



**AKKAYA**  
B O I L E R S

# USER MANUAL

**SKK MODEL  
HOT /SUPERHEATED WATER  
BOILERS**

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## 1. INTRODUCTION

*Valuable Customer,*

*Akkaya hot/superheated water boiler you have purchased is produced according to EN & TURKISH norms.*

*This user guide is prepared for Akkaya SKK model, oil or gas fired hot/superheated water boiler.*

*This user guide includes technical information about the boiler and operating and safety instructions as well.*



**Owner must employ a licensed or certificated boiler operator for a safe and efficient use. Any accidents or breakdowns caused by operating conditions, other than described in this guide, shall be customer's responsibility. All local legal requirements must be fulfilled by the owner prior and during operation of the boiler.**

There are some information and charts referred to standards and norms in this manual. Please refer to the latest versions of the standards and norms.



# GENERAL DESIGN and CONSTRUCTION

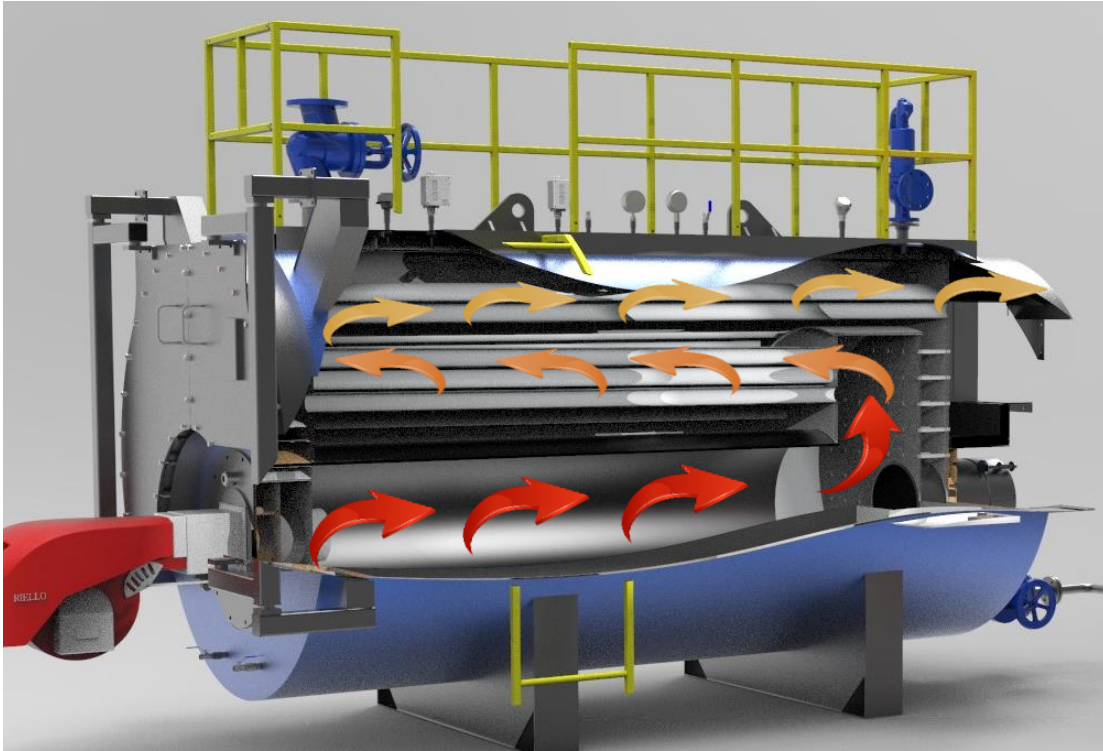


## 2.GENERAL DESIGN AND CONSTRUCTION FEATURES




### 2.1 Design

- SKK model boilers are designed and manufactured according to the system which transfers the usable heat of combustion gases to the water by the 3 passes principle of gases inside the boiler. This model is also known as "SCOTCH TYPE".
- SKK boilers are "wet back" boilers, which means the reversal chamber between 1<sup>st</sup> and 2<sup>nd</sup> smoke pass of the boiler is water cooled. This allows longer lifetime for the boiler and decreases the problems caused by refractory breakdowns in dry back boiler systems.
- The heat transfer area of the boiler and the combustion chamber dimensions are selected properly to increase the efficiency and the lifetime of the boiler. The heat load per heat transfer surface area (W/m<sup>2</sup>) of the boiler is selected properly because of this feature boiler has a safe and reliable operation.
- For the high operating pressure values, the furnace is produced in corrugated form to eliminate thermal expansions and to obtain sufficient strength.
- Isolation of the boiler is specially made to minimize the thermal energy loss. Special covering materials are used on the surface, to protect the shell of the boiler from outdoor conditions and to prevent the tearing at maximum.
- Front door hinges are designed for effortless operation. Opening the front doors are quite easy and safe.
- Rear smoke box and front door side panels are isolated by ceramic-based insulation materials to decrease heat loss and to let safer operation.
- There is a man way with stairs and railing on top of the boilers for easy access and safe operation.
- The boiler body is designed according to PED2014/68 directive and CE marked.
- EN12953, EN13445 & EN1090 norms are followed where applicable.
- Akkaya Boilers has ISO3834 & ISO9001 quality system certificates.

## 2.2 Working Principle



**Figure 2.2.1 SKK Boiler Working Principle**

-  : FIRST STAGE
-  : SECOND STAGE
-  : THIRD STAGE

The flame from the burner first reaches to the reversal chamber of the furnace (wet back) and from here it goes back to the front door's smoke box. Then, the hot gases reach at the rear smoke box from the door's smoke box through the smoke pipes. And finally, hot gas is discharged from the chimney to the atmosphere. By this way 3 pass is completed.

## 2.3 Construction

SKK boiler body consists of a: Cylindrical, 3-pass, fire tube, wet back main body, mirror plates and plain or corrugated furnace at proper thickness, according to the boiler's operating pressure. EN12953 is taken as reference for design calculations where applicable.

## 2.4 Quality

### 2.4.1. Steel Materials

Steel materials are selected according to the requirements of EN12953-2. Generally, boilers are made of carbon steel of quality P265GH - P295GH -P355GH in accordance with EN10028-2 standard in the pressure-exposed parts and of S235JR - S355JR quality in non-pressure parts. The details of the materials used can be found in the “Technical File” of the boiler.

### 2.4.2 Tubes

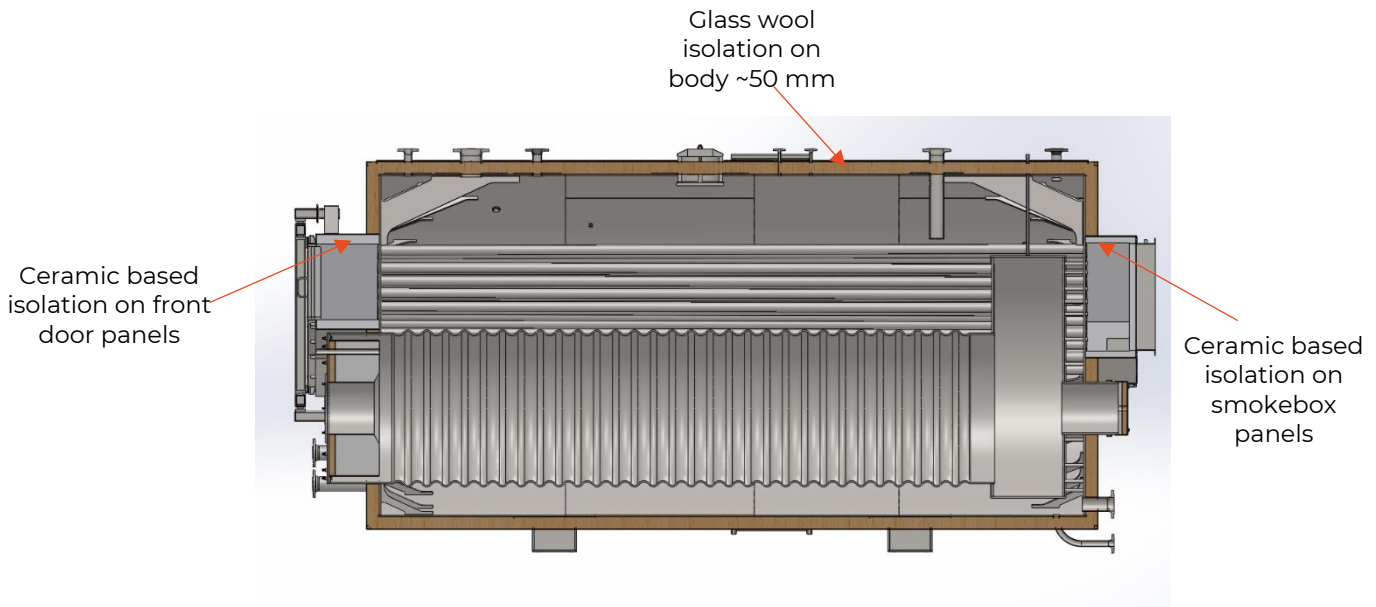
In accordance with the requirements of EN12953-2: EN10216-2 P235GH, 16Mo3 or similar quality seamless steel tubes and EN10217-2 P235GH quality ERW (welded) tubes are used. The details of the materials used can be found in the “Technical File” of the boiler.

### 2.4.3 Welding

Welds were performed by certified welders according to EN9606, in accordance with EN15609, EN15614-1, EN15614-8 requirements of welding procedure specifications. According to EN12953-5, welds are subjected to necessary non-destructive testing procedures (UT / RT, VT, MT / PT). The weld details including WPS, PQR, welding maps, NDT reports, welder certificates can be found in the “Technical File” of the boiler.

### 2.4.4 Isolation

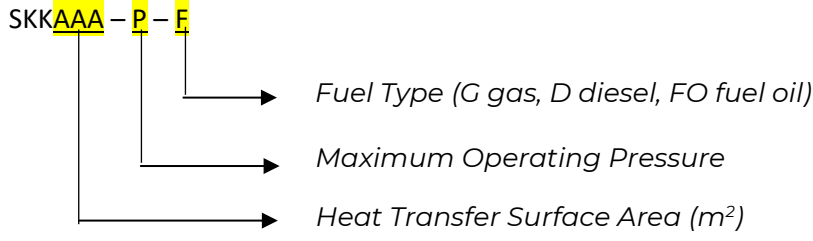
On 50 mm thick glass wool, PVC and protective film coated galvanized sheet, aluminum or, stainless steel coating (specifications of which can be changed according to customer request) is applied. Rear smoke box and front door side panels are isolated by ceramic-based insulation materials to decrease heat loss and to let safer operation.




**Figure 2.4.4.1 Isolation**



## 2.5. Product Coding



## 2.6. Boiler Name Plate (Sample)




# AKKAYA

BOILERS

**AKKAYA ISI MAKİNALARI VE DOĞALGAZ SAN. VE TİC. A.Ş.**  
**AKKAYA HEATING INSTRUMENTS & NATURAL GAS INC.**

<b>Tanım</b> Description	_____
<b>Tipi</b> Type	_____
<b>Seri No</b> Serial Number	_____
<b>Standart</b> Standard	_____
<b>Max. Isıl Kapasitesi</b> Maximum Thermal Capacity	_____
<b>Akışkan Tipi</b> Fluid Type	_____
<b>Isıtma Yüzeyi</b> Heating Surface	_____
<b>Müsaade Edilen En Yüksek Basınç</b> Max. Allowable Working Pressure	_____
<b>Müsaade Edilen En Yüksek Sıcaklık</b> Max. Allowable Working Temperature	_____
<b>Hidrostatik Test Basıncı (bar)</b> Hydrostatic Test Pressure (bar)	_____
<b>Hidrostatik Test Tarihi</b> Hydrostatic Testing Date	_____
<b>İmalat Tarihi</b> Manufacturing Date	_____



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# TRANSPORTATION INSTRUCTIONS



### 3. TRANSPORTATION INSTRUCTIONS

#### 3.1. Placing the Boiler on Transport Vehicle



**Figure 3.1.1 Placing Boiler on Transport Vehicle**

- 1- An open top vehicle must be selected for transportation of the boiler (either with truck or container)
- 2- While loading boiler on a vehicle, a crane (with proper load capacity) must certainly be used. All the covers / doors of the vehicle must be opened before the boiler is lifted for placing.
- 3- Lifting eyebolts of the boiler must be used while lifting to place it on the vehicle. (In Figure 3.1.1)
- 4- Rope or chain must be selected carefully to carry the boiler safely. Connection and angle of the ropes/chains must be done according to the instructions & confirmations given by Akkaya.
- 5- Placing on the vehicle and positioning the boiler must be done carefully and instructions from the transport vehicle operator must be followed.
- 6- The lashing of the boiler on the vehicle or container must be carried out by professional and certificated companies.



**When you lift the boiler from the ground level, there must be **NOBODY** under or close to the boiler. Utmost care must be taken to avoid accidents.**

#### 3.2. Transporting The Boiler

- 1- Before carrying the boiler on a vehicle, it must be fixed to the vehicle by being tied with barrier to prevent slipping. The lashing must be done by certificated companies.
- 2- Boiler mustn't be carried together with fragile equipment and/or living creatures.
- 3- The driver of the vehicle must avoid any sudden movements. The speed limits of the road must strictly be obeyed.

#### 3.3. Placing The Boiler In The Boiler Room

- 1- Boiler must be placed in a boiler room, specially built for boiler and boiler auxiliaries.
- 2- Local legal regulations and rules or TS2025-2021 (whichever is stricter) must be followed for the boiler room placement and construction.
- 3- Boiler must be unloaded from the vehicle, using a crane. The eyebolts of the boiler must be used for crane operation.
- 4- If it is not possible to take the boiler inside the boiler room, either from its roof or doors, some agents like rollers or similar items can be used to slide the boiler on.
- 5- Experienced staff must be in charge for unloading and placing the boiler in the boiler room. Safety tools like helmets, gloves, eye protectors... etc. must be provided.
- 6- The boiler room must be free from dust, flammable materials, dangerous or corrosive gases.
- 7- The fire protection & extinguishing system must be installed.



# INSTALLATION OF BOILER AND AUXILIARIES



#### 4. INSTALLATION OF BOILER AND AUXILIARIES

For the boiler room dimensions and construction rules please refer to the local regulations. Please consult Akkaya for the dimensions of the boiler and auxiliary equipment to be installed inside the boiler room.

- 1- All required legal permissions for boiler fuel supply, electrical power supply, piping & plumbing must be completed and provided by the owner.
- 2- The height of the boiler room must be built at least 2 m higher than boiler's height.
- 3- The boiler room must have at least two facing doors one of which must have ventilation openings to allow air circulation.
- 4- The doors must have at least 2 m height and 0,9 m width.
- 5- The boiler room floor must be a smooth concrete or a non-flammable basement.
- 6- The boiler room must be well ventilated but protected from outdoor conditions or wind.
- 7- Any flammable objects mustn't exist in the room.
- 8- The installation of the boiler and its auxiliary accessories must be carried out by an experienced and qualified staff.
- 9- If there is more than one boiler to be installed in the same boiler room, there must be minimum 1 m space between boilers.
- 10- Adequate space must be left to access the boiler for inspection or service purposes.
- 11- Easy access to the electrical control board and sufficient clearance must be provided.
- 12- Pressure drop in the boiler room can be maximum 0,5 mbar. It must be ensured that there is no negative pressure in the boiler room.
- 13- In case any kind of suction fan exists in the boiler room, it must be ensured that boiler flame draft is not affected. In case needed a draft inducer or engineered flue system must be provided.
- 14- The proper water and fuel line piping must be completed before the boiler start-up. P&ID (piping and instrumentation diagram) and item list of the equipment must be provided and must be kept for future records.

*If the auxiliaries and accessories of the boiler is in the scope of contract, P&ID and item list is supplied by Akkaya. Please consult Akkaya for these documents.*

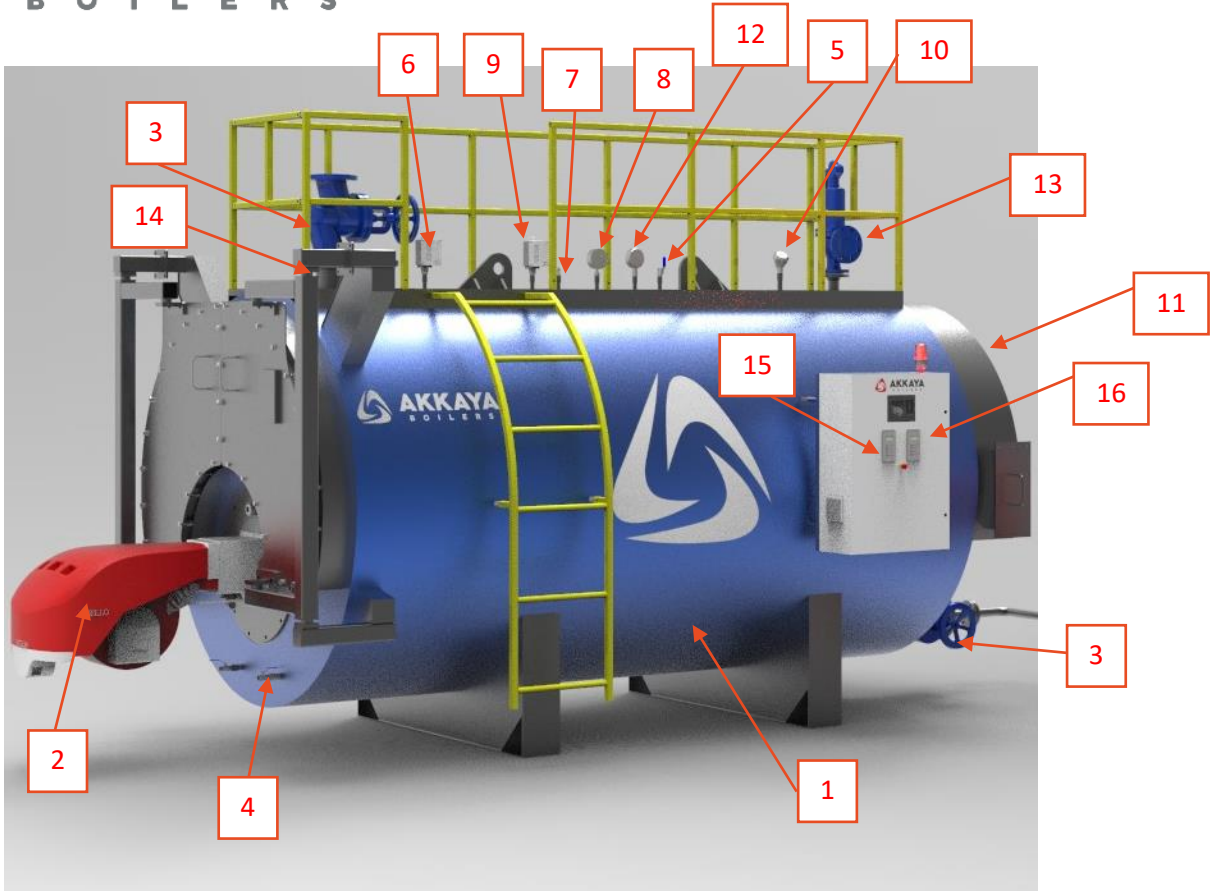


**The owner of the boiler must complete the following pre-works before start-up.**

- 1- Proper water supply line and water drain must be built.
- 2- For the specifications of the water to be connected to the feed water tank and to the boiler feed pump is described in the user manual and in EN 12953-10 standard.
- 3- Piping between boiler and circulation pumps must be done. For the dimensions of the pipes please refer to P&ID.
- 4- A proper electrical power supply cabling to the electrical control board must be done and its earthing (grounding) must be completed. Please refer to the electrical wiring diagram for selection of the power supply cables and protection switches (to be supplied by Akkaya if the control system supply is in the scope of the contract).
- 5- In case the boiler is not delivered as a packaged system with all accessories mounted on, Akkaya's authorized staff must be waited to connect all the accessories to the boiler. Also, the electrical control board connection of the boiler accessories shall be done by Akkaya's technicians, too if these works are in the Akkaya's scope of supply.
- 6- The safety valve outlets must be taken out of boiler room with proper separate piping for each of them. Do not connect the exits of the safety valves to a common pipe.
- 7- Boiler must be connected to a properly designed and certificated chimney. The calculations and the construction of the chimney and the smoke channels must be done according to EN norms.



**Too long horizontal section or improper dimensioned smoke channels may cause poor draft. Chimney draft is very important for the combustion quality. Also, the diameter of the chimney is very important for draft and must be selected properly.**



**Figure 4 Sample Boiler Accessories & Auxiliaries**

The configuration and the equipment descriptions given in this manual are for a standard package SKK boiler system. The specifications and quantities of the accessories may vary due to customer's requests. For safety accessories EN12953 has been taken as reference where applicable.

No	Component	No	Component
1	Hot/Superheated Water Boiler Body	9	Boiler Temperature Switch
2	Burner	10	Boiler Temperature Sensor
3	Boiler Superheated Water Exit & Return Valves	11	Exhaust Gas Temperature Sensor
4	Boiler Drain and Water Filling Valves	12	Boiler Thermometer
5	Boiler Air Discharge Valve	13	Safety Valve
6	Pressure Switch (Min – Max.)	14	Flow Switch
7	Pressure Transmitter	15	Boiler Automatic Low Water Level Controller
8	Manometer and Manometer Valve	16	Electrical Control Board



# **START-UP, OPERATING, CLEANING AND MAINTANENCE INSTRUCTIONS**



## 5. START-UP , OPERATING, CLEANING AND MAINTANENCE

### 5.1 Start-Up And Operating The Boiler



**The boiler's first start-up & commissioning must be done by Akkaya's Technical Service. The guarantee of the boiler will be invalid unless the commissioning is done or approved by Akkaya.**

**When the boiler is turned off manually and needs to be started up again the following steps must be completed to operate the boiler safely.**

**Boiler operators must have a valid license, or a certificate taken from official authorities (In Türkiye MYK certification is required). The operators must be responsible for interfering in any urgent situation. So, it is very important that they know the functional properties and operating principles of all equipment used in boiler systems.**

**The operators must have a control form and must fill it in daily.**

**(For sample daily control chart see Appendix 1)**

- 1- All combustion equipment and chimney system must be checked for a safe operation. This check is done to be sure:
  - a) There is no unfired fuel / oil / flammable object deposit inside the combustion chamber.
  - b) There is no gas deposition inside the boiler.
  - c) There is no leakage at the fuel line and the boiler & burner peripheral is clean and free from fuel / oil / flammable object.
  - d) The chimney and smoke channels are open and clean. Proper suction exists in the combustion chamber. There are no hurdles in the smoke way. All the auxiliaries' (like economizer, recuperator, etc.) dampers are fully open, and smoke can pass through easily.
  - e) There are no hurdles in front of the gas explosion door, and it is functioning well.
- 2- If there is any automatic combustion or control equipment in the system; electrical protection and functional controls and locking system controls must be done. All this equipment must be in operation.
- 3- All valves must be checked for no leakage.
- 4- Minimum pressure level control system and the water flow control of the boiler must be checked strictly, for correct operation. The correct operation of this system must be ensured before the boiler is started-up.
- 5- If the boiler has stayed non-operating for more than 2 weeks, all valves, fittings and control equipment must be checked for any kind of faults before restarting.
- 6- Water with appropriate chemical composition complying with EN12953-10 must be filled in the boiler. Akkaya control systems has a manual filling option on the control board.

**(For boiler water chemical composition information see Appendix 2)**



**Akkaya's manufacturer guarantee shall not be valid unless above mentioned chemical composition of boiler water is provided.**

- 7- The boiler combustion system can be ignited, or the boiler can be started after making all the checks described above.



**Before the first ignition of the burner make sure that there is nobody in front of the boiler doors or in front of the explosion door. At this stage boiler operator(s) must stay at the side of the boiler. There may be a gas explosion and the boiler doors, or the burner can blow away by this explosion. This may cause deadly injuries.**

- 8- Boiler inlet & exit valves must be controlled manually by opening and closing it. These valves must not be tightened too much during operation regarding expansion or squeezing.




- 9- The control values like pressure, temperature and stack temperature must be observed. Boiler pressure manometer and the pressure value on the control screen obtained by the pressure transmitter and the temperature value seen on thermometer and on the screen must be observed and controlled. There may be slight difference between mechanical devices and digital values on the screen. If the difference is higher than 5% Akkaya Technical service must be informed. The temperature of the boiler can be controlled during water circulation continue. The stationary water temperature can be different than the actual value.
- 10- Combustion Air to Fuel ratio adjustment must be done by an expert with an exhaust gas analyzer.
- 11- During first ignition the burner must be operating less than its full capacity. The flame must be observed at minimum length at least one hour without increasing.
- 12- Water level rises because of thermal expansion due to temperature increase. The water volume expansion is compensated by using expansion vessel. Expansion vessel can be closed type or open type. The expansion vessel volume, type and structure must be selected according to operation temperature, pressure, and system full water volume. Please refer to P&ID and item list for detailed information.
- 13- After obtaining homogenous heat inside the boiler, the burner flame and the boiler temperature can be increased gradually. (For example, 15° C in every 15 minutes). Sudden temperature increases must be avoided.
- 14- When the boiler temperature arrives at the set value the burner must stop automatically. There may be a hysteresis set value for restart of the burner. This value must be checked and if it is not well defined for the system needs Akkaya Technical Service must be informed. The burner may be two stage or modulating type; in this case the set value of the 1<sup>st</sup> and 2<sup>nd</sup> stages and the modulating operation of the burner must be checked, if the operation of the burner is not stable the burner's technical service must be informed.
- 15- Safety valve's operation must be checked. When the boiler pressure reaches to set value, the safety valves handles can be lifted to let some water flow. Never try to increase the pressure of the boiler to the safety valve's set value by firing the burner (by making shortcut in burner control line). The check of the safety valves at their set values can only be done by authorized Akkaya Technical Services.
- 16- Check all the flange or nozzle connections for water leakages during the temperature rise of the boiler.





**In case any water leakage is detected at a boiler under pressure and when the temperature is higher than 50°C do not attempt to solve the problem immediately. Wait for the boiler and the water to cool down. Be sure that there is no steam inside the boiler. Superheated water can leak as steam for the high-pressure systems. Breathing steam can burn your trachea and cause suffocation. Steam and hot water can burn your skin. Pressurized water and steam can cause mechanical elements (like bolts, nuts, valves, handles, etc.) to rupture and hit your body. These incidents can cause fatal injuries. Utmost care must be taken during fixing any leakage.**


- 17- During the boiler's operation, the flame must always be kept stable and smooth regardless the fuel type. The boiler operator must also check the fuel consumption and follow it to notice any kind of efficiency loss.
- 18- Water level or system pressure must stay at normal level when boiler is operating. Even if the water pressure level is controlled automatically, boiler operator must still observe the level and the water flow as the automatic system may be out of order because of mechanical or electronic breakdowns.
- 19- Water level controller, flow controller and minimum pressure controller must be cleaned monthly to obtain safe and efficient operation.
- 20- Boiler feed water must be continuously analyzed chemically to prevent improper composition. Water sample must be taken in certain periods and be analyzed as described in Appendix 1 & Appendix 2 of this manual.
- 21- The circulation water pipes and pumps must be controlled frequently (Ave. monthly). The calcination or scale formation inside the pipeline is a frequently faced issue. In case scaling or mud formation is seen they must be fully cleaned by mechanical or chemical means.
- 22- Boiler operator must record all the operations done on the boiler regularly.
- 23- During the whole operation the valves of the circulation pump (the working one, not the stand-by pump) must be kept open.
- 24- The pump rotating direction must have been controlled at the startup by an experienced electrical technician.
- 25- After the boiler and the system is filled in with enough water, take air from the air discharge valve located on top of the boiler and from the air vent screws of the pumps.
- 26- The set values must not be changed by any unauthorized person.



 IF WATER LEVEL FALLS BELOW THE NORMAL LEVEL (THIS IS CONTROLLED BY PRESSURE AND FLOW SWITCH) AND THE BURNER KEEPS ON RUNNING THIS WILL CAUSE OVER HEATING OF THE BOILER PARTS. IN SUCH CASE BOILER&BURNER MUST BE STOPPED IMMEDIATELY. ALL ELECTRICAL POWER SWITCHES MUST BE TURNED OFF. ESPECIALLY WATER CIRCULATION PUMPS POWER CONNECTION MUST BE CUT IMMEDIATELY. NO BODY MUST BE ABLE TO RESTART THE PUMPS ACCIDENTALLY. CIRCULATION PUMP VALVES, BOILER EXIT AND INLET VALVES AND BURNER'S FUEL VALVES MUST BE CLOSED. BOILER MUST BE COOLED DOWN BY OPENING ITS FRONT SMOKE DOORS AND BY LETTING COLD AIR ENTER IN THE SMOKE TUBES. NEVER TRY TO FEED WATER TO THE HOT BOILER. NEVER TRY TO COOL DOWN THE BOILER BY FEEDING WATER. AFTER THE REASON FOR LOW LEVEL IS INVESTIGATED AND ELIMINATED IT MUST BE CHECKED FOR ANY MECHANICAL DAMAGE. ESPECIALLY COMBUSTION CHAMBER OR REVERSAL CHAMBER CAN GET HARMED BECAUSE OF LACK OF WATER. IN ORDER TO CHECK THE SITUATION, AKKAYA TECHNICAL SERVICE MUST BE CONSULTED. BOILER MAY EXPLODE IF YOU FEED THE HOT BOILER WITH WATER!

 THE FLAME MUST BE OBSERVED DURING BOILER OPERATION. IF THE BURNER DOES NOT STOP AUTOMATICALLY AT THE SET TEMPERATURE VALUE, THE FUEL VALVE MUST BE CLOSED IMMEDIATELY AND AKKAYA TECHNICAL SERVICE MUST BE INFORMED.

 IF THE FLAME CAN NOT BE FORMED IN A SHORT TIME AT THE FIRST IGNITION, THE FUEL VALVE MUST BE CLOSED. THE IGNITION MUST BE TRIED AGAIN AFTER BURNER & COMBUSTION CHAMBER IS FULLY VENTILATED AND CLEANED FROM FUEL RESIDUES. DEPOSITED FUEL RESIDUES OR COMBUSTIBLE GASES MAY CAUSE EXPLOSION!

 IF THE BOILER OR ANY OTHER PERIPHERAL EQUIPMENT IS FROZEN DO NOT START THE BOILER BEFORE HAVING AKKAYA'S AUTHORIZED TECHNICAL SERVICE MAKE THE NECESSARY CONTROLS. NEVER TRY TO MELT THE FROZEN PARTS INSIDE THE BOILER BY FIRING THE BURNER. THE BOILER MAY EXPLODE IF YOU TRY TO RUN FROZEN BOILER!

## 5.2 Shutdown And Discharging The Boiler

- 1- Boiler is electrically shutdown from the control board by pressing stop button on HMI. (For different type of control board system please refer to electrical wiring diagram)
- 2- After shutdown be sure that the burner is fully stopped.
- 3- After the burner is fully stopped, fuel line shut off valve must be closed tightly.
- 4- Let the boiler cool down naturally. To prevent sudden temperature changes in the boiler, avoid sudden cooling.
- 5- The circulation pump must keep on working until the temperature of the boiler decreases below 50 C.
- 6- The boiler can be discharged from bottom drain valve after the water temperature is measured below 50 ° C and 0 BarG pressure is observed at the boiler manometers. If only the boiler is intended to be discharged exit and inlet valves of the boiler must be closed before drain.



**It is dangerous to discharge the boiler when it is still hot.**

- 7- Drain valves must be closed tightly after the boiler is fully discharged and warning signs as "do not open" on the drain valves must be placed.

## 5.3 Shutdown Procedures At Emergency Situations

- 1- If there is an emergency case like low water level, low pressure, lack of flow, high temperature, high pressure, or low temperature, press the emergency stop button.
- 2- Be sure the burner and pumps are not working. Close the fuel inlet valve of burner and water inlet valve of the boiler.
- 3- If the system is solid fuel fired boiler. Take out the fire and unburned fuel from the combustion chamber.
- 4- For boilers which have been left without water and heated with lack of water, open the fire tube cleaning doors to let the boiler cool down naturally.
- 5- Never restart the boiler without inspection of an authorized body after an emergency stop.

## 5.4 Precautions

- 1- Do not fire the boiler if the water is under the normal water level.
- 2- Do not put your hands, your head or any of your body parts into the boiler gas side or water side during operation. Do not enter inside the boiler while the boiler is hot.
- 3- Do not close any of dampers on the smoke way fully. These dampers are boiler stack exit damper, economizer damper, recuperator damper or any damper that can stop the exhaust flow.
- 4- Insufficient chimney draft is harmful for human health and reduces boiler efficiency. So, the boiler draft must be kept adequate by means of cleaning and if needed by installation of a suction fan.
- 5- Chimney must be kept clean and in good condition for sufficient combustion. Before starting the boiler, the chimney draft must be controlled.
- 6- Be careful about the possible leakage at chimney and chimney connections.
- 7- Cleaning door on the chimney connection must be closed during operation.
- 8- The doors of fume box and chimney cleaning door must not be opened during operation.
- 9- Do not open the doors of the boiler during operation.
- 10- Before starting the burner, be sure that there are no flammable objects in the boiler and the furnace is clean.
- 11- You must keep the boiler under control during operation frequently.
- 12- Do not cook anything in the boiler.
- 13- Explosion door behind the boiler must be kept clear to be opened easily. Do not put anything in front of the door.
- 14- Do not use fuel with high sulfur content or materials that are harmful for human health.
- 15- Do not put explosive materials in the boiler.
- 16- There mustn't be any materials that can burn around the boiler (like woods, coal, oil, gas, textile materials, plastic materials etc.). Sparks or some heat can get out of the boiler, and this can cause fire. That's why the boiler room and the surrounding of the boiler must always be kept clean and free of materials that can burn.

## 5.5 Cleaning & Maintenance

The perfect reference for a boiler operator is a clean and well cared boiler room. Obtaining high efficiency and continuous operation depend on boiler's and boiler room's condition.

The cleaning and maintenance cost can be kept at a very low level by performing it correctly and frequently. If done so the boiler will have a very long operating life, high efficiency and return of the investment cost will take shorter time.

### General cleaning Instructions:

- 1- All equipment that does not belong to the boiler room must be removed.
- 2- The clean water supply connection and drain connections must exist in the boiler room. The boiler shall be cleaned easily by water.
- 3- The boiler outer shell must be cleaned frequently to keep new and good appearance.
- 4- The control and safety equipment, bushings, flanges must be checked for leakage. If there is no water or steam leakage on any part of the boiler system, the boiler will be clean all the time as there will be no salt, dirt formation or calcification at any part.
- 5- The manholes and flanges must be tightened at least every two months to prevent leakages.
- 6- Front door, burner connection flanges and rear explosion door can be used to clean the gas parts of the boiler.
- 7- If soot layer is less than 0,5 mm, you may leave it. Thicker soot / dirt must be cleaned with special boiler tube brush. The soot inside the tubes decreases the boiler efficiency too much.
- 8- Due to fuel composition and operational conditions, hard layers of soot and sulfur formation may be observed. As these layers are dangerous for boiler materials, they must be cleaned as soon as possible. Cleaning with boiler tube brush shall not be enough for hard layers, a special electric cleaning equipment or movable head cleaning machines can be used.
- 9- Grease oil like molykote must be applied on bolts and nuts before closing the front doors, after cleaning.
- 10- The inlet (return) valve connection nozzle at the back bottom of the boiler can be used to inspect water side of the boiler. There may be additional hand holes on the boiler too. Please refer to the technical file of th boiler and consult to Akkaya Technical Team for further information. Before opening the handholes or any inspection nozzle the steps described in "5.2 - Shutdown & Discharging" section must be completed. Prepare gaskets before opening the hand holes and change the gaskets each time you open these ports. The mud and scale at the bottom of the boiler must be cleaned and washed through these handholes.
- 11- There may be manholes on your boiler. These openings are also used to observe scale formation and sediments on the water part of the boiler. For interior inspection of the boiler Manholes are used. Manholes are heavy accessories. The operator must be very careful during handling these manhole covers. The manhole cover's weight is approximately 30-40 kg. The gasket of these manholes is special. Before attempting to open a manhole be sure to prepare at least 2 spare gaskets. Before opening the manholes, the steps described in "5.2 - Shutdown & Discharging" section must be completed. The doors/covers of manholes must be produced to face the sides of the manhole port with the letting no cavity. Before placing the gaskets, gasket's sockets must be cleaned up and the gaskets must be pulled in the sockets. The space between gaskets and their sockets must be equal in every side. Gaskets of the doors must be tightened equally and gradually. High quality gaskets with graphite or the gaskets advised by Akkaya Technical Service must be used.
- 12- Even just very thin layer like 1 mm of scale/lime on the water side of the boiler, not only drops the efficiency but also causes extra heating of the materials. It must be cleaned with pressurized water. If you fail to get rid of all the lime, chemicals can be used for cleaning.
- 13- If proper water is fed to the boiler, lime formation on the heating surfaces will not occur. In normal conditions the system's water must not be renewed or fresh water must not be added to the system. New water addition can only be considered because of leakages or repair works.
- 14- While filling the system with water antifreeze liquid addition must be considered. Type selection and the mixing rate of this antifreeze liquid must be determined by technical consultant.
- 15- Special filters, air separators mixing tanks must be specified and chosen by the system designer. This equipment increases the lifetime and efficiency of the system.
- 16- Feed water must always be checked for oil content. Oil content in feed water must strictly be avoided.

## 5.6 Protecting The Non-Operating Boiler



**If the boiler is not going to be used longer than one week, the following process must be carried out to prevent rust and corrosion formation.**

- 1- Smoke pipes and smoke side of mirror plates must be cleaned at a boiler temperature of approximately 40 ° C.
- 2- All smoke surfaces of the boiler must be cleaned with oil to prevent direct air contact.
- 3- The air at the smoke side of the boiler must be dry. This can be achieved by putting air drier chemicals inside the boiler.



**When the boiler is out of service, corrosion formation can take place faster than an operating boiler. If there is water with a little alkali content in the boiler, rust and corrosion occurs quickly. If precautions are not taken, corrosion will keep on forming, even when the water is discharged completely. Corrosion can only be prevented if there is NO water in the boiler and the oxygen attack to the metal surfaces are prevented when it is NOT operating.**



**If the boiler will not be operated for a long period and it will be disconnected from the system, it must be kept free of water. The following steps must be followed.**

- 1- Boiler water must be discharged through drain valve.
- 2- All inspection ports (manholes and handholes) must be opened and controlled whether inside of the boiler is dry or not. It must be dried if still wet.
- 3- The pots of diminished lime and calcium chloride must be put in the boiler. These pots must be discharged in every three months.
- 4- To eliminate the rest of oxygen in the boiler, a firing pot with oil-lamp and firewood must be placed in the boiler.
- 5- All inspection ports and valves must be closed.
- 6- Holes, flanges, and valves must be tightly closed and double checked to prevent leakage.

## 5.7 Boiler Water Quality

The possible risks and their results are:

- 1- Lime or scale formation on the boiler surface because of water hardness. This may cause safety failures, heat transfer difficulties, efficiency loss, heat deposition and non-operating boiler.
- 2- Thin layers of oil and organic material on the boiler's heating surface can cause excessive heat in the boiler.
- 3- Free oxygen and free carbon dioxide weaken the boiler material and cause corrosion.
- 4- High organic components quantity causes foam formation, and this foam carries organic substances. When evaporation starts particulate deposition and transfer will occur in the pipelines and equipment which will end up with blockings and breakdowns.



**Proper water according to EN12953-10 must be used for generating hot/superheated water.**



**MANUFACTURER'S GUARANTEE SHALL BE VALID IF ONLY CUSTOMER CARRIES OUT THE RESPONSIBILITY TO PROVIDE PROPER FEED WATER CONDITIONS.**

# APPENDIXES



## APPENDIX 1 -SAMPLE DAILY CONTROL CHART

Observation and testing	Clauses Ref. EN 12953-6	Daily *	1 month	3 months	6 months	12 months	Remarks
Safeguards against excessive pressure (safety valves)	4.1	O			T		-
Water level indication	5.1	T					Compared with limiters and controls
Drain and blow-down devices	4.6	T					-
Valves	5.3	O			T		As per manufacturer's operating instruction
Feed water control	5.5	O			T		-
Low water protection	5.6.1	O	T				Functional check by lowering the water level to the switching points
Boiler pressure and temperature indication	5.2	O					Compared with limiters and controls
Pressure limitation	5.6.2	O	T				Functional check by increasing the pressure to the switching points
Temperature limitation	5.6.3	O	T				
Devices for water quality protection	4.8	O	T (1)		T(2)		(1) Comparison of the measured values with the reliable samples (see 4.7.2 of EN12953-6) (2) Performed by a suitably qualified and competent person
Protective device	4.3	O			T(3)		(3) Electrical and mechanical testing performed by a suitably qualified and competent person
Pressure parts (pipes, inspection openings, flanges, gaskets, joints...)			O				
Pressure controller and temperature controller	4.4.1	O			T		
Feed water supply	5.4	O		T			
Water quality	4.7	T(4)					(4) see EN 12953-10:2003
Energy Supply	4.4	O				T(5)	Performed by a suitably qualified and competent person as per operating instruction but not less than once a year.

(O) Observation of abnormal noises, smells or other noticeable factors.

(T) Checking and/or testing the functional behavior of equipment parts, including observation.

\* In the standard it is written as 72 hours, Akkaya Boilers strictly recommends these controls to be done DAILY.

A daily control chart must be recorded and kept by the operator of the boiler. If the daily controls are not done and recorded properly manufacturer's guarantee will be invalid. A safe and efficient operation of the boiler can be sustained by making these controls.

## APPENDIX 2 - WATER QUALITY REQUIREMENTS

ICS 13.060.25; 27.060.30;  
27.100

TS 377 10  
EN 12953-10 JANUARY 2006

Table 5-1 — Feedwater for steam boilers (except attemperator spray water) and hot water boilers				
Parameter	Unit	Feed water for steam boilers		Feed water for warm water boilers
Working pressure	bar (= 0,1 MPa)	> 0,5 - 20	> 20	Total interval
Appearance	-	clear, free from suspended solids		
Direct conductivity 25 °C	µS/cm	not specified, only guide values relevant for boiler water see table 5-2		
pH value at 25 °C*	-	> 9,2**	> 9,2**	> 7,0
Totalhardness (Ca + Mg)	mmol/L	< 0,01***	< 0,01	< 0,05
Iron (Fe) concentration	mg/L	< 0,3	< 0,1	< 0,2
Copper (Cu) concentration	mg/L	< 0,05	< 0,03	< 0,1
Siliciumdioxide (SiO <sub>2</sub> ) concentration	mg/L	not specified, only guide values for boiler water relevant, see table 5-2		-
Oxygen (O <sub>2</sub> ) concentration	mg/L	< 0,05****	< 0,02	-
Oil/ grease concentration (see EN 12953-6)	mg/L	< 1	< 1	< 1
Organic substances (as TOC) concentration	-	See Footnote *****		

\* pH must be in between 8,7 - 9,2 for copper alloys.

\*\* With softened water pH value > 7,0 the pH value of boiler water according to table 5-2 should be considered.

\*\*\* At operating pressure < 1 bar total hardness max. 0,05 mmol/ shall be acceptable.

\*\*\*\* Instead of observing this value at intermittent operation or operation without deaerator if film forming agents and/or excess of oxygen scavenger shall be used.

\*\*\*\*\* Organic substances are generally a mixture of several different compounds. The composition of such mixtures and the behaviour of their individual components under the conditions of boiler operation are difficult to predict. Organic substances may be decomposed to form carbonic acid or other acidic decomposition products which increase the acid conductivity and cause corrosion or deposits. They also may lead to foaming and/or priming which shall be kept as low as possible.

ICS 13.060.25; 27.060.30;  
27.100

TS 377-10  
EN 12953-10 JANUARY 2006

Table 5-2 — Boiler water for steam boilers and hot water boilers					
Parameter	Unit	Water for steam boilers			Boiler water for hot water boilers
		Feed water direct conductivity > 30 µS/cm		Feed water direct conductivity 30 µS/cm	
Working pressure	bar (= 0,1 MPa)	> 0,5 - 20	> 20	> 0,5	total range
Appearance	-	clear, no stable foam			
Direct conductivity at 25 °C	µS/cm	< 6000 - (a)	Şekil 5.1-(a)	< 1500	< 1500
pH value at 25 °C	-	10,5 to 12,0	10,5 to 11,8	10,0 to 11,0 (b,c)	9,0 to 11,5 (d)
Composite alkalinity	mmol/L	1-15 (a)	1-10 (a)	0,1 to 1,0 (c)	< 5
Silica (SiO <sub>2</sub> ) concentration	mg/l	pressure dependent, according to figure 5-2			-
Phosphate - PO <sub>4</sub> (e)	mg/l	10 to 13	10 to 30	6 to 15	-
Organic substances	-	see footnote (f)			-

a- With superheater consider 50 % of the indicated upper value as maximum value.

b- Basic pH adjustment by injecting Na<sub>3</sub>PO<sub>4</sub>, additional NaOH injection only if the pH value is < 10.

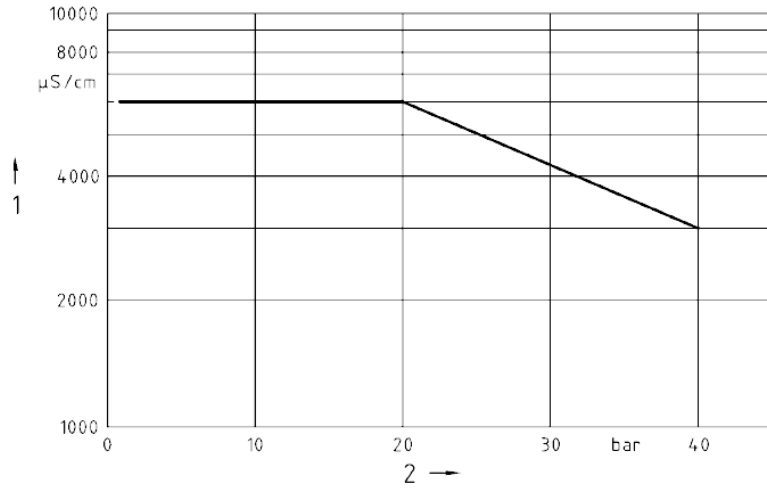
c- If the acid conductivity of the boiler feedwater is < 0,2 Na + K concentration is < 0,010 mg/l, phosphate injection is not necessary. Under the conditions AVT (all volatile treatment, feedwater pH 9,2 and boiler water pH 8,0) can be applied, in this case the acid conductivity of the boiler water is < 5

d- If non-ferrous materials are present in the system, e. g. aluminium, they may require lower pH value and direct conductivity, however, the protection of the boiler has priority.

e- If coordinated phosphate treatment is used; considering all other values higher PO<sub>4</sub>-concentrations are acceptable (see also clause 4).

f- See e in table 5-1.

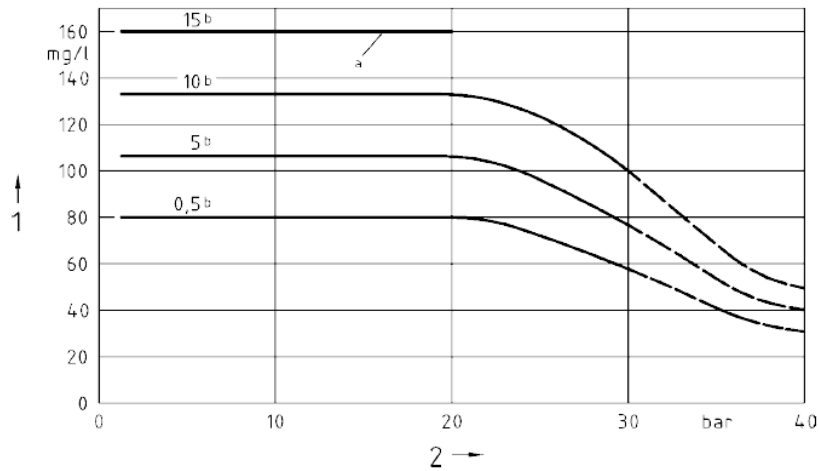




1: Direct Conductivity

2: Operating Pressure

**Chart 1.1 Maximum acceptable direct conductivity of the boiler water dependent on the pressure; feedwater direct conductivity  $\geq 30\mu\text{S} / \text{cm}$**



1: Maximum silica content

2: Operating pressure

a) This level of alkalinity is not permissible  $\geq 20$  bar

a) Alkalinity in mmol / l

**Chart 1.2 Maximum acceptable silica content (SiO<sub>2</sub>) of the boiler water dependent on the pressure**

### APPENDIX 3 - DIMENSION TABLE OF SKK MODEL BOILERS

<i>Model</i>	<i>Maximum Thermal Capacity (kcal/h)</i>	<i>Minimum Water Flowrate (<math>\Delta T 20^{\circ}C</math>) (<math>m^3/h</math>)</i>	<i>Length (mm)</i>	<i>Width (mm)</i>	<i>Height (mm)</i>	<i>Weight* (kg)</i>
SKK 8	200.000	10	1900	1150	1500	1350
SKK 10	250.000	13	2150	1150	1500	1450
SKK 15	375.000	19	2450	1400	1750	2350
SKK 20	500.000	25	3050	1400	1750	2800
SKK 30	750.000	38	2950	1750	2100	4400
SKK 40	1.000.000	50	3650	1750	2100	5250
SKK 50	1.250.000	63	3650	1950	2300	6700
SKK 60	1.500.000	75	4200	1950	2300	7500
SKK 70	1.750.000	88	4750	1950	2300	8250
SKK 80	2.000.000	100	4600	2200	2550	10550
SKK 90	2.250.000	113	5050	2200	2550	11350
SKK 100	2.500.000	125	5450	2200	2550	12100
SKK 125	3.125.000	157	5100	2400	2850	14050
SKK 150	3.750.000	188	5850	2400	2850	15580
SKK 175	4.375.000	219	6300	2600	3050	20650
SKK 200	5.000.000	250	7000	2600	3050	22700
SKK 250	6.250.000	313	7300	2750	3250	26450
SKK 300	7.500.000	375	8450	2750	3250	30250
SKK 350	8.750.000	438	7650	3150	3700	36150
SKK 400	10.000.000	500	8500	3150	3700	39900
SKK 450	11.250.000	563	8950	3150	3700	41200
**SKK 500	12.500.000	625	9700	3150	3700	44650

\*6 bar & empty W/O accessories. Akkaya keeps the right to make modifications and changes in the design and dimensions. For the exact dimensions and design information of your boiler please refer to the technical file provided by Akkaya.

\*\*Twin furnace type boilers.

## APPENDIX 4 - SYSTEM ACCESSORIES AND AUXILIARY EQUIPMENT EXPLANATIONS

The accessories and auxiliaries explained here may be different than the configuration you have purchased. To be sure about your equipment scope please refer to P&ID and item list provided to you by Akkaya.

### APPENDIX 4.1 Burner

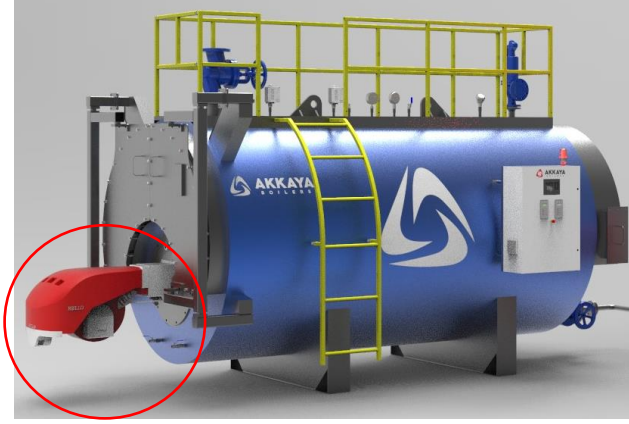


Figure Ap. 4.1 Burner on the Boiler

According to the fuel type, SKK model boilers must be equipped with a proper capacity burner as indicated in each models' technical specification table. SKK models can be fired with natural gas, biogas, diesel, heavy fuel oil or biofuel burners. Consult to burner's manufacturer user manual for details.

**For modulating burner systems, the boiler pressure set value may need to be entered separately both on the boiler control panel and on the burner controller according to the control system design.**

### APPENDIX 4.2 Boiler Exit&Return Valves

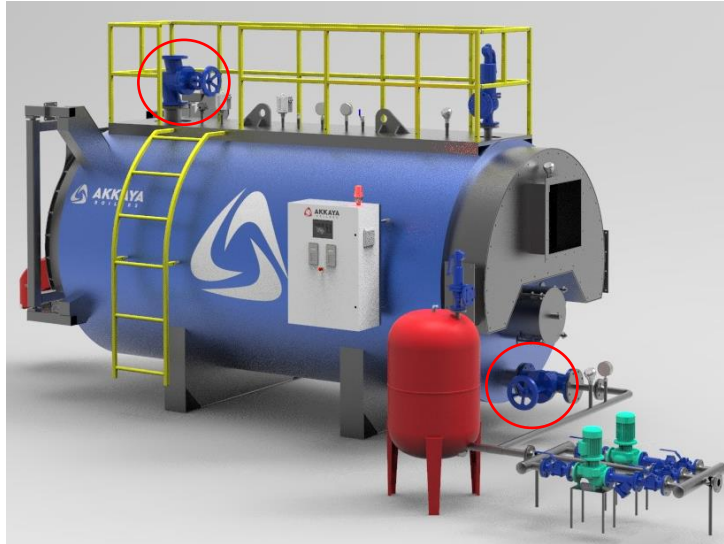
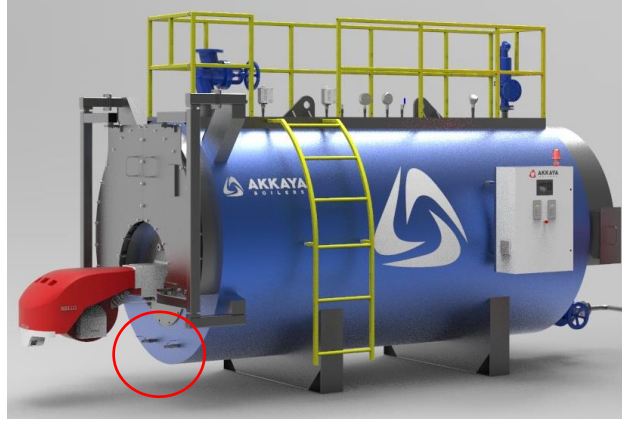


Figure Ap. 4.2 Water Exit and Return Valve Positions on The Boiler

Return and Exit valves are selected according to the flow rate and pressure of the hot/superheated water circulation. The valve at the back bottom side of the boiler is return valve (inlet) and the valve at the front top is the exit valve.

### APPENDIX 4.3 Drain and Water Filling Valves



**Figure Ap. 4.3 Drain and Water Filling Valves**

Boiler drain valve is used to drain water from boiler when needed. Boiler water filling valve allows water to enter the boiler.

### APPENDIX 4.4 Air Discharge Valve



**Figure Ap. 4.4 Air Discharge Valve**

Air discharge valve is used to release air from boiler.

## APPENDIX 4.5 Pressure Switches



**Figure Ap. 4.5 Pressure Switches**

At least one pressure switch for alarm and safety must be installed on the boiler. The set value interval of the pressure switches must be proper for the maximum operating pressure of purchased SKK model. The pressure switches can be used for low pressure alarm and high-pressure alarm.

The pressure switches must be connected onto a siphon (or omega) type tube. This prevents the pressure switch to get harmed by high temperature and sudden pressure hit. Some water is added into the siphon before connecting the pressure switch.

## APPENDIX 4.6 Pressure Transmitter



**Figure Ap. 4.6 Pressure Transmitter**

Pressure transmitter is used to convert the measured pressure to an electrical value (4-20 mA).

Pressure transmitter sends the pressure value information to the main board to regulate the burner's operation.

The pressure transmitters must be connected onto a siphon (or omega) type tube. This prevents the pressure transmitter to get harmed by high temperature and sudden pressure hit. Some water is added into the siphon before connecting the pressure transmitter.

#### APPENDIX 4.7 Manometer & Manometer Valves



**Figure Ap. 4.7 Manometer & Manometer Valves**

Manometers with valve is used to observe the pressure of the boiler. The recommended minimum diameter of the manometers is 100 mm. The scale of the manometer must be able to show maximum working pressure of the boiler. A valve with drain outlet is used under the manometer. The manometers must be connected onto a siphon (or omega) type tube. This prevents the manometer to get harmed by high temperature and sudden pressure hit. Some water is added into the siphon before connecting the manometer.

#### APPENDIX 4.8 Temperature Switch



**Figure Ap. 4.8 Temperature Switch**

Temperature switch controls the alarm for high temperature of the boiler.

#### APPENDIX 4.9 Boiler Temperature Sensor



**Figure Ap. 4.9 Temperature Sensor**

SKK model boilers' control panel is equipped with a digital heat indicator and alarm system, receiving the heat value by the help of a thermocouple placed on the boiler top. This heat controller gives signal to the burner for operation. It is also a safety device. It saves the boiler from getting damaged by low or high temperature. For low temperatures (less than 5 °C) there is always a risk of ice formation inside the boiler or inside the control & safety accessories. In such cases this controller shuts down the burner. In some applications the temperature set value adjustment must also be done from burner's controller too. Please consult Akkaya Technical Service for accurate information about your boiler control system.

For high temperature there is a risk of low water level in the boiler. This is quite hazardous. In this case this controller stops the burner.

#### APPENDIX 4.10 Exhaust Gas Temperature Sensor



**Figure Ap. 4.10 Exhaust Gas Temperature Sensor**

SKK boilers' control panel is equipped with a digital heat indicator and alarm system, receiving the heat value by the help of a thermocouple that is placed between chimney and boiler. This heat controller is a safety device.

Received temperature information is used to understand the heat loss from boiler. In case of lime or slag formation inside the boiler, the stack temperature increases. In this case smoke tube cleaning and water parts cleaning must be carried out. Also, low water case can cause high stack temperature. This sensor stops the burner and prevents water pumps to operate if the alarm value is reached.

#### APPENDIX 4.11 Boiler Thermometer



**Figure Ap. 4.11 Boiler Thermometer**

Thermometer is used to observe the temperature of the boiler. The recommended minimum diameter of the thermometer is 100 mm. The thermometer is connected to the boiler with a well , it is recommended to fill this well with water or oil in order to increase the heat transfer and to obtain better readings.

#### APPENDIX 4.12 Safety Valve



**Figure Ap. 4.12 Safety Valve**

The safety valve is designed to open and relieve excess pressure from boiler. The safety valves must be chosen according to EN12953-8 norm. The exit line of the safety valve must be taken to a safe area with a same or bigger diameter pipe with the valve's exit nozzle. The valve must be directly connected to the boiler or system without any shut off valve.

#### APPENDIX 4.13 Automatic Boiler Low Water Level Controller



In some boiler installations an automatic low water level control system is used for preventing water level inside the boiler from decreasing to a level lower than the set value on controller. Refer to P&ID and item list to learn about your system's components.

**For the exact dimensions of the level probe please consult Akkaya Service. Do not try to adjust probe levels without supervision and approval of Akkaya Technical Service.**

#### APPENDIX 4.14 Flow Switch

In some boiler installations a flow switch is used to ensure the circulation of water through the boiler. Refer to P&ID and item list to learn about your system's components.

#### APPENDIX 4.15 Electrical Control Board



**Figure Ap. 4.15 Electrical Control Board**

A PLC board is provided in the standard package of SKK model boilers. The control board contains the boiler operation system, and the safety system controls.

There is an emergency stop button (can be increased in serial connections) to stop the whole operation in case of emergency or unexpected situations.

A hooter connected to board gives an audial alarm signal in case of safety failures. Also, a flashlight on top of the board gives visual alarm.

A remote connection option is included in the control board by which Akkaya technicians can connect the boiler system remotely if customer provides a cable internet connection to the board.

A separate electrical control board manual and wiring diagram is provided by Akkaya for each purchased boiler.

## APPENDIX 5 -BOILER CONTROL SYSTEM STANDARD ALARMS EXPLANATIONS

### Boiler Water Low Level

If there is a water level controller on the boiler, this alarm turns on when the water inside the boiler is at a lower level than normal set level. When boiler gets into alarm position, burner stops. To operate the boiler again, MANUAL RESTART must be done. The causes of low water level must be investigated. (Faulty pump, lack of water in the system, blocked water feed line... etc.)

### Low Temperature Alarm

This alarm turns on when the water temperature inside the boiler comes close to the freezing point (+5°C). In this case pumps and burner do not operate. After the ambient temperature rises and the ice inside the boiler is checked and safely eliminated, boiler can be operated by MANUAL RESTART.

### High Temperature Alarm

Boiler high temperature alarm turns on in cases where the water temperature inside the boiler exceeds the set value. In this case pumps and burner do not operate. Boiler can be operated again by MANUAL RESTART after the temperature is decreased. Lack of water in the boiler may cause this situation. It must strictly be investigated by the authorized personal / service.

### High Pressure Alarm

This alarm triggered by the pressure switch or by the pressure transmitter installed on the boiler. It turns on when the system pressure is higher than the pre-set value. In this case burner stops automatically. To operate the boiler again, after the pressure decreases to normal value, MANUAL RESTART must be done.



***In high pressure cases burner automatically stops. But if the pressure continues to increase, safety valves automatically open and water is discharged until the pressure decreases to set value and alarm turns-off.***

### Low Pressure Alarm

This alarm triggered by the pressure switch or the pressure transmitter. When there is lack of water in the boiler and in the system, this alarm stops the burner.

### Flow Alarm

This alarm triggered by the flow switch if the circulation of water through the boiler is less than the normal value. The faulty circulation pump or lack of water can cause this alarm.

### Burner Error/ Failure

Signal indicates that there is a fault in burner operation. Boiler must be re operated only after the fault is investigated and eliminated by an authorized service or staff.

### Circulation Pump Operation

-Boiler 1. Circulation Pump On / Off must be "on" in normal operation.

-Boiler 2. Circulation Pump On / Off must be "off" in normal operation as stand-by.

In cases where "pump error" signals are on, faulty pump must be stopped manually and other one must be operated. The pump error signal comes from the motor protection thermic switch. It must be reset from thermic relay.

### Hooter/ Siren Shutdown

It is for shutting down the voice of boiler controls. It only shuts down the voice alarms, signals continue to function.

### Manual Restart Button

It is for deleting the alarm warning on the screen and to re-start the boiler. It aims to prevent the boiler's self, re-starting and forces the operator to go next to the boiler physically to see the alarm and take necessary actions.

### Burner Alarm Reset

For some burner types, burner alarm reset button may be placed on the boiler control board instead of burner control board. This button is to reset the burner alarm from the boiler control board.



***ATTENTION: Information in this section is to give general idea to the operator, about boiler control board and main controls on it. The number of equipment, switches and controllers may vary according to the purchased configuration. The main source for reference shall be the special "electrical control board diagram" that is provided to the customer during the system installation.***



**PLEASE KEEP THE FOLLOWING DOCUMENTS WHICH HAS BEEN SUPPLIED BY AKKAYA IN A SAFE LOCATION DURING THE ENTIRE LIFETIME OF THE BOILER**

- a. USER MANUAL**
- b. P&ID (PIPING AND INSTRUMENTATION DIAGRAM)**
- c. ITEM LIST**
- d. TECHNICAL FILE, INCLUDING CERTIFICATES**
- e. ELECTRICAL WIRING DIAGRAM WITH CONTROL ALGORITHM**

A COPY OF THIS USER MANUAL WITH THE ABOVE DOCUMENTS HAS BEEN RECEIVED BY US AND THE EXPLANATION OF THIS USER MANUAL HAS BEEN DONE BY AKKAYA TECHNICAL SERVICE. WE AGREE TO OPERATE THE BOILER UNDER THE CONDITIONS EXPLAINED IN THIS USER MANUAL.

CUSTOMER NAME:

ADRESS:

DATE:

SIGNED BY (NAME-SURNAME-SIGNATURE):



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