DIN EN 13000:2014-11 (E)

Cranes - Mobile Cranes (includes Amendment A1:2014)

Contents

Page

Foreword 5

Introduction 6

1 Scope 7

2 Normative references 7

3 Terms and definitions 11

4 Safety requirements and/or protective measures 14
4.1 Structures and components 14
4.1.1 General 14
4.1.2 Load effects 14
4.1.3 Limit states 19
4.2 Equipment and devices 21
4.2.1 General principles 21
4.2.2 Control station 22
4.2.3 !Protection against falling objects" 24
4.2.4 Seats 24
4.2.5 Controls and control systems 24
4.2.6 Limiting and indicating devices 26
4.2.7 Steering system 32
4.2.8 Braking systems 33
4.2.9 Protection devices 35
4.2.10 Hydraulic and pneumatic systems and components 37
4.2.11 Pressure vessels and fuel tanks 39
4.2.12 Electric and electronic components and related phenomena 40
4.2.13 Hooks and hook blocks 40
4.2.14 Specific requirements for spare tyres/wheels 40
4.2.15 Specific requirements for pin jointed jib/fly jib connections 40
4.3 Visibility 40
4.3.1 Crane operator's field of view 40
4.3.2 Lighting 41
4.4 Noise and noise reduction 41
4.5 Fire protection 42
4.5.1 Fire resistance 42
4.5.2 Fire extinguisher 42
4.6 Requirements for transport and travel 42
4.6.1 General 42
4.6.2 Separately transported parts 42
4.7 Roll over and tip over protection 42

5 Verification 42
5.1 Methods of verification 42
5.2 Test procedures and conditions 44
5.2.1 General 44
5.2.2 Conceptual verification by calculation 45
5.2.3 Conceptual verification by experiment 45
5.2.4 Examination after test 45
5.2.5 Test report 45
5.3 Verification based on noise emission values 45

6 Information for use ... 46
6.1 Format of instruction ... 46
6.1.1 General ... 46
6.1.2 Noise reduction by information ... 46
6.1.3 Technical data and information ... 46
6.2 Instructions for use ... 48
6.2.1 General ... 48
6.2.2 Crane operator instructions ... 48
6.3 Instructions for assembly, erection, disassembly and transport ... 50
6.4 Instructions for maintenance and inspection ... 51
6.4.1 General ... 51
6.4.2 Instructions for maintenance ... 51
6.4.3 Instructions for inspection ... 51
6.5 Instructions for training ... 52
6.6 Instructions for spare parts ... 53
6.7 Instructions for disposal ... 53

7 Marking ... 53
7.1 Machine marking ... 53
7.2 Information and warning ... 53
7.3 Graphic symbols ... 53
7.4 Marking of crane parts ... 53
7.5 Marking of outriggers ... 53
7.6 Marking !event recorder" ... 53

Annex A (normative) Examples of mobile crane types ... 54

Annex B .1 (informative) Major parts of telescopic cranes ... 56

Annex B.2 (informative) Major parts of lattice !boom" cranes ... 57

Annex C (normative) List of hazards ... 58

Annex D (normative) Load effects of combined motions ... 62

Annex E (normative) Crane operator's seat dimensions ... 66

Annex F (normative) Rigid body stability: Load effects due to acceleration ... 68

Annex G .1 (normative) Noise test code for mobile cranes ... 69

Annex G.2 (normative) Noise measurement, test report ... 75

Annex H (normative) Limit values for structural and fine grain steel types ... 77

Annex J .1 (normative) Minimum requirements for specification of hoist/derrick gears ... 78

Annex K .1 (normative) Minimum requirements for the specification of lifting hooks ... 86

Annex L (normative) Proof of competence ... 95

Annex M (normative) Test of steering systems for off-road mobile cranes ... 98

Annex N .1 (informative) Wind speed as a function of elevation ... 99

Annex P (normative) Efficiency of sheave sets ... 107

Annex Q (informative) Manufacturer's sign ... 108

Annex R (normative) Certificate for wire rope, requirements ... 109

Annex S (normative) Certificate for chain, requirements 110

Annex T (informative) Test procedures: Selection of load cases 111

Annex U (normative) Test certificate 112

Annex V (informative) Additional information of the concept of the limiting and indicating device .113

Annex W (informative) Selection of a suitable set of crane standards for a given application 114

Annex ZA (informative) Relation between this European Standard and the Essential Requirements of EU Directive 2006/42/EC 116

Bibliography 117

Figures Figure A.1 -- Industrial mobile crane 54

Figure A.2 -- Mobile crane with telescopic !boom" 54

Figure A.3 -- Mobile crane with !telescopic boom and fly jib" 54

Figure A.4 -- Mobile crane with luffing fly jib 54

Figure A.5 -- Mobile crane with lattice !boom" 54

Figure A.6 -- Crawler crane 54

Figure A.7 -- Crawler crane with additional counterweight 55

Figure A.8 -- Mobile harbour crane 55

Figure B.1.1 -- Examples of major parts 56

Figure B.1.2 -- Examples of !booms" and !boom/jib" combinations 56

Figure B.2.1 -- Examples of major parts 57

Figure B.2.2 -- Examples of !booms" and !boom/jib" combinations 57

Figure D.1 -- Crawler crane 62

Figure D.2 -- Crane on outriggers 63

Figure D.3 -- Telescopic crane on outriggers 64

Figure E.1 -- Seat dimensions (see Table E.1) 66

Figure F.1 -- Crane !boom" in travelling and in lateral direction 68

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.1.6.1 and G.1.6 70

Figure K.3.1 -- Model of hook blocks (Examples) 90

Figure N.3.1 -- Regions where same mean storm wind velocities are applicable 103

Figure Q.1 -- Example of a Manufacturer's sign 108

Figure T.1 -- Selection of load cases 111

Tables Table 1 -- Verification of safety requirements including the proof of competence 43

Table C.1 -- List of hazards 58

Table D.1 -- Load combinations, one or two simultaneous movements 64

Table D.2 -- Load combinations, more than two simultaneous movements 65

Table E.1 -- Seat dimensions and adjustments 67

Table F.1 -- Minimum values of tipping angle 68

Table H.1 -- Limit values for structural and fine grain steel types 77

Table M.1 -- Permitted steering control effort 98

Table N.1.1 -- 3-second wind gust speed as a function of mean wind speed as per Beaufort Scale and as per elevation 99

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 101

Table R.1 -- Rope certificate (Example) 109

Table S.1 -- Certificate for chain (Example) 110

Table U.1 -- Test certificate (Example) 112