

Contents

Page

European foreword.....	7
Introduction	9
1 Scope	10
2 Normative references	10
3 Terms and definitions	13
3.1 General terms and definitions.....	13
3.2 Combustible gases	15
3.3 Test rig and combustion chamber	18
3.4 Composition of the gaseous combustion products	18
3.5 Burner operation	19
3.5.1 Gas rate	19
3.5.2 Permanent and intermittent burner operation.....	20
3.6 Gas line components	21
3.7 Adjusting, control and safety devices	21
3.8 Sequencing times	25
3.9 Combustion	27
3.10 Diagrams	27
4 Constructional and operational requirements - safety requirements and/or protective measures.....	27
4.1 Conversion to different gases	27
4.2 Construction.....	27
4.2.1 General.....	27
4.2.2 Design	28
4.2.3 Accessibility for maintenance and use	28
4.2.4 Soundness	28
4.2.5 Materials.....	28
4.2.6 Mounting	29
4.2.7 Connections.....	29
4.3 Equipment	29
4.3.1 Motors and fans	29
4.3.2 Electrical safety and EMC related to safety	30
4.3.3 Adjustable air damper.....	30
4.3.4 Gas line components	30
4.4 Functional and operational requirements	39
4.4.1 General function requirements	39
4.4.2 Operational requirements.....	47
4.4.3 Heat input range of the burner	48
4.4.4 Dual-fuel burner	48
4.4.5 Working diagram and test diagram	48
4.4.6 Determination of the flame stability and safe range of operation	48
4.4.7 Limiting values for combustion emissions	48
4.4.8 Starting characteristics.....	51
4.4.9 Appliance categories.....	51
4.4.10 Reset from lock-out.....	51
4.5 Machine safety requirements and/or protective measures.....	52

5	Test methods	52
5.1	General	52
5.1.1	Test gases for forced draught burners.....	52
5.1.2	Test pressures.....	52
5.1.3	Test rig.....	53
5.1.4	Types of test.....	62
5.2	Functional tests	62
5.2.1	General	62
5.2.2	Start-up.....	62
5.2.3	Pre-purge	62
5.2.4	Start-up heat input	62
5.2.5	Ignition	62
5.2.6	Safety times.....	63
5.3	Operation.....	63
5.3.1	External soundness.....	63
5.3.2	Resistance of the burner to over-heating	64
5.3.3	Temperature of the control and safety devices	64
5.3.4	Ignition — flame stability	64
5.3.5	Operation — flame stability.....	66
5.3.6	Auxiliary electricity consumption (ErP)	67
5.3.7	Sound power level L_{WA} (ErP).....	67
5.4	Tests to be carried out on the working and test diagrams	67
5.4.1	Tests at point 1	67
5.4.2	Tests at point Hp1.....	68
5.4.3	Tests at points 2, 5 (single, multi-stage and modulating burners) and 6 (multi-stage and modulating burners).....	68
5.4.4	Tests at points Hp2 (single, multi-stage and modulating burners) and Hp6 (multi-stage and modulating burners)	69
5.4.5	Tests at point 3	69
5.4.6	Tests at point 4	69
5.4.7	Tests at first stage points or minimum heat input.....	70
5.4.8	Summary.....	70
5.5	Combustion	71
5.6	Start-up.....	72
5.7	Obtaining the heat input	72
5.7.1	Determination of heat input at reference conditions.....	72
5.7.2	Determination of heat input at ambient conditions	74
5.8	Electrical safety	74
5.9	Verification of safety and /or protective measures	75
6	Marking, labelling and packaging.....	75
6.1	General	75
6.2	Data plate.....	75
6.3	Other marking.....	76
6.4	Instructions for installation, adjustment, maintenance and operation.....	76
6.5	Packaging.....	78
6.6	Marking on the packaging	78
Annex A	(normative) Determination of combustion characteristics — Carbon monoxide and nitrogen oxides, conversion and corrections.....	79
A.1	CO content (Q_{CO}), calculation from ml/m ³ into mg/kWh.....	79
A.2	NO _x content (Q_{NOx}), calculation from ml/m ³ into mg/kWh.....	80

EN 676:2020 (E)

A.3	Correction for the influence of combustion air temperature and humidity on NO _x emissions Q_{NOx}	81
A.4	NO _x mean value for evaluating the NO _x classes	81
A.5	CO ₂ content f_{CO2}	82
A.6	Other conversion factors for emissions, calculated from ml/m ³ into mg/m ³ at 3 % O ₂ reference flue gas conditions.....	82
Annex B (informative) Examples of control box sequencing		84
Annex C (informative) Test gases.....		85
C.1	General.....	85
C.2	Conditions for preparation of the test gases	85
C.3	Practical application of the test gases	86
Annex D (informative) Gas connections conditions in common use in the various countries.....		89
Annex E (informative) Tests.....		91
E.1	Supplementary testing.....	91
E.2	Drawing review.....	91
E.3	Individual test and inspection.....	91
E.4	Test report.....	92
Annex F (informative) Use of alternative gas lines and test documentation.....		93
F.1	Use of alternative gas lines	93
F.2	Test documentation	93
Annex G (informative) Void.....		94
Annex H (informative) Check of the air proving device		95
Annex I (informative) Additional recommendations for specific applications.....		96
I.1	General.....	96
I.2	Pre-heating of the combustion air	96
I.3	Continuous working of the air ventilator.....	96
I.4	Variable excess of combustion air	96
I.5	Burner with start gas flame.....	96
I.6	Air filtering.....	97
Annex J (normative) Machine Directive (2006/42/CE) related hazards – safety requirements and/or protective measures).....		98
J.1	General.....	98
J.2	List of significant hazards	98
J.3	Safety requirements and /or protective measures	98
J.4	Verification of machine safety requirements and/or protective measures.....	102
J.5	Information for use	102

Annex K (normative) Additional requirements for burners with pressurized parts and burners firing pressurized bodies as defined in Pressure Equipment Directive (PED) 2014/68/EU	103
K.1 General	103
K.2 Pressurized parts	103
K.3 Electrical safety and gas line components	104
K.4 Gas pressure regulator	104
K.5 High gas pressure over load protection device	104
K.6 Automatic safety shut-off valve	105
K.7 Air proving device	105
K.8 Automatic burner control system	105
K.9 Means for draining and venting	105
K.10 General functions requirements	106
K.11 External safety limiter	106
K.12 Design according to Annex L in conjunction with EN 60204-1	107
K.13 Consideration: safety life cycle	108
K.14 Tests of pressurized parts	109
K.15 Other marking	110
K.16 Instructions for installation, adjustment, maintenance and operation	110
Annex L (normative) Electrical requirements – modifications to EN 60204-1:2006	112
L.1 Scope	112
L.2 Normative references	112
L.3 Terms and definitions	112
L.4 General requirements	113
L.5 Incoming supply conductor terminations and devices for disconnecting and switching off	116
L.6 Protection against electric shock	116
L.7 Protection of equipment	116
L.8 Equipotential bonding	116
L.9 Control circuits and control functions	116
L.10 Operator interface and machine-mounted control devices	126
L.11 Electrical equipment (Controlgear: location, mounting, and enclosures)	126
L.12 Conductors and cables	127
L.13 Wiring practices	127
L.14 Electric motors and associated equipment	127
L.15 Accessories and lighting	127
L.16 Marking, warning signs and reference designations	127

EN 676:2020 (E)

L.17	Technical documentation.....	127
L.18	Verification.....	128
	Annex M (informative) Burner equipped to increase the efficiency	129
	Annex N (informative) Electrical interfaces for burners	130
	Annex O (informative) Environmental checklist EN 676.....	135
	Annex P (informative) Guide for the applicability of the different standards on electrical safety.....	137
	Annex Q (informative) Verification procedures for market surveillance purposes (ErP).....	139
Q.1	General.....	139
Q.2	Minimization of the influence of the measurement procedure.....	139
Q.3	Verification of the declared parameters.....	139
	Annex R (informative) Impact of the variations of the gas quality in EU gas grids to gas burners	140
	Annex S (informative) A-Deviations.....	142
	Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2009/142/EC (GAD) aimed to be covered	143
	Annex ZB (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 813/2013 aimed to be covered.....	146
	Bibliography.....	147