

**Instruction manual  
for installation  
and  
operation of a  
heating boiler CET  
ASME**

<b>Type</b>	:	
<b>Boiler serial number</b>	:	
<b>Name of owner</b>	:	
<b>Date of issue</b>	:	
<b>Handed to</b>	:	

Instruction manual for installation and operation of a heating boiler CET Uitg. 27-11-'13

## Confirmation of reception

We would like to point out that you can start claiming warranty from the moment that we have received a copy of this letter fully completed and signed.

Herewith I declare ..... male / female, job title ..... to have received the instruction manual belonging to the Crone boiler number ..... in good order.

Date:

Signature:

.....

.....

Name user

:

Street

:

Zip code

:

Place

:

Telephone number

:

Facsimile number

:

E-mail address

:

Website

:

Crone boiler number

:

Boiler type

:

**Please complete this form fully and send it to:**

F&H Crone B.V.  
Grote Esch 400  
2841 MJ Moordrecht, The Netherlands  
or fax to:  
0031 182-633 257  
or  
Email: [info@fhcrone.nl](mailto:info@fhcrone.nl)

## **GENERAL**

The CET boiler, is a typical one pass wetback boiler, you have just received has been designed and manufactured with the greatest possible care in our factory in order to meet the demands which will be made of it.

To ensure that it functions properly during a long life, it is important that it be installed, started and operated with equal care. That is why this booklet has been provided. You should read it carefully and follow the instructions. To ensure this manual has reached you, we kindly ask you to complete the inserted reply page and return it to us.

## **GUARANTEE**

The equipment carries a 1 year guarantee. This period commences after the boiler has been installed and made operational, but no later than 3 months after delivery has taken place.

If any problem should occur it must be reported to us immediately

Problems which arise due to careless or negligent installation or failure to follow instructions contained in this manual, are not covered by the terms of this guarantee.

Furthermore, the guarantee terms and conditions are as described in the METAALUNIE conditions.

## **WARNING**

During operation no covers nor flanges should be disconnected or removed. Also be aware that certain non-insulated parts or surfaces can, if touched, harm you with serious bullet wounds. Boiler needs to be grounded sufficiently to prevent discharging of static electricity.

## **FUEL**

The boiler is, dependably on the type of burner installed, suitable for the combustion of natural gas, LPG or butane. See burner-instruction manual for further information.

The boiler can only run **on light oil** when this is free of sulphur. The burner has to be adjusted in such a way that there is no sooting, cause this can cause fouling and clogging in the fire tubes.

## **INSTRUCTIONS FOR INSTALLATION**

For technical specifications refer to table on page 8

### **GENERAL**

Aside from that contained in this manual, there are also national codes and standards to be adhered to regarding installing boilers. Furthermore, you have to ensure that you are aware of the regulations, which apply to Nuisance Conditions as well as the regulations issued by your utility companies. The installation has to be performed by a skilled fitter and has to comply to (inter-) national and regional standards. The boiler has an electric protection grade of IP 20 and all the assembled equipment has to be foreseen of a CE marking.

### **POSITIONING**

The boiler is not suited to be placed in the open air or in areas with an earthquake risk. You must ensure that a floor is used with proper foundation suitable of sustaining the total weight of the boiler filled with water.

The floor must be level and smooth so that the boiler's runners are flat against the floor for their entire length and that the boiler is perfectly horizontal.

The boiler must be easy to access for inspections and carrying out controls bearing in mind the boiler must be left free for access to the firetubes for cleaning purposes.

### **SAFETY RELIEVE VALVES**

Each boiler must be equipped with suitable safety relieve valves which comply with the applicable national codes or standards. The safety relieve valves have to be mounted directly to the boiler without an intermediate closing fixture and must be adjusted at a pressure which is in compliance with the national codes and standards. This pressure shall not exceed the maximum allowable working pressure as mentioned on the nameplate.

Refer to appendix 2 for connection dimensions

### **FIXTURES AND FITTINGS**

All connections to the boiler need to be fitted in such a manner that there will be no undue strain transmitted to the boiler.

Without prior consent of the manufacturer, no alternations to the boiler connections may be carried out, neither may piping or nozzles are added to the boiler.

### **THERMOSTATS**

The installation must be provided with a regulator to ensure that the water temperature in the boiler never falls below 60° Centigrade. For the automatic on- and of switching of the burner and for any automatic temperature control the boiler must be provided with thermostats. These thermostats must be connected directly to the boiler shell using the fitted couplings.

The maximum-thermostat must be connected locking off so the burner will be blocked at receiving the maximum temperature signal. This maximum-thermostat shall be adjusted not

higher than 110° C. The on / off thermostats shall be adjusted in such a manner that the burner will be switched off **before** the maximum-thermostat does block off the burner. The temperature control thermostat should be adjusted at 90° C maximum. The max. thermostat has to be adjusted to 95 °C when placed in an open buffer system.

### **WATER LEVEL SAFETY MEASURES**

The boiler installation must be provided with a means of ensuring that it is impossible to operate the boiler when it is not completely filled with water. This low water control must be connected locking off so the burner will be blocked at receiving the signal of low water. Using a low-water electrode the length into the boiler shell is 50 mm. The flow meter has to be placed in a straight part of the return pipe. The flow meter has to be series connected (not parallel connected) with the thermostat.

### **PROTECTION AGAINST OVERPRESSURE or VACUUM**

Besides of a proper amount of safety relief valves the boiler must be connected directly to an expansion vessel. To prevent a vacuum in case boiler cooling down when started with closed valves and the overpressure is relieved through the safety relief valves. Refer to appendix 2 for connection dimensions.

### **CONDENSE COLLECTOR** (if applicable)

To ensure a proper function of the condense collector the supplied rubber hose is to be fitted in such a way that the end of it reaches to 100 mm under the drain connection. Refer to appendix 4B

### **COMMENCING OPERATIONS**

Commencing operations and carrying out activities may only take place after you have ensured that no materials or tools have been left in the boiler by mistake. Check to make sure that the boiler is properly filled with water.

Before starting the boiler, make sure the front door has been properly closed and that the hand wheel has been gradually and firmly secured with the special key, so that the sealing cord fits tightly into the notch preventing leakage's at a later stage.

The explosion lock on the rear of the boiler must be checked as follows: a wooden mallet or block must be used to gently tap the lid into place to ensure the sealing cord fits snugly into the notch. The nuts must be firmly screwed into place to the point where resistance can be felt, but sufficient space must be available for the springs so that should an explosion inside the furnace take place, the lid may be pushed back.

Finally, the soot hatch in the smoke box needs to be gradually mounted, When this has been done, you may start the burner. Starting the burner requires a burner specialist being present. Starting up the boiler must commence using a low flame to ensure that inadmissible strain of materials is avoided and to prevent cracks into the heat resistant concrete. Starting

up the boiler while the water temperature is below 60° Centigrade a great deal of condense appears which may give you the false impression that the boiler is leaking.

Because of a small water volume, this boiler is merely a transit boiler where the water is just pumped through in order to heat it up. Whenever the burner is running, a constant flow has to be maintained over the boiler.

When the boiler is on temperature check all gaskets and review all bolts. Be sure the boiler is tight especially the tube/tubeplate connections. In case of leakage immediately to be fix by rolling. Open valves slowly to prevent waterhammer.

The CET-boiler is equipped with two sight glasses for visual inspection, one at the front and one at the back of the boiler. The are used to check the flame while making adjustments to the burner. To prevent dirt and forming burn deposits it is necessary that the hatch be kept closed in normal operation.

The maximum capacity of the burner must be adjusted in such a manner that the maximum boiler capacity marked in the boiler identification plate is not exceeded.

### **DRAIN PIPES**

The drain cocks has to be connected in such a manner that the drain water, which can be very hot, does not do any harm to men, nature or the environment.

The drainage channel and/or drain must therefore be able to withstand high temperatures.

## **OPERATION AND MAINTENANCE INSTRUCTION**

### **BOILERWATERQUALITY**

The boilerwater must adhere to the specifications described in annex 2. The water may need to be processed prior to being added to the installation. To this you may need to seek professional advice.

### **CHECKS TO BE CARRIED OUT**

During the boiler's use, the quality of water supplied to the installation must be checked. Excessive amounts of water being added to the system means leaking has occurred. You should track down the leakage and repair it without delay in order to prevent corrosion caused by dissolved oxygen. Leakage's of fluegas also must be dealt with immediately.

The flue gas temperature may not be more than approx. 30°C above the water temperature and needs to be regularly checked. If this temperature increases it can be an indication that the firetubes become filthy and need to be cleaned. Filthy firetubes can effect the efficiency of the boiler.

Depending on the circumstances, but no less than twice a year, the boiler ought to be checked for the following:

**In case of entering the boiler, water sided as well as flue gas sided, proper care should be taken of sufficient ventilation.**

- tightness of the sealing in boilerdoor, explosionlid, soot hatch and viewing glass;
- tightness of the firetube / tubesheet fixation;
- pollution o and corrosion of firetubes and other flue gas sided surfaces;
- condition of the heatresistant concrete around the blast tube of the burner;
- the operation of the shunt system;
- proper operation of the safety valve(s);

The boiler needs to be inspected annually for the following: Make sure no vacuum can occur while draining the boiler.

- water sided dirt e.g. muck and scaling (max. thickness 0.25 mm), especially between the firetubes near the tubesheet of the fire box;
- water sided corrosion;
- out of roundness of furnace max. 1 % of the diameter.

Should any divergences be found, a specialist has to be consulted. After cleaning, the boiler can be closed making sure to use new gaskets.

## **COMBUSTION AIR**

Sucking up of air polluted with gases, chemical particles of herbicides or other chemicals, by the burner ventilator, can give serious and unstoppable corrosion in the boiler.  
Make sure your boiler is not exposed to such chemicals.

## **OPERATION AND MAINTENANCE OF AUXILIARY EQUIPMENT**

For operating and maintaining the burner and other equipment refer to the applicable instructions issued by the suppliers of that equipment.

## **PROTECTION AGAINST CLIMATIC INFLUENCES**

During the annual inspection it is to be checked whether to boiler is still properly protected against climatic influences. If for e.g. the roof over the boiler is leaking, water can penetrate between the insulation and the boiler shell which can create external corrosion during season standstill.

## **Appendix 1: Requirements for water in heating boilers**

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Warning: Bad water quality can cause damage to the boiler and heating system by corrosion.

### **Dissolved oxygen and hardness**

The quality of water supplied to heating systems is partly determined by the contents of dissolved oxygen and hardness of the water in the heating system. This is the reason why the whole system is to be checked for leakage regularly and leaking is to be dealt with immediately.

### **Oxygen**

The excess of oxygen in the water is to be prevented. If an open expansion system is applied, then measures have to be taken that solution of oxygen in the water is prevented. Another cause of oxygen dissolving into the water is via gaskets and other permeable materials like some kinds of rubber, plastics, etc. This type of dissolving is not to prevent, therefore actions taken to prevent corrosion still can be necessary.

Starting a circulating pump with insufficient system pressure also entrains air through the pump seal or through automatic deaerators.

### **Hardness**

Scaling can occur when water is heated in a boiler. To predict the possibility of scaling the following formula is to be used:

$$St = tH \times ( 5 \times Sj + I ) / Qk$$

in with:

- St: figure-indicating risk of scaling
- tH: temporary hardness in ° dH.  
This figure is given by the water supplier or easy to measure yourself.
- Sj: Quantity of water added to the system per year.
- I: Volume of the whole heating system in m<sup>3</sup>.
- QK: Boiler capacity in kW.

If  $St \leq 0.25$  the risk of scaling is negligible.

If  $St > 0.25$  measures should be taken to prevent scaling like using a softener.

## **Installationwater**

Inspection of the waterquality, at least once a year is recommended. If this is done by an expert, he will also give an evaluation of the waterquality and advise how to proceed

If chemicals have to be added, this only can be done by experts and following guidelines have to be respected:

Solids (sluds)	:	none
pH	:	8-10 (with presence of aluminum 8-9)
Conductivity	:	without additives < 1000 $\mu$ Si/cm
Cl-	:	< 250 mg/l
Hydrazine	:	none because of carcinogenity
Sulfite	:	of additives only 5-20 mg/l
P <sub>2</sub> O <sub>5</sub>	:	of additives only 5-40 mg/l

Other products on advice and for the responsibility of supplier of this products.

## Appendix 2: Number of high lifting safety relieve valves

E.g. Watts Series 740 1 ½" x 2" capacity at 30 PSI = 2.900 MBTU/H  
 Watts Series 740 2" x 2 ½" capacity at 30 PSI = 5.250 MBTU/H  
 Kunkle model 537 1 ½" x 2" capacity at 30 PSI = 3.497 MBTU/H  
 Kunkle model 537 2" x 2 ½" capacity at 30 PSI = 6.218 MBTU/H

Boiler capacity kW/h		No. and diameter safety nozzles	No. of safety relieve valves	
	MBU/h		WATTS 740	KUNKLE 537
1200	4.13	2 x 1 ½ "	2	2
1500	5.16	2 x 1 ½ "	2	2
1800	6.19	2 x 2"	2	2
2400	8.25	2 x 2"	2	2
3000	10.32	2 x 2"	2	2
3600	12.38	3 x 2"	3	2
4200	14.45	3 x 2"	3	3
4800	16.51	4 x 2"	4	3
5400	18.57	4 x 2"	4	3
6000	20.64	4 x 2"	4	4
6600	22.70	5 x 2"	5	4
7200	24.76	5 x 2"	5	4
8400	28.89	5 x 2"	5	5
9600	33.02	6 x 2"	6	6
10800	37.15	7 x 2"	7	6
12000	41.27	8 x 2"	8	7
13000	44.71	9 x 2"	9	8
14000	48.15	10 x 2"	10	8