



## **TEST REPORT**

### **39-14036/T2**

**Product:** Hot-water boiler for solid fuel (wood pellets – C1) with automatic fuel supply

**Type designation:** CARIA CP-23, CARIA CP-40, CARIA CP-80, CARIA CP-100, CARIA CP-150

**Versions:** CARIA TLUX CPT-23, CARIA TLUX CPT-40, CARIA TLUX CPT-80, CARIA TLUX CPT-100, CARIA TLUX CPT-150

**Customer:** Arikazan a.s.  
Ogulbey Mah. Kumludere Cad.No:4 Golbasi  
Ankara  
Turkey

**Manufacturer:** Arikazan a.s.  
Ogulbey Mah. Kumludere Cad.No:4 Golbasi  
Ankara  
Turkey

**Employee responsible:** Mr. Milan Holomek

**Report issue date:** 2019-06-20

**Distribution list:** 1 copy to the Engineering Test Institute  
1 copy to the Customer



The tests were performed based on these documents:

- Order B-66328 dated 2019-04-23 (received on 2019-04-23)
- Contract B-66328/39 dated 2019-05-02
- Amendment D1 of Contract B-66328/39

## I. Product description, intended use and mode of application

The Hot-water boilers for solid fuel (wood pellets – C1) with automatic fuel supply, Eco Mini-12, Eco Mini-23, Eco Mini-60 are intended for heating of large residential buildings (schools, farms, small factories...) and similar buildings. The boiler is designed for burning of wood pellets – C1. The boiler assembly comprises the boiler body, boiler burner, feed screw and the fuel chamber (storage of fuel). The boiler body is equipped with automatic mechanism for cleaning of combustion product passages. The boiler body is a steel-sheet weldment, cylindrical in shape. The boiler body is thermally insulated with mineral felt. Further detailed descriptions of individual assembly groups are provided in the enclosed technical documentation to Task 32-0148.

## II. Sample tested

- Number of samples: 4
- Date of submission 2019-05-13  
or collection:
- Reg. number: -
- Serial number: prototype1, prototype 2, prototype 3, prototype 4

Boiler output versions that are the subject of the proceedings:

| Boiler output version                         | Heat output [kW] | Fuel              | Place of testing  |
|---|------------------|-------------------|---|
| CARIA CP-23<br>(version: CARIA TLUX CPT-23)   | 23               | Wood Pellets - C1 | Arikazan A.S.<br>Ogulbey Mah.<br>Kumludere Cad. No:4<br>Golbasi, Ankara<br>TURKEY |
| CARIA CP-40<br>(version: CARIA TLUX CPT-40)   | 40               |                   |   |
| CARIA CP-80<br>(version: CARIA TLUX CPT-80)   | 80               |                   |   |
| CARIA CP-100<br>(version: CARIA TLUX CPT-100) | 100              |                   |   |
| CARIA CP-150<br>(version: CARIA TLUX CPT-150) | 150              |                   |   |

Visual inspection, testing and verification were carried out by Ing. Pavel Fojtů, Test Engineer, at Arikazan A.S., Ogulbey Mah. Kumludere Cad. No:4 Golbasi, Ankara, TURKEY, in 05/2019.



The tests were performed with the measurement and test equipment with valid calibration.

### III. Measuring and test equipment

| No. | Description   | Inventory number | Calibration valid until               | Accuracy                               |
|-----|---|------------------|---------------------------------------|--|
| 1.  | Combustion product analyser, Horiba, type ENDA-680P | 022394           | calibration prior to each measurement | see CRM 190/16<br>see CRM 103000414644 |
| 2.  | Weighing machine                                    | 022342           | 02/2021                               | see KL 6051-KL-H0335-19                |
| 3.  | Induction flow meter                                | MaR02_Pr         | 04/2022                               | see 6015-KL-P0269-18                   |
| 4.  | Temperature measurement set                         | 022435T/1        | 07/2020                               | see KL-T-0157-17                       |
| 5.  | Thermometer, Moisture meter                         | 022435/T2        | 01/2023                               | see 6036-KL-V0009-18                   |
| 6.  | Barometer   | MaR09_B          | 06/2020                               | see KL 5749/2017                       |
| 7.  | Draught gauge                                       | 117276           | 06/2019                               | see KL 6013-KL-D0205-17                |
| 8.  | Electronic stop watch                               | 990760           | 11/2022                               | see KL 3434E-17                        |
| 9.  | Gravimat SHC 501                                    | 022328           | 04/2022                               | see KL 150046-150050                   |
| 10. | Analytic weighing machine Sartorius                 | 021682           | 05/2019                               | see KL 19/KA-17                        |
| 11. | Electronic thermometer                              | 022081           | 10/2019                               | see KL 160147                          |
| 12. | Electrometer  | 022399-C1        | 09/2025                               | see K-2019-001472                      |
| 13. | Induction water meter                               | 116320           | 04/2024                               | see KL Q0191/2018                      |
| 14. | Weighing machine                                    | 022151           | 02/2021                               | see 6051-KL-H0120-19                   |
| 15. | Weighing machine                                    | 022211           | 02/2021                               | see 6051-KL-H0333-19                   |
| 16. | Tape measure  | ME 477           | 10/2022                               | see KL 8800/2017                       |



#### IV. Results of tests and evaluation

| No. | Requirement   | Technical standard, regulation applied  | Source materials | Test evaluation |
|-----|---|---|------------------|-----------------|
| 3.  | Surface temperature test (T 001*)   | ČSN EN 303-5:2013<br>Art. 5.12, 5.16.4, 4.3.6   | Pages<br>7 - 8   | +               |
| 4.  | Test of heat output, input and efficiency (T 001*)<br>Test of combustion product temperature (T 001*)     | ČSN EN 303-5:2013<br>Art. 4.4.2, 4.4.3, 5.7, 5.8, 5.10<br>ČSN EN 303-5:2013<br>Art. 4.4.3 | Pages<br>9 - 11  | +               |
| 5.  | Electrical consumption (T 071*)   | ČSN EN 303-5:2013<br>Art. 5.8.5<br>ČSN EN 15456<br>Art. 5                                 | Page<br>12       | +               |
| 6.  | Combustion efficiency test - emissions (T 001*)   | ČSN EN 303-5:2013<br>Art. 5.7.3, 5.7.4, 5.9, 5.10.4                                       | Pages<br>13 - 14 | +               |
| 7.  | Test of heat output, input and efficiency (T 001*)<br><br>Combustion efficiency test - emissions (T 001*) | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from Austria, C.2.2, C.2.3                     | Pages<br>15 - 16 | +               |
|     |   | ČSN EN 303-5:2013<br>Annex C,<br>C.3 Deviation from Croatia                               | -                | 0               |
|     |   | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from Denmark, C.4.1, C.4.2                     | Pages<br>18 - 19 | +               |
|     |   | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from Germany, C.5.1, C.5.2                     | Page<br>20       | +               |
|     |   | ČSN EN 303-5:2013<br>Annex C<br>C.6 Deviation from Switzerland                            | Pages<br>21 - 22 | -               |
|     |   | ČSN EN 303-5:2013<br>Annex C<br>C.8 Deviation for Italy                                   | Page<br>23       | +               |

Evaluation:

- + Requirement fulfilled
- Requirement not fulfilled
- 0 Not applicable



Accredited test number: **T 001\*** Test title: **Surface temperature test**

Test method: ČSN EN 303-5:2013 Art. 5.12, 5.16.4, 4.3.6

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80, CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40, CARIA TLUX CPT-80, CARIA TLUX CPT-100, CARIA TLUX CPT-150)

Measuring equipment used: Chapter III - Measuring and test equipment

**Test results:**

| Requirement   | Requirement specification            | Test evaluation | Note |
|---|--------------------------------------|-----------------|------|
| <p><b>Surface temperature</b><br/>The mean surface temperature shall be measured at nominal heat output. In order to do this, a minimum of 5 points on each boiler surface shall be measured. Under the same conditions, the critical temperatures (e.g. boiler doors, operating levers) shall be measured.</p>   | <p>ČSN EN 303-5:2013 Art. 5.12</p>   | +               |      |
| <p>The surface temperature on the outside of the boiler (including the bottom and doors but not including the flue gas outlet and maintenance openings of natural draft boilers) shall not exceed the room temperature by more than 60 K when tested in accordance with 5.12. The requirement for the bottom is not applicable for instances when the manufacturer declares that the boiler is to be installed on a non-combustible base.<br/>When tested in accordance with 5.12, the surface temperature of operating levers and all parts which shall be touched by hand during operation of the boiler shall not exceed the room temperature by more than the following values:</p> <ul style="list-style-type: none"> <li>- 35 K for metals and similar materials;</li> <li>- 45 K for porcelain and similar materials;</li> <li>- 60 K for plastics and similar materials.</li> </ul> | <p>ČSN EN 303-5:2013 Art. 4.3.6</p>  | +               |      |
| <p><b>Resistance to thermal conductance</b><br/>Temperature measurement shall be performed on the surface of the stoking device at the place next to the fuel line but within a maximum distance which shall be less than 1 m against the feeding direction from the inner wall of the combustion chamber.<br/>For boilers with integrated hopper, the temperature measurement shall be performed on the surface of the stoking device at the place next to the integrated hopper but within a maximum distance which shall be less than 1 m against the feeding direction from the inner wall of the combustion chamber. In addition, the highest surface temperature of the hopper shall be measured.</p>   | <p>ČSN EN 303-5:2013 Art. 5.16.4</p> | +               |      |



**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23)

| Average temperatures of boiler walls, doors and covers (°C): |  |            |
|--|--|------------|
| Boiler type  | CARIA CP-23 (version: CARIA TLUX CPT-23) |            |
| Fuel type  | Wood Pellets - C1                        |            |
| Heat output  | Nominal                                  | Minimal    |
| Testing date   | 2019-05-22                               | 2019-05-22 |
| ambient temperature (°C)                                     | 25.9                                     | 23.8       |
| humidity (%)   | 32.8                                     | 30.0       |
| air pressure (kPa)   | 98.79                                    | 99.32      |
| Front wall   | 33.3                                     | 31.9       |
| Rear wall  | 34.8                                     | 32.5       |
| Right wall   | 31.9                                     | 31.2       |
| Left wall  | 31.7                                     | 30.3       |
| Upper wall   | 35.2                                     | 31.4       |
| Lower wall   | 45.8                                     | 36.8       |
| Temperatures of control elements (°C):                       |  |            |
| Display - plastic  | 36.0                                     |            |
| Temperature of fuel chamber and stoking elements (°C):       |  |            |
| Temperature of fuel line tube (screw feeder - flange)        | 43.0                                     |            |

**Measurement uncertainty:** 2 °C for temperatures within the range of (0 ÷ 200) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

**Test evaluation:**

The specified temperature rise values have not been exceeded.



**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40)

| <b>Average temperatures of boiler walls, doors and covers (°C):</b> |  |            |
|---|--|------------|
| <b>Boiler type</b>  | CARIA CP-40 (version: CARIA TLUX CPT-40) |            |
| <b>Fuel type</b>  | Wood Pellets - C1                        |            |
| <b>Heat output</b>  | Nominal                                  | Minimal    |
| <b>Testing date</b>   | 2019-05-15                               | 2019-05-16 |
| ambient temperature (°C)  | 25.6                                     | 24.2       |
| humidity (%)  | 41.2                                     | 30.9       |
| air pressure (kPa)  | 101.19                                   | 101.19     |
| <b>Front wall</b>   | 32.4                                     | 29.6       |
| <b>Rear wall</b>  | 34.8                                     | 29.8       |
| <b>Right wall</b>   | 32.0                                     | 27.2       |
| <b>Left wall</b>  | 33.3                                     | 30.3       |
| <b>Upper wall</b>   | 37.9                                     | 31.5       |
| <b>Lower wall</b>   | 66.4                                     | 36.6       |
| <b>Temperatures of control elements (°C):</b>                       |  |            |
| <b>Display - plastic</b>  | 35.0                                     |            |
| <b>Temperature of fuel chamber and stoking elements (°C):</b>       |  |            |
| <b>Temperature of fuel line tube (screw feeder - flange)</b>        | 44.0                                     |            |

**Measurement uncertainty:** 2 °C for temperatures within the range of (0 ÷ 200) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

**Test evaluation:** The specified temperature rise values have not been exceeded.



**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80)

| <b>Average temperatures of boiler walls, doors and covers (°C):</b> |  |            |
|---|--|------------|
| <b>Boiler type</b>  | CARIA CP-80 (version: CARIA TLUX CPT-80) |            |
| <b>Fuel type</b>  | Wood Pellets - C1                        |            |
| <b>Heat output</b>  | Nominal                                  | Minimal    |
| <b>Testing date</b>   | 2019-05-20                               | 2019-05-20 |
| ambient temperature (°C)  | 28.3                                     | 27.3       |
| humidity (%)  | 39.9                                     | 37.8       |
| air pressure (kPa)  | 101.06                                   | 101.06     |
| <b>Front wall</b>   | 38.8                                     | 30.4       |
| <b>Rear wall</b>  | 40.4                                     | 29.7       |
| <b>Right wall</b>   | 39.2                                     | 29.1       |
| <b>Left wall</b>  | 37.5                                     | 29.1       |
| <b>Upper wall</b>   | 44.7                                     | 33.2       |
| <b>Lower wall</b>   | 66.4                                     | 36.6       |
| <b>Temperatures of control elements (°C):</b>                       |  |            |
| <b>Display - plastic</b>  | 35.0                                     |            |
| <b>Temperature of fuel chamber and stoking elements (°C):</b>       |  |            |
| <b>Temperature of fuel line tube (screw feeder - flange)</b>        | 48.0                                     |            |

**Measurement uncertainty:** 2 °C for temperatures within the range of (0 ÷ 200) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

**Test evaluation:** The specified temperature rise values have not been exceeded.



**Measurement results:** CARIA CP 100 (version: CARIA TLUX CPT-100)

| <b>Average temperatures of boiler walls, doors and covers (°C):</b> |  |            |
|---|--|------------|
| <b>Boiler type</b>  | CARIA CP-100 (version: CARIA TLUX CPT-100) |            |
| <b>Fuel type</b>  | Wood Pellets - C1                          |            |
| <b>Heat output</b>  | Nominal                                    | Minimal    |
| <b>Testing date</b>   | 2019-05-20                                 | 2019-05-20 |
| ambient temperature (°C)  | 29.7                                       | 27.3       |
| humidity (%)  | 42.8                                       | 37.8       |
| air pressure (kPa)  | 101.32                                     | 101.06     |
| <b>Front wall</b>   | 33.7                                       | 30.4       |
| <b>Rear wall</b>  | 35.6                                       | 29.7       |
| <b>Right wall</b>   | 33.1                                       | 29.1       |
| <b>Left wall</b>  | 33.6                                       | 29.1       |
| <b>Upper wall</b>   | 41.0                                       | 33.2       |
| <b>Lower wall</b>   | 66.4                                       | 36.6       |
| <b>Temperatures of control elements (°C):</b>                       |  |            |
| <b>Display - plastic</b>  | 38.0                                       |            |
| <b>Temperature of fuel chamber and stoking elements (°C):</b>       |  |            |
| <b>Temperature of fuel line tube (screw feeder - flange)</b>        | 43.0                                       |            |

**Measurement uncertainty:** 2 °C for temperatures within the range of (0 + 200) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient, k=2, corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

**Test evaluation:** The specified temperature rise values have not been exceeded.



**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150)

| Average temperatures of boiler walls, doors and covers (°C): |  |            |
|--|--|------------|
| <b>Boiler type</b>   | CARIA CP-150 (version: CARIA TLUX CPT-150) |            |
| <b>Fuel type</b>   | Wood Pellets - C1                          |            |
| <b>Heat output</b>   | Nominal                                    | Minimal    |
| <b>Testing date</b>  | 2019-05-23                                 | 2019-05-23 |
| ambient temperature (°C)                                     | 21.4                                       | 25.9       |
| humidity (%)   | 45.5                                       | 41.6       |
| air pressure (kPa)   | 101.19                                     | 101.19     |
| <b>Front wall</b>  | 30.3                                       | 26.8       |
| <b>Rear wall</b>   | 36.7                                       | 31.5       |
| <b>Right wall</b>  | 32.8                                       | 27.3       |
| <b>Left wall</b>   | 32.3                                       | 27.6       |
| <b>Upper wall</b>  | 34.3                                       | 30.0       |
| <b>Lower wall</b>  | 45.0                                       | 38.0       |
| Temperatures of control elements (°C):                       |  |            |
| <b>Display - plastic</b>                                     | 37.0                                       |            |
| Temperature of fuel chamber and stoking elements (°C):       |  |            |
| <b>Temperature of fuel line tube (screw feeder - flange)</b> | 46.0                                       |            |

**Measurement uncertainty:** 2 °C for temperatures within the range of (0 + 200) °C

"The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient,  $k=2$ , corresponding to the coverage certainty of 95% as regards standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02."

**Test evaluation:** The specified temperature rise values have not been exceeded.



Accredited test number: **T 001\*** Test title: **Test of heat output, input and efficiency  
Test of combustion product temperature**

Test method: ČSN EN 303-5:2013 Art. 4.4.2, 4.4.3, 5.7 to 5.10

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

Measuring equipment used: Chapter III - Measuring and test equipment

**Test results:**

**Average measured and calculated values (solid fuels):**

| Test:  | I.  | II.        |
|--|---|------------|
| Boiler type:   | CARIA CP-23<br>(version: CARIA TLUX CPT-23) |            |
| Output tested:   | Nominal                                     | Minimal    |
| Testing date:  | 2019-05-22                                  | 2019-05-22 |
| Fuel type:   | <b>Wood Pellets - C1</b>                    |            |
| Combustion period, (automatic) stoking                 | Minimally 6 hours                           |            |
| Nominal heat output (specified by manufacturer) [ kW ] | 23  | 23         |
| Flue gas temperature [ °C ]                            | 118.4                                       | 71.0       |
| Fuel mass added [ kg/hour ]                            | 5.050                                       | 1.570      |
| Inlet water temperature [ °C ]                         | 51.0  | 69.6       |
| Outlet water temperature [ °C ]                        | 70.9  | 80.4       |
| Cooling water flow rate [ m3/hour ]                    | 0.9658                                      | 0.5412     |
| Draught [ Pa ]   | 3.0   | 3.0        |
| Ambient temperature [ °C ]                             | 25.9  | 23.8       |
| Relative air humidity [ % ]                            | 32.8  | 30.0       |
| Barometric pressure [ kPa ]                            | 98.79                                       | 99.32      |

**Analysis of combustion products:**

| Test (period of burning) :            | I.    | II.   |
|---------------------------------------|-------|-------|
| Oxygen, O <sub>2</sub> [ % ]          | 7.22  | 11.01 |
| Carbon dioxide CO <sub>2</sub> [ % ]  | 13.80 | 9.80  |
| Carbon monoxide CO [ppm]              | 137   | 64    |
| Higher hydrocarbons THC-OGC [ppm]     | 6     | 14    |
| Nitrogen oxides NO <sub>x</sub> [ppm] | 102   | 57    |
| Sulphur oxides SO <sub>2</sub> [ppm]  | 0     | 0     |



**Auxiliary combustion values (solid fuels):**

| Test (period of burning) :                         |                        | I.      | II.     |
|--|------------------------|---------|---------|
| Stoichiometric oxygen volume                       | [ m <sup>3</sup> /kg ] | 0.945   | 0.945   |
| Stoichiometric air volume                          | [ m <sup>3</sup> /kg ] | 4.498   | 4.498   |
| Stoichiometric volume of dry combustion products   | [ m <sup>3</sup> /kg ] | 4.420   | 4.420   |
| Maximum content of CO <sub>2</sub>                 | [ % ]                  | 19.60   | 19.60   |
| Stoichiometric air multiple                        | [ - ]                  | 1.51    | 2.08    |
| Volume of dry combustion products, actual          | [ m <sup>3</sup> /kg ] | 6.273   | 8.838   |
| Content of H <sub>2</sub> O in combustion air      | [ m <sup>3</sup> /kg ] | 0.076   | 0.084   |
| Content of H <sub>2</sub> O in combustion products | [ m <sup>3</sup> /kg ] | 0.856   | 0.864   |
| Flue gas mass flow                                 | [ kg/s ]               | 0.01297 | 0.00548 |

**Calculated values - thermal overview:**

| Test (period of burning) :                   |               | I.          | II.         |
|--|---------------|-------------|-------------|
| Loss of sensible heat of combustion products | [ % ]         | 5.3         | 3.6         |
| Loss of gas underburning                     | [ % ]         | 0.1         | 0.1         |
| Loss of mechanical underburning              | [ % ]         | 0.3         | 0.3         |
| Loss of heat transfer into environment       | [ % ]         | 1.9         | 4.0         |
| Total loss                                   | [ % ]         | 7.5         | 7.9         |
| Efficiency - indirect method                 | [ % ]         | 92.5        | 92.1        |
| Fuel mass added - actual                     | [ kg/hour ]   | 5.068       | 1.576       |
| Heat input                                   | [ kW ]        | 24.2        | 7.5         |
| <b>Heat output</b>                           | <b>[ kW ]</b> | <b>22.3</b> | <b>6.9</b>  |
| Uncertainty of determining heat output       | [ kW ]        | 0.9         | 0.3         |
| <b>Efficiency – direct method</b>            | <b>[ % ]</b>  | <b>92.1</b> | <b>91.6</b> |
| Output - nominal output                      | [ % ]         | 96.8        | 30.0        |

At nominal and minimal output, when burning **Wood Pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

**Test evaluation:**

The measured heat output is within the  $\pm 8\%$  tolerance;  
Boiler Class 5;

At nominal output, combustion product temperature is less than 160 K above the ambient temperature;

When burning Wood Pellets - C1, the period of burning is more than 6 hours;

The minimum heat output is less than 30% of nominal heat output.



**Average measured and calculated values (solid fuels):**

| Test:  | I.  | II.        |
|--|---|------------|
| Boiler type:   | CARIA CP-40<br>(version: CARIA TLUX CPT-40) |            |
| Output tested:   | Nominal                                     | Minimal    |
| Testing date:  | 2019-05-15                                  | 2019-05-16 |
| Fuel type:   | <b>Wood Pellets - C1</b>                    |            |
| Combustion period, (automatic) stoking                 | Minimally 6 hours                           |            |
| Nominal heat output (specified by manufacturer) [ kW ] | 40  | 40         |
| Flue gas temperature [ °C ]                            | 114.5                                       | 67.2       |
| Fuel mass added [ kg/hour ]                            | 9.650                                       | 2.650      |
| Inlet water temperature [ °C ]                         | 59.9  | 62.1       |
| Outlet water temperature [ °C ]                        | 81.8  | 70.1       |
| Cooling water flow rate [ m3/hour ]                    | 1.6952                                      | 1.2814     |
| Draught [ Pa ]   | 3.0   | 3.0        |
| Ambient temperature [ °C ]                             | 25.6  | 24.2       |
| Relative air humidity [ % ]                            | 41.2  | 30.9       |
| Barometric pressure [ kPa ]                            | 101.19                                      | 101.19     |

**Analysis of combustion products:**

| Test (period of burning) :            | I.    | II.   |
|---------------------------------------|-------|-------|
| Oxygen, O <sub>2</sub> [ % ]          | 7.81  | 11.08 |
| Carbon dioxide CO <sub>2</sub> [ % ]  | 13.42 | 9.63  |
| Carbon monoxide CO [ppm]              | 154   | 54    |
| Higher hydrocarbons THC-OGC [ppm]     | 24    | 12    |
| Nitrogen oxides NO <sub>x</sub> [ppm] | 66    | 53    |
| Sulphur oxides SO <sub>2</sub> [ppm]  | 0     | 0     |

**Auxiliary combustion values (solid fuels):**

| Test (period of burning) :                                   | I.      | II.     |
|--|---------|---------|
| Stoichiometric oxygen volume [ m3/kg ]                       | 0.945   | 0.945   |
| Stoichiometric air volume [ m3/kg ]                          | 4.498   | 4.498   |
| Stoichiometric volume of dry combustion products [ m3/kg ]   | 4.420   | 4.420   |
| Maximum content of CO <sub>2</sub> [ % ]                     | 19.60   | 19.60   |
| Stoichiometric air multiple [ - ]                            | 1.58    | 2.10    |
| Volume of dry combustion products, actual [ m3/kg ]          | 6.451   | 8.993   |
| Content of H <sub>2</sub> O in combustion air [ m3/kg ]      | 0.096   | 0.088   |
| Content of H <sub>2</sub> O in combustion products [ m3/kg ] | 0.876   | 0.867   |
| Flue gas mass flow [ kg/s ]                                  | 0.02544 | 0.00940 |



**Calculated values - thermal overview:**

| Test (period of burning) :                   |               | I.          | II.         |
|--|---------------|-------------|-------------|
| Loss of sensible heat of combustion products | [ % ]         | 5.2         | 3.3         |
| Loss of gas underburning                     | [ % ]         | 0.1         | 0.1         |
| Loss of mechanical underburning              | [ % ]         | 0.3         | 0.3         |
| Loss of heat transfer into environment       | [ % ]         | 1.5         | 2.2         |
| Total loss                                   | [ % ]         | 7.1         | 5.8         |
| Efficiency - indirect method                 | [ % ]         | 92.9        | 94.2        |
| Fuel mass added - actual                     | [ kg/hour ]   | 9.684       | 2.659       |
| Heat input                                   | [ kW ]        | 46.2        | 12.7        |
| <b>Heat output</b>                           | <b>[ kW ]</b> | <b>42.7</b> | <b>11.9</b> |
| Uncertainty of determining heat output       | [ kW ]        | 1.8         | 0.5         |
| <b>Efficiency – direct method</b>            | <b>[ % ]</b>  | <b>92.4</b> | <b>93.6</b> |
| Output - nominal output                      | [ % ]         | 106.7       | 29.7        |

At nominal and minimal output, when burning **Wood Pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

**Test evaluation:**

The measured heat output is within the  $\pm 8\%$  tolerance;  
Boiler Class 5;  
At nominal output, combustion product temperature is less than 160 K above the ambient temperature;  
When burning Wood Pellets - C1, the period of burning is more than 6 hours;  
The minimum heat output is less than 30% of nominal heat output.



**Average measured and calculated values (solid fuels):**

| Test:  | I.  | II.        |
|--|---|------------|
| Boiler type:   | CARIA CP-80<br>(version: CARIA TLUX CPT-80) |            |
| Output tested:   | Nominal                                     | Minimal    |
| Testing date:  | 2019-05-20                                  | 2019-05-20 |
| Fuel type:   | <b>Wood Pellets - C1</b>                    |            |
| Combustion period, (automatic) stoking                 | Minimally 6 hours                           |            |
| Nominal heat output (specified by manufacturer) [ kW ] | 80  | 80         |
| Flue gas temperature [ °C ]                            | 151.0                                       | 99.2       |
| Fuel mass added [ kg/hour]                             | 18.050                                      | 5.080      |
| Inlet water temperature [ °C ]                         | 61.6  | 68.4       |
| Outlet water temperature [ °C ]                        | 81.4  | 77.7       |
| Cooling water flow rate [ m3/hour ]                    | 3.4665                                      | 2.1175     |
| Draught [ Pa ]   | 3.0   | 3.0        |
| Ambient temperature [ °C ]                             | 28.3  | 27.3       |
| Relative air humidity [ % ]                            | 39.9  | 37.8       |
| Barometric pressure [ kPa]                             | 101.06                                      | 101.06     |

**Analysis of combustion products:**

| Test (period of burning) :           | I.    | II.   |
|--------------------------------------|-------|-------|
| Oxygen, O <sub>2</sub> [ % ]         | 7.50  | 10.81 |
| Carbon dioxide CO <sub>2</sub> [ % ] | 13.62 | 10.22 |
| Carbon monoxide CO [ppm]             | 37    | 57    |
| Higher hydrocarbons THC-OGC [ppm]    | 11    | 6     |
| Nitrogen oxides NOx [ppm]            | 81    | 58    |
| Sulphur oxides SO <sub>2</sub> [ppm] | 0     | 0     |

**Auxiliary combustion values (solid fuels):**

| Test (period of burning) :                                   | I.      | II.     |
|--|---------|---------|
| Stoichiometric oxygen volume [ m3/kg ]                       | 0.945   | 0.945   |
| Stoichiometric air volume [ m3/kg ]                          | 4.498   | 4.498   |
| Stoichiometric volume of dry combustion products [ m3/kg ]   | 4.420   | 4.420   |
| Maximum content of CO <sub>2</sub> [ % ]                     | 19.60   | 19.60   |
| Stoichiometric air multiple [ - ]                            | 1.55    | 2.04    |
| Volume of dry combustion products, actual [ m3/kg ]          | 6.359   | 8.475   |
| Content of H <sub>2</sub> O in combustion air [ m3/kg ]      | 0.107   | 0.126   |
| Content of H <sub>2</sub> O in combustion products [ m3/kg ] | 0.887   | 0.906   |
| Flue gas mass flow [ kg/s ]                                  | 0.04703 | 0.01712 |



**Calculated values - thermal overview:**

| Test (period of burning) :                   |               | I.          | II.         |
|--|---------------|-------------|-------------|
| Loss of sensible heat of combustion products | [ % ]         | 7.2         | 5.3         |
| Loss of gas underburning                     | [ % ]         | 0.0         | 0.0         |
| Loss of mechanical underburning              | [ % ]         | 0.3         | 0.3         |
| Loss of heat transfer into environment       | [ % ]         | 0.9         | 1.4         |
| Total loss                                   | [ % ]         | 8.3         | 7.1         |
| Efficiency - indirect method                 | [ % ]         | 91.7        | 92.9        |
| Fuel mass added - actual                     | [ kg/hour ]   | 18.113      | 5.098       |
| Heat input                                   | [ kW ]        | 86.4        | 24.3        |
| <b>Heat output</b>                           | <b>[ kW ]</b> | <b>79.0</b> | <b>22.5</b> |
| Uncertainty of determining heat output       | [ kW ]        | 3.3         | 0.9         |
| <b>Efficiency – direct method</b>            | <b>[ % ]</b>  | <b>91.3</b> | <b>92.5</b> |
| Output - nominal output                      | [ % ]         | 98.7        | 28.1        |

At nominal and minimal output, when burning **Wood Pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

**Test evaluation:**

The measured heat output is within the  $\pm 8\%$  tolerance;  
Boiler Class 5;  
At nominal output, combustion product temperature is less than 160 K above the ambient temperature;  
When burning Wood Pellets - C1, the period of burning is more than 6 hours;  
The minimum heat output is less than 30% of nominal heat output.



**Average measured and calculated values (solid fuels):**

| Test:  | I.  | II.        |
|--|---|------------|
| Boiler type:   | CARIA CP-100<br>(version: CARIA TLUX CPT-100) |            |
| Output tested:   | Nominal                                       | Minimal    |
| Testing date:  | 2019-05-20                                    | 2019-05-20 |
| Fuel type:   | <b>Wood Pellets - C1</b>                      |            |
| Combustion period, (automatic) stoking                 | Minimally 6 hours                             |            |
| Nominal heat output (specified by manufacturer) [ kW ] | 100   | 100        |
| Flue gas temperature [ °C ]                            | 157.2   | 99.2       |
| Fuel mass added [ kg/hour ]                            | 22.170  | 5.080      |
| Inlet water temperature [ °C ]                         | 55.4  | 68.4       |
| Outlet water temperature [ °C ]                        | 74.3  | 77.7       |
| Cooling water flow rate [ m3/hour ]                    | 4.5038  | 2.1175     |
| Draught [ Pa ]   | 3.0   | 3.0        |
| Ambient temperature [ °C ]                             | 29.7  | 27.3       |
| Relative air humidity [ % ]                            | 42.8  | 37.8       |
| Barometric pressure [ kPa ]                            | 101.06  | 101.06     |

**Analysis of combustion products:**

| Test (period of burning) :            | I.    | II.   |
|---------------------------------------|-------|-------|
| Oxygen, O <sub>2</sub> [ % ]          | 5.54  | 10.81 |
| Carbon dioxide CO <sub>2</sub> [ % ]  | 15.70 | 10.22 |
| Carbon monoxide CO [ppm]              | 71    | 57    |
| Higher hydrocarbons THC-OGC [ppm]     | 14    | 6     |
| Nitrogen oxides NO <sub>x</sub> [ppm] | 107   | 58    |
| Sulphur oxides SO <sub>2</sub> [ppm]  | 0     | 0     |

**Auxiliary combustion values (solid fuels):**

| Test (period of burning) :                                   | I.      | II.     |
|--|---------|---------|
| Stoichiometric oxygen volume [ m3/kg ]                       | 0.945   | 0.945   |
| Stoichiometric air volume [ m3/kg ]                          | 4.498   | 4.498   |
| Stoichiometric volume of dry combustion products [ m3/kg ]   | 4.420   | 4.420   |
| Maximum content of CO <sub>2</sub> [ % ]                     | 19.60   | 19.60   |
| Stoichiometric air multiple [ - ]                            | 1.35    | 2.04    |
| Volume of dry combustion products, actual [ m3/kg ]          | 5.517   | 8.475   |
| Content of H <sub>2</sub> O in combustion air [ m3/kg ]      | 0.110   | 0.126   |
| Content of H <sub>2</sub> O in combustion products [ m3/kg ] | 0.889   | 0.906   |
| Flue gas mass flow [ kg/s ]                                  | 0.05109 | 0.01712 |



**Calculated values - thermal overview:**

| Test (period of burning) :                   |               | I.          | II.         |
|--|---------------|-------------|-------------|
| Loss of sensible heat of combustion products | [ % ]         | 6.6         | 5.3         |
| Loss of gas underburning                     | [ % ]         | 0.0         | 0.0         |
| Loss of mechanical underburning              | [ % ]         | 0.3         | 0.3         |
| Loss of heat transfer into environment       | [ % ]         | 0.5         | 1.4         |
| Total loss                                   | [ % ]         | 7.5         | 7.0         |
| Efficiency - indirect method                 | [ % ]         | 92.5        | 93.0        |
| Fuel mass added - actual                     | [ kg/hour ]   | 22.248      | 5.098       |
| Heat input                                   | [ kW ]        | 106.2       | 24.3        |
| <b>Heat output</b>                           | <b>[ kW ]</b> | <b>97.7</b> | <b>22.5</b> |
| Uncertainty of determining heat output       | [ kW ]        | 4.1         | 0.9         |
| <b>Efficiency – direct method</b>            | <b>[ % ]</b>  | <b>92.0</b> | <b>92.5</b> |
| Output - nominal output                      | [ % ]         | 97.7        | 22.5        |

At nominal and minimal output, when burning **Wood Pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

**Test evaluation:**

The measured heat output is within the  $\pm 8\%$  tolerance;  
Boiler Class 5;  
At nominal output, combustion product temperature is less than 160 K above the ambient temperature;  
When burning Wood Pellets - C1, the period of burning is more than 6 hours;  
The minimum heat output is less than 30% of nominal heat output.



**Average measured and calculated values (solid fuels):**

| Test:  | I.  | II.        |
|--|---|------------|
| Boiler type:   | CARIA CP-150<br>(version: CARIA TLUX CPT-150) |            |
| Output tested:   | Nominal                                       | Minimal    |
| Testing date:  | 2019-05-23                                    | 2019-05-23 |
| Fuel type:   | <b>Wood Pellets - C1</b>                      |            |
| Combustion period, (automatic) stoking                 | Minimally 6 hours                             |            |
| Nominal heat output (specified by manufacturer) [ kW ] | 150   | 150        |
| Flue gas temperature [ °C ]                            | 134.2   | 83.5       |
| Fuel mass added [ kg/hour ]                            | 33.200  | 9.400      |
| Inlet water temperature [ °C ]                         | 57.7  | 63.4       |
| Outlet water temperature [ °C ]                        | 77.8  | 82.0       |
| Cooling water flow rate [ m <sup>3</sup> /hour ]       | 6.2729  | 1.9574     |
| Draught [ Pa ]   | 3.0   | 3.0        |
| Ambient temperature [ °C ]                             | 21.4  | 25.9       |
| Relative air humidity [ % ]                            | 45.5  | 41.6       |
| Barometric pressure [ kPa ]                            | 101.19  | 101.19     |

**Analysis of combustion products:**

| Test (period of burning) :            | I.    | II.   |
|---------------------------------------|-------|-------|
| Oxygen, O <sub>2</sub> [ % ]          | 9.32  | 13.09 |
| Carbon dioxide CO <sub>2</sub> [ % ]  | 11.09 | 7.77  |
| Carbon monoxide CO [ppm]              | 123   | 15    |
| Higher hydrocarbons THC-OGC [ppm]     | 10    | 17    |
| Nitrogen oxides NO <sub>x</sub> [ppm] | 80    | 47    |
| Sulphur oxides SO <sub>2</sub> [ppm]  | 0     | 0     |

**Auxiliary combustion values (solid fuels):**

| Test (period of burning) :  | I.      | II.     |
|---|---------|---------|
| Stoichiometric oxygen volume [ m <sup>3</sup> /kg ]                       | 0.945   | 0.945   |
| Stoichiometric air volume [ m <sup>3</sup> /kg ]                          | 4.498   | 4.498   |
| Stoichiometric volume of dry combustion products [ m <sup>3</sup> /kg ]   | 4.420   | 4.420   |
| Maximum content of CO <sub>2</sub> [ % ]                                  | 19.60   | 19.60   |
| Stoichiometric air multiple [ - ]   | 1.78    | 2.63    |
| Volume of dry combustion products, actual [ m <sup>3</sup> /kg ]          | 7.805   | 11.156  |
| Content of H <sub>2</sub> O in combustion air [ m <sup>3</sup> /kg ]      | 0.093   | 0.165   |
| Content of H <sub>2</sub> O in combustion products [ m <sup>3</sup> /kg ] | 0.873   | 0.944   |
| Flue gas mass flow [ kg/s ]   | 0.10356 | 0.04079 |



**Calculated values - thermal overview:**

| Test (period of burning) :                   |               | I.           | II.         |
|--|---------------|--------------|-------------|
| Loss of sensible heat of combustion products | [ % ]         | 7.8          | 5.5         |
| Loss of gas underburning                     | [ % ]         | 0.1          | 0.1         |
| Loss of mechanical underburning              | [ % ]         | 0.3          | 0.3         |
| Loss of heat transfer into environment       | [ % ]         | 0.3          | 0.7         |
| Total loss                                   | [ % ]         | 8.5          | 6.5         |
| Efficiency - indirect method                 | [ % ]         | 91.5         | 93.5        |
| Fuel mass added - actual                     | [ kg/hour ]   | 33.317       | 9.433       |
| Heat input                                   | [ kW ]        | 159.0        | 45.0        |
| <b>Heat output</b>                           | <b>[ kW ]</b> | <b>144.8</b> | <b>41.9</b> |
| Uncertainty of determining heat output       | [ kW ]        | 6.1          | 1.8         |
| <b>Efficiency – direct method</b>            | <b>[ % ]</b>  | <b>91.1</b>  | <b>93.1</b> |
| Output - nominal output                      | [ % ]         | 96.5         | 27.9        |

At nominal and minimal output, when burning **Wood Pellets - C1**, the boiler efficiency meets the requirements applicable to **Class 5** as per ČSN EN 303-5:2013, Fig. 1.

**Test evaluation:**

The measured heat output is within the  $\pm 8\%$  tolerance;  
Boiler Class 5;  
At nominal output, combustion product temperature is less than 160 K above the ambient temperature;  
When burning Wood Pellets - C1, the period of burning is more than 6 hours;  
The minimum heat output is less than 30% of nominal heat output.



**Fuel analysis:**

| Fuel type   | Wood Pellets - C1 |                 |         |             |
|---|-------------------|-----------------|---------|-------------|
| Analytical indicator  | Symbol            | Unit            | Value   | Uncertainty |
| Higher heating value  | $Q_s$             | [ MJ/kg ]       | 18.72   | 0.22        |
| Lower heating value   | $Q_j$             | [ MJ/kg ]       | 17.18   | 0.22        |
| All water in original condition   | $W_t^f$           | [ % by weight ] | 6.83    | 0.03        |
| Ash   | A                 | [ % by weight ] | 0.21    | 0.01        |
| Carbon  | C                 | [ % by weight ] | 46.98   | 0.24        |
| Hydrogen  | H                 | [ % by weight ] | 6.26    | 0.20        |
| Nitrogen  | N                 | [ % by weight ] | 0.06    | 0.14        |
| Sulphur   | S                 | [ % by weight ] | 0.016   | 0.004       |
| Chlorine  | Cl                | [ % by weight ] | 0.015   | 0.001       |
| Oxygen – calculation for 100%   | O                 | [ % by weight ] | 39.62   |             |
| Conversion factor $f_{emis}$ for emissions in [mg/m <sup>3</sup> ] to [mg/MJ] | $f_{emis}$        | [ - ]           | 0.25833 |             |

Note: Sample in original condition

**Measurement uncertainty:** Specified in Measurement results

“The above-specified extended measurement uncertainties are calculated as a factor of the measurement uncertainty and the extension coefficient,  $k=2$ , corresponding to the coverage certainty of 95% for standard classification. The uncertainties do not reflect the impact of sample taking and lack of homogeneity. The standard uncertainty was determined in accordance with Document EA 4-02”.



Accredited test number: **T 071\*** Test title: **Electrical consumption**

Test method: ČSN EN 303-5:2013 Art. 5.8.5, ČSN EN 15456 Art. 5

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80, CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40, CARIA TLUX CPT-80, CARIA TLUX CPT-100, CARIA TLUX CPT-150)

Measuring equipment used: Chapter III - Measuring and test equipment

**Test results:**

| Requirement   | Requirement specification  | Test evaluation | Note |
|---|--|-----------------|------|
| <p><b>Electrical consumption</b><br/>During the tests, the electrical consumption shall be determined according to EN 15456.<br/>The values for maximum consumption, for standby, nominal heat output and minimum heat output shall be stated in the test report. For boilers with automatic feeding systems (fuel line), the electrical consumption of the boiler and the fuel line shall be determined and stated separately.<br/>The average electrical power consumption during stand by shall be measured for a minimum duration of 10 min and shall be stated in watts. In cases where control operations influence the intrinsic energy consumption, a longer duration might be necessary.</p> | <p>ČSN EN 303-5:2013<br/>Art. 5.8.5,<br/>ČSN EN 15456<br/>Art. 5</p> | +               |      |

**Test results:**

| Electrical consumption                               | CARIA CP-23 (version: CARIA TLUX CPT-23) |
|--|--|
| Maximum electrical input                             | 450 W                                    |
| Electrical input at nominal heat output              | 102 W                                    |
| Electrical input at minimum heat output              | 78 W                                     |
| Electrical input for STAND BY mode                   | 4 W                                      |
| Maximum electrical input for fuel supply (fuel line) | 30 W                                     |
| Maximum electrical input for ignition system         | 300 W                                    |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)



| <b>Electrical consumption</b>                        | CARIA CP-40 (version: CARIA TLUX CPT-40) |
|--|--|
| Maximum electrical input                             | 450 W                                    |
| Electrical input at nominal heat output              | 105 W                                    |
| Electrical input at minimum heat output              | 74 W                                     |
| Electrical input for STAND BY mode                   | 4 W                                      |
| Maximum electrical input for fuel supply (fuel line) | 30 W                                     |
| Maximum electrical input for ignition system         | 300 W                                    |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

| <b>Electrical consumption</b>                        | CARIA CP-80 (version: CARIA TLUX CPT-80) |
|--|--|
| Maximum electrical input                             | 550 W                                    |
| Electrical input at nominal heat output              | 116 W                                    |
| Electrical input at minimum heat output              | 74 W                                     |
| Electrical input for STAND BY mode                   | 4 W                                      |
| Maximum electrical input for fuel supply (fuel line) | 30 W                                     |
| Maximum electrical input for ignition system         | 300 W                                    |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

| <b>Electrical consumption</b>                        | CARIA CP-100 (version: CARIA TLUX CPT-100) |
|--|--|
| Maximum electrical input                             | 550 W                                      |
| Electrical input at nominal heat output              | 133 W                                      |
| Electrical input at minimum heat output              | 74 W                                       |
| Electrical input for STAND BY mode                   | 4 W  |
| Maximum electrical input for fuel supply (fuel line) | 30 W                                       |
| Maximum electrical input for ignition system         | 300 W                                      |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

| <b>Electrical consumption</b>                        | CARIA CP-150 (version: CARIA TLUX CPT-150) |
|--|--|
| Maximum electrical input                             | 550 W                                      |
| Electrical input at nominal heat output              | 204 W                                      |
| Electrical input at minimum heat output              | 106 W                                      |
| Electrical input for STAND BY mode                   | 4 W  |
| Maximum electrical input for fuel supply (fuel line) | 30 W                                       |
| Maximum electrical input for ignition system         | 300 W                                      |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)



Accredited test number:

**T 001\*** Test title: **Combustion efficiency test - emissions**

Test method:

ČSN EN 303-5:2013 Art. 5.7.3, 5.7.4, 5.9, 5.10.4

Sample tested:

CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

Measuring equipment used:

Chapter III - Measuring and test equipment

| Requirement   | Requirement specification    | Test evaluation | Note |
|---|------------------------------|-----------------|------|
| <b>Emission limits</b><br>Combustion shall be of low-emission. This requirement shall be satisfied if the emission values shown in Table 6 are not exceeded when operating at nominal heat output or, in the case of boilers with heat output range, when operating at nominal heat output and minimum heat output, in accordance with 5.7, 5.9 and 5.10. | ČSN EN 303-5:2013 Art. 4.4.7 | +               |      |

Table 6

| Stoking   | Fuel     | Nominal heat output<br>kW | Emission limits<br>mg·m <sup>-3</sup> at 10% O <sub>2</sub> |         |         |         |         |         |         |         |         |
|-----------|----------|---------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|
|           |          |                           | CO  |         |         | OGC/THC |         |         | Dust    |         |         |
|           |          |                           | Class 3   | Class 4 | Class 5 | Class 3 | Class 4 | Class 5 | Class 3 | Class 4 | Class 5 |
| Manual    | Biogenic | ≤ 50                      | 5000  | 1200    | 700     | 150     | 50      | 30      | 150     | 75      | 60      |
|           |          | > 50 ≤ 150                | 2500  |         |         | 100     |         |         |         |         |         |
|           |          | > 150 ≤ 500               | 1200  |         |         | 100     |         |         |         |         |         |
|           | Fossil   | ≤ 50                      | 5000  |         |         | 150     |         |         | 125     |         |         |
|           |          | > 50 ≤ 150                | 2500  |         |         | 100     |         |         |         |         |         |
|           |          | > 150 ≤ 500               | 1200  |         |         | 100     |         |         |         |         |         |
| Automatic | Biogenic | ≤ 50                      | 3000  | 1000    | 500     | 100     | 30      | 20      | 150     | 60      | 40      |
|           |          | > 50 ≤ 150                | 2500  |         |         | 80      |         |         |         |         |         |
|           |          | > 150 ≤ 500               | 1200  |         |         | 80      |         |         |         |         |         |
|           | Fossil   | ≤ 50                      | 3000  |         |         | 100     |         |         | 125     |         |         |
|           |          | > 50 ≤ 150                | 2500  |         |         | 80      |         |         |         |         |         |
|           |          | > 150 ≤ 500               | 1200  |         |         | 80      |         |         |         |         |         |

NOTE 1: The dust values in this Table are based on the experience of the gravimetric filter method. The method used needs to be referred to in the test report. The particulate matter emission measured according to this European Standard does not include condensable organic compounds which may form additional particulate matter when the flue gas is mixed with ambient air. The values are therefore not directly comparable with values measured by dilution tunnel methods. Neither can they be directly translated into ambient air particulate concentrations.

NOTE 2: Additional test methods and emission limits which apply in some countries are given in the A-Deviations in Annex C.

<sup>a</sup> Referred to dry exit flue gas, 0 °C, 1013 mbar.

<sup>b</sup> Boilers of class 3 for type E-fuels according to 1.2.1 or e-fuels according to 1.2.3 in this Table and marked with the classification E-fuels and e-fuels do not need to fulfil the requirements for the dust emissions. The actual value shall be stated in the technical documentation and shall not exceed 200 mg·m<sup>-3</sup> at 10 % O<sub>2</sub>.



**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Average values     |                     |          |               |                       |                           |                                      |                              |                                      |                           |
|---------------|--------------------|---------------------|----------|---------------|-----------------------|---------------------------|--------------------------------------|------------------------------|--------------------------------------|---------------------------|
|               | Measured values    |                     |          |               |                       |                           | Converted values O <sub>2</sub> =10% |                              |                                      |                           |
|               | O <sub>2</sub> [%] | CO <sub>2</sub> [%] | CO [ppm] | OGC/THC [ppm] | NO <sub>x</sub> [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | NO <sub>x</sub> [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.22               | 13.80               | 137      | 6             | 102                   | 23                        | 137                                  | 3                            | 167                                  | 19                        |
| Minimal       | 11.01              | 9.80                | 64       | 14            | 57                    | 17                        | 88                                   | 9                            | 128                                  | 19                        |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

**Test evaluation:**

CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average values     |                     |          |               |                       |                           |                                      |                              |                                      |                           |
|---------------|--------------------|---------------------|----------|---------------|-----------------------|---------------------------|--------------------------------------|------------------------------|--------------------------------------|---------------------------|
|               | Measured values    |                     |          |               |                       |                           | Converted values O <sub>2</sub> =10% |                              |                                      |                           |
|               | O <sub>2</sub> [%] | CO <sub>2</sub> [%] | CO [ppm] | OGC/THC [ppm] | NO <sub>x</sub> [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | NO <sub>x</sub> [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.81               | 13.42               | 154      | 24            | 66                    | 14                        | 160                                  | 11                           | 113                                  | 12                        |
| Minimal       | 11.08              | 9.63                | 54       | 12            | 53                    | 21                        | 75                                   | 7                            | 121                                  | 23                        |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

**Test evaluation:**

CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.

**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average values     |                     |          |               |                       |                           |                                      |                              |                                      |                           |
|---------------|--------------------|---------------------|----------|---------------|-----------------------|---------------------------|--------------------------------------|------------------------------|--------------------------------------|---------------------------|
|               | Measured values    |                     |          |               |                       |                           | Converted values O <sub>2</sub> =10% |                              |                                      |                           |
|               | O <sub>2</sub> [%] | CO <sub>2</sub> [%] | CO [ppm] | OGC/THC [ppm] | NO <sub>x</sub> [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | NO <sub>x</sub> [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.50               | 13.62               | 37       | 11            | 81                    | 18                        | 38                                   | 5                            | 136                                  | 15                        |
| Minimal       | 10.81              | 10.22               | 57       | 6             | 58                    | 10                        | 77                                   | 3                            | 128                                  | 11                        |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

**Test evaluation:**

CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.



**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average values     |                     |          |               |                       |                           |                                      |                              |                                      |                           |
|---------------|--------------------|---------------------|----------|---------------|-----------------------|---------------------------|--------------------------------------|------------------------------|--------------------------------------|---------------------------|
|               | Measured values    |                     |          |               |                       |                           | Converted values O <sub>2</sub> =10% |                              |                                      |                           |
|               | O <sub>2</sub> [%] | CO <sub>2</sub> [%] | CO [ppm] | OGC/THC [ppm] | NO <sub>x</sub> [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | NO <sub>x</sub> [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 5.54               | 15.70               | 71       | 14            | 107                   | 20                        | 63                                   | 5                            | 156                                  | 14                        |
| Minimal       | 10.81              | 10.22               | 57       | 6             | 58                    | 10                        | 77                                   | 3                            | 128                                  | 11                        |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

**Test evaluation:**

CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.

**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average values     |                     |          |               |                       |                           |                                      |                              |                                      |                           |
|---------------|--------------------|---------------------|----------|---------------|-----------------------|---------------------------|--------------------------------------|------------------------------|--------------------------------------|---------------------------|
|               | Measured values    |                     |          |               |                       |                           | Converted values O <sub>2</sub> =10% |                              |                                      |                           |
|               | O <sub>2</sub> [%] | CO <sub>2</sub> [%] | CO [ppm] | OGC/THC [ppm] | NO <sub>x</sub> [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | NO <sub>x</sub> [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 9.32               | 11.09               | 123      | 10            | 80                    | 16                        | 145                                  | 5                            | 154                                  | 15                        |
| Minimal       | 13.09              | 7.77                | 15       | 17            | 47                    | 12                        | 26                                   | 12                           | 135                                  | 17                        |

Note: Testing date and ambient conditions - see Test No. T 001\* (Test of heat output, input and efficiency)

**Test evaluation:**

CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 meets at nominal and minimal output the emission requirements for **Class 5**, as per ČSN EN 303-5:2013 Table 6.



Accredited test number: **T 001\*** Test title: **Test of heat output input and efficiency  
Combustion efficiency test - emissions**

Requirement: ČSN EN 303-5:2013 Annex C,  
Deviation from Austria, C.2.2, C.2.3

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

**Test results:** Evaluation of the test results stated in this Test Report only.

| Requirement   | Requirement specification                                      | Test evaluation                         |   |
|---|--|---|---|
| <b>Boiler efficiency for nominal heat output and minimum heat output</b>          | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from Austria, C.2.2 | Wood Pellets - C1                       |   |
| <b>Boiler</b>   |  |   |   |
| <b>Heating boilers for solid fuels</b>  |  | <b>75 %</b>                             | + |
| <b>a) manually loaded</b>   |  |   |   |
| up to 10 kW   |  | 79 %                                    |   |
| >10 to 200 kW   |  | (71.3 + 7.7 log P <sub>n</sub> ) %      |   |
| >200 kW   |  | 89 %                                    |   |
| <b>b) automatically loaded</b>  |  |   |   |
| up to 10 kW   |  | 80 %                                    |   |
| <b>&gt;10 to 200 kW</b>   |  | <b>(72.3 + 7.7 log P<sub>n</sub>) %</b> | + |
| >200 kW   | 90 %   |   |   |
| NOTE: P <sub>n</sub> is the nominal heat output (Q <sub>n</sub> in this standard) |  |   |   |

| Requirement  | Requirement specification                                      | Test evaluation                  |                                     |                    |                                    |
|--|--|----------------------------------|-------------------------------------|--------------------|------------------------------------|
| <b>Emission limits</b>   | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from Austria, C.2.3 | Wood Pellets - C1                |                                     |                    |                                    |
| <b>Small burners used for solid fuels automatically loaded</b> |  |                                  |                                     |                    |                                    |
|  |  | <b>Emission limits<br/>mg-MJ</b> |                                     |                    |                                    |
| Parameter  |  | Wooden Wood Pellets Room heaters | Wooden Wood Pellets Central heaters | Other wooden fuels | Other standardised biogenous fuels |
| CO   |  | 500 <sup>a</sup>                 | <b>250<sup>a</sup></b>              | 250 <sup>a</sup>   | 500 <sup>a</sup>                   |
| NO <sub>x</sub>  |  | 100                              | <b>100</b>                          | 100                | 300                                |
| OGC/THC  | 30   | <b>20</b>                        | 30                                  | 20                 |                                    |
| Dust   | 25   | <b>20</b>                        | 30                                  | 35                 |                                    |

<sup>a</sup> The limit value can be exceeded by 50 % during partial load operation at 30 % of nominal heat output.



**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 82.8               | 92.1                |
| Minimal       |                    | 91.6                |

**Test evaluation:**

The measured efficiency of CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Average values     |          |                       |               |                           |                                     |                         |                 |              |
|---------------|--------------------|----------|-----------------------|---------------|---------------------------|-------------------------------------|-------------------------|-----------------|--------------|
|               | Measured values    |          |                       |               |                           | Converted values O <sub>2</sub> =0% |                         |                 |              |
|               | O <sub>2</sub> [%] | CO [ppm] | NO <sub>x</sub> [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/MJ]                          | NO <sub>x</sub> [mg/MJ] | OGC/THC [mg/MJ] | Dust [mg/MJ] |
| Nominal       | 7.22               | 137      | 102                   | 6             | 23                        | 67                                  | 82                      | 1               | 9            |
| Minimal       | 11.01              | 64       | 57                    | 14            | 17                        | 43                                  | 63                      | 4               | 9            |

**Test evaluation:**

The measured emission values for CARIA CP-23 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 84.6               | 92.4                |
| Minimal       |                    | 93.6                |

**Test evaluation:**

The measured efficiency of CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average values     |          |                       |               |                           |                                     |                         |                 |              |
|---------------|--------------------|----------|-----------------------|---------------|---------------------------|-------------------------------------|-------------------------|-----------------|--------------|
|               | Measured values    |          |                       |               |                           | Converted values O <sub>2</sub> =0% |                         |                 |              |
|               | O <sub>2</sub> [%] | CO [ppm] | NO <sub>x</sub> [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/MJ]                          | NO <sub>x</sub> [mg/MJ] | OGC/THC [mg/MJ] | Dust [mg/MJ] |
| Nominal       | 7.81               | 154      | 66                    | 24            | 14                        | 79                                  | 56                      | 5               | 6            |
| Minimal       | 11.08              | 54       | 53                    | 12            | 21                        | 37                                  | 59                      | 3               | 11           |

**Test evaluation:**

The measured emission values for CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 87.0               | 91.3                |
| Minimal       |                    | 92.5                |

**Test evaluation:**

The measured efficiency of CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average values     |          |                       |               |                           |                                     |                         |                 |              |
|---------------|--------------------|----------|-----------------------|---------------|---------------------------|-------------------------------------|-------------------------|-----------------|--------------|
|               | Measured values    |          |                       |               |                           | Converted values O <sub>2</sub> =0% |                         |                 |              |
|               | O <sub>2</sub> [%] | CO [ppm] | NO <sub>x</sub> [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/MJ]                          | NO <sub>x</sub> [mg/MJ] | OGC/THC [mg/MJ] | Dust [mg/MJ] |
| Nominal       | 7.50               | 37       | 81                    | 11            | 18                        | 19                                  | 67                      | 2               | 7            |
| Minimal       | 10.81              | 57       | 58                    | 6             | 10                        | 38                                  | 63                      | 2               | 5            |

**Test evaluation:**

The measured emission values for CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 87.7               | 92.0                |
| Minimal       |                    | 92.5                |

**Test evaluation:**

The measured efficiency of CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average values     |          |                       |               |                           |                                     |                         |                 |              |
|---------------|--------------------|----------|-----------------------|---------------|---------------------------|-------------------------------------|-------------------------|-----------------|--------------|
|               | Measured values    |          |                       |               |                           | Converted values O <sub>2</sub> =0% |                         |                 |              |
|               | O <sub>2</sub> [%] | CO [ppm] | NO <sub>x</sub> [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/MJ]                          | NO <sub>x</sub> [mg/MJ] | OGC/THC [mg/MJ] | Dust [mg/MJ] |
| Nominal       | 5.54               | 71       | 107                   | 14            | 20                        | 31                                  | 77                      | 3               | 7            |
| Minimal       | 10.81              | 57       | 58                    | 6             | 10                        | 38                                  | 63                      | 2               | 5            |

**Test evaluation:**

The measured emission values for CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 89.1               | 91.1                |
| Minimal       |                    | 93.1                |

**Test evaluation:**

The measured efficiency of CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average values     |          |                       |               |                           |                                     |                         |                 |              |
|---------------|--------------------|----------|-----------------------|---------------|---------------------------|-------------------------------------|-------------------------|-----------------|--------------|
|               | Measured values    |          |                       |               |                           | Converted values O <sub>2</sub> =0% |                         |                 |              |
|               | O <sub>2</sub> [%] | CO [ppm] | NO <sub>x</sub> [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/MJ]                          | NO <sub>x</sub> [mg/MJ] | OGC/THC [mg/MJ] | Dust [mg/MJ] |
| Nominal       | 9.32               | 123      | 80                    | 10            | 16                        | 71                                  | 76                      | 3               | 8            |
| Minimal       | 13.09              | 15       | 47                    | 17            | 12                        | 13                                  | 66                      | 6               | 8            |

**Test evaluation:**

The measured emission values for CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 **do not exceed** the specified values.



Accredited test number: **T 001\*** Test title: **Test of heat output, input and efficiency  
Combustion efficiency test - emissions**

Requirement: ČSN EN 303-5:2013 Annex C,  
Deviation from Denmark, C.4.1, C.4.2

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

**Test results:** Evaluation of the test results stated in this Test Report only.

| Requirement   |                          | Requirement specification                                | Test evaluation   |   |
|---|--------------------------|--|-------------------|---|
| <b>Boiler Efficiency</b>  |                          | ČSN EN 303-5:2013 Annex C, Deviation from Denmark, C.4.1 | Wood Pellets - C1 |   |
| According to the Danish Construction Code BR08, Clause 8.5.1.4, Sub-clause 7, boilers for coal, coke, bio fuel or biomass shall have an efficiency equivalent to Class 3 in EN 303-5. |                          |  |                   |   |
| <b>Minimum efficiency</b>   | <b>(67 + 6 log Qn) %</b> |  |                   | + |
| For boilers above 300 kW, the requirement corresponding to 300 kW shall be used.  |                          |  |                   |   |

| Requirement   |          |                     |  | Requirement specification                                | Test evaluation   |         |      |
|---|----------|---------------------|--|--|-------------------|---------|------|
| <b>Emission limits</b>  |          |                     |  | ČSN EN 303-5:2013 Annex C, Deviation from Denmark, C.4.2 | Wood Pellets - C1 |         |      |
| According to the Danish EPA Statutory Order no. 1432 of 11-12-2007, only Class 3 (or higher) is acceptable for Denmark. |          |                     |  |  |                   |         |      |
| Stoking   | Fuel     | Nominal heat output | Emission limit values <sup>a</sup>       |  |                   |         |      |
|   |          |                     | CO                                       |  |                   | OGC/THC | Dust |
|   |          |                     | mg·m <sup>-3</sup> at 10% O <sub>2</sub> |  |                   |         |      |
|   |          |                     | Class                                    |  |                   |         |      |
|   |          |                     | 3  |  |                   |         |      |
| Manual  | Biogenic | ≤ 50                | 5000                                     |  |                   | 150     | 150  |
|   |          | > 50 to 150         | 2500                                     |  |                   | 100     |      |
|   |          | > 150 to 300        | 1200                                     |  |                   |         |      |
|   | Fossil   | ≤ 50                | 5000                                     | 150  | 125               |         |      |
|   |          | > 50 to 150         | 2500                                     |  |                   |         |      |
|   |          | > 150 to 300        | 1200                                     | 100  |                   |         |      |
| Automatic   | Biogenic | ≤ 50                | 3000                                     |  | 150               |         |      |
|   |          | > 50 to 150         | 2500                                     | 80   |                   |         |      |
|   |          | > 150 to 300        | 1200                                     |  |                   |         |      |
|   | Fossil   | ≤ 50                | 3000                                     | 100  | 125               |         |      |
|   |          | > 50 to 150         | 2500                                     |  |                   |         |      |
|   |          | > 150 to 300        | 1200                                     | 80   |                   |         |      |
|   |          |                     |  |  | +                 |         |      |
|   |          |                     |  |  | +                 |         |      |

<sup>a</sup> Referring to dry exit flue gas, 0 °C, 1 013 mbar.



**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 75.2               | 92.1                |
| Minimal       |                    | 91.6                |

**Test evaluation:**

Measured efficiency for CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Average emission values |          |               |                           |                                      |                              |                           |
|---------------|-------------------------|----------|---------------|---------------------------|--------------------------------------|------------------------------|---------------------------|
|               | Measured values         |          |               |                           | Converted values O <sub>2</sub> =10% |                              |                           |
|               | O <sub>2</sub> [%]      | CO [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.22                    | 137      | 6             | 23                        | 137                                  | 3                            | 19                        |
| Minimal       | 11.01                   | 64       | 14            | 17                        | 88                                   | 9                            | 19                        |

**Test evaluation:**

The measured emission values CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 76.6               | 92.4                |
| Minimal       |                    | 93.6                |

**Test evaluation:**

Measured efficiency for CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average emission values |          |               |                           |                                      |                              |                           |
|---------------|-------------------------|----------|---------------|---------------------------|--------------------------------------|------------------------------|---------------------------|
|               | Measured values         |          |               |                           | Converted values O <sub>2</sub> =10% |                              |                           |
|               | O <sub>2</sub> [%]      | CO [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.81                    | 154      | 24            | 14                        | 160                                  | 11                           | 12                        |
| Minimal       | 11.08                   | 54       | 12            | 21                        | 75                                   | 7                            | 23                        |

**Test evaluation:**

The measured emission values CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 78.4               | 91.3                |
| Minimal       |                    | 92.5                |

**Test evaluation:**

Measured efficiency for CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average emission values |          |               |                           |                                      |                              |                           |
|---------------|-------------------------|----------|---------------|---------------------------|--------------------------------------|------------------------------|---------------------------|
|               | Measured values         |          |               |                           | Converted values O <sub>2</sub> =10% |                              |                           |
|               | O <sub>2</sub> [%]      | CO [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 7.50                    | 37       | 11            | 18                        | 38                                   | 5                            | 15                        |
| Minimal       | 10.81                   | 57       | 6             | 10                        | 77                                   | 3                            | 11                        |

**Test evaluation:**

The measured emission values CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 79.0               | 92.0                |
| Minimal       |                    | 92.5                |

**Test evaluation:**

Measured efficiency for CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average emission values |          |               |                           |                                      |                              |                           |
|---------------|-------------------------|----------|---------------|---------------------------|--------------------------------------|------------------------------|---------------------------|
|               | Measured values         |          |               |                           | Converted values O <sub>2</sub> =10% |                              |                           |
|               | O <sub>2</sub> [%]      | CO [ppm] | OGC/THC [ppm] | Dust [mg/m <sup>3</sup> ] | CO [mg/m <sup>3</sup> ]              | OGC/THC [mg/m <sup>3</sup> ] | Dust [mg/m <sup>3</sup> ] |
| Nominal       | 5.54                    | 71       | 14            | 20                        | 63                                   | 5                            | 14                        |
| Minimal       | 10.81                   | 57       | 6             | 10                        | 77                                   | 3                            | 11                        |

**Test evaluation:**

The measured emission values CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Minimum efficiency | Measured efficiency |
|---------------|--------------------|---------------------|
| Nominal       | 80.1               | 91.1                |
| Minimal       |                    | 93.1                |

**Test evaluation:**

Measured efficiency for CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 is **higher** than required.

**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average emission values |             |                  |                              |                                      |                                 |                              |
|---------------|-------------------------|-------------|------------------|------------------------------|--------------------------------------|---------------------------------|------------------------------|
|               | Measured values         |             |                  |                              | Converted values O <sub>2</sub> =10% |                                 |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | OGC/THC<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | OGC/THC<br>[mg/m <sup>3</sup> ] | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 9.32                    | 123         | 10               | 16                           | 145                                  | 5                               | 15                           |
| Minimal       | 13.09                   | 15          | 17               | 12                           | 26                                   | 12                              | 17                           |

**Test evaluation:**

The measured emission values CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 **do not exceed** the specified values.



Accredited test number: **T 001\*** Test title: **Test of heat output, input and efficiency  
Combustion efficiency test - emissions**

Requirement: ČSN EN 303-5:2013 Annex C,  
Deviation from Germany, C.5.1, C.5.2

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

**Test results:** Evaluation of the test results stated in this Test Report only.

| Requirement  |                            |                                |                             |                           | Requirement specification   | Test evaluation   |
|--|----------------------------|--------------------------------|-----------------------------|---------------------------|---|-------------------|
| <b>Emission limits</b>   |                            |                                |                             |                           | ČSN EN 303-5:2013<br>Annex C,<br>Deviation from<br>Germany,<br>C.5.1, C.5.2 | Wood Pellets - C1 |
| Table 7 – Emission limits<br>The emission limits are regulated in Chapter 2, paragraphs 4, 5 and Annex 2 of the German Immission Control Ordinance "Erste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über kleine und mittlere Feuerungsanlagen - 1. BImSchV)".<br>Boilers operated with solid fuels shall only be installed, possess the quality and be put into operation if they fulfil the following specifications of the 1. BImSchV: |                            |                                |                             |                           |   |                   |
|  | <b>Fuel acc. to §3 (1)</b> | <b>Nominal output range kW</b> | <b>Dust g/m<sup>3</sup></b> | <b>CO g/m<sup>3</sup></b> |   |                   |
| Stage 2:<br>Appliances,<br>which will be<br>installed<br>after<br>31.12.2014   | Numbers 1 to 5a            | ≥ 4                            | 0.02                        | 0.4                       |   |                   |
|  | Numbers 6 to 7             | ≥ 30 ≤ 500                     | 0.02                        | 0.4                       |   |                   |
|  |                            | > 500                          | 0.02                        | 0.3                       |   |                   |
| Numbers 8 to 13  | ≥ 4 < 100                  | 0.02                           | 0.4                         |                           |   |                   |
| NOTE: Differing from sentence 1 for firing systems (appliances) which will exclusively be fired by fuels according §3 article 1 Number 4 in the form of split logs, the limits according Stage 2 apply for firing systems (appliances) if they are installed after 31.12.2016.   |                            |                                |                             |                           |   |                   |

**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Average emission values |          |                           |                                      |                          |
|---------------|-------------------------|----------|---------------------------|--------------------------------------|--------------------------|
|               | Measured values         |          |                           | Converted values O <sub>2</sub> =13% |                          |
|               | O <sub>2</sub> [%]      | CO [ppm] | Dust [mg/m <sup>3</sup> ] | CO [g/m <sup>3</sup> ]               | Dust [g/m <sup>3</sup> ] |
| Nominal       | 7.22                    | 137      | 23                        | 0.099                                | 0.013                    |
| Minimal       | 11.01                   | 64       | 17                        | 0.064                                | 0.014                    |

**Test evaluation:**

The measured emission values for CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 do not exceed the specified values.



**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average emission values |          |                           |                                      |                          |
|---------------|-------------------------|----------|---------------------------|--------------------------------------|--------------------------|
|               | Measured values         |          |                           | Converted values O <sub>2</sub> =13% |                          |
|               | O <sub>2</sub> [%]      | CO [ppm] | Dust [mg/m <sup>3</sup> ] | CO [g/m <sup>3</sup> ]               | Dust [g/m <sup>3</sup> ] |
| Nominal       | 7.81                    | 154      | 14                        | 0.116                                | 0.008                    |
| Minimal       | 11.08                   | 54       | 21                        | 0.055                                | 0.017                    |

**Test evaluation:**

The measured emission values for CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average emission values |          |                           |                                      |                          |
|---------------|-------------------------|----------|---------------------------|--------------------------------------|--------------------------|
|               | Measured values         |          |                           | Converted values O <sub>2</sub> =13% |                          |
|               | O <sub>2</sub> [%]      | CO [ppm] | Dust [mg/m <sup>3</sup> ] | CO [g/m <sup>3</sup> ]               | Dust [g/m <sup>3</sup> ] |
| Nominal       | 7.50                    | 37       | 18                        | 0.028                                | 0.011                    |
| Minimal       | 10.81                   | 57       | 10                        | 0.056                                | 0.008                    |

**Test evaluation:**

The measured emission values for CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average emission values |          |                           |                                      |                          |
|---------------|-------------------------|----------|---------------------------|--------------------------------------|--------------------------|
|               | Measured values         |          |                           | Converted values O <sub>2</sub> =13% |                          |
|               | O <sub>2</sub> [%]      | CO [ppm] | Dust [mg/m <sup>3</sup> ] | CO [g/m <sup>3</sup> ]               | Dust [g/m <sup>3</sup> ] |
| Nominal       | 5.54                    | 71       | 20                        | 0.046                                | 0.011                    |
| Minimal       | 10.81                   | 57       | 10                        | 0.056                                | 0.008                    |

**Test evaluation:**

The measured emission values for CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                             |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|-----------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                             |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[g/m <sup>3</sup> ]            | Dust<br>[g/m <sup>3</sup> ] |
| Nominal       | 9.32                    | 123         | 16                           | 0.105                                | 0.011                       |
| Minimal       | 13.09                   | 15          | 12                           | 0.019                                | 0.012                       |

**Test evaluation:**

The measured emission values for CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 **do not exceed** the specified values.



Accredited test number: **T 001\*** Test title: **Test of heat output, input and efficiency  
Combustion efficiency test - emissions**

Requirement: **ČSN EN 303-5:2013 Annex C  
C.6 Deviation from Switzerland**

Sample tested: **CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)**

**Test results:** Evaluation of the test results stated in this Test Report only.

| Requirement  |  | Requirement specification                                | Test evaluation   |                            |                          |                            |   |     |    |  |     |    |   |     |
|--|--|--|-------------------|----------------------------|--------------------------|----------------------------|---|-----|----|--|-----|----|---|-----|
| <b>Emission limits</b>   |  | ČSN EN 303-5:2013 Annex C C.6 Deviation from Switzerland | Wood Pellets - C1 |                            |                          |                            |   |     |    |  |     |    |   |     |
| Clause 4.4.7, Table 7<br>The emission limits are regulated in Annex 4 of the Swiss Ordinance on Air Pollution Control ([OAPC] SR 814.318.142.1) of 1985-12-16 (as at 2010-07-15). Boilers operated with woody biomass shall only be put on the market if they fulfil the following specifications of the OAPC:<br>– declarations of conformity (Figure 20 OAPC);<br>– Figures 1, 212, 23 Annex 4 OAPC;<br>– Figures 31, 32 Annex 5 OAPC.<br>Emissions for boilers operated with coal or wood fuels shall not exceed the following limits:                  |  |  |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
| Type of installation   | <b>Particular requirements (emission limits)<sup>a</sup> for carbon monoxide (CO) and particulate matter (dust)</b>  |  |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
|  | <table border="1"> <thead> <tr> <th></th> <th>CO (mg·m<sup>-3</sup>)</th> <th>Dust (mg·m<sup>-3</sup>)</th> </tr> </thead> <tbody> <tr> <td>Boilers for log wood and boilers for coal, manual stoking</td> <td>800</td> <td>50</td> </tr> <tr> <td>Boilers for chipped wood and boilers for coal, automatic stoking</td> <td>400</td> <td>60</td> </tr> <tr> <td>Boilers for Wood Pellets, automatic stoking</td> <td>300</td> <td>40</td> </tr> </tbody> </table> |  |                   |                            | CO (mg·m <sup>-3</sup> ) | Dust (mg·m <sup>-3</sup> ) | Boilers for log wood and boilers for coal, manual stoking | 800 | 50 | Boilers for chipped wood and boilers for coal, automatic stoking | 400 | 60 | Boilers for Wood Pellets, automatic stoking | 300 |
|  | CO (mg·m <sup>-3</sup> )   |  |                   | Dust (mg·m <sup>-3</sup> ) |                          |                            |   |     |    |  |     |    |   |     |
| Boilers for log wood and boilers for coal, manual stoking  | 800  | 50   |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
| Boilers for chipped wood and boilers for coal, automatic stoking   | 400  | 60   |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
| Boilers for Wood Pellets, automatic stoking  | 300  | 40   |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
| <sup>a</sup> Referred to oxygen basis:<br>– for boilers for natural state wood 13 % volume;<br>– for boilers for coal 7 % volume.  |  |  |                   |                            |                          |                            |   |     |    |  |     |    |   |     |
| The sulphur content of coal, coal briquettes and coke shall not exceed 3 %. Boilers operated with non-woody biomass shall comply with the following specifications of the OAPC:<br>– Figures 741, 742, 743 Annex 2 OAPC;<br>– Figures 81, 82 Annex 3 OAPC.<br>According to Figure 743, Annex 2 OAPC, non-woody biomass, such as biogenic waste and products from agriculture, may only be burnt in boilers with a heat input of at least 70 kW. Such units need an approval and shall meet stronger emission limits according to Figure 742, Annex 2 OAPC. |  | 0  |                   |                            |                          |                            |   |     |    |  |     |    |   |     |



**Measurement results:** CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 7.22                    | 137         | 23                           | 99                                   | 13                           |
| Minimal       | 11.01                   | 64          | 17                           | 64                                   | 14                           |

**Test evaluation:**

The measured emission values for CARIA CP-23 (version: CARIA TLUX CPT-23) - Wood Pellets - C1 **exceed** the specified values.

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 7.81                    | 154         | 14                           | 116                                  | 8                            |
| Minimal       | 11.08                   | 54          | 21                           | 55                                   | 17                           |

**Test evaluation:**

The measured emission values for CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 7.50                    | 37          | 18                           | 28                                   | 11                           |
| Minimal       | 10.81                   | 57          | 10                           | 56                                   | 8                            |

**Test evaluation:**

The measured emission values for CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 5.54                    | 71          | 20                           | 46                                   | 11                           |
| Minimal       | 10.81                   | 57          | 10                           | 56                                   | 8                            |

**Test evaluation:**

The measured emission values for CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =13% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 9.32                    | 123         | 16                           | 105                                  | 11                           |
| Minimal       | 13.09                   | 15          | 12                           | 19                                   | 12                           |

**Test evaluation:**

The measured emission values for CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 **do not exceed** the specified values.



Accredited test number: **T 001\*** Test title: **Test of heat output, input and efficiency  
Combustion efficiency test - emissions**

Requirement: ČSN EN 303-5:2013  
Annex C,  
C.8 Deviations for Italy

Sample tested: CARIA CP-23, CARIA CP-40, CARIA CP-80,  
CARIA CP-100, CARIA CP-150  
(versions: CARIA TLUX CPT-23, CARIA TLUX CPT-40,  
CARIA TLUX CPT-80, CARIA TLUX CPT-100,  
CARIA TLUX CPT-150)

**Test results:** Evaluation of the test results stated in this Test Report only.

| Requirement  | Specification of requirement             |                                | Test evaluation   |
|--|--|--------------------------------|-------------------|
| <b>Italian emission limits for heating plants fuelled with biomass solid fuels</b>     | Emissions refer to an 11% O <sub>2</sub> |                                | Wood Pellets - C1 |
| <b>Plant nominal thermal output (MW)</b>   | >0,035 + <0,15<br>(>35kW+<150kW)         | >0,15 + <1<br>(>150kW+<1000kW) |                   |
| Total Particulate Matter   | 200mg-Nm <sup>3</sup>                    | 100mg-Nm <sup>3</sup>          | +                 |
| Total Organic Carbon (COT)<br>Carbon Monoxide (CO)                                     |  | -<br>350 mg-Nm <sup>3</sup>    |                   |
| Nitrogen Dioxide (expressed as NO <sub>2</sub> )                                       |  | 500 mg-Nm <sup>3</sup>         |                   |
| Sulphur Dioxide (expressed as SO <sub>2</sub> )  |  | 200mg-Nm <sup>3</sup>          |                   |
| <b>Italian emission limits for heating plants fuelled with non-biomass solid fuels</b> | Emissions refer to an 6% O <sub>2</sub>  |                                | 0                 |
| Nominal Thermal output (MW)  | >0.35 (350kW)                            |                                |                   |
| Total Particulate Matter   | 50 mg-Nm <sup>3</sup>                    |                                |                   |

**Measurement results:** CARIA CP-40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =11% |                              |
|               | O <sub>2</sub><br>[%]   | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 7.81                    | 154         | 14                           | 145                                  | 11                           |
| Minimal       | 11.08                   | 54          | 21                           | 68                                   | 21                           |

**Test evaluation:**

The measured emission values for CARIA CP 40 (version: CARIA TLUX CPT-40) - Wood Pellets - C1 **do not exceed** the specified values.



**Measurement results:** CARIA CP-80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =11% |                              |
|               | O <sub>2</sub><br>[ % ] | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 7.50                    | 37          | 18                           | 35                                   | 14                           |
| Minimal       | 10.81                   | 57          | 10                           | 70                                   | 10                           |

**Test evaluation:**

The measured emission values for CARIA CP 80 (version: CARIA TLUX CPT-80) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =11% |                              |
|               | O <sub>2</sub><br>[ % ] | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 5.54                    | 71          | 20                           | 57                                   | 13                           |
| Minimal       | 10.81                   | 57          | 10                           | 70                                   | 10                           |

**Test evaluation:**

The measured emission values for CARIA CP-100 (version: CARIA TLUX CPT-100) - Wood Pellets - C1 **do not exceed** the specified values.

**Measurement results:** CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1

| Boiler output | Average emission values |             |                              |                                      |                              |
|---------------|-------------------------|-------------|------------------------------|--------------------------------------|------------------------------|
|               | Measured values         |             |                              | Converted values O <sub>2</sub> =11% |                              |
|               | O <sub>2</sub><br>[ % ] | CO<br>[ppm] | Dust<br>[mg/m <sup>3</sup> ] | CO<br>[mg/m <sup>3</sup> ]           | Dust<br>[mg/m <sup>3</sup> ] |
| Nominal       | 9.32                    | 123         | 16                           | 131                                  | 14                           |
| Minimal       | 13.09                   | 15          | 12                           | 24                                   | 16                           |

**Test evaluation:**

The measured emission values for CARIA CP-150 (version: CARIA TLUX CPT-150) - Wood Pellets - C1 **do not exceed** the specified values.

Tested by: Ing. Pavel Fojtů

Date: 05/2019

Signed: 

Reviewed by: Ing. Stanislav Buchta

Date: 06/2019

Signed: 



**V. A list of other referenced documents**

- Order B-66328 dated 2019-04-23 (received on 2019-04-23)
- Contract B-66328/39 dated 2019-05-02
- Amendment D1 of Contract B-66328/39
- ČSN EN 303-5:2013 - Heating boilers - Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW - Terminology, requirements, testing and marking
- ČSN EN 15456 - Heating boilers - Electrical power consumption for heat generators - System boundaries - Measurements

Test Report compiled by:

Ing. Pavel Fojtů

Person responsible for correctness of the Report:

**Milan Holomek**

Head of Heat and Environment-Friendly Equipment Test Station



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