



Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 16510-1:2022

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

Häusliche Feuerstätten für feste
Brennstoffe - Teil 1: Allgemeine
Anforderungen und Prüfverfahren

Appareils de chauffage domestiques à
combustible solide - Partie 1 : Exigences
générales et méthodes d'essai

12/2022



National Foreword

This European Standard EN 16510-1:2022 was adopted as Luxembourgish Standard ILNAS-EN 16510-1:2022.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

ILNAS-EN 16510-1:2022

EUROPEAN STANDARD **EN 16510-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2022

ICS 97.100.30

Supersedes EN 12809:2001, EN 12815:2001,
EN 13229:2001, EN 13240:2001, EN 16510-1:2018

English Version

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

Appareils de chauffage domestiques à combustible solide - Partie 1 : Exigences générales et méthodes d'essai

Häusliche Feuerstätten für feste Brennstoffe - Teil 1: Allgemeine Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 23 October 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard 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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	8
1 Scope	10
2 Normative references	10
3 Terms and definitions	12
4 Descriptive features	24
4.1 Designation of appliances	24
4.2 System boundary	25
4.3 Production documentation.....	25
4.4 Construction and materials.....	26
4.4.1 General construction	26
4.4.2 Integral boiler or heat exchanger	27
4.4.3 Cleaning of heating surfaces.....	33
4.4.4 Flue gas outlet	33
4.4.5 Flueways.....	33
4.4.6 Components built-in the flue ways	34
4.4.7 Ashpan and ash removal	34
4.4.8 Bottomgrate	34
4.4.9 Combustion air supply	34
4.4.10 Damper	35
4.4.11 Charging doors and ash-pit doors.....	35
4.4.12 Flue bypass device	35
4.4.13 Internal flue gas diverter	35
4.4.14 Front firebars	35
4.4.15 Fossil solid fuel and peat briquettes burning appliances.....	35
4.4.16 Draught regulator	35
4.4.17 Cut-off device for inset appliances without doors.....	36
4.4.18 Convection air outlet for inserts for Kachelofen/Putzofen	36
4.4.19 Oven door of cookers	36
4.4.20 Hotplate and top plate of cookers	36
4.4.21 Main/additional ovens of cookers	36
4.4.22 Ashpit and ashpit cover/door of cookers.....	36
4.4.23 Oven temperature indicators for cookers.....	37
4.4.24 Air inlet for pellet appliances according to EN 16510-2-6	37
4.4.25 Retort for pellet appliances according to EN 16510-2-6.....	37
4.4.26 Heat output control device for pellet appliances according to EN 16510-2-6.....	37
4.4.27 Hopper for pellet appliances according to EN 16510-2-6	37
4.5 Sound level	37
4.6 Load bearing capacity.....	38
5 Safety requirements.....	38
5.1 Natural draught	38
5.2 Open operation of an appliance.....	38
5.3 Strength and leak tightness of integral boiler shells.....	38
5.4 Temperature rise in the fuel storage (other than the fuel hopper).....	38
5.5 Temperature rise of the operating components.....	39
5.6 Protection of combustible materials.....	39
5.7 Safety devices for appliances fitted with an integral boiler	39

5.7.1	General	39
5.7.2	Appliances intended for sealed water systems	39
5.7.3	Safety devices for appliances fitted with a heat exchanger that are not directly in contact with fire	40
5.8	Electrical safety and functional safety of electrical components	40
5.8.1	General	40
5.8.2	Electrical safety	40
5.8.3	Functional safety of control functions with electrical components	40
5.8.4	Risk assessment	40
5.9	Safety requirements of roomsealed appliances	41
5.9.1	Tightness related to CO-emission	41
5.9.2	Overall leakage rate	41
5.10	Minimum distances from non-combustible walls	41
5.11	Requirements for appliances suitable for a shared flue system	42
5.12	General safety aspects of the water system	42
6	Operation requirements	42
6.1	General	42
6.2	Flue gas temperature and flue gas outlet temperature	43
6.2.1	General	43
6.2.2	Flue gas temperature at safety test	43
6.3	Emissions	43
6.3.1	General	43
6.3.2	Carbon monoxide emission	44
6.3.3	NO _x emissions	44
6.3.4	Emission of organic gaseous carbon (OGC)	44
6.3.5	Particulate matter (PM) emissions	44
6.3.6	Threshold levels for emissions according to appliance types	45
6.4	Efficiency	45
6.4.1	General	45
6.4.2	Seasonal space heating efficiency	46
6.4.3	Energy efficiency index (EEI)	46
6.4.4	Energy efficiency class	46
6.5	Flue draught	47
6.6	Recovery test	48
6.7	Refuelling intervals	48
6.8	Space heat output	48
6.9	Water heat output	48
6.10	User operations	48
6.11	Auxiliary electrical energy consumption	49
6.12	Flue gas mass flow	49
7	Appliance instructions	49
7.1	General	49
7.2	Installation instructions	49
7.3	User operating and maintenance instructions	52
8	Environmental sustainability	54
8.1	General	54
8.2	Calculation rules	55
8.2.1	Declared and functional unit	55
8.2.2	Reference lifetime	55
8.3	Product stage	55
8.3.1	General	55

8.3.2	Production processes	56
8.3.3	Processes to be reported	56
8.3.4	Transport from the manufacturer to the site of use.....	57
8.4	Use stage.....	58
8.5	End-of-life stage	58
8.5.1	General.....	58
8.5.2	Scenarios for end-of-life	58
8.5.3	Transport to waste processing.....	59
8.6	Data collection/quality/basis.....	59
8.7	Content of environmental sustainability information	60
9	Assessment and verification of constancy of performance – AVCP.....	61
10	Marking and technical datasheet	62
	Annex A (normative) Test methods.....	67
A.1	Test environment.....	67
A.1.1	Ambient room temperature	67
A.1.2	Cross-draught	67
A.1.3	External sources	67
A.2	Test assembly	67
A.2.1	General.....	67
A.2.2	Trihedron.....	68
A.2.3	Measurement section	69
A.2.4	Connection of appliance to measurement section	71
A.2.5	Water circuit for appliances with integral boilers.....	71
A.3	Measurement equipment.....	72
A.4	Test procedures	73
A.4.1	Appliance installation	73
A.4.2	Fuel load and basic firebed.....	73
A.4.3	Fuelling and de-ashing the fire.....	74
A.4.4	Flue gas losses	74
A.4.5	Water heat output.....	75
A.4.6	Combustible heat losses in the residue.....	75
A.4.7	Performance test at nominal heat output	75
A.4.8	Part load heat output test	79
A.4.9	Slow combustion and recovery test.....	80
A.4.10	Safety tests.....	81
A.4.11	Safety tests of roomsealed appliances.....	88
A.5	Test results	90
A.6	Calculation methods.....	91
A.6.1	Notations and units used	91

A.6.2	Formulae.....	93
A.7	Test report	99
Annex B (normative) Test fuels and recommended fuels.....		115
B.1	General	115
B.2	Test fuel.....	115
B.2.1	Selection of test fuel.....	115
B.2.2	Storage, preparation and analysis.....	115
B.3	Tests for recommended fuels.....	116
B.3.1	Basis of testing	116
B.3.2	Test methods and criteria	117
Annex C (informative) Arrangement for measuring the leakage rate.....		122
Annex D (normative) Measuring procedure for nitrogen oxides (NO _x)		123
D.1	General procedure	123
D.2	Measuring principle of analysers	123
D.2.1	General description	123
D.2.2	Chemiluminescence method (EN 14792:2017)	124
D.2.3	Non-dispersive infrared (NDIR) method (ISO 10849:1996).....	125
D.2.4	Other methods	126
D.3	Description of measuring equipment	126
D.3.1	General	126
D.3.2	Sampling line.....	126
D.3.3	Filter	127
D.3.4	Sample pump.....	127
D.3.5	Secondary filter	127
D.3.6	Flow controller and flow meter	127
D.3.7	Converter	127
D.4	Setting of measurement system	127
D.4.1	General	127
D.4.2	Preliminary zero and span check and adjustments.....	128
D.5	Calculation method	129
Annex E (normative) Measuring procedure for organic gaseous carbon (OGC).....		131
E.1	General procedure	131
E.2	Description of measuring equipment	131
E.2.1	General	131
E.2.2	Sampling probe and filter	131
E.2.3	Sampling line.....	132

E.2.4	Sample pump	132
E.2.5	Secondary filter.....	132
E.2.6	Analyser (FID)	132
E.2.7	FID fuel	132
E.2.8	FID combustion air	132
E.3	Setting of measurement system.....	132
E.3.1	General.....	132
E.3.2	Preliminary zero and span check and adjustments	133
E.4	Calculation of OGC.....	134
E.4.1	General.....	134
E.4.2	Calculation assumptions.....	134
E.4.3	Calculation of organic gaseous compounds.....	134
Annex F (normative)	Measurement procedure for particulate matter (PM)	136
F.1	General.....	136
F.2	Test set-up	136
F.2.1	Sampling train	136
F.2.2	Sample probe.....	137
F.2.3	Particulate matter filter.....	137
F.2.4	Filter holder	137
F.2.5	Gas dryer	138
F.2.6	Pressure gauge.....	138
F.2.7	Indicating gas flow meter.....	138
F.2.8	Pump.....	138
F.2.9	Dry gas meter.....	138
F.2.10	Flue gas sample temperature at the filter	138
F.3	Test procedure.....	138
F.3.1	Pre procedure.....	138
F.3.2	Sampling.....	139
F.3.3	Analysis.....	142
F.3.4	Determination of the probe deposit weight.....	142
F.4	Calculations.....	142
F.4.1	Gas volume sampled (STP, 273,15 K, 1013 hPa)	142
F.4.2	PM mass	143
F.4.3	PM concentration	143
F.4.4	PM concentration at 13 % oxygen.....	143

Annex G (normative) Guideline for the characteristics to be taken into account in order to decide on families of appliances	144
G.1 Principles.....	144
G.2 Example for the determination of the appliances to be tested	144
G.3 Overview of the items related to design and construction to take account in order to decide family of appliances.....	145
G.4 Principles for determination of efficiency, carbon monoxide emission and safety distances to combustible materials in initial type tests of a family of appliances...	146
Annex H (informative) Deviation of measuring results as a basis for market surveillance measurements	151
Annex I (informative) Standing air loss.....	152
I.1 General	152
I.2 Requirements.....	152
I.3 Test method.....	152
I.3.1 Type B appliance.....	152
I.3.2 Type BE appliance	152
Annex J (normative) Energy label.....	154
Annex K (normative) Guide to carry out a risk assessment.....	159
Bibliography	162