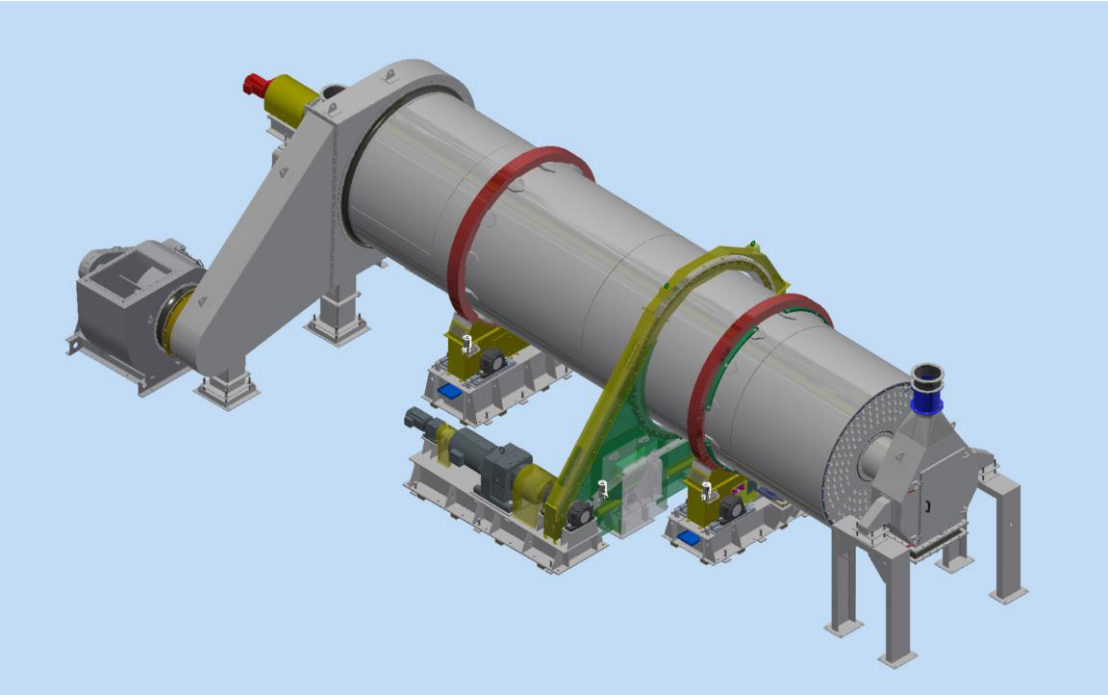
Stucco Cooler

Installation, Operation and Maintenance Manual



Introduction

The technical information in this **Operation & Maintenance Manual** is intended to guide personnel in the proper installation, trouble-free operation, and maintenance of the **Stucco Cooler** to ensure personal safety and maximum equipment life. This is not intended to be all-inclusive.

This manual must be read before beginning any work on this equipment.

It is the User's responsibility to ensure that all established safety practices and applicable safety codes are strictly adhered to.

For **Area** information, reference the Mill Area Operations Guide.

For **Safety** information, reference the Safety Overview Guide.

CAUTION: To avoid injury, personnel should complete formal safety training before operating any piece of equipment.

KEY: All personnel must follow **Lockout/Tagout (LOTO)** procedures and operate in compliance with both their company policy and local regulations.

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1 Introduction to the Maintenance Manual

This maintenance manual shall facilitate the usage of the machine / system and its conventional application.

The maintenance manual contains important instructions for using the machine / system securely, appropriately, and economically. Following these instructions helps to prevent dangers, to minder lower costs of repair and downtimes and to increase the reliability and the lifetime of the machine / system.

Additionally, the provided maintenance manuals for the attached parts must be considered also.

The maintenance manual is to be supplemented with instructions based on existing national regulations for accident control and ecology.

The maintenance manual must be available at the place of installation of the machine / system.

It must always be complete and readable.

The maintenance manual is to be read and executed by every person, who is commissioned to do work with / on the machine / system, such as:

- Operation, including adjusting, fault repair during the operational procedures
- Maintenance
- Servicing (maintenance, inspection, repairs)
- Handling and transport.

Additional to this maintenance manual, the mandatory regulations for accident control of the country of application must be considered.

Also, the proven functional regulations for safe and professional work must be considered.

1.1 Illustrations in the text and abbreviations

The following illustrations are used in this document:

Functionality/Subject	Illustration
Instruction	➢ Sign for Instruction
Numeration	• Sign for numeration
Abbreviation	none

2 Safety Overview

Guidelines in this **Safety Overview** and throughout this Manual are intended for qualified, experienced personnel who can understand the hazards of machinery operation and maintenance. Having a thorough understanding of equipment function is crucial to safe operation. Before servicing any equipment, be aware of and follow all Safety procedures for the equipment and area you are working in

CAUTION: Equipment has the potential to cause severe injury, or even death.

IMPORTANT: Include the following **Safety Guidelines** in comprehensive safety program for the **Installation** and refer to the **Safety Overview** Plant Operations Guide for **Safety** information.

2.1 Safety Guidelines

This machine is designed according to the state of the art and acknowledged technical safety rules. Although, threats to life of physical condition of the user or of a third person, related to the detraction of the machine and other material assets can occur during its usage.

The **Operation & Maintenance Manual** must be complemented by instructions including compulsory control and registration of operational specialties such as:

- Work organization
- Operating procedures
- Applied personnel

Only use this machine when:

- It is in a technically faultless state
- Operated according to regulations, both safety-consciously and danger-consciously
- Considering the **Operation & Maintenance Manual**
- Inspection and maintenance conditions are in compliance
- Generally accepted legal and other regulations for accident control are considered and instructed
- Generally accepted legal and other regulations for ecology are considered and instructed

IMPORTANT: Prior to the start of work, machine maintenance and adjustments, all personnel instructed to work with the machine must read the **Operation & Maintenance Manual** paying special attention to the **Safety** warnings.

2.1.1 Operation & Maintenance Manual

A copy of the Maintenance Manual must always be made available and secured nearby the machine. The operator of the machine must make the **Operation & Maintenance Manual** available to the user and must assure that the contents of the Manual are understood, prior to the **Startup**.

2.1.2 Safety Instructions

For Personal Safety:

- **Personal Protective Equipment (PPE)** must be used as necessary or required by regulations
- All safety and hazard indications on the machine must be regarded and kept in a readable state
- Deadlines for recurring inspections, mandatory or stated in the maintenance manual, must be kept
- Ensure that only commissioned personnel work on the machine – only trained and instructed personnel may be deployed
- According to the electro technical regulations, electronic equipment work on the machine may be conducted only by an electrically skilled person or by supervised persons while being guided and supervised by an electrically skilled person
- Work on the machine, or with the machine must be conducted only by reliable personnel, and the legal minimum age must be considered
- All Personnel attending general schooling or that need to be trained must work on or with the machine only when supervised by an experienced person
- Define the machine operator responsibility to enable the decline of safety-adverse instructions by third parties – All safety-risky method of operation must be left undone
- Explicitly define responsibilities for personnel:
    - Handling equipment
    - Adjusting
    - Performing maintenance
    - Doing repairs
- For execution of maintenance tasks, shop equipment must be adequate for the work
- Fire alert and firefighting possibilities must be regarded
- The location and handling of fire extinguishers must be made known for assembly work and repairs, e.g. beveling, welding.
- For any security relevant changes on the machine or its operating behavior, the machine must be stopped, and the responsible person must be notified of the disturbance
- Spare parts must match the defined technical requirements of the manufacturer (this is always warranted with original spare parts)
- Competencies for the various machine operations, adjustments, maintenance, and repair work must be clearly defined and always met, examples:
    - Greasing and meeting the greasing intervals
    - Cleaning and visual checking of the machine
    - Surveillance of the electrical system and the safety equipment

2.1.3 Personnel

The operator must ensure that only authorized and qualified personnel work on the machines. All personnel working on and around this equipment must:

- Know the legal norms, regulations, stipulations and accident prevention regulations
- Be instructed on the machine operation conditions and functionality
- Be able to recognize and prevent dangers

2.1.4 Operational Safety

For **Operational Safety** when the **Stucco Cooler** is in use:

- Maintain and keep all equipment **Machine Guards** in place
- Do not wear loose clothing or jewelry that can get caught in moving parts

Machine Guards must be mounted and fixed with Nuts. Any defects with the Guards must be repaired immediately. The only time that the Guards may be removed is when the machine is out of order

CAUTION: Equipment has the potential to cause severe injury or even death.

2.1.5 Start-up Safety

Prior to **Startup** of any equipment:

- All **Machine Guards** must be in position and secured
- Confirm that all pneumatic and electrical connections which may have been removed, replaced, or disconnected during an equipment **Shutdown** have been securely reconnected.
- Return all **Valves** back to their normal **Startup** condition, both manual and control system operated
- Return movable machine members that may have been changed from their normal **Startup** condition during an equipment Shutdown back to their normal Startup condition
- Confirm that all personnel and product are clear of machinery

2.1.6 Emergency Situation

In an **Emergency Situation** that may cause personal or material damage, press the **Emergency Stop** push button (PB) immediately. For injuries, conduct first aid measures immediately and ensure medical aid.

Changes to normal operation, such as unusual sounds or responses from monitoring devices, indicate that the functionality of the machine is affected. Inform the responsible maintenance personnel immediately.

2.1.7 Shutdown Safety

Prior to any work being done on the **Stucco Cooler**, **Lock Out** all power sources.

2.1.8 Maintenance Safety

If the disassembly of safety equipment for adjustment, maintenance, or repair is necessary, the installation and inspection of safety equipment must be conducted immediately after finishing maintenance and repairs.

For hooking on loads, only experienced personnel must perform this work with the instruction of the crane operator who must be in visual range of the operator or be in radio contact. Do not work under or remain under suspended loads.

For work above head height, use the designated or other safety-appropriate ascent support and work platforms. For maintenance work in high altitude, a harness must be worn. Do not use Machine Parts as an ascent support.

All handles, treads, rails, platforms, stages, ladders must be kept free from fouling, snow, and ice. Arrange a safe and environmentally friendly disposal of operating supply items, additives, and spare parts.

CAUTION: An Automatic Startup of the machine can cause a dangerous situation.

KEY: Protect the machine against an unexpected restart.

2.2 Safety Signs

Safety Signs are located throughout the **Mill**.

Table 1.2 Mill Safety Signs

Sign Type	Pictogram	Description
Mandatory		Wear a mask
Mandatory		Wear ear protection
Mandatory		Wear protective gloves
Safe Condition		Storage tank for containers with flammable liquids

Sign Type	Pictogram	Description
Warning		Automatic startup
Warning		Crushing of hands
Warning		Electricity
Warning		General
Warning		Overhead load
Warning		Substance or mixture creating a health hazard

2.3 Stucco Cooler Hazards

Always wear **personal protective equipment (PPE)** appropriate for the area and equipment that work is being performed on or near.

2.3.1 Automatic Startup Hazard

In the event of an unexplained or unintended machine stoppage, the machine must be protected against an unexpected or **Automatic Startup**. Prior to determining the cause, take all security and accident protection measures.

IMPORTANT: The machine may be restarted only after the reason for the stoppage has been found and all personnel have left the Hazard area.

2.3.2 Burn Hazard

When operating the **Stucco Cooler**, a **Burn Hazard** develops due to extreme temperatures. A permanent temperature of 150 °C is permitted within this machine which is loaded with hot gypsum. The accessible surfaces turn hot during usage. Contact with the machine can happen both intentionally and unintentionally when nearby.

CAUTION: A Burn Hazard exists when near the hot machine and hot machine parts.

KEY: Attach **Burn Hazard Warning Signs** and inform personnel that burns can happen simply when near the machine. Do not go near the machine when in operation or touch hot surfaces.

With the high temperatures of touchable surfaces, DIN EN 563 must be considered. According to the EC machinery directive 98/37 EG, attachment I, section 1.5.5, or according local, national norms and regulations, precautionary measures must be taken to prevent every danger of injury by touching hot machine parts or being in the immediate area of the hot machine.

The operator must secure the machine by access inhibiting measures. This can be stationary, separating safety equipment (safety fence, shields) according to 3.2.1 / 3.2.2 of EN 953, with an access opening, built as locked, separating safety equipment with guard control according to 3.6 of EN 953 and EN 1088.

Note: The operating company must make people aware of this danger by attaching warning signs and instructing personnel.

2.3.3 Chemical Hazards

When handling oils, grease and other chemical substances, their specific safety regulations must be considered!

2.3.4 Crushing of Hands Hazard

Rotating Machine Parts must be secured on all sides by adequate safety measures to prevent touching and contact with rotating spindles. Adequate norms on safety distances must be complied with.

IMPORTANT: Do not start up the system without adequate safety installations.

CAUTION: Rotating machine parts can crush or cut off fingers and hands causing severe injury, or even death.

2.3.5 Electrical Hazard

Inspect the electrical equipment of the machine/system regularly. Immediately dispose of defects, for example, loose connections related to braised cables. If there is an interference with the electrical energy supply, immediately shut down the machine/system.

According to the electro technical regulations, electronic equipment work on the machine may be conducted only by an electrically skilled person or by supervised persons while being guided and supervised by an electrically skilled person.

Machine and system parts that require inspection, maintenance, or repair work must be de-energized (if required). Confirm that the de-energized parts are at zero-potential, then earthed and bypassed. Nearby energized parts must be isolated.

In the case of necessary works on energized parts, a second person must be consulted. In an emergency, the **Emergency Switch**, related to the main switch must be used with shunt tripping.

IMPORTANT:

- Use a red-and-white safety chain and warning sign to secure the work area
- Use only voltage-isolated tools
- Use only original fuses with the required current rating

2.3.6 Fire Risk and Explosion Hazards

Before welding, burning, or grinding operations, the machine/system and its surrounding area must be cleaned of dust and flammable substances. Sufficient ventilation must be ensured.

IMPORTANT: Do not perform welding, burning, or grinding operations on the machine/system unless explicitly authorized.

CAUTION: Fire Risk and Explosion Hazards.

KEY: Before any machine work, ensure that the machine is clean and there is sufficient ventilation.

2.3.7 Noise Hazard

The acoustic emission for this machine generally reaches a rating level of 85 dB(A) or more (according to DIN 45635). Because the noise produced by the machine depends on different factors, such as location of installation and operating parameters, it is not possible to state a generally significant sound intensity level.

CAUTION: Hearing can be permanently damaged due to excessive noise.

KEY: If during machine operation the noise rating level exceeds:

- 80 dB(A) – Suitable hearing protection must be provided
- 85 dB(A) – Hearing protection must be worn

2.4 Stucco Cooler Safety Indications

The intended usage of the **Stucco Cooler** is exclusively for cooling gypsum. This includes the consideration of this **Operation & Maintenance Manual** and compliance with repair terms and conditions.

IMPORTANT: Edificial changes can lead to machine damage. Changes are forbidden for safety reasons and result in the loss of warranty. They may only be conducted in exceptional cases and solely after consultation and written agreement of Gyptech GmbH.

At the point of purchase, the manufacturer cannot know all the characteristics of the product processed in the machine. Additional dangers can emerge with certain products. The evaluation of the dangers and the initialization of appropriate countermeasures are within the field of responsibility of the operator.

2.4.1 Liability for Damages

Gyptech cannot be made liable for damages:

- If the machine is changed or rebuilt – the safety of the machine is thereby compromised
- In terms of the production liability law for damages, or following damages of products or components delivered by us which occur due to:
    - Improper installation
    - Improper handling
    - Usage against regulations

Note: It is in the authority of the operator / user, to make sure, that the established regulations are met

The **Manufacturer** cannot be made liable for damages if:

- Component parts provided by the operator do not meet the appropriate regulations, or are not installed according to regulations – especially safety-relevant parts
- Maintenance and repair are not conducted, or not appropriately conducted by the operator – a professional maintenance, related to. repair can only be warranted by the manufacturer

Note: Spare Parts must meet the technical requirements determined by the manufacturer. This is always the case with original spare parts.

3 Machine Overview

3.1 Design and functionality

The functionality of the gypsum cooler is to cool the gypsum from a maximum of 145°C down to a temperature of 80°C.

The gypsum cooler basically consists of the drum casing with the bundle of pipes, the track roller station with the horizontal rollers, the track roller station without a horizontal roller, the drive, the screw-conveyor, the material discharge housing, and the cooling air outlet housing.

Important for the correct functionality of the gypsum cooler is:

Constant feed of material.

The constant rotational speed of the cooler drum.

The constant feed of cooling air.

The harmonization of the pre-mentioned three parameters with each other.

Danger by dust!

Dust can lead to respiratory, skin and eye irritation and illness.

Therefore, the de-dusting of the gypsum cooler is necessary. The de-dusting is not part of the gypsum cooler.

3.2 Cooling

The cooling works by the rotation of the cooling drum and the flow of cooling air through the bundle of pipes. The gypsum is fed by the screw-conveyor. It flows due to the turning of the cooling drum and its 3% inclination in relation to the material discharge housing.

With this, it gets cooled on the surface of the bundle of pipes, where there is the flow of cooling air inside.

3.3 Material loading

The feed of material is done by means of the screw-conveyor, which is mounted on a rack, and which conveys the gypsum through the in-feed tube into the cooling drum. The material feed screw-conveyor is no metering unit! The metering of the mass flow must be carried out by upstream on-site equipment.

3.4 Material discharge

The cooled gypsum is conveyed into the discharge pipe by lifters and further conveyed into the material discharge housing.

3.5 Design of the gypsum cooler

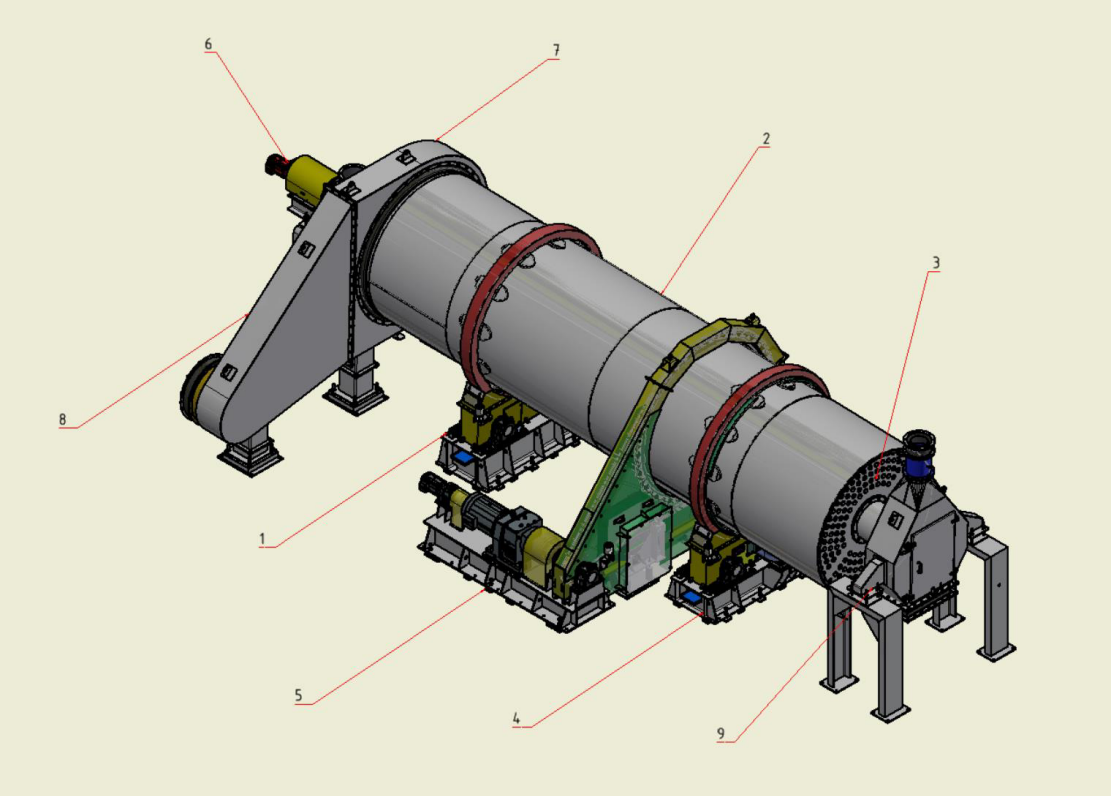


Fig.1: Main assembly of the Gypsum Cooler

1. Roller station without horizontal rolls
2. Drum body
3. Tube bundle
4. Roller station with horizontal rolls
5. Drive unit
6. Feed screw conveyor
7. Cooling air outlet housing
8. Transition piece
9. Material discharge housing

3.6 Machine guards

The guards may under no circumstances be changed, removed or passed by due to changes to the machine.

Defects with the guards must be repaired immediately.

The guards must be mounted and fixed with nuts.

The guards may only be removed when the machine is out of order.

3.6.1 Inspection intervals

At the beginning of each shift (interrupted operation)

Once a week (continuous operation)

After all maintenance and repair works

3.6.2 Content of the inspection

Mandatory status (as delivered by the manufacturer, complete and undamaged)

Position (mounted at the position, which is set by the manufacturer)

Tight assembly

	Danger! **In case of damaged or non-existing safety equipment.** **Rotating machine parts can cut off or crush fingers and hands.** **Don’t grasp into the running machine or touch machine parts!**

3.6.3 Overview on safety equipment

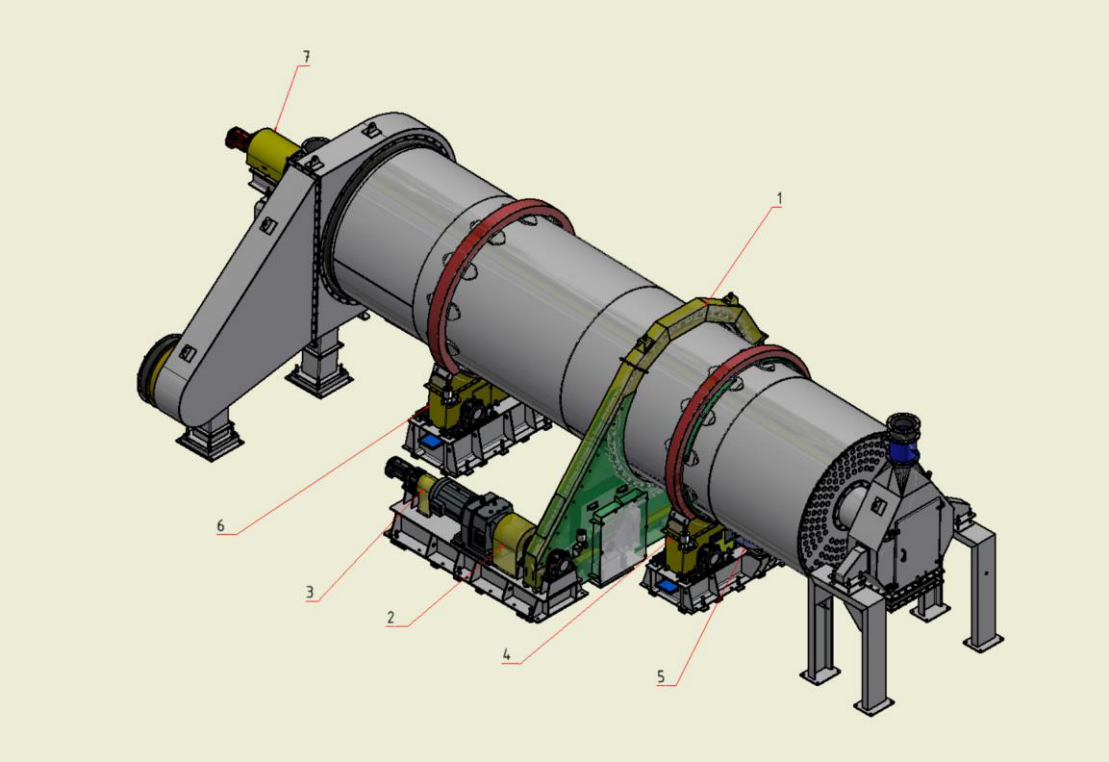


Fig. 2: Overview on safety equipment

Safety equipment:

1. Chain protection
2. Coupling cover
3. Coupling cover
4. Cover for roller ring and support roll unit with horizontal roll
5. Cover for horizontal roller
6. Cover for roller ring and support roll unit without horizontal roll
7. Screw-conveyor cover

Functionality: Protection against the contact with rotating spindles and the drive chain.

Inspection: Mounted and fixed with screwed nuts.

3.7 Regulations on operating the machine

The machine is loaded with hot gypsum. Here, a permanent temperature of 150°C is permitted within the machine.

When operating the machine, dangers emerge due to extreme temperatures. Accessible surfaces of the machine, which turn hot during its usage, pose the risk of burning. Contact with the machine can happen intentionally or unintentionally, when a person is nearby the machine. Dangers for persons can also pose due to the presence nearby the machine.

With the determination of temperatures of touchable surfaces, DIN EN 563 must be considered.

According to the EC machinery directive 98/37 EG, attachment I, section 1.5.5, or according local, national norms and regulations, precautionary measures must be taken, to prevent every danger of injury by touching hot machine parts or the stay in the immediate area of the hot machine.

The operator must secure the machine by access inhibiting measures. This can be stationary, separating safety equipment (safety fence, shields) according to 3.2.1 / 3.2.2 of EN 953, with an access opening, built as locked, separating safety equipment with guard control according to 3.6 of EN 953 and EN 1088.

Danger of burning!

Danger of burning exists with the hot machine or hot machine parts.

Prior to inspection or maintenance works, the gypsum cooler must cool down until it can be made sure that no danger of burning exists.

The operating company must make aware of this danger by attaching warning signs and by instructing his personnel.

3.8 Safety instructions

Danger!

In case of false or improper operation, danger to life and physical condition impends.

The operator must ensure meeting the instructions listed in the following:

The operation, maintenance and repair of the machine, resp. system, may only be conducted by skilled people, who know the safety equipment and the operation instructions.

All work must be controlled by skilled people. The skilled people must be ordered and authorized by the operator, resp. the announced person responsible for safety.

The machine has been developed for operation within a facility and not for operation as a single machine. Therefore, before the startup of the machine, all connections (electric connections, gypsum feed and discharge systems) must be applied according to standard regulations and must be controlled accordingly.

Prior to dismantling pipe connections and machine parts, any opening of the machine and all works which subserve the adjustment, maintenance or repair

- the facility and the machine must be shut down
- the main control switch must be shut off and be secured against unintended activating the stoppage of the machine must be awaited
- the settling of the dust inside the machine and the facility must be awaited.

Prior to working on the electronics or the opening of the control cabinet, the electric power supply must be intercepted.

The warning and information signs attached to the machine may not be removed, not painted over with paint and not be changed. Damaged or unreadable signs must be replaced immediately.

Cleaning works may never be conducted while the machine is running.

All machine safeguards and covers must be attached and secured with nuts.

Prior to operating with increased temperature, adequate safety measures, which exclude hot machine surfaces, must be taken (Section 3.7).

With the installation and the operation of the machine and related equipment, the operator must regard:

The introduction of this maintenance manual.

The general, corresponding accident prevention regulations.

The local corresponding regulations.

The special regulations of the responsible worker's compensation board, resp. the corresponding national regulations.

The operator is made responsible for the realization of the mandatory accident prevention regulations, for the consideration of the availability and the operability of the safety equipment and the security equipment at any time.

The machine's starting up is prohibited as long as determining, that

The machine is properly mounted and installed.

All safety equipment is attached and functioning.

For application in the countries of the European Union: the whole facility, resp. the system, in which the machine shall be integrated, is according to the EG machinery directive and a CE declaration of conformity is on hand.

3.9 Noise

The machine is part of the work installations, whose acoustic emission generally reaches a rating level of 85 dB(A) or more (according to DIN 45635).

The noise produced by the machine depends on different factors, such as location of installation, operating parameters et al.

Therefore, it is not possible to state a generally significant sound intensity level.

When operating the machine in the European Union, the EC directive 2003/10/EG (Endangerment by noise at work) and the regulations of the worker's compensation board – noise BGV B3 must be considered.

In other countries, according to national norms and regulations must be applied.

The excess of a noise rating level of 85 dB(A) obligates among others the usage of suitable hearing protection (RL 2003/10/EG).

Danger!

Due to excessive noise, the hearing can be damaged permanently.

If, during operation of the machine, the noise rating level exceeds 80 dB(A), suitable hearing protection must be provided.

If the machine exceeds the noise rating level of 85 dB(A), hearing protection must be worn.

3.10 Workstation

The feed of material to and discharge from the machine will start automatically.

Manipulation during the operation is not necessary.

The workstation, for the machine's operating personnel, resp. the whole system is typically located in front of the switch room. The workstation has generally to be kept free.

3.11 Intended usage

The machine is exclusively dedicated for the cooling of gypsum, which is listed in section 4. Technical data.

The intended usage also includes consideration of the maintenance manual and the compliance with repair terms and conditions.

Danger due to damaging the machine!

Edificial changes can lead to damaging the machine. They are forbidden for safety reasons and result in the loss of warranty. They may only be conducted in exceptional cases and solely after consultation and written agreement of Gyptech GmbH.

At the point of purchase, the manufacturer cannot know all the characteristics of the product, which is processed in the machine. Additional dangers can emerge with certain products. The evaluation of the dangers and the initialization of appropriate countermeasures are within the field of responsibility of the operator.

Gyptech cannot be made liable if the machine has been changed or rebuilt. This in particular is the case when the safety of the machine is thereby compromised.

The manufacturer cannot be made liable if the component parts, provided by the operator, especially safety-relevant parts, do not meet the appropriate regulations or are not installed according to regulations.

The manufacturer cannot be made liable, if the maintenance and repair is not or not appropriately conducted by the operator. A professional maintenance, resp. repair can only be warranted by the manufacturer.

Spare parts must meet the technical requirements determined by the manufacturer. This is always the case with original spare parts.

Gyptech cannot be made liable for damages or following damages of the products or components delivered by us, which occur due to improper installation, improper handling or usage against regulations, in terms of the production liability law.

It is in the authority of the operator / user, to make sure, that the established regulations are met.

4 Technical data

4.1 Design parameters

Material	Calcined gypsum
Feed capacity	25 t/h
Material feed temperature	145°C
Material discharge temperature	80°C
Particle feed size	< 200µ
Air inlet temperature	40°C
Air outlet temperature	79°C
Cooler dimension	Ø2,0 x 8m
Drum rotation speed	Approx. 5 min-1
Motor power rating	30 kW

4.2 Scope of delivery

Drum body complete

Bundle of pipes complete

Material discharge housing complete

Cooling air outlet housing complete

Feed screw complete

Roller station without horizontal rolls complete

Roller station with horizontal rolls complete

Drive complete

Chain guard complete

4.3 Description of the installation

4.3.1 Drum body

The drum body consists of 4 sections welded together

Plate thickness: 2 x 12mm and 2 x 15mm

Material: S235JRG2

The longitudinal and the circumferential weld seams are checked with ultrasonic sound.

The weld seams' crossing points are checked with x-ray.

4.3.2 Recuperator (Bundle of pipes)

Pipe diameter: 60,3mm

Material: P235GH+N TC1

The pipes are supported by four intermediate plates.

The pipes' fixing point is the tube plate on the material feed side. With the discharge-sided tube plate, the bundle of pipes has a sliding seal against the drum body. The complete discharge unit conduces to discharge the gypsum from the cooler and allows the cooler's almost complete discharge.

4.3.3 2 roller rings

For rotating the drum body, two roller rings are mounted on the outer diameter.

Inner diameter: 2087,5mm

Outer diameter: 2340mm

Width: 180mm

Material: S355J2G3

4.3.4 4 support rollers

Diameter: 600mm

Width: 200mm

Material: EN-GJS-700-2

The support rollers are covered for the safety reason to avoid somebody touching in and to support the lubricating unit.

4.3.5 2 horizontal rollers

Diameter: 400mm

Width: 185mm

Material: E335

The horizontal rollers are to fixate the drum body in axial direction.

The horizontal rollers are screwed on the support roller frame.

4.3.6 2 basic support roller frames

Height: 330 – 450mm

Length: 2390mm

The basic frames are welded constructions (incl. installation material, washers, screws, etc.)

The contact surface of the vertical bearings is machined. To one of the basic frames, both the horizontal rolls are attached. The basic frames are delivered completely, with mounted support rollers and horizontal rollers.

4.3.7 Material feed (Screw-conveyor)

The gypsum is conveyed by a screw-conveyor into the drum.

Diameter: 300mm

Length: 1500mm

Gear motor 3 kW Manufacturer SEW

Rotation speed: 89 min-1

Inclusively rotation speed monitor

4.3.8 Material discharge housing

Connection: 770 x 500mm material discharge

Connection: Ø300mm de-dusting

The gypsum falls out of the material discharge opening of the material discharge housing.

On its upper side, the plug for the cooler's de-dusting is located.

The material discharge housing is sealed off to the discharge pipe with a flexible bellow.

4.3.9 Cooling air outlet housing

Connection: 2400 x 425mm

The cooling air is exhausted through the cooling air outlet housing.

The cooling air outlet housing is sealed off to the load pipe with a flexible bellow.

4.3.10 Drive complete

The drive unit contains:

Gear motor 30kW	Manufacturer SEW
Gear motor 3 kW	Manufacturer SEW
Roller chain Ro 3	Manufacturer Rexnord

Drive frame

Sprocket-wheel and vertical bearing

Free-Wheel-Clutch between main gear motor and auxiliary gear motor

Coupling between gearbox and drive shaft

Chain support unit

4.3.11 Lubrication

Support rollers:	oil drip lubricator with magnetic valve (On / Off)
Horizontal rollers:	dry lubrication (Molybdenum)
Chain:	oil drip lubricator with magnetic valve (On / Off)

4.3.12 Coating

Primary coat:	40µ
Final coat:	40µ

Color: RAL1015 light Ivory

All outer surfaces are painted with two-component-paint.

All machined surfaces are protected against corrosion.

4.4 Delivery / Assembly

Drum body complete (mounted support roller) incl. bundle of pipes

Support roller unit without horizontal rolls (complete mounted)

Support roller station with horizontal rolls (complete mounted)

Complete drive unit.

Screw-conveyor, material discharge housing, cooling air outlet housing, transition piece and covers are delivered demounted.

Small parts are packed in boxes or cartons.

4.5 Scope of delivery of:

Connection flange of the screw conveyor

Material discharge housing air discharge de-dusting

Material discharge housingmaterial discharge

Cooling air outlet housing air discharge – cooling air

4.6 Special equipment

The covers which are mounted on the gypsum cooler do not meet the CE conformity.

If needed, an offer for covers, which meet the CE conformity, can be provided.

Gyptech recommends protection of the gypsum cooler within safety fences (area safety)

4.7 Total weight

Total weight: approx. 27.100kg

5 Handling instructions

5.1 Transport

In the case of transport, the guideline for the usage or working appliance 89/655/EWG or according to national norms and regulations must be considered.

Transport may only be conducted by people skilled in transportation with special knowledge and abilities.

To be considered in Germany:

The weight and the accident prevention regulation, with the operation of hoisting devices and selecting the hoisting device, sling gears, load-carriers and the like:

"Lastaufnahmeeinrichtungen im Hebezeugbetrieb (VBG 9a)"

The announced weight and the accident prevention regulation, with transports with floor-borne vehicles and with their selection:

„Flurförderzeuge (VBG 12a bzw. VBG 36)"

The Gyptech gypsum cooler is delivered to the construction site in several packages. For the loading of the drum, a crane can be used. For the loading of the drive complete, the support roller units, as well as for the remaining parts, a forklift truck or a crane can be used.

Prior to the transport with the forklift trucks, the parts must be screwed with an adequate pallet (slip and tilting danger!)

The measurements and weights of the packages are to be gathered from the packing list.

Falling loads warning!

Falling loads can lead to heavy bodily injury up to death.

When moving machine parts and work parts with the crane, use adequately dimensioned machines, ropes or straps. Use the provided hoisting eyes

Ensure secure hold and level load distribution.

Never remain under suspended loads.

Name a skilled crane/forklift operator for the lifting operation.

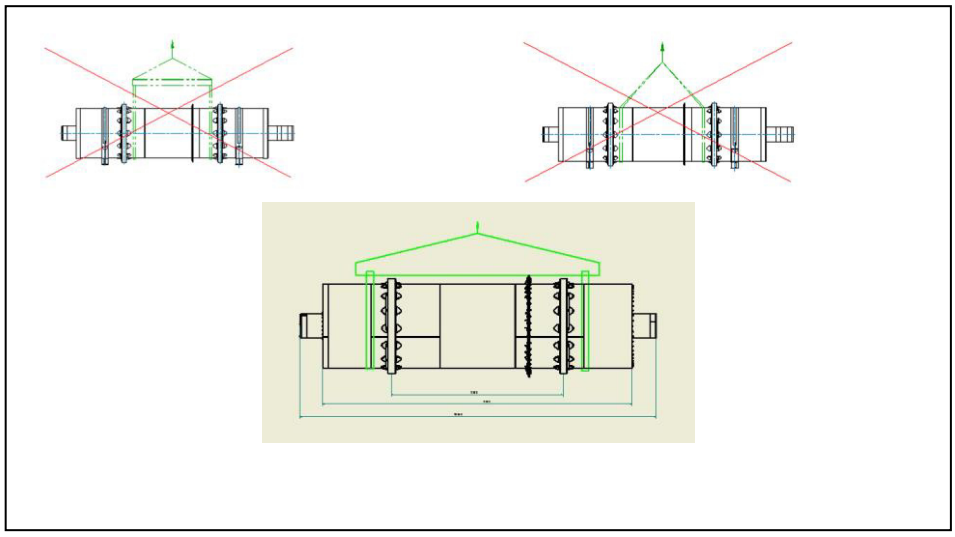


Fig. 3: Suspension points for the transport with a crane

To prevent damage to the machine parts, adequate inserts should be put under the suspension (such as rubber mats or wood).

Due to high transport weight, special care on testing and usability of all hoisting devices and its components (ropes, chains and the like) is necessary, according to the respective safety regulation.

Sharp edges make another source of danger. Hoisting devices can be damaged and be made non-functional.

General safety indications for the transport:

The work area must be secured by using a red-white safety chain for transport.

Indication signs must be put in place.

Only experienced persons skilled in transport may be assigned with the execution of the transport.

Use hoisting devices, resp. load handling devices with sufficient load capacity.

Do not step under suspended loads.

5.2 Intermediate storage of the machine

With intermediate storage of the machine for a longer time, care must be taken that the machine is widely secured from atmospheric influence, for example by placing it in a dry warehouse or the like.

Against possible contamination, the machine is to be covered with a canvas cover, etc. Water and eventual condensed water must be able to drain off. Machine parts must be stored on timber planks. Bare parts must be protected against corrosion.

Electric parts must be stored dry, against aggressive atmospheres, direct sunlight and extreme temperatures.

6 Foundation

6.1 General topics

Gyptech Gypsum coolers can be placed on a concrete foundation or a steel construction resembling a horizontal assembly surface.

Steel constructions must come with adequate rigidity and must be vibration-free. They have always to be expatiated on the basics of reliable static calculations. It must be considered that the interference of vibrations with vibrations of other system parts can cause unexpected problems, resp. damages.

The foundation must be made thoroughly, to make sure, that the vibrations emerging during the production are absorbed sufficiently. Defects of the foundation, which prevent the absorption of vibrations, raise the risk of considerable damage to the support rollers and the roller rings.

The required foot plate size as well as its load can be gathered from the related foundation drawing “130200-123010ER-FA01”.

The screws, resp. anchor bolts must be tightened with a torque wrench (see table “fastening torque”). They must be fastened with screw nuts and no later than 1 week of operating time they must be checked to be still fastened.

Danger due to insufficiently mounted machine!

In case of wrong or insufficient assembly, the risk of heavy accidents impends.

A moving or even toppling machine can lead to heavy bodily injury or to death.

The foundation or the bolting must be executed according to the regulations of the foundation drawing.

Indications for the layout of the foundation or anchor bolting:

It must be assured that the foundation must be done in such a way, that the holes for the anchor bolts can be drilled into the concrete foundation (the reinforcement steel must be installed correctly).

It is advisable to provide enough space for platforms or stages next to the machine, for the purpose of maintenance.

Maintenance doors must be accessible as well as enough space for maintenance and repairs (screw-conveyor, material discharge) must be considered.

Prior to assembling the machine on the intended foundation, this foundation must be checked (levelness, right execution).

The result must be recorded in an inspection protocol, which has also to be made available to the machine manufacturer.

Static and dynamic foundation-load
The dynamic loads can be found in the related foundation drawing „130200-123010ER-FA01“.

It is imperative:

Dynamic loads = 1,25 x static loads

Earthquake factors must be calculated additionally!

7 Installation

To guarantee a fast and smooth installation, the following preconditions must be fulfilled:

The delivered equipment must be checked for completeness according to the packing list. In case of missing components or machine parts, the provider must be notified immediately.

The foundations must be prepared for the installation and be resilient. Especially with concrete foundations, the load capacity must be ensured.

The hoisting devices and its component parts must be provided according to the expected appearing loads and must comply with the local safety regulations.

The installation location must be accessible free from hindrance. When working on stages and platforms, adequate protective devices must be installed. Contamination of the substructure must be removed.

The assembly personnel must consist of skilled personnel and must be trained in safety regulations.

The assembly utilities and tools must be in proper state and be available in sufficient amounts, so no hindrance or delay occurs.

The transport safety devices are to be removed directly after the delivery, and before the assembly, if needed.

The structures axis and the height markings must be prepared clearly visible and freely accessible.

7.1 Machine installation

The gypsum cooler is delivered to the construction site in several packages.

Falling loads warning!

Falling loads can lead to heavy bodily injury up to death.

When hoisting the gypsum cooler components, only the intended hoisting eyes may be used.

Indications for machine installation:

The machine parts, like drum housing, support roller units, drive, etc., which are part of the gypsum cooler, are delivered separately and must be installed according to the layout drawing and the foundation drawing.

The installation of the machine parts can be done with anchor bolts in case of concrete floor, with bolts and nuts in case of steel constructions. Which type of installation is selected, can be gathered from the foundation drawing „130200-123010ER-FA01“.

The assembly may only be conducted by Gyptech or by personnel authorized, briefed and taught by Gyptech. We advise the installation to be conducted by our master fitters or at least to request support by an assembly supervisor.

Customers who want to execute the assembly and the installation on their own and in their own responsibility (or arrange this execution), should consider the specified assembly, installation and operation regulations of this manual and act upon them.

Prior to installing the machine parts, the center lines, as well as the position of the machine parts, must be marked on the floor, according to the foundation drawing.

All base plates must sit on the concrete base or the steel construction on their whole surface. If necessary, an ideal horizontal and vertical adjustment must be done with shimming plates.

All frames (support roller unit, drive unit) with level screws must be adjusted to the required level and the required incline and to be supported with shimming plates. The space between the rear side frame and the concrete base must be filled with shrinking sealing compound after the final adjustment.

After installing the screw-conveyor and the material and cooling air outlet housing and, the distance to the drum body, resp. the infeed and the discharge tube must be measured. These measurements must be done 4 times, while the drum body is turned by 90° each time. The results must be documented in written form.

After finishing the assembly and the installation and after the machine has been tested in cold operation for more than 5 hours, all screws must be checked with a torque wrench (see section 7.2 table tightening torque).
In the meanwhile, all relevant functions and parameters (chain tension, roller ring and support roller position, position of the roller ring at the horizontal rolls, lubrication of the support rollers and horizontal rollers, chain lubrication, function of the compensator-seals, grease and oil lubrication of the bearing and the gearbox, etc.) must be repetitively checked.

Caution!

The final adjustment of the support rollers must be conducted under operation conditions. This means under production operation with hot products and alter all components have reached their final and regular operating temperature.

After an operation time of 100 hours, all attachment screws must be rechecked.

The end of the assembly is to be protocolled and to be sent to the operator and the manufacturer immediately.

Danger!

The rotating machine parts can lead to heavy bodily injury up to death.

The rotating parts of the machine must be secured by adequate safety measures from touching on all sides. The adequate norms on safety distances must be complied with. We advise that the system may not be started up, without the adequate safety installations!

7.2 Table tightening torque

Permitted assembly pretensions [FMzul] and tightening torques [MAzul] (calculated with µtotal= 0,14 as average friction factor in the screw thread) for

Headless screws with metric coarse pitch thread according to DIN 13

Hexagon bolt DIN EN 24014

Cylinder screw DIN ISO 4762 (according to VDI 2230).

	Assembly pretensions F_{Mzul} [N] for μ_{total}= 0,14		Tightening torque M_{Azul} [Nm] for μ_{total}= 0,14	
	strength class of the screw		strength class of the screw	
Thread	8.8	10.9	8.8	10.9
M8	16500	24300	25	36
M10	26300	38700	49	72
M12	38400	56500	85	125
M16	72500	107000	210	310
M20	117000	166000	425	610
M24	168000	240000	730	1050
M30	269000	384000	1450	2100

Tightening torque for stud bolts Upat EXA	
Thread	torque (Screws / Nuts, non-lubricated)
M10	45 Nm
M12	65 Nm
M16	110 Nm
M20	230 Nm
M24	300 Nm

7.3 Assembly of the support roller units

The support roller units and the drum body (incl. bundle of pipes) are delivered separately and must be assembled at the job site.

To be able to transport the support roller units to the assembly location, cranes, forklifts, pallet trucks or tank steel rollers can be used.

Hydraulic cylinders and other adequate hoisting devices must be kept at hand.

When the support roller units are positioned (see drawings Stucco Cooler Installation “130200-123010ER-IN02, -IN03 and -IN04“), they must be adjusted exactly by the center line of the drum.

The adjustment of the support roller unit is conducted by the adjusting screw at the base plate and by putting spacers underneath.

Exact parallelism of the track roller axes to the drum axis must be ensured. The unevenness of the concrete foundation, which causes a varying distance of the base plates to the foundation, must be filled after the final adjustments with non-shrinking sealing compound.

Caution!

The joint-less and complete grouting of the support roller unit, that means, the full-surface support of the support roller unit and the drive station on the foundation, is urgently prescribed for the start-up of the gypsum cooler.

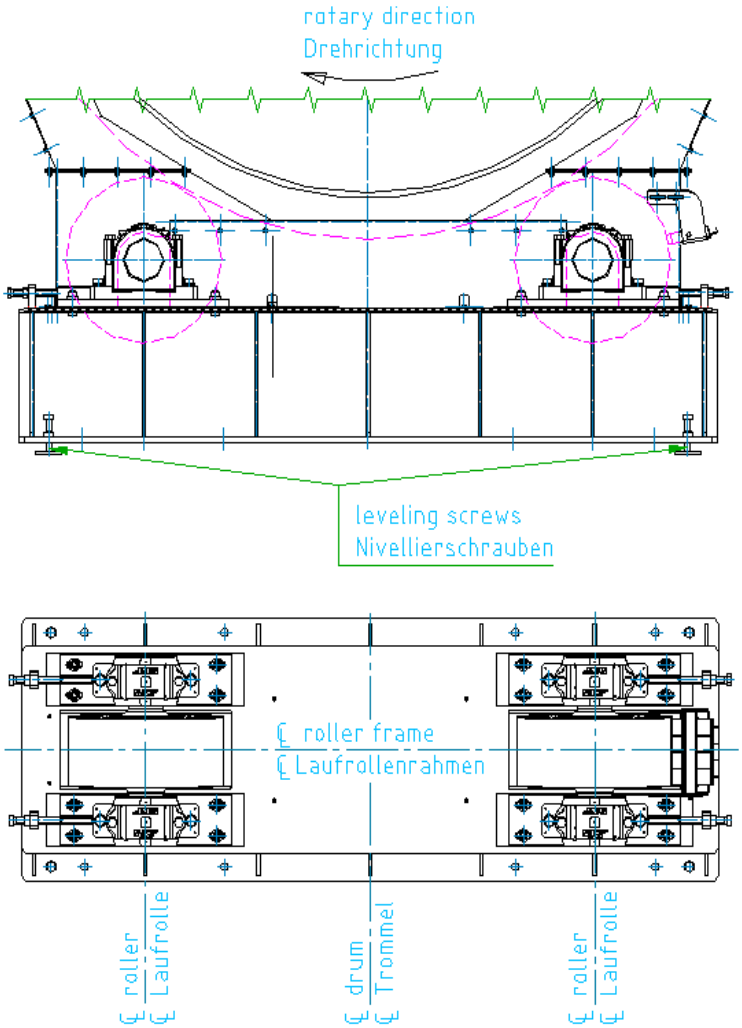


Fig. 4: Stucco Cooler Roller Station

7.4 Installation of the drum body

The installation of the drum body requires the exact positioning of the support roller units on the position announced on the foundation drawing according to drawing (130200-123010ER-IN05).

The drum body can be put down on the support roller unit from above (because of the horizontal rolls), by using a crane or a forklift.

Warning!

Caution, when putting the drum body on the track roller station. Danger of heavy bruises exists.

Remain aloof!

The drum body must be put on the support rollers so that the middle of the support rollers (at the support rollers' diameter) conforms to the middle of the roller ring (at the roller ring's diameter).

The largest width of the support rollers compared to the roller rings is needed, to balance the operational linear extension of the drum, caused by thermal changes.

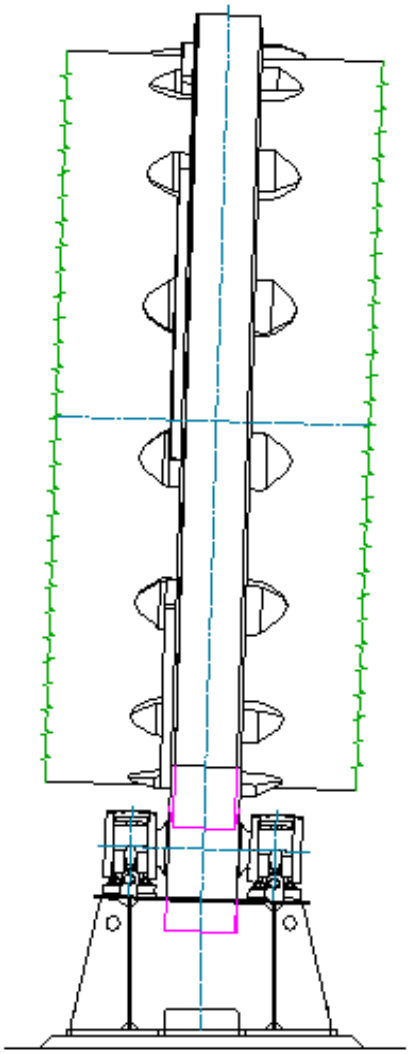


Fig. 5: Stucco Cooler Ring on Roller Station

The horizontal rollers must be adjusted, so that a distance of ca. 5 mm between the horizontal roller (2) and the roller ring (1) exists, if the latter touches against a horizontal roll.

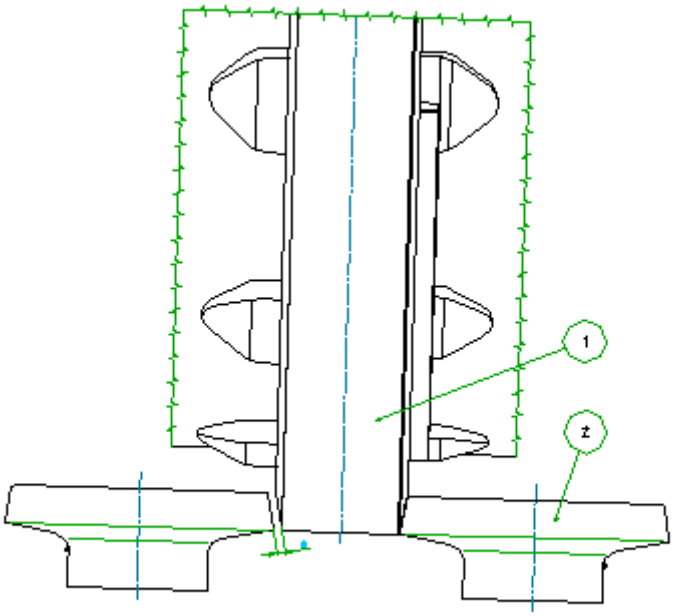


Fig. 6: Stucco Cooler Ring on Roller Station with Horizontal Rollers

When finishing these works, all data must be checked to match with the overview drawing. The results must be documented.

The horizontal rollers must be fixed on the foundation with the prescribed anchor bolts (concrete base) or screw connections (steel construction).

7.5 Installation of the material discharge housing

When the material discharge housing arrives on the job site, it must be assembled according to the drawing (130200-123010ER-IN15).

After the assembly, the material discharge housing must be positioned according to the measurements of the general drawing (130200-123010ER-IN02). The height and inclination of the material discharge housing can be adjusted by using the jack bolts at the foot of the machine.

The material discharge housing must be fixed to the foundation with the prescribed anchor bolts (concrete base) or screw connectors (steel construction).

The distance between the drum body and the material discharge housing must be the same on the whole perimeter and may not change when turning the drum.

7.6 Installation of the cooling air outlet housing

When the cooling air outlet housing arrives in parts at the job site, is must be assembled according to the drawing (130200-123010ER-IN08, -IN16, -IN17).

After the assembly, the cooling air outlet housing must be positioned according to the measurements of the general drawing (130200-123010ER-IN02). The height and inclination of the material discharge housing can be adjusted by using the jack bolts at the foot of the machine.

The material discharge housing must be fixed to the foundation with the prescribed anchor bolts (concrete base) or screw connectors (steel construction).

The distance between the drum body and the material discharge housing must be the same on the whole perimeter and may not change when turning the drum.

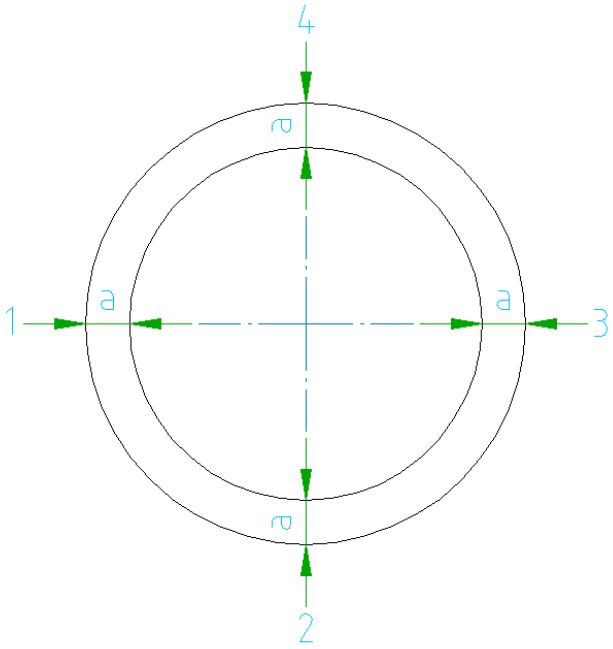


Fig. 7: Concentricity of Cooler drum to Material discharge housing

Caution!

The distance between the drum body and the cooling air outlet housing must be checked and be documented. Subsequent corrections are difficult and time consuming.

The adjustment of the cooling air outlet casing may not be hindered by attached equipment (compensator).

7.7 Installation of the drive

To transport the drive station at the job site, a crane, a forklift, pallet trucks or tank steel rollers can be used as per drawing 130200-123010ER-IN06, -IN12, -IN13.

Hydraulic cylinders and other suitable hoisting devices are to be held ready.

When the drive station is positioned (see drawing „130200-123010ER-IN02“), it must be adjusted exactly according to the center line of the drum.

The adjustment of the support roller unit is conducted by the jack bolts at the base plate and with shimming plates.

An exact parallelism of the drive station to the drum center line must be ensured. The unevenness of the concrete foundation, which causes a varying distance of the base plates to the foundation, must be filled after the final adjustments with noon-shrinking sealing grouting.

Caution!

The joint-less and complete grouting of the drive unit, that means, the full-surface support of the drive unit on the foundation, is urgently prescribed for the start-up of the gypsum cooler.

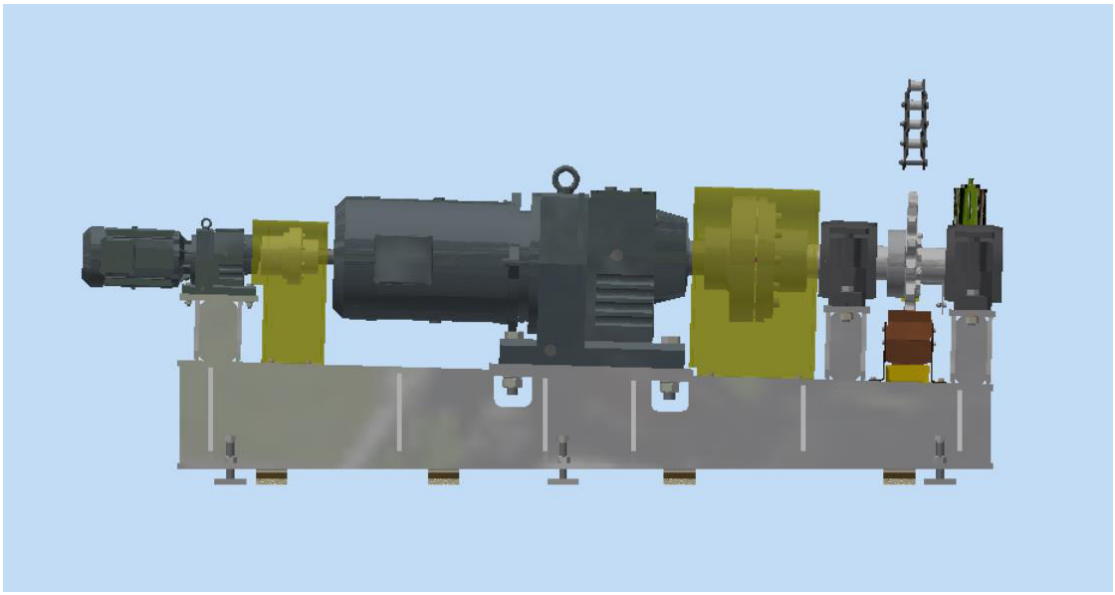


Fig. 8: Stucco Cooler drive unit

The drive chain is delivered separately and must be put on the drive tooth system of the drum and the drive unit and must be joined. The direction of the drive chain must be strictly observed. If the chain is delivered with extended length, it must be shortened before the assembly.

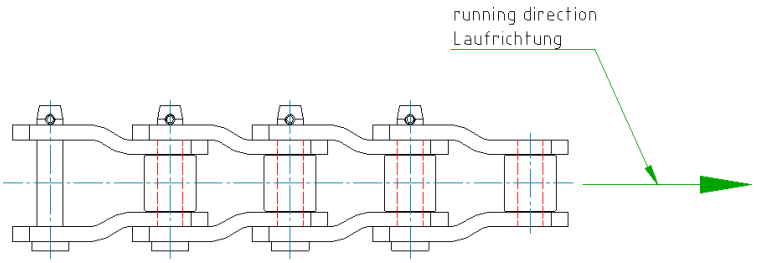


Fig. 9: Cooler drive chain running direction

	Information/Indication The OEM assembly / installation instructions of the manufacturers of the different units are sure to follow.

All drive elements must be exactly adjusted (to each other).

The feasible chain slack (when not tightened) may not be larger than 50mm.

7.8 Assembly of the chain support unit

The chain support unit is delivered completely mounted and must be positioned according to the general drawing (130200-123010ER-IN02) and be fixed to the foundation with anchor bolts.

Prior to that, the alignment of the chain support to the drive chain is necessary.

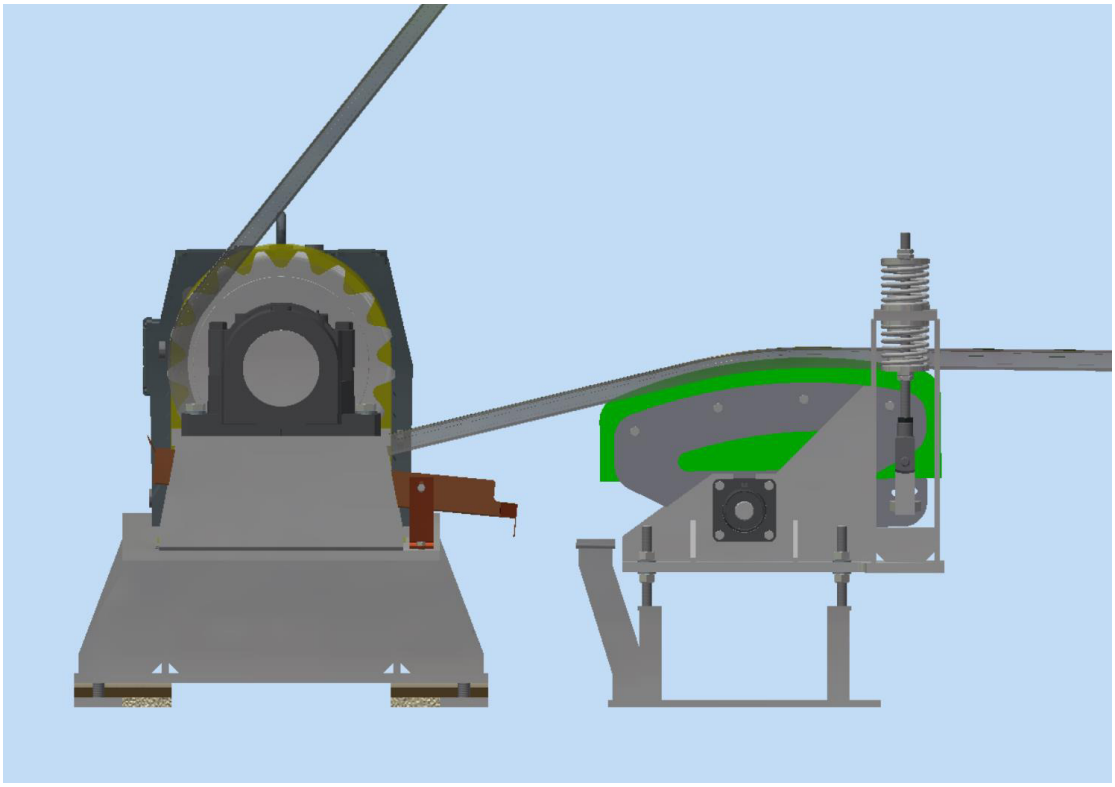


Fig. 10: Cooler drive chain with support unit

7.9 Assembly of the chain guard

The chain guard is delivered in several parts and must be assembled according to the drawing (130200-123010ER-IN07, -IN14.)

Afterwards, it must be positioned according to the general drawing (130200-123010ER-IN02) and be fixed to the foundation with anchor bolts.

A consistent distance of the chain guard to the chain and to the cooling drum must be ensured. The chain guard may not touch the chain at any position.

7.10 Assembly of the (compensator) seals

The seals must be attached to the relevant bolts, at the flange, so the joint is orientated upwards.

When connecting the Velcro fastener, it must be ensured that the lower face is showing in the direction of rotation of the related pipe.

At the seals' flange side, an additional Velcro fastener is attached to the joint. Afterwards, the split clamping flanges are attached, so that their joint does not conform to the joint of the seal or the housing flange. When fixing the bolts, it must be ensured that the radius of the inner diameter of the clamping flange is always oriented towards the flange side.

The pipe side of the seals is pressed to the slide plate of the pipes.

7.11 Installation of the feed screw

The screw-conveyor (drawing no. 130200-123010ER-IN09) for the feed of the material into the drum must be mounted with the rack of the screw-conveyor.

Afterwards, the screw-conveyer must be inserted into the infeed tube as per drawing (130200-123010ER-IN02).

Caution!

It must be ensured, that the center line of the screw-conveyor and the center line of the infeed tube of the cooling drum are concentrically.

The screw-conveyor must be easily accessible after the assembly.

7.12 Installation of the packing seal

The following procedure must be followed.

The joint surface of the packing seal at the drum body and the bundle of pipes must be cleaned.

The packing ropes 1, 2 and 3 are one after another laid into the gap between the drum body and the bundle of pipes and pressed against the front end of the plate of the bundle of pipes with an adequate tool.

It must be ensured that the joint of the single packing ropes are displaced 120° to each other.

If the cross-section of the soft packing is too large, it can be rolled to the right cross-section with a pipe or a tube.

The packing ropes 1, 2, 3 are pressed against the front end of the plate of the bundle of pipes by ring-plate 4 with hexagonal nuts 7 and 8 (plate 6). Thereby the distance between the plate of the bundle of pipes and the ring-plate must be the same on the whole perimeter.

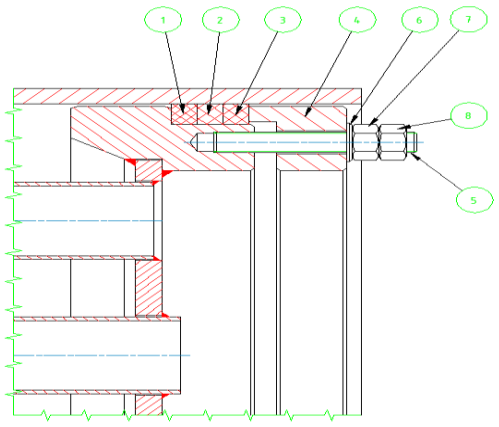


Fig. 11: Packing Seal with main components

8 Electrical Installation

All works with the electric equipment of the gypsum cooler may basically only be conducted by electrically skilled personnel.

The electrical components must be connected and checked on functionality. Details about the electrical components can be gathered from the documentation of the manufacturers in section manufacturer documentation.

Electrical equipment and layout must meet VDE 0100, VDE 0113 (EN 60204 T1) VDE 0660 and the corresponding national regulations.

Warning!

Rotating the cooling drum or the screw-conveyor in wrong direction can lead to damages to the machine.

The rotation direction is marked on the machine by arrows on labels on the cooling drum or on the screw-conveyor and need to be followed imperatively.

With conducting these works, the accident prevention regulations „Elektrische Anlagen und Betriebsmittel“ (VBG 4), resp. the corresponding national norms and regulations must be considered.

8.1 Power-up and power-down sequence

To reach the correct functionality of the gypsum cooler, the following sequence for the power-up and power-down must be considered:

Power-up sequence:

Aggregate	Switching	Comment
Material conveying	ON	
Auxiliary drive	ON	switch on ca. 1 minute after the material conveying
Main drive	ON	switch on ca. 1 minute after the auxiliary drive
Auxiliary drive	OFF	wait until the cooling drum reached the prescribed rotation speed
Cooling air fan	ON	switch on ca. 1 minute after the main drive
dedusting fan	ON	switch on ca. 1 minute after the cooling air fan
Feed screw	ON	switch on ca. 1 minute after the dedusting fan

Power-down sequence

Aggregate	Switching	Comment
On site feed of Material to the feed screw	OFF	let the feed screw run for approx. 2 minutes until the screw drains
Feed screw	OFF	
Cooling air fan	OFF	switch off approx. 45 minutes after switching off the feed screw
Main drive	OFF	after the complete draining of the cooling drum – according to the time settings during start-up
Material conveying	OFF	after 1 minute
dedusting fan	OFF	after 1 minute

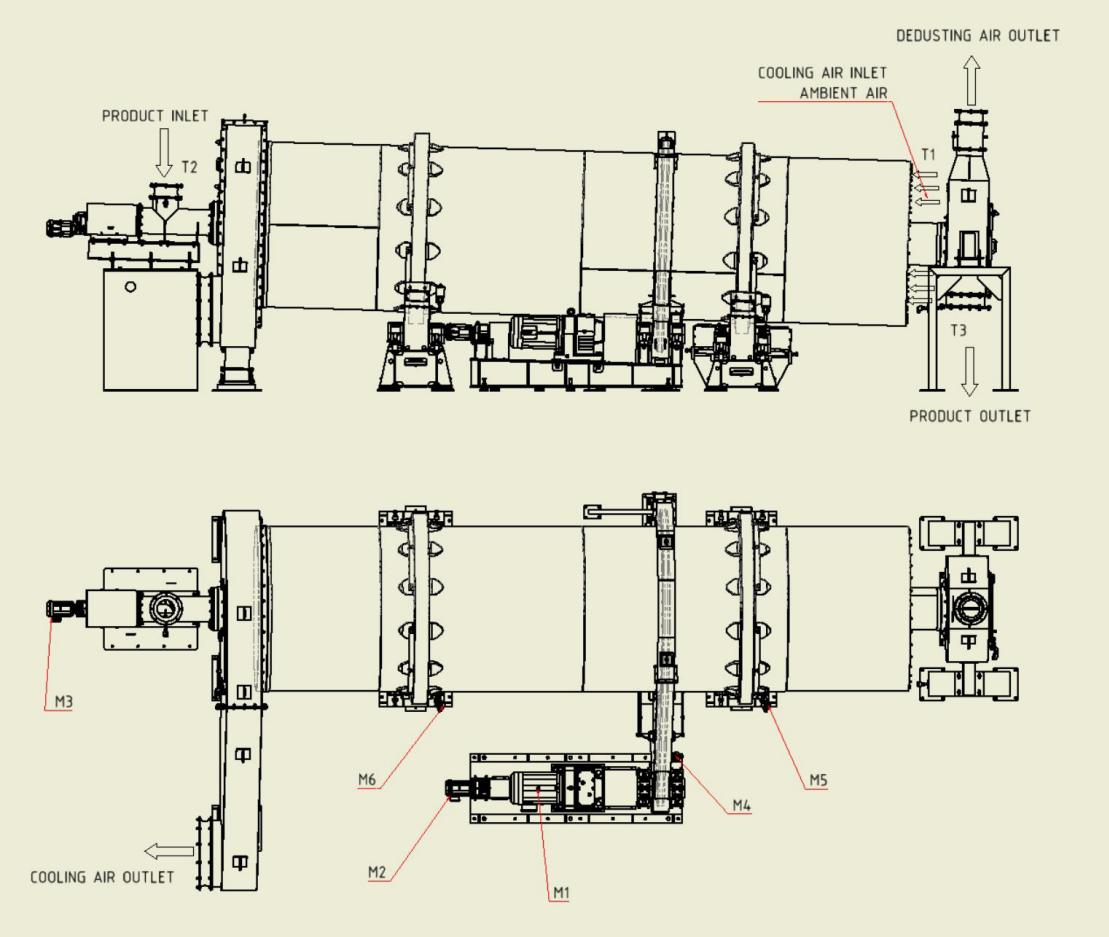


Fig. 12: Stucco Cooler actuators (M) and temperature measures (T)

8.2 Motor list

Motor	Description	Technical Data
M1	Main drive	SEW – R147DRN200L4 – 30KW –380/400V – 50Hz – 155 F – IP 54
M2	Auxiliary drive	SEW – R67DRN100L4 – 3KW – 380/400V – 50Hz – 155 F – IP 54
M3	Feed screw	SEW – FH47GDRN100L4 – 3KW – 380/400V – 50Hz – 155 F – IP 54
	Speed monitor	ifm – IIS204
	Speed monitor	ifm – IIS204
M4	lubricant valve	Beck - ELO 1000 - G ½ - Uni Elektro - 24 V DC 12VA
M5	lubricant valve	Beck - ELO 1000 - G ½ - Uni Elektro - 24 V DC 12VA
M6	lubricant valve	Beck - ELO 1000 - G ½ - Uni Elektro - 24 V DC 12VA

Caution!

If the gypsum cooler (with stucco inside the cooler) has been shut-down by the emergency stop switch or the main switch for more than 2 hours, it may only be re-started with the auxiliary drive.

Caution!

These are general instructions to start-up the gypsum cooler from cold state.

It must be guaranteed, that the material conveying at the discharge, the main drive, the cooling air fan and the dedusting fan operate prior to the feed screw.

Let the cooler rotate for minimum of 45 minutes to discharge stucco.

9 Start-up

Before the start-up, the following checks must be conducted:

Annotation: The following annotation corresponds to all components of the delivered system.

For all work on the system the following is imperative:

Danger!

The unintended start-up of the machine can lead to the heaviest injuries up to death!

Switch off the machine at the main switch and secure the machine against restart!

The following items must be considered before the start-up:

Control all bolted joints. The tightening torques can be gathered from the table tightening torques (see section 7.2).

All frames and racks must be firmly screwed with steel construction, resp. the concrete foundation. The anchor bolts must be pulled tight after the jointing, according to the table tightening torques (see section 7.2) “Tightening torques for anchor bolts”.

The support roller center lines must be aligned with the drum center line. The inclination (3%) must be guaranteed.

The right contact between support rollers, resp. horizontal rollers and the roller ring must be controlled and re-adjusted if necessary.

The distance of the support roller and roller ring guard and the chain guard must match the whole perimeter of the cooling drum.

All compensator seals must be leak-proofed.

The tension of the chain must be set right.

The dry lubrication of the support rollers and the horizontal rollers must work. The level of the oil lubricant must be controlled.

The connection values of the motors of all components and their current supply must be checked.

The connections of all sensors and devices must be checked.

The rotation direction of the cooling drum must be checked.

The rotation direction of the feed screw must be checked.

The rotation direction of the cooling air fan must be checked.

The rotation direction of the dedusting fan must be checked.

The position of the air throttle valve must be controlled and be corrected if necessary.

All coverings and covers must be attached and be fully functional.

Danger!

It must be guaranteed, that during test without covers and/or guards, no personnel can be hurt by turning spindles and/or rolls, running screw-conveyors and/or fans.

With missing cover equipment danger of in running and danger of bruising of hands and other body parts exists.

Generally, two phases of start-up are distinguished:

Cold operation (chap. 9.1)

Warm operation (chap. 9.2)

9.1 Cold operation

This test is performed without material. The intention of cold operation is, to run the gypsum cooler for a period of at least 8 hours without material and to test the mechanical operation in the process. Afterwards, adjustment works must eventually be conducted on the shut-down and secured against restarting machine.

Caution!

Basic safety rules with all works on the machine:

The machine is to be shut down by the main switch and to be secured against illegitimate restart properly.

Before the start of operation, the vertical bearings of the support rollers must be checked to guarantee that the pre-start control list is completed.

Two roller rings are attached to the drum perimeter. Those are supported by two support rollers each, which facilitate the rotation of the drum.

The lifetime of the support rollers and roller rings is influenced by their adjustment to each other. Therefore, the optimal adjustment of the support rollers to the roller rings is of the utmost importance, for the lifetime of the whole gypsum cooler.

The main criteria for the proper adjustment of the support rollers to the roller rings is the contact surface of the support rollers on the whole width of the roller rings while they are turned.

9.1.1 Running Track

While turning the roller ring on the support roller a visible track on the roller ring occurs. The so-called running track or contact area.

The running track allows the evaluation of the contact between the support roller and the roller ring on the whole perimeter and thus it is a reliable indication for the proper adjustment of the support roller.

The running track (contact area) should preferably be large (roller ring width = 100%)

Usually, in the first phase of operation, manufacturing tolerance, final roughness and other tolerances limit the contact area to approx. 70-80% of the ball race perimeter.

Therefore, a repeated re-adjustment (re-alignment) of the support rollers is imperatively necessary.

The following illustration describes the possibility of the adjustment and its effects.

9.1.2 Effects of the support rollers adjustment

Depending on the side on which the support rollers are adjusted, the drum moves to the contrary direction.

The adjustment of the drum is limited by the horizontal rollers.

Caution!

With repeated adjustment of the support rollers on only one side of the drum, the danger exists, that the drum center line slides.

This can lead to problems with the compensator seals.

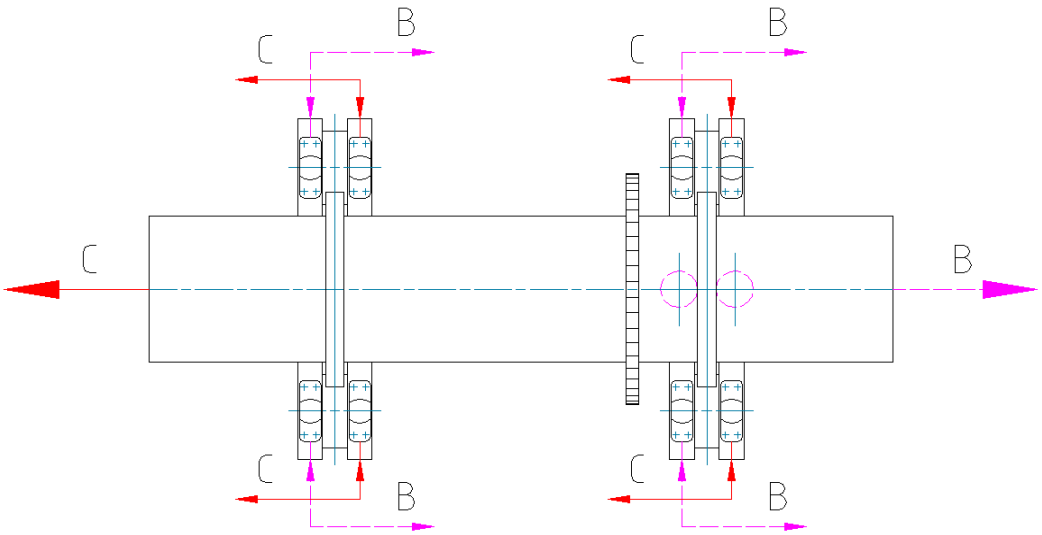


Fig. 13: Stucco Cooler tracking 1

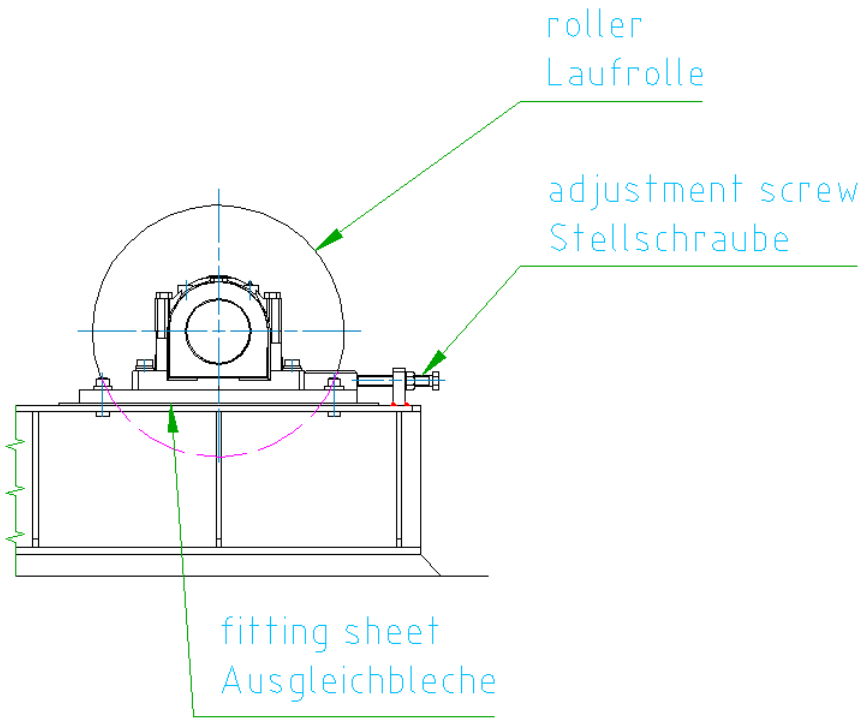


Fig. 14: Stucco Cooler tracking 2

9.1.3 Support roller adjustment with non-rotating drum

Caution!

Before adjustment, the roller ring and the support rollers must be cleaned thoroughly.

With the help of a hydraulic cylinder, the drum can be easily lifted, so a gap of ca. 1mm forms between the roller ring and the two support rollers.

With a thickness gauge, the symmetric gap between the roller ring and the support rollers can be checked.

Afterwards the support rollers can be adjusted.

An easier, but also reliable method for the adjustment of the support rollers is often applied. The method is explained in the following step by step.

9.1.4 Support roller adjustment with rotating drum

Caution!

As all guards and covers of the roller rings must be removed, those works may under no circumstances be performed by just one person.

An assistant with visual and auditory contact to the adjusting person is necessary, who is ready to push the emergency main switch, in case of an emergency.

Adjusting procedure (see illustrations on the previous and next page)

Loosening the counter nut of the adjustment screw and turning of the screw in the required direction. Effects can be gathered from the following drawing.

The adjustment screws shall be turned in small steps (fine adjustment max. 90°).

For checking the parallelism of the contact area of the roller ring and the support roller, a light source, which is installed in between the support rollers, can be used. This way, it can be checked, where the support roller needs to be readjusted (light gap). The adjustment must endure if a light gap between roller ring and support roller is visible.

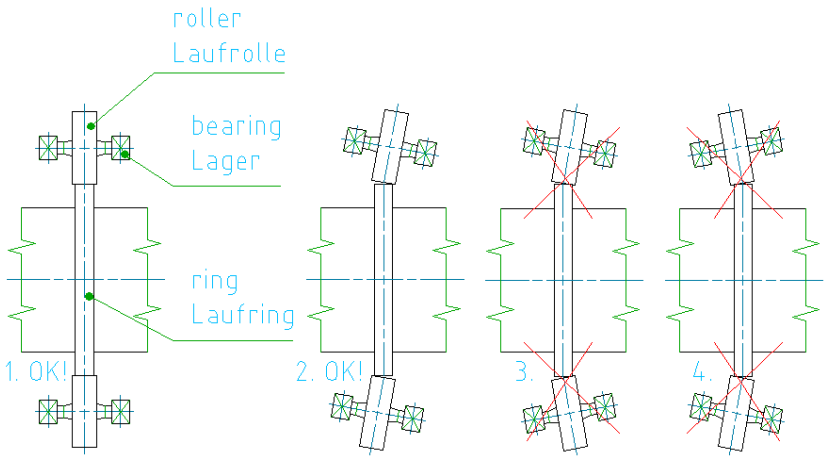


Fig. 15: Stucco Cooler tracking 3

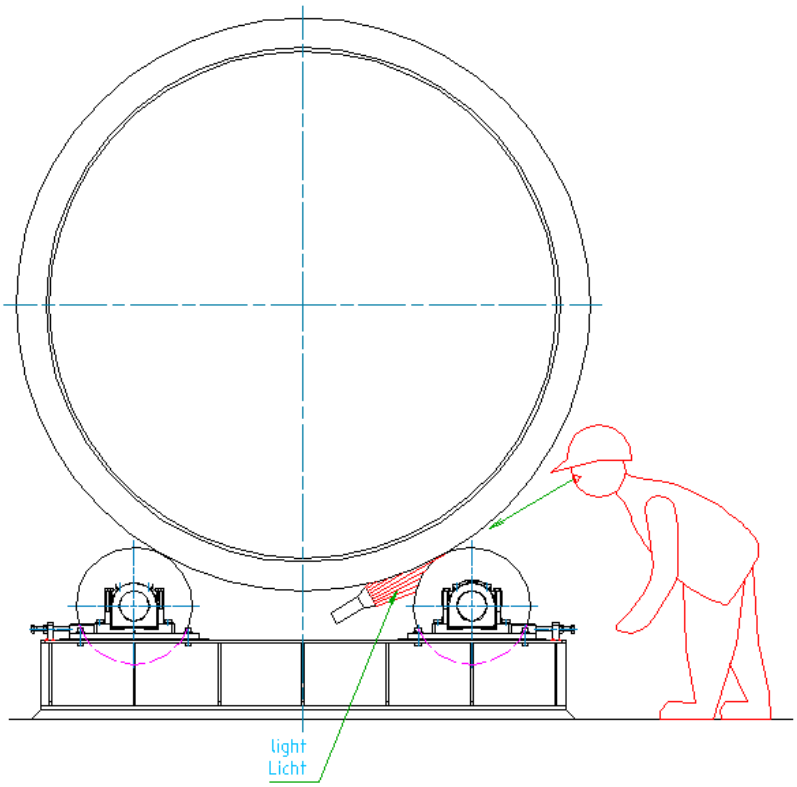


Fig. 16: Stucco Cooler tracking 4

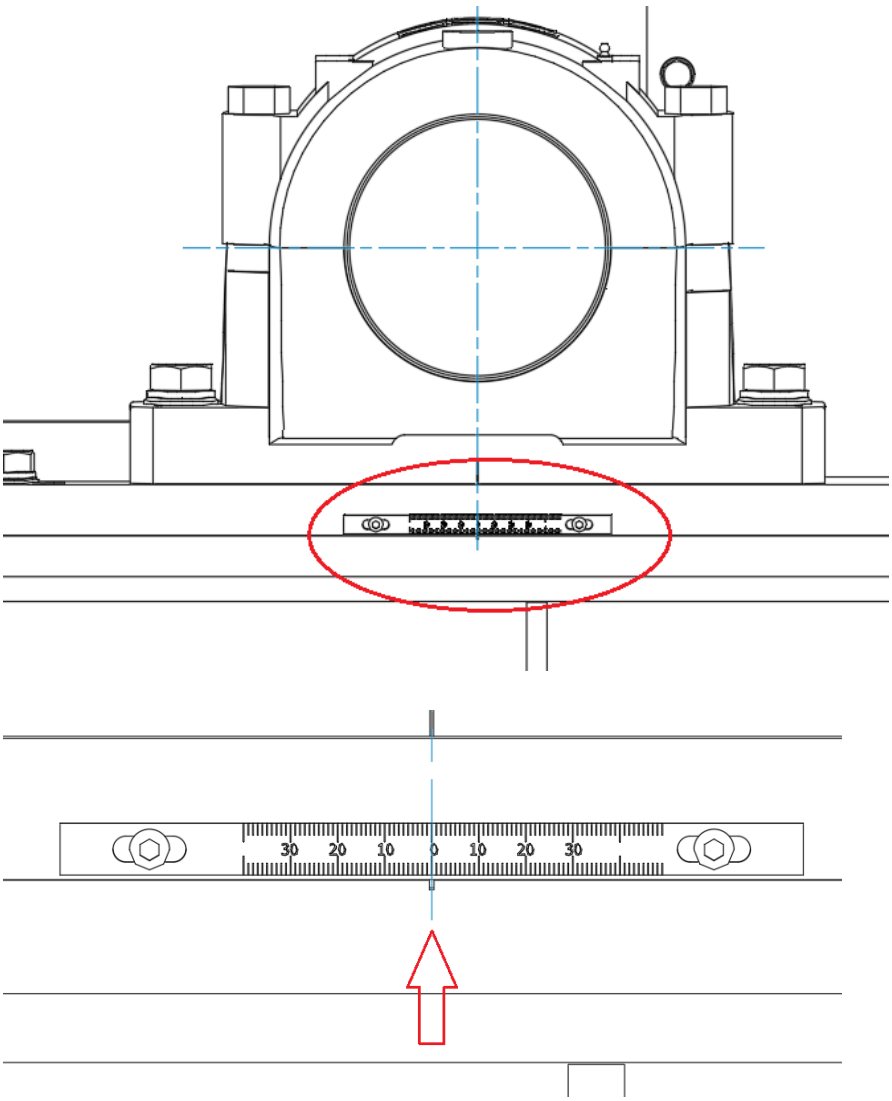
When the adjustment is finished, the adjustment screw is secured with the counter nut.

The quality of the adjustment must be repeatedly checked during the following hours.

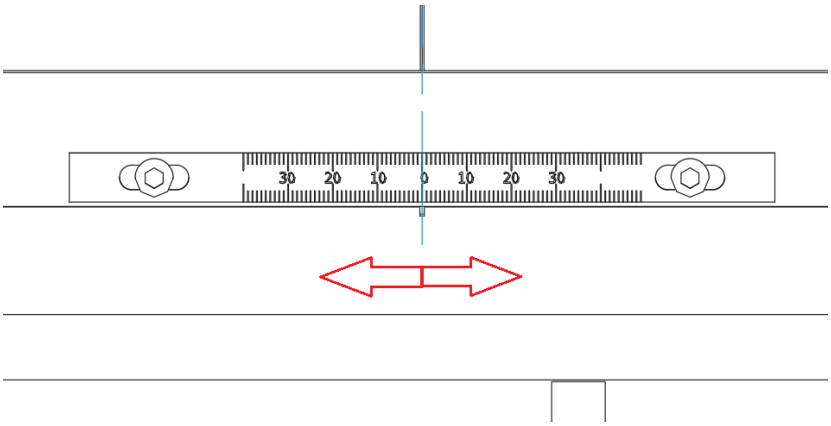
A too narrow track (contact area) must be adjusted.

A contact area of the roller ring on the support roller of at least 80% of the roller ring width is sufficient.

When the contact area is optimized the scale near the bearings should be all set to zero by means of the slotted holes.



For tracking the support rollers might need adjustment as described above. The direction of adjustment at the different spots can be documented by the scale.



During the cold operation, all functionalities of the gypsum cooler are operating and must be repeatedly checked. This includes the optimal tension of the chain, the chain lubrication, the adjustment of the horizontal rolls, the check of the seals on position and tightness. Also, the proper function of the drive unit is to be checked. This includes the right function of the couplings and the check for sufficient lubricant in the gearboxes and bearings.

9.2 Warm operation

Caution!

Important basic safety rules for all works on the machine

The machine must be switched off by using the main switch and to be secured against an unintended restart.

In this phase of inspection, the gypsum cooler is fed with material.

This inspection tests the performance of all components of the gypsum cooler under normal operation condition and to enable a final and optimal adjustment for the long-term operation.

The following items must be considered before the test run:

After three days of control of all screw connections. The tightening torques can be gathered from the table tightening torques (see 7.2). It is possible, that the screw connections have been loosened, due to the adjustment works and due to temperature changes.

Rechecking and eventually correcting the track (contact area) (see 9.1.4 support roller adjustment with rotating drum).

Measuring and documenting of the power input of the motors under operating condition.

Check all seals at final operation temperature.

Amount of material feed.

Temperature of the feed material.

Temperature of the discharged material.

Temperature at the air discharge housing.

9.3 Operation protocol sheet

This form is to be used to document relevant parameters for a period of eight hours.

Operation hours

Parameter	t1	t2	t3	t4	t5	t6	t7	t8
Output (t / h)								
Inlet temperature Material (C°)								
Outlet temperature Material (C°)								
Inlet temperature Cooling air (C°)								
Outlet temperature Cooling air (C°)								
Outlet temperature System Filter air (C°)								
Drum rotation speed min-1								
Power input main motor (A)								
Power input auxiliary motor (A)								
Power input feed screw (A)								

9.4 Debugging

Problem	Probable reason(s)	Remedy
the drum is not operating smoothly	Accumulation of dirt on the roller ring, resp. support roller. The anchor bolt is not screwed sufficiently. Gaps / hollows between frame and foundation. Influences of a machine standing nearby The foundation is too weak. Chain is loose. Chain touches the chain cover.	Cleaning of roller ring and support roller. The anchor bolt must be re-screwed. Gaps / hollows must be filled with grouting. Check foundation. Check foundation. Tighten chain and check chain connection. Free space between chain and chain cover must be adjusted.
Motor is running, but the drum doesn't turn.	Lose tensioning elements on the drive unit.	Tighten the tensioning elements according to regulations (documentation)
Unsmooth run of the chain	Squeezed chain link. Insufficient lubrication. Insufficient adjustment of chain and chain wheels. Chain too much tensioned / too loose	Change chain link. Refill lubricants. Adjust chain wheels. Optimize chain tension.
Vibration from covers and guards.	Contact of covers and guards with the drum.	Ensure sufficient distance between cover and guards to the drum.
Irregular running track (contact area)	Irregular adjustment of the support rollers.	New adjustment of the support rollers.
No lubricant at the lubrication section.	Oiler empty. Air in container or lubricant pipe. Dirt in the lubricant valve.	Refill lubricant. Clean Container and pipe. Clean the lubricant valve.

	Wrong lubricant. Defect lubricant valve.	Use lubricant with the right viscosity. Change lubricant valve.
Speed monitor out of order.	Dysfunction	Replace the speed monitor.
Seals out of order.	Insufficient pretension.	Re-tension or adjust the seals.
Excessive degeneration of the seal.	Too high pretension. Pollution of the sealing face.	Retraction of the pretension. Cleaning of the seals.
Gearbox too hot.	Insufficient or wrong lubricant.	Use enough and specified lubricant.

10 Maintenance instructions

Basic safety indications, consider section 2.

Warning!

Death, injuries, or substantial property damage can occur if the following items are not considered.

Prior to all work on the system components, the main switch must be switched off and secured against restarting.

Skilled and authorized personnel may only conduct work on the electric system!

With rebuild, repair and dismounting works on the machines, the work area must be secured as prescribed.

Do not open the door/cover until the complete stoppage of the machine.

Warning!

Injuries to the eyes and other body parts can emerge from blown out of material.

Prior to beginning maintenance work, regard the following items:

Ensure that the feed of material is stopped.

Wait until the dust inside of the machine has settled.

Caution!

Hot surfaces of the machine parts can lead to burns on the skin.

Let the machine cool down to non-harmful temperature!

Wear protective gloves / protective clothing.

Wear protective clothing suitable to the material, such as

Gloves, Protective clothing

Wear light breathing protection.

Wear light breathing protection.

10.1 General

The following regulations must be especially regarded:

Only conduct works according to the effective accident regulations.

The load handling device to be used, such as crane / forklift must have enough load capacity.

Only adequate and sufficiently dimensioned hoisting devices may be used.

The machine's weight is to be obtained from the related list of parts.

For attaching the hoisting devices, only the marked attachment points from the drawings may be used.

Works on the electrical equipment of the machine may only be conducted by an electrically skilled person, according to the electrically regulations to be applied on the installation site.

Do only use isolated tools.

Check the released parts on zero-potential first, then be earthed and short-circuited.

It must be ensured that an unauthorized restart of the machine is impossible.

Caution!

It must be ensured that pollution is avoided, and the machine parts are cleaned regularly. As the system is subjected to natural wear, readjustment is necessary from time to time. The producer specific specifications must be kept exactly. We suggest that warranty claims are only legal when the operator accomplishes thorough and documented maintenance.

10.2 Regular maintenance work

Caution!

Important basic safety rule for all works on the machine.

The machine must be switched-off by switching the main switch and to be secured against unintended restart.

System component	What to check	Interval	Action
Seal / air discharge housing, material feed and discharge tube	Visual check, status of the seal, tight fit of the screws	monthly	Readjustment. Consider the rotation direction when mounting
Drum	Visual check, status of the attached parts and inserts (toothed ring, roller ring)	monthly	In case of changes or dysfunctions, contact the manufacturer
Roller ring, support roller	Visual control, status of the surfaces (grit), distance to the covers and guards, tight fit of the screws	monthly	Readjustment or replacing of the support rollers
Horizontal rollers	Visual check, status of the surfaces (grit), distance to the covers and coverings, tight fit of the screws	monthly	Readjustment or replacing of the horizontal rollers.
Locking units	Tightening torque of the screws	monthly	Tighten the screws (cf. table tightening torque for screws), replace if necessary

Gearbox, couplings	Consider the maintenance manual of the manufacturer.	monthly	Consider the maintenance manual of the manufacturer.
motors	Consider the maintenance manual of the manufacturer.	monthly	Consider the maintenance manual of the manufacturer.
Packing seal, bundle of pipes, screw-conveyor	Visual control, compression, status of the seals, tight fit of the screws	monthly	Readjustment, replacing the packing seal if necessary. Consider the rotation direction when mounting
Mechanic connections, screws	Setting, tightening torque	monthly	Tighten the screws (see table tightening torques for screws), change if necessary
Lubrication of the support rollers and the horizontal rollers	see chapter 10.3.1	weekly	see chapter 10.3.1
Lubrication of the chain	see chapter 10.3.2	weekly	see chapter 10.3.2
Inspection openings and doors	Tightness, seals	monthly	Changing of the seals
Electrical equipment	General status of the wiring, functioning of the sensors	monthly	Cleaning, replenishing the cables

10.2.1 Check the bearings during operation

10.2.1.1 Sound check

Put your ear against a wooden stick, the handhold of a screwdriver or a similar object, whose other end bears on, close to the bearing of the housing. If everything is in order, a low buzzing sound can be heard.

Damaged bearings on the contrary cause a loud, often irregular rumbling sound.

10.2.1.2 Temperature check

Check the temperature of the bearing positions with a thermometer, such as the SKF digital thermometer TMTP200, by placing it on the bearing casing.

Unusual high temperatures or a sudden rise in temperature with unchanged operation condition is a sure sign for something being wrong.

Reasons therefore can be insufficient or exceeding lubrication, pollution, overstress, bearing damage, too low bearing clearance, stress, high friction in the seals or heat supply from the outside. It must be considered that immediately after re-lubricating, a certain rise in temperature, which can sustain one to two days, is unavoidable

.

10.2.1.3 Visual check

Check the status of the seals, screw plugs, joints and the like and determine, if lubricants emerge or pollutants of any kind, such as hot or corrosive liquids or gasses, can get into the storage room. Dark discolored lubricant usually indicates pollution in the bearing.

10.2.1.4 Lubrication

Re-lubricate the bearing according to the maintenance indications in section 9.3. When re-lubricating, the danger exists, that pollutants get into the bearing.

It must be considered that the lubricant containers and lubricators are clean and that the lubricant doesn’t get polluted during the decanting. The lubrication nipples must be cleaned before re-lubricating.

Lubricating greases of different saponification basis should not be mixed, as mixing unfavorably affects the temperature stability and the lubrication characteristics.

10.2.1.5 Test run and protocols

Shortly after recommissioning a machine, it is still possible to correct faults. Immediately after commissioning, the operation behavior of the bearings must be checked according to the instructions on this side. In case of the slightest suspicion that the bearing doesn’t run smoothly, the machine must be shut down and the bearing must be checked.

All information about the maintenance, such as the date, the lubricant used, lubrication time limits, operation temperatures, control measures etc, shall be composed in form of a protocol. This way, a good overview is provided, so all repair work can be better planned.

10.3 Lube point diagram

Caution!

The disposal of lubricants and detergents is regulated by environmental protection laws.

Deliver used lubricants to the hazardous waste point of acceptance or dispose them according to regulations.

In case of spilling lubricants, spread binder on it immediately and dispose the binder after the binding as hazardous waste.

Take precautions, that spilled lubricant is contained (sealed floor, drain trays, drain canvas covers).

10.3.1 Lube point diagram of the support roller station

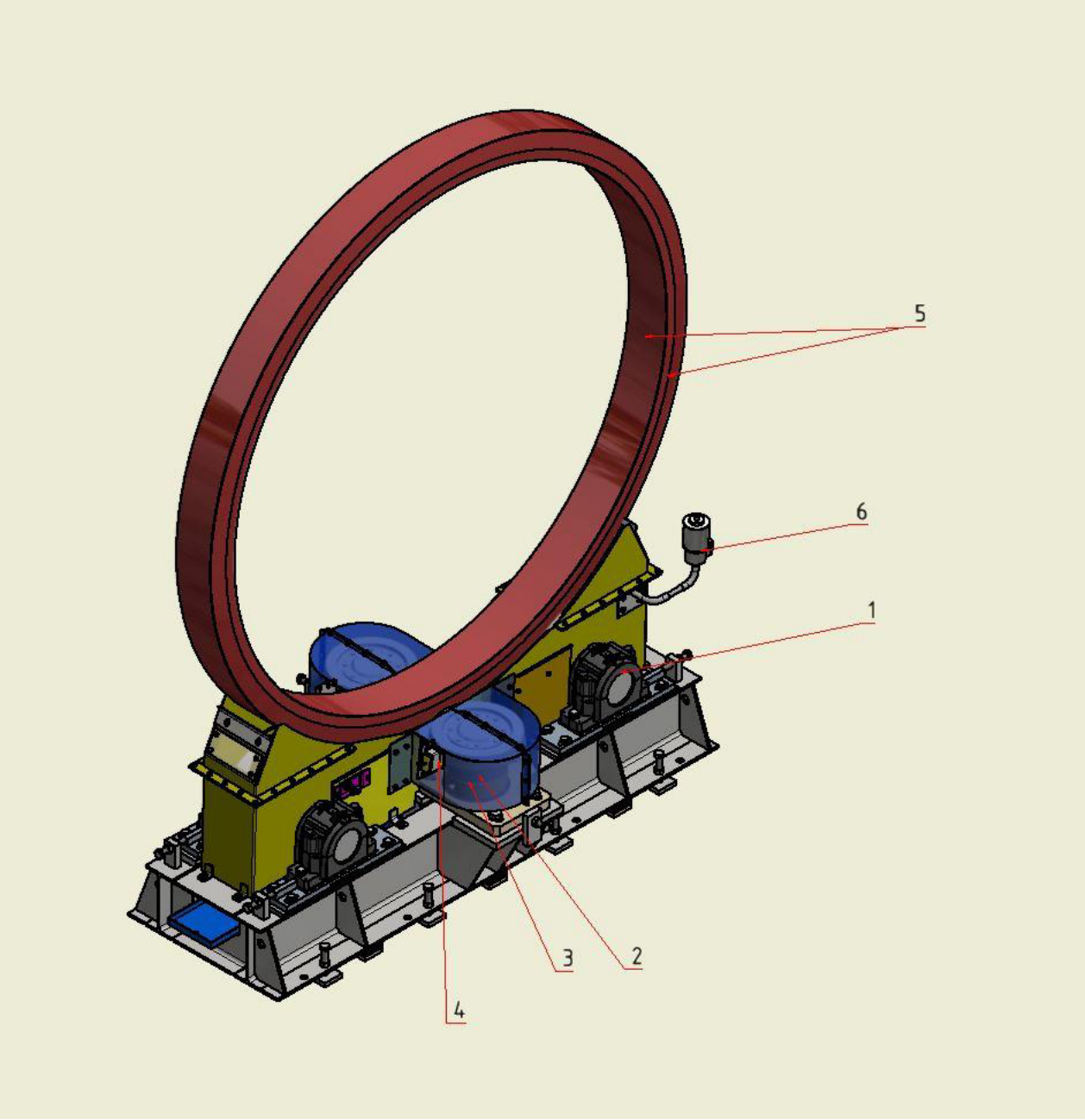


Fig. 17: Lube point diagram of the support roller station

The lubrication points must be re-lubricated regularly. The lubrication points and the lubrication time limits can be gathered from the following table.

Lubrication point	Pos.	lubrication type	lubrication amount		lubrication time limit
			refill	initial filling	
Spherical roller bearings 23224 CC/W33 SKF	1	Grease lubrication SKF Fett LGHP 2			Re-lubricate every 1500 operating hours. Renew the whole grease filling after 6000 operating hours.
Spherical roller bearings 22317 E SKF	2	Grease lubrication SKF Fett LGHP 2			Re-lubricate every 1500 operating hours. Renew the whole grease filling after 6000 operating hours.
Spherical roller bearings 22220 E SKF	3	Grease lubrication SKF Fett LGHP 2			Re-lubricate every 1500 operating hours. Renew the whole grease filling after 6000 operating hours.
Scratchpad unit HG04570	4	Molybdenum Lubrication			Check monthly. Renew if necessary.
Roller rings	5	CEPLATTYN HT http://www.fuchs-lubritech.com	Inside of roller rings and both sides gliding against support shoes	Inside of roller rings and both sides gliding against support shoes	Re-lubricate every 250 operating hours.

Drip lubricator ELO 1000 Beck	6	Oil lubrication ISO / NLGI class VG 100 For example: ADDINOL ISO-VG 100	refill oil		refill every 500 operating hours

10.3.2 Lube point diagram of the drive unit

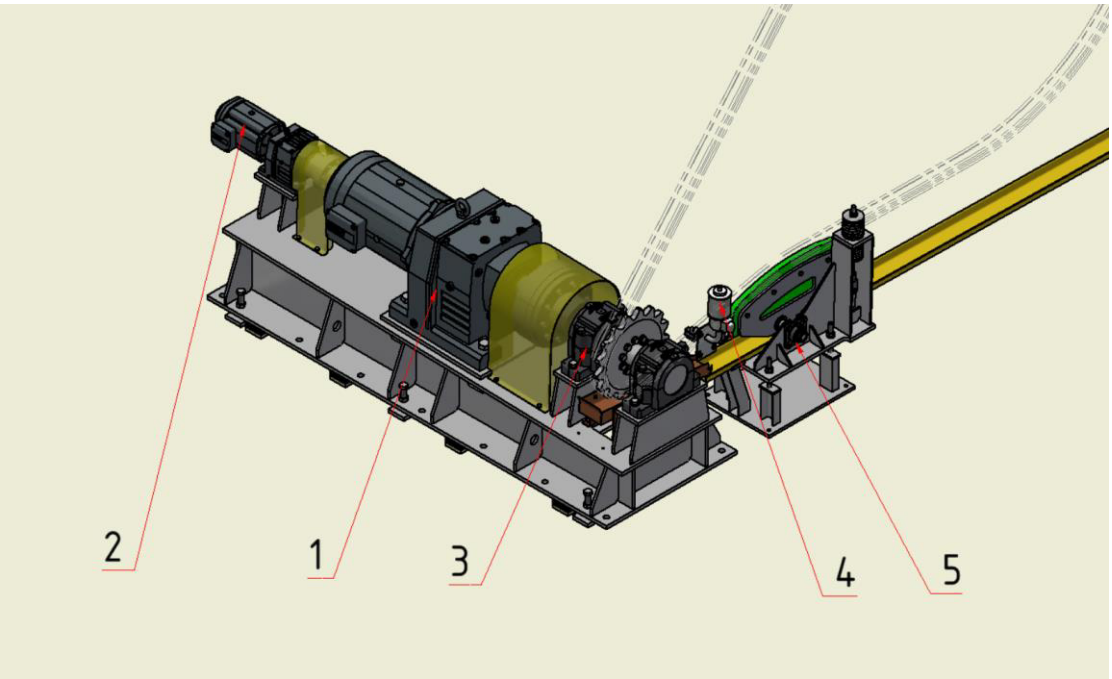


Fig. 18: Lube point diagram of the drive unit

The lube points must be re-lubed regularly. The lubrication points and the lubrication time limits can be gathered from the following table.

Lubrication point	Pos.	Lubrication type	Lubricant amount		Lubrication time limit
			refill	initial fill	
Gear motor SEW	1	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer
Gear motor SEW	2	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer
Spherical roller bearing 23224CCK/W33 SKF	3	Grease lubrication SKF Fett LGHP 2	refill lubricant		re-lube every 1500 operating hours
Drip lubricator ELO 1000 Beck	4	Oil lubrication ISO / NLGI class V For example: ADDINOL ISO-VG 100G 100	refill oil		refill every 500 operating hours
Flange bearing FY40WF SKF	5	Grease lubrication SKF Grease LGHP 2	refill lubrication		re-lube every 1500 operation hours

10.3.3 Lube point diagram of the screw-conveyor

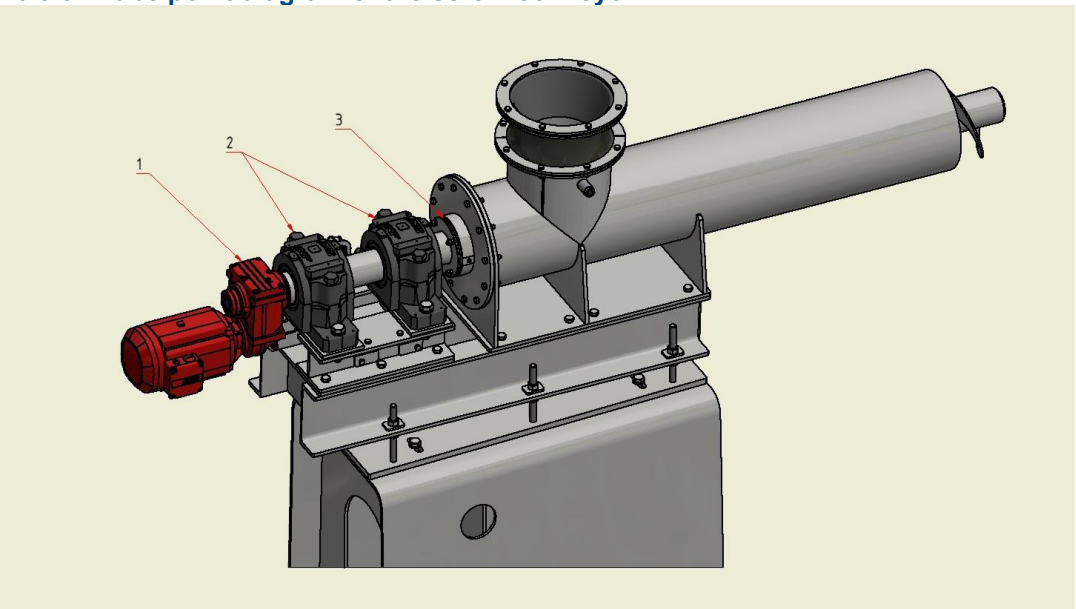


Fig. 19: Lube point diagram of the screw conveyor

The lubrication points must be re-lubed regularly. The lubrication points and the lubrication time limits can be gathered from the following table.

Lubrication point	Pos.	Lubrication type	Lubrication amount		Lubrication time limit
			Refill	Initial fill	
Gear motor SEW	1	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer	Consider the maintenance instructions of the manufacturer
spherical roller bearing 22222 EK SKF	2	Grease lubrication SKF Fett LGHP 2	Refill lubricant		Re-lubricate every 1500 operating hours. Renew the whole grease filling after 6000 operating hours.
Packing seal of the spindle	3	Generally, self-lubrication is sufficient --- In exceptional case: Grease lubrication SKF Fett LGHP 2	--- Fill the gap between spindle and seal	Self-lubricating graphite package	Control package status every 2 weeks

10.4 Spare parts list

The spare parts list and spare parts drawings can be found in a separate folder. Therein, all necessary spare and wear parts are listed.

Title	PDF-file / Excel-file
Stucco cooler Ø2,0 x 8m Spare Parts	130200-123010ER-XX01 130200-123010ER-XX02
Spare Parts list Summary Totals	130200-123010ER-XX01-Spare-Parts

10.5 Manufacturer documentation

The vendor documentation and the data sheets can be found in a separate folder. Therein the manufacturers are listed, with their own maintenance manual.

The suppliers of single components, not listed here, can be found in the spare parts list.

Component part	Manufacturer	PDF-file
Gear motor	SEW	R147DRN200L4_2W
Gear motor	SEW	R67DRN100L4
Gear motor	SEW	FH47GDRN100L4

10.6 Table of drawings

The following drawings, resp. sketches are attached to the maintenance manual.

Description	Drawing number
Stucco cooler Ø2,0 x 8m cpl.	130200-123010ER-10000-1 130200-123010ER-10000-2
Stucco cooler installation	130200-123010ER-IN01 130200-123010ER-IN02 130200-123010ER-IN03 130200-123010ER-IN04 130200-123010ER-IN05 130200-123010ER-IN06

	130200-123010ER-IN07 130200-123010ER-IN08 130200-123010ER-IN09 130200-123010ER-IN10 130200-123010ER-IN11 130200-123010ER-IN12 130200-123010ER-IN13 130200-123010ER-IN14 130200-123010ER-IN15 130200-123010ER-IN16 130200-123010ER-IN17 130200-123010ER-IN20
Stucco cooler Ø2,0 x 8m – spare parts dwg	130200-123010ER-XX01/02
Stucco cooler Ø2,0 x 8m – foundation drawing	130200-123010ER-FA01
Stucco cooler Ø2,0 x 8m – electrical drawing	130200-123010ER-EL01

10.7 Directory of revisions

The following updates were done in revisions.

Revision	Update Information