

A17.1a–2005 Table of Contents

Part 1 General

1.1 Scope.....	1
1.1.1 Equipment Covered by This Code.....	1
1.1.2 Equipment Not Covered by This Code.....	1
1.1.3 Application of Parts.....	1
1.1.4 Effective Date.....	1
1.2 Purpose and Exceptions	2
1.3 Definition.....	2

Part 2 Electric Elevators

2.1 Scope	16
2.1.1 Hoistway Enclosures.....	16
2.1.2 Construction at Top/Bottom Hoistway.....	16
2.1.3 Floor Over Hoistways.....	17
2.1.4 Control of Smoke and Hot Gases	17
2.1.5 Windows and Skylights.....	17
2.1.6 Projections, Recesses and Setbacks in Hoistway Enclosures.....	18
2.2 Pits.....	18
2.2.1 General.....	18
2.2.2 Design and Construction of Pits.....	18
2.2.3 Guards Between Adjacent Pits.....	18
2.2.4 Access to Pits.....	18
2.2.5 Illumination of Pits.....	19
2.2.6 Stop Switch in Pits.....	19
2.2.7 Minimum Pit Depths Required.....	19
2.2.8 Access to Underside of Car.....	19
2.3 Location and Guarding of Counterweights.....	19
2.3.1 Location of Counterweights.....	19
2.3.2 Counterweight Guards.....	19
2.3.3 Remote Counterweight Hoistways.....	20
2.3.4 Counterweight Runway Enclosures.....	20
2.4 Vertical Clearances and Runbys for Cars and Counterweights	20
2.4.1 Bottom Car Clearances.....	20
2.4.2 Minimum Bottom Runby for Counterweighted Elevators.....	21
2.4.3 Minimum Bottom Runby for Uncounterweighted Elevators.....	21
2.4.4 Maximum Bottom Runby.....	21
2.4.5 Counterweight Runby Data Plate.....	21
2.4.6 Top Car Clearances for Counterweighted Elevators.....	21
2.4.7 Top Car Clearances for Uncounterweighted Elevators.....	22
2.4.8 Vertical Clearances with Underslung Car Frames.....	22
2.4.9 Top Counterweight Clearances.....	22
2.4.10 Overhead Clearances Where Overhead Beams Are Not Over Car Crosshead.....	22
2.4.11 Equipment on Top of Car Not Permitted to Strike Overhead Structure.....	22
2.4.12 Refuge Space on Top of Car Enclosure.....	22
2.5 Horizontal Car and Counterweight Clearances.....	23
2.5.1 Clearances Between Cars, Counterweights, and Hoistway Enclosures.....	23
2.6 Protection of Space Below Hoistways.....	23
2.6.1 Where the Space is Underneath the Counterweight and/or Its Guides.....	23
2.6.2 Where the Space is Underneath the Car and/or Its Guides.....	23
2.7 Machine Rooms and Machinery Spaces.....	24
2.7.1 Enclosure of Machine Rooms and Machinery Spaces.....	24
2.7.2 Equipment in Machine Rooms.....	24
2.7.3 Access to Machine Rooms and Machinery Spaces.....	24
2.7.4 Headroom in Machine Rooms and Overhead Machinery Spaces.....	25
2.7.5 Lighting, Temperature, and Humidity in Machine Rooms and Machinery Spaces.....	25
2.7.6 Location of Machine Rooms and Control Rooms.....	25
2.7.7 Machine and Control Rooms Underneath the Hoistway.....	25

A17.1a–2005 Table of Contents	
2.7.8 Remote Machine and Control Rooms.....	26
2.8 Equipment in Hoistways and Machine Rooms.....	26
2.8.1 Electrical Equipment and Wiring.....	26
2.8.2 Pipes, Ducts, Tanks, and Sprinklers.....	26
2.8.3 Electrical Heaters.....	27
2.8.4 Air Conditioning.....	27
2.8.5 Reserved.....	27
2.8.4 Miscellaneous Equipment.....	27
2.9 Machinery and Sheave Beams, Supports, and Foundations.....	27
2.9.1 Beams and Supports Required.....	27
2.9.2 Loads on Machinery and Sheave Beams, Floors, or Foundations and Their Supports.....	27.1
2.9.3 Securing of Machinery and Equipment to Beams, Foundations, or Floors.....	28
2.9.4 Allowable Stresses for Machinery and Sheave Beams or Floors and Their Supports.....	29
2.9.5 Allowable Deflections of Machinery and Sheave Beams and Their Supports.....	29
2.9.6 Allowable Stresses Due to Emergency Braking.....	29
2.10 Guarding of Equipment and Standard Railing.....	29
2.10.1 Guarding of Equipment.....	29
2.10.2 Standard Railing.....	29
2.11 Protection of Hoistway Openings.....	29
2.11.1 Entrances and Emergency Doors Required.....	29
2.11.2 Types of Entrances.....	30
2.11.3 Closing of Hoistway Doors.....	30
2.11.4 Location of Horizontally Sliding or Swinging Hoistway Doors.....	30
2.11.5 Projection of Entrances and Other Equipment Beyond the Landing Sills.....	31
2.11.6 Opening of Hoistway Doors.....	31
2.11.7 Glass in Hoistway Doors.....	31
2.11.8 Weights for Closing or Balancing Doors.....	32
2.11.9 Hoistway-Door Locking Devices and Power Operation.....	32
2.11.10 Landing-Sill Guards, Landing-Sill Illumination, Hinged Landing Sills, and Tracks on Landings.....	32
2.11.11 Entrances, Horizontal Slide Type.....	32
2.11.12 Entrances, Vertical Slide Type.....	34
2.11.13 Entrances, Swinging Type.....	35
2.11.14 Fire Tests.....	35
2.11.15 Marking.....	36
2.11.16 Factory Inspections.....	36
2.11.17 Transoms and Fixed Side Panels.....	36
2.11.18 Installation Instructions.....	37
2.11.19 Gasketing of Hoistway Entrances.....	37
2.12 Hoistway-Door Locking Devices and Electric Contacts, and Hoistway Access Switches.....	37
2.12.1 General.....	37
2.12.2 Interlocks.....	37
2.12.3 Hoistway Door Combination Mechanical Locks and Electric Contacts.....	38
2.12.4 Listing/Certification Door Locking Devices and Door or Gate Electric Contacts.....	39
2.12.5 Restricted Opening of Hoistway or Car Door.....	39
2.12.6 Hoistway Door Unlocking Devices.....	40
2.12.7 Hoistway Access Switches.....	40
2.13 Power Operation of Hoistway Doors and Car Doors.....	41
2.13.1 Types of Doors and Gates Permitted.....	41
2.13.2 Power Opening.....	41
2.13.3 Power Closing.....	41
2.13.4 Closing Limitations for Power-Operated Horizontally Sliding Hoistway Doors and Horizontally Sliding Car Doors or Gates.....	42
2.13.5 Reopening Device for Power-Operated Car Doors or Gates.....	43
2.13.6 Sequence Operation for Power-Operated Hoistway Doors with Car Doors/Gates.....	43
2.14 Car Enclosures, Car Doors and Gates, and Car Illumination.....	43
2.14.1 Passenger and Freight Enclosures, General.....	43

A17.1a–2005 Table of Contents

2.14.2 Passenger-Car Enclosures.....	46
2.14.3 Freight-Car Enclosure.....	47
2.14.4 Passenger and Freight Car Doors and Gates, General Requirements.....	47
2.14.5 Passenger Car Doors.....	49
2.14.6 Freight Elevator Car Doors and Gates.....	50
2.14.7 Illumination of Cars and Lighting Fixtures.....	50
2.15 Car Frames and Platforms.....	51
2.15.1 Car Frames Required.....	51
2.15.2 Guiding Members.....	51
2.15.3 Design of Car Frames and Guiding Members.....	51
2.15.4 Underslung or Sub-Post Frames.....	51
2.15.5 Car Platforms.....	51
2.15.6 Materials for Car Frames and Platform Frames.....	52
2.15.7 Car Frame and Platform Connections.....	52
2.15.8 Protection of Platforms Against Fire.....	52
2.15.9 Platform Guards (Aprons).....	52
2.15.10 Maximum Allowable Stresses in Car Frame and Platform Members and Connections...	53
2.15.11 Maximum Allowable Deflections of Car Frame and Platform Members.....	53
2.15.12 Car Frames with Sheaves.....	53
2.15.13 Suspension-Rope Hitch Plates or Shapes.....	53
2.15.14 Calculation of Stresses in Car-Frame and Platform-Frame Members.....	54
2.15.15 Platform Side Braces.....	54
2.15.16 Hinged Platform Sills.....	54
2.15.17 Fastening of Compensation Means.....	54
2.16 Capacity and Loading.....	54
2.16.1 Minimum Rated Load for Passenger Elevators.....	54
2.16.2 Minimum Rated Load for Freight Elevators.....	56
2.16.3 Capacity and Data Plates.....	57
2.16.4 Carrying of Passengers on Freight Elevators.....	57
2.16.5 Signs Required in Freight Elevator Cars.....	57
2.16.6 Overloading of Freight Elevators.....	58
2.16.7 Carrying of One-Piece Loads Exceeding the Rated Load.....	58
2.16.8 Additional Requirements for Passenger Overload in the Down Directions.....	59
2.16.9 Special Loading Means.....	59
2.17 Car and Counterweight Safeties.....	59
2.17.1 Where Required and Location.....	59
2.17.2 Duplex Safeties.....	59
2.17.3 Function and Stopping Distance of Safeties.....	59
2.17.4 Counterweight Safeties.....	59
2.17.5 Identification and Classification of Types of Safeties.....	59
2.17.6 Reserved for Future Use.....	60
2.17.7 Governor-Actuated Safeties and Car-Safety-Mechanism Switches Required.....	60
2.17.8 Limits of Use of Various Types of Safeties.....	60
2.17.9 Application and Release of Safeties.....	61
2.17.10 Minimum Permissible Clearance Between Rail-Gripping Faces of Safety Parts.....	61
2.17.11 Maximum Permissible Movement of Governor Rope to Operate the Safety Mechanism	61
2.17.12 Minimum Factors of Safety and Stresses of Safety Parts and Rope Connections.....	62
2.17.13 Corrosion-Resistant Bearings in Safeties and Safety Operating Mechanisms.....	62
2.17.14 Marking Plates for Safeties.....	62
2.17.15 Governor-Rope Releasing Carriers.....	62
2.17.16 Rail Lubricants and Lubrication Plate.....	62
2.18 Speed Governors.....	62
2.18.1 Speed Governors Required and Location.....	62
2.18.2 Tripping Speeds for Speed Governors.....	63
2.18.3 Sealing and Painting of Speed Governors.....	63
2.18.4 Speed-Governor Overspeed Switch.....	64
2.18.5 Governor Ropes.....	64

A17.1a–2005 Table of Contents

2.18.6 Design of Governor Rope-Retarding Means for Type B Safeties.....	64
2.18.7 Design Speed-Governor Sheaves & Traction Between Speed-Governor Rope & Sheave.....	65
2.18.8 Factors of Safety in Load-Bearing parts of Speed Governor.....	65
2.18.9 Speed-Governor Marking Plate.....	65
2.19 Ascending Car Overspeed and Unintended Car Movement Protection.....	65
2.19.1 Ascending Car Overspeed Protection.....	65
2.19.2 Protection Against Unintended Car Movement.....	66
2.19.3 Emergency Brake.....	66
2.19.4 Emergency Brake Supports.....	67
2.20 Suspension Ropes and Their Connections.....	67
2.20.1 Suspension Means.....	67
2.20.2 Wire Rope Data.....	67
2.20.3 Factor of Safety.....	67
2.20.4 Minimum Number and Diameter of Suspension Rope.....	68
2.20.5 Suspension Rope Equalizers.....	68
2.20.6 Securing of Suspension Wire Ropes to Winding Drums.....	68
2.20.7 Spare Rope Turns on Winding Drums.....	68
2.20.8 Reserved.....	68
2.20.9 Suspension Rope Fastening.....	68
2.20.10 Auxiliary Rope-Fastening Devices.....	73
2.21 Counterweights.....	73
2.21.1 General Requirements.....	73
2.21.2 Design Requirements for Frames and Rods.....	73
2.21.3 Cars Counterbalancing One Another.....	74
2.21.4 Compensation Means.....	74
2.21.4.2 Tie-Down Compensation Means.....	74
2.22 Buffers and Bumpers.....	74
2.22.1 Type and Location.....	74
2.22.2 Solid Bumpers.....	74
2.22.3 Spring Buffers.....	75
2.22.4 Oil Buffers.....	75
2.23 Car and counterweight Guide Rails, Guide-Rail Supports, and Fastenings.....	77
2.23.1 Guide Rails Required.....	77
2.23.2 Material.....	77
2.23.3 Rail Section.....	77
2.23.4 Maximum Load on Rails in Relation to the Bracket Spacing.....	77
2.23.5 Stressed and Deflections.....	78
2.23.6 Guide-Rail Surfaces.....	83
2.23.7 Rail Joints and Fishplates.....	84
2.23.8 Overall Length of Guide Rails.....	84
2.23.9 Guide-Rail Brackets and Building Supports.....	84
2.23.10 Fastening of Guide Rails to Rail Brackets.....	85
2.24 Driving Machines and Sheaves.....	85
2.24.1 Type of Driving Machines.....	85
2.24.2 Sheaves and Drums.....	85
2.24.3 Factor of Safety for Driving Machines and Sheaves.....	86
2.24.4 Fasteners Transmitting Load.....	86
2.24.5 Shaft Fillets and Keys.....	86
2.24.6 Cast-Iron Worms and Worm Gears.....	86
2.24.7 Friction Gearing and Clutches.....	86
2.24.8 Braking System and Driving-Machine Brakes.....	86
2.24.9 Indirect-Driving Machines.....	87
2.24.10 Means for Inspection of Gears.....	87
2.25 Terminal-Stopping Device.....	87
2.25.1 General Requirements.....	87
2.25.2 Normal Terminal Stopping Devices.....	88
2.25.3 Final Terminal-Stopping Devices.....	88

A17.1a–2005 Table of Contents

2.25.4 Emergency Terminal-Stopping Means.....	89
2.26 Operating Devices and Control Equipment.....	90
2.26.1 Operation and Operating Devices.....	90
2.26.2 Electrical Protective Devices.....	91
2.26.3 Contractors and Relays for Use in Critical Operating Circuits.....	93
2.26.4 Electrical Equipment and Wiring.....	93
2.26.5 System to Monitor and Prevent Automatic Operation of the Elevator w/Faulty Door	93
2.26.6 Phase Protection of Motors.....	94
2.26.7 Installation of Capacitors or Devices to Make Electrical Protective Devices Ineffective..	94
2.26.8 Release and Application of Driving Machine Brakes.....	94
2.26.9 Control and Operating Circuits.....	94
2.26.10 Absorption of Regenerated Power.....	95
2.26.11 Car Platform to Hoistway Door Sills Vertical Distance.....	95
2.26.12 Symbols.....	95
2.27 Emergency Operation and Signaling Devices.....	97
2.27.1 Car Emergency Signaling Devices.....	97
2.27.2 Emergency or Standby Power System.....	98
2.27.3 Firefighters’ Emergency Operation Automatic Elevators.....	98
2.27.4 Firefighters’ Emergency Operation Non-Automatic Elevators.....	102
2.27.5 Firefighters’ Emergency Operation Automatic Elevators w/Designated Attendant Operation.....	103
2.27.6 Firefighters’ Emergency Operation Inspection Operation.....	104
2.27.7 Firefighters’ Emergency Operation: Operating Procdeures.....	104
2.27.8 Switch Keys.....	104
2.28 Layout Drawings	104
2.28.1 Information Required on Layout Drawings.....	104
2.29 Identification.....	105
2.29.1 Identification of Equipment.....	105
2.29.2 Identification of Floors.....	105
 Part 3 Hydraulic Elevators	
3.1 Construction of Hoistways and Hoistway Enclosures.....	106
3.1.1 Strength of Pit Floor.....	106
3.1.2 Floors Over Hoistways.....	106
3.2 Pits.....	106
3.2.1 Minimum Pit Depths Required.....	106
3.3. Location and Guarding of Counterweights.....	106
3.4 Bottom and Top Clearance & Runbys for Cars & Counterweights.....	106
3.4.1 Bottom Car Clearance.....	106
3.4.2 Minimum Bottom and Top Car Runby.....	107
3.4.3 Car Top and Bottom Maximum Runby.....	107
3.4.4 Top Car Clearance.....	107
3.4.5 Equipment Projecting Above the Car Top.....	107
3.4.6 Top Clearance and Bottom Runby of Counterweight.....	107
3.4.7 Refuge Space on Top of Car Enclosure.....	107
3.4.8 Vertical Clearances with Underslung Car Frames.....	107
3.5 Horizontal Car and Counterweight Clearances.....	108
3.6 Protection of Spaces Below Hoistway.....	108
3.6.1 Jack Supporting Structure.....	108
3.6.2 Counterweight Safety Actuation.....	108
3.6.3 Buffer Types.....	108
3.6.4 Buffer Supports.....	108
3.7 Machine Rooms and Machinery Spaces.....	108
3.7.1 Location of Machine Rooms.....	108
3.8 Electrical Equipment, Wiring, Pipes, and Ducts in Hoistway and Machine Rooms.....	108
3.9 Machinery and Sheave Beams, Supports and Foundations.....	108
3.10 Guarding of Exposed Auxiliary Equipment.....	108

A17.1a–2005 Table of Contents

3.11 Protection of Hoistway-Landing Openings.....	108
3.11.1 Emergency Doors	108
3.12 Hoistway-Door Locking Device, Car-Door/Gate Electric Contact, Hoistway Access Switches	108
3.12.1 Hoistway-Door Locking Devices and Electric Contacts and Hoistway Access Switches.....	108
3.12.2 Car-Door or Gate Electric Contracts and Car-Door Interlocks.....	108
3.13 Power Operation, Power Opening and Power Closing of Hoistway Doors/Car Doors/Gates...	109
3.14 Car Enclosures, Car Doors and Gates, and Car Illumination.....	109
3.15 Car Frames and Platforms.....	109
3.15.1 Requirements.....	109
3.15.2 Maximum Allowable Stresses & Deflections in Car Frame and Platform Members.....	109
3.15.3 Calculations of Stresses & Deflections in Car Frame and Platform Members.....	109
3.16 Capacity and Loading.....	109
3.16.1 Minimum Rated Load for Passenger Elevators.....	109
3.16.2 Minimum Rated Load for Freight Elevators.....	109
3.16.3 Capacity and Data Plates.....	109
3.16.4 Carrying of Passengers on Freight Elevators.....	110
3.16.5 Signs Required in Freight Elevators.....	110
3.16.6 Overloading of Freight Elevators.....	110
3.16.7 One-Piece Loads Exceeding the Rated Load.....	110
3.16.8 Additional Requirements for Passenger Overload.....	110
3.16.9 Special Loading Means.....	110
3.17 Car and Counterweight Safeties and Plunger Gripper.....	110
3.17.1 Car Safeties.....	110
3.17.2 Counterweight Safeties.....	110
3.17.3 Plunger Gripper.....	110
3.18 Hydraulic Jacks.....	111
3.18.1 Hydraulic Jack and Connections.....	111
3.18.2 Plungers.....	112
3.18.3 Cylinders.....	113
3.18.4 Plunger Stops.....	113
3.18.5 Welding.....	114
3.19 Valves, Pressure Piping and Fittings.....	114
3.19.1 Materials and Working Pressures.....	114
3.19.2 Pressure Piping.....	114
3.19.3 Connections and Fittings.....	114
3.19.4 Valves.....	115
3.19.5 Piping Buried in the Ground.....	116
3.19.6 Welding.....	116
3.19.7 Electrical Requirements.....	116
3.20 Ropes and Rope Connections.....	116
3.21 Counterweights.....	116
3.21.1 Counterweights	116
3.21.2 Counterweight Sheaves.....	116
3.22 Buffers and Bumpers.....	116
3.22.1 Car Buffers or Bumpers.....	116
3.22.2 Counterweight Buffers.....	117
3.23 Guide Rails, Guide-Rail Supports, and Fastenings.....	117
3.23.1 Direct-Acting Hydraulic Elevators.....	117
3.23.2 Roped-Hydraulic Elevators.....	117
3.24 Hydraulic Machines and Tanks.....	117
3.24.1 Hydraulic Machines (Power Units).....	117
3.24.2 Tanks.....	117
3.24.3 Atmosphere Storage and Discharge Tanks.....	117
3.24.4 Welding.....	117
3.24.5 Deleted.....	
3.25 Terminal-Stopping Devices.....	117

A17.1a–2005 Table of Contents	
3.25.1 Normal Terminal-Stopping Devices.....	117
3.25.2 Terminal-Speed Reducing Devices.....	118
3.25.3 Final Terminal-Stopping Devices.....	118
3.26 Operating Devices and Control Equipment.....	118
3.26.1 Operating Devices and Control Equipment.....	118
3.26.2 Inspection Operation.....	118
3.26.3 Anti-Creep and Leveling Operation.....	119
3.26.4 Electrical Protective Devices	119
3.26.5 Phase-Reversal and Failure Protection.....	119
3.26.6 Control and Operating Circuits.....	119
3.26.7 Recycling Operation for Multiple or Telescopic Plungers.....	119
3.26.8 Pressure Switch.....	120
3.26.9 Low Oil Protection.....	120
3.26.10 Auxiliary Power Lowering Operation.....	120
3.27 Emergency Operation and Signaling Devices.....	120
3.27.1 Phase I Emergency Recall Operation After Device Actuation	120
3.27.2 Phase I Emergency Recall Operation Prior to Device Actuation.....	120
3.27.3 Device Actuation at Recall Level.....	120.1
3.27.4 Device Actuation w/Phase II Emergency In-Car Operation in Effect	121
3.28 Layout Data.....	121
3.28.1 Information Required on Layout Drawing.....	121
3.29 Identification.....	121
 Part 4 Elevators with Other Types of Driving Machines	
4.1 Rack and Pinion Elevators.....	122
4.1.1 Hoistways, Hoistway Enclosures, and Related Construction.....	122
4.1.2 Machinery Rooms and Machinery Spaces.....	122
4.1.3 Equipment in Hoistways or Machine Rooms.....	122
4.1.4 Supports and Foundations.....	122
4.1.5 Emergency Doors.....	122
4.1.6 Car Enclosures, Car Doors and Gates, and Car Illumination.....	122
4.1.7 Car Frames and Platforms.....	122
4.1.8 Capacity and Loading.....	122
4.1.9 Car Safeties and Speed Governor.....	122
4.1.10 Counterweights.....	123
4.1.11 Car Buffers.....	123
4.1.12 Guide Rails, Guide-Rail Supports and Fastenings.....	123
4.1.13 Rack and Pinion Driving Machine.....	123
4.1.14 Terminal Stopping Devices.....	123
4.1.15 Operating Devices and Control Equipment.....	123
4.1.16 Emergency Operation and Signal Devices.....	124
4.1.17 Layout Drawings.....	124
4.1.18 Welding.....	124
4.2 Screw-Column Elevators.....	124
4.2.1 Hoistways, Hoistway Enclosures, and Related Construction.....	124
4.2.2 Vertical Clearance and Runby for Cars.....	124
4.2.3 Horizontal Car Clearance.....	125
4.2.4 Protection of Spaces Below Hoistway.....	125
4.2.5 Machine Rooms and Machinery Spaces.....	125
4.2.6 Equipment in Hoistways and Machine Rooms.....	125
4.2.7 Supports and Foundations.....	125
4.2.8 Car Enclosures, Car Doors and Gates, and Car Illumination.....	126
4.2.9 Car Frames and Platforms.....	126
4.2.10 Capacity and Loading.....	126
4.2.11 Car Safeties and Speed Governor.....	126
4.2.12 Safety Nut and Data Tag.....	126
4.2.13 Car Buffers.....	126

A17.1a–2005 Table of Contents	
4.2.14 Guide Rails, Guide-Rail Supports and Fastenings.....	126
4.2.15 Driving Machine and Screw Column.....	126
4.2.16 Terminal Stopping Device.....	127
4.2.17 Operating Devices and Control Equipment.....	127
4.2.18 Emergency Operation and Signaling Devices.....	127
4.2.19 Layout Drawings.....	127
4.2.20 Welding.....	128
4.3 Hand Elevators.....	128
4.3.1 Hoistways, Hoistway Enclosures, and Related Construction.....	128
4.3.2 Pits.....	128
4.3.3 Top Clearances.....	128
4.3.4 Enclosures for Machines and Control Equipment.....	128
4.3.5 Overhead Beams and Supports, and Access to Machines and Sheaves.....	128
4.3.6 Hoistway Entrances.....	128
4.3.7 Hoistway Gates for Landing Openings.....	129
4.3.8 Hoistway-Door and Hoistway-Gate Locking Devices.....	129
4.3.9 Car Enclosures.....	129
4.3.10 Use of Glass in Cars.....	129
4.3.11 Car Frames and Platforms.....	129
4.3.12 Car Compartments.....	129
4.3.13 Cars Counterbalancing One Another.....	129
4.3.14 Capacity and Loading.....	129
4.3.15 Car Safeties.....	129
4.3.16 Suspension Means.....	130
4.3.17 Counterweights.....	130
4.3.18 Guide Rails and Fastenings.....	130
4.3.19 Driving Machines and Sheaves.....	130
4.3.20 Power Attachments.....	130
4.3.21 Layout Data.....	130
4.3.22 Inspections and Tests.....	130
Part 5 Special Application Elevators	
5.1 Inclined Elevators.....	131
5.1.1 General Requirements.....	131
5.1.2 Construction of Hoistway and Hoistway Enclosures.....	131
5.1.3 Pits and Work Spaces.....	131
5.1.4 Counterweight Pit Guards.....	132
5.1.5 Clearances for Cars and Counterweights.....	132
5.1.6 Protection of Spaces in Line with the Direction of Travel.....	132
5.1.7 Equipment in Hoistways and Machine Rooms.....	132
5.1.8 Protection of Hoistway Openings.....	132
5.1.9 Restricted Opening of Hoistway or Car Door.....	132
5.1.10 Access to Hoistways for Inspection, Maintenance, and Repairs.....	132
5.1.11 Car Enclosures.....	132
5.1.12 Car Frames and Platforms.....	133
5.1.13 Capacity and Loading.....	133
5.1.14 Car and Counterweight Safeties.....	133
5.1.15 Speed Governor Drive.....	135
5.1.16 Suspension Ropes and Their Connections.....	135
5.1.17 Car and Counterweight Buffers.....	135
5.1.18 Car and Counterweight Guide Rails, Guide-Rail Supports, and Fastenings.....	135
5.1.19 Driving Machines.....	136
5.1.20 Operating Devices and Control Equipment.....	136
5.1.21 Emergency Operations and Signaling Devices.....	136
5.1.22 End-Loading Inclined Elevators.....	137
5.2 Limited-Use/Limited-Application Elevators.....	137
5.2.1 Electric Limited-Use/Limited-Application Elevators.....	137

A17.1a–2005 Table of Contents

5.2.1.1 Construction of Hoistway and Hoistway Enclosure.....	137
5.2.1.2 Pits.....	137
5.2.1.3 Location and Guarding of Counterweights.....	137
5.2.1.4 Vertical Clearances and Runbys for Cars and Counterweights.....	137
5.2.1.5 Horizontal Car and Counterweight Clearances.....	138
5.2.1.6 Protection of Spaces Below Hoistways.....	138
5.2.1.7 Machine Rooms and Machinery Spaces.....	138
5.2.1.8 Electrical Equipment, Wiring, Pipes, and Ducts in Hoistways and Machine Rooms.....	139
5.2.1.9 Machinery and Sheave Beams, Supports, and Foundations.....	139
5.2.1.10 Guarding.....	139
5.2.1.11 Protection of Hoistway Landing Openings.....	139
5.2.1.12 Hoistway Door Locking Devices and Electric Contacts, and Hoistway Access Switches	139
5.2.1.13 Power Operation of Hoistway Doors and Car Doors and Gates.....	139
5.2.1.14 Car Enclosures, Car Doors, and Car Illumination.....	139
5.2.1.15 Car Frames and Platforms.....	139
5.2.1.16 Capacity, Loading, Speed, and Rise.	139
5.2.1.17 Car and Counterweight	140
5.2.1.18 Speed Governors	140
5.2.1.19 Ascending Car Overspeed and Unintended Car Movement Protection.	140
5.2.1.20 Suspension Ropes and Their Connections.....	140
5.2.1.21 Counterweights.....	140
5.2.1.22 Buffers and Bumpers.....	140
5.2.1.23 Car and Counterweight Guide Rails, Guide-Rail Supports, and Fastenings.....	140
5.2.1.24 Driving Machine and Sheaves.....	141
5.2.1.25 Terminal Stopping Devices.....	141
5.2.1.26 Operating Devices and Control Equipment.....	141
5.2.1.27 Emergency Operations and Signaling Devices	141
5.2.1.28 Manual Operation.....	141
5.2.1.29 Layout Data.....	141
5.2.1.30 Welding.....	141
5.2.2 Hydraulic Limited-Use/Limited-Application Elevators	141
5.2.2.1 Hoistway and Related Construction.....	141
5.2.2.2 Bottom and Top Clearances and Runbys.....	141
5.2.2.3 Mechanical Equipment.....	141
5.2.2.4 Car Enclosures, Car Doors and Gates, and Car illumination.....	141
5.2.2.5 Platform Guards.....	141
5.2.2.6 Capacity, Loading, Speed, and Rise.....	142
5.2.2.7 Alternative to Speed Governor for Roped-Hydraulic Elevators.	142
5.2.2.8 Hydraulic Jacks and Sheaves.....	142
5.2.2.9 Valves, Pressure Piping, and Fittings.....	142
5.2.2.10 Bumpers.....	142
5.2.2.11 Guide Rails, Guide-Rail Supports, and Their Fastenings.....	142
5.2.2.12 Tanks.....	142
5.2.2.13 Terminal Stopping Devices.....	142
5.2.2.14 Operating Devices and Control Equipment.....	142
5.2.2.15 Emergency Operations and Signaling Devices	142
5.2.2.16 Car Frames and Platforms.....	142
5.2.2.17 Layout Data.....	142
5.2.2.17 Identification.....	142
5.3 Private Residence Elevators.....	142
5.3.1 Private Residence Electric Elevators.....	142
5.3.1.1 Construction of Hoistway and Hoistway Enclosure.....	142
5.3.1.2 Pits.....	143
5.3.1.3 Top Car Clearances.....	143
5.3.1.4 Horizontal Car Clearances.....	143
5.3.1.5 Pipes in Hoistways.....	143

A17.1a–2005 Table of Contents

5.3.1.6 Guarding of Suspension Means.....	143
5.3.1.7 Protection of Hoistway Openings.....	143
5.3.1.8 Car Enclosures, Car Doors, and Car Illumination.....	144
5.3.1.9 Car Frames and Platforms.....	144
5.3.1.10 Capacity, Loading, Speed, and Rise.....	145
5.3.1.11 Safeties and Governors.....	145
5.3.1.12 Suspension Means.....	145
5.3.1.13 Counterweights.....	146
5.3.1.14 Buffers and Buffer Supports.....	146
5.3.1.15 Car and Counterweight Guide Rails and Guide Fastenings.....	146
5.3.1.16 Driving Machine, Sheaves, and Their Supports.....	146
5.3.1.17 Terminal Stopping Devices.....	147
5.3.1.18 Operating Devices and Control Equipment.....	148
5.3.1.19 Emergency Signaling Devices.....	148
5.3.1.20 Marking Plates.....	148
5.3.2 Private Residence Hydraulic Elevators.....	148
5.3.2.1 General Requirements for Hydraulic Private Residence Elevators.....	148
5.3.2.2 Driving Machines, Sheaves, and Supports for Direct-Plunger and Roped-Hydraulic Driving Machines.....	149
5.3.2.3 Terminal Stopping Devices.....	149
5.3.2.4 Anticreep Leveling Devices.....	149
5.4 Private Residence Inclined Elevators.....	149
5.4.1 Runway Protection.....	149
5.4.2 Landing Enclosures and Gates (Where Required).....	149
5.4.3 Machinery Beams and Supports.....	150
5.4.4 Car Enclosures, Car Doors, and Gates.....	150
5.4.5 Car and Chassis Construction.....	150
5.4.6 Capacity.....	151
5.4.7 Safeties and Governors.....	151
5.4.8 Suspension Means.....	151
5.4.9 Counterweight Guiding and Construction.....	152
5.4.10 Bumpers and Buffers.....	152
5.4.11 Car and Counterweight Guide and Track Supports and Fastenings.....	152
5.4.12 Track(s)/Guides(s) Supporting Structure.....	152
5.4.13 Driving Machines and Sheaves.....	152
5.4.14 Terminal Stopping Devices.....	153
5.4.15 Operating Devices and Control Equipment.....	153
5.4.16 Marking Plates.....	153
5.5 Power Sidewalk Elevators.....	153
5.5.1 Electric Sidewalk Elevators.....	153
5.5.2 Direct-Plunger Hydraulic Sidewalk Elevators.....	157
5.6 Rooftop Elevators.....	157
5.6.1 Electric Rooftop Elevators.....	157
5.6.2 Direct-Plunger Hydraulic Rooftop Elevators.....	160
5.7 Special Purpose Personnel Elevators.....	161
5.7.1 Construction of Hoistways and Hoistway Enclosures.....	161
5.7.2 Pits.....	161
5.7.3 Location and Enclosing of Counterweights.....	161
5.7.4 Vertical Clearances and Runby.....	161
5.7.5 Horizontal Car and Counterweight Clearances.....	161
5.7.6 Protection of Spaces Below Hoistway.....	162
5.7.7 Overhead Machinery Beams and Supports.....	162
5.7.8 Hoistway Doors and Gates.....	162
5.7.9 Locking Devices for Hoistway Doors or Gates.....	162
5.7.10 Car Enclosures, Car Doors and Gates, and Car Illumination.....	162
5.7.11 Car Construction.....	163
5.7.12 Capacity and Loading.....	163

A17.1a–2005 Table of Contents

5.7.13 Car Safeties and Governors.....	163
5.7.14 Suspension Ropes.....	164
5.7.15 Counterweight Guiding and Construction.....	164
5.7.16 Car and Counterweight Buffers.....	164
5.7.17 Car Guide and Guide-Rail Fastenings.....	164
5.7.18 Driving Machines and Sheaves.....	165
5.7.19 Operating Devices and Control Equipment.....	165
5.7.20 Operation.....	165
5.7.21 Emergency Signal and/or Communication.....	165
5.7.22 Layout Drawings.....	166
5.7.23 Welding.....	166
5.8 Shipboard Elevators.....	166
5.8.1 Electric Shipboard Elevators	166
5.8.2 Hydraulic Shipboard Elevators	167
5.8.3 Rack and Pinion Shipboard Elevators	167
5.9 Mine Elevators.....	167
5.9.1 Construction of Hoistways and Hoistway Enclosures.....	167
5.9.2 Pits.....	168
5.9.3 Location and Guarding of Counterweights.....	168
5.9.4 Vertical Clearances and Runbys for Cars and Counterweights.....	168
5.9.5 Horizontal Car and Counterweight Clearances.....	168
5.9.6 Protection of Space Below Hoistways.....	168
5.9.7 Machine Rooms and Machinery Spaces.....	168
5.9.8 Equipment in Hoistways and Machine Rooms.....	168
5.9.9 Machinery and Sheave Beams, Supports and Foundations.....	168
5.9.10 Guarding.....	168
5.9.11 Protection of Hoistway Openings.....	168
5.9.12 Hoistway-Door Locking Devices & Electric Contacts & Hoistway Access Switches.....	168
5.9.13 Power Operation of Hoistway Doors and Car Doors.....	169
5.9.14 Car Enclosures, Car Doors and Gates, and Car Illumination.....	169
5.9.15 Car Frames and Platforms.....	169
5.9.16 Capacity and Loading.....	169
5.9.17 Car and Counterweight Safeties.....	169
5.9.18 Speed Governors.....	169
5.9.19 Ascending Car Overspeed and Unintended Car Movement Protection.....	169
5.9.20 Suspension Ropes and Their Connections.....	169
5.9.21 Counterweights.....	170
5.9.22 Buffers and Bumpers.....	170
5.9.23 Car and Counterweight Guide Rails, Guide-Rail Supports and Fastenings.....	170
5.9.24 Driving Machines and Sheaves.....	170
5.9.25 Terminal Stopping Devices.....	170
5.9.26 Operating Devices and Control Equipment.....	170
5.9.27 Emergency Operations and Signaling Devices.....	170
5.9.28 Layout Drawings.....	170
5.9.29 Identification.....	170
5.9.30 Welding.....	170
5.10 Elevators Used for Construction.....	170
5.10.1 Electric Elevators Used for Construction	170
5.10.2 Hydraulic Elevators Used for Construction	174
Part 6 Escalators and Moving Walks	
6.1 Escalators.....	176
6.1.1 Protection of Floor Openings.....	176
6.1.1.1 Protection Required.....	176
6.1.2 Protection of Trusses and Machines Spaces Against Fire.....	176
6.1.2.1 Protection Required.....	176
6.1.3 Construction Requirements.....	176

A17.1a–2005 Table of Contents

6.1.3.1 Angle of Inclination	176
6.1.3.2 Geometry	176
6.1.3.3 Balustrades	176
6.1.3.4 Handrails	179
6.1.3.5 Steps.....	179
6.1.3.6 Entrance and Egress Ends	180
6.1.3.7 Trusses or Girders	180
6.1.3.8 Step Wheel Tracks	180
6.1.3.9 Rated Load	180
6.1.3.10 Design Factors of Safety	181
6.1.3.11 Chains	181
6.1.3.12 Headroom.....	181
6.1.3.13 Welding	181
6.1.3.14 Non-Escalator-Related Equipment	181
6.1.3.15 Pit Drains	181
6.1.4 Rated Speed	181
6.1.4.1 Limits of Speed	181
6.1.5 Driving Machine, Motor, and Brake.....	181
6.1.5.1 Connection between Driving Machine and Main Drive Shaft	181
6.1.5.2 Driving Motor.....	182
6.1.5.3 Brakes.....	182
6.1.6 Operating and Safety Devices.....	182
6.1.6.1 General	182
6.1.6.2 Starting and Inspection Control Switches	182
6.1.6.3 Electrical Protective Devices.....	183
6.1.6.4 Handrail Speed Monitoring Device	185
6.1.6.5 Missing Step and Missing Dynamic Skirt Devices.....	185
6.1.6.6 Tandem Operation	185
6.1.6.7 Step Demarcation Lights	185
6.1.6.8 Escalator Smoke Detectors.....	185
6.1.6.9 Signs	185
6.1.6.10 Control and Operating Circuits	185
6.1.6.11 Electrically Powered Safety Devices	186
6.1.6.12 Installation of Capacitors or Other Devices to Make Electrical Protective Devices Ineffective	187
6.1.6.13 Completion or Maintenance of Circuit	187
6.1.6.14 Escalator Manual Reset	187
6.1.6.15 Contactors and Relays for Use in Critical Operating Circuits	187
6.1.7 Lighting, Access, and Electrical Work.....	187
6.1.7.1 Lighting of Machine Room and Truss Interior	187
6.1.7.2 Lighting of Escalator	187
6.1.7.3 Access to Interior	187
6.1.7.4 Electrical Equipment and Wiring	187
6.1.8 Outdoor Escalators.....	188
6.1.8.1 Weatherproofing	188
6.1.8.2 Slip Resistance.....	188
6.2 Moving Walks.....	188
6.2.1 Protection of Floor Openings.....	188
6.2.1.1 Protection Required.....	188
6.2.2 Protection of Supports and Machine Spaces Against Fire.....	188
6.2.2.1 Protection Required.....	188
6.2.3 Construction Requirements.....	188
6.2.3.1 Angle of Inclination	188
6.2.3.2 Geometry	188
6.2.3.3 Balustrades	188
6.2.3.4 Handrails	189
6.2.3.5 Pallet-Type Treadway.....	190

A17.1a–2005 Table of Contents

6.2.3.6 Belt-Type Treadway.....	190
6.2.3.7 Width	190
6.2.3.8 Entrance and Egress Ends	190
6.2.3.9 Supporting Structure.....	190
6.2.3.10 Rated Load	191
6.2.3.11 Design Factors of Safety	192
6.2.3.12 Chains	192
6.2.3.13 Chain Drives	192
6.2.3.14 V-Belt Drives	192
6.2.3.15 Headroom.....	192
6.2.3.16 Welding	192
6.2.3.17 Nonmoving-Walk Related Equipment	192
6.2.4 Rated Speed.....	192
6.2.5 Driving Machine, Motor, and Brake.....	193
6.2.5.1 Connection Between Driving Machine and Main Drive Shaft	193
6.2.5.2 Driving Motor.....	193
6.2.5.3 Brakes	193
6.2.6 Operating and Safety Devices.....	193
6.2.6.1 General	193
6.2.6.2 Starting and Inspection Control Switches	193
6.2.6.3 Electrical Protective Devices.....	194
6.2.6.4 Handrail Speed Monitoring Device	195
6.2.6.5 Missing Pallet Device	195
6.2.6.6 Tandem Operation	196
6.2.6.7 Moving Walk Smoke Detectors.....	196
6.2.6.8 Signs	196
6.2.6.9 Control and Operating Circuits	196
6.2.6.10 Electrically Powered Safety Devices	196
6.2.6.11 Installation of Capacitors or Other Devices to Make Electrical Protective Devices Ineffective	197
6.2.6.12 Completion or Maintenance of Circuit	197
6.2.6.13 Moving Walk Manual Reset	197
6.2.6.14 Contactors and Relays for Use in Critical Operating Circuits	197
6.2.7 Lighting, Access, and Electrical Work.....	197
6.2.7.1 Lighting of Machine Room and Truss Interior	197
6.2.7.2 Lighting of Treadway	197
6.2.7.3 Access to Interior	197
6.2.7.4 Electrical Equipment and Wiring	197
6.2.8 Outdoor Moving Walks.....	198
6.2.8.1 Weatherproofing	198
6.2.8.2 Slip Resistance.....	198
 Part 7 Dumbwaiters and Material Lifts	
7.1 Power and Hand Dumbwaiters w/o Automatic Transfer Devices.....	199
7.1.1 Construction of Hoistways and Hoistway Enclosures	199
7.1.2 Pits.....	199
7.1.3 Location and Guarding of Counterweights.....	199
7.1.4 Vertical Car Clearances and Runbys for Cars and Counterweights.....	199
7.1.5 Horizontal Car and Counterweight Clearances.....	200
7.1.6 Protection of Spaces Below Hoistway.....	200
7.1.7 Machine Rooms and Machinery Spaces.....	200
7.1.8 Electrical Equipment, Wiring, Pipes, Ducts and HVAC in Hoistways and Machine Rooms.....	200
7.1.9 Machinery and Sheave Beams, Supports and Foundations.....	200
7.1.10 Guarding of Equipment.....	201
7.1.11 Protection of Hoistway Openings.....	201
7.1.12 Hoistway Door Locking Devices, Access Switches, and Unlocking Devices.....	202

A17.1a–2005 Table of Contents

7.1.13 Power Operation of Hoistway Doors and Car Doors or Gates.....	203
7.1.14 Identification.....	203
7.2 Electric and Hand Dumbwaiters w/o Automatic Transfer Devices.....	203
7.2.1 Car Enclosures, Car Doors and Gates, and Car Illumination.....	203
7.2.2 Car Frames and Platforms.....	204
7.2.3 Capacity and Loading.....	205
7.2.4 Car and Counterweight Safeties.....	205
7.2.5 Speed Governors.....	205
7.2.6 Suspension Means.....	205
7.2.7 Counterweights.....	206
7.2.8 Buffers and Bumpers.....	207
7.2.9 Car and Counterweight Guide Rails, Guide-Rail Supports and Fastenings.....	207
7.2.10 Driving Machines and Sheaves.....	207
7.2.11 Terminal Stopping Devices.....	208
7.2.12 Operating Devices and Control Equipment.....	208
7.2.13 Layout Data.....	209
7.2.14 Welding for Dumbwaiters.....	209
7.3 Hydraulic Dumbwaiters w/o Automatic Transfer Devices.....	209
7.3.1 Car Enclosures, Car Doors and Gates and Car Illumination.....	209
7.3.2 Car Frames and Platforms.....	209
7.3.3 Capacity and Loading.....	209
7.3.4 Car and Counterweight Safeties.....	209
7.3.5 Driving Machines, Valves, Supply Piping, Fittings, and Tanks.....	209
7.3.6 Rope, Rope Connections, and Sheaves.....	209
7.3.7 Counterweights.....	209
7.3.8 Buffers and Bumpers.....	209
7.3.9 Guide Rails, Guide-Rail Supports, and Fastenings.....	209
7.3.10 Terminal Stopping Devices.....	209
7.3.11 Operating Devices and Control Equipment.....	209
7.3.12 Layout Data.....	210
7.4 Material Lifts w/o Automatic Transfer Devices.....	210
7.4.1 General Requirement.....	210
7.4.2 Classification.....	210
7.4.3 Construction of Hoistways and Hoistway Enclosures.....	210
7.4.4 Pits.....	211
7.4.5 Location and Guarding of Counterweights.....	211
7.4.6 Vertical Clearances and Runbys for Cars and Counterweights.....	211
7.4.7 Horizontal Car and Counterweight Clearances.....	212
7.4.8 Protection of Spaces Below Hoistways.....	212
7.4.9 Machine Rooms and Machinery Spaces.....	212
7.4.10 Equipment in Hoistways and Machine Rooms.....	212
7.4.11 Machinery and Sheave Beams Supports, and Foundations.....	213
7.4.12 Guarding.....	213
7.4.13 Protection of Hoistway Landing Openings.....	213
7.4.14 Hoistway Door Locking Devices & Electric Contacts, & Hoistway Access Switches.....	213
7.4.15 Power Operation of Hoistway Doors and Car Doors and Gates.....	213
7.4.16 Identification of Equipment.....	214
7.5 Electric Material Lifts w/o Automatic Transfer Devices.....	214
7.5.1 Car Enclosures, Car Doors and Gates and Car Illumination.....	214
7.5.2 Car Frames and Platforms.....	215
7.5.3 Capacity and Loading.....	215
7.5.4 Car and Counterweight Safeties.....	215
7.5.5 Speed Governors.....	215
7.5.6 Suspension Ropes and Their Connections.....	216
7.5.7 Counterweights.....	216
7.5.8 Buffers and Bumpers.....	216
7.5.9 Car and Counterweight Guide Rails, Guide-Rail Supports and Fastenings.....	216

A17.1a–2005 Table of Contents	
7.5.10 Driving Machine and Sheaves.....	216
7.5.11 Terminal Stopping Devices.....	217
7.5.12 Operating Devices and Control Equipment.....	217
7.5.13 Layout Data.....	219
7.5.14 Welding.....	219
7.6 Hydraulic Material Lifts w/o Automatic Transfer Devices.....	219
7.6.1 Hoistways, Hoistway Enclosures, and Related Construction.....	219
7.6.2 Mechanical Equipment.....	219
7.6.3 Hydraulic Driving Machines.....	219
7.6.4 Valves, Pressure Pipings, and Fittings.....	219
7.6.5 Counterweight Ropes, Rope Connections, and Sheaves.....	219
7.6.6 Hydraulic Machines and Tanks.....	219
7.6.7 Terminal Stopping Device.....	219
7.6.8 Operating Devices and Control Equipment.....	219
7.6.9 Layout Data.....	219
7.7 Automatic Transfer Devices.....	219
7.7.1 General.....	219
7.7.2 Clearances.....	219
7.7.3 Guarding.....	220
7.7.4 Floor Level.....	220
7.8 Power Dumbwaiter with Automatic Transfer Devices.....	220
7.8.1 Requirements.....	220
7.8.2 Safety Devices.....	220
7.8.3 Emergency Stop Switch.....	220
7.8.4 Structural Capacity Load.....	220
7.9 Electric Material Lifts with Automatic Transfer Devices.....	220
7.9.1 Hoistways, Hoistway Enclosures, and Related Construction.....	220
7.9.2 Machinery and Equipment.....	221
7.10 Hydraulic Material Lifts with Automatic Transfer Devices.....	222
7.11 Material Lifts with Obscured Transfer Devices.....	222
 Part 8 General Requirements	 223
8.1 Security.....	223
8.1.1 General.....	223
8.1.2 Group 1: Restricted.....	223
8.1.3 Group 2: Authorized Personnel.....	223
8.1.4 Group 3: Emergency Operation.....	223
8.1.5 Group 4: Other.....	223
8.2 Design Data and Formulas.....	223
8.2.1 Minimum Rated Load for Passenger Elevators.....	224
8.2.2 Electric Elevator Car Frame and Platform Stresses and Deflections.....	224
8.2.3 Impact on Buffer Supports.....	227
8.2.4 Gravity Stopping Distances.....	228
8.2.5 Governor Tripping Speeds.....	228
8.2.6 Stopping Distances for Car and Counterweight Safeties.....	228
8.2.7 Factors of Safety for Suspension Wire Ropes for Power Elevators.....	228
8.2.8 Hydraulic Jack and Piping.....	228
8.2.9 Hydraulic Elevator Car Frame and Platform Stresses and Deflections.....	238
8.2.10 Minimum Oil Buffer Strokes: Inclined Elevators.....	240
8.2.11 Stopping Distances for Car and Counterweight Safeties for Inclined Elevators.....	240
8.2.12 Material Lifts with Automatic Transfer Devices, Design, Data, and Formulas.....	240
8.3 Engineering Tests, Type Tests, and Certification.....	241
8.3.1 General Requirements for Tests and Certification.....	241
8.3.2 Type Tests of Car and Counterweight Oil Buffers.....	242
8.3.3 Type Tests of Interlocks, Combination Mechanical Locks & Electric Contacts, & Door Or Gate Electric Contacts.....	244
8.3.4 Entrance Fire Type Tests.....	246

A17.1a–2005 Table of Contents

8.3.5 Type Tests for Hydraulic Control Valves.....	246
8.3.6 Escalator Brake Type Test.....	246
8.3.7 Vertical Burn Engineering Test.....	247
8.3.8 Test Method for Evaluating Room Fire Growth Contribution of Textile Wall Covering...	247
8.3.9 Engineering Tests fro Hydraulic Overspeed Valves.....	247
8.3.10 Engineering Tests – Safety Nut & Speed Limiting Devices of Screw-Column Elevators.	248
8.3.11 Step and Pallet Fatigue Engineering Test.....	248
8.4 Elevator Safety Requirements for Seismic Risk Zone 2 or Greater.....	248
8.4.1 Horizontal Car and Counterweight Clearances.....	249
8.4.2 Machinery and Sheave Beams, Supports, and Foundations.....	249
8.4.3 Guarding of Equipment.....	249
8.4.4 Car Enclosures, Car Doors and Gates, and Car Illumination.....	250
8.4.5 Car Frames and Platforms.....	250
8.4.6 Car and Counterweight Safeties.....	250
8.4.7 Counterweights.....	250
8.4.8 Car and Counterweight Guide Rail Systems.....	251
8.4.9 Driving Machines and Sheaves.....	262
8.4.10 Emergency Operation and Signaling Devices.....	262
8.4.11 Hydraulic Elevators.....	264
8.4.12 Design Data and Formulas for Elevators.....	266
8.4.13 Ground Motion Parameters.....	269
8.5 Escalator and Moving Walk Safety Requirement for Seismic Risk Zone 2 or Greater.....	269
8.5.1 Balustrade Construction.....	269
8.5.2 Truss Members.....	269
8.5.3 Supporting Connections Between the Truss and the Building.....	270
8.5.4 Earthquake Protective Devices.....	270
8.6 Maintenance, Repair, and Replacement.....	270
8.6.1 General Requirements.....	270
8.6.2 Repairs.....	272
8.6.3 Replacements.....	272
8.6.4 Maintenance of Electric Elevators.....	274
8.6.5 Maintenance of Hydraulic Elevators.....	276
8.6.6 Maintenance of Elevators with Other Types of Driving Machines.....	276
8.6.7 Maintenance of Special Application Elevators.....	277
8.6.8 Maintenance of Escalator.....	277
8.6.9 Maintenance of Moving Walks.....	279
8.6.10 Maintenance of Dumbwaiters and Material Lifts.....	279
8.6.11 Special Provisions.....	279
8.7 Alterations.....	279.1
8.7.1 General Requirements.....	280
8.7.2 Alterations to Electric Elevators.....	280
8.7.3 Alterations to Hydraulic Elevators.....	287
8.7.4 Alterations to Elevators with Other Types of Driving Machines.....	290
8.7.5 Alterations to Special Application Elevators.....	291
8.7.6 Alterations to Escalators and Moving Walks.....	291
8.7.7 Alterations to Dumbwaiters and Material Lifts.....	293
8.8 Welding.....	293
8.8.1 Qualification of Welders.....	293
8.8.2 Welding Steel.....	293
8.8.3 Welding Metals Other Than Steel.....	293
8.9 Code Data Plate.....	293
8.9.1 Required Information.....	293
8.9.2 Location.....	293.1
8.9.3 Material and Construction.....	293.1
8.10 Acceptance Inspections and Tests.....	293.1
8.10.1 General Requirements for Acceptance Inspections and Tests.....	294
8.10.2 Acceptance Inspection and Tests of Electric Elevators.....	294

A17.1a–2005 Table of Contents	
8.10.3 Acceptance Inspection and Tests of Hydraulic Elevators.....	300
8.10.4 Acceptance Inspection and Tests of Escalators and Moving Walks.....	303
8.10.5 Acceptance Inspection and Tests of Other Equipment.....	306
8.11 Periodic Inspections and Tests.....	307
8.11.1 General Requirements for Periodic Inspections and Tests.....	307
8.11.2 Periodic Inspections and Tests of Electric Elevators.....	308
8.11.3 Periodic Inspections and Tests of Hydraulic Elevators.....	312
8.11.4 Periodic Inspections and Tests of Escalators and Moving Walls.....	314
8.11.5 Periodic Inspections and Tests of Other Equipment.....	316
8.12 Flood Resistances.....	317
8.12.1 Flood-Resistant Design and Construction.	317
Part 9 Reference Codes, Standards, and Specifications	318
9.1 Reference Documents.....	319
9.2 Procurement Information.....	325
Appendix A Control System.....	327
Appendix B Door Landing and Unlocking Zones.....	329
Appendix C Location of Top Emergency Exit.....	330
Appendix D Rated Load and Capacity Plates for Passenger Elevators.....	331
Appendix E CSA B44 Elevator Requirements for Persons with Physical Disabilities.....	332
Appendix F Ascending Car Overspeed and Unintended Car Movement Protection.....	333
Appendix G Top of Car Clearance.....	337
Appendix H Private Residence Elevator Guarding.....	339
Appendix I Escalator and Moving Walk Diagrams.....	340
Appendix J CSA B44 Maintenance Requirements and Intervals for Elevators, Dumbwaiters, Escalators, and Moving Walks.....	346
Appendix K Beveling and Clearance Requirements.....	347
Appendix L Index of Alteration Requirements for Electric Elevators, Hydraulic Elevators, Escalators, and Moving Walks.....	348
Appendix M Inertia Application for Type A Safety Device Location of Test Weight.....	353
Appendix N Recommended Inspection and Test Intervals in “Months”.....	354
NONMANDATORY APPENDIX O DELETED.....	356
Appendix P Plunger Gripper Stopping Distances.....	357
Index	358