DIN EN 13836:2007-06 (E)

Gas-fired central heating boilers - Type B boilers of nominal heat input exceeding 300 kW, but not exceeding 1000 kW

Contents

Page

Foreword 6

1 Scope 7

2 Normative references 8

3 Terms and definitions 9
3.1 Combustible gases 9
3.2 Constituent parts of the boiler 11
3.2.1 Gas supply 11
3.2.2 Combustion circuit 12
3.2.3 Adjusting, control and safety devices 13
3.3 Operation of the boiler 16
3.3.1 Gas rates 16
3.3.2 Outputs 17
3.3.4 Gas combustion 17
3.3.5 Times 18
3.3.10 Locking out 19

4 Classification of boilers 19
4.1 Gases and categories 19
4.2 Classification according to the mode of evacuation of the combustion products 20
4.2.1 General 20
4.2.2 Type B 20
4.3 Classification according to operating conditions) 21
4.3.1 Standard boiler 21
4.3.2 Low-temperature boiler 21
4.3.3 Gas condensing boiler) 21
4.4 Modular boiler 21

5 Constructional requirements 21
5.1 General 21
5.2 Conversion to different gases 21
5.3 Materials and method of construction 22
5.3.1 General 22
5.3.2 Materials and thicknesses of walls or tubes under water pressure 22
5.3.3 Thermal insulation 32
5.4 Design 33
5.4.1 General 33
5.4.2 Modular boilers 33
5.5 Use and servicing 33
5.6 Connections to the gas and water pipes 34
5.6.1 General 34
5.6.2 Connections to the gas pipe 34
5.6.3 Connections to the central heating circuit 34
5.7 Soundness 34
5.7.1 Soundness of the gas circuit 34
5.7.2 Soundness of the combustion circuit 34
5.8 Supply of combustion air and the evacuation of the combustion products 35
5.8.1 Control dampers in the air or combustion products circuit 35
5.8.2 Fan 35

5.8.3 Air proving ... 35
5.8.4 Gas/air ratio controls ... 35
5.8.5 Condensate discharge ... 36
5.9 Checking the state of operation ... 36
5.10 Drainage ... 36
5.11 Electrical equipment ... 37
5.12 Operational safety in the event of failure of the auxiliary energy ... 37
5.13 Adjusting, control and safety devices ... 37
5.13.1 General ... 37
5.13.2 Adjusters and range rating devices ... 37
5.13.3 Gas circuit ... 38
5.13.4 Gas pressure regulator ... 39
5.13.5 Ignition devices ... 40
5.13.6 Flame supervision systems ... 40
5.13.7 Thermostats and water temperature limiting devices ... 41
5.13.8 Device for monitoring the evacuation of combustion products ... 42
5.14 Burners ... 42
5.15 Pressure test points ... 42
5.16 Chemical composition of the condensate for low-temperature boilers ... 43

6 Operational requirements ... 43
6.1 General ... 43
6.2 Soundness ... 43
6.2.1 Soundness of the gas circuit ... 43
6.2.2 Soundness of the combustion circuit and correct evacuation of the combustion products ... 43
6.2.3 Soundness of the water circuit ... 43
6.3 Nominal, maximum and minimum heat inputs, and nominal output ... 43
6.3.1 Nominal heat input or maximum and minimum heat inputs ... 43
6.3.2 Adjustment of the heat input by the downstream pressure ... 44
6.3.3 Minimum ignition rate ... 44
6.3.4 Nominal output ... 44
6.3.5 Gas pressure regulator ... 44
6.4 Safety of operation ... 44
6.4.1 Limiting temperatures ... 44
6.4.2 Ignition -- Cross-lighting -- Flame stability ... 45
6.4.3 Pre-purge ... 46
6.5 Adjusting, control and safety devices ... 47
6.5.1 General ... 47
6.5.2 Ignition devices ... 47
6.5.3 Flame supervision devices ... 48
6.5.4 Ignition burner and ignition rates ... 50
6.5.5 Air proving ... 50
6.5.6 Gas pressure switches ... 51
6.5.7 Control thermostat and safety temperature limiter ... 52
6.5.8 Device for monitoring the evacuation of combustion products ... 52
6.5.9 Condensate discharge blockage ... 53
6.6 Combustion ... 53
6.6.1 Carbon monoxide ... 53
6.6.2 Other pollutants ... 53
6.7 Useful efficiencies ... 54
6.7.1 Useful efficiency at the nominal heat input ... 54
6.7.2 Useful efficiency at part load ... 54
6.8 Criteria for condensation in the flue ... 55
6.9 Resistance of materials to pressure ... 55
6.9.1 General ... 55
6.9.2 Boilers of sheet steel or non-ferrous metals ... 55
6.9.3 Boilers of cast iron and cast materials ... 55
6.10 Hydraulic resistance ... 56
6.11 Combustion air and flue dampers ... 56
6.12 Condensation in a standard boiler ... 56

7 Test methods 56
7.1 General 56
7.1.1 Characteristics of the reference and limit gases 56
7.1.2 General test conditions 62
7.2 Soundness 66
7.2.1 Soundness of the gas circuit 66
7.2.2 Soundness of the combustion circuit and correct evacuation of the combustion products 66
7.2.3 Soundness of the water circuit 66
7.3 Nominal, maximum and minimum heat inputs and nominal output 67
7.3.1 The nominal heat input or the maximum and minimum heat inputs 67
7.3.2 Adjustment of the heat input by the downstream pressure 68
7.3.3 Minimum ignition rate 68
7.3.4 Nominal output 68
7.3.5 Gas regulator 68
7.4 Safety of operation 69
7.4.1 Limiting temperatures 69
7.4.2 Ignition -- Cross-lighting -- Flame stability 69
7.4.3 Pre-purge 71
7.5 Adjusting, control and safety devices 72
7.5.1 General 72
7.5.2 Ignition devices 72
7.5.3 Flame supervision device 73
7.5.4 Ignition burner and ignition rates 75
7.5.5 Air proving 75
7.5.6 Gas pressure switches 77
7.5.7 Control thermostat and safety temperature limiter 77
7.5.8 Device for monitoring the evacuation of combustion products 79
7.5.9 Condensate discharge blockage 79
7.6 Combustion 80
7.6.1 Carbon monoxide 80
7.6.2 Other pollutants 83
7.7 Useful efficiencies 86
7.7.1 Useful efficiency at the nominal heat input 86
7.7.2 Useful efficiency at part load 87
7.8 Criteria for condensation in the flue 92
7.8.1 Determination of flue losses 92
7.8.2 Minimum temperature of the combustion products 93
7.9 Resistance of materials to pressure 93
7.9.1 General 93
7.9.2 Boilers of sheet steel or non-ferrous metals 93
7.9.3 Boilers of cast iron and cast materials 93
7.10 Hydraulic resistance 94
7.11 Combustion air and flue dampers 94
7.12 Condensation in a standard boiler 94

8 Marking and instructions 95
8.1 Marking of the boiler 95
8.1.1 General 95
8.1.2 Data plate 95
8.1.3 Supplementary marking 96
8.1.4 Packaging 97
8.1.5 Warnings on the boiler and on the packaging 98
8.1.6 Other information 98
8.2 Instructions 98
8.2.1 Technical instructions for the installer 98
8.2.2 Use and maintenance instructions for the user 99
8.2.3 Conversion instructions 100
8.3 Presentation 100

Annex A (informative) National situations 112

Annex B (informative) Special national conditions 118

Annex C (informative) A-deviations 119

Annex D (informative) Practical method of calibrating the test rig to enable the heat loss Dp to be determined 120

Annex E (informative) Main symbols and abbreviations used within this European Standard 121

Annex F (informative) Compilations of test conditions used within this European Standard 122

Annex G (informative) Valving 125

Annex H (informative) Determination of the heat losses from the test rig of the indirect method and the contributions of the circulating pump of the test rig 128

Annex I (informative) Means of determining the ignition time at full rate 129

Annex J (informative) Example of calculation of the weighting factors for a boiler with several rates 130

Annex K (informative) Calculation of conversions of NOx 132

Annex L (informative) Use of test gases 133

Annex ZA (informative) Clauses of this European Standard addressing essential requirements or provisions of EU Directives 134

Bibliography 138