DIN EN 1991-1-7:2010-12 (E)

Eurocode 1: Actions on structures - Part 1-7: General actions - Accidental actions (includes Corrigendum AC:2010)

Contents

Page

FOREWORD 4

BACKGROUND OF THE EUROCODE PROGRAMME 4

STATUS AND FIELD OF APPLICATION OF EUROCODES 5

NATIONAL STANDARDS IMPLEMENTING EUROCODES 5

LINKS BETWEEN EUROCODES AND HARMONISED TECHNICAL SPECIFICATIONS (ENS AND ETAS) FOR PRODUCTS 6

NATIONAL ANNEX 6

SECTION 1 GENERAL 9

1.1 SCOPE 9
1.2 NORMATIVE REFERENCES 9
1.3 ASSUMPTIONS 10
1.4 DISTINCTION BETWEEN PRINCIPLES AND APPLICATION RULES 10
1.5 TERMS AND DEFINITIONS 10
1.6 SYMBOLS 12

SECTION 2 CLASSIFICATION OF ACTIONS 14

SECTION 3 DESIGN SITUATIONS 15

3.1 GENERAL 15
3.2 ACCIDENTAL DESIGN SITUATIONS - STRATEGIES FOR IDENTIFIED ACCIDENTAL ACTIONS 16
3.3 ACCIDENTAL DESIGN SITUATIONS - STRATEGIES FOR LIMITING THE EXTENT OF LOCALISED FAILURE 17
3.4 ACCIDENTAL DESIGN SITUATIONS - USE OF CONSEQUENCE CLASSES 17

SECTION 4 IMPACT 19

4.1 FIELD OF APPLICATION 19
4.2 REPRESENTATION OF ACTIONS 19
4.3 ACCIDENTAL ACTIONS CAUSED BY ROAD VEHICLES 20
4.3.1 Impact on supporting substructures 20
4.3.2 Impact on superstructures 22
4.4 ACCIDENTAL ACTIONS CAUSED BY FORK LIFT TRUCKS 24
4.5 ACCIDENTAL ACTIONS CAUSED BY DERAILED RAIL TRAFFIC UNDER OR ADJACENT TO STRUCTURES 25
4.5.1 Structures spanning across or alongside operational railway lines 25
4.5.2 Structures located in areas beyond track ends 27
4.6 ACCIDENTAL ACTIONS CAUSED BY SHIP TRAFFIC 27
4.6.1 General 27
4.6.2 Impact from river and canal traffic 28
4.6.3 Impact from seagoing vessels 29
4.7 ACCIDENTAL ACTIONS CAUSED BY HELICOPTERS 30

SECTION 5 INTERNAL EXPLOSIONS 31

5.1 FIELD OF APPLICATION 31
5.2 REPRESENTATION OF ACTION 31
5.3 PRINCIPLES FOR DESIGN 32

ANNEX A (INFORMATIVE) DESIGN FOR CONSEQUENCES OF LOCALISED FAILURE IN BUILDINGS FROM AN UNSPECIFIED CAUSE 33

A.1 SCOPE AND FIELD OF APPLICATION 33
A.2 INTRODUCTION 33
A.3 CONSEQUENCES CLASSES OF BUILDINGS 33
A.4 RECOMMENDED STRATEGIES 34
A.5 EFFECTIVE HORIZONTAL TIES 36
A.5.1 Framed structures 36
A.5.2 Load-bearing wall construction 37
A.6 EFFECTIVE VERTICAL TIES 39
A.7 NOMINAL SECTION OF LOAD-BEARING WALL 39
A.8 KEY ELEMENTS 39

ANNEX B (INFORMATIVE) INFORMATION ON RISK ASSESSMENT 40

B.1 INTRODUCTION 40
B.2 DEFINITIONS 41
B.3 DESCRIPTION OF THE SCOPE OF A RISK ANALYSIS 41
B.4 METHODS OF RISK ANALYSIS 42
B.4.1 Qualitative risk analysis 42
B.4.2 Quantitative risk analysis 42
B.5 RISK ACCEPTANCE AND MITIGATING MEASURES 43
B.6 RISK MITIGATING MEASURES 45
B.7 MODIFICATION 45
B.8 COMMUNICATION OF RESULTS AND CONCLUSIONS 46
B.9 APPLICATIONS TO BUILDINGS AND CIVIL ENGINEERING STRUCTURES 46
B.9.1 General 46
B.9.2 Structural risk analysis 47
B.9.3 Modelling of risks from extreme load events 48
B.9.4 Guidance for application of risk analysis related to impact from rail traffic 5

ANNEX C (INFORMATIVE) DYNAMIC DESIGN FOR IMPACT 53

C.1 GENERAL 53
C.2 IMPACT DYNAMICS 53
C.2.1 Hard Impact 53
C.2.2 Soft Impact 54
C.3 IMPACT FROM ABERRANT ROAD VEHICLES 55
C.4 IMPACT BY SHIPS 58
C.4.1 Ship impact on inland waterways 58
C.4.2 Ship impact for sea waterways 59
C.4.3 Advanced ship impact analysis for inland waterways 59
C.4.4 Advanced ship impact analysis for sea waterways 62

ANNEX D (INFORMATIVE) INTERNAL EXPLOSIONS 63

D.1 DUST EXPLOSIONS IN ROOMS, VESSELS AND BUNKERS 63
D.2 NATURAL GAS EXPLOSIONS 65
D.3 EXPLOSIONS IN ROAD AND RAIL TUNNELS 6