

**Report-no. K 1349 2014 T2**

**Type testing  
in accordance with EN 303-5:2012  
-test report C-  
Heating boilers for solid fuels**

Types:  
**CPC200  
CPC240**

Company:  
**AMG S.p.A**



**2014**

**Test Centre for Energy Appliances**

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Publication of page 2 is permitted.**

**The test results presented in this report refer solely to the test object stated.**

**Type testing**  
**Solid fuel boilers acc. EN 303-5:2012**  
**Test of the heating requirements, test report C**

**Boiler manufacturer/Contractor:** **AMG S.p.A**  
Via delle Arti e dei Mestieri, 1/3  
I-36030 San Vito di Leguzzano (VI)

**Types designation:** **CPC200 - CPC240**

**Type of construction:** **Heating boilers in accordance with EN303-5**

**Type of loading:** Automatically

**Burner type:** -

**Type of fuel:** **Wood pellets**

No.	Type designation	Nominal load Output [kW] Wood pellets	Heat Input [kW] Wood pellets
1	CPC200	5,2 – 17,5	5,9 – 19,0
3	CPC240	5,2 – 21,5	5,9 – 23,8

**Test basis:**

According EN 303-5:2012, 4.4 Heating requirements.

This examination has been carried out by the impartial test centre of TÜV Rheinland in a test laboratory equipped in accordance with DIN EN 304, version 01/04.

**Remarks:**

Both boilers based on the same construction.

The difference between the boiler types CPC 200 and CPC 240 is nominal input. This is realized in the software setting.

**Test result:**

The boilers are in conformity with the emission class 5, EN 303-5:2012, 4.4.7 and the efficiency class 5 of DIN EN 303-5:2012, 4.4.2.

The requirements of the above-mentioned standard is fulfilled.

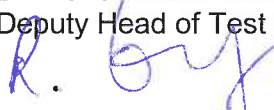
The local, applicable installation conditions to be observed.

Cologne, 4.9.2014  
432/mr  
Expert



Dipl.-Ing. Reibold

Test Centre for Energy Appliances  
DIN- und DVGW-Laboratory  
Deputy Head of Test Centre



Dipl.-Ing. Verbert

## 1. Date of test

This examination has been carried out in June 2014 by the impartial test centre of TÜV Rheinland/ CMC Centro Misura Compatibilità in a test laboratory equipped in accordance with DIN EN 304, version 01/04.

The factory production control is not part of this assessment.

## 2. Description of the boiler

### 2.1 Technical boiler data

<b>Boiler type:</b>		<b>CPC200</b>
Dimensions: height x length x width	mm	1240 x 786 x 610
Practical testing	-	Yes
Water content	Liter	50
Max. working temperature	°C	80
Max working pressure	bar	2,5

<b>Boiler type:</b>		<b>CPC240</b>
Dimensions: height x length x width	mm	1240 x 786 x 610
Practical testing	-	Yes
Water content	Liter	50
Max. working temperature	°C	80
Max working pressure	bar	2,5

Additional information can be found in report K13492014T1.

### 3. Testing

- P (pass / Anforderungen erfüllt)
- N (not applicable / Anforderungen nicht zutreffend)
- F (fail / Anforderungen nicht erfüllt)

Requirements	EN 303 Part 5	Result
<b>Boiler performance requirements</b>	<b>4.4</b>	<b>Result</b>
<b>General</b> The performance requirements are to be conducted with the test fuel	4.4.1	<b>P</b>
<b>Boiler efficiency</b>  Class 5 Minimum required $\geq$ 88,2% (CPC200) Minimum required $\geq$ 88,3% (CPC240)	4.4.2	<b>P</b>
<b>Flue temperature</b> Maximum load Minimum load	4.4.3	<b>P*</b>
<b>Draught</b> Maximum load: 10,0 Pa  Minimum load: 5,0 Pa	4.4.4	<b>P</b>
<b>Combustion period for hand-stoked boilers</b>	4.4.5	<b>N</b>
<b>Minimum heat output</b> The minimum heat output shall be not more than 30% of the nominal heat output	4.4.6	<b>P</b>
<b>Emission limits</b>  Class 5 CO $\leq$ 500 mg/m <sup>3</sup> OGC $\leq$ 20 mg/m <sup>3</sup> Dust $\leq$ 40 mg/m <sup>3</sup>	4.4.7	<b>P</b>

\* Flue gas temperature below 160 K (based on 20°C combustion temperature) .  
See the recommendations regarding the flue installation in the manual.

**Test results**
**3.1.1 Maximum load**

<b>CPC200</b>		<b>required</b>	<b>achieved</b>
Type of fuel	-	<b>Wood pellets</b>	
Nominal heat input	KW	19,0	19,0
Nominal heat output	kW	17,5	17,51
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 ÷ 90	75,1
Boiler efficiency (direct method)	%	≥ 88,2	92,13
Efficiency class		Class 5 acc. EN 303-5	
Flue gas pressure	Pa	10,0	10,0
Flue gas temperature	°C	≥ 160 + room temperature	90,5*
Room temperature	°C	15 ÷ 30	27,6
O <sub>2</sub> -Concentration	Vol-%	-	7,6
CO-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 500	19,3
Emission class		Class 5 acc. EN 303-5	
CO-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	-	14,0
Emission class			
OGC-Emission (CxHy) (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 20	2,9
Emission class		Class 5 acc. EN 303-5	
Dust-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 40	6,7
Emission class		Class 5 acc. EN 303-5	
Dust-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	-	4,8
Emission class			
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	-	6,0

\* Flue gas temperature below 160 K (based on 20°C combustion temperature) .  
 See the recommendations regarding the flue installation in the manual.

<b>CPC240</b>		<b>required</b>	<b>achieved</b>
Type of fuel	-	<b>Wood pellets</b>	
Nominal heat input	KW	23,8	23,79
Nominal heat output	kW	21,5	21,51
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 ÷ 90	80,9
Boiler efficiency (direct method)	%	≥ 88,3	90,39
Efficiency class		Class 5 acc. EN 303-5	
Flue gas pressure	Pa	10,0	10,0
Flue gas temperature	°C	≥ 160 + room temperature	108,1*
Room temperature	°C	15 ÷ 30	27,3
O <sub>2</sub> -Concentration	Vol-%	-	7,5
CO-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 500	26,7
Emission class		Class 5 acc. EN 303-5	
CO-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	-	19,4
Emission class			
OGC-Emission (C <sub>x</sub> H <sub>y</sub> ) (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 20	3,2
Emission class		Class 5 acc. EN 303-5	
Dust-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	≤ 40	8,1
Emission class		Class 5 acc. EN 303-5	
Dust-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry)	mg/m <sup>3</sup>	-	5,9
Emission class			
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	-	6,9

\* Flue gas temperature below 160 K (based on 20°C combustion temperature) .  
 See the recommendations regarding the flue installation in the manual.

### 3.1.2 Minimum load

<b>CPC200 – CPC240</b>		<b>required</b>	<b>achieved</b>
Type of fuel	-	<b>Wood pellets</b>	
Nominal heat input	KW	5,9	5,86
Nominal heat output	kW	5,2	5,21
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 ÷ 90	72,1
Boiler efficiency (direct method) Efficiency class	%	≥ 87,7	88,8
Flue gas pressure	Pa	5,0	5,0
Flue gas temperature	°C	-	56,6
Room temperature	° C	15 ÷ 30	27,3
O <sub>2</sub> -Concentration	Vol-%	-	12,4
CO-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry) Emission class	mg/m <sup>3</sup>	≤ 500 Class 5 acc. EN 303-5	245,0
CO-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry) Emission class	mg/m <sup>3</sup>	-	178,2
OGC-Emission (CxHy) (Referring to 10 Vol. % O <sub>2</sub> , dry) Emission class	mg/m <sup>3</sup>	≤ 20 Class 5 acc. EN 303-5	3,7
Dust-Emission (Referring to 10 Vol. % O <sub>2</sub> , dry) Emission class	mg/m <sup>3</sup>	-	46,3
Dust-Emission (Referring to 13 Vol. % O <sub>2</sub> , dry) Emission class	mg/m <sup>3</sup>	-	33,7
Particulate emission acc. PrEN16510:2012	mg/m <sup>3</sup>	-	34,9

## **4 Test results, confirmation of conformity with test standard**

The solid fuel boilers **CPC200 – CPC240**

of the company **AMG S.p.A**

fulfil and corresponds to the requirements of the standard with EN 303-5:2012.

The test results presented in this report refer solely to the test object stated.

The factory production control was not part of this assessment.

The test statement was made on the basis of the documentation submitted by the manufacturer and by means of the prototypes presented. It only applies to such appliances, which have been manufactured in accordance with the prototypes.



**Annex 1  
Fuel data**

Verbrennungsrechnung aus der Elementaranalyse											
nach DIN EN 304 Teil 2, Ausgabe 01/2004											
nach DIN 4702 Teil 2, Ausgabe 3/1990											
Analysis from:		28.11.2011		Analysis No. 2011001334		Fuel sampling date:		19.01.11			
Fuel:		Wood pellets									
Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf		Abgasbestandteile aus Brennstoff in Nm <sup>3</sup> /kg Brennstoff							
		in Nm <sup>3</sup> je kg Bestandteil	in Nm <sup>3</sup> je kg Brennstoff	CO <sub>2</sub>		SO <sub>2</sub>		H <sub>2</sub> O		N <sub>2</sub>	
	Gew. %		Sauerstoff- Bedarf	in Nm <sup>3</sup> je kg Bestandteil	in Nm <sup>3</sup> je kg Brennstoff	in Nm <sup>3</sup> je kg Bestandteil	in Nm <sup>3</sup> je kg Brennstoff	in Nm <sup>3</sup> je kg Bestandteil	in Nm <sup>3</sup> je kg Brennstoff	in Nm <sup>3</sup> je kg Bestandteil	in Nm <sup>3</sup> je kg Brennstoff
c	47,300	1,860	0,880	1,850	0,8751	-	-	-	-	-	-
s	0,220	0,700	0,002	-	-	0,680	0,0015	-	-	-	-
h	5,670	5,550	0,315	-	-	-	-	11,100	0,6294	-	-
n	0,050	-	-	-	-	-	-	-	-	0,80	0,0004
o	39,590	-0,700	-0,277	-	-	-	-	-	-	-	-
wasser	6,900	-	-	-	-	-	-	1,240	0,0856	-	-
asche	0,280	-	-	-	-	-	-	-	-	-	-
summe	100,010	O min=	0,919	V CO <sub>2</sub> =	0,8751	V SO <sub>2</sub> =	0,0015	V W =	0,7149	V N <sub>2</sub> =	0,0004
Luftbedarf				L min =		4,3756 Nm <sup>3</sup> /kg Brennstoff					
trockene stöchiometrische Abgasmenge				V A tr min =		4,3333 Nm <sup>3</sup> /kg Brennstoff					
Max. Kohlenstoffdioxid-Anteil				CO <sub>2</sub> max =		20,1938 Vol.-%					
Wasserdampfmenge				V w =		0,7149 Nm <sup>3</sup> /kg Brennstoff					
				V A tr min/ L min =		0,9903					
Heizwert, wf				Hu =		19145 kJ/kg					
						5,318 kWh/kg					

**Annex 2**

Test results Minimum CPC 200/CPC 240; Nominal Load CPC200; Nominal Load CPC 240

Report- No.		K13492014T2	
TÜV- order- No.		21225734	
Manufacture		AMG S.p.A	
Type		CPC200 – CPC240	
Model		Pellet boiler	
<b>Specifics</b>			
Minimum heat output		5,2 kW	
Test place		Thiene	
Test date		19.06.2014	
Type of test		EN 303-5:2012	
		Minimum load	
		1. Period	
Test date		19.06.2014	
Time		8.30-14.30	
<b>Ambient:</b>			
Ambient pressure, measurement	mbar	1008	
Air temperature (combustion air), measurement	°C	27,3	
Humidity of combustion air, measurement	%	38	
Ambient temperature, measurement	°C	27,3	
<b>Fuel:</b>			
Type of fuel		Wood pellets	
Number of fuel tasks		1	
Weight of the stove, start, measurement	kg	384,63	
Weight of the stove, end, measurement	kg	377,46	
Weight of additional fuel tasks	kg	7,17	
Fuel consumption, calculated of the difference	sec	21600	
Test duration, measurement			
Fuel consumption "B"	kg/h	1,195	
Combustible constituents in material passing through the grate "b", analyse	Gew. %	15,0	
Residue passing through the grate, measurement	kg	0,220	
Residue passing through the grate "R"	Gew. %	3,1	
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew. %	0,46	
<b>Water side, measurement</b>			
Flow, measurement	°C	72,1	
Return, measurement	°C	53,2	
Delta T	K	18,9	
Cold water flow, measurement	kg/h	237,4	
Additional energy of the pump	kW	0,000	
<b>Flue, average</b>			
Flow, measurement	°C	56,6	
Flue draught, measurement	Pa	5,0	
O <sub>2</sub> - concentration, measurement	Vol.-%	12,3	
CO <sub>2</sub> - concentration, calculated	Vol.-%	8,4	
lambda figure	-	2,389	
CO - concentration, measurement	ppm	155,8	
CO - concentration, measurement	Vol.-%	0,016	
CO - concentration, measurement	mg/m <sup>3</sup>	194,7	
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,020	
CO - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	245,0	
CO - concentration	mg/kWh	413,3	
CO - concentration	mg/MJ	114,8	
NO <sub>x</sub> - concentration, measurement	ppm	57,0	
NO <sub>x</sub> - concentration, measurement	mg/m <sup>3</sup>	116,9	
NO <sub>x</sub> - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	147,2	
NO <sub>x</sub> - concentration	mg/kWh	248,2	
NO <sub>x</sub> - concentration	mg/MJ	69,0	
CnHm concentration, measurement	ppm	1,8	
CnHm concentration, measurement	mg/m <sup>3</sup>	2,9	
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	3,7	
CnHm - concentration (total C)	mg/kWh	6,2	
CnHm - concentration (total C)	mg/MJ	1,7	
Dust, measurement*	mg	24,8	
Dust, measurement*	mg/m <sup>3</sup>	36,8	
Dust (at reference - O <sub>2</sub> )*	mg/m <sup>3</sup>	46,3	
Dust*	mg/kWh	78,1	
Dust*	mg/MJ	21,7	
PME concentration (measurement*)	mg/m <sup>3</sup>	34,9	
<b>Calculation</b>			
"Qa" loss free heating flue gas	kJ/kg	452,5	
"qa" loss flue gas	%	2,56	
"Qb" loss fix heating in flue gas	kJ/kg	20,4	
"qb" loss fix heating in flue gas	%	0,12	
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	154,2	
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,87	
"m" flue gas mass flow	g/s	4,7	
cpm, acc. DIN 4702-2, version 03.90for dry flue gas	kJ/(m <sup>3</sup> K)	1,33	
"eta" Efficiency (direct), to consider only water heating output P <sub>w</sub>	%	88,82	
"eta" Efficiency (indirect)	%	90,92	
Heating input	kW	5,86	
"P <sub>w</sub> " water heating output	kW	5,21	
<b>Adjustments</b>			
Flue gas motor	-	650	
Fuel motor	sec	1,3 on / 4,7 off	
Cleaning time	sec	5 sec every 75 min	
Firedoor	open/closed	closed	

Report- No.		K13492014T2	
TÜV- order- No.		21225734	
Manufacture		AMG S.p.A	
Type		CPC200	
Model		Pellet boiler	
<b>Specifics</b>			
Nominal heat output		17,5 kW	
Test place		Thiene	
Test date		17.06.2014	
Type of test		EN 303-5:2012	
		Nominal load	
		1. Period	
Test date		17.06.2014	
Time		9.40-15.40	
<b>Ambient:</b>			
Ambient pressure, measurement	mbar	1010	
Air temperature (combustion air), measurement	°C	27,6	
Humidity of combustion air, measurement	%	40	
Ambient temperature, measurement	°C	27,6	
<b>Fuel:</b>			
Type of fuel		Wood pellets	
Number of fuel tasks		1	
Weight of the stove, start, measurement	kg	380,77	
Weight of the stove, end, measurement	kg	357,52	
Weight of additional fuel tasks	kg	23,25	
Fuel consumption, calculated of the difference	sec	21600	
Test duration, measurement			
Fuel consumption "B"	kg/h	3,875	
Combustible constituents in material passing through the grate "b", analyse	Gew. %	15,0	
Residue passing through the grate, measurement	kg	0,220	
Residue passing through the grate "R"	Gew. %	0,9	
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew. %	0,14	
<b>Water side, measurement</b>			
Flow, measurement	°C	75,1	
Return, measurement	°C	53,2	
Delta T	K	21,9	
Cold water flow, measurement	kg/h	688,0	
Additional energy of the pump	kW	0,000	
<b>Flue, average</b>			
Flow, measurement	°C	90,5	
Flue draught, measurement	Pa	10,0	
O <sub>2</sub> - concentration, measurement	Vol.-%	7,6	
CO <sub>2</sub> - concentration, calculated	Vol.-%	12,9	
lambda figure	-	1,565	
CO - concentration, measurement	ppm	18,8	
CO - concentration, measurement	Vol.-%	0,002	
CO - concentration, measurement	mg/m <sup>3</sup>	23,5	
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,002	
CO - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	19,3	
CO - concentration	mg/kWh	32,6	
CO - concentration	mg/MJ	9,1	
NOx - concentration, measurement	ppm	103,2	
NOx - concentration, measurement	mg/m <sup>3</sup>	211,6	
NOx - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	174,1	
NOx - concentration	mg/kWh	293,7	
NOx - concentration	mg/MJ	81,6	
CnHm concentration, measurement	ppm	2,2	
CnHm concentration, measurement	mg/m <sup>3</sup>	3,5	
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	2,9	
CnHm - concentration (total C)	mg/kWh	4,9	
CnHm - concentration (total C)	mg/MJ	1,4	
Dust, measurement*	mg	5,5	
Dust, measurement*	mg/m <sup>3</sup>	8,1	
Dust (at reference - O <sub>2</sub> )*	mg/m <sup>3</sup>	6,7	
Dust*	mg/kWh	11,2	
Dust*	mg/MJ	3,1	
PME concentration (measurement*)	mg/m <sup>3</sup>	6,0	
<b>Calculation</b>			
"Qa" loss free heating flue gas	kJ/kg	686,1	
"qa" loss flue gas	%	3,89	
"Qb" loss fix heating in flue gas	kJ/kg	1,6	
"qb" loss fix heating in flue gas	%	0,01	
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	47,5	
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,27	
"m" flue gas mass flow	g/s	10,4	
cpm, acc. DIN 4702-2, version 03.90for dry flue gas	kJ/(m <sup>3</sup> K)	1,35	
"eta" Efficiency (direct), to consider only water heating output Pw	%	92,13	
"eta" Efficiency (indirect)	%	92,43	
Heating input	kW	19,00	
"Pw" water heating output	kW	17,51	
<b>Adjustments</b>			
Flue gas motor	-	1720	
Fuel motor	sec	4,4 on / 1,6 off	
Cleaning time	min	10 sec every 75 min	
Firedoor	sec	closed	

Report- No.		K13492014T2	
TÜV- order- No.		21225734	
Manufacture		AMG S.p.A	
Type		CPC240	
Model		Pellet boiler	
<b>Specifics</b>			
Nominal heat output		21,5 kW	
Test place		Thiene	
Test date		16.06.2014	
Type of test		EN 303-5:2012	
		Nominal load	
		1. Period	
Test date		16.06.2014	
Time		11.30-17.30	
<b>Ambient:</b>			
Ambient pressure, measurement	mbar	1008	
Air temperature (combustion air), measurement	°C	27,3	
Humidity of combustion air, measurement	%	38	
Ambient temperature, measurement	°C	27,3	
<b>Fuel:</b>			
Type of fuel		Wood pellets	
Number of fuel tasks		1	
Weight of the stove, start, measurement	kg	382,95	
Weight of the stove, end, measurement	kg	353,84	
Weight of additional fuel tasks	kg	29,11	
Fuel consumption, calculated of the difference	sec	21600	
Test duration, measurement			
Fuel consumption "B"	kg/h	4,852	
Combustible constituents in material passing through the grate "b", analyse	Gew. %	15,0	
Residue passing through the grate, measurement	kg	0,220	
Residue passing through the grate "R"	Gew. %	0,8	
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew. %	0,11	
<b>Water side, measurement</b>			
Flow, measurement	°C	80,9	
Return, measurement	°C	57,5	
Delta T	K	23,4	
Cold water flow, measurement	kg/h	792,1	
Additional energy of the pump	kW	0,000	
<b>Flue, average</b>			
Flow, measurement	°C	108,1	
Flue draught, measurement	Pa	10,0	
O <sub>2</sub> - concentration, measurement	Vol.-%	7,5	
CO <sub>2</sub> - concentration, calculated	Vol.-%	13,0	
lambda figure	-	1,546	
CO - concentration, measurement	ppm	26,3	
CO - concentration, measurement	Vol.-%	0,003	
CO - concentration, measurement	mg/m <sup>3</sup>	32,9	
CO - concentr. (at reference - O <sub>2</sub> )	Vol.-%	0,002	
CO - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	26,7	
CO - concentration	mg/kWh	45,0	
CO - concentration	mg/MJ	12,5	
NOx - concentration, measurement	ppm	119,5	
NOx - concentration, measurement	mg/m <sup>3</sup>	245,1	
NOx - concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	199,1	
NOx - concentration	mg/kWh	335,8	
NOx - concentration	mg/MJ	93,3	
CnHm concentration, measurement	ppm	2,4	
CnHm concentration, measurement	mg/m <sup>3</sup>	4,0	
CnHm concentr. (at reference - O <sub>2</sub> )	mg/m <sup>3</sup>	3,2	
CnHm - concentration (total C)	mg/kWh	5,4	
CnHm - concentration (total C)	mg/MJ	1,5	
Dust, measurement*	mg	6,8	
Dust, measurement*	mg/m <sup>3</sup>	10,0	
Dust (at reference - O <sub>2</sub> )*	mg/m <sup>3</sup>	8,1	
Dust*	mg/kWh	13,7	
Dust*	mg/MJ	3,8	
PME concentration (measurement*)	mg/m <sup>3</sup>	6,9	
<b>Calculation</b>			
"Qa" loss free heating flue gas	kJ/kg	874,3	
"qa" loss flue gas	%	4,95	
"Qb" loss fix heating in flue gas	kJ/kg	2,2	
"qb" loss fix heating in flue gas	%	0,01	
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	38,0	
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,22	
"m" flue gas mass flow	g/s	12,9	
cpm, acc. DIN 4702-2, version 03.90for dry flue gas	kJ/(m <sup>3</sup> K)	1,35	
"eta" Efficiency (direct), to consider only water heating output Pw	%	90,39	
"eta" Efficiency (indirect)	%	91,80	
Heating input	kW	23,79	
"Pw" water heating output	kW	21,51	
<b>Adjustments</b>			
Flue gas motor	-	2150	
Fuel motor	sec	5,5 on / 0,5 off	
Cleaning time	min	10 sec every 75 min	
Firedoor	sec	closed	

**Annex 3**

**Measuring devices**

**The requirements of the measuring instruments are fulfilled.  
Before each qualified measuring analysers were calibrated with zero gas and calibration gas.**

Internal name	Measure	Principle	Company	Range	Uncertainty	Reference
CMC B094	CO <sub>2</sub>	Infrared-absorption	Siemens Ultramat 6E	0 – 3 % 0 – 30 %	± 1% related to final value	Reference gas: 15,53 %
CMC B096 CMC B122		Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	
CMC B094		CO	Infrared-absorption	Siemens Ultramat 6E	0 – 300 ppm 0 – 3000 ppm	
CMC B096 CMC B122	Infrared-absorption		Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	
CMC B095	Infrared-absorption		Siemens Ultramat 23	0 – 1 % 0 – 5 %	± 1% related to the range	Reference gas: 4,929 %
CMC B077	NO <sub>x</sub>	Chemoluminescenz	ECO Physics CLD 700 EL	0 – 10 ppm 0 – 10 ppm 0 – 100 ppm 0 – 1000 ppm 0 – 10000 ppm	± 1% related to final value	Reference gas: 198,3 ppm
CMC B122 + CMC B123		Infrared-absorption	Siemens Ultramat 23 + Bühler Bünox MV	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	
CMC B096	NO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	
CMC B097 CMC B121	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C <sub>3</sub> 0 – 33,3 ppm C <sub>3</sub> 0 – 333 ppm C <sub>3</sub> 0 – 3333 ppm C <sub>3</sub>	± 1% related to the range	Reference gas: 29,96 ppm propane
CMC B090	Dust content	Gravimetric	Sartorius CPA 224 S	0,1 mg – 220 g	± 0,1 mg	Reference load
CMC B070 CMC B092	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 1200 kg	± 10 g	Reference load
CMC B079	Water flow	Magnetic	ABB Copa-XE DE43FI	0 – 2000 kg/h	± 1% related to the range	Balance
CMC B129	Water flow	Magnetic	ASA AF6-2600/1/B/1/A C	0 – 1500 kg/h	Accuracy: ± 0,5% r.v.	Balance
CMC	Temperatur	PT 100	Agilent 34970	0 – 300 °C	Up to 0,5 °C	Reference

B062 CMC B084	e	K-type thermocouple s	A			thermometer
CMC B087	Electrical power	---	Yokogawa WT3000	0 – 600 W	± 0,5 %	External calibration
CMC B116	Air flow	Mass flow masurement	Bronkhorst F- 11AC-50K- AAD-33-V	0 – 50 l/min	± (0,5 % Rd + 0,1 % FS)	External calibration
CMC B030	Water pressure	Manometer	Cewal DN 150	0 – 25 bar	± 0,6%	External calibration

The values are continuously recorded. The scan interval is 10s. All related certificates are stored.