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solid fuel (NA.K) central heating boiler operating and maintenance instruction manual

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ENSURE THAT THE BOILER PERSONNEL READ
THESE OPERATING-MAINTENANCE INSTRUCTIONS

CONTENTS

FEATURES OF e r e n s a n° BRAND BOILERS

- Gases and particles are ensured to burn completely, as they are diverged into primary and secondary currents in the combustion air fan and the air grate and then transferred to the combustion chamber.
- The bright flame formed in the combustion chamber by means of the double pass concentrated combustion is passed from the combustion chamber to the water via heat transfer.
- Gas delaying turbulators, increase the speed of the smoke and gases in the flame pipes and enable convection maintenance of heat transfer at optimal level.
- **erensan°** brand solid fuelled hot water boilers provide high efficiency with these features, and cut down operational costs.
- The boiler can work with solid fuel like: logs of wood with dimensions of the boiler furnace and wood briquettes, wood dust, wood chips and waste forestry and lignite coal.

STANDARDS APPLIED TO MANUFACTURING AND TESTING

BOILERS BETWEEN NA.K 80 – NA.K 250

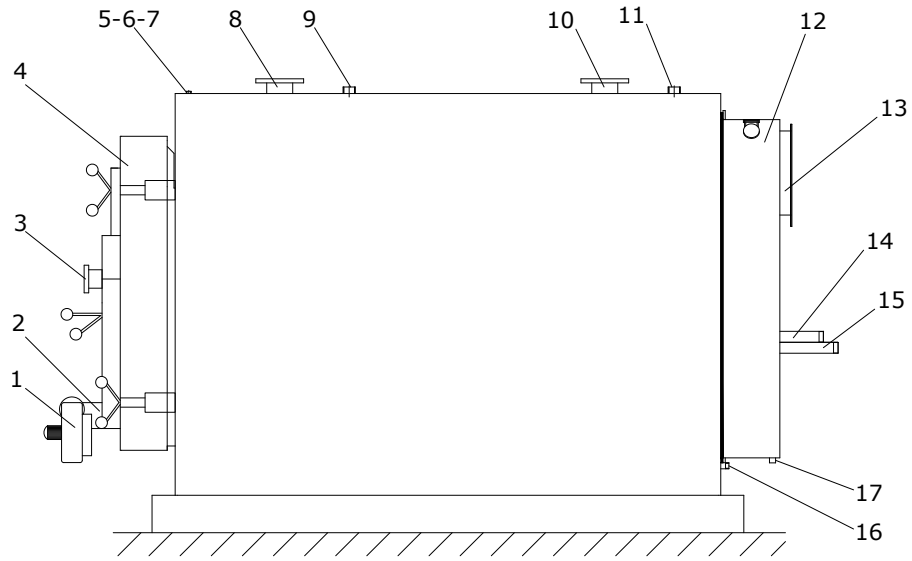
TS EN 303-5

BOILERS BETWEEN NA.K 300 – NA.K 600

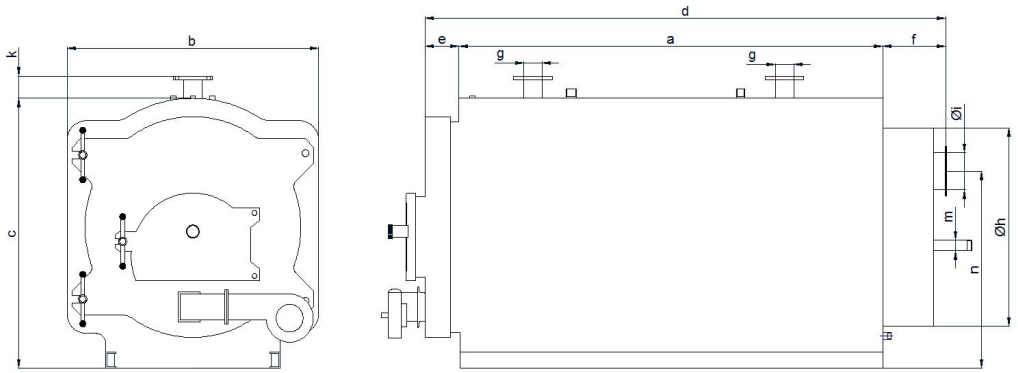
TS 497
TS 4040
TS 4041

INTRODUCTION

(3 Sleeves side by side)



1. Fan
2. Air duct
3. Observation port
4. Door
5. Hydrometer sleeve
6. Thermometer sleeve
7. Thermostat sleeve
8. Hot water outlet
9. Safety outlet
10. Cold water return
11. Safety return
12. Smoke chest
13. Chimney duct
14. Grate hot water outflow
15. Grate hot water return
16. Filling / discharge



BOILER DIMENSIONS FOR DIFFERENT BOILER TYPES

NA.K		80	100	130	160	200	250	300	360	400	450	500	600
Kapasite / Capacity	[kcal/h]	80.000	100.000	130.000	160.000	200.000	250.000	300.000	360.000	400.000	450.000	500.000	600.000
Kapasite / Capacity	[kW]	93	116	151	186	233	291	349	419	465	523	581	698
a	[mm]	1.750	1.750	1.752	1.752	2.338	2.338	2.345	2.380	2.400	2.400	2.400	2.470
b	[mm]	1.040	1.040	1.110	1.220	1.280	1.330	1.500	1.600	1.660	1.720	1.740	1.856
c	[mm]	1.090	1.090	1.160	1.270	1.330	1.380	1.550	1.650	1.710	1.770	1.790	1.906
d	[mm]	2.150	2.150	2.152	2.172	2.758	2.758	2.795	2.830	2.850	2.850	2.850	2.920
e	[mm]	140	140	140	140	140	140	140	140	140	140	140	140
f	[mm]	260	260	260	280	280	280	310	310	310	310	310	310
Øg	DN	65	65	65	65	65	80	80	80	80	100	100	100
Øh	[mm]	800	800	900	1.000	1.050	1.100	1.260	1.380	1.420	1.490	1.520	1.620
Øi	[mm]	150	150	150	150	200	200	250	250	300	300	300	350
k	[mm]	90	90	90	90	90	90	90	90	90	90	90	90
m	[inç]	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
n	[mm]	795	795	905	960	1.015	1.065	1.230	1.340	1.365	1.430	1.455	1.563
Su Hacmi / Water Volume	[lt]	624	610	752	940	1.378	1.514	2.098	2.129	2.366	2.603	2.478	2.784

BOILER OPERATING PERSONEL

Boiler operating personel (boiler operator) should be knowledgeable about general boiler failures and their reparation, as well as the tasks and working principles of all measurement, adjustment, control and safety devices on the system.

The boiler operator should have an official document (boiler operator certificate) verifying his expertise on the abovementioned issues.

MAKE SURE THE BOILER PERSONNEL ARE CERTIFIED BOILER OPERATORS.

TRANSPORTATION AND TEMPORARY STORAGE:

The boiler should be transported using the lifting and transportation points and appropriate equipment.

For horizontal movement; where it is not possible to use a winch, horizontal displacement is possible through controlled sliding on pipes.

The boiler should be protected against mechanical blows and collisions during loading, transportation and unloading.

It must be protected against damages resulting from moisture and external mechanical factors that may arise during temporary storage before transportation and installation.

USE THE BOILER COMPLYING WITH WARNINGS AND RECOMMENDATIONS IN THIS PROCEDURE.

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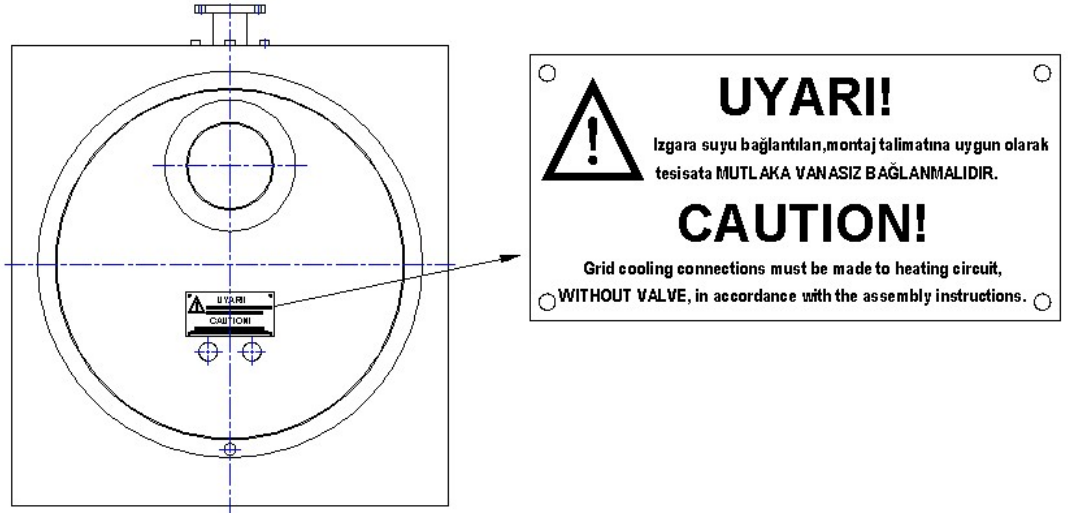
BOILER INSTALLATION

- Install the boiler in the boiler room at the installation site on a foundation elevated from the floor.

- Make the boiler mechanical connections as per the installation circuit diagram.



- Boiler installation site should comply with the related standards and procedures. It must have a door opening to the outside, a fresh air inlet duct at floor level and a polluted air discharge chimney duct at ceiling level (apart from the boiler chimney). The door and the window frames must be of non-flammable material.

- Burner Power Panel, Air Fan and Thermostat connections should be made by an eligible electrician complying with Command Panel Connection Instructions.

- There must be a thermostat, thermometer, hydrometer or manometer on the boiler. We recommend that a thermometer also be installed on the boiler return collector or return pipe.

- We recommend the boiler to be operated in open expansion system. In case it is used in a closed expansion system; a closed expansion

tank suitable for the total boiler and central heating water volume should be used at building static water level pressure and with adjusted gas side pressure. The closed expansion tank should be connected to one of the expansion nozzles directly on the boiler or to the boiler main outlet or return pipe provided that there is no stop gate valve. A pressure relief valve with opening pressure of 0,5 bars over the boiler operating pressure should be used.

- More than one boiler should not be connected to the same chimney

FUEL SELECTION AND STORAGE:

Coal with low sulphur and humidity content should be used.

Coals with low ash fusion temperature, that produce slag and stuff up the grate air vents and effect combustion adversely should not be used. Coals with ash fusion temperature of 1200° C and over should be used.

The coal lump size should be between fist-nut sizes. You may use wood and wood coals in larger dimensions (20x20 cm).

Sieve the dust and small fragments in the coal that may fall through the grate, and keep these in a separate place. You may sprinkle this fine coal over burning coal and burn them gradually.

Do not store the coal you purchase in the open, under rain and sun, keep it under an open shed or in a closed, clean and cool place, avoiding stacking over 1 m.

STOP THE FAN BEFORE OPENING THE FRONT DOOR AND SHUT DOWN FAN PANEL ELECTRICITY!

FILLING THE SYSTEM WITH WATER

The boiler should be filled with water before operation. The boiler should not be operated before it is filled with water.

To fill the boiler with water, the main distribution and collection pipes, the boiler feeding pipes, installation column valves should be opened fully, water should be let in from the filling/discharge tap and it should be filled slowly until water starts coming from the monitor pipe of the Expansion Tank. In closed expansion systems, during water filling from boiler filling/discharge tap, the air discharge tube valves and mechanical purgers should be opened and then closed when it is observed that the incoming water does not have bubbles. When the air tube at the top most level of the installation or at the roof is completely filled with water, filling will be completed.

The circulation pump should not be operated during the filling process.

The expansion tank connections should conform to the installation circuit diagram.

DO NOT OPERATE BOILER WITHOUT WATER.

PREPARATION OF BOILER FOR OPERATION

The boiler room must be designed to meet the combustion air requirements of the boiler.

The boilers should be completely cleaned from internal and external dust, soot, etc.

The smoke channel, smoke pipe and chimney cleaning doors should be checked and leakages should be prevented.

The fuel combustion system should be reviewed with respect to the system's working principles and each element should be controlled for proper operation.

The boiler explosion door should be checked for proper operation.
Boiler safety devices (manometer, hydrometer, safety valve, visual and sound warning system etc.) should be reviewed to ensure proper operation.

SAFETY RULES

- Use boiler only for hot water production.
- Use the boiler complying with warnings and recommendations in this procedure.
- Have the heating system installed by authorized personnel.
- Have the boiler electrical connections made by authorized personnel.
- Do not operate boiler without water.
- The small door should never be opened without stopping the fan.
- Make sure the boiler personnel are certified boiler operators.
- Do not use hard water in heater circuit.
- The boiler is designed for water temperature between 90-70°C. Install a safety system for water temperature not to exceed 100° C.
- Perform the inspection and maintenance activities of the boiler thoroughly.
- The boiler chimney should be built in compliance with chimney building rules. Airbrick and briquette should not be used in boiler chimneys.
- In closed expansion systems, the expansion tank gas pressure should be checked to be equal to that of the building static water height and the operation of the safety valve should be tested at opening pressure.
- The boiler grate is water circulated and the grate pipes should be directly connected to outflow and return lines without a valve in between.

- If abnormal sounds are heard from the boiler or the system during the operation of the boiler, the coal on the grate should be quickly taken out with proper safety measures at discharge location. Then the malfunction should be inspected and repaired.
- In cold climate regions, required measures should be taken to prevent installation water temperature falling to freezing temperature. Circulation pump should be operated continuously at workplaces that are closed at night and during weekends. If heating is to be stopped for a long period of time, the boiler and system water should be discharged. Antifreeze should not be used. Antifreeze causes corrosion and lowers the thermal capacity of water.
- Flammable substances such as gasoline, thinner, gas oil, etc. should never be used to fire up the boiler or revive the fire.
- At the beginning of each heating season, chimney cleaning should be procured, it should be ensured that the chimney does not have any cracks or holes, and the chimney cleaning door is closed and insulated properly.
- The pump collector should have a by-pass line and valve of at least the size of the boiler outflow pipe cross section. In case of power failures or circulation pump malfunctions (and its spare is damaged and not operational) due to various reasons, the by-pass valve should be opened to let boiler water circulate naturally.
- Installing a thermometer between the output and input collectors of the boiler, make sure that there is a difference of 20°C between the input and output.

OPERATING AND FIRING TECHNIQUE

Check system and boiler connections.

Fill the system with water. Make sure all valves (except spare circulation pump valves and the by pass valve) are open. Discharge air from the air valves and purgers in the system. Do not operate the circulation pump during air discharge.

Open the small door of the boiler and place a generous amount of wood and wood blocks on the grate and ignite the pile.

Wait with the door open until the wood fully takes fire, then close the door and start the fan. You will observe that the flames get stronger.

After running the fan in this manner for several minutes, stop it before the flames subside. Open the small door and push the burning wood toward the back of the furnace with the iron rake and throw 3-4 full shovels of coal on it. The purpose here is to provide pre-firing with the thin layer of coal with the benefit of the wood flames.

Close the small door and start the fan. You will see the coal flame up in a short while. When the coal starts to burn efficiently, close the fan. Open the small door and shovel in the required quantity of coal toward the back of the grate. The required quantity should be enough fuel for at least an hour.
Hourly fuel quantity will be calculated with the formula :

$B=Q_k/Hu.v$

B= Hourly coal quantity kg/h,
Qk= Boiler capacity kCal/h,
Hu= The lower thermal value of coal kCal/kg,
v= Boiler efficiency may be taken as (0.75-0.79).
With coals that have a sub thermal value of 6,000 kCal/kg and over, you may make loadings for 4-hour burning periods. When coal is used at lower sub thermal values, loading quantity should be decreased since weight and volume will rise. Pile height should not exceed half the distance from grate top to the combustion chamber ceiling. More coal

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than what is needed for 4 hours, should not be loaded. After loading the coal, close the door and start the fan. The coal will start to burn.

Boiler water temperature will rise as long as the coal is burning. When it starts rising above the start value, start the circulation pump. When the coal in the boiler burns out and starts to cool, water temperature will start to fall. In this case, the furnace should be reloaded with coal.

When coal burns out, depletion forms in the furnace. This residue, in small or large quantities depending on the coal type, is drawn to the front with the rake without taking any slog so as to leave a thin layer for firing, and the fresh coal is thrown to the rear of the grate. Do not load coal onto slug and ash. When the fresh coal loading is completed, the coal drawn to the front will lean against the new coal pile. To prevent the fresh coal from leaning completely on the grate rear collector and combustion chamber back wall, an air pass gap should be created with the rack. Close the small door and start the fan.

It is recommended to stop the fan at mid loading, open the small door and stoke the coal. This way, air will reach the inner regions more easily, unburned coal will burn well and fire bridge formation may be decreased. Use of coal that forms slug or fire bridges is not recommended. However, in case of using such coal, the coal height should be kept low and intermediate stoking should be performed more frequently.

When there is no space left to load coal in the furnace after a while, the small door should be opened once more, a quantity of completely burned slug and ash taken out from grate front, and fresh coal loaded as described above.

PUTTING BOILER IN OPERATION

Before the solid fuel heater boiler is operated, the existence of the following conditions should be controlled:

- The boiler thermostat should be adjusted to the suitable value.
- It should be made sure that the heating system is filled with water.
- The system should be filled with water and all the valves (except the emergency circulation pump and the by-pass valve) should be checked to be open. Discharge air from the air valves and purgers in the system. Circulation pump should not be operated during air discharge.
- Circulation pump should be started.
- If the boiler water heats excessively, rotation direction of circulation pump should be checked (the pump may be rotating in reverse). If that this does not bring a solution, burning should be stopped and the installation should be checked.
- Ventilator fan rotation direction should be the same as the air inflow to boiler. If it is reversed, change phase connections on the panel.
- When using boiler with chimney flap, pull the lever at boiler side toward yourself to close the flap during coal loading. When loading is completed push the flap lever back to open position and start the ventilator. If coal fires-up well and the boiler water outflow temperature rises quickly, the chimney lapel may be closed partly for regulation.
- The air regulation flap on the ventilator will be adjusted by observing the combustion and smoke gas coming from the chimney. After coal loading, the flap will be in open position. Upon decrease of coal gas in the combustion chamber, clearance of the vision of the coal burning and disappearance of smoke, the flap will be closed gradually.
  - Open the boiler door carefully.
  - Protect the front door fire cement surface from collusion with hard objects (skewer, brush arm, turbulence makers, etc.).

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HAVE THE HEATING SYSTEM INSTALLED BY AUTHORIZED PERSONNEL.

HEATING SYSTEM ADJUSTMENTS:

Check the boiler circulation pump for proper selection and setting.
a- Pump flow should be calculated with the formula below:
$Q_p=Q_k/C_p.(tg-td)$ = lt.
Qp=Pump flow lt. Qk=Boiler capacity kCal/h
C_p=Specific heat of water 1kCal/Kg
is taken as t_g-t_d=20 C (in 90/0 ^{0}C system)
b-Pump pressure H_p=mSS. Should be greater than the calculated critical circuit pressure of the building.

The pump selection should be approved by the (Mech. Eng.) responsible for the building project and the technical application. Where a project and calculations do not exist or are not available, regulations can be made practically by placing thermometers, one each, on the boiler outflow and return lines, a manometer to the circulation pump exit and by adjustments with the help of the related pump curve, through the circulation pump valves so that the water temperature difference between outflow and return lines is 20^0 C. In case of big pump selection, the outflow-return temperature difference will stay below 20^o C and boiler outflow temperature may not rise, in the case of small pump selection, the outflow return temperature difference will be over 20 ^{0} C and the high and remote radiators may not function efficiently enough.

Ventilator fan rotation direction should be the same as the air inflow to boiler. If it is in reverse, swap phase connections on panel.

When using boiler with chimney flap, pull the lever at boiler side toward yourself to close the flap during coal loading. When loading is completed push the flap lever back to open position and start the ventilator. If coal fires-up well and the boiler water outflow

temperature rises quickly, the chimney lapel may be closed partly for regulation.

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Every morning, the water level and pressure should be controlled from the hydrometer or manometer on the boiler. If it is below the value it should be, reinforce it when the boiler is cool. If it is a closed expansion system, check to see that the closed expansion tank gas pressure is equal to the static water height of the building. Do this control from the manometer on the tank, if it exists, or measure it or have it measured by an authorized person, with an air pressure gage from the gas side valve.

If the pressure is excessive, lower it by discharge from related valve, if it is insufficient, have the authorized service add nitrogen gas. In cases when nitrogen cannot be obtained, air may be used. If water comes out from the valve during the check, instead of gas or air, this means the tank diaphragm is torn and it should be replaced by contacting the authorized service.

DISCHARGE OF BOILER WATER

- After a season's utilization, the boilers should be cleared of gasket remains, mud and residue in the heating system.
- The blind flanges at the lowest level of the main distribution and collection reservoir and boiler filling-discharge tap are opened, and the system and boiler water is rapidly flushed out.
- The emptied boiler water surface (internal surface of boiler) is cleaned with pressurized water.
- After cleaning, the boiler and the system is filled with water until water comes from the monitor pipe.
- The boiler water should not be discharged at any time except pre-operation cleaning and water should not be added to the boiler except for the purpose of compensating any depletion in the expansion tank.

TAKING BOILER OUT OF OPERATION

The taking of boiler out of operation should be as follows:

- The burner is stopped and boiler surfaces are cooled.
- The soot and smut in the boiler (the cover, smoke chest and the smoke pipes) should be cleaned.
- The cleaned surfaces should be checked under strong light to detect damages like leakages, oozing, cracks, etc. If such damages exist, the authorized services are notified and the necessary repairs are done.
- The chimney cleaning flap should be brought to fully open position.
- The damaged heat insulators should be repaired.
- During non-operational period, the boiler room temperature should be kept at min. +5° C.

PERFORM THE INSPECTION AND MAINTENANCE ACTIVITIES OF THE BOILER THOROUGHLY !

PREVENTION OF LOW TEMPERATURE CORROSION:
Boiler pipes should not be let to burst due to low temperature corrosion formation. To prevent this:

- Obtain coal with low sulphur and humidity.
- To prevent THE condensation of gasses passing from the boiler heating surfaces and the smoke pipes, the boiler water outlet temperature should not be dropped below 60°C and the chimney smoke gas temperature below 70°C.
- Never use wet coal or allow the coal to get wet.
- During unloading ash and slag from the boiler, do not perform wetting in the boiler.
- Do not allow soot and smut to gather on the heating surfaces (combustion chamber, smoke pipes, smoke chest), perform the cleaning process as frequently as possible.
- Do not extinguish and re-fire the boiler frequently.
- You may use dry, small or fine coal to put the boiler to sleep and thus to suppress the coal during daytime or at night. Never use wet material or allow the coal to get wet. During this process, stop the ventilator, and bring the ventilator and chimney lapels to closed position to prevent air inlet to boiler.
- To revive a boiler put to sleep; the little door is opened, the coal is stoked and dislocated. Slug, if any, is raked forward. The little door is closed, the ventilator is started, the ventilator and air lapels are opened and the combustion process is re-started.

- Check whether efficient burning is maintained. A good combustion should have red or orange flames.

INSPECTION AND MAINTENANCE OF BOILER

1. General Maintenance
Heating system boilers should be subjected to general maintenance at least once a year. The following points should be checked during general maintenance.

- The operation of boiler armatures (thermostat, thermometer, hydrometer/manometer) should be observed continuously and in case of malfunction, required controls should be done and if needed, these should be changed.
- All connections in the system should be controlled for proper insulation, leakages and oozing should be repaired and if needed, the valve gaskets should be reinforced.
- The boiler front big door, the little door (for loading coal) and the rear smoke chest insulation elements should be checked continuously; if leakage exists, the tightening elements and bolts should be tightened in balance; if leakage is not stopped, gasket/sealant should be changed or our authorized services should be contacted. Grease the bolt screws and nuts of tightening elements.
- Combustion room, smoke pipe and smoke chest cleaning must be done at least once a week. The turbulators should be taken out and all pipes should be cleaned with a roll brush. Turbulators should be reinstalled in place after cleaning. For full boiler efficiency, turbulators should be installed in full.
- During cleaning, the air holes on the grate should be checked and opened, if necessary, with the help of a nail. Always keep the area under the grate clean; the ash compiled should be taken out with a small rake.
- The ½" blind plug in front of the front grate collector should be opened twice in a season to clear solid residuals like mud, lime, etc. that may compile in the grate.

- At end of season, the boiler should be cleaned fully as in weekly cleaning. Boiler heating metallic surfaces should be protected against oxidation by applying transformer oil or a thin metallic lubricant.

- The boiler and system water should not be discharged if it is not a necessity. At end of season, hydrazine residual or similar chemical protective additive should be added to system water, to prevent negative effects of the oxygen in water on the metal surfaces.

- The power panel and ventilator fan should be cleaned with pressurized air. Should be protected from dust and water.

- When a change is detected in ventilator sound, our authorized service should be contacted.

- Care should be shown not to let any material slip into the ventilator body, during coal loading or taking slag and ash out. If such an event happens, the required cleaning should be done immediately. When noise is heard during ventilator startup, the ventilator switch should be turned off immediately. Required controls should be performed and our authorized service should be contacted, if needed.

- Temperature gages should be compared to a calibrated thermometer.

- Safety elements, outlet and return safety pipes and safety valves are checked for proper operation.

- The door, the smoke chest, smoke pipe and smoke ducts are cleaned.

- Turbulator wires are inspected and cleaned.

- The controls described in article on taking boiler out of operation, are performed.

2. Hydraulic Test

The boiler parts such the smoke pipe, nozzle, mirror should pass a hydraulic test supervised by an authorized mechanical engineer during replacement or every 5 years for control purposes.

Performance of hydraulic test for boilers under 1000kW:

- Close all outlets and inlets with blind flanges except one outlet/return pipe left open.

- Let water into the boiler from the filling/discharge tap until water comes from the vent left open.

- Install a manometer on the open vent.

- Pressure the boiler to 1.3 times the design pressure. Wait 20 minutes and then check for drop in pressure, leakage, oozing and permanent form changes.

For boilers over 1000kW:

The procedures described above are applied; test pressure is taken as 1.5 times the design pressure.

GENERAL BOILER MALFUNCTIONS

Malfunction Symptom	Reason	Solution
Dark black smoke from chimney	• Air excess coefficient is low • Circuit voltage low	• Check the fresh air entering the boiler room or the fan air setting. • Voltage drop will cause motor revolutions to drop and result with a low fuel-air mixture.
Drumming noise in boiler water compartment	• Air in system.	• Discharge the air.
Overheating in boiler water	• Circulation pump malfunction. • Thermostat malfunction	• Check circulation pump for reverse turning. • Check boiler thermometer for proper operation.

For malfunctions listed above, boiler operator personnel intervention is sufficient. For malfunctions apart from these, contact our authorized services.

BOILER FEED WATER AND BOILER WATER CHEMICAL CHARACTERISTICS

Water to be used in Hot Water boilers must comply with the table values indicated below.
To operate a productive and economic boiler, boiler feed water and boiler water must be continuously controlled and it must be ensured that the chemical conditions required for water are provided.

FEEDWATER FOR HOT WATER BOILERS

Parameter	Unit	Make-up water for hot water & superheated water boilers
Operating Pressure	bar	total range
	MPa	total range
Appearance	-	clear, free from suspended solids
Conductivity at 25 °C	µS/cm	< 1500
pH value at 25 °C [1])	-	> 7,0
Total hardness (Ca + Mg)	mgl/liter(ppm)	< 5 [=0,5 Fr.H]
Iron (Fe)	mgl/liter(ppm)	< 0,2
Copper (Cu)	mgl/liter(ppm)	< 0,1
Silica (SiO_2)	mgl/liter(ppm)	-
Oxygen (O_2)	mgl/liter(ppm)	-
Oil/grease	mgl/liter(ppm)	< 1
Organic substances	-	See clause 5
[1]) With copper alloys in the system the pH value shall be maintained in the range 8,7 to 9,2		
[2])		
[3])		
[4]) If non-ferrous materials are present in the system, e.g. Aluminium, they may require lower pH value and conductivity, however, the protection of the boiler has priority.		
[5]) If Phosphate is used; considering all other values higher PO4-concentrations are acceptable, for instance with balanced or coordinated phosphate treatment (see also clause 4).		

BOILERWATER FOR HOT WATER BOILERS

Parameter	Unit	Boiler water for hot water & superheated water boilers
Operating Pressure	bar	total range
	MPa	total range
Appearance	-	clear, no stable foam
Conductivity at 25 °C	µS/cm	< 1500
pH value at 25 °C	-	9,0 to 11,5 [4])
Acid Capacity up to pH 8,2	mmol/liter	< 5
Silica (SiO_2)	mg/liter	-
Phosphate (PO_4) [5])	mg/liter	-
Organic substances	-	-

[1])

[2])

[3])

[4]) If non-ferrous materials are present in the system, e.g. Aluminium, they may require lower pH value and conductivity, however, the protection of the boiler has priority.

[5]) If Phosphate is used; considering all other values higher PO_4-concentrations are acceptable, for instance with balanced or coordinated phosphate treatment (see also clause 4).

Ref : prEN 12953-10, Table 5-1, 5-2; 1998

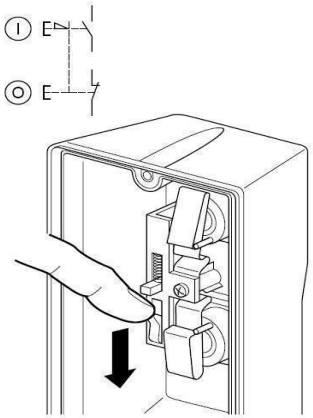
BOILER LIFE SPAN

If **erensan°** brand boilers are utilized in compliance with operating and maintenance instructions, it is possible to go well over the ministry stated life span. Therefore, **make sure that this operating and maintenance procedure is read and fully applied by operating personnel.**

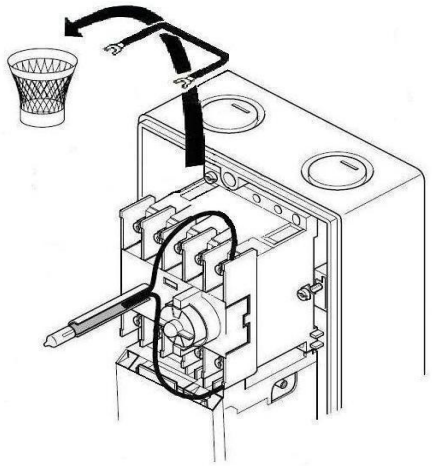
When the boiler has reached unusable state, remove the junk from usage area in compliance with environmental procedures.

HAVE THE BOILER ELECTRICAL CONNECTIONS MADE BY AUTHORIZED PERSONNEL.

FAN CONTROL PANEL ELECTRICAL CIRCUIT DIAGRAM

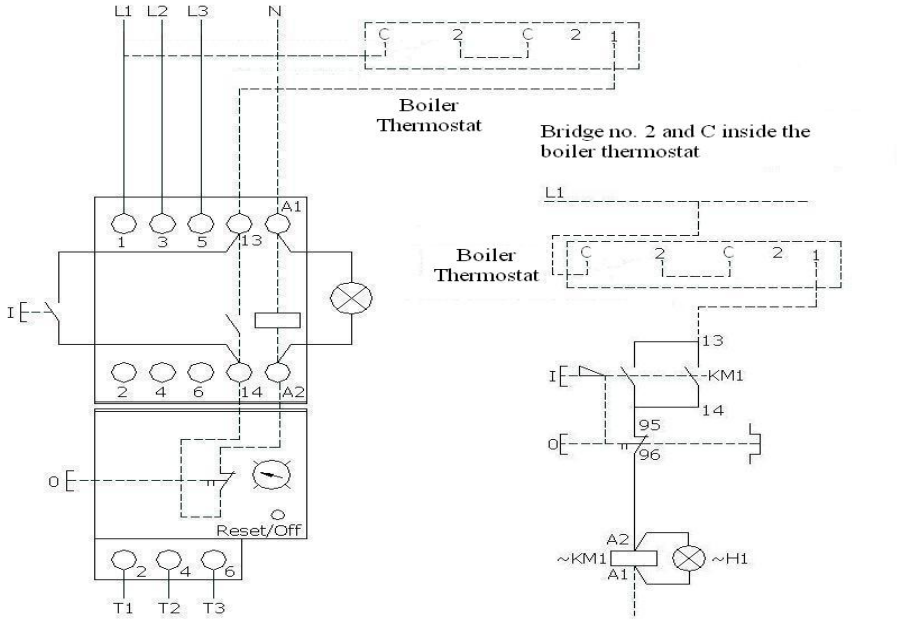


In order to stabilize the start button, push down the swich as shown



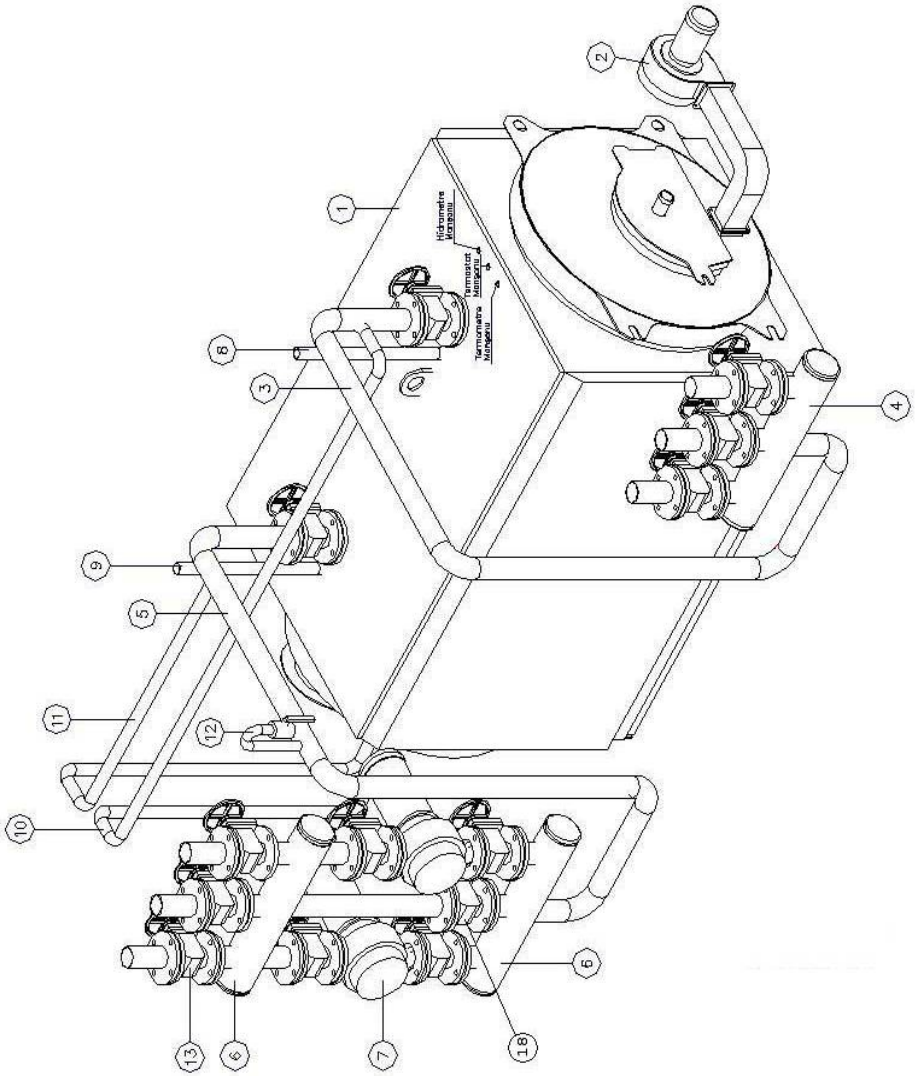
Disconnect the cable bridge between L1 and 13, then insert the boiler thermostat cables no.1 being inserted into 13 and C being inserted into no:1 (see below for details)

LE1-M35▪M7▪▪-3~



INSTALLATION CIRCUIT DIAGRAM (EXAMPLE)

Front view (Element descriptions are in page 29.)



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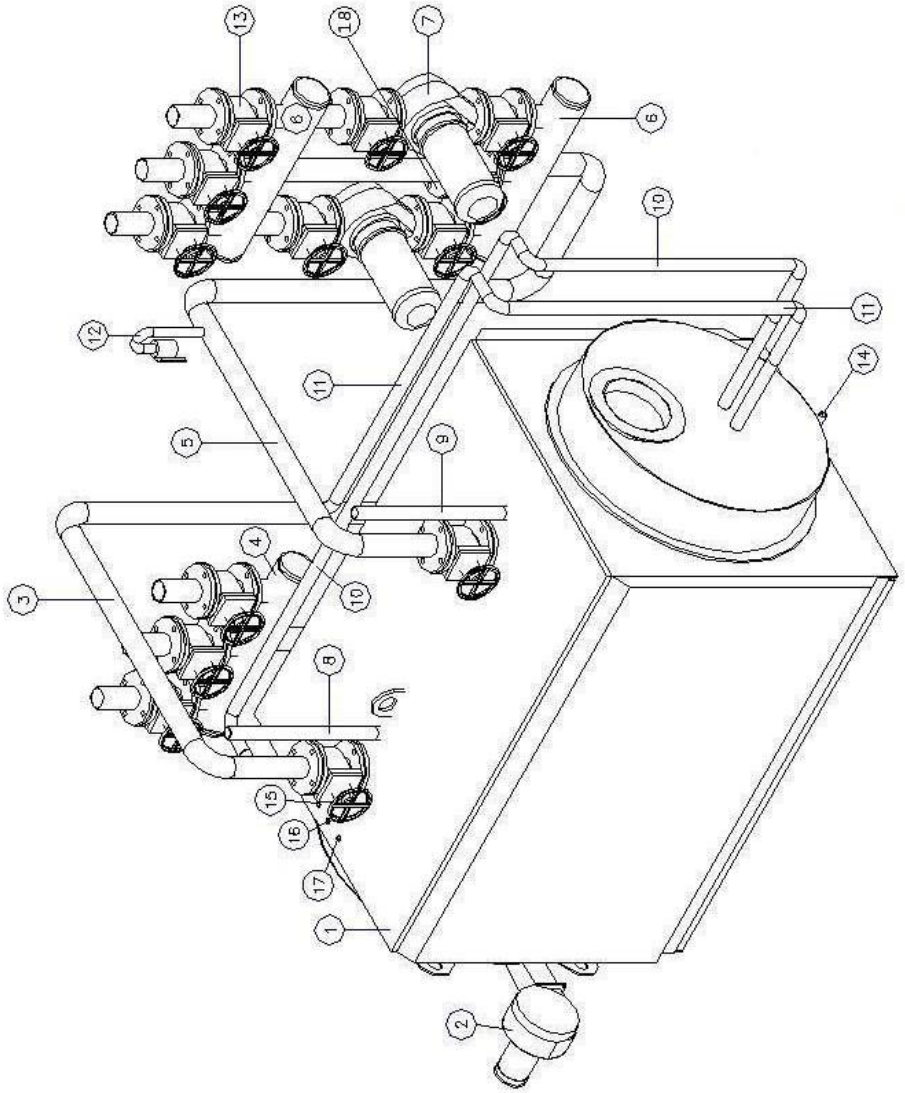
Rear View



1. Hot water tank
2. Fan
3. Hot water outlet line
4. Outlet collector
5. Hot water return line
6. Return collector
7. Pump
8. Safety outflow line
9. Safety return line
10. Grate circulation outflow
11. Grate circulation return
12. Air pipe
13. Valve
14. Filling, discharge vent
15. Hydrometer sleeve
16. Thermometer sleeve
17. Thermostat sleeve
18. By pass valve

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