

DIN EN 16510-1:2018-11 (E)

Residential solid fuel burning appliances - Part 1: General requirements and test methods

Contents		Page
European foreword		7
1	Scope	8
2	Normative references	8
3	Terms and definitions	10
4	Classification of appliances and system boundary for roomsealed appliances	21
4.1	Classification of appliances	21
4.2	System boundary	22
5	Performance requirements in relation to materials, design and construction	22
5.1	Production documentation	22
5.2	Construction and materials	23
5.2.1	General construction	23
5.2.2	Integral boiler or heat exchanger	24
5.2.3	Cleaning of heating surfaces	29
5.2.4	Flue gas outlet	30
5.2.5	Flueways	30
5.2.6	Ashpan and ash removal	30
5.2.7	Bottomgrate	30
5.2.8	Combustion air supply	31
5.2.9	Damper	31
5.2.10	Charging doors and ash-pit doors	31
5.2.11	Flue bypass device	31
5.2.12	Internal flue gas diverter	32
5.2.13	Front firebars	32
5.2.14	Solid mineral fuel and peat briquettes burning appliances	32
5.2.15	Draught regulator	32
5.3	Sound level	32
6	Performance requirements in relation to safety	32
6.1	Natural draught	32
6.2	Open operation of an appliance	32
6.3	Strength and leaktightness of boiler shells	33
6.4	Temperature rise in the fuel storage (other than the fuel hopper)	33
6.5	Temperature rise of the operating components	33
6.6	Temperature of adjacent combustible materials	33
6.7	Safety devices for appliances fitted with a boiler	33
6.7.1	General	33
6.7.2	Appliances intended for sealed water systems	33
6.7.3	Safety devices for appliances fitted with a heat exchangers that are not directly in contact with fire	34
6.8	Electrical safety and functional safety of electrical components	34
6.8.1	General	34
6.8.2	Electrical safety	34
6.8.3	Functional safety of control functions with electrical components	35
6.9	Safety requirements of roomsealed appliances	35
6.10	Minimum distances from non combustible walls	35
6.11	Requirements for appliances suitable for a shared flue system	35

6.12	General safety aspects of the water system	35
7	Performance requirements in relation to the appliance operation	36
7.1	General	36
7.2	Flue gas temperature and flue gas outlet temperature	36
7.3	Emissions	37
7.3.1	General	37
7.3.2	Carbon monoxide emission	37
7.3.3	NOx emissions	37
7.3.4	Emission of organic gaseous carbon (OGC)	37
7.3.5	Particulate matter (PM / PME) emissions	37
7.4	Efficiency	37
7.5	Flue draught	38
7.6	Recovery test	39
7.7	Refuelling intervals	39
7.8	Space heat output	39
7.9	Water heat output	39
7.10	User operations	39
8	Appliance instructions	40
8.1	General	40
8.2	Installation instructions	40
8.3	User operating and maintenance instructions	42
9	Assessment and verification of constancy of performance - AVCP	44
9.1	General	44
9.2	Type testing	44
9.2.1	General	44
9.2.2	Test samples, testing and compliance criteria	46
9.2.3	Test reports	46
9.2.4	Shared other party results	47
9.2.5	Cascading determination of the product type results	47
9.3	Factory production control (FPC)	48
9.3.1	General	48
9.3.2	Requirements	49
9.3.3	Product specific requirements	54
9.3.4	Procedure for modifications	54
9.3.5	One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity	54
10	Marking	55
Annex A (normative) Test methods		59
A.1	Test environment	59
A.1.1	Ambient room temperature	59
A.1.2	Cross-draught	59
A.1.3	External sources	59
A.2	Test assembly	59
A.2.1	General	59
A.2.2	Trihedron	60
A.2.3	Measurement section	61
A.2.4	Connection of appliance to measurement section	62
A.2.5	Water circuit for appliances with boilers	63
A.3	Measurement equipment	64
A.4	Test procedures	65
A.4.1	Appliance installation	65
A.4.2	Fuel load and basic firebed	65
A.4.3	Fuelling and de-ashing the fire	66
A.4.4	Flue gas losses	66

A.4.5	Water heat output	67
A.4.6	Combustible heat losses in the residue	67
A.4.7	Performance test at nominal heat output	67
A.4.8	Part load heat output test	71
A.4.9	Slow combustion and recovery test	71
A.4.10	Safety tests	73
A.4.11	Safety tests of roomsealed appliances	79
A.5	Test results	81
A.6	Calculation methods	82
A.6.1	Notations and units used	82
A.6.2	Formulae	83
A.7	Test report	87
Annex B (normative) Test fuels and recommended fuels		102
B.1	General	102
B.2	Test fuel	102
B.2.1	Selection of test fuel	102
B.2.2	Storage, preparation and analysis	102
B.3	Tests for recommended fuels	102
B.3.1	Basis of testing	102
B.3.2	Test methods and criteria	103
Annex C (informative) Arrangement for measuring the leakage rate		109
Annex D (normative) Measuring procedure for nitrogen oxides (NOx)		110
D.1	General procedure	110
D.2	Measuring principle of analysers	110
D.2.1	General description	110
D.2.2	Chemiluminescence method	111
D.2.3	Non-dispersive infrared (NDIR) method	112
D.2.4	Other methods	113
D.3	Description of measuring equipment	113
D.3.1	General	113
D.3.2	Sampling line	113
D.3.3	Filter	114
D.3.4	Sample pump	114
D.3.5	Secondary filter	114
D.3.6	Flow controller and flow meter	114
D.3.7	Converter	114
D.4	Setting of measurement system	114
D.4.1	General	114
D.4.2	Preliminary zero and span check and adjustments	115
D.5	Calculation method	116
Annex E (normative) Measuring procedure for organic gaseous carbon (OGC)		117
E.1	General procedure	117
E.2	Description of measuring equipment	117
E.2.1	General	117
E.2.2	Sampling probe and filter	117
E.2.3	Sampling line	118
E.2.4	Sample pump	118
E.2.5	Secondary filter	118
E.2.6	Analyser (FID)	118
E.2.7	FID fuel	118
E.2.8	FID combustion air	118
E.3	Setting of measurement system	118
E.3.1	General	118
E.3.2	Preliminary zero and span check and adjustments	119
E.4	Calculation of OGC	120

E.4.1	General	120
E.4.2	Calculation assumptions	120
E.4.3	Calculation of organic gaseous compounds	120
Annex F (normative) Measuring procedure for particulate matter (PM)		122
F.1	General principle	122
F.2	Heated filter	122
F.2.1	General	122
F.2.2	Test set-up	122
F.2.3	Test procedure	124
F.2.4	Overall blank sample	126
F.2.5	Calculation	126
F.3	Full flow dilution tunnel	127
F.3.1	General	127
F.3.2	Principle	127
F.3.3	Equipment	127
F.3.4	Particulate matter sampling train	132
F.3.5	Reagents	133
F.3.6	Test procedure	134
F.3.7	Overall blank sample	136
F.3.8	Calculations	137
Annex G (informative) Guideline for the characteristics to be taken into account in order to decide on families of appliances		139
G.1	Principles	139
G.2	Example for the determination of the appliances to be tested	139
G.3	Principles for determination of efficiency, carbon monoxide emission and safety distances to combustible materials in initial type tests of a family of appliances	140
Annex H (informative) Spread of measuring results as a basis for market surveillance measurements		145
Annex I (informative) Standing Air Loss		146
I.1	General	146
I.2	Requirements	146
I.3	Test Method	146
I.3.1	Type B appliance	146
I.3.2	Type BE appliance	146
Annex J (informative) A-deviations		149
Bibliography		150