Erection Work, Operating and Maintenance Instructions

Machine **Turbomix TMX800**

Machine No.: 131997609
Year of construction:2013

Order Code: Dong Tien Paper,Vietnam
Order no.: PPF 40025865

TRANSLATION OF THE ORIGINAL OPERATING INSTRUCTIONS

Issued by:	PPF/Zhang Wenna, 2013-08	Revision:
Checked:	PPF/Ren Xiaojiang, 2013-08	Checked:

TABLE OF CONTENTS

1 INTRODUCTION

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

1.1 Use

Target group

This operating manual is intended for users with knowledge of mechanical engineering and is for the exclusive use of the operator and his personnel.

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

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

In particular, the following must be considered:

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

Supplementary instructions

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

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

Safekeeping

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

1.2 Standards and guidelines

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

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

1.3 Use of manual

Presentation

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

  Chapter on SAFETY

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

  Press the "xxx" switch

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

Pictograms

The following pictograms are used in the operating instructions:

Warning signs

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

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

Marks an instruction on handling of the machine.

Marks a useful piece of information.

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

e.g.  /MACHINE/SAFETY

Work steps

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

Numbering of pages, tables and figures

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

Abbreviations

Tab.	Table
Fig.	Figure

Illustrations and graphics

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

Detailed information on the equipment supplied

➨ .../PARTS BOOK

➨ .../SUPPLIER DOCUMENTATION

1.4 Warranty and liability

The ANDRITZ general terms of delivery and sale shall apply.

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

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

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

1.5 Name and address of the manufacturer

ANDRITZ AG
Stattegger Strasse 18
A-8045 Graz

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

ANDRITZ AG
Stattegger Strasse 18
A-8045 Graz

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

1.6 Copyright

2 SAFETY

2.1 General safety regulations

The Safety Chapter contains general safety regulations that must be observed when working with/on the machine/plant.

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

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

➨ .../SUPPLIER DOCUMENTATION

These safety instructions supplement the ANDRITZ operating instructions.

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

ANDRITZ requires the operator to provide the following:

- The operator has prepared a comprehensive, general safety program. Anyone working at or in the vicinity of the machine must have received training for working on plants of this type and on the process running there, including where to mount barriers and markings.

2.2 Danger and warning signs

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

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

DANGER

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

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

WARNING

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

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

CAUTION

This symbol points to a dangerous situation.

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

Further symbols and pictograms used are described in the INTRODUCTION chapter.

2.3 Intended use

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

Use of the machine/plant for any other purpose is considered contrary to its designated use.

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

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

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

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

2.4 General remarks on machine/plant safety

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

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

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

2.5 Hazardous applications

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

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

In particular, the following must be observed:

1. If combustible or potentially explosive materials are to be processed, all electric motors, cabling and operating elements MUST be explosion-proof. Furthermore, maintenance work on the plant MUST be performed using non-sparking tools. Smoking is forbidden.
2. If the material processed is toxic or is a dangerous fluid according to Pressure Equipment Directive 97/23/EC, appropriate safety measures must be implemented.

2.6 Duties of the operator

Intended use

The operator of the machine is responsible for its designated use.

Work instructions

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

Qualification of personnel assigned

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

The minimum legal age must be taken into account.

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

Instruction

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

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

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

Definition of areas of responsibility

The operator is responsible for:

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

Inspections and tests

The operator must:

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

Attachment of safety features

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

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

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

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

2.7 General duties of personnel

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

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

2.8 Safety devices

The machine/plant must not be operated without effective safety equipment.

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

Safety equipment and access thereto must be kept clear.

Lockable switches

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

Safety devices

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

The TurboMix must not be operated without the safety covers mounted.

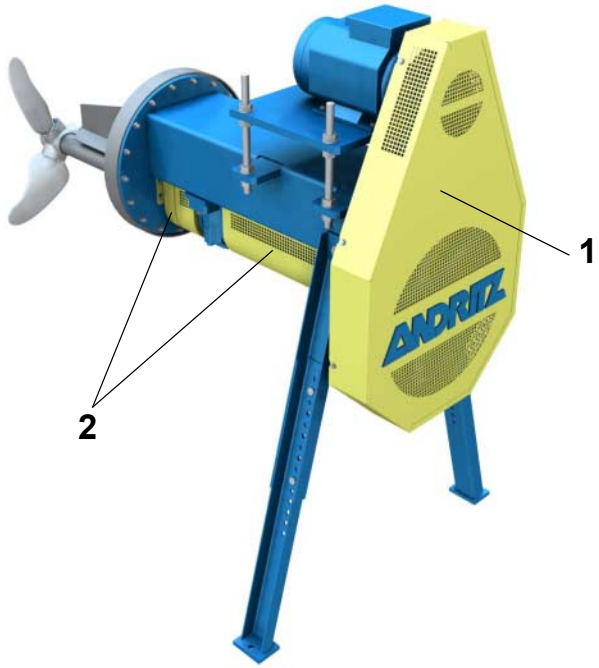

Fig. 2-1 Safety guards at the TurboMix

Item	Component
1	Belt guard
2	Shaft protection

EMERGENCY STOP button, safety shutdown

The operator must provide an EMERGENCY STOP device in the immediate vicinity of the TurboMix to guarantee that it can be shut down by immediately cutting off the power supply to the drive elements of the machine. Possible designs of the EMERGENCY STOP switch, see Fig. 2-2

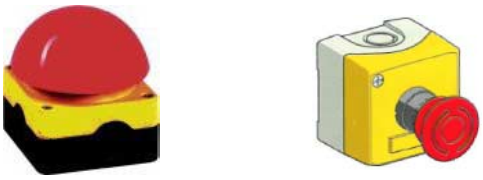

Fig. 2-2 EMERGENCY STOP button

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

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

Indicative, warning and prohibiting signs

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

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

Do not enter the container unless you have written permission to do so!

Hot surface warning!

To be mounted on or above the manholes of the tank in which the TurboMix is installed.

2.9 Personal protective apparel

General safety equipment

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

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

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

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

Tab. 2-1 Recommended safety equipment for certain work

Key to symbols

	Protective clothing to prevent the pulp from coming into contact with the skin.		Safety shoes as protection against foot injuries.
	Gloves to prevent hand injuries.		Ear protection to prevent damage to hearing.
	Goggles to prevent eye injuries.		Standard hard hat as protection against head injuries.
	Use full body harness when entering the tank.		Wear breathing apparatus if there is any risk from vapors and gases that are dangerous or damaging to health.

Tab. 2-2 Purpose of the safety equipment

2.10 Safety at the machine installation site

There is no permanent place of work at the TurboMix. Working near the TurboMix is only necessary during inspection and maintenance work. The equipment is operated at the DCS (process control system) located in a control room.

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

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

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

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

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

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

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

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

The TurboMix must be kept dry!

In icy conditions the external area around the tank must be gritted and appropriate safety measures implemented if the operator climbs onto the tank (e.g. safety harness mandatory).

2.11 Temperature

If the stock used is warmer than 73°C, the safety sign "Danger - Hot Surface" must be mounted on the tank (see Section 2.8), and all of the necessary safety measures must be implemented by the operator (e.g. hand protection, training. etc.).

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

2.12 Noise

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

The noise level is more than 85 dB(A) and is indicated in the motor operating instructions.

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

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

2.13 Electrical equipment

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

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

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

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

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

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

The operator is responsible for the appropriate lightning protection measures, particularly if the equipment is installed in the open air.

2.14 Welding work

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

DANGER

HOT WORK PERMIT REQUIRED!

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

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

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

2.15 Fluids, (liquids, gases, vapor or smoke)

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

The machine must be thoroughly cleaned after prolonged stoppages.

The area must be adequately ventilated.

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

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

2.16 Oils and greases

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

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

Also observe relevant requirements for disposal.

2.17 Chemicals

Safety data sheets

If chemicals are used, the measures prescribed in the safety data sheets for the individual chemicals must be observed.

Safety measures

The user shall be responsible for the following, among other things:

- wearing personal safety equipment, particularly adequate eye protection.
- installing water connections and emergency showers in order to rinse the eyes or skin under running water in the event of an emergency and having a source of drinking water if any chemicals are inadvertently swallowed.
- providing medical treatment in emergencies.
- preventing any chemical reactions that can lead to a risk of fire or explosion.
- regular training on the properties and handling regulations for the chemicals used.
- hanging the safety data sheets for chemicals in areas where chemicals are processed/produced.
- mounting of safety signs on the plant (e.g. "Warning against toxic and corrosive substances").
- mounting a means of flushing out the pump.
- interlocking the chemicals feed so that the no more chemicals can flow into the pump when the pump is shutdown.
- emptying the condensate/drainage line safely to prevent possible contact with chemicals.
- adequate ventilation in the workplace.
- thorough cleaning of the equipment before any maintenance work is performed.
- observing national regulations on disposal.
- ensuring that filling, handling and processing of chemicals is performed by trained personnel who have been given appropriate instruction and are authorized to do so.
- regular checks on seals so that no chemicals can escape.
- preparing an evacuation plan and conducting regular training sessions on evacuation measures.
- installation of a control system for detection, warning, interlocking and shutting down the plant section, as well as implementing further appropriate measures to protect individuals and plant sections.

2.18 Work in enclosed vessels and in confined spaces

Definition

All operating equipment that is closed off towards the surrounding atmosphere is considered an enclosed vessel. This includes shafts, channels, pipework and cavities in machines.

Procedure

Step	Procedure
1	**The safety measures must be defined in writing before beginning any work.** The safety measures must be defined by a competent expert in this field.
2	**Permit to enter an enclosed vessel, to be issued by a supervisor who is present at all times.** This supervisor must check personally that the measures defined in writing are implemented and thus, that it is safe to enter the enclosed vessel.
3	**Permanent supervisor available for rescue measures.** There must always be someone present who is well versed in the required protective and safety measures. This person must be capable of rescuing whoever is inside the container or of fetching help without actually leaving the place of the incident.
4	**Approval for re-start to be given by permanent supervisor.**

Tab. 2-3 Working in enclosed vessels - procedure

Specimen permit to enter an enclosed vessel, see **Section 2.19**.

Emptying and cleaning

The enclosed vessel must be disconnected reliably from all pipes leading to and from it.

The following shut-off devices are mandatory for automatic and remotely controlled shut-off devices:

- Blanking plates, blank flanges or two shut-off valves mounted one after the other with a pressure relief opening between the two. (Mount warnings against switching the equipment on again.)

Possible cleaning methods:

- Flushing out
- Steaming out
- Using high-pressure cleaning equipment

If high-pressure cleaning equipment is used in a potentially explosive atmosphere, the cleaning lance must always be made of non-sparking material.

The enclosed vessel should only be cleaned mechanically in exceptional cases as this work requires someone to enter the vessel.

Safety measures against dangers from moving parts

Agitators, crushers, endless screws, and live bottom discharge units inside the tank that are operating or start up unexpectedly when someone enters or is working inside the tank can cause serious injury!

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

Moving parts that are able to change position and thus have crushing or shearing points must be secured in position with supporting bars or equivalent measures (e.g. lowering).

Ventilation – protective breathing equipment

The ventilation system must be sized such as to maintain the concentration of noxious substances below the maximum concentration permitted in the work place and also to ensure that sufficient oxygen is available. This will ensure that it is possible to work without protective breathing equipment and that there is no risk of fire or explosion. Ventilation is only permitted with air. It is forbidden to ventilate using pure oxygen or air with an increased oxygen content!

If the concentration of noxious substances exceeds the maximum permitted values, suitable protective breathing equipment must be used.

Respiratory equipment		
Oxygen content	**Concentration of noxious substances**	**Safety measures**
>17%	< MAC	None
>17%	> MAC < Retaining capacity	Filter mask
>17%	> MAC > Retaining capacity	self-contained breathing protection
<17%		self-contained breathing protection
	50% of lower explosion limit	Entry is forbidden

Rules for ventilation

- Solvent vapors are heavier than air, thus they must be extracted by suction at the lowest point of the tank.
- Fresh air should be blown in close to the respiratory organs.
- Ventilating efficiency should be monitored with measuring instruments.
- If substances presenting a fire hazard are extracted, the risk of explosion must be considered.

Further regulations and measures

Gas bottles

It is forbidden to take gas bottles or liquid fuels (liquid gas) into containers (e.g. welding equipment, lamps or soldering equipment).

Safety harness

If it is necessary to enter an enclosed vessel in which there is a danger of fire or of harmful work substances being present or a risk of oxygen deficiency, the person entering the vessel should be roped up with a safety harness.

The following points must be observed:

- The end of the rope must be secured outside the vessel. Do not allow the rope to sag too much.
- Each worker must be monitored by a second person outside the danger zone.
- It must always be possible to evacuate a worker from the danger zone without delay.
- If the only rescue route is upwards, use only approved rescue equipment, such as cable winches or manual lifting devices.

In the presence of working substances that may ignite, rescue ropes must either be plastic-sheathed steel ropes or ropes with at least equivalent heat-resistance properties.

If roping up is not possible, suitable escape hatches must be available that will allow anyone inside the vessel to climb out without assistance from outside.

Opening a manhole

In order to prevent any risks, such as hot and dangerous media splashing out, the filling level in the tank must be checked against the following table before opening the manhole:

Step	Activity
1	Check the tank filling level at the display for level monitoring (in the control room).
2	Visual check on the tank filling level by looking into the tank through the cleaning port in the roof of the tank. **The filling level must be below the manhole!**

Tab. 2-4 Check the filling level in the tank

2.19 Permit for work in enclosed / confined spaces

Object / location / point at which work is performed: . . . . . .
Type of work: . . . . . .
Supervisor . . . . . .

Preparatory protective measures

Which substances are or were present?

Amount / concentration . . . . . .

What substances can form?

Amount / concentration . . . . . .
Existing equipment . . . . . .
Equipment brought in . . . . . .

Access ports to be cleared:

No. / size . . . . . .

Definition of safety measures

Vessel to be emptied yes p no p Type: . . . . . .
Residue to be removed yes p no p Type: . . . . . .
Ventilation: natural p technical p Type: . . . . . .
Air analysis required . . . . . yes p no p
Protective breathing equipment required . . . . . yes p no p
Equipment available or brought in . . . . . yes p no p
if so, what are the safety measures? . . . . . .
Personal protective apparel required . . . . . yes p no p
if so, what protection measures? . . . . . .
Explosion protection measures required . . . . . yes p no p
if so, what protection measures? . . . . . .
Look-out personnel. . . . . yes p no p
Rescue equipment required . . . . . yes p no p

Safety measures cancelled

by . . . . . .
Safety measures mentioned were observed: . . . . . .

Approved

from _____ at _____ hrs to _____ at _____ hrs

_____ _____

(Supervisor) (Contractor or sub-contractor)

3 TECHNICAL DATA

3.1 Data

Propeller diameter800

installable motor power

Speedrpm	220	246	277	308	
Output KW	5.5	7.5	11	15	

Sealing water

Flow rate . . . . . 0,5 - 2 l/min
Pressure . . . . . 4 bar
Temperature . . . . . 20 - 40 °C
Quality . . . . . 75 Micron (fresh water)

Weights

Total weight480 kg
Welding ring . . . . . 38 kg
Support . . . . . 161 kg
Drive shaft with bearing assembly . . . . . 69 kg
Propeller blade . . . . . 4,5 kg
Propeller (hub with blade) . . . . . 30 kg
Drive . . . . . 88 kg
Protection device . . . . . 15 kg

Medium

Medium . . . . . Pulp, water, sludge
Medium temperature range . . . . . 10°C - 90°C
Medium consistency . . . . . 0% - 6%
pH-range . . . . . 6 -10

4 DESCRIPTION

4.1 Field of application

The TurboMix is used to mix or agitate fiber pulp suspensions.

Fig. 4-1 Turbomix TMX800

4.2 Main components of the machine

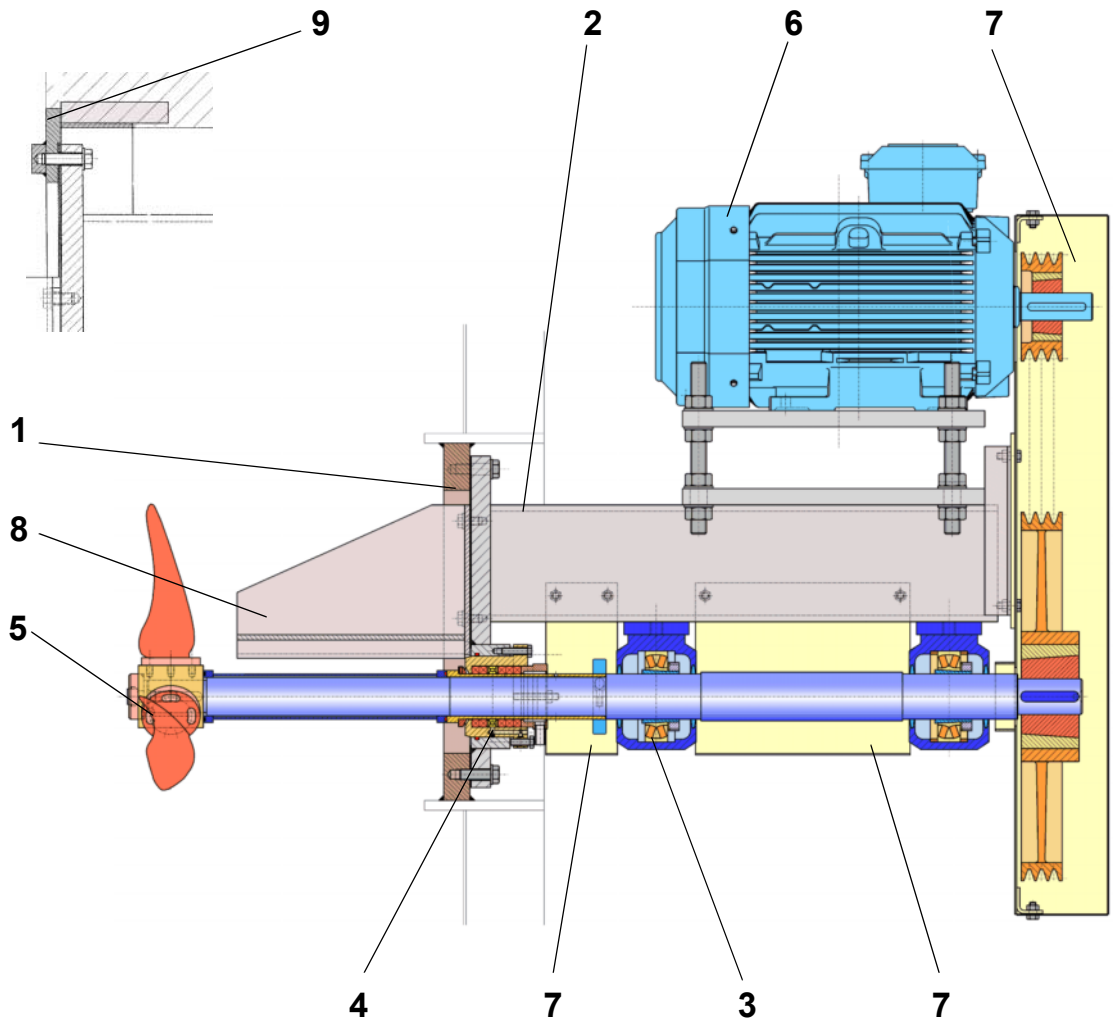

Fig. 4-2 Turbomix TMX800

Item	Component	Item	Component
1	Welding ring	6	Drive
2	Bracket	7	Safety covers
3	Bearing assembly	8	Guide plate
4	Seal	9	Wall ring
5	Propeller		

Welding ring (1)

Function: Securing the TurboMix to the tank.

Design: The welding ring is a massive flange made of acid-proof stainless steel and is welded into the shell of the tank.

Bracket (2)

Function: Holding the bearing, the seal and the drive.

Design: Welded structure made of steel.

Bearing assembly (3)

Function: Holding and supporting the agitating element.

Design: Two split pedestal bearing housings are screwed to the bracket. The steel drive shaft is supported on two bearings.

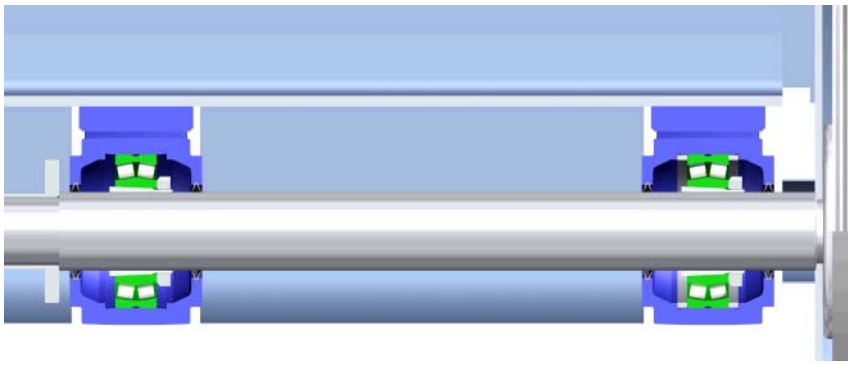

Fig. 4-3 Bearing assembly

Seal (4)

Function: The seal prevents the medium from escaping from the tank. The seal must have a continuous supply of sealing water. The connecting dimension and water requirement are indicated in the arrangement drawing.

Design: Several packing rings and the lantern ring are mounted in the stuffing box housing. The sealing water connection is located at the stuffing box housing .

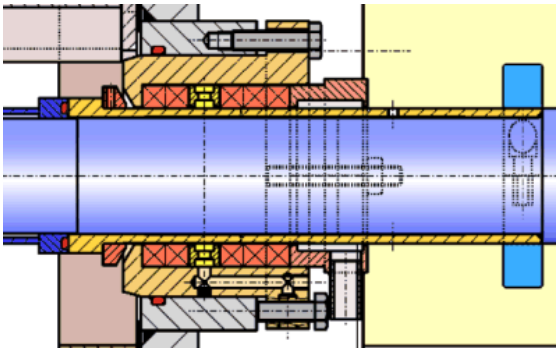

Fig. 4-4 Seal

Propeller (5)

Function: The propeller ensures that the medium is circulated in the tank.

Design: The propeller consists of a hub with two acid-proof, stainless steel vanes screwed onto it.

Fig. 4-5 Propeller

Drive (6)

Function: Driving the propeller.

Design:

- Three-phase asynchronous motor (**6a**)
- V-belt pulleys (**6b**)
-

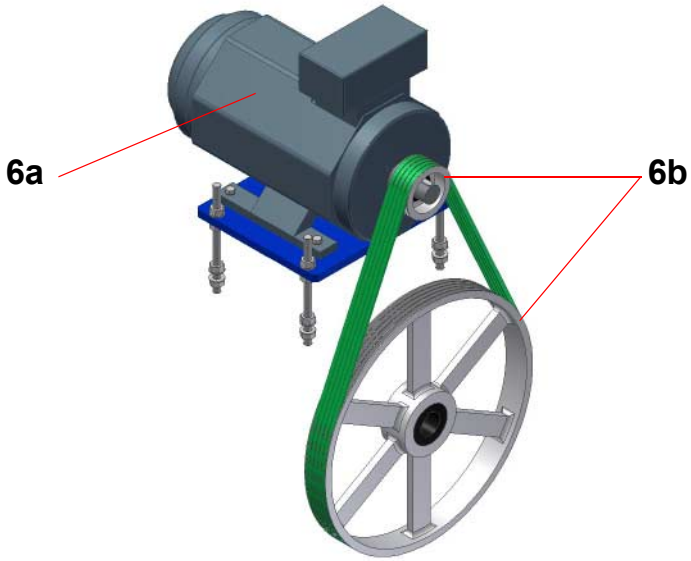

Fig. 4-6 Drive

Safety covers (7)

Function: The safety guard prevents direct access to rotating parts and protects the TurboMix against foreign objects.

Design: The safety guards are made of sheet steel and mounted on the bracket. They can be removed quickly for maintenance work.

Guide plate (8)

Function: The guide plate influences flow of the medium.

Design: Welded structure made of acidproof stainless steel. The guide plate is screwed to the bracket (**2**).

Wall ring (9)

Function: Securing the TurboMix to the tank.

Design: The welding ring is a massive flange made of acid-proof stainless steel and is set in the concrete of the tank.

4.3 Machine controls

The machine is controlled and also switched on and off from the DCS.

The machine must be switched off automatically under the following conditions, regardless of which mode is set in the DCS.

- EMERGENCY STOP has been activated
  Caution! When the EMERGENCY STOP is activated, the energy supply to the machine's drive motor is shut down.
- The level in the tank is too low.
  The energy supply is shut down via a limit value switch (the limit value switch is normally an adjustable software switch in the DCS control program).
  The shutdown (1) and the switching-on point (2) are set according to Fig. 4-7.

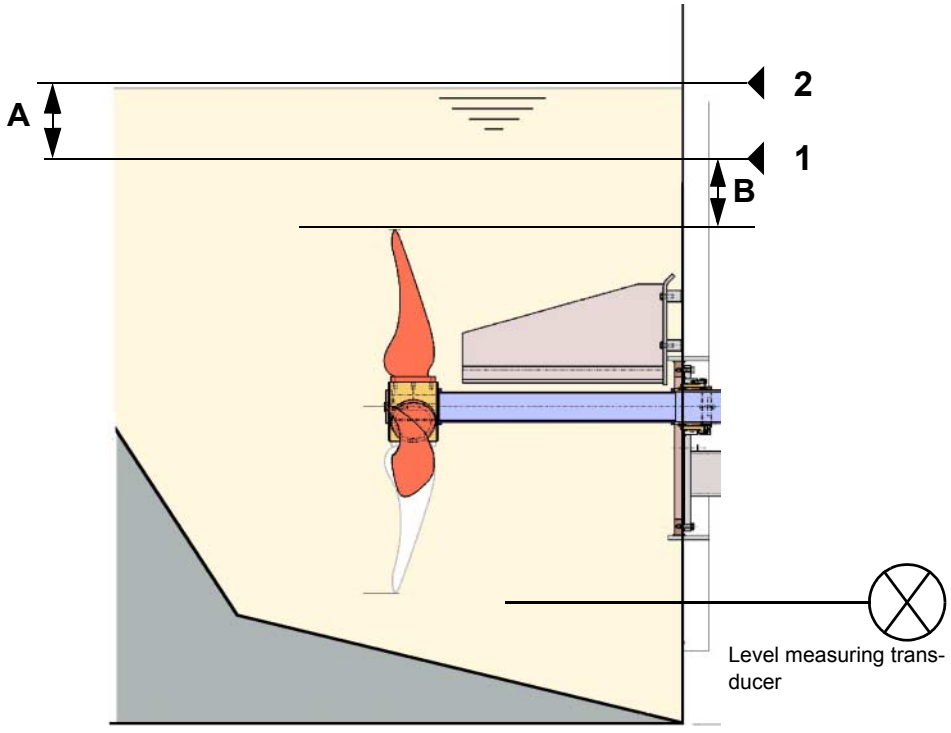

Fig. 4-7 Switching points

TMX	A (hysteresis)	B
TMX800	150	100

Tab. 4-1 Switching points

4.4 Instrumentation

- Level measuring transducer for continuous measuring of the tank filling level. The level measuring transducer should not be installed in the tank above the middle of the propeller.

Options at customer's request:

- Sealing water monitoring unit with setting range from 0.3 - 3.0 l/min and minimum flow rate switch (setting range from 0.5 - 2.0 l/min).

5 ERECTION WORK and TRANSPORT

5.1 General

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

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

5.2 Safety instructions

DANGER

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

General safety regulations

All applicable accident prevention regulations must be observed.

The applicable regulations for work in enclosed and confined spaces must be observed (➡ /SAFETY).

Potential risks caused by gases and vapors forming must be analyzed in detail. The appropriate safety measures must be implemented.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads against falling from a height.

Do not step or walk below suspended loads! Standing below suspended loads can have fatal consequences and thus is strictly forbidden!

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

Qualification of personnel assigned

Transport and unloading is to be carried out by personnel specially familiar with such work.

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

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

Personal protective apparel

The following protective equipment must be worn when carrying out installation and transport work:

- Hard hat
- Protective clothing
- Protective gloves
- Safety shoes
- Eye protection

5.3 Transport

DANGER

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

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

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

Do not step or walk below suspended loads!

Delivery

The TurboMix is supplied pre-assembled. Machine components (propeller blades, belt drive, etc.) and auxiliary materials are packed in crates.

Transport sizes and weights are stated in the shipping documents.

Largest supply weights:
➡ .../TECHNICAL DATA

Transport sketch

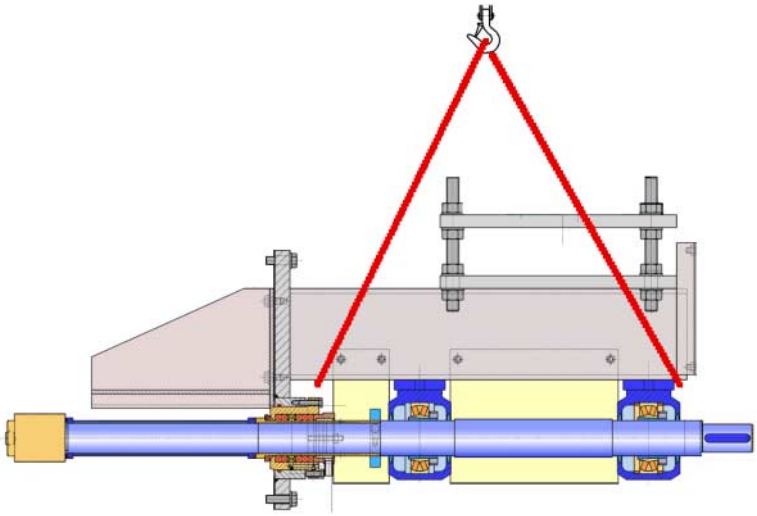

Fig. 5-1 Transport of TurboMix

Acceptance

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

5.4 Storage

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

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

5.5 Installation

General

WARNING

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

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

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

Required documentation at installation site

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

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

Protective coating of preserving agent

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

The preservative grease need not be removed.

DANGER

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

DANGER

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

Moving parts that are able to change position and thus have crushing or shearing points must be secured in position with supporting bars or equivalent measures (e.g. lowering).

Mounting the welding ring

Mount the welding ring according to the following table:

Step	Activity
1	Align welding ring according to the foundation drawing.
2	Weld in the welding ring leak-tight with 5mm fillet welds on either side according to the foundation drawing.

Tab. 5-1 Mounting the welding ring

DANGER

HOT WORK PERMIT REQUIRED!

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

Mounting the wall ring

Mount the wall ring according to the following table:

Step	Activity
1	Align and set the wall ring in concrete according to the foundation drawing.

Tab. 5-2 Mounting the wall ring

Mounting the TurboMix

Mount the TurboMix according to the following table:

Step	Activity
1	Apply seal (**1**) at welding or wall ring.
2	Attach the TurboMix according to **Fig. 5-1**.
3	Mount the TurboMix at the welding ring or wall ring (**2**) and screw tight.
4	Align, weld and secure the support (**3**) to the foundation with shear connectors. **CAUTION: The support should be secured to the same foundation as the tank.** See ➡ arrangement drawing and assembly drawings
5	Mount the propeller (see ➡ /MAINTENANCE).

Tab. 5-3 Mounting the TurboMix

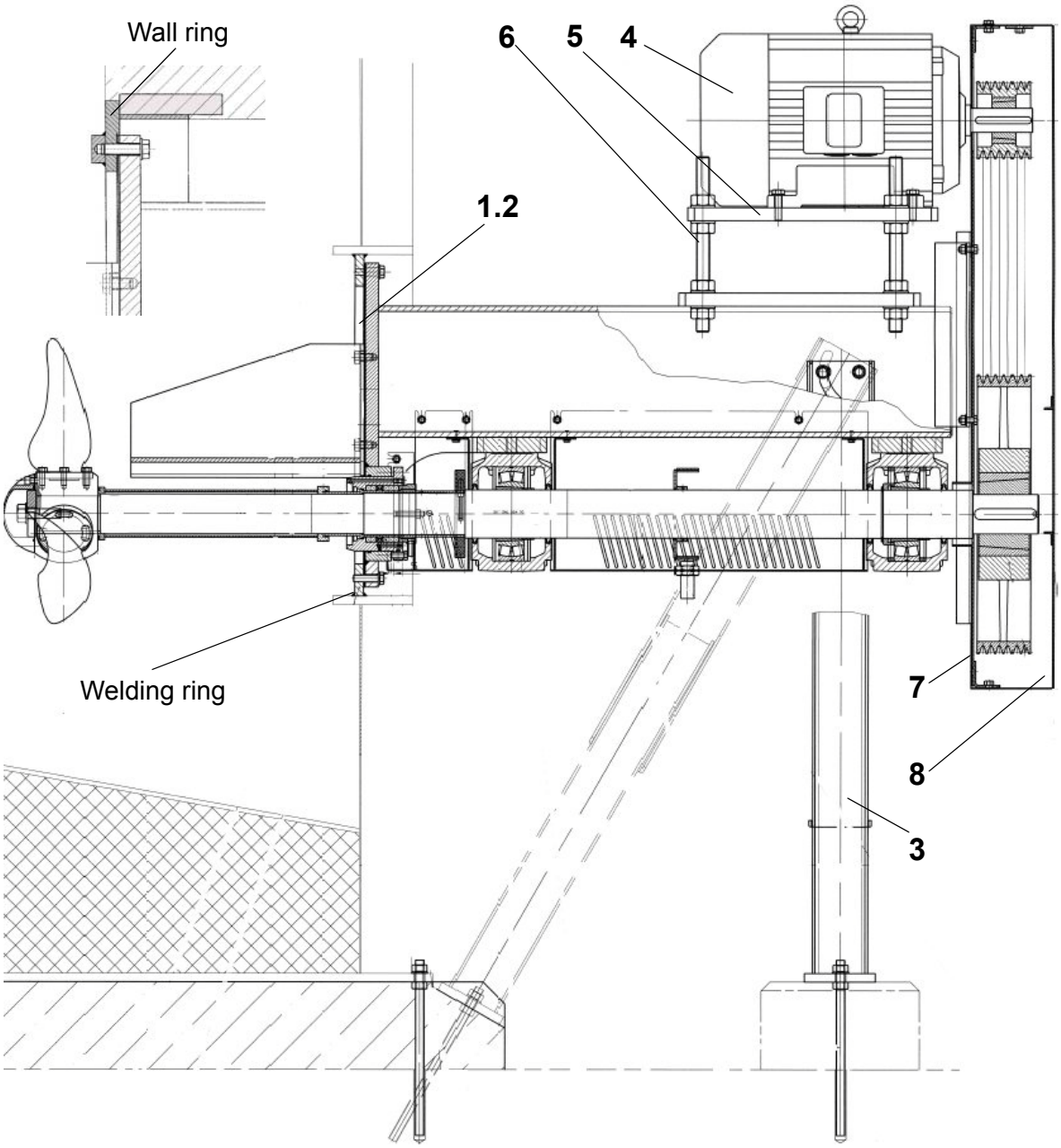

Fig. 5-2 Mounting the TurboMix

Mounting the motor

Mount the motor according to the following table:

Step	Activity
1	Place the motor (**4**) on the bracket (**5**) and bolt to the bracket.
2	Mount belt guard (**7**) on the machine side.
3	Place the feather key in the shaft groove, align the V-belt pulleys to one another, and mount with the V-belts (see ➡ /MAINTENANCE).
4	Tension the V-belts with the tensioning device (**6**) (see ➡ /MAINTENANCE).
5	Mount cover (**8**) on belt guard.

Tab. 5-4 Mounting the motor

5.6 Connections

Sealing water connection

All connections and connecting dimensions at the TurboMix are shown in the arrangement drawing.

CAUTION

Errors in the installation of pipework and hoses may result in risks to life and limb and in damage to the machine. Mount all pipes stress-free and free of vibration.
The pipework must be mounted such that it does not stress the machine during operation (e.g. by heat expansion of the pipes).

Electrical equipment

The complete electrical installations are to be set up and operated according to the applicable standards.

Safety devices

The following safety devices are to be provided by the operator:

- EMERGENCY-STOP button near the TurboMix drive
- Automatic sealing water monitoring (option).
- Device for safe disconnecting of all drives from the power supply during maintenance and repair work. This can be achieved with a maintenance switch, lockable racks in the MCC, or with other suitable measures that comply with the safety regulations.

CAUTION

Risk of injury from rotating parts!
Clothing and parts of the body can be caught up in rotating parts.

Other work

Other work to be completed:

- Clean the machine.
- Mount safety covers.

5.7 Cold test (preparation for initial start-up)

Sense of rotation of the machine

Prerequisites

- Shaft seals are set, but the sealing gland has not yet been pressed on.
- Sealing water pipe flushed out and sealing water available in the quality specified
- Motor for the main drive is connected up to the electricity supply.
- V-belt drive is mounted correctly
- Vessel is empty (no medium)
- Safety covers mounted correctly and EMERGENCY STOP devices checked and functioning.
- Coupling (machine / motor) is mounted correctly

Check sense of rotation

The sense of rotation of the machine should be checked according to the following table:

Step	Activity
1	Turn on supply of sealing water.
2	Switch motor on briefly.
3	Sense of rotation (according to Fig. 5-3) facing the rear side of the agitator: **"anti-clockwise"**
4	Switch motor off again.
5	Turn off sealing water supply when the TurboMix has stopped rotating.

Tab. 5-5 Checking the sense of rotation of the machine

Fig. 5-3 Sense of rotation of the machine

Lubrication

- Initial filling of lubricant according to lubricating schedule (bearings, etc.).

CAUTION

Damage to machine due to use of wrong lubricants.
Only use lubricants with the properties listed in the lubrication schedules.

Cold test

The checks to be performed must be carried out according to the cold test report and ticked off after completion.

- Check functioning of the shaft seal
- Check belt tensioning
- Rotate TurboMix by hand

5.8 Disassembly and disposal

DANGER

The machine must be disconnected from the power source and secured to prevent switching on again before disassembly!
The machine should only be disassembled by qualified and authorized personnel.

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

Machine parts

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

Plastic parts

WARNING

Synthetic components may be flammable!
Observe the local fire protection regulations. When separating the materials, do not work with welding devices or other equipment that generates sparks.

Additives

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

Other metal groups to be separated are:

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

6 START-UP

6.1 General

This Chapter describes the preparations and steps required for initial start-up of the TurboMix TMX800.

6.2 Safety instructions

DANGER

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

General safety regulations

All applicable accident prevention regulations must be observed.

The applicable regulations for work in enclosed and confined spaces must be observed (➡ /SAFETY).

Potential risks caused by gases and vapors forming must be analyzed in detail. The appropriate safety measures must be implemented.

Qualification of personnel assigned

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

Personal protective apparel

The following protective equipment must be worn when carrying out start-up and erection work:

- Hard hat
- Safety shoes
- Protective clothing
- Eye protection
- Protective gloves

6.3 Prerequisites for start-up

The following must be checked before start-up:

- Erection work completed.
- Cold test completed.
- Installation site has been cleared and cleaned.
- The tank has been cleaned.
- Electricity, water and pulp are available.
- Supply of sealing water to shaft seal has been checked.
- All safety guards mounted.
- First filling of lubricants (gearing, bearings, etc.) provided.
- All propeller blades have been set identically.
- All electric interlocks and EMERGENCY STOP safety devices are functioning and have been checked.
- The sense of rotation of the machine has been checked.
- All personnel know the location of the EMERGENCY STOP switch.
- All control circuits have been installed and tested.
- Process control system (DCS) installed and tested
- The setting of the level for the limit value switch for shutting down the machine has been checked (see "Description" chapter, Machine controls)

6.4 Start-up

Proceed according to the following table at start-up:

Step	Activity
1	Turn on supply of sealing water.
2	Fill tank, for minimum filling level please refer to ➡ **Fig. 6-1**.
3	Start the TurboMix.
4	Check function of the shaft seal (min/max level).
5	Check TurboMix for inadmissible vibrations.
6	Check bearing and gear temperatures.
7	Check belt tension.
8	Check for unusual noises.
9	Check power consumption.

Tab. 6-1 Start-up

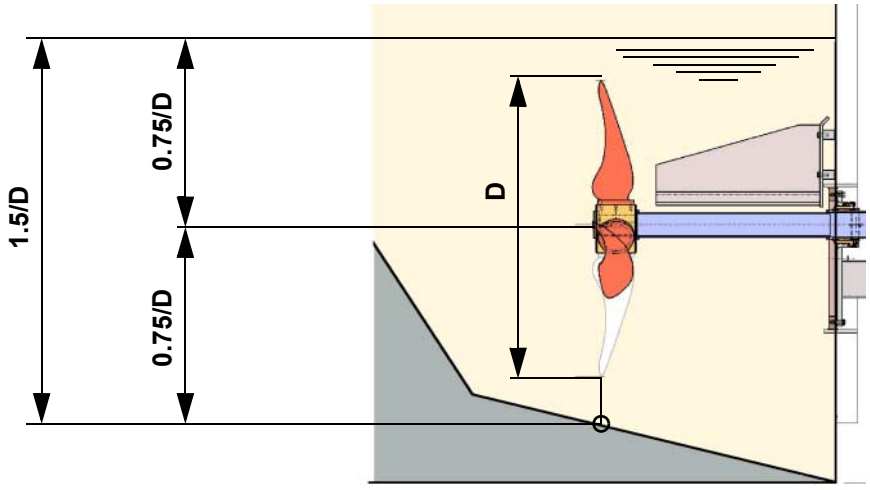

Fig. 6-1 Minimum level in tank

CAUTION

The level of the medium in the tank must be at least 1.5 times the diameter of the propeller.
Risk of damage to machine or one of its components.

WARNING

Risk of injury if the tank spills over.
Suitable measures (sensors, etc.) must be implemented to prevent the tank from spilling over.

7 OPERATION

7.1 General

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

7.2 Safety instructions

DANGER

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

General safety regulations

All applicable accident prevention regulations must be observed.

Operating the TurboMix is not permitted without all the required safety devices.

The regulations for work in containers and enclosed spaces must be observed.

Qualification of personnel assigned

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

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

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

Personal protective apparel

The following personal protective equipment/apparel shall be used when performing work on the machine (e.g. troubleshooting):

- Hard hat
- Protective gloves
- Safety shoes
- Eye protection
- Protective clothing

WARNING

The chemicals added may cause hazardous fumes.
Contact with the pulp or breathing in the fumes can result in dangerous situations.
Personal protective apparel must be worn!
Personnel working with the fiber stock should not be allergic to it.

7.3 Operating conditions

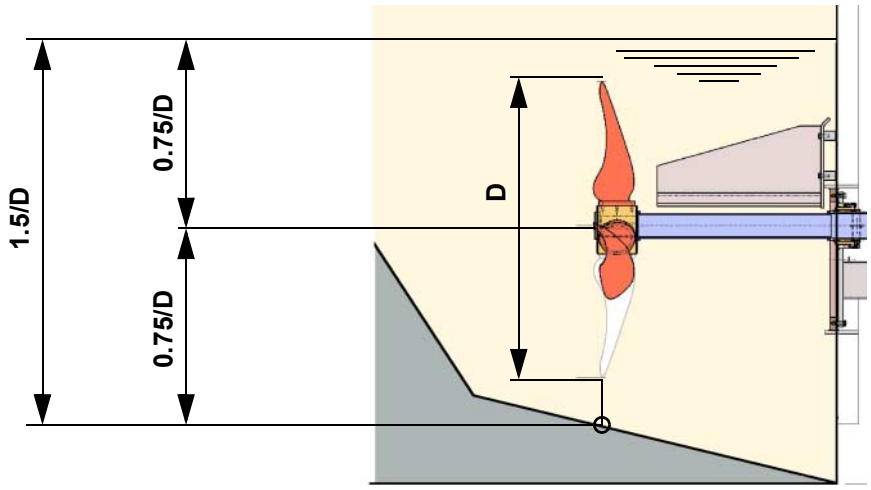

Fig. 7-1 Minimum level in tank

CAUTION	**The level of the medium in the tank must be at least 1.5 times the diameter of the propeller.** **Risk of damage to machine or its components.**

WARNING	**Risk of injury if the tank spills over.** **Suitable measures (sensors, etc.) must be implemented to prevent the tank from spilling over.**

7.4 Control via DCS

The TurboMix is started up and stopped entirely from the DCS.

7.5 Normal operation

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

Daily jobs and checks

The following work has to be performed in normal operation:

Check	Activity
Level in tank	Check or adjust

Tab. 7-1 Daily checks

In case of a malfunction, proceed according to **Section 7.7** (Operating faults and troubleshooting).

7.6 Re-start after an EMERGENCY STOP

Prerequisites for starting

Before starting up again after an EMERGENCY STOP, the reason for the stoppage must be found and eliminated.

Starting

The machine should be started up according to Sections 7.3 and 7.4.

CAUTION

Pulp may dry on inside the tank after a longer shutdown period if the tank has not been flushed out.
Empty the tank manually and flush out before re-starting.

7.7 Operating malfunctions and troubleshooting

Malfunction	Cause	Remedy
Increased power consumption by drive.	Consistency of the medium is too high.	Set consistency.
	Foreign objects or dirt in tank	Empty the tank and remove foreign objects.
	Bearing of TurboMix is worn.	Replace bearing (➡ /MAINTENANCE).
	Propeller vanes are not adjusted to the optimum setting.	Adjust propeller blades (➡ /MAINTENANCE).
Insufficient circulation.		
	Consistency of the medium is too high.	Set consistency.
	Propeller blades are worn.	Repair propeller blades (➡ /MAINTENANCE).
	Propeller blades are not adjusted to the optimum setting.	Adjust propeller blades (➡ /MAINTENANCE).
	V-belts are slipping.	Tension V-belts.
Fiber proportion too high in sealing water escaping	Sealing water pressure is too low.	Increase sealing water pressure.
	Stuffing box packings are worn.	Tighten stuffing box gland or replace stuffing box packings if necessary (➡ /MAINTENANCE).
Stuffing box becoming too hot.	Too little flow of sealing water pressure.	Set flow of sealing water
	Sealing water supply is clogged.	Clean the sealing water feed.
	Stuffing box gland is too tight.	Loosen the screw fitting a little at the stuffing box gland. Set sealing water flow (➡ /MAINTENANCE).
Bearings becoming too hot.	Insufficient lubrication.	Re-grease bearing
	Bearing is worn.	Replace bearing (➡ /MAINTENANCE).

Tab. 7-2 Operating malfunctions and troubleshooting

8 MAINTENANCE

8.1 General

This chapter describes the maintenance and upkeep of the TurboMix, which are the responsibility of the machine operator.

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

The ANDRITZ service department is at your disposal for troubleshooting, as well as for extensive maintenance and repair work.

/INTRODUCTION

Repair work on the plant components must be carried out at the manufacturer's works.

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

8.2 Safety instructions

DANGER

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

General safety regulations

All applicable accident prevention regulations must be observed.

The applicable regulations for work in enclosed and confined spaces must be observed (/SAFETY).

Potential risks caused by gases and vapors forming must be analyzed in detail. The appropriate safety measures must be implemented.

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

Service and maintenance work should not be performed until the machine has come to a standstill and all supply lines have been closed off.

Do not exceed permissible crane loads and weights on lifting gear and ropes/shackles. Secure loads against falling from a height.

Do not step or walk below suspended loads! Standing below suspended loads can have fatal consequences and thus is strictly forbidden!

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

Use only original spare parts.

Safety devices

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

Power supply

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

Lighting

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

Qualification of personnel assigned

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

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

Personal protective apparel

The following protective equipment must be worn when carrying out cleaning and maintenance work:

- Hard hat
- Protective gloves
- Safety shoes
- Eye protection
- Protective clothing

Welding work

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

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

DANGER

HOT WORK PERMIT REQUIRED!

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

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

Gases, steam or smoke

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

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

8.3 Regular maintenance

For machines operating continuously (24 hours/day, 7 days/week), a prescheduled maintenance period is recommended every two weeks. During these periods the machine should be shut down, thoroughly cleaned, and checked for wear and tear.

Machines operating less than 24 hours a day should undergo these routine checks and be cleaned at each shutdown.

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

.../SUPPLIER DOCUMENTATION

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

Cleaning

Machine must be cleaned before carrying out any maintenance work.

WARNING

Toxic gases and vapors can form or collect in the container.
The regulations for work in containers and enclosed spaces must be observed!
Complete entry permit!

WARNING

Contact with the fiber pulps may cause skin damage and burning.
Persons working with the pulp should not suffer from any allergic condition to such substances!
Personal protective apparel must be worn!

CAUTION

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

8.4 Maintenance schedule

In addition to the work outlined below, maintenance has to be carried out in accordance with **Section 8.3** and normal operation work.

/OPERATION

Every 2 weeks

The following maintenance work is to be carried out every 2 weeks.

Component	Activity
Bearings	• Check temperature and for noises.
Shaft seal	• Check leaking water rate.
V-belt	• Check tension.

Tab. 8-1 Every 2 weeks

Quarterly

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

Component	Activity
V-belt	• Check for wear and tear.
Propeller blade	• Check for damage
Shaft preservation	• Replace

Tab. 8-2 Quarterly

Annually

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

Component	Activity
Screws/bolts	• Check that screws/bolts are firm and tighten if necessary.
Shaft seal	• Check function and for wear and tear.
EMERGENCY STOP button	• Check function.
Earthing	• Check
Foundation bolt connection	• Check

Tab. 8-3 Annually

8.5 Fasteners

Fastener material

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

CAUTION

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

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

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

Tab. 8-4 Installation data for set screws

Coefficients of friction and lubrication

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

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

Tab. 8-5 Recommended lubrication and friction coefficients

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

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

CAUTION

Wrong torque tightening may cause machine damage and hazards leading to personal injury.
Please apply the tightening torques as shown in the drawings and table (Tab. 8-4)!

8.6 Spare parts

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

➔ .../PARTS BOOK

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

➔ .../SUPPLIER DOCUMENTATION

8.7 Lubrication

Before start-up, check whether all lubrication points have been filled with the appropriate lubricants.

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

➔ .../SUPPLIER DOCUMENTATION

Please also observe maintenance instructions on the maintenance signs and rating plates attached to the machine and the components.

CAUTION

Incorrect disposal of waste oil causes an environmental risk!
Do not add foreign matter such as solvents, brake fluid or cooling liquid.
Collect leaking oil and dispose of properly without causing environmental pollution.
Oil containing plant-based raw materials should always be collected and disposed of separately.

8.8 Lubrication schedule

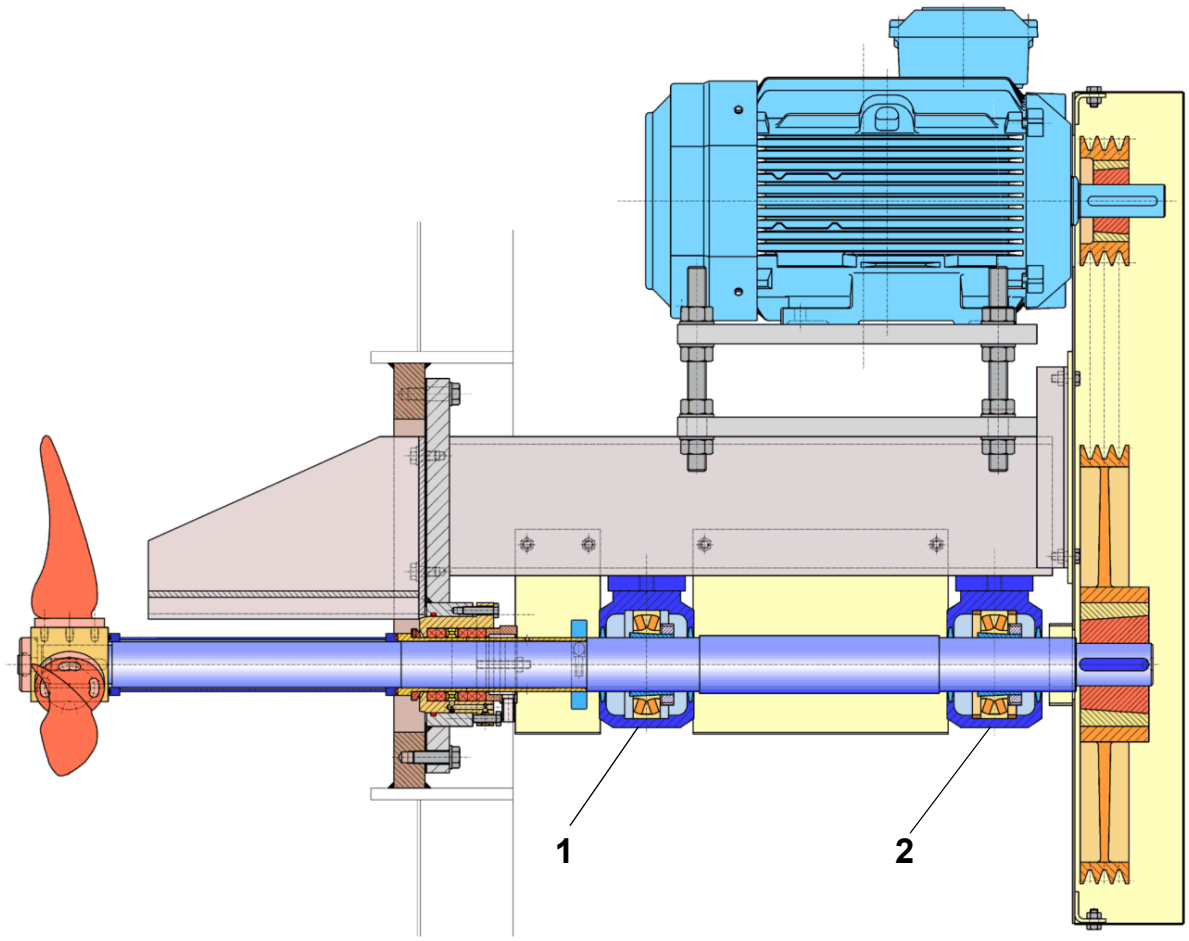

Fig. 8-1 Turbomix TMX800

		Lubricating point			Quantity / grammes		Intervals / Operating hours	
Item	**Structural component**	**No.**	**Designation**	**Recommended lubricant**	**First filling**	**Refill**	**Refill**	**Oil/Grease change**
1	Bearing assembly	1	Self-aligning roller bearing	NLGI Class 2 DIN 51818 (Mobilux EP 2)	280 g	9 g	150	8000
2	Bearing assembly	1	Self-aligning roller bearing	NLGI Class 2 DIN 51818 (Mobilux EP 2)	280 g	9 g	150	8000

Tab. 8-6 Lubrication schedule

8.9 Installation and removal of the propeller blades

WARNING

Toxic gases and vapours can form or collect in the tank.
The regulations for work in containers and enclosed spaces must be observed!
Complete entry permit!

Removing the propeller blades

Remove the propeller blades according to the following table:

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Empty the tank completely, then clean it.
3	Mark the position of the propeller blades.
4	Remove threaded pin (**3**).
5	Detach lock washer (**2**) and remove bolts (**1**) together with lock washer.
6	Remove the propeller blades (**4**).

Tab. 8-7 Removing the propeller blades

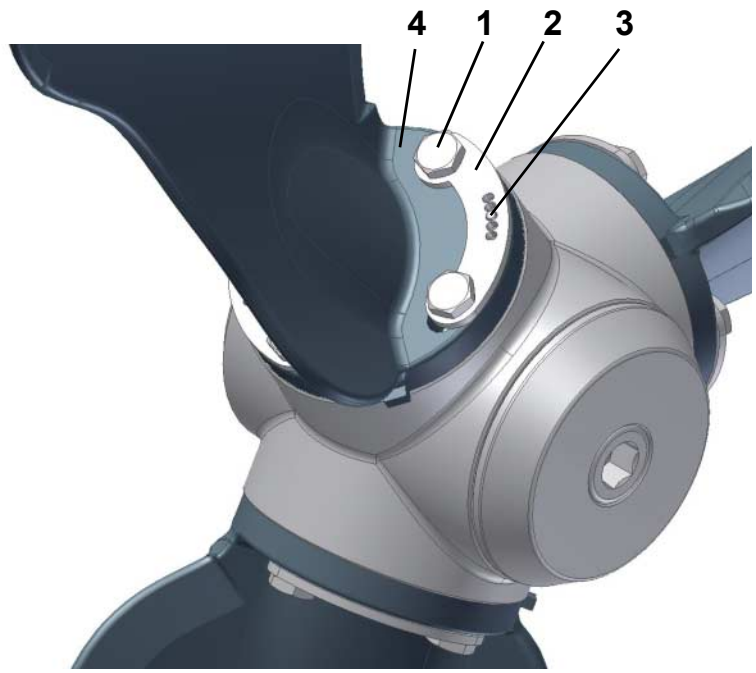

Fig. 8-2 Removing the propeller blades

Installing the propeller blades

The propeller blade are installed in reverse order to the above.

- Align the propeller blades (see ➔ **Section 8.11**).

8.10 Installation and removal of propeller hub

WARNING

Toxic gases and vapours can form or collect in the tank.
The regulations for work in containers and enclosed spaces must be observed!
Complete entry permit!

Disassembly

Proceed according to the following table when removing the propeller:

Step	Procedure
1	Empty the tank completely, then clean it.
2	Shut down drive at all poles and secure against accidental start.
3	Check position markings of blades. The markings must be renewed if they are no longer clearly visible.
4	Detach the screws (**8**) and remove the cap (**4**).
5	Detach the screws (**1**) and remove the washer (**2**).
6	Remove the washer (**2**)..
7	Take out the O-ring (**3**).
8	Pull the hub (**5**) off the shaft (**6**).
9	Remove seal (**7**).
10	Remove fitting key.

Tab. 8-8 Removing the propeller hub

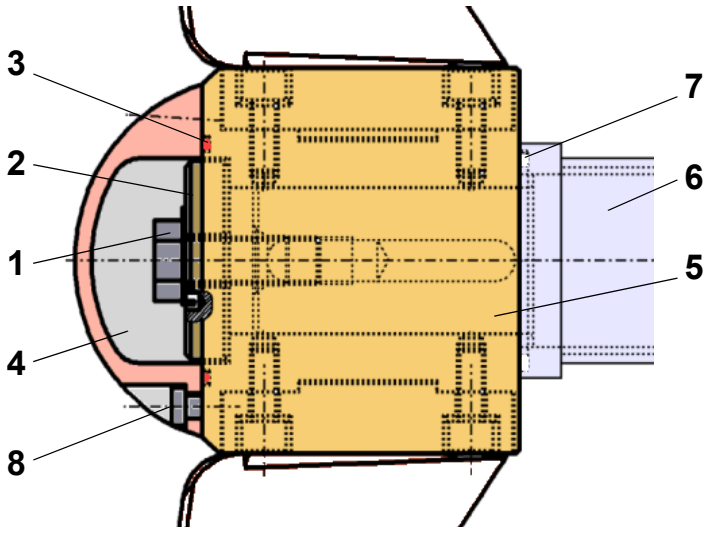

Fig. 8-3 Removing the propeller hub

Installation

The propeller hub is installed in reverse order to the above.

- Always replace the seals when the unit is dismantled.

8.11 Setting the propeller blades

Setting the propeller blades

Set the propeller blade according to the following table:

Step	Procedure
1	Unlock lock washer (**2**) and loosen screws (**1**).
2	Remove threaded pin (**3**).
3	Adjust propeller blades (**4**) and screw in threaded pin (**3**). • Setting at works assembly 0° • Maximum angle of adjustment +/-15°
4	Screw bolts (**1**) tight and secure with lock washer (**2**).

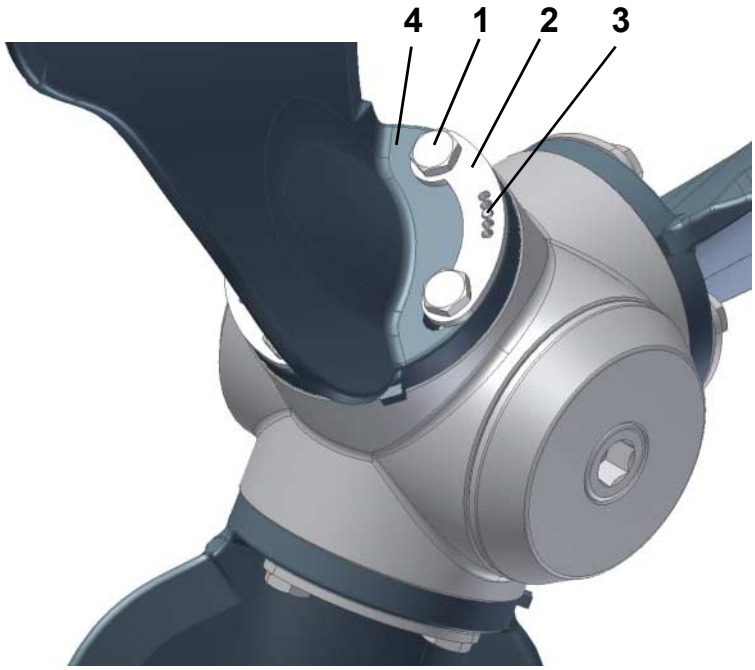

Fig. 8-4 Setting the propeller blades

CAUTION

All propeller blades must be aligned identically in order to avoid unsymmetrical loads on the shaft and bearings.

8.12 Installation and removal of stuffing box packing

Removing the stuffing box packking

Proceed according to the following table:

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Shut off supply of sealing water.
3	Clean the machine (see ➡ **Section 8.3**).
4	Remove safety guard.
5	The following tasks must be performed when the tank is full: • Turn out adjusting screws (**1**). • Push the stuffing box housing (**3**) with the screws (**2**) towards surface "A" of the shaft protection sleeve (**4**).
6	Detach sealing water line.
7	Detach the nuts (**5**) and remove the stuffing box gland (**6**).
8	Remove stuffing box packings (**7**).
9	Take off the lantern ring (**8**).
10	Then remove the remaining stuffing box packings.
11	Clean the stuffing box gland, lantern ring and packing area thoroughly.
12	Check shaft protection sleeve (**4**) and replace if necessary if it is worn (see ➡ **Section 8.14**). **Notches or grooves on the surface of the shaft protection sleeve cause excessive wear on the stuffing box packing!**

Tab. 8-9 Removing the stuffing box packing

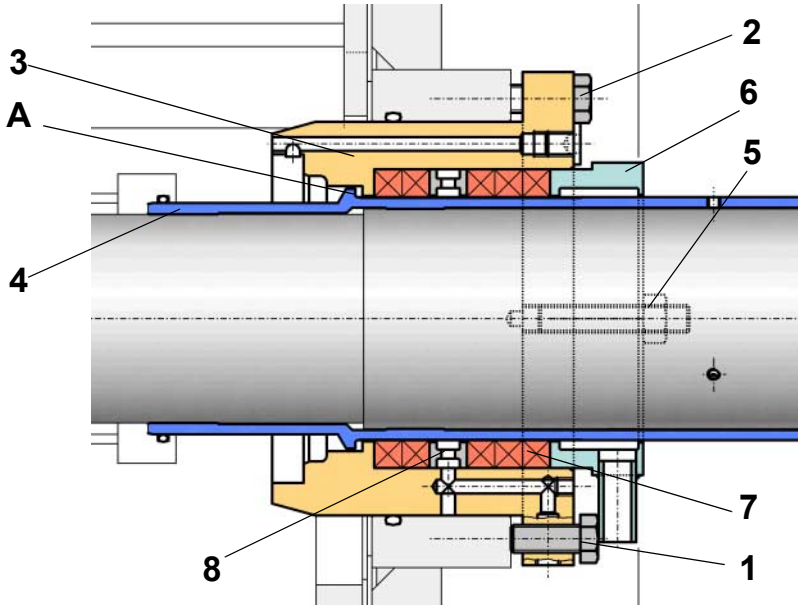

Fig. 8-5 Changing the stuffing box packing

Installing the stuffing box packking

Proceed according to the following table when installing the stuffing box packing:

Step	Procedure
1	Mark stuffing box packing and cut to the appropriate length. Keep the stuffing box clean. Neither stretch nor squeeze while measuring and cutting!
2	Wrap the packing round the shaft protection sleeve, then push the first packing ring into the stuffing box, starting at the butt joint. The ends of the ring must form a butt joint with no gap.
3	Push the first packing ring right in using a suitable tool. Mount the second packing ring with the butt joint offset by 120 degrees.
4	After inserting the second packing ring, mount the lantern ring.
5	Mount the remaining packing rings with the butt joints offset by 120 degrees.
6	When the stuffing box gland has been installed, tighten all nuts (**5**) evenly according to Section 8.13.
7	Detach the screws (**2**) and turn in the adjusting screws (**1**) until there is a gap of approximately 3 mm between the housing (**3**) and the shaft protection sleeve (**4**).
8	Tighten bolts (**2**).

Tab. 8-10 Installing the stuffing box packing

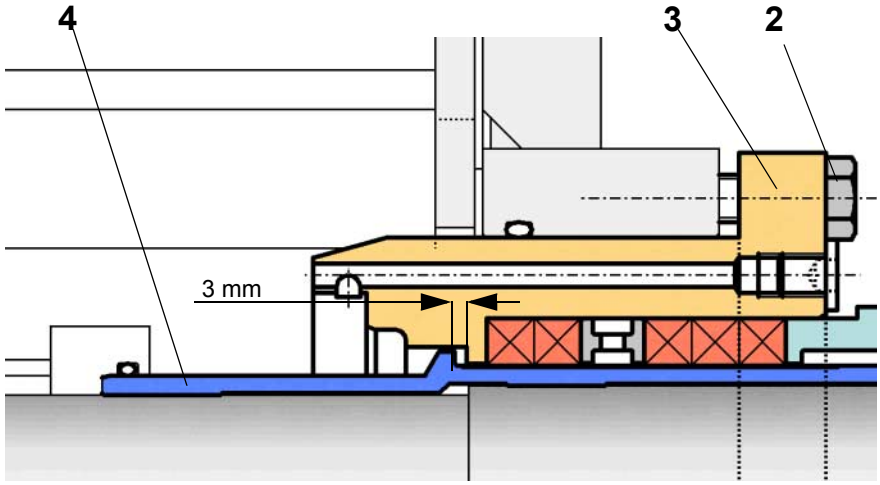

Fig. 8-6 Setting the seal

8.13 Setting the stuffing box gland

New packings may swell due to absorption of water. This increases the surface pressure on the shaft and the large amount of sealing water that escapes at first is then reduced.

CAUTION

The stuffing box packing will be damaged if the stuffing box gland is screwed too tight.
If the stuffing box gland is too tight, this will cause burning on the seal surfaces.

DANGER

There is a considerable risk of crushing and being drawn into the machine when setting the stuffing box!
The stuffing box may only be set by trained and authorized personnel.

Set the stuffing box according to the following table:

Step	Procedure
1	Tighten the screw fitting slightly at the stuffing box gland.
2	Turn on supply of sealing water.
3	Start up the machine when sealing water is seen to escape.
4	Shut down the machine after a few minutes and check the temperature of the stuffing box seal. The temperature of the seal casing must not exceed 40°C.
5	Tighten the stuffing box gland further until there is less sealing water escaping.

Tab. 8-11 Setting the stuffing box

- The stuffing box should be checked at short intervals during the first few hours in operation.
- Set the stuffing box such that the shaft at the stuffing box gland is always moist.
- Loosen the screw fitting at the stuffing box gland if the stuffing box overheats.

8.14 Installation and removal of the shaft protection sleeve

Removing the shaft protection sleeve

Remove the shaft protection sleeve according to the following table:

Step	Procedure
1	Dismantle the propeller with fitting key (see ➡**Section 8.10**).
2	Pull protective tube (**1**) off the shaft.
3	Remove splash guard (**2**).
4	Dismantle the stuffing box packings (see ➡**Section 8.12**).
5	Detach threaded pins (**4**).
6	Pull the shaft protection sleeve (**5**) off the shaft.

Tab. 8-12 Removing the shaft protection sleeve

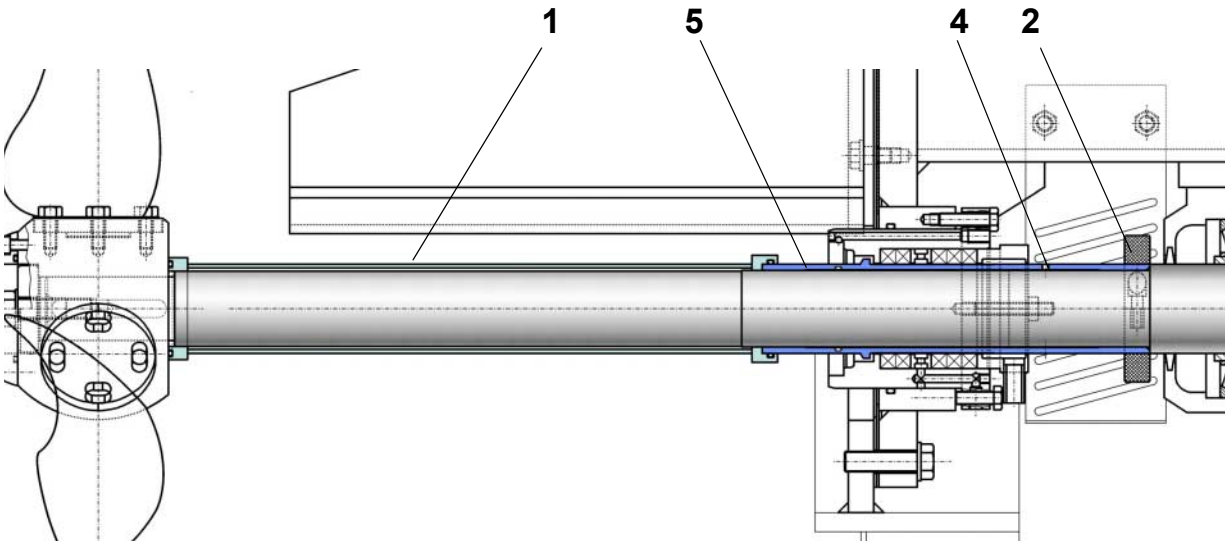

Fig. 8-7 Removing the shaft protection sleeve

Mounting the shaft protection sleeve

Re-install in reverse order

- Replace the seals (**3**, **4**) each time.

8.15 Changing the V-belts

Step	Procedure
1	Shut down drive at all poles and secure against accidental start.
2	Detach screws (**1**) and dismantle top section of safety cover (**2**).
3	Relieve tension on the V-belts (**5**) by means of the tensioning device (**3**) at the motor.
4	Remove the V-belts (**5**) from the pulleys.
5	Mount the new V-belts.
6	Tension the V-belts with the tensioning device (**3**). Both V-belt pulleys must be aligned to one another.
7	Rotate the drive completely several times to distribute the tension evenly.
8	Check the V-belt tension once again.
9	Mount safety cover.

Tab. 8-13 Changing the V-belts

The correct belt tension is immensely important in obtaining perfect power transmission and achieving the normal belt service life.

Too little or too much tension frequently leads to the belts failing prematurely. Overstretching the V-belts often leads to bearing damage at the drive or machine.

Detailed instructions for changing the V-belts, mounting the belt pulleys, and checking the V-belt tension are provided in the enclosed V-belt instruction manual.

>> Abschnitt 9.1.1, Keilriemenantrieb

CAUTION

Always replace the complete set of V-belts!

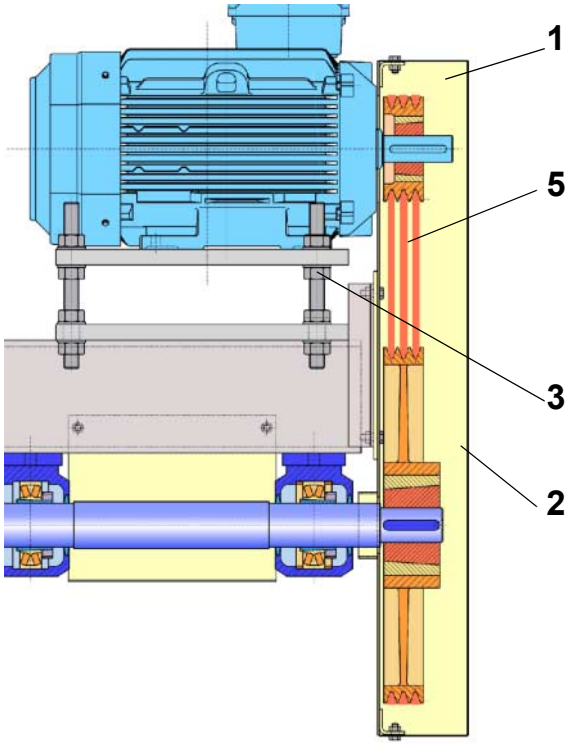

Fig. 8-8 Changing the V-belts

8.16 Installation and removal of bearings

Removing the bearing

Proceed according to the following table when removing the bearings:

Step	Procedure
1	Shut down all drives at all poles and secure against accidental start.
2	Empty the tank and clean it (see ➔ **Section 8.3**).
3	Detach bolts (**1**) and remove the bearing housing (**2**).
4	Dismantle the V-belts (see ➔**Section 8.16**).
5	Dismantle the propeller (see ➔**Section 8.10**).
6	Ensure that the drive shaft is properly secured and cannot fall down. Detach the screws (3) in the plummer block .
7	Pull the shaft out of the tank.
8	Dismount the shaft protection sleeve (see ➔**Section 8.14**).
9	Take the belt pulleys off the drive shaft (see ➔**Section 8.17**).
10	Open plummer block (**4**) and dismantle top and bottom sections.
11	Remove locating rings (**6**) from fixed bearing.
12	Remove bearing grease.
13	Mark the position of the taper sleeves (**5**) on the shaft before removing them.
14	Bend locking plates (**7**) upwards and loosen slotted nuts (**8**).
15	Loosen the taper sleeves (**5**) by striking the slotted nuts lightly.
16	Remove slotted nuts and taper sleeves.
17	Take the bearing off the shaft.

Tab. 8-14 Dismounting the bearing

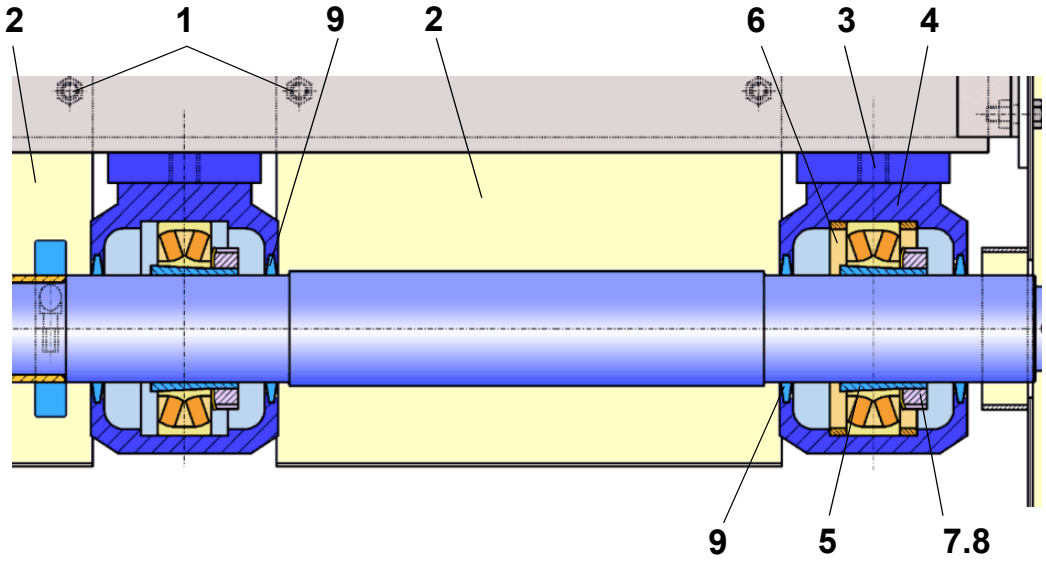

Fig. 8-9 Dismounting the bearing

Installing the bearing

The spherical roller bearings are installed in reverse order.

- Clean all parts before assembling.
- Position the taper sleeves at the marking.
- Set the radial play of the bearings using a slotted nut according to the manufacturer's instructions.
- Replace the seals in the bearing housing (**9**) each time.
- Fill the plummer blocks with grease (see ➡ **Section 8.8**).

9 SUPPLIER DOCUMENTATION

9.1 Drive

9.1.1 V-belt drive

Name of company WOT

Technical data Type . . . . . SPB