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**Instruction manual  
for installation  
and operation  
F&H CRONE CET  
Heating boiler**

**ASME CODE IV H-stamped**

<b>Type</b>	:	<b>CET</b>
<b>Boiler serialnummer</b>	:	<b>2216.</b>
<b>User</b>	:	
<b>Date of issue</b>	:	
<b>Handed to</b>	:	

Revision 2023 issue 0



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## **GENERAL**

The CET ASME H-stamped boiler, of the one pass type with direct passage, you have just received has been designed and manufactured with the greatest possible care in our factory in order to meet the requirements.

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.

### **Guarantee**

The delivered boiler is covered with a guarantee period as described in the General Terms and Conditions of Delivery for the Metal and Electrical Engineering Industry, issued by the association for the Metal and Electrical Engineering Industry FME, which we will send to you free of charge upon request.

The period starts after the commissioning of the boiler, but no later than 3 months after delivery.

Any defects must be reported to us immediately. Problems that arise due to non-application or careless application of the instructions in this book are not covered by the warranty

### **Warning**

No lids or flanges may be detached or removed during operation.

It is also pointed out that certain non-insulated parts can cause severe burns if touched.

The boiler must also be earthed to prevent discharge of static electricity.

### **Fuel**

Depending on the burner installed, the boiler is suitable for burning natural gas, LPG or butane. For further details, see the burner instructions.

## **INSTRUCTIONS FOR INSTALLATION**

### **General**

In addition to what is stated in this book, there are rules set by the national government that a boiler installation must comply with. Furthermore, one must be aware of the locally applicable rules, such as, for example, the Environmental License and the Energy Company's rules.

The installation must be carried out by a skilled installer and must comply with the applicable (inter) national and regional standards.

The boiler has a degree of protection of IP 20 and all equipment connected to it must be CE marked.

### **Positioning**

The boiler is not suitable for outdoor installation and for areas with an earthquake risk.

It must be ensured that a floor is present that is sufficiently heavy to support the total weight of the boiler filled with water.

The floor must be perfectly level and flat so that the boiler members rest on the floor over their full length and give the boiler a purely horizontal arrangement.

The boiler must be easily accessible for inspection and inspection work, whereby there must be sufficient space in front of the boiler door for cleaning and possibly replacing the boiler pipes.

## Safety Relief Valves

It is necessary that there are sufficient safety valves within the main valves, preferably directly on the boiler, with a minimum capacity determined in accordance with locally applicable standards, but not smaller than in accordance with Appendix 3, adjusted to the maximum operating pressure. These must be mounted directly on the boiler body, ie without an intermediate valve. Unclosable pipes must also be laid from the safety valves in such a way that any hot water and / or steam blown off cannot cause damage or injury to people, animals or the environment. The function of the safety valves must be checked before the boiler is put into operation. Use a good pressure gauge for this.

## Connections to the boiler

The pipes to be connected to the boiler must be laid in such a way that, due to expansion or otherwise, no forces are exerted on the boiler connections.

No changes to the boiler connections or connections may be made without the manufacturer's permission.

## Insulation

The boiler is equipped with insulation with cladding as standard. This consists of 100 mm mineral non-combustible insulation wool, which comprises the entire boiler body, as well as the smoke tray. The insulation wool is applied in 2 layers of 50 mm. The method of insulation is carried out without heat bridges. If the insulation is not included in our delivery on special request, the insulation requirements stated here must be used, such that the surface temperature will be as low as possible, but maximum 80 ° C.

## Thermostats

The installation must be equipped with such a control that the temperature of the boiler water cannot fall below 70 ° C. For the automatic switching on and off of the burner and possibly for the temperature control, the boiler must be equipped with thermostats. These are mounted directly on the boiler body using the existing welding socks. The maximum thermostat must be locked in such a way that the burner is locked with the signal obtained. This maximum thermostat must be set to a maximum of 95 ° C. The on / off thermostat is set so that the burner stops **before** the maximum thermostat starts. The control thermostat must be set to a maximum of 90 ° C.

Appendix 2 lists the CE-approved security devices to be used from which a choice must be made.

## Low water level safety control

The boiler must be equipped with a device that makes it impossible for the burner to operate while the boiler is not completely filled with water. This low water protection must be locked in such a way that the burner locks on the signal obtained.

Appendix 2 specifies the type of CE-approved low-water protection that must be applied.

## Protection against over/under pressure

In addition to sufficient overpressure safety devices, the boiler must be directly connected to an expansion vessel. In the event that the boiler is fired with closed shut-off valves and the resulting unacceptable overpressure has been discharged through the safety valves, an underpressure could possibly occur upon cooling, which is prevented in this way. For connection details, see Appendix 4.

## Fluegas exhaust

The flue gas discharge channel on the boiler must be executed and installed according to national and regional requirements. The maximum permitted weight load as a result of the flue gas discharge on the boiler's flue gas box is 500 kg.

The flue gas discharge must be properly shored to prevent wind influences. Diameter of the flue gas channels are shown in the overview of Annexes 4.

### **Condensbin** (if applicable)

To ensure that the condensate discharge functions properly, the condensate drain pipe supplied must end up at least 50 mm below the outlet in the condensbin. See the instruction manual of the condenser for info.

## **COMMENCING INSTRUCTION**

At the first commissioning and / or after carrying out work on the boiler, it must be checked whether there are no materials or tools in the boiler that have been accidentally left behind by engineers. It is also necessary to check whether the boiler is sufficiently filled with water.

You must check the explosion cover on the side of the boiler as follows:

Tap the lid all around with a mallet or block so that the sealing cord can form in the rebate. Tighten the nuts to such an extent that a considerable spring tension is created and there is still sufficient space between the windings of the springs, so that the cover can be pressed back in the event of an explosion.

Finally, the inspection hatch in the smoke tray, this should also be tightened gradually. Then one is ready to start the burner.

NOTE: When starting the burner it is necessary that a burner expert is present.

The boiler must be fired at a low flame setting to prevent unacceptable material stresses and cracks in the brickwork. During this firing, as long as the boiler temperature is below 60 ° C, a lot of condensation is created which can sometimes give the impression that the boiler is leaking. If the boiler is at the right temperature, all gaskets must be checked and possibly checked. It must also be ensured that the flame pipe / pipe plate connections are tight. Have any leakage remedied immediately by rolling.

The sight glass on the explosion cover is only for checking and adjusting the flame and must therefore be closed during normal operation.

The maximum capacity of the burner must be set in such a way that the maximum boiler capacity indicated on the stamp plate is not exceeded.

### **Drain**

A pipe system must be installed from the drain valve of the boiler in such a way that the hot drain water does not endanger humans, animals or the environment. It must be ensured that the waste water pipe or hose and sink can also withstand high temperatures.

## **OPERATION AND MAINTENANCE INSTRUCTION**

### **Boiler water quality**

The boiler water must meet the requirements stated in Appendix 1.  
The water may need to be processed before it is added to the installation.  
An expert must be advised for this purpose.

### **Mandatory checks**

During the use of the boiler, the amount of water that may be required to top up the installation must be checked. In the event of excessive topping up, there is a leak and this must be detected immediately and remedied, this to prevent oxygen corrosion, among other things. Flue gas-side leaks occurring during use must also be rectified immediately.

The flue gas temperature must not exceed 100 ° C above the boiler water temperature and must be measured regularly. When it rises, the boiler pipes must be cleaned.

Regularly check the operation of the condens bin (if present) and the presence of sediment in it.

Depending on the conditions of use, but at least twice a year, the boiler must be checked for the following:  
**Ensure adequate ventilation when entering the boiler, on both water and flue gas sides.**

- condition of gaskets and boiler door (s), explosion cover, inspection hatch and sightglass;
- condition of boiler pipe / pipe plate connections;
- contamination and corrosion of the boiler pipes and other flue gas-side surfaces;
- condition of the burner brickwork;
- the operation of the shunt system;
- operation of the safety valve (s) or relief valve (s).

The boiler must be inspected annually on:

- water-side contamination such as sludge and scaling max. Thickness 0.25 mm, especially between the boilerpipes at the location of the pipe plate firebox, ensure good aeration when draining the boiler;
- Water-side corrosion;
- out of roundness of the furnace max. 1% of the diameter.

In the case of deviations, an expert must be consulted. After cleaning, the boiler can be used again closed, using new gaskets.

### **Burnerfan**

The intake by the burner fan of air, contaminated with mists, components of plant protection products or other chemicals, can cause serious and unstoppable corrosion in the boiler and must therefore be excluded at all times.

### **Operation and maintenance burner and boiler controls**

For the operation and maintenance of the burner and other equipment, explicit reference is made to instructions from the relevant suppliers.

### **Protection of the boiler against the weather.**

During the annual inspection, care must also be taken that the boiler is still well protected against the weather. For example, leakage from the roof above the boiler through which water can come between the insulation of the boiler and thus cause external corrosion during standstill.

## **APPENDIX 1: REQUIREMENTS WATER QUALITY HEATING BOILERS**

### **Oxygen content and hardness**

The amount of make-up water supplied to the heating system determines, among other things, the oxygen content and hardness of the water. The heating system must therefore be regularly checked for leaks and any leaks that may occur must be detected and remedied without delay.

### **Oxygen**

As little oxygen as possible should enter the system. A source of oxygen uptake is diffusion through gaskets, O-rings, plastic, and the like. This form of oxygen uptake cannot be prevented, which is why corrosion prevention measures sometimes remain necessary.

### **Hardness**

Calcium is formed when the water in the boiler is heated.

To get an idea whether the amount of lime that comes from a certain water type with a certain water supplementation can cause problems for the boiler, the formula below can be used.

Scale number	=	$tH \times (5 \times S_j + I) / Q_k$ .
Whereas:	tH	= Temporary hardness in ° DH (easy to measure with test set for temporary hardness).
	S <sub>j</sub>	= Annual make-up water quantity (water meter installation in the make-up line is therefore absolutely necessary).
	I	= Content of the total system in m <sup>3</sup> .
	Q <sub>k</sub>	= Boilercapacity in kW

If this calculation gives a result <0.25, then the chance of scaling that is dangerous for the boiler will be low. If the number is > 0.25, (partial) softening is recommended.

The system water must not be noticeably thickened (for example due to the escape of steam) because the chloride content in this water may not be more than 10% higher than in the make-up water.

## **INSTALLATIONWATER**

Checking the quality of the installation water, at least once a year, is recommended.

If this is done by an expert, he will also provide an assessment of that water and, if necessary, issue an opinion as to whether or not treatment is or becomes necessary. Under no circumstances may the following values be exceeded. (In case of pH the value may also not be lower than recommended value)

Solids (sludge)	:	absent or very small amount
pH	:	9 - 10 (in the presence of Aluminium 8 - 9)
Hardness	:	< 0,1 °DH
p-number/l	:	0,5 - 2 mval/l
m-numner	:	< 2 p-getal
Oxygen O <sub>2</sub>	:	< 0,1 mg/l
Conductivity	:	without additives < 1000 µS/cm
Cl	:	< 100 mg/l
Hydrazine	:	absent due to carcinogenicity
Phosphate PO <sub>4</sub>	:	20 - 50 mg/l
Sulfate SO <sub>4</sub>	:	< 100 mg/l

If chemicals need to be dosed, this should only be done by experts. Other treatment products on supplier's advice.

**APPENDIX 2: PERMITTED THERMOSTATES AND LOW WATER CONTROL**

<b>Controlthermostat</b>	<b>Maximum (shut off) thermostat</b>	<b>Low watercontrol</b>
JUMO PT100	JUMO AT STW-STB 90.3070	SYR 932.1
JUMO ATHs 60.3035	Siemens RAK TW1000HB	

### **APPENDIX 3: REQUIRED SAFETY VALVE CAPACITY**

The safety valve (s) must have such a capacity that all on the water transferred heat can be discharged as steam.

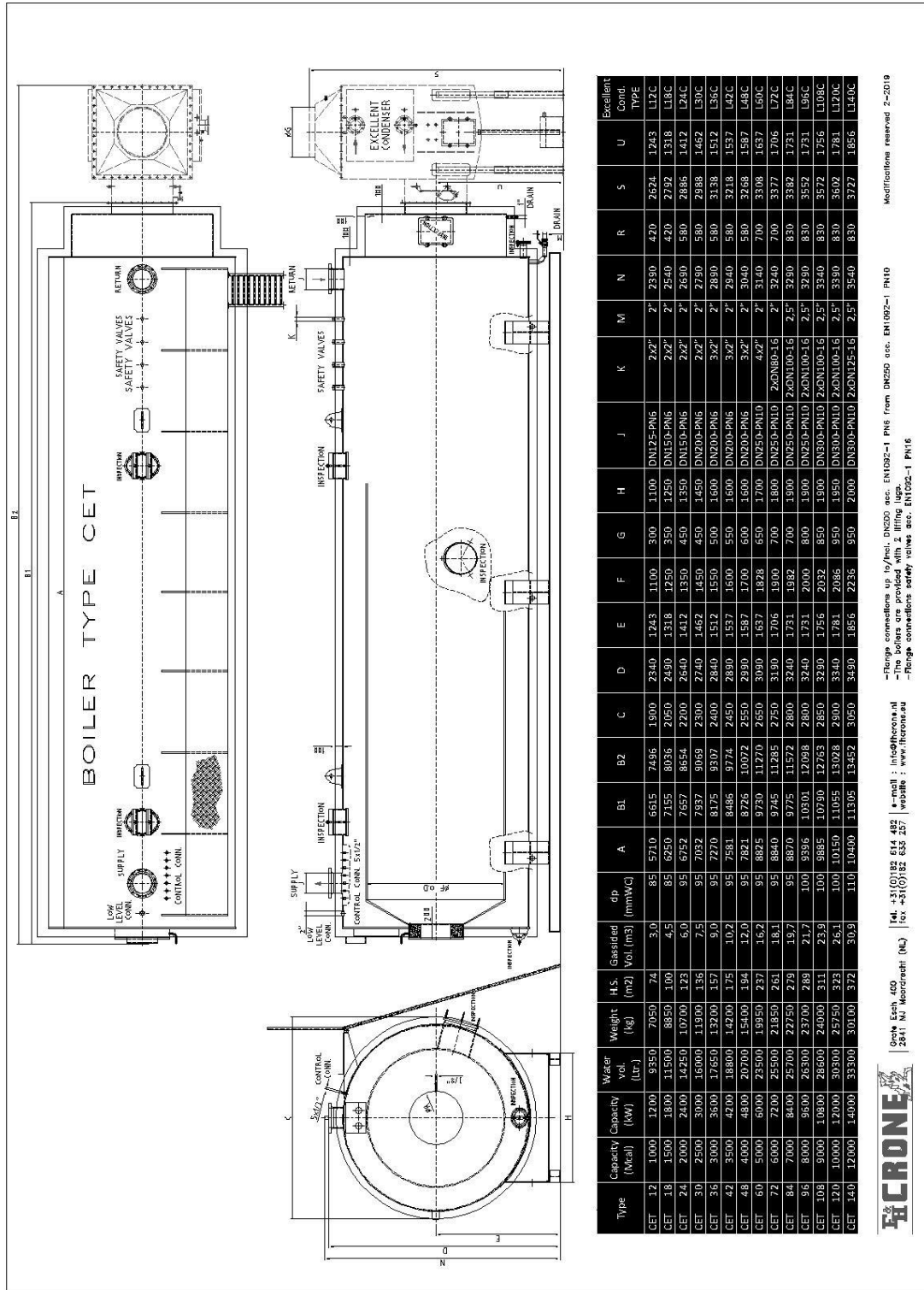
For example the following types may be used:

Watts Ocean Series 740 2" x 2 1/2" capacity at 30 PSI = 5.250 MBTU/H  
 Kunkle model 537 2" x 2 1/2" capacity at 30 PSI = 6.218 MBTU/H

<b>Boilertype</b>	<b>capacity kW/h</b>	<b>MBU/h</b>	<b>* Required valves based upon Watts valves</b>
CET12	1200	4.12	2 x 2"
CET15	1500	5.16	2 x 2"
CET18	1800	6.19	2 x 2"
CET24	2400	8.25	2 x 2"
CET30	3000	10.32	2 x 2"
CET36	3600	12.38	3 x 2"
CET42	4200	14.45	3 x 2"
CET48	4800	16.51	4 x 2"
CET54	5400	18.57	4 x 2"
CET60	6000	20.64	4 x 2"
CET66	6600	22.70	5 x 2"
CET72	7200	24.76	5 x 2"
CET84	8400	28.89	5 x 2"
CET96	9600	33.02	6 x 2"
CET108	10800	37.15	7 x 2"
CET120	12000	41.27	8 x 2"
CET140	14000	48.15	10 x 2"

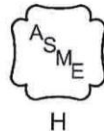


**APPENDIX 4: DIMENSIONS CET**



Type	Capacity (Mval)	Capacity (kW)	Water vol. (Ltr.)	Weights (kg)	H.S. (m2)	Gasfield Vol. (m3)	dp (mmWC)	A	B1	B2	C	D	E	F	G	H	J	K	M	N	R	S	U	Excellent Cond. TYPE
CET 12	1000	1200	9350	7050	74	3.0	85	5710	5615	7496	1900	2340	1243	1100	300	1100	DN125-PN16	2x2"	2"	2390	420	2624	1243	L12C
CET 18	1500	1800	11500	8850	100	4.5	85	6250	7155	8036	2050	2490	1318	1250	350	1250	DN150-PN16	2x2"	2"	2540	420	2792	1318	L18C
CET 24	2000	2400	14250	10700	123	6.0	95	6752	7657	8654	2200	2640	1412	1350	450	1350	DN150-PN16	2x2"	2"	2690	580	2886	1412	L24C
CET 30	2500	3000	16000	11900	136	7.5	95	7032	7937	9069	2300	2740	1462	1450	450	1450	DN200-PN16	2x2"	2"	2790	580	2988	1462	L30C
CET 36	3000	3600	17850	13200	157	9.0	95	7220	8175	9307	2400	2840	1512	1500	500	1500	DN200-PN16	3x2"	2"	2890	580	3138	1512	L36C
CET 42	3500	4200	18800	14200	175	10.2	95	7581	8486	9774	2450	2890	1537	1500	550	1500	DN200-PN16	3x2"	2"	2940	580	3218	1537	L42C
CET 48	4000	4800	20700	15400	194	12.0	95	7821	8726	10072	2550	2990	1587	1700	600	1600	DN250-PN16	3x2"	2"	3040	580	3268	1587	L48C
CET 60	5000	6000	23500	19950	237	15.2	95	8825	9730	11270	2650	3090	1637	1828	650	1700	DN250-PN16	4x2"	2"	3140	700	3308	1637	L60C
CET 72	6000	7200	25500	21850	261	18.1	95	8840	9745	11285	2750	3190	1706	1900	700	1800	DN250-PN16	4x2"	2"	3240	700	3377	1706	L72C
CET 84	7000	8400	25700	22750	279	19.7	95	8870	9775	11572	2800	3240	1781	1982	700	1900	DN250-PN16	2xDN100-16	2.5"	3290	830	3382	1781	L84C
CET 96	8000	9600	26300	23700	289	21.7	100	9395	10301	12093	2800	3240	1781	2000	800	1900	DN300-PN16	2xDN100-16	2.5"	3290	830	3552	1781	L96C
CET 108	9000	10800	28500	24900	311	23.9	100	9835	10780	12763	2850	3240	1756	2032	850	1900	DN300-PN16	2xDN100-16	2.5"	3340	830	3572	1756	L108C
CET 120	10000	12000	30300	25750	323	26.1	100	10130	11035	13028	2900	3340	1781	2066	950	1950	DN300-PN16	2xDN100-16	2.5"	3390	830	3602	1781	L120C
CET 140	12000	14000	33300	30100	372	30.9	110	10400	11305	13452	3050	3490	1856	2236	950	2000	DN300-PN16	2xDN125-16	2.5"	3540	830	3727	1856	L140C

Modifications reserved 2-2019  
 -Flange connections up to/incl. DN200 acc. EN1092-1 PN10  
 -Flange connections up to/incl. DN250 acc. EN1092-1 PN16  
 -Flange connections up to/incl. DN300 acc. EN1092-1 PN16  
 -Flange connections safety valves acc. EN1092-1 PN16  
 -Flange connections up to/incl. DN200 acc. EN1092-1 PN10  
 -Flange connections up to/incl. DN250 acc. EN1092-1 PN16  
 -Flange connections up to/incl. DN300 acc. EN1092-1 PN16  
 -Flange connections safety valves acc. EN1092-1 PN16



## CERTIFICATE OF AUTHORIZATION

The named company is authorized by the American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the ASME Certification Mark and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with the ASME Certification Mark shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

COMPANY:

**F&H Crone B.V.**  
Grote Esch 400  
Moordrecht 2841 MJ  
The Netherlands

SCOPE:

**Heating boilers except cast iron and cast aluminum at the above location only**

AUTHORIZED: **July 19, 2020**  
EXPIRES: **July 19, 2023**  
CERTIFICATE NUMBER: **29077**

Board Chair, Conformity Assessment

Managing Director, Conformity Assessment

