DIN EN 12309-2:2016-04 (E)

Gas-fired sorption appliances for heating and/or cooling with a net heat input not exceeding 70 kW - Part 2: Saf ety (includes Corrigendum :2015)

Contents

Page

Foreword 6

1 Scope 8
1.1 Scope of EN 12309 series 8
1.2 Scope of this Part 2 to EN 12309 8

2 Normative references 8

3 Terms and definitions 10

4 Classification 10
4.1 Classification of appliances 10
4.1.1 Classification of gases 10
4.1.2 Classification according to the mode of air supply and evacuation of the combustion products 10
4.1.3 Classification according to the temperatures of the heat transfer media 11
4.1.4 Classification according to denomination 11

5 Construction and design requirements 12
5.1 General 12
5.1.1 Conversion to different gases 12
5.1.2 Materials and method of construction 13
5.1.3 Accessibility for maintenance and use 13
5.1.4 Thermal insulation 13
5.1.5 Gas connection 14
5.1.6 Soundness 14
5.1.7 Air proving 15
5.1.8 Air proving device 15
5.1.9 Gas/air ratio controls 16
5.1.10 Supply of combustion air and evacuation of combustion products 17
5.1.11 Checking the state of operation 19
5.1.12 Electrical equipment 19
5.1.13 Operational safety in the event of fluctuation, interruption and restoration of the auxiliary energy 20
5.1.14 Rotating parts (e.g. motors and fans) 20
5.1.15 Pressurized parts of the appliance 20
5.2 Requirements for adjusting, control and safety devices 21
5.2.1 General 21
5.2.2 Gas rate adjusters and range-rating device 21
5.2.3 Aeration adjusters 21
5.2.4 Automatic gas/air ratio controls 22
5.2.5 Gas pressure regulators 22
5.2.6 Multifunctional controls 22
5.2.7 Automatic shut-off valves 22
5.2.8 Automatic burner control systems 23
5.2.9 Gas strainers 23
5.3 Ignition devices 23
5.3.1 General 23
5.3.2 Ignition device for the main burner 23
5.3.3 Ignition burners 24
5.4 Transportation of combustion air and/or flue gases 24

5.4.1 Combustion air 24
5.4.2 Pre-purge and post-purge 24
5.5 Flame supervision system 24
5.6 Flame ignition and safety time TSA 25
5.7 Main flame establishment 26
5.7.1 Establishment by means of an ignition flame 26
5.7.2 Direct establishment of the main flame 26
5.8 Main burner 26
5.9 Facility for remote control 26
5.10 Thermostats and control of air temperature 27
5.10.1 General requirements 27
5.10.2 Overheat cut-off device 27
5.10.3 Sensors 27
5.11 Gas pressure test points 27
5.12 Pressure relief devices 27
5.13 Additional requirements for appliances designed for outdoor installation 28
5.13.1 General 28
5.13.2 Combustion air inlets 28
5.13.3 Access panels and doors 28
5.13.4 Dimensions of openings 28
5.13.5 Fixing screws 28
5.13.6 Frost protection 28
5.14 Materials in contact with condensate 28
5.15 Condensate 28
5.15.1 Discharge of condensate 28
5.15.2 Control of the combustion products temperature 29
5.15.3 Chemical composition of the condensate 29
5.15.4 Additional requirements for indoor installations 29
5.16 Electrical safety 29

6 Operational requirements 30
6.1 Soundness 30
6.1.1 Soundness of the gas circuit 30
6.1.2 Soundness of the combustion circuit and correct evacuation of combustion products 30
6.2 Heat inputs 31
6.2.1 Nominal heat input 31
6.2.2 Ignition heat input 31
6.2.3 Effectiveness of gas rate adjusters 31
6.2.4 Effectiveness of the gas pressure regulator 31
6.2.5 Effectiveness of the range-rating device 31
6.3 Limiting temperatures 32
6.3.1 Temperature of parts of the appliance which have to be touched during normal use 32
6.3.2 Temperatures of the outer case of the appliance 32
6.3.3 Temperature of the floor, walls and worktop/ceiling 32
6.3.4 Component temperatures 32
6.3.5 Motor temperatures (motor windings) 32
6.4 Ignition, cross lighting, flame stability 32
6.4.1 Ignition and cross-lighting 32
6.4.2 Flame stability 33
6.5 Combustion 34
6.5.1 General 34
6.5.2 Limit conditions 34
6.5.3 Special conditions 34
6.5.4 Sooting 34
6.5.5 Supplementary requirement for condensing appliances 34
6.5.6 Supplementary requirements for B12 and B13 appliances 34
6.6 Safety of operation in various temperature environments 34
6.6.1 Temperature operating range 34
6.6.2 Safety in the event of operation outside the temperature operating range 35
6.7 Overheat cut off device 35
6.8 Maximum working pressure of pressurized vessels 35
6.9 Pressure relief devices 35

6.9.1 Pressure activated pressure relief devices 35
6.9.2 Temperature activated pressure relief devices 36
6.10 Effectiveness of the pre-purge 36
6.11 Weather resistance 36
6.12 Formation of condensate 36
6.13 NOx 37
6.14 Combustion products temperature 37

7 Test methods 37
7.1 General 37
7.1.1 Characteristics of test gases: reference and limit gases 37
7.1.2 Conditions for preparation of the test gases 37
7.1.3 Practical application of test gases 38
7.1.4 Test pressures 39
7.1.5 Test procedures - Tests requiring the use of limit gases 39
7.1.6 General test conditions 39
7.1.7 Modulating and high/low operation 42
7.1.8 Tolerances of measurements 42
7.2 Construction and design 43
7.2.1 Manually operated devices (see 5.2.8.2) 43
7.2.2 Extinction safety time (see 5.5) 43
7.2.3 Safety time (see 5.6) 43
7.3 Safety of operation 43
7.3.1 Soundness 43
7.3.2 Heat inputs 46
7.3.3 Limiting temperatures 48
7.3.4 Ignition, Cross-lighting, Flame stability 49
7.3.5 Combustion 56
7.3.6 Safety of operation in various temperature environments 59
7.3.7 Overheat cut-off device 61
7.3.8 Maximum working pressure of pressurized vessels 62
7.3.9 Pressure relief devices 64
7.3.10 Effectiveness of the pre-purge for all appliances 66
7.3.11 Weather resistance 67
7.3.12 NOx Measurement 67
7.3.13 Combustion product temperature 72
7.3.14 Supervision of the combustion air rate or the combustion products rate 72
7.3.15 Leakage of control tubes 73
7.3.16 Adjustment of the gas/air ratio 73
7.3.17 Flame ignition and safety time TSA 73
7.3.18 Discharge of condensate 73

8 Marking and instructions 73
8.1 Appliance marking 73
8.1.1 Data plate 73
8.1.2 Supplementary markings 74
8.1.3 Packaging 75
8.1.4 Warnings on the appliance and the packaging 75
8.1.5 Other information 76
8.2 Instructions 76
8.2.1 Technical instructions 76
8.2.2 User's instructions 78
8.2.3 Conversion instructions 78
8.3 Presentation 79
8.4 Supplementary marking and instructions in the case of appliances to be installed outdoor or in partially protected places 79
8.4.1 General information 79
8.4.2 Warning on the appliance and the packaging 79
8.4.3 Technical instructions 79

9 Figures 80

Annex A (informative) Alternative method for the determination of the nominal heat input or the maximum and minimum heat input for appliances using a pneumatic gas/air ratio control system 91

Annex B (informative) Calculation of conversions of NO 93x

Annex C Example of calculation of weighting factors NO 94x

Annex D Ratio of calorific value Gross to Net and Net to Gross for Gas Families 1, 2 and 3 96

Annex ZA Relationship between this European Standard and the Essential Requirements of EU Directive 2009/142/EC relating to appliances burning gaseous fuels (codified version) 97

Annex ZB Relationship between this European Standard and the requirements of Commission Regulation (EC) No 813/2013 100

Annex ZC Relationship between this European Standard and the requirements of Commission Regulation (EC) N° 811/2013 101

Bibliography 102