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# TECHNICAL MANUAL

INSTALLATION, USE AND MAINTENANCE INSTRUCTIONS

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**GV**



**GVO**

STEAM BOILER

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Dear Customer,

Thank you for choosing a boiler by IVAR.

In your interest and to maintain the highest level of performance and duration of your appliance, we recommend that you follow the instructions contained in this booklet and have regular maintenance performed by qualified personnel.

We would like to remind you that failure to follow the instructions contained in this booklet may invalidate the guarantee.

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## **GENERAL WARNINGS**

This instruction booklet is an integral and essential part of the product.

Should the appliance be sold or transferred to another owner, or if you move and leave the appliance behind, always ensure that this booklet accompanies the appliance so that the new owner and/or installation technician can consult it.

This appliance must be used for the purpose for which it was specifically intended.

All contractual or non-contractual responsibility of the manufacturer is excluded in the event of damages to persons, animals or things caused by errors in installation, adjustment, maintenance and improper use.

The manufacturer's responsibility is excluded for all damage to persons and/or things resulting from a clear risk for the user which he could have avoided by taking suitable safety measures.

After having removed the packaging, check the contents for breakages. If you are in doubt do not use the appliance, contact your supplier.

Do not leave the packaging materials (wooden cage, nails, staples, plastic bags, polystyrene foam, etc.) within the reach of children, as they are potential sources of risk.

The installation must be performed in compliance with the regulations in force, following the manufacturer's instructions, by professionally qualified personnel. The term "professionally qualified personnel" means persons with specific technical skills in the sector of steam systems.

To guarantee the efficiency of the appliance and ensure correct operation, it is indispensable to have regular maintenance performed by professionally qualified personnel, following the manufacturer's instructions.

Any repairs to the appliance must be carried out using only original spare parts.

If you decide not to use the appliance for a long period, ensure you have professionally qualified personnel to carry out the necessary operations to preserve the generator.

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## **GENERAL SAFETY RULES**

The use of any component utilising energy power, fuels and water requires that certain fundamental rules be respected, such as:

Do not allow children or unskilled people to use the appliance;

If you notice smell of gas, do not turn on electric switches, household appliances, telephone or any other objects that could cause sparks. If this is the case:

- open doors and windows immediately to clear the air in the room;
- turn off the fuel taps;
- contact professional qualified personnel.

Do not touch the appliance with wet or damp parts of the body and/or with bare feet.

Do not perform any maintenance and cleaning operations without having disconnected the electric power and turned off the fuel supply tap(s).

Do not pull, disconnect, unwind electric cables coming from the boiler, even if they are disconnected from the mains supply.

Do not block or reduce the ventilation openings in the room to prevent the formation of toxic and explosive mixtures caused by gas leakage; it is also uneconomic and polluting because it causes bad combustion.

Do not expose the appliance to atmospheric agents.

The generator has not been designed to work outdoors and is not provided with automatic anti-freezing systems. Keep the boiler turned on in freezing conditions.

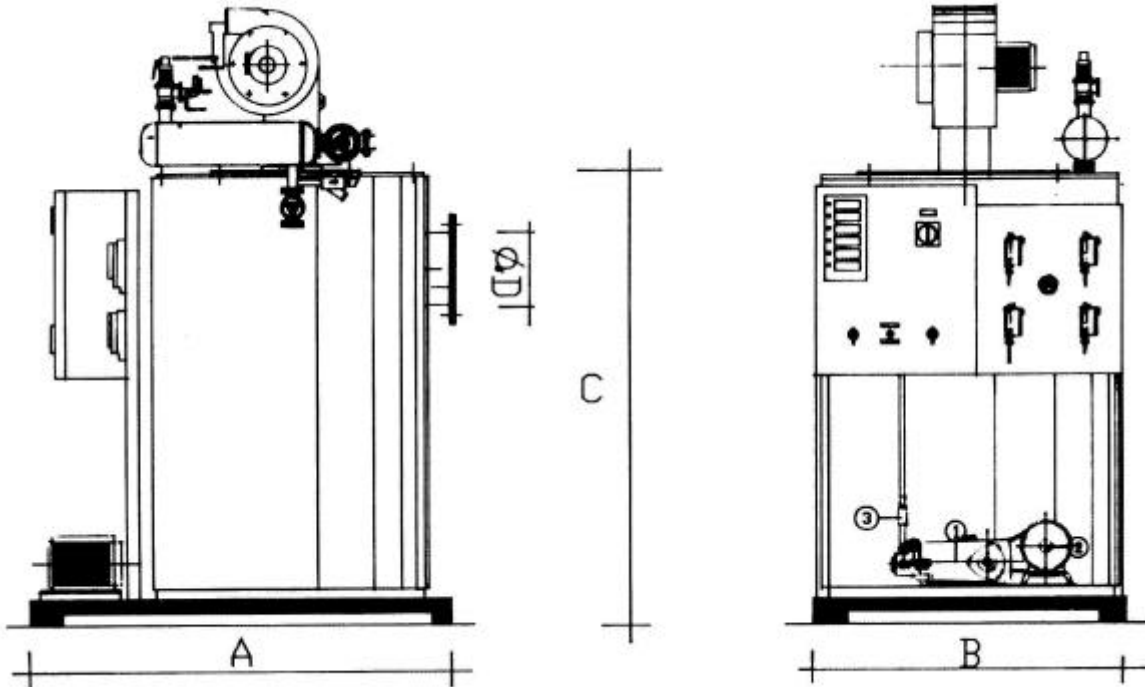
Other important warnings to be respected:

- If the power cable of the appliance is damaged, have it replaced by professionally qualified personnel;
- do not fix (and do not allow other persons to fix) electric cables on the system pipes or near sources of heat;
- ensure that the earthing cables of the appliance are not connected to the water system;
- do not touch the hot parts of the system (in particular the door and the smoke box) as they normally remain hot even for some time after the appliance has been turned off.

In the event of a water leak, turn off the system and contact exclusively professionally qualified personnel.

# GV

STEAM BOILER (12 bar)

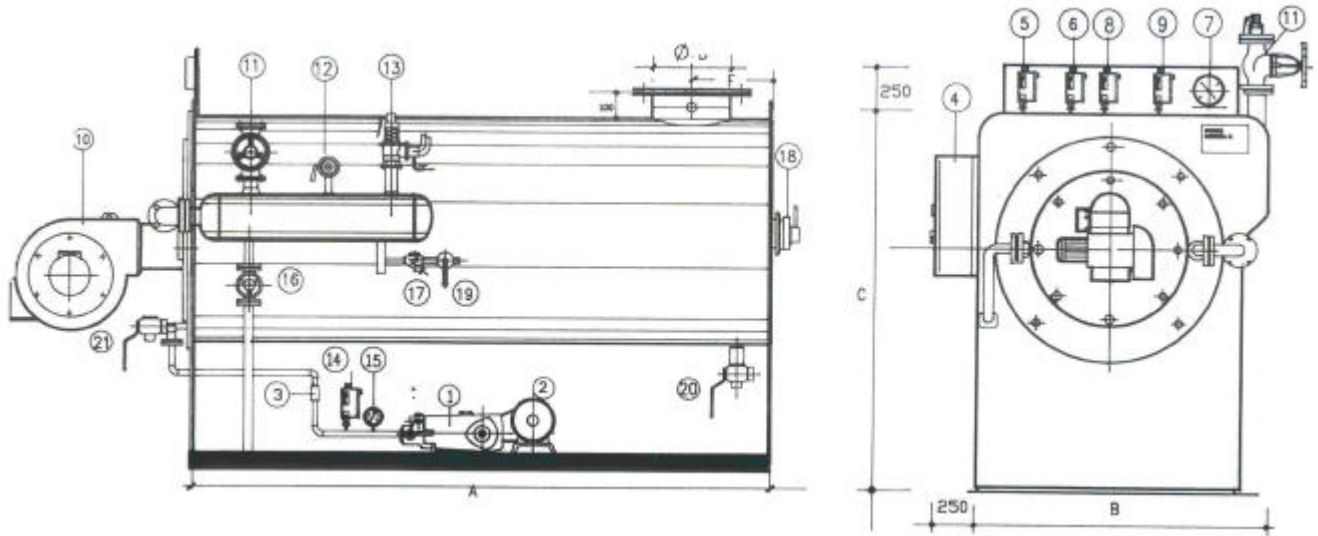


type GV		125	200	300	400	550	700
Nominal capacity	Kw	87	139	209	278	383	488
	Kcal/h	75000	120000	180000	240000	330000	420000
Furnace capacity	Kw	98,9	158	237,5	316	435,3	554,6
	Kcal/h	85230	136400	204600	272750	375000	477300
Furnace pressure	mbar	2	2	3	3	3	3
Steam production	Kg/h	125	200	300	400	550	700
Electric pump	n°	1	1	1	1	1	1
	stadi	1	1	2	2	2	2
Water content	dm <sup>3</sup>	38	38	54	54	68	77
Dimensions	A – mm	1250	1250	1350	1350	1350	1350
	B – mm	800	800	900	900	900	900
	C – mm	1500	1500	1500	1500	1500	1750
Steam outlet connection	DN	32	32	40	40	40	40
Stack connection	Ø - mm	115	115	160	160	160	160
Empty weight	Kg	600	600	800	800	900	960

I.VAR. INDUSTRY reserves the right to make any modifications considered necessary for improving production

# GVO

## STEAM BOILER (12 bar)



- |                                  |                                  |                                 |
|----------------------------------|----------------------------------|---------------------------------|
| 1 – WATER PUMP                   | 8 – STEAM SAFETY THERMOSTAT      | 15 – WATER MANOMETER            |
| 2 – ELECTRIC ENGINE              | 9 – STEAM SAFETY PRESSURE SWITCH | 16 – START VALVE DISCHARGE      |
| 3 – WATER FLOWMETER              | 10 – BURNER                      | 17 – STEAM TRAP                 |
| 4 – PANEL                        | 11 – STEAM DELIVERY              | 18 – FLAME SPY                  |
| 5 – STEAM REGUL. PRESSURE SWITCH | 12 – MANOMETER COCK              | 19 – CONDENSATE DISCHARGE VALVE |
| 6 – STEAM MAX PRESSURE SWITCH    | 13 – SAFETY VALVE                | 20 – SMOKE SIDE CLEANING VALVE  |
| 7 – STEAM MANOMETER              | 14 – WATER PRESSURE SWITCH       | 21 – COUNTERWASH VALVE          |

TYPE	GVO	200	450	750	1000	1500	2000	2500	3000*
Nominal capacity	kW	140	314	523	698	1045	1395	1745	2093
	kcal/h	120000	270000	450000	600000	900000	1200000	1500000	1800000
Furnace capacity									
	kcal/h	133350	300000	500000	666700	1000000	1333350	1666700	2000000
Furnace pressure	mbar	2	3	5	5	6	8	8,5	8,5
Steam production	kg/h	200	450	750	1000	1500	2000	2500	3000
Electric pump	n° - nr.	1	1	1	1	1	2	2	2
	stadi - stages	1	2	2	2	2	2	2	2
Water content	dm <sup>3</sup>	45	89	118	153	201	218	249	299
Dimensions	A mm	1250	1500	2000	2400	2650	3000	3300	3800
	B mm	1000	1150	1150	1150	1350	1350	1350	1350
	C mm	1150	1350	1350	1350	1600	1600	1650	1650
	F mm	200	220	220	220	330	330	400	400
Steam outlet connection	DN	32	40	40	50	65	80	100	100
Stack connection	Ø mm	120	160	200	250	350	350	450	450
Empty weight	kg	700	1400	1700	2000	2500	3000	3200	3600

\* 10 bar

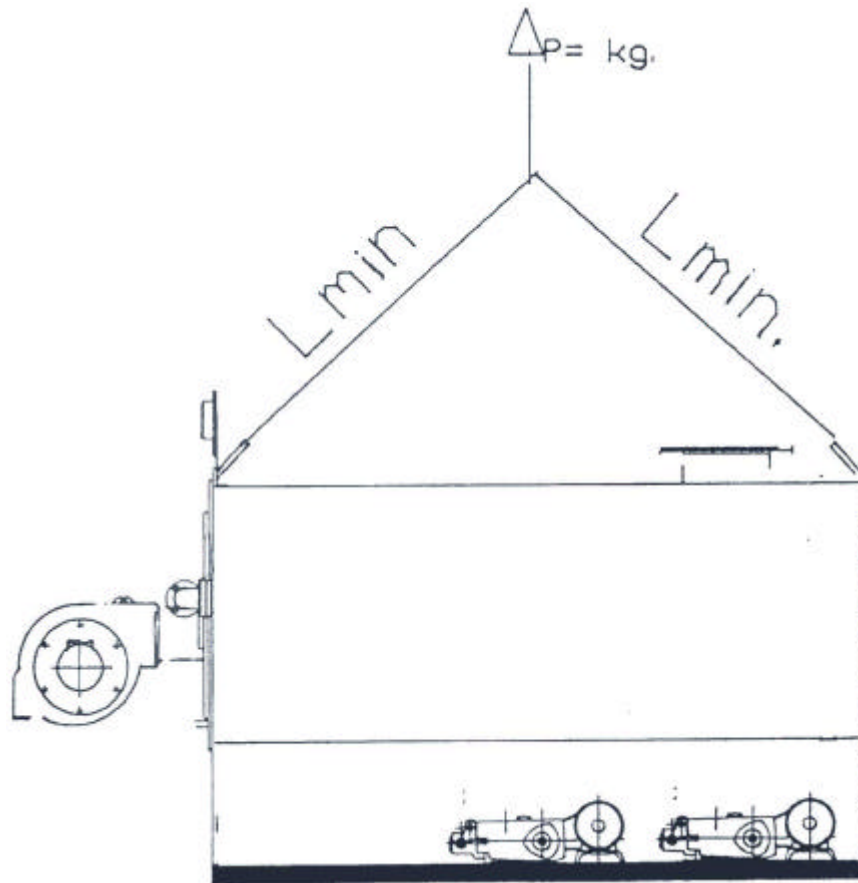
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## HANDLING AND POSITIONING

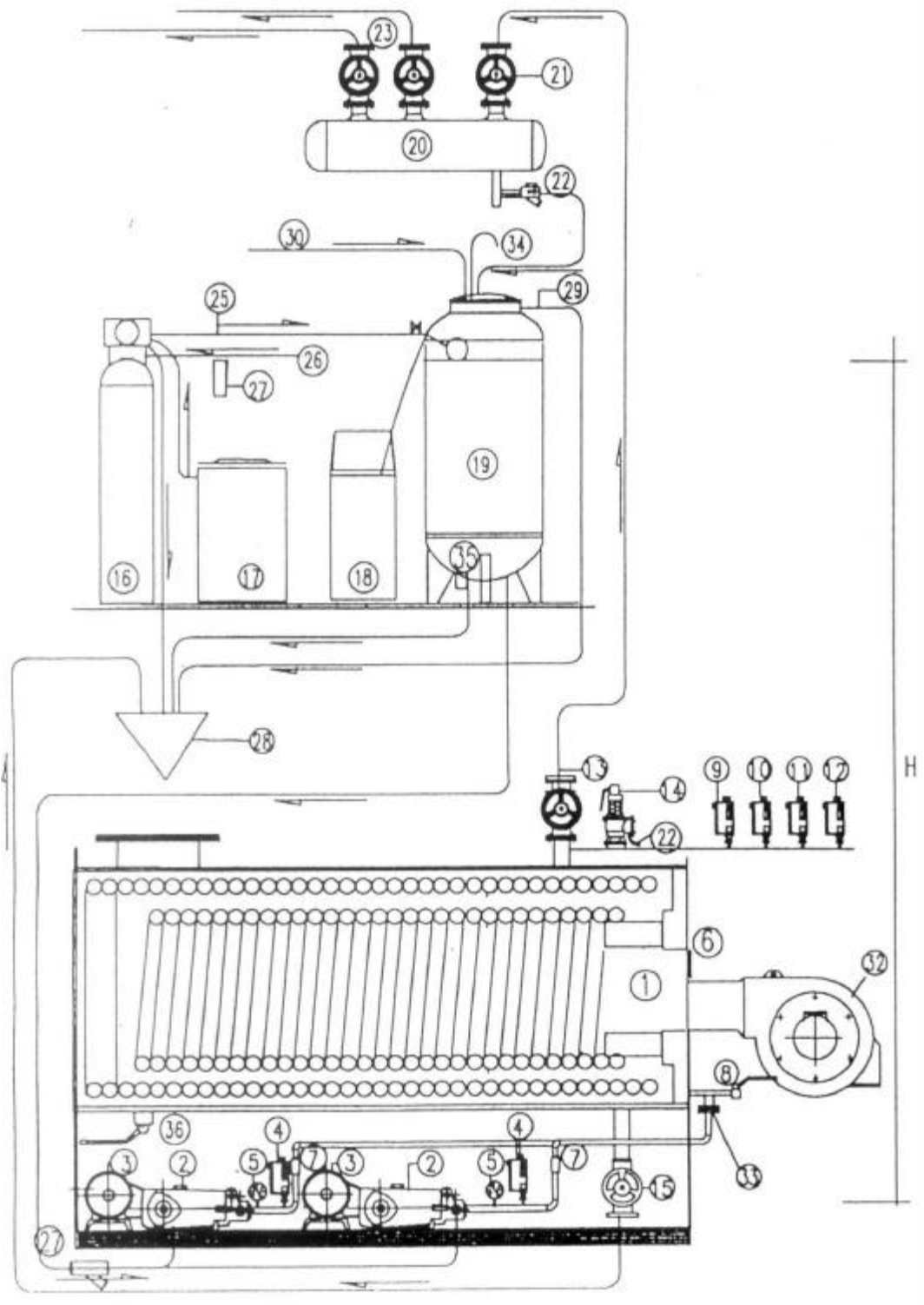
For the lifting of the generators GVO, please see the diagram below.

<b>GVO</b>	<b>L min.</b>
200	900
450	1100
750	1400
1000	1700
1500	1900
2000	2200
2500	2300
3000	2750





**PLANT TYPE**



- |                              |                             |                      |                           |
|------------------------------|-----------------------------|----------------------|---------------------------|
| 1 – GVO boiler               | 10 – max pressure switch    | 19 – water tank      | 28 – discharges           |
| 2 – water pump               | 11 – safety pressure switch | 20 – steam collector | 29 – safety discharge     |
| 3 – electric engine          | 12 – steam thermostat       | 21 – stop valves     | 30 – condensate return    |
| 4 – water pressure switch    | 13 – steam valve            | 22 – steam trap      |                           |
| 5 – water manometer          | 14 – safety valve           | 23 – steam output    | 32 – burner               |
| 6 – flame spy                | 15 – start valve discharge  | 24 – water to tank   | 33 – no return valve      |
| 7 – water flowmeter          | 16 – softener               | 25 – water to tank   | 34 – air discharge        |
| 8 – counterwash valve        | 17 – salt tank              | 26 – hard water      | 35 – tank discharge       |
| 9 – regulat. pressure switch | 18 – dosing pump            | 27 - filter          | 36 – smoke side discharge |

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## **A) STARTING UP OF THE BOILER**

- A1) Check the hardness of the water : max 0.5 °F.
- A2) Open drain valve **15**.
- A3) Shut off the delivery valve **13**.
- A4) Switch on the main switch on the electrical panel.
- A5) Switch on the pump switch on **"MANUALE"**.

Wait the water flows by the drain valve.

- A6) Switch on the burner switch.
- A7) Switch on the pump switch on **"AUTOMATICO"**.

Wait steam mixed with water flows by the drain valve.

- A8) Close slowly the drain valve and contemporary open slowly the delivery valve.

## **B) STOP OF THE BOILER**

- B1) Switch off the burner switch.
- B2) Open the drain valve.
- B3) Close the delivery valve.
- B4) Switch the pump switch on **"MANUALE"**.

Wait the water flows by the drain valve.

- B5) Switch off the main switch.

In this way the coil is full of water then in the best condition to avoid oxygen corrosion.

## **C) ONCE A WEEK**

Before of the operation described in B)

- C1) Close the delivery valve. The boiler will stop for max steam pressure.
- C2) Switch off the burner switch and pump switch.
- C3) Open the counterwash valve **8** so that the coil will be cleaned in the reverse direction.

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## **FAULTS AND REMEDIES**

### FLOW SWITCH BLOCK

The burner goes out. The flow switch block lamp lights up on the control panel. This means lack of water. Check the water level in the service tank.

### STEAM BLOCK

The burner goes out and steam temperature thermometer pointer exceeds 200°C. The steam block lamp lights up on the control panel. This means a capacity defect in the water pump or excessive fuel capacity in the burner pump.

a - Water pump defect Check the pump capacity: open valve 13, collect the outlet water in a bucket for 1 minute, then weigh it and determine the pump capacity in liters/h. The capacity must coincide with the steam output of the boiler.

E.G. : a 1.000 Kg/h boiler is equal to 16.7 litres/Minute. If the capacity is insufficient:

- 1) remove the water pump bell, check the suction and delivery valves and relevant seat. Change them if necessary.
- 2) open lid on the pump head and check the piston gaskets. Change them if necessary (see water pump instructions).

b - Defect on fuel side Contact the burner service manual.

### CHIMNEY BLOCK

The burner goes out. The chimney block lamp up on the control panel. To start burner again, press the reconnection push-button on the thermostat. The chimney block indicates that the boiler is dirty. Clean the boiler with a pressure water jet and drain from plug.

Note The action of the safety equipment: flow switch, steam block, chimney block, causes stoppage of the burner flame. The limit block lamp lights up on control panel. To resume the operation, press "limit release" push button.

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## **BOILER HOUSE**

A boiler house is generally made up of the following equipment:

- 1 - The steam boiler itself, complete with burner.
- 2 - Water conditioning plant, generally composed of a water softener with change of bases and possibly a mattering unit for conditioning products.
- 3 - Purified water and condensate collecting tank, having a capacity at least one and half times the hourly steam output of the generator.
- 4 - Steam collector-header and distributor.
- 5 - Connection pipes between the single parts.

The " boiler house " dimension must be such as to guarantee an easy access to the various part, means that the boiler operation can be checked and kept under control; a bad access means negligence leading to probable breakdowns due to carelessness.

The boiler room has to be ventilated and must therefore be provided with suitable openings to allow proper aeration.

We remind you that the burner combustion air fan is up to 3.000 m<sup>3</sup>/h of air for the larger models and for each generator, and this air must be able to enter the boiler room without any difficulty.

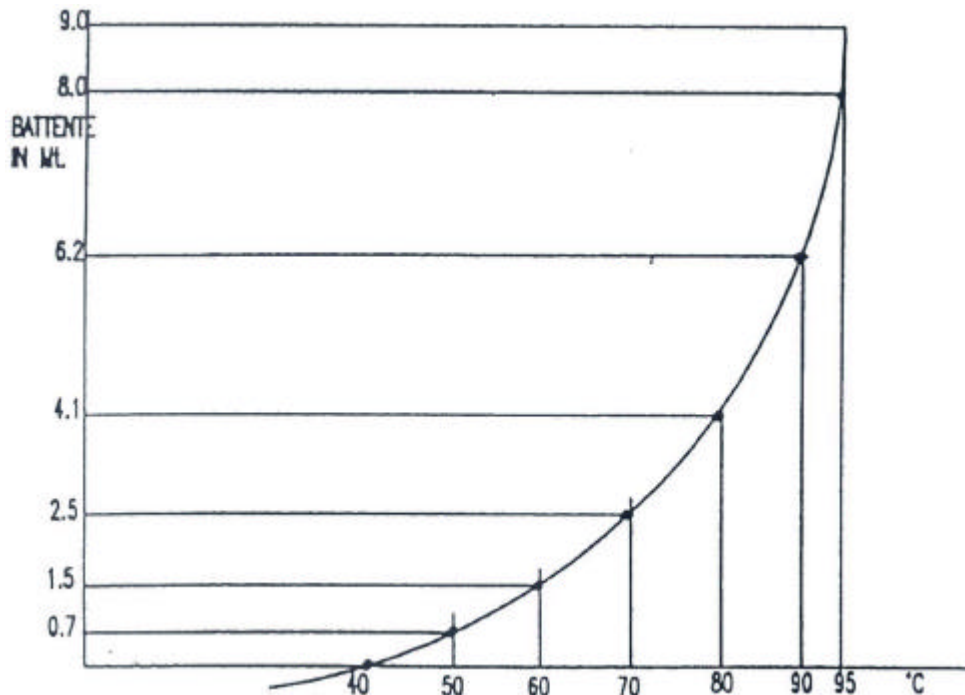
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## **BOILER CONNECTION**

### WATER CONNECTION

The hard water reaches the conditioning plant. This must be surrounded by dividing wall; the floor should possibly be made in "gres"; independent drain for backwashing the conditioner. When the softened water leaves the conditioner it must then be forwarded to the purified water and condensate collecting tank.

The condensate tank, especially if the water is at high temperature, must have a minimum head of about 1.50 meters over the generator pump level.



RELATION BETWEEN THE WATER TEMPERATURE AT THE PUMP AND HEAD, NECESSARY TO AVOID THE CAVITATION.

The connection piping between the tank and boiler must have an adequate diameter.

Never make a rigid fitting between the boiler piping and pump - Interpose m. 0.30 of high temperature resisting flexible rubber hose.

Do not use elbows but bend pipes to avoid head loss.

A breather pipe should be applied to the condensate collecting tank and let through to the outside of the room to discharge the fumes.

It is recommendable for the water pipings and tank to be galvanised.

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## FUEL CONNECTION

(see also burner instruction book)

These may be three types:

- a - pipings for light oil (gas oil);
- b - pipings for heavy oil (fuel oil);
- c - pipings for gas.

### Gas oil pipings

The pipings conveying oil from the tank to the pump and viceversa, must be made with welded fittings for iron pipings and biconical fittings for copper ones.

### Fuel oil pipings

In this case it is always recommendable to prepare a plant having the day fuel tank located in the boiler room and the transfer pump between this and the storage tank. The day fuel tank must be complete with electric and steam preheater (where possible and convenient), the piping from the day fuel tank to the burner pump must be insulated and, in the event of heavy fuel oil, wound with a heat tape.

Special instructions should be requested case by case.

### Gas pipings

Connect the main gas network to the burner. For town gas it is advisable to provide a pressure stabiliser.

## CHIMNEY

The chimney is usually made of a sheet steel piping of suitable diameter which must be taken from the boiler flange to the outside of the room over the top of the roof. When its height exceeds 12 meter, a draught equaliser should be provided at the base.

Should several boilers be connected to one chimney, it is important to make sure that exhausts do not interfere with each other.

## STEAM

The steam pipings must have an appropriate diameter PN 16 valves are always used. The pipes must be insulated and the header must be provided with a steam trap.

## EXHAUSTS

Connect the exhausts to the traps, taking care to make suitable raisers to avoid sprays.

## ELECTRIC LINES

The electric lines are connected to the RST and N terminals of the boiler panel. The cable section must be suitable to stand the installed electric power. Check to ensure that the network voltage coincides with the one on the rating-plate and the wiring diagram.

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## **WARNING**

It is recommended to purge all the piping which have to be connected to the boiler to ensure that they do not contain any foreign bodies such as fragments of gaskets, welding slag or anything else which might damage the generator equipment before finally connecting it to the boiler!

## **ELECTRIC PANEL**

The control switches with relevant pilot lamps are installed on this panel.

- 1 - Main switch in position "1" supplies voltage to the panel.
- 2 - The green pilot lamp signals that the panel is live.
- 3 - The red lamps signal defects in working of various circuits.
- 4 - The main switch in position "0" cuts off the current to the panel.
- 5 - The main switch in position "1" starts up the boiler.

## **TROUBLES SIGNALLED BY THE PANEL LAMPS AND REMEDIES TO BE TAKEN**

### 1 - Feed water block lights out

The burner goes out - lights up on the panel - check whether there is water in the service tank.

Pump defect: check the capacity in liters/minute - if capacity is insufficient remove the pump bell - check gaskets and change them if necessary.

### 2 - Steam block lights out

The burner goes out, due to the lack of fuel delivery.

### 3 - Chimney block lights out

This indicates that the boiler is dirty on the fume side.

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## **LIST RECOMMENDED SPARE PARTS**

WATER PUMP	Suction valves Delivery valves Valves springs set Valves seat gaskets set Piston gaskets Lid gaskets Head gaskets Manometer in glycerine bath
SAFETY DEVICE	Thermometer with electric contacts Contacts for thermometer Steam pressure switch Water pressure switch Flow switch Octal relay Magnetic starter with over load and under voltage protection Type RT 124 thermostat Pilot lamps set Stop-running switch
BOILER	Gaskets for door Inspection window Boiler inox diffuser
BURNER	Electrode set (n.2) Nozzles set (n.2) Milled disk Burner diffuser Photoresistence Gas oil pump Hydraulic jack Flame relay



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NOTES



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