



**NSAI**  
Standards

Irish Standard  
I.S. EN 13000:2010

## Cranes - Mobile cranes

© NSAI 2010 No copying without NSAI permission except as permitted by copyright law.

## I.S. EN 13000:2010

*Incorporating amendments/corrigenda issued since publication:*

*This document replaces:*  
EN 13000:2004

*This document is based on:*  
EN 13000:2010  
EN 13000:2004

*Published:*  
27 January, 2010  
10 August, 2004

This document was published  
under the authority of the NSAI  
and comes into effect on:  
13 February, 2010

*ICS number:*  
53.020.20

**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E [standards@nsai.ie](mailto:standards@nsai.ie)  
W [NSAI.ie](http://NSAI.ie)

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W [standards.ie](http://standards.ie)

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD

**EN 13000**

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2010

ICS 53.020.20

Supersedes EN 13000:2004

English Version

## Cranes - Mobile cranes

Appareils de levage à charge suspendue - Grues mobiles

Krane - Fahrzeugkrane

This European Standard was approved by CEN on 19 December 2009.

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 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 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

## Contents

	Page
<b>Foreword</b> .....	<b>7</b>
<b>Introduction</b> .....	<b>8</b>
<b>1 Scope</b> .....	<b>9</b>
<b>2 Normative references</b> .....	<b>9</b>
<b>3 Terms and definitions</b> .....	<b>12</b>
<b>4 Safety requirements and/or protective measures</b> .....	<b>15</b>
<b>4.1 Structures and components</b> .....	<b>15</b>
<b>4.1.1 General</b> .....	15
<b>4.1.2 Load effects</b> .....	16
<b>4.1.3 Limit states</b> .....	21
<b>4.2 Equipment and devices</b> .....	23
<b>4.2.1 General principles</b> .....	23
<b>4.2.2 Control station</b> .....	23
<b>4.2.3 Protection against falling tools</b> .....	25
<b>4.2.4 Seats</b> .....	25
<b>4.2.5 Controls and control systems</b> .....	26
<b>4.2.6 Limiting and indicating devices</b> .....	27
<b>4.2.7 Steering system</b> .....	33
<b>4.2.8 Braking systems</b> .....	34
<b>4.2.9 Protection devices</b> .....	36
<b>4.2.10 Hydraulic and pneumatic systems and components</b> .....	38
<b>4.2.11 Pressure vessels and fuel tanks</b> .....	40
<b>4.2.12 Electric and electronic components and related phenomena</b> .....	40
<b>4.2.13 Hooks and hook blocks</b> .....	41
<b>4.2.14 Specific requirements for spare tyres/wheels</b> .....	41
<b>4.2.15 Specific requirements for pin jointed jib/fly jib connections</b> .....	41
<b>4.3 Visibility</b> .....	41
<b>4.3.1 Crane operator's field of view</b> .....	41
<b>4.3.2 Lighting</b> .....	42
<b>4.4 Noise and noise reduction</b> .....	42
<b>4.4.1 Noise and noise reduction at source by design</b> .....	42
<b>4.4.2 Noise reduction by information</b> .....	42
<b>4.5 Fire protection</b> .....	42
<b>4.5.1 Fire resistance</b> .....	42
<b>4.5.2 Fire extinguisher</b> .....	43
<b>4.6 Requirements for transport and travel</b> .....	43
<b>4.6.1 General</b> .....	43
<b>4.6.2 Separately transported parts</b> .....	43
<b>4.7 Roll over and tip over protection</b> .....	43
<b>5 Verification</b> .....	<b>43</b>
<b>5.1 Methods of verification</b> .....	43
<b>5.2 Test procedures and conditions</b> .....	46
<b>5.2.1 General</b> .....	46
<b>5.2.2 Conceptual verification by calculation</b> .....	46
<b>5.2.3 Conceptual verification by experiment</b> .....	46
<b>5.2.4 Examination after test</b> .....	46
<b>5.2.5 Test report</b> .....	46
<b>5.3 Verification based on noise emission values</b> .....	47
<b>6 Information for use</b> .....	<b>47</b>
<b>6.1 Format of instruction</b> .....	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
<b>Annex A (normative) Examples of mobile crane types.....</b>		53
<b>Annex B.1 (informative) Major parts of telescopic cranes.....</b>		55
<b>Annex B.2 (informative) Major parts of lattice jib cranes.....</b>		56
<b>Annex C (normative) List of hazards .....</b>		57
<b>Annex D (normative) Load effects of combined motions .....</b>		60
<b>Annex E (normative) Crane operator's seat dimensions .....</b>		64
E.1	General.....	64
E.2	Dimensions of crane operator's seat.....	64
E.3	Other dimensions or adjustments .....	64
<b>Annex F (normative) Rigid body stability: Load effects due to acceleration .....</b>		66
<b>Annex G.1 (normative) Noise test code for mobile cranes.....</b>		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
<b>Annex G.2 (normative) Noise measurement, test report .....</b>		73
G.2.1	General data .....	73

<b>G.2.2 Measurements per motion .....</b>	<b>74</b>
<b>Annex H (normative) Limit values for structural and fine grain steel types .....</b>	<b>76</b>
<b>Annex J.1 (normative) Minimum requirements for specification of hoist/derrick gears .....</b>	<b>77</b>
<b>Annex J.2 (normative) Minimum requirements for specification of slewing gears .....</b>	<b>79</b>
<b>Annex J.3 (normative) Minimum requirements for specification of travel gears .....</b>	<b>81</b>
<b>Annex J.4 (normative) Minimum requirements for specification of drums .....</b>	<b>83</b>
<b>Annex K.1 (normative) Minimum requirements for the specification of lifting hooks .....</b>	<b>85</b>
<b>Annex K.2 (normative) Minimum requirements for specification of sheaves.....</b>	<b>86</b>
<b>Annex K.3 (normative) Minimum requirements for specification of hook blocks.....</b>	<b>88</b>
<b>Annex K.4 (normative) Minimum requirements for the specification of hydraulic cylinders .....</b>	<b>90</b>
<b>Annex K.5 (normative) Minimum requirements for the specification of slew rings.....</b>	<b>92</b>
<b>Annex L (normative) Proof of competence .....</b>	<b>94</b>
<b>L.1 General.....</b>	<b>94</b>
<b>L.2 Proof of competence for steel structures .....</b>	<b>94</b>
<b>L.2.1 General.....</b>	<b>94</b>
<b>L.2.2 Method of permissible stresses .....</b>	<b>94</b>
<b>L.2.3 Method of partial safety coefficients and limiting stresses .....</b>	<b>94</b>
<b>L.3 Proof of competence for non steel structures.....</b>	<b>95</b>
<b>L.4 Proof of competence for load bearing components .....</b>	<b>95</b>
<b>L.4.1 General.....</b>	<b>95</b>
<b>L.4.2 Proof of competence for mechanisms .....</b>	<b>95</b>
<b>L.4.3 Proof of competence for ropes .....</b>	<b>95</b>
<b>L.4.4 Proof of competence for chains .....</b>	<b>95</b>
<b>L.4.5 Proof of competence for other components.....</b>	<b>96</b>
<b>L.5 Proof of competence of rigid body stability of the crane.....</b>	<b>96</b>
<b>L.6 Proof of competence – experimental.....</b>	<b>96</b>
<b>L.6.1 Structural tests.....</b>	<b>96</b>
<b>L.6.2 Rigid body stability tests .....</b>	<b>96</b>
<b>Annex M (normative) Test of steering systems for off-road mobile cranes .....</b>	<b>97</b>
<b>M.1 Test conditions .....</b>	<b>97</b>
<b>M.2 Test procedure .....</b>	<b>97</b>
<b>M.3 Permitted steering control effort.....</b>	<b>97</b>
<b>Annex N.1 (informative) Wind speed as a function of elevation .....</b>	<b>98</b>
<b>Annex N.2 (informative) Impact pressure as a function of elevation.....</b>	<b>99</b>
<b>Annex N.3 (informative) Storm wind map of Europe .....</b>	<b>100</b>
<b>Annex P (normative) Efficiency of sheave sets .....</b>	<b>101</b>
<b>Annex Q (informative) Manufacturer's sign.....</b>	<b>102</b>
<b>Annex R (normative) Certificate for wire rope, requirements.....</b>	<b>103</b>
<b>Annex S (normative) Certificate for chain, requirements .....</b>	<b>104</b>
<b>Annex T (informative) Test procedures: Selection of load cases .....</b>	<b>105</b>
<b>Annex U (normative) Test certificate.....</b>	<b>106</b>
<b>Annex V (informative) Additional information of the concept of the limiting and indicating device.....</b>	<b>107</b>
<b>Annex W (informative) Selection of a suitable set of crane standards for a given application .....</b>	<b>108</b>
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37EC .....</b>	<b>109</b>
<b>Annex ZB (informative) Relation between this European Standard and the Essential Requirements of EU Directive 2006/42/EC .....</b>	<b>110</b>
<b>Bibliography .....</b>	<b>111</b>

## 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

## Foreword

This document (EN 13000:2010) has been prepared by Technical Committee CEN/TC 147 "Cranes — Safety", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2010, and conflicting national standards shall be withdrawn at the latest by July 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13000:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.

This standard applies to mobile cranes which are put on the market 12 months after the date of ratification by CEN of this standard or at the latest 2010-01-01.

This document has been prepared by Product Working Group CEN/TC 147/WG 11 "Mobile Cranes", the secretariat of which is held by DIN.

Annexes A, C, D, E, F, G.1 and G.2, H, J.1 to J.4, K.1 to K.5, L, M, P, R, S and U are normative. Annexes B.1 and B.2, N.1 to N.3, Q, T, V and W are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

## **Introduction**

This European Standard is a type C standard.

This European Standard has been prepared to provide one means for mobile cranes to conform with the essential health and safety requirements of the Machinery Directive.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

## 1 Scope

This European Standard is applicable to the design, construction, installation of safety devices, information for use, maintenance and testing of mobile cranes as defined in ISO 4306-2 with the exception of loader cranes (see 3.1.1 of EN 12999:2002). Examples of mobile crane types and of their major parts are given in Annexes A and B.

This standard does not cover hazards related to the lifting of persons.

NOTE The use of mobile cranes for the lifting of persons is subject to specific national regulations.

Mobile cranes covered by this European Standard are designed for a limited number of stress cycles and particular properties of motions, e.g. smooth application of the driving forces and loading conditions according to ISO 4301-2:1985, group A1.

For a duty cycle such as grab, magnet or similar work, additional provisions are required which are outside the scope of this European Standard.

The hazards covered by this European Standard are identified by Annex C.

This document is not applicable to mobile cranes which are manufactured before the date of publication of this document by CEN.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2:1992, *Classification of fires*

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

EN 349:1993, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 547-1:1996, *Safety of machinery — Human body measurements — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 614-1:2006, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 626-1:1994, *Safety of machinery — Reduction of risk to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 811:1996, *Safety of machinery — Safety distances to prevent danger zones being reached by the lower limbs*

EN 842:1996, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 853:1996, *Rubber hoses and hose assemblies — Wire braid reinforced hydraulic type — Specification*

EN 854:1996, *Rubber hoses and hose assemblies — Textile reinforced hydraulic type — Specification*

EN 856:1996, *Rubber hoses and hose assemblies — Rubber-covered spiral wire reinforced hydraulic type — Specification*

EN 894-2:1997, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 2: Displays*

EN 894-3:2000, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 953:1997, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*



This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- Looking for additional Standards? Visit Intertek Inform Infostore
- Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation