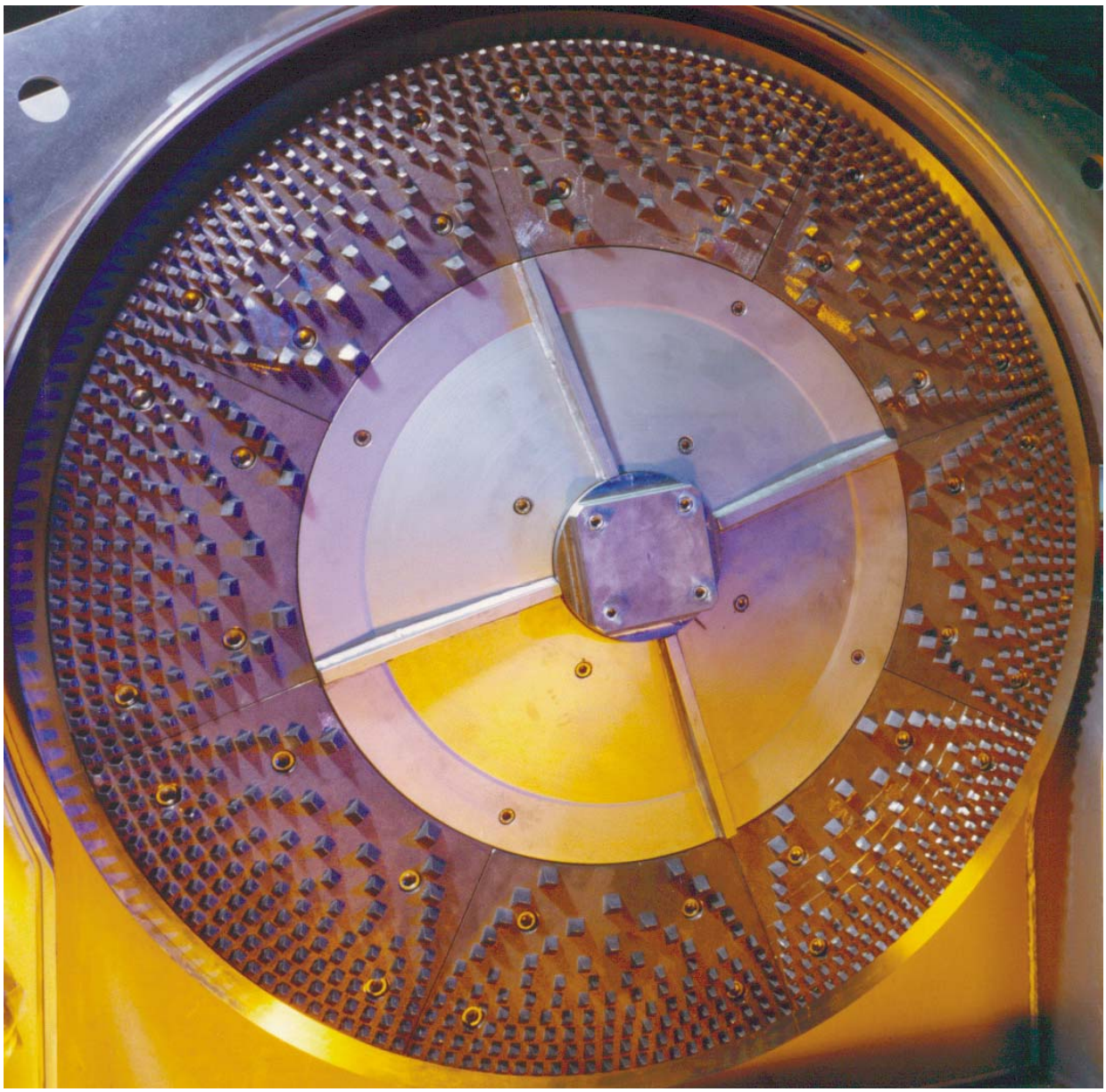


Erection Work, Operating and Maintenance Instructions

Machine: **HC-Fluffer HCM2HH**

Machine No.:
Year of construction:2012

Order code: BUCKEYE
Order no.: D-01-813177-928

ORIGINAL LANGUAGE:german

Issued by:	PDe/Hubeny, 2012-06	Revision:	
Checked:	PDe/Cargnel, 2012-06	Checked:	

TABLE OF CONTENTS

1 INTRODUCTION

This manual is part of the ANDRITZ technical documentation for the machine. It is intended as a supplement to the training provided, to supply the basic knowledge required for proper, safe and economical use of the equipment delivered by ANDRITZ. Observing these instructions helps avoid hazards and reduce repair and downtime costs, as well as increasing the reliability and useful life of the machines.

1.1 Use

Target group

This operating manual is intended for users with a knowledge of mechanical engineering and is for the exclusive use of the operating company and its personnel.

Personnel entrusted with work on the machine must have read and understood these operating instructions and comply with them. This refers in particular to the following tasks:

- Erection work, installation and start-up
- Handling, starting and stopping
- Troubleshooting
- Maintenance and upkeep
- Transport
- Maintenance and disposal of process materials, cleaning of machine and the area around the machine

In particular, the following must be considered:

- Chapter SAFETY
- the safety instructions contained in various other chapters

Supplementary instructions

The plant operating company shall complete this manual by adding national regulations on occupational health and safety, and on environmental protection.

Instructions on any special operational conditions concerning work organization, sequence of work/operations and the personnel assigned to the job shall also be added. This includes instructions regarding obligatory supervision and notification requirements.

Safekeeping

Keep the entire operating manual near the place where the machine is installed and within easy reach.

1.2 Standards and guidelines

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules.

Auxiliary electrical equipment supplied has CE marking if it falls within the scope of a directive, for example the low-voltage or EMC Directive.

1.3 Use of manual

Presentation

- Chapter and paragraph headings are printed in capitals in the body text:

  Chapter SAFETY

- Designations for display and operating elements are written in inverted commas in the body text:

  Operate switch "xxx"

- Lists without numbering do not require operations to be carried out in a certain order.

Pictograms

The following pictograms are used in the operating instructions:

Warning signs

Warning signs are shown with an explanation of the type of hazard.

The meanings of the different graduations of hazards are described in the Chapter on SAFETY.

Marks an instruction on handling of the machine.

Marks a useful piece of information.

>> Marks a cross-reference to another Chapter with path indication.

e.g. >> /MACHINE/SAFETY

Work steps

Work steps are presented in tables. Work steps are numbered and must be carried out in the order specified.

Numbering of pages, tables and figures

Pages:	Consecutive numbering of chapters	2-1
Tables:	Tab.+ Consecutive numbering in Chapters	Tab.2-1
Figures:	Fig. + Consecutive numbering in Chapters	Fig.2-1

Abbreviations

Tab.	Table
Fig.	Figure

Illustrations and graphics

The figures and graphics show the basic design of the machine. This need not necessarily correspond exactly to the version supplied.

Detailed information on the equipment supplied

➨ .../PARTS BOOK

➨ .../SUB.-SUPPLIER DOCUMENTATION

1.4 Warranty and liability

The ANDRITZ general terms of delivery and sale shall apply.

Guarantee and liability claims towards ANDRITZ shall become void if personal injury or material damage is caused by one or several of the following:

- Use of the machine for any purpose other than its designated use
- Non-conformity of erection work, start-up and handling of the machine
- Non-observance of the safety instructions in the manual
- Non-authorized structural changes to the machine
- Non-observance of the maintenance and upkeep instructions

In the event of a claim for repair under guarantee, ANDRITZ reserves the right to assess the damage to the machine.

1.5 Name and address of the manufacturer

ANDRITZ AG
Stattegger Strasse 18
A-8045 Graz

Our Service Department will be pleased to help you and can be contacted at:

ANDRITZ AG
Stattegger Strasse 18
A-8045 Graz

Tel.: +43/316-6902-0
Fax: +43/316-6902-424
e-mail: paper.service@andritz.com

1.6 Copyright

2 SAFETY

2.1 General safety regulations

The chapter on safety contains general safety regulations which must be observed when working on or in the machine/plant.

The regulations are supplemented by additional safety instructions for individual activities and which are provided in the relevant chapters of the manual. These inst ructions are highlighted in the text with special warning signs.

Safety instructions on components not supplied by ANDRITZ are contained in the descriptions of the components provided by sub-suppliers.

>>.../SUB-SUPPLIER DOCUMENTATION

The safety instructions supplement the ANDRITZ operating instructions.

All safety instructions must be observed. Non-observance of the safety instructions can lead to personal injury, damage to the environment, and/or material damage.

ANDRITZ requires the operating company to provide the following:

- The machine/plant will be assembled by qualified plant engineers in accordance with United States OSHA (Occupational Safety and Health Administration) and NEC Regulations, as well as with all applicable federal, state and local legislation, and according to drafts relating to the site itself. These engineers have the necessary training in mechanical engineering, design engineering, electrical engineering, and other specialist areas.
- The operating company has mounted suitable lockable service switches for shutting down the energy supply to the main drive of the disc filter (shut-off devices and labeling), as required according to OSHA and NEC, and suitable process instructions have been compiled for shut-off devices and labeling, as is required of employers according to OSHA.
- The operating company has compiled a comprehensive, general safety program. Anyone working at or in the vicinity of the machine must have received training for working on plants of this type and on the process running there, including where to mount barriers and markings.

2.2 Danger and warning signs

The entire SAFETY chapter is of extreme importance and relevant to safety. Thus, the information in this chapter is not marked with special danger symbols.

In the Chapters on ERECTION WORK, START-UP, OPERATION, and MAINTENANCE in this Manual, warnings are marked by a pictogram. The following warning signs are used:

DANGER

This symbol indicates that there may be a risk to life and limb.

Non-compliance with the warning signs may lead to serious health problems or even fatal injuries, and can cause extensive damage to property.

WARNING

This symbol indicates that there is an imminent health risk, as well as a risk of environmental pollution and of damage to property.

Non-compliance with the warning signs may cause moderate health problems and/or extensive environmental pollution and damage to property.

DANGER

This symbol gives warning of a dangerous situation

Non-observance of these signs may cause environmental pollution and damage to property.

Further symbols and pictograms used are described under INTRODUCTION.

2.3 Intended use

The Fluffer should only be used according to the specifications forming part of the purchase order.

Using the machine/plant for other purposes is considered contrary to its designated use.

Any modifications to the scope of supply made without the agreement of ANDRITZ are considered contrary to the designated use.

The term designated use also covers adherence to the operating instructions, compliance with the operating, inspection and maintenance conditions and with the regulations on cleaning and upkeep.

The Fluffer is designed for installation in a non-explosive atmosphere. Designated use provides for operation outside a zone according to ATEX directive 1999/92/EU.

The Fluffer is intended for installation in a plant with a roof covering.

2.4 General remarks on machine/plant safety

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine/plant and to other material assets.

The machine/plant may only be operated when in perfect condition and with due consideration to safety and the risks involved. All protective devices and the EMERGENCY STOP equipment must be in place and fully functional.

Malfunctions and unforeseen changes to the machine/plant must be remedied immediately.

2.5 Hazardous applications

The machine was designed specially for the process specified in the sales contract. All changes to this process must be checked and approved because ANDRITZ does not know in detail the chemical and biological properties of the numerous materials that can be processed in this machine. The machine as-sold is not suitable for safe processing of hazardous materials unless additional precautions are taken.

Before processing materials that are already combustible, explosive, toxic, or hazardous in other ways or which can become hazardous in a reaction, the operating company must conduct a thorough hazard analysis and risk evaluation of the entire process. This includes drawing up of contingency plans for handling process errors and faults.

In particular, the following must be observed:

1. If combustible or potentially explosive materials are to be processed, all electric motors, cabling and operating elements MUST be explosion-proof. Furthermore, maintenance work on the plant MUST be performed using non-sparking tools. Smoking is forbidden.
2. If the material processed is toxic, appropriate safety measures MUST be implemented.

2.6 Operating company's obligations

Designated use

The company operating the machine is responsible for its designated use.

Work instructions

In addition to the operating instructions, the applicable legal regulations in the user countries and other rules governing safety at work, health and environmental protection must be observed and personnel instructed in these matters.

Qualification of personnel assigned

The machine/plant may only be operated, maintained and serviced by authorized, skilled personnel with hands-on training.

The minimum legal age must be taken into account.

Any person undergoing training; in apprenticeship, or under instruction may only work on the machine/plant after receiving instruction on the theory and only under the supervision of an experienced person.

Instruction

The operating and maintenance personnel of the operating company must be instructed by qualified persons after completion of the installation work.

The user undertakes to have new, additional operating and maintenance personnel instructed in machine/plant operation and maintenance to the same extent and applying the same care, and with due consideration to the safety instructions.

Workers entrusted with the transportation, erection work, start-up, operation, and maintenance of the machine/plant must have read and understood the operating instructions, especially the Safety Chapter, the safety instructions concerning a certain activity, as well as the safety instructions issued by sub-suppliers.

Definition of areas of responsibility

The operating company is responsible for:

- definition of the machine operator's responsibility and his right to give instructions,
- definition of the contents and of responsibility for keeping the records on functioning and any failure of the monitoring equipment (log book),
- personnel areas of responsibility in terms of operating, tooling, maintenance and upkeep.

Inspections and tests

The operating company must:

- check regularly whether the safety instructions and regulations are observed when working on the machine/plant
- carry out regular training to confirm the level of knowledge of the operating and maintenance personnel.

Attachment of safety features

The operating company shall ensure that all safety-relevant instructions are observed and that all symbols and notices are attached in the production area in accordance with the local regulations.

- Safety devices and regulations (**see Section 2.8**)

In addition, ANDRITZ recommends mounting the following devices, symbols and signs, in as far as these are not already included in the local regulations.

- Markings on the floor for vehicle routes, protective fencing and danger areas (yellow)
- Barriers and covers
- Handrails (foot, center and chest height)
- Emergency lighting
- Lockable maintenance switch (shut-off device for power to the drive motor)
- Means of shutting off water and air supply
- Information signs – fire prevention equipment
- Information signs – emergency phone number
- Direction signs – exits
- Direction signs – escape routes
- Information signs (first aid post)
- Fire-fighting equipment as required by national regulations

2.7 General obligations of personnel

To avoid personal injury and material damage, all persons working on the plant shall observe the following safety instructions:

- The safety instructions in the manual and attached to the machine must be observed.
- In the event of a safety-relevant functional disorder, stop and secure the part of the plant affected. Report disorders and have them repaired immediately.
- All safety-critical modes of operation are prohibited.
- Use only the machine accesses, paths and passages intended for this purpose.
- Do not touch moving and rotating parts and/or reach out beyond them.
- Keep the machine and the workplace clean. Do not place tools and other objects on the machine/plant.
- Do not wear any garments/pieces of jewelry which might get caught on moving machine/plant parts. This includes ties, scarves, rings and necklaces.
- Do not wear long hair loose.
- Familiarise yourself with the function and any failure of machine monitoring equipment (log book) before starting work.
- No smoking in the vicinity of the machine/plant.
- Wear personal protective apparel when working on the machine/plant. (See Section 2.9)

2.8 Safety devices

The machine must not be operated without effective safety equipment.

Safety equipment must not be circumvented, dismantled or made unserviceable during operations. The safety equipment is there to protect operating personnel.

Safety equipment and access thereto must be kept clear.

Safety devices

Fig. 2-1 shows the safety devices at the Fluffer.

The machine/plant must not be operated without safety covers mounted.

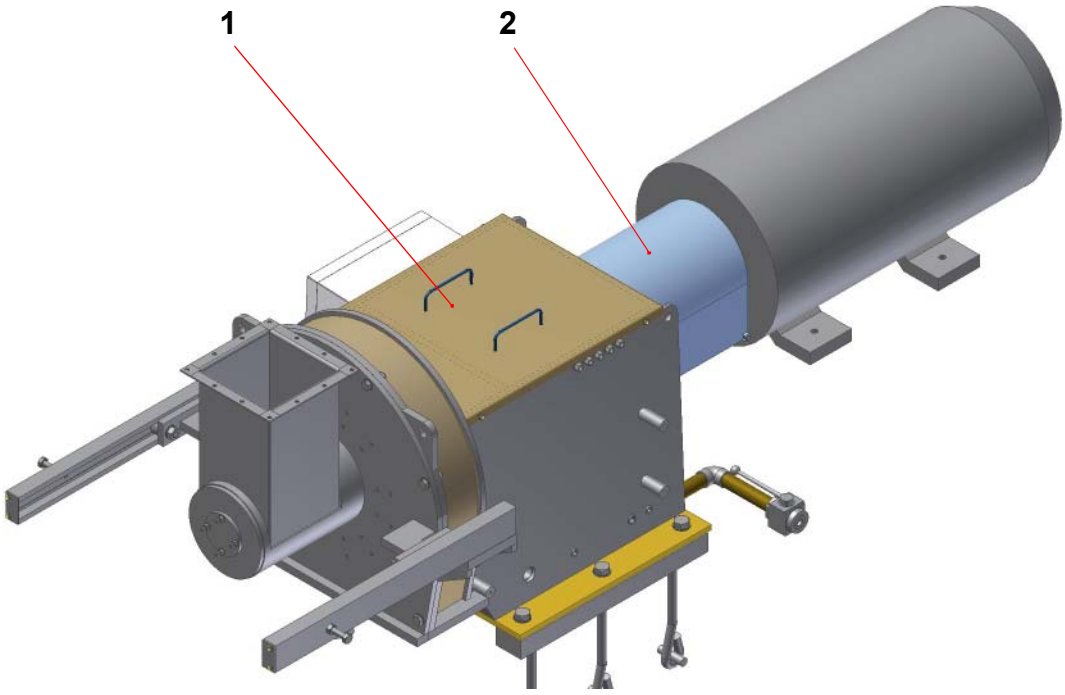


Fig. 2-1 Protective covers for the machine

Item	Component
1	Cover for bearing casing
2	Cover for coupling

Tab. 2-1 Safety covers

Lockable switches

The keys for maintenance switches or operating mode switches for local machine settings must be removed from these switches and retained by the operator to prevent the setting being changed by any third parties and thus also prevent risks!

EMERGENCY STOP switch, safety shutdown

The following EMERGENCY STOP switches are provided on the machine:

- EMERGENCY STOP switch at the control panel for the Fluffer

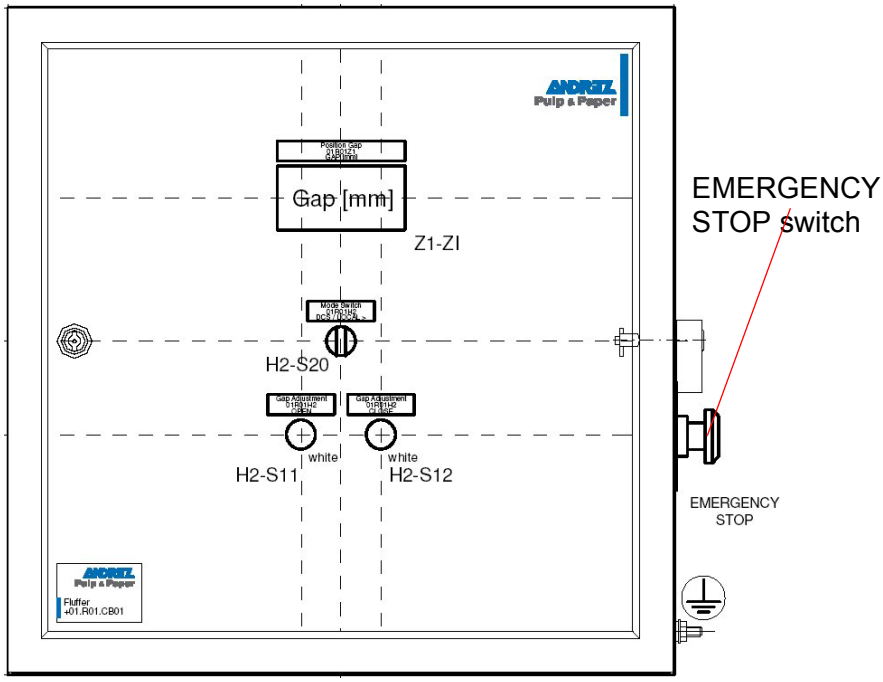


Fig. 2-2 HC Fluffer control panel

The operating company must provide an EMERGENCY STOP device in the immediate vicinity of the Fluffer to guarantee that it can be shut down by immediately cutting off the power supply to the drive elements of the machine.

If a control panel is supplied with an EMERGENCY STOP switch installed by ANDRITZ, the operating company need only wire and integrate the switch into the EMERGENCY STOP chain.

The EMERGENCY STOP device must not be installed more than 15 m away from the machine.

The EMERGENCY STOP switch and further units included in the EMERGENCY STOP safety equipment must be installed and implemented by the operator in accordance with the applicable standards, particularly EN ISO 13850 and EN 60204-1 (stop category 0).

Indicative, warning and prohibiting signs

Information, warning and prohibiting signs must be observed. They must be checked regularly for legibility and completeness and they must not be removed or obstructed.

The following indicative, warning and prohibiting signs are attached to the machine:

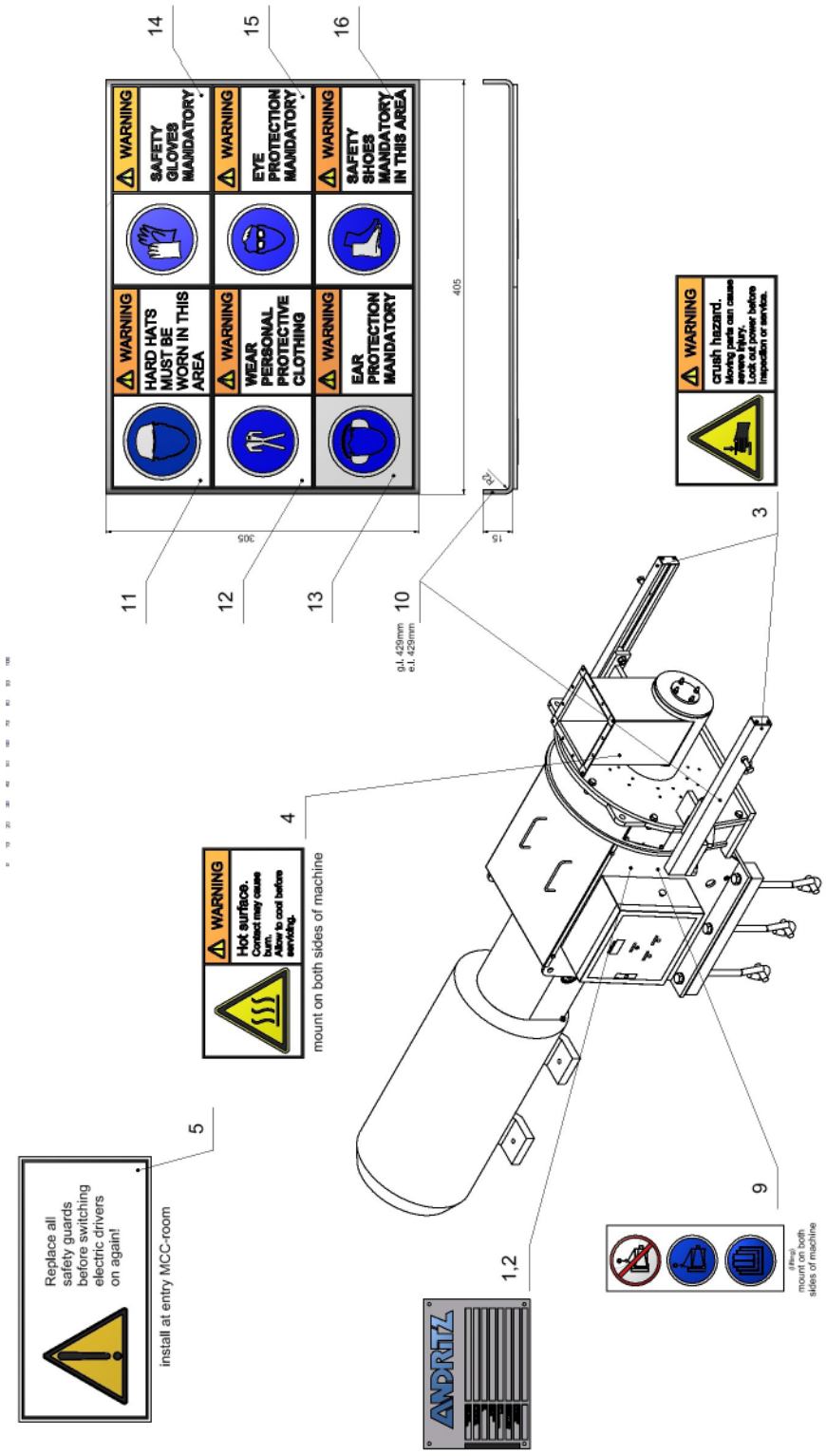


Fig. 2-3 Safety Signs

2.9 Personal protective apparel

General safety equipment

Use and always carry personal protective equipment in accordance with local regulations or those of the plant operating company.

It should be compulsory to wear hard-toed boots throughout the entire mill premises.

In addition to the regulations applying, we recommend using the following safety equipment for certain work:

Activity	Safety equipment		
Time spent in the immediate vicinity of the machine while it is running			
Taking pulp samples			
Field installation and maintenance work for which parts of the machine have to be removed			

Tab. 2-2 Recommended safety equipment for certain work

Key to symbols

	Protective clothing to prevent the pulp from coming into contact with the skin.		Safety shoes as protection against foot injuries.
	Gloves to prevent hand injuries.		Ear protection to prevent damage to hearing.
	Goggles to prevent eye injuries.		Standard hard hat as protection against head injuries.

Tab. 2-3 Purpose of the safety equipment

2.10 Safety at the machine installation site

There is no permanent place of work at the Fluffer. Working near the Fluffer is only necessary during inspection and maintenance work. The equipment is operated at the DCS (process control system) located in a control room. In order to check the limit switch setting at start-up and after changing a refiner plate, the refiner plates can also be adjusted from the control panel at the machine, but only if the main drive is switched off.

A suitably large, clear, and unconfined working area must be created on all sides of the machine. Pipework, ducting, etc. must be laid such as not to impede access to the machine.

All operating and maintenance areas of the machine must have adequate lighting and ventilation (industrial lighting).

The foundation must be sized to withstand the loads caused by the machine.

The area around the machine and the marked escapes are to be kept clear. The area around the machine must be marked as a danger zone. It must be possible to enter and leave the operating area unimpeded.

Make sure machine and surrounding area are kept clean. In particular, oil and grease on the floor and on machine elements may cause slipping. This is therefore a considerable source of injuries, as are tools that have not been put down in a safe place. The operating area must be clear of waste materials, tools and other extraneous objects.

The floor around the machine must be provided with a non-slip finish.

In order to prevent any falls from or damage to the machine, it is forbidden to climb onto machine elements or on the machine (except for the treading areas provided). Use ladders or similar equipment in accordance with recognized standards.

Ramps, platforms and lifts must be used to avoid injury or excessive physical effort.

2.11 Temperature

The Fluffer is designed for a pulp temperature of up to 100°C. All pipes whose surface temperature exceeds 73°C must be insulated.

No maintenance work should be carried out until the hot surface has cooled down.

2.12 Noise

Sound pressure from the machine (including the drive) within the specified operating range: 85 dB(A).

When the machine is in operation, the noise level of the motor is higher than the noise level of the machine itself. As a result, the overall noise level may vary according to the motor type used.

The total noise emissions from all machines in the production room can restrict spoken communication and impair hearing.

The machine is designed such that no operating personnel is required in the immediate vicinity of the machine during normal operation. Appropriate hearing protection should be worn throughout maintenance and adjusting work while the machine is running.

2.13 Electrical equipment

All work on the electrical equipment, without exception, must be carried out by skilled electricians.

Any form of contact with electrical equipment may cause fatal injuries.

Before beginning any maintenance or repair work, the operating company must disconnect the electric power supply to all drives securely. This can be achieved with a lockable maintenance switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations applying.

If any work is necessary on live parts, it is essential to proceed according to the applicable standards.

Users of medical electronic equipment (e.g. pacemakers) must not enter the electric danger zone.

The machine must be grounded to avoid electrostatic loading or contact voltage. Machine, gears and motors must be connected to the grounding system.

2.14 Hydraulic and pneumatic equipment

Hydraulic and pneumatic systems operate at high pressure. Malfunctions in the hydraulic system may cause hazards to operating personnel, damage to property and environmental pollution.

The specified operating data and the prescribed revision and maintenance intervals must be observed at all times.

Systems must be depressurized before carrying out maintenance work.

Work on hydraulic and pneumatic equipment must not be carried out other than by skilled erection personnel with special training and experience in handling hydraulic and pneumatic equipment.

In order to avoid injuries (e.g. caused by whiplash), all pressurized flexible hoses and pipes must be tied or held together.

2.15 Welding work

In general, welding work is only permitted after consulting ANDRITZ. Any welding work that is described in detail in the maintenance instructions is excluded from this ruling.
When performing welding work, always observe the relevant safety rules and the appropriate safety regulations for work performed in enclosed and confined spaces.

DANGER

HOT WORK PERMIT REQUIRED!
Danger of fire and explosions!
There is a considerable risk of fire or explosion during welding work. Always take the appropriate fire precautions before beginning work, e.g. keep fire extinguishers at the ready.

All motors should be disconnected before carrying out electric welding work.

During arc welding work the ground should never be allowed to run over the rolling bearings. A grounding cable is to be connected up in the immediate vicinity of the welding area.

2.16 Fluids, (liquids, gases, vapour or smoke)

Unintended chemical reactions may take place in fibre pulps during a prolonged standstill and hazardous fumes may be produced.

The machine must be thoroughly cleaned after prolonged stoppages.

The area must be adequately ventilated.

Before beginning work on the machine, ensure that no liquids, gases, vapors or smoke can enter the working area from feed pipes, discharge pipes or shafts.

If it is not possible to exclude reliably the risk of liquids, gases, vapors or smoke flowing in, all persons working in the danger zone must be equipped with a safety harness and a safety rope. Each worker must be monitored by a second person outside the danger zone.
It must always be possible to evacuate a worker from the danger zone without delay.

Steam supply (optional)

Ensure that the steam pressure does not exceed the maximum permitted operating pressure of 1.5 bar.

2.17 Oils and greases

The safety instructions for the products concerned must be observed when handling oil, grease and other chemical substances.

Suitable skin protection is required when handling aggressive media. See manufacturers' information for the type of skin protection required.

Also observe the relevant requirements for disposal.

3 TECHNICAL DATA

3.1 Data

Type	**HCM2HH**
General data	Max. throughput . . . . . 150 bdmt/d
	Consistency . . . . . approx. 45 %
	Rotor speed . . . . . 1800 rpm
Dimensions	Length . . . . . approx. 3800 mm
	Width . . . . . approx. 1350 mm
	Height . . . . . approx. 1100 mm
	Rotor diameter . . . . . 770 mm
Hydraulics	Operating pressure for gap adjustment . . . . . 80 bar
	Operating pressure for bearing lubrication . . . . . 10 bar
Drive	Main drive . . . . . 250 HP
	Hydraulic pump drive for Gap adjustment and bearing lubrication . . . . . 2 HP
Weights	Fluffer (without motor) . . . . . approx. 1800 kg
	Rotor and shaft . . . . . approx. 560 kg
Process materials	Sealing water for labyrinth seal . . . . . 0.5 l/min . . . . . Fresh water, 3 bar, continuously
	Cooling water . . . . . 5 l/min . . . . . 30°C max., occasionally
Medium	Pulp, specified in the contract.
	Foreign objects, such as stones, wire, sand, other heavy rejects or the use of chemicals in contravention of the specifications can cause damage to the machine for which ANDRITZ does not accept liability.
	Max. chloride substance in the medium . . . . . 150 ppm

4 DESCRIPTION

4.1 Field of application

The HC fluffer is used for fluffing pulp.

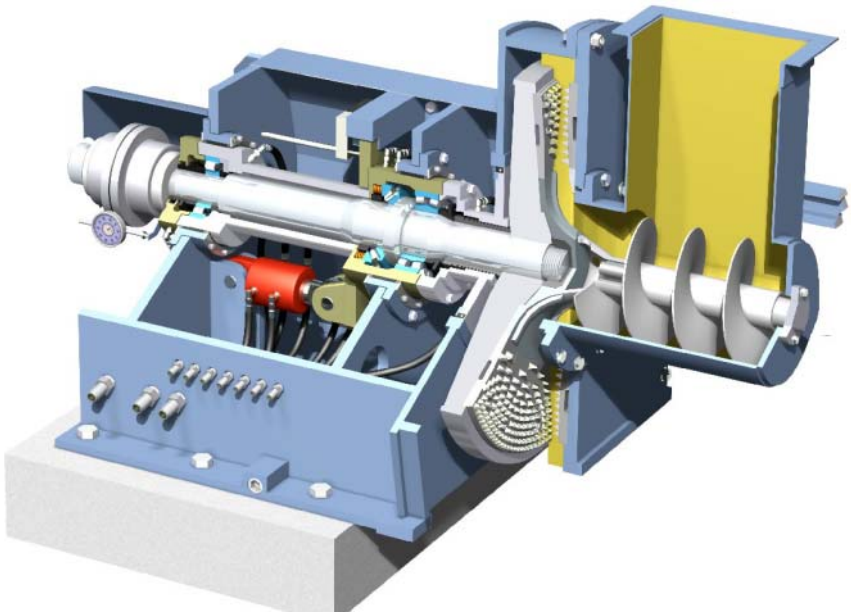


Fig. 4-1 Fluffer HCM2HH

4.2 Main plant components

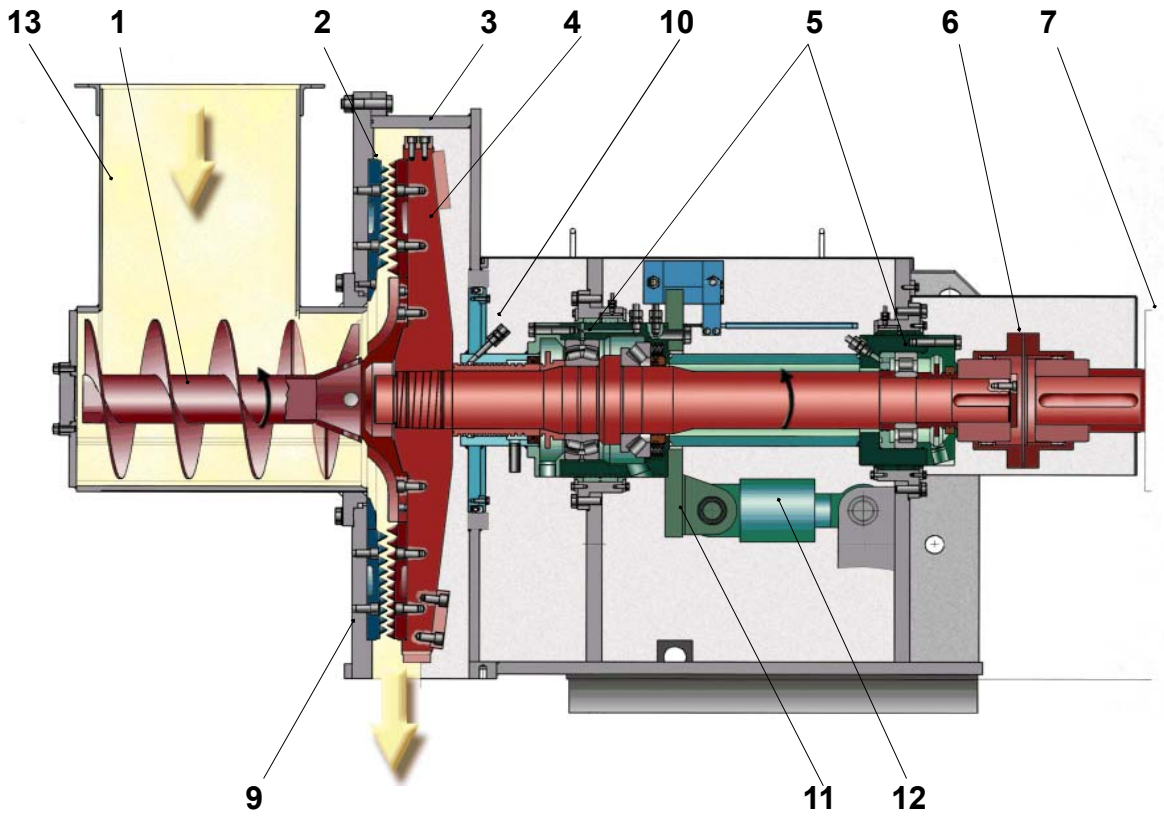


Fig. 4-2 HC fluffer

Item	Component	Item	Component	Item	Component	Item	Component
1	Feed screw	4	Rotor	7	Drive	10	Labyrinth seal
2	Fluffer discs	5	Rotor bearing	8		11	Hydraulic setting
3	Housing	6	Curved teeth coupling	9	Housing cover	12	Hydraulic cylinder

Tab. 4-1 Main components

Feed screw (1)

Function: Suspension feed.

Design: The feed screw is attached directly to the rotor.

Fluffer discs (2)

Function: Fluffing the pulp.

Design: The fluffer discs are screwed to the stator and rotor and are made of stainless and acid-proof steel.

Housing (3. 9, 13)

Function: The housing consists of several parts: the feed part (**13**), the stator (**9**) and the rotor-side part (**3**).

Design: Welded structure

Rotor (4)

Function: The chemicals and the pulp are mixed between the fluffer discs attached to the rotor and the stator.

Design: Rotor is linked to its shaft via a conical press fit. The rotor shaft is in turn connected to the drive motor via a curved teeth coupling (6).

Bearing (5)

Function: Inner and outer rotor bearing.

Design: The rotor shaft runs in two radial and one axial roller bearing. The bearing assembly is lubricated by an external lubricating system.

Outer bearing: The rotor unit is pushed into the outer plain bearing unit.

Drive (7)

Function: Driving the rotor.

Design: Fluffer drive by motor coupled to the rotor shaft via a curved teeth coupling. The curved teeth coupling (**6**) absorbs the axial movement of the rotor shaft.

Housing cover (9)

Function: Holds the static fluffer discs.
The housing cover can be moved out axially for the purposes of inspection and of changing the fluffer discs.

Design: The housing cover, which is fitted with fluffer discs, is part of the housing (screwed together).

Seal (10)

Function: Rotor shaft sealing.

Design: Labyrinth seal with sealing water.

Hydraulic setting (11)

Function: Hydraulic setting of the fluffer discs.

Design: Hydraulic gap adjustment via two hydraulic cylinders (**12**). The rotor is displaced axially by these cylinders and the fluffer discs are moved into position.

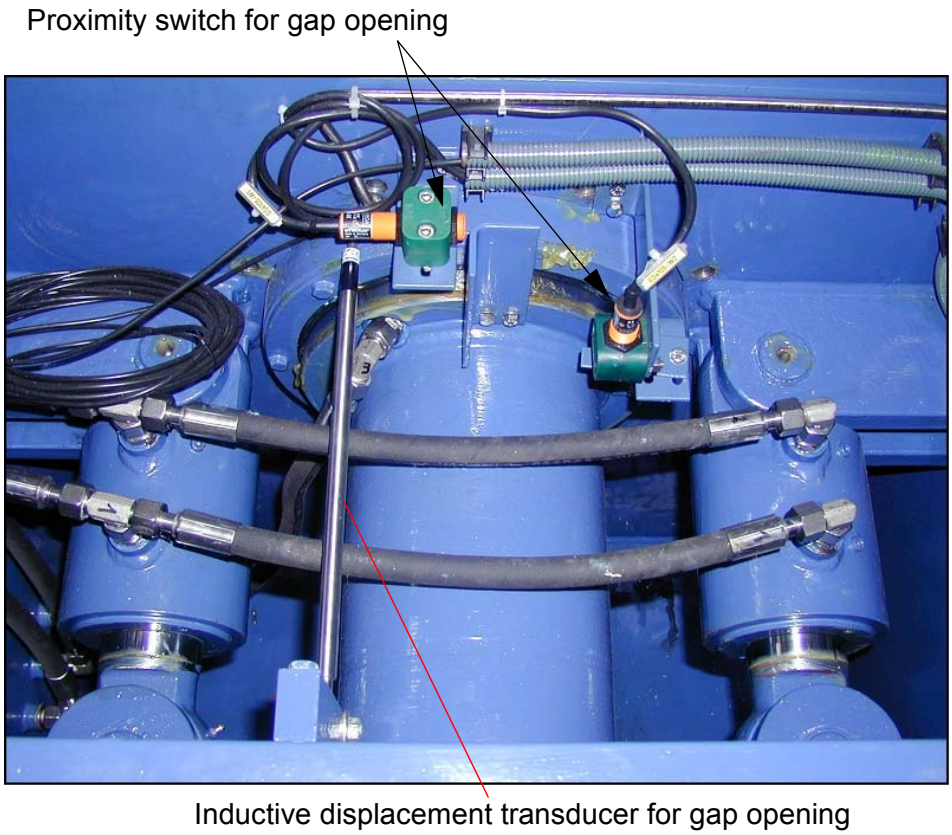


Fig. 4-3 Hydraulic gap setting

Hydraulic unit

Function:

- Controlling the hydraulic gap setting
- Circulating oil lubricating system for the anti-friction bearings

Design:

Hydraulic unit built onto the fluffer. The oil tank is integrated into the fluffer housing.

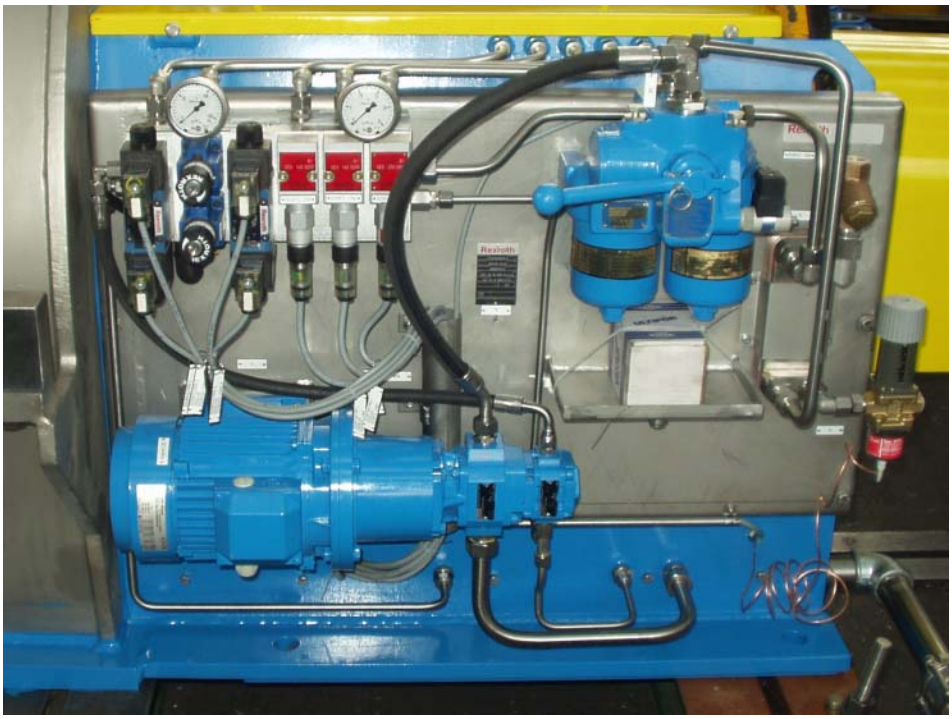


Fig. 4-4 Hydraulic unit at fluffer

>> For details, see supplier documentation

Materials

All parts in contact with the pulp are made of stainless, acid-proof steel.

4.3 Technological description

The item numbers in the following description refer to Abb. 4-2

Function

The shredded pulp drops from above into the pulper. The pulp is conveyed to the fluffer discs (**2**) via the feed screw (**1**).

The fluffer discs on the rotor and the stator have pyramid-shaped teeth. The pulp is fluffed between the fluffer discs.

The gap between the fluffer discs is adjusted hydraulically (**11**) by setting the rotor.

If a certain limit for the motor load is exceeded, or if the motor does not reach its nominal speed, the gap is opened automatically via the hydraulic system. When normal values are reached again, the fluffer discs are moved back to their original position.

The fluffed pulp is discharged at the bottom of the fluffer housing.

4.4 Machine monitoring equipment

The HC fluffer has the following monitoring equipment:

Limit switches

Two proximity switches for the largest and smallest gap position are attached to the machine.

Gap indicator

The fluffer is fitted with a mechanical and an electronic gap display.

Mechanical gap display

- Meter attached to the machine near the coupling guard

Electronic gap display

- Inductive displacement transducer

Bearing monitoring

Connecting threads for fitting a vibration monitoring unit are provided at the bearings.

Hydraulics

The machine's oil circulation system is monitored by the following equipment:

- 3 flow meters
- 1 level sensor
- 1 temperature sensor
- 1 differential pressure gauge

Control panel

The following operating elements are located at the HC fluffer control panel:

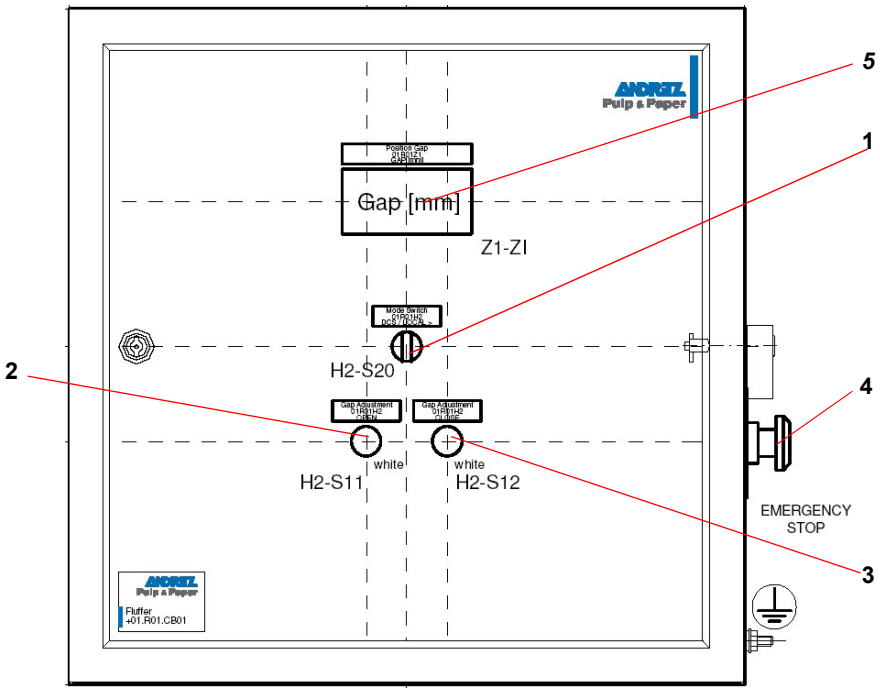


Fig. 4-5 HC fluffer control panel

Item	Control device
1	Switch for changing to local operation or process control system ("LOCAL/DCS")
2	Button for opening the gap adjustment ("OPEN GAP")
3	Button for closing the gap adjustment ("CLOSE GAP")
4	EMERGENCY STOP switch
5	Gap indicator

Tab. 4-2 HC fluffer control panel

5 ERECTION WORK and TRANSPORT

5.1 General

This chapter describes certain steps for transport, storage and installation of the machine, which may be the responsibility of the operating company.

Activities which are carried out by ANDRITZ, including works assembly, are not the subject of this description.

5.2 Safety regulations

DANGER

Do not disregard the safety regulations.
If the safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety regulations

Assembly will be carried out under the supervision of the ANDRITZ erection work supervisor.

All applicable accident prevention rules must be observed.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads to prevent them from falling.

Do not step or walk below suspended loads! Standing below suspended loads is dangerous and thus, strictly forbidden!

Jolts must be avoided. This refers especially to the handling of pre-assembled machines.

Qualification of personnel assigned

Transport and unloading of the machine are to be carried out by personnel specially familiar with such work.

Workers entrusted with lifting and conveying equipment must have the national qualifications required.

Erection work may only be carried out by trained, skilled personnel.

Personal protective apparel

The following protective equipment must be worn when carrying out start-up and erection work: (>>see Chapter 2.9.)

5.3 Transport

DANGER

During transport or loading/unloading there is a risk to life and limb from falling machine components and also a danger that machine components may be damaged.

Do not lift machine and transport crates except at the points marked for lifting by crane or forklift!

Take account of the machine's center of gravity (top-heavy)!

If the entire machine is lifted and there are several different types of lifting lug available, personnel should only use suitable lugs (according to the transport sketch) for the work in hand.

Do not step or walk below suspended loads!

Delivery

The fluffer is supplied pre-assembled. The machine components and auxiliary materials are packed in crates. The lifting points to be used are shown in Fig. 5.1.

Transport sizes and weights are stated in the shipping documents.

Largest supply weights:

>> .../TECHNICAL DATA

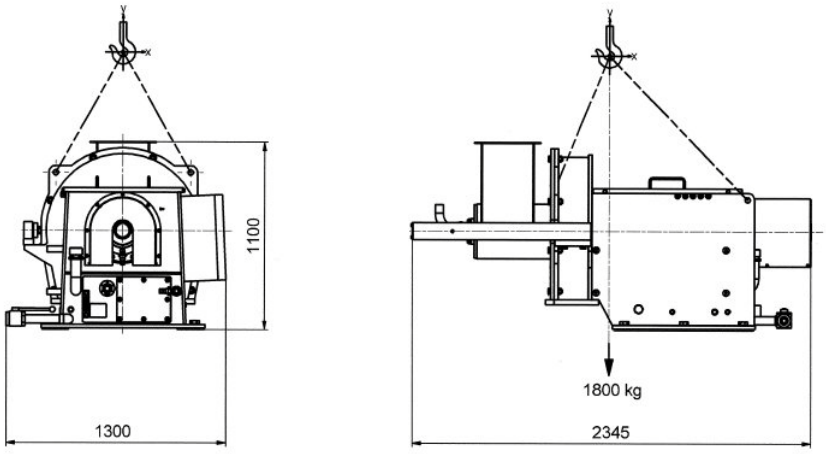


Fig. 5-1 Transport sketch

Acceptance

- Check against shipping documents and packing lists whether the supply is complete and in perfect condition.
- In the event of transport damage or short supply, do not accept goods, but notify forwarder and the ANDRITZ shipping department accordingly.
- If there is a hidden loss or defect, notify the forwarder and the ANDRITZ shipping department within 15 days of receiving the goods.

5.4 Safekeeping

The following instructions must be observed if the system is not to be installed immediately:

- Please inform the ANDRITZ shipping department.
- Provide weather protection for stored machine components. In particular, avoid wide variations in temperature and ensure that the equipment is kept clean.
- Incidentals should be protected against damage and unauthorized withdrawal by storing in a lockable room.
- Packaging should not be removed until field installation work begins.

5.5 Installation

General

.

WARNING

Disregarding the sequence plan and the installation instructions may result in hazardous situations causing a danger to life and limb, as well as machine damage.
The sequence of erection work is important and must be strictly observed!

Completion of the various steps must be documented in the certificate of completion of erection work.

The sequence of erection work is shown in step-by-step tables. The individual activities are numbered according to the sequence in which they are to be performed.

Required documentation at installation site

The following supplementary documentation must be available at the beginning of installation work:

- Foundation and arrangement drawing
- Pipe connection diagram
- Documentation on electrical, measuring and control equipment
- Packing lists for each individual consignment

Preparations

Foundation

The foundation is prepared according to the ANDRITZ foundation plan.

The following preparations have to be made prior to placing the fluffer on the foundation:

- Mark axes and elevations on the foundation.
- Check the workmanship of the foundation before beginning erection work.

Protective coating of preserving agent

Corrodible machine components are protected with "Cortec VCI 369" preservative grease.

The preservative grease need not be removed.

DANGER

Machines or machine components may fall during transport at installation site.
Do not lift machine and transport crates except at the points marked for lifting by crane or forklift!
Do not step or walk below suspended loads!

DANGER

Parts of the body may be trapped or crushed during installation work.
Do not place your hand below suspended loads!
Wear your personal protective apparel!

Mounting the fluffer

Erect the unit according to the instructions in the following table:

Step	Activity
1	The machine is installed according to the necessary documents (arrangement and assembly drawings, sequence of erection work plan, etc.) under the instructions of the fitter responsible.
2	Aligning the fluffer according to axes and height. max. deviation (+/- 1 mm). **CAUTION: In order to prevent the fluffer from tilting, the machine must be supported with suitable auxiliary equipment underneath the chute when mounting.** **The support must not be removed before the machine is secured to the base frame!**
3	Screw the fluffer to the frame.
4	Mounting the coupling on the motor.
5	Mount motor according to supplier documentation and align coupling. Take account of fluffer shaft displacement!
6	Check coupling alignment

Tab. 5-1 Mounting the fluffer

Installation of peripheral equipment

Installing peripheral equipment:

- Hydraulic pipes
- Water conduit (sealing water, etc.)
- Steam pipes
- Process pipes
- Complete electrical installation work, including installation of limit switch and emergency off switch, according to electrical, process control, and instrumentation diagram provided by ANDRITZ
- The instrumentation (instruments, actuators and control devices) of the machine is to be installed according to the flow sheet and the applicable standards.

DANGER

All pipes whose surface temperature exceeds 65°C must be insulated.
Insulate steam pipes, condensate pipes, and steam joint!

DANGER

Errors in the installation of pipework and hoses may result in risks to life and limb and in damage to the machine.
Mount all pipes stress-free!
Make sure hose connections are attached correctly!

Other work

Other work to be completed:

- Clean the machine.

Mount protective covers and warning signs.

5.6 Cold test

Prerequisites

The following utilities must be available:

- Electricity
- Water

Lubrication

- First filling of lubricant and recording of all further lubrication procedures according to the lubrication schedule (coupling, bearings, etc.)

DANGER

Machine may be damaged if the wrong oil grades are used.
Only use oil with the properties listed in the lubrication schedules!

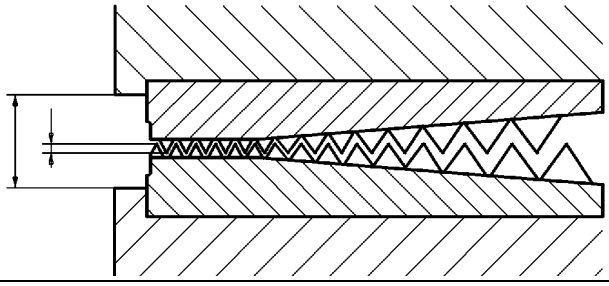
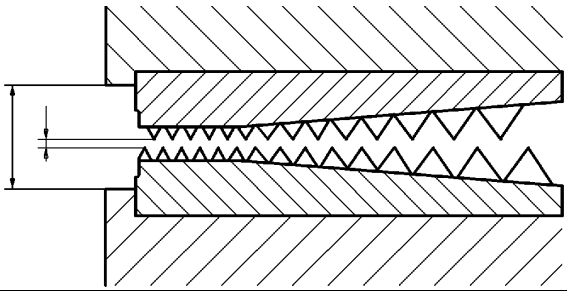
Cold test

The cold test is to be carried out together with the customer's authorized representative.

The steps listed in the table must be carried out for the cold test and also documented:

Components	Activity
Connectors	Visual check
Hydraulic equipment for gap adjustment and lubrication	• Oil filling for hydraulic unit. • Start-up of the hydraulic unit. • Function test and direction of rotation check at oil pumps • Check the current consumption of the pump drive. • Check oil temperature monitoring setting (70°C maximum). • Set cooling water thermostat valve to 50°C oil temperature. • Set flow control valves for speed of gap adjustment according to hydraulics diagram. • Rinse and ventilate the hydraulic pipes
Pipework for cooling and sealing water	Close and flush out with water.

Tab. 5-2 Cold test

Components	Activity
Fluffer discs	Set fluffer discs hydraulically to minimum spacing. Turn the rotor manually through 360° and check whether the fluffer discs are touching. 
Limit switches	Set the switch points Set the fluffer discs hydraulically to a gap of 8–10 mm and the limit switch position to "SLOW". Set the fluffer discs hydraulically to a gap of 18-22 mm and the limit switch position to "OPEN". 
Seal	Check sealing water pressure and flow for shaft seal.
Drive	• Function test and direction of rotation check • Check interlock.

Tab. 5-2 Cold test

Final inspection

The customer and the erection work supervisor shall conduct a final inspection of the installation upon completion of the cold tests.

Certificates

The following certificates are to be issued after completion of the cold test

- Cold test certificate
- Certificate of completion of erection work

5.7 Disassembly and disposal

DANGER

The machine must be disconnected from the power source and secured to prevent switching on again before disassembly!

The machine may only be disassembled by qualified and authorized personnel.

If the machine/plant is to be shut down, the following must be taken into account for subsequent disposal:

Machine parts

- The machine components must be disassembled according to the various materials, lubricant fillings and various forms of contamination.
- The materials must be disposed of in accordance with the applicable legislation on waste disposal.
- Proof must be brought of the properties and the disposal route of the various materials according to the applicable regulations on proof of recovery and disposal (e.g. statement and entry in register).
- Compile the necessary documents before disposal and dispose of the materials according to the regulations, observing the documents.

Plastic parts

WARNING

Synthetic components may be flammable!

Follow the local fire protection regulations. When separating the materials, do not work with welding devices or other equipment that generates sparks.

Additives

- Oil, utilities and cleaning agents must be disposed of according to the local provisions and in compliance with the appropriate manufacturer regulations.

Other material groups to be separated are:

- Surface-treated sheet steel, such as powder-coated or wet-painted doors, covers, etc.
- Surface-coated construction steel, such as rotating parts, gratings, bolts, etc.
- Copper (electrical grade copper or silver-coated electrical grade copper), such as busbars, connecting straps, connections pieces, etc.
- Cables
- Built-in units, electrical components and components generating radiation (radio-active probe), etc.

6 START-UP

6.1 General

This chapter describes the preparations and steps required for initial start-up of the machine.

6.2 Safety regulations

DANGER

Do not disregard the safety regulations.
If safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety instructions

All applicable accident prevention rules must be observed.

Qualification of personnel assigned

Start-up may only be carried out by skilled workers with the appropriate training.

Personal protective apparel

The following protective equipment must be worn when carrying out start-up and erection work: (>>see Chapter 2.9.)

6.3 Prerequisites for start-up

The following must be checked before start-up:

- Before start-up, ensure that all the necessary measures mentioned in the engineering documents supplied with the equipment have been duly implemented.
- Erection work completed.
- Cold test completed. (>> Chapter 5.6.)
- Installation site has been cleared and cleaned.
- Electricity, water and pulp are available.
- Supply of sealing water to shaft seal has been checked.
- All safety guards mounted.
- First filling of lubricants (gear units, bearings, etc.) provided.
- The sense of rotation of the drives has been checked.
- All electric interlocks and EMERGENCY STOP safety devices are functioning and have been checked.
- All control circuits have been installed and tested.
- Process control system installed and tested
- All pipes upstream and downstream of the Fluffer and the Fluffer itself have been cleaned and flushed out.
- The Fluffer has been emptied after flushing out, cleaned carefully, and then closed again.

DANGER

In order to avoid damage to the machine, the pulp must be free of any heavy matter (wire, screws, and similar).

6.4 Start-up

DANGER

Machine may be damaged if incorrect start-up procedures are used.
All electric interlocks must be functional and checked.

Before start-up, the procedure must be defined together with ANDRITZ AG's start-up engineer.

Machine start-up according to the following documents:

- Block diagram for start-up
- Start-up protocol

During start-up, practical training will also be provided on the machine. Participants must receive instruction on the theory beforehand.

After start-up, the machine will be handed over to the mill operating company in a complete, reliable condition and ready for operation.

6.5 Certificates

The following certificates must be completed and signed after start-up:

- Start-up protocol
- Preliminary acceptance certificate

7 OPERATION

7.1 General

This chapter describes the activities required for starting, operating and stopping the fluffer. Possible malfunctions and troubleshooting methods are also presented.

The fluffer is part of the bleach plant. It must be borne in mind that there are interactions with other machines in the plant.

DANGER

In order to avoid damage to the machine, the pulp must be free of any heavy matter (wire, stones, glass, screws, and the like).

7.2 Safety regulations

DANGER

Do not disregard the safety regulations.
If safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety instructions

All applicable accident prevention rules must be observed.

Operating the HC fluffer is not permitted without all the required safety devices.

Qualification of personnel assigned

The equipment may only be operated by trained and qualified personnel.

Operating personnel must know how to use and where the EMERGENCY STOP BUTTONS and the escape routes are located.

Operating personnel must be instructed in the function and possible failure of machine monitoring equipment, and in carrying out maintenance and inspection work (shift log book, maintenance inspection records).

Personal protective apparel

The following protective equipment must be worn when carrying out maintenance and installation work: (>>see Chapter 2.9.)

7.3 Description of operating elements

Control panel

The following operating elements are located at the HC fluffer control panel:

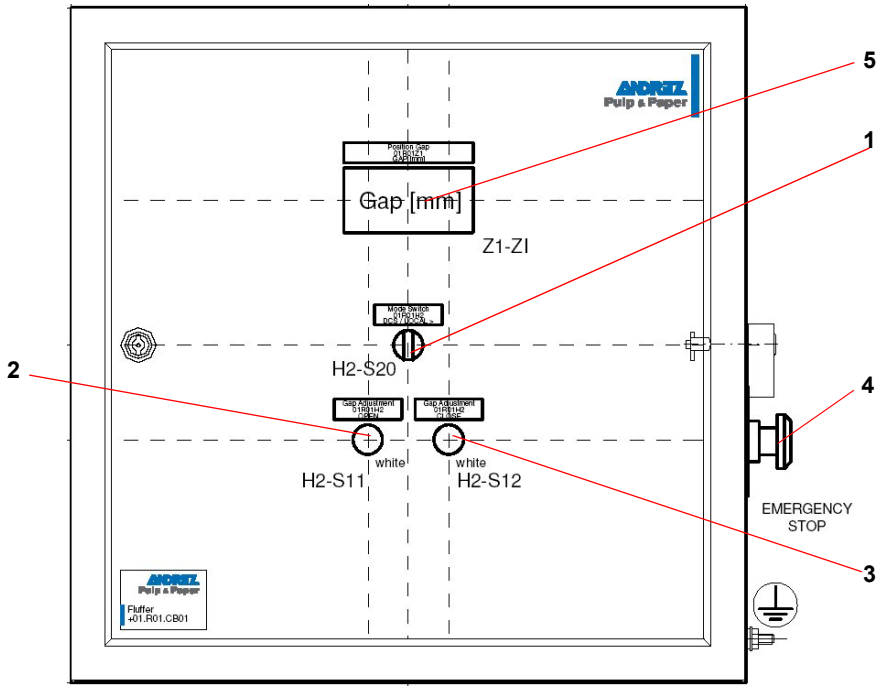


Fig. 7-1 HC Fluffer control panel

Item	Control device
1	Switch for changing to local operation or process control system ("LOCAL/DCS")
2	Button for opening the gap adjustment ("OPEN GAP")
3	Button for closing the gap adjustment ("CLOSE GAP")
4	EMERGENCY STOP switch
5	Gap indicator

Tab. 7-1 Fluffer operating panel

7.4 Control via DCS

The fluffer can be started up entirely from the DCS. The fluffer and all auxiliary units are started and stopped with the group start and stop function.

7.5 Starting

Prerequisites

Before starting the machine, complete the following preparation work:

If the fluffer is blocked, proceed as described under "Re-starting after an EMERGENCY STOP".

Automatic starting

When using the group start, all of the steps required are implemented automatically by the DCS.

Re-start after an EMERGENCY STOP

- Check the fluffer for clogging through the inspection hole in the rotor casing.
- Inspection hole must be closed after the visual check.

All protective covers must be in place.

Manual start-up

Carry out the following steps for manual start-up:

Step	Activity	Operation
1	Switch on subsequent machines.	DCS
2	Switch on oil pump.	DCS
3	Check whether the fluffer discs are in their maximum open position.	DCS or local control panel. At the local operating panel, set the selector switch to "LOCAL" and press the "OPEN GAP" button until the maximum gap is reached. (Abb. 7-1)
4	Switch on main drive.	DCS
5	Set fluffer discs to the required gap.	DCS or local control panel. Continue to press the "CLOSE GAP" button at the local control panel until the desired gap is obtained. Read off the gap at the display.
6	Start up the pulp and sealing water feed.	DCS

Tab. 7-2 Manual start-up

7.6 Normal operation

DANGER

Do not operate without all safety devices in place

During operation, operating personnel must make sure that data are recorded (in the shift log book and data recording sheets), and also carry out the following work:

daily

The following work has to be performed daily in normal operation:

Component	Activity
Sealing water for labyrinth seal	Check flow meter for function and cleanliness.
Hydraulics	Check the pressure reading
	Check the oil level
	Check the oil temperature

Tab. 7-3 daily

In case of a malfunction, proceed as described in 7.9 (Operating faults and troubleshooting).

7.7 Shutdown

Automatic shutdown When using the group stop, all necessary steps are carried out automatically by the DCS.

Manual shutdown Carry out the following steps for manual shutdown:

Step	Activity	Operation
1	Shut down stock feed.	DCS
2	Stop drive when system is free of pulp. Shut off supply of sealing water.	DCS
3	Set fluffer discs to open position.	DCS or local control panel. At the local operating panel, set the selector switch to "LOCAL" and press the "OPEN GAP" button until the maximum gap is reached. (Abb. 7-1)
4	Shut down the oil pump when the rotor has come to a standstill.	DCS

Tab. 7-4 Manual shutdown

7.8 Re-start after an EMERGENCY STOP

Do not switch the machine off if there is still pulp in it, except in emergencies.

Prerequisites for starting

In the event of power failures or emergency shutdown, the machine should not be started up again until the following requirements are met:

- Check the fluffer for clogging through the inspection hole in the rotor casing.

WARNING

Contact with the pulp or breathing in the fumes can result in dangerous situations.
Personal protective apparel must be worn!
Do not assign personnel to work with the fiber stock who are allergic to this substance.

In the event of clogging, proceed as follows:

Step	Activity
1	Shut down all drives at all poles and secure against accidental start.
2	Remove the cover from the inspection hatch and check whether the rotor is at a standstill.
3	Open the fluffer.
4	Clean pulp off the feed screw and fluffer discs.

Tab. 7-5 Activities before re-starting

Starting

The fluffer can be started as described in section 7.5 after being cleaned.

7.9 Operating malfunctions and troubleshooting

Malfunction	Cause	Remedy
Motor protection becomes responsive	Motor is overloaded (stalling), fluffer is blocked	Secure drive from being switched on again, open fluffer and clean. **Cause of plugging:** • Discharge chute is blocked • Production rate too high for the gap setting • Consistency too low
Lubrication monitor responding	Operating pressure too low	Check oil pipes Check pump and electric motor
	Oil filter polluted	Replace filter
	Level in oil tank too low	Top up oil
	Oil temperature too high	Check oil cooler and cooling water supply.
	Oil flow rate too low	Check oil pipes
Signs of bearing damage • Overheating • Noise emissions • Vibration	• No lubrication • Insufficient lubrication	• Measure vibrations • Measure signs of wear • Measure temperature • Check lubricant feed • Analyse lubricant
	Wrong bearing clearance	Check bearing play
	Dirt/foreign matter in bearing	Check lubrication and seal
	Bearing worn or faulty	Change bearing
Oil flow interrupted	Check hose connections	Tighten connection
Oil is dirty	Filter clogged	Replace filter
Poor fluffing	Wrong gap setting Fluffer discs furred	Check and correct Clean the fluffer discs with high-pressure cleaner (steam 120°C)
	Teeth worn by corrosion	Replace the fluffer discs
Rotor adjustment jammed	Guides not lubricated	Re-lubricate

Tab. 7-6 Operating malfunctions and troubleshooting

WARNING

Vibrations beyond the permitted level can cause damage to the machine and to other equipment connected to it.

8 MAINTENANCE

8.1 General

This chapter describes the maintenance and upkeep of the HC fluffer, which are the responsibility of the machine operating company.

All activities mentioned in this chapter must be performed at the correct time.

The ANDRITZ service department is at your disposal for troubleshooting, as well as for extensive maintenance and repair work. (>> .../INTRODUCTION)

Repair work on the plant components may only be carried out at the supplier's works.

Workers trained and authorized by ANDRITZ may carry out repairs on site after obtaining consent from ANDRITZ.

8.2 Safety regulations

DANGER

Do not disregard the safety regulations.
If the safety regulations are disregarded, this may cause a risk to life and limb and damage to the machine or its components.
All safety instructions in this section must be strictly observed!

General safety regulations

All applicable accident prevention rules must be observed.

Sufficient space for maintenance work must be included right away in the arrangement drawing.

Maintenance and service work is not permitted while the machine is in operation.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads to prevent them from falling.

Do not step or walk below suspended loads! Standing below suspended loads is dangerous and thus, strictly forbidden!

Use only original spare parts.

The machine must be thoroughly cleaned before carrying out any maintenance work.

Maintenance switches must be secured before beginning maintenance work to prevent drives being switched on accidentally by unauthorized persons.

Depressurize the systems before starting maintenance work on hydraulics.

Opening the fluffer

Before opening the fluffer: Remove the cover from the inspection hatch and check whether the rotor is at a standstill.

Safety devices

After completion of maintenance work, all required safety devices must be mounted again.

Power supply

Before beginning any maintenance or repair work, the operating company must disconnect the energy supply to all drives securely. This can be achieved with a maintenance switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations.

Lighting

The operating company shall ensure that adequate lighting is provided (with extra-low voltage bulbs) during service and repair work.

Qualification of personnel assigned

Maintenance and upkeep must be carried out by specially trained, skilled personnel only.

All work on the electrical equipment, without exception, must be carried out by skilled electricians.

Personal protective apparel

The following protective equipment must be worn when carrying out maintenance and installation work: (>>see Chapter 2.9.)

Welding work

In general, welding work is only permitted after consulting ANDRITZ.

When performing welding work, always observe the relevant safety rules and the appropriate safety regulations for work performed in enclosed and confined spaces.

DANGER

HOT WORK PERMIT REQUIRED!
Danger of fire and explosions!
There is a considerable risk of fire or explosion during welding work. Always take the appropriate fire precautions before beginning work, e.g. keep fire extinguishers at the ready.

All motors should be disconnected before carrying out electric welding work.

Gases, steam or smoke

Before beginning any service work, ensure that no gas, vapor or smoke can enter the working area from feed pipes, discharge pipes or shafts.

If it is not possible to reliably exclude the risk of gas, steam or smoke flowing in, all persons working in the danger zone must be equipped with a safety harness and a safety rope. Each worker must be monitored by a second person outside the danger zone. It must always be possible to evacuate a worker from the danger zone without delay.

8.3 Regular maintenance

Regular maintenance is subject to the maintenance schedule in Chapter 8.5.

When the machine is shut down, the inspections specified in Section 8.5 of the maintenance schedule should be performed.

In the course of general machine checks, all additional units should also be checked to guarantee that the entire plant functions satisfactorily. For these checks, the attached maintenance and upkeep instructions provided by the manufacturer must be observed.

.../SUPPLIER DOCUMENTATION

Malfunctions and inadmissible changes found during these checks must be rectified immediately.

8.4 Cleaning

DANGER

Risk of scalding when opening the machine.

WARNING

Contact with the pulp or breathing in the fumes can result in dangerous situations.
Personal protective apparel must be worn!
Do not assign personnel to work with the pulp who are allergic to this substance.

The machine should be thoroughly cleaned when shut down.

In particular, the following cleaning work must be performed:

- Remove residual pulp from the fluffer discs.

DANGER

Do not use caustic substances for cleaning purposes!
Make sure no water, steam or other cleaning medium enters electrical plant components.

8.5 Maintenance schedule

The maintenance work for normal operations must also be performed alongside the tasks described below.

>> .../OPERATION

Weekly

The following maintenance work is to be carried out at weekly intervals.

Component	Activity
Hydraulics	• Check oil level. • Check oil temperature and for leaks
Labyrinth seal	• Check leaking water rate.

Tab. 8-1 Weekly

Monthly

The following maintenance work is to be carried out at monthly intervals.

Component	Activity
Bearings	• Check temperature and for noises.
Slide bearing	• Re-lubricate according to lubrication schedule.

Tab. 8-2 Monthly

Six-monthly

The following maintenance work is to be carried out at 6-monthly intervals.

Component	Activity
Fluffer discs	• Check for wear and tear.
Screw connections at the fluffer discs	• Check tightening torques
Hydraulic gap adjustment	• Check for function and leaks.
Discharge chute	• Clean
Fluffer discs and housing area behind rotor	• Clean
Bearings	• Analyse oil • Measure vibrations.

Tab. 8-3 Six-monthly

Annually

The following maintenance work is to be carried out at annual intervals.

Component	Activity
Screws/bolts	• Check that screws/bolts are firm and tighten if necessary.
EMERGENCY STOP switch	• Check function.
Grounding	• Check
Foundation bolt connection	• Check

Tab. 8-4 Annually

every 2 years

The following maintenance work must be carried out every 2 years.

Component	Activity
Rotor	• Dismount fluffer discs and conduct a visual check for cracks in the transition area between rotor and hub.

Tab. 8-5 every 2 years

every 5 years

The following maintenance work must be carried out every 5 years.

Component	Activity
Rotor	• Dismount the fluffer discs and carry out a liquid penetration test in the transition area between rotor and hub according to DIN EN 10228-2.

Tab. 8-6 every 5 years

Screw connections at the fluffer discs

Checking the tightening torques

The tightening torques of the fluffer disc screws must be checked after one week in operation each time the fluffer discs are changed.

8.6 Fasteners

Fastener material

Bolts and screws are manufactured in several classes of material. The heads of these screws and bolts are marked to show the strength class. Damaged or lost fasteners should only be replaced with fasteners of the same material.

DANGER

The installation data apply to standard screwed/bolted connections at the machine and should only be used if no special installation data are stated in the assembly drawings!

The information in the following table applies to commercially available hexagon head and cheese head screws with metric ISO thread.

SET SCREWS

	Pre-stressing forces for erection work (kN)						μ	Tightening torques (Nm)					
	5.6	8.8	A4-50	A4-70	A4-80	C3-80		5.6	8.8	A4-50	A4-70	A4-80	C3-80
M8	7	15	5	11	14	15	0.1	8	17	6	12	16	17
							0.125	10	21	7	15	19	21
							0.14	11	23	7	16	21	23
M10	11	24	8	17	23	24	0.1	16	34	11	24	32	34
							0.125	19	41	13	29	38	41
							0.14	21	45	15	32	42	45
M12	16	35	12	25	33	35	0.1	27	58	19	41	54	58
							0.125	33	70	23	49	66	70
							0.14	36	77	25	54	72	77
M16	31	65	21	46	61	65	0.1	66	140	46	99	132	140
							0.125	80	170	56	120	160	170
							0.14	88	188	62	133	177	188
M20	48	102	33	72	95	102	0.1	129	275	90	193	258	275
							0.125	156	334	110	235	313	334
							0.14	173	369	121	259	346	369
M24	69	147	48	103	137	147	0.1	222	474	156	333	444	474
							0.125	269	575	189	404	539	575
							0.14	298	635	209	447	596	635
M30	109	233	77	109	219	233	0.1	443	945	310	443	-	945
							0.125	538	1149	377	538	-	1149
							0.14	596	1271	417	596	-	1271
M36	159	340	111	159	319	340	0.1	767	1637	537	767	-	1637
							0.125	934	1992	654	934	-	1992
							0.14	1034	2205	724	1034	-	2205
M42	219	466	153	328	437	466	0.1	1223	2609	-	-	-	2609
							0.125	1490	3178	-	-	-	3178
							0.14	1650	3520	-	-	-	3520
M48	287	612	201	431	574	612	0.1	1841	3928	-	-	-	3928
							0.125	2245	4789	-	-	-	4789
							0.14	2487	5305	-	-	-	5305

Tab. 8-7 Installation data for set screws

Coefficients of friction and lubrication

The coefficient of friction depending on the lubrication can be found in the following table:

μ	Lubrication	
	5.6 / 8.8 / C3-80	**A4-50 / A4-70 / A4-80**
0.1	MoS2	Chlorinated paraffin or MoS2
0.125	dry or oiled	
0.14		Anti-seize compounds

Tab. 8-8 Recommended lubrication and friction coefficients

If the special lubricants mentioned here are not used, please follow the respective manufacturer's instructions.

The manufacturer's instructions should be observed for sub-supplies pertaining to the machine.

DANGER

Incorrect torque tightening may cause machine damage and hazards leading to personal injury.
Please apply the tightening torques as shown in the drawings and table (Tab. 8-7)!

8.7 Spare Parts

A list of the spare parts required can be found in the parts book.

>> .../PARTS BOOK

Details on spare parts from sub-suppliers are also included in specifications from component suppliers.

>> .../SUPPLIER DOCUMENTATION

8.8 Lubrication

DANGER

The fluffer is supplied ex works without oil filling.
The tank must be filled with oil before starting up the fluffer.
The correct oil level can be read off at the oil level window.

Circulation system lubrication

The rotor bearing is greased automatically by a circulating lubrication system (Fig. 8-1 and Fig. 8-2). The oil pressure and oil flow are monitored automatically.

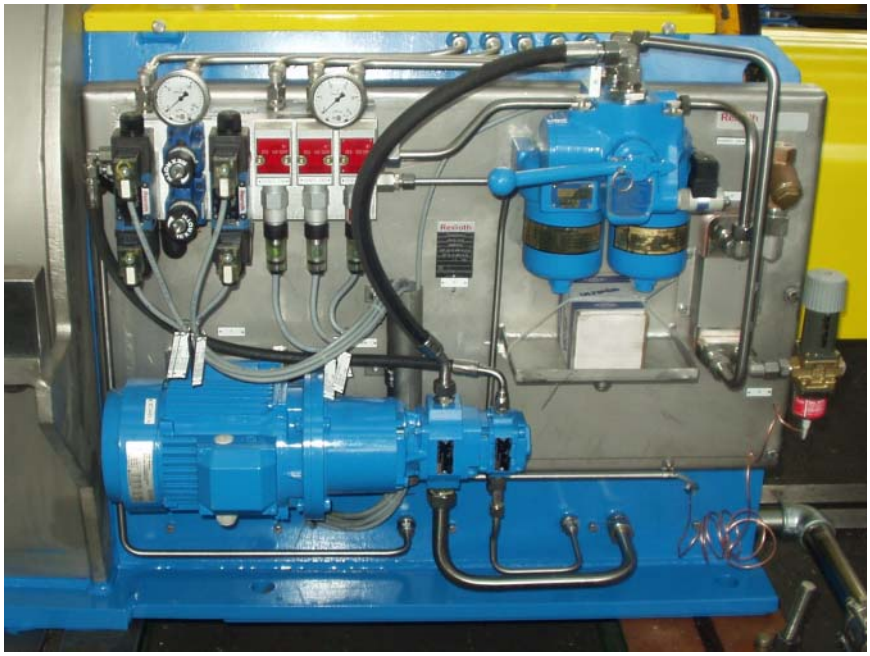


Fig. 8-1 Hydraulic unit at HC fluffer

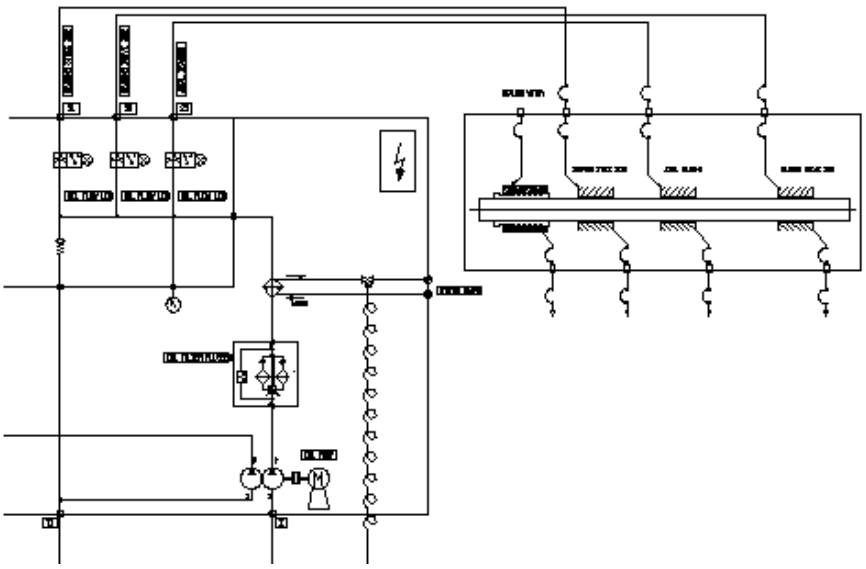


Fig. 8-2 Hydraulic diagram - lubrication system (symbolic illustration)

8.9 Lubrication schedule

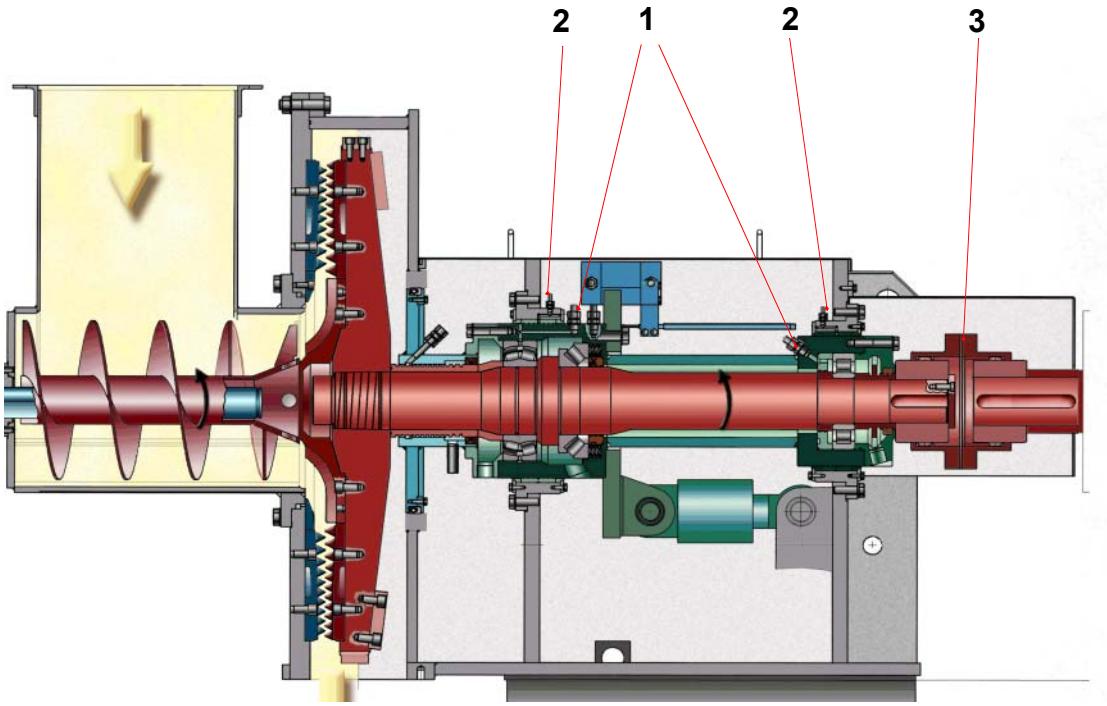


Fig. 8-3 Fluffer HCM2HH

		Lubricating point			Quantity		Intervals / Operating hours	
Item	**Structural component**	**No.**	**Designation**	**Recommended lubricant**	**First filling**	**Refill**	**Refill**	**Oil and/or grease change**
1	Bearing	1	Rotor bearing	ISO VG46	approx. 40 l	Oil level indicator	at each check	Six-monthly
2	Rotor unit	2	Plain bearing bush	Mobilux EP2	30 g	5 g	800 h	
3	Drive	1	Curved teeth coupling HAC-35	Mobiltemp SHC460 special	0.64 kg		3000 h	

Tab. 8-9 Lubrication schedule

Details on lubrication are also included in the descriptions from component suppliers.

>> .../SUPPLIER DOCUMENTATION

Please also observe maintenance instructions on the maintenance signs and nameplates attached to machine/components.

DANGER

Incorrect disposal of waste oil creates an environmental risk!

Do not add foreign matter such as solvents, brake fluid or cooling liquid.

Collect leaking oil and dispose of properly without causing environmental pollution.

Oil containing plant-based raw materials should always be collected and disposed of separately.

8.10 Changing the fluffer discs

Marking

The fluffer discs on the stator are marked with an "S".

The fluffer discs on the rotor are marked with an "R".

DANGER!

Limbs can be trapped or crushed during maintenance work.
Wear your personal protective apparel!

Changing procedure

Change the fluffer discs according to the following table:
(The item numbers in Tab. 8-10 refer to Fig. 8-4).

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Remove the cover from the inspection hatch and check whether the rotor is at a standstill.
3	Dismantle the stock feed.
4	Remove the screws (**1**) from the housing cover.
5	Move housing cover out of position.
6	Remove the fastening screws (**3**) from the fluffer discs.
7	Remove the fluffer discs (**4**).
8	Clean supporting surface.
9	Install balanced fluffer discs on the rotor according to the numbering and pre-stress the screws (**3**) slightly.
10	Install balanced fluffer discs in the housing cover and pre-stress screws (**3**) slightly.
11	Position the fluffer discs such that the hubs on the outer diameter of the discs are resting on the bevel of the stator and rotor. The gap between the individual discs should be as uniform as possible.
12	Tighten the screws (**3**) according to Section 8.6.

Tab. 8-10 Changing the fluffer discs

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DANGER

Incorrect torque tightening may cause machine damage and hazards leading to personal injury.
The tightening torques on the drawings and/or table (Tab. 8-7) must be observed.

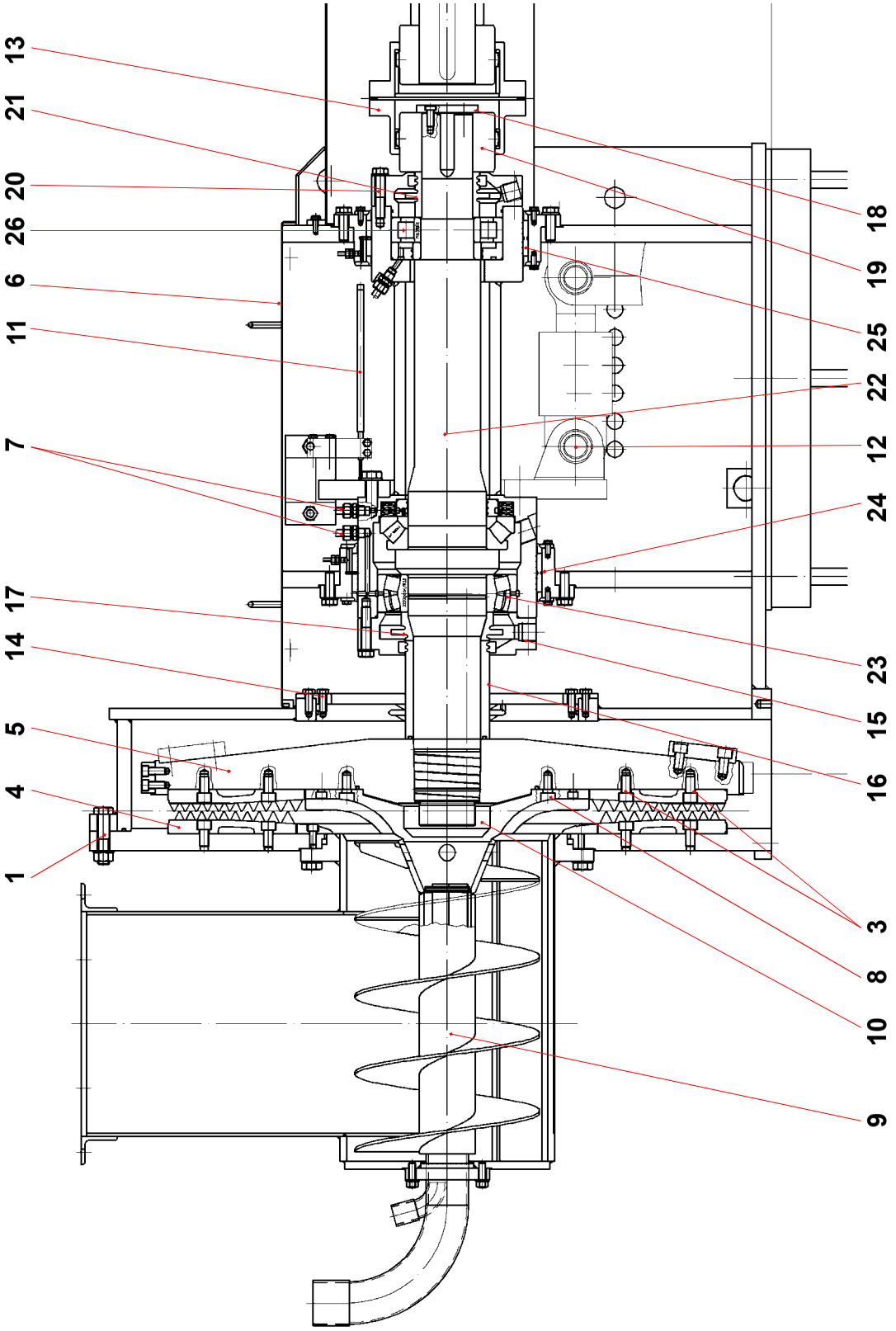

Fig. 8-4 HC fluffer

8.11 Changing the feed screw

DANGER!

Limbs can be trapped or crushed during maintenance work.
Wear your personal protective apparel!

Removing the feed screw

Remove the feed screw according to the following table:
(The item numbers in Tab. 8-12 refer to Fig. 8-4).

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Remove the cover from the inspection hatch and check whether the rotor is at a standstill.
3	Move housing cover out of position as described in Tab. 8-10 (Steps 1-6)
4	Remove the fastening screws (**8**) from the feed screw.
5	Detach feed screw (**9**) from rotor and lift out of the machine.

Tab. 8-11 Removing the feed screw

Installing the feed screw

The feed screw is installed in reverse order to Tab. 8-11.

8.12 Changing the rotor bearing

DANGER!

Limbs can be trapped or crushed during maintenance work.
Wear your personal protective apparel!

Removing the bearing

Change the rotor bearings according to the following table:
(The item numbers in Tab. 8-12 refer to Fig. 8-4).

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Remove the cover from the inspection hatch and check whether the rotor is at a standstill.
3	Move housing cover out of position as described in Tab. 8-10 (Steps 1-6)
4	Remove housing cover (**6**).
5	Loosen the fastening screws (**7**) at the oil supply and oil return pipe.
6	Remove the fastening screws (**8**) from the feed screw.
7	Detach feed screw (**9**) from rotor.
8	Remove one fluffer disc (**4**) from the rotor.
9	Screw retaining strap provided into the vacant space where the fluffer disc (**4**) has been removed.
10	Remove displacement transducer (**11**).
11	Loosen the connection (**12**) to the hydraulic cylinder.
12	Separate the flanges (**13**) from the curved teeth coupling.
13	Remove shell halves (**14**) for housing sealing washer.
14	Pull out entire rotor horizontally.
15	Unscrew nut (**10**) and set 2 mm clearance to the supporting surface.
16	Detach rotor (**5**) from the shaft with a hydraulic press (pressure: approx. 1500 bar) at the pressure connections "K" (Fig. 8-7).
17	Take nut (**10**) and rotor off the shaft.
18	Remove cover (**15**).
19	Pull off the sealing sleeve (**16**) and splash ring (**17**).
20	Remove cover (**18**) at curved teeth coupling and pull off coupling hub (**19**).
21	Pull off rear cover (**20**) and remove spacer ring (**21**).

Tab. 8-12 Dismantling the rotor bearing

Step	Procedure
22	Pull out rotor shaft (**22**) and dismantle bearing (**23**, **24**, **25** and **26**) according to the manufacturer's instructions .

Tab. 8-12 Dismantling the rotor bearing

Assembly

Assemble the rotor bearings according to the following table:
(The item numbers in Tab. 8-13 refer to Fig. 8-4).

Setting the axial play:

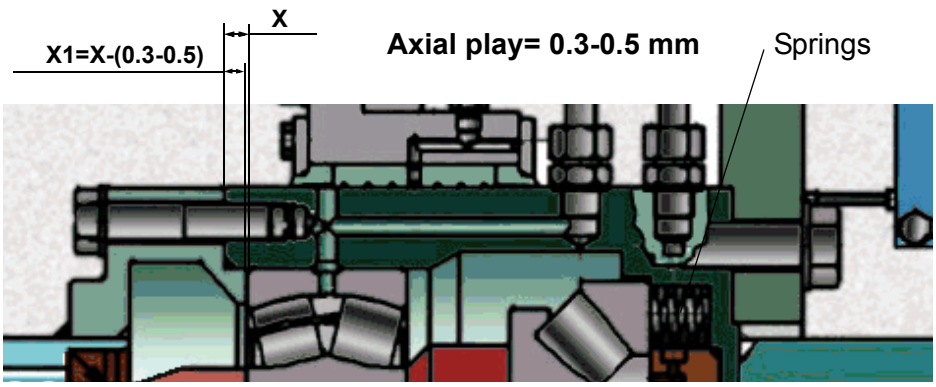

Fig. 8-5 Setting the axial play

Step	Procedure
1	Assemble the bearing first of all **without** springs.
2	Measure dimension "**X**" between the bearing ring and the bearing cover.
3	Then measure dimension "**X1**" at the bearing cover.
4	Dimension "**X1**" must be in the range of "**X1=X-(0.3-0.5 mm)**".
5	If the axial play is outside a range of **0.3-0.5 mm**, the bearing cover should be turned to size accordingly.
6	If the axial play in correct, remove the bearing, insert the springs and mount the bearing once again.
7	Reinstall in reverse order to Tab. 8-12
8	Check guide bushings on rotor (**24**) and motor sides (**25**), and replace if necessary.
9	• Caution: When the rotor has been mounted several times, the "Y-L" measurement may be reduced to a value which is too small. In such case, turn the sealing sleeve further until the "Y-L" measurement matches the theoretical value again according to (Tab. 8-14). • Push-on distance (Y-L): see Tab. 8-14 and Fig. 8-6.

Tab. 8-13 Assembly

DANGER

Incorrect torque tightening may cause machine damage and hazards leading to personal injury.
The tightening torques on the drawings and/or table (Tab. 8-7) must be observed.

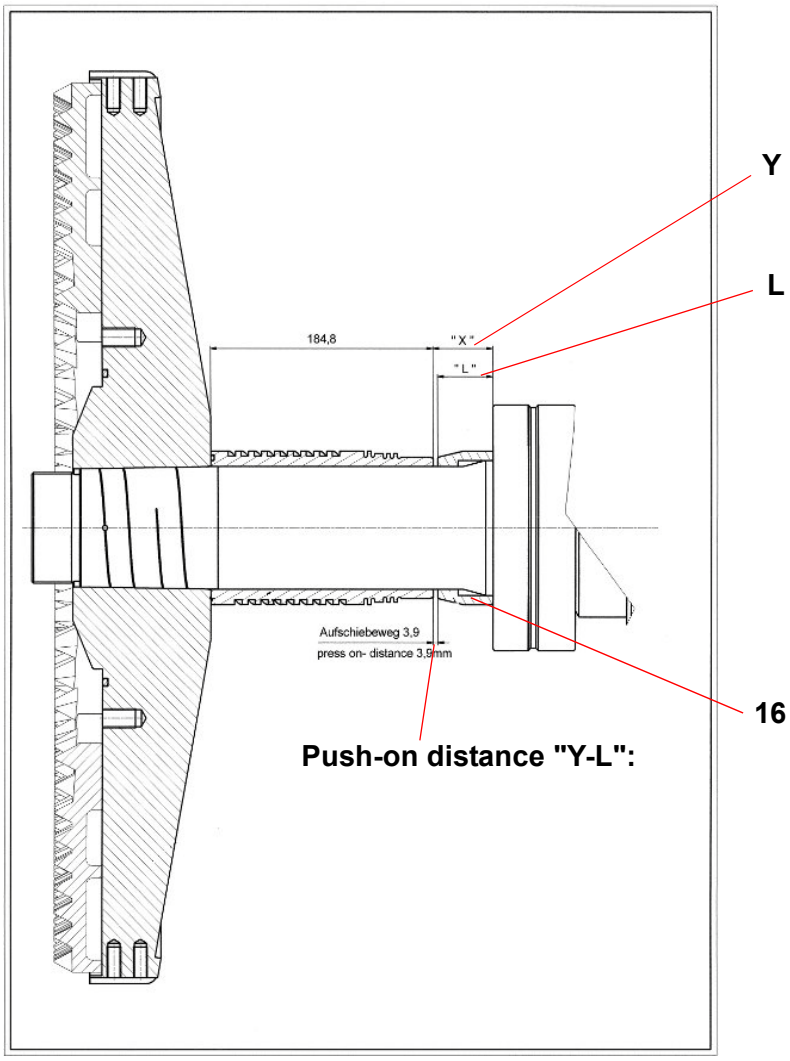

Fig. 8-6 Sliding the rotor on

Push-on distance "Y-L":

Push-on distance	"Y-L"
Theoretical push-on distance	3.9 mm 0/-0.1
Minimum push-on distance	3.0 mm
Maximum push-on distance	4.0 mm

Tab. 8-14 Push-on distance

8.13 Sliding the rotor on

DANGER!

Limbs can be trapped or crushed during maintenance work.
Wear your personal protective apparel!

Slide rotor on

Proceed according to the following table when sliding the rotor on:
(The item numbers in Tab. 8-15 refer to Fig. 8-4).

Step	Procedure
1	Push rotor on until a tight fit is obtained
2	Measure the length marked "Y" (Fig. 8-6)
3	Remove rotor and machine the bush (**16**) to a length of (y-3.9)mm. • Caution: When the rotor has been mounted several times, the "Y-L" measurement may be reduced to a value which is too small. In such case, turn the sealing sleeve further until the "Y-L" measurement matches the theoretical value again according to (Tab. 8-14). • Push-on distance (Y-L): see Tab. 8-14 and Fig. 8-6.
4	Install sealing sleeve and push rotor on.
5	Mount hydraulic nut(s) and pressure hoses. **CAUTION:** Use connections marked "K". (see Fig. 8-7)
6	Apply 800 bar pressure to hydraulic nut.
7	Apply 800 bar pressure to "K" connections.
8	Push rotor on as far as limit stop.

Tab. 8-15 Slide rotor on

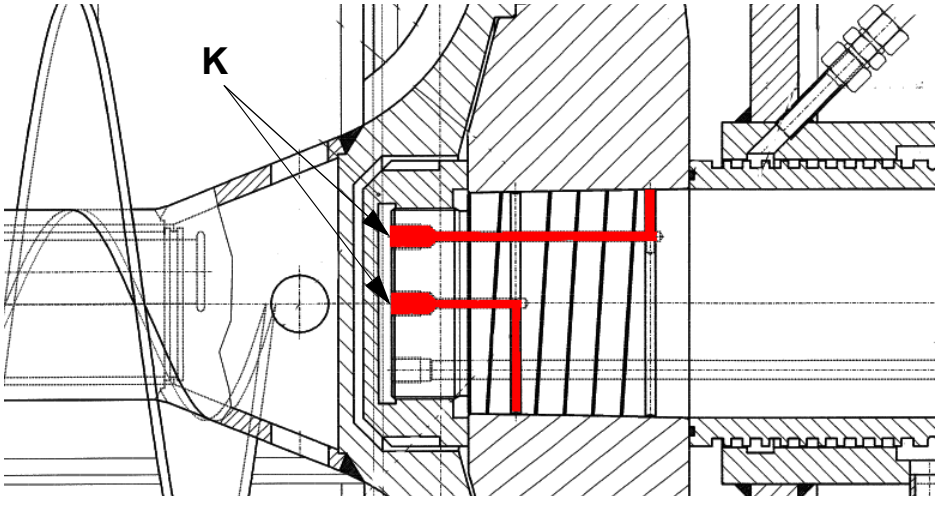

Fig. 8-7 Slide rotor on - pressure connections

9 SUB-SUPPLIER DOCUMENTATION

9.1 Hydraulic gap adjustment

9.1.1 Hydraulic cylinder

Name of company GEGNER

Technical data

Type . . . . . HS 7877
Piston diameter . . . . . 63 mm
Rod diameter . . . . . 45 mm
Stroke . . . . . 25 mm
Operating pressure . . . . . 200 bar

9.1.2 Proximity switch

Name of company IFM

Technical data

Type . . . . . IG 0006 / IG 2008-ABOA

9.1.3 Displacement transducer

Name of company TWK

Technical data

Type . . . . . IW 253

9.2 Drive

9.2.1 Coupling

Name of company JAURE

Technical data

Typ HAC-35

9.3 Hydraulic panel

9.3.1 Hydraulic panel

Name of company REXROTH

Technical data

Pump capacity Q1 . . . . . 4,8 l/min
Operating pressureP1 . . . . . 10 bar
Pump capacity Q2 . . . . . 3,1 l/min
Operating pressure P2 . . . . . 80 bar
Motor power. . . . . .2.0 kW
Motor speed. . . . . .1750 rpm

9.3.2 Nivotemp

Name of company BÜHLER

Technical data

Type. 61-0-M3-TW

9.3.3 Filter element

Name of company HYDAC

Technical data

Type. 0110

9.3.4 Dirt trap

Name of company STASTO

Technical data

Type. . . . . 1121-3/4"

9.4 Control devices

9.4.1 Flow meter

Name of company KYTOLA

Technical data Type SLM3-G-ILK-M18

9.4.2 Vibration guard

Name of company PCH

Technical data Type . . . . . PCH 1270