DIN EN 81-2:2010-08 (E)

Safety rules for the construction and installation of lifts - Part 2: Hydraulic lifts (includes Amendment A3:2009)

Contents

Page

Foreword 5

Introduction 7

1 Scope 11

2 Normative references 12

3 Definitions 14

4 Units and symbols 18
4.1 Units 18
4.2 Symbols 18

5 Lift well 18
5.1 General provisions 18
5.2 Well enclosure 18
5.3 Walls, floor and ceiling of the well 22
5.4 Construction of the walls of lift wells and landing doors facing a car entrance 24
5.5 Protection of any spaces located below the car or the balancing weight 25
5.6 Protection in the well 25
5.7 Headroom and pit 25
5.8 Exclusive use of the lift well 27
5.9 Lighting of the well 28
5.10 Emergency release 28

6 Machinery and pulley spaces 28
6.2 Access 28
6.3 Machinery in machine room 29
6.4 Machinery inside the well 31
6.5 Machinery outside of the well 35
6.6 Devices for emergency and test operations 36
6.7 Construction and equipment of pulley spaces 37

7 Landing doors 38
7.1 General provisions 38
7.2 Strength of doors and their frames 39
7.3 Height and width of entrances 40
7.4 Sills, guides, door suspension 40
7.5 Protection in relation to door operation 41
7.6 Local lighting and «car here» signal lights 42
7.7 Locking and closed landing door check 43
7.8 Closing of automatically operated doors 46

8 Car and balancing weight 46
8.1 Height of car 46
8.2 Available car area, rated load, number of passengers 46
8.3 Walls, floor and roof of the car 49
8.4 Apron 50
8.5 Car entrance 50
8.6 Car doors 50

8.7 Protection during operation of doors 52
8.8 Reversal of closing movement 53
8.9 Electrical device for proving the car doors closed 53
8.10 Sliding doors with multiple, mechanically linked panels 53
8.11 Opening the car door 54
8.12 Emergency trap doors and emergency doors 54
8.13 Car roof 55
8.14 Car header 56
8.15 Equipment on top of the car 56
8.16 Ventilation 56
8.17 Lighting 56
8.18 Balancing weight 57

9 Suspension, precaution against free fall, descent with excessive speed and protection against unintended car movement..... 57
9.1 Suspension 57
9.2 Pulley and rope diameter ratios, rope/chain terminations 57
9.3 Distribution of load between the ropes or the chains 58
9.4 Protection for pulleys and sprockets 58
9.5 Precautions against free fall, descent with excessive speed and creeping of the car 59
9.6 Precautions against free fall of the balancing weight 62
9.7 (Kept free) 62
9.8 Safety gear 62
9.9 Clamping device 64
9.10 Tripping means for safety gears and clamping devices 65
9.11 Pawl device 68
9.12 Electrical anti-creep system 69
9.13 Protection against unintended car movement 70

10 Guide rails, buffers and final limit switch 72
10.1 General provisions concerning guide rails 72
10.2 Guiding of the car and balancing weight 74
10.3 Car buffers 74
10.4 Stroke of car buffers 75
10.5 Final limit switch 77

11 ~~~~Clearances between car and wall facing the car entrance, and between car and balancing weightTMTMTMTM 78
11.1 General provision 78
11.2 Clearances between car and wall facing the car entrance 78
11.3 ~~~~Clearances between car and balancing weightTMTMTMTM 79

12 Lift machine 79
12.1 General provisions 79
12.2 Jack 80
12.3 Piping 83
12.4 Stopping the machine and checking its stopped condition 84
12.5 Hydraulic control and safety devices 84
12.6 Checking the pressure 87
12.7 Tank 88
12.8 Speed 88
12.9 Emergency operation 88
12.10 Protection of the pulley(s) or sprocket(s) on the jack 89
12.11 Protection of machinery 89
12.12 Motor run time limiter 89
12.13 Slack rope (or chain) safety device for indirect acting lifts 90
12.14 Protection against overheating of the hydraulic fluid 90
12.15 Normal stopping of the car at landings and levelling accuracy 90

13 Electric installations and appliances 90
13.1 General provisions 90
13.2 Contactors, relay-contactors, components of safety circuits 91

13.3 Protection of motors and other electrical equipment 92
13.4 Main switches 93
13.5 Electric wiring 94
13.6 Lighting and socket outlets 95

14 Protection against electric faults ; controls ; priorities 96
14.1 Failure analysis and electric safety devices 96
14.2 Controls 108

15 Notices, markings and operating instructions 112
15.1 General provisions 112
15.2 Car 112
15.3 Car roof 113
15.4 Machine and pulley spaces..... 113
15.5 Well 114
15.6 Overspeed governor 114
15.7 Pit 115
15.8 Buffers 115
15.9 Landing identification 115
15.10 Electrical identification 115
15.11 Unlocking key for landing doors 115
15.12 Alarm device 115
15.13 Locking devices 115
15.14 Safety gear 115
15.15 Emergency lowering valve 116
15.16 Hand pump 116
15.17 Groups of lifts 116
15.18 Tank 116
15.19 Rupture valve/one-way restrictor 116

16 Examinations - Tests - Register - Maintenance 116
16.1 Examinations and tests 116
16.2 Register 117
16.3 Installer information 118

Annex A (normative) List of the electric safety devices 119

Annex B(normative) Unlocking triangle 121

Annex C (informative) Technical dossier 122

Annex D (normative) Examinations and tests before putting into service 125

Annex E (informative) Periodical examinations and tests, examinations and tests after an important modification or after an accident 131

Annex F (normative) Safety components - Tests procedures for verification of conformity 133

Annex G (Informative) Proof of guide rails 165

Annex H (normative) Electronic components - Failure exclusion 198

Annex J (normative) Pendulum shock tests 206

Annex K (normative) Calculations of rams, cylinders, rigid pipes and fittings 212

Annex L (informative) #Machinery spaces - Access (6.1)..... 221

Annex M (informative) !!Description of possible measures..... 226

Annex ZA (informative) %%%%Relationship between this European Standard and the Essential Requirements of EU Directive 95/16/EC amended by 2006/42/EC.....227