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period of time specified by the producer where the nominal heat output is set free

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proportion (in percent) of the nominal heat output multiplied with the storage period to the total heat input

4 Calculations

4.1 Nominal heat output

The required nominal heat output (P_n) of the stove shall be specified by the producer so that the dimensions of the stove can be calculated in accordance with clauses 4.2 to 4.10.

4.2 Load of fuel

4.2.1 Maximum load

The maximum load of fuel shall be calculated as follows:

$$m_B = \frac{P_n \times t_n}{3{,}25} \qquad (1)$$

NOTE 1 To calculate the factor 3,25 in equation (1), a net calorific value of wood of 4,16 kWh*kg^{-1} and an efficiency of 0,78 (78%) was presumed.

where

m_B is the maximum load (kg);

P_n is the specified nominal heat output (kW);

t_n is the specified storage period (h).

NOTE 2 The specified storage period can vary between 8 h and 24 h.

4.2.2 Minimum load

The minimum load shall be calculated as 50 % of the maximum load as follows:

$$m_{Bmin} = 0{,}5 \times m_B \qquad (2)$$

where

m_B is the maximum load (kg);

m_{Bmin} is the minimum load (kg).

4.3 Design of the essential dimensions

4.3.1 Combustion chamber dimensions

NOTE Designing the dimensions of the combustion chamber serves two main purposes: firstly to ensure that sufficient room is available to contain the fuel needed to be charged and secondly that the requirements for clean combustion are met.

4.3.1.1 Combustion chamber surface

The dimension of the combustion chamber surface shall be calculated as follows:

$$O_{BR} = 900 \times m_B \tag{3}$$

where

m_B is the maximum load (in kg);

O_{BR} is the combustion chamber surface (in cm^2).

For the calculation of the combustion chamber surface all its walls, the ceiling and the base including the area of the combustion chamber opening and the combustion chamber exit for the flue gas shall be regarded equally i.e. calculated as if there were no combustion openings or exits.

4.3.1.2 Combustion chamber base

The combustion chamber base can be varied between a minimum and a maximum value.

The minimum value results from the requirement that at maximum load a height of the fuel of 33 cm shall not be exceeded. Therefore the base shall be calculated using 100 cm² per kg fuel as follows:

$$A_{BRmin} = 100 \times m_B \tag{4}$$

where

m_B is the maximum load (in kg);

A_{BRmin} is the minimum combustion chamber base (in cm^2).

The maximum area of the base of the combustion chamber shall be defined as a result of equations (3) and (6) as follows:

$$A_{BRmax} = \frac{900 \times m_B - (25 + m_B) \times U_{BR}}{2} \tag{5}$$

where

m_B is the maximum load (in kg);

A_{BRmax} is the maximum combustion chamber base (in cm^2);

U_{BR} is the combustion chamber admeasurement (in cm).

When the base is square, the proportion of length to width can be varied from 1 to 2, but there shall be a minimum width of 23 cm.

4.3.1.3 Combustion chamber height

The minimum combustion chamber height shall be defined as follows:

$$H_{BR} \geq 25 + m_B \tag{6}$$

where

m_B is the maximum load (in kg);

H_{BR} is the combustion chamber height (in cm).

On the basis of the specifications of the combustion chamber base and the combustion chamber surface the combustion chamber height shall be calculated as follows:

$$H_{BR} = \frac{900 \times m_B - 2 \times A_{BR}}{U_{BR}} \tag{7}$$

where

m_B is the maximum load (in kg);

A_{BR} is the combustion chamber base (in cm^2);

H_{BR} is the combustion chamber height (in cm);

U_{BR} is the combustion chamber admeasurement (in cm).

4.3.2 Minimum flue pipe length

4.3.2.1 Construction without air gap

The minimum flue pipe length shall be calculated as follows:

$$L_{Zmin} = 1{,}3 \times \sqrt{m_B} \tag{8a}$$

where

m_B is the maximum load (in kg);

L_{Zmin} is the minimum flue pipe length (in m).

4.3.2.2 Construction with air gap

The minimum flue pipe length shall be calculated as follows:

$$L_{Zmin} = 1{,}5 \times \sqrt{m_B} \tag{8b}$$

where

m_B is the maximum load (in kg);

L_{Zmin} is the minimum flue pipe length (in m).

4.3.3 Gas groove profile

The gas groove profile shall be calculated as follows:

$$A_{GS} = 1 \times m_B \tag{9}$$

where

A_{GS} is the profile of the gas groove (in cm^2);

m_B is the maximum load (in kg).