

**SKYK-S SERIES
AUTOMATIC LOADING SOLID FUEL BOILER**

INSTALLATION, OPERATION & MAINTENANCE MANUAL



HEATING SYSTEMS

www.sistemtubular.com



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1. PRODUCT TYPE AND WARRANTY

Thank you for choosing System Tubular automatic loading SKYK-S series solid fuel boiler.

Before installing and operating your product, please read the user manual carefully and keep it together with the accompanying warranty certificate throughout the life of your boiler.

SKYK-S series are high efficiency hot water boilers designed for burning solid fuel only. Its steel body is made of welded joints. These boilers should only be used for heating the water in the heating system. It is not suitable to use the heated water directly for other needs. Please get information from authorized dealers for different applications.

Automatic loading and smoke tube models are named as SKYK-S series. The number next to it expresses how many thousand kilocalories are the boilers. For example, SKYK-S 40 boiler has a heating capacity of 40 thousand kilocalories. The warranty period of SKYK-S boilers is 2 years. The warranty document is delivered with the product. The lifetime of the boiler is more than 10 years. On the other hand, the maintenance of the boiler should be done regularly and the system components that are completed their service life must be replaced on time. This product is among the most efficient solid fuel boilers worldwide.

2. GENERAL INFORMATION

This user manual contains all the necessary explanations regarding the introduction, installation, operation and maintenance of the product. Boiler installation, maintenance, and service should be done by technical experts. The user manual and regulations should be observed for choosing the appropriate place, installation, water pipe connection, and chimney design of the boiler.

Sistem Tubular is a company that provides services on both solar water heating systems and solid fuel boilers used in central space heating. Among the priorities of the company are to develop new products and increase productivity with R&D activities in line with the needs, using high-tech equipment. SKYK-S series boilers have been designed and manufactured using computer aided programs in order to meet the expectations of solid fuel use in line with the demands of the market. Depending on its capacity, it can be used both to meet the heating needs of the

household and to meet the space heating needs of large buildings such as hotels and dormitories.

3. INTRODUCTION AND WORKING PRINCIPLE OF BOILER

Automatic loading solid fuel boilers are also called stoker boilers as coal goes to the combustion chamber automatically from the hopper. The heat energy in the combustion chamber is transferred to the heating water by smoke tube heat exchanger.

The grate must be loaded at the appropriate level to work SKYK-S model boiler efficiently. Control of the combustion circuit, fan and system pump is carried out by the electronic control panel supplied with the boiler. In SKYK-S boilers, only nut coal should be used as fuel. Depending on the calorific values of fuels and the way of loading, the heat transferred from the boiler to the water may differ.

Fuels:

Only nut coal should be used in SKYK-S model boilers. Coal is placed in the hopper and fed into the boiler automatically. When coals are large, it can block the screw conveyor. Damage caused by such use is not covered by the warranty. Never try to burn large pieces of coal or wood by opening the lower door. Small pieces of wood can be placed over coal only during initial ignition.

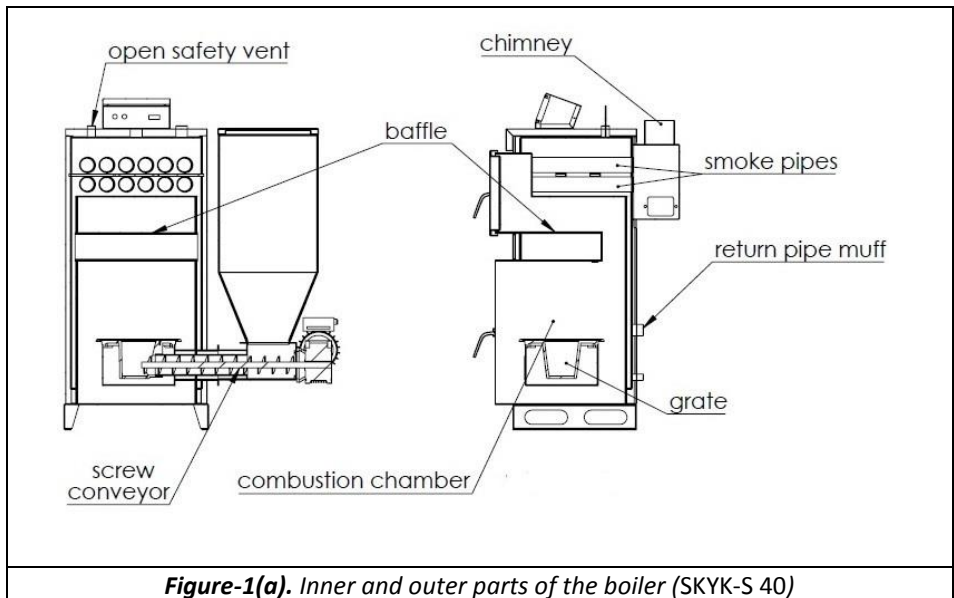
The main parts of the system are (a) Hopper, (b) Screw Conveyor, (c) Grate and (d) Control Panel. All parts of the boiler are given in Figure-1 (a) and (b).

- (a) Hopper:** It is the part where the daily fuel of the boiler is stored. The coal filled in the hopper must be dry. Wet coal reduces the combustion efficiency. It also causes blockages at the entrance of the screw conveyor. If the hopper is left empty, smoke can come out from here. It can also be damaged the screw conveyor. Therefore, it is always recommended to keep it filled with solid fuel during usage. The sieve on top of the hopper is placed to prevent other substances and large pieces of fuel that they go directly into the screw conveyor.
- (b) Screw Conveyor:** It is a part that transmits the coal in the hopper to the combustion chamber.
- (c) Grate:** It is the part where combustion occurs. The coal brought by the screw conveyor and the air directed by the fan mix here, creating efficient combustion.

The Points to Take into Consideration in the Grate:

- The grate must be loaded at the appropriate level to work boiler efficiently. This must be achieved by setting the feeding and stand by times in the control panel.
- Do not interfere to the middle part of the grate.
- In central boilers, the slag accumulated on the edges of the grate should be removed once or twice a day.
- Once or twice in a season, the door on the lower part of the grate should be opened and the dust falling into the lower part should be cleaned.

(d) Control Panel: It is an electronic control panel that provides automatic operation of the boiler.



4. SECTIONS AND SIZE OF BOILER

The inner and outer parts of the boiler are given in Figure 1. Outer parts of the boiler:

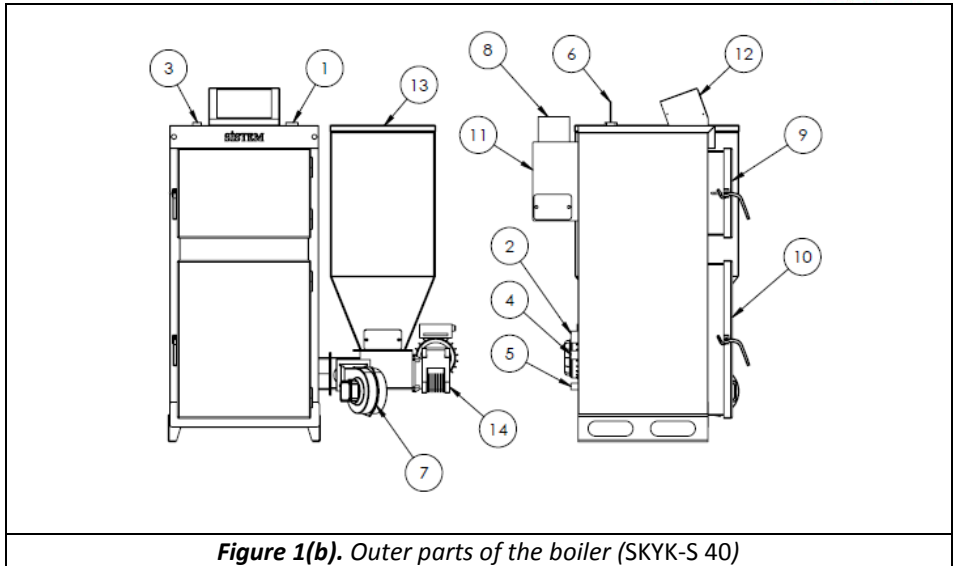
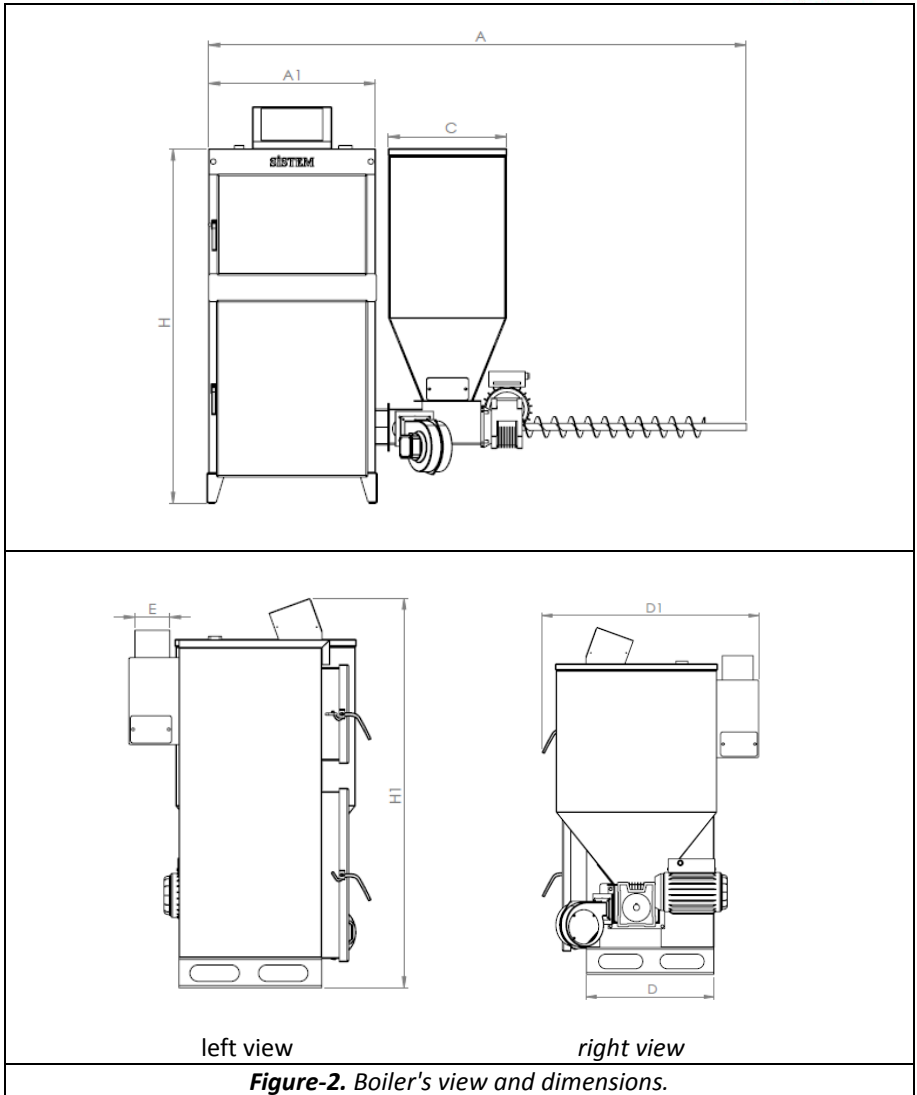


Figure 1(b). Outer parts of the boiler (SKYK-S 40)

1. Supply pipe: It is the pipe line that transfers the hot water from the boiler to the radiators.
2. Return pipe: It is the return pipe line to transfer the water from the radiators to the boiler.
3. Open safety vent: It is the pipe line from the boiler to the expansion tank.
4. Feed and expansion pipe: It is the return pipe line from the expansion tank to the boiler.
5. Refill and drain pipe: It is the pipe line to fill up the boiler.
6. Carrying ring: It is to carry the boiler.
7. Fan: It is the fresh air source required for combustion.
8. Chimney: It is the channel to throw out smoke.
9. Upper door: Cleaning of the heat exchanger and smoke pipe passages should be done by using this door.
10. Lower door: It is used to remove ash and slag accumulated in the boiler, to ignite the fuel, and to reach the grate.
11. Smoke box: It holds the ash so that the chimney becomes less polluted.
12. Control panel: It is an electronic control box that controls the boiler.
13. Hopper: It is the fuel loading chamber.
14. Feeder motor: It rotates the the screw conveyor to transfer fuel from the hopper to the grate in the boiler.



Dimensions and technical specifications of the boilers are available in Figure-2 and Table-1.

Table-1. Technical features and dimensions of boilers.

Boiler Dimensions		SKYK-S 30	SKYK-S 40	SKYK-S 50
Heating Power,	kW	34,89	46,52	58,15
	kcal/h	30.000	40.000	50.000
Temperature Set, °C	70-90°C 35-50°C (for underfloor heating systems) Minimum temperature can be adjusted by the service on request			
Max. Working Temp., °C	95			
Max. Working Pressure, bar	3			
Test Pressure, bar	4,5			
Dimensions				
Width, mm	A ₁	440	610	610
	A	1785	1925	1925
Depth, mm	D ₁	880	880	950
	D	620	620	700
Height, mm	H	1245	1270	1330
	H ₁	1375	1420	1480
Hopper Width, mm	C	385	425	425
	B	830	860	860
Chimney Diameter	E	130	140	140
Supply & Return Pipe	R	1"	1"	1¼"
Feed&Expansion Pipe	R	3/4"	3/4"	3/4"
Refill & Drain Pipe	R	1/2"	1/2"	1/2"
Mass (empty), kg	280		368	420
Water capacity, lt	65,5		85,5	110

SKYK-S model boilers must be installed on a concrete base. The minimum dimensions of the concrete base according to the models are given in Table-2. It is important to use a large enough concrete base on which the hopper's foot also stands.

Table-2. Concrete base sizes to install the boiler.

Minimum dimensions (mm)	SKYK-S 30	SKYK-S 40	SKYK-S 50
Width	850	1100	1100
Depth	850	850	900
Height	60		

Mounting room size:

The size of the boiler room must be large enough. The minimum dimensions of the room are given in Figure-3.

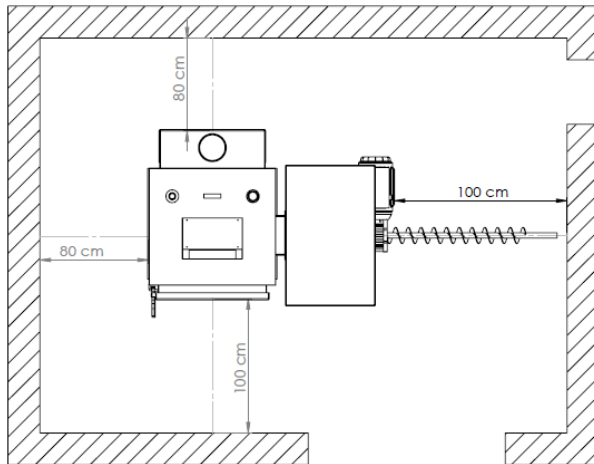


Figure-3. Boiler room dimensions.

5. TRANSPORTATION AND HANDLING INSTRUCTIONS

System Tubular SKYK-S series boilers are one piece.

1. Boiler Group: The boiler is shipped with its insulation and outer cover. Control panel, feeder motor, and fan are shipped on the boiler as assembled.
2. Accessories: User manual, fire rake, for the smoke tube boiler a metal cleaning rod, and pump are supplied with accessory pack.

Transportation of the product safely:

The mass of SKYK-S model boilers is high. Therefore, caution should be paid when transporting the boiler to the place where it will be installed. The net mass of each type of boiler is given in Table-1 in addition to technical specifications. The equipment to be used to lift and transport the product must have enough capacity. While the boilers are transported by crane, nobody should be passed under and if possible, the boiler should be guided by a rope.

In order not to damage the outer cover and the boiler during transportation, it should be carried;

- by a forklift holding from boiler legs connected to the chassis.
- by a narrow pallet truck holding from the back of the boiler,
- or by a hoist or crane attached from the boiler's carrying ring.

Do not use hard and sharp objects to remove the package of the boiler. You may scratch the paint of the outer cover.

While holding the sheet metal, care should be taken due to their bent sharp edges. They causing injuries should be avoided during the transportation of the boiler.

6. ASSEMBLY AND INSTALLATION

SKYK-S model boilers should be installed in a place prepared for heating. The place where the boiler is installed must have enough free space for the installation, combustion and maintenance of the boiler. In addition, there should be sufficient amount of fresh air circulation for efficient combustion. Chimney design must meet the required draft values for the model used, and must comply with the construction criteria given in the user manual and local regulations.

The boiler should never be installed outdoors or in balconies, living areas (such as kitchen, living room, bathroom, bedroom), or in a space directly connected to them. Moreover, it should not be installed in places with explosive and easily flammable materials.

The boiler room must be directly connected to the outside for ventilation and must have vent holes that allow the entrance of fresh air. One of the vent holes should be at most 40 cm below the ceiling of the boiler room, and the other should be at most 50 cm above the floor. These vents must always be open. The lower vent should be at least 40 x 40 cm, and the upper vent should be at least 30 x 30 cm in size.

If the boiler is to be connected to an existing heating line, inside of the flow and return pipe lines should be cleaned thoroughly before installation.

Circulation pump:

Water circulation pipe line should be designed to do it by a pump. And also, a right size pump should be selected for the heating installation. The capacity of the pump to be used should be determined by taking into account the resistances and pressure losses in the installation and the boiler. The selected pump has to provide the total flow rate required for the heating installation and overcome the total pressure loss of the heating system while doing so. To determine the correct position of the pump in the system, hydraulic diagrams given in the user manual should be taken as reference.

Open tank expansion system:

As a company, we recommend an open tank expansion system to the atmosphere for SKYK-S series boilers. Figure-4 shows an example hydraulic diagram for open expansion tank and installation connection. The circulation pump can be mounted either on the flow or return line.

The open expansion tank must be installed higher than the entire system. No valves should be used on the safety pipe lines between the boiler and the expansion tank. Safety pipes should reach the closest point of boiler inlet and outlet from the shortest vertical path.

A hydrometer should be connected to the flow line to monitor the pressure value of the installation and to see whether there is any leak in the system. The hydrometer should be purchased separately and connected at the same level with supply pipe of the boiler.

To circulate the hot water easily even if the pump is off, the boiler should be installed at a lower level than the central heating system. A by-pass line should be installed between the pump inlet and outlet in order to operate the system without any problems in case of power failure. In this case, since the heated water rises when the by-pass valve is opened, natural water circulation will occur without a pump.

Water volume of the expansion tank can be practically calculated using the following formula:

$$V_g = 0,0025 * Q$$

V_g : Water volume of the expansion tank (lt)

Q : Boiler heating Power (kcal/h)

SAMPLE:

Calculation of expansion tank size for SKYK-S 50 boiler

$$V_g = 0,0025 * 50000$$

$$V_g = 125 \text{ lt.}$$

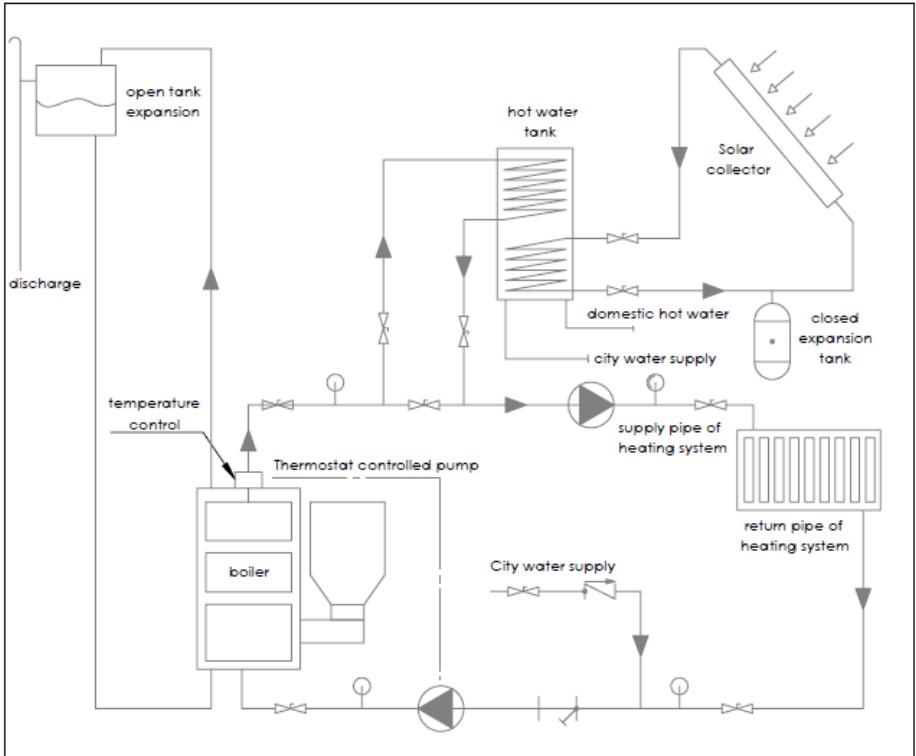


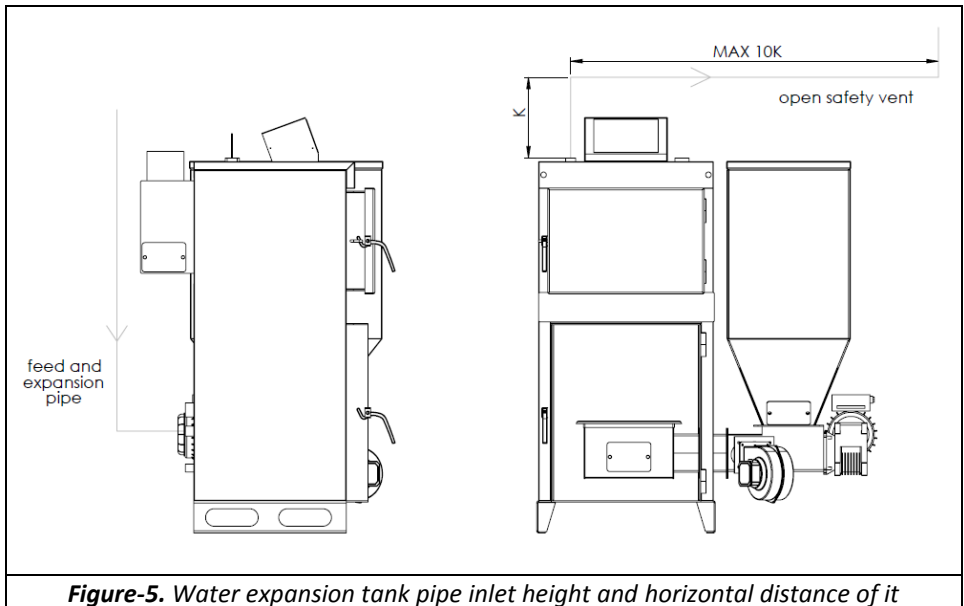
Figure-4. Hydraulic diagram: open tank expansion system.

Optimum open expansion tank sizes for systems where panel radiators are installed in spaces are given in Table-3.

Expansion tank provides extra volume for hot water due to varied temperature and protects the system from excessive pressure increase. Expansion tank can be manufactured in a cylindrical form or rectangular prism, and mounted horizontally or vertically. Expansion tank outflow and return safety pipes should be installed with an always rising slope from the boiler to the expansion tank. The farthest position where the flow and return safety pipes can be installed from the vertical axis of the boiler is given in Figure-5.

Table-3. Open expansion tank sizes for boilers.

Boiler series	Capacity, kcal	Open expansion tank volume, lt
SKYK-S 30	30.000	75
SKYK-S 40	40.000	100
SKYK-S 50	50.000	125



Closed pressurized expansion tank system:

Closed expansion tanks contain nitrogen or air that can be compressed. When the water expands in the system due to heating, pressure increases, the nitrogen in the

closed expansion tank gets compressed and the water expanded goes into the tank. Later, when the system cools down, the water in the tank returns to the pipe line as the pressure decreases. Since the system is closed to the outside environment, heat loss is less, it is exposed to less corrosion and there is no water loss due to evaporation.

In closed expansion tanks, the decrease of water in the system can be observed with a manometer. Manometer is a pressure indicator. The pressure must be between 1 & 1.5 bar in the boiler when it is cold. The pressure increases as the boiler water heats up. A safety valve must be used in heating systems with closed expansion tanks.

The closed expansion tank size should be selected according to the amount of water circulating in the system, the temperature of the tap water entering the boiler, the outlet water temperature of the boiler, the building height (in terms of static pressure), and the pre-gas pressure of the selected closed expansion tank.

The assembly of the closed expansion tank system is seen in the hydraulic diagram given in Figure-6. In addition, the solar collector can be used as an additional heat source.

Boilers on which a closed expansion tank is be mounted must be installed with a suitable safety valve and automatic air purjer.

Underfloor heated places:

When SKYK-S boiler is used together with underfloor heating system in a place, a thermostatic mixing valve should be added to the hot water pipeline as seen in Figure-7. When the thermostat fails for any reason, the boiler water temperature may suddenly increase extremely. In this case, the thermostatic valve will be activated in order to protect the polymer pipes used in underfloor heating. PEX pipes are generally used for underfloor heating. These pipes can withstand approximately 5.5 bars pressure at 90°C. In addition, although the foam material used varies, Polystyrene is generally used. The maximum operating temperature of this material is 75°C. However, if any damage is ocured during the assembly of the pipe, another type of pipe is used instead of pex, or there is a problem caused by a manufacturing error, the pipe may crack or the foam material may be damaged. In addition, excessive increase in temperature may cause parquet flooring to swell. Replacing the underfloor heating pipes is quite laborious and costly. Therefore, it is recommended to install a thermostatic mixing valve for underfloor heating systems.

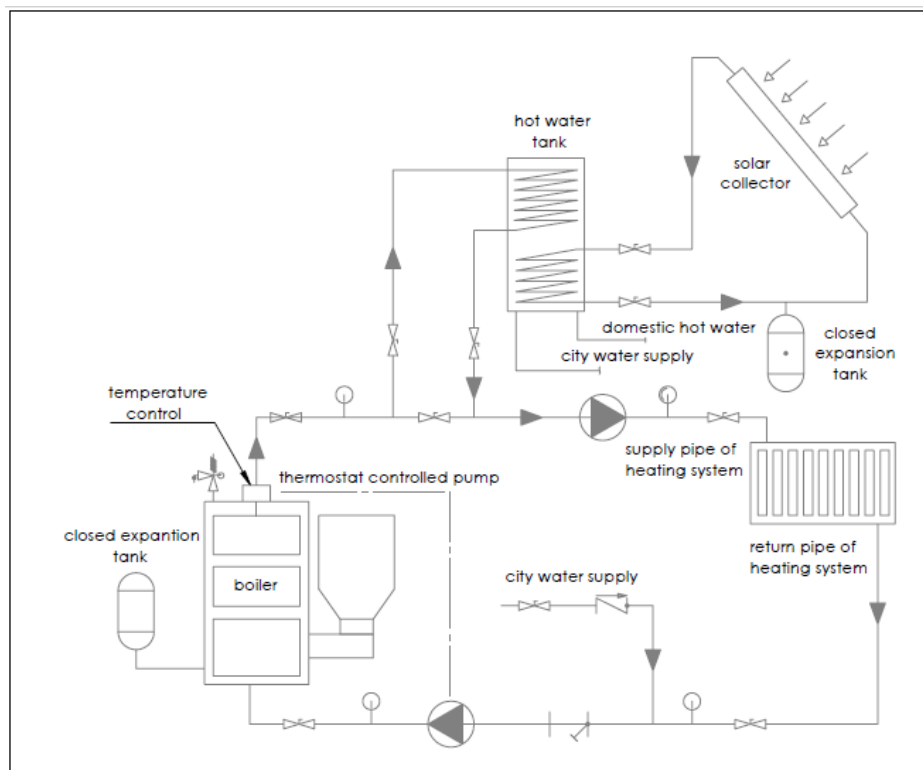


Figure-6. Hydraulic diagram: closed pressurized expansion tank system.

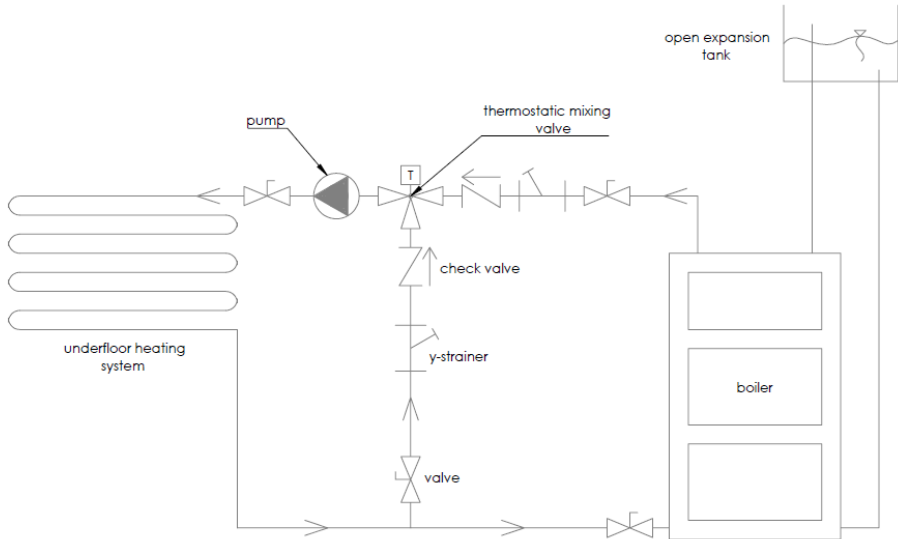


Figure-7. Hydraulic diagram for underfloor heating systems.

Warnings about water level:

After the first water is pumped into the system, the minimum water level should be marked on the hydrometer in open expansion systems and on the manometer in closed expansion systems. The water level should be checked daily, when it falls below the minimum value, water should be added to the installation. Water should be added to the system only when the installation is cold.

To solve the overheating problem, cold water should never be added directly to the water side of the boiler. This can cause serious damage in the boiler block. That kind of damage causes the product to be out of warranty.

Chimney connection:

The boiler must be connected to a chimney conforming to the features specified in the user manual and relevant regulations (Figure-8). The boiler should not be operated without a chimney connection and there must be sufficient chimney draught for combustion. If the chimney doesn't draw well, it smokes a lot. The boiler room remains in smoke and combustion is being inefficient.

Chimney passing through the external environment must be insulated to prevent condensation.

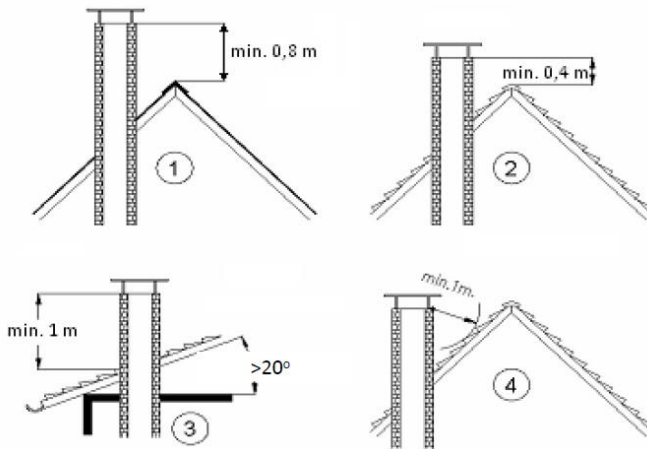


Figure-8. Basic Properties of chimneys.

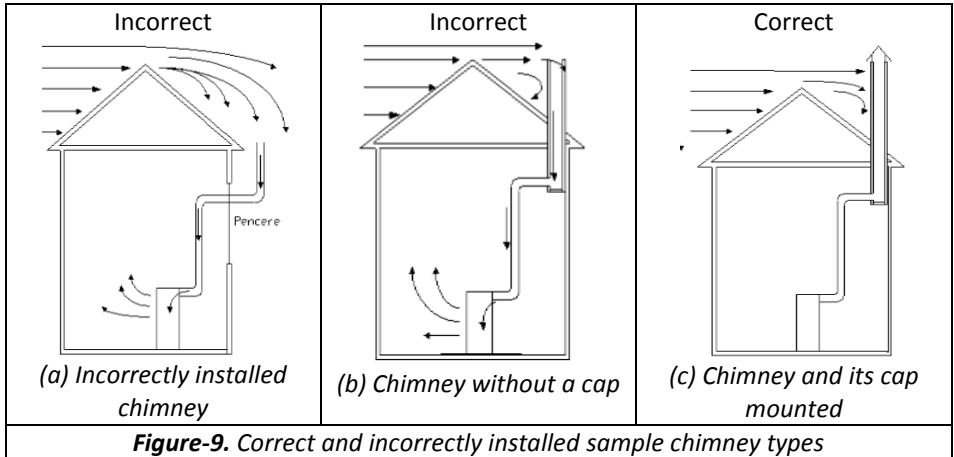
SKYK-S model boilers should be connected to an independent chimney that can provide at least the desired minimum draft. The part of the waste smoke line between the boiler and the chimney should be insulated with glass wool. The waste smoke pipe and chimney should be made of stainless steel sheet or material resistant up to 400°C. To get better combustion and efficiency, all the connections on the waste smoke pipe must be sealed. The waste smoke pipe should be connected to the flue in the shortest way. Horizontal connection equipment such as elbows that reduce draft should be avoided.

The chimney should not be used as a vertical single steel pipe, it must have an inner and an outer surface. The outer surface of it can be steel or brick mesh. Corrosion-resistant stainless steel can be preferred for the inner surface of the chimney. In order to prevent condensation, thermal insulation should be made in the space between the inner and outer surfaces of the chimney.

At the bottom of the chimney, there should be a steel made cleaning door having all kinds of sealing. The length of the flue smoke pipe between the chimney and the boiler should not exceed one quarter of the chimney height.

The size of the flue smoke pipe and chimney should be larger than the boiler's waste smoke outlet cross section. The used chimney for the boiler should be at least 1 meter above flat roof, and at least 0.4 meters above tiled roof, from the highest point of the roof (Figure-8).

The chimney must be installed correctly as indicated in Figure-9



Warnings about electrical connection:

All electrical and water installations must be carried out by authorized persons in accordance with all legal and technical rules approved by the relevant legal institutions. The boiler must be connected to electricity with a ground line.

SKYK-S 30, 40, 50 model boilers are fed with 220V network voltage. Where the mains voltage is lower than 205V or greater than 230V, a regulator should be used.

The control panel must be connected to a wall panel which has strong enough ground line.

Thermal isolation:

Avoid contact of the isolation material with your skin, eyes, and inhalation of its dust.

If the insulation material is to be cut, do it in a well-ventilated place, using gloves that protect your hands, wearing protective goggles and masks.

If you experience itching, swelling or itching in your eyes, the process on thermal insulation material should be stopped and medical assistance should be sought.

7. HOW TO USE BOILER

At the first burning of the boiler, the paint odor released should not be inhaled and the place should be well ventilated.

In the first combustion of the boiler, the water that may occur due to condensation inside the chimney while it is cold can be flow down into the boiler until the chimney gets heated. In this case, the flue temperature should be raised as quickly as possible, and black water formed due to condensation should be collected in a container and disposed of in order to prevent any pollution in the environment.

Smoke that may occur during the first burning should not be inhaled and boiler doors should always be kept closed. In case of inhalation of smoke, you should stay outdoors for a long time while the smoke is removed from the room.

When any of the boiler doors are opened due to fuel loading or any other reason, If the chimney draft in the system is weak, smoke may goes out into the boiler room. This smoke should never be inhaled.

Direct cold water should never be pumped into the heated boiler to cool it down for any reason. That may causes permanent damage in the boiler and invalidates the warranty process.

Unless for maintenance process or frost risk, the water in the installation should not be drained. The water level should be checked regularly.

The flow rate should be calculated according to the boiler and pipe line capacity. Here, the temperature difference of the boiler inlet and outlet water should be taken at most 20°C in order to avoid thermal stresses that may occur in the boiler block. Leaks, if any, should be fixed to minimize water loss in the system.

Fuels should be kept at a distance of at least 1 meter from the boiler. It is recommended that the fuels be stored in a separate place.

Do not touch high temperature parts and surfaces while the boiler is active. These surfaces are the doors of the boiler, ash tray behind the bottom door, water inlet-

outlet and safety pipes even if insulated, smoke box, connection between the boiler and the chimney, and circulation pump.

Regular checks:

- The water level in the boiler should be checked. The hydrometer must be marked after the first filling of the system so that the water level can be checked regularly. If the water level or pressure has dropped below the static pressure or the system setting, it is necessary to add water to the system. In order to protect the system and the boiler from corrosion, the water to be fed into the system must be softened according to the local settings. If there is a manometer in the system, the pressure should be marked and observed.
- It should be checked whether the front doors are closed well. If there is a smoke leak outside the combustion chamber, the door seals should be changed.
- It should be checked whether there is gas leakage from the flue connection. If there is a leak, the boiler chimney must be insulated temporarily with aluminum foil tape while it is cold and service must be called to be repaired.
- The formation of soot in the boiler varies according to the type of combustion and fuel. Heating surfaces should be checked and cleaned using a fire rake or scraper if necessary.
- The operating sound of the pump should be heard, and the boiler must not be operated in case of malfunction.
- It should be checked that the feeder motor is running and fuel is fed on the grate.
- The hopper should always be kept filled with fuel. Otherwise, the burning embers on the grate may damage the screw conveyor. In addition, smoke emission from the hopper can be observed. Damage caused by such use is not covered by the warranty.

Cleaning the boiler:

Before cleaning the boiler, all electrical devices connected to the system must be turned off. To clean the boiler;

- All heating surfaces should be cleaned using the fire rake supplied with the boiler. In smoke tube boilers, the cleaning process should be done using the metal cleaning rod. When cleaning with the metal rod; it should be fully inserted into the smoke tube and withdrawn. The surfaces inside the boiler should be cleaned at least every two weeks. It can be done more often when necessary.
- The dust inside the boiler fan should be vacuumed at least once a month without damaging the fan blades. Otherwise, the dust is affected the performance of the fan and that kind of damage is not covered by the warranty.

- The grate should be cleaned, if any, blocked holes should be opened with a nail or similar apparatus. Ashes under the grate should be removed from lower door.
- All soot accumulated in the smoke box and ash tray (according to the model) should be cleaned. The ash tray should be cleaned every day. It can be done more often if necessary.
- In order to improve the chimney draft (depending on the model), the smoke box should be cleaned at least once a month. Periodic cleaning processes and times are given in Table-4.

Table-4. Periodic cleaning processes of the boiler.

Cleaning process	Cleaning period
Ash tray	Every day
Heating surfaces of the boiler	Once a week or more often
Smoke box	Once a season or more often
Chimney	Once a season or more often
Cleaning ash inside the combustion chamber and ventilation holes under the hopper	Once a season or more often
Fan cleaning	Once in a month
Please contact the technical service for cleaning and maintenance related to the heating installation such as strainer filter, etc.	

Parts under pressure:

1. During the operation of the boiler, it should be avoided to hit the pressured parts of the system by hard objects. These sections are boiler body, boiler input and output line, safety lines, pressure relief devices.
2. The water in the system should never be drained while the boiler is running.
3. While the boiler is hot, water should never be added directly into the boiler for cooling or any other reason.

Boiler room:

1. The boiler room should have a door that allows easy exit in case of danger.
2. Solid fuel and other fire igniters such as kindling, paper must be at least 1 meter away from the boiler.
3. Do not close the fresh air intake vents of the boiler room. Fresh air intake is important for a quality combustion.
4. There is a risk of smoke coming out when the doors of the boiler is opened for any reason. Never breathe this smoke.

5. Protect your hands and face when opening the lower door for any reason. If necessary, wear protective gloves against the heat and turn off the fan from the control panel.

Fuels and combustion:

1. Do not take the burning fuel out of the combustion chamber of the boiler.
2. Do not use water or other liquids to put out the flame in the boiler.
3. To slow down or stop combustion, close the boiler air inlets and the fan.
4. Use the fuels specified in the user manual and local regulations. Do not use any solid fuel that could damage the boiler. Do not operate the boiler with liquid and gas fuels.

The fact that the moisture value and part size of the fuel is higher than the allowed limits negatively affects the combustion in the boiler. Therefore, the heating power and efficiency given by the manufacturer may not be provided. The manufacturer is not responsible for this.

According to the regulation following values must be meet; max total sulfur ratio of the fuel used is 2%, fuel min lower calorific value is 3.800 kcal / kg, the humidity is up to 25%, and max ash content is 25%.

8. CONTROL, MAINTENANCE AND REPAIR

Service should be called before the season for the maintenance of boiler, hydraulic installation, electrical connections, and chimney. Maintenance should not be done without the help of an expert.

At the end of the season, it is appropriate to make annual maintenance by the person who installed the boiler and to make a periodic service agreement. Chimney cleaning should be done at the beginning or end of each season. Chimney should be cleaned by qualified persons.

The control list showing the things to be done during and after the installation of the boiler is given in Table-5. Detection of failures in the system and troubleshooting methods are listed in Table-6.

Table-5. Post-installation checklist of the boiler.

CONTROL LIST	Check
Installation	
Are the installation place or boiler room dimensions in accordance with this user manual and regulations?	
Has the installation been made according to this manual and local regulations?	
Are the dimensions of concrete base suitable for the selected boiler?	
Are all bolts, nuts and other fasteners checked for tightness?	
Has the chimney suitable for the boiler been selected?	
Has the flue connection been made in accordance with the regulations?	
Hydraulic and Pipe Connections	
Have all the pipes (inlet and outlet to the boiler) properly been installed?	
Is the hot water pipeline installed above the hot water outlet level to prevent any air bubble formation in the pipeline?	
If closed expansion tank is to be used, has the appropriate size of expansion tank been selected?	
If a closed expansion tank was used, have the appropriate safety valve and automatic air purger been installed?	
Has the closed expansion tank pre-gas pressure been set equal to the hydrostatic pressure of the plumbing water when the boiler is cold?	
Have all hydraulic connections been made?	
Has a bypass valve been installed in the pump to be used in case of power failure?	
Electric Connections	
Has the electrical connection been made in accordance with the regulations?	
Has the power line been grounded?	
Has a regulator been connected in regions where the mains voltage is lower than 205V or greater than 230V?	
General Info	
Was the proper selection of the model made according to the needs of the client?	
Was the selected model suitable for usage water?	
Was the guarantee properly filled in and given to the client?	

9. TROUBLESHOOTING

Table-6. Detection of failures in the system and troubleshooting.

DETECTION OF FAILURE	CAUSE OF THE PROBLEM	TROUBLESHOOTING
Insufficient heating	Heat transfer surfaces of the boiler may be covered by smoke soot	While the boiler is cold, clean it using fire rake
	Poor quality fuel	Change your fuel. Before buying fuel, test its quality
	Check the pump	First, check power connection, then call for service
	Insufficient space isolation	Make better the thermal insulation
	Inappropriate feeding and standby settings	Review the set values using Table-A1
	Feeder motor problem	Call for service
poor combustion	Insufficient combustion air	Make sure the fan is running. Make sure that its flap is open
	Inadequate chimney draft	Clean chimney, smoke box and flue pipes
		Insulate your chimney
		Check for defects or cracks anywhere in the chimney. If the chimney draft is still insufficient, consult the chimney
Not good combustion distribution on the grate	Distribute burning fuel homogeneously	
Tar formation in smoke pipes	Burning of plastic and its derivative as fuels	Never throw plastic derivative wastes into the boiler or hopper
	Not heated chimney	Check for defects or cracks anywhere in the chimney. If the chimney draft is still insufficient, consult the chimney
		Insulate your chimney
Excessive fuel	Poor quality fuel	Change the fuel

consumption	Excessive chimney draft	(If applicable) turn the flue flap to half or less closed position. Turn down the fan speed
	Excess air	Turn down the fan speed
	Insufficient space isolation	Make better the thermal insulation
	Inappropriate feeding and standby settings	Review the set values using Table-A1
Smoke gas leaking from boiler front doors	Wear of the cover seals	Change seals
	Any defect in the doors	Make sure that fire does not reach to the doors. Get help from the service to fix deformed doors
Smoke goes out from the hopper	Chimney flap is closed	Check if the chimney flap is closed
	Inadequate chimney draft	Clean chimney, smoke box and flue pipes
		Insulate your chimney
The boiler cannot reach the set temperature	Temperature sensor may be out of its socket	Install the temperature sensor of the control panel card by removing the upper cover of the boiler. Pour heat transfer oil into the housing. Call the service for this process.
	There may be no power to the control panel	Plug on the control panel to the electricity. If it still does not work, call service
	Examine also the causes for insufficient heating	See also suggested solutions for insufficient heating
Chimney overheated	Compressed air intake to the combustion chamber	Turn down the fan speed
	Excessive chimney draft	(If applicable) turn the flue flap to half or less closed position

Heating of the expansion tank	Expansion tank being affected by the pump	Raise the expansion tank or reduce the pump speed
Partial heating of radiators	Air in the radiator	Take off air by air purgers of the radiator
		Make sure that the pipe to the open expansion tank is always upward
Raised boiler temperature more than set value	Excessive chimney draft	(If applicable) turn the flue flap to half or less closed position
	Fan does not stop	Call service
Noisy water sound from inside the boiler	If the boiler water temperature is not too high, air bubble remaining in the boiler water line	See getting started section
Water boiling sound into the boiler	Boiling of water in narrow passage sections due to overheating of the boiler	Do not open the boiler doors
		Turn the flue flap to fully closed position
		If the expansion tank decreased by discharging water, add water slowly into the open expansion tank
		Make sure the pump is running
		Turn off the fan and call for service

In case of power cut, consider and follow the warnings in Table-7.

Table-7. Things to do in power cut.

Things to do	Things NEVER to do
Do not open the boiler doors	Never take out the burning fuel in the boiler.
Turn the flue flap to fully closed position (if applicable)	Do not spray water into the boiler to put out the fuel
(If possible) prevent air passing through the fan intake.	Never drain/add water from/to the system.
If there is a UPS or other energy source that can run the pump, turn on the pump, and if possible, adjust the pump speed to the highest level.	Never add fuel
If there is no UPS source connected to the system, open the valve of the pump bypass line.	
When the electricity power is on, restore the normal settings back.	

In case of power cuts, an uninterruptible power supply (UPS) should be connected to the system, preferably for the boiler to work. UPS should be selected using the data in Table-8 or according to the values given by the manufacturers.

Table-8. Electricity and UPS power of the pump according to boiler models.

Boiler Models	Electricity power	UPS power
ST-S 30, 40, 50	735 W	1200 VA

APPENDIX

APPENDIX 1

AUTHORIZED SERVICES & MANUFACTURER

MANUFACTURER:

Title: SİSTEM ENERJİ ÜRETİM SAN ve TİC LTD ŞTİ
Address: Organize Sanayi Bölgesi 8 Sk No 17 Nazilli, Aydın / Turkey
Telephone: +90 (256) 316 2003
Fax: +90 (256) 316 2002
export@sistemtubular.com
teknikservis@sistemtubular.com
<http://www.sistemtubular.com/>

Note: Sistem Tubular reserves the right to make any changes on this catalog due to innovations or renovations on the product models and similar reasons. The date of revision is given on the first page.

Note: Since control cards and their electrical connections used in boilers may differ, the user manual of the control card is given as a separate document.

Warranty Certificate:

The warranty period is 2 years. Malfunctions resulting from the use contrary to the points in this user manual are not covered by the warranty.