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Report

on the

test of a heating boiler according to EN 303-5

Report A Summarized Validation

Test laboratory	TÜV SÜD Industrie Service GmbH Abteilung Feuerungs- und Wärmetechnik Prüfbereich Wärmetechnik	
Subject of test	Heating boiler for solid fuels	
	Type	PuroWIN
	Sizes/ Models	PuroWIN see page 2
	Fuel:	chipped wood B1 and compressed wood C1
	Fuel supply:	automatic stoking
	Combustion air supply: with an induced draught fan	
Customer/Manufacturer	Windhager Zentralheizung Technik GmbH Anton-Windhager-Strasse 20 5201 Seekirchen, Austria	
Manufacturer's plant	Windhager Zentralheizung Technik GmbH Anton-Windhager-Strasse 20 5201 Seekirchen, Austria	
Scope	Summarized validation of the requirements of DIN EN 303-5 on the heating boilers	
Expert	Dipl.-Ing. Michael Schmidt	
Period of test	November 2017 to March 2019	
Basis of test	DIN EN 303-5:2012-10	

Date: 2019-03-05

Our reference:
IS-TAF-MUC/smi

Report No. H-A 1408-03/19
Order no. 2776090

Document:
HA14080319_PuroWIN_Englisch.doc

This document includes
16 pages

The test results refer exclusively to the units under test.

This test report is also issued in a German version.
In any case of doubts the German version is binding.
In this test report a comma is used as a decimal separator.

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D-PL-14153-04-00

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1 Summary

Customer/Manufacturer: Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen

Manufacturer's plant: Windhager Zentralheizung Technik GmbH, A-5201 Seekirchen

Construction: Heating boiler made of steel according to DIN EN 303-5 with an induced draught fan for not room sealed operation

Operating mode:	modulating
Combustion:	gasification in primary zone and combustion in secondary and tertiary zone
Fuel feed:	automatic stoking, downwards direction of combustion
Grate design:	moving grate and firebed slide
Ash removal:	automatic
Fittings:	combustion chamber out of steel turbulators in all heat exchanger tubes

Type: PuroWIN

Models: with fuel supply with cell feeder and feeder screw or with sliding damper and integral fuel hopper with pneumatic filling

Technical data of the heating boiler series (manufacturer's information)

No	Size	Nominal heat output range kW	Fuel –	max. flue gas temp °C
1	PuroWIN	7,2 – 24,0	B1, C1	109
2	PuroWIN	9,0 – 30,0	B1, C1	110
3*	PuroWIN	12,0 – 40,0	B1, C1	110
4*	PuroWIN	13,5 – 45,0	B1, C1	110
5*	PuroWIN	14,7 – 49,0	B1, C1	110
6	PuroWIN	18,0 – 60,0	B1, C1	110
7*	PuroWIN 72	18,0 – 72,0	B1, C1	143
8*	PuroWIN 83	25,0 – 83,0	B1, C1	143
9	PuroWIN 99	29,7 – 99,0	B1	143
10	PuroWIN 100	30,0 – 100,0	B1	143
11	PuroWIN 103	30,0 – 103,0	B1	143
12	PuroWIN 110	33,0 – 110,0	C1	140

A: Log wood B1: Chipped wood (water content 15 to 35 %) B2: Chipped wood (water content greater 35 %) C1: Compressed wood Pellets (6 mmØ) D: Sawdust

* not tested intermediate size, data given by manufacturer

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Destination countries	all countries of European community and Switzerland
Boiler class	5
Maximum allowable temperature	90 °C
Max. allowable operating pressure	3 bar
Necessary flue gas draught	10 Pa
Electrical power supply	230 V, 50 Hz

The examined heating boilers comply with the requirements of DIN EN 303-5:2012-10 without clause 4.3.9.3 (EMV) as well as with the additional requirements on the destination countries AT, HR, DK, DE, CH and IT according to annex C, clauses C.2, C.3, C.4, C.5, C.6 and C.8 of DIN EN 303-5:2012-10.

The proof on the national requirements of the destination country UK according to annex C.7 of DIN EN 303-5:2012-10 was not part of the order by the customer and must be evaluated separately when required.

Feuerungs- und Wärmetechnik
Prüfbereich Wärmetechnik

Johannes Steiglechner
Leiter
Feuerungs- und Wärmetechnik

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2 Scope of test

The manufacturer Windhager Zentralheizung Technik GmbH orders the Summarized Validation on the requirements according to DIN EN 303-5:2012-10 of the heating boilers type PuroWIN.

3 Basis of test

DIN EN 303-5:2012-10	Heating boilers - Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW without clause 4.3.9.3 (EMV)

4 Applied test documents

- test reports on partial test on the boiler series according to chapter 7 of this report
- manufacturer's documents according to chapter 5 of this report

5 Enclosures and further applicable documents

Enclosure

Enclosures A to F are documented with the German version of this report only

A1 – A3	Operating instructions and installation / service instructions
B1 – B18	Drawings
C1	Data plate
D1	Interpolated value of intermediate sizes

Documents

Quantity	Designation (see also clause 7)
1	Test report B / construction requirements
7	Test reports C / boiler performance requirements
1	Test reports E / electrical safety
1	Test report R / evaluation of risk assessment
1	Test report SP / operational safety

6 Description of the boiler series

6.1	Construction	Warm water heating boiler with - automatic stoking device out of external fuel hopper or with integral fuel hopper - burner/combustion unit out of steel with integrated ash slide to remove ash from firebed and firebed slide to spread fuel and to separate from ash removal area - automatic ash removal by traverse screw underneath of combustion unit and heat exchanger into external ash box - combustion air supply via primary, secondary and tertiary combustion air flap by means of induced draught fan - combustion air passes below housing of boiler - automatic cleaning device of heat exchanger - flue gas manifold, induced draught fan and a flue gas connector at top of heating boiler
6.2	Operation	Modulating operation within heat output range
6.3	Accessories	
6.3.1	Control system	Microprocessor control board, type PuroWIN Version C2 V1.03, operating unit type Info WIN Touch as unit with boiler additionally, with model with sliding damper and integral fuel hopper with pneumatic filling: control system board EWM PW-01, Version C2 to control sliding damper and suction turbine and board Super Cap EDV 012008 (electrical closing of sliding damper)
6.3.1.1	Boiler's water temperature control	Manufacturer TEM, type ZTF 222, NTC 5K, positioned in immersion pocket, no further proof according to DIN EN 14597 available at test, processing of signal by control system, sensor length 50 mm, immersion pocket at rear, top side of heating boiler at flow connector with an inner depth of 180 mm
6.3.1.2	O_2-control	O_2 content is measured in flue gas manufacturer: NGK/NTK, Type: 118.02-7100 place of installation of O_2-Sensor at left side of heating boiler, below heat exchanger tubes processing of signal by control system to control primary, secondary and tertiary combustion air flap

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6.3.1.3	Combustion chamber temperature control	Sensor type: NiCrNi processing of signal by control system, sensor placed at top side of boiler at middle position, in area between combustion unit and heat exchanger, positioned in immersion pocket with an inner depth of 45 mm, sensor length 90 mm
6.3.1.4	Safety temperature limiter (manual reset) (boiler's water)	Type 89.42, manufacturer Rathgeber, DIN-Register-No. STB 115408 according to DIN EN 14597, sensor placed in same immersion pocket together with boiler's water temperature sensor, inner depth of immersion pocket 180 mm, sensor length 80 mm, set point: 100 °C, switches of fuel supply and induced draught fan, solenoid will be closed, primary combustion air flap closed and secondary and tertiary combustion air flap opened by control system.
6.3.1.5	Flue gas temperature sensor	PT-1000E sensor in flue gas way at flue gas connector, processing of signal by control system only to display flue gas temperature, sensor positioned at flue gas connector, inner depth of 65 mm of immersion pocket, sensor length 100 mm
6.3.2	Safety-temperature limiter to prevent back burning (manual reset) (at feeder screw)	Type 602031 20, manufacturer Jumo, DIN-Register-No. STW(STB) 1190 according to DIN EN 14597, sensor fixed at outside of housing of the feeder screw, sensor length 88 mm, set point: 88 °C if activated: switching off of suction turbine if running or of fuel supply screw, closing of sliding damper (depending of corresponding model), burnout phase started by control system in following course of action: operation of feeder screw for a period of 10 minutes, operation of induced draught fan at 1500 min^{-1}, closing of primary combustion air flap and damper at primary combustion air supply, secondary and tertiary combustion air flap fully opened, shut down of feeder screw after operation of 10 minutes, continuous operation of induced draught fan at 1500 min^{-1}, alarm must be quit manually at operating unit, safety-temperature limiter must be manually reset

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6.3.3	Fuel supply	Automatic stoking device out of external fuel storage, fuel supply includes model with fuel supply with cell feeder and feeder screw: - external fuel storage and fuel supply screw - drop distance - cell feeder, common drive with feeder screw, motor mounted at cell feeder shaft - drop distance - connector for fire extinguisher device at drop distance above feeder screw, sensor of fire extinguisher device fixed at housing of feeder screw - surveillance of temperature (STW) with sensor fixed at housing of feeder screw - feeder screw - mechanical firebed level control above grate and a proximity switch model with sliding damper and integral fuel hopper with pneumatic filling: - pneumatic fuel supply out of external fuel storage - sliding damper between suction turbine and integral fuel hopper - integral fuel hopper including two proximity switches for upper and lower fuel level - fuel supply screw - drop distance - sliding damper - drop distance - connector for fire extinguisher device at drop distance above feeder screw, sensor of fire extinguisher device fixed at housing of feeder screw - surveillance of temperature (STW) with sensor fixed at housing of feeder screw - feeder screw - mechanical firebed level control above grate and a proximity switch

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6.3.4	Fire extinguisher device	Thermal discharge safety device, set point 95 °C, manufacturer Syr, type 3065A, DIN-Register-No. TH 797according to DIN EN 14597, sensor fixed at housing of feeder screw, sensor length 140 mm, connection at feeder screw and at open circuit water pipe
6.3.5	Ash slide	Position switch type ICB12SF04N01595, 10-36 VDC, LN3454118, manufacturer Gavazzi motor manufacturer Moons, type 64S032L3-80001 3, GMSM 100006
6.3.6	Sliding damper in drop distance between integral fuel hopper and feeder screw	Only model with sliding damper and integral fuel hopper with pneumatic filling: sliding damper drive motor type Dunker G30.1, 12 V, 0,9 A, 3300/1100 1/min, 15 Nm position switch type Z-15GQ21, manufacturer Omron
6.3.7	Integral fuel hopper	Only model with with sliding damper and integral fuel hopper with pneumatic filling: motor fuel supply screw with gear box and temperature control switch manufacturer ABM, type FGA 103/4DEKG63AS-4, 230 V, 50 Hz, 0,05 kW, 4,5/1360 1/min, FU manufacturer Lenze, type ESV371N02YXB571 two capacitive proximity sensors, processing of signal by control system, manufacturer Gavazzi, type EC 3025 NPAPL, 10 - 40 V, DC, 200 mA position switch type Z-15GQ21B, 250 V AC, 0,2 A, manufacturer Omron

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6.3.8	Firebed slider	Position switch type ICB12SF04N01595, 10-36 VDC, LN3454118, manufacturer Gavazzi motor manufacturer Moons, type 64S032L3-80001 3, GMSM 100006
6.3.9	Firebed level control	Mechanical device including proximity switch above firebed in primary combustion zone, position switch type ICB12SF04N01595, 10-36 VDC, LN3454118, manufacturer Gavazzi, processing of signal by control system
6.3.10	Feeder screw	Electrical driven screw, motor with overcurrent control, manufacturer motor Lenze, motor: 50 Hz, 1,1 kW, 42 min^{-1} external gear box gear wheel: 20 tooth at motor shaft, 20 tooth at feeder screw shaft, model with fuel supply with cell feeder and feeder screw: motor mounted on cell feeder shaft, model with sliding damper and integral fuel hopper with pneumatic filling: motor mounted on feeder screw shaft feeder screw length 547 mm fuel supply screw of integral fuel hopper, length 824 mm, Ø126/35 mm FU manufacturer Lenze, type ESV371N02YXB571 opening for intended directed flow in feeder screw, 8,5 mmØ
6.3.11	Primary combustion air control	Mass flow rate sensor, processing of signal by control system, manufacturer E+E Elektronik, type not found at test, 10-29 V input, 0-5 V output, 0-10 m/s
6.3.12	Ash removal	Common electrical drive of both ash removal screws to transport ash into ash box manufacturer Rotek, type S8A135A122-A124 motor: 230 V, 50 Hz, 1200 min^{-1} electrical drive of cleaning device of heat exchanger tubes, manufacturer Rotek, type TS15-0033 motor: 230 V, 50 Hz, 28,5 W, 2850 min^{-1}
6.3.13	Suction turbine	Only model with sliding damper and integral fuel hopper with pneumatic filling: manufacturer Dietz, type GR125-K-90/2, 230/400 V, 50 Hz, 2,2 kW

6.3.14	Ignition device	Ignition devices including 3 heating elements one ignition device including 2 heating elements in primary combustion zone, manufacturer Preziehs, each heating element 1000 W one ignition device including 1 heating element in secondary combustion zone, PuroWIN 24 to 60, 290 W PuroWIN 72 to 110, 500 W
6.3.15	Induced draught fan	PuroWIN 24 to 60 Motor, manufacturer Rotek, type: OSB-9225-A1845D, 230 V, 50 Hz, 118 W, 2065 min^{-1} , fan wheel 180 mm∅, 6 blades, height 45 mm PuroWIN 72 to 110 Motor, manufacturer ebm Papst, type: R2E 250-BE03-14, 230 V, 50 Hz, 118 W, 2065 min^{-1} , fan wheel 250 mm∅, 6 blades, height 65 mm
6.3.16	Combustion air	Damper primary combustion air supply, driven by solenoid hub, manufacturer of solenoid hub Intertec, damper is positioned before primary combustion air flap, both placed in a tight box with an intake and a connection to the primary zone of burner/combustion unit primary combustion air flap, manufacturer Mechtex, type 15 G SOE-59, motor: 230 V, 50 Hz, 0,3 min^{-1}, position switch type V3, manufacturer Crouzet secondary and tertiary combustion air flap, manufacturer Mechtex, type 15 G SOE-59, motor: 230 V, 50 Hz, 0,3 min^{-1}, position switch type V3, manufacturer Crouzet, minimum opening (see drawings)

6.3.17	Burner/ Combustion unit	integral burner/combustion unit with fittings and movable grate upper cone for secondary combustion air supply: Ø 328/296/300/286/296/320/350 mm, height 132/105 mm 4 holes, Ø 15,5 mm, position seen from lower edge 38/87 mm cone for tertiary combustion air supply: Ø 380/314/200/235/300/314/324 mm, height 120/99 mm 4 holes, Ø 21,5 mm burner tube: Ø 400/376/366 mm, height 313 mm, distance tubes combustion air supply 182 mm upper gasification tube: Ø 296, height 188 mm lower gasification tube: Ø 298/288/270/279, height 355 mm hole Ø 34 mm, position seen from lower edge 301,5 mm opening 134*131/53,5 mm
6.3.18	Thermal discharge safety device	Installed on site, user defined but adequate, e.g. tested according to DIN EN 14597 and certified, set point 95 °C, minimal flow rate 1,8 m³/h, sensor length maximum 150 mm, used at test: manufacturer: Syr, type: 3065A, DIN-Reg.-No. TH 797 according to DIN EN 14597, set point 95 °C, sensor length 140 mm, immersion pocket at top side of boiler at flow connector, inner depth 160 mm

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6.3.19	Safety heat exchanger	heat exchanger, integrated in boiler at upper positon
6.3.20	Turbulators	Tubes of 2nd and 3rd flow direction of heat exchanger completely equipped with turbulators
6.3.21	Data plate	Manufacturer: Windhager Zentralheizung Technik GmbH Anton-Windhager-Strasse 20 A-5201 Seekirchen Type: will be added Article number: will be added Serial number: will be added Year of manufacture: will be added Nominal heat output: will be added Nominal heat output range: will be added Heat input range: will be added Boiler class: will be added Fuel: will be added Maximum allowable operating pressure: will be added Maximum allowable temperature: will be added Water content: will be added Electrical supply: will be added Electrical power consumption: will be added Basis of test will be added

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7 Performed tests and evaluations

The list of measurement devices used for the test are documented in the below listed test reports.

7.1 Testing of construction requirements

Test laboratory: TÜV SÜD Industrie Service GmbH, Feuerungs- und Wärmetechnik

Type designation/boiler size	Test report B
PuroWIN 24 to PuroWIN 110	H-B 1408-01/18 dated 2018-08-29

The construction requirements are fulfilled according to clauses 4.1 (materials), 4.2 and 5.4 of DIN EN 303-5:2012-10.

7.2 Testing of boiler performance requirements

Test laboratory: TÜV SÜD Industrie Service GmbH, Feuerungs- und Wärmetechnik

Type designation/boiler size	Output performance ratio of the tested boiler size	Test report C
PuroWIN 24	1 : 1	H-C2 1408-00/16 dated 2016-02-29
PuroWIN 30	1 : 1	H-C1 1408-00/15 dated 2015-12-21
PuroWIN 40	1,3 : 1	intermediate size
PuroWIN 45	1,5 : 1	intermediate size
PuroWIN 49	1,6 : 1	intermediate size
PuroWIN 60	1 : 1	H-C3 1408-00/16 dated 2016-04-19
PuroWIN 72	1,2 :1	intermediate size
PuroWIN 83	1,4 : 1	intermediate size
PuroWIN 99	1 : 1	H-C6 1408-00/18 dated 2018-01-03
PuroWIN 100	1 : 1	H-C5 1408-00/18 dated 2018-01-03
PuroWIN 103	1 : 1	H-C7 1408-00/18 dated 2018-01-03
PuroWIN 110	1 : 1	H-C4 1408-00/18 dated 2018-01-03

The boiler performance requirements of boiler class 5 are fulfilled according to clause 4.4 of DIN EN 303-5:2012-10.

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7.3 Risk assessment

Test laboratory: TÜV SÜD Industrie Service GmbH, Feuerungs- und Wärmetechnik

Type designation/boiler size	Test report R
PuroWIN 24 to PuroWIN 110	H-R 1408-00/16 dated 2016-09-22

The requirements are fulfilled regarding the test on completeness, accuracy and plausibility of the risk assessment of the manufacturer according to clause 5.16.1 of DIN EN 303-5:2012-10. Corresponding measures were respected to minimize risks.

7.4 Testing of operational safety

Test laboratory: TÜV SÜD Industrie Service GmbH, Feuerungs- und Wärmetechnik

Type designation/boiler size	Test report SP
PuroWIN 24 to PuroWIN 110	H-SP 1408-00/16 dated 2016-09-22

The requirements are fulfilled according to clauses 4.3.1 to 4.3.8 of DIN EN 303-5:2012-10.

The proof includes also the test on temperature control and safety temperature limiter according to clause 5.13 of DIN EN 303-5:2012-10. The requirements on partly disconnectable firing systems including a device for dissipating excess heat are also fulfilled according to clause 5.15 of DIN EN 303-5:2012-10.
Suitability is given in closed vented systems (e.g. for Germany as described in DIN EN 12828).

The test of requirements according to DIN EN 303-5:2012-10, clause 4.3.9.3 (EMC) was not part of the order.

7.5 Testing of electrical safety

Test laboratory: TÜV SÜD Industrie Service GmbH, Feuerungs- und Wärmetechnik

Type designation/boiler size	Test report E
PuroWIN 24 to PuroWIN 110	H-E 1408-00/19 dated 2019-02-05

The requirements of electrical safety are fulfilled according to clause 4.3.9.2 of DIN EN 303-5:2012-10.

8 Technical information and manuals

The installation and operation manuals include the essential information on installation and operation of the heating boiler according to clauses 8.2 and 8.3 of DIN EN 303-5:2012-10.

9 Data plate

The draft of data plate includes the essential information according to clause 7.2 of DIN EN 303-5:2012-10, see clause 6.3.21.

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10 Expertise

The heating boilers of manufacturer	Windhager Zentralheizung Technik GmbH Anton-Windhager-Strasse 20 5201 Seekirchen, Österreich
as presented for the testing	heating boilers firing the solid fuels chipped wood B1 and compressed wood C1
type	PuroWIN
sizes/models	PuroWIN 24 B1/C1 PuroWIN 30 B1/C1 PuroWIN 40 B1/C1 PuroWIN 45 B1/C1 PuroWIN 49 B1/C1 PuroWIN 60 B1/C1 PuroWIN 72 B1/C1 PuroWIN 83 B1/C1 PuroWIN 99 B1 PuroWIN 100 B1 PuroWIN 103 B1 PuroWIN 110 C1

were tested according to the requirements as given the in clause 3 (basis of test) by the test laboratory of TÜV SÜD Industrie Service GmbH.

The requirements of DIN EN 303-5:2012-10 are fulfilled as well as the additional requirements for the destination countries AT, HR, DK, DE, CH and IT of annex C, clauses C.2, C.3, C.4, C.5, C.6 and C.8 of DIN EN 303-5:2012-10.

The proof on the additional requirements of the destination country UK according to annex C, clause C.7 of the DIN EN 303–5:2012-10 was not part of the test order by the manufacturer and must be tested separately when required.

The test on requirements according to clause 4.3.9.3 (EMC) was not part of the order.

An adequate safety in operation is given to use the heating boilers in the destination countries when respecting the applicable laws and regulations.

Feuerungs- und Wärmetechnik
Prüfbereich Wärmetechnik

Johannes Steiglechner
Leiter
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The expert

Michael Schmidt

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Heating boiler, type PuroWIN firing with solid fuel chipped wood B1
(sizes/models: data given by manufacturer)

heating boiler	fuel[1]	nominal heat output range [2]	necessary flue gas draught (under pressure)	average flue gas temperature	boiler efficiency direct	emissions values							
					η	CO		NO_X		C_XH_Y		dust	
size/ models		kW	Pa	°C	%	mg/m³		mg/m³		mg/m³		mg/m³	
						related to O_2							
						10%	13%	10%	13%	10%	13%	10%	13%
PuroWIN 24	**B1**	NL	24,0	6	111	93,5	2	2	93	68	1	1	1	1
		TL	7,2	3	65	93,4	22	16	71	52	1	1	1	1
PuroWIN 30	**B1**	NL	30,0	3	112	93,4	8	6	115	84	1	0	1	1
		TL	10,0	2	62	93,0	21	15	85	62	2	1	1	1
PuroWIN 40[3]	**B1**	NL	40,0	3	111	93,8	6	5	111	81	1	0	1	1
		TL	12,0	3	65	93,6	18	13	81	60	2	1	1	1
PuroWIN 45[3]	**B1**	NL	45,0	4	111	94,0	6	4	109	80	1	0	1	1
		TL	13,5	4	66	93,8	15	11	79	59	2	1	1	1
PuroWIN 49[3]	**B1**	NL	49,0	4	111	94,2	5	4	108	79	1	0	1	1
		TL	14,7	4	67	94,0	13	10	78	57	1	1	2	2
PuroWIN 60	**B1**	NL	60,0	4	110	94,7	3	2	103	75	1	0	1	1
		TL	18,0	6	69	94,5	8	6	74	54	1	1	2	2
PuroWIN 72[3]	**B1**	NL	72,0	6	118	94,3	18	13	112	81	1	0	4	3
		TL	21,6	7	71	94,5	12	9	84	59	1	1	9	7
PuroWIN 83[3]	**B1**	NL	83,0	8	128	93,8	35	26	122	88	1	0	7	6
		TL	24,9	9	73	94,5	16	12	93	63	1	1	14	10
PuroWIN 99	**B1**	NL	99,0	13	143	93,1	63	46	138	100	1	1	13	10
		TL	29,7	12	75	94,5	26	18	101	74	0	0	20	14
PuroWIN 100	**B1**	NL	100,0	13	143	93,1	63	46	138	100	1	1	13	10
		TL	30,0	12	75	94,5	26	18	101	74	0	0	20	14
PuroWIN 103	**B1**	NL	103,0	13	143	93,1	63	46	138	100	1	1	13	10
		TL	30,0	12	75	94,5	26	18	101	74	0	0	20	14

A plausibility check of the interpolated values was carried out on the basis of the measured values from the heating tests according to the test reports see clause 7.2

[1] A: Log wood B1: Chipped wood (water content 15 to 35 %) B2: Chipped wood (water content >35 %) C1: Compressed wood Pellets (6 mmØ) D: Sawdust
[2] NL = nominal load / TL = part load
[3] not tested intermediate size, data given by manufacturer

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Heating boiler, type PuroWIN firing with solid fuel compressed wood C1
(sizes/models: data given by manufacturer)

heating boiler	fuel[4]	nominal heat output range [5]	necessary flue gas draught (under pressure)	average flue gas temperature	boiler efficiency direct	emissions values							
					η	CO		NO_X		C_XH_Y		dust	
size/ models		kW	Pa	°C	%	mg/m³		mg/m³		mg/m³		mg/m³	
						related to O_2							
						10%	13%	10%	13%	10%	13%	10%	13%
PuroWIN 24	**C1**	NL	24,0	5	109	94,9	11	8	112	82	1	1	1	1
		TL	7,2	4	63	94,8	29	21	110	80	3	2	1	1
PuroWIN 30	**C1**	NL	30,0	2	110	94,2	7	5	116	84	1	1	1	1
		TL	10,0	2	93	94,6	15	11	102	74	2	1	2	1
PuroWIN 40[6]	**C1**	NL	40,0	3	110	94,3	6	4	121	88	1	1	2	1
		TL	12,0	3	88	94,4	15	11	100	72	2	1	4	3
PuroWIN 45[6]	**C1**	NL	45,0	4	110	94,4	6	4	124	90	1	1	2	2
		TL	13,5	4	83	94,3	14	10	98	71	2	1	6	4
PuroWIN 49[6]	**C1**	NL	49,0	4	110	94,5	5	4	126	92	1	1	2	2
		TL	14,7	4	80	94,2	14	10	96	70	1	1	7	5
PuroWIN 60	**C1**	NL	60,0	5	110	94,6	4	3	131	96	1	1	3	2
		TL	18,0	6	71	93,9	13	9	92	67	1	1	10	7
PuroWIN 72[6]	**C1**	NL	72,0	7	117	94,5	6	5	129	94	1	1	4	3
		TL	21,6	7	72	93,9	13	9	90	66	1	1	11	8
PuroWIN 83[6]	**C1**	NL	83,0	9	124	94,3	9	6	127	93	1	1	5	3
		TL	24,9	9	73	94,0	13	9	89	65	1	1	12	9
PuroWIN 110	**C1**	NL	110,0	14	140	94,0	14	10	122	89	0	0	7	5
		TL	33,0	12	76	94,1	13	9	85	62	0	0	15	11

A plausibility check of the interpolated values was carried out on the basis of the measured values from the heating tests according to the test reports see clause 7.2

[4] A: Log wood B1: Chipped wood (water content 15 to 35 %) B2: Chipped wood (water content >35 %) C1: Compressed wood Pellets (6 mmØ) D: Sawdust
[5] NL = nominal load / TL = part load
[6] not tested intermediate size, data given by manufacturer