SLOVENSKI STANDARD
SIST EN 297:1997/A3:1997

01-marec-1997

Plinski kotli za centralno ogrevanje - Tipa B <(indeks)11> in B<(indeks)11BS> z atmosferskimi gorilniki z imensko močjo do vključno 70 kW - Dopolnilo A3

Gas-fired central heating boilers - Type B11 and B11BS boilers, fitted with atmospheric burners of nominal heat input not exceeding 70 kW

Heizkessel für gasförmige Brennstoffe - Heizkessel der Typen B11 und B11BS mit atmosphärischen Brennern mit einer Nennwärmebelastung kleiner als oder gleich 70 kW

Chaudieres de chauffage central utilisant les combustibles gazeux - Chaudieres des types B11 et B11BS équipées de bruleurs atmosphériques, dont le débit calorifique nominal est inférieur ou égal a 70 kW

Ta slovenski standard je istoveten z: **EN 297:1994/A3:1996**

ICS:

91.140.10	Sistemi centralnega ogrevanja	Central heating systems
97.100.20	Plinski grelniki	Gas heaters

SIST EN 297:1997/A3:1997 **en**

EUROPEAN STANDARD

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ICS 91.140.10

Descriptors: central heating, boilers, gaseous fuels, polluant gases, measurements, limits

English version

Gas-fired central heating boilers - Type B_{11} and B_{11BS} boilers fitted with atmospheric burners of nominal heat input not exceeding 70 kW

Chaudières de chauffage central utilisant les combustibles gazeux - Chaudières des types B_{11} et B_{11BS} équipées de brûleurs atmosphériques, dont le débit calorifique nominal est inférieur ou égal à 70 kW

Heizkessel für gasförmige Brennstoffe - Heizkessel der Typen B_{11} und B_{11BS} mit atmosphärischen Brennern mit einer Nennwärmebelastung kleiner als oder gleich 70 kW

This amendment 3 modifies the European Standard EN 297:1994.This amendment was approved by CEN on 1996-09-20. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

FOREWORD

This Amendment EN 297:1994/A3:1996 to the EN 297:1994 has been prepared by Technical Committee CEN/TC 109 "Central heating boilers using gaseous fuels", the secretariat of which is held by NNI.

This Amendment to the European Standard EN 297:1994 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 1997, and conflicting national standards shall be withdrawn at the latest by April 1997.

This Amendment modifies EN 297:1994. It has been prepared to incorporate requirements and test methods concerning NO_x-emissions of boilers. In future the requirements given in this amendment will be reviewed and will be more stringent.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this Amendment: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1.2 Normative references

Add :

"CR 1404 Determination of emissions from appliances burning gaseous fuels during type testing"

3.6.2 Other pollutants

Replace subclause 3.6.2 as follows :

The manufacturer shall select the NO_x class of the boiler from table 14. Under the test and calculation conditions of 4.6.2 the permissible NO_x concentration assigned to this class in the dry, air free products of combustion shall not be exceeded.

Table 14 : NO_x classes

NO_x-Classes	Limit NO_x concentration in mg/kWh
1	260
2	200
3	150
4	100

4.6.2 Other pollutants

Replace subclause 4.6.2 as follows :

4.6.2.1 General

The boiler is installed as specified in 4.1.6.

For boilers intended to use second family gases, the tests are carried out with reference gas G 20.

For boilers intended to use only G 25, the tests are carried out with reference gas G 25.

For boilers intended to use only third family gases, the tests are carried out with reference gas G 30 and the limit NO_x value is multiplied by a factor of 1,30.

For boilers intended to use propane only, the tests are carried out with reference gas G 31 and the limit NO_x value is multiplied by a factor of 1,20.

The boiler is adjusted to its nominal heat input for a flow water temperature of 80 °C and a return temperature of 60 °C.

For measurements at partial heat inputs lower than the nominal heat input Q_n the return water temperature T_r is calculated as a function of the particular heat input using the following formula :

$$T_r = (0{,}4 \times Q) + 20$$

where :

T_r is the return water temperature, expressed in degrees Celsius (°C),

Q is the partial heat input, expressed in percent of Q_n.

The flow is kept constant.

The NO_x measurements are carried out when the boiler is at thermal equilibrium, conforming with details given in CR 1404.
No wet meters are used.

The reference conditions for the combustion air are :

- temperature : 20 °C ;
- relative humidity : 10 g H_2O /kg air.

If the test conditions are different from these reference conditions, it will be necessary to correct the NO_x values as specified below.

$$NO_{x,0} = NO_{x,m} + \frac{0{,}02\ NO_{x,m} - 0{,}34}{1 - 0{,}02\ (h_m - 10)} (h_m - 10) + 0{,}85\ (20 - T_m)$$

Where :

- $NO_{x,0}$ is the value of NO_x corrected to the reference conditions expressed in milligram per kilowatthour (mg/kWh).
- $NO_{x,m}$ is the NO_x measured at h_m and T_m in milligram per kilowatthour (mg/kWh) in the range 50 mg/kWh to 300 mg/kWh ;
- h_m is humidity during the measurement of $NO_{x,m}$ in g/kg in the range 5 g/kg to 15 g/kg ;
- T_m is the ambient temperature during the measurement of $NO_{x,m}$ in °C in the range 15°C to 25°C ;

Where appropriate, the measured NO_x values are weighted in accordance with 4.6.2.2.

It is checked that the weighted NO_x values comply with the values of table 14 of 3.6.2, depending on

the NO_x class chosen.

For the calculation of conversions of NO_x, see Annex M.

4.6.2.2 Weighting

4.6.2.2.1 General

The weighting of the NO_x measured values shall be as described in 4.6.2.2.2 to 4.6.2.2.5, on the basis of the values in table 15.

Table 15 : Weighting factors

Partial heat input Q_{pi} as % of Q_n	70	60	40	20
Weighting factor F_{pi}	0,15	0,25	0,30	0,30

For range rated boilers Q_n is replaced by Q_a, the arithmetic mean of the maximum and the minimum heat input, as stated by the manufacturer.

4.6.2.2.2 On/off boilers

The NO_x concentration is measured (and possibly corrected as specified in 4.6.2.1) at the nominal heat input, Q_n.

4.6.2.2.3 Boilers with several rates

The NO_x concentration is measured (and possibly corrected as specified in 4.6.2.1) at the partial heat input corresponding to each of the rates and weighted in accordance with table 15.

If necessary, the weighting factor specified in table 15 is recalculated for each rate as specified below.

If the heat inputs of two rates are between the partial heat inputs specified in table 15, it will be necessary to apportion the weighting factor between the heat inputs of the higher and lower rates, as follows :

$$F_{p,\text{high rate}} = F_{pi} \cdot \frac{Q_{pi} - Q_{\text{low rate}}}{Q_{\text{high rate}} - Q_{\text{low rate}}} \cdot \frac{Q_{\text{high}}}{Q_{pi}}$$

$$F_{p,\text{low rate}} = F_{pi} - F_{p,\text{high rate}}$$

If the heat inputs of two rates cover more than one partial heat input specified in table 15, then it is necessary to apportion each weighting factor between the heat inputs of the higher and lower rate as indicated above.

The weighting NO_x value is then equal to the sum of the products of the measured NO_x values at the different rates, $NO_{x,\,mes(rate)}$, multiplied by their weighting factor, calculated as specified above :

$$NO_{x,pond} = \Sigma\ (NO_{x,mes\ (rate)}\ .\ F_{p,rate})$$

(See calculation example in annex L).

4.6.2.2.4 Modulating boilers in which the minimum modulating heat input is no greater than 0,20 Q_n

The NO_x concentration is measured (and possibly corrected as specified in 4.6.2.1) at the partial heat inputs specified in table 15.

The NO_x value is weighted as specified below :

$$NO_{x,pond} = 0{,}15\ .\ NO_{x,mes\ (70)} + 0{,}25\ .\ NO_{x,mes\ (60)} + 0{,}30\ .\ NO_{x,mes\ (40)} + 0{,}30\ .\ NO_{x,mes\ (20)}$$

4.6.2.2.5 Modulating boilers in which the minimum modulating heat input is greater than 0,20 Q_n

The NO_x concentration is measured (and possibly corrected as specified in 4.6.2.1) at the minimum modulating rate and at the partial heat inputs Q_{pi} , specified in table 15, which are greater than the minimum modulation rate.

The weighting factors for the partial heat inputs in table 15, which are no greater than the minimum modulation rate are added and multiplied by this heat input.

The NO_x value is therefore weighted as follows :

$$NO_{x,pond} = (NO_{x,mes\ Q_{min}}\ .\ \Sigma\ F_{pi}(Q \leq Q_{min})) + \Sigma\ (NO_{x,mes}\ .\ F_{pi})$$

Symbols used in 4.6.2.2

Q_{min} is the minimum modulating heat input, expressed in kilowatts (kW) ;

Q_n is the nominal heat input, expressed in kilowatts (kW) ;

Q_{pi} is the partial heat input for weighting, expressed in percent of Q_n ;

F_{pi} is the weighting factor corresponding to the partial heat input Q_{pi} ;

$NO_{x,pond}$ is the weighted value of the NO_x concentration, in milligrams per kilowatthour (mg/kWh) ;

$NO_{x,mes}$ is the measured (and possibly corrected) value :

- at the partial heat input : $NO_{x,mes\ (70)}$, $NO_{x,mes\ (60)}$, $NO_{x,mes\ (40)}$, $NO_{x,mes\ (20)}$,
- at the minimum heat input (modulating boilers) : $NO_{x,mes,Q_{min}}$,
- at the heat input corresponding to a single rate : $NO_{x,mes(rate)}$;

$Q_{high\ rate}$ is the rate greater than Q_{pi} ;

$Q_{low\ rate}$ is the rate less than Q_{pi} ;

$F_{p,high\ rate}$ is the apportioned weighting factor, high rate ;

$F_{p,low\ rate}$ is the apportioned weighting factor, low rate."

5.1.1 Data plate

Add a final indent as follows :

" - the NO_x-class of the boiler."