



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

ASME CODE IV H-stamped

Type	:	CLW
Boiler serialnummer	:	
User	:	
Date of issue	:	
Handed to	:	

Revision 2020- issue 0



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GENERAL

The CLW ASME H-stamped boiler, of the three pass wetback 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.



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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 5, 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 4 lists the CE-approved security devices to be used from which a choice must be made.

Shuntinstallation

It is important for the boiler that the temperature of the water throughout the entire boiler is as similar as possible. To achieve this, the boiler must be equipped with a shunt (round pump) installation with a capacity such that at least an amount of water equal to 3 x the boiler capacity is pumped around per hour.

The boiler water is drawn out of the boiler by means of the shunt pump and brought into the internal distribution tank at the top of the boiler via the connection fitted to the boiler.

See Appendix 2 for clarification and required pump capacity.

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 4 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 6 and 6A.

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 6 and 6A.

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.

Before starting the burner, the boiler door must be closed properly and the handwheels with the appropriate key must be tightened gradually, so that the sealing cord can form in the rebate and no leaks occur afterwards.

You must check the explosion cover on the rear 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 3.
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.

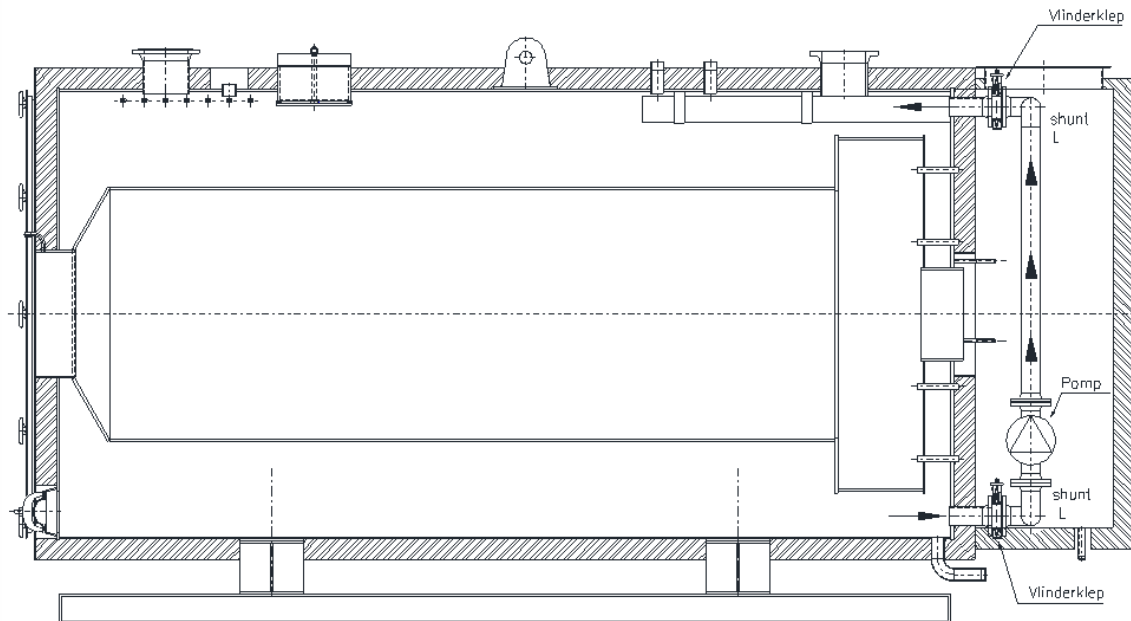
Protection of the boiler against the weather.

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 : DATASHEET CLW

Table technical specifications						10 daPa = 100 Pa = 10 mmwc					
efficiency lower heating value 95%	nominal max. load l.v. kW	nominal capacity (90/70°C) kW	nominal load incl. economiser	at incoming temperature 25°C kW	furnace pressure / resistance daPa	furnace diameter mm	furnace length mm	combustion chamber volumem.3	watersided resistance daPa	stand still lose boiler (0,1 %) kW	non-insulated economiser 1% kW
efficiency higher heating value 86%											
Type											
CLW 40	1304	1200			60	800	3079	1,55	1000	1,2	
CLW 40 + L(C)12				1320	95				1000+400		1,2
CLW 50	1630	1500			55	880	3060	1,86	1000	1,5	
CLW 50 + L(C)12				1650	90				1000+400		1,5
CLW 60	1957	1800			58	900	3862	2,46	1000	1,8	
CLW 60 + L(C)18				1980	93				1000+440		1,8
CLW 75	2609	2400			62	1000	3862	3,03	1000	2,4	
CLW 75 + L(C)24				2640	97				1000+470		2,4
CLW 95	3261	3000			60	1150	3888	4,04	1000	3	
CLW 95 + L(C)30				3300	95				1000+520		3
CLW 115	3913	3600			55	1200	3831	4,33	1000	3,6	
CLW 115 + L(C)36				3960	90				1000+530		3,6
CLW 130	4565	4200			68	1200	4806	5,44	1000	4,2	
CLW 130 + L(C)42				4620	103				1000+540		4,2
CLW 145	5217	4800			65	1250	4796	5,89	1000	4,8	
CLW 145 + L(C)48				5280	100				1000+570		4,8
CLW 155	5870	5400			76	1350	4781	6,84	1000	5,4	
CLW 155 + L(C)60				5940	111				1000+600		5,4
CLW 170	6522	6000			75	1400	4786	7,37	1000	6	
CLW 170 + L(C)60				6600	110				1000+600		6
CLW 185	7174	6600			80	1450	5053	8,34	1000	6,6	
CLW 185 + L(C)72				7260	115				1000+600		6,6
CLW 200	7826	7200			80	1500	5040	8,91	1000	7,2	
CLW 200 + L(C)72				7920	115				1000+600		7,2
CLW 220	9130	8400			90	1600	5194	10,44	1000	8,4	
CLW 220 + L(C)84				9240	125				1000+670		8,4
CLW 250	10435	9600			98	1600	5894	11,85	1000	9,6	
CLW 250 + L(C)96				10560	133				1000+700		9,6
CLW 275	11739	10800			98	1650	5883	12,58	1000	10,8	
CLW 275 + L(C)108				11880	133				1000+700		10,8
CLW 300S	13043	12000			120	1700	6453	14,65	1000	12	
CLW 300S + L(C)120				13200	155				1000+800		12
CLW 350S	15217	14000			120	1800	6425	16,35	1000	14	
CLW 350S + L(C)140				15400	155				1000+900		14
Efficiency to higher heating value 86% / lower heating value 95% (1.11)											
nominal min. load l.v. 15% of the nominal max. load lower value											
Excess of combustion air for high load = 1.2											
Excess of combustion air for low load = 1.3											

APPENDIX 2 : SHUNTSYSTEM CLW



Ketel type	CLW 40	CLW 50	CLW 60	CLW 75	CLW 95	CLW115	CLW130	CLW145	CLW155	CLW170	CLW185	CLW200	CLW220	CLW250	CLW275	CLW300S	CLW350S
Watervolume m ³	3,22	3,93	5,14	5,95	7,05	7,83	9,95	11,27	11,38	11,91	12,85	13,46	15,28	16,75	18,78	23,7	25,8
Min. pompcapaciteit m ³ /h	9,7	11,9	15,5	17,9	21,2	23,5	29,9	33 B	34	35,5	38,5	40,4	45,8	50,2	56,3	71,1	77,4

APPENDIX 3: 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_j = Annual make-up water quantity (water meter installation in the make-up line is therefore absolutely necessary).

I = Content of the total system in m³.

Q_k = Boiler capacity 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.

INSTALLATION WATER

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.

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 ₂	:	< 0,1 mg/l
Conductivity	:	without additives < 1000 µS/cm
Cl	:	< 100 mg/l
Hydrazine	:	absent due to carcinogenicity
Phosphate PO ₄	:	20 - 50 mg/l
Sulfate SO ₄	:	< 100 mg/l

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

APPENDIX 4: PERMITTED THERMOSTATES AND LOW WATER CONTROL

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

APPENDIX 5: 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.

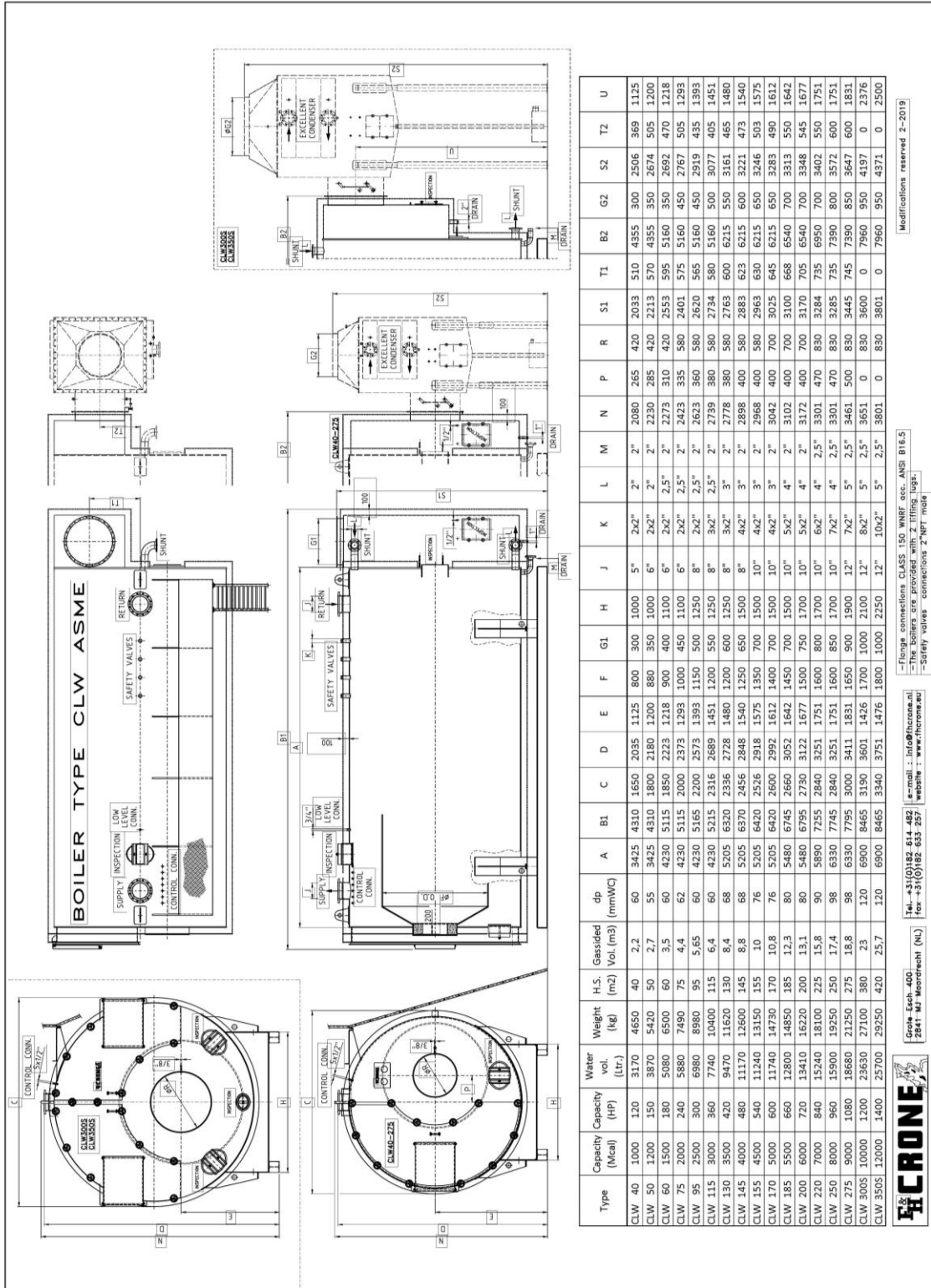
For example the following types may be used:

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

Boilertype	capacity Mcal	MBU/h	* Required valves based upon Watts valves
CLW 40	1000	4.12	2 x 2"
CLW 50	1200	5.16	2 x 2"
CLW 60	1500	6.19	2 x 2"
CLW 75	2000	8.25	2 x 2"
CLW 95	2500	10.32	2 x 2"
CLW 115	3000	12.38	3 x 2"
CLW 130	3500	14.45	3 x 2"
CLW 145	4000	16.51	4 x 2"
CLW 155	4500	18.57	4 x 2"
CLW 170	5000	20.64	4 x 2"
CLW 185	5500	22.70	5 x 2"
CLW 200	6000	24.76	5 x 2"
CLW 220	7000	28.89	6 x 2"
CLW 250	8000	33.02	7 x 2"
CLW 275	9000	37.15	7 x 2"
CLW 300S	10000	41.27	8 x 2"
CLW 350S	12000	48.15	10 x 2"

APPENDIX 6: DIMENSIONS CLW



APPENDIX 6A: DIMENSIONS CLW WITH BUILT ON CONDENSER

Opmeting : Flansmatelingen vlgms. DIN 2851

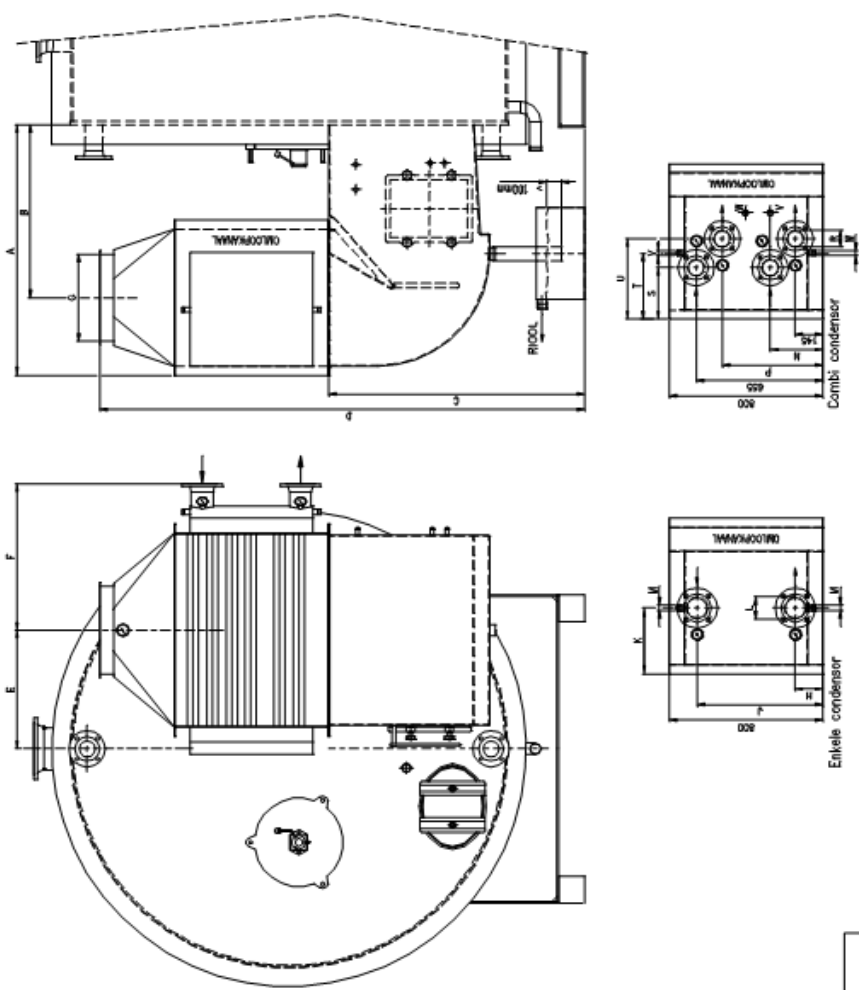
Enkele condensor						
Type	H	J	K	L	M	
L06	145	655	168	DN100	3/4"	
L12	145	655	274	DN150	3/4"	
L18	145	655	380	DN200	3/4"	
L24	145	655	487	DN250	3/4"	
L30	145	655	593	DN300	3/4"	
L36	145	655	700	DN350	3/4"	
L42	145	655	807	DN400	3/4"	
L48	145	655	914	DN450	3/4"	
L60	155	645	458	DN125	2 1/4"	
L72	155	645	543	DN150	2 1/4"	
L84	140	660	572	DN150	2 1/2"	
L96	140	660	630	DN150	2 1/2"	
L108				op aanvraag		

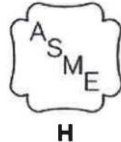
Combi condensor										
Type	N	P	R	S	T	U	V	W		
LC06	273	527	DN100	164	224	284	3/4"	3/4"		
LC12	273	527	DN150	207	282	357	3/4"	3/4"		
LC18	273	527	DN200	250	357	432	3/4"	3/4"		
LC24	273	527	DN250	293	415	490	3/4"	3/4"		
LC30	273	527	DN300	336	478	553	3/4"	3/4"		
LC36	273	527	DN350	379	541	616	3/4"	3/4"		
LC42	273	527	DN400	422	604	679	3/4"	3/4"		
LC48	273	527	DN450	465	667	742	3/4"	3/4"		
LC60	288	512	DN100	453	543	633	1"	3/4"		
LC72	288	512	DN150	492	572	663	1"	3/4"		
LC84	288	512	DN200	540	630	720	1 1/2"	3/4"		
LC96	288	512	DN250	588	690	780	1 1/2"	3/4"		
LC108				op aanvraag						

Enkele Condensor												
Ketel	Kond.	A	B	C	D	E	F	G				
GW 40	L 12	1000	739	1025	2121	470	611	300				
GW 50	L 18	1150	816	1200	2291	500	661	350				
GW 60	L 24	1300	893	1385	2461	530	711	400				
GW 75	L 30	1450	970	1570	2631	560	761	450				
GW 90	L 36	1600	1047	1755	2801	590	811	500				
GW 105	L 42	1750	1124	1940	2971	620	861	550				
GW 120	L 48	1900	1201	2125	3141	650	911	600				
GW 135	L 54	2050	1278	2310	3311	680	961	650				
GW 150	L 60	2200	1355	2495	3481	710	1011	700				
GW 165	L 66	2350	1432	2680	3651	740	1061	750				
GW 180	L 72	2500	1509	2865	3821	770	1111	800				
GW 200	L 84	2800	1713	3267	4223	861	1201	900				
GW 250	L 96	3350	2117	3901	4847	951	1301	1000				

Combi Condensor												
Ketel	Kond.	A	B	C	D	E	F	G				
GW 40	LC 12	1150	816	1025	2116	470	641	350				
GW 50	LC 18	1300	893	1190	2281	500	691	400				
GW 60	LC 24	1450	970	1380	2451	530	741	450				
GW 75	LC 30	1600	1047	1570	2621	560	791	500				
GW 90	LC 36	1750	1124	1760	2791	590	841	550				
GW 105	LC 42	1900	1201	1950	2961	620	891	600				
GW 120	LC 48	2050	1278	2140	3131	650	941	650				
GW 135	LC 54	2200	1355	2330	3301	680	991	700				
GW 150	LC 60	2350	1432	2520	3471	710	1041	750				
GW 165	LC 66	2500	1509	2710	3641	740	1091	800				
GW 180	LC 72	2650	1586	2900	3811	770	1141	850				
GW 200	LC 84	2950	1790	3302	4213	861	1231	950				
GW 250	LC 96	3500	2194	3936	4837	951	1331	1050				

AANSLUITMATEN CONDENSORS





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 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 this 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: **October 16, 2017**

EXPIRES: **July 19, 2020**

CERTIFICATE NUMBER: **29,077**


Board Chair, Conformity Assessment


Managing Director, Conformity Assessment

