

# 8 | OPERATION AND MAINTENANCE



**The following prescribed maintenance and servicing intervals for the individual components of the unit must be observed to keep the manufacturer's warranty of MANDÍK, a. s. and for trouble-free and safe operation of the unit.**

These intervals are intended for standard units with normal operating conditions. In units that are operated differently (24-hour operation, higher operating temperatures, higher dust content in the surrounding air, etc.) intervals for maintenance and servicing must be shortened by at least one level below. It always depends on the actual operating conditions for which the intervals are determined at commissioning, training and handover of the unit.



**All the performed maintenance operations, maintenance, inspections must always be recorded in an operational logbook of the unit. The obligation to start and maintain an operational logbook lies on the person who puts the unit into operation. Entries for individual events are made by the unit operator.**

## **SAFETY DURING MAINTENANCE:**

- **CAUTION:** ALL THE OPERATIONS, MAINTENANCE AND INTERVENTIONS ON THE EQUIPMENT MUST BE PERFORMED BY A QUALIFIED PERSON WITH RELEVANT AUTHORISATIONS (E.G. GAS INSTALLATIONS, ELECTRICAL INSTALLATIONS, ETC.)!
- **CAUTION:** ANY SERVICING AND MAINTENANCE ON THE EQUIPMENT MAY BE PERFORMED ONLY WHEN SWITCHED OFF (IT MUST BE SECURED AGAINST ACCIDENTAL STARTING OR STARTING BY ANOTHER PERSON)!
- **CAUTION:** PRIOR ENTERING THE EQUIPMENT, ALL THE ROTATING COMPONENTS (FANS, ROTARY EXCHANGERS, ETC.) MUST BE STOPPED!
- **CAUTION:** MINIMUM WAITING TIME OF 15 MINUTES IS REQUIRED FOR FANS AND ELECTRIC MOTORS THAT ARE EQUIPPED WITH FREQUENCY CONVERTERS DUE TO RESIDUAL VOLTAGE!
- **CAUTION:** THE HEAT EXCHANGERS, COMPONENTS OF THE HYDRAULIC SYSTEM, COMPONENTS OF THE COOLING CIRCUIT MUST BE COOLED TO THE AMBIENT TEMPERATURE, THE MAX. SURFACE TEMPERATURE IS +40 °C!
- **CAUTION:** THE PRESSURE VALUES OF THE PRESSURE SYSTEMS ARE AT AMBIENT PRESSURE!

## 8.1 SERVICE AND MAINTENANCE INTERVALS

Detailed instructions for operation and maintenance/servicing procedures are provided in the following paragraphs of Section 8.2 and various components of the unit.

SERVICING AND MAINTENANCE OPERATIONS							
	Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)			
				1	3	6	12
<b>1. UNIT IN GENERAL</b>							
1.01.	Overall check of cleaning, damage and corrosion on all components of the unit (outside/inside).	N	cleaning and repair		✓		
1.02.	Overall check of the tightness of the doors, service and fixed panels on all components of the unit.	Y	repair			✓	
1.03.	Overall check of the tightness of connections between the unit chambers.	Y	repair			✓	
1.04.	Check the tightness of the connections of HVAC ducts and the condition of the damping inserts.	Y	repair			✓	
1.05.	Check the unit for excessive vibrations.	Y	repair	✓			
1.06.	Check the air output of the unit (when the unit and filters are clean inside).	Y	measuring				✓
1.07.	Check the function of the roof of an exterior unit.						✓

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>2. FILTERS G2-F9, GREASE</b>							
2.01.	Check the filter pressure losses.	Y	value from the measuring and control system	✓			
2.02.	Check the integrity of the filtration medium of the filter elements.	N	replacement		✓		
2.03.	Check the integrity of the filter holder sealing profiles and the seal between the filter elements.	N	repair			✓	
2.04.	Check the setting and function of the differential pressure gauge (switches, digital, sloping tube).	Y	repositioning/replacement		✓		
2.05.	Check the fitting of pressure probes for measuring filter differential pressure.	N	repair	✓			

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>3. FILTERS WITH ACTIVATED CHARCOAL</b>							
3.01.	Check the integrity of the filter cartridges.	N	replacement				✓
3.02.	Check the fitting of the filter cartridges in their frames.	N	repair			✓	
3.03.	Check the condition of the filtration medium – activated charcoal through a weight method.	N	reactivation		✓		

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>4. FANS WITH FREE IMPELLERS</b>							
4.01.	Check the cleanness and condition of the impeller and the chamber inside.	N	cleaning			✓	
4.02.	Check the integrity of the damping insert of the fan.	N	replacement			✓	
4.03.	Check the impeller for free rotation.	N	repair			✓	
4.04.	Tighten the cables in the electric motor terminal board.	N	repair			✓	
4.05.	Check the assembly for excessive vibrations – the assembly must not show any visible vibrations.	Y	repair	✓			
4.06.	Check the condition of the assembly vibration insulator.	N	repair		✓		

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>5. WATER HEATER</b>							
5.01.	Check the integrity of the exchanger heat-transfer surface.	N	repair/replacement			✓	
5.02.	Check the cleanness of the exchanger heat-transfer surface.	N	cleaning			✓	
5.03.	Check the tightness of the exchanger on the side of working fluid.	N	repair			✓	
5.04.	Check the function of the exchanger anti-freeze protection (always prior a heating season).	N	repair/measuring and control system			✓	
5.05.	Check the condition of connection of the exchanger hydraulic circuit.	N	repair			✓	
5.06.	Check the condition and function of the mixing device according to the manufacturer's instructions.	N	repair			✓	

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>6. ELECTRIC HEATER</b>							
6.01.	Check the heating rods for damage.	N	replacement			✓	
6.02.	Check the cleanness of the terminal board.	N	cleaning			✓	
6.03.	Check the heating rods for cleanness.	N	cleaning			✓	
6.04.	Check the condition of the wiring of the heating rods and protection (condition of the cables, tightening of the cables, etc.).	N	repair			✓	
6.05.	Check the function of the operating and safety thermostats.	N	value from the measuring and control system			✓	

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>7. 'PECÍN' GAS HEATER</b>							
7.01.	Check the condition of the exchanger (damage, corrosion).	N	repair/replacement			✓	
7.02.	Check the outside of the exchanger for contamination.	N	cleaning			✓	
7.03.	Check the inside of the exchanger for contamination – combustion product exhaust system.	N	cleaning				✓
7.04.	Check the gas connection,	N	repair/replacement		✓		
7.05.	Check the burner for its condition and correct function – always performed by a service technician of the burner manufacturer.	N	repair/replacement				✓
7.06.	Check the burner cover heating for its function in case of exterior installation.	N	repair/replacement				✓
7.07.	Check the function of the safety thermostat.	N	repair/replacement				✓

7.08.	Check the condition and passability of the heater combustion product exhaust.	N	repair/replacement				✓
7.09.	Check the function of condensate draining from the combustion product exhaust.	N	repair/replacement				✓
7.10.	Check the free turning of the bypass damper.	N	repair/replacement			✓	
7.11.	Check the bypass damper for contamination.	N	cleaning			✓	

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
	Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)			
				1	3	6	12
<b>8. 'MONZUN' GAS HEATER</b>							
8.01.	Check the condition of the exchanger (damage, corrosion).	N	repair/replacement			✓	
8.02.	Check the outside of the exchanger for contamination.	N	cleaning			✓	
8.03.	Check the gas connection,	N	repair/replacement		✓		
8.04.	Check the condition and passability of the heater combustion product exhaust.	N	repair/replacement				✓
8.05.	Complete check of the condition and function of the heater (burner, automatics, exchanger, bypass, etc.) must be always be performed by a service technician of MANDÍK, a.s. or by a service technician authorised by MANDÍK, a.s.	N	repair/replacement				✓

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
	Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)			
				1	3	6	12
<b>9. WATER COOLER</b>							
9.01.	Check the integrity of the exchanger heat-transfer surface.	N	repair/replacement			✓	

9.02.	Check the cleanness of the exchanger heat-transfer surface.	N	cleaning			✓	
9.03.	Check the tightness of the exchanger on the side of working fluid.	N	repair			✓	
9.04.	Check the condition and cleanness condensate droplet eliminator.	N	repair/cleaning			✓	
9.05.	Check the condition of connection of the exchanger hydraulic circuit.	N	repair			✓	
9.06.	Check the condition and function of the mixing device according to the manufacturer's instructions.	N	repair			✓	
9.07.	Check the cleanness and passability of the condensate drain.	N	cleaning/repair			✓	
9.08.	Check the condition and flooding with water of the condensate drain siphon.	N	repair			✓	

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>10. EVAPORATOR</b>							
10.01.	Check the integrity of the exchanger heat-transfer surface.	N	repair/replacement			✓	
10.02.	Check the cleanness of the exchanger heat-transfer surface.	N	cleaning			✓	
10.03.	Check the condition and cleanness condensate droplet eliminator.	N	repair/cleaning			✓	
10.04.	Complete checks of the condition and function of the cooling circuit (tightness, expansion valve, condensation unit, coolant condition, etc.) must always be performed by a qualified refrigeration technician authorized to work with coolants.	N	repair/replacement				✓
10.05.	Check the cleanness and passability of the condensate drain.	N	cleaning/repair			✓	
10.06.	Check the condition and flooding with water of the condensate drain siphon.	N	repair			✓	

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>11. PLATE RECUPERATOR</b>							
11.01.	Check the integrity of the exchanger heat-transfer surface.	N	repair/replacement			✓	
11.02.	Check the cleanness of the exchanger heat-transfer surface.	N	cleaning			✓	
11.03.	Check the free turning of the bypass/mixing damper.	N	repair/replacement			✓	
11.04.	Check the dampers for contamination.	N	cleaning			✓	
11.05.	Check the condition and cleanness condensate droplet eliminator.	N	repair/cleaning			✓	
11.06.	Check the cleanness and passability of the condensate drain.	N	cleaning/repair			✓	
11.07.	Check the condition and flooding with water of the condensate drain siphon.	N	repair			✓	

\* status of unit operation while performing the checks

**SERVICING AND MAINTENANCE OPERATIONS**

Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>12. ROTARY REGENERATIVE RECUPERATOR</b>							
12.01.	Check the integrity of the rotor heat-transfer surface.	N	repair/replacement			✓	
12.02.	Check the cleanness of the rotor heat-transfer surface.	N	cleaning			✓	
12.03.	Check the free turning of the rotor.	N	repair/replacement			✓	
12.04.	Check the tensioning of the rotor drive belt.	N	repair/cleaning			✓	
12.05.	Check the condition and correct setting of the rotor seals – circumferential and cross-sectional seals.	N	repair/replacement			✓	
12.06.	Check the condition of the wiring of the driving electric motor – tighten the cables in the terminal board.	N	repair			✓	
12.07.	Check the condition and function of the device at its minimum and maximum speeds.	N	repair/replacement			✓	



\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>13. FLUID CIRCUIT – HEAT RECUPERATION</b>							
13.01.	The same instructions as for the water heater.	N					
13.02.	The same instructions as for the water cooler.	N					
13.03.	Check the condition and function of the fluid circuit.	N	repair/replacement			✓	

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>14. STEAM HUMIDIFIER</b>							
14.01.	Check the condition and fitting of the distribution tubes inside the chamber.	N	repair/replacement			✓	
14.02.	Check the condition and function of the steam humidifier circuit.	N	repair/replacement			✓	
14.03.	Check the cleanness and passability of the condensate drain.	N	cleaning/repair			✓	
14.04.	Check the condition and flooding with water of the condensate drain siphon.	N	repair			✓	

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)				
			1	3	6	12	
<b>15. SILENCER</b>							

15.01.	Check the silencer screens for damage – in particular to the screen fabric	N	repair/replacement			✓	
15.02.	Check the fitting of the silencer screens.	N	repair			✓	

\* status of unit operation while performing the checks

SERVICING AND MAINTENANCE OPERATIONS							
	Check operation	Unit in operation Y/N*	Service/rectification method	Intervals (months)			
				1	3	6	12
<b>16. DAMPER CHAMBER AND END-WALL DAMPER</b>							
16.01.	Check the dampers for free movement.	N	repair/replacement			✓	
16.02.	Check the dampers for contamination.	N	cleaning			✓	

\* status of unit operation while performing the checks

## 8.2 UNIT OPERATION AND MAINTENANCE IN GENERAL



**All the persons performing maintenance of air-conditioning units must be familiar with the contents of the maintenance instructions, and they must follow the recommendations set out in them. These instructions are only a complementary source of information and the knowledge is expected of mounting and operating regulations for air-conditioning units MANDÍK, a. s., series M, P, S and T, and complying with all the requirements contained therein. The manufacturer cannot be held liable for any damage arising from failure to observe the mounting and operating regulations and these instructions.**

Air-conditioning units are machines for transport and treatment of air and they require regular maintenance and cleaning. According to the scope and purpose of air-conditioning facility whose part they are, as well as the composition and equipment of air-conditioning units themselves, the operator is advised to develop local operation and maintenance regulations respecting the requirements of mounting and operating regulations and instructions for maintenance of air-conditioning units MANDÍK, a. s., series M, P, S and T.

Any time intervals for maintenance, mentioned in the text below, are for informative purposes only and they are valid for air containing normal amounts of pollutants. These time intervals can be lengthened or shortened, depending on the local operating conditions, the nature of the facility and pollution of the transported air. These intervals also cannot relieve the operators of their responsibility to ensure daily the correct and safe operation of their air-conditioning unit.

All the items whose nature determines them to be ejected, opened or disassembled easily must be put into such a position to allow as thorough cleaning of the unit interior as possible. Remove coarse dirt with a vacuum cleaner or, if necessary, use a damp cloth. In case of greasy dirt, use a neutral cleaner; then wipe the surface again with a damp cloth. Any damage to painted surfaces or traces of corrosion must be treated and repaired with a suitable coat. The moving components (hinges, handles, etc.) must be treated, if necessary, with a lubricant spray. All the inspection doors must be seated properly and checked for free opening. According to the conditions of unit seating, it may be necessary to align the doors within the adjustment play of bolts of the handles and hinges. Check proper fitting-in of the doors to the sealed surfaces. The door seals should be checked and repaired or replaced in the event of untightness.

## 8.3 FAN CHAMBER



**Prior starting any intervention or work on the chamber, it is necessary to wait until the fan impeller stops completely! It is also necessary to prevent unintentional or accidental start of the fan by another person!**

In fans, check the cleanness of the free impeller; remove any coarse dust with a vacuum cleaner and wipe fine dust with a damp cloth.

Keeping the fan impeller clean is very important, especially in terms of maintaining the best possible balance. Any damage to painted surfaces or traces of corrosion must be treated and repaired with a suitable coat.

Check regularly for any unbalance (vibrations), mounting of the impeller to the hub and of the hub to the motor shaft. Furthermore, check the width of the gap between the free impeller and the fan suction mouth and tighten all the bolts on the motor unit and the fan. Check the electric motor for vibrations, noise of the bearings, any excessive heating, tightening the terminals in the terminal board and the integrity of the conductors connected to the chamber frame.

Measure the motor current, check the voltage and phase symmetry during maintenance. Any surface damage must be repaired. Check the proper mounting of the electric motor to the base as well as all the bolting on the fan unit base. Check also the functionality of rubber vibration dampers under the unit and their anchoring. The periodic checks also include checking for leaks and integrity of the elastic collar on the fan intake and its cleaning.



## 8.4 FILTER CHAMBER



**Dust deposited on the filter element can cause allergic reactions on the skin, mucous membranes and eyes or difficulty in breathing. Therefore, avoid any contact with the collected dust. During maintenance and when replacing the filter elements, it is necessary to wear protective clothing and, if necessary, protective equipment (breathing mask, etc.)!**

In fan chambers, check the cleanness of the chamber; remove any coarse dust with a vacuum cleaner and wipe fine dust with a damp cloth. Furthermore, check clogging and tightness of the entire filter element. When changing the filters, avoid contamination of the chambers or new filter elements by deposited dust.

### **Pocket and frame filters**

According to the filtration class and filters used and their replacement interval, it is always necessary to have a supply of at least one set of replacement filters and to ensure that their prescribed maximum shelf life is not exceeded. It is recommended to set the filter replacement interval on the basis of the results of observations during a trial run of the unit. This interval can then be, depending on the local conditions, shorter or longer than the interval for regular maintenance. In no case must the maximum allowable terminal pressure loss for the used type of filter element and the time interval of 12 months between changes (this applies to the first stage of filtration) be exceeded. For second and subsequent stages of filtration and also for filters of drainage components of the units, this time may be determined individually but it should not be longer than 24 months. All the filters across a filter element are usually replaced at the same time; the replacement of individual filters is allowed only if they are damaged.

### **Filters with activated charcoal**

In plants where activated-charcoal filter are used to separate non-hazardous odours, the functionality of the filters can be checked using olfactory sensory perception. In cases of separation of odourless, toxic and other hazardous substances, the saturation of the charcoal and the remaining filter life can only be found through a laboratory test that can be carried out by the manufacturer of filter cartridges. On the basis of this test, the interval of replacing cartridges with activated charcoal may be determined. When determining the replacement interval it is always necessary to take into account the characteristics and nature of the substances to be separated, especially with regard to their potential health harmfulness or other hazards.

When disposing of used filter cartridges, it is necessary to observe the general and local regulations on environmental protection. In filters where it is technologically possible and available, it is preferred to use the possibility of recycling and regeneration of organic filtering materials.

**Recommended end pressure losses of the filters are listed in Annex F.**

## 8.5 END PANELS WITH DAMPERS AND DAMPER CHAMBERS



**The shutters of the open damper must be secured against accidental or unintentional closing. Never put your limbs through the shutters of an opened damper – there is a risk of serious injury!**



**Check contamination, potential damage, free movement of the damper shutters and especially the correctness of damper closing. Remove any deposited dust with a vacuum cleaner; clean the damper**

shutter surfaces with a damp cloth. Plastic gears of the dampers are made of a material that does not require additional lubrication. In dampers with leverage, lubricate the necessary points of the leverage with lubricant spray. If a damper is followed by an elastic collar, check its tightness and integrity or clean it.

## 8.6 HEATING WATER OR STEAM CHAMBER, WATER COOLING CHAMBER



**Surface temperature of the heater and medium connections during operation may exceed the safe touch temperature of 60 °C. Prior starting any intervention or work on the chamber, it is necessary to wait until the exchanger and the connections cool down sufficiently!**

**When filling, draining and deaerating the exchanger, avoid contact of unprotected skin and the heat-transfer medium. In the event of using of additives or complete ready mixtures in heating/cooling systems, it is necessary to observe the manufacturer's information for the use and handling of these substances.**

Check exchangers for contamination, tightness and any damage. Remove any contamination by blowing air, steam or using a hot-water pressure cleaner against the air flow. In any case, care should be taken to prevent deformation of the exchanger plates. For this reason, high-pressure equipment, whether it water or air, should not be used for cleaning.

Check regularly the tightness of the connection threads and the functionality air-relief valves. In independently specified maintenance intervals and always prior the cold seasons of the year, check the functionality of anti-frost protection or check the antifreeze mixture concentration. Drain the medium from the coolers prior winter, from all the exchangers prior prolonged shutdown (if they are not filled with an antifreeze mixture of a sufficient concentration). The actual draining of the medium does not guarantee emptying of all the fluid from the exchanger, it is imperative also to blow compressed air through the exchanger!

In addition, the coolers must be checked for the condition and function of the trays for condensate draining, passability of the drain from the tray, and the condition and function of the siphon. Clean and add water if necessary. Prior winter, check the functionality of anti-freeze measures for the condensate drain (if they are in operation even in winter and there is a risk of freezing). Furthermore, check the droplet eliminator for the presence of any deposits, the condition and cleanliness and, if necessary, pull it out and clean.

## 8.7 HEATING CHAMBER WITH A CONDENSER, COOLING CHAMBERS WITH A DIRECT EVAPORATOR



**Surface temperature of the heater and medium connections during operation may exceed the safe touch temperature of 60 °C. Prior starting any intervention or work on the chamber, it is necessary to wait until the exchanger and the connections cool down sufficiently!**

**During any work on the cooling circuit, avoid contact of the skin, mucous membranes or eyes with the coolant charge. In the event of coolant leakage, use personal protective equipment and a breathing apparatus when entering the plant room. Coolants and compressor oil may be toxic or cause allergic reactions. Mixtures of coolants with air may be explosive; coolant components may be heavier than air and displace oxygen from the space where persons are present. Always proceed in accordance with the instructions in the MSDS of the substance used!**

**Servicing of the cooling circuit, such as adding or replacing the coolant, replacing the circuit components (filter drier, expansion valves, pressure sensors, etc.) may only be performed by a qualified refrigeration technician authorized to work with coolants and in accordance with the instructions of the condensation unit manufacturer.**

Check exchangers for contamination, tightness and any damage. Remove any contamination by blowing air, steam or using a hot-water pressure cleaner against the air flow. In any case, care should be taken to prevent deformation of the exchanger plates. For this reason, high-pressure equipment, whether it water or air, should not be used for cleaning. Check regularly the tightness of the circuit.

In addition, the coolers must be checked for the condition and function of the trays for condensate draining, passability of the drain from the tray, and the condition and function of the siphon. Clean and add water if necessary. Prior winter, check the functionality of anti-freeze measures for the condensate drain (if they are in operation even in winter and there is a risk of freezing). Furthermore, check the droplet eliminator for the presence of any deposits, the condition and cleanliness and, if necessary, pull it out and clean.

In addition, check direct evaporators for any icing of the exchanger during cooling.

When disposing of coolants and compressor oils, it is necessary to observe the applicable regulations on environmental protection.

## 8.8 CHAMBER WITH ROTARY REGENERATIVE EXCHANGER



**Prior starting any intervention or work on the chamber, it is necessary to wait until the exchanger impeller stops completely. It is also necessary to prevent unintentional or accidental start of the fan by another person!**

Check the impeller for condition and contamination, free movement and its backlash, bearing noise, belt tensioning and condition of the recuperator wheel.

Furthermore, check the condition of the electric motor and the gearbox. Remove contamination from the chamber (burrs from the belt, abrasion from the pulleys, dust) with a vacuum cleaner and wipe the surfaces with a damp cloth. Remove any accumulated contamination from the impeller by blowing air, steam or using a hot-water pressure cleaner. In any case, care should be taken to prevent deformation of the exchanger plates. For this reason, high-pressure equipment, whether it water or air, should not be used for cleaning. Always direct water or air stream perpendicular to the exchanger accumulation surface.

Check any slippage of the belt for the exchanger wheel drive.

Check the position and condition of the movable recuperator wheel seal and make any necessary corrections at the places where the seal is more distant from the wheel. In any case, avoid direct contact between the wheel and the seal.

Check the gearbox and the electric motor for vibrations, noise of the bearings, any excessive heating, vibrations and the integrity of the conductors connected to the chamber frame. Measure the motor current and check the voltage during maintenance. Check the proper mounting of the electric motor to the tensioning base as well as all the bolting on the belt tensioning device.

## 8.9 CHAMBER WITH PLATE RECUPERATOR



**The shutters of the open damper must be secured against accidental or unintentional closing. Never put your limbs through the shutters of an opened damper – there is a risk of serious injury!**

Check the recuperator for its condition and contamination, function of the dampers, condensate drain and droplet eliminator.

Remove any contamination of the recuperator by blowing air, steam or using a hot-water pressure cleaner. In any case, care should be taken to prevent deformation of the plates of the exchanger.

Check the damper shutters for contamination, potential damage, free movement. Remove any dust deposits with a vacuum cleaner. Clean the damper shutter surfaces with a damp cloth. Plastic gears of the dampers are made of a material that does not require additional lubrication. In dampers with leverage, lubricate the necessary points of the leverage with lubricant spray.

In addition, check the function of the trays for condensate draining, passability of the drain from the tray, and the condition and function of the siphon. Clean and add water if necessary. Prior winter, check the functionality of anti-freeze measures for the condensate drain (if there is a risk of freezing).

Furthermore, check the droplet eliminator for the presence of any deposits, the condition and cleanliness and, if necessary, pull it out and clean.

## 8.10 SILENCING CHAMBER

Check the silencing screens for their condition and any contamination and, if necessary, cleaned them with a vacuum cleaner. Protect the absorption material of the screens against mechanical damage during cleaning.

## 8.11 GAS HEATING CHAMBER



**Surface temperature of the heater and the exhaust system during operation exceeds highly the safe touch temperature of 60 °C. Prior starting any intervention or work on the chamber, it is necessary to wait until the exchanger, the exhaust system and chamber cool down sufficiently!**

**The shutters of the open damper must be secured against accidental or unintentional closing. Never put your limbs through the shutters of an opened damper – there is a risk of serious injury!**

Check the exchanger for its condition and, if necessary, clean it with a vacuum cleaner.

Check the damper shutters for contamination, potential damage, free movement. Remove any deposited dust with a vacuum cleaner; clean the damper shutter surfaces with a damp cloth. Plastic gears of the dampers are made of a material that does not require additional lubrication.

In dampers with leverage, lubricate the necessary points of the leverage with lubricant spray.

In addition, check the function of the trays for condensate draining from the exchanger and the exhaust system, passability of the drain and of the siphon behind. Clean and add water if necessary. Check the gas connections and the exhaust system for leaks and functionality in addition to the exactly prescribed inspection dates.

### 'Pecín' gas heater



**To apply warranty, servicing of the burner may be performed only by a service technician of the burner manufacturer or an authorised service technician of the burner manufacturer.**

**To apply warranty, servicing of the exchanger (cleaning of the tube plate, etc.) may be performed only by a service technician of MANDÍK, a. s. or an authorised service technician of MANDÍK, a. s.**



**To apply warranty, servicing of the chimney system of the exhaust system may be performed by a specialist company.**

Maintenance of the burner and the gas line fittings must follow the instructions in the manual and technical documentation enclosed in the packaging of the burner and stored subsequently at the place of installation of the equipment.

When maintaining an exchanger component, check the tightening of the burner flange and the burner itself always at least prior the start of the heating season. After removing the tube plate cover, rotate the combustion product swirling generator to loosen any deposits and, if necessary, remove the swirling generators and sweep the tubes. After inspection and possible replacement of the cover seal, replace it and tighten the bolts.

#### **'MONZUN' gas heater**



**To apply warranty, servicing may be performed only by a service technician of MANDÍK, a. s. or an authorised service technician of MANDÍK, a. s.**

When maintaining the heater, check the strength of the bolted joints in the area of the burner and test the functionality of the combustion product exhaust, thermostats and lights on the control panel. Furthermore, check the electrical connection and tighten cable clamps. If necessary, vacuum any dust and check the passability of the suction inlet of the combustion air for the burner.

## 8.12 ELECTRIC HEATING CHAMBER



**Surface temperature of the heating elements during operation exceeds highly the safe touch temperature of 60 °C. Prior starting any intervention or work on the chamber, it is necessary to wait until the heating rods and the chamber cool down sufficiently!**



**Any interference with the electric heater may only be performed by personnel qualified according to valid regulations of the country in which the unit is put into operation.**

Check the heating rods for its condition and, if necessary, clean them with a vacuum cleaner.

Furthermore, it is necessary to check the functionality of the equipment for controlling air flow and the operating and safety thermostats. With an electric heating chamber, it is always necessary, under all operating conditions and modes, to observe the minimum cross-sectional air speed of 1 m/sec. to ensure that heat is removed from the heating rods.