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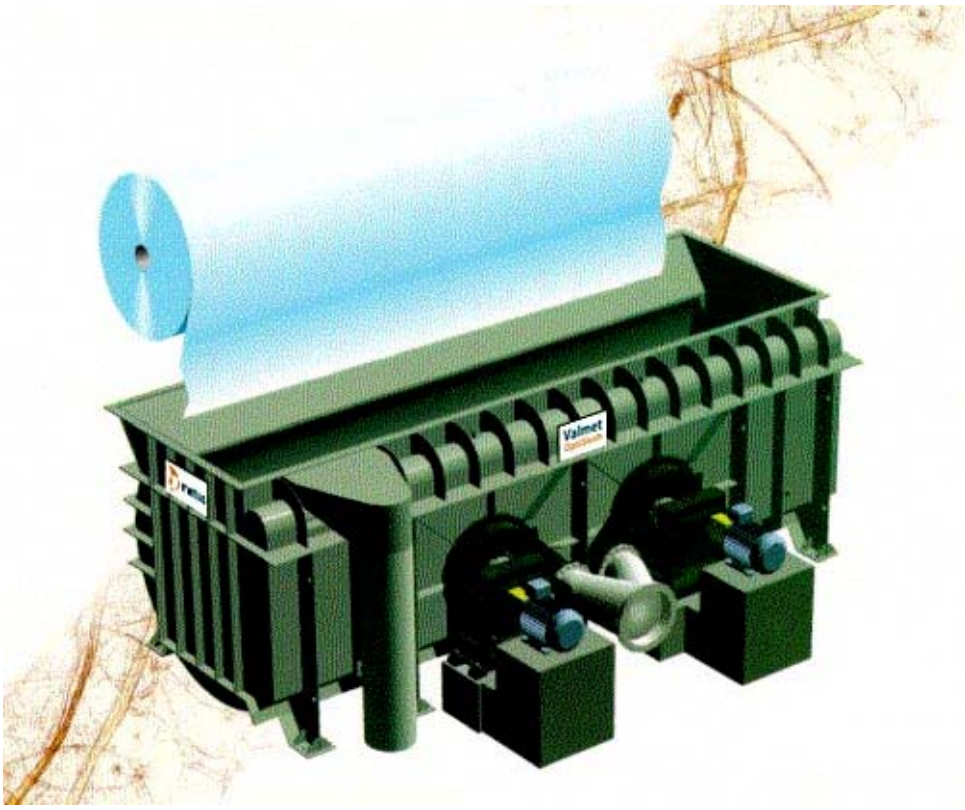
Pulper Book



Appleton Papers Inc.
West Carrollton, OH, USA
OptiSlush HP-33B1

STOA102392COV.EN

metso paper

Stock Preparation and Recycled Fiber

Appleton Papers Inc.

Pulper

Machine Manual 2008

STOA102392EN

Compiled by: J.Tepponen
2008-01-24

Checked by

1 SAFETY INSTRUCTIONS

1 SAFETY

These operation and service instructions include warnings. Based on the severity of the accident or damage that could be caused by the hazard, the warnings are divided into two categories:

Indicates a hazard that could cause an accident or death.

Indicates that the product, process, or the environment could be damaged as a result of the accident in question.

1.1 Ensuring Safety

These operation and service instructions must be kept for the entire service life of the equipment. If the equipment is moved to another location or sold, the person responsible for operating and servicing it must ensure that the instructions are kept with the equipment.

The following is a presentation of safety instructions designed to ensure the safety of personnel who operate, monitor, and service the machinery, as well as all others in its immediate vicinity.

In the interest of safety, Metso Paper, as the manufacturer of the equipment, requires that:

- the owner of the equipment make the safety instructions available to all personnel responsible for operating, monitoring, and servicing the equipment, and ensure that personnel follow these instructions
- the personnel operating, servicing, and monitoring the equipment have been trained and have acquainted themselves carefully with the safety instructions before beginning work
- the operating, servicing, and monitoring personnel possess the appropriate basic qualifications and expertise required for their work

- the operating, servicing, and monitoring personnel comply with these instructions, current applicable legislation in effect where the equipment is located, and general occupational safety regulations

1.2 Safety during Installation

All installation work must be carried out in accordance with general occupational safety regulations, and specific requirements of plant conditions must be taken into account.

Lifting and transferring parts of the equipment must be performed in accordance with general occupational safety regulations, and no parts of the unit may be allowed to fall.

When installing a chute section, be careful with the component's sharp edges.

1.3 Safety during Operation

The pulper hatch is operated by remote control – be careful of its automatic closure and opening functions.

When feeding the paper web into the pulper, be careful of the drop openings on the floor.

When working from a sampling or other hatch, be careful not to open the shower unintentionally.

When operating the equipment, beware its standing braces and other projections.

Due to noise generated by the gear, hearing protectors must be used during operation.

Check regularly (at least once a year) the following fastening and joint points:

- the fastening of the rotor unit to the foundation
- the overflow connection in order to detect any blockage
- the tightness of the gear fastening in order to avoid oil leaks and other damage
- the fastening and tightness of the seal water connections

Periodically check the tightness of the V-belts and fastening of the belt pulley in accordance with the separate instructions, to prevent the pulley from becoming detached due to slipping of the belts.

Dust and other dirt accumulating on the surfaces of the pulper should be washed off periodically.

1.3.1 Procedures for Emergency Draining

In an emergency, the pulper must be drained as follows:

1. Stop and lock the motor(s) and the conveyor (if applicable) and turn off the shower pipes.
2. Start the pulper's exhaust pump.
3. Start ventilation.
4. Open the manhole as soon as the stock level allows this.
5. Enter the pulper and administer first aid to the victim. Remember the protective equipment when entering the pulper.

1.4 Safety during Service

Service work must be carried out in accordance with general occupational safety regulations, and specific requirements of plant conditions must be taken into account.

Lifting and transferring parts of the equipment must be performed in accordance with general occupational safety regulations, and no parts of the unit may be allowed to fall.

Do the following before you begin service:

- Before starting any service, make sure that the hot parts of the equipment have cooled off.
- Before opening a seal water pipe or pneumatic lubrication unit, ensure that the system is depressurized and empty.

- The pulper must be fitted with a separate railed scaffold to prevent slipping off the chutes.
- If the pulper cover hatch has been removed and taken for repair, the pulper opening must be covered with netting or a similar covering, to prevent falling in.

- The equipment's pneumatic system must be locked in case of pneumatic cylinder or pipe fractures.
- Before cleaning the ventilation duct, ensure that the cleaning shower hand valve is closed and locked.

If the service requires entry into the pulper, in the interest of safety ensure that:

- the person responsible for operating the equipment has been notified of the start of service and of its estimated duration.
- signs warning of the service have been placed in appropriate places

- all of the pulper's feed conveyors have been locked to prevent start-up
- the safety switch of the rotor's drive motor has been locked in STOP position and the motor locked to prevent start-up
- cover openings have been blocked so that objects cannot fall into the pulper during maintenance

- the pulper hatch has been locked to prevent opening and closing
- the hand valves on the showers and connections are shut and locked to prevent unexpected opening

For the safety of personnel descending into the pulper, ensure that:

- harmful chemicals and bacteria have been rinsed from the pulper and there is a steady flow of fresh air into the pulper

- service personnel use proper protective equipment (e.g., safety rope) and they have a contact person outside the pulper for the entire duration of the service

- service personnel use personal protective equipment in order to prevent, for example, slipping in the pulper vat

- electric tools used during service have been inspected for defects before entering the vat or tank

Once service is complete, ensure that all of the equipment's protective covers are in the correct places.

Remove warning signs regarding service.

Let the person responsible for operating the equipment know that service is finished.

1.00 PRESS PULPER

Q'ty		
1	**OptiSlush Pulper**	**HP-33B1**
	Technical data	
	Rotor diameter	33 in
	- Screen plate with holes	360° / Ø 0.59 in
	Vat volume, net/gross	614/ 812 ft³
	- Length / width / height (inside dimensions in mm)	178 / 91 / 103
	Materials	
	Stock contacted parts, sheet metal	EN1.4404 (AISI316L)
	Supports and stiffeners for rotor unit	mild steel
	Supports and stiffeners for chutes and shower pipes	EN1.4301 (AISI304)
	Supports and stiffeners for vat	EN1.4301 (AISI304)
	Delivery includes	
	Vat with	
	- Over flow, drain and level transmitter connections	
	- Manhole	
	- Foundation bolts	
	- Delivered in	2 sections
	Rotor unit with	1 ea
	- Rotor and screen plate	
	- Extraction box with discharge connection	
	- V-belt drive with guard	
	- Bearing unit	
	- Mechanical sealing	Provided by customer
	- Seal water flow monitoring unit with alarm	Safematic
	- Bearing vibration control nipples	SPM
	Chutes and exhaust plenum, total area	602 ft^2
	Shower pipes for sheet break	2 ea / 6 in
	Shower pipe for exhaust plenum cleaning	1 ea / 4 in
	Side flange opening to allow for removal of rotor	
	Delivery excludes	
	Motor with fastening elements	150 HP / 1200 rpm
	Mechanical Seal	

3 DESIGN AND OPERATING PRINCIPLE

1 CONSTRUCTION AND OPERATION

The **OptiSlush** product family covers all pulping applications in the areas of recycled fibers and pulp handling in various stages of the process and at different consistencies.

Based on the intended application and position, OptiSlush equipment has been divided into the following product groups:

Product name	**Typical consistencies**
Pulpers:	
OptiSlush HP	3.5–4.5%
OptiSlush VM	4–8%
OptiSlush VH	8–15%
OptiSlush VC	4–5.5%
OptiSlush A	2–4%
Drum screens:	
OptiSlush DS	< 2

1.1 Intended Use and Operation of OptiSlush HP Horizontal Pulper

OptiSlush HP pulpers are used mainly as a broke pulper for a paper machine or under the finishing machines.

Typical applications include:

- press pulper
- calender pulper
- on-machine coater pulper
- reel pulper
- winder pulper
- guillotine pulper

The purpose of pulping is to disintegrate the paper into a form ready for pumping and deflake the paper as well as possible. However, the degree of de-flaking depends on the paper grade and the pulping. In addition, using a deflaker is recommended with paper grades that are hard to disintegrate.

The paper is mixed with water so that the bonds between the fibers can be more easily dissolved. When the fibers get wet, they become weak at the same time and regain their original characteristics.

Due to the mixing and mechanical kneading, the fibers are separated. Separation is induced by vigorously mixing the water/fiber suspension with the rotor. The rotor's rotation induces speed differences in the flow between the stock layers, which further cause the turbulent flows necessary for de-flaking.

The rotor also has a mechanical de-flaking effect. The rotor blades hit the bits of paper that have not been deflaked yet, and they knead the stock in the zone between the rotor's lower surface and the screen plate. In mechanical de-flaking, the slotted plate in particular has an important influence.

Mechanical forces are important at the beginning of pulping when stock is fed into the pulper. At first, the rotor tears the paper into small bits, after which hydraulic forces finish the de-flaking of the stock.

1.2 OptiSlush HP Pulper Type Codes

Example of a type code: OptiSlush HP-33G2

Key to the code:

HP = **H**orizontal **P**ulper

33 = rotor diameter in inches

G = **G**ear Drive / B = **B**elt Drive

2 = number of rotors

Type markings:

OptiSlush HP-24B1	OptiSlush HP-42B2
OptiSlush HP-24B2	OptiSlush HP-42G1
OptiSlush HP-24G1	OptiSlush HP-42G2
OptiSlush HP-24G2	OptiSlush HP-50B1
OptiSlush HP-33B1	OptiSlush HP-50B2
OptiSlush HP-33B2	OptiSlush HP-50G1
OptiSlush HP-33G1	OptiSlush HP-50G2
OptiSlush HP-33G2	OptiSlush HP 63G1
OptiSlush HP-42B1	OptiSlush HP-63G2

1.3 Construction and Materials

The main components of the OptiSlush HP pulper are:

- vat
- rotor unit(s)
- drive equipment

Essential construction components also include:

- chutes
- shower pipes
- cover

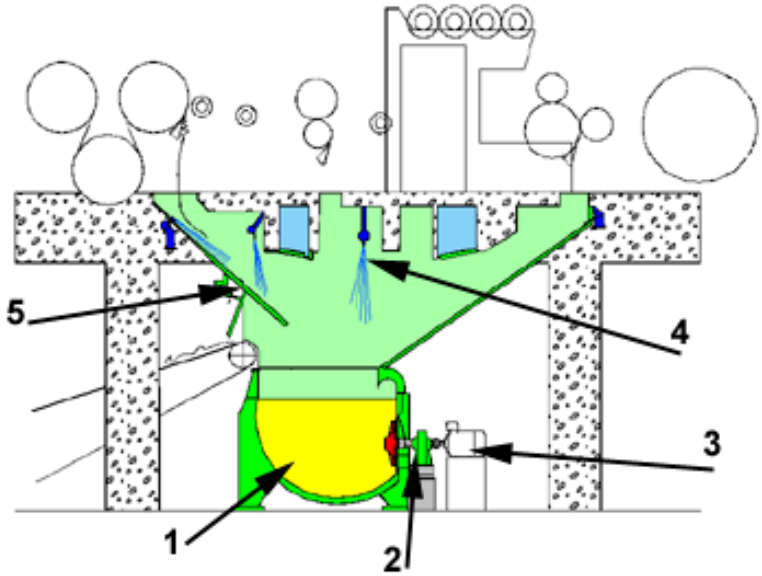


Figure 1 Construction of the OptiSlush HP pulper (STOA009535)

1. Vat
2. Rotor unit
3. Drive motor
4. Shower pipes
5. Chutes

1.3.1 Vat

The vat of the pulper has a welded steel construction. The parts of the vat that come into contact with the stock are acid-proof steel, and the external supporting structures are structural steel. The vat is rectangular with 4–10 feet welded to the bottom. The vat is equipped with a hinged manhole.

The vat has standard connections for draining and surface-level measurement. Other necessary connections are made on a customer-specific basis.

An adjustment ring has been welded to the side of the vat to house the rotor unit(s).

1.3.2 Rotor Unit(s)

There are two kinds of rotor units: belt-driven and gear-driven.
The rotor is attached to the bearing unit shaft in a belt-driven rotor unit, and to the gear shaft in a gear-driven unit.

The rotor unit and vat are flexibly connected due to the O-ring between them. There are either one or two rotor units in a pulper.

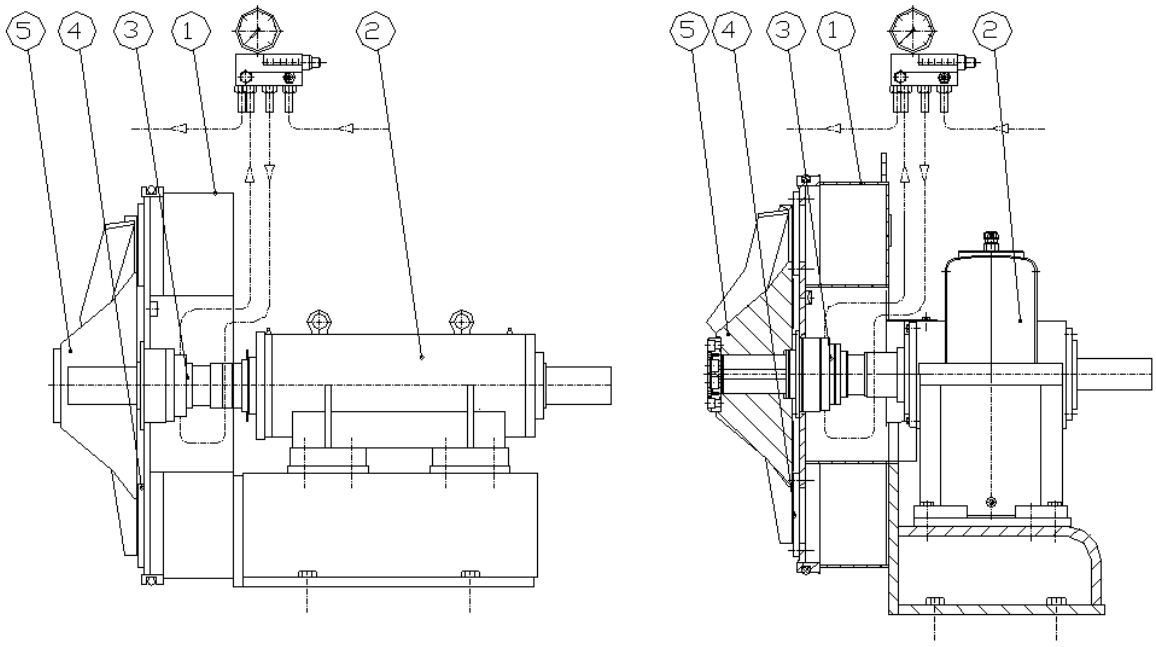


Figure 2 The rotor units, belt-driven on the left and gear-driven on the right (STOA009536)

1. Frame channel
2. Bearing unit or gear
3. Shaft seal
4. Screen plate
5. Rotor

Rotor

The rotor has eight blades, four of them with additional pump blades. The rotor is usually made of acid-resistant steel casting. The rotor is located in the rotor unit so that its blades move on the screen and slot plates at about 1-2 mm distance from the plate surface.

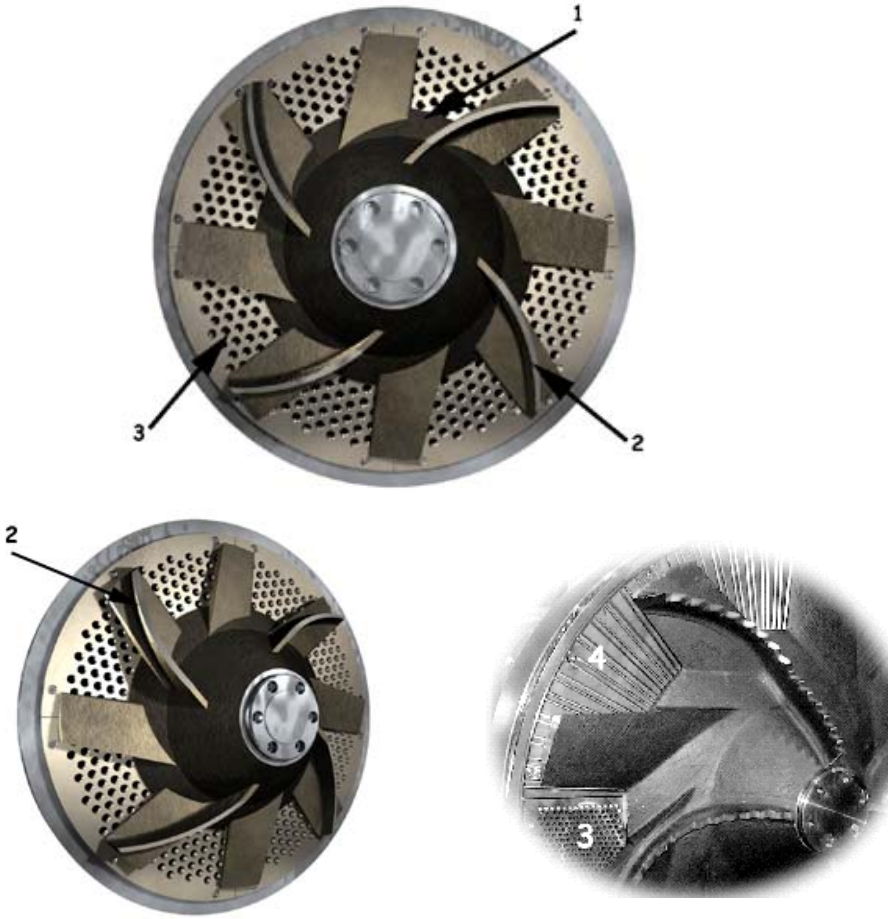
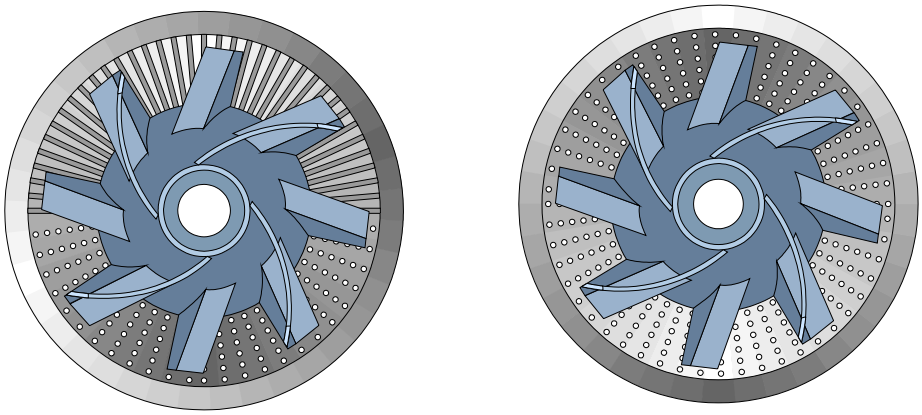


Figure 3 OptiSlush HP pulper rotor
(STOA009537,STOA009538,STOA009539)

1. Rotor
2. Pump blade
3. Screen plates
4. Slot plates

Screen/slot plates

The rotor unit can be equipped with both a screen and slot plate or just a single screen plate. Depending on the pumping capacity, we use either a 360-degree screen plate sector or a 180-degree screen plate sector with the upper section replaced with a slot plate.



Screen plate sector of 180° Screen plate sector of 360°

Figure 4 Screen/slot plates (STOA009540)

1.3.3 Drive Equipment

The drive equipment is determined by the power required by the pulper and the space available. Either gear drive or belt drive is used.

Gear drive

The gear drive equipment includes the gear, coupling, and motor.

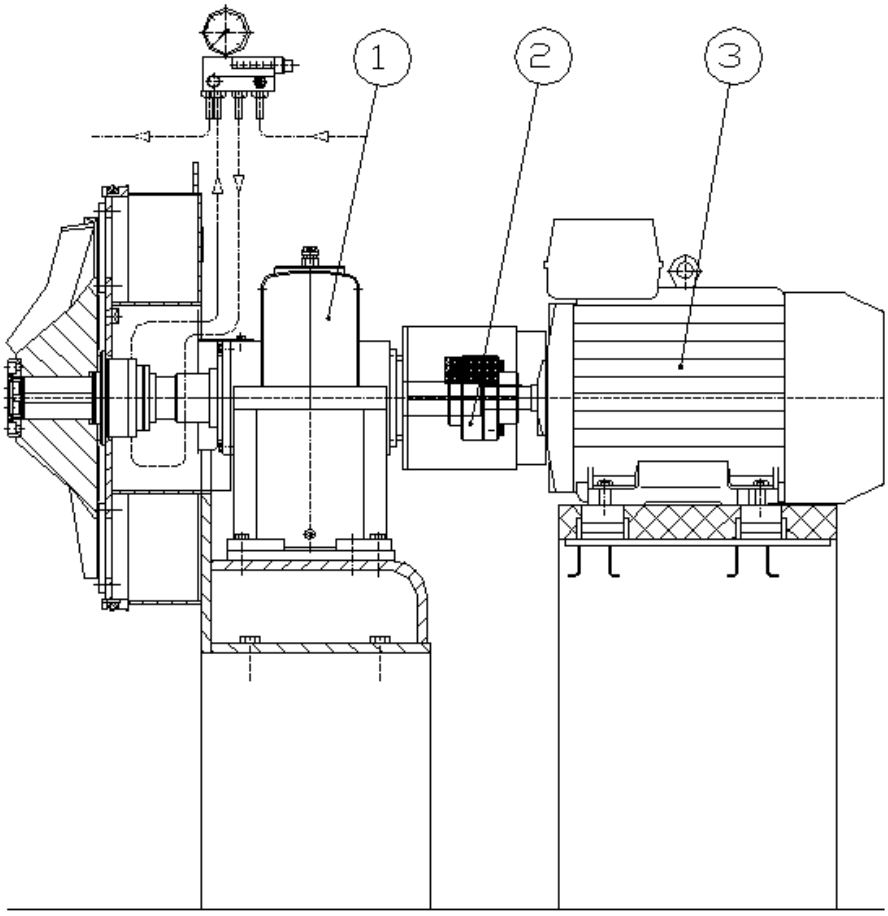


Figure 5 Gear drive (STOA009541)

1. Gear
2. Coupling
3. Motor

In gear-driven pulpers, the rotor is mounted on the gear shaft using bearings.

All rotating parts are equipped with mechanical protective covers.

Belt drive

The belt drive equipment includes the pulleys, V-belts, coupling, and motor.

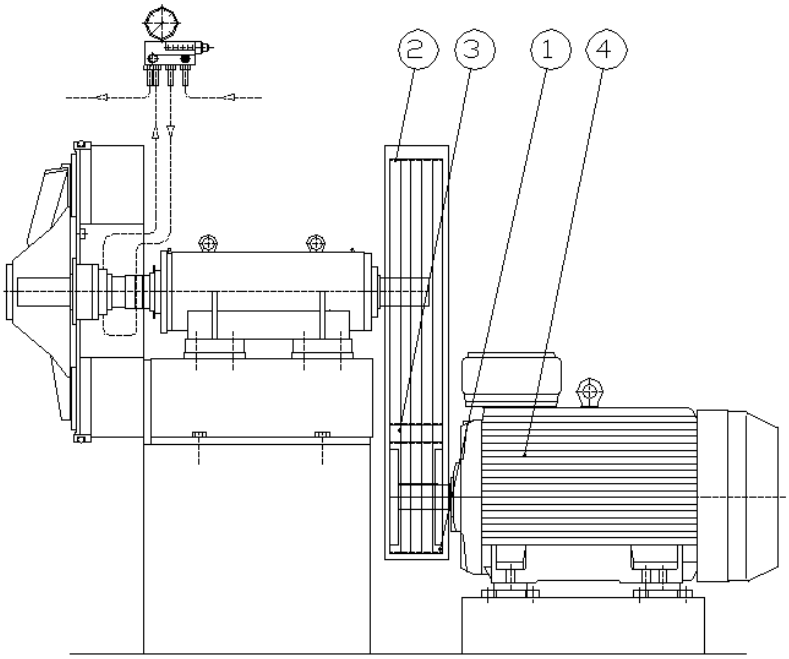


Figure 6 Belt drive (STOA009542)

1. Pulley 1
2. Pulley 2
3. V-belts
4. Motor

All rotating parts are equipped with mechanical protective covers.

1.3.4 Chutes or Cover

The parts of the chutes and cover that come into contact with the stock are acid-proof steel. The external stiffeners are stainless steel.

The cover is normally welded to the vat.

The chutes and covers are always designed and manufactured customer-specifically and are equipped with the necessary pipe connections.

1.3.5 Shower Pipes

The shower pipes are acid-proof steel. The external brackets are stainless steel. The shower pipes are welded to the chutes or the dowel bars in the building.

4 OPERATING INSTRUCTIONS

1 OPERATION

1.1 Safety During Operation

The pulper hatch is operated by remote control – be careful of its automatic closure and opening functions.

When feeding the paper web into the pulper, be careful of the drop openings on the floor.

When working from a sampling or other hatch, be careful not to open the shower unintentionally.

When operating the equipment, beware of its standing braces and other projections.

Due to noise generated by the gear, hearing protectors must be used during operation.

Check regularly (at least once a year) the following fastening and joint points:

- the fastening of the rotor unit to the foundation
- the overflow connection in order to detect any blockage
- the tightness of the gear fastening in order to avoid oil leaks and other damage
- the fastening and tightness of the seal water connections

Periodically check the tightness of the V-belts and fastening of the belt pulley in accordance with the separate instructions, to prevent the pulley from becoming detached due to slipping of the belts.

Dust and other dirt accumulating on the surfaces of the pulper should be washed off periodically.

1.1.1 Procedures for Emergency Draining

In an emergency, the pulper must be drained as follows:

1. Stop and lock the motor(s) and the conveyor (if applicable) and turn off the shower pipes.
2. Start the pulper's exhaust pump.
3. Start ventilation.
4. Open the manhole as soon as the stock level allows this.
5. Enter the pulper and administer first aid to the victim. Remember the protective equipment when entering the pulper.

1.2 Procedures Before Commissioning

Before commissioning, the installation inspection must be carried out and any defects repaired.

Ensure that

- the gearbox of a gear-driven pulper has been filled with oil
- the bearings in the rotor unit of a belt-driven pulper have been lubricated with grease

Checking the rotor's direction of rotation

The rotor must always rotate in the direction of the thicker side of the blades.

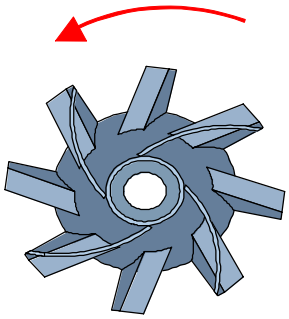


Figure 1 The rotor's direction of rotation in a pulper with one rotor (STOA009543)

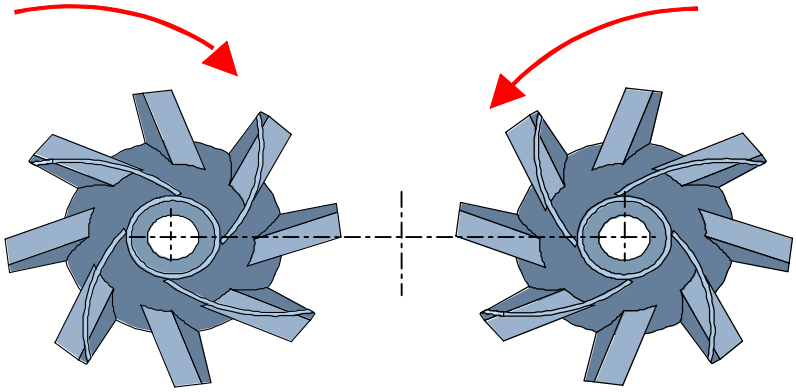


Figure 2 The rotors' direction of rotation in a pulper with two rotors (STOA009544)

1.2.1 Procedures Outside the Pulper

1. Check that all covers are closed and safety devices function correctly (emergency switches).
2. To prepare the seal water line for operation:
   - Flush the seal water line so that no impurities pass beyond the shaft seal.
   - Connect the seal water connection to the shaft seal.
   - Open the seal water line and check the connections for leaks.
   - Adjust shaft seal water pressure and flow (see Section 5: Mechanical Maintenance).
3. Start the possible pressure lubrication unit of the gear.
4. Check that the level transmitter is connected.

1.2.2 Procedures Inside the Pulper

- Check for cleanliness inside the pulper and remove all foreign objects (tools etc.).
- Visually check all internal weld seams.

1.3 Water Run

After the procedures before commissioning have been completed and the required adjustments and modifications have been made, perform the pulper's water run as follows:

1 Close the pulper's discharge valves.

2 Fill the vat with water to about 2/3 of its volume.

3 Check the vat and the seal between the vat and the rotor unit for leaks.

4 Start the possible pressure lubrication unit and monitor the pressure level.

5 Open the seal water line and check the flow and pressure.

6 Start the pulper's drive motor.

7 Check that the pulper runs smoothly, and observe the sound and the motor's power intake (60–90% of the nominal value).

8 Observe the shaft seal's performance.

9 Check and calibrate the pulper's instrumentation.

1.4 Level Height

A suitable pulping level height has been specified separately for each pulper. The pulper instrumentation should keep the level at the given value. It is necessary for the pulper's operation that the level height remains within the given limits. Both too low and too high levels will weaken the de-flaking properties of the pulper. If the level is too low and a part of the rotor is above the level, the level flow pattern of the stock is disturbed and harmful air is mixed into the stock.

If the level is too high, both the level flow of the stock and the sinking of the feed inside the pulper are slowed down.

1.5 Procedures During Operation

1. Check that the manhole is closed.
2. Check that all valves are closed:

- drain valve
- discharge valve

3. Fill the vat with water to check for leaks.

4. Check the tightness between the vat and the rotor unit.

5. Visually check all external weld seams for leaks.

6. Check the operation.

- In a belt-driven pulper, check the tightness of the V-belts (see Section 5: Mechanical Maintenance, Separate Instructions / Belt Drive).
- In a gear-driven pulper, check the oil level of the gearbox (see Section 5: Mechanical Maintenance, Separate Instructions / Gear).

7. Open the seal water line and check the flow and pressure.

8. With the correct water level, start the main motor of the pulper and observe the vibration and operating sound.

9. Check the direction of rotation of the rotor(s). The rotor must rotate with the thicker side of the blades leading.

10. Observe the motors' power intake (60–90% of the nominal value).

11. Recheck all external weld seams for leaks.

12. Check and calibrate the pulper's instrumentation.

1.6 Stock Consistency

The optimal stock consistency for the OptiSlush HP pulper is 3.5–4.5%, depending on the situation. The consistency control system ensures that the consistency during both pulping and discharge is within the proper limits.

Too low a consistency causes harmful turbulence, and too high a consistency weakens the suction effect of the rotor by limiting the flow speed of the stock in the vat. Thus, both too low and too high consistencies impair the sinking of the material into the pulper. A consistency appropriate to the pulper is marked on the layout drawing.

1.7 Showers

The showers are used in the pulper for the following purposes:

1. To wash and to prevent paper from sticking to the chute surfaces.
2. To dampen the paper web to speed up sinking.
3. To water down the stock.

The showers are always directed at the top surface of the paper web. Only the rinsing showers of the chutes are directed at the lower surface of the paper web and at the chutes.

The showers used for dampening the web are either water or stock showers. Water showers are used for paper and thin qualities, but heavy qualities, such as board, require a stock shower to sink into the pulper effectively enough. The stock shower normally has a separate connection, a so-called circulation connection, in the frame channel of the rotor unit.

The flows of different showers are adjusted in accordance with the pulper's location in the process.

1.8 Rinsing Water

The rinsing water led below the rotor keeps the rear side of the rotor clean from stock and any impurities. The rinsing water line is usually opened periodically, 3-4 times a day, e.g., during breaks.

1.9 Monitoring During Operation

During operation, certain operational and mechanical parameters have to be monitored. Most of this monitoring can be carried out by the instruments, which sound an alarm if a deviation from the parameter's set value or operation range occurs.

Regular monitoring of certain functions ensures trouble-free operation and low service costs.

With regard to the pulper's operation, it is essential to monitor:

- the condition of the shaft seal: flow and pressure of the seal water, as well as the amount of cord packing leakage water

- stock level: maximum deviation is 150 mm above or below the specified level
- stock consistency: the optimal consistency is 3.5–4.5%
- rotor clearance: the clearance must be checked twice a year:
  - Increased rotor clearance impairs the pumping out of stock from the vat.
- rotor and screen plate condition:
  - Wear to the rotor or screen plate impairs the de-flaking properties of the pulper.
- the motor's power intake:
  - Rotor condition can be observed by regular monitoring (as the rotor becomes worn, its power consumption decreases).
- operation:
  - In gear-driven pulpers, check the oil level of the gear and the temperature (see Section 5: Mechanical Maintenance, Separate Instructions / Gear).
  - In a belt-driven pulper, monitor the tightness of the V-belts (see Section 5: Mechanical Maintenance, Separate Instructions / Belt Drive).

1.10 Shutdown

1.10.1 Short Shutdown Period

1. Stop the rotor, stock pump, and any air exhaust fan.
2. Close the water valves, which will dilute stock in the vat:

- shower water
- rotor rinsing water
- **Note:** Seal water may flow.

1.10.2 Long Shutdown Period

1. Pump the pulper as empty as possible.
2. Dilute the remaining stock by adding water up to the overflow connection.
3. Pump the pulper as empty as possible again.
4. Stop the rotor(s), stock pump, and any exhaust fan.
5. Close the water valves (as for a short shutdown period).

5 MECHANICAL MAINTENANCE

1 SERVICE

1.1 Safety During Service

Service work must be carried out in accordance with general occupational safety regulations, and specific requirements of plant conditions must be taken into account.

Lifting and transferring parts of the equipment must be performed in accordance with general occupational safety regulations, and no parts of the unit may be allowed to fall.

Do the following before you begin service:

- Before starting any service, make sure that the hot parts of the equipment have cooled off.
- Before opening a seal water pipe, shower pipe, or pneumatic lubrication unit, ensure that the system is depressurized and empty.

- The pulper must be fitted with a separate railed scaffold to prevent slipping off the chutes.
- If the pulper cover hatch has been removed and taken for repair, the pulper opening must be covered with netting or a similar covering to prevent falling in.

- The equipment's pneumatic system must be locked in case of pneumatic cylinder or pipe fractures.
- Before cleaning the ventilation duct, ensure that the cleaning shower hand valve is closed and locked.

If the service requires entry into the pulper, ensure, in the interest of safety, that:

- the person responsible for operating the equipment has been notified of the start of the service and of its estimated duration

- warning signs about the service have been placed in appropriate places

- all of the pulper's feed conveyors have been locked to prevent start-up
- the safety switch of the rotor's drive motor has been locked in STOP position and the motor has been locked to prevent start-up.
- Cover openings have been blocked so that objects cannot fall into the pulper when someone is working there.

- The pulper hatch has been locked to prevent opening and closing.
- The hand valves on the showers and connections are shut and locked to prevent unexpected opening.

For the safety of personnel descending into the pulper, ensure that:

- harmful chemicals and bacteria have been rinsed from the pulper and the supply of fresh air into the pulper is guaranteed

- service personnel use proper protective equipment (e.g., safety rope) and have a contact person outside the pulper for the entire duration of the service
- service personnel use personal protective equipment in order to prevent, for example, slipping in the pulper vat
- electric tools used during service have been inspected for defects before they enter the vat or tank

Once service is complete, ensure that all of the equipment's protective covers are in the correct places.

Remove warning signs regarding service.

Let the person responsible for operating the equipment know that service is finished.

1.2 Recommended Inspection and Service Intervals

ACTION	1. AFTER FIRST START-UP	FURTHER ACTION
Motor bearings: lubrication	See manufacturer's recommendation	See manufacturer's recommendation
Inspection of couplings and change of oil in gear couplings	Inspection of screw tightening moment after approx. 400 operating hours	Change of oil in gear coupling once a year; Cleaning of coupling, if necessary
Gear oil level: checking	At start-up	During shutdowns
Gear oil temperature: checking and adjusting	Checked at start, max. 70°C (no adjustment)	Every 200 operating hours
Gear secondary shaft seal: lubrication	Before start-up	After 4300 hours or annually
Rotor, screen, and slot plates: checking	After approx. 50 operating hours	Every 4500 operating hours
Fastening screws of the gear and rotor unit: checking tightness	At start-up	During shutdowns
Gear oil: changing	After 400–500 operating hours	After 4000 hours or annually
Rotor unit bearings: lubrication	See separate lubrication instructions	See separate lubrication instructions
V-belts in belt drive: checking tightness	See separate instructions	Every 2000 operating hours
Seal water amount: checking and adjusting	At start-up	Every 200 operating hours
Rotor clearance: checking and adjusting	After approx. 50 operating hours	Every 4500 operating hours
Rotor screen and slot plates: checking	After approx. 50 operating hours	Every 4500 operating hours
Amount of water leakage in cord packing: checking and adjusting	At start-up	Every 200 operating hours
Tightness of fastening screws	At start-up	During shutdowns

ACTION	1. AFTER FIRST START-UP	FURTHER ACTION
of the bearing unit: checking		
Tightness of fastening screws of the rotor unit: checking	At start-up	During shutdowns

1.3 Lubrication Recommendations

Gear drive

The lubrication maintenance of a gear-driven pulper comprises changing the oil and lubricating the lip seal of the gear's secondary shaft at intervals of 4300 hours. You should use 10 g of grease filling.

Separate lubrication instructions for each gear can be found at the end of this section.

Belt drive

The lubrication maintenance of a belt-driven pulper comprises grease lubrication of the rotor unit bearings. The rotor unit includes 2 bearings:

- Bearing A on rotor side
- Bearing B on pulley side

The following recommendations should be followed when lubricating bearings:

LUBRICANT AMOUNT (g) / LUBRICATION INTERVAL (h)		
Horizontal pulper size	**Bearing A**	**Bearing B**
HP-24	55/2500	55/2500
HP-33	110/2500	110/2500
HP-42	110/3000	110/3000
HP-50	130/4000	130/4000

The OEM lubricant is Mobilith SHC PM.

The grease is lithium complex based with a synthetic base oil.

Grease characteristics (typical values)

Mobilith SHC PM

Thickener	Lithium complex
Base oil	Synthetic hydrocarbon fluid
Penetration (worked)	305 - 335
NLGI class	1 ½
Drop point	290°C
Operating temperature range	-40 - +230°C
Color	Light tan

Grease used in subsequent lubrication must correspond to or be compatible with the Mobilith SHC PM grease.

When the temperature of the stock is below 70°C, the following greases can be used.

Such lubricants as lithium-based rolling bearing grease, Shell Alvania EP Grease 2, or an equivalent.

Company	**Grease type**	**Penetration**	**Drop point, °C**
Esso	Beacon EP2	270/290	185
Gulf	Gulfgrown Grease No2	279/290	193
Mobil	Mobilux EP2	265/295	180
Shell	Alvania EP Grease 2	265/295	180
Texaco	Markfak MP2	270/295	199
BP	Energrease L2	265/295	190
Castrol	Spheerol APS2	270/290	185

Operating temperature: -30 - +100°C

1.4 Tightening Torques

The base values given on the table below must be followed unless advised otherwise by **the customer drawings**.

TIGHTENING TORQUES steel bolts and nuts SFS-ISO 4014, SFS-ISO 4016, SFS-ISO 2219			
Nominal Size	**8,8 Zne Nm 1)**	**A4 - 80 Nm 2)**	**A4 – 70 Nm 2)**
M 5	5	5	
M 6	9	8	
M 8	24	22	
M 10	45	42	
M 12	85	75	
M 14	125	115	
M 16	200	175	
M 20	400	350	
M 22	525	465	
M 24	675	600	
M 27	980		795
M 30	1345		990
M 33	1820		1200
M 36	2350		1385
M 39	3000		1800
1) Non-lubricated threads 2) Primarily Molycote 1000/Molycote HSC Plus Alternatively Chesterton 785, Loctite 8155 Hirange (coefficient of friction always < 0,20) USE ONLY CALIBRATED TORQUE WRENCHES			

1.5 Troubleshooting

SYMPTOM	POSSIBLE CAUSE	SOLUTION
1. Vibration	- fastening of equipment is not tight - bearings are worn - rotor shaft is bent - rotor is incorrectly balanced (or worn) - level of vat is too low	- tighten fastening bolts, screws, etc. - replace bearings - replace shaft - replace rotor - raise vat level
2. Gear overheats	- bearings are worn	- replace bearings
3. V-belts slip or make unusual noise in belt-driven pulper	- V-belts are too loose - V-belts are worn - pulleys are worn - alignment of pulleys is not correct	- tighten belts - replace belts - replace pulleys - align pulleys
4. Mechanical seal leaks	- seal surfaces are worn or faulty	- service seal
5. Cord packing leaks	- cord packing is too loose - too much sealing water	- tighten cord packing - decrease amount of sealing water
6. Cord packing overheats	- cord packing too tight - insufficient seal water flow	- loosen cord packing - increase seal water flow and/or check and repair seal water feeding equipment
7. De-flaking of pulp permanently decreased	- screen plate is worn - rotor is worn	- replace screen plate - replace rotor
8. Drive motor power consumption permanently decreased	- rotor is worn	- replace rotor
9. Pumping out of stock permanently decreased	- screen plate and/or rotor is worn	- replace screen plate and/or rotor
10. Drive motor overheats	- cooling of motor is prevented - bearings are worn - sealing rings of cord packing are worn	- eliminate the cause - replace bearings - service seal

In addition to these instructions, see the separate instructions delivered.

1.6 Shaft Seal

The pulper is equipped with a mechanical slide ring seal or cord packing (see separate instructions).

Mechanical seal maintenance

Replacing or repairing the seal

- The mechanical seal has to be replaced or repaired if the slide rings are worn out or damaged, such as by running dry.
- Both replacing and repairing require removing the seal. When this is done, the rotor must also be removed.
- The seal is drawn out from the shaft (note the possible installation pieces) after loosening the seal water lines (see the drawing).
- When the seal is remounted, the O-rings between the seal and pulper body as well as the O-rings between the shaft sleeve and the rotor nave should be replaced with new ones. Remember also to remove any mounting blocks and connect the seal water lines properly.
- The construction of the mechanical seal is described in more detail in the separate instructions at the end of this section.

Cord packing maintenance

Tightening the cord packing

The cord packing should be tightened at regular intervals with running machine, by tightening the nuts of the tightening flange. The tightness is correct when drops of water fall regularly from the packing into the air space. Then there is no risk of the cord packing catching fire due to running dry.

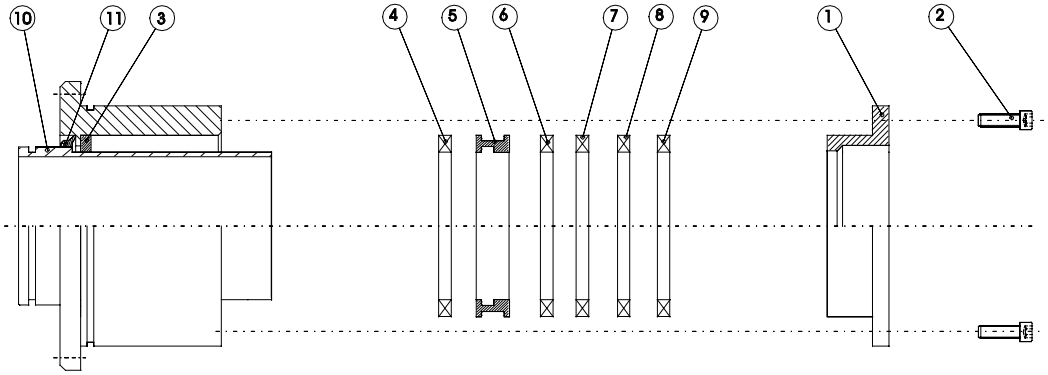


Figure 1 Packing box (STOA009545)

1	Tightening flange
2	Screw
3	Seal ring
4	Seal ring 1
5	Water ring
6	Seal ring 2
7	Seal ring 3
8	Seal ring 4
9	Seal ring 5
10	Sleeve
11	V-ring

Instructions for adjusting water

1. Loosen the hose between the rotameter and the seal.
2. Adjust the flow amount to 3–5 L per minute with an Allen wrench in the controller of the rotameter (= max. flow of the worn seal).
3. Fasten the hose between the rotameter and the seal back into place.
4. Adjust the pressure to that needed for the packing box (2-4 bar) by tightening the screws gradually and evenly from all directions.
5. The operative packing should slightly leak outwards (for example, 60–100 drops per minute).

Note 1:

It is recommended to initially control the operation and temperature of the packing and tighten the packing gradually.

Note 2:

See also the directions of the packing box supplier and those for the rotameter, elsewhere in this manual.

Replacing worn cords

The cords have to be changed when the tightening allowance of the tightening flange is worn out, i.e. when plenty of water is leaking from the packing into the air space or, in the worst case, the stock. The packing cord rings can be changed from the air space by removing the tightening flange.

Replacing a worn shaft sleeve

The shaft sleeve is hard-coated and lasts for a long time in normal use. If the packing runs dry for a long time, the sleeve surface will be damaged and the sleeve will have to be changed. To replace the shaft sleeve, remove the whole sealing package. The sealing package can be removed from the rotor side after the rotor has been removed (see the “Replacing Rotor” section).

Replacing the V-ring packing

If the V-ring packing on the rotor side gets damaged, it has to be changed by removing the rotor (see the “Replacing Rotor” section).

The V-packing should always be changed when the rotor has been removed from the shaft.

Always remember to adjust the flow and pressure of the seal water line after seal service!

1.7 Adjusting Rotor Clearance

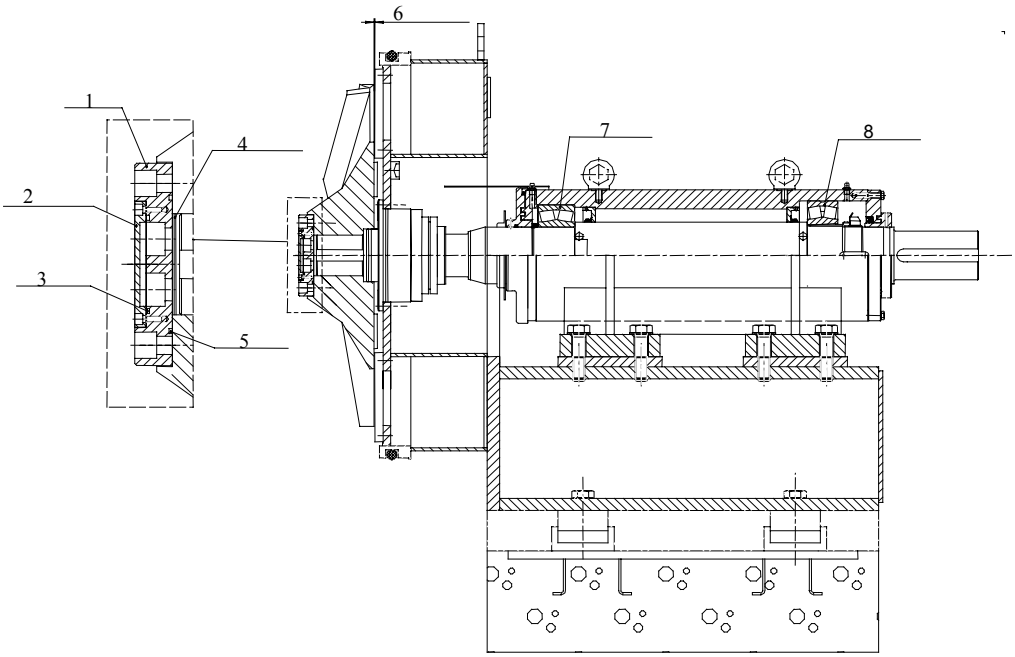


Figure 2a Adjusting the rotor clearance, belt drive (STOA009546)

1. Flange
2. Cover
3. O-seal
4. Shims
5. O-seal
6. Clearance 1-2 mm
7. Bearing A
8. Bearing B

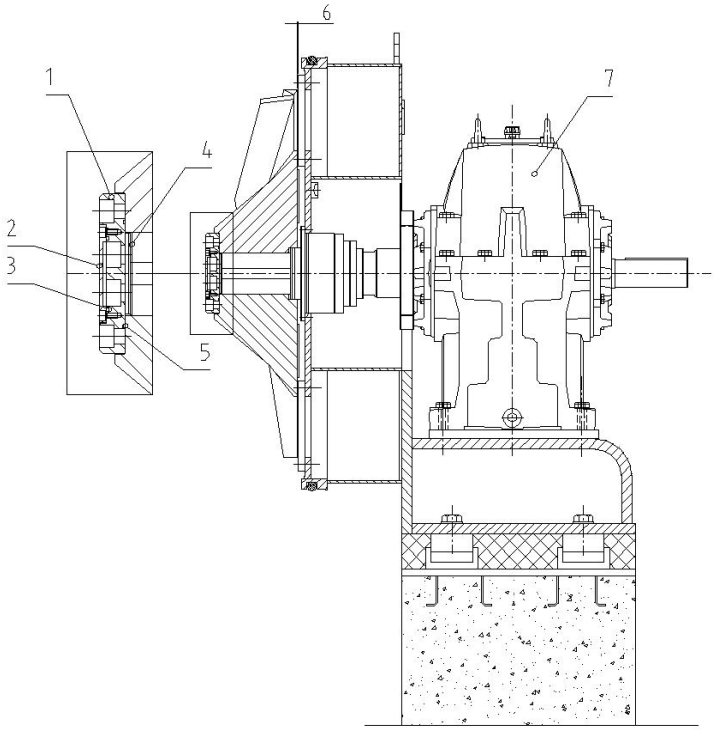


Figure 2b Adjusting the rotor clearance, gear drive (STOA016595)

1. Flange
2. Cover
3. O-seal
4. Shims
5. O-seal
6. Clearance 1-2 mm
7. Gear

The rotor is fastened to the shaft with a key. The rotor clearance can be adjusted, by adding or removing shims in the shaft end.

Measure the rotor clearance (space between lower surface of rotor vanes and screen and slot plates) at least from below 2 opposite vanes.

If the clearance is under 1 mm or over 2 mm, it has to be adjusted as follows:

1. Remove the protective cover and the O-ring under it.
2. Loosen the locking screws, and remove the flange and O-sealing in the middle part of the rotor.
3. Put spacers corresponding to a suitable clearance between opposite wings and screen and slot plates, and push the rotor until the rotor touches the spacers.
4. Check the rotor clearance and adjust it again if necessary.
5. Place as many shims as are needed in the shaft end.
6. Install the O-sealing and flange in their places and fasten the screws.
7. Lock the screws with locking weld and fasten the protective cover. Also lock the screws of the protective cover by welding.

1.8 Replacing Rotor

Do the following to replace the rotor or dismount and mount it, for maintenance work, for example:

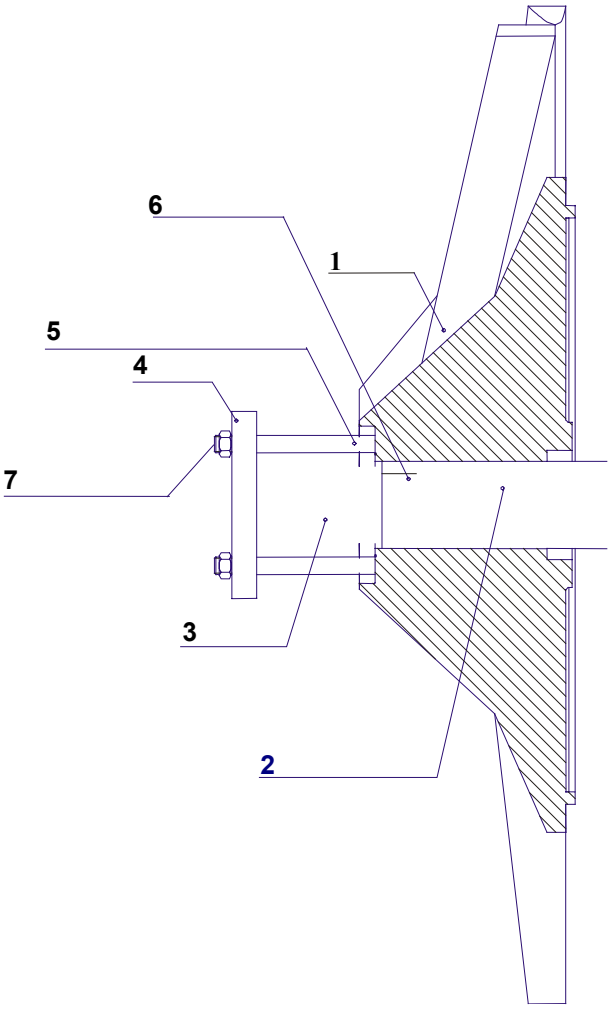


Figure 3 Extracting the rotor (STOA009547)

1. Rotor
2. Shaft
3. Jack
4. Flange
5. Threaded rod M24, 4 pcs
6. Thread hole
7. 6-nut M24

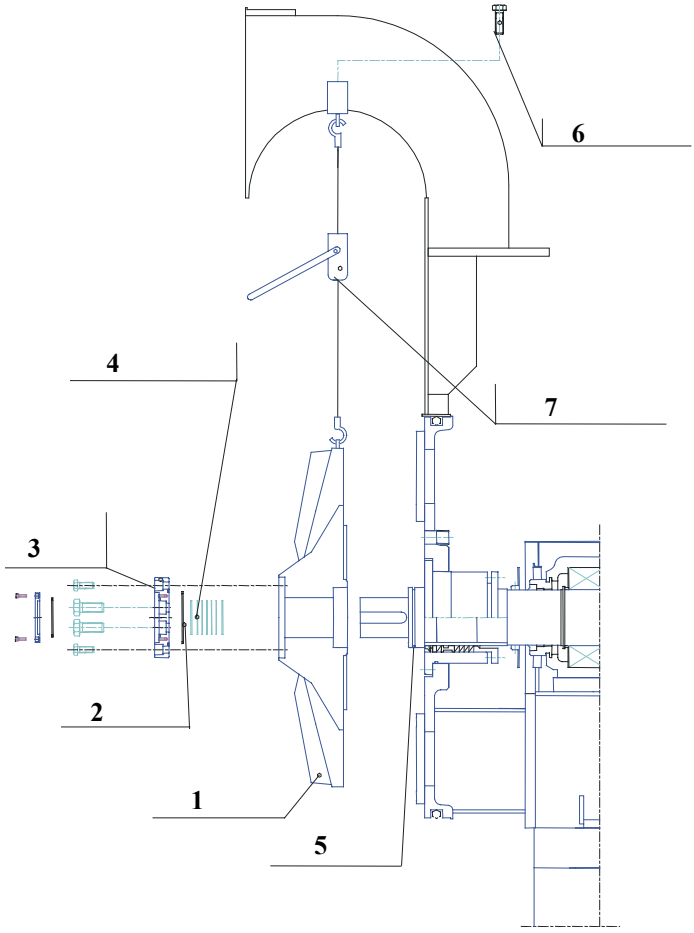


Figure 4 Removing the rotor (STOA009548)

1. Rotor
2. Seal
3. Flange
4. Shims
5. O-ring
6. Screw plug
7. Lifting rope

Dismounting

1. Remove the protective cover in the middle of the rotor.
2. Remove the plug screw from the splash plate above the rotor in the vat and replace it with a lifting eye screw from inside the vat.
3. Fasten the lifting eye screw in the thread in the outer edge of the rotor blade and put the lifting rope between the lifting eye screws in the rotor and the vat.
4. Remove the flange, sealing, and shims.
5. Pull the rotor out of the shaft sleeve and the shaft with a jack and place it at the bottom of the vat with a lifting rope.

Mounting

1. Check that the O-ring on the shaft sleeve is in good condition (replace the ring if necessary).
2. Lubricate the shaft with installation grease.
3. Lift the rotor to the shaft and attach it to the shaft using the flange, threaded rods, and nuts.

1.9 Replacing Screen and Slot Plates

Do the following to replace the screen and slot plates or dismount and mount them, for maintenance work, for example:

Dismounting

1. Remove the rotor as described in Section 1.7: Replacing Rotor, under “Dismounting” (Figure 4).
2. Loosen the tightening screws of the slot and screen plates. Depending on rotor size and manufacturing mode, the slot and screen plate may consist of up to three segments.
3. Remove the plates and check the cleanliness of the frame channel behind the plates.

Installation

1. Mount the slot and screen plates in their places.
2. Tighten the fastening screws carefully and lock the screws with locking weld.
3. Mount the rotor as described in Section 1.3.2.

1.10 Replacing Bearings and Seals

The bearing system can be dismounted by performing the following steps:

1. Loosen the rotor and dismount the packing box.
2. Loosen the belt guard, the V-belts, and the bigger pulley.
3. Loosen the screws (part 27) and lift the bearing unit using the lifting eyes (part 23).

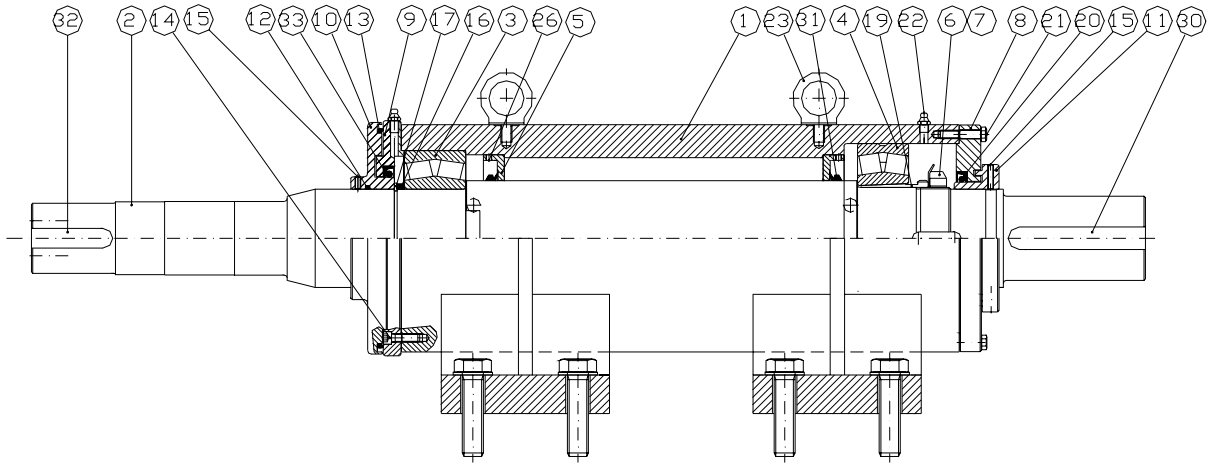


Figure 5 Replacing Bearings and Seals, STOA008688 (STOA004415)

Removing the bearings

1. Move the bearing unit to a dust-free room that has a crane.
2. Place the bearing assembly horizontally on a steady base.
3. Loosen the screws (part 15), 6 each, from both ends.
4. Loosen the flinger ring (part 10) and the labyrinth ring (part 11).
5. Loosen the fastening screws (parts 14, 21) from the end covers (parts 8, 9) and remove the covers.
6. Loosen the lock plate (part 6) and the shaft nut (part 7).
7. Draw out the sleeve (part 19) with a nut.

8. Draw out the shaft with the bearing (part 3) from the rotor end.
9. Loosen the bearing (part 4).
10. Loosen the snap ring (part 17) and bearing (part 3) from the shaft.

Mounting the bearings

1. Clean all parts carefully, removing old grease and other impurities.
2. Slip the spacer rings (parts 5) into the bearing pipe and lock them with screws (part 26).
3. Place the first V-ring (part 31) on the shaft.
4. Mount the bearing (part 3) onto the shaft. Heat the bearing to about 110°C before mounting (using an oil bath or induction heater, for example).
5. Mount the support ring (part 16) and the snap ring (part 17).
6. Lift the shaft into a vertical position and slip it into the bearing pipe (part 1).
7. Mount the end cover (part 9) and tighten the screws (part 14).
8. Mount the other V-ring (part 31).
9. Mount the bearing (part 4) and tighten the sleeve (part 19) with a shaft nut (part 7) so that about 50% of the bearing clearance is eliminated. Lock the lock plate (part 6).
10. Mount the other end cover (part 8) and tighten with screws (part 21).
11. Continue the mounting by following the removal steps in reverse order. Replace all rubber seals with new ones. When mounting the bearing, absolute cleanliness should be observed.
12. Be especially careful during the mounting and follow the lubrication instructions.

2 INSTALLATION

2.1 Installing Vat and Chutes

Delivery of the vat and chutes

The method of delivery depends on both the mode of transportation and the installation site. A small vat is usually delivered in one piece. In general, a vat is delivered in two separate pieces, in which case the vat is horizontally divided into two pieces. The biggest vats can be delivered in, for example, four pieces if necessary.

Installation of a vat delivered in one piece

- Before delivering the vat to the installation site, check that the anchor bolts in the foundation are installed according to the measurements given in the installation drawing.
- Transport the vat to the installation site.
- Before lifting the vat onto the foundation, attach the foundation bolts and nuts to the vat feet.
- Adjust the vat in the longitudinal and latitudinal direction according to the drawing.
- Attach the nuts for the foundation bolts.
- Adjust the vat in the vertical direction, ensuring that the flange of the vat is exactly vertical.
- Install the unconnected pipe connections.
- Perform grouting.

Installation of a vat delivered in segments

- Before delivering the pieces to the installation site, check that the anchor bolts in the foundation are installed according to the measurements given in the installation drawing.
- Transport the pieces to the installation site.
- Before lifting the pieces onto the foundation, fasten the foundation bolts and nuts to the vat feet.
- Using a screw joint, join the parts together, adjust vertical seams, and tack weld them.
- Weld the bottom stiffeners together, using extra balk if needed.

- Install the bottom cover plate and weld the seams.
- Adjust the vat in the longitudinal and latitudinal direction according to the drawing.
- Fasten the nuts to the foundation bolts.
- Adjust the vat in the vertical direction, ensuring that the flange of the vat is exactly vertical.
- Install the unconnected pipe connections.
- Perform grouting.

Installing the pulper chutes

- Different chute constructions are used in different installations, and therefore installation must be made according to the special chute installation drawing made for each pulper.
- Before starting the installation work, a plan of installation order should be made. The order can be different depending on the construction of the chutes or other matters connected to the installation.

In general, the installation order is as follows:

1. Chutes
2. Any inside ventilation channel and shower pipes
3. Support balks for the front and rear chutes + the chutes
4. Outside shower pipes

- The chute sections are usually welded together with lap seam, so the inside part is completely firm. The outside part of the seam should be tack welded firmly enough in order to avoid breakage.
- When installing shower pipes, check that the showers are correctly directed, for this will ensure the proper direction of the web. See Customer Assembly Drawing.
- Finally, any temporary welds must be ground off and the welded seams cleaned.

2.2 Installing Rotor Unit

Delivery of the rotor unit

The rotor unit is delivered almost fully assembled. The equipment delivered separately includes:

- seal water rotameter
- foundation screws with shims
- coupling flanges with accessories (gear drives)
- pulleys with belts (belt drives)
- coupling/belt guard
- motor (normally delivered by customer)
- fastening equipment for the motor (normally delivered by customer)

Before the rotor is mounted, the pulper vat should be permanently mounted in its place.

Before starting the mounting, make sure that the foundation is of the correct height and furnished with an anchor plate.

Installing the rotor unit

1. Mount the O-ring in the groove in the frame flange.
2. To make mounting easier, lubricate the O-ring and mounting opening with silicon grease, for example.
3. Fasten the rotor unit as straight as possible in the mounting hoist and move the rotor unit over the foundation.
4. Fasten the mounting plates with a screw attached to the frame. Mount the adjusting screws.
5. Lower the unit into place. At the same time, place the mounting beams under the mounting plates.
6. Adjust the height so that the unit meets the opening.
7. Draw the unit in its place with a pulley. Make sure that the O-ring is not cut.

8. Make the final adjustment so that the shaft is exactly horizontal. Using a feeler gauge, make sure that the rotor is exactly in the center of the opening (metal must not touch metal).
9. Weld the mounting beams and mounting plates.
10. Now the unit is ready for grouting.

Installing the motor

1. Wash the protective grease from the rotor unit and motor shaft.
2. Heat the coupling halves to about 200°C and mount them in place (gear drives).
3. The belt wheels are fastened with conical sleeves. Mount the wheels according to the appropriate instructions (belt drives).
4. Mount the motor with the mounting equipment delivered. In the case of belt drive, the motor is mounted on tightening rails.
5. Carry out the motor alignment according to the instructions delivered.
6. The final alignment is made after drying of the grout.
7. Mount the accessories, such as rotameters and the belt/coupling guard.

9 SERVICE AND SPARE PARTS

If you need our Customer service or spare parts, please contact

Metso Paper Oy

Service, Valkeakoski

P.O. Box 125

37601 Valkeakoski

Finland

tel. int'l +358 20 482 170

fax int'l +358 20 482 171

www.metso.com

10 APPENDICES

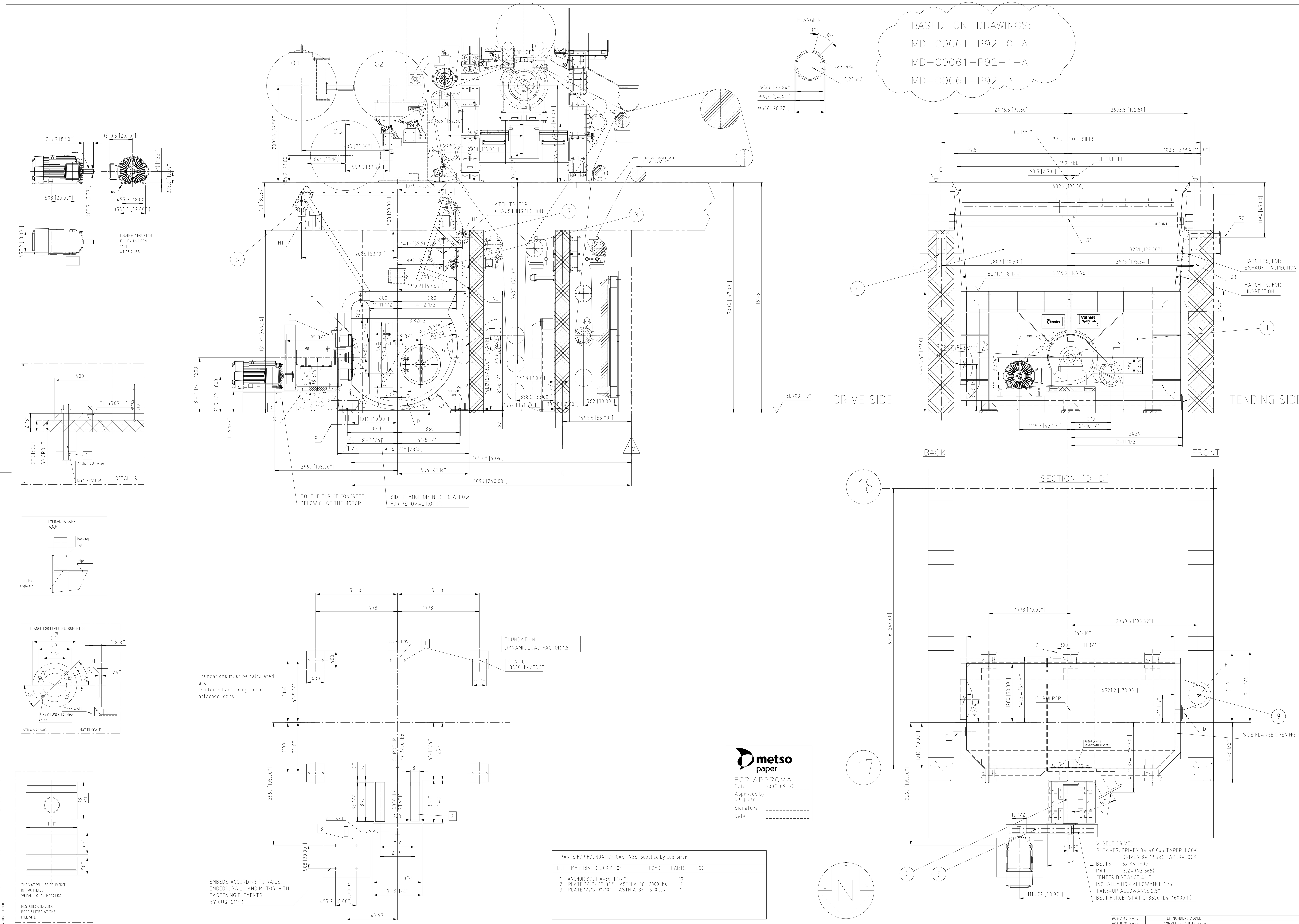
1 DRAWINGS

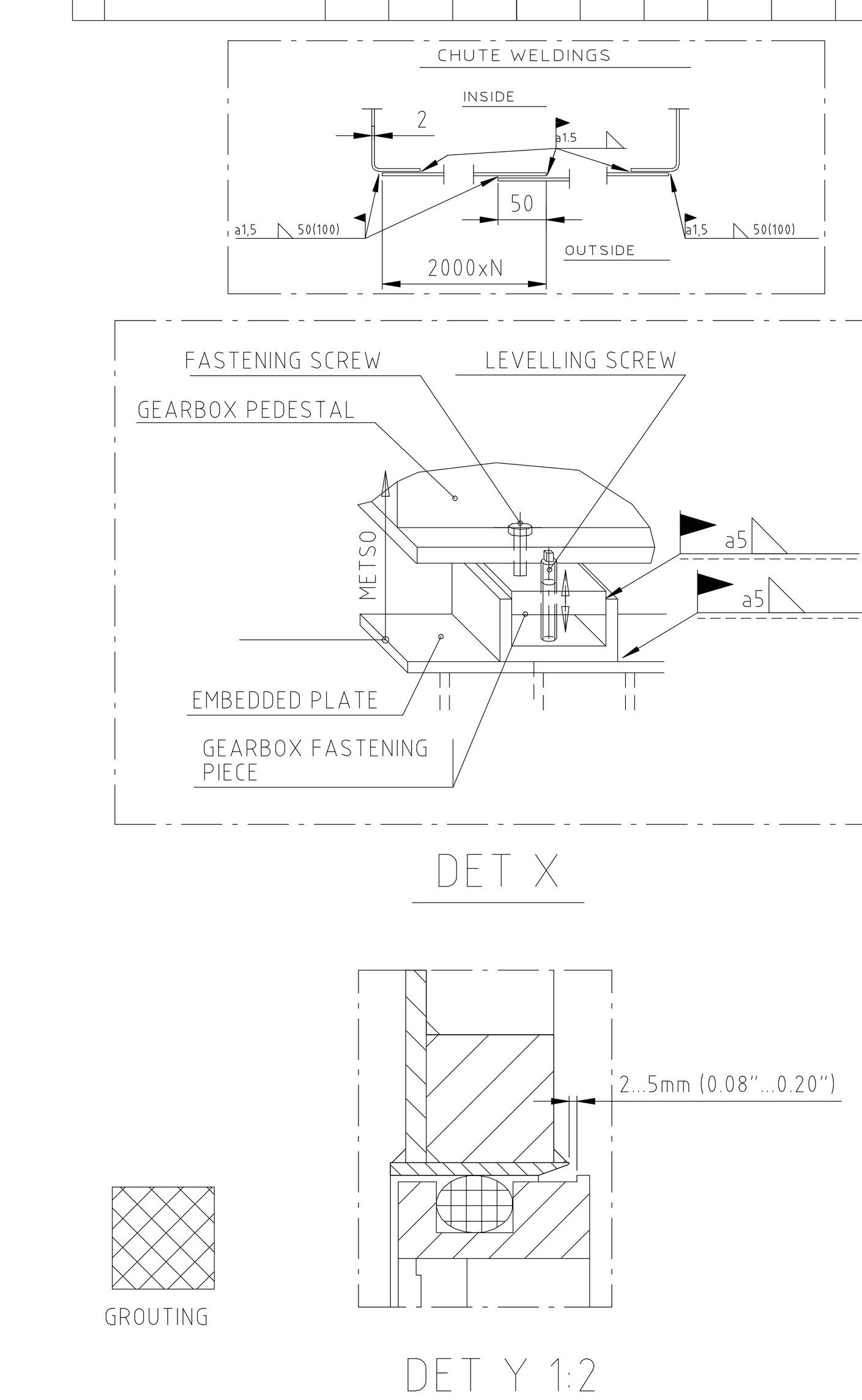
1.1 Customer Assembly STOD112303

1.2 Rotor Unit STOD112304

1.3 Bearing Unit STO1013362

1.4 Drive STOD112838





V-BELT DRIVES
SHEAVES: DRIVEN 8V 40.0x6 TAPER-LOCK
DRIVEN 8V 12.5x6 TAPER-LOCK
BELTS: 6x 8V 1800
RATIO: 3,24 (N2 365)
CENTER DISTANCE 46.7"
INSTALLATION ALLOWANCE 1.75"
TAKE-UP ALLOWANCE 2,5"
BELT FORCE (STATIC) 3520 lbs (16000 N)

PARTS FOR FOUNDATION CASTINGS, Supplied by Customer

DET	MATERIAL DESCRIPTION	LOAD	PARTS	LOC.
1	ANCHOR BOLT A-36 1 1/4"		10	
2	PLATE 3/4"x 8"-33.5" ASTM A-36	2000 lbs	2	
3	PLATE 1/2"x10"x10" ASTM A-36	500 lbs	1	

DIMENSIONING DATA:

FURNISH/ PAPER GRADES............FINE PAPER
CAPACITY............400 BDSTPD (37...74 g/m2)
BASIS WEIGHT ....35...50 lb/3300ft^2
TRIM WIDTH............178 in
WIRE WIDTH ....190 in
SPEED ....2750ft/min(838 m/min)
DRY SOLIDS CONTENT ....45 %
SLUSHING CONSISTENCY............4,0 %
PUMP OUT RATE............1665 GPM (6300 l/min)
DWELL TIME............2.8 min

MOTOR............150 HP / 1200 RPM
- customer delivery

VAT: NET- / GROSS VOLUME ....614 /812 ft^3 17.3 m3/ 23.0m3

CONNECTIONS:
A = STOCK OUTLET NPS 16" ANSI B16.5, CLASS 150
(B = FLUSHING WATER UNDER ROTOR, 1 PC, 1 1/2 NPT FEMALE, PLUGGED)
C = WATER TO MECHANICAL SEAL 3/8" HOSE CONNECTION,
0.5 GPM, PRESSURE 15 to 30 PSI, 2 ea, CLEAN WATER
0.08 dm3/s, 1-2 bar, CLEAN WATER:
-SOLID PARTICLES MAX 10 mg/l
-PARTICLE SIZE MAX 50 µm
-PERMANGANTE NUMBER MAX 30
-AMOUNT OF IRON MAX 1 mg/l
-HARDNESS OF WATER MAX 10 dH
D = DRAIN NPS 8" ANSI B16.5, CLASS 150
E = FLANGE FOR LEVEL INSTRUMENT DIA 3", see det.
F = OVERFLOW NPS 16" ASI B16.5, CLASS 150
G = MANWAY DIA 30"
H1 = SHOWER PIPE NPS 6" ANSI B16.5, CLASS 150
562 GPM, 2125 dm3/min, 35 % ,nozzle 10 x 21.3 slightly flatten
H2 = SHOWER PIPE NPS 6" ANSI B16.5, CLASS 150
562 GPM, 2125 dm3/min, 35% ,nozzle 10 x 21.3 slightly flatten
H3 = SHOWER PIPE NPS 4" ANSI B16.5, CLASS 150
FOR EXHAUST CLEANING, PERIODICAL, 50 GPM, 190 dm3/min
K = EXHAUST DIA22" 7415 CFM (3,5 m3/s)
N = HATCH FOR INSPECTION 12"x12"
O = DILUTION NPS 6" ANSI B16.5, CLASS 150
480 GPM, 1817 dm3/min 30 %

xxxx MECHANICAL SEAL BY CUSTOMERxxxxxx

metso paper
CERTIFIED
Signature RAHE
Date 2007-08-18

PO # 122734

DATE	NAME	CHKD	REVISION	CHS/KEY
2008-01-08	RAHE		ITEM NUMBERS ADDED	03
2007-11-08	RAHE		COMPLETED CHUTE AREA	02
2007-08-17	RAHE		CHANGED ROTOR HANDEDNESS, ADDED MOTOR	01

PART	DESCRIPTION	DIMENSIONS	MATERIAL	DRAWING/IDENTIFICATION NO	QTY

GENERAL TOLERANCES.
DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS:
MACHINING: ISO 2768-MK (SFS-EN 22768-1, SFS-EN 22768-2)
WELDING: ISO 13920-BE (SFS-EN ISO 13920)
CASTING: ISO 8062-CT 11 (SFS-ISO 8062)
WELDING QUALITY LEVEL C (SFS-EN 25817, ISO 5817)
FLAME CUTTING: ISO 9013-IAH (SFS-EN ISO 9013)

APPLE PM92 — EN / FI
APPLETON
WEST CARROLTON, PM 92
OH, USA

metso paper — PROJECTION: ISO — SCALE 1:25 — WEIGHT kg

PRODUCT OPTISLUSH HP-33B1
PRESS PULPER

DESD RAHE	DATE 2007-06-08
CHKD	DATE
APPD	DATE

REF. STOD104087 — SUPERS. — A0
WORK B20173-810201 — FILE STOD112303 — AutoCAD
DRAWING ID STOD112303 . 03 — SHEET 1/1

Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
	STOD112303	03	STOD112303	PRESS PULPER OPTISLUSH HP-33B1				*				pc
1	STOD112306	00	STOD112306	VAT HP-33					4800.0	1.0	Psd.	pc
2	STOD112304	01	STOD112304	ROTOR UNIT HP-33B MARKING OF THE PRODUCT PLATE: * HP-33B , STOD112304 * SERIAL NUMBER B20173 * MANUFACTURING YEAR 2007 MECHANICAL SEAL BY CUSTOMER				*	2200.0	1.0		pc
4	STOD112305	00	STOD112305	CHUTES HP-33					2000.0	1.0	Psd.	pc
5	STOD112838	00	STOD112838	DRIVE HP-33B				*		1.0		pc
6	STOD114064	00	STOD114064	SHOWER PIPE H1, 6"					92.0	1.0	Psd.	pc
7	STOD114065	00	STOD114065	SHOWER PIPE H2, 6"					112.0	1.0	Psd.	pc
8	STOD114066	00	STOD114066	SHOWER PIPE H3, 4"					38.0	1.0	Psd.	pc
9	STOD039075	00	STOD039075	OVERFLOW 16"					76.0	1.0	Psd.	pc
20	STOD014505	00	STOD014505	METSO SIGN OPTISLUSH				*	6.8	1.0		pc

Item	R	Drawing	Description
STOD112303	03	STOD112303	PRESS PULPER OPTISLUSH HP-33B1

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	1/2

pc = piece, mm = millimeter, m = meter, m2 = square meter, m3 = cubic meter, kg = kilogram, l = liter, in = inch, in2 = square inch, in3 = cubic inch, lb = pound, ft = feet, R = Rev., B = BOM, L = Level, S = Status

Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
21	STOD014506	01	STOD014506	PLATE OPTISLUSH				*	6.8	1.0		pc
30	STOA102392	00	STOA102392	OPERATING AND MAINTENANCE MANUAL HP						1.0	Psd.	pc
40	STOA102387	00	STOA102387	QUALITY ASSURANCE PLAN HP-				*		1.0	Psd.	pc

Item	R	Drawing	Description
STOD112303	03	STOD112303	PRESS PULPER OPTISLUSH HP-33B1

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	2/2

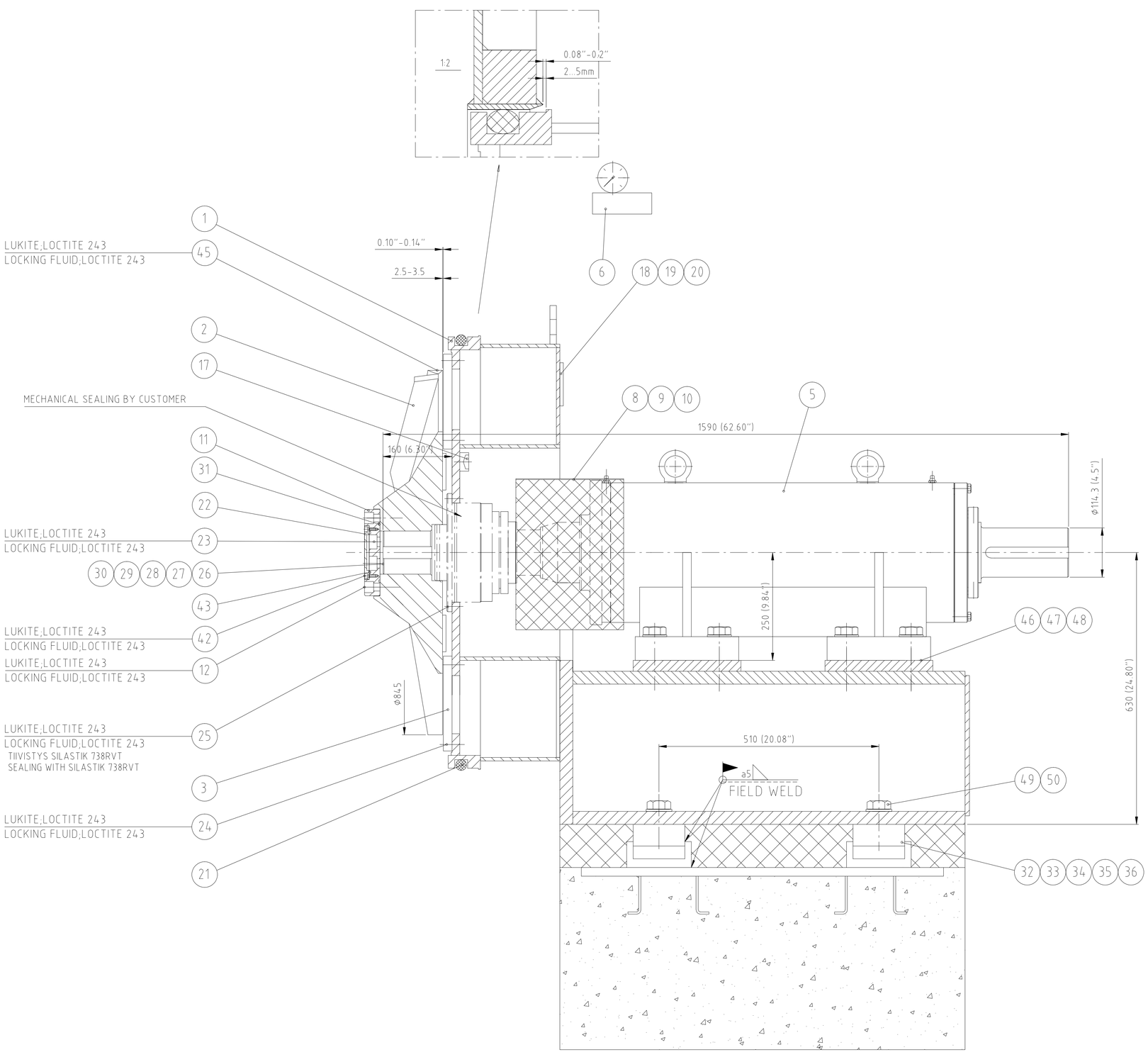
pc = piece, mm = millimeter, m = meter, m2 = square meter, m3 = cubic meter, kg = kilogram, l = liter, in = inch, in2 = square inch, in3 = cubic inch, lb = pound, ft = feet, R = Rev., B = BOM, L = Level, S = Status

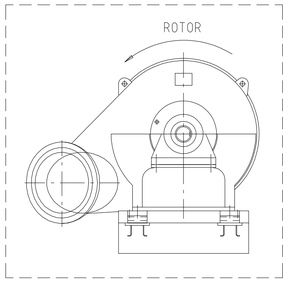
TIGHTENING TORQUES
Steel bolts and nuts
SFS–ISO 4014, SFS–ISO 4016,
SFS–ISO 2219

Nominal size	8.8 Zne Nm 1)	A4–80 Nm 2)	A4–70 Nm 2)
M 5	5	5	
M 6	9	8	
M 8	24	22	
M 10	45	42	
M 12	85	75	
M 14	125	115	
M 16	200	175	
M 20	400	350	
M 22	525	465	
M 24	675	600	
M 27	980		795
M 30	1345		990
M 33	1820		1200
M 36	2350		1385
M 39	3000		1800

1) Non–lubricated threads
2) Primarily Molycote 1000/
Molycote HSC Plus
Alternatively Chesterton 785, Loctite 8155
Hirange(coefficient of friction < 0,20)

USE ONLY CALIBRATED TORQUE WRENCHES





PART	DESCRIPTION	DIMENSIONS	MATERIAL	DRAWING/IDENTIFICATION NO	QTY
GENERAL TOLERANCES: DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS: MACHINING: ISO 2768-MK (SFS-EN 22768-1, SFS-EN 22768-2) WELDING: ISO 13920-BE (SFS-EN ISO 13920) CASTING: ISO 8062-CT 11 (SFS-ISO 8062) WELDING QUALITY LEVEL C (SFS-EN 25817, ISO 5817) FLAME CUTTING: ISO 9013-1AH (SFS-EN ISO 9013)		APPLE PM92 EN / FI	APPLETON PRESS PULPER HP-33B1		

metso paper	PROJECTION	SCALE 1:5	WEIGHT kg
PRODUCT OPTISLUSH HP-33B		DESD SDVJNJO	DATE 070620
ROTOR UNIT HP-33B ROOTTORIYKSIKKÖ HP-33B		CHKD	DATE
		APPD SDVJHHI	DATE 070620
REF. STOD100069	SUPERS.	A1	DRAWING ID STOD112304 . 00
WORK B20173 810201	FILE STOD112304	AutoCAD	SHEET 1/1

DATE	NAME	CHKD	REVISION	CHS/KEY

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
	STOD112304	01	STOD112304	ROTOR UNIT HP-33B MARKING OF THE PRODUCT PLATE: * HP-33B , STOD112304 * SERIAL NUMBER B20173 * MANUFACTURING YEAR 2007				*	2200.0			pc
1	STOD111119	00	STOD111119	FRAME HP-33B, RH, DN400, SLANT30DEG., ANSI				*		1.0		pc
2	STOD100132E	01	STOD100132	ROTOR HP-33, CW, V100%, PS50				*	230.0	1.0	B1	pc
3	STOM000221	01	STOM000221	SCREEN PLATE HP-33, D/T=15/19				*	19.0	4.0	C4	pc
5	STO1013362	05	STO1013362	BEARING UNIT HP-33B, UNC				*	710.0	1.0	B1	pc
6	STOD017338A	01	STOD017338	CONTROL UNIT VM/VC/VH/HP, D, AC-1					5.0	1.0	B1	pc
8	STOM000129	02	STOM000129	COVER HP-33B/42B/50B						1.0		pc
9	VAL0011993			HEXAGON SCREW M8x20-A4-80-ISO 3506	M8x20	A4-80	ISO 4017		0.0123	4.0		pc
10	VAL0137824			WASHER 8-200HV-A4-ISO 3506	8,4x16x1,6	200HV-A4	ISO 7089			4.0		pc
11	STOM000257	01	STOM000257	COVER FLANGE HP-33						1.0		pc
12	VAL0017986			HEXAGON SOCKET HEAD CAP SCREW M16x40-A4-80-ISO 3506	M16x40	A4-80	ISO 4762		0.091	6.0		pc
17	VAL0079588			PLUG NORDS R-235 R1 11-0235-06. Male thread R1, 1.4404	R1	1.4404	Outokumpu		0.19	1.0		pc
18	STOM000122	01	STOM000122	DIRECTION ARROW				*	0.01	1.0		pc
19	STOD010120	01	STOD010120	MANUFACTURER'S PLATE				*		1.0		pc

Item	R	Drawing	Description
STOD112304	01	STOD112304	ROTOR UNIT HP-33B

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	1/3

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
				CE								
20	VAL0026372			DRIVE SCREW KDS Nr6x6-A4	6x6	A4	SMS 1549		0.001	6.0		pc
21	VAL0186553			O-RING 960 (+/-1,0) x 25 (+/-0,7) NBR 70 (+/-5) Sh A Vulcanized	960x25	NBR	Busak+Shamban			1.0	C1	pc
22	STOM000258	01	STOM000258	COVER PLATE HP-33						1.0		pc
23	VAL0007401			HEXAGON SOCKET HEAD CAP SCREW M20x50-A4-80-ISO 3506	M20x50	A4-80	ISO 4762		0.091	2.0		pc
24	VAL0017971			HEXAGON SOCKET HEAD CAP SCREW M12x25-A4-80-ISO 3506	M12x25	A4-80	ISO 4762		0.0357	24.0		pc
25	VAL0017971			HEXAGON SOCKET HEAD CAP SCREW M12x25-A4-80-ISO 3506	M12x25	A4-80	ISO 4762		0.0357	6.0	B6	pc
26	STOD100142A	00	STOD100142	SHIM HP-33, S=3						2.0		pc
27	STOD100142B	00	STOD100142	SHIM HP-33, S=1,5						2.0		pc
28	STOD100142C	00	STOD100142	SHIM HP-33, S=1,0						4.0		pc
29	STOD100142D	00	STOD100142	SHIM HP-33, S=0,5						4.0		pc
30	STOD100142E	00	STOD100142	SHIM HP-33, S=0,2						4.0		pc
31	VAL0210958			O-RING 6421222 125,0x4,0 NBR70	125,0x4,0	NBR70ShA	Tiivistekeskus			1.0	C	pc
32	STOM000126	01	STOM000126	LUG M30/M20					12.0	4.0		pc
33	STOD100020B	00	STOD100020	SHIM S=1,0						8.0		pc
34	STOD100020A	00	STOD100020	SHIM						8.0		pc

Item	R	Drawing	Description
STOD112304	01	STOD112304	ROTOR UNIT HP-33B

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	2/3

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
				S=0,5								
35	STOD100020G	00	STOD100020	SHIM S=0,2						8.0		pc
36	STOD100149A	00	STOD100149	ADJUSTMENT SCREW L=143					0.35	4.0		pc
42	VAL0010906			HEXAGON SOCKET HEAD CAP SCREW M6x16-A4-80-ISO 3506	M6x16	A4-80	ISO 4762		0.00575	6.0		pc
43	VAL0210956			O-RING 6412930 85,0x4,0 NBR70	85,0x4,0	NBR70ShA	Tiivistekeskus			1.0	C	pc
45	VAL0112051			HEXAGON SOCKET SET SCREW WITH CUP POINT M16x30-A4	M16x30	A4	DIN 916			1.0		pc
46	STOD103297C	00	STOD103297	SHIM HP-33B/42B/50B, S=0.5						8.0		pc
47	STOD103297D	00	STOD103297	SHIM HP-33B/42B/50B, S=1						8.0		pc
48	STOD103297B	00	STOD103297	SHIM HP-33B/42B/50B, S=0.2						4.0		pc
49	VAL0047341			HEXAGON SCREW M30x70-8.8-tZn-DIN 267 With tZn type finish as in DIN 267 part 10.	M30x70	8.8-tZn	ISO 4017			4.0		pc
50	VAL0137819			WASHER 30-200HV-A4-ISO 3506	31x56x4	200HV-A4	ISO 7089			4.0		pc

Item	R	Drawing	Description
STOD112304	01	STOD112304	ROTOR UNIT HP-33B

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	3/3

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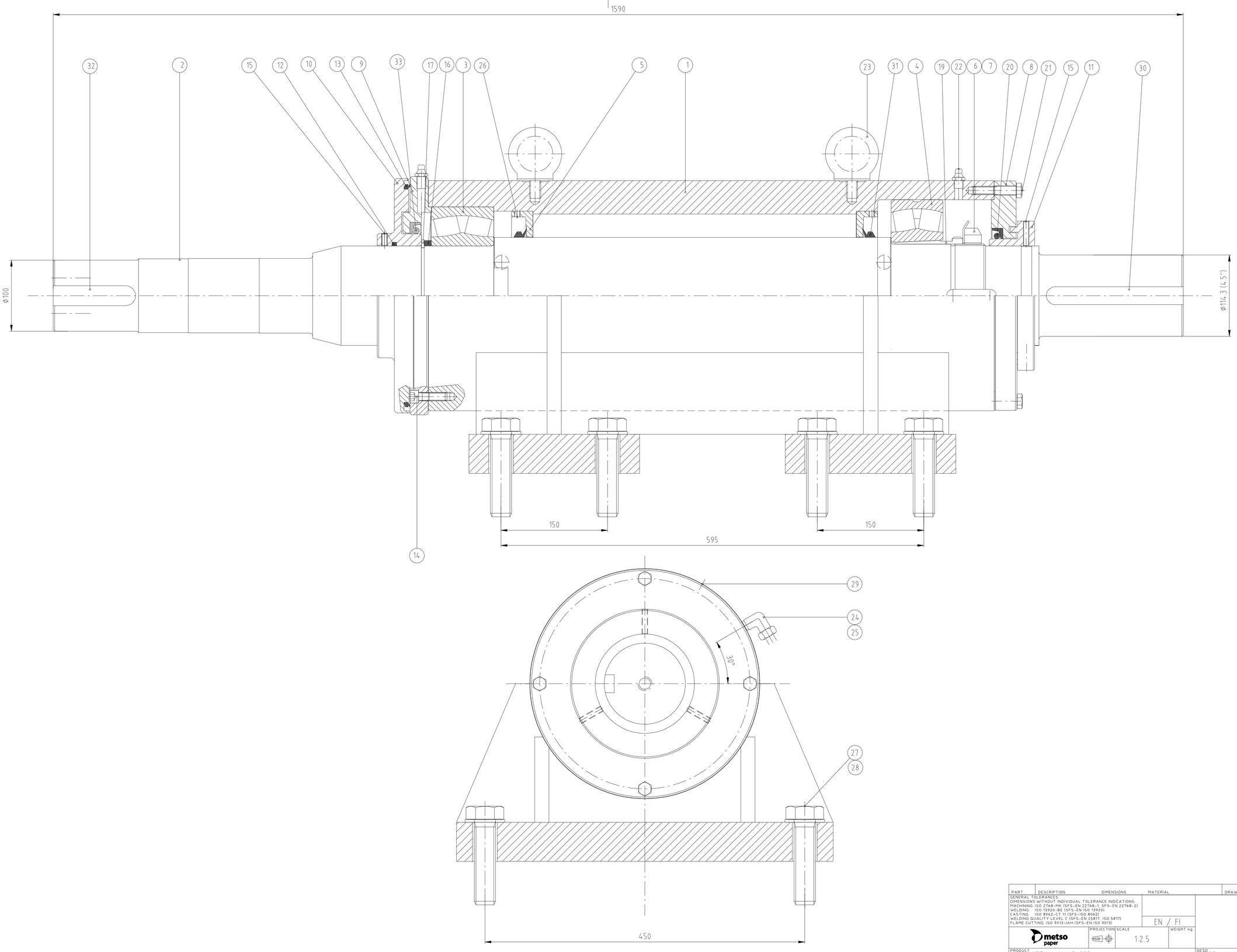

DATE	NAME	CHKD	REVISION	CHS/KEY
2007-01-17	JHHI		CHANGED POS.32	05
2004-12-21	JHHI		CHANGED POS.29	03
2004-10-12	JHHI		VERTEX---->AUTOCAD	02

PART	DESCRIPTION	DIMENSIONS	MATERIAL	DRAWING/IDENTIFICATION NO	QTY

GENERAL TOLERANCES:
DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS:
MACHINING: ISO 2768-MK (SFS-EN 22768-1, SFS-EN 22768-2)
WELDING: ISO 13920-BE (SFS-EN ISO 13920)
CASTING: ISO 8062-CT 11 (SFS-ISO 8062)
WELDING QUALITY LEVEL C (SFS-EN 25817, ISO 5817)
FLAME CUTTING: ISO 9013-JAH (SFS-EN ISO 9013)

EN / FI

metso paper

PROJECTION | SCALE 1:2.5 | WEIGHT kg

PRODUCT	OPTISLUSH HP-33B	DESD SDVJHHI	DATE 041012
	SHAFT BEARING AKSELIN LAAKEROINTI UNC	CHKD	DATE
		APPD	DATE
REF. STO1013362	SUPERS. STOM000270	A1	DRAWING ID STO1013362 . 05	SHEET 1/1
WORK	FILE STOM000270	AutoCAD		

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
	STO1013362	05	STO1013362	BEARING UNIT HP-33B, UNC				*	710.0			pc
1	STOM000130	02	STOM000130	BEARING PIPE HP-33B/42B/50B, CASTING					380.0	1.0		pc
2	STO1013363	01	STO1013363	SHAFT HP-33B					175.0	1.0		pc
3	VAL0007190			SPHERICAL ROLLER BEARING 23228 CC/W33	23228		SKF		18.5	1.0		pc
4	VAL0007084			SPHERICAL ROLLER BEARING 22230 CCK/W33	22230		SKF		18.0	1.0		pc
5	STOM000153	01	STOM000153	SPACER RING HP-33B/42B/50B					2.6	2.0		pc
6	VAL0001156			LOCKING WASHER MB 29	MB 29		SKF		0.165	1.0		pc
7	VAL0001066			LOCKNUT KM 29	KM 29		SKF		1.842	1.0		pc
8	STOM000154	01	STOM000154	COVER HP-33B/42B/50B						1.0		pc
9	STOM000526	01	STOM000526	COVER HP-33B/42B/50B						1.0		pc
10	STOM000527	01	STOM000527	FLINGER RING HP-33B/42B/50B						1.0		pc
11	STOM000157	02	STOM000157	LABYRINTH RING HP-33B/42B/50B						1.0		pc
12	VAL0010317			O-RING 139,3x5,7 NBR701 SS162630	139,3x5,7	NBR701	SMS 1586			1.0		pc
13	VAL0045514			V-RING VL-300 NBR	VL-300	NBR				1.0		pc
14	VAL0010866			HEXAGON SOCKET HEAD CAP SCREW M12x40-8.8-A3E-ISO 4042	M12x40	8.8-A3E	ISO 4762		0.0465	12.0		pc
15	VAL0042581			HEXAGON SOCKET SET SCREW WITH CUP POINT	M8x20	A4	DIN 916			6.0		pc

Item	R	Drawing	Description
STO1013362	05	STO1013362	BEARING UNIT HP-33B, UNC

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	1/3

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
				M8x20-A4								
16	STOM000158	01	STOM000158	BACKING RING HP-33B/42B/50B						1.0		pc
17	VAL0001352			EXTERNAL RETAINING RING 140x4-Phosphat Phosphated.	140x4	PHOSPHAT	DIN 471			1.0		pc
19	VAL0045516			WITHDRAWAL SLEEVE AHX 3130 G KM32 THREAD for KM32 nut	AHX 3130 G		SKF			1.0		pc
20	VAL0070946			SHAFT SEAL TYP1 160x190x15 NBR	160x190x15	NBR	ISO 6194			1.0		pc
21	VAL0092152			HEXAGON SCREW M12x60-8.8 tZn-DIN 267	M12x60	8.8 tZn	ISO 4014			4.0		pc
22	VAL0156434			GREASE NIPPLE A R1/4 A2 Collar nipple	R1/4	A2	DIN 71412			2.0		pc
23	VAL0040205			LIFTING EYE BOLT M16-C15-DIN 17210	M16	C15	DIN 580		0.28	2.0		pc
24	VAL0112400			PIPE 16x1,5 St35.4NBK	16x1,5	St35.4	DIN 2445			0.14		m
25	VAL0045636			FITTING DIN 2353-GS 16-A3C Male Elbow, Male thread R1/2, Zinc plated Steel	GS 16	A3C	DIN 2353		0.189	2.0		pc
26	VAL0001455			HEXAGON SOCKET SET SCREW WITH CUP POINT M8x8-A4	M8x8	A4	DIN 916			6.0		pc
27	VAL0109076			HEXAGON SCREW M30x120-8.8-tZn-DIN 267	M30x120	8.8-tZn	ISO 4017		0.84	8.0		pc
28	VAL0137819			WASHER 30-200HV-A4-ISO 3506	31x56x4	200HV-A4	ISO 7089			8.0		pc
29	VAL0001393			MEASURING NIPPLE	M8x24	SS2346	SPM Instrument			2.0		pc

Item	R	Drawing	Description
STO1013362	05	STO1013362	BEARING UNIT HP-33B, UNC

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	2/3

pc = piece, mm = millimeter, m = meter, m2 = square meter, m3 = cubic meter, kg = kilogram, l = liter, in = inch, in2 = square inch, in3 = cubic inch, lb = pound, ft = feet, R = Rev., B = BOM, L = Level, S = Status

Bill of Material

MPL Pulpers

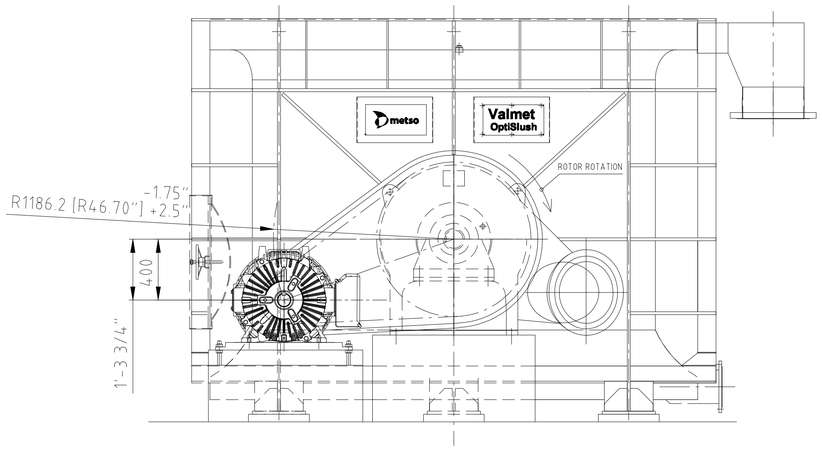
INTERNAL

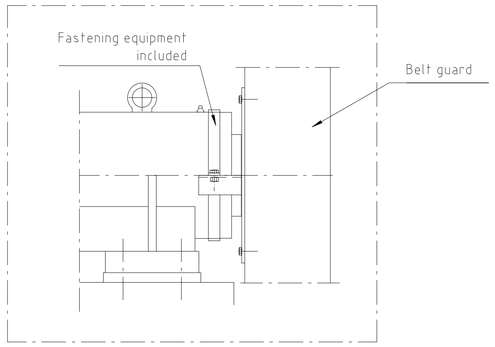
No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
				32010 M8x24								
30	STOD105474	00	STOD105474	KEY 1"x1"						1.0		pc
31	VAL0011165			V-RING VS-160 NBR	VS-160	NBR	Freudenberg Simrit			2.0		pc
32	VAL0040139			KEYSTOCK 28x16 C45K	28x16	C45K	DIN 6880			0.102		m
33	VAL0148468			SHAFT SEAL TYP1 170x200x15 NBR	170x200x15	NBR	ISO 6194			1.0		pc

Item	R	Drawing	Description
STO1013362	05	STO1013362	BEARING UNIT HP-33B, UNC

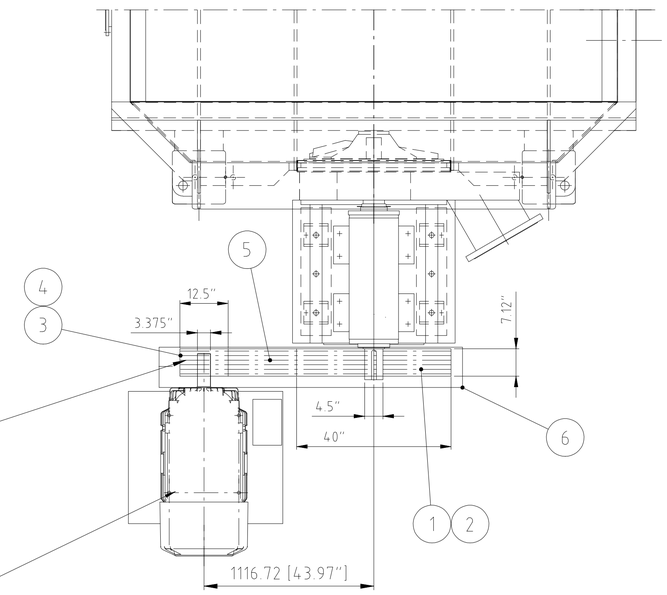
Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	3/3

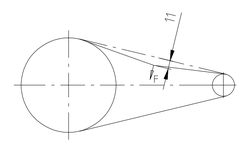
pc = piece, mm = millimeter, m = meter, m2 = square meter, m3 = cubic meter, kg = kilogram, l = liter, in = inch, in2 = square inch, in3 = cubic inch, lb = pound, ft = feet, R = Rev., B = BOM, L = Level, S = Status





V-BELT DRIVES
SHEAVES: DRIVEN 8V 40.0x6 TAPER-LOCK
DRIVEN 8V 12.5x6 TAPER-LOCK
BELTS: 6x 8V 1800
RATIO: 3,24 (N2 365)
CENTER DISTANCE 46.7"
INSTALLATION ALLOWANCE 1.75"
TAKE-UP ALLOWANCE 2,5"
BELT FORCE (STATIC) 3520 lbs (16000 N)





Static tension per belt/rib	1013 N
Belt Deflection	11.4 mm
Min.Deflection force at installation	59 N
Max.Deflection force at installation	63 N
Min.Deflection force at retensioning	51 N
Max.Deflection force at retensioning	55 N

PART	DESCRIPTION	DIMENSIONS	MATERIAL	DRAWING/IDENTIFICATION NO	QTY

GENERAL TOLERANCES:
DIMENSIONS WITHOUT INDIVIDUAL TOLERANCE INDICATIONS:
MACHINING: ISO 2768-MK (SFS-EN 22768-1, SFS-EN 22768-2)
WELDING: ISO 13920-BE (SFS-EN ISO 13920)
CASTING: ISO 8062-CT 11 (SFS-ISO 8062)
WELDING QUALITY LEVEL C (SFS-EN 25817, ISO 5817)
FLAME CUTTING: ISO 9013-1AH (SFS-EN ISO 9013)

APPLETON
EN / FI

PROJECTION: ISO | SCALE: 1:20 | WEIGHT kg

PRESS PULPER HP-33B1

PRODUCT: OPTISLUSH HP-33B
DESD: SDVJNJO DATE: 080125
CHKD: DATE:
BELT DRIVE HP-33B1 KÄYTTÖ HP-33B1
APPD: SDVRAHE DATE: 080125

REF.
SUPERS.
A1
DRAWING ID: STOD112838 . 00
SHEET: 1/1
WORK: B20173 810201
FILE: STOD112838
AutoCAD

DATE	NAME	CHKD	REVISION	CHS/KEY

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Bill of Material

MPL Pulpers

INTERNAL

No.	Item	R	Drawing / Doc	Description	Size	Mater.	Std.	B	Weight (kg)	Qty.	Info	Unit
	STOD112838	00	STOD112838	DRIVE HP-33B				*				pc
1	VAL0165208			V-BELT SHEAVE 6/8V40.0-5050 Bore for bush 5050.	6x8V/40.0		Dodge			1.0	Psd.	pc
2	VAL0170136			TAPER BUSH 5050 d=4.500 in Keyway 1.0 in x 1.0 in	4.500 in		Dodge			1.0	Psd.	pc
3	VAL0168869			V-BELT SHEAVE 6/8V12.5-4040 Bore for bush 4040	6x8V/12.5		Dodge			1.0	Psd.	pc
4	VAL0168865			TAPER BUSH 4040 d=3.375 in Keyway 0.875 in x 0.875 in	3.375 in		Dodge			1.0	Psd.	pc
5	VAL0149047			V-BELT 8V1800	8V1800		Dodge			6.0	Psd.	pc
6	STO1013174AH	02	STO1013174	BELT GUARD 40"/12.5" 6x8V1800						1.0		pc

Item	R	Drawing	Description
STOD112838	00	STOD112838	DRIVE HP-33B

Note	Main project title	Project search key	Subtitle	Product	Date	Page
	Appleton Papers Inc.	APPLETON HP-33	B20173	HP-33B1	2008-01-24	1/1

pc = piece, mm = millimeter, m = meter, m2 = square meter, m3 = cubic meter, kg = kilogram, l = liter, in = inch, in2 = square inch, in3 = cubic inch, lb = pound, ft = feet, R = Rev., B = BOM, L = Level, S = Status

2 BROCHURES

2.1 Belt Drive

2.2 Taper Bush

2.3 Flowmeter (Safematic)

BELT DRIVE

1 BELT DRIVE

1.1 Safety during Pulley Removal

The heavy pulley can cause serious injuries.

The pulley will drop off the shaft immediately after the screws of the taper bush are loosened.

NOTE! Make sure the pulley is properly supported before unscrewing the screws.

The pulley is attached on the shaft with a TaperLock-type bush (E).

1.2 Pulley Removal

1. Follow the equipment’s safety instructions.
2. Remove the guards.
3. Shorten the shaft distance by moving the motor bed so that the belts come off the grooves without being forced.
4. Support the pulley.
5. Remove the possible lock washer from the end of the shaft.
6. Open the taper bush following the manufacturer's instructions.

The cross-section in the figure does not show the actual location of the holes used for installation and dismantling.

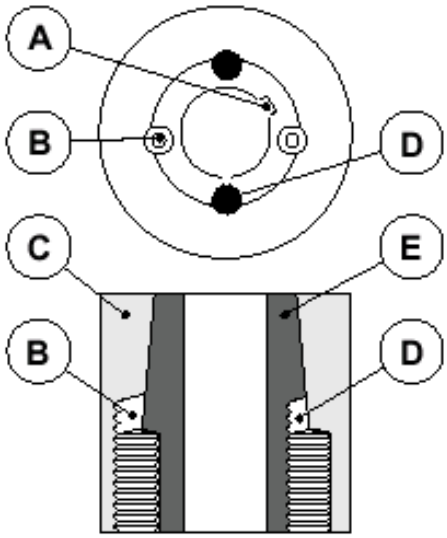


Figure 1 Diagram of a typical taper bush (STOA010374)

A Keyway

B Fastening screw hole

C Hub

D Removal hole

E Taper Lock bush (or corresponding taper bush)

1.2.1 Installing Pulley and Belt

1. Clean the pulley grooves, removing oil and grease.
2. Lift the pulley onto the shaft and fasten the taper bush according to the manufacturer's instruction. Check that no screws are left in the removal holes.
3. Check that the pulleys are aligned with one another. The deviation must not be greater than 0.002 A (A = shaft distance).
4. Install the possible lock washer onto the end of the shaft
5. Fit the belts into their grooves and tighten them by moving the motor bed. NOTE! Use a group V-belt in a series arrangement.
6. Install the guards into place.

1.2.2 Tightening the Belts

1. Rotate the drive by hand for a few cycles so that the belts settle in the grooves and the tension evens out.
2. Pre-tighten the belts by moving the motor bed and turning the drive by hand.
3. Check belt tension and measure the distance between the shafts.
4. Push the V-belt from the center of the shaft distance perpendicularly against the belt with a tension measuring gauge.
5. The amount of slack in the belt = the distance between the shafts in meters x 16 mm
   The amount of slack in the belt = the distance between the shafts in inches 1/64”
6. For the thrust value, see the table below.
7. Check the tightness for only one belt at a time.
8. As a measuring value for a new drive, use the highest value on the table
9. The first re-tightening should be done after approximately one hour of operation.
10. The second re-tightening should be done after approximately three hours of operation.
11. The third re-tightening should be done after 3 days; after this, the tightness should be checked every three months.

The thrust for a group V-belt is the number of profiles x the thrust for one belt. An alternative method is to use the belt's manufacturer-specific tightening methods based on the stretch or vibration frequency.

BELT	THRUST	
	D/mm	F/N
SPB	160-224	35-50
	236-315	50-65
SPC	224-355	60-90
	375-560	90-120

BELT PROFILE	SMALL SHEAVE		BELT DEFLECTION FORCE	
	RPM	OUTSIDE DIAM.	Min. lb	Max. lb
3 V	1000 - 3000	2,6 - 3,5	3,7	5,6
		3,65 - 6,0	5,1	7,5
		6,2 - 10,0	5,5	8,4
	Over 3000 - 5000	2,6 - 3,5	3,3	5,0
		3,65 - 6,0	4,4	6,6
5 V	600 - 1700	7,0 - 8,5	11,2	16,8
		8,6 - 12,0	13,3	19,9
		12,5 - 16,0	14,3	21,5
	Over 1700 - 2250	7,0 - 8,5	10,6	15,9
		8,6 - 12,0	12,8	19,3
8 V	300 - 1000	12,5 - 14,5	27,7	41,8
		15,0 - 21,0	33,0	49,7
		21,2 - 25,0	35,5	53,4
	Over 1000 - 1700	12,5 - 14,5	25,8	38,5
		15,0 - 21,0	29,7	45,1

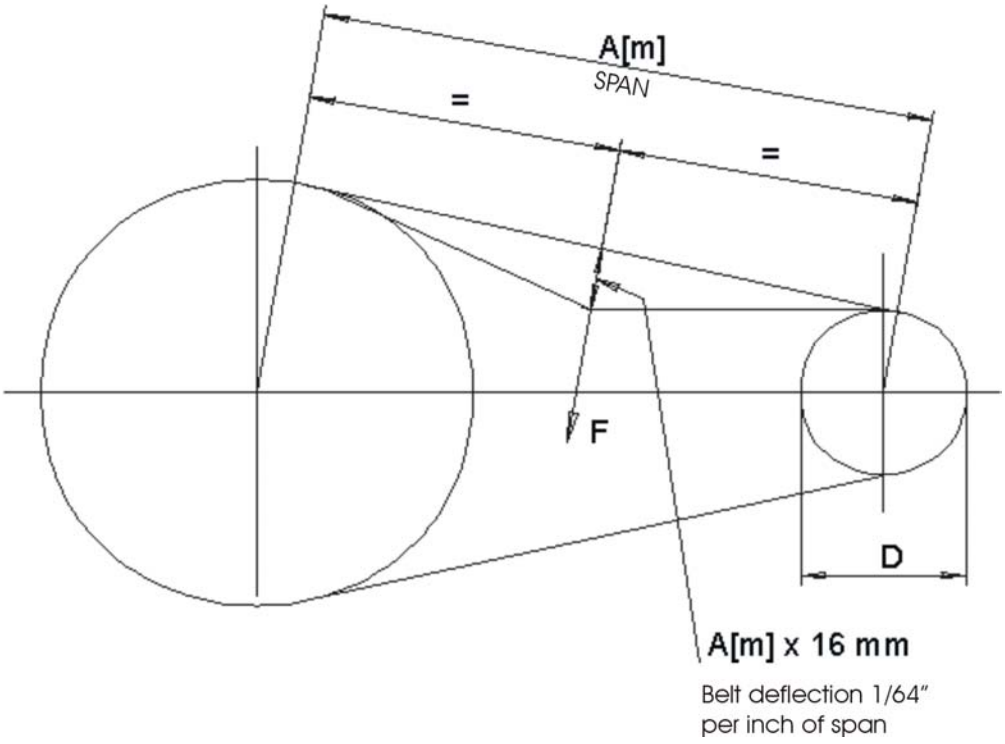
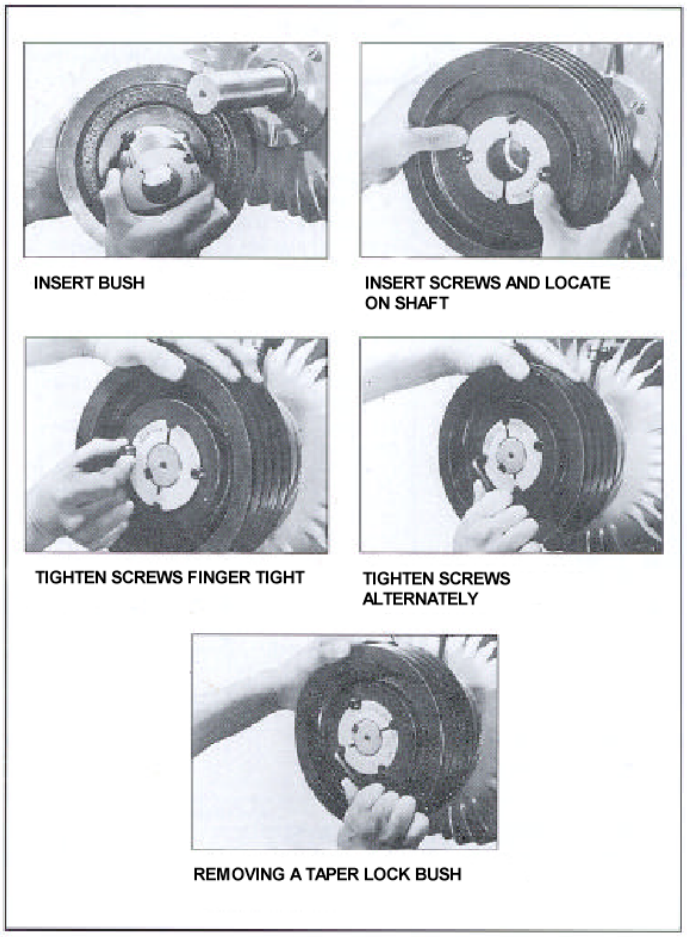


Figure 2 Measuring of belt tightness (STOA009526)

Taper bush Installation Instructions

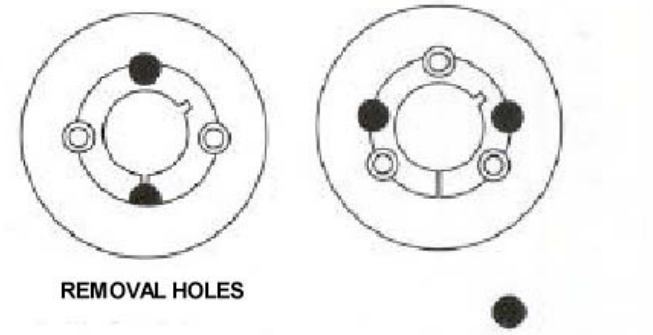
TO INSTALL

1. Remove the protective coating from the bore and outside of bush, and bore of hub. After ensuring that the mating tapered surfaces are completely clean and free from oil or dirt, insert bush in hub so that holes line up.
2. Sparingly oil thread and point of grub screws, or thread and under head of cap screws. Place screws loosely in holes threaded in hub, shown thus ○ in diagram.
3. Clean shaft and fit hub to shaft as one unit and locate in position desired, remembering that bush will nip the shaft first and then hub will be slightly drawn on to the brush.
4. Using a hexagon wrench tighten screws gradually and alternately to torque shown in table below.
5. Hammer against large-end of bush, using a block or sleeve to prevent damage. (This will ensure that the bush is seated squarely in the bore.) Screws will now turn a little more. Repeat this alternate hammering and screw tightening once or twice to achieve maximum grip on the shaft.
6. If a key is to be fitted place it in the shaft key way before fitting the bush. It is essential that it is a parallel key and side fitting only and has TOP CLEARANCE.
7. After drive has been running under load for a short time stop and check tightness of screws.
8. Fill empty holes with grease to exclude dirt.



TO REMOVE

1. Slacken all screws by several turns, remove one or two according to number of removal holes shown thus ● in diagram. Insert screws into removal holes after oiling thread and under head of cap screws.
2. Tighten screws alternately until bush is loosened in hub and assembly is free on the shaft.
3. Remove assembly from shaft.



Bush size		1008	1108	1210	1610	1615	2012	2517	3020	3030	3525	3535	4030	4040	4535	4545	5040	5050
Screw tightening torque (Nm)		5.6	5.6	20	20	20	30	50	90	90	115	115	170	170	190	190	270	270
Screw details	qty	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
	size (BSW)	¼"	¼"	3/8"	3/8"	3/8"	7/16"	½"	5/8"	5/8"	½"	½"	5/8"	5/8"	¾"	¾"	7/8"	7/8"
	Hex. socket size (mm)	3	3	5	5	5	6	6	8	8	10	10	12	12	14	14	14	14
Large end dia. (mm)		35.0	38.0	47.5	57.0	57.0	70.0	85.5	108.0	108.0	127.0	127.0	146.0	146.0	162.0	162.0	177.5	177.5
Approx. Mass (kg)		0.1	0.1	0.2	0.3	0.5	0.7	1.5	2.7	3.6	3.8	5.0	5.6	7.7	7.5	10.0	11.1	14.0

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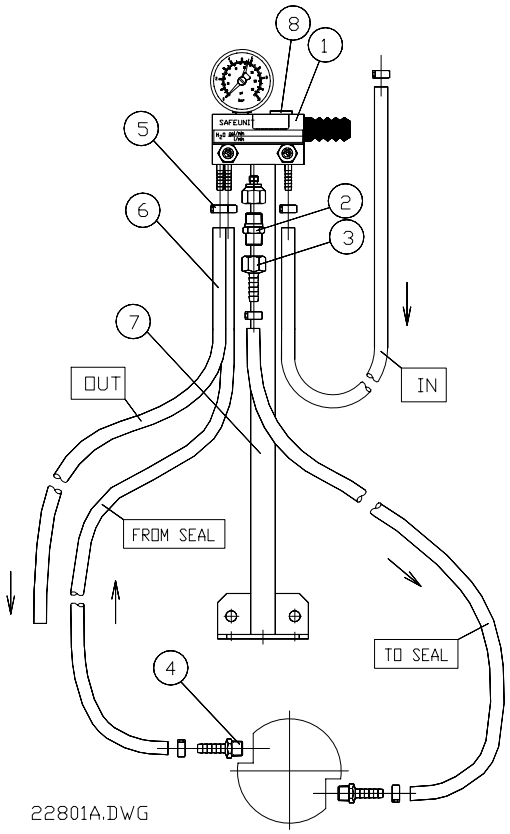
INSTALLATION AND OPERATION INSTRUCTIONS

No.	20000228EN
Date	01.06.1998
Revision No.	03
Date	11.12.2006

SAFEUNIT™ MONITORING AND CONTROL SYSTEM FOR SEAL WATER TYPE SFD COMPLETE FOR DOUBLE SEALS



BILL OF MATERIAL

1. Flowmeter	1 pc
2. Back valve	1 pc
3. Hose coupling	1 pc
4. Hose coupling	2 pcs
5. Hose clamp	7 pcs
6. Hose (inside diameter 3/8", 10 mm)	4 pcs
7. Stand	1 pc (option)
8. Alarm device	1 pc (option)*

* Alarm device type: AC-1, DC-1 or EX-1 (*see separate instructions: 20000224, 20000225 or 20000246*).

TECHNICAL SPECIFICATION

Operational limits

Safeunit™ can be used only in applications that use water as seal liquid.

Water temperature must be within +2 - +60 °C (36 - 140 °F). The maximum water pressure in the control unit is 25 bar (360 psi). The maximum pressure limit must not be exceeded under any circumstances.

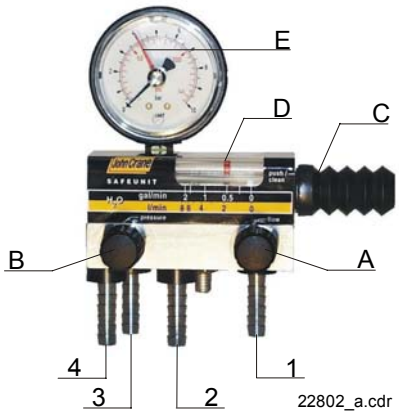
Operation circumstances

Safeunit™ must be istalled so that it does not get exposed to mechanical wear and tear.

Hot surfaces may not be near SafeunitTM, since they may be able to raise the temperature in Safeunit™ over 50 °C (122 °F). Due to danger of freezing, Safeunit™ must not be used in temperatures below +2 °C (36 °F).

Safeunit™ materials have been selected so that its corrosion resistance is sufficient in normal factory circumstances. Materials are not resistant to strong acids, alcohols and carbon hydrates. Weak acids and alkalis do not create any problems.

OPERATION INSTRUCTIONS OF SAFEUNIT™ FLOWMETER



Type SFD

- Lead water to the flowmeter
- Open both valves (A and B) fully open.
- Use the regulating valve (A) to adjust the desired flow.
- Use the regulating valve (B) to adjust the desired pressure (altough the flow decreases).
- Calibrate flow and pressure by turning both valves (add and reduce) to reach desired values.
- Adjust the red indicator (D) of the flowmeter and the red arrow (E) of the pressure gauge to show the desired values. This allows you to control changes in flow and pressure. These changes indicate the condition of the seal.

Water connections

1. Water in
2. To seal
3. From seal
4. Out

Cleaning

1. Press the button (C) on the right side of the unit. This does not affect the pressure or the flow of the sealing water.
2. The display surface is now cleaned by the float.
3. Repeat until full readability is reached.
4. When the alarm is connected, pushing the cleaning button won't cause an extra alarm.

Flow

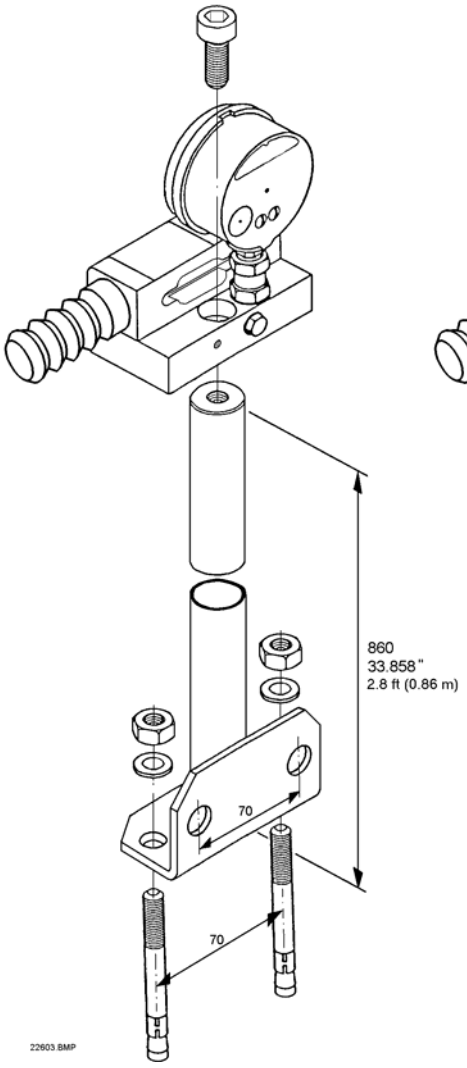
3 = 0 - 3	l/min	(0 - 0,75 GPM)
8 = 0 - 8	l/min	(0 - 2 GPM)
15 = 0 - 15	l/min	(0 - 4 GPM)

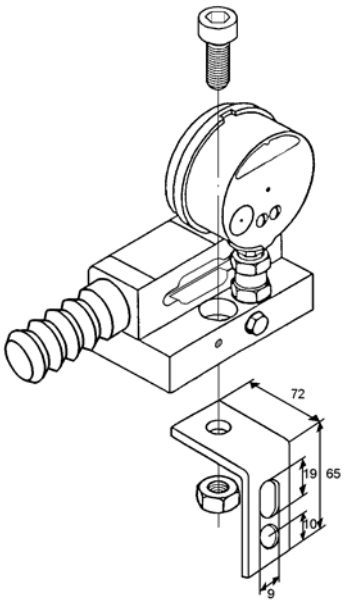
Pressure

10 = max 10 bar, 145 psi
25 = max 25 bar, 360 psi

INSTALLATION OF SAFEUNIT™

Install the Safeunit™ to a place where it is accessable for reading and testing according to drawings 1 or 2.





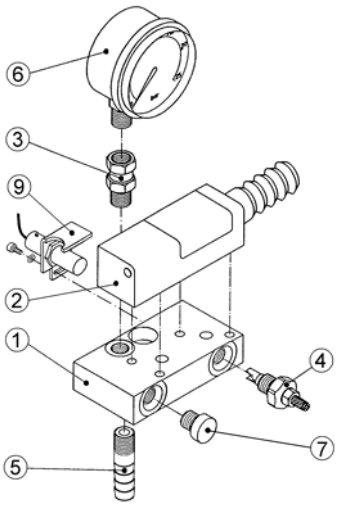
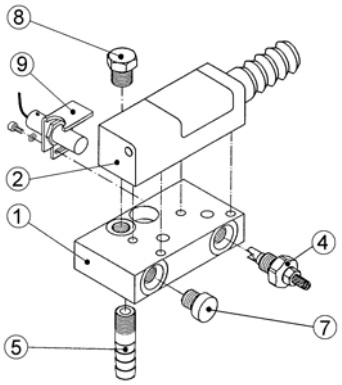
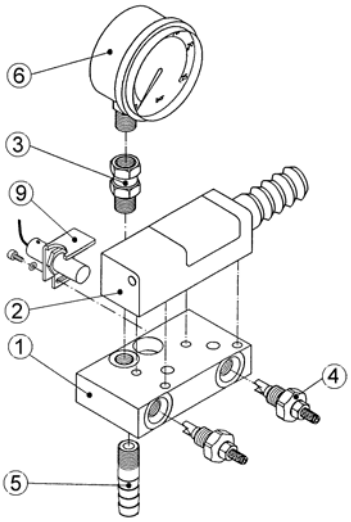
Drawing 1

Safeunit™ installation to stand 404317.

Drawing 2

Safeunit™ installation to any other stand.

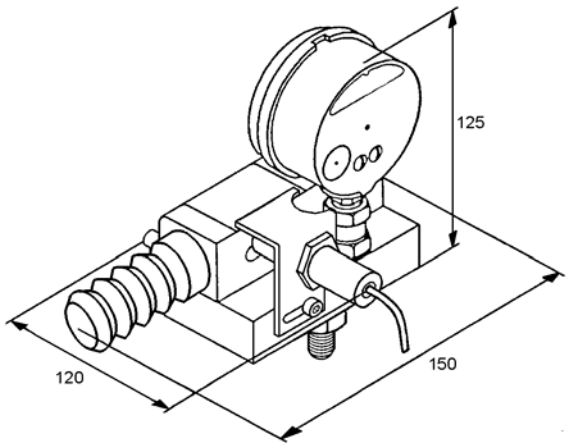
SAFEUNIT^{TM} SEALWATER MONITORING AND CONTROL SYSTEM SPARE PARTS

Type SFP	Type SFQ	Type SFD
 22604.BMP	 22605.BMP	 22606.BMP

ITEM	Type SFP	Type SFQ	Type SFD
1. BASE PLATE			
R-thread	22771370	22771370	22771370
NPT-thread	22771350	22771350	22771350
2. ACRYL PART			
3 l/min	22400050	22400050	22400050
8 l/min	22400100	22400100	22400100
15 l/min	22400150	22400150	22400150
3. PRESSURE GAUGE COUPLING	22640850		22640850
4. REGULATING VALVE	22400200 (1 pc)	22400200 (1 pc)	22400200 (2 pcs)
5. HOSE COUPLING	22640400 (2 pcs)	22640400 (2 pcs)	22640400 (4 pcs)
6. PRESSURE GAUGE			
0-10 bar	22600050		22600050
0-10 bar (AISI 316)	22600100		22600100
0-25 bar	22600150		22600150
0-25 bar (AISI 316)	22600200		22600200
7. PLUG FOR REGULATING VALVE	22770030 (1 pc)	22770030 (1 pc)	
8. PLUG FOR PRESSURE GAUGE		22661350	
9. ALARM			
AC-1	22770511	22770511	22770511
DC-1	22770515	22770515	22770515

DIMENSIONS

Flowmeter, model 3, 8 and 15 l/min



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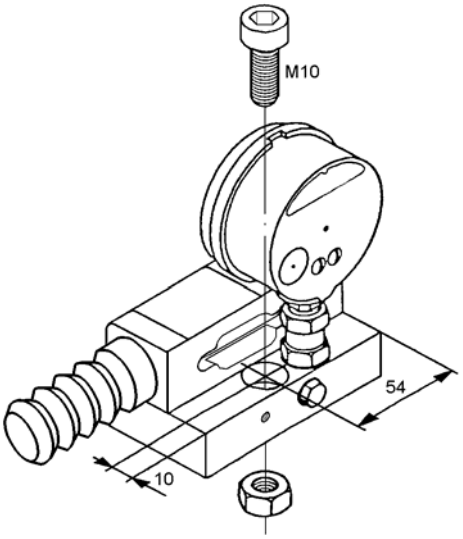

22608.BMP

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INSTALLATION AND OPERATION INSTRUCTIONS

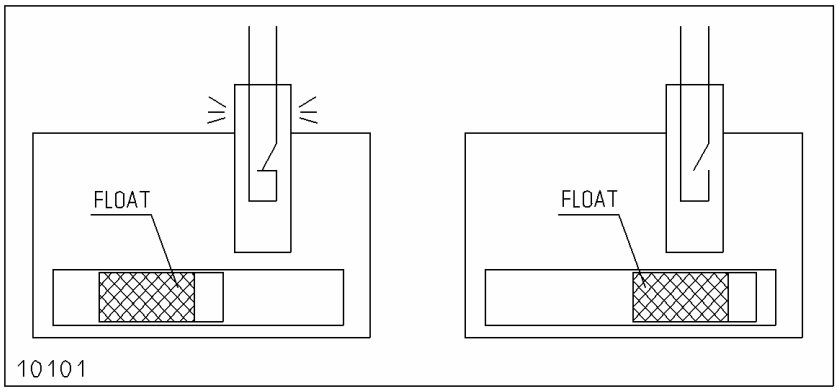
No. 20000224EN
Date 01.06.1998
Revision no.
Date

SEAL WATER MONITORING UNIT FOR TYPES SFP, SFQ AND SFD

Inductive alarm unit for low flow, AC-1 Suitable for AC- and DC-service

ALARM FUNCTION

The alarm signal is issued by an opening contact. The normally closed contact opens when the flow rate falls below a preset lower limit.



Flow rate within permissible range Alarm for low flow

INDICATOR FUNCTION

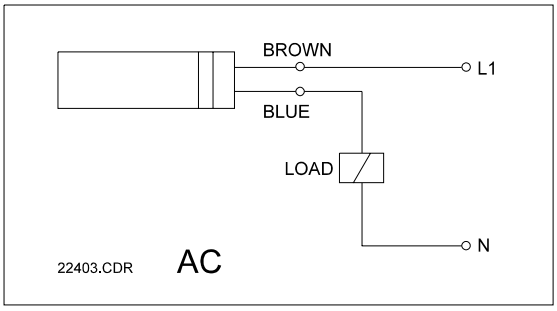
LED light on. Flow rate within permissible range.
LED light off. Low flow alarm activated.

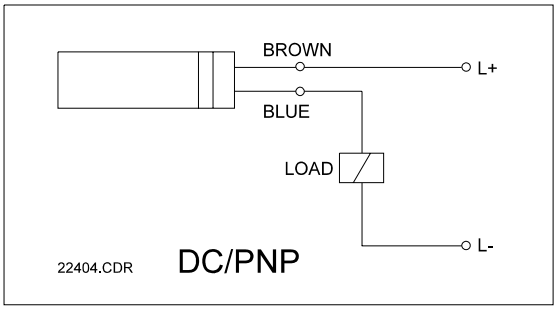
ADJUSTMENT RANGE OF THE ALARM UNIT

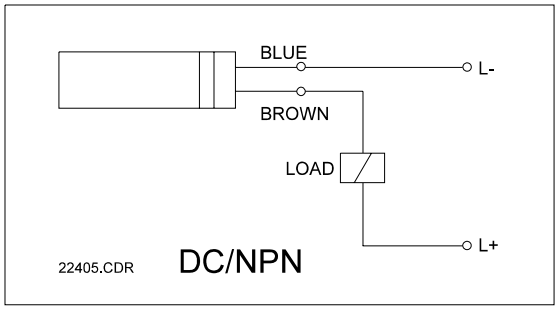
- Model 3: 0,5 - 2,0 l/min (0,1 - 0,5 GPM)
- Model 8: 1,0 - 3,0 l/min (0,25 - 0,75 GPM)
- Model 15: 6,0 - 12,0 l/min (1,5 - 3,0 GPM)

ELECTRICAL CONNECTION OF INDUCTIVE ALARM

Supply voltage:	20 ... 250 VAC/DC, 45 ... 65 Hz for AC
Load current:	I min. = 5 mA, I max. = 350 mA AC/100 mA DC
Leakage current:	Less than 2,5 mA/250 VAC; 0,8 mA/24 VDC
Switch contact:	Normally-closed (N/C) when the alarm is not activated
Protection class:	NEMA 4, IP 67







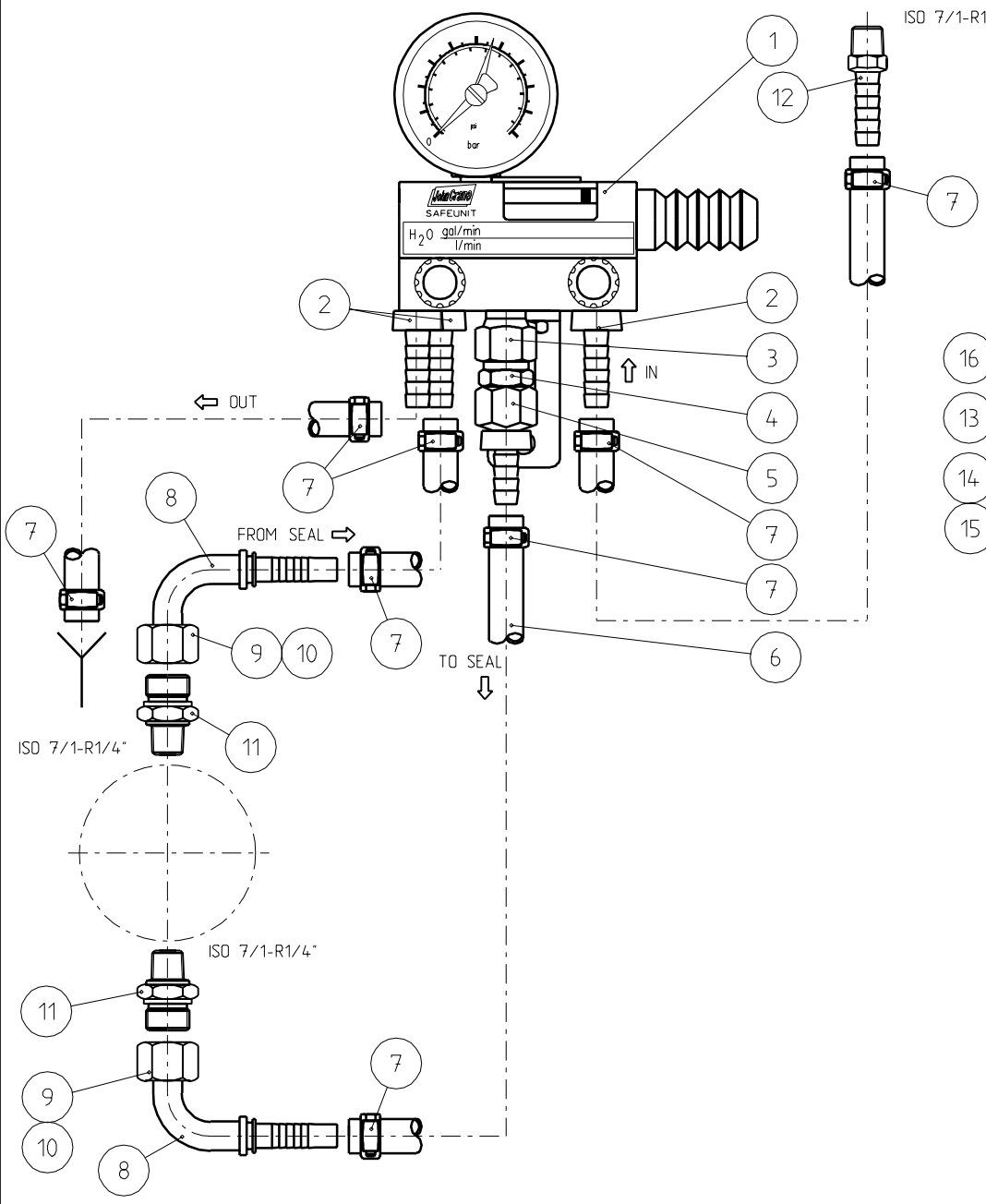
ADJUSTMENT OF THE ALARM UNIT

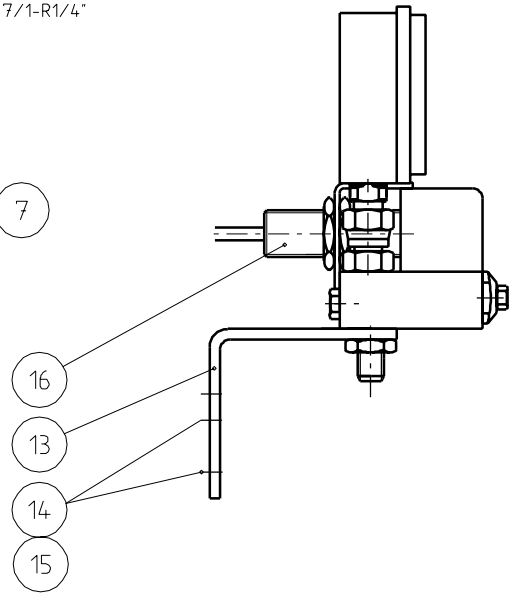
1. Set the flow to the desired lower limit by the flowmeter.
2. Loosen the locking screw and attach the alarm in to the body and move the alarm horizontally to the position in which the alarm is activated. The alarm is at the minimum value of the adjustment range when the alarm is in the leftmost position as viewed from the rear of the alarm unit which is, e.g., 1 l/min (0,25 GPM) for Model 8. To increase the setting toward its max. value which is, e.g., 3 l/min (0,75 GPM) for Model 8, move the alarm to the right.
3. Tighten the lock screw of the alarm.
4. Check the correct function of the alarm unit by the LED indicator. The LED should turn off at the alarm point and stay off when the flow rate is reduced to zero. The LED should stay on only when the flow is within the permissible range of flow rate.
5. Finally adjust the seal water flow rate to desired value with the help of the flowmeter.

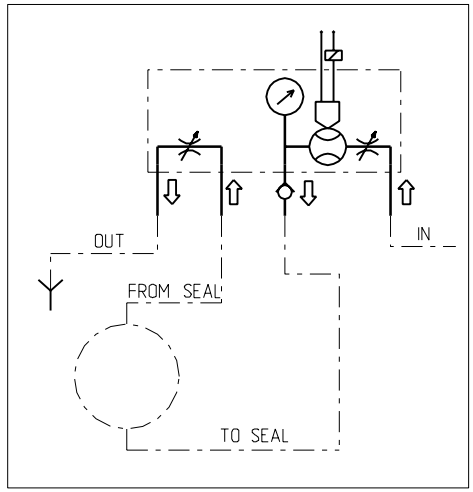
NOTE! Unnecessary alarms may also be caused by the occational pressure fluctuations in the sealing water line. Such erroneous alarms can be inhibited by, e.g, programming a delay in the logic control system or using a delay unit with an independent power supply.

The delay can be programmed as follows:

Fluctuation in the flow -> delay 20 seconds -> alarm -> delay 5 minutes -> shut down of the equipment.







ITEM	DESCRIPTION	DETAIL DRAW	MATERIAL	DIMENSIONS,TYPES	QTY/ITEM	
			MATERIAL DESCRIPTION		(WEIGHT KG)	PCS
		SPECIFICATION OF ITEM				

DESIGNED KaL	DRAWN KaL	CHECKED		PREVIOUS DRG	NEW DRG
SAFEMATIC MUURAME - FINLAND			2211306765 SAFEUNIT 306765 SFD-C-08-10-R1/4"/B/AC-1 METSO	DATE 30.04.2003	STOD017338
				SCALE	DRAWING NUMBER 306765 X REV.

John Crane Safematic

Safematic Oy

Bill of materials

Code **2211306765**
Revision **0**
Descriptio **SAFEUNIT 306765**
SFD-C-08-10-R1/4"/B/AC-1
Equipment **METSO**

Date 30.04.2003
Designed KaL

Part	Code	Pcs	Draw no.	Description	Material	Dimensions
0	2211306765	1	306765	SAFEUNIT 306765	SFD-C-08-10-R1/4"/B/AC-1	
01	228842000000	1	228842000000	SAFEUNIT	SFD-08-10 WOHC	
02	22640405	3	402556	HOSE COUPLING	AISI316	
03	22641560	1	402792	ADAPTER	AISI316	
04	22600850	1	402039	CHECK VALVE	AISI316	
05	22640590	1	403437	HOSE COUPLING	AISI316	
06	22640260	1	22640260	HOSE	TEXTILE REINFORCED	L=13000 3/8"
07	22640750	8	22640750	HOSE CLAMP	AISI316	
08	22641710	2	22641710	PORT CONNECTOR	AISI316	
09	12641060	2	12641060	FERRULE	AISI316	
10	12641210	2	12641210	NUT	AISI316	
11	22641584	2	22641584	UNION	AISI316	XPEL 12L ISO7/1-R1/4" H
12	22640370	1	403474	HOSE COUPLING	AISI316	R1/4"u-3/8"
13	22661720	1	401949	BRACKET	AISI304	
14	12661620	2	12661620	ALLEN SCREW	AISI316	M8x50
15	12661200	2	12661200	NUT	AISI316	M8
16	22770511	1	403714	ALARM	AC-1	

3 PREVENTIVE MAINTENANCE / LUBRICATION TABLE

1. Position	2. Delivery code	3. Title	4. Specification	5. Docum./ Brochure No.	6. Service interval	7. Unit	8. Action	9. No. of points	10. Lub. method	11. Qty/ point	12. Lubri-cant	13. K/S	14. Notes
		Horizontal pulper HP-33B/rotor unit	Bearing, rotor side		17	w	801	1	N	110	A	S	
		Horizontal pulper HP-33B/rotor unit	Bearing, drive side		17	w	801	1	N	110	A	S	
		Horizontal pulper HP-33B/rotor unit	Bearing, rotor side		24	h	801	1	X	0,9	A	K	
		Horizontal pulper HP-33B/rotor unit	Bearing, drive side		24	h	801	1	X	0,9	A	K	
		Horizontal pulper HP-33B drive	Motor bearings	x			814						
		Control unit for sealing water	Sealing water flow and pressure	x	1	w	809	1				K	
		Rotor Unit	Shaft seal	x	1	w	808	1				K	Cord packing tightening or replacing Mechanical sealing change When leakage occurs.
		Rotor Unit	Screen- and slot plates		8	w	807					S	
		Rotor Unit	Rotor clearance		52	w	817	1				S	
		Rotor Unit	Attachment		52	w	811	1				S	

Column 8. Action

801 lubricate or check oil level
802 clean and change oil or grease
803 dismantle, clean and check
804 clean and check, inside
805 clean and check, outside
806 check sound, temperature and vibration
807 check wear
808 check leaks
809 check operation
810 blow clean
811 check screw torque
812 grind or plane
813 check tension
814 see manufacturer´s inst.
815 replace
816 inspection by authorities
817 calibration
818 sample

Column 10.Lub. method

K circulation lubrication
M other
N nipple
P pressure lubrication
R grease filling
X central grease lub.
S smearing
U mist lubrication
O oil bath
V can lubrication

Column 11. Qty/point
g per point
l per point
l/min

Column 12. Lubricant
see symbols in lubricant table

Column 13.
S=at shutdown
K=during operation

metso paper Rautpohja

Prepared by:	Date:
J.Tepponen	24.1.2008

SERVICE/LUBRICATION TABLE

Customer: Appleton Papers Inc.

Machine: OptiSlush HP-33B

Name of book: Pulper Book

Document No: STOA102392GB

1. Position	2. Delivery code	3. Title	4. Specification	5. Docum./ Brochure No.	6. Service interval	7. Unit	8. Action	9. No. of points	10. Lub. method	11. Qty/ point	12. Lubri-cant	13. K/S	14. Notes
		Bearing unit	Attachment		52	w	811						
		Drive	V-belts		12	w	813	1				S	
		Drive	V-belts		12	w	807	1				S	
		Drive	V-belts		156	w	815	1				S	
		Horizontal pulper	Condition of bearings		8	w	806	2				K	
		Horizontal pulper			26	w	806	1				K	
		Horizontal pulper			52	w	805	1				S	
		Horizontal pulper					804	1				S	During every shutdown
		Horizontal pulper	Pipe connections		26	w	808					S	
		Horizontal pulper	Pipe connections		26	w	811					S	
		Horizontal pulper	Sealing water connections		24	h	808					K	
		Horizontal pulper	Sealing water connections		26	w	811					S	
		Horizontal pulper	Instrumentation air connections		24	h	808					K	
		Horizontal pulper	Instrumentation air connections		26	w	811					S	
		Guards			1	w	811					K	
		Drive motor					814	1					

Column 8. Action

801 lubricate or check oil level
802 clean and change oil or grease
803 dismantle, clean and check
804 clean and check, inside
805 clean and check, outside
806 check sound, temperature and vibration
807 check wear
808 check leaks
809 check operation
810 blow clean
811 check screw torque
812 grind or plane
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PREVENTIVE MAINTENANCE AND LUBRICATION TABLE

1 HOW TO READ THE SERVICE/LUBRICATION TABLE

The Service/Lubrication Table gives the required inspection, maintenance and lubrication schedule for various machine parts.

NO DAILY ROUTINES performed by the production and/or mechanical maintenance personnel are included in this table.

1. The "Position" column indicates the location of the machine part.
2. The "Delivery Code" column indicates the drawing or item number of the part in question.
3. The "Title" column indicates the part name.
4. The "Specification" column specifies the maintenance item in more detail.
5. The "Docum./Brochure No." column gives the applicable binder and brochure/section number if separate instructions exist for the item. Primarily follow the instructions provided by the device/component manufacturer.
6. The "Service Interval" column indicates the lapse of time between service actions.
7. The "Unit" column indicates the unit of time for service action frequency. This time unit is either hours (h) or weeks (wk).
8. The number in the "Action" column indicates the standard maintenance task required.
9. The "No. of Points" column gives the number of items per service action.
10. The "Lube Method" column letter indicates the method of lubrication used.
11. The "Qty/Point" column indicates the required quantity of lubricant per lubrication point:

- oz/point: always refers to grease lubrication
- USgal/point: always refers to oil lubrication
- USgal/min: always refers to circulation lubrication.

12. The "Lubricant" column gives Metso Paper's lubricant recommendation for the item. Each lubricant is marked with a symbol. For the symbols, refer to the Lubricant Table.

13. The "S/K" column indicates whether or not maintenance task can be performed during machine operation. Machine operation (K), shutdown (S).
14. The "Notes" column refers to any additional notes or separate instructions related to the maintenance of the item concerned.

2 RECOMMENDED LUBRICANTS

Grease Table

Symbol	Required Performance	Other Quality and Special Requirements
A	Lithium-based universal grease. Roller bearing grease 120 DIN 51825. Drop point not below 338 °F. Penetration 220...300. Operating temperature 248 °F.	Must not dissolve easily in water. Must contain anti-corrosive agents and antioxidants.
C	Specialty grease for hot conditions. Operating temperature 392 °F.	High-quality grease for hot applications. Applicable for lubrication of calender steam joints. Does not corrode.
D	Semi-fluid grease.	High-quality gear grease. Applicable for gears with vertical shafts. Does not corrode.
E	Sealing grease. Operating temperature range -13...302 °F. Composition: barium/synthetic oil. Color: reddish beige. Drop point DIN ISO 2176 > 302 °F. NLGI grade 2. RPM factor (n x d_m): 300 000.	Developed for lubrication of rubber elastic seals. Applicable for all types of rubber, including EPDM and natural rubber. Withstands cold and hot water, steam and alkali. Applicable for roller bearings.
F	Specialty lubricant for slide surfaces and lead screws. NLGI grade 2. Operating temperature 302 °F. Composition: barium/mineral oil. Color: white.	Reduces stick-slip movement. Must not dissolve easily in water. Prevents fretting corrosion.
G	Synthetic specialty grease for hot conditions. Thickener: lithium complex. Basic oil ISO VG 460 (460 cSt / 104°F). Penetration 300 – 340. NLGI grade 1.5. Drop point not below +500°F. Operating temperature up to +446°F.	Must not dissolve easily in water. Must contain anti-corrosive agents. Viscosity higher than 40 cSt at 212°F.
H	Grease for roller bearings submitted to high loads. Thickener: lithium complex. NLGI grade 2. Penetration 280. Drop point > +491°F. Basic oil viscosity (ASTM D 445) 1000 cSt. 4-ball weld test (ASTM D 2596) 620 kg (1367 lb).	Grease for slowly rotating roller bearings submitted to high loads.

Lubrication Oil Table

Symbol	Required Performance	Other Quality and Special Requirements
K	Oil for universal lubrication and circulation lubrication. Viscosity 200...240 cSt at 104 °F. Flash point 455...500 °F. Pour point 21.2...8.6 °F. Permitted operating temperature +248 °F.	Must not corrode bearings or gear wheels. Must contain effective anti-foam agents. Must contain anti-corrosive agents and antioxidants. Must not hamper separation of water from oil.
L	EP oil for worm gears and other heavy-duty applications. Viscosity 290...350 cSt at 104 °F. Flash point 356...446 °F. Pour point 21.2...-4 °F. Permitted operating temperature 158 °F.	Must not corrode lubrication points. Must contain pressure additives. Must have proven applicability for continuous use in heavy-duty worm gears.
M	Mist lubrication oil. Viscosity 42...51 cSt at 104 °F. Flash point 356...446 °F. Pour point 14...-22 °F. Permitted operating temperature 248 °F.	Must not corrode lubrication points. Must mist easily and spread evenly when atomized. Must provide perfect lubrication in continuous use tests.
N	Hydraulic fluid. Viscosity 62...75 cSt at 104 °F. Flash point 410...482 °F. Pour point 23...-22 °F. Permitted operating temperature 194 °F.	Must be non-emulsified and provide perfect lubrication. Must effectively resist foaming, corrosion and oxidation. Must not form deposits even at high temperatures. Must not discolor over long service periods.
P	ISO VG 100. EP oil for worm gears and other heavy-duty applications. Viscosity 90...100 cSt at 104°F. Flash point +446°F…+482°F. Pour point –11.2°F… -16.6°F. Permitted operating temperature 194°F.	Must not corrode lubrication points. Must contain pressure additives. Must have proven applicability for continuous use in heavy-duty worm gears.
R	Hydraulic fluid. ISO VG 68. Viscosity 62...75 cSt at 104°F. Flash point 410°F…482°F. Pour point 23°F…-22°F. Permitted operating temperature 194°F.	Must be non-emulsified and provide perfect lubrication. Must effectively resist foaming, corrosion and oxidation. Must not form deposits even at high temperatures. Must not discolor over long service periods.
U	Flushing oil for flushing the circulation lubrication system prior to startup.	Must be compatible with the lubrication oil. Minimum viscosity required by pumps must be considered when selecting oil. Viscosity approx. 68...100 cSt at 104 °F.

See the equipment-specific maintenance and lubrication table.