of the oil | approx. 400 operating hours, at least once per year, see chapter 10.2.1 | | | | | | | | | | x | | |
| | <> Perform the first oil change | approx. 400 operating hours after start-up; see chapter 10.2.2 see also lubrication plan | | | | | | | | | | | x | |
| | <> Perform subsequent oil changes | every 24 months or 10 000 operating hours; see chapter 10.2.2 see also lubrication plan | | | | | | | | | | | x | |
| | <> Clean air filter | every 3 months; see chapter 10.2.3 | | | | | | x | | | | | | |
| | <> Clean fan and gear unit | Depending on requirements, at least every 2 years; see chapter 10.2.4 | | | | | | | | | | | x | |
| | <> Refill Taconite seals with grease | Every 3000 operating hours or at least every 6 months; see chapter 10.2.5 see also lubrication plan | | | | | | | | | | | x | |
| | <> Check hose lines | yearly; see chapter 10.2.10 | | | | | | | | | | x | | |
| | <> Change the hose lines | 6 years from the manufacturing date impressed; see chapter 10.2.10 | | | | | | | | | | | x | |
| | <> Check cooling coil | every 2 years; see chapter 10.2.7 | | | | | | | | | | | x | |
| | <> Check friction linings of torquelimiting backstop | once per year at least; see chapter 5.9 | | | | | | | | | | x | | |
| | <> Check auxiliary drive | see chapter 5.16 | | | | | | | | | | x | | |
| | <> Check tightness of fastening bolts | after first oil change, then every 2 years; see chapter 10.2.14 | | | | | | | | | | x | | |
| | <> Check shrink disk | every 12 months; see chapter 6.7.5 | | | | | | | | | | x | | |
| | <> Inspection of the gear unit | approx. every 2 years; see chapter 10.4 | | | | | | | | | | x | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Item No. | Equipment / Sub-assembly Description of scope of performances | | | | | | | | | | | | Actions / Notes | a | b | c | d | e | f | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.2 | Motor KV1R 315 M6 HB IL LL PT HW (1 pc) | | | | | | | | | | | | see Installation, Operating and Maintenance Instructions for Three-phase Asynchronous Motors with Squirrel-cage Rotor for Low Voltage Applications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> First inspection | | | | | | | | | | | | after about 500 operating hours, ½ year at the latest | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Control of air circulation and surface of motor | | | | | | | | | | | | depending on local environmental pollution | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Main inspection | | | | | | | | | | | | after about 10,000 operating hours or once a year | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Remove condensate water | | | | | | | | | | | | depending on the local environmental conditions | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Relubrication | | | | | | | | | | | | see lubrication plan | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.3 | Coupling RUPEX RBS 198 (1 pc) | | | | | | | | | | | | see Operating instructions BA 3600, chapter 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of the torsional backlash between the two coupling parts | | | | | | | | | | | | after 3 months, then at least once a year; | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| |  <p>Wear mark</p> <p>Wear mark for the torsional backlash</p> <table border="1"> <tr> <td>Size</td> <td>105</td> <td>125</td> <td>162</td> <td>228</td> <td>285</td> <td>360</td> <td>450</td> <td>560</td> <td>710</td> <td>900</td> <td>1120</td> <td>1400</td> <td>1800</td> </tr> <tr> <td></td> <td>144</td> <td>198</td> <td>252</td> <td>320</td> <td>400</td> <td>500</td> <td>630</td> <td>800</td> <td>1000</td> <td>1250</td> <td>1600</td> <td>2000</td> <td></td> </tr> <tr> <td>Wear mark ΔS_y in mm</td> <td>3.0</td> <td>3.5</td> <td>4.0</td> <td>4.5</td> <td>6.0</td> <td>7.0</td> <td>8.5</td> <td>10.0</td> <td>12.0</td> <td>13.5</td> <td>15.0</td> <td>18.0</td> <td>20.0</td> </tr> </table> | | | | | | | | | | | | Size | 105 | 125 | 162 | 228 | 285 | 360 | 450 | 560 | 710 | 900 | 1120 | 1400 | 1800 | | 144 | 198 | 252 | 320 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | | Wear mark ΔS_y in mm | 3.0 | 3.5 | 4.0 | 4.5 | 6.0 | 7.0 | 8.5 | 10.0 | 12.0 | 13.5 | 15.0 | 18.0 | 20.0 | The buffers must be replaced, when the torsional backlash exceeds the value stated in table. The buffers must be replaced in sets. Only identical buffers may be used. | | | | | | | |
| Size | 105 | 125 | 162 | 228 | 285 | 360 | 450 | 560 | 710 | 900 | 1120 | 1400 | 1800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 144 | 198 | 252 | 320 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Wear mark ΔS_y in mm | 3.0 | 3.5 | 4.0 | 4.5 | 6.0 | 7.0 | 8.5 | 10.0 | 12.0 | 13.5 | 15.0 | 18.0 | 20.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10.4 | Drum brake SL315-30/5 (1 pc) | | | | | | | | | | | | see Mounting and Operating Instruction for Drum Brakes Type SL, chapter 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Perform following checks and/or maintenance works: | | | | | | | | | | | | after 100 operating hours, after an emergency stop event and in case of brake distance respectively brake time do increase considerably | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of the reserve stroke | | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of the air gap (shoe clearance) | | | | | | | | | | | | The air gap has to be checked regularly and, if it is necessary, to be readjusted in order to guarantee a constant shoe clearance on both friction linings, also in case of the brake equipped with an automatic wear adjustment. | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of the friction linings and, if necessary, replacement of the brake shoes | | | | | | | | | | | | minimum thickness of 3 mm in case of bonded linings and 4 to 5 mm in case of riveted linings When achieving the minimum lining thickness, the worn-out friction linings must be replaced | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Control of adjustment and properly operation of the automatic wear adjustment | | | | | | | | | | | | see Operating Instructions, item 2.4 | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|---|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | | | | a | b | c | d | e | f | S |
| | <> Check the value of the adjusted braking torque | | | | | | | | | | | | | | | x |
| | <> Check the solidity of all screwings | | | | | | | | | | | | | | | x |
| | <> Check the Arbeitsbereitschaft sämtlicher Schalter | | | | | | | | | | | | | | | x |
| | <> Check the cleanliness and soft running of all bearings | the bearings including the pivoting pins must not be covered with paint in case of spray-painting | | | | | | | | | | | | | | x |
| | <> Check for existence of all cotter pins in the pivoting pins | | | | | | | | | | | | | | | x |
| | <> Check the condition of the brake drum | | | | | | | | | | | | | | | x |
| | <> Check the condition of the piston rod and impermeability of the releasing device | | | | | | | | | | | | | | | x |
| | <> Check the correct seat of steel bushes in the brake shoes | | | | | | | | | | | | | | | |
| 10.5 | Electrohydraulic thruster EB 300-50 (1 pc.) | see Users manual Electrohydraulic Thrusters | | | | | | | | | | | | | | |
| | <> refilling after repair | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 11 | Flange coupling (1 pc) | | | | | | | | | | | | | | | x |
| | <> Check the bolt connections for tight seating | visual check | | | | | | | | | | | | | | x |
| | <> Check for any change in the noise level | at least every three months The coupling must run with little noise and without vibration in all operating phases | | | | | | | | | | | | | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|---|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | | Actions / Notes | | | | | | a | b | c | d | e | f | S |
| 12 | Discharge pulley (1 pc) | | see Manual 7 Register 7.5 | | | | | | | | | | | | |
| | <> Lubrication | | see lubrication plan | | | | | | | | | | | x | |
| | <> Check the belt pulley for detection of visible damage, abnormal noise and vibrations | | | | | | | | | x | | | | | |
| | <> Check the bearing housings for detection of excessive temperatures (smoke formation) or excessive grease loss | | | | | | | | | x | | | | | |
| | <> Check the tensioning sets for technically perfect condition and firm seating of bolts | | | | | | | | | | | x | | | |
| | <> Inspection of pulley coating | | Every two months; replace coating in case thickness of smooth coating falls below 3 mm, or below 2 mm in case of chequered coating | | | | | | | | | x | | | |
| 13 | Pre-scraper Type B9S + PEM (1 pc) | | see Manual 7 Register 7.3 Installation and operating instructions for HOSCH Pre-scraper | | | | | | | | | | | | |
| | <> Visual inspection to check: - function of the device - cleaning efficiency - material discharge - working behavior - belt surface, belt junctions and patches | | directly after the first full working day, afterwards monthly | | | | | | | | | x | | | |
| | <> Assessment of the wear degree | | monthly, it is recommended to replace the parallel elasto-mounts (Pos. 7 in the figure) after approx. 8000 Bh | | | | | | | x | | | | | |
| | | | | | | | | | | | | | | | |
| | <> Cleaning of the scraper | | Make sure not to damage the anti-corrosion coat or the scraping edges of the cleaning blocks (Pos. 3 in the figure) | | | | | | | x | | | | | |
| | <> Service inspection including: - cleaning of all scraper components - functional check of all components - assessment and, if necessary, repair of anti-corrosion coat of all components - assessment of the degree of wear of all components - replacement of worn-out or damaged parts by original parts - installation and re-adjustment of the scraper | | at least every 4000 operating hours see Installation and operating instructions | | | | | | | | | | x | | |
| | | | Install new securing elements during each service inspection | | | | | | | | | | | | |

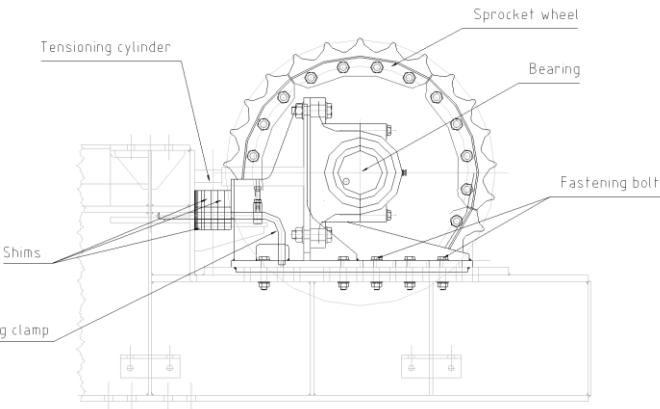
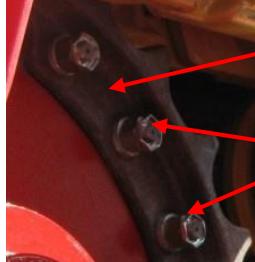
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--|--|--|--|--|---|---|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | | a | b | c | d | e | f | S |
| 14 | Main scraper Type C3 (1 pc) | see Manual 7 Register 7.3 Installation and operation instructions for HOSCH Sprung Blade scrapers | | | | | | | | | | x | | |
| | <> Visual inspection to check: - function of the device - cleaning efficiency - material discharge - working behavior - belt surface, belt junctions and patches | | | | | | | | | | | | | |
| | <> Assessment of the wear degree of the modules (Pos. 4 in the figure) and other wear parts | | | | | | | | | | | x | | |
| | |  | | | | | | | | | | | | |
| | <> Cleaning of the scraper | | | | | | | | | | | x | | |
| | <> Service inspection including: - cleaning of all scraper components - disassembly of the assembly carrier - functional check of all components - assessment and, if necessary, repair of anti-corrosion coat of all components - assessment of the degree of wear of all components - replacement of worn-out or damaged parts by original parts - installation and re-adjustment of the scraper | | | | | | | | | | | | x | |

Note the special information on maintenance in the add-on parts documentation!

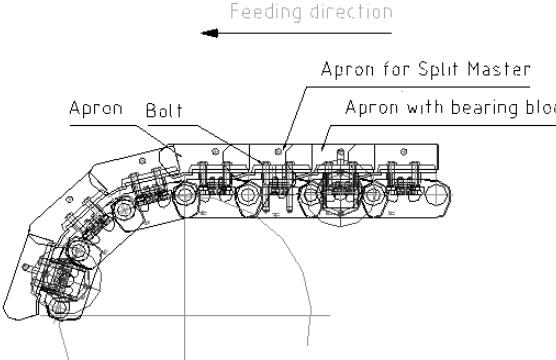
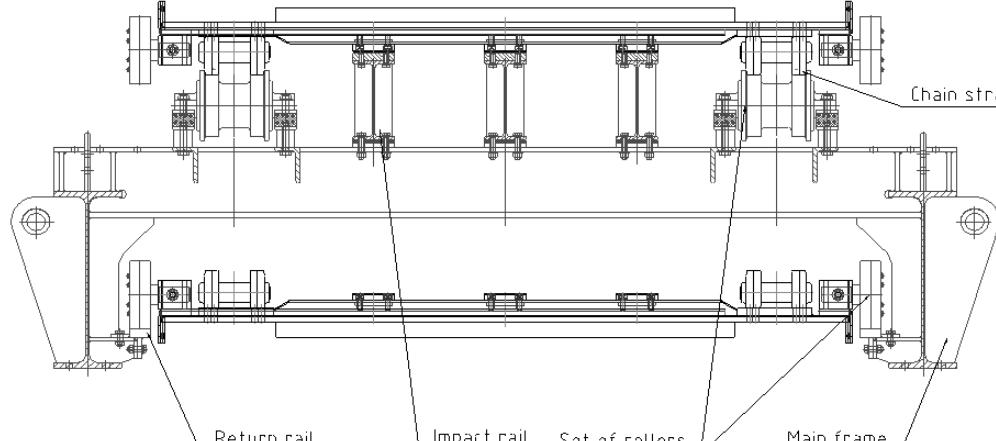
| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| A | General maintenance | | | | | | |
| | <> General visual inspection of all plant components | daily | x | | | | |
| | <> Visual inspection for bulk material accumulations and dirt | weekly (remove bulk material accumulations and dirt if necessary) | | x | | | |
| | <> Cleaning the surfaces of equipment items and electric components | monthly | | x | | | |
| B | Steel structures and fasteners (bolts, nuts, pins etc.) | | | | | | |
| | <> Check for corrosion | every 6 months; Defects in the paint coating must be repaired under consideration of coating specification | | | | x | |
| | <> Check for: -- Deformation -- Loose joints of bolted, screwed and other connections -- Visual damage to welded connections | every 6 months | | | x | | |
| | <> Check all fasteners like bolts, nuts, pins etc. for firm seating | every 2 years | | | | | x |
| C | Local electrical appliances | | | | | | |
| | <> Check for dirt | monthly | | x | | | |
| | <> Check electrical connections for safe fixing / damage | monthly | | x | | | |
| | <> Check for correct function | monthly | | x | | | |
| D | Wear parts | | | | | | |
| | <> Control of all rubber seals | Seals are wear parts and must be controlled at regular intervals. Depending on the operating and ambient conditions, we recommend a monthly visual control. Worn | | x | | | |
| | <> Control of gearbox seals | Seals are wear parts and must be controlled at regular intervals. Depending on the operating and ambient conditions, we recommend a monthly visual control. Worn | | | | | |
| Crushing station | | | | | | | |
| 1. | Inlet Hopper for Lignite | | | | | | |
| | <> Check the side walls for wear and damage | monthly (if necessary, weld in new steel plates) | | x | | | |
| 2. | Apron Feeder (Type AF2200X15) | | | | | | |
| 2.1 | General maintenance | | | | | | |
| | <> General visual inspection of apron conveyor components | daily | x | | | | |
| | <> Visual inspection for bulk material accumulation and dirt | daily (remove if necessary) | x | | | | |
| | <> Cleaning the surfaces of drive units and electric components | monthly | | x | | | |
| | <> Checking the feeding chute for wear and damage | monthly (replace if necessary) | | x | | | |

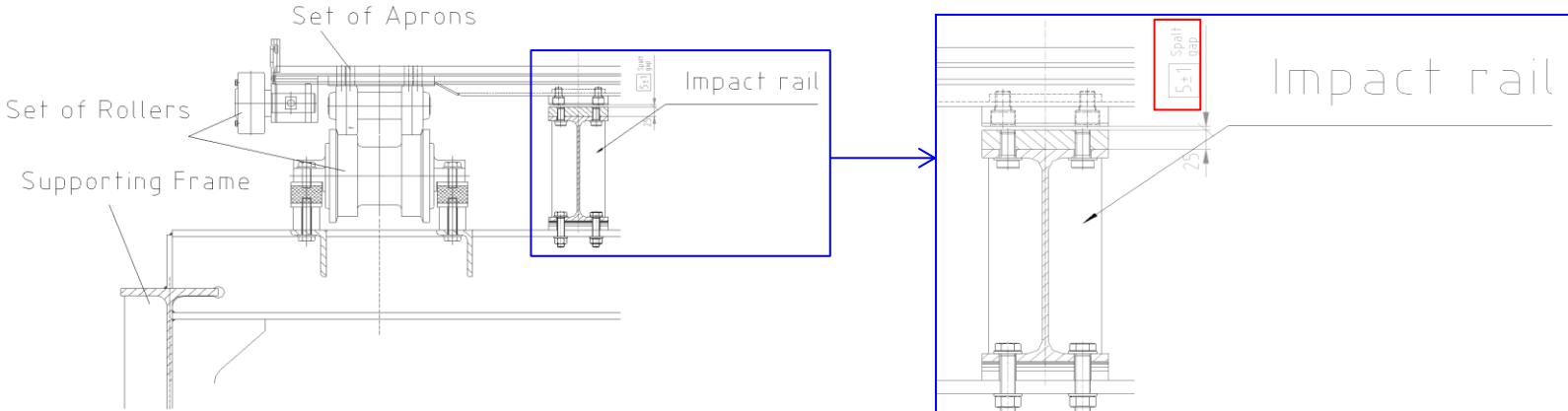
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.2 | Drive unit PHF072/T (KF157.DRE280S4) (1 pc) | see Manual 7 Register 7.1.1 | | | | | |
| 2.2.1 | Planetary gear PHF072/T (1 pc) | see Assembly and Operating Instructions for Planetary Gears | | | | | |
| | <> Check the housing temperature and gear unit noise | daily (max. temperature 100°) | | | | | |
| | <> Check gear unit for signs of leakage | monthly | | | | | |
| | <> Check the oil level | monthly (see chapter 7.4) | | | | | |
| | | <p>[1] The oil level must be within this range</p> | | | | | |
| | <> First oil change after initial startup | After 500 Bh (see chapter 7.6) | | | | | |
| | <> Check the oil consistency | Every 3000 Bh, at least every 6 months (see chapter 7.5) | | | | | |
| | <> Fill regreasable sealing systems with grease | at least every 6 months (see chapter 7.7) | | | | | |
| | <> Check whether retaining screws are tightly secured | at least every 12 months | | | | | |
| | <> Clean oil filter, replace filter element if necessary | at least every 12 months | | | | | |
| | <> Check breather plug, replace it if required | at least every 12 months (see chapter 7.8) | | | | | |
| | <> Check the alignment of the input and output shafts | at least every 12 months (see chapter 5.6) | | | | | |
| | <> Further oil changes | Depending on the operating conditions (see chapter 7.3), every 5 years at the latest. | | | | | |
| | | | | | | | |
| | <> Touch up or renew the surfaces/anticorrosion coating | Depending on external factors | | | | | |

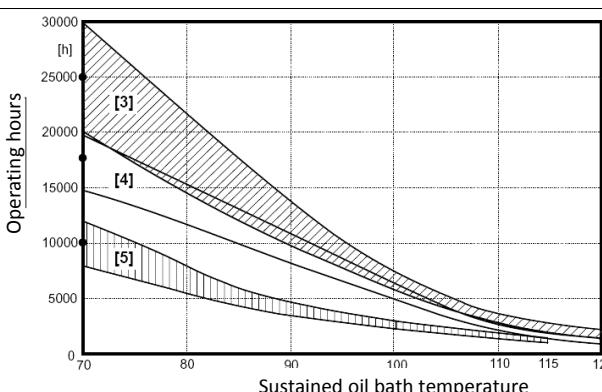
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.2.2 | Helical-bevel gear unit KF157 (1 pc) | see Assembly and Operating Instructions for Gear Units | | | | | |
| | <> Check oil and oil level | Every 3000 Bh, at least every 6 months | | | | x | |
| | <> Check running noise for possible bearing damage | Every 3000 Bh, at least every 6 months | | | | x | |
| | <> Visual inspection of the seals for leakage | Every 3000 Bh, at least every 6 months | | | | x | |
| | <> Check the rubber buffers of the torque arm | Every 3000 Bh, at least every 6 months; replace, if necessary | | | | x | |
| | <> Oil change | <p>According to operation conditions but not later than every 5 years (depending on oil temperature)</p> <p>-- See lubrication plan</p> <p>[3] CLP PG [4] CLP HC / HCE [5] CLP /HLP /E</p> | | | | | |
| | <> Replace rolling bearing grease | In combination with oil change -- See lubrication plan | | | | | x |
| | <> Replace oil seal (do not install it in the same track) | In combination with oil change | | | | | x |
| | <> Touch up or renew the surfaces/anticorrosion coating | Depending on external factors | | | | | x |
| 2.2.3 | Motor DRE280S4/TF/AL/NIB/R12 (1 pc) | see Operating Instructions for AC Motors | | | | | |
| | <> Inspect the motor: - Check rolling bearing and change if necessary | every 10000 operating hours; see chapter 7.6/8.7 | | | | | |
| | - Replace the oil seal | | | | | | |
| | - Clean the cooling air passages | | | | | | |
| | <> Touch up or renew the surfaces/anticorrosion coating | depending on external factors | | | | | |
| | <> Clean clogged bores | depending on external factors | | | | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.3 | Take-up station | see Manual 7 Register 7.1.3 Instruction Sheet for Hydraulic Cylinders / Hydraulic Hand Pumps | | | | | |
| | <> Check if chain tension is correct | | | | | x | |
| |  | 4 weeks after commissioning; later every 6 months - If necessary, re-tension the chain | | | | | |
| | | The tension of the apron chains can be adjusted stepwise by the take-up sprocket wheels. This tension adjustment is effected by hydraulic cylinders. | | | | | |
| | | The maximum admissible tension force of each chain is 100kN | | | | | |
| | <> Lubrication of the hydraulic tension station | see lubrication plan | | | | | |
| 2.4 | Chain sprockets of take-up and drive stations (4 pcs) | | | | | | |
| | <> Check the chain visually for - Dirt - General condition - Firm seating of fasteners | Daily visual inspection | x | | | | |
| | <> Check for smooth run, wear (especially the gear flanks) and completeness and/or firm seating of fasteners | Every 6 months <> If necessary, replace the gear rims - Place the gear rim segment so that the tooth segment to be replaced is free. - If necessary, replace the bolts and tighten them by hand. | | | x | | |
| |  | | | | | | |

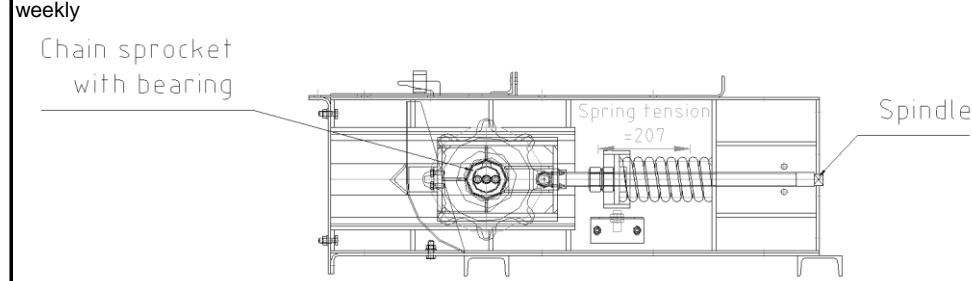
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.5 | Pillow block housings SD3160TSAL/ SD3160TSBF/ S3030K (4 pcs) | | | | | | |
| | <> Check the bearing housing for: - visible damage - firm seating of the fixing elements - high noise level - temperature rise at the bearing housing - excessive grease loss at the bearing housing | daily | x | | | | |
| | <> Bearing relubrication | see lubrication plan | | | | | x |
| | <> Labyrinth seal relubrication | see lubrication plan | | | | | x |
| 2.6 | Chain strand PR06.80 (4 pcs) | see Manual 7 Register 7.1.2 Installation and Maintenance Guidelines for Crawler Components | | | | | |
| | <> Check the chain strands for: -- tightness of the chain (for oil and grease lubricated tracks only) | | | | | | |
| | -- tensioning and slack of the chain | daily visual inspection | x | | | | |
| | -- state and wear of chain bearing surface, bushing | daily visual inspection | x | | | | |
| | -- exterior diameter and elongation of the chain | monthly visual inspection | | x | | | |
| | -- state and wear of the grouser shoe | monthly visual inspection | | x | | | |
| | <> Lubrication | see lubrication plan | | | | | x |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.7 | Chains, aprons, impact and return rails | | | | | | |
| | <> Visual check for - dirt, foreign material - general condition (wear, damage) - firm seating of the fixing elements | | | | | x | |
| | <> Check for smooth running, wear, completeness and firm seating of the fixing elements | monthly - If necessary, replace the worn out part | | | x | | |
| | <> Check if the torque for tightening of chain bolts is correct | 50 to 100 service hours after erection, later every 6 months. - If necessary, re-tighten the bolts with the specified torque of 320 ± 40 Nm and one additional 1/3 turn. | | | x | | |
| |   | | | | | | |

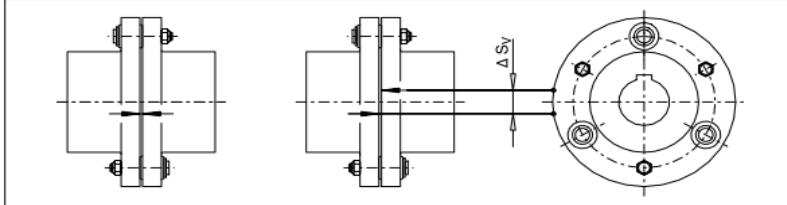
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 2.8 | Impact rails (3 pcs) | | | | | | |
| | <> Visual check of the wear plates for wear | replace worn out wear plates | | x | | | |
| | <> Check the air gap between wear plates of the impact rails and wear plates of the pans | The air gap should be approx. 5 ± 1 mm -- if the gap is greater than 6mm, check the condition of the wear plates -- if the gap is less than 4mm, check the pre-tension of the chain | | x | | | |
| |  | | | | | | |
| 2.9 | Track rollers (78 pcs), return rollers (64 pcs) | | | | | | |
| | <> Visual check for - free movement - general condition (wear, damage) - firm seating of the fixing elements | Daily visual inspection | x | | | | |
| | <> Check visually the running rate of return rollers on return bars | Monthly - Remove dirt from upper edges of return bars, if necessary. | | x | | | |

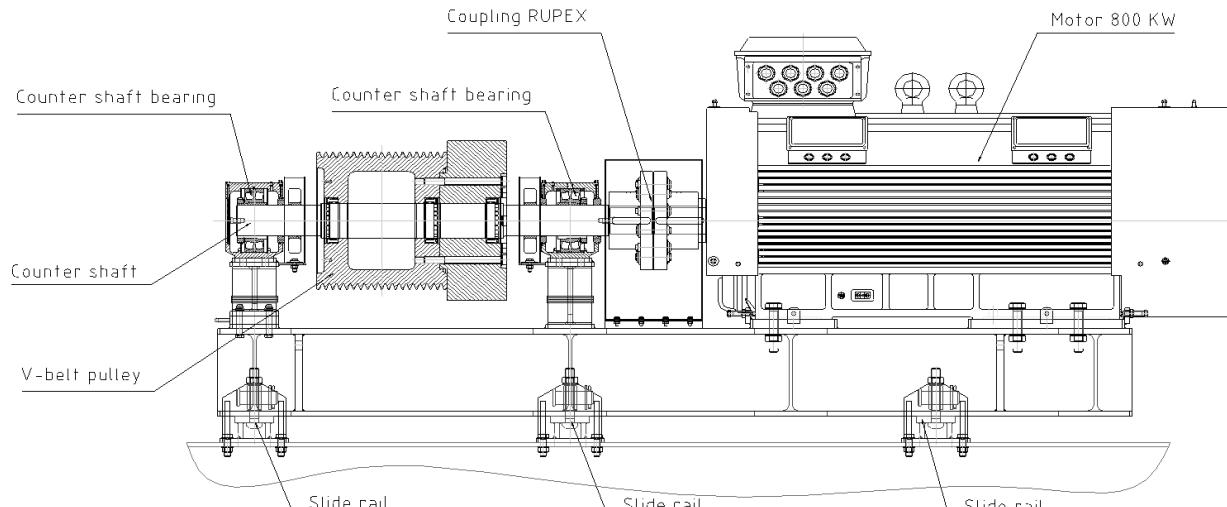
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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 3 | Spillage Conveyor | | | | | | |
| 3.1 | General maintenance | | | | | | |
| | <> General visual inspection of conveyor components | daily | | x | | | |
| | <> Visual inspection for bulk material accumulations and dirt | daily (remove if applicable) | | x | | | |
| | <> Cleaning the surfaces of drive units and electric components | monthly | | | x | | |
| 3.2 | Drive unit KHF107 DRE132M4/TF/AL (1 pc) | see Manual 7 Register 7.2 | | | | | |
| 3.2.1 | Motor DRE132M4/TF/AL (1 pc) | see Operating Instructions for AC Motors | | | | | |
| | <> Inspect the motor: | every 10000 operating hours; see chapter 7.6/8.7 | | | | | x |
| | - Check rolling bearing and change if necessary | | | | | | |
| | - Replace the oil seal | | | | | | |
| | - Clean the cooling air passages | | | | | | |
| | <> Touch up or renew the surfaces/anticorrosion coating | depending on external factors | | | | | x |
| | <> Clean clogged bores | depending on external factors | | | | | x |
| 3.2.2 | Helical-bevel gear unit KHF107 (1 pc) | see Assembly and Operating Instructions for Gear Units | | | | | |
| | <> Check oil and oil level | Every 3000 Bh, at least every 6 months | | | | x | |
| | <> Check running noise for possible bearing damage | Every 3000 Bh, at least every 6 months | | | x | | |
| | <> Visual inspection of the seals for leakage | Every 3000 Bh, at least every 6 months | | | x | | |
| | <> Check the rubber buffers of the torque arm | Every 3000 Bh, at least every 6 months; replace, if necessary | | | x | | |
| | <> Oil change | According to operation conditions but not later than every 5 years (depending on oil temperature) -- See lubrication plan  [3] CLP PG [4] CLP HC / HCE [5] CLP /HLP /E | | | | | |
| | <> Replace rolling bearing grease | In combination with oil change -- See lubrication plan | | | | | x |
| | <> Replace oil seal (do not install it in the same track) | In combination with oil change | | | | | x |
| | <> Touch up or renew the surfaces/anticorrosion coating | Depending on external factors | | | | | x |

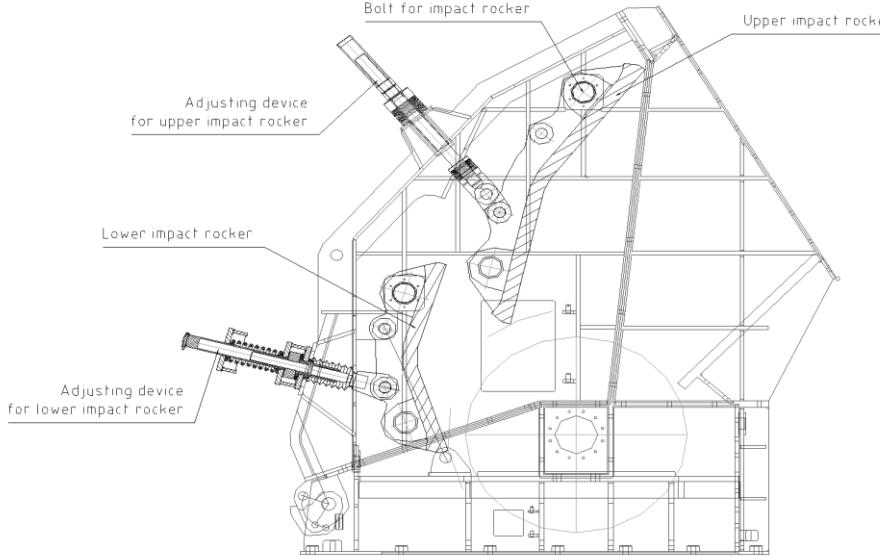
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| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 3.3 | Take-up station | | | | | | |
| | <> Inspection of take-up shaft -- Check the shaft for visible damage, abnormal noises or vibrations -- Check the bearing housings for excessive heating or high loss of grease | weekly | | | | x | |
| | <> Check if chain tension is correct | weekly | | | | x | |
| | <> Re-grease the bearings | See lubrication plan | | | | | x |
| 3.4 | Drive shaft | | | | | | |
| | <> Inspection of drive shaft -- Check the shaft for visible damage, abnormal noises or vibrations -- Check the bearing housings for excessive heating or high loss of grease | weekly | | | | x | |
| | <> Re-grease the bearings | See lubrication plan | | | | | x |
| 3.5 | Round steel chain and follower | | | | | | |
| | <> Check visually for wear | monthly visual inspection - If necessary, re-tighten fasteners or replace follower | | | x | | |
| 3.6 | Trough | | | | | | |
| | <> Check visually for wear | monthly visual inspection - If necessary, replace the wear bars | | x | | | |
| 4 | Crusher inlet chute | | | | | | |
| 4.1 | Wear parts | | | | | | |
| | <> Check the wear plates for firm seating, damages and wear | if necessary tighten the fastening bolts or replace the wear plates | | | x | | |
| | <> Check the rubber for wear | visual check, if necessary change | | x | | | |



| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 5 | Impact Crusher PB 1822 PP | | | | | | |
| 5.1 | General maintenance | | | | | | |
| | <> General visual inspection of crusher components | daily | | x | | | |
| | <> Visual inspection for bulk material accumulations and dirt | daily (remove if necessary) | | x | | | |
| | <> Cleaning the surfaces of equipment items and electric components | monthly | | | x | | |
| 5.2 | Housing | | | | | | |
| | <> Check to assess the general condition | weekly | | x | | | |
| | <> Check wear plates for firm seating and wear | weekly visual check | | x | | | |
| | <> Check for dust tightness | weekly | | x | | | |
| | <> Check the rubber parts and seals for damage and wear | monthly | | | x | | |
| 5.3 | Crusher rotor (1 pcs) | | | | | | |
| | <> Check crusher rotor for: - visual damage - heavy vibrations - change of operating noise | weekly daily daily | | x | | | |
| 5.4 | Rotor shaft bearings (2 pcs) | | | | | | |
| | <> Check the bearings for excessive temperature and abnormal noises | daily disassemble bearing if necessary | | x | | | |
| | <> Lubrication of shaft bearings | see lubrication plan | | | | | x |
| | <> Lubrication of bearing labyrinth | see lubrication plan | | | | | x |
| 5.5 | V-belt pulleys 8V (2 pcs) | | | | | | |
| | <> Check V-belt pulleys for: - Firm seating - Arrangement towards drive unit | before commissioning, thereafter daily visual check daily visual check; if necessary, re-arrange the drive unit | | x | | | |
| | <> Check of running noises | daily | | x | | | |
| 5.6 | V-belt (18 pcs) | | | | | | |
| | <> Check pre-tensioning of V-belts | first inspection after 0,5 to 4 Bh, thereafter daily visual control; if necessary, adjust the tension of V-belts | | x | | | |
| | <> Re-tensioning of V-belts | monthly; Belt tension: 2418 N new v-belt; 1860 N used v-belt | | x | | | |
| | <> Check of running noises | daily | | x | | | |

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| Item No. | Equipment / Sub-assembly Description of scope of performances | | Actions / Notes | | | | | | | | | | a | b | c | d | e | f | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.7 | Drive unit (1 pc) | | see Manual 7 Register 7.3.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.7.1 | Motor K8MR450L6 (1 pc) | | see Installation and Maintenance Instructions for Squirrel Cage Motors | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Visual control of all components: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | - Check of operation behaviour, temperatures, vibrations, noise | | daily | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> General inspection and cleaning | | annually or every 8600 Bh; Cleaning requires the use of vacuum cleaners or compressed air, it must be oil and water-free! | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of insulation resistances and lubricant behaviour | | annually or every 8600 Bh | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Control of shaft alignment | | after 1st week operation, then monthly or every 720 Bh | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Re-lubrication of anti-friction bearings | | see lubrication plan | | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Note: after 1st week operation one extra lubrication, further recommended lubrication intervals according grease schedule; continuous bearing monitoring if necessary | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Control and cleaning of windings | | Corresponding to the operation conditions in 1-3 years periods. The windings must be refurbished with electro-insulation varnish. | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of cooling-system (ribs, tubes, fans, water, filter) | | daily control | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Filter change | | annually or every 8600 Bh | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.7.2 | Coupling RUPEX RWN 450 (1 pc) | | see Operating instructions BA 3600, chapter 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <> Check of the torsional backlash between the two coupling parts | | after 3 months, then at least once a year; | | | | | | | | | | | | | | | x | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Wear mark | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Wear mark for the torsional backlash | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Size</th> <th>105</th> <th>125</th> <th>162</th> <th>228</th> <th>285</th> <th>360</th> <th>450</th> <th>560</th> <th>710</th> <th>900</th> <th>1120</th> <th>1400</th> <th>1800</th> </tr> </thead> <tbody> <tr> <td></td> <td>144</td> <td>198</td> <td>252</td> <td>320</td> <td>400</td> <td>500</td> <td>630</td> <td>800</td> <td>1000</td> <td>1250</td> <td>1600</td> <td>2000</td> <td></td> </tr> </tbody> </table> | | Size | 105 | 125 | 162 | 228 | 285 | 360 | 450 | 560 | 710 | 900 | 1120 | 1400 | 1800 | | 144 | 198 | 252 | 320 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | | | | | | | | | | | | | | | | | | |
| Size | 105 | 125 | 162 | 228 | 285 | 360 | 450 | 560 | 710 | 900 | 1120 | 1400 | 1800 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 144 | 198 | 252 | 320 | 400 | 500 | 630 | 800 | 1000 | 1250 | 1600 | 2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Wear mark ΔSy in mm | | 3.0 3.5 4.0 4.5 6.0 7.0 8.5 10.0 12.0 13.5 15.0 18.0 20.0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 5.8 | Counter shaft bearings (2 pcs) | | | | | | |
| | <> Check the bearings for excessive temperature and abnormal noises | weekly | | | x | | |
| | <> Lubrication of shaft bearings | see lubrication plan | | | | | x |
| | <> Lubrication of bearing labyrinth | see lubrication plan | | | | | x |
| 5.9 | Slide rail (3 pcs) | | | | | | |
| | <> Visual control for: - damage - firm seating | weekly | | | x | | |
| | <> Lubrication of take-up spindles | see lubrication plan | | | | | x |
| | |  <p>The diagram illustrates a mechanical system. On the left, a V-belt pulley is connected to a counter shaft bearing. The counter shaft is supported by two counter shaft bearings. A coupling labeled 'RUPEX' connects the counter shaft to a motor labeled 'Motor 800 KW'. The motor is mounted on a base. Two slide rails are shown at the bottom, each supported by a pair of slide rail bearings. The entire assembly is mounted on a foundation.</p> | | | | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 5.10 | Adjusting device for upper impact rocker (2 pcs) | | | | | | |
| | <> Coat take-up spindles and disc springs with grease | see lubrication plan | | | | | x |
| | <> Inspection to assess the condition of thread and the fixture of threaded spindles, check for deformation | weekly visual inspection | x | | | | |
| | <> Inspection of disc springs | weekly visual inspection | x | | | | |
| | |  | | | | | |
| 5.11 | Adjusting device for lower impact rocker (1 pc) | | | | | | |
| | <> Coat adjusting spindles with grease | see lubrication plan | | | | | x |
| | <> Check the condition of thread and the fixture of spring pre-stressing spindles, check for deformation | weekly visual inspection | x | | | | |
| | <> Coat spring spindles with grease | see lubrication plan | | | | | x |
| | <> Coat compression springs and disc springs with grease | see lubrication plan | | | | | x |
| | <> Inspection of disc springs | weekly visual inspection | x | | | | |
| | <> Inspect the clip seat of bellows | weekly visual inspection | x | | | | |
| 5.12 | Suspension pin for impact rocker (4 pcs) | | | | | | |
| | <> Check the pin fixture and fastening screws for firm seating | weekly visual inspection | x | | | | |
| | <> Re-lubrication | see lubrication plan | | | | | x |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| 5.13 | Hydraulic system (1 pc) | see Manual 7 Register 7.3.3 | | | | | |
| | Maintenance tasks and interventions in the functional system may be executed by authorised and trained staff only. During work on the hydraulic system (replacement of components or maintenance) the electric actuators must be free of current and the device concerned must be depressurised. Shut-off valves are to be closed, pumps turned off, pressure accumulators discharged. Closed valves and open switches are to be fixed with a warning sign: "Do not turn on. Maintenance work underway". Tighten fittings only in a depressurised state. When replacing valves, pumps, filter elements etc., use only original spare parts. If electrical control elements have been replaced, proper integration into the locking conditions must be tested. Switching points and output signals must be checked. | | | | | | |
| <> General visual inspection of the system components | daily visual inspection | x | | | | | |
| <> Check system for any unusual noises or vibrations | Search for causes and eliminate them. | x | | | | | |
| <> Check temperatures at hydraulic units, valves, hydraulic cylinders, hydraulic motors and in the conduit network | At elevated temperatures, seek causes and eliminate them. | x | | | | | |
| <> Check contamination of filter elements | If necessary, clean filter or replace filter elements at the latest after soiling indication. | x | | | | | |
| <> Check oil despite electrical monitoring | Refill oil if necessary. Note oil grade! If available, use filling unit (e.g. OF7). | x | | | | | |
| <> Check all fasteners, such as screws, nuts, bolts | If necessary, retighten | x | | | | | |
| <> Inspect the conduits and hoses for freedom from leakage, firmness and hose quality (connections, flanges, screw connections, fastenings, abrasion and kinks) | Eliminate defects if necessary Observe hose-replacement cycles (6 years) | x | | | | | |
| <> Check oil state | Replace immediately and eliminate the cause of dark discoloured, foamy, milky, turbid or slimy oil | x | | | | | |
| <> Check pressure, performance, sound, electrical connections and control voltage | Adjust or set to the preset values if necessary (see manufacturer documentation) | x | | | | | |
| <> Check the coupling slack | Replace sprocket if necessary | | x | | | | |
| <> Monitor nitrogen-charging pressure | Refill nitrogen if necessary, check pressure accumulator for tightness | | x | | | | |
| <> Check valves, cylinders, pipes and hoses for leakage | Eliminate leaks | | x | | | | |
| <> Inspection of signal and measurement value of pressure transmitter | Output signals of the pressure transmitter must be checked with an external pressure measurement indicating device (for example, a precision pressure gauge). Replace if necessary. | | x | | | | |
| <> Examine the external condition of the system (dirt and damage) | If necessary clean and repair any damage | | | x | | | |
| <> Check set values and functioning of all safety-related parts | Functioning of pressure-limiting, pressure-sequence, pressure cut-out and pressure-reducing valves, flow control and throttle-check valves as well as pressure gauges and pressure switches so far as system specificity allows | | | | x | | |

| Legend of maintenance intervals: a - Daily; b - Weekly; c - Monthly; d - Every 3 months; e - Every six months; f - Yearly; S - Special intervals; Bh - Service hours | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---|---|---|---|---|
| Item No. | Equipment / Sub-assembly Description of scope of performances | Actions / Notes | | | | | |
| | | a | b | c | d | e | f |
| | <> Change air filter | | | | | | x |
| | <> Check for corrosion | | | | | | x |
| | <> Oil change | | | | | | x |
| | Hydraulic unit | | | | | | |
| |  <p>pressure gauge check valve return line filter oil level gauge motor tank breather filter oil tank oil sump</p> | | | | | | |
| | | hydraulic cylinder right | | | | | |
| | | | | | | | |
| | | hydraulic cylinder left | | | | | |
| | | | | | | | |
| 6 | Crusher outlet chute | | | | | | |
| 6.1 | Wear parts | | | | | | |
| | <> Check the wear plates for firm seating, damages and wear | if necessary tighten the fastening bolts or replace the wear plates | | | | | |
| | <> Check the rubber seal for wear | visual check, if necessary change | | | | | |

OPERATING INSTRUCTIONS

Semi Mobile Crushing Station

Manual 4 Design and Function

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1 DESIGN AND FUNCTION

1.1 General Description

Semi-mobile crushing equipment is used for transporting coal, mixed with xylitol, from a nearby open cast mining to an open air coal storage (not in scope of supply) inside a power plant.

The entire equipment consists of two main components:

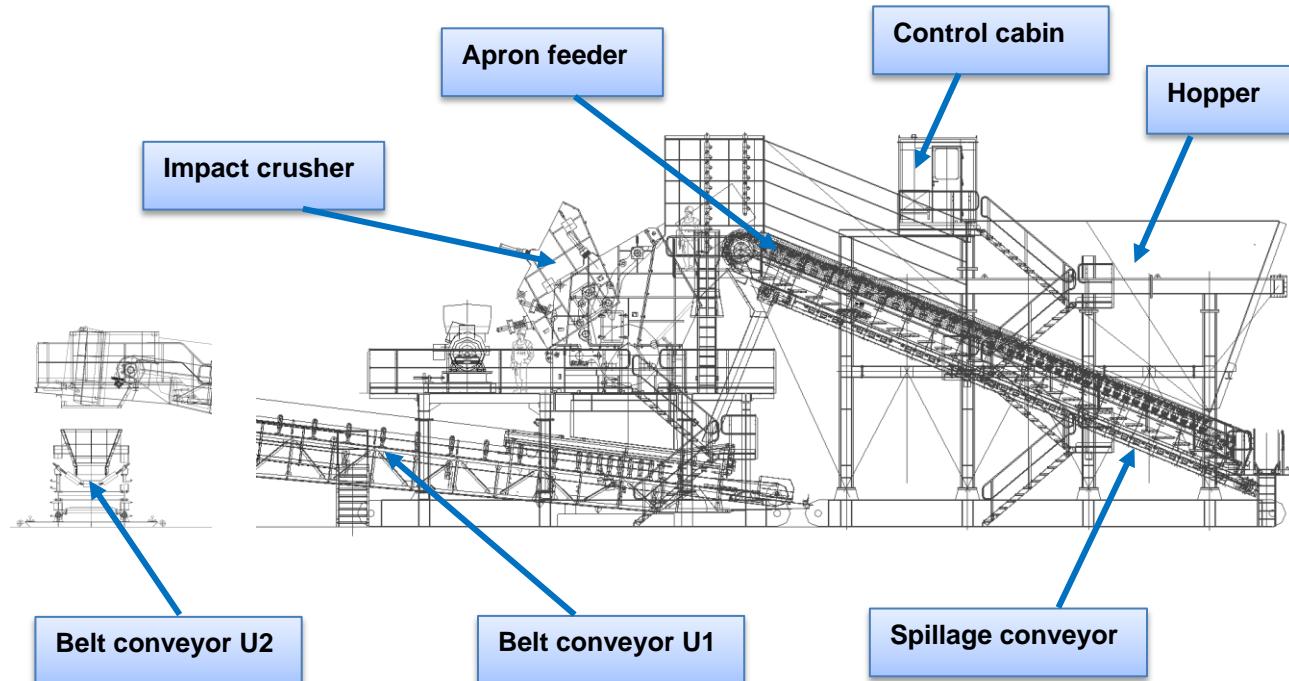
- Crusher station for twin truck feeding,
- Belt conveyor system with 1 line for feeding the power plant open air stockpiles.

The crusher station is designed to feed an apron feeder by trucks from 2 sides. During unloading, trucks dump the coal-xylitol-mix through a hopper to the loading surface of the apron feeder. It starts and carries the material along a slope to its top point and discharges the load into a chute with a running impact crusher below.

Big lumps of coal and long pieces of xylitol are cracked inside the crusher immediately and the outgoing material falls through a chute to the loading table of the first belt conveyor with flowing sequence.

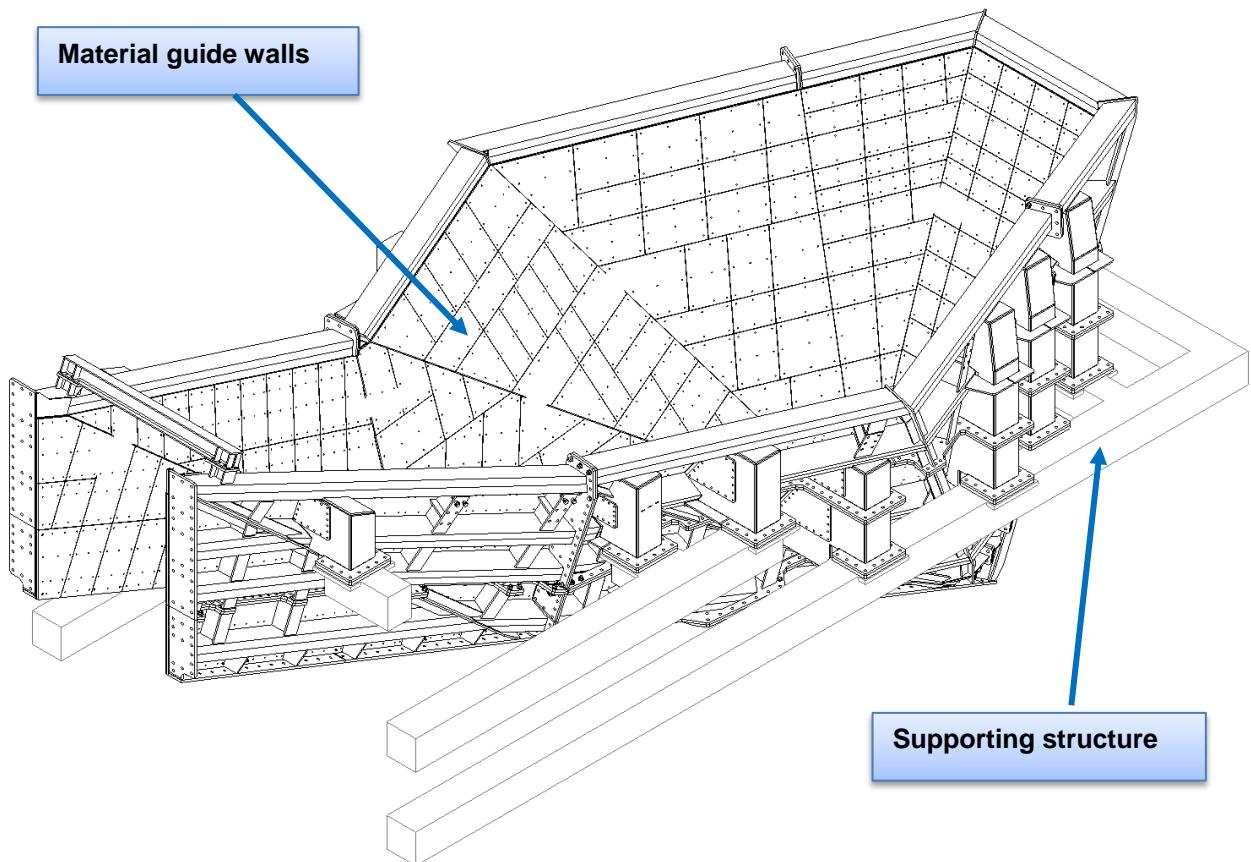
The conveyor system consists of a continuous belt conveyor line involving conveyors U-1 to U-5 with a common length of 2937m.

In the immediate vicinity of the crusher station, there is an operator cabin installed to control the handling process of the crushing station and the belt conveyor system. This cabin is designed for a continuous presence of an operator.



1.2 Feeder Hopper

The feeder hopper accepts material discharged by dump trucks from the loading ramps, which are designed in a way allowing the trucks to approach the hopper backwards from two sides. The hopper is made as a solid robust construction. Its material guide walls are lined with RCH1000 plates. The base frame and supporting structure of sectional steel components are designed to accommodate the feeder hopper and its outlet walls.



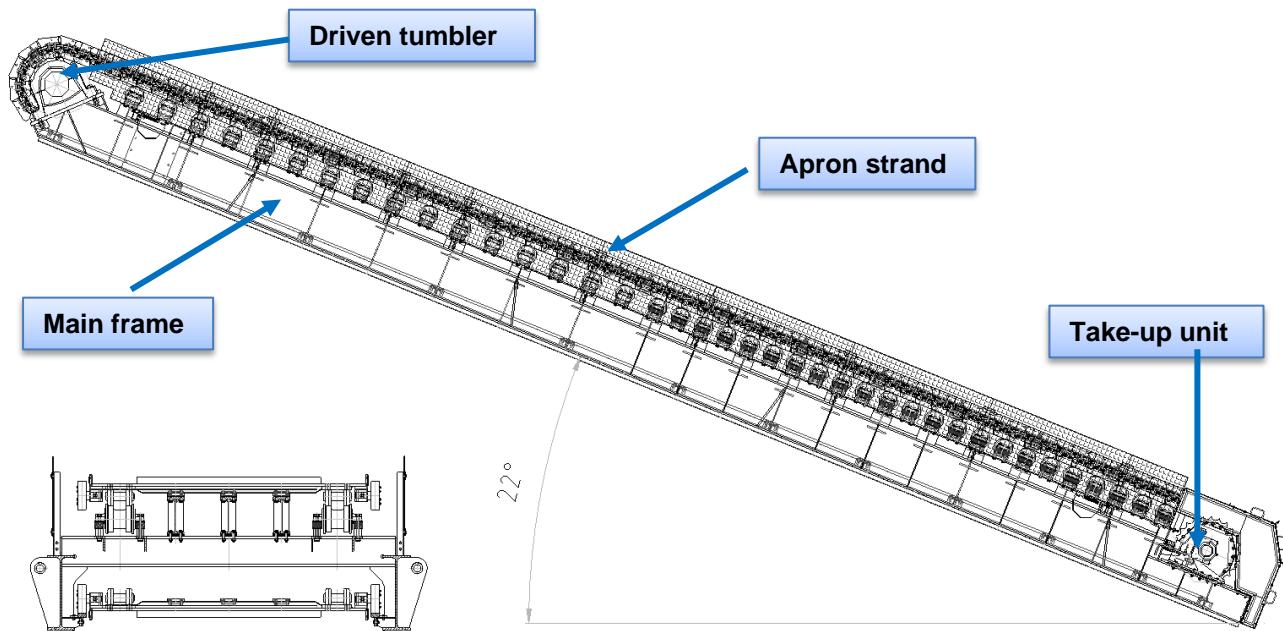
1.3 Apron Feeder AF 2200 x 15

1.3.1 General Notes

The apron feeder is a flat steel plate conveyor. It is the first drive in the conveying sequence and has a capacity of three truck loads (two truck unloading ramps allow double unloading). During unloading operation, the coal falls from the dump truck into a hopper at which base the apron feeder is situated. The material is transported along a slope to the top point of the apron feeder where it is discharged into a further chute, which guides the coal directly into the crusher. Capacitive material detectors on the ground and on top report to the control system if the chute is filled or free for a new truck unloading operation.

The apron feeder consists basically of following main components:

- main frame,
- apron strand,
- driven tumbler,
- drive unit,
- take-up unit,
- set of rollers,
- set of impact rails.



1.3.2 Main Frame

All components of the apron feeder are mounted on the main frame which is designed as a welded structure built up by two longitudinal girders and numerous cross beams.

1.3.3 Apron Strand

The apron strand consists of individual aprons. The pulling unit is formed by means of two track chains which are arranged in the double-link style.

The individual aprons are fastened on the chain links. The gap between adjacent aprons is closed with a seal so that material cannot penetrate between the aprons even when moving around the sprocket wheels.

The aprons are fabricated in welded design.

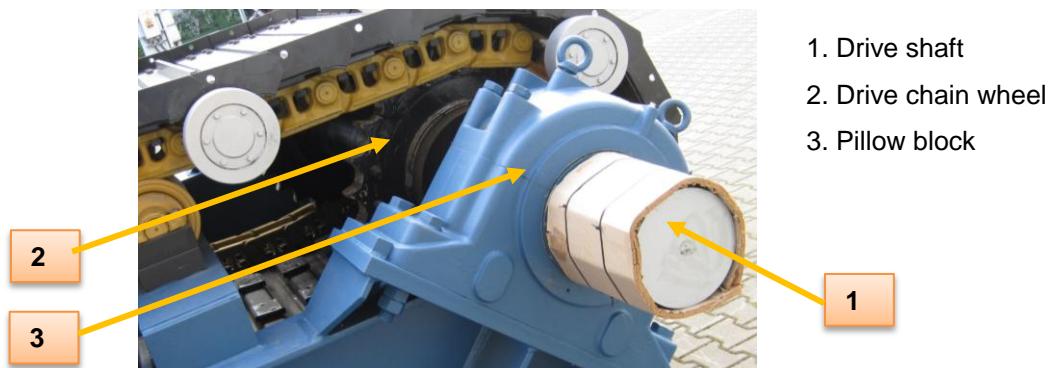
The complete apron strand is guided in the upper run by means of rigidly fixed and maintenance-free track rollers. Below the apron strand, there are arranged impact rails which absorb the loading impact resulting from feeding operation.

The return rollers are installed on both sides under the aprons. These rollers run on rails fitted to the carrying frame in the return strand. The chain is guided over a drive sprocket and a return sprocket.



1.3.4 Driven Tumbler

The driven tumbler is formed by a drive shaft with drive chain wheels and pillow blocks containing spherical roller bearings. The drive chain wheels with replaceable gear segments are fixed to the drive shaft by means of taper keys.



1.3.5 Drive Unit

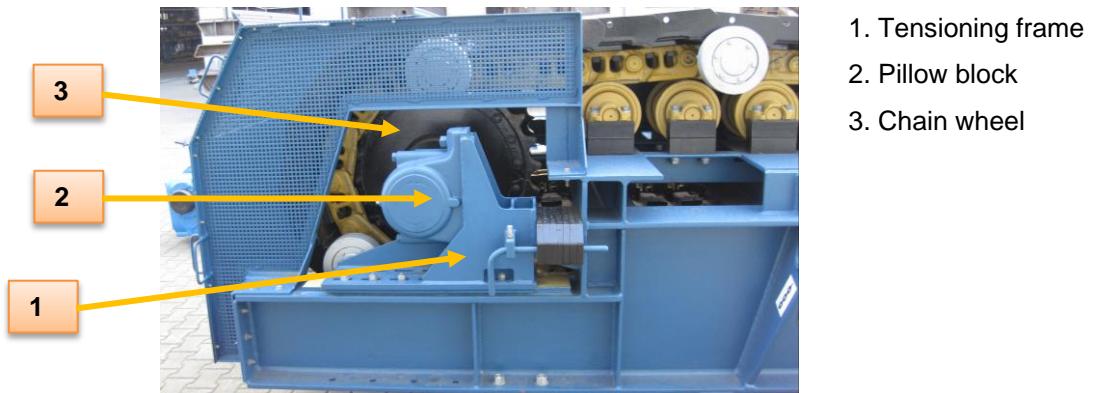
The apron feeder is driven by a planetary-gear motor. The connection between the gearbox and the drive shaft is established by a shrink disc. The entire drive unit is linked with the carrying frame of the apron feeder via a torque arm.

1.3.6 Take-up Unit

The take-up unit consists of a moveable tensioning frame with the two pillow blocks, bolted to the frame. Both chain wheels with replaceable gear segments are bolted to the tensioning shaft.

The tension of the apron chains can be adjusted in stages of 1 mm each by means of the take-up chain wheels.

The tension adjustment is effected by hydraulic cylinders.



1.4 Spillage Conveyor KGF 2490 x 15,1

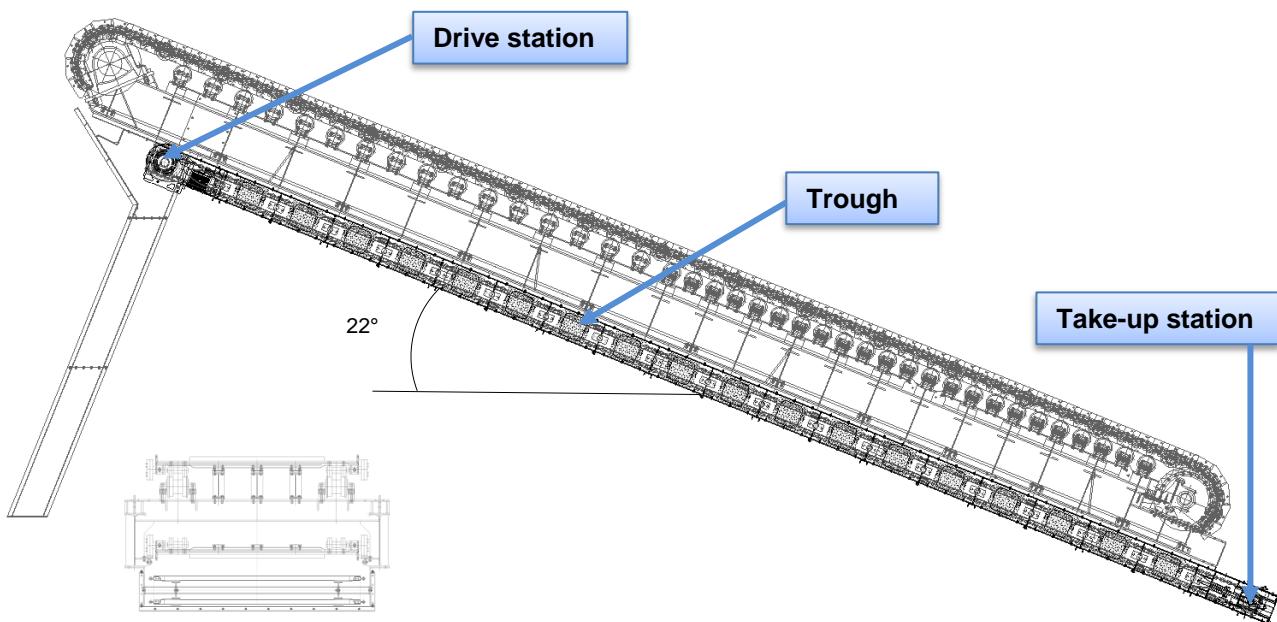
1.4.1 General Notes

The spillage conveyor is located below the apron feeder. It is aimed to remove any coal pieces falling from the lower run of the apron feeder. The material falls through between the upper run scrapers of the spillage conveyor and is further transported by its lower run scrapers to a spillage chute.

The spillage chute guides the coal powder beside the crusher directly to the upper surface of the belt conveyor U-1.

The spillage conveyor consists basically of following main components:

- trough,
- drive station,
- take-up station.



1.4.2 Trough

The trough is a sheet steel structure. It is equipped with scraper guides and wear rails used for scrapers to slide.

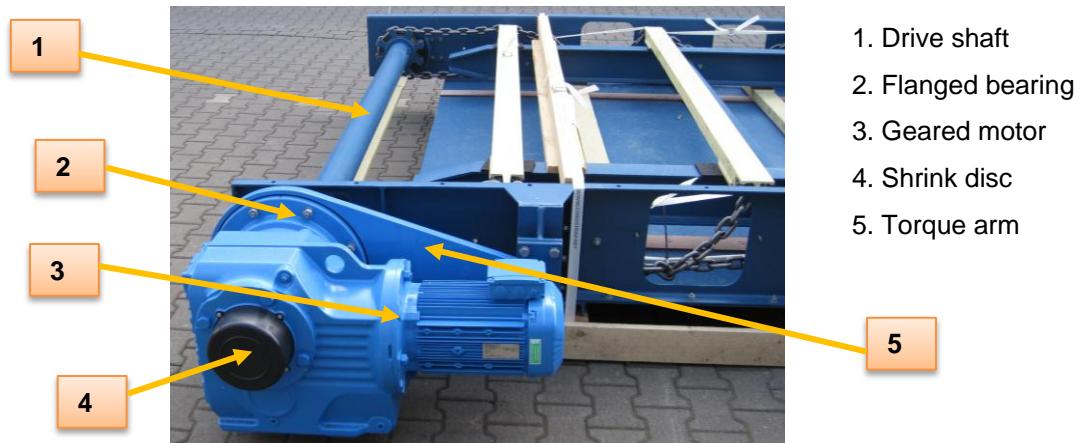
The scrapers spaced at intervals of 1000 mm are mounted on the round steel chains. They guide spillage material falling into the trough back into the flow of the conveyed material.



1.4.3 Drive Station

The drive station consists of a drive shaft which passes through the trough and is supported laterally by flanged bearings. Two chain sprockets are fixed on the shaft by means of gib keys.

The driving unit consisting of a bevel geared motor is mounted onto the drive shaft. The geared motor is connected with the drive shaft in the force-closed manner by means of a shrink disc. The torque arm of the geared motor is fastened on the base frame.



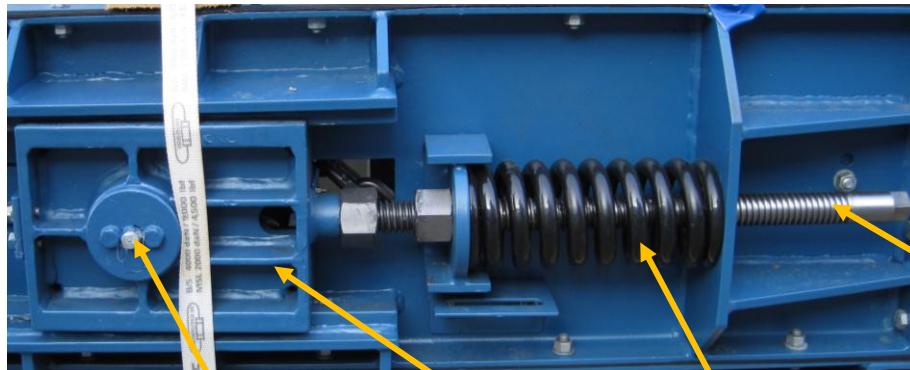
1.4.4 Take-up Station

The take-up station is designed as a spindle tensioning station. The necessary pre-tensioning of the chain strands is reached by turning the take-up spindles (on both sides).

By turning the take-up spindles, the springs get tensioned (compressed) and the position of the sliding block changes.

The springs are necessary to compensate the polygon effect of the chain sprockets and impacts. The sliding blocks accommodate the take-up shaft which holds chain sprockets supported by bearings.

On the end faces of the tensioning shaft, there are provided grease nipples which supply the chain sprockets with lubricant.



1. Take-up spindle
2. Compression spring
3. Sliding block
4. Grease nipple

1.5 Impact Crusher PB 1822 PP

1.5.1 General Notes

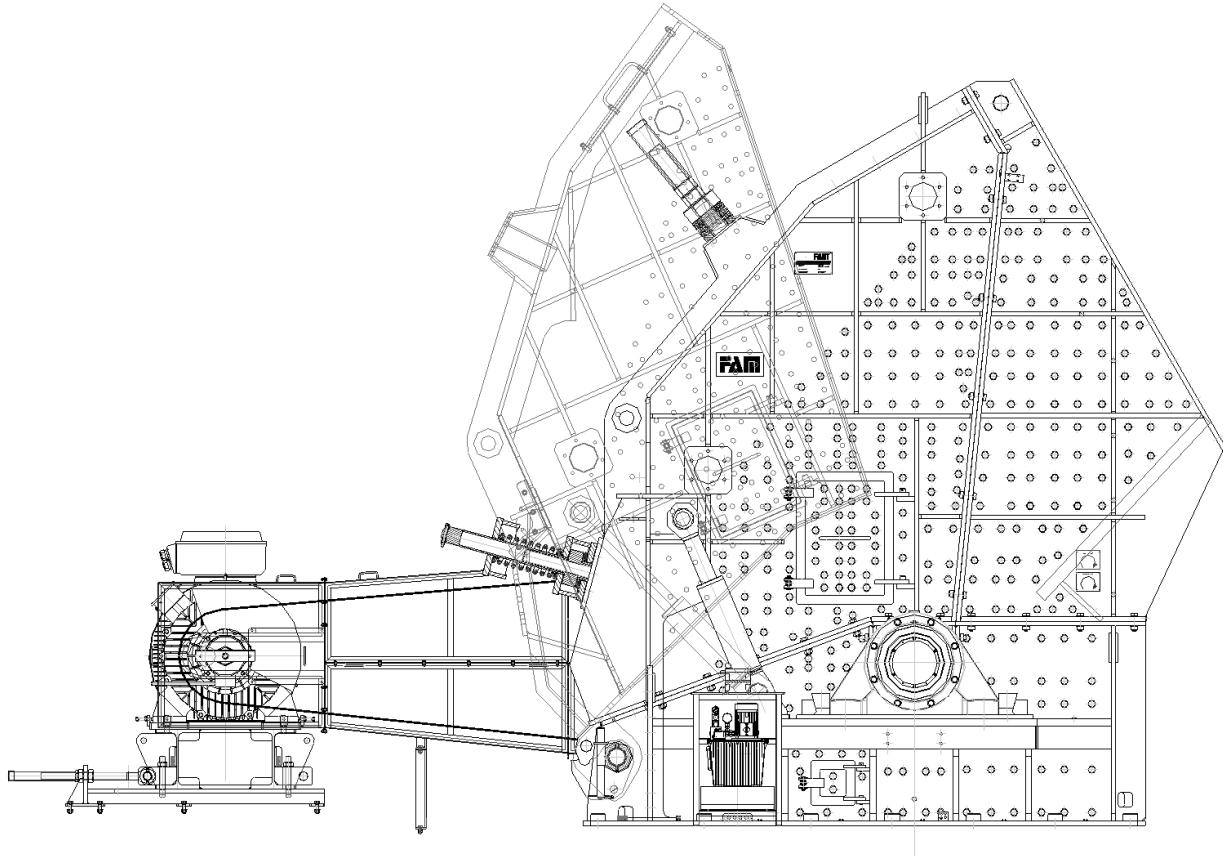
The impact crusher beats the big lumps and xylitol pieces into small parts, which have the size of bulk material. Rotating at high speed (ca. 39 m/sec), the rotor placed in a housing lined with wear plates grasps the feed material with great force and throws it against impact rockers. The impact rockers with oscillating suspension are installed in the housing.

The feed material is crushed between blow bars and impact rockers to the desired grain size. The impact rockers are arranged in a way so that the product is thrown back into the crushing radius.

The output grain size can be determined and easily controlled from outside by adjusting the impact rockers, t.i., by altering the gap between the rotor and the impact rocker.

Besides, the contact pressure can be changed by respective tensioning of the helical compression springs.

The crushed material falls without time delay through the third chute onto the belt conveyor U-1 installed below the chute.



1.5.2 Drive Unit

The impact crusher is driven by a narrow V-belt drive consisting of 18 V-belts 8V/25N with a pitch length of 12700 mm. Tensioning and releasing of the tension is effected by three external take-up spindles.

Drive unit and crusher have a fixed coupling via belt-drive. The motor and countershaft are connected via an elastic coupling. For that matter, the motor is energized via a frequency converter. Due to its volume, the running crusher has a high inertia torque and much kinetic energy. The FC allows a better and longer controlled start-up and shut-down after using. The start-up takes approx. 2 min. and the shut-down lasts about 5 min.

To detect any slipping between the drive unit and the crusher there are speed sensors installed on both sides. Both values will be compared to detect slipping before a different speed causes friction and heat to the V-belts, which connect both sides - the motor and the machine.



1.5.3 Hydraulic System

The impact crusher is furnished with two hydraulic cylinders for the housing opening device. The cylinders of the machine are supplied by one hydraulic unit with which they are connected via pipe and hose lines.

The cylinder pair is provided with a 4/3 directional valve on the hydraulic unit to actuate opening and closing operation of the crusher housing.

Each cylinder is equipped with a load-holding valve to keep the cylinder in position and protect it against overloads



OPERATING INSTRUCTIONS

Belt Conveyor System

Manual 4 Design and Function

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1 DESIGN AND FUNCTION

1.1 General description

The belt conveying system with a crushing station are used for transporting coal, mixed with xylitol, from a nearby open cast mining to an open air coal storage (not in scope of supply) inside a power plant.

The entire equipment consists of two main components:

- Crusher station for twin truck feeding,
- Belt conveyor system with 1 line for feeding the power plant open air stockpiles.

The crushing station is designed to feed an apron feeder by trucks from 2 sides. During unloading, trucks dump the coal-xylitol-mix through a hopper to the loading surface of the apron feeder. It starts and carries the material along a slope to its top point and discharges the load into a chute with a running impact crusher below.

Big lumps of coal and long pieces of xylitol are cracked inside the crusher immediately and the outgoing material falls through a chute to the loading table of the first belt conveyor with flowing sequence.

The continuous conveyor line consisting of conveyors U-1 to U-5 transports the material further to the secondary crushing equipment.

In the immediate vicinity of the crusher station, there is an operator cabin installed to control the handling process of the crushing station and the belt conveyor system. This cabin is designed for a continuous presence of an operator.

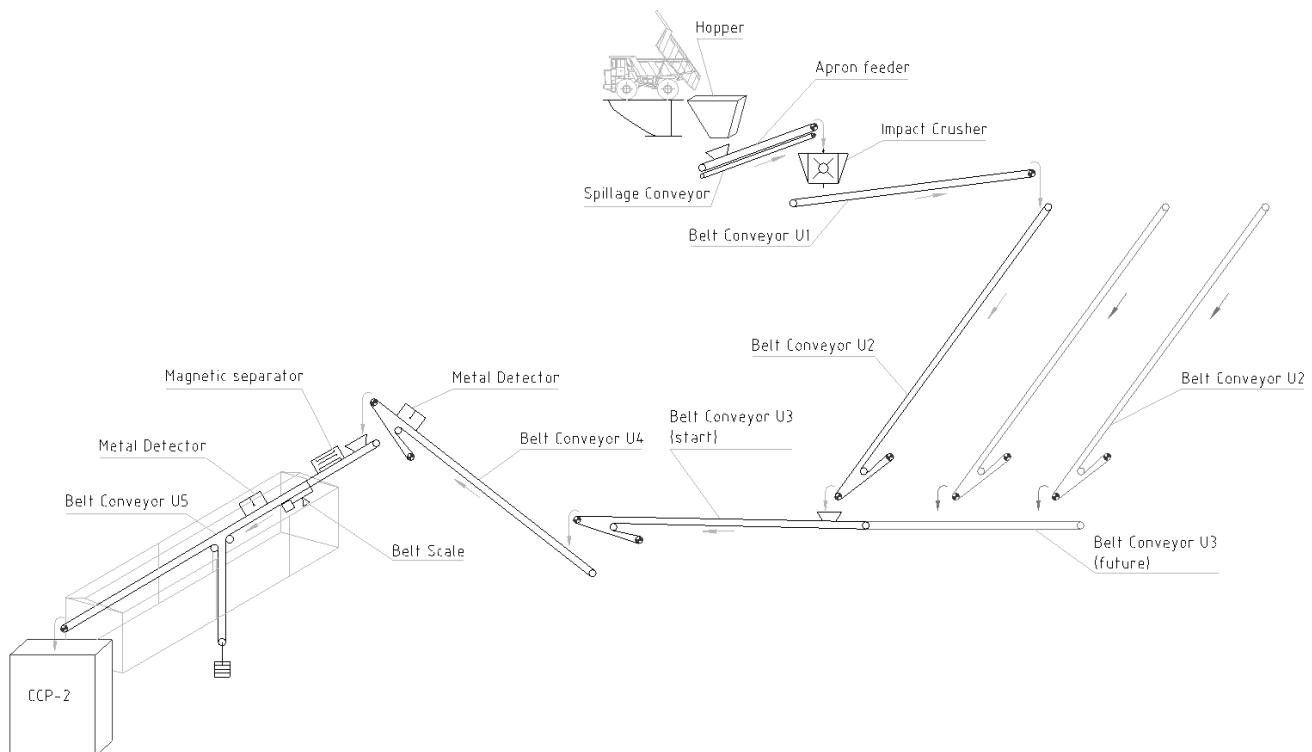


Figure 1: Flow sheet of crushing and conveying equipment

1.2 Belt Conveyors BC U1 – U5

The belt conveyor system performs transport of the coal received from the semi-mobile crushing equipment and delivers it to the secondary crushing equipment. The conveyor system consists of a continuous belt conveyor line involving conveyors U-1 to U-5 with a capacity of 1000 t/h and common final length of approx. 2901 m.

Almost at the end of the conveyor line, at the conveyor U-5, additional equipment is installed to check the incoming bulk material and to hold it clean. These are:

- 1 magnetic separator,
- 2 metal detectors before and after the separator and
- 1 belt scale.

The belt conveyors are the key drives for material handling. These drives are only switchable from the local repair switch to enable the repair operation outside of interlocking. Further, each belt conveyor can be separately locked in manual mode when the following conveyor is running. If all conditions are met, all conveyors in the conveying line in the semi-automatic operation start counter to the conveying direction and stop in the conveying direction.

In the locked and semi-automatic operation, separate and independent switching of individual promoters within the line is not possible. The sequence described above is observed in all cases.

In an emergency situation the system can be immediately shut-down by opening the emergency stop loop. This can be done by pulling a ripcord or by pressing a hardware red mushroom emergency stop button or a virtual red mushroom emergency stop button on a monitor in the control room.

The start process is delayed by the respective start-warning time.

The stop operation is also delayed as a function of the belt speed and the effective length of the upper belt run to secure emptying of the conveyor in order to guarantee normal operation.



Figure 2: Example of belt conveyor

1.2.1 Intermediate Belt Conveyor U-1

1.2.1.1 General

The belt conveyor U1 is a functional component of the coal conveying system between the semi-mobile crushing station and the second crushing plant. From the crushing station the crushed coal is transferred to the belt conveyor U1 which transports the material further to the hopper of the belt conveyor U2.

The conveyor U1 is a relocated conveyor with an elevating structure. Depending on the mining progress, it can be shifted together with the semi-mobile crushing station. The belt conveyor U1 consists basically of the following components:

- Main frame,
- Drive station with drive pulley,
- Take-up station with take-up pulley,
- Feeding hopper,
- Discharge box with chute and adjustable baffle plate,
- Carrying idler stations, conveyor belt and belt cleaners,
- Safety devices.

1.2.1.1 Conveyor frame

The conveyor frame directing the conveyor belt between the drive station and the take-up station is designed as a welded and bolted steel framework construction. The steel construction rests in the rear part on a pontoon. On the other side the frame is held by a support which is connected with the main frame via pins. At the support bottom a pontoon is installed. Both pontoons are connected by an intermediate cross bar via pins. The rear pontoon has a centering and is thus located centrally under the crusher chute.

The conveyor between the crusher chute and the discharge box is protected by guard covers.

The conveyor is furnished with walkways which provide safe access to the components requiring regular maintenance as well as in case if corresponding operational, service and inspection works are needed.

Components which can endanger operation and maintenance personnel are equipped with effective and easily mount/dismountable protective devices/guards.

1.2.1.2 Drive station with discharge box

The drive station is located in the head part (heading section) of the U1. It includes a discharge pulley and a discharge box which are mounted on the conveyor frame. The discharge pulley is also the drive pulley whose pillow blocks are connected with the frame. The shaft end of the drive pulley is furnished with a coupling half.

The drive pulley is equipped with one drive unit which is installed laterally on the right side next to the frame. The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support on the motor side. A steel beam installed under the swing base serves as a support beam and shaft break safety. In addition, the drive unit is equipped with a backstop.

For cleaning of the belt after discharge, one pre-scraper and one main scraper are provided.

The discharge box is designed as a welded and bolted steel construction. Inside the discharge box, an adjustable baffle plate is provided to direct the coal flow centrally on the downstream conveyor belt U2. Sliding surfaces coming in contact with the transported material are lined with Hardox wear plates.

1.2.1.3 Take-up station

The take-up station is a spindle-operated tensioning station consisting of a moveable take-up sledge, a belt pulley and two take-up spindles. The conveyor belt coming from the drive pulley is guided in the lower run over carrying idler stations to the take-up sledge. The necessary belt pre-tension is reached by shifting the take-up sledge with the pulley by means of the spindles and spindle nuts.

The sledge and the take-up spindles are installed in the steel construction. The tension way is built by two longitudinal beams which are welded to the frame on both sides. Lift-off restraints hold the take-up sledge on the longitudinal beams. The pedestal bearings of the take-up pulley are fastened on the take-up sledge.

When installing the belt, the sledge should be brought into a definite position depending on the take-up way and secured there.

The necessary pre-tension of the conveyor belt is effected by a mechanical pre-stressing (note the belt sag!). If due to the belt elongation the belt tension changes, it must be corrected by the take-up spindles.

Before the take-up pulley, an inside belt cleaner is installed.

1.2.1.4 Feeding box

The feeding box is located in the tail part (end section of U1) and is used for receiving of conveyed material from the crusher chute and spillage from the apron feeder. The feeding box is designed as a stable welded and bolted steel construction which rests on the steel substructure.

The lateral walls of the hopper are lined with wear plates. The feeding box is sealed on both sides along the belt by adjustable rubber strips.

In the feeding zone, reinforced carrying idler stations are applied with idler spacing of 300 mm. The feeding idler stations are fastened by means of bolted connections.

The rubber curtains mounted in the feeding hopper are intended to reduce dust emissions.

The hopper is protected by covers.

1.2.1.5 Pulleys

The drive pulley has herringbone rubber lining and is supported by pillow blocks with anti-friction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

The take-up pulley has plain rubber lining and is supported by pillow blocks with antifriction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

1.2.1.6 Idlers

Rigid carrying idler stations consist of three idlers with equal length. The idlers are rigidly fastened to the idler supports. Rigid return idler stations consist of two idlers with equal length. The return run stations have rubber disc idlers in order to present very narrow surfaces for adhesion and thus to reduce the tendency for material build up. The idlers are rigidly fastened to the idler supports. Transfer points are equipped with impact idler stations with rigid fixtures.

Idlers of the same type are interchangeable. The bearings are lubricated for lifetime.

1.2.1.7 Belt cleaning equipment

The conveyor U1 is equipped with one primary and one secondary belt scrapers at the discharge pulley. A V-type plow scraper over the full belt width is installed in the return run before the take-up pulley, where material can be caught between the belt and pulley. The V-type plow scraper is mounted in a way preventing the steel frame from reaching the belt after the wiper rubber has completely worn down.

All pulleys in contact with the dirt side of the belt have a pulley scraper to remove adhering material from the pulley.

1.2.1.8 Safety devices

All exposed rotating parts with the exception of the idlers are protected against accidental contact by boxes, wire mesh guards or railings.

In cases of emergency the equipment can be turned off by means of emergency switches with relevant pull cords installed on both sides of the conveyor line. Actuation of the pull rope triggers immediately standstill of the conveyor and of the technologically interconnected conveying devices.

Visual and acoustic start-up signals are provided by a warning lamp and a horn.

Safety and warning devices include also:

- Material feeding of conveyor,
- Misalignment switch,
- Speed sensor and/or slip controller,
- Belt damage control,
- Filling level sensor of discharge station,
- Supplying of LED-lamps for the entire conveyor.

1.2.2 Relocated Belt Conveyor U-2

1.2.2.1 General

The belt conveyor U2 is a functional component of the coal conveying system between the semi-mobile crushing station and the second crushing plant. From the crushing station the crushed coal is transferred to the belt conveyor U1 which transports the material further to the hopper of the belt conveyor U2. The conveyor U2 carries the coal as far as the drive station and transfers it to the belt conveyor U3.

The conveyor U2 is a relocated conveyor with an elevating structure. Depending on the mining progress, it can be shifted together with the semi-mobile crushing station. The belt conveyor U2 consists basically of the following components:

- Conveyor frame,
- Combined drive and take-up station,
- Return station,
- Feeding hopper,
- Discharge box with chute and adjustable baffle plate,
- Carrying idler garlands, conveyor belt and belt cleaners,
- Safety devices.

1.2.2.2 Conveyor frame

The conveyor frame rests on steel sleepers and builds a connection between the return station and the combined drive/take-up station. The conveyor consists of definite number of frame sections which results from the conveyor length.

Each conveyor section includes four upper run garlands and two lower run garlands. The idler spacing in the upper run comprises 1,6 m and in the lower run 3,2 m. All conveyor sections have a system length of 6,4 m. Each section consists of two supports on which longitudinal stringers made from profile steel are mounted. The spacing between the supports makes 3,2 m. On the level of lower run garland suspension the supports are fastened to the frame construction by means of angles. The sleeper is also integrated in the supports of the conveyor sections.

The textile conveyor belt is supported in the upper run by three-piece garland stations and in the lower run by two-piece garland stations with rubber disc idlers. The entire conveyor frame is equipped with cable hooks and segmental arch covers.

The conveyor is furnished with walkways which provide safe access to the components requiring regular maintenance as well as in case if corresponding operational, service and inspection works are needed.

Components which can endanger operation and maintenance personnel are equipped with effective and easily mount/dismountable protective devices/guards.

1.2.2.3 Combined drive and take-up station

The drive station with the integrated take-up system is located in the head part (end of conveying line) of the U2. The supporting structure consists of welded and partly bolted sheet and sectional steel members. Between the drive station and the conveyor line, the belt is guided over a connecting bridge.

The drive station rests on pontoons, has two drive pulleys and three drive units. The three main frame sections are designed as framework constructions furnished with walkways. The belt is directed in the upper run over the conveyor frame towards the drive station.

On the discharge side of the station, a discharge pulley and a discharge box are mounted on the frame. The discharge pulley is also the drive pulley whose pillow blocks are connected with the frame. Each shaft end of the drive pulley is furnished with a coupling half.

The drive pulley on the discharge side is equipped with two drive units which are installed laterally on the right and left side next to the frame. The shaft of each gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support. In addition, the drive unit is equipped with a backstop.

For cleaning of the belt after discharge, one pre-scraper and one main scraper are provided.

The discharge box is designed as a welded and bolted steel construction. Inside the discharge box, an adjustable baffle plate is provided to direct the coal flow centrally on the downstream conveyor belt U3. Sliding surfaces coming in contact with the transported material are lined with Hardox wear plates.

The tensioning device is a winch-operated take-up station which includes a take-up carriage, rope sheaves and a driven rope drum. The carriage and the rope sheaves are positioned in the framework construction, the rope drum with the drive unit are fastened on the frame. The conveyor belt coming from the drive pulley is directed in the lower run over the second drive pulley to the take-up carriage. The belt loops around the take-up carriage pulley and runs back in the lower run of the conveyor.

The travel path of the take-up carriage is built by two longitudinal beams welded on both sides in the frame. The shiftable carriage whose take-up pulley deflects the conveyor belt has four travelling wheels. Further four horizontal wheels (excenter axis) hold the carriage in the track. The pillow blocks of the take-up pulley are screwed to the take-up carriage. Possible lifting of the take-up carriage is prevented by lift-off restraints. The travel way of the take-up carriage is secured by limit switches.

The take-up rope is reeved and directed from the rope drum over rope sheaves to the take-up carriage. When installing the belt, the carriage should be brought into a definite position depending on the take-up way and secured there.

The rope is provided with a rope force measuring device which controls and corrects the tension.

The necessary pre-tension of the belt is reached electrically (the value is set). If due to the belt elongation the value changes, the rope drum control is actuated and the value is adjusted.

The second drive pulley installed in the rear part is a one-side drive pulley whose pillow blocks are connected with the frame of the tail section. One shaft end of the drive pulley is furnished with a coupling half. The second drive pulley of the conveyor U2 is equipped with one drive unit which is installed laterally on the left side in the conveying direction next to the frame.

The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support.

1.2.2.4 Return station with feeding hopper

The return station with the feeding hopper is mounted on a pontoon. Under the pontoon an anchoring construction is embedded. The anchoring consists of a pivot plate, strings and two ground anchors. The pontoon and the pivot plate are connected via a pin of the plate.

The steel construction of the return station includes a frame and a hopper. It is a welded and partly bolted steel structure. The frame of the feeding hopper is fastened on the pontoon by means of bolted connections.

The feeding hopper is located in the tail part (end section of U2) and is used for receiving of conveyed material from the belt conveyor U1. It is designed as a stable welded and bolted steel construction which is connected with the frame via bolted connections. The lateral walls of the hopper are lined with wear plates. The feeding box is sealed on both sides along the belt by adjustable rubber strips.

The rubber curtains mounted in the feeding hopper are intended to reduce dust emissions. The hopper is protected by covers.

In the feeding zone, reinforced garland stations are applied. The feeding garlands are fastened by pins with wedges. In the outlet zone the upper run garlands are hung.

For belt directing, in the lower run a self-centring belt training station is provided as well as an inside belt cleaner and a diagonal scraper.

The return pulley is precisely aligned and fastened on the frame via pillow blocks. It is covered by a protective hood to prevent access to the rotating parts.

The return station with hopper are protected on both sides by guard gratings.

1.2.2.5 Pulleys

The drive pulleys have herringbone rubber lining and are supported by pillow blocks with anti-friction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

The return and take-up pulleys have plain rubber lagging and are supported by pillow blocks with antifriction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

1.2.2.6 Idlers

Both the carrying run and the return run of the conveyor belt are supported by garland idlers. The carrying garland stations consist of three idlers with equal length and hook suspension. The V-type return garland stations consist of two idlers with equal length and chain suspension. The return run stations have rubber disc idlers in order to present very narrow surfaces for adhesion and thus to reduce the tendency for material build up. Transfer points are equipped by impact idler garlands with bolt and wedge suspension.

Idlers of the same type are interchangeable. The bearings are lubricated for lifetime.

1.2.2.7 Belt cleaning equipment

The conveyor U2 is equipped with one primary and one secondary belt scrapers at the discharge pulley. A V-type plow scraper over the full belt width is installed in the return run before the take-up pulley as well as before the return pulley, where material can be caught between the belt and pulley. The V-type plow scraper is mounted in a way preventing the steel frame from reaching the belt after the wiper rubber has completely worn down.

All pulleys in contact with the dirt side of the belt have a pulley scraper to remove adhering material from the pulley.

1.2.2.8 Safety devices

All exposed rotating parts with the exception of the idlers are protected against accidental contact by boxes, wire mesh guards or railings.

In cases of emergency the equipment can be turned off by means of emergency switches with relevant pull cords installed on both sides of the conveyor line. Actuation of the pull rope triggers immediately standstill of the conveyor and of the technologically interconnected conveying devices.

Visual and acoustic start-up signals are provided by a warning lamp and a horn.

Safety and warning devices include also:

- Limit switches for take-up way limit,
- Travel limit of take-up carriage,
- Misalignment switch,
- Speed sensor and/or slip controller,
- Belt damage control,
- Filling level sensor of hopper,
- Supplying of LED-lamps for the entire conveyor.

1.2.3 Stationary Belt Conveyor U-3

1.2.3.1 General

The belt conveyor U3 is a functional component of the coal conveying system between the semi-mobile crushing station and the second crushing plant. The conveyor U3 receives the coal from the conveyor U2 through its hopper in the return station and carries it as far as the drive station where the material is transferred further to the belt conveyor U4.

The conveyor U3 is an extendable conveyor with a horizontal structure. Depending on the mining progress, it can be lengthened. The hopper of U3, the belt conveyor U2 and the semi-mobile crushing station with U1 are shifted according to the mining technological process. The U3 drive station and conveyor frame remain stationary. The free space between the end of the conveyor frame and the hopper is filled by corresponding number of conveyor frame sections.

The initial length is 363 m, the final length is 1100 m.

The belt conveyor U3 consists basically of the following components:

- Conveyor frame,
- Combined drive and take-up station,
- Return station,
- Feeding hopper,
- Discharge box with chute and adjustable baffle plate,
- Carrying idler garlands, conveyor belt and belt cleaners,
- Safety devices.

1.2.3.2 Conveyor frame U3 – initial length

The conveyor frame rests on steel sleepers and builds a connection between the return station and the combined drive/take-up station. The conveyor consists of definite number of frame sections which results from the conveyor length. The initial length of the conveyor U3 is 363 m.

Each conveyor section includes four upper run garlands and two lower run garlands. The idler spacing in the upper run comprises 1,6 m and in the lower run 3,2 m. All conveyor sections have a system length of 6,4 m. Each section consists of two supports on which longitudinal stringers made from profile steel are mounted. The spacing between the supports makes 3,2 m. On the level of lower run garland suspension the supports are fastened to the frame construction by means of angles. The sleeper is also integrated in the supports of the conveyor sections.

The textile conveyor belt is supported in the upper run by three-piece garland stations and in the lower run by two-piece garland stations with rubber disc idlers. The entire conveyor frame is equipped with cable hooks and segmental arch covers.

The conveyor is furnished with walkways which provide safe access to the components requiring regular maintenance as well as in case if corresponding operational, service and inspection works are needed.

Components which can endanger operation and maintenance personnel are equipped with effective and easily mount/dismountable protective devices/guards.

1.2.3.3 Extension of the belt conveyor U3

The conveyor is basically extended by adding a definite number of conveyor sections against the conveying direction. When extending the conveyor frame, the system length of the conveyor sections comprising 6,4 m each must be observed. The idler spacing in the upper run of 1,6 m must be adhered to as well. The number of electrical appliances must be adjusted.

With extension of the conveyor, the drive power also increases. The drive units 2 and 3 must be successively installed. Prior to this, the walkways including grating must be adjusted in the head part of corresponding drive side.

In the end the drive station U3 will be the same as the drive station U4.

1.2.3.4 Combined drive and take-up station

The drive station with the integrated take-up system is located in the head part (end of conveying line) of the U3. The supporting structure consists of welded and partly bolted sheet and sectional steel members. Between the drive station and the conveyor line, the belt is guided over a connecting bridge.

The drive station rests on pontoons, has two drive pulleys and three drive units in the final assembly stage. In the initial assembly stage only the drive pulley in the rear part of the drive station is equipped with a drive unit. Depending on the extension of the conveyor, the drive units 2 and 3 will be installed on the discharge side. The three main frame sections are designed as framework constructions furnished with walkways. The belt is directed in the upper run over the conveyor frame towards the drive station.

On the discharge side of the station, a discharge pulley and a discharge box are mounted on the frame. The discharge pulley is also the drive pulley whose pillow blocks are connected with the frame. Each shaft end of the drive pulley is furnished with a coupling half.

In the start phase no drive units are foreseen for the drive pulley on the discharge side.

For cleaning of the belt after discharge, one pre-scraper and one main scraper are provided.

The discharge box is designed as a welded and bolted steel construction. Inside the discharge box, an adjustable baffle plate is provided to direct the coal flow centrally on the downstream conveyor belt U4. Sliding surfaces coming in contact with the transported material are lined with Hardox wear plates.

The tensioning device is a winch-operated take-up station which includes a take-up carriage, rope sheaves and a driven rope drum. The carriage and the rope sheaves are positioned in the framework construction, the rope drum with the drive unit are fastened on the frame. The conveyor belt coming from the drive pulley is directed in the lower run over the second drive pulley to the take-up carriage. The belt loops around the take-up carriage pulley and runs back in the lower run of the conveyor.

The travel path of the take-up carriage is built by two longitudinal beams welded on both sides in the frame. The shiftable carriage whose take-up pulley deflects the conveyor belt has four travelling wheels. Further four horizontal wheels (excenter axis) hold the carriage in the track. The pillow blocks of the take-up pulley are screwed to the take-up carriage. Possible lifting of the take-up carriage is prevented by lift-off restraints. The travel way of the take-up carriage is secured by limit switches.

The take-up rope is reeved and directed from the rope drum over rope sheaves to the take-up carriage. When installing the belt, the carriage should be brought into a definite position depending on the take-up way and secured there.

The rope is provided with a rope force measuring device which controls and corrects the tension.

The necessary pre-tension of the belt is reached electrically (the value is set). If due to the belt elongation the value changes, the rope drum control is actuated and the value is adjusted. After extension the take-up forces must be set again.

The second drive pulley installed in the rear part is a one-side drive pulley whose pillow blocks are connected with the frame of the tail section. One shaft end of the drive pulley is furnished with a coupling half. The second drive pulley of the conveyor U3 is equipped with one drive unit which is installed laterally on the left side in the conveying direction next to the frame.

The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support. In addition, the drive unit is equipped with a backstop.

1.2.3.1 Return station with feeding hopper

The return station with the feeding hopper is mounted on a pontoon. Under the pontoon an anchoring construction is embedded. The anchoring consists of a pivot plate, strings and two ground anchors. The pontoon and the pivot plate are connected via a pin of the plate.

The steel construction of the return station includes a frame and a hopper. It is a welded and partly bolted steel structure. The frame of the feeding hopper is fastened on the pontoon by means of bolted connections.

The feeding hopper is located in the tail part (end section of U3) and is used for receiving of conveyed material from the belt conveyor U2. It is designed as a stable welded and bolted steel construction which is connected with the frame via bolted connections. The lateral walls of the hopper are lined with wear plates. The feeding box is sealed on both sides along the belt by adjustable rubber strips.

The rubber curtains mounted in the feeding hopper are intended to reduce dust emissions. The hopper is protected by covers.

In the feeding zone, reinforced garland stations are applied. The feeding garlands are fastened by pins with wedges. In the outlet zone the upper run garlands are hung.

For belt directing, in the lower run a self-centring belt training station is provided as well as an inside belt cleaner and a diagonal scraper.

The return pulley is precisely aligned and fastened on the frame via pillow blocks. It is covered by a protective hood to prevent access to the rotating parts.

The return station with hopper are protected on both sides by guard gratings.

1.2.3.2 Pulleys

The drive pulleys have herringbone rubber lining and are supported by pillow blocks with anti-friction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

The return and take-up pulleys have plain rubber lagging and are supported by pillow blocks with antifriction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

1.2.3.3 Idlers

Both the carrying run and the return run of the conveyor belt are supported by garland idlers. The carrying garland stations consist of three idlers with equal length and hook suspension. The V-type return garland stations consist of two idlers with equal length and chain suspension. The return run stations have rubber disc idlers in order to present very narrow surfaces for adhesion and thus to reduce the tendency for material build up. Transfer points are equipped by impact idler garlands with bolt and wedge suspension.

Idlers of the same type are interchangeable. The bearings are lubricated for lifetime.

1.2.3.4 Belt cleaning equipment

The conveyor U3 is equipped with one primary and one secondary belt scrapers at the discharge pulley. A V-type plow scraper over the full belt width is installed in the return run before the take-up pulley as well as before the return pulley, where material can be caught between the belt and pulley. The V-type plow scraper is mounted in a way preventing the steel frame from reaching the belt after the wiper rubber has completely worn down.

All pulleys in contact with the dirt side of the belt have a pulley scraper to remove adhering material from the pulley.

1.2.3.5 Safety devices

All exposed rotating parts with the exception of the idlers are protected against accidental contact by boxes, wire mesh guards or railings.

In cases of emergency the equipment can be turned off by means of emergency switches with relevant pull cords installed on both sides of the conveyor line. Actuation of the pull rope triggers immediately standstill of the conveyor and of the technologically interconnected conveying devices.

Visual and acoustic start-up signals are provided by a warning lamp and a horn.

Safety and warning devices include also:

- Limit switches for take-up way limit,
- Travel limit of take-up carriage,
- Misalignment switch,
- Speed sensor and/or slip controller,
- Belt damage control,
- Filling level sensor of hopper,
- Supplying of LED-lamps for the entire conveyor.

1.2.4 Stationary Belt Conveyor U-4

1.2.4.1 General

The belt conveyor U4 is a functional component of the coal conveying system between the semi-mobile crushing station and the second crushing plant. The conveyor U4 receives the coal from the conveyor U3 through its hopper in the return station and carries it as far as the drive station where the material is transferred further to the belt conveyor U5. Additionally, the drive station is equipped with a metal detector.

The conveyor U4 has a horizontal structure. It consists basically of the following components:

- Conveyor frame,
- Combined drive and take-up station,
- Return station,
- Feeding hopper,
- Discharge box with chute and adjustable baffle plate,
- Carrying idler garlands, conveyor belt and belt cleaners,
- Metal detector,
- Safety devices.

1.2.4.2 Conveyor frame U4

The conveyor frame rests on steel sleepers and builds a connection between the return station and the combined drive/take-up station. The conveyor consists of definite number of frame sections which results from the conveyor length.

Each conveyor section includes four upper run garlands and two lower run garlands. The idler spacing in the upper run comprises 1,6 m and in the lower run 3,2 m. All conveyor sections have a system length of 6,4 m. Each section consists of two supports on which longitudinal stringers made from profile steel are mounted. The spacing between the supports makes 3,2 m. On the level of lower run garland suspension the supports are fastened to the frame construction by means of angles. The sleeper is also integrated in the supports of the conveyor sections.

The textile conveyor belt is supported in the upper run by three-piece garland stations and in the lower run by two-piece garland stations with rubber disc idlers. The entire conveyor frame is equipped with cable hooks and segmental arch covers.

The conveyor is furnished with walkways which provide safe access to the components requiring regular maintenance as well as in case if corresponding operational, service and inspection works are needed.

Components which can endanger operation and maintenance personnel are equipped with effective and easily mount/dismountable protective devices/guards.

1.2.4.1 Combined drive and take-up station

The drive station with the integrated take-up system is located in the head part (end of conveying line) of the U4. The supporting structure consists of welded and partly bolted sheet and sectional steel members. Between the drive station and the conveyor line, the belt is guided over a connecting bridge.

The drive station rests on pontoons, has two drive pulleys and two drive units. The three main frame sections are designed as framework constructions furnished with walkways. The belt is directed in the upper run over the conveyor frame towards the drive station.

On the discharge side of the station, a discharge pulley and a discharge box are mounted on the frame. The discharge pulley is also the drive pulley whose pillow blocks are connected with the frame. Each shaft end of the drive pulley is furnished with a coupling half.

The drive pulley on the discharge side is equipped with one drive unit which is installed laterally on the right side next to the frame. The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support. In addition, the drive unit is equipped with a backstop.

For cleaning of the belt after discharge, one pre-scraper and one main scraper are provided.

The discharge box is designed as a welded and bolted steel construction. Inside the discharge box, an adjustable baffle plate is provided to direct the coal flow centrally on the downstream conveyor belt U5. Sliding surfaces coming in contact with the transported material are lined with Hardox wear plates.

The tensioning device is a winch-operated take-up station which includes a take-up carriage, rope sheaves and a driven rope drum. The carriage and the rope sheaves are positioned in the framework construction, the rope drum with the drive unit are fastened on the frame. The conveyor belt coming from the drive pulley is directed in the lower run over the second drive pulley to the take-up carriage. The belt loops around the take-up carriage pulley and runs back in the lower run of the conveyor.

The travel path of the take-up carriage is built by two longitudinal beams welded on both sides in the frame. The shiftable carriage whose take-up pulley deflects the conveyor belt has four travelling wheels. Further four horizontal wheels (excenter axis) hold the carriage in the track. The pillow blocks of the take-up pulley are screwed to the take-up carriage. Possible lifting of the take-up carriage is prevented by lift-off restraints. The travel way of the take-up carriage is secured by limit switches.

The take-up rope is reeved and directed from the rope drum over rope sheaves to the take-up carriage. When installing the belt, the carriage should be brought into a definite position depending on the take-up way and secured there.

The rope is provided with a rope force measuring device which controls and corrects the tension.

The necessary pre-tension of the belt is reached electrically (the value is set). If due to the belt elongation the value changes, the rope drum control is actuated and the value is adjusted.

The second drive pulley installed in the rear part is a one-side drive pulley whose pillow blocks are connected with the frame of the tail section. One shaft end of the drive pulley is furnished with a coupling half. The second drive pulley of the conveyor U4 is equipped with one drive unit which is installed laterally on the left side in the conveying direction next to the frame.

The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support.

1.2.4.2 Return station with feeding hopper

The return station with the feeding hopper is mounted on a pontoon. Under the pontoon an anchoring construction is embedded. The anchoring consists of a pivot plate, strings and two ground anchors. The pontoon and the pivot plate are connected via a pin of the plate.

The steel construction of the return station includes a frame and a hopper. It is a welded and partly bolted steel structure. The frame of the feeding hopper is fastened on the pontoon by means of bolted connections.

The feeding hopper is located in the tail part (end section of U4) and is used for receiving of conveyed material from the belt conveyor U3. It is designed as a stable welded and bolted steel construction which is connected with the frame via bolted connections. The lateral walls of the hopper are lined with wear plates. The feeding box is sealed on both sides along the belt by adjustable rubber strips.

The rubber curtains mounted in the feeding hopper are intended to reduce dust emissions. The hopper is protected by covers.

In the feeding zone, reinforced garland stations are applied. The feeding garlands are fastened by pins with wedges. In the outlet zone the upper run garlands are hung.

For belt directing, in the lower run a self-centring belt training station is provided as well as an inside belt cleaner and a diagonal scraper.

The return pulley is precisely aligned and fastened on the frame via pillow blocks. It is covered by a protective hood to prevent access to the rotating parts.

The return station with hopper are protected on both sides by guard gratings.

1.2.4.3 Pulleys

The drive pulleys have herringbone rubber lining and are supported by pillow blocks with anti-friction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

The return and take-up pulleys have plain rubber lagging and are supported by pillow blocks with antifriction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

1.2.4.4 Idlers

Both the carrying run and the return run of the conveyor belt are supported by garland idlers. The carrying garland stations consist of three idlers with equal length and hook suspension. The V-type return garland stations consist of two idlers with equal length and chain suspension. The return run stations have rubber disc idlers in order to present very narrow surfaces for adhesion and thus to reduce the tendency for material build up. Transfer points are equipped by impact idler garlands with bolt and wedge suspension.

Idlers of the same type are interchangeable. The bearings are lubricated for lifetime.

1.2.4.5 Belt cleaning equipment

The conveyor U4 is equipped with one primary and one secondary belt scrapers at the discharge pulley. A V-type plow scraper over the full belt width is installed in the return run before the take-up pulley as well as before the return pulley, where material can be caught between the belt and pulley. The V-type plow scraper is mounted in a way preventing the steel frame from reaching the belt after the wiper rubber has completely worn down.

All pulleys in contact with the dirt side of the belt have a pulley scraper to remove adhering material from the pulley.

1.2.4.6 Metal detector

The metal detector is arranged in the construction of the drive/take-up station U4 and aimed to activate the following magnetic separator in case of detection of metal parts or non-ferromagnetic foreign bodies in the flow.

The metal detector is composed of a frame with a search coil. The metal detector generates an electromagnetic field. If a metal object enters the field, the measurement signal is deflected in a certain direction. When the metal object leaves the field, a deflection occurs in the opposite direction. If both triggering limits of the signal are exceeded, the metal relay is switched.

An electronic circuit with an adjustable trigger enables the detection and display of metal elements.

1.2.4.7 Safety devices

All exposed rotating parts with the exception of the idlers are protected against accidental contact by boxes, wire mesh guards or railings.

In cases of emergency the equipment can be turned off by means of emergency switches with relevant pull cords installed on both sides of the conveyor line. Actuation of the pull rope triggers immediately standstill of the conveyor and of the technologically interconnected conveying devices.

Visual and acoustic start-up signals are provided by a warning lamp and a horn.

Safety and warning devices include also:

- Limit switches for take-up way limit,
- Travel limit of take-up carriage,
- Misalignment switch,
- Speed sensor and/or slip controller,
- Belt damage control,
- Filling level sensor of hopper,
- Supplying of LED-lamps for the entire conveyor.

1.2.5 Stationary Belt Conveyor U-5

1.2.5.1 General

The belt conveyor U5 is a functional component of the coal conveying system between the semi-mobile crushing station and the second crushing plant. The conveyor U5 receives the coal from the conveyor U4 through its hopper in the return station and carries it as far as the drive station where the material is transferred further to the CCH building of the next crushing station.

The conveyor U5 runs for the most part in a closed steel conveyor bridge. The bridge is elevated at an angle of 7.4° only in the first section (35 m) and has further a horizontal structure.

After the return station the magnetic separator for ferromagnetic parts is arranged. In the successive conveyor bridge a belt weigher and another metal detector with an adjacent selecting line are installed.

In case of danger emergency exits are provided on the left and right side of the steel bridge. The respective escape routes lead downstairs via ladders at the columns of the conveyor line.

In the event of fire the conveyor line is protected inside the steel bridge by a fire extinguishing system. The supply of the fire extinguishing system is located in a container installed at the column 5 of the conveyor bridge.

For the purposes of maintenance of the conveyor interior, a wash-down system is provided. Wastewater and roof drainage run downwards in a water collecting system to the main drainage connection.

The belt conveyor U5 consists basically of the following components:

- Conveyor frame,
- Drive station,
- Take-up station,
- Return station,
- Feeding hopper,
- Discharge box with chute and adjustable baffle plate,
- Magnetic separator,
- Belt weigher,
- Metal detector,
- Carrying idler garlands, conveyor belt and belt cleaners,
- Safety devices.

1.2.5.2 Conveyor frame

The conveyor gallery rests on the steel structure of the conveyor bridge and builds a connection between the return station and the drive station. The conveyor consists of definite number of frame sections which results from the conveyor length.

Conveyor frame sections accommodate the upper run idler stations at the distance of 1,2 m. The lower run idler stations are positioned at the frame supports at the distance of 3 m. All conveyor frame sections have a system length of 3 m. Each frame section consists of 2 stringers made from longitudinally arranged steel profile and mounted on the steel structure together with the frame supports at the distance of 3 m.

In the area of the CCH intermediate building the frame supports stand on mounting plates which were welded during the assembly on the anchor plates embedded in concrete.

The textile conveyor belt is supported in the upper run by three-piece carrying idler stations and in the lower run by two-piece carrying idler stations with rubber disc idlers. In the lower run belt training stations are additionally provided for correct belt running.

1.2.5.3 Drive station

The drive station is located in the head part of the U5. Between the drive station, the conveyor line and the return station, the belt is guided over idler stations which are fastened on the conveyor frame.

The drive stations rests on anchor plates embedded in the concrete floor (+15m level) of the CCH intermediate building.

The steel frame of the drive station is designed as a welded and bolted steel structure. It includes a discharge pulley and a discharge box which are mounted on the conveyor frame. The discharge pulley is also the drive pulley whose pillow blocks are connected with the frame. The shaft end of the drive pulley is furnished with a coupling half.

The drive pulley is equipped with one drive unit which is installed laterally on the left side in the conveying direction next to the frame. The shaft of the gear unit is connected with the shaft of the drive pulley via a flange coupling.

The power transmission between the motor and the gear unit is effected via a flexible coupling. The drive unit is mounted on a torsion-resistant swing base which is fastened to the drive pulley via the flange coupling and held on the main frame by a torque support on the motor side. A steel beam installed under the swing base serves as a support beam and shaft break safety. In addition, the drive unit is equipped with a backstop.

For cleaning of the belt after discharge, one pre-scraper and one main scraper are provided.

The discharge box is designed as a welded and bolted steel construction. Inside the discharge box, an adjustable baffle plate is provided to direct the coal flow centrally on the downstream conveyor belt U5. Sliding surfaces coming in contact with the transported material are lined with Hardox wear plates.

1.2.5.4 Take-up station

The take-up station is located at the column 5 of the conveyor bridge. It is a weight-operated tensioning station which consists of a take-up sledge, a dead weight box with ballast and a take-up pulley. The sledge and the dead weight box are arranged vertically in lateral guide rails.

The conveyor belt coming from the first deflection pulley is guided downwards to the take-up sledge where it wraps around the take-up pulley and runs again upwards to the second deflection pulley in the lower run of the conveyor line.

The guiding device of the take-up sledge is built by two longitudinal beams which are mounted on both sides of the conveyor bridge and fastened at the foot in concrete by means of anchor bolts.

The take-up sledge is equipped with a V-shaped inside belt cleaner which is mounted on the take-up frame. The sledge and the dead weight box have lateral guiding elements intended for lateral stabilising during vertical movement.

The pillow blocks of the take-up pulley are fastened in the take-up sledge. The take-up sledge and the dead weight box are bolted directly with each other.

For repair and maintenance works, an auxiliary platform is provided at the height of 5,35 m. In its middle, the platform has a through hole. The guiding rails are mounted laterally and the take-up sledge with the dead weight moves vertically through. The work platform is mounted sideways on two single supports. The other side of the platform is connected with the column 5 of the bridge. The platform is accessible via a walkway to the column 5 and a ladder installed at the column.

By reason of belt stretching and eventual movements during start-up and shutdown, the dead weight can move in the vertical direction between the limit values. The travel path of the take-up sledge is controlled and secured by limit switches.

1.2.5.5 Return station with feeding hopper

The return station with the feeding hopper is installed on an inclined concrete surface with anchor bolts.

The steel construction of the return station includes a frame and a hopper. It is a welded and partly bolted steel structure. The frame of the feeding hopper stands on stable support feet with anchor bolts installed in the bottom plates.

The feeding hopper is located in the tail part (end section of U5) and is used for receiving of conveyed material from the belt conveyor U4. It is designed as a stable welded and bolted steel construction which is connected with the frame via bolted connections. The lateral walls of the hopper are lined with wear plates. The feeding box is sealed on both sides along the belt by adjustable rubber strips.

In the feeding zone, reinforced garland stations are applied. The feeding garlands are fastened by pins with wedges. In the outlet zone the upper run garlands are hung.

For belt directing, in the lower run a self-centring belt training station is provided as well as an inside belt cleaner and a diagonal scraper.

The return pulley is precisely aligned and fastened on the frame via pillow blocks. It is covered by a protective hood to prevent access to the rotating parts. The protective hood accommodates sensors for slip control.

The cover of the feeding hopper and the sealed transfer point between the chute and the hopper facilitate reduction of dust emissions.

The return station with hopper are protected on both sides by guard gratings.

1.2.5.6 Pulleys

The drive pulley has herringbone rubber lining and is supported by pillow blocks with anti-friction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

The return, take-up and deflection pulleys have plain rubber lagging and are supported by pillow blocks with antifriction bearings with adapter sleeve. The shaft and pulley tube are connected by taperlock connections.

1.2.5.7 Idlers

Rigid carrying idler stations consist of three idlers with equal length. The idlers are rigidly fastened to the idler supports. Rigid return idler stations consist of two idlers with equal length. The return run stations have rubber disc idlers in order to present very narrow surfaces for adhesion and thus to reduce the tendency for material build up. The idlers are rigidly fastened to the idler supports. Transfer points are equipped with impact idler garlands.

Idlers of the same type are interchangeable. The bearings are lubricated for lifetime.

1.2.5.8 Belt cleaning equipment

The conveyor U5 is equipped with one primary and one secondary belt scrapers at the discharge pulley. A V-type plow scraper over the full belt width is installed in the return run before the take-up pulley as well as before the return pulley, where material can be caught between the belt and pulley. The V-type plow scraper is mounted in a way preventing the steel frame from reaching the belt after the wiper rubber has completely worn down.

All pulleys in contact with the dirt side of the belt have a pulley scraper to remove adhering material from the pulley.

1.2.5.9 Magnetic separator

The magnetic separator is a belt conveyor, which is orthogonally installed above the main conveyor U-5 behind the return station. In the middle between the lower belt and the upper belt, there is installed a strong electrical magnet which separates any ferrous parts from the conveyed material flow while the conveyor is running. From the area in the middle it carries the undesirable metal components sideward, where the magnetic field is lower, and lets them fall into a collection container for recyclable metal parts.

The metal piece discharge conveyor is hung in a steel construction with possibility of adjustment relatively to the conveyor line. The steel construction consists of an upper and lower part. The lower part is rigidly fastened in the concrete ground by means of anchor bolts in the bottom plates.

The steel construction is located at the beginning of the conveyor bridge and protected against atmospheric effects by a roof. For the purposes of maintenance and assembly of the magnetic separator, the upper part of the steel construction can be removed and laid down sideways.

The magnetic separator starts up only when the metal detector at the belt conveyor U-4 announces incoming metal and it runs for several minutes. The magnetic separator doesn't run continuously together with the running conveyor U-5.

1.2.5.10 Belt weigher

The belt weigher is installed behind the feeding hopper U5. It is designed to acquire the instantaneous flow rate. The belt scale consists of at least one load cell, a speed sensor and the processing electronics. The load cell determines the weight of the load on a certain belt section (1 m), and the speed transducer measures the belt speed. The product of the two measured variables results in the current feed rate in t/h. The data provided are passed over to the existing interface of the PLC for further evaluation.

The belt weigher is fastened on the stringers of the conveyor frame and equipped in the upper run with two 3-piece idler stations for weight acquisition. The belt weigher is installed in the first frame section of the conveyor line which is located at the beginning of the conveyor bridge.

1.2.5.11 Metal detector

Behind the belt weigher, there is the second metal detector installed to recognize remaining undetected metal parts in the material flow. After detection of metal foreign bodies, a discharge station gets activated to facilitate identification of the relevant location.

In case of detection of metal parts in the material flow, the metal detector stops the belt conveyor.

The metal detector is composed of a frame with a search coil. The metal detector generates an electromagnetic field. If a metal object enters the field, the measurement signal is deflected in a certain direction. When the metal object leaves the field, a deflection occurs in the opposite direction. If both triggering limits of the signal are exceeded, the metal relay is switched.

An electronic circuit with an adjustable trigger enables the detection and display of metal elements.

An easy access to the conveyor is provided in the selecting line section.

1.2.5.12 Safety devices

All exposed rotating parts with the exception of the idlers are protected against accidental contact by boxes, wire mesh guards or railings.

In cases of emergency the equipment can be turned off by means of emergency switches with relevant pull cords installed on both sides of the conveyor line. Actuation of the pull rope triggers immediately standstill of the conveyor and of the technologically interconnected conveying devices.

Visual and acoustic start-up signals are provided by a warning lamp and a horn.

Safety and warning devices include also:

- Limit switches for take-up way limit,
- Misalignment switch,
- Speed sensor and/or slip controller,
- Belt damage control,
- Filling level sensor of hopper,
- Supplying of LED-lamps for the entire conveyor.

Client: EFT – Rudnik I Termoelektrana Stanari D.O.O.

**Project: Coal Crushing and Conveying Equipment –
Stanari Mine BiH**

Commissioning Program and Dossiers

Crusher station & belt conveying system



Pic.1 Side view Crusher station

Date: 19.02.2015
Rev. 0



Magdeburger Förderanlagen und Baumaschinen GmbH
Sudenburger Wuhne 47
39112 MAGDEBURG

Table of Contents

1. Commissioning Procedure
2. Prerequisites to provide by the buyer
3. Check Lists
 - 3.1 Test Protocol Crusher
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 - 3.3 Test Protocol Conveyor
 - 3.4 Consumer List
 - 3.5 Sensor List

1. Commissioning Program

1.1 General

This Commissioning program is intended to describe step by step the commissioning activities and tests. It covers the period of time from mechanical completion right up to the Start-Up Procedures.

Commissioning includes coordination of all individual activities (incl. those of the sub-suppliers) in order to provide production requirements and performance as contractually agreed to.

All commissioning measures are allocated to the commissioning stages explained subsequently. The commissioning stages (**fig. 1**) contain the essential steps of preparation and execution of the commissioning activities of all by FAM supplied equipments.

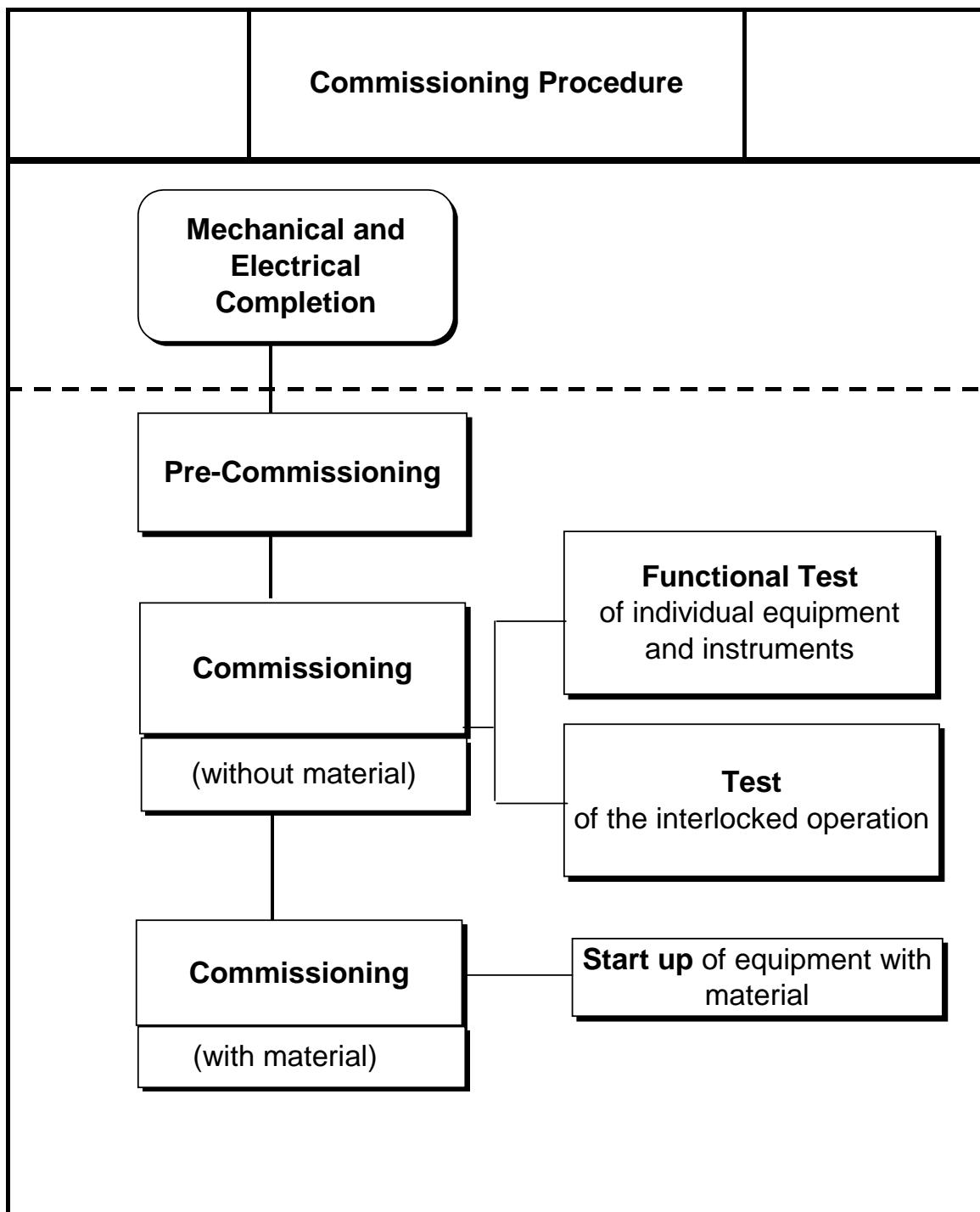
In general the commissioning procedures are sub-divided into the following steps.

- Pre-commissioning
- Commissioning (Functional and Interlocked Operation Test) without material
- Commissioning with material

These steps include all settings, adjustments and functional tests to that allow operability of the plant to operate without and with material (as specified in contract documents).

The system consist:

- Crusher Station for twin Truck feeding
- Belt conveyor system consists of a continuous belt conveyor line U-1 to U-5 (with Magnetic separator, Metal detector and belt scale).

**Fig. 1: Commissioning steps**

1.2 Pre-commissioning

The Pre-commissioning activities begin, as a rule, only after mechanical, electrical and control completion of the equipment. The Pre-Commissioning tests comprise all activities for testing the system controls.

Before switching on (switch gear) for the first time, the contractor must submit the end of erection work.

The Pre-commissioning tests require component suppliers to be present for the electrical and control equipment review and checkout.

1.3 Commissioning without material

The purpose of the commissioning procedure is to make adjustments and assure that the equipment are ready for Commissioning with material. The Commissioning procedures contain the following two activities:

- Functional Tests
- Interlocked Operation Test

1.3.1 Functional Tests

Functional Tests are physical run tests of individual components **without feed material**.

During the Functional Tests for example the following items are addressed:

- Check all bearings for temperature and assure proper and sufficient lubrication,
- Circulation control devices are checked for operation and sensitivity,
- All limit switches are set and safety devices checked,
- Mechanical settings such as tensioning and aligning the conveyors are rechecked,
- Rotational direction of motors, power draw
- and temperature are checked.

Specification, Sensor List and List of Power Consumption (Motor List) will form the basis for the Functional Tests.

The switching state remaining after the functional test “disconnected” or “ready for operation” is determined in agreement with the client. Specific Lock-out-Procedures shall be arranged before starting the tests.

Carrying out of the Functional Tests and readiness for Interlocked Operation Tests must be recorded.

1.3.2 Interlocked Operation Test

These tests are conducted **without operating the facility with feed material**.

These tests demonstrate the functionality of the equipment, including Start-Stop-sequences, interlocking and control and safety functions. For the equipment, this covers the entire system tests required prior the introduction of product.

During the Testing, for example the following checks are carried out and operating possibilities are checked:

- Functioning of the individual devices/control systems in interlocked operation,
- Starting up and shutting down procedures including interlocks and permissives,
- “Emergency-Stop” and starting up after “Emergency-Stop”,
- Switching on and off interlockings of all operating possibilities,
- Functioning of the safety devices during starting up and shutting down as well as in the case of malfunction changeovers,
- Intended and actual parameters in interlocked operation.

The specification and the contractual agreements are the basis for carry out the Interlocked Operation Test.

On conclusion of a successful Interlocked Operation Test, the equipment are ready for start-up operation with material.

1.4 Commissioning with material

Start-up of the facility occurs after commissioning and all interlocks and permissives have been checked. The feed material is introduced into the system for processing.

The key function of the start up testing with feed is to assure that the settings without and with feed are within normal parameters. All interlocking possibilities and specified functions are run through and tested again under normal operating conditions and recorded. The tests shall be started with low load and after reaching suitable operating conditions shall proceed to design load.

During the Commissioning with material, the following checks are carried out.

- Check the material handling,
- Set upper and lower limits and trigger values of the level indicators,
- Set the signalling devices,
- Start up
- Start-up after “Emergency-Stop”,
- Check settings of safety devices (hydraulic safety valves, shutdown switches, etc.)

During the Start-Up-procedures of the components and function groups of the equipment are operated in connection **with the operating material**.

During this period all systems are checked und adjusted under various modes of operation and loading configurations.

2. Prerequisites to provide by the buyer

| | |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | |
| 01 | Operating staff |
| | <ul style="list-style-type: none"> - Operator in centre operator - Machine operator - Other labour force |
| 02 | Provision of fluids (with marking of transfer points) |
| | <ul style="list-style-type: none"> - Fluids in agreed / and required quality/composition/volume - Sufficient filling level of storehouses/silos Volume per hour/day/month - Electric energy |
| 03 | Provision of gauges (if required) |
| | <ul style="list-style-type: none"> - Trains, waggons |
| 04 | Safeguarding the availability of suppliers of orderer of equivalent rank |
| | <ul style="list-style-type: none"> - Software engineers - Electronic specialists for attendance of superior instrumentation and control equipment - Readiness for calling |
| 05 | Safeguarding the readiness-for-service of equipment upstream and downstream of plant |
| 06 | Sufficient storage capacity of silos, open-air storage grounds etc. |
| 07 | Availability of controls (if included in orderer's scope of performances) |
| | <ul style="list-style-type: none"> - Local control - Remote and automatic control - Interlock conditions and signalling appliances |
| 08 | Safety equipment ready for service |

EFT Stanari109794

Crusher station & belt conveying system

Commissioning Program



3. Check Lists

3.1 Test Certificate Crusher

Commissioning Procedure

Impact crusher System



Impact crusher

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| | | | |
|---------------------|-------------|-------------------------|--|
| Project: | EFT Stanari | Test date: | |
| Project No.: | 109794 | Supervisor: | |
| Doc.-No.: | | Present Persons: | |

| Item | Test Method / Operation Procedure | | Remarks | Result |
|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------|--------------------------|
| 1. Purpose | To check and confirm whether the impact crusher can operate continuously without problem. | | | <input type="checkbox"/> |
| 2. Test Item | <ul style="list-style-type: none"> • No-load-operation (Cold run) • Continuous operation (Heat run) | | | <input type="checkbox"/> |
| 3. Scope | This procedure shall be applied to the following crusher: impact crusher | | | <input type="checkbox"/> |
| 4. Commissioning Organization | Commissioning organization is shown in Table 1 | | | <input type="checkbox"/> |
| 5. Instruments & Tools | List of required Instruments and Tools is shown in Table 2 | | | <input type="checkbox"/> |
| 6. Schedule | Commissioning organization schedule must be cleared up in front of commissioning | | | <input type="checkbox"/> |
| 7. Pre-inspection and preparation before commissioning operation | 1. | Confirm all safety devices working properly | | <input type="checkbox"/> |
| | 2. | Concerned crusher are erected completely | | <input type="checkbox"/> |
| | 3. | Electrical cabling works and checks are completed | | <input type="checkbox"/> |
| | 4. | Hydraulical connecting works and checks are completed | | <input type="checkbox"/> |
| | 5. | Confirm all transport locks are taken out | | <input type="checkbox"/> |

Commissioning Procedure

Impact crusher System



Impact crusher

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| | | | |
|--|-----|----------------------------------------------------------------------------------------------------------------------|--------------------------|
| | 6. | Confirm the rotor lock is dismounted (on opposite side of drive) | <input type="checkbox"/> |
| | 7. | Confirm the alignment of the impact crusher is exact horizontal | <input type="checkbox"/> |
| | 8. | Check casing is closed | <input type="checkbox"/> |
| | 9. | Confirm if the lubrication oil and grease is filled in at required level | <input type="checkbox"/> |
| | 10. | Machine cleaning and removal of foreign matter | <input type="checkbox"/> |
| | 11. | Check the V-belt drive for correct tensioning and correct alignment of the belt pulleys | <input type="checkbox"/> |
| | 12. | Confirm the feeding device is mounted to feed over the whole width of the impact crusher | <input type="checkbox"/> |
| | 13. | Instrument cabling works and checks are completed | <input type="checkbox"/> |
| | 14. | Confirm if the electric motor thermal set value is appropriate | <input type="checkbox"/> |
| | 15. | Check if the control test is completed | <input type="checkbox"/> |
| | 16. | Confirm if electric power supply for control & instrument is on | <input type="checkbox"/> |
| | 17. | Confirm the motor for the correct sense of rotation | <input type="checkbox"/> |
| | 18. | Check the bolts and nuts for tight seat | <input type="checkbox"/> |
| | 19. | Confirm preparation of measuring equipment, instruments and tools required for commissioning operation (see Table 2) | <input type="checkbox"/> |

Commissioning Procedure

Impact crusher System



Impact crusher

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| | | | |
|--------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 8. Safety countermeasure | 1. | Setting of marks for commissioning operation and restricted areas | <input type="checkbox"/> |
| | 2. | Communication with all personnel at operation area | <input type="checkbox"/> |
| | 3. | Setting of safety tape around commissioning area | <input type="checkbox"/> |
| | 4. | Radio/telephone communication between FGD control room and local operators | <input type="checkbox"/> |
| | 5. | Putting safety protectors | <input type="checkbox"/> |
| | 6. | Provision of fire extinguishers | <input type="checkbox"/> |
| 9. Continuous operation | 9.1 Preparation | | |
| | 1. | Establishment of operating system | <input type="checkbox"/> |
| | 9.2 No-load-operation | | |
| | 1. | Switch on main power supply | <input type="checkbox"/> |
| | a) | Switch on mill | <input type="checkbox"/> |
| | 2. | Confirmation items | <input type="checkbox"/> |
| | a) | Check the rotation direction (rotation direction shall be same as arrow mark shown on the mill housing) | <input type="checkbox"/> |
| | b) | Check the abnormal sound/noise | <input type="checkbox"/> |
| | c) | Check the speed sensor | <input type="checkbox"/> |
| | d) | Check the bearing temperature | <input type="checkbox"/> |
| | e) | Noise measuring in No-load operation | <input type="checkbox"/> |
| | 9.3 Continuous operation | | |
| | 1. | If no abnormally is observed during the No-load-Operation mentioned in 9.2 above, approximately 2 hours continuous operation will be carried out. | <input type="checkbox"/> |

Commissioning Procedure

Impact crusher System



Förderanlagen Magdeburg

Impact crusher

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| | | | | |
|--|----|------------------------------------------------------------------------------------------------------------|--|--------------------------|
| | 2. | Switch on the conveyors and equipment behind the mill. | | <input type="checkbox"/> |
| | 3. | Start-up the apron feeder with 50% capacity. | | <input type="checkbox"/> |
| | 4. | Checks and measurements | | |
| | a) | Speed sensor: function test | | <input type="checkbox"/> |
| | b) | Housing opening sensors: function test | | <input type="checkbox"/> |
| | c) | Vibration sensor: function test | | <input type="checkbox"/> |
| | d) | Temp: Bearing temperature measurement | | <input type="checkbox"/> |
| | e) | Current: start up current, stable operation current etc. shall be recorded according to test record sheet. | | <input type="checkbox"/> |
| | | | | |

| | Approved | Checked | Prepared |
|-----------|----------|---------|----------|
| Signature | | | |

Commissioning Procedure

Impact crusher System



Impact crusher

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| Required Personnel | Client | Remarks | | | | |
|---------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------|------------------|-------------|------------|
| Supervisors | | | | | | |
| 2x Operator └─ 1x in FGD control room └─ 1x local | | | | | | |
| Local Foreman | | | | | | |
| Recorder | | Record of noise and temperature | | | | |
| Switchgear Observer Electrician | | Measuring of start up current, stable operation current | | | | |
| Communication Method (temporary) | | | | | | |
| | | <table border="1"> <tr> <td>FGD Operator</td> <td>FGD Control Room</td> </tr> </table> Temporary telephone or transceiver | FGD Operator | FGD Control Room | | |
| FGD Operator | FGD Control Room | | | | | |
| | | <table border="1"> <tr> <td>FGD Operator</td> <td>Local</td> </tr> </table> | FGD Operator | Local | | |
| FGD Operator | Local | | | | | |
| | | <table border="1"> <tr> <td>Supervisor</td> <td>Local</td> </tr> </table> | Supervisor | Local | | |
| Supervisor | Local | | | | | |
| | | <table border="1"> <tr> <td>Foreman</td> <td>Local</td> <td>Electrician</td> <td>Switchgear</td> </tr> </table> | Foreman | Local | Electrician | Switchgear |
| Foreman | Local | Electrician | Switchgear | | | |

Table 1: Commissioning Operation Organization

Commissioning Procedure

Impact crusher System



Impact crusher

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| No. | Name | Prepared by Client | Remarks |
|-----|------------------------------------------------|--------------------------|---------|
| 1. | Thermometer (contactless) | <input type="checkbox"/> | |
| 2. | Noise meter | <input type="checkbox"/> | |
| 3. | Multimeter (Clamp meter) | <input type="checkbox"/> | |
| 4. | Stop watch | <input type="checkbox"/> | |
| 5. | Transceiver or temporary telephone | <input type="checkbox"/> | |
| 6. | General Tools | <input type="checkbox"/> | |
| 7. | Waste Cloth | <input type="checkbox"/> | |
| 8. | Hand lamp | <input type="checkbox"/> | |
| 9. | Grease Gun | <input type="checkbox"/> | |
| 10. | Safety Tape | <input type="checkbox"/> | |
| 11. | Marks | <input type="checkbox"/> | |
| 12. | Test Record Sheets | <input type="checkbox"/> | |
| 13. | Factory Test Record | <input type="checkbox"/> | |
| 14. | Construction Drawings, Dimensional Drawings | <input type="checkbox"/> | |

Table 2: List of Required Instruments and Tools

Commissioning assembly inspection Impact crusher



Impact crusher

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| Motor | | Impact Crusher | | |
|----------------|--|----------------|--|--|
| Type: | | Type: | | |
| Voltage: | | Capacity: | | |
| Serial Number: | | Serial Number: | | |

Test belt tension

| Setting via belt elongation (new belt) | | | Remarks |
|-----------------------------------------|---------------|--------------|---------|
| | nominal value | actual value | |
| equilibrated | 1000 mm | | |
| tense | 1008,78 mm | | |
| Setting via belt elongation (used belt) | | | |
| | nominal value | actual value | |
| equilibrated | 1000 mm | | |
| tense | 1005,60 mm | | |

Hydraulic system

| Test housing opening | | | Remarks |
|----------------------|------|-------|---------|
| | open | close | |
| | | | |

Visual control

| proofness hydraulik system | | Remarks |
|----------------------------|--|---------|
| equipment labeling | | |
| security equipment | | |

Erection work

| | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|----------|
| <ul style="list-style-type: none"> The assembly work is carried out by qualified and experienced personnel in compliance with the relevant accident prevention regulations. The installation was carried out properly and professionally under the rules of the art. | | |
| Approved | Checked | Prepared |

Commissioning Operation Record

Impact crusher



Impact crusher

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| Motor | | Impact Crusher | | Medium | |
|----------------|--|----------------|--|--------|--|
| Type: | | Type: | | | |
| Voltage: | | Capacity: | | | |
| Serial Number: | | Serial Number: | | | |

| Test Record Temperature | | | | | | | | | | | |
|-------------------------|-----------|----------------|------------------|---------------|----------------------|----------|---|---|---|---------|--|
| | Test Time | Current (A) | Voltage (V) | Rev. (rpm) | Measured Temperature | | | | | | |
| | | | | | 1 | 2 | 3 | 4 | | Ambient | |
| No-load operation | start 0' | | | | | | | | | | |
| | 10' | | | | | | | | | | |
| | 20' | | | | | | | | | | |
| | 30' | | | | | | | | | | |
| | 40' | | | | | | | | | | |
| | 50' | | | | | | | | | | |
| | 1°00' | | | | | | | | | | |
| | 30' | | | | | | | | | | |
| | 2°00' | | | | | | | | | | |
| | | | | | | | | | | | |
| Start up current: | | A | Measuring Points | | | | | | | | |
| Start up time: | | sec | | | | | | | | | |
| Shut down time: | | sec | | | | | | | | | |
| | | | | | | 4 | 1 | 3 | 2 | | |
| | | | | | | | | | | | |
| Approved | | | Checked | | | Prepared | | | | | |
| | | | | | | | | | | | |

EFT Stanari109794

Crusher station & belt conveying system

Commissioning Program



3. Check Lists

3.2 Test Certificate Apron Feeder

client: EFT Stanari

**Checklist Functional Tests
Apron Feeder**

FAM

Plant:

Apron Feeder AF 2000x15

Project:

Semi Mobile Crushing Station

Order No.:

109794

| Pos. | component | date | signature | remark |
|------|-----------------------|------|-----------|--------|
| 1 | safety facilities | | | |
| 2 | drive unit | | | |
| 3 | drive, bearings | | | |
| 4 | chain, apron | | | |
| 5 | additional facilities | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

remark:

Final assembly control:

An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM).

commissioning without material

commissioning with material

| | name | place of examination | date | signature |
|----------|------|----------------------|------|-----------|
| examiner | | | | |
| | | | | |
| | | | | |
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| | | | | |

| EFT Stanari | Checklist Functional Tests | | | FAM | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------|--------------------------|------------|-----------|
| Plant: | Apron Feeder AF 2000x15 | | | | |
| Project: | Semi Mobile Crushing Station | | | | |
| Order No.: | 109794 | | | | |
| Pos. | component | quantity | function test | | remark |
| | | | mechanical | electrical | |
| 1 | safety facilities | | | | |
| | emergency pull cord | | | | |
| | signal horn | | | | |
| | signal light | | | | |
| | mounting of all safety devices | | | | |
| | | | | | |
| | acc. drawings: | | | | |
| | 09247440 - Apron Feeder AF2200x15 | | | | |
| | 09244637 - Switching element | | | | |
| | 09262021 - Emergency switch device | | | | |
| | | | | | |
| remark: | | | | | |
| Final assembly control: | | | | | |
| An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM). | | | | | |
| commissioning without material | | | <input type="checkbox"/> | | |
| commissioning with material | | | <input type="checkbox"/> | | |
| examiner | name | place of examination | | date | signature |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| EFT Stanari | Checklist Functional Tests | | | FAM | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------|--------------------------|------------|-----------|
| Plant: | Apron Feeder AF 2000x15 | | | | |
| Project: | Semi Mobile Crushing Station | | | | |
| Order No.: | 109794 | | | | |
| Pos. | component | quantity | function test | | remark |
| | | | mechanical | electrical | |
| 2 | drive unit | | | | |
| | checking the quit run of the drive unit | | | | |
| | checking the sense of rotation of the motors | | | | |
| | oil filling gear unit | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | acc. drawings: | | | | |
| | 09261840 - Drive unit | | | | |
| | | | | | |
| | | | | | |
| remark: | | | | | |
| Final assembly control: | | | | | |
| An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM). | | | | | |
| commissioning without material | | | <input type="checkbox"/> | | |
| commissioning with material | | | <input type="checkbox"/> | | |
| examiner | name | place of examination | | date | signature |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| EFT Stanari | Checklist Functional Tests | | | FAM | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------|--------------------------|------------|-----------|
| Plant: | Apron Feeder AF 2000x15 | | | | |
| Project: | Semi Mobile Crushing Station | | | | |
| Order No.: | 109794 | | | | |
| Pos. | component | quantity | function test | | remark |
| | | | mechanical | electrical | |
| 3 | drive, bearings | | | | |
| | checking the temperature of bearings during running | | | | |
| | alignment drive unit | | | | |
| | checking for unusual running noise | | | | |
| | checking the connections and lines for | | | | |
| | damage and tightness | | | | |
| | | | | | |
| | acc. drawings: | | | | |
| | 09261840 - Drive unit | | | | |
| | 09136441 - Driven tumbler | | | | |
| | 09136447 - Take-up unit | | | | |
| remark: | | | | | |
| Final assembly control: | | | | | |
| An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM). | | | | | |
| commissioning without material | | | <input type="checkbox"/> | | |
| commissioning with material | | | <input type="checkbox"/> | | |
| examiner | name | place of examination | | date | signature |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| EFT Stanari | Checklist Functional Tests Apron Feeder | | | FAM | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------|--------------------------|------------|-----------|
| Plant: | Apron Feeder AF 2000x15 | | | | |
| Project: | Semi Mobile Crushing Station | | | | |
| Order No.: | 109794 | | | | |
| Pos. | component | quantity | function test | | remark |
| | | | mechanical | electrical | |
| 4 | chain, apron | | | | |
| | checking for alignment of chain | | | | |
| | checking the movement of chains over the driving- and take-up sprocket | | | | |
| | checking and correcting, if necessary, the chain tension | | | | |
| | checking the aprons for fastening | | | | |
| | | | | | |
| | | | | | |
| | acc. drawings: | | | | |
| | 09255162 - Set of aprons | | | | |
| | | | | | |
| remark: | | | | | |
| Final assembly control: | | | | | |
| An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM). | | | | | |
| commissioning without material | | | <input type="checkbox"/> | | |
| commissioning with material | | | <input type="checkbox"/> | | |
| examiner | name | place of examination | | date | signature |
| | | | | | |
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| EFT Stanari | Checklist Functional Tests Apron Feeder | | | FAM | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------|--------------------------|------------|-----------|
| Plant: | Apron Feeder AF 2000x15 | | | | |
| Project: | Semi Mobile Crushing Station | | | | |
| Order No.: | 109794 | | | | |
| Pos. | component | quantity | function test | | remark |
| | | | mechanical | electrical | |
| 5 additional facilities | | | | | |
| | | | | | |
| | checking the gap between aprons and impact rails | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | acc. drawings: | | | | |
| | 09255163 - Set of impact rails | | | | |
| | | | | | |
| | | | | | |
| remark: | | | | | |
| Final assembly control: | | | | | |
| An inspection was carried out by the a.m. participants to check the readiness for commissioning the assembled plant (only system delivery FAM). | | | | | |
| commissioning without material | | | <input type="checkbox"/> | | |
| commissioning with material | | | <input type="checkbox"/> | | |
| examiner | name | place of examination | | date | signature |
| | | | | | |
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EFT Stanari109794

Crusher station & belt conveying system

Commissioning Program

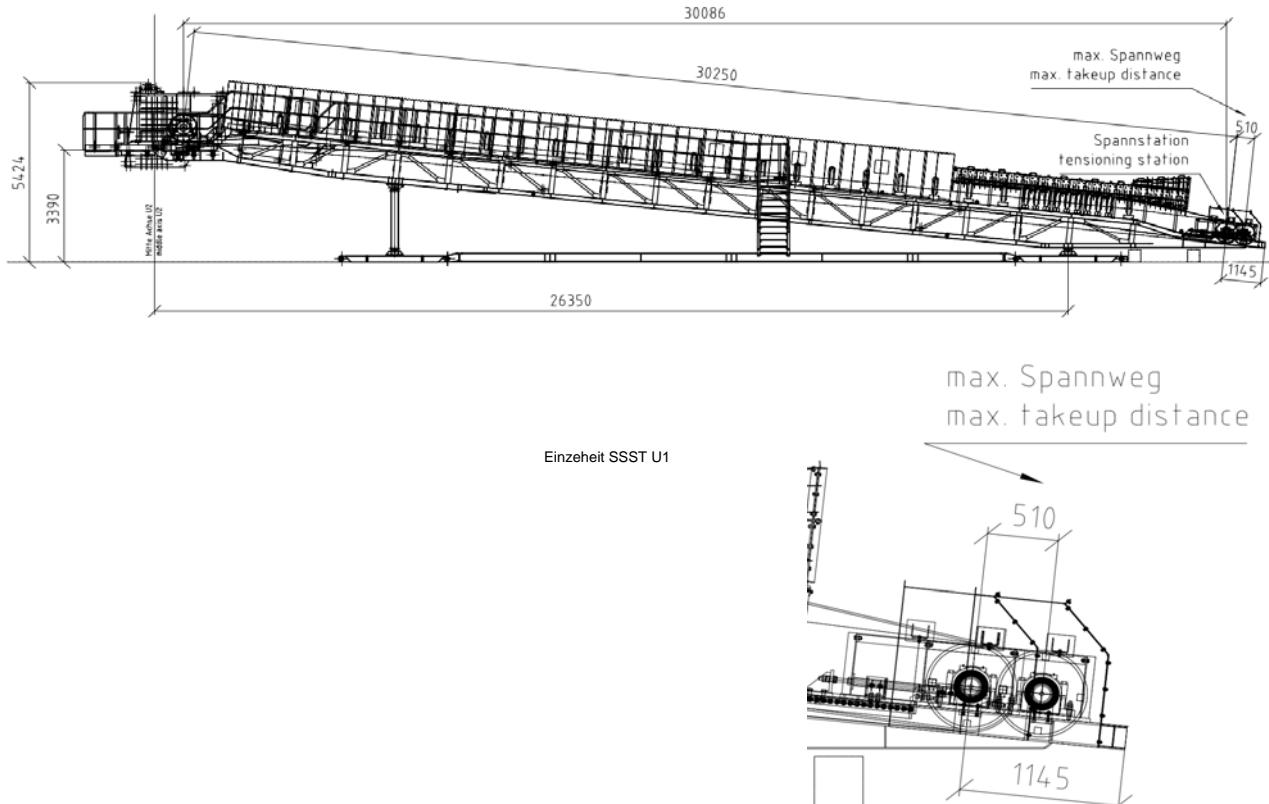


3. Check Lists

3.3 Test Certificate Conveyor

| | Check and Control List (Prüf- und Kontrollvorschrift) U1 | | | | Rev.0 | 17.02.2015 |
|----------|-----------------------------------------------------------------------------|-----|--------|-----------|----------|----------------------------------------------------|
| 0 | Geometric Data | | | | | |
| 0.1 | Conveyor length | m | 30 | X | X | initial installation |
| 0.2 | Conveyor height | m | 4 | X | X | initial installation (incl. constructional height) |
| 1 | Take up pulley position | | target | tolerance | realized | comments |
| 1.1 | start position take up carriage - for belt vulcanisation | mm | 0 | +/- 50 | | (see sketch) |
| 2 | Speeds | | target | tolerance | realized | comments |
| 2.1 | conveyor belt speed | m/s | 1,21 | +/- 0,2 | | correlates n Motor= 1000 /min |
| 3 | Belt tension | | target | tolerance | realized | comments |
| 3.1 | by screw | | | | | |
| 3.1.1 | pretension distance | mm | 90 | +/- 1 | | |
| 3.1.2 | corresponding take up force (at pulley) | kN | 80 | +/- 1 | | |
| 4 | Setting VFD's (torque and ramp time from 0 to 1000 min⁻¹) | | target | tolerance | realized | comments |
| 4.1 | Torque limited | | | | | |
| 4.1.1 | Belt drive (VFD) (operation) | Nm | 475 | +/- 5% | | |
| 4.1.2 | Belt drive (VFD) (starting) | Nm | 700 | +/- 5% | | |
| 4.2 | Ramp time (Time from 0 to nominal motor speed) | | | | | |
| 4.2.1 | Belt drive (VFD) - starting | sec | 5 | +/- 10% | | |
| 4.2.2 | Belt drive (VFD) - braking | sec | 5 | +/- 10% | | |
| 5 | Brake torques | | target | tolerance | realized | comments |
| 5.1 | Belt conveyor drive | Nm | 75 | +/- 10% | | |

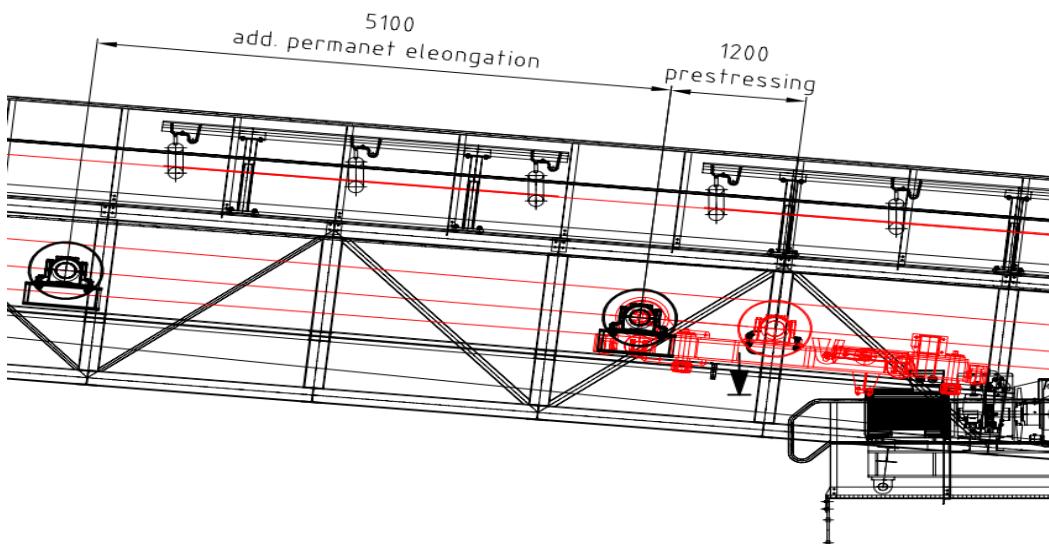
sketch 1



| | Check and Control List (Prüf- und Kontrollvorschrift) U2 | | | | Rev.0 | 17.02.2015 |
|-------|------------------------------------------------------------------------|-----|-------|---------|--------------------------------------------------------|------------|
| 0 | Geometric Data | | | | | |
| 0.1 | Conveyor length | m | 501 | X X X X | initial installation | |
| 0.2 | Conveyor height | m | 31,23 | X X X X | initial installation (incl. constructional height) | |
| 1 | Take up pulley position | | | | target | tolerance |
| 1.1 | start position take up carriage - for belt vulcanisation | mm | 0 | +/- 50 | rubber block take up car in end position (see sketch) | |
| 1.2 | distance pulley as a result of prestressing | mm | 1200 | +/- 50 | consider additional permanent elongation 5100mm | |
| 2 | Speeds | | | | target | tolerance |
| 2.1 | conveyor belt speed | m/s | 2,64 | +/- 0,2 | correlates n Motor = 1000 /min | |
| 3 | Belt tension | | | | target | tolerance |
| 3.1 | by winch | | | | | |
| 3.2 | Resultant Force at tension pulley out of operation + / -1% | kN | 82 | +/- 1 | rope force at measuring device = 20,5 KN | |
| 3.2.1 | Force measured by meas. device no load operation + / -1% | kN | 19,5 | +/- 1 | check value for no load operation | |
| 3.2.2 | max. Force in meas.device during const. operation +1 % | kN | 22 | +/- 1 | | |
| 3.2.3 | min. Force in meas.device during const. operation -1 % | kN | 14 | +/- 1 | | |
| 4 | Setting VFD's (torque and ramp time from 0 to 1000 min ⁻¹) | | | | target | tolerance |
| 4.1 | Torque limited | | | | | |
| 4.1.1 | Belt drive (VFD) (operation) | Nm | 750 | +/- 5% | each drive | |
| 4.1.1 | Belt drive (VFD) (starting) | Nm | 1050 | +/- 5% | each drive | |
| 4.2 | Ramp time (Time from 0 to nominal motor speed) | | | | | |
| 4.2.1 | Belt drive (VFD) - starting | sec | 20 | +/- 10% | | |
| 4.2.2 | Belt drive (VFD) - braking | sec | 15 | +/- 10% | | |
| 5 | Brake torques | | | | target | tolerance |
| 5.1 | Belt conveyor drive | Nm | 90 | +/- 10% | each drive | |

sketch 1

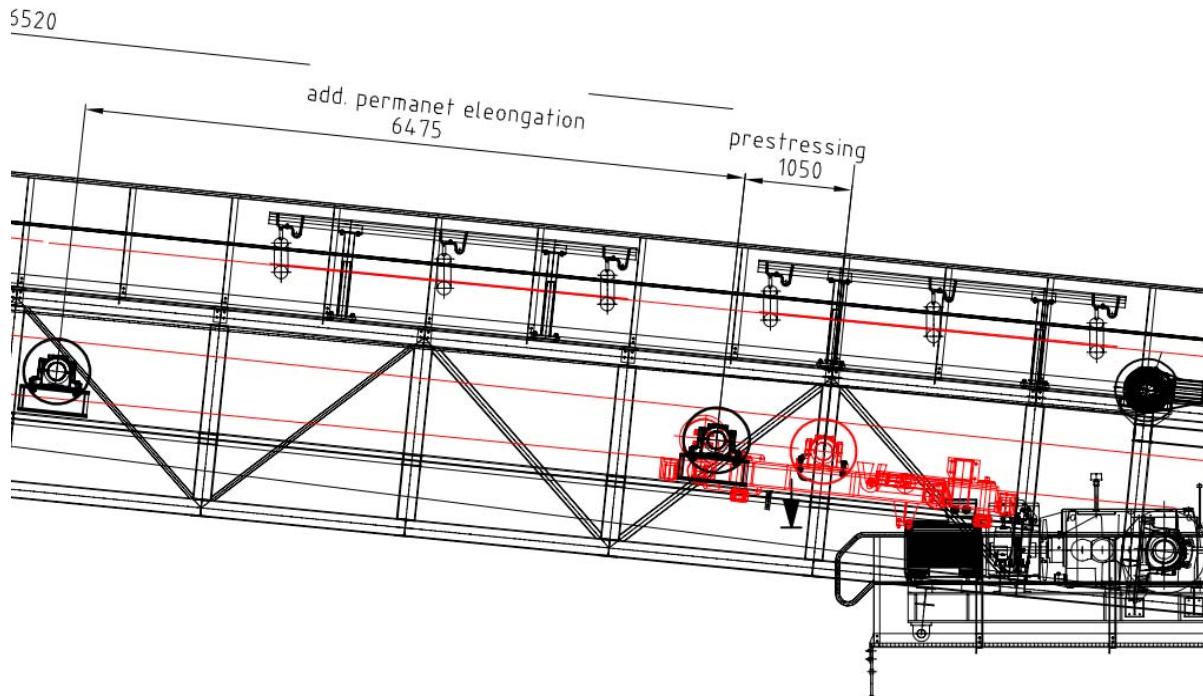
sketch 1 GF U2



| | Check and Control List (Prüf- und Kontrollvorschrift) U3 | | | | Rev.0 | 17.02.2015 |
|----------|-----------------------------------------------------------------------------|-----|--------|-----------|----------------------------------------------------|-------------------------------------------------------|
| 0 | Geometric Data | | | | | |
| 0.1 | Conveyor length | m | 642,33 | X X X X | initial installation | |
| 0.2 | Conveyor height | m | -0,05 | X X X X | initial installation (incl. constructional height) | |
| 1 | Take up pulley position | | target | tolerance | realized | comments |
| 1.1 | start position take up carriage - for belt vulcanisation | mm | 0 | +/- 50 | | rubber block take up car in end position (see sketch) |
| 1.2 | distance pulley as a result of prestressing | mm | 1050 | +/- 50 | | consider additional permanent elongation 6475mm |
| 2 | Speeds | | target | tolerance | realized | comments |
| 2.1 | conveyor belt speed | m/s | 2,65 | +/- 0,2 | | correlates n Motor= 1000 /min |
| 3 | Belt tension | | target | tolerance | realized | comments |
| 3.1 | by winch | | | | | |
| 3.2 | Resultant Force at tension pulley out of operation + / -1% | kN | 53 | +/- 1 | | rope force at measuring device = 13,25 KN |
| 3.2.1 | Force measured by meas. device no load operation + / -1% | kN | 13,5 | +/- 1 | | check value for no load operation |
| 3.2.2 | max. Force in meas.device during const. operation +1 % | kN | 15 | +/- 1 | | |
| 3.2.3 | min. Force in meas.device during const. operation -1 % | kN | 12,5 | +/- 1 | | |
| 4 | Setting VFD's (torque and ramp time from 0 to 1000 min⁻¹) | | target | tolerance | realized | comments |
| 4.1 | Torque limited | | | | | |
| 4.1.1 | Belt drive (VFD) (operation) | Nm | 400 | +/- 5% | | each drive |
| 4.1.1 | Belt drive (VFD) (starting) | Nm | 600 | +/- 5% | | each drive |
| 4.2 | Ramp time (Time from 0 to nominal motor speed) | | | | | |
| 4.2.1 | Belt drive (VFD) - starting | sec | 20 | +/- 10% | | |
| 4.2.2 | Belt drive (VFD) - braking | sec | 15 | +/- 10% | | |
| 5 | Brake torques | | target | tolerance | realized | comments |
| 5.1 | Belt conveyor drive | Nm | 90 | +/- 10% | | each drive |

sketch 1

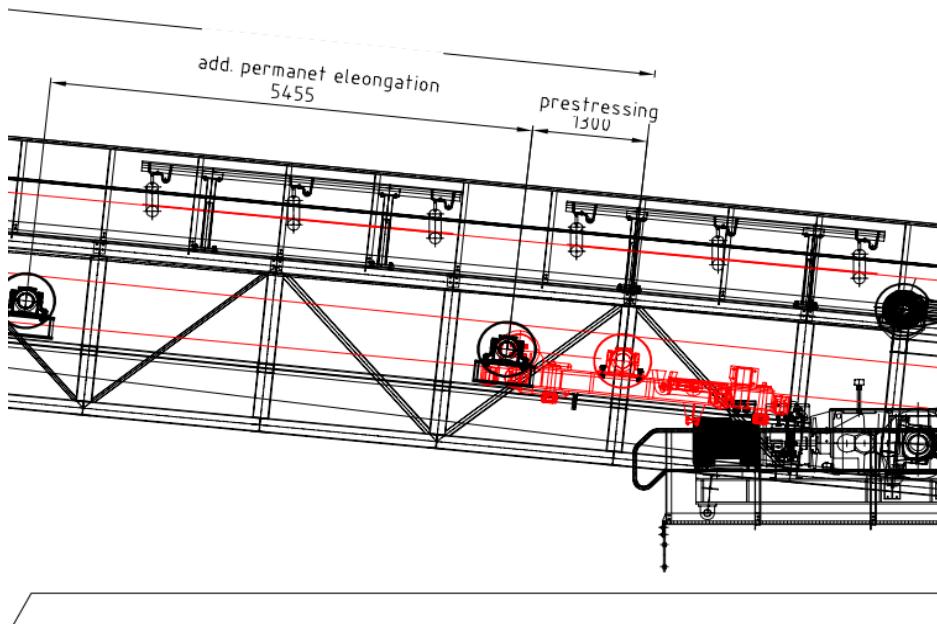
sketch 1 GF U3



| | Check and Control List (Prüf- und Kontrollvorschrift) U4 | | | | Rev.0 | 17.02.2015 |
|----------|-----------------------------------------------------------------------------|-----|--------|-----------|----------------------------------------------------|-------------------------------------------------------|
| 0 | Geometric Data | | | | | |
| 0.1 | Conveyor length | m | 539,95 | X X X X | initial installation | |
| 0.2 | Conveyor height | m | 4,7 | X X X X | initial installation (incl. constructional height) | |
| 1 | Take up pulley position | | target | tolerance | realized | comments |
| 1.1 | start position take up pulley - for belt vulcanisation | mm | 0 | +/- 50 | | rubber block take up car in end position (see sketch) |
| 1.2 | distance pulley as a result of prestressing | mm | 1300 | +/- 50 | | consider additional permanent elongation 5455mm |
| 2 | Speeds | | target | tolerance | realized | comments |
| 2.1 | conveyor belt speed | m/s | 2,65 | +/- 0,2 | | correlates n Motor= 1000 /min |
| 3 | Belt tension | | target | tolerance | realized | comments |
| 3.1 | by winch | | | | | |
| 3.2 | Resultant Force at tension pulley out of operation + / -1% | kN | 75 | +/- 1 | | rope force at measuring device = 18,75 KN |
| 3.2.1 | Force measured by meas. device no load operation + / -1% | kN | 22,9 | +/- 1 | | check value for no load operation |
| 3.2.2 | max. Force in meas.device during const. operation +1 % | kN | 25,75 | +/- 1 | | |
| 3.2.3 | min. Force in meas.device during const. operation -1 % | kN | 20,4 | +/- 1 | | |
| 4 | Setting VFD's (torque and ramp time from 0 to 1000 min⁻¹) | | target | tolerance | realized | comments |
| 4.1 | Torque limited | | | | | |
| 4.1.1 | Belt drive (VFD) (operation) | Nm | 420 | +/- 5% | | each drive |
| 4.1.1 | Belt drive (VFD) (starting) | Nm | 650 | +/- 5% | | each drive |
| 4.2 | Ramp time (Time from 0 to nominal motor speed) | | | | | |
| 4.2.1 | Belt drive (VFD) - starting | sec | 20 | +/- 10% | | |
| 4.2.2 | Belt drive (VFD) - braking | sec | 15 | +/- 10% | | |
| 5 | Brake torques | | target | tolerance | realized | comments |
| 5.1 | Belt conveyor drive | Nm | 90 | +/- 10% | | each brake |

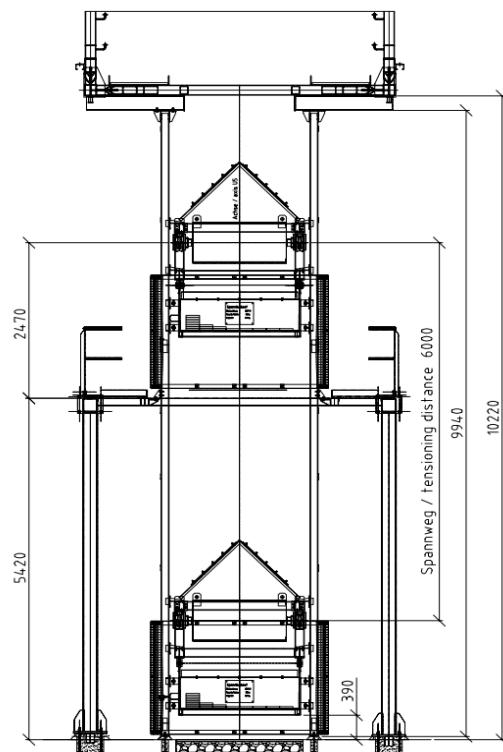
sketch 1

sketch 1 GF U4



| | Check and Control List (Prüf- und Kontrollvorschrift) U5 | | | | Rev.0 | 17.02.2015 |
|----------|-----------------------------------------------------------------------------|-----|--------|-----------|----------------------------------------------------|-------------------------------|
| 0 | Geometric Data | | | | | |
| 0.1 | Conveyor length | m | 284,03 | X X X X | initial installation | |
| 0.2 | Conveyor height | m | 5,61 | X X X X | initial installation (incl. constructional height) | |
| 1 | Take up pulley position | | target | tolerance | realized | comments |
| 1.1 | start position ballast box - for vulcanisation | mm | | +/- 100 | | (see sketch) |
| 2 | Speeds | | target | tolerance | realized | comments |
| 2.1 | conveyor belt speed | m/s | 2,65 | +/- 0,2 | | correlates n Motor= 1000 /min |
| 3 | Belt tension - | | target | tolerance | realized | comments |
| 3.1 | by gravity | | | | | |
| 3.1.1 | nominal value at take-up pulley | kN | 38,1 | +/- 1 | | |
| 3.1.2 | max. Filling of ballast box 100% | kg | 2025 | +/- 10 | | |
| 4 | Setting VFD's (torque and ramp time from 0 to 1000 min⁻¹) | | target | tolerance | realized | comments |
| 4.1 | Torque limited | | | | | |
| 4.1.1 | Belt drive (VFD) (operation) | Nm | 650 | +/- 5% | | |
| 4.1.1 | Belt drive (VFD) (starting) | Nm | 1000 | +/- 5% | | |
| 4.2 | Ramp time (Time from 0 to nominal motor speed) | | | | | |
| 4.2.1 | Belt drive (VFD) - starting | sec | 20 | +/- 10% | | |
| 4.2.2 | Belt drive (VFD) - braking | sec | 15 | +/- 10% | | |
| 5 | Brake torques | | target | tolerance | realized | comments |
| 5.1 | Belt conveyor drive | Nm | 280 | +/- 10% | | |

sketch 1



3. Check Lists

3.4 Consumer List

PROJECT: EFT Stanari
 FAM PROJECT NO.: 10979416A.AEZ.810390.810
 DOCUMENT NO.:
 STATUS : For Approval

CONSUMER LIST

DOCUMENT NO.: 109794-1700-Consumer list

REVISION NO.: 0

MACHINE NO.: Crusher +Belt Conveyor U-1...U-5

Date: 21.01.15

FAM
 Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Equipmt' Tag No. | Motor Tag | Qty | Service | Power | | | Start. Torque [%] | Model | Duty | FLA [A] | PF | EFF | Manu- fact. | Temp. rise [K] | Insul. class | Prot- degree | Cool. Noise [dB] | Voltage [V] | Freq. [Hz] | Speed [rpm] | Starter | Frame | Local Control Box | checked Date | signature | | |
|---------------------------------|---------------------|-----------------------|-----|---------------------------------------------------------------|--------------------------|----------------|--------------|-------------------------|----------------|----------------|------------|-----------------------------------|-------|----------------|-------------------------|-----------------|-------------------|------------------------|----------------|---------------|----------------|---------|-------|-------------------------|-----------------|-----------|--------|-------------------|
| | | | | | rated kW | required kW | common kW | | | | | | | | | | | | | | | | | | | | | |
| Performance reserve Transformer | | | 0% | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| LV-Load | | | | C Continuous (Acc. IEC S1) I Intermittent (Acc. IEC S3,S4) | S blue= estimated values | | | Standby Formula | IC410 IC411 | IC410 IC411 | - | Non-ventilated Self-ventilated | IC416 | - | Fan cooled DC-Busbar | 6kV 690V | 400V DC-Busbar | | | | | | | | | | 4 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | Datasheet decided |
| EC1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | 1600kVA | | | | | | 162,1 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | |
| 2 | EC1 | EC1 . 00 - T01 | 1 | Transformer 6000/690V | | 1600kVA | | | | | | 162,1 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | |
| 3 | EC1 | | | Reserve | | | | 0 | | | | | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | |
| 4 | EC1 | | | | | | | 0 | | | | | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | |
| 5 | EC1 | | | | | 1097kW | | | | | | 1409,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | |
| 6 | CR | CR . 11 - M02 | 1 | Spillage conveyor | | 5,50 | | | | | | 5,6 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | VOS-22 | |
| 7 | CR | CR . 81 - M01 | 1 | hydraulics crusher | | 1,50 | | | | | | 1,5 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | VOS-23 | |
| 8 | EC1 | EC1 . 00 - T02 | 1 | Transformer 690/400V | | 63 | | | | | | 64,5 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | |
| 9 | U1 | U1 . 11 - Y01 | 1 | Belt conveyor U-1 Brake | | 0,2 | | | | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | CR | CR . 11 - M01 | 1 | Aapron Feeder drive motor | | 75 | | | | | | 76,8 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | VFD | | VOS-22 | |
| 13 | CR | CR . 41 - M01 | 1 | Crusher drive motor | | 900 | | | | | | 911,2 | 0,87 | 0,95 | | | | | | | | 690 | 50 | | VFD | | VOS-22 | |
| 14 | U1 | U1 . 11 - M01 | 1 | Belt conveyor U-1 drive motor | | 75 | 52 | 52 | | | | 79,6 | 0,83 | 0,95 | | | | | | | | 690 | 50 | | VFD | | VOS-22 | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | EC1 | | | | | | | 0 | | | | 0,0 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | |
| 17 | EC1 | | | | | 24 | | | | | | 111,3 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 18 | EC1 | EC1 . 04 - E01...ff | 1 | Indoor Lighting EC1+ Cab | | 2 | | | | | | 3,5 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 19 | EC1 | EC1 . 04 - E40... ff. | 1 | Outdoor Lighting U1 | | 0,2 | | | | | | 0,4 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 20 | EC1 | EC1 . 04 - E40... ff. | 1 | Outdoor Lighting CR | | 0,8 | | | | | | 1,4 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 21 | EC1 | EC1 . 04 - E10... ff. | 1 | Internal consumers switchgear EC1 | | 3 | | | | | | 5,3 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 22 | EC1 | EC1 . 04 - G01 | 1 | Battery charger | | 2,8 | | | | | | 4,9 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 23 | EC1 | EC1 . 04 - E01 | 1 | Air Conditioner 1 | | 4,65 | | | | | | 8,2 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 24 | EC1 | EC1 . 04 - E02 | 1 | Air Conditioner 2 | | 4,65 | | | | | | 8,2 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 25 | EC1 | EC1 . 04 - E01 | 1 | Air Conditioner Cab | | 4 | | | | | | 7,1 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 26 | EC1 | EC1 . 05 - E02 | 1 | Internal consumers switchgear Cab | | 1 | | | | | | 1,8 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |
| 27 | U1 | U1 . 04 - E01 | 1 | Belt conveyor U-1-heating gear box | | 0,5 | | | | | | 1,5 | 0,86 | 0,95 | | | | | | | | 230 | 50 | | | | | |
| 28 | EC1 | | 0 | Reserve | | 2,01 | | | | | | 0,0 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | |

PROJECT: EFT Stanari
 FAM PROJECT NO.: 10979416.A.EEZ.810390.810
 DOCUMENT NO.:
 STATUS : For Approval

CONSUMER LIST

DOCUMENT NO.: 109794-1700-Consumer list

REVISION NO.: 0

MACHINE NO.: Crusher +Belt Conveyor U-1...U-5

Date: 21.01.15


 Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Equipmt' Tag No. | Motor Tag | Qty | Service | Power | | Start. Torque [%] | Model | Duty | FLA [A] | PF | EFF | Manu- fact. | Temp. rise [K] | Insul. class | Prot- degree | Cool. | Noise [dB] | Voltage [V] | Freq. [Hz] | Speed [rpm] | Starter | Frame | Local Control Box | checked Date | signature | | | | |
|------------|---------------------|----------------------|-----|---------------------------------|-------------|----------------|-------------------------|--------|------|------------|------|------|----------------|----------------------|-----------------|-----------------|-------|---------------|----------------|---------------|----------------|---------|-------|-------------------------|-----------------|-----------|--|--------|--|--|
| | | | | | rated kW | required kW | | | | | | | | | | | | | | | | | | | | | | | | |
| EC2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | | 2630kVA | | 2630kVA | | | 266,4 | 0,86 | 0,95 | | | | | | | 6000 | 50 | | | | | | | | | | |
| 2 | EC2 | EC2 . 00 - T01 | 1 | Transformer 6000/690V | 630kVA | | 630kVA | | | 63,8 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | | | | | |
| 3 | EC2 | . | 1 | Reserve | | | 0 | | | 0,0 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | | | | | |
| 4 | EC2 | EC2 . 00 - W02 | 1 | Feeding EC1 | 1600kVA | | 1600kVA | | | 162,1 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | | | | | |
| 5 | EC2 | EC2 . 00 - W03 | 1 | Feeding EC3 | 400kVA | | 400kVA | | | 40,5 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | | | | | |
| 6 | EC2 | . | | | | | | | | | | | 0,95 | | | | | | | | | | | | | | | | | |
| 7 | EC2 | . | | | 452kW | | 452kW | 502kVA | | 554,9 | 0,90 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 8 | U2 | U2 . 81 - M01 | 1 | Take-up station U-2 | 4,00 | 3,30 | 4 | | | 4,3 | 0,82 | 0,95 | | | | | | | | 690 | 50 | | | | VOS-23 | | | | | |
| 9 | U3 | U3 . 81 - M01 | 1 | Take-up station U-3 | 4,00 | 3,30 | 4 | | | 4,3 | 0,82 | 0,95 | | | | | | | | 690 | 50 | | | | VOS-23 | | | | | |
| 10 | EC2 | EC2 . 00 - T02 | 1 | Transformer 690/400V | 63 | | 63 | | | 64,5 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 11 | U2 | U2 . 11 - Y01 | 1 | Belt conveyor U-2 Brake 1 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 12 | U2 | U2 . 11 - Y02 | 1 | Belt conveyor U-2 Brake 2 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 13 | U3 | U3 . 11 - Y01 | 1 | Belt conveyor U-3 Brake 1 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 14 | U3 | U3 . 11 - Y02 | 1 | Belt conveyor U-3 Brake 2 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 15 | U3 | U3 . 11 - Y03 | 1 | Belt conveyor U-3 Brake 3 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | | | |
| 16 | U2 | U2 . 11 - M01 | 1 | Belt conveyor U-2 drive motor 1 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | VOS-22 | | |
| 17 | U2 | U2 . 11 - M02 | 1 | Belt conveyor U-2 drive motor 2 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | | | |
| 18 | U2 | U2 . 11 - M03 | 1 | Belt conveyor U-2 drive motor 3 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | | | |
| 19 | U3 | U3 . 11 - M01 | 1 | Belt conveyor U-3 drive motor 1 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | VOS-22 | | |
| 20 | U3 | U3 . 11 - M02 | 1 | Belt conveyor U-3 drive motor 2 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | | | |
| 21 | U3 | U3 . 11 - M03 | 1 | Belt conveyor U-3 drive motor 3 | 90 | | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | VFD | | | | |
| 22 | | | 1 | | | | | | | | | | | | | | | 0,0 | 0,86 | 0,95 | | | | | | | | | | |
| 23 | | | 1 | | | | | | | | | | | | | | | 0,0 | 0,86 | 0,95 | | | | | | | | | | |
| 24 | EC2 | . | 1 | | | | | | | | | | | | | | | 0,0 | 0,86 | 0,95 | | | | | | | | | | |
| 25 | EC2 | . | | | 27 | | 27 | 31kVA | | 111,3 | 0,86 | 0,95 | | | | | | | | | 400 | 50 | | | | | | | | |
| 26 | EC2 | EC2 . 04 - E01...ff | 1 | Indoor Lighting | 2 | | 2 | | | 3,5 | 0,86 | 0,95 | | | | | | | | | 400 | 50 | | | | | | | | |
| 27 | EC2 | EC2 . 04 - E40...ff. | 1 | Outdoor Lighting U2 | 1,9 | | 2 | | | 3,4 | 0,86 | 0,95 | | | | | | | | | 400 | 50 | | | | | | | | |
| 28 | EC3 | EC3 . 04 - E40...ff. | 1 | Outdoor Lighting U3 | 1,1 | | 1 | | | 1,9 | 0,86 | 0,95 | | | | | | | | | 400 | 50 | | | | | | | | |
| 29 | EC2 | EC2 . 04 - E10...ff. | 1 | Internal consumers switchgear | 3 | | 3 | | | 5,3 | 0,86 | 0,95 | | | | | | | | | 400 | 50 | | | | | | | | |

PROJECT: EFT Stanari
 FAM PROJECT NO.: 10979416A.AEZ.810390.810
 DOCUMENT NO.:
 STATUS : For Approval

CONSUMER LIST

DOCUMENT NO.: 109794-1700-Consumer list

REVISION NO.: 0

MACHINE NO.: Crusher +Belt Conveyor U-1...U-5

Date: 21.01.15

FAM
 Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Equipmt' Tag No. | Motor Tag | Qty | Service | Power required | | Start. Torque [%] | Model | Duty | FLA [A] | PF | EFF | Manu- fact. | Temp. rise [K] | Insul. class | Prot- degree | Cool. | Noise [dB] | Voltage [V] | Freq. [Hz] | Speed [rpm] | Starter | Frame | Local Control Box | checked Date | signature | | |
|------------|---------------------|----------------------|-----|---------------------------------|-------------------|------|-------------------------|--------|------|------------|------|------|----------------|----------------------|-----------------|-----------------|-------|---------------|----------------|---------------|----------------|---------|-------|-------------------------|-----------------|-----------|--|--|
| | | | | | kW | kW | | | | | | | | | | | | | | | | | | | | | | |
| 30 | EC2 | EC2 . 04 - G01 | 1 | Battery charger | 2,8 | | 3 | | | 5,5 | 0,86 | 0,85 | | | | | | | | 400 | 50 | | | | | | | |
| 31 | EC2 | EC2 . 04 - E01 | 1 | Air Conditioner 1 | 5,5 | | 6 | | | 18,9 | 0,86 | 0,85 | | | | | | | | | 230 | 50 | | | | | | |
| 32 | EC2 | EC2 . 04 - E02 | 1 | Air Conditioner 2 | 5,5 | | 6 | | | 18,9 | 0,86 | 0,85 | | | | | | | | | 230 | 50 | | | | | | |
| 33 | | . | 1 | Reserve | 1,98 | | 2 | | | 3,9 | 0,86 | 0,85 | | | | | | | | | 400 | 50 | | | | | | |
| 34 | U2 | U2 . 04 - E1...ff. | 3 | Belt conv. U2 heating gear box | 0,5 | | 1,5 | | | 2,4 | 1,86 | 0,85 | | | | | | | | | 230 | 50 | | | | | | |
| 35 | U3 | U3 . 04 - E1...ff. | 3 | Belt conv. U3 heating gear box | 0,5 | | 1,5 | | | 1,5 | 2,86 | 0,85 | | | | | | | | | 230 | 50 | | | | | | |
| 36 | | . | | | | | 0,0 | | | 0,0 | 3,86 | 0,85 | | | | | | | | | 230 | 50 | | | | | | |
| EC3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | 1 | | 400kVA | | 400kVA | | | 40,5 | 0,86 | 0,95 | | | | | | | | 6000 | 50 | | | | | | | |
| 2 | EC3 | EC3 . 00 - T01 | 1 | Transformer 6000/690V | 250kVA | | 400kVA | | | 40,5 | 0,86 | 0,95 | | | | | | | | | 6000 | 50 | | | | | | |
| 3 | EC3 | EC3 . | 1 | Reserve | | | 0 | | | | | | 0,86 | 0,95 | | | | | | | 6000 | 50 | | | | | | |
| 4 | | . | | | | | | | | | | | 0,86 | 0,95 | | | | | | | 6000 | 50 | | | | | | |
| 5 | | . | | | 206 | | 206 | 240kVA | | 352,3 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 6 | U4 | U4 . 81 - M01 | 1 | Take-up station U-4 | 4,00 | 3,30 | 4,0 | | | 4,3 | 0,82 | 0,95 | | | | | | | | 690 | 50 | | | VOS-23 | | | | |
| 7 | | | | | | | | | | | | | 0,86 | 0,95 | | | | | | 690 | 50 | | | | | | | |
| 8 | EC3 | EC3 . 00 - T02 | 1 | Transformer 690/400V | 63 | | 63 | | | 64,5 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 9 | U4 | U4 . 11 - Y01 | 1 | Belt conveyor U-4 brake 1 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 10 | U4 | U4 . 11 - Y02 | 1 | Belt conveyor U-4 brake 2 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 11 | U5 | U5 . 11 - Y01 | 1 | Belt conveyor U-5 brake 1 | 0,2 | | 0,2 | | | 0,2 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 12 | U5 | U5 . 11 - E03 | 1 | Metal Separator | 8,75 | | 9 | | | 9,0 | 0,86 | 0,95 | | | | | | | | 690 | 50 | | | | | | | |
| 13 | U4 | U4 . 11 - M01 | 1 | Belt conveyor U-4 drive motor 1 | 90 | | | | | | | | | | | | | | | 690 | 50 | | VFD | VOS-22 | | | | |
| 14 | U4 | U4 . 11 - M02 | 1 | Belt conveyor U-4 drive motor 2 | 90 | | | | | | | | | | | | | | | 690 | 50 | | VFD | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | . | | | 24 | | 24 | 28kVA | | 111,3 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | | | |
| 19 | EC3 | EC3 . 04 - E01...ff. | 1 | Indoor Lighting | 2 | | 2 | | | 3,5 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | | | |
| 20 | U4 | U4 . 04 - E40...ff. | 1 | Outdoor Lighting U4 | 1,9 | | 2 | | | 3,4 | 0,86 | 0,95 | | | | | | | | 400 | 50 | | | | | | | |

PROJECT: EFT Stanari
 FAM PROJECT NO.: 10979416A.AEZ.810390.810
 DOCUMENT NO.:
 STATUS : For Approval

CONSUMER LIST

DOCUMENT NO.: 109794-1700-Consumer list

REVISION NO.: 0

MACHINE NO.: Crusher +Belt Conveyor U-1...U-5

Date: 21.01.15

FAM
 Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Equipmt' Tag No. | Motor Tag | Qty | Service | Power required | | Start. Torque [%] | Model | Duty | FLA [A] | PF | EFF | Manu- fact. | Temp. rise [K] | Insul. class | Prot- degree | Cool. | Noise [dB] | Voltage [V] | Freq. [Hz] | Speed [rpm] | Starter | Frame | Local Control Box | checked Date | signature | |
|--------------------|---------------------|-----------------------|-----|--------------------------------|-------------------|----|-------------------------|-------|------|------------|------|------|----------------|----------------------|-----------------|-----------------|-------|---------------|----------------|---------------|----------------|---------|--------|-------------------------|-----------------|-----------|--|
| | | | | | kW | kW | | | | | | | | | | | | | | | | | | | | | |
| 21 | U5 | U5 . 04 - E40... ff. | 1 | Outdoor Lighting U5 | 2,1 | | 2 | | | 3,7 | 0,86 | 0,95 | | | | | | | 400 | 50 | | | | | | | |
| 22 | EC3 | EC3 . 04 - E10... ff. | 1 | Internal consumers switchgear | 3 | | 3 | | | 5,3 | 0,86 | 0,95 | | | | | | | 400 | 50 | | | | | | | |
| 23 | EC3 | EC3 . 04 - G01 | 1 | Battery charger | 2,8 | | 3 | | | 4,9 | 0,86 | 0,95 | | | | | | | 400 | 50 | | | | | | | |
| 24 | EC3 | EC3 . 04 - E01 | 1 | Air Conditioner 1 | 5,5 | | 6 | | | 16,9 | 0,86 | 0,95 | | | | | | | 230 | 50 | | | | | | | |
| 25 | EC3 | EC3 . 04 - E02 | 1 | Air Conditioner 2 | 5,5 | | 6 | | | 16,9 | 0,86 | 0,95 | | | | | | | 230 | 50 | | | | | | | |
| 26 | EC3 | . | 0 | Reserve | 2,28 | | 0 | | | 0,0 | 0,86 | 0,95 | | | | | | | 400 | 50 | | | | | | | |
| 27 | U4 | U4 . 04 - E1... ff. | 2 | Belt conv. U4-heating gear box | 0,5 | | 1,0 | | | 3,1 | 0,86 | 0,95 | | | | | | | 230 | 50 | | | | | | | |
| 28 | U5 | U5 . 04 - E1... ff. | 1 | Belt conv. U5-heating gear box | 0,5 | | 0,5 | | | 1,5 | 0,86 | 0,95 | | | | | | | 230 | 50 | | | | | | | |
| 29 | | . | 0 | | | | 0 | | | 0,0 | 0,86 | 0,95 | | | | | | | 400 | 50 | | | | | | | |
| TPP-Station | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | U5 | U5 . 11 - M01 | 1 | Belt conveyor U-5 drive motor | 110 | 70 | 70 | | | 123,7 | 0,86 | 0,95 | | | | | | | 400 | 50 | | VFD | VOS-22 | | | | |

3. Check Lists

3.5 Sensor List

PROJECT: EFT Stanari
 FAM PROJECT NO.: 109794
 DOCUMENT NO.: 109794-1600-Sensor List
 STATUS : preliminary

SENSOR LIST

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | Signal Points | | | | | | Remark | Checked date | Signature |
|------|---------|------------|---------------|-------------|------|--------------|---------|--------|--------|--------------|-----------|
| | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |

Emergency stop U-1

| | | | | | | | | | | | |
|---|-----|--------------------|---|------------------------------|---------------------|---------|----|--------|---|--|--|
| 1 | =U1 | =U1 .02 +L415 -S01 | 1 | Pull rope switch 1 | PRS00191.054033.001 | KIEPE | NC | 24V DC | - | | |
| 2 | =U1 | =U1 .02 +L415 -S02 | 1 | Pull rope switch 2 | PRS00191.054033.002 | KIEPE | NC | 24V DC | - | | |
| 3 | =U1 | =U1 .02 +L499 -S03 | 1 | Emergency stop push button 1 | 3SB3801-0DF-Z | SIEMENS | NC | 24V DC | - | | |
| 4 | | | | | | | | | | | |

Emergency stop U-2

| | | | | | | | | | | | |
|----|-----|--------------------|---|---------------------|---------------------|-------|----|--------|---|--|--|
| 5 | =U2 | =U2 .02 +L415 -S01 | 1 | Pull rope switch 1 | PRS00191.054033.001 | KIEPE | NC | 24V DC | - | | |
| 6 | =U2 | =U2 .02 +L415 -S02 | 1 | Pull rope switch 2 | PRS00191.054033.002 | KIEPE | NC | 24V DC | - | | |
| 7 | =U2 | =U2 .02 +L425 -S03 | 1 | Pull rope switch 3 | PRS00191.054033.003 | KIEPE | NC | 24V DC | - | | |
| 8 | =U2 | =U2 .02 +L425 -S04 | 1 | Pull rope switch 4 | PRS00191.054033.004 | KIEPE | NC | 24V DC | - | | |
| 9 | =U2 | =U2 .02 +L435 -S05 | 1 | Pull rope switch 5 | PRS00191.054033.005 | KIEPE | NC | 24V DC | - | | |
| 10 | =U2 | =U2 .02 +L435 -S06 | 1 | Pull rope switch 6 | PRS00191.054033.006 | KIEPE | NC | 24V DC | - | | |
| 11 | =U2 | =U2 .02 +L445 -S07 | 1 | Pull rope switch 7 | PRS00191.054033.007 | KIEPE | NC | 24V DC | - | | |
| 12 | =U2 | =U2 .02 +L445 -S08 | 1 | Pull rope switch 8 | PRS00191.054033.008 | KIEPE | NC | 24V DC | - | | |
| 13 | =U2 | =U2 .02 +L455 -S09 | 1 | Pull rope switch 9 | PRS00191.054033.009 | KIEPE | NC | 24V DC | - | | |
| 14 | =U2 | =U2 .02 +L455 -S10 | 1 | Pull rope switch 10 | PRS00191.054033.010 | KIEPE | NC | 24V DC | - | | |
| 15 | =U2 | =U2 .02 +L465 -S11 | 1 | Pull rope switch 11 | PRS00191.054033.011 | KIEPE | NC | 24V DC | - | | |
| 16 | =U2 | =U2 .02 +L465 -S12 | 1 | Pull rope switch 12 | PRS00191.054033.012 | KIEPE | NC | 24V DC | - | | |
| 17 | =U2 | =U2 .02 +L475 -S13 | 1 | Pull rope switch 13 | PRS00191.054033.013 | KIEPE | NC | 24V DC | - | | |
| 18 | =U2 | =U2 .02 +L475 -S14 | 1 | Pull rope switch 14 | PRS00191.054033.014 | KIEPE | NC | 24V DC | - | | |
| 19 | =U3 | =U3 .03 +L476 -S15 | 1 | Pull rope switch 15 | PRS00191.054033.015 | KIEPE | NC | 24V DC | | | |
| 20 | =U2 | =U2 .02 +L499 -S16 | 1 | Pull rope switch 16 | PRS00191.054033.016 | KIEPE | NC | 24V DC | - | | |

Emergency stop U-3

| | | | | | | | | | | | |
|----|-----|--------------------|---|--------------------|---------------------|-------|----|--------|---|-----------|--|
| 21 | =U3 | =U3 .02 +L415 -S01 | 1 | Pull rope switch 1 | PRS00191.054033.001 | KIEPE | NC | 24V DC | - | in future | |
| 22 | =U3 | =U3 .02 +L415 -S02 | 1 | Pull rope switch 2 | PRS00191.054033.002 | KIEPE | NC | 24V DC | - | in future | |
| 22 | =U3 | =U3 .02 +L425 -S03 | 1 | Pull rope switch 3 | PRS00191.054033.003 | KIEPE | NC | 24V DC | - | in future | |
| 23 | =U3 | =U3 .02 +L425 -S04 | 1 | Pull rope switch 4 | PRS00191.054033.004 | KIEPE | NC | 24V DC | - | in future | |

PROJECT: EFT Stanari
 FAM PROJECT NO. : 109794
 DOCUMENT NO.: 109794-1600-Sensor
 STATUS : preliminary

SENSOR LIST

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | Signal Points | | | | | | | Remark | Checked date | Signature |
|------|---------|--------------------|---------------|------------------------------|---------------------|--------------------|---------|--------|----------------------|-----------|--------------|-----------|
| | | | Qty | Description | Type | Manufacturer | Contact | Signal | Kind of sensor/actor | | | |
| 23 | =U3 | =U3 .02 +L435 -S05 | 1 | Pull rope switch 5 | PRS00191.054033.005 | KIEPE | NC | 24V DC | - | in future | | |
| 24 | =U3 | =U3 .02 +L435 -S06 | 1 | Pull rope switch 6 | PRS00191.054033.006 | KIEPE | NC | 24V DC | - | in future | | |
| 24 | =U3 | =U3 .02 +L445 -S07 | 1 | Pull rope switch 7 | PRS00191.054033.007 | KIEPE | NC | 24V DC | - | in future | | |
| 25 | =U3 | =U3 .02 +L445 -S08 | 1 | Pull rope switch 8 | PRS00191.054033.008 | KIEPE | NC | 24V DC | - | in future | | |
| 26 | =U3 | =U3 .02 +L455 -S09 | 1 | Pull rope switch 9 | PRS00191.054033.009 | KIEPE | NC | 24V DC | - | in future | | |
| 27 | =U3 | =U3 .02 +L455 -S10 | 1 | Pull rope switch 10 | PRS00191.054033.010 | KIEPE | NC | 24V DC | - | in future | | |
| 28 | =U3 | =U3 .02 +L465 -S11 | 1 | Pull rope switch 11 | PRS00191.054033.011 | KIEPE | NC | 24V DC | - | in future | | |
| 29 | =U3 | =U3 .02 +L465 -S12 | 1 | Pull rope switch 12 | PRS00191.054033.012 | KIEPE | NC | 24V DC | - | in future | | |
| 30 | =U3 | =U3 .02 +L475 -S13 | 1 | Pull rope switch 13 | PRS00191.054033.013 | KIEPE | NC | 24V DC | - | in future | | |
| 31 | =U3 | =U3 .02 +L475 -S14 | 1 | Pull rope switch 14 | PRS00191.054033.014 | KIEPE | NC | 24V DC | - | in future | | |
| 32 | =U3 | =U3 .02 +L485 -S15 | 1 | Pull rope switch 15 | PRS00191.054033.015 | KIEPE | NC | 24V DC | | | | |
| 33 | =U3 | =U3 .02 +L485 -S16 | 1 | Pull rope switch 16 | PRS00191.054033.016 | KIEPE | NC | 24V DC | | | | |
| 34 | =U3 | =U3 .02 +L495 -S17 | 1 | Pull rope switch 17 | PRS00191.054033.017 | KIEPE | NC | 24V DC | | | | |
| 35 | =U3 | =U3 .02 +L495 -S18 | 1 | Pull rope switch 18 | PRS00191.054033.018 | KIEPE | NC | 24V DC | | | | |
| 36 | =U3 | =U3 .02 +L495 -S19 | 1 | Pull rope switch 19 | PRS00191.054033.019 | KIEPE | NC | 24V DC | | | | |
| 37 | =U3 | =U3 .02 +L495 -S20 | 1 | Pull rope switch 20 | PRS00191.054033.020 | KIEPE | NC | 24V DC | | | | |
| 38 | =U3 | =U3 .02 +L498 -S21 | 1 | Pull rope switch 21 | PRS00191.054033.021 | KIEPE | NC | 24V DC | | | | |
| 39 | =U3 | =U3 .02 +L498 -S22 | 1 | Pull rope switch 22 | PRS00191.054033.022 | KIEPE | NC | 24V DC | | | | |
| 40 | =U3 | =U3 .02 +L231 -S05 | 1 | Emergency stop push button 1 | VOS-22-NT | Dittelbach&Kerzler | NC | 24V DC | | | | |
| 41 | | | | | | | | | | | | |

Emergency stop U-4

| | | | | | | | | | | | | |
|----|-----|--------------------|---|--------------------|---------------------|-------|----|--------|---|--|--|--|
| 42 | =U4 | =U4 .02 +L415 -S01 | 1 | Pull rope switch 1 | PRS00191.054033.001 | KIEPE | NC | 24V DC | - | | | |
| 43 | =U4 | =U4 .02 +L415 -S02 | 1 | Pull rope switch 2 | PRS00191.054033.002 | KIEPE | NC | 24V DC | - | | | |
| 44 | =U4 | =U4 .02 +L425 -S03 | 1 | Pull rope switch 3 | PRS00191.054033.003 | KIEPE | NC | 24V DC | - | | | |
| 45 | =U4 | =U4 .02 +L425 -S04 | 1 | Pull rope switch 4 | PRS00191.054033.004 | KIEPE | NC | 24V DC | - | | | |

PROJECT: EFT Stanari
 FAM PROJECT NO. : 109794
 DOCUMENT NO.: 109794-1600-Sensor
 STATUS : preliminary

SENSOR LIST

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | Signal Points | | | | | | | Remark | Checked date | Signature |
|------|---------|--------------------|---------------|------------------------------|---------------------|--------------------|---------|--------|----------------------|--------|--------------|-----------|
| | | | Qty | Description | Type | Manufacturer | Contact | Signal | Kind of sensor/actor | | | |
| 46 | =U4 | =U4 .02 +L435 -S05 | 1 | Pull rope switch 5 | PRS00191.054033.005 | KIEPE | NC | 24V DC | - | | | |
| 47 | =U4 | =U4 .02 +L435 -S06 | 1 | Pull rope switch 6 | PRS00191.054033.006 | KIEPE | NC | 24V DC | - | | | |
| 48 | =U4 | =U4 .02 +L445 -S07 | 1 | Pull rope switch 7 | PRS00191.054033.007 | KIEPE | NC | 24V DC | - | | | |
| 49 | =U4 | =U4 .02 +L445 -S08 | 1 | Pull rope switch 8 | PRS00191.054033.008 | KIEPE | NC | 24V DC | - | | | |
| 50 | =U4 | =U4 .02 +L445 -S09 | 1 | Pull rope switch 9 | PRS00191.054033.009 | KIEPE | NC | 24V DC | - | | | |
| 51 | =U4 | =U4 .02 +L455 -S10 | 1 | Pull rope switch 10 | PRS00191.054033.010 | KIEPE | NC | 24V DC | - | | | |
| 52 | =U4 | =U4 .02 +L455 -S11 | 1 | Pull rope switch 11 | PRS00191.054033.011 | KIEPE | NC | 24V DC | - | | | |
| 53 | =U4 | =U4 .02 +L465 -S12 | 1 | Pull rope switch 12 | PRS00191.054033.012 | KIEPE | NC | 24V DC | - | | | |
| 54 | =U4 | =U4 .02 +L465 -S13 | 1 | Pull rope switch 13 | PRS00191.054033.013 | KIEPE | NC | 24V DC | - | | | |
| 55 | =U4 | =U4 .02 +L465 -S14 | 1 | Pull rope switch 14 | PRS00191.054033.014 | KIEPE | NC | 24V DC | - | | | |
| 56 | =U4 | =U4 .02 +L475 -S15 | 1 | Pull rope switch 15 | PRS00191.054033.015 | KIEPE | NC | 24V DC | - | | | |
| 57 | =U4 | =U4 .02 +L475 -S16 | 1 | Pull rope switch 16 | PRS00191.054033.016 | KIEPE | NC | 24V DC | - | | | |
| 58 | =U4 | =U4 .02 +L231 -S05 | 1 | Emergency stop push button 1 | VOS-22-NT | Dittelbach&Kerzler | NC | 24V DC | - | | | |
| 59 | =U5 | =U5 .03 +L232 -S06 | 1 | Emergency stop push button 2 | VOS-22-NT | Dittelbach&Kerzler | NC | | | | | |

Emergency stop U-5

| | | | | | | | | | | | | |
|----|-----|--------------------|---|------------------------------|---------------------|---------|----|--------|---|--|--|--|
| 60 | =U5 | =U5 .02 +L415 -S01 | 1 | Pull rope switch 1 | PRS00191.054033.001 | KIEPE | NC | 24V DC | - | | | |
| 61 | =U5 | =U5 .02 +L415 -S02 | 1 | Pull rope switch 2 | PRS00191.054033.002 | KIEPE | NC | 24V DC | - | | | |
| 62 | =U5 | =U5 .02 +L425 -S03 | 1 | Pull rope switch 3 | PRS00191.054033.003 | KIEPE | NC | 24V DC | - | | | |
| 63 | =U5 | =U5 .02 +L425 -S04 | 1 | Pull rope switch 4 | PRS00191.054033.004 | KIEPE | NC | 24V DC | - | | | |
| 64 | =U5 | =U5 .02 +L435 -S05 | 1 | Pull rope switch 5 | PRS00191.054033.005 | KIEPE | NC | 24V DC | - | | | |
| 65 | =U5 | =U5 .02 +L435 -S06 | 1 | Pull rope switch 6 | PRS00191.054033.006 | KIEPE | NC | 24V DC | - | | | |
| 66 | =U5 | =U5 .02 +L499 -S07 | 1 | Emergency stop push button 1 | 3SB3801-0DF-Z | SIEMENS | NC | 24V DC | - | | | |
| 67 | | | | | | | | | | | | |

Start up warning U-1

| | | | | | | | | | | | | |
|----|-----|--------------------|---|--------------|---------|-------------|---|---|--------|--|--|--|
| 68 | =U1 | =U1 .03 +L415 -H01 | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | | | |
|----|-----|--------------------|---|--------------|---------|-------------|---|---|--------|--|--|--|

PROJECT: EFT Stanari
FAM PROJECT NO.: 109794

SENSOR LIST

DOCUMENT NO.: 109794-1600-Sensor
STATUS : preliminary

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
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|-----------------------------|---------|--------------------|--|---------------|--------------|------------|--------------|---------|--------|--------|--------------|-----------|
| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |
| 69 | =U1 | =U1 .03 +L415 -H02 | | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 70 | | | | | | | | | | | | |
| Start up warning U-2 | | | | | | | | | | | | |
| 71 | =U2 | =U2 .03 +L415 -H01 | | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 72 | =U2 | =U2 .03 +L415 -H02 | | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 73 | =U2 | =U2 .03 +L425 -H03 | | 1 | Flash lamp 2 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 74 | =U2 | =U2 .03 +L425 -H04 | | 1 | Horn 2 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 75 | =U2 | =U2 .03 +L435 -H05 | | 1 | Flash lamp 3 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 76 | =U2 | =U2 .03 +L435 -H06 | | 1 | Horn 3 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 77 | =U2 | =U2 .03 +L445 -H07 | | 1 | Flash lamp 4 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 78 | =U2 | =U2 .03 +L445 -H08 | | 1 | Horn 4 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 79 | =U2 | =U2 .03 +L455 -H10 | | 1 | Flash lamp 5 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 80 | =U2 | =U2 .03 +L455 -H09 | | 1 | Horn 5 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 81 | =U2 | =U2 .03 +L465 -H11 | | 1 | Flash lamp 6 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 82 | =U2 | =U2 .03 +L465 -H12 | | 1 | Horn 6 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 83 | =U2 | =U2 .03 +L475 -H13 | | 1 | Flash lamp 7 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 84 | =U2 | =U2 .03 +L475 -H14 | | 1 | Horn 7 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 85 | =U2 | =U2 .03 +L485 -H15 | | 1 | Flash lamp 8 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 86 | =U2 | =U2 .03 +L485 -H16 | | 1 | Horn 8 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 87 | =U2 | =U2 .81 +L498 | | | | | | | | | | |

Start up warning U-3

| | | | | | | | | | | | | |
|---|-----|--------------------|--|---|--------------|------------|-------------|---|---|--------|-----------|--|
| 1 | =U3 | =U3 .03 +L405 -H01 | | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 2 | =U3 | =U3 .03 +L405 -H02 | | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 3 | =U3 | =U3 .03 +L415 -H03 | | 1 | Flash lamp 2 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 4 | =U3 | =U3 .03 +L415 -H04 | | 1 | Horn 2 | 570 052 68 | WERMA | - | - | 230VAC | in future | |

PROJECT: EFT Stanari
FAM PROJECT NO.: 109794

SENSOR LIST

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BELT CONVEYOR

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REVISION NO.: preliminary

MACHINE NO.: BC

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| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |
| 5 | =U3 | =U3 .03 +L425 -H05 | | 1 | Flash lamp 3 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 6 | =U3 | =U3 .03 +L425 -H06 | | 1 | Horn 3 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 7 | =U3 | =U3 .03 +L435 -H07 | | 1 | Flash lamp 4 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 8 | =U3 | =U3 .03 +L435 -H08 | | 1 | Horn 4 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 9 | =U3 | =U3 .03 +L445 -H09 | | 1 | Flash lamp 5 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 10 | =U3 | =U3 .03 +L445 -H10 | | 1 | Horn 5 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 11 | =U3 | =U3 .03 +L455 -H11 | | 1 | Flash lamp 6 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 12 | =U3 | =U3 .03 +L455 -H12 | | 1 | Horn 6 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 13 | =U3 | =U3 .03 +L465 -H13 | | 1 | Flash lamp 7 | PMF2030 | Pfannenberg | - | - | 230VAC | in future | |
| 14 | =U3 | =U3 .03 +L465 -H14 | | 1 | Horn 7 | 570 052 68 | WERMA | - | - | 230VAC | in future | |
| 15 | =U3 | =U3 .03 +L475 -H15 | | 1 | Flash lamp 8 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 16 | =U3 | =U3 .03 +L475 -H16 | | 1 | Horn 8 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 17 | =U3 | =U3 .03 +L485 -H17 | | 1 | Flash lamp 9 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 18 | =U3 | =U3 .03 +L485 -H18 | | 1 | Horn 9 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 19 | =U3 | =U3 .03 +L495 -H19 | | 1 | Flash lamp 9 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 20 | =U3 | =U3 .03 +L495 -H20 | | 1 | Horn 9 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 21 | =U3 | =U3 .03 +L498 -H21 | | 1 | Flash lamp 10 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 22 | =U3 | =U3 .03 +L498 -H22 | | 1 | Horn 10 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 23 | | | | | | | | | | | | |

Start up warning U-4

| | | | | | | | | | | | | |
|----|-----|--------------------|--|---|--------------|------------|-------------|---|---|--------|--|--|
| 24 | =U4 | =U4 .03 +L415 -H01 | | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 25 | =U4 | =U4 .03 +L415 -H02 | | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 26 | =U4 | =U4 .03 +L425 -H03 | | 1 | Flash lamp 2 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 27 | =U4 | =U4 .03 +L425 -H04 | | 1 | Horn 2 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 28 | =U4 | =U4 .03 +L435 -H05 | | 1 | Flash lamp 3 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 29 | =U4 | =U4 .03 +L435 -H06 | | 1 | Horn 3 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 30 | =U4 | =U4 .03 +L445 -H07 | | 1 | Flash lamp 4 | PMF2030 | Pfannenberg | - | - | 230VAC | | |

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FAM PROJECT NO.: 109794

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| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |
| 31 | =U4 | =U4 .03 +L445 -H08 | | 1 | Horn 4 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 32 | =U4 | =U4 .03 +L455 -H09 | | 1 | Flash lamp 5 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 33 | =U4 | =U4 .03 +L455 -H10 | | 1 | Horn 5 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 34 | =U4 | =U4 .03 +L465 -H11 | | 1 | Flash lamp 6 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 35 | =U4 | =U4 .03 +L465 -H12 | | 1 | Horn 6 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 36 | =U4 | =U4 .03 +L475 -H13 | | 1 | Flash lamp 7 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 37 | =U4 | =U4 .03 +L475 -H14 | | 1 | Horn 7 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 38 | =U4 | =U4 .03 +L485 -H15 | | 1 | Flash lamp 8 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 39 | =U4 | =U4 .03 +L485 -H16 | | 1 | Horn 8 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 40 | | | | | | | | | | | | |

Start up warning U-5

| | | | | | | | | | | | | |
|----|-----|--------------------|--|---|--------------|------------|-------------|---|---|--------|--|--|
| 41 | =U5 | =U5 .03 +L405 -H01 | | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 42 | =U5 | =U5 .03 +L405 -H02 | | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 43 | =U5 | =U5 .03 +L415 -H03 | | 1 | Flash lamp 2 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 44 | =U5 | =U5 .03 +L415 -H04 | | 1 | Horn 2 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 45 | =U5 | =U5 .03 +L424 -H05 | | 1 | Flash lamp 3 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| 46 | =U5 | =U5 .03 +L424 -H06 | | 1 | Horn 3 | 570 052 68 | WERMA | - | - | 230VAC | | |
| 47 | | | | | | | | | | | | |

Conveyor drive U-1

| | | | | | | | | | | | | |
|------|-----|--------------------|--|---|-----------------------|-------------------|-----------------|--------|--------|-------------------|-----------------|--|
| 48 | =U1 | =U1 .11 +L400 -B01 | | 1 | Speed sensor | XSA-V12373 | TELEMECANIQUE | NC | 24V DC | inductive +Timer | | |
| 49 | =U1 | =U1 .11 +L400 -B02 | | 1 | Belt breakage | BLS001 | KIEPE | NC | 24V DC | Magnetic switch | | |
| 50 | =U1 | =U1 .11 +L405 -B03 | | 1 | Material height | UC3000-U9+IUE2+R2 | Pepperl + Fuchs | 4-20mA | 24V DC | ultrasonic sensor | 300-3000mm | |
| 135a | =U1 | =U1 .12 +L406 -B06 | | 1 | Brake open | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | Proximity switch | add. 18.11.2013 | |
| 51 | =U1 | =U1 .11 +L405 -S04 | | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 52 | =U1 | =U1 .11 +L405 -S05 | | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 53 | =U1 | =U1 .11 +L425 -S06 | | 1 | Misalignment switch 3 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |

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| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |
| 54 | =U1 | =U1 .11 +L425 -S07 | | 1 | Misalignment switch 4 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 55 | =U1 | =U1 .11 +L499 -B04 | | 1 | Overfilling chute | MFTS 20-59-NM-75 | Ramsey | NC | 24V DC | pendulum sensor | | |
| 56 | =U1 | =U1 .11 +L231 -A01 | | 1 | Local control station conveyor drive | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 57 | =U1 | =U1 .11 +L499 -R01 | | 1 | Motor 1 PT100 resistor | internal motor | Motor Subsuplier | analogue | PT100 | temperature sensor | | |
| 58 | =U1 | =U1 .11 +L499 -R02 | | 1 | Thruster Brake PTC-resistor | internal motor | Motor Subsuplier | analogue | PTC | temperature sensor | | |
| 59 | | | | | | | | | | | | |

Conveyor drive U-2

| | | | | | | | | | | | | |
|----|-----|--------------------|--|---|---------------------------------------|------------------|----------------------|-------|--------|---------------------|--|--|
| 61 | =U2 | =U2 .11 +L400 -B02 | | 1 | Belt breakage | BLS001 | KIEPE | NC | 24V DC | Magnetic switch | | |
| 62 | =U2 | =U2 .11 +L405 -B03 | | 1 | Material detection | MWM-1/5-G | Dittelbach & Kerzler | NO/NC | 24V DC | micro switch | | |
| 63 | =U2 | =U2 .11 +L405 -S01 | | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 64 | =U2 | =U2 .11 +L405 -S02 | | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 65 | =U2 | =U2 .11 +L415 -S03 | | 1 | Misalignment switch 3 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 66 | =U2 | =U2 .11 +L415 -S04 | | 1 | Misalignment switch 4 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 67 | =U2 | =U2 .11 +L435 -S05 | | 1 | Misalignment switch 5 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 68 | =U2 | =U2 .11 +L435 -S06 | | 1 | Misalignment switch 6 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 69 | =U2 | =U2 .11 +L455 -S07 | | 1 | Misalignment switch 7 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 70 | =U2 | =U2 .11 +L455 -S08 | | 1 | Misalignment switch 8 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 71 | =U2 | =U2 .11 +L475 -S09 | | 1 | Misalignment switch 9 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 72 | =U2 | =U2 .11 +L475 -S10 | | 1 | Misalignment switch 10 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 73 | =U2 | =U2 .11 +L475 -S11 | | 1 | Misalignment switch 11 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 74 | =U2 | =U2 .11 +L475 -S12 | | 1 | Misalignment switch 12 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 75 | =U2 | =U2 .81 +L498 -B04 | | 1 | Belt tension high 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 76 | =U2 | =U2 .81 +L498 -B05 | | 1 | Belt tension low 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 77 | =U2 | =U2 .11 +L499 -B06 | | 1 | Overfilling chute | MFTS 20-59-NM-75 | Ramsey | NC | 24V DC | pendulum sensor | | |
| 78 | =U2 | =U2 .11 +L231 -A01 | | 1 | Local control station conveyor drive | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 79 | =U3 | =U3 .81 +L232 -A02 | | 2 | Local control station take-up station | VOS-23-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |

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| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | Kind of sensor/actor | | |
| 79 | =U2 | =U2 .11 +L499 -R01 | | 1 | Motor 1 PT100 resistor | internal motor | | analogue | PT100 | temperature sensor | | |
| 80 | =U2 | =U2 .11 +L499 -R02 | | 1 | Motor 2 PT100 resistor | internal motor | | analogue | PT100 | temperature sensor | | |
| 81 | =U2 | =U2 .11 +L499 -R03 | | 1 | Motor 3 PT100 resistor | internal motor | | analogue | PT100 | temperature sensor | | |
| 82 | =U2 | =U2 .11 +L499 -R04 | | 1 | Thruster Brake PTC-resistor | internal motor | | analogue | PTC | temperature sensor | | |
| 83 | =U2 | =U2 .11 +L499 -B07 | | 1 | Brake open | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | Proximity switch | | add. 18.11.2013 |
| 84 | =U2 | =U2 .11 +L499 -B01 | | | Load sensing bolt | KSW/70kN/D6-22/4...20mA | Piab | analogue | 4-20mA | | | |

Conveyor drive U-3

| | | | | | | | | | | | | |
|-----|-----|--------------------|--|---|------------------------|------------------|----------------------|-------|--------|-------------------|---------------------------------|--|
| 84 | =U3 | =U3 .11 +L405 -S09 | | 1 | Misalignment switch 9 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | in future | |
| 85 | =U3 | =U3 .11 +L405 -S10 | | 1 | Misalignment switch 10 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | in future | |
| 86 | =U3 | =U3 .11 +L405 -S11 | | 1 | Misalignment switch 11 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | in future | |
| 87 | =U3 | =U3 .11 +L405 -S12 | | 1 | Misalignment switch 12 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | in future | |
| 88 | =U3 | =U3 .11 +L455 -B01 | | 1 | Speed sensor | XSA-V12373 | TELEMECANIQUE | NO | 24V DC | inductive +Timer | in future to re-locate to +L400 | |
| 89 | =U3 | =U3 .11 +L455 -B02 | | 1 | Belt breakage | BLS001 | KIEPE | NO | 24V DC | Magnetic switch | in future to re-locate to +L400 | |
| 89a | =U3 | =U3 .11 +L455 -B03 | | 1 | Material detection | MWM-1/5-G | Dittelbach & Kerzler | NO/NC | 24V DC | micro switch | in future to re-locate to +L400 | |
| 90 | =U3 | =U3 .11 +L455 -S01 | | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 91 | =U3 | =U3 .11 +L455 -S02 | | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 92 | =U3 | =U3 .11 +L475 -S03 | | 1 | Misalignment switch 3 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 93 | =U3 | =U3 .11 +L475 -S04 | | 1 | Misalignment switch 4 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 94 | =U3 | =U3 .11 +L495 -S05 | | 1 | Misalignment switch 5 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 95 | =U3 | =U3 .11 +L495 -S06 | | 1 | Misalignment switch 6 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 96 | =U3 | =U3 .11 +L495 -B03 | | 1 | Belt tension high 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 97 | =U3 | =U3 .11 +L495 -B04 | | 1 | Belt tension low 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 98 | =U3 | =U3 .11 +L499 -B05 | | 1 | Overfilling chute | MFTS 20-59-NM-75 | Ramsey | NC | 24V DC | pendulum sensor | | |
| 99 | =U3 | =U3 .11 +L499 -S07 | | 1 | Misalignment switch 7 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 100 | =U3 | =U3 .11 +L499 -S08 | | 1 | Misalignment switch 8 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |

PROJECT: EFT Stanari
 FAM PROJECT NO. : 109794
 DOCUMENT NO.: 109794-1600-Sensor
 STATUS : preliminary

SENSOR LIST

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | | Signal Points | | | | | | | Remark | Checked date | Signature | |
|------|---------|------------|-----|---------------|-------------|------------|---------------------------------------|----------------|--------------------|----------------------|------------------|---------------------|-----------|--|
| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | Kind of sensor/actor | | | | |
| 101 | =U3 | =U3 | .11 | +L231 | -A01 | 1 | Local control station conveyor drive | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 102 | =U3 | =U3 | .81 | +L232 | -A02 | 1 | Local control station take-up station | VOS-23-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 103 | =U3 | =U3 | .11 | +L499 | -R01 | 1 | Motor 1 PT100 resistor | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | in future | |
| 104 | =U3 | =U3 | .11 | +L499 | -R02 | 1 | Motor 2 PT100 resistor | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | in future | |
| 105 | =U3 | =U3 | .11 | +L499 | -R03 | 1 | Motor 3 PT100 resistor | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | in future | |
| 106 | =U3 | =U3 | .11 | +L499 | -R04 | | Thruster Brake PTC-resistor | internal motor | Motor Subsupplier | analogue | PTC | temperature sensor | | |
| 107 | | | | | 1 | Brake open | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | Proximity switch | add. 18.11.2013 | | |

Conveyor drive U-4

| | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-------|------|---|--------------------------------------|------------------|----------------------|-------|--------|---------------------|--|--|
| 108 | =U4 | =U4 | .11 | +L400 | -B01 | 1 | Speed sensor | XSA-V12373 | TELEMECANIQUE | NO | 24V DC | inductive +Timer | | |
| 109 | =U4 | =U4 | .12 | +L400 | -B02 | 2 | Belt breakage | BLS001 | KIEPE | NO | 24V DC | Magnetic switch | | |
| 110 | =U4 | =U4 | .11 | +L400 | -B03 | 1 | Material detection | MWM-1/5-G | Dittelbach & Kerzler | NO/NC | 24V DC | micro switch | | |
| 111 | =U4 | =U4 | .11 | +L405 | -S01 | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 112 | =U4 | =U4 | .11 | +L405 | -S02 | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 113 | =U4 | =U4 | .11 | +L415 | -S03 | 1 | Misalignment switch 3 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 114 | =U4 | =U4 | .11 | +L415 | -S04 | 1 | Misalignment switch 4 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 115 | =U4 | =U4 | .11 | +L435 | -S05 | 1 | Misalignment switch 5 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 116 | =U4 | =U4 | .11 | +L435 | -S06 | 1 | Misalignment switch 6 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 117 | =U4 | =U4 | .11 | +L445 | -S07 | 1 | Misalignment switch 7 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 118 | =U4 | =U4 | .11 | +L445 | -S08 | 1 | Misalignment switch 8 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 119 | =U4 | =U4 | .11 | +L475 | -S09 | 1 | Misalignment switch 9 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 120 | =U4 | =U4 | .11 | +L475 | -S10 | 1 | Misalignment switch 10 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 121 | =U4 | =U4 | .11 | +L475 | -S11 | 1 | Misalignment switch 11 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 122 | =U4 | =U4 | .11 | +L475 | -S12 | 1 | Misalignment switch 12 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 121 | =U4 | =U4 | .11 | +L475 | -B03 | 1 | Belt tension high 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 122 | =U4 | =U4 | .11 | +L475 | -B04 | 1 | Belt tension low 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 123 | =U4 | =U4 | .11 | +L499 | -B05 | 1 | Overfilling chute | MFTS 20-59-NM-75 | Ramsey | NC | 24V DC | pendulum sensor | | |
| 124 | =U4 | =U4 | .11 | +L231 | -A01 | 1 | Local control station conveyor drive | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |

PROJECT: EFT Stanari
 FAM PROJECT NO. : 109794
 DOCUMENT NO.: 109794-1600-Sensor List
 STATUS : preliminary

SENSOR LIST

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
 und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | | Signal Points | | | | | | | Remark | Checked date | Signature | |
|------|---------|------------|-----|---------------|-------------|------|---------------------------------------|----------------|--------------------|----------------------|--------|---------------------|-----------------|--|
| | | | | Qty | Description | Type | Manufacturer | Contact | Signal | Kind of sensor/actor | | | | |
| 125 | =U4 | =U4 | .81 | +L232 | -A02 | 1 | Local control station take-up station | VOS-23-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 126 | =U4 | =U4 | .11 | +L499 | -R01 | 1 | Motor 1 PT100 resistor | internal motor | Motor Subsuplier | analogue | PT100 | temperature sensor | | |
| 127 | =U4 | =U4 | .11 | +L499 | -R02 | 1 | Motor 2 PT100 resistor | internal motor | Motor Subsuplier | analogue | PT100 | temperature sensor | | |
| 128 | =U4 | =U4 | .11 | +L499 | B6 | 1 | Brake open | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | Proximity switch | add. 18.11.2013 | |

Conveyor drive U-5

| | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-------|------|---|--------------------------------------|------------------|----------------------|----------|--------|---------------------|-----------------|--|
| 129 | =U5 | =U5 | .11 | +L400 | -B01 | 1 | Speed sensor | XSA-V12373 | TELEMECANIQUE | NO | 24V DC | inductive +Timer | | |
| 130 | =U5 | =U5 | .11 | +L400 | -B02 | 2 | Belt breakage | BLS001 | KIEPE | NO | 24V DC | Magnetic switch | | |
| 131 | =U5 | =U5 | .11 | +L400 | -B03 | 1 | Material detection | MWM-1/5-G | Dittelbach & Kerzler | NO/NC | 24V DC | micro switch | | |
| 132 | =U5 | =U5 | .11 | +L405 | -S01 | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 133 | =U5 | =U5 | .11 | +L405 | -S02 | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 134 | =U5 | =U5 | .11 | +L415 | -B04 | 1 | Belt tension high 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 135 | =U5 | =U5 | .11 | +L415 | -B05 | 1 | Belt tension low 1 | XS7-C40PC449 | TELEMECANIQUE | NC | 24V DC | inductive sensor | | |
| 136 | =U5 | =U5 | .11 | +L405 | -S01 | 1 | Misalignment switch 1 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 137 | =U5 | =U5 | .11 | +L405 | -S02 | 1 | Misalignment switch 2 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 138 | =U5 | =U5 | .11 | +L415 | -S03 | 1 | Misalignment switch 3 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 139 | =U5 | =U5 | .11 | +L415 | -S04 | 1 | Misalignment switch 4 | MRS001 | KIEPE | NC | 24V DC | mechanical switch | | |
| 140 | =U5 | =U5 | .12 | +L425 | -S05 | 1 | Misalignment switch 5 | | | | | | | |
| 141 | =U5 | =U5 | .13 | +L425 | -S06 | 1 | Misalignment switch 6 | | | | | | | |
| 142 | =U5 | =U5 | .11 | +L231 | -A01 | 1 | Local control station conveyor drive | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | | |
| 143 | =U5 | =U5 | .11 | +L499 | -R01 | 1 | Motor 1 resistor | internal motor | Motor Subs | analogue | PT100 | temperature sensor | | |
| 144 | =U5 | =U5 | .11 | +L499 | -B06 | 1 | Overfilling chute | MFTS 20-59-NM-75 | Ramsey | NC | 24V DC | pendulum sensor | | |
| 145 | =U5 | =U5 | .12 | +L500 | -R03 | 1 | Brake open | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | Proximity switch | add. 18.11.2013 | |

Emergency stop Crusher

| | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-------|------|---|------------------------------|---------------|---------|----|--------|---|--|--|
| 146 | =U5 | =U5 | .02 | +L400 | -S01 | 1 | Emergency stop push button 1 | 3SB3801-0DF-Z | SIEMENS | NO | 24V DC | - | | |
| 147 | =U5 | =U5 | .02 | +L400 | -S02 | 1 | Emergency stop push button 2 | 3SB3801-0DF-Z | SIEMENS | NO | 24V DC | - | | |
| 148 | =U5 | =U5 | .02 | +L400 | -S03 | 1 | Emergency stop push button 3 | 3SB3801-0DF-Z | SIEMENS | NO | 24V DC | - | | |

PROJECT: EFT Stanari
FAM PROJECT NO. : 109794

SENSOR LIST

DOCUMENT NO.: 109794-1600-Sensor
STATUS : preliminary

BELT CONVEYOR

DOCUMENT NO.: 109794-1600-Sensor List

REVISION NO.: preliminary

MACHINE NO.: BC

Date: 02.05.14



Magdeburger Förderanlagen
und Baumaschinen GmbH

| Item | Tag No. | Sensor Tag | Signal Points | | | | | | Remark | Checked date | Signature |
|---------------------------------|---------|---------------------|---------------|----------------------------------|--------------------|--------------------|----------|--------|------------------------|-----------------------------|-----------|
| | | | Qty | Description | Type | Manufacturer | Contact | Signal | | | |
| 149 | =U5 | =U5 .02 +L400 -S04 | 1 | Emergency stop push button 4 | 3SB3801-0DF-Z | SIEMENS | NO | 24V DC | - | | |
| Start up warning Crusher | | | | | | | | | | | |
| #### | =CR1 | =CR1 .03 +L599 -H01 | 1 | Flash lamp 1 | PMF2030 | Pfannenberg | - | - | 230VAC | | |
| #### | =CR1 | =CR1 .03 +L599 -H02 | 1 | Horn 1 | 570 052 68 | WERMA | - | - | 230VAC | | |
| Crusher Station | | | | | | | | | | | |
| #### | =CR1 | =CR1 .11 +L400 -B01 | 1 | Speed sensor 1 | XS1-N18PA349D | TELEMECANIQUE | NO | 24V DC | proximity switch | | |
| #### | =CR1 | =CR1 .11 +L400 -B02 | 1 | Speed sensor 2 | XS1-N18PA349D | TELEMECANIQUE | NO | 24V DC | proximity switch | | |
| #### | =CR1 | =CR1 .11 +L400 -B03 | 1 | Vibration sensor | ? | | NC | 24V DC | | | |
| #### | =CR1 | =CR1 .11 +L400 -R01 | 1 | Motor 1 resistor 1 | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | Crusher motor | |
| #### | =CR1 | =CR1 .11 +L400 -R02 | 1 | Motor 1 resistor 2 | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | Crusher motor | |
| #### | =CR1 | =CR1 .11 +L400 -R03 | 1 | Motor 1 resistor 3 | internal motor | Motor Subsupplier | analogue | PT100 | temperature sensor | Crusher motor | |
| #### | =CR1 | =CR1 .11 +L400 -R04 | 1 | Bearing resistor 1 | internal | Subsupplier | analogue | PT100 | temperature sensor | Bearing Crusher | |
| #### | =CR1 | =CR1 .11 +L400 -R05 | 1 | Bearing resistor 2 | internal | Subsupplier | analogue | PT100 | temperature sensor | Bearing Crusher | |
| #### | =CR1 | =CR1 .11 +L400 -R06 | 1 | Motor 2 resistor | internal motor | Motor Subsupplier | analogue | PTC | temperature sensor | Crusher Hydraulic | |
| #### | =CR1 | =CR1 .11 +L400 -R07 | 1 | Motor 3 resistor | internal motor | Motor Subsupplier | analogue | PTC | temperature sensor | Apron feeder | |
| #### | =CR1 | =CR1 .81 +L400 -R08 | 1 | Motor 4 resistor | internal motor | Motor Subsupplier | analogue | PTC | temperature sensor | Spillage conveyor | |
| #### | =CR1 | =CR1 .11 +L400 -S01 | 1 | Limit switch closed left | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | mechanical switch | Chrusher housing monitoring | |
| #### | =CR1 | =CR1 .11 +L400 -S02 | 1 | Limit switch closed right | XS7-C40PC449 | TELEMECANIQUE | NO | 24V DC | mechanical switch | Chrusher housing monitoring | |
| #### | =CR1 | =CR1 .11 +L231 -A01 | 1 | Local control station | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | Crusher | |
| #### | =CR1 | =CR1 .11 +L232 -A01 | 1 | Local control station | VOS-23-NT | Dittelbach&Kerzler | | 24V DC | several push button | Crusher Hydraulic | |
| #### | =CR1 | =CR1 .11 +L233 -A01 | 1 | Local control station | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | Apron feeder | |
| #### | =CR1 | =CR1 .11 +L234 -A01 | 1 | Local control station | VOS-22-NT | Dittelbach&Kerzler | | 24V DC | several push button | Spillage conveyor | |
| #### | =CR1 | =CR1 .11 +L400 -B22 | 1 | Material detection Apron F.below | FTI55-BAC2RVJ21A1A | ENDRESS+HAUSER | NO | 24V DC | capacitive stick probe | Apron feeder | |
| #### | =CR1 | =CR1 .11 +L400 -B23 | 1 | Material detection Apron F.above | FTI55-BAC2RVJ21A1A | ENDRESS+HAUSER | NO | 24V DC | capacitive stick probe | Apron feeder | |