

DIN EN 13000:2010-05 (E)

Cranes - Mobile cranes

Contents		Page
Foreword		7
Introduction		8
1	Scope	9
2	Normative references	9
3	Terms and definitions	12
4	Safety requirements and/or protective measures	15
4.1	Structures and components	15
4.1.1	General	15
4.1.2	Load effects	16
4.1.3	Limit states	21
4.2	Equipment and devices	23
4.2.1	General principles	23
4.2.2	Control station	23
4.2.3	Protection against falling tools	25
4.2.4	Seats	25
4.2.5	Controls and control systems	26
4.2.6	Limiting and indicating devices	27
4.2.7	Steering system	33
4.2.8	Braking systems	34
4.2.9	Protection devices	36
4.2.10	Hydraulic and pneumatic systems and components	38
4.2.11	Pressure vessels and fuel tanks	40
4.2.12	Electric and electronic components and related phenomena	40
4.2.13	Hooks and hook blocks	41
4.2.14	Specific requirements for spare tyres/wheels	41
4.2.15	Specific requirements for pin jointed jib/fly jib connections	41
4.3	Visibility	41
4.3.1	Crane operator's field of view	41
4.3.2	Lighting	42
4.4	Noise and noise reduction	42
4.4.1	Noise and noise reduction at source by design	42
4.4.2	Noise reduction by information	42
4.5	Fire protection	42
4.5.1	Fire resistance	42
4.5.2	Fire extinguisher	43
4.6	Requirements for transport and travel	43
4.6.1	General	43
4.6.2	Separately transported parts	43
4.7	Roll over and tip over protection	43
5	Verification	43
5.1	Methods of verification	43
5.2	Test procedures and conditions	46
5.2.1	General	46
5.2.2	Conceptual verification by calculation	46
5.2.3	Conceptual verification by experiment	46
5.2.4	Examination after test	46

5.2.5	Test report	46
5.3	Verification based on noise emission values	47
6	Information for use	47
6.1	Format of instruction	47
6.1.1	General	47
6.1.2	Technical data and information	47
6.2	Instructions for use	48
6.2.1	General	48
6.2.2	Crane operator instructions	49
6.3	Instructions for assembly, erection, disassembly and transport	50
6.4	Instructions for maintenance and inspection	50
6.4.1	General	50
6.4.2	Instructions for maintenance	50
6.4.3	Instructions for inspection	51
6.5	Instructions for training	51
6.6	Instructions for spare parts	51
6.7	Instructions for disposal	51
7	Marking	52
7.1	Machine marking	52
7.2	Information and warning	52
7.3	Graphic symbols	52
7.4	Marking of crane parts	52
7.5	Marking of outriggers	52
7.6	Marking data recorder	52
Annex A (normative) Examples of mobile crane types		53
Annex B.1 (informative) Major parts of telescopic cranes		55
Annex B.2 (informative) Major parts of lattice jib cranes		56
Annex C (normative) List of hazards		57
Annex D (normative) Load effects of combined motions		60
Annex E (normative) Crane operator's seat dimensions		64
E.1	General	64
E.2	Dimensions of crane operator's seat	64
E.3	Other dimensions or adjustments	64
Annex F (normative) Rigid body stability: Load effects due to acceleration		66
Annex G.1 (normative) Noise test code for mobile cranes		67
G.1.1	Introduction	67
G.1.2	Normative references	67
G.1.3	Terms and definitions	67
G.1.4	Description of machinery family	67
G.1.5	Sound power level determination	68
G.1.5.1	Basic standard to be used	68
G.1.5.2	Positioning of the crane	68
G.1.5.3	Microphone positions	68
G.1.5.4	Measurement and calculation procedure	68
G.1.6	Emission sound pressure level determination	69
G.1.6.1	Basic standard to be used	69
G.1.6.2	Crane operator position	69
G.1.6.3	Specifications concerning the crane operating cabin	69
G.1.6.4	Specification relating to wind speed	69
G.1.6.5	Measurement and calculation procedure	69

G.1.7	Configuration	70
G.1.8	Operating conditions	70
G.1.8.1	General	70
G.1.8.2	Test procedure	70
G.1.9	Information on measurement uncertainties	71
G.1.10	Information to be recorded	71
G.1.11	Information to be reported	71
G.1.12	Declaration and verification of noise emission values	71
Annex G.2 (normative) Noise measurement, test report		73
G.2.1	General data	73
G.2.2	Measurements per motion	74
Annex H (normative) Limit values for structural and fine grain steel types		76
Annex J.1 (normative) Minimum requirements for specification of hoist/derrick gears		77
Annex J.2 (normative) Minimum requirements for specification of slewing gears		79
Annex J.3 (normative) Minimum requirements for specification of travel gears		81
Annex J.4 (normative) Minimum requirements for specification of drums		83
Annex K.1 (normative) Minimum requirements for the specification of lifting hooks		85
Annex K.2 (normative) Minimum requirements for specification of sheaves		86
Annex K.3 (normative) Minimum requirements for specification of hook blocks		88
Annex K.4 (normative) Minimum requirements for the specification of hydraulic cylinders		90
Annex K.5 (normative) Minimum requirements for the specification of slew rings		92
Annex L (normative) Proof of competence		94
L.1	General	94
L.2	Proof of competence for steel structures	94
L.2.1	General	94
L.2.2	Method of permissible stresses	94
L.2.3	Method of partial safety coefficients and limiting stresses	94
L.3	Proof of competence for non steel structures	95
L.4	Proof of competence for load bearing components	95
L.4.1	General	95
L.4.2	Proof of competence for mechanisms	95
L.4.3	Proof of competence for ropes	95
L.4.4	Proof of competence for chains	95
L.4.5	Proof of competence for other components	96
L.5	Proof of competence of rigid body stability of the crane	96
L.6	Proof of competence - experimental	96
L.6.1	Structural tests	96
L.6.2	Rigid body stability tests	96
Annex M (normative) Test of steering systems for off-road mobile cranes		97
M.1	Test conditions	97
M.2	Test procedure	97
M.3	Permitted steering control effort	97
Annex N.1 (informative) Wind speed as a function of elevation		98
Annex N.2 (informative) Impact pressure as a function of elevation		99

Annex N.3 (informative) Storm wind map of Europe	100
Annex P (normative) Efficiency of sheave sets	101
Annex Q (informative) Manufacturer's sign	102
Annex R (normative) Certificate for wire rope, requirements	103
Annex S (normative) Certificate for chain, requirements	104
Annex T (informative) Test procedures: Selection of load cases	105
Annex U (normative) Test certificate	106
Annex V (informative) Additional information of the concept of the limiting and indicating device .	107
Annex W (informative) Selection of a suitable set of crane standards for a given application	108
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37EC	109
Annex ZB (informative) Relation between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	110
Bibliography	111
Figures Figure A.1 -- Industrial mobile crane	53
Figure A.2 -- Mobile crane with telescopic jib	53
Figure A.3 -- Mobile crane with telescopic and fly jib	53
Figure A.4 -- Mobile crane with luffing fly jib	53
Figure A.5 -- Mobile crane with lattice jib	53
Figure A.6 -- Crawler crane	53
Figure A.7 -- Crawler crane with additional counterweight	54
Figure A.8 -- Mobile harbour crane	54
Figure B.1.1 -- Examples of major parts	55
Figure B.1.2 -- Examples of jibs and jib combinations	55
Figure B.2.1 -- Examples of major parts	56
Figure B.2.2 -- Examples of jibs and jib combinations	56
Figure D.1 -- Crawler crane	60
Figure D.2 -- Crane on outriggers	61
Figure D.3 -- Telescopic crane on outriggers	62
Figure E.1 -- Seat dimensions (see Table E.1)	64
Figure F.1 -- Crane jib in travelling and in lateral direction	66
Figure G.1 -- Test conditions - Position of the crane; exact position of the crane in relation to the radial centre of the hemisphere, see G.1.5.1 and G.1.5.2	72

Figure K.3.1 -- Model of hook blocks (Examples)	89
Figure N.3.1 -- Regions where same mean storm wind velocities are applicable	100
Figure Q.1 -- Example of a Manufacturer's sign	102
Figure T.1 -- Selection of load cases	105
Tables Table 1 -- Verification of safety requirements including the proof of competence	44
Table C.1 -- List of hazards	57
Table D.1 -- Load combinations, one or two simultaneous movements	62
Table D.2 -- Load combinations, more than two simultaneous movements	63
Table E.1 -- Seat dimensions and adjustments	65
Table F.1 -- Minimum values of tipping angle	66
Table H.1 -- Limit values for structural and fine grain steel types	76
Table M.1 -- Permitted steering control effort	97
Table N.1.1 -- 3-second wind gust speed as a function of mean wind speed as per Beaufort Scale and as per elevation	98
Table N.2.1 -- Quasistatic impact pressure as a function of mean wind speed as per the Beaufort Scale and as a function of elevation	99
Table R.1 -- Rope certificate (Example)	103
Table S.1 -- Certificate for chain (Example)	104
Table U.1 -- Test certificate (Example)	106