

Eurocode 1 — Actions on structures

Part 3: Actions induced by cranes and machinery

ICS 91.010.30

National foreword

This British Standard is the UK implementation of EN 1991-3:2006, incorporating corrigendum December 2012.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by CEN corrigendum December 2012 is indicated in the text by AC1 AC1

The UK participation in its preparation was entrusted by Technical Committee B/525, Building and civil engineering structures, to Subcommittee B/525/1, Actions (loadings) and basis of design.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Where a normative part of this EN allows for a choice to be made at the national level, the range and possible choice will be given in the normative text, and a note will qualify it as a Nationally Determined Parameter (NDP). NDPs can be a specific value for a factor, a specific level or class, a particular method or a particular application rule if several are proposed in the EN.

To enable EN 1991-3 to be used in the UK, the latest version of the NA to this Standard containing these NDPs should also be used. At the time of publication, it is NA to BS EN 1991-3:2006.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 September 2006

© The British Standards Institution 2013.
Published by BSI Standards Limited 2013

ISBN 978 0 580 82662 7

Amendments/corrigenda issued since publication

Date	Comments
28 February 2013	Implementation of CEN corrigendum December 2012
30 April 2013	Corrections to misaligned text throughout standard

English Version

Eurocode 1 - Actions on structures - Part 3: Actions induced by cranes and machinery

Eurocode 1 - Actions sur les structures - Partie 3: Actions induites par les appareils de levage et les machines

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 3: Einwirkungen infolge von Kranen und Maschinen

This European Standard was approved by CEN on 9 January 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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: rue de Stassart, 36 B-1050 Brussels

CONTENTS

Page

FOREWORD.....	4
BACKGROUND OF THE EUROCODE PROGRAMME.....	4
STATUS AND FIELD OF APPLICATION OF EUROCODES.....	5
NATIONAL STANDARDS IMPLEMENTING EUROCODES	6
LINKS BETWEEN EUROCODES AND HARMONISED TECHNICAL SPECIFICATIONS (ENs AND ETAS) FOR PRODUCTS	6
ADDITIONAL INFORMATION SPECIFIC FOR EN 1991-3.....	6
NATIONAL ANNEX FOR EN 1991-3	7
SECTION 1 GENERAL	8
1.1 SCOPE.....	8
1.2 NORMATIVE REFERENCES	8
1.3 DISTINCTION BETWEEN PRINCIPLES AND APPLICATION RULES	8
1.4 TERMS AND DEFINITIONS	9
1.4.1 Terms and definitions specifically for hoists and cranes on runway beams.....	9
1.4.2 Terms and definitions specifically for actions induced by machines.....	11
1.5 SYMBOLS	12
SECTION 2 ACTIONS INDUCED BY HOISTS AND CRANES ON RUNWAY BEAMS 14	
2.1 FIELD OF APPLICATION.....	14
2.2 CLASSIFICATIONS OF ACTIONS	14
2.2.1 General.....	14
2.2.2 Variable actions	14
2.2.3 Accidental actions	15
2.3 DESIGN SITUATIONS	16
2.4 REPRESENTATION OF CRANE ACTIONS.....	17
2.5 LOAD ARRANGEMENTS	17
2.5.1 Monorail hoist blocks underslung from runway beams	17
2.5.1.1 Vertical loads.....	17
2.5.1.2 Horizontal forces	17
2.5.2 Overhead travelling cranes	17
2.5.2.1 Vertical loads.....	17
2.5.2.2 Horizontal forces.....	18
2.5.3 Multiple crane action.....	20
2.6 VERTICAL CRANE LOADS - CHARACTERISTIC VALUES	21
2.7 HORIZONTAL CRANE LOADS - CHARACTERISTIC VALUES	23
2.7.1 General.....	23
2.7.2 Longitudinal forces $H_{L,i}$ and transverse forces $H_{T,i}$ caused by acceleration and deceleration of the crane	23
2.7.3 Drive force K	25
2.7.4 Horizontal forces $H_{S,i,j,k}$ and the guide force S caused by skewing of the crane..	26
2.8 TEMPERATURE EFFECTS.....	30
2.9 LOADS ON ACCESS WALKWAYS, STAIRS, PLATFORMS AND GUARD RAILS	30
2.9.1 Vertical loads	30
2.9.2 Horizontal loads.....	30
2.10 TEST LOADS	30
2.11 ACCIDENTAL ACTIONS.....	31
2.11.1 Buffer forces $H_{B,1}$ related to crane movement.....	31
2.11.2 Buffer forces $H_{B,2}$ related to movements of the crab	32
2.11.3 Tilting forces	32

2.12	FATIGUE LOADS	32
2.12.1	<i>Single crane action</i>	32
2.12.2	<i>Stress range effects of multiple wheel or crane actions</i>	35
SECTION 3 ACTIONS INDUCED BY MACHINERY		36
3.1	FIELD OF APPLICATION.....	36
3.2	CLASSIFICATION OF ACTIONS	36
3.2.1	<i>General</i>	36
3.2.2	<i>Permanent actions</i>	36
3.2.3	<i>Variable actions</i>	37
3.2.4	<i>Accidental actions</i>	37
3.3	DESIGN SITUATIONS	37
3.4	REPRESENTATION OF ACTIONS.....	37
3.4.1	<i>Nature of the loads</i>	37
3.4.2	<i>Modelling of dynamic actions</i>	38
3.4.3	<i>Modelling of the machinery-structure interaction</i>	38
3.5	CHARACTERISTIC VALUES	39
3.6	SERVICEABILITY CRITERIA	41
ANNEX A (NORMATIVE).....		43
BASIS OF DESIGN – SUPPLEMENTARY CLAUSES TO EN 1990 FOR RUNWAY		
BEAMS LOADED BY CRANES		43
A.1	GENERAL	43
A.2	ULTIMATE LIMIT STATES	43
A.2.1	<i>Combinations of actions</i>	43
A.2.2	<i>Partial factors</i>	44
A.2.3	<i>ψ-factors for crane loads</i>	44
A.3	SERVICEABILITY LIMIT STATES	45
A.3.1	<i>Combinations of actions</i>	45
A.3.2	<i>Partial factors</i>	45
A.3.3	<i>ψ-factors for crane actions</i>	45
A.4	FATIGUE	45
ANNEX B (INFORMATIVE)		46
GUIDANCE FOR CRANE CLASSIFICATION FOR FATIGUE		46