



TANSAN



Installation – Operation – Maintenance Manual
For
TANSAN Alternative - Fuel Fired Boilers
A.E / A.EP / A.S



INTRODUCTION

First of all, we wish to thank you for your preference of TANSAN make. In this Manual, you will be able to find operation and maintenance information on TANSAN hot water boilers fired with alternative fuels.

Please read this Manual very carefully in order to be able to use the product efficiently, economically, for along time without any problems.

The Manual includes, along with operation and maintenance information, introductory and technical data concerning with the boiler, and summary data on installation, commissioning and maintenance procedures. For more detailed information on your boiler, you may wish to have a look at product manual brochure, and if non - conformity, you may also contact with TANSAN authorized dealers and services.

Please keep this Manual for further reference, at an easy - access location near the product.

Our authorized dealers and services will provide you with necessary information on product operation and maintenance after they have installed the boiler and completed relevant connections. You may always require clarification on these issues.

1 - WARRANTY AND SERVICE

Your boiler unit is under 2 (two) year TANSAN product warranty against material and manufacturing defects provided that the principles, warnings and standards given in the Operation Manual are strictly observed. WARRANTY CERTIFICATE should be filled in by the dealer where you purchased it, and send to us after you have signed it. Please follow this procedure.

TANSAN authorized services will be at your service even when you have minor problems. You may find relevant TANSAN authorized services for installation, commissioning and if needed for repair of the equipment, at this Internet link : www.tansanisi.com.tr You may alternatively call 0 312 2803318 (Ankara) in case of any problem, or you may contact with TANSAN by e - mail at the address of info@tansanisi.com.tr through Internet.

Under the relevant regulations of Trade and Industry Ministry, the operation life of the boiler is at least 10 (ten) years. Our company is legally obliged to maintain in its stock all types of spare parts for your boiler during this period.

2 - WARNINGS

Do not strictly install the boilers in inhabited indoor areas with respect to safety. Dust and soot deposition in the boiler pipes by time or excess wind may cause poisonous gases to leak operation area. Therefore, boilers should be installed in locations outside the residential areas, which are properly ventilated. Our Company may not be held responsible for problems caused by boilers installed in living areas.

The boilers are manufactured according to Boilers, Pressurized Containers Directive (97 / 23 / EC).

Do not operate solid - fuel boilers with closed expansion tanks. In installations with closed expansion tank, the pressure surge caused by power interruptions or by other reasons, may result in the bursting of the boiler or the weakest equipment in the installation line. Our Company is not responsible from problems caused by boilers operated with a closed expansion tank.

You should connect open expansion tanks in conformity with the standards. Observe the values given in this document for tank volumes and pipe diameters. Lower capacities may lead boiler overheating as a result of lack of water inside the boiler. We strictly recommend that plastic pipes should not be used in the installation line. Absolutely make sure to connect both feeding and return safety pipes. This connection should be made immediately after boiler outlet, and strictly no valve should be present on the line.

Do not let the boilers operate without water. Do not absolutely feed cold water into a boiler while it is still hot. Cold water can be fed when the boiler temperature falls below 40 °C. Do not feed cold water for cooling the boiler while it is overheated (above 90 °C) for any reasons. The best intervention to an overheated boiler is to remove burning coal from the boiler. Attempts to extinguish the burning in the boiler is dangerous.

Do not operate boilers for purposes other than intended. Our boilers are manufactured to provide hot water (maximum 90 °C) into the central heating systems open to atmosphere. Attempts to use the boilers for unintended purposes may lead harmful situations for both the equipment and the user. Our Company may not be held responsible from any problems that may arise in such uses.

Solid - fuel boilers are designed to fire coal. Boilers firing other alternative fuels (lignite, petrol - derived coke, coke etc.) are outside the warranty scope. Do not leave cinder door open while the boiler is operating. This may promote burning of coal, and steam generation by receiving air through the cinder door in situations where the coal should not receive any air, such as power interruption, failure of circulation pump or similar situations.

3 - GENERAL PROPERTIES

The boilers are manufactured in totally welded construction, using fully cylindrical or elliptical prismatic body steel and special boiler tubes, in the form of three - pass structure.

Our boilers are designed and manufactured to operate under 3 bars operation pressure, with a full quality control. Each manufactured boiler is delivered after being tested under 4.5 bars pressure.

All natural draft boilers with or without a fan should have a sufficient chimney suction (minimum - 0,15 / - 0,25 mbar while the boiler is in operation) in order to ensure a safe and efficient operation at the nominal capacity.

Our solid - fuel boilers achieve higher combustion efficiencies that can be attained by traditional coal boilers.

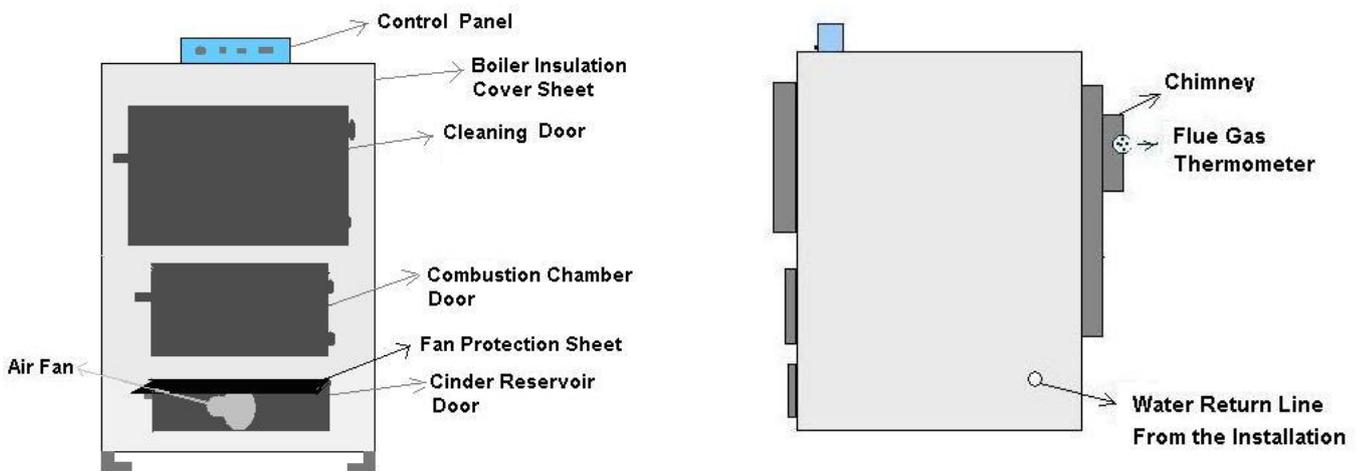
Our TANSAN Alternative - Fuel boilers are equipped with a fan in standard design. Selected specifically, the fan has features that can provide necessary air for full combustion. They do not cause unnecessary fuel consumption by blowing excess air.

4 - FUEL PROPERTIES

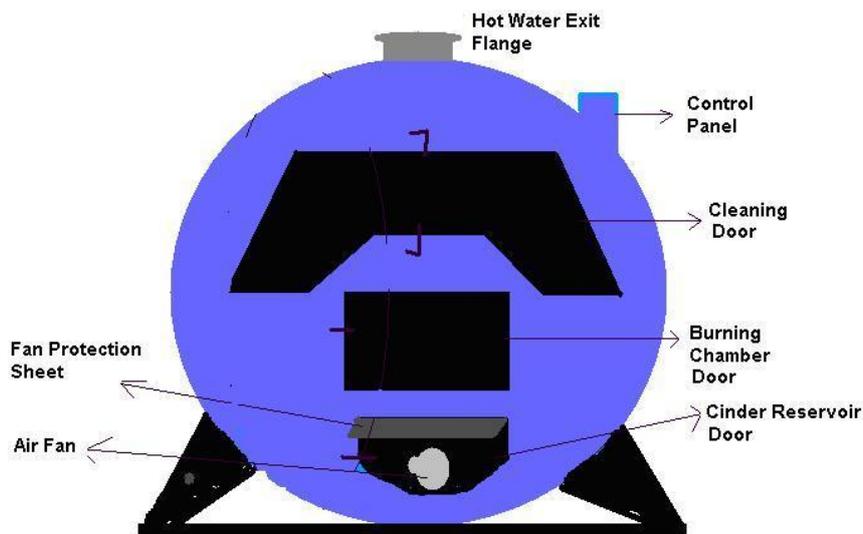
It is recommended that, for a problem - free operation of the boiler, the boiler should be fed with high quality coal at 25 - 60 mm diameter, which should be free of dusts, dry and have a heat value 6.500 kcal / kg (minimum 6.000 kcal / kg - maximum 8.000 kcal / kg). Imported coal of high quality with low sulfur dioxide (from Siberia or South Africa) is recommended.

Petrol - derived coke and coke may damage the boiler due to their high heat values. On the other hand, low - calorie lignite coal may cause clogging of boiler pipes in a short time, may reduce capacity and efficiency and in addition, may lead formation of holes on the pipe wall and boiler sheet damage through low temperature corrosion (sulfuric acid formation).

5 - MAIN PARTS AND THEIR FUNCTIONS



Model A.E



Model A.S

Main Boiler Body : Made of steel material, fully cylindrical or elliptical prismatic welded construction

External Insulation Sheets : Made of galvanized sheet, coated with industrial paint over 3 layers of prime coating.

Grate : Designed specifically in order to ensure ideal fuel – air mixture. It is manufactured from special alloy cast material in order to prevent melting problems in case of using recommended fuels.

Combustion Chamber : Designed suitable for liquid, gas and solid fuels. It ensures to operate the boiler with different fuels.

Boiler Tubes : Special boiler tubes conformant with EN 10217.

Cleaning Door : The door allows you to have an easy access to Smoke and Flame tubes and to clean them.

Combustion Chamber Door : It ensures access to the combustion chamber in the first firing. It is equipped with refractory heat insulation, fully leak - proof, easily opened and closed conical tightness mechanism and special hinge system.

Cinder Chamber Door : It allows removal of ashes / cinder materials formed as a result of combustion. It is equipped with a fully leak - proof, easily opened and closed conical tightness mechanism and special hinge system. It also permits natural air draught to ensure firing.

Flue Gas Adjustment Valve : It ensures sensitive adjustment of chimney draught required for combustion process, thus allowing maximum efficiency and operating the boiler at lower capacities.

Flue Temperature Indicator : There is a flue gas thermometer indicating the temperature of the exhausted flue gases.

6 - INSTALLATION

The installation of the boiler equipment should be performed by a certified installer and electrician, in accordance with existing standards. Faulty installation may cause damages and accidents, which the manufacturer will not be held responsible for. Boilers should be installed / erected in accordance with current standards. In addition to these standards, the following issues should be observed during erection works.

CAUTION!

Do not modify the original design or do not attach additional parts. Boilers so amended shall be outside the warranty scope.

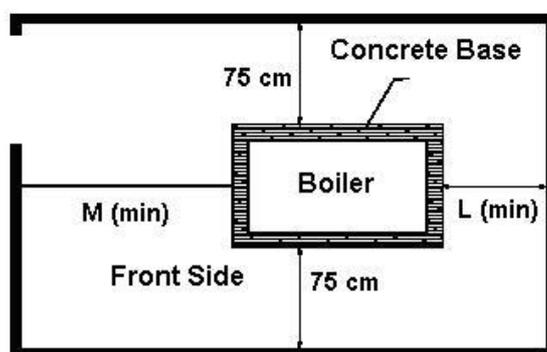
7 - INSTALLATION SITE AND LOCATION

For safety aspects, do not install the boiler in residential areas. Obstruction of boiler tubes or the chimney by time, deposition of dust and soot, chimney repulsion due to reverse wind blowing may result in poisonous exhaust gas leaks. Therefore, boilers should be installed in locations outside the residential areas, which are properly ventilated.

A reinforced concrete platform of at least 25 cm high should be constructed on the floor where the boiler is to be installed. This platform will protect the boiler and its accessories from floods.

Boiler Base Dimensions and Location Details

The following drawing and table show the minimum distances to be allowed in order to ensure correct connection of the installation and to facilitate service work. There should be no other equipments or materials such as coal etc in the indicated area.



| Type | L (min) | M (min) | Type | L (min) | M (min) | Type | L (min) | M (min) | Type | L (min) | M (min) |
|---------|---------|---------|----------|---------|---------|---------|---------|---------|----------|---------|---------|
| A.E 20 | 80 | 1170 | A.E 540 | 100 | 2270 | A.S 20 | 80 | 1030 | A.S 540 | 100 | 1770 |
| A.E 40 | 80 | 1170 | A.E 570 | 100 | 2270 | A.S 40 | 80 | 1030 | A.S 570 | 100 | 1770 |
| A.E 60 | 80 | 1170 | A.E 600 | 100 | 2270 | A.S 60 | 80 | 1030 | A.S 600 | 100 | 1770 |
| A.E 90 | 80 | 1170 | A.E 630 | 100 | 2270 | A.S 90 | 80 | 1030 | A.S 630 | 100 | 1770 |
| A.E 120 | 80 | 1170 | A.E 660 | 100 | 2368 | A.S 120 | 80 | 1180 | A.S 660 | 100 | 1785 |
| A.E 150 | 80 | 1170 | A.E 690 | 100 | 2360 | A.S 150 | 80 | 1430 | A.S 690 | 100 | 1785 |
| A.E 180 | 80 | 1410 | A.E 720 | 100 | 2368 | A.S 180 | 80 | 1430 | A.S 720 | 100 | 1870 |
| A.E 210 | 80 | 1430 | A.E 750 | 100 | 2270 | A.S 210 | 80 | 1430 | A.S 750 | 100 | 2170 |
| A.E 240 | 80 | 1770 | A.E 780 | 100 | 2368 | A.S 240 | 80 | 1430 | A.S 780 | 100 | 2270 |
| A.E 270 | 80 | 1770 | A.E 810 | 100 | 2368 | A.S 270 | 80 | 1430 | A.S 810 | 100 | 2070 |
| A.E 300 | 80 | 1770 | A.E 900 | 100 | 2270 | A.S 300 | 80 | 1430 | A.S 900 | 100 | 2170 |
| A.E 330 | 80 | 1770 | A.E 1000 | 100 | 2368 | A.S 330 | 80 | 1770 | A.S 1000 | 100 | 2270 |
| A.E 360 | 80 | 1770 | A.E 1250 | 100 | 2070 | A.S 360 | 80 | 1770 | A.S 1250 | 100 | 2360 |
| A.E 390 | 80 | 1770 | A.E 1500 | 100 | 2490 | A.S 390 | 80 | 1770 | A.S 1500 | 100 | 2360 |
| A.E 420 | 100 | 1770 | | | | A.S 420 | 100 | 1770 | | | |
| A.E 450 | 100 | 1770 | | | | A.S 450 | 100 | 1770 | | | |
| A.E 480 | 100 | 1770 | | | | A.S 480 | 100 | 1770 | | | |
| A.E 510 | 100 | 2270 | | | | A.S 510 | 100 | 1770 | | | |

8 - ASSEMBLY – INSTALLATION LINE

Make sure definitely to use open expansion tank in installation lines to which a solid - fuel fired boiler is connected. In installations with closed expansion tanks, power interruptions, or disruption of heat transfer by the boiler to the system may result bursting of the weakest equipment in the installation line. It is strictly forbidden to operate solid - fuel fired boilers with a closed expansion tank. Pressure relief valves connected to the system do not provide sufficient and standard type of protection.

You should connect open expansion tanks in conformity with the standards. Observe the values given in the table for tank volumes and pipe diameters. When using a lower capacity expansion tank, the boiler may become dry and get damaged, especially in single - pass applications.

Plastic pipes are not recommended in the installation line. Make sure absolutely that open expansion outlet and return pipes are both connected to the boiler. These connections should be ensured by following the shortest possible route from boiler safety outlet / return nipples, and there should be no other valves or equipments on the line. Pipes should be protected against freezing.

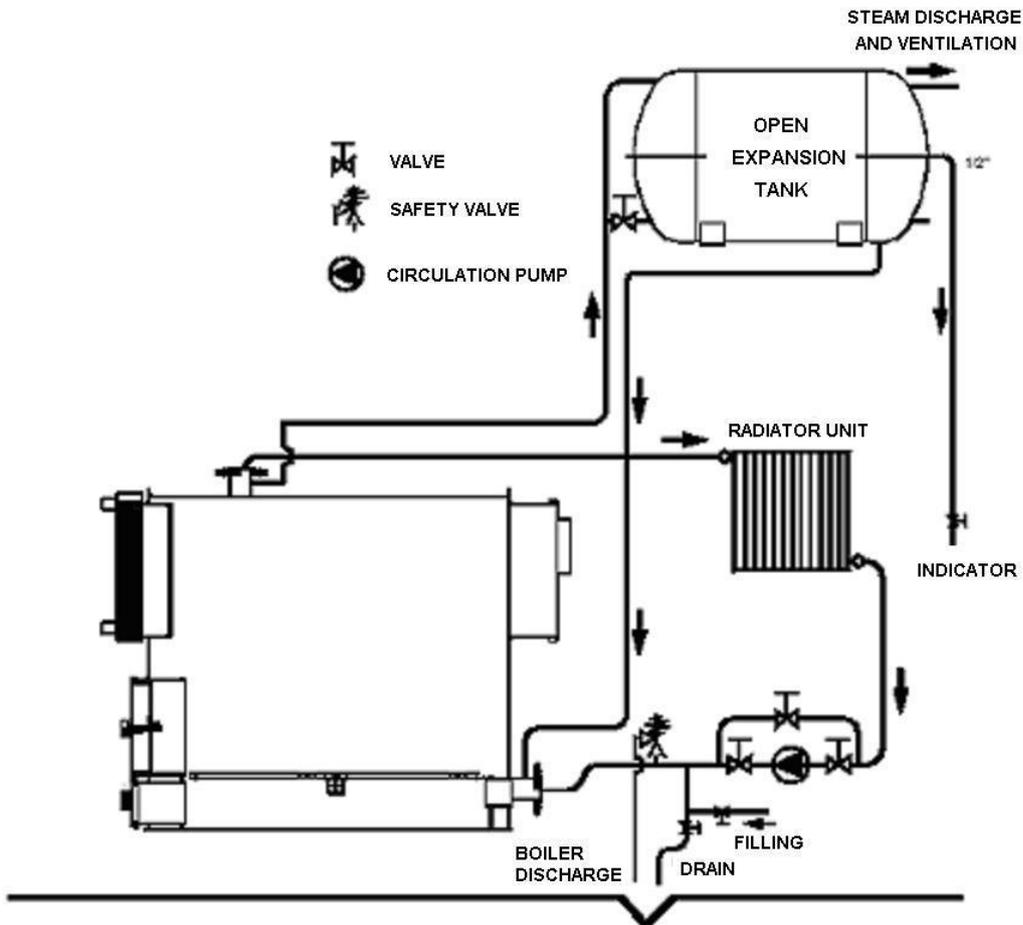
In open expansion tank systems, the excess energy formed when the heat transfer to the system is stopped is relieved through relief pipe of the open expansion tank and the boiler is protected this way. The steam formed inside the boiler goes to the open expansion tank and exhausted through expansion relief. The amount of water decreased in the boiler is made up from the water reserve in the open expansion tank through safety return line, and thus, the hazard of the boiler being waterless is protected. For this reason, the open expansion tank should be over the capacity recommended by the standards in especially single pass applications.

In multi - pass applications, the capacity proposed by the standards may be sufficient. In order to eliminate hazards in steam exhaust procedure, the steam relief pipe (min 1" diameter) of open expansion tank should be extended outside the building in a shortest route, without mounting any valve on it. Down bends should be avoided when constructing the relief pipe line. No valve should be mounted on the steam relief pipe line. Pipes should be protected against freezing.

In order to protect the boiler against high pressure, you must absolutely use a safety valve that is suitable for boiler capacity and pressure. The safety valve should be mounted on the return line or directly over the boiler since steam traps may form on the boiler outlet line. It is recommended to be mounted on the return line in order to protect circulation pump from excess temperature (steam).

In single - pass installation applications, you should mount all radiator units to the floor level in order to prevent any circulation problems that may be caused by the pump in the return line.

Connection of the pump to the installation line by a bypass valve may ensure circulation in multi - stage systems, and thus this is recommended.



Extend the stem discharge pipe of the open expansion tank to the outside. It is recommended that one each valve should be installed on all connections other than boiler safety outlet and return connections, in order to facilitate maintenance and repair works. Pipe couplings / unions should be used in all connections running from the boiler to the central heating system in order to ensure easy servicing and maintenance. In order to ensure operational faults, do not use a permanent connection for boiler water feed line the from the cold water line, but set up a removable feeding arrangement.

CAUTION! Do not absolutely start up the boiler with a closed expansion tank.

A. INSTALLATION INSTRUCTION FOR EP MODEL

9 - INSTALLATION – VENTILATION REQUIREMENTS

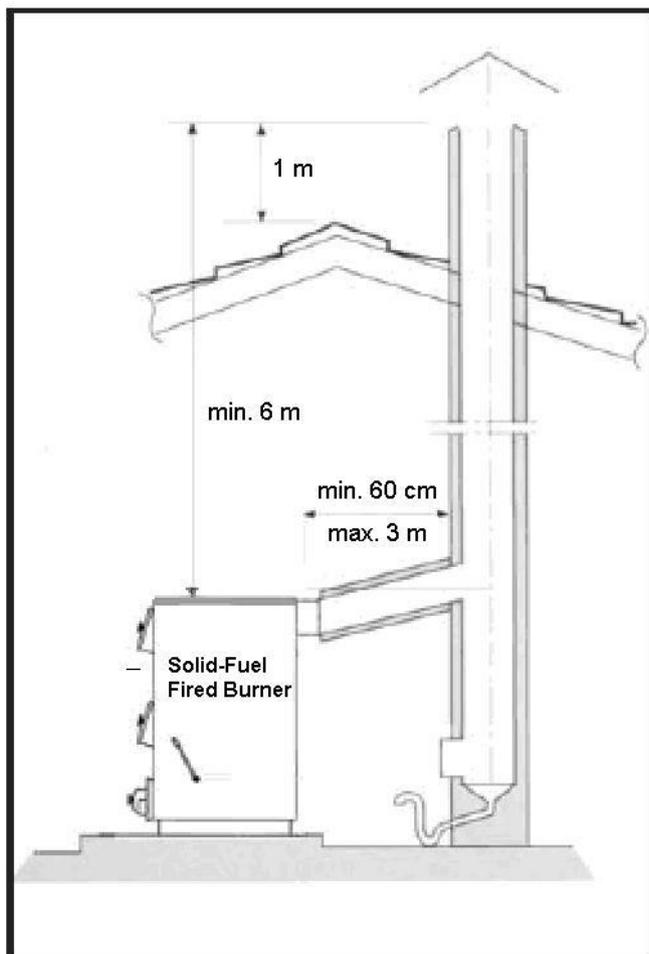
The location where the boiler is to be mounted should be ventilated continuously. This should be ensured by a natural draught through a window or a fixed vent culvert, or by forced draught by using a fan. When a fan is used, the combustion process is made by introducing air into the combustion volume and thus the boiler operates with a positive pressure. In this case, there is a possibility of gas leak. Therefore, boilers should not be mounted in indoor areas and in location where people reside. Fresh air is needed in order to burn the fuel in a safe manner. In all closed volumes, oxygen will be depleted after the combustion process has started and then combustion process will degrade. Boilers running on insufficient air, the efficiency

reduces greatly, the boiler and chimney gets occluded with soot in a short period, and frequent cleaning becomes mandatory.

10 - INSTALLATION - CHIMNEY CONDITIONS

The boiler should be connected to a chimney conformant to the norms, which can provide sufficient draught (minimum - 0,20 mbar).

Chimneys lacking sufficient draught result in significant capacity and efficiency degradation, as well as frequent clogging of the flue pipes of the boiler.



For an efficient chimney draught, the diameter of vertical smoke channel should not be less than chimney diameter, its length should not be less than 60 cm nor more than 3 m, it should not exceed $\frac{1}{4}$ of chimney height, and it should be connected to the chimney with an increasing 10% inclination, and directly if possible. If it is obligatory to use a bend, they should be round and with large angles, with the number of bends being no more than two. In applications where bends are used, each bend is to be regarded as 1 m straight pipe when comparing the length of smoke channel with the chimney height. Chimney connection should be manufactured and mounted in a form that is removable from the boiler, and it should be LEAK - PROOF. Chimney height should not be less than 6 mm, and the upper end of the chimney should be minimum 1 m higher than the roof ridge of the building. A protective cap shall be mounted on the outlet end of the chimney against excess wind effects.

11 - COMMISSIONING AND START - UP OPERATION

CAUTION! The first start - up operation of your boiler should be performed by TANSAN Authorized Services.

Please check that the boiler and connected installation network have been installed in conformity with the standards, regulations, operation manuals and the warnings given in the manual, as well as with the installation and commissioning instructions. The system should be open expansion type, and be designed and mounted according to the relevant standards.

Make sure that the power supply in the boiler feeding panel is 220 V, 50 Hz, and that ground line and system protective elements are conformant to relevant standards.

The system should be filled with water compatible with standards. If you are not sure of water hardness, have it checked.

Turn all necessary valves in the system in ON position. Check water level in the open expansion tank, and fill it if necessary. Run the circulation pump and check the rotation direction. Make sure that sensor ends of boiler thermostat and boiler thermometers in the control panel have been placed correctly in their sockets on the boiler. Operate combustion fan and check that it is rotating in the correct direction and it can deliver air.

As the heating system is full of water, you can now put the boiler system into operation after making sure that circulation pump and other electrical equipments are operating correctly and functionally.

12 - CONTROL PANEL

A - Manual Control



Temperature
Indicator

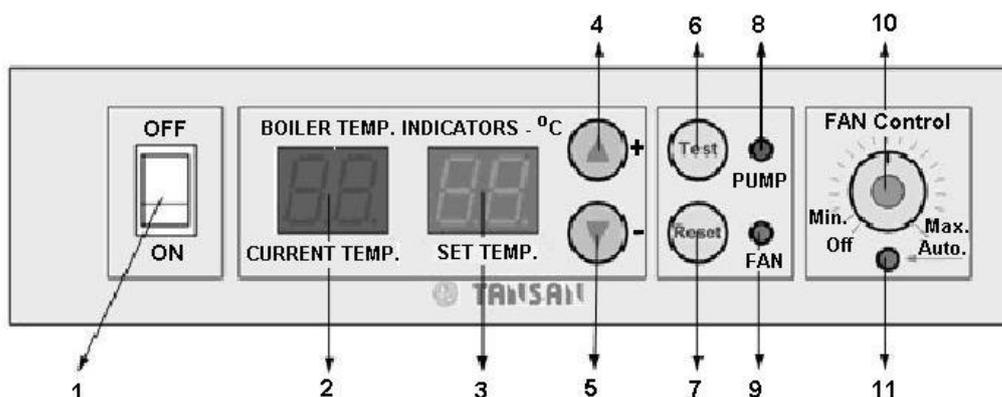
Boiler
Thermostat

ON/OFF
Switch

1. **Temperature Indicator** : It displays the temperature of the heating fluid inside the boiler.
2. **Boiler Thermostat** : It allows adjustment of the boiler temperature boiler 65 - 90 °C.
3. **ON / OFF Switch** : It turns the fan on and off.

B - Digital Control Panel

Front view of the boiler control unit is as follows.



1. On / Off Switch
2. Boiler temperature indicator
3. Boiler Set / Adjusted temperature indicator
4. Boiler set temperature increase button
5. Boiler set temperature decrease button
6. Test Button
7. Reset Button
8. Circulation pump lamp (LED)
9. FAN lamp (LED)
10. Fan speed adjustment button
11. FAN automatic lamp (LED)

1. On / Off Switch

It is used to turn the unit ON / OFF. When the unit is ON, figures shall be displayed in the indicators.

2. Boiler Temperature Indicator (Current Temperature)

Current boiler water temperature is displayed on this indicator.

3. Set Temperature Indicator (Desired Temperature)

Adjusted (desired) boiler water temperature is displayed on this indicator.

4. Increase Button

Desired set temperature is increased at steps of 1°C by this button. Maximum adjustable set temperature is 90°C.

5. Decrease Button

Desired set temperature is decreased at steps of 1°C by this button. Minimum adjustable set temperature is 20°C.

6. Test Button

As long as this button is depressed, circulation pump is operated, and circulation lamp (8) is lit in such a case.

7. Reset Button

When pressed for a period of 3 seconds, the unit returns to the first operation status (reset status).

8. Circulation Pump Lamp (LED)

This lamp is lit red when the circulation pump is operated. When it is lit, circulation pump should be running.

9. FAN Lamp (LED)

It is lit green when the FAN is running. When this lamp is lit, the FAN should be rotating at the adjusted speed. When FAN speed adjustment knob is turned to OFF position, this lamp is turned off.

10. FAN Speed Adjustment Knob

This knob has 3 functions :

- a. When turned to the utmost left (OFF), FAN is put out of operation and stops running.
- b. When turned to the utmost right (Automatic), FAN speed is adjusted automatically according to temperature value, and FAN auto lamp is lit.
- c. In other positions, FAN operates at the adjusted speed boiler minimum and maximum.

11. FAN Automatic Lamp (LED)

When FAN speed adjustment knob is turned to the utmost right (Automatic) position, this lamp is lit green, thus indicating that FAN speed will be adjusted automatically.

Operation of the Control Panel

When On / Off switch (1) is turned to ON position, the unit starts operation. At first, test figures (varying between 0 to 9) are displayed for a period of up to 3 seconds. Then, current value of boiler temperature is displayed on the red indicator, while set temperature is displayed on the green indicator, and the unit goes into initial operation status.

At the initial operation status, Circulation pump will not start running until the boiler temperature raises to 40 °C, irrespective of the set temperature. If, at the initial operation, FAN speed adjustment is at Auto position, the FAN will start running at full speed until the boiler reaches to the set temperature. If FAN speed adjustment is not at Auto position, the FAN will operate at the adjusted speed.

When the boiler temperature reaches 40 °C, the circulation pump is activated. When the boiler reaches to the adjusted temperature, FAN is deactivated, and initial operation status is terminated.

When the boiler temperature drops 5 °C below the adjusted value, the Fan starts running again and ensures to increase the boiler temperature.

When FAN speed adjustment is at Auto position, Fan speed is at maximum value until 49 °C, and then it runs by reducing at every 10 °C. Fan speed is at minimum value between 80 °C and 90 °C.

If the boiler temperature drops below 26 °C, the fan and circulation pump are deactivated. When the boiler temperature drops below 5 °C, the circulation pump is activated again in order to prevent freezing of the water in the installation line.

Error Messages

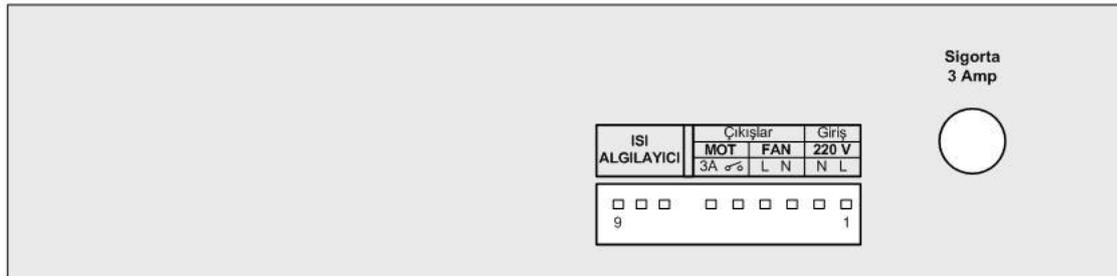
H - 01 This message is displayed when the temperature sensor is not connected. In such a case, connect a temperature sensor to the unit. When the temperature sensor is functional properly, the unit will continue with its normal operation.

H - 02 This message is displayed when there is a fault in the value read in the temperature sensor, or when temperature sensor malfunctions. Check the connections, and if necessary, replace the temperature sensor.

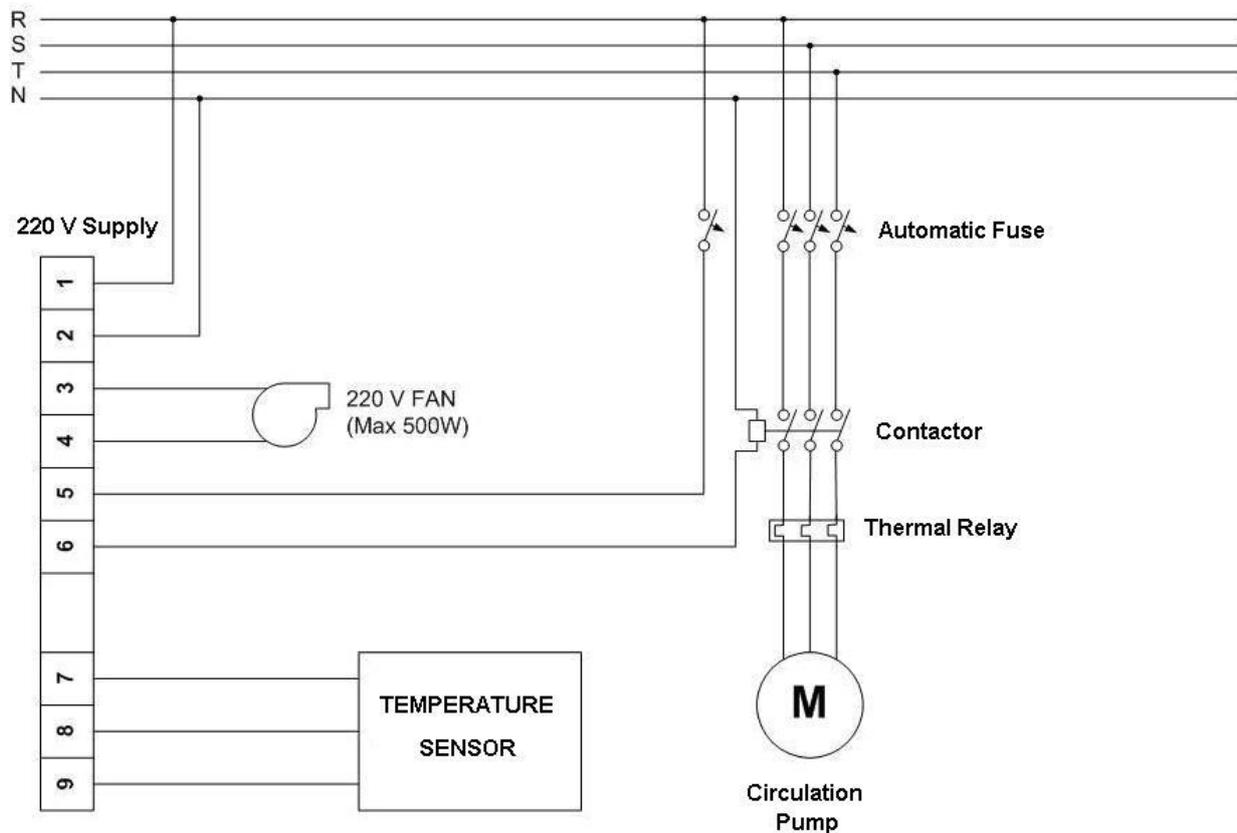
If the unit is not functional when ON / OFF switch is turned to ON position, check the electrical connections of the unit. If the problem persists, the fuse located inside the fuse holder at the rear of the unit should be inspected. If the fuse is blown, replace it with the same type of fuse; do not absolutely use a fuse greater than 3 Ampere rating.

Panel Connections

Rear view of the boiler Control Panel is as follows.



An example of panel connection is given below.



NOT: The connections here are presented as an example.

Maximum current to be provided by Terminals Nos. 5 and 6 should be 3 Amp. Therefore, the current supplied by these terminals should be controlled by a fuse (as shown in the figure above).

Terminal Nos. 7, 8 and 9 of Temperature Sensor should not be connected in reverse order. Otherwise, temperature sensors may get damaged / destroyed.

13 - START / STOP OF OPERATION

Preliminary Preparations

Check water level of the system.

Check cleaning status of boiler smoke pipes. If necessary, clean them.

Remove the cinder in combustion chamber and cinder reservoir.

Check valve positions.

Operating the Panel with Manual Control

- Since the boiler and boiler chamber are cold, smoke may be emitted or smoke may leak until the boiler water temperature reaches to 50 °C. in order to decrease this undesired situation, you are advised to warm up the chimney during the first commissioning procedure, by firing ample firewood or diesel - impregnated oakum inside the chimney for a period of at least 45 minutes in order to ensure a good draught inside the chimney....

- Then, take tightness measures inside the chimney duct and in the chimney to prevent air entry, burn firewood with ample flame in the furnace section of the boiler for a period of 60 minutes to create a large flame. Continue this firing process until the boiler water temperature exceeds 50 °C and when the rear outlet of the chimney becomes too hot for touching by hand. The thermometer located at the outlet of rear chimney indicating flue gas temperature should display above 150 °C.

- You can check if the preliminary heating and chimney draught is good or not, by opening coal loading door and observing that there is not any smoke coming out. If so, then you can add coal to the furnace section in small parts and observe that the added coal is fired completely. Continue this controlled firing process by adding coal bit by bit. When the temperature of boiler water exceeds 50 - 55 °C, add ample coal inside the furnace to continue boiler operation. Run the Circulation Pump.

- Air fan should not be started during the initial firing process. Since the chimney channel is cold at the beginning, the main chimney can not ensure sufficient draught. In addition, supplying air to a chimney that can not aspirate properly will cause smoke emission in the boiler and in the chimney.

- In models with a fan, the fan can be operated from the Control panel as desired. In these models, the thermostat is set to the desired temperature, and the fan stops at this temperature.

- When fan is operated and there is a smoke leak while boiler water temperature is around 50 - 55 °C and Circulation Pump is running, this means that the fan blows excess air inside the boiler. If half of the suction section of the fan is covered with a packing band, the air blown inside the boiler will decrease and smoke leak will be prevented. If fuel saving at the extent possible is desired, it is recommended not to operate the fan. Boiler can be fired with natural draught by keeping the fan door open. As this is a natural firing, fuel saving can be achieved.

- Feed as much coal as needed to meet the temperature demand of the building while the boiler continues firing. Insufficient coal feeding will result in low boiler temperatures.

- If you desire to shut down air entry and keep the boiler in sleeping mode, air inlet door is closed and furnace section of the boiler goes into passive operation mode.

Operation with Digital Control Panel

When ON / OFF switch (1) is turned ON, the control unit starts operation. At first, test figures (varying between 0 to 9) are displayed in order for a period of up to 3 seconds. Then, the current value of boiler temperature is displayed on the red indicator, while set temperature is displayed on the green indicator, and the unit goes into initial operation status.

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If the unit is not functional when ON / OFF switch is turned to ON position, check the electrical connections of the unit. If the problem persists, the fuse located inside the fuse holder at the rear of the unit should be inspected. If the fuse is blown, replace it with the same type of fuse; do not absolutely use a fuse greater than 3 Ampere rating.

- In addition, boiler tubes should be cleaned each week, using a brush having a length longer than boiler tubes. Tubes not cleaned timely makes combustion difficult and prevents the increase of boiler water.

- There should absolutely be no air suction to the chimney from flue gas duct of the boiler, from the main chimney, from cinder and soot removal location or from any other openings. Otherwise, the boiler fires but does not provide sufficient heat. It appears as if the boiler is insufficient. Therefore, any holes and openings in the chimney should be closed properly. If boiler seems firing properly but the combustion is sooty and with dirty flame, and if the smoke comes out completely from here instead of the chimney when the coal feeding door is opened, then the chimney may be obstructed. Chimney section and height may not be appropriate for the boiler. Or boiler chimney receives air from some other points. For these reasons, if the boiler does not provide sufficient heat even it is fired properly, probably the chimney does not ensure sufficient suction. A chimney expert should be consulted in such a situation. Too long chimney ducts, chimneys made of metal sheet constitute obstacles for combustion. Chimneys made of metal sheet should absolutely be insulated with glass wool in a manner not to cause cooling of the chimney. Boiler does not provide draught at all in cold chimneys, and causes smoke leak.

- For chimney check, please perform Flue Gas Temperature Measurement with a Wire Thermometer located in the chimney outlet of the boiler!

In the following situations, the chimney is considered to provide a good draught :

- 1) If Flue Gas temperature is above 140°C while boiler water temperature is 50°C,
- 2) If Flue Gas temperature between 175°C - 220 °C while boiler water temperature is 60°C.

In the following situations, the chimney is considered to provide a poor draught :

- 3) If Flue Gas temperature is around 80 - 90 °C while boiler water temperature is 50 °C,
- 4) If Flue Gas temperature is around 110 - 115°C or lower while boiler water temperature is 60°C,

In such a situation, boiler water temperature does not rise even if the coal is burned in the boiler.

In the following situation, the chimney is considered to provide too much draught and there is a heat loss :

- 5) If Flue Gas temperature is above 30% higher of normal Flue Gas temperatures (50 - 60 °C); that is, if it is above 220°C or 240 °C.

- In addition, TANSAN Boiler sucks the boiler smoke and prevents any smoke leak even the upper smoke pipe cover or the coal feeding door is open as long as the chimney provides a good draught. In these boilers, the chimney is very important. A chimney providing a good draught will present no problems at all in boiler firing and heating.

- After a full combustion conditions have been ensured, the cinder of the burning coal should be removed both from the furnace section and from air supply section, without delay, and fresh coal supply should be fed to the furnace. The slag and cinder that are not removed timely prevent proper combustion.

- In addition, the Furnace section should be poked at 30 - minute intervals or more frequently if necessary in order to prevent formation of large masses that prevent air supply to the boiler, such as slag formed by adhesion of coal particles. In order to prevent this situation, the burning coal should be poked frequently, and proper air entry should be allowed through the grate.

- Coal powders and ashes scattered under the grate should be cleaned continuously. Otherwise, sufficient air can not enter the grates and combustion is disrupted and heating capacity reduces.

CAUTION! IF BOILER HAS NOT BEEN USED FOR A PERIOD OF MORE THAN 3 MONTHS, PLEASE RE - APPLY THE START - UP INSTRUCTIONS AGAIN.

After the boiler is warmed up, make sure that the circulation pump functions properly and it provides hot water circulation. Adjust the chimney draught level by means of the chimney clack in order to prevent excess coal consumption. As the boiler operates from upper firing principle, it burns smokeless and at maximum efficiency.

If the boiler has been heated up excessively (over 90°C) and you want to cool it down, then the best way is to remove the burning coal outside the furnace and wait the boiler to cool

down by itself. It is dangerous to throw sand soil or water onto burning coal to extinguish it. If you are unable to remove the burning coal outside, then do not intervene with the boiler. A boiler that was installed in conformity with the necessary conditions will extinguish itself by evaporating the water in the open expansion tank, without causing any harm to the surrounding area. In such situations, do not absolutely feed water into the boiler. You can feed water after the boiler has cooled down sufficiently (Temperature below 40 °C). In multi - stage systems, it may be helpful for cooling to open bypass valve of the circulation pump, to open cleaning door, and to fully close chimney clack.

CAUTION! Do not absolutely turn off circulation pump in order to stop the operation of the boiler containing burning coal. This may prevent water circulation in the system and may result in dangerous temperatures.

CAUTION! Tampering with the fan clack adjustment and coal flow rate without proper knowledge may seriously decrease boiler efficiency. Such adjustments should only be made by authorized service personnel.

STOPPING THE BOILER

Turn the On / Off switch in the boiler control panel to “Off” position. When the coal inside the furnace is burned out on its own, the boiler will stop.

14 - MAINTENANCE

Open the cover located at the upper front of the boiler. Use an appropriate wire brush to clean the soot deposited inside the flame smoke pipes seen inside the boiler. Then, remove the ashes inside the rear smoke chamber. Perform these procedures frequently by checking the amount of soot deposition at the beginning, and later at required periods depending on the coal quality. This period is recommended to be one week at most.

Vent the air collected in the system from necessary points. Check water level again.

Cleaning the Fan

If fan fins are too dirty, they should be cleaning. Deposited dusts may deteriorate fan balance.

Cleaning the Chimney

If there is not sufficient chimney draught (min. - 0,25 mbar) while cleaning the boiler, check the main chimney.

Exhaust Gas Tightness Control

The seal wicks of boiler coal door and cinder door should be sound and tight - proof. If any of these parts are defective, replace them.

ANNEX 1

TECHNICAL SPECIFICATION TABLE FOR SERIES A.E and A. EP BOILERS

| TYPE | CAPACITY Kcal / h - Kw | WEIGHT Kg | WATER VOLUME Lt. | A | Ap1 | B | Bp | L | Lp1 | Lp2 | l | f | WATER | WATER | Safety Outlet | Safety Return | OP. TEMP. (°C) | OP. PRESS. (*) Bar (Max) | FURNACE | PUMP | EXPANSION |
|----------|---------------------------|--------------|------------------------|------|------|------|------|------|--------|--------|------|---------|---------------|--------------|------------------|------------------|------------------------|------------------------------------|--------------------------|---------------|--------------------------------------|
| | | | | | | | | | | | | | OUTLET NW1 | INLET NW1 | | | | | INTERNAL VOLUME m3 | SELECT. m3 | TANK SELECTION Liters (Min.) |
| A.E 20 | 20000 - 23 | 310 | 175 | 660 | 1010 | 1230 | 1540 | 1045 | 522,5 | 522,5 | 980 | 165*165 | 50 | 50 | 1' | 1'' | 90/70 | 2,55 | 0,237 | 3,0 | 50 |
| A.E 40 | 40000 - 47 | 430 | 255 | 660 | 1010 | 1290 | 1540 | 1163 | 581,5 | 581,5 | 980 | 165*165 | 50 | 50 | 1'' | 1'' | 90/70 | 2,55 | 0,237 | 3,0 | 100 |
| A.E 60 | 60000 - 70 | 696 | 338 | 780 | 1030 | 1501 | 1751 | 1405 | 702,5 | 702,5 | 980 | 150*250 | 65 | 65 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,237 | 3,0 | 150 |
| A.E 90 | 90000 - 105 | 832 | 460 | 880 | 1130 | 1530 | 1780 | 1545 | 772,5 | 772,5 | 1120 | 150*400 | 80 | 80 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,237 | 4,5 | 225 |
| A.E 120 | 120000 - 140 | 860 | 475 | 900 | 1150 | 1560 | 1810 | 1545 | 772,5 | 772,5 | 1120 | 175*340 | 80 | 80 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,255 | 6,0 | 300 |
| A.E 150 | 150000 - 175 | 1037 | 578 | 900 | 1150 | 1745 | 1995 | 1570 | 785 | 785 | 1120 | 200*300 | 100 | 100 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,255 | 7,5 | 375 |
| A.E 180 | 180000 - 209 | 1287 | 745 | 960 | 1210 | 1755 | 2005 | 1810 | 905 | 905 | 1360 | 175*350 | 100 | 100 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,385 | 9,0 | 450 |
| A.E 210 | 210000 - 245 | 1424 | 805 | 980 | 1230 | 1814 | 2064 | 1830 | 915 | 915 | 1380 | 250*350 | 100 | 100 | 1 1/4'' | 1 1/4'' | 90/70 | 2,55 | 0,385 | 10,5 | 525 |
| A.E 240 | 240000 - 279 | 1679 | 975 | 980 | 1230 | 1834 | 2084 | 2170 | 1085 | 1085 | 1720 | 250*350 | 100 | 100 | 1 1/2'' | 1 1/2'' | 90/70 | 2,55 | 0,545 | 12,0 | 600 |
| A.E 270 | 270000 - 314 | 1689 | 984 | 980 | 1230 | 1834 | 2084 | 2170 | 1085 | 1085 | 1720 | 250*370 | 100 | 100 | 1 1/2'' | 1 1/2'' | 90/70 | 2,55 | 0,545 | 13,5 | 675 |
| A.E 300 | 300000 - 349 | 1911 | 1345 | 1220 | 1470 | 1882 | 2132 | 2170 | 1085 | 1085 | 1720 | 250*400 | 100 | 100 | 1 1/2'' | 1 1/2'' | 90/70 | 2,55 | 0,615 | 15,0 | 750 |
| A.E 330 | 330000 - 384 | 2022 | 1386 | 1220 | 1470 | 1860 | 2110 | 2195 | 1097,5 | 1097,5 | 1720 | 250*400 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,615 | 16,5 | 825 |
| A.E 360 | 360000 - 419 | 2180 | 1487 | 1180 | 1430 | 1970 | 2220 | 2195 | 1097,5 | 1097,5 | 1720 | 300*400 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,615 | 18,0 | 900 |
| A.E 390 | 390000 - 454 | 2224 | 1464 | 1180 | 1430 | 1970 | 2220 | 2195 | 1097,5 | 1097,5 | 1720 | 250*500 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,615 | 19,5 | 975 |
| A.E 420 | 420000 - 488 | 2431 | 1712 | 1320 | 1570 | 2034 | 2284 | 2195 | 1097,5 | 1097,5 | 1720 | 300*400 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,690 | 21,0 | 1050 |
| A.E 450 | 450000 - 523 | 2505 | 1665 | 1320 | 1570 | 2034 | 2284 | 2195 | 1097,5 | 1097,5 | 1720 | 300*400 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,690 | 22,5 | 1125 |
| A.E 480 | 480000 - 558 | 2518 | 1678 | 1320 | 1570 | 2094 | 2344 | 2195 | 1097,5 | 1097,5 | 1720 | 300*400 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,690 | 24,0 | 1200 |
| A.E 510 | 510000 - 593 | 2821 | 1713 | 1330 | 1580 | 1972 | 2222 | 2695 | 1347,5 | 1347,5 | 2220 | 350*500 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,690 | 25,5 | 1275 |
| A.E 540 | 540000 - 628 | 2924 | 1782 | 1330 | 1580 | 1972 | 2222 | 2695 | 1347,5 | 1347,5 | 2220 | 350*500 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,785 | 27,0 | 1350 |
| A.E 570 | 570000 - 663 | 3049 | 2135 | 1330 | 1580 | 2009 | 2259 | 2595 | 1297,5 | 1297,5 | 2120 | 350*500 | 125 | 125 | 2'' | 2'' | 90/70 | 2,55 | 0,780 | 28,5 | 1425 |
| A.E 600 | 600000 - 698 | 3174 | 2236 | 1330 | 1580 | 2009 | 2259 | 2695 | 1347,5 | 1347,5 | 2220 | 350*600 | 125 | 125 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,816 | 30,0 | 1500 |
| A.E 630 | 630000 - 733 | 3388 | 2448 | 1330 | 1580 | 2109 | 2359 | 2695 | 1347,5 | 1347,5 | 2220 | 350*600 | 125 | 125 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,816 | 31,5 | 1575 |
| A.E 660 | 660000 - 767 | 3443 | 2556 | 1330 | 1580 | 2109 | 2359 | 2843 | 1421,5 | 1421,5 | 2318 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,855 | 33,0 | 1650 |
| A.E 690 | 690000 - 802 | 3629 | 2766 | 1410 | 1660 | 2175 | 2425 | 2835 | 1417,5 | 1417,5 | 2310 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,960 | 34,5 | 1725 |
| A.E 720 | 720000 - 837 | 3658 | 2812 | 1410 | 1660 | 2175 | 2425 | 2843 | 1421,5 | 1421,5 | 2318 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,960 | 36,0 | 1800 |
| A.E 750 | 750000 - 872 | 3690 | 2831 | 1510 | 1760 | 2163 | 2413 | 2745 | 1372,5 | 1372,5 | 2220 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,960 | 37,5 | 1875 |
| A.E 780 | 780000 - 907 | 3841 | 2996 | 1510 | 1760 | 2163 | 2413 | 2843 | 1421,5 | 1421,5 | 2318 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,960 | 39,0 | 1950 |
| A.E 810 | 810000 - 942 | 3841 | 2996 | 1510 | 1760 | 2163 | 2413 | 2843 | 1421,5 | 1421,5 | 2318 | 350*500 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 0,960 | 40,5 | 2025 |
| A.E 900 | 900000 - 1047 | 4320 | 3430 | 1600 | 1850 | 2434 | 2684 | 2745 | 1372,5 | 1372,5 | 2220 | 500*600 | 150 | 150 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 1,130 | 45,0 | 2250 |
| A.E 1000 | 1000000 - 1163 | 4670 | 3550 | 1600 | 1850 | 2434 | 2684 | 2843 | 1421,5 | 1421,5 | 2318 | 500*600 | 200 | 200 | 2 1/2'' | 2 1/2'' | 90/70 | 2,55 | 1,130 | 50,0 | 2500 |
| A.E 1250 | 1200000 - 1395 | 6800 | 4400 | 1800 | 2050 | 2950 | 3200 | 2570 | 1285 | 1285 | 2020 | 600*800 | 200 | 200 | 3'' | 3'' | 90/70 | 2,55 | 1,627 | 60,0 | 3000 |
| A.E 1500 | 1500000 - 1744 | 7800 | 5180 | 1800 | 2050 | 2950 | 3200 | 2990 | 1495 | 1495 | 2440 | 600*800 | 200 | 200 | 3'' | 3'' | 90/70 | 2,55 | 1,775 | 75,0 | 3750 |

ANNEX 2

TECHNICAL SPECIFICATION TABLE FOR SERIES A.S BOILERS

| TYPE | CAPACITY | WEIGHT | WATER VOLUME | A | L | I | B | f | WATER OUTLET | WATER INLET | Safety Outlet | Safety Return | OP. TEMP. | OP. PRESS. (*) | FURNACE INTERNAL VOLUME | PUMP SELECT. | EXPANSION TANK SELECTION |
|----------|----------------|--------|--------------|------|------|------|------|---------|--------------|-------------|---------------|---------------|-----------|------------------|-------------------------|----------------|--------------------------|
| | Kcal / h - Kw | Kg | Lt. | | | | | | NW1 | NW1 | Eg | Ed | (° C) | Bar (Max) | m3 | Liters (Min) | m3 |
| A.S 20 | 20000 - 23 | 350 | 1000 | 970 | 1405 | 980 | 1310 | 80*300 | 50 | 50 | 1 '' | 1 '' | 90 / 70 | 2,55 | 3,0 | 50 | 0,215 |
| A.S 40 | 40000 - 47 | 450 | 1000 | 980 | 1405 | 980 | 1310 | 80*300 | 50 | 50 | 1 '' | 1 '' | 90 / 70 | 2,55 | 3,0 | 100 | 0,215 |
| A.S 60 | 60000 - 70 | 850 | 1052 | 1150 | 1405 | 980 | 1310 | 80*300 | 65 | 65 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 3,0 | 150 | 0,215 |
| A.S 90 | 90000 - 105 | 1020 | 1157 | 1250 | 1405 | 980 | 1410 | 150*400 | 80 | 80 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 4,5 | 225 | 0,200 |
| A.S 120 | 120000 - 140 | 1211 | 1542 | 1350 | 1555 | 1130 | 1510 | 175*350 | 80 | 80 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 6,0 | 300 | 0,245 |
| A.S 150 | 150000 - 175 | 1562 | 2132 | 1420 | 1830 | 1380 | 1580 | 200*300 | 100 | 100 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 7,5 | 375 | 0,375 |
| A.S 180 | 180000 - 209 | 1562 | 2132 | 1420 | 1830 | 1380 | 1580 | 200*300 | 100 | 100 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 9,0 | 450 | 0,375 |
| A.S 210 | 210000 - 245 | 1562 | 2132 | 1420 | 1830 | 1380 | 1580 | 200*300 | 100 | 100 | 1 1 / 4'' | 1 1 / 4'' | 90 / 70 | 2,55 | 10,5 | 525 | 0,375 |
| A.S 240 | 240000 - 279 | 1775 | 2267 | 1500 | 1830 | 1380 | 1660 | 250*350 | 100 | 100 | 1 1 / 2'' | 1 1 / 2'' | 90 / 70 | 2,5 | 12,0 | 600 | 0,375 |
| A.S 270 | 270000 - 314 | 1804 | 2267 | 1500 | 1830 | 1380 | 1660 | 250*350 | 100 | 100 | 1 1 / 2'' | 1 1 / 2'' | 90 / 70 | 2,55 | 13,5 | 675 | 0,375 |
| A.S 300 | 300000 - 349 | 1925 | 2267 | 1550 | 1830 | 1380 | 1710 | 250*375 | 100 | 100 | 1 1 / 2'' | 1 1 / 2'' | 90 / 70 | 2,55 | 15,0 | 750 | 0,400 |
| A.S 330 | 330000 - 384 | 2273 | 3298 | 1600 | 2195 | 1720 | 1760 | 250*400 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 16,5 | 825 | 0,530 |
| A.S 360 | 360000 - 419 | 2346 | 3252 | 1600 | 2195 | 1720 | 1760 | 250*400 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 18,0 | 900 | 0,530 |
| A.S 390 | 390000 - 454 | 2515 | 3372 | 1650 | 2195 | 1720 | 1810 | 250*400 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 19,5 | 975 | 0,530 |
| A.S 420 | 420000 - 488 | 2691 | 3860 | 1730 | 2195 | 1720 | 1890 | 250*480 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 21,0 | 1050 | 0,530 |
| A.S 450 | 450000 - 523 | 2746 | 3741 | 1750 | 2195 | 1720 | 1910 | 250*480 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 22,5 | 1125 | 0,530 |
| A.S 480 | 480000 - 558 | 2980 | 4184 | 1820 | 2195 | 1720 | 1980 | 300*600 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 24,0 | 1200 | 0,670 |
| A.S 510 | 510000 - 593 | 3055 | 4293 | 1850 | 2195 | 1720 | 2010 | 300*600 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 25,5 | 1275 | 0,670 |
| A.S 540 | 540000 - 628 | 3291 | 4309 | 1900 | 2195 | 1720 | 2060 | 350*500 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 27,0 | 1350 | 0,670 |
| A.S 570 | 570000 - 663 | 3360 | 4581 | 1900 | 2210 | 1735 | 2060 | 350*500 | 125 | 125 | 2'' | 2'' | 90 / 70 | 2,55 | 28,5 | 1425 | 0,670 |
| A.S 600 | 600000 - 698 | 3434 | 4534 | 1900 | 2210 | 1735 | 2060 | 350*600 | 125 | 125 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 30,0 | 1500 | 0,670 |
| A.S 630 | 630000 - 733 | 3584 | 4875 | 1920 | 2295 | 1820 | 2080 | 350*600 | 125 | 125 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 31,5 | 1575 | 0,715 |
| A.S 660 | 660000 - 767 | 3782 | 5375 | 1850 | 2625 | 2120 | 2010 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 33,0 | 1650 | 0,845 |
| A.S 690 | 690000 - 802 | 3977 | 5634 | 1850 | 2725 | 2220 | 2010 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 34,5 | 1725 | 0,890 |
| A.S 720 | 720000 - 837 | 3863 | 5423 | 1920 | 2525 | 2020 | 2080 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 36,0 | 1800 | 0,810 |
| A.S 750 | 750000 - 872 | 4057 | 5697 | 1920 | 2625 | 2120 | 2080 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 37,5 | 1875 | 0,846 |
| A.S 780 | 780000 - 907 | 4140 | 5971 | 1920 | 2725 | 2220 | 2080 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 39,0 | 1950 | 0,890 |
| A.S 810 | 810000 - 942 | 4341 | 6224 | 1920 | 2815 | 2310 | 2080 | 350*500 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 40,5 | 2025 | 0,935 |
| A.S 900 | 900000 - 1047 | 4736 | 7666 | 2100 | 2815 | 2310 | 2260 | 400*600 | 150 | 150 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 45,0 | 2250 | 1,154 |
| A.S 1000 | 100000 - 1163 | 5232 | 7781 | 2140 | 2815 | 2310 | 2300 | 400*600 | 200 | 200 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 50,0 | 2500 | 1,154 |
| A.S 1250 | 1500000 - 1163 | 5232 | 7781 | 2150 | 2815 | 2310 | 2300 | 400*600 | 200 | 200 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 50,0 | 2500 | 1,154 |
| A.S 1500 | 1500000 - 1163 | 5232 | 7781 | 2160 | 2815 | 2310 | 2300 | 400*600 | 200 | 200 | 2 1 / 2'' | 2 1 / 2'' | 90 / 70 | 2,55 | 50,0 | 2500 | 1,154 |

ANNEX 3

RECOMMENDATIONS FOR TROUBLESHOOTING

The chimney should be inspected carefully. There should be no hole or vent opening to the chimney, and no air should be escape inside the chimney.

Like the boiler, boiler chimney duct should be inspected carefully, and there should be no metal sheet parts or other items that will occlude the chimney. In addition, air leak into the duct should be prevented. If there is a cleaning vent and it lid, air tightness should be carefully ensured.

The boiler should be able to receive sufficient air while is fired. For this purpose, the fan should be checked, observing if it is rotating in the right direction. Considering the fact that boilers can be operated without a fan, you should check whether the boiler fires efficiently by using air door (cinder door) without operating the fan.

No other boilers can be attached to the chimney to which the boiler is connected. Otherwise, none of the boilers and the chimney itself can provide sufficient draught, and combustion problems may be experienced.

Chimneys should be inspected to ensure inner surface coating, and to eliminate any occlusions. In addition, even if the chimney is clean, an inspection should be made to the boiler outlet point to detect any obstacles in the chimney duct.

Chimney section and height should be determined by making chimney section calculations. If the outcomes do not conform with the calculations, an appropriate chimney aspirator should be selected.

You should not allow any openings that will bypass the air entering from the bottom of the grate and that will lead the air to escape from the sides and the rear without entering into the grate unit. Otherwise, the air will escape through such openings and combustion can not be obtained as there will be no air coming under the coal. Cinder reservoir section should be kept clean all the times. Otherwise no air can reach there, and no combustion can occur. It should be kept always clean in order to maintain the air passage in clear status.

Tightness of all doors on the boiler should be checked. Any air leaking inside the boiler from these doors reduces combustion degree.

The circulation pump should be started when the boiler water temperature reaches to 50 °C. If the boiler fails to reach 80 °C within one hour while the circulation pump is off, then this means that the boiler chimney does not provide a good draught.

Boiler flame pipes shall be inspected regularly with respect to soot deposition; chimneys and pipes occupied with soot prevent proper firing of the boiler. Tar in the form of pitch may deposit in the boiler smoke pipes, and if not cleaned timely, it combines with water and then it clogs internal passages of the pipes, resulting poor heating capacity of the boiler. This situation is caused by insufficient draught of the chimney. The chimney must be repaired or a new chimney must be constructed.

ANNEX 4

| | | |
|--|---|----------------------------------|
|  INITIAL START - UP FORM | | Document No. : FR.77 |
| | | Issue Date : 12.09.2005 |
| | | Revision # and Date : 0 - 0 / - |
| Query Date by End - User Customer : | Address of the by End - User Customer Requiring Service : | Tel No. of End - User Customer : |
| Product Type / Capacity : | Product Manufacturing Date / Serial No. | |

| | YES | NO |
|---|--------------------------|--------------------------|
| 1 - Is the boiler and installation line filled with water? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 - Is there any leak in the system? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 - Are the outlet and return valves open? | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 - Does the pump deliver water? | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 - Are the outlet and return valves of the pump open? | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 - Is the pump rating suitable for the boiler capacity (otherwise set temperature can not be obtained) | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 - Is the bypass line closed while the pump is operating? | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 - Are there any air leak openings in the boiler chimney and ducts, through which air can enter? | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 - Are there any compartments inside the main chimney, and is there air draught between these parts? | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 - Are the ash and soot collection doors in the chimney made tight and leak - proof? | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 - Are there any draught problems in the chimney? | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 - Have the chimney been cleaned? | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 - Is the chimney sufficiently high, and is its section suitable for the boiler capacity? | <input type="checkbox"/> | <input type="checkbox"/> |
| 14 - Is the boiler fired with ample flame during the initial firing process? | <input type="checkbox"/> | <input type="checkbox"/> |
| 15 - Is the circulation pump started when the boiler water temperature has reached to 50 °C? | <input type="checkbox"/> | <input type="checkbox"/> |
| 16 - Is the flue gas temperature 100 °C when the boiler water temperature is 50 °C? (.....°C) | <input type="checkbox"/> | <input type="checkbox"/> |
| 17 - Is the flue gas temperature 120 °C when the boiler water temperature is 60 °C? (.....°C) | <input type="checkbox"/> | <input type="checkbox"/> |
| 18 - Is the flue gas temperature 130 °C when the boiler water temperature is 70 °C? (.....°C) | <input type="checkbox"/> | <input type="checkbox"/> |
| 19 - Is the flue gas temperature 140 °C when the boiler water temperature is 80 °C? (.....°C) | <input type="checkbox"/> | <input type="checkbox"/> |
| 20 - Do not exceed boiler water temperature of 80 °C unless it is really necessary? | <input type="checkbox"/> | <input type="checkbox"/> |
| 21 - Check the temperature of boiler exit and return water? Is the difference between them 20 °C? | <input type="checkbox"/> | <input type="checkbox"/> |
| 22 - Does the boiler water temperature reach to the desired temperature within the desired period? | <input type="checkbox"/> | <input type="checkbox"/> |
| 23 - Is there sufficient air circulation inside the boiler room? | <input type="checkbox"/> | <input type="checkbox"/> |
| 24 - Is the system to which the boiler is connected an open expansion system? (for fuel solids) | <input type="checkbox"/> | <input type="checkbox"/> |
| 25 - Boiler may not be operated in closed system with solid fuels. The equipment is out of warranty. | <input type="checkbox"/> | <input type="checkbox"/> |
| 26 - Is the stoker a certified person? | <input type="checkbox"/> | <input type="checkbox"/> |
| 27 - Is the coal at the sufficient quality? (Lower heat value should be minimum Hu=6000 kcal / h) | <input type="checkbox"/> | <input type="checkbox"/> |
| 28 - If everything else is suitable, approve the warranty card and start the 2 - year warranty period. | <input type="checkbox"/> | <input type="checkbox"/> |

REPORT

| | | |
|--------------------------------|--|---|
| Name of Service : _____ | Name of Technician / Signature : _____ _____ | Name of the End - User Customer / Signature : _____ _____ |
|--------------------------------|--|---|

COMMUNICATION :

TANSAN BOILER HEAT AND MACHINERY INDUSTRY
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