TÜV Rheinland Energy GmbH
Test Centre for Energy Appliances

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Report-no. K 2539 2018 T2_Rev.01
Heating boilers for solid fuels
Type testing
in accordance with DIN EN 303-5:2012
-test report C-

Types:
E147
E148

Models:
PK15, PR15
PK20, PR20

Trademark:
Extraflame

Company:
Extraflame S.p.A.

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-11120-04-00

This accreditation is valid only for the listed standards as stated in the accreditation annex of D-PL-11120-04-00

Type testing

Heating boilers for solid fuels acc. DIN EN 303-5: October 2012
Test of the heating requirements, test report C

Applicant/contractor:	**Extraflame S.p.A.** Via dell'Artigianato, 12 36030 Montecchio Precalcino (VI)	
Trademark:	**Extraflame**	
Type designations:	**E147**	**E148**
Model designations:	**PK15, PR15**	**PK20, PR20**
Heat Input:	4,7 kW – 16,2 kW	6,5 kW – 21,7 kW
Nominal heat Output:	4,1 kW – 15,0 kW	5,7 kW – 20 kW
Type of construction:	Heating boilers in accordance with DIN EN303-5	
Type of loading:	automatic load	
Type of fuel:	wood pellets, class A1 acc. to EN17225-2. Ø: 6 mm, maximum length: 30 mm, maximum humidity: 7,5%, Heizinos. GCV (Gross Calorific Value): 18.500 kJ/kg	

Test basis:
According to DIN EN 303-5:2012, clause 4.4 - Heating requirements.

This examination has been carried out by the impartial test centre of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l. in a test laboratory equipped in accordance with DIN EN 304, version 01/04.

For the constructional requirements, see the “B” test report K 2539 2018 T1_Rev.01.

Remarks: -

Test result:
The boiler is in conformity to the emission class 5, DIN EN 303-5:2012, 4.4.7, and the efficiency class 5, DIN EN 303-5:2012, 4.4.2.
The requirements of the above-mentioned standards are fulfilled.
The local and applicable installation conditions to be observed.

Cologne, 2019-06-21
432 / mc

Assessor:

Dipl.-Ing. M. Ciccarelli

Test Centre for Energy Appliances
DIN- und DVGW-Laboratory

Report released after review:

Dipl.-Ing. A. Pomp

1. Date of test

This examination has been carried out from the 15th to the 23rd of April 2019 by the impartial test centre of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l. in a test laboratory equipped in accordance with DIN EN 304, version 01/2004.

The Factory Production Control (FPC) was not a part of this assessment.

Rev.01: In the previous report K 2539 2018 T2 there was a wrong sentence listed. Therefore this report is conducted as a revision report. All other measurement results remain unchanged.

This revision report replaced the test report K 2539 2018 T2.

2. Brief description of the boilers

The boilers are steel constructed with the basic material S235JR and with the ST37.0 for the pipes of the heat exchanger. The appliance bodies are covered with thermal insulation.

The boilers have electrical equipment and are fitted with a combustion air motor. The combustion air is taken from the installation room.

Furthermore, the appliances are equipped with the following safety devices:
- a water temperature limiter (manual reset)
- an air pressure switch

PK15 and PR15 are all identical, except than PR15 has a device for automatic ash removal.
PK20 and PR20 are all identical, except than PR20 has a device for automatic ash removal.
PK15 and PK20 are all identical in construction, except than for the burner.
PR15 and PR20 are all identical in construction, except than for the burner.

2.1 Technical boiler data

Type designations:		**E147**	
Model designations:		**PK15**	**PR15**
Dimension: (height x width x depth)	mm	1398 x 822 x 745	1398 x 822 x 817
Diameter of the flue outlet	mm	100	
Practical testing	-	Yes	
Water content	liters	46	
Maximum allowable operating temperature	°C	80	
Maximum allowable operating pressure	bar	3	
Rated Voltage	V/Hz	230/50	
Rated electrical power (max)	W	410	
Electrical consumption at nominal heat output* (measured acc. to EN 15456:2008)	W	25	
Electrical consumption at minimum heat output* (measured acc. to EN 15456:2008)	W	20	
Electrical consumption (stand-by) measured acc. to IEC 62301:2011	W	3	
Weight	kg	295	

* The electrical consumption of the circulator is not included.

Type designation:		**E148**	
Model designations:		**PK20**	**PR20**
Dimension: (height x width x depth)	mm	1398 x 822 x 745	1398 x 822 x 817
Diameter of the flue outlet	mm	100	
Practical testing	-	Yes	
Water content	liters	46	
Maximum allowable operating temperature	°C	80	
Maximum allowable operating pressure	bar	3	
Rated Voltage	V/Hz	230/50	
Rated electrical power (max)	W	410	
Electrical consumption at nominal heat output* (measured acc. to EN 15456:2008)	W	30	
Electrical consumption at minimum heat output* (measured acc. to EN 15456:2008)	W	20	
Electrical consumption (stand-by) measured acc. to IEC 62301:2011	W	3	
Weight	kg	295	

* The electrical consumption of the circulator is not included. Additional information can be found in report K25392018T1

3. Testing

The tests were carried out in April 2019 in the laboratory of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l in Thiene (VI) – Italy.

- P (pass)
- NA (not applicable)
- F (fail)

Requirements	DIN EN 303-5	Result
Boiler performance requirements	**4.4**	
General The performance requirements are to be conducted with the test fuel	4.4.1	P
Boiler efficiency PK15, PR15 class 5 - Minimum required: ≥ 88,2% PK20, PR20 class 5 - Minimum required: ≥ 88,3%	4.4.2	P
Flue temperature Nominal heat output >160 K	4.4.3	P*
Draught Nominal heat output: 5,0 Pa Minimum heat output: 3,0 Pa	4.4.4	P
Combustion period for hand-stoked boilers	4.4.5	NA
Minimum heat output The minimum heat output shall be not more than 30% of the nominal heat output	4.4.6	P
Emission limits (class 5) CO < 500 mg/m³ | OGC< 20 mg/m³ | Dust < 40 mg/m³	4.4.7	P

3.1 Test results

3.1.1 Nominal heat output

PK15, PR15		required	achieved
Type of fuel		**wood pellets**	
Nominal heat input	kW	-	16,2
Nominal heat output	kW	-	15,0
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	74,0
Boiler efficiency (direct method) Efficiency class	%	≥ 88,2 Class 5 acc. to DIN EN 303-5	93,0
Flue gas pressure	Pa	-	5
Flue gas temperature	°C	-	99,8*
Room temperature	°C	15 - 30	22,4
O_2-Concentration	Vol-%	-	5,7
CO-Emission (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	15
CO-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	11
NOx-Emission (Referring to 10 Vol. % O2, dry)	mg/m³	-	163
NOx-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	118
OGC-Emission (CxHy) (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	1
OGC-Emission (CxHy) (Referring to 13 Vol. % O2, dry)	mg/m³	-	1
Dust-Emission (Referring to 10 Vol. % O2, dry) Emission class*	mg/m³	≤ 40 Class 5 acc. to DIN EN 303-5	9
Dust-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	7

* Flue gas temperature below 160 K room temperature. See the recommendations regarding the flue installation in the manual.

PK20, PR20		**required**	**achieved**
Type of fuel		**wood pellets**	
Nominal heat input	kW	21,7	21,7
Nominal heat output	kW	20,0	20,0
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	72,7
Boiler efficiency (direct method) Efficiency class	%	≥ 88,3 Class 5 acc. to DIN EN 303-5	92,4
Flue gas pressure	Pa	5	5
Flue gas temperature	°C	-	106,6 *
Room temperature	°C	15 - 30	23,3
O_2-Concentration	Vol-%	-	4,0
CO-Emission (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	23
CO-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	17
NOx-Emission (Referring to 10 Vol. % O2, dry)	mg/m³	-	163
NOx-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	119
OGC-Emission (CxHy) (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	1
OGC-Emission (CxHy) (Referring to 13 Vol. % O2, dry)	mg/m³	-	1
Dust-Emission (Referring to 10 Vol. % O2, dry) Emission class*	mg/m³	≤ 40 Class 5 acc. to DIN EN 303-5	14
Dust-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	10

* Flue gas temperature below 160 K room temperature. See the recommendations regarding the flue installation in the manual.

3.1.2 Minimum heat output

PK15, PR15		**required**	**achieved**
Type of fuel		**wood pellets**	
Nominal heat input	kW	-	4,7
Nominal heat output	kW	-	4,1
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	71,8
Boiler efficiency (direct method) Efficiency class	%	≥ 87,6 Class 5 acc. to DIN EN 303-5	87,7
Flue gas pressure	Pa	-	3,0
Flue gas temperature	°C	-	63,6
Room temperature	°C	15 - 30	21,9
O_2-Concentration	Vol-%	-	14,1
CO-Emission (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	459
CO-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	334
NOx-Emission (Referring to 10 Vol. % O2, dry)	mg/m³	-	144
NOx-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	105
OGC-Emission (CxHy) (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	9
OGC-Emission (CxHy) (Referring to 13 Vol. % O2, dry)	mg/m³	-	7
Dust-Emission** (Referring to 10 Vol. % O2, dry)	mg/m³	-	20
Dust-Emission** (Referring to 13 Vol. % O2, dry)	mg/m³	-	15

PK20, PR20		**required**	**achieved**
Type of fuel		**wood pellets**	
Nominal heat input	kW	-	6,5
Nominal heat output	kW	-	5,7
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	72,3
Boiler efficiency (direct method) Efficiency class	%	≥ 87,8 Class 5 acc. to DIN EN 303-5	88,4
Flue gas pressure	Pa	-	3,0
Flue gas temperature	°C	-	62,0
Room temperature	°C	15 - 30	23,3
O_2-Concentration	Vol-%	-	12,4
CO-Emission (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	72
CO-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	53
NOx-Emission (Referring to 10 Vol. % O2, dry)	mg/m³	-	150
NOx-Emission (Referring to 13 Vol. % O2, dry)	mg/m³	-	109
OGC-Emission (CxHy) (Referring to 10 Vol. % O2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	3
OGC-Emission (CxHy) (Referring to 13 Vol. % O2, dry)	mg/m³	-	2
Dust-Emission** (Referring to 10 Vol. % O2, dry)	mg/m³	-	6
Dust-Emission** (Referring to 13 Vol. % O2, dry)	mg/m³	-	4

4. Test results, confirmation of conformity with test standard

The boilers with types:

E147
E148

and models:

PK15, PR15
PK20, PR20

of the company:

Extraflame S.p.A.

fulfil and corresponds to the requirements of the standard DIN EN 303-5:2012
The boiler is in conformity to the emission class 5, DIN EN 303-5:2012, 4.4.7, and the efficiency class 5, DIN EN 303-5:2012, 4.4.2.
The local, applicable installation conditions to be observed.

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

5. List of the documents

Appendix A 01 Fuel Data
Appendix A 02 Test results
Appendix A 03 Measurement Instruments

Appendix A 01
Fuel data

Test at nominal load

Verbrennungsrechnung aus der Elementaranalyse
nach DIN EN 304 Teil 2, Ausgabe 01/2004
nach DIN 4702 Teil 2, Ausgabe 3/1990

Analysis from:	**08/08/2018**	**Analysis No.** **1809618_001**	**Fuel sampling date:** **27/07/2018**
Fuel:	**wood pellets**		

Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf in Nm^3 je kg Bestandteil	Sauerstoffbedarf in Nm^3 je kg Brennstoff	Abgasbestandteile aus Brennstoff in Nm^3/kg Brennstoff							
			Stoffanteil	CO_2		SO_2		H_2O		N_2	
	Gew. %		Sauerstoff-Bedarf	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff
c	47,70	1,860	0,887	1,850	0,8825		-	-	-	-	-
s	0,01	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	6,39	5,550	0,355	-	-		-	11,100	0,7093	-	-
n	0,09	-	-	-	-		-	-	-	0,80	0,0007
o	37,80	-0,700	-0,265	-	-		-	-	-	-	-
wasser	7,50	-	-	-	-		-	1,240	0,0930	-	-
asche	0,51	-	-	-	-		-	-	-	-	-
summe	100,000	O min=	0,977	V CO_2 =	0,8825	V SO_2 =	0,0000	V W =	0,8023	V N_2 =	0,0007

Luftbedarf	L min =	4,6538	Nm^3/kg Brennstoff
trockene stöchiometrische Abgasmenge	V A tr min =	4,5590	Nm^3/kg Brennstoff
Max. Kohlenstoffdioxid-Anteil	CO_2 max =	19,3561	Vol.-%
Wasserdampfmenge	V w =	0,8023	Nm^3/kg Brennstoff
	V A tr min/ L min =	0,9796	
Heizwert, wf	Hu =	18733	kJ/kg
		5,204	kWh/kg

Berechnungen zum Versuchszeitpunkt

wasser	zum Versuchszeitpunkt	w =	7,500	Gew. %
Heizwert, roh	zum Versuchszeitpunkt	Hu	17145	kJ/kg

Test at reduced load

Verbrennungsrechnung aus der Elementaranalyse
nach DIN EN 304 Teil 2, Ausgabe 01/2004
nach DIN 4702 Teil 2, Ausgabe 3/1990

Analysis from:	**08/08/2018**	**Analysis No.** **1809618_001**	**Fuel sampling date:** **27/07/2018**
Fuel:	**wood pellets**		

Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf in Nm^3 je kg Bestandteil	Sauerstoffbedarf in Nm^3 je kg Brennstoff	Abgasbestandteile aus Brennstoff in Nm^3/kg Brennstoff							
			Stoffanteil	CO_2		SO_2		H_2O		N_2	
	Gew. %		Sauerstoff-Bedarf	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff
c	47,70	1,860	0,887	1,850	0,8825		-	-	-	-	-
s	0,01	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	6,39	5,550	0,355	-	-		-	11,100	0,7093	-	-
n	0,09	-	-	-	-		-	-	-	0,80	0,0007
o	37,80	-0,700	-0,265	-	-		-	-	-	-	-
wasser	7,50	-	-	-	-		-	1,240	0,0930	-	-
asche	0,51	-	-	-	-		-	-	-	-	-
summe	100,000	O min=	0,977	V CO_2 =	0,8825	V SO_2 =	0,0000	V W =	0,8023	V N_2 =	0,0007

Luftbedarf	L min =	4,6538	Nm^3/kg Brennstoff
trockene stöchiometrische Abgasmenge	V A tr min =	4,5590	Nm^3/kg Brennstoff
Max. Kohlenstoffdioxid-Anteil	CO_2 max =	19,3561	Vol.-%
Wasserdampfmenge	V w =	0,8023	Nm^3/kg Brennstoff
	V A tr min/ L min =	0,9796	
Heizwert, wf	Hu =	18733	kJ/kg
		5,204	kWh/kg

Berechnungen zum Versuchszeitpunkt

wasser	zum Versuchszeitpunkt	w =	7,500	Gew. %
Heizwert, roh	zum Versuchszeitpunkt	Hu	17145	kJ/kg

Appendix A 02

Test results

Report- No.		**K25392018T1**		
TÜV- order- No.		**21245368**		
Manufacturer		**Extraflame S.p.A.**		
Construction type		**Wood pellets boiler**		
max. working temperature	°C	**80**		
max. working pressure	bar	**3,0**		
Type of fuel charging		**automatic load**		
Special properties / Remarks		**-**		
Burner Type		**-**		
Type designation:		**E147**		
Model designation:		**PK15, PR15**		
Test place		**Thiene**		
Standard		**EN 303-5:2012**		
Type of test		**Test at nominal load**		
Heat input from manufacturer	**kW**	**16,2**		
Heat output from manufacturer	**kW**	**15,0**		
		1. test	**2. test**	**Average**
Test date		15/04/2019		
Time		11:05 - 17:05	not tested	
Ambient:				
Ambient pressure, measurement	mbar	1007		1007
Air temperature (combustion air), measurement	°C	22,4		22,4
Humidity of combustion air, measurement	%	69		69
Ambient temperature, measurement	°C	22,4		22,4
Type of Fuel		w ood pellets		
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5% Heizinos class A1 according to E		
Number of fuel tasks		1		
Weight of the stove, start, measurement	kg	445,9		
Weight of the stove, end, measurement	kg	425,5		
Fuel consumption, calculated of the difference	kg	20,4		
Test duration, measurement	sec	21600		
Fuel consumption "B"	kg/h	3,39		3,39
Combustible constituents in material passing through the grate "b", analyse	Gew . %	15,0		15,0
Residue passing through the grate, measurement	kg	0,400		0,400
Residue passing through the grate "R"	Gew . %	2,0		2,0
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,29		0,29
Water side, measurement				
Flow , measurement	°C	74,0		74,0
Return, measurement	°C	59,8		59,8
Delta T	K	14,1		14,1
Cold w ater flow , measurement	kg/h	915,3		915,3
Additional energy of the pump	kW	0,000		0,000
Flue, average				
Flue gas temperature, measurement	°C	99,8		99,8
Flue draught, measurement	Pa	5,0		5,0
O_2 - concentration, measurement	Vol.-%	5,7		5,7
CO_2 - concentration, calculated	Vol.-%	14,1		14,1
lambda figure	-	1,362		1,362

CO - concentration, measurement	ppm	17		17
CO - concentration, measurement	Vol.-%	0,002		0,002
CO - concentration, measurement	mg/m³	21		21
CO - concentr. (at 10% - O2)	Vol.-%	0,001		0,001
CO - concentr. (at 10% - O2)	mg/m³	15		15
CO - concentration	mg/kWh	28		28
CO - concentration	mg/MJ	8		8
NOx - concentration, measurement	ppm	110		110
NOx - concentration, measurement	mg/m³	227		227
NOx - concentr. (at 10% - O2)	mg/m³	163		163
NOx - concentration	mg/kWh	297		297
NOx - concentration	mg/MJ	82		82
CnHm concentration, measurement	ppm	1		1
CnHm concentration, measurement	mg/m³	2		2
CnHm concentr. (at 10% - O2)	mg/m³	1		1
CnHm - concentration (total C)	mg/kWh	2		2
CnHm - concentration (total C)	mg/MJ	1		1
Dust, measurement*	mg	4		4
Dust, measurement*	mg/m³	13		13
Dust (at 10% - O2)*	mg/m³	9		9
Dust*	mg/kWh	17		17
Dust*	mg/MJ	5		5
PME concentration (at 13% - O2)*	mg/m³	7		7
Electrical consumption				
Rated electrical power (max)	W		410	
Electrical consumption (at nominal heat output) - acc. EN 15456	W		25	
Electrical consumption (at minimum heat output) - acc. EN 15456	W		20	
PSTBY (during stand-by) - acc. IEC 62301	W		3	
Calculation				
"Qa" loss free heating flue gas	kJ/kg	803,1		803,1
"qa" loss flue gas	%	4,7		4,7
"Qb" loss fix heating in flue gas	kJ/kg	1,4		1,4
"qb" loss fix heating in flue gas	%	0,01		0,01
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	98,8		98,8
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,58		0,58
"m" flue gas mass flow	g/s	8,5		8,5
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,36		1,36
"eta" Efficiency (direct), to consider only water heating output Pw	%	93,0		**93,0**
"eta" Efficiency (indirect)	%	92,1		92,1
Heating input	kW	16,2		**16,2**
"Pw" water heating output	kW	15,0		**15,0**
Adjustments				
Flue gas motor	rpm	1600		
Fuel motor		133		
Cleaning time		OFF		
Firedoor	-	closed		

Report- No.		**K25392018T1**
TÜV- order- No.		**21245368**
Manufacturer		**Extraflame S.p.A.**
Construction type		**Wood pellets boiler**
max. working temperature	°C	**80**
max. working pressure	bar	**3,0**
Type of fuel charging		**automatic load**
Special properties / Remarks		**-**
Burner Type		**-**
Type designation:		**E147**
Model designation:		**PK15, PR15**
Test place		**Thiene**
Standard		**EN 303-5:2012**
Type of test		**Test at reduced load**
Heat input from manufacturer	**kW**	**4,7**
Heat output from manufacturer	**kW**	**4,1**
		1. test
Test date		16/04/2019
Time		11:15 - 17:15
Ambient:		
Ambient pressure, measurement	mbar	1007
Air temperature (combustion air), measurement	°C	21,9
Humidity of combustion air, measurement	%	60
Ambient temperature, measurement	°C	21,9
Type of Fuel		w ood pellets
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5% Heizinos class A1 according to EN
Number of fuel tasks		1
Weight of the stove, start, measurement	kg	440,4
Weight of the stove, end, measurement	kg	434,5
Fuel consumption, calculated of the difference	kg	5,9
Test duration, measurement	sec	21600
Fuel consumption "B"	kg/h	0,98
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 . %	3,7
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,56
Water side, measurement		
Flow , measurement	°C	71,8
Return, measurement	°C	61,8
Delta T	K	10,0
Cold w ater flow , measurement	kg/h	353,5
Additional energy of the pump	kW	0,000
Flue, average		
Flue gas temperature, measurement	°C	63,6
Flue draught, measurement	Pa	3,0
O_2 - concentration, measurement	Vol.-%	14,1
CO_2 - concentration, calculated	Vol.-%	6,3
lambda figure	-	3,016

CO - concentration, measurement	ppm	229
CO - concentration, measurement	Vol.-%	0,023
CO - concentration, measurement	mg/m³	287
CO - concentr. (at 10% - O2)	Vol.-%	0,037
CO - concentr. (at 10% - O2)	mg/m³	459
CO - concentration	mg/kWh	840
CO - concentration	mg/MJ	233
NOx - concentration, measurement	ppm	44
NOx - concentration, measurement	mg/m³	90
NOx - concentr. (at 10% - O2)	mg/m³	144
NOx - concentration	mg/kWh	263
NOx - concentration	mg/MJ	73
CnHm concentration, measurement	ppm	3
CnHm concentration, measurement	mg/m³	6
CnHm concentr. (at 10% - O2)	mg/m³	9
CnHm - concentration (total C)	mg/kWh	17
CnHm - concentration (total C)	mg/MJ	5
Dust, measurement*	mg	3
Dust, measurement*	mg/m³	13
Dust (at 10% - O2)*	mg/m³	20
Dust*	mg/kWh	37
Dust*	mg/MJ	10
PME concentration (at 13% - O2)*	mg/m³	17
Electrical consumption		
Rated electrical power (max)	W	410
Electrical consumption (at nominal heat output) - acc. EN 15456	W	25
Electrical consumption (at minimum heat output) - acc. EN 15456	W	20
PSTBY (during stand-by) - acc. IEC 62301	W	3
Calculation		
"Qa" loss free heating flue gas	kJ/kg	843,1
"qa" loss flue gas	%	4,92
"Qb" loss fix heating in flue gas	kJ/kg	40,2
"qb" loss fix heating in flue gas	%	0,23
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	188,0
"qr" losses due to combustible constituents in the residue passing through the grate	%	1,10
"m" flue gas mass flow	g/s	5,1
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,32
"eta" Efficiency (direct), to consider only water heating output Pw	%	**87,7**
"eta" Efficiency (indirect)	%	89,1
Heating input	kW	**4,7**
"Pw" water heating output	kW	**4,1**
Adjustments		
Flue gas motor	rpm	1100
Fuel motor		43
Cleaning time		OFF
Firedoor	-	closed

Report- No.		**K25392018T1**		
TÜV- order- No.		**21245368**		
Manufacturer		**Extraflame S.p.A.**		
Construction type		**Wood pellets boiler**		
max. working temperature	°C	**80**		
max. working pressure	bar	**3,0**		
Type of fuel charging		**automatic load**		
Special properties / Remarks		**-**		
Burner Type		**-**		
Type designation:		**E148**		
Model designation:		**PK20, PR20**		
Test place		**Thiene**		
Standard		**EN 303-5:2012**		
Type of test		**Test at nominal load**		
Heat input from manufacturer	**kW**	**21,7**		
Heat output from manufacturer	**kW**	**20,0**		
		1. test	**2. test**	**Average**
Test date		18/04/2019		
Time		11:15 - 17:15	not tested	
Ambient:				
Ambient pressure, measurement	mbar	1013		1013
Air temperature (combustion air), measurement	°C	23,3		23,3
Humidity of combustion air, measurement	%	50		50
Ambient temperature, measurement	°C	23,3		23,3
Type of Fuel		wood pellets		
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5% Heizinos class A1 according to E		
Number of fuel tasks		1		
Weight of the stove, start, measurement	kg	451,1		
Weight of the stove, end, measurement	kg	423,8		
Fuel consumption, calculated of the difference	kg	27,3		
Test duration, measurement	sec	21600		
Fuel consumption "B"	kg/h	4,55		4,55
Combustible constituents in material passing through the grate "b", analyse	Gew. %	15,0		15,0
Residue passing through the grate, measurement	kg	0,400		0,400
Residue passing through the grate "R"	Gew. %	1,5		1,5
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew. %	0,22		0,22
Water side, measurement				
Flow, measurement	°C	72,7		72,7
Return, measurement	°C	56,1		56,1
Delta T	K	16,5		16,5
Cold water flow, measurement	kg/h	1042,4		1042,4
Additional energy of the pump	kW	0,000		0,000
Flue, average				
Flue gas temperature, measurement	°C	106,6		106,6
Flue draught, measurement	Pa	5,0		5,0
O_2 - concentration, measurement	Vol.-%	4,0		4,0
CO_2 - concentration, calculated	Vol.-%	15,7		15,7
lambda figure	-	1,232		1,232

CO - concentration, measurement	ppm	29		29
CO - concentration, measurement	Vol.-%	0,003		0,003
CO - concentration, measurement	mg/m³	36		36
CO - concentr. (at 10% - O2)	Vol.-%	0,002		0,002
CO - concentr. (at 10% - O2)	mg/m³	23		23
CO - concentration	mg/kWh	43		43
CO - concentration	mg/MJ	12		12
NOx - concentration, measurement	ppm	123		123
NOx - concentration, measurement	mg/m³	252		252
NOx - concentr. (at 10% - O2)	mg/m³	163		163
NOx - concentration	mg/kWh	298		298
NOx - concentration	mg/MJ	83		83
CnHm concentration, measurement	ppm	1		1
CnHm concentration, measurement	mg/m³	2		2
CnHm concentr. (at 10% - O2)	mg/m³	1		1
CnHm - concentration (total C)	mg/kWh	2		2
CnHm - concentration (total C)	mg/MJ	1		1
Dust, measurement*	mg	5		5
Dust, measurement*	mg/m³	21		21
Dust (at 10% - O2)*	mg/m³	14		14
Dust*	mg/kWh	25		25
Dust*	mg/MJ	7		7
PME concentration (at 13% - O2)*	mg/m³	10		10
Electrical consumption				
Rated electrical power (max)	W		410	
Electrical consumption (at nominal heat output) - acc. EN 15456	W		30	
Electrical consumption (at minimum heat output) - acc. EN 15456	W		20	
PSTBY (during stand-by) - acc. IEC 62301	W		3	
Calculation				
"Qa" loss free heating flue gas	kJ/kg	798,9		798,9
"qa" loss flue gas	%	4,7		4,7
"Qb" loss fix heating in flue gas	kJ/kg	2,1		2,1
"qb" loss fix heating in flue gas	%	0,01		0,01
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	73,7		73,7
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,43		0,43
"m" flue gas mass flow	g/s	10,4		10,4
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,37		1,37
"eta" Efficiency (direct), to consider only water heating output Pw	%	92,4		**92,4**
"eta" Efficiency (indirect)	%	93,3		93,3
Heating input	kW	21,7		**21,7**
"Pw" water heating output	kW	20,0		**20,0**
Adjustments				
Flue gas motor	rpm	1980		
Fuel motor		133		
Cleaning time		OFF		
Firedoor	-	closed		

Report- No.		**K25392018T1**
TÜV- order- No.		**21245368**
Manufacturer		**Extraflame S.p.A.**
Construction type		**Wood pellets boiler**
max. working temperature	°C	**80**
max. working pressure	bar	**3,0**
Type of fuel charging		**automatic load**
Special properties / Remarks		**-**
Burner Type		**-**
Type designation:		**E148**
Model designation:		**PK20, PR20**
Test place		**Thiene**
Standard		**EN 303-5:2012**
Type of test		**Test at reduced load**
Heat input from manufacturer	**kW**	**6,5**
Heat output from manufacturer	**kW**	**5,7**
		1. test
Test date		19/04/2019
Time		10:35 - 16:35
Ambient:		
Ambient pressure, measurement	mbar	1018
Air temperature (combustion air), measurement	°C	23,3
Humidity of combustion air, measurement	%	45
Ambient temperature, measurement	°C	23,3
Type of Fuel		w ood pellets
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5% Heizinos class A1 according to EN
Number of fuel tasks		1
Weight of the stove, start, measurement	kg	453,2
Weight of the stove, end, measurement	kg	445,0
Fuel consumption, calculated of the difference	kg	8,2
Test duration, measurement	sec	21600
Fuel consumption "B"	kg/h	1,36
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 . %	2,7
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew . %	0,40
Water side, measurement		
Flow , measurement	°C	72,3
Return, measurement	°C	63,9
Delta T	K	8,4
Cold w ater flow , measurement	kg/h	588,0
Additional energy of the pump	kW	0,000
Flue, average		
Flue gas temperature, measurement	°C	62,0
Flue draught, measurement	Pa	3,0
O_2 - concentration, measurement	Vol.-%	12,4
CO_2 - concentration, calculated	Vol.-%	7,9
lambda figure	-	2,410

CO - concentration, measurement	ppm	45
CO - concentration, measurement	Vol.-%	0,005
CO - concentration, measurement	mg/m³	57
CO - concentr. (at 10% - O2)	Vol.-%	0,006
CO - concentr. (at 10% - O2)	mg/m³	72
CO - concentration	mg/kWh	132
CO - concentration	mg/MJ	37
NOx - concentration, measurement	ppm	57
NOx - concentration, measurement	mg/m³	118
NOx - concentr. (at 10% - O2)	mg/m³	150
NOx - concentration	mg/kWh	275
NOx - concentration	mg/MJ	76
CnHm concentration, measurement	ppm	2
CnHm concentration, measurement	mg/m³	3
CnHm concentr. (at 10% - O2)	mg/m³	3
CnHm - concentration (total C)	mg/kWh	6
CnHm - concentration (total C)	mg/MJ	2
Dust, measurement*	mg	1
Dust, measurement*	mg/m³	5
Dust (at 10% - O2)*	mg/m³	6
Dust*	mg/kWh	11
Dust*	mg/MJ	3
PME concentration (at 13% - O2)*	mg/m³	5
Electrical consumption		
Rated electrical power (max)	W	410
Electrical consumption (at nominal heat output) - acc. EN 15456	W	30
Electrical consumption (at minimum heat output) - acc. EN 15456	W	20
PSTBY (during stand-by) - acc. IEC 62301	W	3
Calculation		
"Qa" loss free heating flue gas	kJ/kg	643,4
"qa" loss flue gas	%	3,75
"Qb" loss fix heating in flue gas	kJ/kg	6,4
"qb" loss fix heating in flue gas	%	0,04
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	135,5
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,79
"m" flue gas mass flow	g/s	5,8
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,33
"eta" Efficiency (direct), to consider only water heating output Pw	%	**88,4**
"eta" Efficiency (indirect)	%	91,9
Heating input	kW	**6,5**
"Pw" water heating output	kW	**5,7**
Adjustments		
Flue gas motor	rpm	1040
Fuel motor		41
Cleaning time		OFF
Firedoor	-	closed

Appendix A 03

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

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B030	Water pressure	Manometer	Cewal DN 150	0 – 25 bar	± 0,6%	Reference manometer
B062	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B066	Gas pressure	Manometer	Testo 510	0 – 100 hPa	± 3% related to final value	Reference manometer
B068	Temperature	IR emission	Fluke Ti20	-10 – 350 °C	---	---
B070	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 600 kg	± 10 g	Reference load
B079	Water flow	Magnetic	ABB Copa-XE DE43FI	0 – 2000 kg/h	± 1% related to the range	Balance
B084	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B090	Dust content	Gravimetric	Sartorius CPA 224 S	0,1 mg – 220 g	± 0,1 mg	Reference load
B092	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 1200 kg	± 10 g	Reference load
B094	CO_2	Infrared-absorption	Siemens Ultramat 6E	0 – 3 % 0 – 30 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 6E	0 – 300 ppm 0 – 3000 ppm	± 1% related to the range	Reference gas: 2002 ppm
B095	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1 % 0 – 5 %	± 1% related to the range	Reference gas: 4,925 %
B096 + B123	CO_2	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NOx	Infrared-absorption	Siemens Ultramat 23 + Bühler Bünox MV	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B097	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B098	Temperature	K-type thermocouple	Testo 925	0 – 200 °C	± 2 °C	Reference thermometer
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
B118	Gas volume	Diaphragm	CMC	0,016 – 2,5 m^3/h	± 5 %	Air flow
B121	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B122	CO_2	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B129	Water flow	Magnetic	ASA AF6-2600/1/B/1/AC	0 – 1500 kg/h	Accuracy: ± 0,5% r.v.	Balance
B140	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer
B141	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B149	Mass	Gravimetric	Kern FKB 15K0.5A	0 – 15 kg	± 0,5 g (reproducibility)	Reference load
B154	Gas volume	Diaphragm	Elster BK-G4M	---	Class 1,5	Air flow
B169	Electrical power	---	Yokogawa WT310E	0 – 2000 W	± 0,5 %	External calibration
B179	Stopwatch	---	RS 8111814	0 – 99 h	0,01 s	---
B180	Absolute pressure meter	Absolute pressure meter	Testo 511	0 – 999,0 hPa	±3,0 hPa	External calibration

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

TÜV Rheinland Energy GmbH
Test Centre for Energy Appliances

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Precisely Right.

Report-no. K25372018T2
Heating boilers for solid fuels
Type testing
in accordance with DIN EN 303-5:2012
-test report C-

Type:
E149

Models:
PK30, PR30

Trademark:
Extraflame

Company:
Extraflame S.p.A.

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-11120-04-00

This accreditation is valid only for the listed standards as stated in the accreditation annex of D-PL-11120-04-00

Type testing

Heating boilers for solid fuels acc. DIN EN 303-5: October 2012
Test of the heating requirements, test report C

Applicant/contractor:	**Extraflame S.p.A.** Via dell'Artigianato, 12 36030 Montecchio Precalcino (VI)
Trademark:	**Extraflame**
Type designation:	**E149**
Model designations:	**PK30,** **PR30**
Heat Input:	9,6 kW – 32,5 kW
Nominal heat Output:	8,9 kW – 30,0 kW
Type of construction:	Heating boilers in accordance with DIN EN303-5
Type of loading:	automatic load
Type of fuel:	wood pellets, class A1 acc. to EN17225-2. Ø: 6 mm, maximum length: 30 mm, maximum humidity: 7,5%, Heizinos. GCV (Gross Calorific Value): 18.500 kJ/kg

Test basis:
According to DIN EN 303-5:2012, clause 4.4 - Heating requirements.

This examination has been carried out by the impartial test centre of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l. in a test laboratory equipped in accordance with DIN EN 304, version 01/04.

For the constructional requirements, see the “B” test report K25372018T1.

Remarks: -

Test result:
The boiler is in conformity to the emission class 5, DIN EN 303-5:2012, 4.4.7, and the efficiency class 5, DIN EN 303-5:2012, 4.4.2.
The requirements of the above-mentioned standards are fulfilled.
The local and applicable installation conditions to be observed.

Cologne, 2019-08-22
432 / jd

Assessor:

B. Sc. J. Duschanek

TÜV Rheinland Energy GmbH
Test Centre for Energy Appliances
DIN- und DVGW-Laboratory

Report released after review:

Dipl.-Ing. A. Pomp

1. Date of test

This examination has been carried out from the 24th of April 2019 to the 7th of May 2019 by the impartial test centre of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l. in a test laboratory equipped in accordance with DIN EN 304, version 01/2004.

The Factory Production Control (FPC) was not a part of this assessment.

2. Brief description of the boilers

The boilers are steel constructed with the basic material S235JR and with the ST37.0 for the pipes of the heat exchanger. The appliance bodies are covered with thermal insulation.

The boilers have electrical equipment and are fitted with a combustion air motor. The combustion air is taken from the installation room.

Furthermore, the appliances are equipped with the following safety devices:
- a water temperature limiter (manual reset)
- an air pressure switch

PK30 and PR30 appliances are all identical, except than PR30 has an ash press.

2.1 Technical boiler data

Type designations:		**E149**	
Model designations:		**PK30**	**PR30**
Dimension: (height x width x depth)	mm	1398 x 892 x 745	1398 x 892 x 817
Weight	kg	310	325
Diameter of the flue outlet	mm	120	
Practical testing	-	Yes	
Water content	liters	63	
Maximum allowable operating temperature	°C	80	
Maximum allowable operating pressure	bar	3	
Rated Voltage	V/Hz	230/50	
Rated electrical power (max)	W	410	
Electrical consumption at nominal heat output* (measured acc. to EN 15456:2008)	W	45	
Electrical consumption at minimum heat output* (measured acc. to EN 15456:2008)	W	27	
Electrical consumption (stand-by) measured acc. to IEC 62301:2011	W	3	

* The electrical consumption of the circulator is not included.

Additional information can be found in report K25372018T1.

3. Testing

The tests were carried out from the 24th of April 2019 to the 7th of May 2019 in the laboratory of TÜV Rheinland Energy GmbH / CMC Centro Misure Compatibilità S.r.l in Thiene (VI) – Italy.

- P (pass)
- NA (not applicable)
- NT (not tested)
- F (fail)

Requirements	DIN EN 303-5	Result
Boiler performance requirements	**4.4**	
General The performance requirements are to be conducted with the test fuel	4.4.1	P
Boiler efficiency PK30, PR30 class 5 - Minimum required: ≥ 88,5%	4.4.2	P
Flue temperature Nominal heat output >160 K	4.4.3	P*
Draught Nominal heat output: 5,0 Pa Minimum heat output: 3,0 Pa	4.4.4	P
Combustion period for hand-stoked boilers	4.4.5	NA
Minimum heat output The minimum heat output shall be not more than 30% of the nominal heat output	4.4.6	P
Emission limits (class 5) CO < 500 mg/m³ | OGC< 20 mg/m³ | Dust < 40 mg/m³	4.4.7	P

* Flue gas temperature below 160 K room temperature. See the recommendations regarding the flue installation in the manual.

3.1 Test results

3.1.1 Nominal heat output

PK30, PR30		required	achieved
Type of fuel		**wood pellets**	
Nominal heat input	kW	32,5	32,5
Nominal heat output	kW	30,0	30,0
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	73,4
Boiler efficiency (direct method) Efficiency class	%	≥ 88,5 Class 5 acc. to DIN EN 303-5	92,4
Flue gas pressure	Pa	5	5
Flue gas temperature	°C	≥ 160 + room temperature	113,8 *
Room temperature	°C	15 - 30	23,4
O_2-Concentration	Vol-%	-	4,5
CO-Emission (Referring to 10 Vol. % O_2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	18
CO-Emission (Referring to 13 Vol. % O_2, dry)	mg/m³	-	13
NOx-Emission (Referring to 10 Vol. % O_2, dry)	mg/m³	-	153
NOx-Emission (Referring to 13 Vol. % O_2, dry)	mg/m³	-	111
OGC-Emission (CxHy) (Referring to 10 Vol. % O_2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	1
OGC-Emission (CxHy) (Referring to 13 Vol. % O_2, dry)	mg/m³	-	1
Dust-Emission (Referring to 10 Vol. % O_2, dry) Emission class*	mg/m³	≤ 40 Class 5 acc. to DIN EN 303-5	14
Dust-Emission (Referring to 13 Vol. % O_2, dry)	mg/m³	-	10

*** Flue gas temperature below 160 K room temperature. See the recommendations regarding the flue installation in the manual.**

3.1.2 Minimum heat output

PK30, PR30		**required**	**achieved**
Type of fuel		**wood pellets**	
Nominal heat input	kW	9,6	9,6
Nominal heat output	kW	8,9	8,9
Duration of combustion	s	≥ 21600	21600
Mean flow temperature	°C	70 - 90	70,9
Boiler efficiency (direct method) Efficiency class	%	≥ 87,8 Class 5 acc. to DIN EN 303-5	92,7
Flue gas pressure	Pa	3,0	3,0
Flue gas temperature	°C	-	66,5
Room temperature	°C	15 - 30	20,5
O_2-Concentration	Vol-%	-	12,9
CO-Emission (Referring to 10 Vol. % O_2, dry) Emission class	mg/m³	≤ 500 Class 5 acc. to DIN EN 303-5	157
CO-Emission (Referring to 13 Vol. % O_2, dry)	mg/m³	-	114
NOx-Emission (Referring to 10 Vol. % O_2, dry)	mg/m³	-	157
NOx-Emission (Referring to 13 Vol. % O_2, dry)	mg/m³	-	114
OGC-Emission (CxHy) (Referring to 10 Vol. % O_2, dry) Emission class	mg/m³	≤ 20 Class 5 acc. to DIN EN 303-5	4
OGC-Emission (CxHy) (Referring to 13 Vol. % O_2, dry)	mg/m³	-	3
Dust-Emission** (Referring to 10 Vol. % O_2, dry)	mg/m³	-	14
Dust-Emission** (Referring to 13 Vol. % O_2, dry)	mg/m³	-	10

4. Test results, confirmation of conformity with test standard

The boilers with type:

E149

and models:

PK30, PR30

of the company:

Extraflame S.p.A.

fulfil and corresponds to the requirements of the standard DIN EN 303-5:2012
The boiler is in conformity to the emission class 5, DIN EN 303-5:2012, 4.4.7, and the efficiency class 5, DIN EN 303-5:2012, 4.4.2.
The local, applicable installation conditions to be observed.

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

5. List of the documents

Appendix A 01 Fuel Data
Appendix A 02 Test results
Appendix A 03 Measurement Instruments

Appendix A 01
Fuel data

Test at nominal load

Verbrennungsrechnung aus der Elementaranalyse
nach DIN EN 304 Teil 2, Ausgabe 01/2004
nach DIN 4702 Teil 2, Ausgabe 3/1990

Analysis from:	**08/08/2018**	**Analysis No.** **1809618_001**	**Fuel sampling date:** **27/07/2018**
Fuel:	**wood pellets**		

Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf in Nm^3 je kg Bestandteil	Sauerstoffbedarf in Nm^3 je kg Brennstoff	Abgasbestandteile aus Brennstoff in Nm^3/kg Brennstoff							
			Stoffanteil	CO_2		SO_2		H_2O		N_2	
	Gew. %		Sauerstoff-Bedarf	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff
c	47,70	1,860	0,887	1,850	0,8825		-	-	-	-	-
s	0,01	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	6,39	5,550	0,355	-	-		-	11,100	0,7093	-	-
n	0,09	-	-	-	-		-	-	-	0,80	0,0007
o	37,80	-0,700	-0,265	-	-		-	-	-	-	-
wasser	7,50	-	-	-	-		-	1,240	0,0930	-	-
asche	0,51	-	-	-	-		-	-	-	-	-
summe	100,000	O min=	0,977	V CO_2 =	0,8825	V SO_2 =	0,0000	V W =	0,8023	V N_2 =	0,0007

Luftbedarf	L min =	4,6538	Nm^3/kg Brennstoff
trockene stöchiometrische Abgasmenge	V A tr min =	4,5590	Nm^3/kg Brennstoff
Max. Kohlenstoffdioxid-Anteil	CO_2 max =	19,3561	Vol.-%
Wasserdampfmenge	V w =	0,8023	Nm^3/kg Brennstoff
	V A tr min/ L min =	0,9796	
Heizwert, wf	Hu =	18733	kJ/kg
		5,204	kWh/kg

Berechnungen zum Versuchszeitpunkt

wasser	zum Versuchszeitpunkt	w =	7,500	Gew. %
Heizwert, roh	zum Versuchszeitpunkt	Hu	17145	kJ/kg

Test at reduced load

Verbrennungsrechnung aus der Elementaranalyse
nach DIN EN 304 Teil 2, Ausgabe 01/2004
nach DIN 4702 Teil 2, Ausgabe 3/1990

Analysis from:	**08/08/2018**	**Analysis No.** **1809618_001**	**Fuel sampling date:** **27/07/2018**
Fuel:	**wood pellets**		

Bestandteil im Brennstoff	Stoffanteil	Sauerstoffbedarf in Nm^3 je kg Bestandteil	Sauerstoffbedarf in Nm^3 je kg Brennstoff	Abgasbestandteile aus Brennstoff in Nm^3/kg Brennstoff							
			Stoffanteil	CO_2		SO_2		H_2O		N_2	
	Gew. %		Sauerstoff-Bedarf	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff	in Nm^3 je kg Bestandteil	in Nm^3 je kg Brennstoff
c	47,70	1,860	0,887	1,850	0,8825		-	-	-	-	-
s	0,01	0,700	0,000	-	-	0,680	0,0000	-	-	-	-
h	6,39	5,550	0,355	-	-		-	11,100	0,7093	-	-
n	0,09	-	-	-	-		-	-	-	0,80	0,0007
o	37,80	-0,700	-0,265	-	-		-	-	-	-	-
wasser	7,50	-	-	-	-		-	1,240	0,0930	-	-
asche	0,51	-	-	-	-		-	-	-	-	-
summe	100,000	O min=	0,977	V CO_2 =	0,8825	V SO_2 =	0,0000	V W =	0,8023	V N_2 =	0,0007

Luftbedarf	L min =	4,6538	Nm^3/kg Brennstoff
trockene stöchiometrische Abgasmenge	V A tr min =	4,5590	Nm^3/kg Brennstoff
Max. Kohlenstoffdioxid-Anteil	CO_2 max =	19,3561	Vol.-%
Wasserdampfmenge	V w =	0,8023	Nm^3/kg Brennstoff
	V A tr min/ L min =	0,9796	
Heizwert, wf	Hu =	18733	kJ/kg
		5,204	kWh/kg

Berechnungen zum Versuchszeitpunkt

wasser	zum Versuchszeitpunkt	w =	7,500	Gew. %
Heizwert, roh	zum Versuchszeitpunkt	Hu	17145	kJ/kg

Appendix A 02
Test results

Report- No.		**K25372018T1**		
TÜV- order- No.		**21245356**		
Manufacturer		**Extraflame S.p.A.**		
Construction type		**Wood pellets boiler**		
max. working temperature	°C	**80**		
max. working pressure	bar	**3,0**		
Type of fuel charging		**automatic load**		
Special properties / Remarks		**-**		
Burner Type		**-**		
Type designation:		**E149**		
Model designation:		**PK30, PR30**		
Test place		**Thiene**		
Standard		**EN 303-5:2012**		
Type of test		**Test at nominal load**		
Heat input from manufacturer	**kW**	**32,5**		
Heat output from manufacturer	**kW**	**30,0**		
		1. test	**2. test**	**Average**
Test date		24/04/2019		
Time		11:00 - 17:00	not tested	
Ambient:				
Ambient pressure, measurement	mbar	1002		1002
Air temperature (combustion air), measurement	°C	23,4		23,4
Humidity of combustion air, measurement	%	80		80
Ambient temperature, measurement	°C	23,4		23,4
Type of Fuel		wood pellets		
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5% Heizinos class A1 according to EN 17225-2		
Number of fuel tasks		1		
Weight of the stove, start, measurement	kg	475,6		
Weight of the stove, end, measurement	kg	434,7		
Fuel consumption, calculated of the difference	kg	40,9		
Test duration, measurement	sec	21600		
Fuel consumption "B"	kg/h	6,82		6,82
Combustible constituents in material passing through the grate "b", analyse	Gew. %	15,0		15,0
Residue passing through the grate, measurement	kg	0,400		0,400
Residue passing through the grate "R"	Gew. %	1,0		1,0
Carbon content of the residue passing through the grate "Cr" depending of 1kg fuel	Gew. %	0,15		0,15
Water side, measurement				
Flow, measurement	°C	73,4		73,4
Return, measurement	°C	54,4		54,4
Delta T	K	19,0		19,0
Cold water flow, measurement	kg/h	1362,0		1362,0
Additional energy of the pump	kW	0,000		0,000
Flue, average				
Flue gas temperature, measurement	°C	113,8		113,8
Flue draught, measurement	Pa	5,0		5,0
O_2 - concentration, measurement	Vol.-%	4,5		4,5
CO_2 - concentration, calculated	Vol.-%	15,2		15,2
lambda figure	-	1,265		1,265

CO - concentration, measurement	ppm	21		21
CO - concentration, measurement	Vol.-%	0,002		0,002
CO - concentration, measurement	mg/m³	27		27
CO - concentr. (at 10% - O2)	Vol.-%	0,001		0,001
CO - concentr. (at 10% - O2)	mg/m³	18		18
CO - concentration	mg/kWh	33		33
CO - concentration	mg/MJ	9		9
NOx - concentration, measurement	ppm	112		112
NOx - concentration, measurement	mg/m³	230		230
NOx - concentr. (at 10% - O2)	mg/m³	153		153
NOx - concentration	mg/kWh	280		280
NOx - concentration	mg/MJ	78		78
CnHm concentration, measurement	ppm	1		1
CnHm concentration, measurement	mg/m³	2		2
CnHm concentr. (at 10% - O2)	mg/m³	1		1
CnHm - concentration (total C)	mg/kWh	2		2
CnHm - concentration (total C)	mg/MJ	1		1
Dust, measurement*	mg	5		5
Dust, measurement*	mg/m³	21		21
Dust (at 10% - O2)*	mg/m³	14		14
Dust*	mg/kWh	25		25
Dust*	mg/MJ	7		7
PME concentration (at 13% - O2)*	mg/m³	10		10
Electrical consumption				
Rated electrical power (max)	W		410	
Electrical consumption (at nominal heat output) - acc. EN 15456	W		45	
Electrical consumption (at minimum heat output) - acc. EN 15456	W		27	
PSTBY (during stand-by) - acc. IEC 62301	W		3	
Calculation				
"Qa" loss free heating flue gas	kJ/kg	887,7		887,7
"qa" loss flue gas	%	5,2		5,2
"Qb" loss fix heating in flue gas	kJ/kg	1,6		1,6
"qb" loss fix heating in flue gas	%	0,01		0,01
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	49,1		49,1
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,29		0,29
"m" flue gas mass flow	g/s	15,9		15,9
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,36		1,36
"eta" Efficiency (direct), to consider only water heating output Pw	%	92,4		**92,4**
"eta" Efficiency (indirect)	%	93,7		93,7
Heating input	kW	32,5		**32,5**
"Pw" water heating output	kW	30,0		**30,0**
Adjustments				
Flue gas motor	rpm	2150		
Fuel motor		140		
Cleaning time		OFF		
Firedoor	-	closed		

Report- No.		**K25372018T1**
TÜV- order- No.		**21245356**
Manufacturer		**Extraflame S.p.A.**
Construction type		**Wood pellets boiler**
max. working temperature	°C	**80**
max. working pressure	bar	**3,0**
Type of fuel charging		**automatic load**
Special properties / Remarks		**-**
Burner Type		**-**
Type designation:		**E149**
Model designation:		**PK30, PR30**
Test place		**Thiene**
Standard		**EN 303-5:2012**
Type of test		**Test at reduced load**
Heat input from manufacturer	**kW**	**9,6**
Heat output from manufacturer	**kW**	**8,9**
		1. test
Test date		29/04/2019
Time		10:30 - 16:30
Ambient:		
Ambient pressure, measurement	mbar	1003
Air temperature (combustion air), measurement	°C	20,5
Humidity of combustion air, measurement	%	0
Ambient temperature, measurement	°C	20,5
Type of Fuel		wood pellets
Properties of Fuel		Ø 6 mm, Lmax 30 mm, max humidity 7,5%, Heizinos class A1 according to EN
Number of fuel tasks		1
Weight of the stove, start, measurement	kg	479,4
Weight of the stove, end, measurement	kg	467,2
Fuel consumption, calculated of the difference	kg	12,1
Test duration, measurement	sec	21600
Fuel consumption "B"	kg/h	2,02
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 . %	1,8
Carbon content of the residue passing through the grate "Cr" depending of 1 kg fuel	Gew . %	0,27
Water side, measurement		
Flow , measurement	°C	70,9
Return, measurement	°C	61,5
Delta T	K	9,4
Cold water flow , measurement	kg/h	816,8
Additional energy of the pump	kW	0,000
Flue, average		
Flue gas temperature, measurement	°C	66,5
Flue draught, measurement	Pa	3,0
O_2 - concentration, measurement	Vol.-%	12,9
CO_2 - concentration, calculated	Vol.-%	7,5
lambda figure	-	2,557

CO - concentration, measurement	ppm	93
CO - concentration, measurement	Vol.-%	0,009
CO - concentration, measurement	mg/m³	116
CO - concentr. (at 10% - O2)	Vol.-%	0,013
CO - concentr. (at 10% - O2)	mg/m³	157
CO - concentration	mg/kWh	287
CO - concentration	mg/MJ	80
NOx - concentration, measurement	ppm	56
NOx - concentration, measurement	mg/m³	116
NOx - concentr. (at 10% - O2)	mg/m³	157
NOx - concentration	mg/kWh	286
NOx - concentration	mg/MJ	80
CnHm concentration, measurement	ppm	2
CnHm concentration, measurement	mg/m³	3
CnHm concentr. (at 10% - O2)	mg/m³	4
CnHm - concentration (total C)	mg/kWh	7
CnHm - concentration (total C)	mg/MJ	2
Dust, measurement*	mg	3
Dust, measurement*	mg/m³	10
Dust (at 10% - O2)*	mg/m³	14
Dust*	mg/kWh	25
Dust*	mg/MJ	7
PME concentration (at 13% - O2)*	mg/m³	11
Electrical consumption		
Rated electrical power (max)	W	410
Electrical consumption (at nominal heat output) - acc. EN 15456	W	45
Electrical consumption (at minimum heat output) - acc. EN 15456	W	27
PSTBY (during stand-by) - acc. IEC 62301	W	3
Calculation		
"Qa" loss free heating flue gas	kJ/kg	808,3
"qa" loss flue gas	%	4,71
"Qb" loss fix heating in flue gas	kJ/kg	13,8
"qb" loss fix heating in flue gas	%	0,08
"Qr" losses due to combustible constituents in the residue passing through the grate	kJ/kg	91,1
"qr" losses due to combustible constituents in the residue passing through the grate	%	0,53
"m" flue gas mass flow	g/s	9,1
cpm, acc. DIN 4702-2, version 03.90 for dry flue gas	kJ/(m³K)	1,33
"eta" Efficiency (direct), to consider only water heating output Pw	%	**92,7**
"eta" Efficiency (indirect)	%	92,7
Heating input	kW	**9,6**
"Pw" water heating output	kW	**8,9**
Adjustments		
Flue gas motor	rpm	1090
Fuel motor		45
Cleaning time		OFF
Firedoor	-	closed

Appendix A 03

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

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B030	Water pressure	Manometer	Cewal DN 150	0 – 25 bar	± 0,6%	Reference manometer
B062	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B066	Gas pressure	Manometer	Testo 510	0 – 100 hPa	± 3% related to final value	Reference manometer
B068	Temperature	IR emission	Fluke Ti20	-10 – 350 °C	---	---
B070	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 600 kg	± 10 g	Reference load
B079	Water flow	Magnetic	ABB Copa-XE DE43FI	0 – 2000 kg/h	± 1% related to the range	Balance
B084	Temperature	PT 100 K-type thermocouples	Agilent 34970 A	0 – 300 °C	Up to 0,5 °C	Reference thermometer
B090	Dust content	Gravimetric	Sartorius CPA 224 S	0,1 mg – 220 g	± 0,1 mg	Reference load
B092	Fuel consumption	Gravimetric	Dini Angeo DFWK	0 – 1200 kg	± 10 g	Reference load
B094	CO_2	Infrared-absorption	Siemens Ultramat 6E	0 – 3 % 0 – 30 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 6E	0 – 300 ppm 0 – 3000 ppm	± 1% related to the range	Reference gas: 2002 ppm
B095	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1 % 0 – 5 %	± 1% related to the range	Reference gas: 4,925 %
B096 + B123	CO_2	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NOx	Infrared-absorption	Siemens Ultramat 23 + Bühler Bünox MV	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B097	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B098	Temperature	K-type thermocouple	Testo 925	0 – 200 °C	± 2 °C	Reference thermometer
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
B118	Gas volume	Diaphragm	CMC	0,016 – 2,5 m^3/h	± 5 %	Air flow
B121	OGC	FID	Siemens Fidamat 6	0 – 3,33 ppm C3 0 – 33,3 ppm C3 0 – 333 ppm C3 0 – 3333 ppm C3	± 1% related to the range	Reference gas: 29,82 ppm propane
B122	CO_2	Infrared-absorption	Siemens Ultramat 23	0 – 5 % 0 – 25 %	± 1% related to the range	Reference gas: 19,99 %
	CO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 2002 ppm
	NO	Infrared-absorption	Siemens Ultramat 23	0 – 1000 ppm 0 – 5000 ppm	± 1% related to the range	Reference gas: 191,4 ppm
B129	Water flow	Magnetic	ASA AF6-2600/1/B/1/AC	0 – 1500 kg/h	Accuracy: ± 0,5% r.v.	Balance
B140	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer

Index	Measure	Principle	Company	Range	Instrument specification	Reference
B141	Gas pressure	Inclined liquid column manometer	Kimo HP series	0 – 15 Pa	± 10% related to final value	Reference manometer
B149	Mass	Gravimetric	Kern FKB 15K0.5A	0 – 15 kg	± 0,5 g (reproducibility)	Reference load
B154	Gas volume	Diaphragm	Elster BK-G4M	---	Class 1,5	Air flow
B169	Electrical power	---	Yokogawa WT310E	0 – 2000 W	± 0,5 %	External calibration
B179	Stopwatch	---	RS 8111814	0 – 99 h	0,01 s	---
B180	Absolute pressure meter	Absolute pressure meter	Testo 511	0 – 999,0 hPa	±3,0 hPa	External calibration

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