

REVISION RECORD FOR THE STATE OF CALIFORNIA

SUPPLEMENT

July 1, 2018

2016 Title 24, Part 2, Vol. 2, California Building Code

General Information:

1. The date of this supplement is for identification purposes only. See the History Note Appendix at the end of the code.
2. This supplement is issued by the California Building Standards Commission in order to provide new and/or replacement pages containing recently adopted provisions, for California Code of Regulations, Title 24, Part 2, Volume 2, of the 2016 *California Building Code*. Instructions are provided below.
3. Health and Safety Code Section 18938.5 establishes that only building standards in effect at the time of the application for a building permit may be applied to the project plans and construction. This rule applies to both adoptions of building standards for Title 24 by the California Building Standards Commission and local adoptions and ordinances imposing building standards. The new building standards provided with the enclosed blue supplement pages must not be enforced before the effective date.
4. Not all code text on the enclosed blue supplement pages is a new building standard. New, amended, or repealed building standards are identified by margin symbols. An explanation of margin symbols is provided in the code before the table of contents.
5. You may wish to retain the superseded material with this revision record so that the prior wording of any section can be easily ascertained.

Title 24, Part 2, Vol. 2

Remove Existing Pages

xxi through xxvi
47 through 50
53 and 54
61 through 66
117 and 118
121 and 122
213 through 218
369 and 370
377 through 382
395 and 396
407 and 408
539 and 540
549 and 550
555 through 560
655 and 656

Insert Blue-Colored Pages

xxi through xxvi
47 through 50
53 and 54
61 through 66
117 and 118
121 and 122
213 through 218
369 and 370
377 through 382
395 and 396
407 and 408
539 and 540
549 and 550
555 through 560
655 and 656

TABLE OF CONTENTS

VOLUME 1

CHAPTER 1 SCOPE AND ADMINISTRATION 3

DIVISION I CALIFORNIA ADMINISTRATION 3

Section

1.1	General	3
1.2	Building Standards Commission	5
1.3	Board of State and Community Corrections	7
1.4	Department of Consumer Affairs	7
1.5	Reserved	7
1.6	Department of Food and Agriculture	7
1.7	California Department of Public Health	8
1.8	Department of Housing and Community Development	8
1.8.2	Authority and Abbreviations	8
1.8.3	Local Enforcing Agency	9
1.8.4	Permits, Fees, Applications and Inspections	10
1.8.5	Right of Entry for Enforcement	10
1.8.6	Local Modification by Ordinance or Regulation	11
1.8.7	Alternate Materials, Designs, Tests and Methods of Construction	11
1.8.8	Appeals Board	12
1.8.9	Unsafe Buildings or Structures	12
1.8.10	Other Building Regulations	13
1.9	Division of the State Architect	13
1.10	Office of Statewide Health Planning and Development	15
1.11	Office of the State Fire Marshal	17
1.12	State Librarian	21
1.13	Reserved	21
1.14	California State Lands Commission	21

DIVISION II SCOPE AND ADMINISTRATION 23

101	General	23
102	Applicability	24
103	Department of Building Safety	24
104	Duties and Powers of Building Official	24
105	Permits	26
106	Floor and Roof Design Loads	28
107	Submittal Documents	28
108	Temporary Structures and Uses	30
109	Fees	30

110	Inspections	30
111	Certificate of Occupancy	31
112	Service Utilities	32
113	Board of Appeals	32
114	Violations	32
115	Stop Work Order	33
116	Unsafe Structures and Equipment	33

CHAPTER 2 DEFINITIONS 45

Section

201	General	45
202	Definitions	45

CHAPTER 3 USE AND OCCUPANCY CLASSIFICATION 93

Section

301	General	93
302	Classification	93
303	Assembly Group A	93
304	Business Group B	94
305	Educational Group E	94
306	Factory Group F	95
307	High-hazard Group H	95
308	Institutional Group I	100
309	Mercantile Group M	101
310	Residential Group R	101
311	Storage Group S	103
312	Utility and Miscellaneous Group U	104
313	Laboratories Group L [SFM]	104
314	Organized Camps Group C [SFM]	104

CHAPTER 4 SPECIAL DETAILED REQUIREMENTS BASED ON USE AND OCCUPANCY 109

Section

401	Scope	109
402	Covered Mall and Open Mall Buildings	109
403	High-rise Buildings	113
404	Atriums	116
405	Underground Buildings	117
406	Motor-vehicle-related Occupancies	118
407	Group I-2	122
408	Group I-3	127
409	Motion Picture Projection Rooms	132

TABLE OF CONTENTS

410 Stages, Platforms and Technical
Production Areas 133

411 Special Amusement Buildings 134

412 Aircraft-related Occupancies 135

413 Combustible Storage 138

414 Hazardous Materials 138

415 Groups H-1, H-2, H-3, H-4 and H-5 141

416 Application of Flammable Finishes 152

417 Drying Rooms 152

418 Organic Coatings 152

419 Live/work Units 153

420 Groups R-1, R-2, R-2.1, R-3, R-3.1 and R-4 ... 153

421 Hydrogen Fuel Gas Rooms 154

422 Ambulatory Care Facilities 155

423 Storm Shelters 155

424 Children’s Play Structures 155

425 Hyperbaric Facilities 156

426 Combustible Dusts,
Grain Processing and Storage 156

435 Special Provisions for Licensed
24-Hour Care Facilities in a
Group R-2.1, R-3.1, R-4 [SFM] 157

436 Group I-4 [SFM] 160

437 Reserved 161

438 Reserved 161

439 Road Tunnels, Bridges, and Other
Limited-Access Highways [SFM] 161

440 Horse Racing Stables [SFM] 161

441 Pet Kennels and Pet Boarding
Facilities [SFM] 161

442 Combustion Engines and
Gas Turbines [SFM] 161

443 Fixed Guideway Transit and Passenger Rail
Systems [SFM] 161

444 Explosives [SFM] 162

445 Reserved 162

446 Winery Caves [SFM] 162

447 Reserved 163

448 Reserved 163

449 Public Libraries [SL AND SFM] 163

450 Group C [SFM] 163

451 Reserved 166

452 School Facilities for Kindergarten through
12th Grade and Group E Day Care 166

453 Group L [SFM] 167

454 Reserved 170

455 Large Family Day-care Homes [SFM] 170

**CHAPTER 5 GENERAL BUILDING
HEIGHTS AND AREAS 173**

Section

501 General 173

502 Definitions 173

503 General Building Height and
Area Limitations 174

504 Building Height and Number of Stories 175

505 Mezzanines and Equipment Platforms 175

506 Building Area 179

507 Unlimited Area Buildings 184

508 Mixed Use and Occupancy 186

509 Incidental Uses 187

510 Special Provisions 188

CHAPTER 6 TYPES OF CONSTRUCTION 191

Section

601 General 191

602 Construction Classification 191

603 Combustible Material in
Types I and II Construction 194

**CHAPTER 7 FIRE AND SMOKE
PROTECTION FEATURES 197**

Section

701 General 197

702 Definitions 197

703 Fire-resistance Ratings and Fire Tests 198

704 Fire-resistance Rating of
Structural Members 199

705 Exterior Walls 201

706 Fire Walls 205

707 Fire Barriers 207

708 Fire Partitions 209

709 Smoke Barriers 210

710 Smoke Partitions 211

711 Horizontal Assemblies 211

712 Vertical Openings 212

713 Shaft Enclosures 213

714 Penetrations 215

715 Fire-resistant Joint Systems 217

716 Opening Protectives 218

717 Ducts and Air Transfer Openings 224

718 Concealed Spaces 229

719 Fire-resistance Requirements for Plaster 232

720 Thermal- and Sound-insulating Materials 232

721 Prescriptive Fire Resistance 233
 722 Calculated Fire Resistance 235

CHAPTER 7A MATERIALS AND CONSTRUCTION METHODS FOR EXTERIOR WILDFIRE EXPOSURE 285

Section
 701A Scope, Purpose and Application 285
 702A Definitions 286
 703A Standards of Quality 287
 704A Ignition-resistant Construction 288
 705A Roofing 288
 706A Vents 288
 707A Exterior Covering 289
 708A Exterior Windows, Skylights and Doors 291
 709A Decking 292
 710A Accessory Structures 292.1

CHAPTER 8 INTERIOR FINISHES 293

Section
 801 General 293
 802 Definitions 293
 803 Wall and Ceiling Finishes 294
 804 Interior Floor Finish 296
 805 Combustible Materials in Types I and II Construction 297
 806 Decorative Materials and Trim 297
 807 Insulation 298
 808 Acoustical Ceiling Systems 298

CHAPTER 9 FIRE PROTECTION SYSTEMS 305

Section
 901 General 305
 902 Definitions 305
 903 Automatic Sprinkler Systems 306
 904 Alternative Automatic Fire-extinguishing Systems 315
 905 Standpipe Systems 317
 906 Portable Fire Extinguishers 319
 907 Fire Alarm and Detection Systems 321
 908 Emergency Alarm Systems 339
 909 Smoke Control Systems 339
 910 Smoke and Heat Removal 349
 911 Fire Command Center 350
 912 Fire Department Connections 351
 913 Fire Pumps 352
 914 Emergency Responder Safety Features 352
 915 Carbon Monoxide Detection 353

916 Gas Detection Systems 355
 917 Emergency Responder Radio Coverage 355

CHAPTER 10 MEANS OF EGRESS 361

Section
 1001 Administration 361
 1002 Definitions 361
 1003 General Means of Egress 362
 1004 Occupant Load 363
 1005 Means of Egress Sizing 364
 1006 Number of Exits and Exit Access Doorways 366
 1007 Exit and Exit Access Doorway Configuration 369
 1008 Means of Egress Illumination 369
 1009 Accessible Means of Egress 370
 1010 Doors, Gates and Turnstiles 373
 1011 Stairways 382
 1012 Ramps 385
 1013 Exit Signs 386
 1014 Handrails 388
 1015 Guards 389
 1016 Exit Access 391
 1017 Exit Access Travel Distance 392
 1018 Aisles 392
 1019 Exit Access Stairways and Ramps 393
 1020 Corridors 393
 1021 Egress Balconies 395
 1022 Exits 395
 1023 Interior Exit Stairways and Ramps 396
 1024 Exit Passageways 398
 1025 Luminous Egress Path Markings 398
 1026 Horizontal Exits 400
 1027 Exterior Exit Stairways and Ramps 400
 1028 Exit Discharge 401
 1029 Assembly 402
 1030 Emergency Escape and Rescue 409

CHAPTER 11 RESERVED 411

CHAPTER 11A HOUSING ACCESSIBILITY 415

Section
 1101A Application 415
 1102A Building Accessibility 415
 1103A Design and Construction 416
 1104A Covered Multifamily Dwellings 416
 1105A Garages, Carports and Parking Facilities 417
 1106A Site and Building Characteristics 417

TABLE OF CONTENTS

1107A Definitions 417

1108A General Requirements for Accessible Parking
and Exterior Routes of Travel 418

1109A Parking Facilities 418

1110A Exterior Accessible Routes. 420

1111A Changes in Level on Accessible Routes. 421

1112A Curb Ramps on Accessible Routes. 421

1113A Walks and Sidewalks on
Accessible Routes. 421

1114A Exterior Ramps and Landings on
Accessible Routes. 422

1115A Exterior Stairways 423

1116A Hazards on Accessible Routes 424

1117A General Requirements for Accessible
Entrances, Exits, Interior Routes of
Travel and Facility Accessibility 425

1118A Egress and Areas of Refuge 425

1119A Interior Accessible Routes 425

1120A Reserved. 426

1121A Changes in Level on Accessible Routes. 426

1122A Interior Ramps and Landings on
Accessible Routes. 426

1123A Interior Stairways 427

1124A Elevators and Platform
(Wheelchair) Lifts 428

1125A Hazards on Accessible Routes 430

1126A Doors, Gates and Windows 431

1127A Common Use Facilities 433

1128A Covered Dwelling Units. 440

1129A Reserved. 440

1130A Accessible Route within Covered
Multifamily Dwelling Units. 440

1131A Changes in Level on Accessible Routes. 440

1132A Doors 440

1133A Kitchens 441

1134A Bathing and Toilet Facilities 443

1135A Laundry Rooms 446

1136A Electrical Receptacle,
Switch and Control Heights 446

1137A Other Features and Facilities 447

1138A Space Allowances and Reach Ranges 447

1139A Accessible Drinking Fountains. 449

1140A Accessible Telephones 450

1141A Accessible Swimming Pools 450

1142A Electrical Receptacle, Switch and
Control Heights 451

1143A Signage 451

1144A Reserved. 453

1145A Reserved. 453

1146A Reserved. 453

1147A Reserved. 453

1148A Reserved. 453

1149A Reserved. 453

1150A Site Impracticality Tests. 454

**CHAPTER 11B ACCESSIBILITY TO PUBLIC
BUILDINGS, PUBLIC
ACCOMMODATIONS,
COMMERCIAL BUILDINGS
AND PUBLIC HOUSING. 511**

DIVISION 1 – APPLICATION AND ADMINISTRATION

Section

11B-101 Purpose 511

11B-102 Dimensions for Adults and Children 511

11B-103 Equivalent Facilitation 511

11B-104 Conventions 511

11B-105 Referenced Standards. 511

11B-106 Definitions 511

11B-107 Special Conditions Appeals Action 513

11B-108 Maintenance of Accessible Features 513

DIVISION 2 – SCOPING REQUIREMENTS

11B-201 Application 514

11B-202 Existing Buildings and Facilities 514

11B-203 General Exceptions. 516

11B-204 Protruding Objects 517

11B-205 Operable Parts 517

11B-206 Accessible Routes. 517

11B-207 Accessible Means of Egress 521

11B-208 Parking Spaces 522

11B-209 Passenger Drop-off and Loading
Zones and Bus Stops 523

11B-210 Stairways 523

11B-211 Drinking Fountains. 524

11B-212 Kitchens, Kitchenettes, Wet Bars and Sinks. 524

11B-213 Toilet Facilities and Bathing Facilities. 524

11B-214 Washing Machines and Clothes Dryers 525

11B-215 Fire Alarm Systems and Carbon
Monoxide Alarm Systems 525

11B-216 Signs 525

11B-217 Telephones 527

11B-218 Transportation Facilities. 528

11B-219 Assistive Listening Systems. 528

11B-220 Automatic Teller Machines, Fare
Machines and Point-of-sale Devices 529

11B-221 Assembly Areas 529

11B-222 Dressing, Fitting, and Locker Rooms. 531

11B-223 Medical care and Long-term Care Facilities. 531

11B-224 Transient Lodging Guest Rooms, Housing at a Place of Education and Social Service Center Establishments. 532

11B-225 Storage 533

11B-226 Dining Surfaces and Work Surfaces. 534

11B-227 Sales and Service 534

11B-228 Depositories, Vending Machines, Change Machines, Mail Boxes, Fuel Dispensers and Electric Vehicle Charging Stations . . . 534

11B-229 Windows 535

11B-230 Two-way Communication Systems 535

11B-231 Judicial Facilities. 535

11B-232 Detention Facilities and Correctional Facilities. 536

11B-233 Residential Facilities. 537

11B-234 Amusement Rides 538

11B-235 Recreational Boating Facilities. 539

11B-236 Exercise Machines and Equipment. 539

11B-237 Fishing Piers and Platforms 539

11B-238 Golf Facilities 539

11B-239 Miniature Golf Facilities. 539

11B-240 Play Areas 539

11B-241 Saunas and Steam Rooms 540

11B-242 Swimming Pools, Wading Pools, and Spas . . 540

11B-243 Shooting Facilities with Firing Positions . . . 541

11B-244 Religious Facilities 541

11B-245 Public Accommodations Located in Private Residences 541

11B-246 Outdoor Developed Areas. 541

11B-247 Detectable Warnings and Detectable Directional Texture 542

DIVISION 3 – BUILDING BLOCKS

11B-301 General 543

11B-302 Floor or Ground Surfaces 543

11B-303 Changes in Level. 543

11B-304 Turning Space 543

11B-305 Clear Floor or Ground Space 544

11B-306 Knee and Toe Clearance 545

11B-307 Protruding Objects 546

11B-308 Reach ranges 547

11B-309 Operable Parts. 548

DIVISION 4 – ACCESSIBLE ROUTES

11B-401 General 549

11B-402 Accessible Routes 549

11B-403 Walking Surfaces 549

11B-404 Doors, Doorways, and Gates. 550

11B-405 Ramps 557

11B-406 Curb Ramps, Blended Transitions and Islands. 558

11B-407 Elevators 560

11B-408 Limited-use/Limited-application Elevators . . 565

11B-409 Private Residence Elevators 566

11B-410 Platform Lifts 567

11B-411 Destination-oriented Elevators 567

DIVISION 5 – GENERAL SITE AND BUILDING ELEMENTS

11B-501 General 573

11B-502 Parking Spaces 573

11B-503 Passenger Drop-off and Loading Zones. 576

11B-504 Stairways 577

11B-505 Handrails. 577

DIVISION 6 – PLUMBING ELEMENTS AND FACILITIES

11B-601 General 580

11B-602 Drinking Fountains. 580

11B-603 Toilet and Bathing Rooms 580

11B-604 Water Closets and Toilet Compartments . . . 581

11B-605 Urinals 586

11B-606 Lavatories and Sinks. 586

11B-607 Bathtubs 587

11B-608 Shower Compartments 589

11B-609 Grab Bars 591

11B-610 Seats 592

11B-611 Washing Machines and Clothes Dryers 593

11B-612 Saunas and Steam Rooms. 593

DIVISION 7 – COMMUNICATION ELEMENTS AND FEATURES

11B-701 General 594

11B-702 Fire Alarm Systems 594

11B-703 Signs 594

11B-704 Telephones 600

11B-705 Detectable Warnings and Detectable Directional Texture. 600

11B-706 Assistive Listening Systems 602

11B-707 Automatic Teller Machines, Fare Machines and Point-of-sale Devices. 602

11B-708 Two-way Communication Systems 604

DIVISION 8 – SPECIAL ROOMS, SPACES, AND ELEMENTS

11B-801 General 605

11B-802 Wheelchair Spaces, Companion Seats, and Designated Aisle Seats and Semi-ambulant Seats 605

TABLE OF CONTENTS

11B-803	Dressing, Fitting, and Locker Rooms	606	1215	Reserved.	636
11B-804	Kitchens, Kitchenettes and Wet Bars	606	1216	Reserved.	636
11B-805	Medical Care and Long-term Care Facilities	608	1217	Reserved.	636
11B-806	Transient Lodging Guest Rooms	609	1218	Reserved.	636
11B-807	Holding Cells and Housing Cells	609	1219	Reserved.	636
11B-808	Courtrooms	610	1220	Reserved.	636
11B-809	Residential Dwelling Units	610	1221	Reserved.	636
11B-810	Transportation Facilities	611	1222	Reserved.	636
11B-811	Storage	612	1223	Reserved.	636
11B-812	Electric Vehicle Charging Stations	612	1224	[OSHPD 1] Hospitals.	636
			1225	[OSHPD 2] Skilled Nursing and Intermediate-care Facilities	676
<i>DIVISION 9 – BUILT-IN ELEMENTS</i>			1226	[OSHPD 3] Clinics	685
11B-901	General	615	1227	[OSHPD 4] Correctional Treatment Centers	696
11B-902	Dining Surfaces and Work Surfaces	615	1228	Acute Psychiatric Hospitals	701
11B-903	Benches	615	1229	Reserved.	707
11B-904	Check-out Aisles and Sales and Service Counters	615	1230	[BSCC] Minimum Standards for Juvenile Facilities.	707
<i>DIVISION 10 – RECREATION FACILITIES</i>			1231	[BSCC] Local Detention	711
11B-1001	General	617	1232	Reserved.	716
11B-1002	Amusement Rides	617	1233	Reserved.	716
11B-1003	Recreational Boating Facilities	618	1234	Reserved.	716
11B-1004	Exercise Machines and Equipment	620	1235	[DPH] Sanitary Control of Shellfish (Plants and Operations)	716
11B-1005	Fishing Piers and Platforms	621	1236	[DPH] Laboratory Animal Quarters	717
11B-1006	Golf Facilities	621	1237	[DPH] Wild Animal Quarantine Facilities.	717
11B-1007	Miniature Golf Facilities	622	1238	Reserved.	718
11B-1008	Play Areas	622	1239	Reserved.	718
11B-1009	Swimming Pools, Wading Pools, and Spas.	624	1240	[AGR] Meat and Poultry Processing Plants.	718
11B-1010	Shooting Facilities with Firing Positions	628	1241	[AGR] Collection Centers and Facilities.	718.1
			1242	[AGR] Renderers	718.2
			1243	[AGR] Horsemeat and Pet Food Establishments	718.2
			1244	Reserved.	718.2
			1245	Reserved.	718.2
			1246	Reserved.	718.2
			1247	Reserved.	718.2
			1248	Reserved.	718.2
			1249	Reserved.	718.2
			1250	[CA] Pharmacies	718.2
			1251	[CA] Veterinary Facilities	718.3
			1252	[CA] Barber Colleges and Shops.	718.3
			1253	[CA] Schools of Cosmetology, Cosmetological Establishments and Satellite Classrooms	718.4
			1254	[CA] Acupuncture Offices	718.4
CHAPTER 12 INTERIOR ENVIRONMENT 630			CHAPTER 13 ENERGY EFFICIENCY 719		
Section					
1201	General	630			
1202	Definitions	630			
1203	Ventilation	630			
1204	Temperature Control	632			
1205	Lighting	633			
1206	Yards or Courts.	633			
1207	Sound Transmission	634			
1208	Interior Space Dimensions	634			
1209	Access to Unoccupied Spaces	635			
1210	Toilet and Bathroom Requirements	635			
1211	[HCD 1 & HCD 2] Garage Door Springs	636			
1212	[HCD 1] Pollutant Control	636			
1213	Reserved.	636			
1214	Reserved.	636			

1615.4.2.1 Longitudinal ties. Longitudinal ties shall consist of continuous reinforcement in slabs; continuous or spliced decks or sheathing; continuous or spliced members framing to, within or across walls; or connections of continuous framing members to walls. Longitudinal ties shall extend across interior load-bearing walls and shall connect to exterior load-bearing walls and shall be spaced at not greater than 10 feet (3038 mm) on center. Ties shall have a minimum nominal tensile strength, T_T , given by Equation 16-41. For ASD the minimum nominal tensile strength shall be permitted to be taken as 1.5 times the allowable tensile stress times the area of the tie.

$$T_T = wLS \leq \alpha_T S \quad \text{(Equation 16-41)}$$

where:

L = The span of the horizontal element in the direction of the tie, between bearing walls, feet (m).

w = The weight per unit area of the floor or roof in the span being tied to or across the wall, psf (N/m²).

S = The spacing between ties, feet (m).

α_T = A coefficient with a value of 1,500 pounds per foot (2.25 kN/m) for masonry bearing wall structures and a value of 375 pounds per foot (0.6 kN/m) for structures with bearing walls of cold-formed steel light-frame construction.

1615.4.2.2 Transverse ties. Transverse ties shall consist of continuous reinforcement in slabs; continuous or spliced decks or sheathing; continuous or spliced members framing to, within or across walls; or connections of continuous framing members to walls. Transverse ties shall be placed no farther apart than the spacing of load-bearing walls. Transverse ties shall have minimum nominal tensile strength T_T , given by Equation 16-41. For ASD the minimum nominal tensile strength shall

be permitted to be taken as 1.5 times the allowable tensile stress times the area of the tie.

1615.4.2.3 Perimeter ties. Perimeter ties shall consist of continuous reinforcement in slabs; continuous or spliced decks or sheathing; continuous or spliced members framing to, within or across walls; or connections of continuous framing members to walls. Ties around the perimeter of each floor and roof shall be located within 4 feet (1219 mm) of the edge and shall provide a nominal strength in tension not less than T_p , given by Equation 16-42. For ASD the minimum nominal tensile strength shall be permitted to be taken as 1.5 times the allowable tensile stress times the area of the tie.

$$T_p = 200w \leq \beta_T \quad \text{(Equation 16-42)}$$

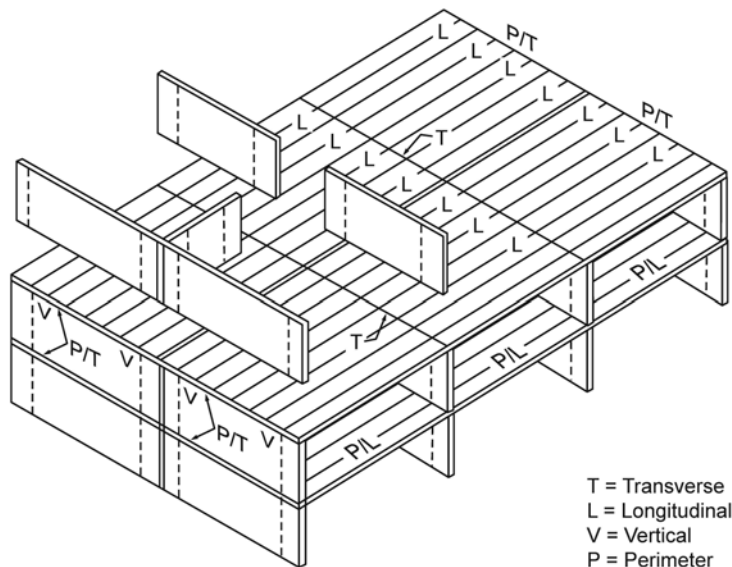
For SI: $T_p = 90.7w \leq \beta_T$

where:

w = As defined in Section 1615.4.2.1.

β_T = A coefficient with a value of 16,000 pounds (7200 kN) for structures with masonry bearing walls and a value of 4,000 pounds (1300 kN) for structures with bearing walls of cold-formed steel light-frame construction.

1615.4.2.4 Vertical ties. Vertical ties shall consist of continuous or spliced reinforcing, continuous or spliced members, wall sheathing or other engineered systems. Vertical tension ties shall be provided in bearing walls and shall be continuous over the height of the building. The minimum nominal tensile strength for vertical ties within a bearing wall shall be equal to the weight of the wall within that story plus the weight of the diaphragm tributary to the wall in the story below. No fewer than two ties shall be provided for each wall. The strength of each tie need not exceed 3,000 pounds per foot (450 kN/m) of



T = Transverse
L = Longitudinal
V = Vertical
P = Perimeter

FIGURE 1615.4
LONGITUDINAL, PERIMETER, TRANSVERSE AND VERTICAL TIES

wall tributary to the tie for walls of masonry construction or 750 pounds per foot (140 kN/m) of wall tributary to the tie for walls of cold-formed steel light-frame construction.

**SECTION 1616
ADDITIONAL REQUIREMENTS FOR
COMMUNITY COLLEGES [DSA-SS/CC]**

1616.1 Construction documents.

1616.1.1 Additional requirements for construction documents are included in Sections 4-210 and 4-317 of the California Administrative Code (Part 1, Title 24, C.C.R).

1616.1.2 Connections. Connections that resist design seismic forces shall be designed and detailed on the design drawings.

1616.1.3 Construction procedures. Where unusual erection or construction procedures are considered essential by the project structural engineer or architect in order to accomplish the intent of the design or influence the construction, such procedure shall be indicated on the plans or in the specifications.

1616.2 General design requirements.

1616.2.1 Lateral load deflections.

1616.2.1.1 Horizontal diaphragms. The maximum span-depth ratio for any roof or floor diaphragm consisting of steel and composite steel slab decking or concrete shall be based on test data and design calculations acceptable to the enforcement agency.

1616.2.1.2 Veneers. The deflection shall not exceed $l/600$ for veneered walls, anchored veneers and adhered veneers over 1 inch (25 mm) thick, including the mortar backing.

1616.2.1.3 Risk Category of buildings and other structures. Risk Category IV includes structures as defined in the California Administrative Code, Section 4-207 and all structures required for their continuous operation or access/egress.

1616.2.1.4 Analysis. Structural analysis shall explicitly include consideration of stiffness of diaphragm in accordance with ASCE 7 Section 12.3.1. A diaphragm is rigid for the purpose of distribution of story shear and torsional moment where so indicated in Section 12.3.1 of ASCE 7.

1616.2.2 Structural walls. For anchorage of concrete or masonry walls to roof and floor diaphragms, the out-of-plane strength design force shall not be less than 280 lb/linear ft (4.09 kN/m) of wall.

1616.3 Load combinations.

1616.3.1 Stability. When checking stability under the provisions of Section 1605.1.1 using allowable stress design, the factor of safety for soil bearing values shall not be less than the overstrength factor of the structures supported.

1616.3.2 Modifications to load combinations in ICC 300. The text of ICC 300 shall be modified as indicated in Section 1616.3.2.1 through 1616.3.2.3.

1616.3.2.1 ICC 300, Section 303.5.1. Modify Section 303.5.1 by adding Equation 3-1a and replacing Equation 3-2 as follows:

$$0.9D + 0.4L + 1.6Z \quad (\text{Equation 3-1a})$$

$$1.2D + 1.6L + 1.6R, \quad (\text{Equation 3-2})$$

1616.3.2.2 ICC 300, Section 303.5.2. Modify Section 303.5.2 by adding Equation 3-3a, adding Equation 3-3b, and replacing Equation 3-4 as follows:

$$D + 0.4L + Z \quad (\text{Equation 3-3a})$$

$$0.6D + 0.3L + Z \quad (\text{Equation 3-3b})$$

$$D + L + R, \quad (\text{Equation 3-4})$$

1616.3.2.3 ICC 300, Section 303.5.3. Modify Section 303.5.3 as follows:

The uniform live load, L , used in Equation 3-2 and 3-4 may be taken as zero when evaluating elements supporting the handrail/guardrail provided those elements do not also support L .

1616.4 Roof dead loads. The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section 1511.

1616.5 Live loads.

1616.5.1 Modifications to Table 1607.1.

1616.5.1.1 Item 4. Assembly areas. The following minimum loads for stage accessories apply:

1. Gridirons and fly galleries: 75 pounds per square foot uniform live load.
2. Loft block wells: 250 pounds per lineal foot vertical load and lateral load.
3. Head block wells and sheave beams: 250 pounds per lineal foot vertical load and lateral load. Head block wells and sheave beams shall be designed for all tributary loft block well loads. Sheave blocks shall be designed with a safety factor of five.
4. Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.
5. Ceiling framing over stages shall be designed for a uniform live load of 20 pounds per square foot. For members supporting a tributary area of 200 square feet or more, this additional load may be reduced to 15 pounds per square foot (0.72 kN/m²).

1616.5.1.2 Item 5. Balconies and decks. The minimum uniform live load for balconies and decks is 1.5 times the live load for the area served. Not required to exceed 100 psf.

1616.5.1.3 Item 24. Reviewing stands, grandstands and bleachers. The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.

1616.5.1.4 Item 35. Yards and terraces, pedestrians. Item 35 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.

1616.5.1.5 Item 36. Storage racks and wall-hung cabinets. The minimum vertical design live load shall be as follows:

Paper media:

12-inch-deep (305 mm) shelf - 33 pounds per lineal foot (482 N/m)

15-inch-deep (381 mm) shelf - 41 pounds per lineal foot (598 N/m), or 33 pounds per cubic foot (5183 N/m³) per total volume of the rack or cabinet, whichever is less.

Film media:

18-inch-deep (457 mm) shelf - 100 pounds per lineal foot (1459 N/m), or

50 pounds per cubic foot (7853 N/m³) per total volume of the rack or cabinet, whichever is less.

Other media:

20 pounds per cubic foot (311 N/m³) or 20 pounds per square foot (958 Pa), whichever is less, but not less than actual loads.

1616.5.1.6. Footnote c: Modify Footnote c as follows:

c. Design in accordance with ICC 300 as amended by Section 1616.3.2 Modifications to Load Combinations in ICC 300.

1616.5.2 Uncovered open-frame roof structures. Uncovered open-frame roof structures shall be designed for a vertical live load of not less than 10 pounds per square foot (0.48 kN/m²) of the total area encompassed by the framework.

1616.6 Determination of snow loads. The ground snow load or the design snow load for roofs shall conform with the adopted ordinance of the city, county, or city and county in which the project site is located, and shall be approved by DSA.

1616.7 Wind loads.

1616.7.1 Story drift for wind loads. The calculated story drift due to wind pressures with ultimate design wind speed, V_{ult} , shall not exceed 0.008 times the story height for buildings less than 65 feet (19,812 mm) in height or 0.007 times the story height for buildings 65 feet (19,812 mm) or greater in height.

Exception: This story drift limit need not be applied for single-story open buildings in Risk Category I and II.

1616.8 Establishment of flood hazard areas. Flood hazard maps shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency's Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto.

1616.9 Earthquake loads.

1616.9.1 Seismic design category. The seismic design category for a structure shall be determined in accordance with Section 1613.

1616.9.2 Definitions. In addition to the definitions in Section 1613.2, the following words and terms shall, for the purposes of this section, have the meanings shown herein.

ACTIVE EARTHQUAKE FAULT. A fault that has been the source of earthquakes or is recognized as a potential source of earthquakes, including those that have exhibited surface displacement within Holocene time (about 11,000 years) as determined by California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act, those included as type A or type B faults for the U.S. Geological Survey (USGS) National Seismic Hazard Maps, and faults considered to have been active in Holocene time by an authoritative source, federal, state or local governmental agency.

DISTANCE FROM AN ACTIVE EARTHQUAKE FAULT. Distance measured from the nearest point of the building to the closest edge of an Alquist-Priolo Earthquake fault zone for an active fault, if such a map exists, or to the closest mapped splay of the fault.

IRREGULAR STRUCTURE. A structure designed as having one or more plan or vertical irregularities per ASCE 7 Section 12.3.

1616.9.3 Mapped acceleration parameters. Seismic Design Category shall be determined in accordance with Section 1613.3.5.

1616.9.4 Determination of seismic design category. Structures not assigned to Seismic Design Category E or F, in accordance with Section 1613.3, shall be assigned to Seismic Design Category D.

1616.9.4.1 Alternative seismic design category determination. The alternative Seismic Design Category determination procedure of Section 1613.3.5.1 is not permitted by DSA-SS/CC.

1616.9.4.2 Simplified design procedure. The simplified design procedure of Section 1613.3.5.2 is not permitted by DSA-SS/CC.

1616.10 Modifications to ASCE 7. The text of ASCE 7 shall be modified as indicated in Sections 1616.10.1 through 1616.10.24.

1616.10.1 ASCE 7, Section 1.3. Modify ASCE 7 Section 1.3 by adding Section 1.3.6 as follows:

1.3.6 Structural design criteria. Where design is based on ASCE 7 Chapters 16, 17, 18, or 31, the ground motion, wind tunnel design recommendations, analysis, and design methods, material assumptions, testing requirements, and acceptance criteria proposed by the engineer shall be submitted to the enforcement agency in the form of structural design criteria for approval.

Peer review requirements in Section 322 of the California Existing Buildings Code shall apply to design reviews required by ASCE 7 Chapters 17 and 18.

1616.10.2 ASCE 7, Section 11.4.7. Modify ASCE 7 Section 11.4.7 by adding the following:

For buildings assigned to Seismic Design Category E and F, or when required by the building official, a ground motion hazard analysis shall be performed in

accordance with ASCE 7 Chapter 21, as modified by Section 1803A.6 of this code.

1616.10.3 ASCE 7, Table 12.2-1. Modify ASCE 7 Table 12.2-1 as follows:

A. BEARING WALL SYSTEMS

17. Light-framed walls with shear panels of all other materials - Not permitted by DSA-SS/CC.

B. BUILDING FRAME SYSTEMS

24. Light-framed walls with shear panels of all other materials - Not permitted by DSA-SS/CC.

C. MOMENT RESISTING FRAME SYSTEMS

12. Cold-formed steel — special bolted moment frame - Not permitted by DSA-SS/CC.

Exception:

- 1) Systems listed in this section can be used as an alternative system when pre-approved by the enforcement agency.
- 2) Rooftop or other supported structures not exceeding two stories in height and 10 percent of the total structure weight can use the systems in this section when designed as components per ASCE 7 Chapter 13.
- 3) Systems listed in this section can be used for seismically isolated buildings when permitted by Section 1613.4.1.

1616.10.4 ASCE 7, Section 12.2.3.1. Replace ASCE 7 Section 12.2.3.1, Items 1 and 2 by the following:

The value of the response modification coefficient, R , used for design at any story shall not exceed the lowest value of R that is used in the same direction at any story above that story. Likewise, the deflection amplification factor, C_d , and the system over strength factor, Ω_p , used for the design at any story shall not be less than the largest value of these factors that are used in the same direction at any story above that story.

1616.10.5 ASCE 7, Section 12.2.3.2. Modify ASCE 7 Section 12.2.3.2 by adding the following additional requirements for a two stage equivalent lateral force procedure or modal response spectrum procedure:

- f. Where design of elements of the upper portion is governed by special seismic load combinations, the special loads shall be considered in the design of the lower portions.

1616.10.6 ASCE 7, Section 12.2.5.6.1. The exception in Item a is not permitted by DSA-SS/CC.

1616.10.7 ASCE 7, Section 12.2.5.7.1. The exception in Item a is not permitted by DSA-SS/CC.

1616.10.8 ASCE 7, Section 12.2.5.7.2. The exception in Item a is not permitted by DSA-SS/CC.

1616.10.9 ASCE 7, Section 12.3.3.1. Modify ASCE 7 Section 12.3.3.1 as follows:

12.3.3.1 Prohibited horizontal and vertical irregularities for Seismic Design Categories D through F. Structures

assigned to Seismic Design Category E or F having horizontal structural irregularity Type 1b of Table 12.3-1 or vertical structural irregularities Type 1b, 5a or 5b of Table 12.3-2 shall not be permitted. Structures assigned to Seismic Design Category D having vertical irregularity Type 1b or 5b of Table 12.3-2 shall not be permitted.

1616.10.10 ASCE 7, Section 12.7.2. Modify ASCE 7 Section 12.7.2 by adding Item 6 to read as follows:

6. Where buildings provide lateral support for walls retaining earth, and the exterior grades on opposite sides of the building differ by more than 6 feet (1829 mm), the load combination of the seismic increment of earth pressure due to earthquake acting on the higher side, as determined by a Geotechnical engineer qualified in soils engineering, plus the difference in earth pressures shall be added to the lateral forces provided in this section.

1616.10.11 ASCE 7, Section 12.8.1.3. Replace ASCE 7 Section 12.8.1.3 by the following:

12.8.1.3 Maximum S_{DS} Value in Determination of C_s and E_v . The value of C_s and E_v are permitted to be calculated using a value of S_{DS} equal to 1.0, but not less than 70% of S_{DS} as defined in Section 11.4.4, provided that all of the following criteria are met:

1. The structure does not have irregularities, as defined in Section 12.3.2;
2. The structure does not exceed five stories above the base as defined in Section 11.2;
3. The structure has a fundamental period, T , that does not exceed 0.5 seconds, as determined using Section 12.8.2;
4. The structure meets the requirements necessary for the redundancy factor, ρ , to be permitted to be taken as 1.0, in accordance with Section 12.3.4.2;
5. The site soil properties are not classified as Site Class E or F, as defined in Section 11.4.2; and
6. The structure is classified as Risk Category I or II, as defined in Section 1.5.1.

1616.10.12 ASCE 7, Section 12.9.4. Replace ASCE 7 Section 12.9.4 as follows:

12.9.4 Scaling design values of combined response. Modal base shears used to determine forces and drifts shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.

1616.10.13 ASCE 7, Section 12.10.2.1. Replace ASCE 7 Exception 1 of Section 12.10.2.1 by the following:

Exception: The forces calculated above need not exceed those calculated using the load combinations of Section 12.4.3.2 with seismic forces determined by Equation 12.10-3 and transfer forces, where applicable.

1616.10.14 ASCE 7, Section 12.13.1. Modify ASCE 7 Section 12.13.1 by adding Section 12.13.1.1 as follows:

12.13.1.1 Foundations and superstructure-to-foundation connections. The foundation shall be capable of transmitting the design base shear and the overturning

1616.10.19 ASCE 7, Section 13.6.8.3. Replace ASCE 7, Section 13.6.8.3 with the following:

13.6.8.3 Exceptions. Design of piping systems and attachments for the seismic forces of Section 13.3 shall not be required where one of the following conditions apply:

1. Trapeze assemblies are used to support piping whereby no single pipe exceeds the limits set forth in 3a. or b. below and the total weight of the piping supported by the trapeze assemblies is less than 10 lb/ft (146 N/m).
2. The piping is supported by hangers and each hanger in the piping run is 12 in. (305 mm) or less in length from the top of the pipe to the supporting structure. Where pipes are supported on a trapeze, the trapeze shall be supported by hangers having a length of 12 in. (305 mm) or less. Where rod hangers are used, they shall be equipped with swivels, eye nuts or other devices to prevent bending in the rod.
3. Piping having an R_p in Table 13.6-1 of 4.5 or greater is used and provisions are made to avoid impact with other structural or nonstructural components or to protect the piping in the event of such impact and where the following size requirements are satisfied:
 - a. For Seismic Design Categories D, E or F and values of I_p greater than one, the nominal pipe size shall be 1 inch (25 mm) or less.
 - b. For Seismic Design Categories D, E or F where $I_p = 1.0$ the nominal pipe size shall be 3 inches (80 mm) or less.

The exceptions above shall not apply to elevator piping.

1616.10.20 ASCE 7, Section 13.6.10.1. Modify ASCE 7 Section 13.6.10.1 by adding Section 13.6.10.1.1, as follows:

13.6.10.1.1 Elevators guide rail support. The design of guide rail support bracket fastenings and the supporting structural framing shall use the weight of the counterweight or maximum weight of the car plus not more than 40 percent of its rated load. The seismic forces shall be assumed to be distributed one-third to the top guiding members and two-thirds to the bottom guiding members of cars and counterweights, unless other substantiating data are provided. In addition to the requirements of ASCE 7 Section 13.6.10.1, the minimum seismic forces shall be 0.5g acting in any horizontal direction.

1616.10.21 ASCE 7, Section 13.6.10.4. Replace ASCE 7 Section 13.6.10.4, as follows:

13.6.10.4 Retainer plates. Retainer plates are required at the top and bottom of the car and counterweight, except where safety devices acceptable to the enforce-

ment agency are provided which meet all requirements of the retainer plates, including full engagement of the machined portion of the rail. The design of the car, cab stabilizers, counterweight guide rails and counterweight frames for seismic forces shall be based on the following requirements:

1. The seismic force shall be computed per the requirements of ASCE 7 Section 13.6.10.1. The minimum horizontal acceleration shall be 0.5g for all buildings.
2. W_p shall equal the weight of the counterweight or the maximum weight of the car plus not less than 40 percent of its rated load.
3. With the car or counterweight located in the most adverse position, the stress in the rail shall not exceed the limitations specified in these regulations, nor shall the deflection of the rail relative to its supports exceed the deflection listed below in Table 1224.4.11.
4. Where guide rails are continuous over supports and rail joints are within 2 feet (610 mm) of their supporting brackets, a simple span may be assumed.
5. The use of spreader brackets is allowed.
6. Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g.

**TABLE 1224.4.11
ALLOWABLE RAIL DEFLECTION**

RAIL SIZE (weight per foot of length, pounds)	WIDTH OF MACHINED SURFACE (inches)	ALLOWABLE RAIL DEFLECTION (inches)
8	1 ¹ / ₄	0.20
11	1 ¹ / ₂	0.30
12	1 ³ / ₄	0.40
15	1 ³¹ / ₃₂	0.50
18 ¹ / ₂	1 ³¹ / ₃₂	0.50
22 ¹ / ₂	2	0.50
30	2 ¹ / ₄	0.50

For SI: 1 inch = 25 mm, 1 foot = 305 mm, 1 pound = 0.454 kg.

Note: Deflection limitations are given to maintain a consistent factor of safety against disengagement of retainer plates from the guide rails during an earthquake.

1616.10.22 ASCE 7, Section 16.1.4. Remove ASCE 7 Sections 16.1.4.1 and 16.1.4.2 and modify 16.1.4 by the following:

Maximum scaled base shears used to determine forces and drifts shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.

1616.10.23 ASCE 7, Section 16.2.4. *Modify ASCE 7 Section 16.2.4 by the following:*

- a) *Where site is located within 3.1 miles (5 km) of an active fault at least seven ground motions shall be analyzed and response parameters shall be based on larger of the average of the maximum response with ground motions applied as follows:*
 1. *Each of the ground motions shall have their maximum component at the fundamental period aligned in one direction.*
 2. *Each of the ground motion's maximum component shall be rotated orthogonal to the previous analysis direction.*
- b) *Where site is located more than 3.1 miles (5 km) from an active fault at least 10 ground motions shall be analyzed. The ground motions shall be applied such that one-half shall have their maximum component aligned in one direction and the other half aligned in the orthogonal direction. The average of the maximum response of all the analyses shall be used for design.*

1616.10.24 ASCE 7 Section 17.2.4.7. *Modify ASCE 7 Section 17.2.4.7 by adding the following to the end of the section:*

The effects of uplift shall be explicitly accounted for in the analysis and in the testing of the isolator units.

1604.5A.1 Multiple occupancies. Where a building or structure is occupied by two or more occupancies not included in the same risk category, it shall be assigned the classification of the highest risk category corresponding to the various occupancies. Where buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required access to, required egress from or shares life safety components with another portion having a higher risk category, both portions shall be assigned to the higher risk category.

1604.6 In-situ load tests. The building official is authorized to require an engineering analysis or a load test, or both, of any construction whenever there is reason to question the safety of the construction for the intended occupancy. Engineering analysis and load tests shall be conducted in accordance with Section 1709A.

1604.7 Preconstruction load tests. Materials and methods of construction that are not capable of being designed by approved engineering analysis or that do not comply with the applicable referenced standards, or alternative test procedures in accordance with Section 1707A, shall be load tested in accordance with Section 1710A.

1604.8 Anchorage. Buildings and other structures, and portions thereof, shall be provided with anchorage in accordance with Sections 1604A.8.1 through 1604A.8.3, as applicable.

1604.8.1 General. Anchorage of the roof to walls and columns, and of walls and columns to foundations, shall be provided to resist the uplift and sliding forces that result from the application of the prescribed loads.

1604.8.2 Structural walls. Walls that provide vertical load-bearing resistance or lateral shear resistance for a portion of the structure shall be anchored to the roof and to all floors and members that provide lateral support for the wall or that are supported by the wall. The connections shall be capable of resisting the horizontal forces specified in Section 1.4.5 of ASCE 7 for walls of structures assigned to Seismic Design Category A and to Section 12.11 of ASCE 7 for walls of structures assigned to all other seismic design categories. *For anchorage of concrete or masonry walls to roof and floor diaphragms, the out-of-plane strength design force shall not be less than 280 lb/linear ft (4.09 kN/m) of wall.* Required anchors in masonry walls of hollow units or cavity walls shall be embedded in a reinforced grouted structural element of the wall. See Sections 1609A for wind design requirements and 1613A for earthquake design requirements.

1604.8.3 Decks. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads as applicable. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. Connections of decks with cantilevered framing members to exterior walls or other framing members shall be designed for both of the following:

1. The reactions resulting from the dead load and live load specified in Table 1607A.1, or the snow load specified in Section 1608A, in accordance with Section 1605A, acting on all portions of the deck.
2. The reactions resulting from the dead load and live load specified in Table 1607A.1, or the snow load specified in Section 1608A, in accordance with Section 1605A, acting on the cantilevered portion of the deck, and no live load or snow load on the remaining portion of the deck.

1604.9 Counteracting structural actions. Structural members, systems, components and cladding shall be designed to resist forces due to earthquakes and wind, with consideration of overturning, sliding and uplift. Continuous load paths shall be provided for transmitting these forces to the foundation. Where sliding is used to isolate the elements, the effects of friction between sliding elements shall be included as a force.

1604.10 Wind and seismic detailing. Lateral force-resisting systems shall meet seismic detailing requirements and limitations prescribed in this code and ASCE 7, excluding Chapter 14 and Appendix 11A, even when wind load effects are greater than seismic load effects.

SECTION 1605A LOAD COMBINATIONS

1605A.1 General. Buildings and other structures and portions thereof shall be designed to resist:

1. The load combinations specified in Section 1605A.2, 1605A.3.1 or 1605A.3.2;
2. The load combinations specified in Chapters 18 through 23; and
3. The seismic load effects including overstrength factor in accordance with Section 12.4.3 of ASCE 7 where required by Section 12.2.5.2, 12.3.3.3 or 12.10.2.1 of ASCE 7. With the simplified procedure of ASCE 7 Section 12.14, the seismic load effects including overstrength factor in accordance with Section 12.14.3.2 of ASCE 7 shall be used.

Applicable loads shall be considered, including both earthquake and wind, in accordance with the specified load combinations. Each load combination shall also be investigated with one or more of the variable loads set to zero.

Where the load combinations with overstrength factor in Section 12.4.3.2 of ASCE 7 apply, they shall be used as follows:

1. The basic combinations for strength design with overstrength factor in lieu of Equations 16A-5 and 16A-7 in Section 1605A.2.
2. The basic combinations for allowable stress design with overstrength factor in lieu of Equations 16A-12, 16A-14 and 16A-16 in Section 1605A.3.1.
3. The basic combinations for allowable stress design with overstrength factor in lieu of Equations 16A-21 and 16A-22 in Section 1605A.3.2.

1605A.1.1 Stability. Regardless of which load combinations are used to design for strength, where overall structure stability (such as stability against overturning, sliding, or buoyancy) is being verified, use of the load combinations specified in Section 1605A.2 or 1605A.3 shall be permitted. Where the load combinations specified in Section 1605A.2 are used, strength reduction factors applicable to soil resistance shall be provided by a registered design professional. The stability of retaining walls shall be verified in accordance with Section 1807A.2.3. *When using allowable stress design, factor of safety for soil bearing values shall not be less than the overstrength factor of the structures supported.*

1605A.2 Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:

$$1.4(D + F) \quad \text{(Equation 16A-1)}$$

$$1.2(D + F) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-2)}$$

$$1.2(D + F) + 1.6(L_r \text{ or } S \text{ or } R) + 1.6H + (f_1 L \text{ or } 0.5W) \quad \text{(Equation 16A-3)}$$

$$1.2(D + F) + 1.0W + f_1 L + 1.6H + 0.5(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-4)}$$

$$1.2(D + F) + 1.0E + f_1 L + 1.6H + f_2 S \quad \text{(Equation 16A-5)}$$

$$0.9D + 1.0W + 1.6H \quad \text{(Equation 16A-6)}$$

$$0.9(D + F) + 1.0E + 1.6H \quad \text{(Equation 16A-7)}$$

where:

$f_1 = 1$ for places of public assembly live loads in excess of 100 pounds per square foot (4.79 kN/m²), and parking garages; and 0.5 for other live loads.

$f_2 = 0.7$ for roof configurations (such as saw tooth) that do not shed snow off the structure, and 0.2 for other roof configurations.

Exceptions:

1. Where other factored load combinations are specifically required by other provisions of this code, such combinations shall take precedence.
2. Where the effect of H resists the primary variable load effect, a load factor of 0.9 shall be included with H where H is permanent and H shall be set to zero for all other conditions.

1605A.2.1 Other loads. Where flood loads, F_a , are to be considered in the design, the load combinations of Section 2.3.3 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.5 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.3.4 of ASCE 7 shall be considered.

1605A.3 Load combinations using allowable stress design.

1605A.3.1 Basic load combinations. Where allowable stress design (working stress design), as permitted by this code, is used, structures and portions thereof shall resist the most critical effects resulting from the following combinations of loads:

$$D + F \quad \text{(Equation 16A-8)}$$

$$D + H + F + L \quad \text{(Equation 16A-9)}$$

$$D + H + F + (L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-10)}$$

$$D + H + F + 0.75(L) + 0.75(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-11)}$$

$$D + H + F + (0.6W \text{ or } 0.7E) \quad \text{(Equation 16A-12)}$$

$$D + H + F + 0.75(0.6W) + 0.75L + 0.75(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-13)}$$

$$D + H + F + 0.75(0.7E) + 0.75L + 0.75S \quad \text{(Equation 16A-14)}$$

$$0.6D + 0.6W + H \quad \text{(Equation 16A-15)}$$

$$0.6(D + F) + 0.7E + H \quad \text{(Equation 16A-16)}$$

Exceptions:

1. Crane hook loads need not be combined with roof live load or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m²) or less and roof live loads of 30 psf (1.44 kN/m²) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m²), 20 percent shall be combined with seismic loads.
3. Where the effect of H resists the primary variable load effect, a load factor of 0.6 shall be included with H where H is permanent and H shall be set to zero for all other conditions.
4. In Equation 16A-15, the wind load, W , is permitted to be reduced in accordance with Exception 2 of Section 2.4.1 of ASCE 7.
5. In Equation 16A-16, 0.6 D is permitted to be increased to 0.9 D for the design of special reinforced masonry shear walls complying with Chapter 21.

1605A.3.1.1 Stress increases. Increases in allowable stresses specified in the appropriate material chapter or the referenced standards shall not be used with the load combinations of Section 1605A.3.1, except that increases shall be permitted in accordance with Chapter 23.

1605A.3.1.2 Other loads. Where flood loads, F_a , are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.

1605A.3.2 Alternative basic load combinations. In lieu of the basic load combinations specified in Section 1605A.3.1,

structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. When using these alternative basic load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. When using allowable stresses that have been increased or load combinations that have been reduced as permitted by the material chapter of this code or the referenced standards, where wind loads are calculated in accordance with Chapters 26 through 31 of ASCE 7, the coefficient (ω) in the following equations shall be taken as 1.3. For other wind loads, (ω) shall be taken as 1. When allowable stresses have not been increased or load combinations have not been reduced as permitted by the material chapter of this code or the referenced standards, (ω) shall be taken as 1. When using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used. When using these alternative basic load combinations for proportioning foundations for loadings, which include seismic loads, the vertical seismic load effect, E_v , in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero.

$$D + L + (L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16A-17)}$$

$$D + L + 0.6 \omega W \quad \text{(Equation 16A-18)}$$

$$D + L + 0.6 \omega W + S/2 \quad \text{(Equation 16A-19)}$$

$$D + L + S + 0.6 \omega W/2 \quad \text{(Equation 16A-20)}$$

$$D + L + S + E/1.4 \quad \text{(Equation 16A-21)}$$

$$0.9D + E/1.4 \quad \text{(Equation 16A-22)}$$

Exceptions:

1. Crane hook loads need not be combined with roof live loads or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m²) or less and roof live loads of 30 psf (1.44 kN/m²) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m²), 20 percent shall be combined with seismic loads.

1605A.3.2.1 Other loads. Where F , H or T are to be considered in the design, each applicable load shall be added to the combinations specified in Section 1605A.3.2. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7.

1605A.4 Modifications to load combinations in ICC 300. The text of ICC 300 shall be modified as indicated in Section 1605A.4.1 through 1605A.4.3.

1605A.4.1 ICC 300, Section 303.5.1. Modify Section 303.5.1 by adding Equation 3-1a and replacing Equation 3-2 as follows:

$$0.9D + 0.4L + 1.6Z \quad \text{(Equation 3-1a)}$$

$$1.2D + 1.6L + 1.6R, \quad \text{(Equation 3-2)}$$

1605A.4.2 ICC 300, Section 303.5.2. Modify Section 303.5.2 by adding Equation 3-3a, adding Equation 3-3b, and replacing Equation 3-4 as follows:

$$D + 0.4L + Z \quad \text{(Equation 3-3a)}$$

$$0.6D + 0.3L + Z \quad \text{(Equation 3-3b)}$$

$$D + L + R, \quad \text{(Equation 3-4)}$$

1605A.4.3 ICC 300, Section 303.5.3. Modify Section 303.5.3 as follows:

The uniform live load L used in Equation 3-2 and 3-4 may be taken as zero when evaluating elements supporting the hand-rail/guard provided those elements do not also support L .

**SECTION 1606A
DEAD LOADS**

1606A.1 General. Dead loads are those loads defined in Chapter 2 of this code. Dead loads shall be considered permanent loads.

1606A.2 Design dead load. For purposes of design, the actual weights of materials of construction and fixed service equipment shall be used. In the absence of definite information, values used shall be subject to the approval of the building official.

1606A.3 Roof dead loads. The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section 1511.

**SECTION 1607A
LIVE LOADS**

1607A.1 General. Live loads are those loads defined in Chapter 2 and Section 1602A.1 of this code.

1607A.2 Loads not specified. For occupancies or uses not designated in Table 1607A.1, the live load shall be determined in accordance with a method approved by the building official.

1607A.3 Uniform live loads. The live loads used in the design of buildings and other structures shall be the maximum loads expected by the intended use or occupancy but shall in no case be less than the minimum uniformly distributed live loads given in Table 1607A.1.

1607A.4 Concentrated live loads. Floors and other similar surfaces shall be designed to support the uniformly distributed live loads prescribed in Section 1607A.3 or the concentrated live loads, given in Table 1607A.1, whichever produces the greater load effects. Unless otherwise specified, the indicated concentration shall be assumed to be uniformly distributed over an area of 2½ feet by 2½ feet (762 mm by 762 mm) and shall be located so as to produce the maximum load effects in the structural members.

1607A.5 Partition loads. In office buildings and in other buildings where partition locations are subject to change, provisions for partition weight shall be made, whether or not partitions are shown on the construction documents, unless the specified live load is 80 psf (3.83 kN/m²) or greater. The partition load shall be not less than a uniformly distributed live load of 15 psf (0.72 kN/m²).

**TABLE 1607A.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o ,
AND MINIMUM CONCENTRATED LIVE LOADS^g**

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
1. Apartments (see residential)	—	—
2. Access floor systems		
Office use	50	2,000
Computer use	100	2,000
3. Armories and drill rooms	150 ^m	—
4. Assembly areas ^{a, q}		
Fixed seats (fastened to floor)	60 ^m	
Follow spot, projections and control rooms	50	
Lobbies	100 ^m	—
Movable seats	100 ^m	
Stage floors	150 ^m	
Platforms (assembly)	100 ^m	
Other assembly areas	100 ^m	
5. Balconies and decks ^b	<i>[DSA-SS] 1.5 times the live load for the area served. Not required to exceed 100 psf.</i>	—
6. Catwalks	40	300
7. Cornices	60	—
8. Corridors		
First floor	100	
Other floors	Same as occupancy served except as indicated	—
9. Dining rooms and restaurants	100 ^m	—
10. Dwellings (see residential)	—	—
11. Elevator machine room and control room grating (on area of 2 inches by 2 inches)	—	300
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200
13. Fire escapes	100	
On single-family dwellings only	40	—
14. Garages (passenger vehicles only)	40 ^m	Note a
Trucks and buses	See Section 1607.7	
15. Handrails, guards and grab bars	See Section 1607.8	
16. Helipads	See Section 1607.6	
17. Hospitals [OSHPD 1 & 4]		
Corridors above first floor	80	1,000
Operating rooms, laboratories	60	1,000
Patient rooms	40	1,000
Mechanical and electrical equipment areas including open areas around equipment	50	
Storage		
Light	125	
Heavy	250	
Dining Area (not used for assembly)	100	1,000
Kitchen and serving areas	50	1,000
18. Hotels (see residential)	—	—
19. Libraries ^r		
Corridors above first floor	80	1,000
Reading rooms	60 ^m	1,000
Stack rooms	150 ^{b, m}	1,000
20. Manufacturing		
Heavy	250 ^m	3,000
Light	125 ^m	2,000
21. Marquees, except one- and two-family dwellings	75	—

(continued)

**TABLE 1607A.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o ,
AND MINIMUM CONCENTRATED LIVE LOADS^g**

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
22. Office buildings ^r		
Corridors above first floor	80	2,000
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—
Lobbies and first-floor corridors	100	2,000
Offices	50	2,000
23. Penal institutions		
Cell blocks	40	—
Corridors	100	—
24. Recreational uses:		
Bowling alleys, poolrooms and similar uses	75 ^m	
Dance halls and ballrooms	100 ^m	
Gymnasiums	100 ^m	
Ice skating rink	250 ^m	—
Reviewing stands, grandstands and bleachers ^q	100 ^{c, m}	
Roller skating rink	100 ^m	
Stadiums and arenas with fixed seats (fastened to floor)	60 ^{c, m}	
25. Residential		
One- and two-family dwellings		
Uninhabitable attics without storage ⁱ	10	
Uninhabitable attics with storage ^{i, j, k}	20	
Habitable attics and sleeping areas ^k	30	
Canopies, including marquees	20	—
All other areas	40	
Hotels and multifamily dwellings		
Private rooms and corridors serving them	40	
Public rooms ^m and corridors serving them	100	
26. Roofs		
All roof surfaces subject to maintenance workers		300
Awnings and canopies:		
Fabric construction supported by a skeleton structure	5	Nonreducible
All other construction, except one- and two-family dwellings	20	
Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	
Primary roof members exposed to a work floor		
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages		2,000
All other primary roof members		300
Occupiable roofs:		
Roof gardens	100	
Assembly areas	100 ^m	
All other similar areas	Note 1	Note 1
27. Schools ⁿ		
Classrooms	40 ^p	1,000
Corridors above first floor	80	1,000
First-floor corridors	100	1,000
28. Scuttles, skylight ribs and accessible ceilings	—	200
29. Sidewalks, vehicular drive ways and yards, subject to trucking	250 ^{d, m}	8,000 ^e

(continued)

TABLE 1607A.1—continued
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o ,
AND MINIMUM CONCENTRATED LIVE LOADS^g

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
30. Stairs and exits One- and two-family dwellings All other	40 100	300 ^f 300 ^f
31. Storage warehouses (shall be designed for heavier loads if required for anticipated storage) Heavy Light	250 ^m 125 ^m	—
32. Stores Retail First floor Upper floors Wholesale, all floors	100 75 125 ^m	1,000 1,000 1,000
33. Vehicle barriers	See Section 1607.8.3	
34. Walkways and elevated platforms (other than exitways)	60	—
35. Yards and terraces, pedestrians ^r	100 ^m	—
36. Storage racks and wall-hung cabinets	Total loads ⁿ	

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm²,
 1 square foot = 0.0929 m²,
 1 pound per square foot = 0.0479 kN/m², 1 pound = 0.004448 kN,
 1 pound per cubic foot = 16 kg/m³.

- a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of this Table or the following concentrated loads: (1) for garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4½ inches by 4½ inches; (2) for mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds per wheel.
- b. The loading applies to stack room floors that support nonmobile, double-faced library book stacks, subject to the following limitations:
 - 1. The nominal book stack unit height shall not exceed 90 inches;
 - 2. The nominal shelf depth shall not exceed 12 inches for each face; and
 - 3. Parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches wide.
- c. Design in accordance with ICC 300 [DSA-SS] as modified by Section 1605A.4 load combinations.
- d. Other uniform loads in accordance with an approved method containing provisions for truck loadings shall be considered where appropriate.
- e. The concentrated wheel load shall be applied on an area of 4.5 inches by 4.5 inches.
- f. The minimum concentrated load on stair treads shall be applied on an area of 2 inches by 2 inches. This load need not be assumed to act concurrently with the uniform load.
- g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608).
- h. See Section 1604.8.3 for decks attached to exterior walls.
- i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.
- j. Uninhabitable attics with storage are those where the maximum clear height between the joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.
 The live load need only be applied to those portions of the joists or truss bottom chords where both of the following conditions are met:
 - i. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches; and
 - ii. The slopes of the joists or truss bottom chords are no greater than two units vertical in 12 units horizontal.
 The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.
- k. Attic spaces served by stairways other than the pull-down type shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.
- l. Areas of occupiable roofs, other than roof gardens and assembly areas, shall be designed for appropriate loads as approved by the building official. Unoccupied landscaped areas of roofs shall be designed in accordance with Section 1607.12.3.
- m. Live load reduction is not permitted unless specific exceptions of Section 1607.10 apply.

Table Notes TABLE 1607A.1—continued

- n. The minimum vertical design live load shall be as follows:
 - Paper media:
 - 12-inch-deep shelf 33 pounds per lineal foot
 - 15-inch-deep shelf 41 pounds per lineal foot, or
 - 33 pounds per cubic foot per total volume of the rack or cabinet, whichever is less.
 - Film media:
 - 18-inch-deep shelf 100 pounds per lineal foot, or
 - 50 pounds per cubic foot per total volume of the rack or cabinet, whichever is less.
 - Other media:
 - 20 pounds per cubic foot or 20 pounds per square foot, whichever is less, but not less than actual loads.
- o. [DSA-SS] The following minimum loads for stage accessories apply:
 - 1. Gridirons and fly galleries: 75 pounds per square foot uniform live load.
 - 2. Loft block wells: 250 pounds per lineal foot vertical load and lateral load.
 - 3. Head block wells and sheave beams: 250 pounds per lineal foot vertical load and lateral load. Head block wells and sheave beams shall be designed for all tributary loft block well loads. Sheave blocks shall be designed with a safety factor of five.
 - 4. Scenery beams where there is no gridiron: 300 pounds per lineal foot vertical load and lateral load.
 - 5. Ceiling framing over stages shall be designed for a uniform live load of 20 pounds per square foot. For members supporting a tributary area of 200 square feet or more, this additional load may be reduced to 15 pounds per square foot.
- p. [DSA-SS] The minimum uniform live load for classroom occupancies is 50 psf. Live load reduction is not permitted for classrooms classified as Group A occupancies unless specific exception of Section 1607A.10 apply.
- q. [DSA-SS] The minimum uniform live load for a press box floor or accessible roof with railing is 100 psf.
- r. [DSA-SS] Item 35 applies to pedestrian bridges and walkways that are not subjected to uncontrolled vehicle access.

1607A.6 Helipads. Helipads shall be designed for the following live loads:

- 1. A uniform live load, L , as specified below. This load shall not be reduced.
 - 1.1. 40 psf (1.92 kN/m²) where the design basis helicopter has a maximum take-off weight of 3,000 pounds (13.35 kN) or less.
 - 1.2. 60 psf (2.87 kN/m²) where the design basis helicopter has a maximum take-off weight greater than 3,000 pounds (13.35 kN).
- 2. A single concentrated live load, L , of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated load is not required to act concurrently with other uniform or concentrated live loads.
- 3. Two single concentrated live loads, L , 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum take-off weight of the helicopter, and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated loads shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated live loads.

Landing areas designed for a design basis helicopter with maximum take-off weight of 3,000-pounds (13.35 kN) shall be identified with a 3,000 pound (13.34 kN) weight limitation. The landing area weight limitation shall be indicated by the numeral "3" (kips) located in the bottom right corner of the landing area as viewed from the primary approach path. The indication for the landing area weight limitation shall be a minimum 5 feet (1524 mm) in height.

1607A.7 Heavy vehicle loads. Floors and other surfaces that are intended to support vehicle loads greater than a 10,000-pound (4536 kg) gross vehicle weight rating shall comply with Sections 1607A.7.1 through 1607A.7.5.

1607A.7.1 Loads. Where any structure does not restrict access for vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, those portions of the structure subject to such loads shall be designed using the vehicular live loads, including consideration of impact and fatigue, in accordance with the codes and specifications required by the jurisdiction having authority for the design and construction of the roadways and bridges in the same location of the structure.

1607A.7.2 Fire truck and emergency vehicles. Where a structure or portions of a structure are accessed and loaded by fire department access vehicles and other similar emergency vehicles, the structure shall be designed for the greater of the following loads:

1. The actual operational loads, including outrigger reactions and contact areas of the vehicles as stipulated and approved by the building official; or
2. The live loading specified in Section 1607A.7.1.

1607A.7.3 Heavy vehicle garages. Garages designed to accommodate vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, shall be designed using the live loading specified by Section 1607A.7.1. For garages the design for impact and fatigue is not required.

Exception: The vehicular live loads and load placement are allowed to be determined using the actual vehicle weights for the vehicles allowed onto the garage floors, provided such loads and placement are based on rational engineering principles and are approved by the building official, but shall not be less than 50 psf (2.9 kN/m²). This live load shall not be reduced.

1607A.7.4 Forklifts and movable equipment. Where a structure is intended to have forklifts or other movable equipment present, the structure shall be designed for the total vehicle or equipment load and the individual wheel loads for the anticipated vehicles as specified by the owner of the facility. These loads shall be posted in accordance with Section 1607A.7.5.

1607A.7.4.1 Impact and fatigue. Impact loads and fatigue loading shall be considered in the design of the supporting structure. For the purposes of design, the vehicle and wheel loads shall be increased by 30 percent to account for impact.

1607A.7.5 Posting. The maximum weight of vehicles allowed into or on a garage or other structure shall be posted by the owner or the owner's authorized agent in accordance with Section 106.1.

1607A.8 Loads on handrails, guards, grab bars, seats and vehicle barriers. Handrails, guards, grab bars, accessible seats, accessible benches and vehicle barriers shall be designed and constructed for the structural loading conditions set forth in this section.

1607A.8.1 Handrails and guards. Handrails and guards shall be designed to resist a linear load of 50 pounds per

linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1 of ASCE 7. Glass handrail assemblies and guards shall also comply with Section 2407.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated load required by Section 1607A.8.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and that have an occupant load less than 50, the minimum load shall be 20 pounds per foot (0.29 kN/m).

1607A.8.1.1 Concentrated load. Handrails and guards shall be designed to resist a concentrated load of 200 pounds (0.89 kN) in accordance with Section 4.5.1 of ASCE 7.

1607A.8.1.2 Intermediate rails. Intermediate rails (all those except the handrail), balusters and panel fillers shall be designed to resist a concentrated load of 50 pounds (0.22 kN) in accordance with Section 4.5.1 of ASCE 7.

1607A.8.2 Grab bars, shower seats and dressing room bench seats. Grab bars, shower seats and dressing room bench seats shall be designed to resist a single concentrated load of 250 pounds (1.11 kN) applied in any direction at any point on the grab bar or seat so as to produce the maximum load effects. *[DSA-AC] See Chapter 11A, Section 1127A.4, and Chapter 11B, Sections 11B-609.8, 11B-610.4 and 11B-903.6 for grab bars, shower seats and dressing room bench seats, as applicable.*

1607A.8.3 Vehicle barriers. Vehicle barriers for passenger vehicles shall be designed to resist a concentrated load of 6,000 pounds (26.70 kN) in accordance with Section 4.5.3 of ASCE 7. Garages accommodating trucks and buses shall be designed in accordance with an approved method that contains provisions for traffic railings.

1607A.9 Impact loads. The live loads specified in Sections 1607A.3 through 1607A.8 shall be assumed to include adequate allowance for ordinary impact conditions. Provisions shall be made in the structural design for uses and loads that involve unusual vibration and impact forces.

1607A.9.1 Elevators. Members, elements and components subject to dynamic loads from elevators shall be designed for impact loads and deflection limits prescribed by ASME A17.1.

1607A.9.2 Machinery. For the purpose of design, the weight of machinery and moving loads shall be increased as follows to allow for impact: (1) light machinery, shaft- or motor-driven, 20 percent; and (2) reciprocating machinery or power-driven units, 50 percent. Percentages shall be increased where specified by the manufacturer.

1607A.9.3 Elements supporting hoists for façade access equipment. In addition to any other applicable live loads, structural elements that support hoists for façade access equipment shall be designed for a live load consisting of the larger of the rated load of the hoist times 2.5 and the stall load of the hoist.

1607A.9.4 Lifeline anchorages for façade access equipment. In addition to any other applicable live loads, life-

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE

CHAPTER 17A – SPECIAL INSPECTIONS AND TESTS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA			OSHDP				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter								X	X	X			X								
Adopt entire chapter as amendeded (amended sections listed below)																					
Adopt only those sections that are listed below																					
Chapter / Section																					

The state agency does not adopt sections identified with the following symbol: †
The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 17A

SPECIAL INSPECTIONS AND TESTS

SECTION 1701A GENERAL

1701A.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

1701A.1.1 Application. The scope of application of Chapter 17A is as follows:

1. Structures regulated by the Division of the State Architect-Structural Safety, which include those applications listed in Sections 1.9.2.1 (DSA-SS), and 1.9.2.2 (DSA-SS/CC). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.
2. Structures regulated by the Office of Statewide Health Planning and Development (OSHDP), which include those applications listed in Sections 1.10.1, and 1.10.4. These applications include hospitals, skilled nursing facilities, intermediate care facilities and correctional treatment centers.

Exception: [OSHDP 2] Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 17 and any applicable amendments therein.

1701A.1.2 Amendments in this chapter. DSA-SS and DSA-SS/CC adopt this chapter and all amendments.

Exceptions: Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:

1. Division of the State Architect - Structural Safety:
[DSA-SS] For applications listed in Section 1.9.2.1.
[DSA-SS/CC] For applications listed in Section 1.9.2.2.
2. Office of Statewide Health Planning and Development:
[OSHDP 1] – For applications listed in Section 1.10.1.
[OSHDP 4] – For applications listed in Section 1.10.4.

1701A.1.3 Reference to other chapters.

1701A.1.3.1 [DSA-SS/CC] Where reference within this chapter is made to sections in Chapters 16A, 19A, 21A, and 22A, the provisions in Chapters 16, 19, 21 and 22, respectively, shall apply instead.

1701A.2 New materials. New building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the approved rules to determine character, quality and limitations of use.

1701A.3 Special inspections and tests. [OSHDP 1 and 4] In addition to the inspector(s) of record required by the California Administrative Code (CCR, Title 24, Part 1), Section 7-144, the owner shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work listed under Chapters 17A, 18A, 19A, 20, 21A, 22A, 23, 25, 34A, and noted in the Test, Inspection, and Observation (TIO) program required by Sections 7-141, 7-

SPECIAL INSPECTIONS AND TESTS

145 and 7-149, of the California Administrative Code. Test, Inspection and Observation (TIO) program shall satisfy requirements of Section 1704A.

1701A.4 Special inspections and tests. [DSA-SS & DSA-SS/CC] In addition to the project inspector required by the California Administrative Code (CCR, Title 24, Part 1), Section 4-333, the owner shall employ one or more approved agencies to provide special inspections and tests as required by the enforcement agency during construction on the types of work listed under Chapters 17A, 18A, 19A, 20, 21A, 22A, 23, and 25 and the California Existing Building Code and noted in the special test, inspection and observation plan required by Section 4-335 of the California Administrative Code.

SECTION 1702A DEFINITIONS

1702A.1 Definitions. The following terms are defined in Chapter 2, except those defined below which shall, for the purposes of this chapter, have the meanings shown herein.

APPROVED AGENCY.

APPROVED FABRICATOR.

CERTIFICATE OF COMPLIANCE.

DESIGNATED SEISMIC SYSTEM.

FABRICATED ITEM.

INTUMESCENT FIRE-RESISTANT COATINGS.

MAIN WINDFORCE-RESISTING SYSTEM.

MASTIC FIRE-RESISTANT COATINGS.

PROJECT INSPECTOR. [DSA-SS, DSA-SS/CC] The person approved to provide inspection in accordance with the California Administrative Code, Section 4-333(b). The term “project inspector” is synonymous with “inspector of record.”

Quality Assurance (QA). Special inspections and testing provided by an approved agency employed by the Owner. Project specific testing required by approved construction documents shall be performed by the approved agency responsible for Quality Assurance (QA), unless approved otherwise by the building official.

Quality Control (QC). Inspections and materials/functionality testing provided by the fabricator, erector, manufacturer or other responsible contractor as applicable.

SPECIAL INSPECTION.

Continuous special inspection. The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.

Periodic special inspection. The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.

SPECIAL INSPECTOR.

SPRAYED FIRE-RESISTANT MATERIALS.

STRUCTURAL OBSERVATION.

SECTION 1703A APPROVALS

1703A.1 Approved agency. An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements specified in Sections 1703A.1.1 through 1703A.1.3.

1703A.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose to the building official and the registered design professional in responsible charge possible conflicts of interest so that objectivity can be confirmed.

1703A.1.2 Equipment. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

1703A.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and special inspections.

1703A.2 Written approval. Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be approved in writing after satisfactory completion of the required tests and submission of required test reports.

1703A.3 Record of approval. For any material, appliance, equipment, system or method of construction that has been approved, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the building official’s office and shall be available for public review at appropriate times.

1703A.4 Performance. Specific information consisting of test reports conducted by an approved agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the building official to determine that the product, material or assembly meets the applicable code requirements.

[OSHPD 1 & 4] Tests performed by an independent approved testing agency/laboratory having accreditation to the International Standards Organization (ISO) accreditation Standard 17025 or under the responsible charge of a competent approved independent Registered Design Professional shall be deemed to comply with requirements of this section. Test reports for structural tests shall be reviewed and accepted by an independent California licensed structural engineer.

1703A.4.1 Research and investigation. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the

3. Certificates of compliance for *equipment/components requiring special seismic certification* in accordance with Section 1705A.13.3.
4. Reports of preconstruction tests for shotcrete in accordance with Section 1908.5.
5. Certificates of compliance for open web steel joists and joist girders in accordance with Section 2207.5.
6. Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.6.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded; and
7. Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake-induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of seismic force-resisting systems in structures assigned to Seismic Design Category B, C, D, E or F.

1704A.6 Structural observations. The owner shall employ a registered design professional to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in Section 110 or the special inspections in Section 1705A or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the building official a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the building official a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

[DSA-SS, DSA-SS/CC] Reference to Section 110 shall be to the California Administrative Code instead.

SECTION 1705A REQUIRED SPECIAL INSPECTIONS AND TESTS

1705A.1 General. Special inspections and tests of elements and nonstructural components of buildings and structures shall meet the applicable requirements of this section.

1705A.1.1 Special cases. Special inspections and tests shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

1705A.2 Steel construction. The special inspections and nondestructive testing of steel construction in buildings, structures, and portions thereof shall be in accordance with this section.

Exception: Special inspections of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements when required by the approved construction documents.

1705A.2.1 Structural steel. Special inspections and nondestructive testing of structural steel elements in buildings, structures and portions thereof shall be in accordance with the quality assurance requirements of this section, *Chapter 22A and quality control requirements of AISC 360, AISC 341 and AISC 358.*

Exception: Special inspection of railing systems composed of structural steel elements shall be limited to welding inspection of welds at the base of cantilevered rail posts.

AISC 360, Chapter N and AISC 341, Chapter J are adopted, except as noted below:

The following provisions of AISC 360, Chapter N are not adopted:

1. N4., Item 2. (*Quality Assurance Inspector Qualifications*)
2. N5., Item 2. (*Quality Assurance*)
3. *[DSA-SS, DSA-SS/CC]*
N5., Item 3. (*Coordinated Inspection*)
4. *[DSA-SS, DSA-SS/CC]*
N5., Item 4. (*Inspection of Welding*)
5. *[DSA-SS, DSA-SS/CC]*
N7 (*Approved Fabricators and Erectors*)
6. *[DSA-SS, DSA-SS/CC]*
N8 (*Nonconforming Material and Workmanship*)

In addition to the quality assurance inspection requirements contained in AISC 360, Section N5 (Minimum Requirements for Inspection of Structural Steel Buildings), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

[DSA-SS, DSA-SS/CC] Modify AISC 360, Section N5.5(b), as follows:

For structures in Risk Category II, III or IV of Table 1.5-1, Risk Category of Buildings and Other Structures for Flood, Wind, Snow, Earthquake and Ice Loads, of ASCE/SEI 7, Minimum Design Loads for Buildings and Other Structures, UT shall be performed by QA on all CJP groove welds subject to transversely applied tension loading in butt, T- and corner joints, in materials $\frac{5}{16}$ in. (8 mm) thick or greater.

In addition to the quality assurance requirements contained in AISC 360, Section N6 (Minimum Requirements for Inspection of Composite Construction), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 341, Chapter J, Section J5 (Inspection Tasks), the requirements of Section 1704A.3 and Table 1705A.2.1 of the California Building Code shall apply.

1705A.2.2 Cold-formed steel deck. Special inspections for cold-formed steel floor and roof deck shall be in accordance with the quality assurance inspection requirements of SDI QA/QC.

Deck weld special inspection shall also satisfy requirements in Table 1705A.2.1 and Section 1705A.2.5.

1705A.2.3 Open-web steel joists and joist girders. Special inspections of open-web steel joists and joist girders in buildings, structures and portions thereof shall be in accordance with Table 1705A.2.3.

1705A.2.3.1 Steel joist and joist girder inspection. Special inspection is required during the manufacture and welding of steel joists or joist girders. The approved agency shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. The approved agency shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected joist or joist girder. This mark or tag shall remain on the joist or joist girder throughout the job site receiving and erection process.

1705A.2.4 Cold-formed steel trusses spanning 60 feet or greater. Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

1705A.2.4.1 Light-framed steel truss inspection. The manufacture of cold-formed light framed steel trusses shall be continuously inspected by an approved agency. The approved agency shall verify conformance of materials and manufacture with approved plans and specifications. The approved agency shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected truss. This mark or tag shall remain on the truss throughout the job site receiving and erection process.

1705A.2.5 Inspection of structural welding. Inspection of all shop and field welding operations shall be made by a qualified welding inspector approved by the enforcement agency. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the AWS QC1.

Exception: [OSHPD 1 & 4] Inspection and nondestructive testing personnel meeting the requirements of AISC 341 Section J4 (in addition to AISC 360 Section

N4) shall be permitted to perform quality control and quality assurance inspections at the premises of an approved fabricator's shop.

The welding inspector shall make a systematic daily record of all welds. In addition to other required records, this record shall include:

1. Identification marks of welders.
2. List of defective welds.
3. Manner of correction of defects.

The welding inspector shall check the material, details of construction and procedure, as well as workmanship of the welds. The inspector shall verify that the installation of end-welded stud shear connectors is in accordance with the requirements of AWS D1.1 and the approved plans and specifications. The approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report that the welding has been done in conformance with AWS D1.1, D1.3, D1.8, and the approved construction documents.

1705A.3 Concrete construction. Special inspections and tests of concrete construction shall be performed in accordance with this section and Table 1705A.3.

Exception: Special inspections and tests shall not be required for concrete patios, driveways and sidewalks, on grade.

1705A.3.1 Welding of reinforcing bars. Special inspections of welding and qualifications of special inspectors for reinforcing bars shall be in accordance with the requirements of AWS D1.4 for special inspection and of AWS D1.4 for special inspector qualification.

1705A.3.2 Material tests. In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials in Chapters 19 and 20 of ACI 318, the building official shall require testing of materials in accordance with the appropriate standards and criteria for the material in Chapters 19 and 20 of ACI 318.

1705A.3.3 Batch plant inspection. Except as provided under this section, the quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected by an approved agency at the location where materials are measured.

1705A.3.3.1 Waiver of continuous batch plant inspection. Continuous batch plant inspection may be waived by the registered design professional, subject to approval by the enforcement agency under either of the following conditions:

1. The concrete plant complies fully with the requirements of ASTM C94, Sections 9 and 10, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to the enforcement agency. The certification shall indicate that the plant has automatic batching and recording capabilities.
2. For single-story light-framed construction (without basement or retaining walls higher than 6' in height

ment required per lineal foot of wall. Horizontal extent of boundary element shall be in accordance with ACI 318 Section 18.10.6.4 (a), (b) and (c).

1905A.1.12 ACI 318, Section 18.12.6. Add Section 18.12.6.2 to ACI 318 as follows:

18.12.6.2 – Collector and boundary elements in topping slabs placed over precast floor and roof elements shall not be less than 3 inches (76 mm) or 6 d_b thick, where d_b is the diameter of the largest reinforcement in the topping slab.

1905A.1.13 ACI 318, Section 18.13.1.1. Modify ACI 318, Section 18.13.1.1, to read as follows:

18.13.1.1 – Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of 18.13 and other applicable provisions of ACI 318 *unless modified by Chapter 18A of the California Building Code.*

1905A.1.14 ACI 318, Table 21.2.2. Replace Table 21.2.2 as follows:

**TABLE 21.2.2
STRENGTH REDUCTION FACTOR ϕ FOR MOMENT,
AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE**

NET TENSILE STRAIN ϵ_t	CLASSIFICATION	ϕ			
		Type of transverse reinforcement			
		Spirals conforming to 25.7.3		Other	
$\epsilon_t \leq \epsilon_{ty}$	Compression-controlled	0.75	(a)	0.65	(b)
$\epsilon_{ty} < \epsilon_t < 0.005$	Transition ^{1,2}	$0.75 + 0.15 \frac{\epsilon_t - \epsilon_{ty}}{\epsilon_t^* - \epsilon_{ty}}$	(c)	$0.65 + 0.25 \frac{\epsilon_t - \epsilon_{ty}}{\epsilon_t^* - \epsilon_{ty}}$	(d)
$\epsilon_t \geq 0.005$	Tension-controlled ³	0.9	(e)	0.9	(f)

- For sections classified as transition, it shall be permitted to use ϕ corresponding to compression-controlled sections.
- ϵ_t^* is the greater of net tensile strain calculated for $P_u = 0.1A_g f'_c$ and 0.005.
- For sections with factored axial compression force $P_u \geq 0.1A_g f'_c$, ϕ shall be calculated using equation (c) or (d) for sections classified as transition, as applicable.

1905A.1.15 ACI 318, Section 24.2.1. Add Section 24.2.1.1 to ACI 318 as follows:

24.2.1.1 – Span to depth ratio. Prestressed Beam and Slab Span to depth ratios for continuous prestressed concrete members shall not exceed the following, except when calculations of deflections and vibration effects prove that greater values may be used without adverse effects:

- Beams 30*
- One-way slabs 40*
- Two-way floor slabs 40*
- Two-way roof slabs 44*

These ratios should be decreased for special conditions such as heavy loads and simple spans.

Maximum deflection criteria shall be in accordance with ACI 318 Section 24.2.2.

1905A.1.16 ACI 318, Section 26.12.2.1(a). Replace ACI 318 Section 26.12.2.1(a) by the following:

26.12.2.1(a) Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards (345 m³) of concrete, or not less than once for each 2,000 square feet (186 m²) of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.

**SECTION 1906A
STRUCTURAL PLAIN CONCRETE**

Not permitted by OSHPD and DSA-SS

**SECTION 1907A
MINIMUM SLAB PROVISIONS**

1907A.1 General. The thickness of concrete floor slabs supported directly on the ground shall not be less than 3 1/2 inches (89 mm). A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other approved equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

Exception: A vapor retarder is not required:

- For detached structures accessory to occupancies in Group R-3, such as garages, utility buildings or other unheated facilities.
- For unheated storage rooms having an area of less than 70 square feet (6.5 m²) and carports attached to occupancies in Group R-3.
- For buildings of other occupancies where migration of moisture through the slab from below will not be detrimental to the intended occupancy of the building.
- For driveways, walks, patios and other flatwork that will not be enclosed at a later date.
- Where approved based on local site conditions.

**SECTION 1908A
SHOTCRETE**

1908A.1 General. Shotcrete is mortar or concrete that is pneumatically projected at high velocity onto a surface. Except as specified in this section, shotcrete shall conform to the requirements of this chapter for reinforced concrete and the provisions of ACI 506. The specified compressive strength of shotcrete shall not be less than 3,000 psi (20.69 MPa).

[DSA-SS] Exception: The reference to ACI 506 shall be to ACI 506.2, unless otherwise approved by the enforcing agent. The specified compressive strength of structural shot-

crete shall not be less than 4,000 psi (27.58 MPa) unless specifically approved by the enforcing agent.

Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by sand blasting, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and masonry shall be wetted before shotcrete is deposited, but not so wet as to overcome suction. Sand for sand blasting shall be clean, sharp and uniform in size, with no particles that will pass a 50-mesh screen. [DSA-SS] Cleaning and roughening provisions of ACI 506.2, Section 2.4.2, may alternatively be permitted.

1908A.2 Proportions and materials. Shotcrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected and shall result in finished in-place hardened shotcrete meeting the strength requirements of this code.

1908A.3 Aggregate. Coarse aggregate, if used, shall not exceed $\frac{3}{4}$ inch (19.1 mm).

For shear walls, when total rebar in any direction is more than 0.31 in²/ft. or rebar size is larger than #5, shotcrete shall conform to course aggregate grading No. 2 per Table 1.1 of ACI 506.

[DSA-SS] **Exception:** The table reference shall be to Table 1908A.3 instead.

**TABLE 1908A.3
GRADING LIMITS FOR COMBINED AGGREGATES**

SIEVE SIZE, U.S. STANDARD SQUARE MESH	PERCENT BY WEIGHT PASSING INDIVIDUAL SIEVES	
	Grading No. 1	Grading No. 2
$\frac{3}{4}$ in. (19 mm)	—	—
$\frac{1}{2}$ in. (12 mm)	—	100
$\frac{3}{8}$ in. (10 mm)	100	90 to 100
No. 4 (4.75 mm)	95 to 100	70 to 85
No. 8 (2.4 mm)	80 to 98	50 to 70
No. 16 (1.2 mm)	50 to 85	35 to 55
No. 30 (600 μ m)	25 to 60	20 to 35
No. 50 (300 μ m)	10 to 30	8 to 20
No. 100 (150 μ m)	2 to 10	2 to 10

1908A.4 Reinforcement. Reinforcement used in shotcrete construction shall comply with the provisions of Sections 1908A.4.1 through 1908A.4.4.

1908A.4.1 Size. The maximum size of reinforcement shall be No. 5 bars unless it is demonstrated by preconstruction tests that adequate encasement of larger bars will be achieved.

1908A.4.2 Clearance. When No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of $2\frac{1}{2}$ inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. When two curtains of steel are provided, the curtain nearer the nozzle shall have a minimum spacing

equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

Exception: Subject to the approval of the building official, required clearances shall be reduced where it is demonstrated by preconstruction tests that adequate encasement of the bars used in the design will be achieved.

1908A.4.3 Splices. Lap splices of reinforcing bars shall utilize the noncontact lap splice method with a minimum clearance of 2 inches (51 mm) between bars. The use of contact lap splices necessary for support of the reinforcing is permitted when approved by the building official, based on satisfactory preconstruction tests that show that adequate encasement of the bars will be achieved, and provided that the splice is oriented so that a plane through the center of the spliced bars is perpendicular to the surface of the shotcrete.

1908A.4.4 Spirally tied columns. Shotcrete shall not be applied to spirally tied columns.

1908A.5 Preconstruction tests. A test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative of the project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzle man and with the same concrete mix design that will be used on the project. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is approved by the building official. Reports of preconstruction tests shall be submitted to the building official as specified in Section 1704A.5.

1908A.6 Rebound. Any rebound or accumulated loose aggregate shall be removed from the surfaces to be covered prior to placing the initial or any succeeding layers of shotcrete. Rebound shall not be used as aggregate.

1908A.7 Joints. Except where permitted herein, unfinished work shall not be allowed to stand for more than 30 minutes unless edges are sloped to a thin edge. For structural elements that will be under compression and for construction joints shown on the approved construction documents, square joints are permitted. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted.

The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.

1908A.8 Damage. In-place shotcrete that exhibits sags, sloughs, segregation, honeycombing, sand pockets or other obvious defects shall be removed and replaced. Shotcrete above sags and sloughs shall be removed and replaced while still plastic.

1908A.9 Curing. During the curing periods specified herein, shotcrete shall be maintained above 40°F (4°C) and in moist condition.

[DSA-SS] Exception: Curing temperatures shall be maintained in accordance with the more restrictive requirements specified in ACI 506.2, Section 3.7.1.2, unless specifically approved by the enforcing agent.

1908A.9.1 Initial curing. Shotcrete shall be kept continuously moist for 24 hours after shotcreting is complete or shall be sealed with an approved curing compound.

1908A.9.2 Final curing. Final curing shall continue for seven days after shotcreting, or for three days if high-early-strength cement is used, or until the specified strength is obtained. Final curing shall consist of the initial curing process or the shotcrete shall be covered with an approved moisture-retaining cover.

1908A.9.3 Natural curing. Natural curing shall not be used in lieu of that specified in this section unless the relative humidity remains at or above 85 percent, and is authorized by the registered design professional and approved by the building official.

1908A.10 Strength tests. Strength tests for shotcrete shall be made in accordance with ASTM C1604 by an approved agency on specimens that are representative of the work and which have been water soaked for at least 24 hours prior to testing. When the maximum-size aggregate is larger than $\frac{3}{8}$ inch (9.5 mm), specimens shall consist of not less than three 3-inch-diameter (76 mm) cores or 3-inch (76 mm) cubes. When the maximum-size aggregate is $\frac{3}{8}$ inch (9.5 mm) or smaller, specimens shall consist of not less than 2-inch-diameter (51 mm) cores or 2-inch (51 mm) cubes.

1908A.10.1 Sampling. Specimens shall be taken from the in-place work or from test panels, and shall be taken at least once each shift, but not less than one for each 50 cubic yards (38.2 m³) of shotcrete.

1908A.10.2 Panel criteria. When the maximum-size aggregate is larger than $\frac{3}{8}$ inch (9.5 mm), the test panels shall have minimum dimensions of 18 inches by 18 inches (457 mm by 457 mm). When the maximum-size aggregate is $\frac{3}{8}$ inch (9.5 mm) or smaller, the test panels shall have minimum dimensions of 12 inches by 12 inches (305 mm by 305 mm). Panels shall be shot in the same position as the work, during the course of the work and by the nozzle-men doing the work. The conditions under which the panels are cured shall be the same as the work. *Approval from the enforcement agency shall be obtained prior to performing the test panel method.*

1908A.10.3 Acceptance criteria. The average compressive strength of three cores from the in-place work or a single test panel shall equal or exceed $0.85 f'_c$ with no single core less than $0.75 f'_c$. The average compressive strength of three cubes taken from the in-place work or a single test panel shall equal or exceed f'_c with no individual cube less than $0.88 f'_c$. To check accuracy, locations represented by erratic core or cube strengths shall be retested.

1908A.11 Forms and ground wires for shotcrete. Forms for shotcrete shall be substantial and rigid. Forms shall be built and placed so as to permit the escape of air and rebound.

Adequate ground wires, which are to be used as screeds, shall be placed to establish the thickness, surface planes and form of the shotcrete work. All surfaces shall be rodded to these wires.

1908A.12 Placing. Shotcrete shall be placed in accordance with ACI 506.

SECTION 1909A RESERVED

SECTION 1910A CONCRETE, REINFORCEMENT AND ANCHOR TESTING

1910A.1 Cementitious material. *The concrete supplier shall furnish to the enforcement agency certification that the cement proposed for use on the project has been manufactured and tested in compliance with the requirements of ASTM C150 for portland cement and ASTM C595 or ASTM C1157 for blended hydraulic cement, whichever is applicable. When a mineral admixture or ground granulated blast-furnace slag is proposed for use, the concrete supplier shall furnish to the enforcement agency certification that they have been manufactured and tested in compliance with ASTM C618 or ASTM C989, whichever is applicable. The concrete producer shall provide copies of the cementitious material supplier's Certificate of Compliance that represents the materials used by date of shipment for concrete. Cementitious materials without Certification of Compliance shall not be used.*

1910A.2 Tests of reinforcing bars. *Samples shall be taken from bundles as delivered from the mill, with the bundles identified as to heat number and the accompanying mill certificate. One tensile test and one bend test shall be made from a sample from each 10 tons (9080 kg) or fraction thereof of each size of reinforcing steel.*

Where positive identification of the heat number cannot be made or where random samples are to be taken, one series of tests shall be made from each 2 $\frac{1}{2}$ tons (2270 kg) or fraction thereof of each size of reinforcing steel.

Tests of reinforcing bars may be waived by the structural engineer with the approval of the Building Official for one-story buildings or non-building structures provided they are identified in the construction documents and certified mill test reports are provided to the inspector of record for each shipment of such reinforcement.

1910A.3 Tests for prestressing steel and anchorage. *All wires or bars of each size from each mill heat and all strands from each manufactured reel to be shipped to the site shall be assigned an individual lot number and shall be tagged in such a manner that each lot can be accurately identified at the jobsite. Each lot of tendon and anchorage assemblies and bar couplers to be installed shall be likewise identified.*

The following samples of materials and tendons selected by the engineer or the designated testing laboratory from the prestressing steel at the plant or jobsite shall be furnished by the contractor and tested by an approved independent testing agency:

1. For wire, strand or bars, 7-foot-long (2134 mm) samples shall be taken of the coil of wire or strand reel or rods. A minimum of one random sample per 5,000 pounds (2270 kg) of each heat or lot used on the job shall be selected.
2. For prefabricated prestressing tendons other than bars, one completely fabricated tendon 10 feet (3048 mm) in length between grips with anchorage assembly at one end shall be furnished for each size and type of tendon and anchorage assembly.

Variations of the bearing plate size need not be considered.

The anchorages of unbonded tendons shall develop at least 95 percent of the minimum specified ultimate strength of the pre-stressing steel. The total elongation of the tendon under ultimate load shall not be less than 2 percent measured in a minimum gage length of 10 feet (3048 mm).

Anchorages of bonded tendons shall develop at least 90 percent of the minimum specified strength of the prestressing steel tested in an unbonded state. All couplings shall develop at least 95 percent of the minimum specified strength of the prestressing steel and shall not reduce the elongation at rupture below the requirements of the tendon itself.

3. If the prestressing tendon is a bar, one 7-foot (2134 mm) length complete with one end anchorage shall be furnished and, in addition, if couplers are to be used with the bar, two 4-foot (1219 mm) lengths of bar fabricated to fit and equipped with one coupler shall be furnished.
4. Mill tests of materials used for end anchorages shall be furnished. In addition, at least one Brinnell hardness test shall be made of each thickness of bearing plate.

1910A.4 Composite construction cores. Cores of the completed composite concrete construction shall be taken to demonstrate the shear strength along the contact surfaces. The cores shall be tested when the cast-in-place concrete is approximately 28 days old and shall be tested by a shear loading parallel to the joint between the precast concrete and the cast-in-place concrete. The minimum unit shear strength of the contact surface area of the core shall not be less than 100 psi (689 kPa).

At least one core shall be taken from each building for each 5,000 square feet (465m²) of area of composite concrete construction and not less than three cores shall be taken from each project. The architect or structural engineer in responsible charge of the project or his or her representative shall designate the location for sampling.

1910A.5 Tests for post-installed anchors in concrete. When post-installed anchors are used in lieu of cast-in place bolts,

the installation verification test loads, frequency, and acceptance criteria shall be in accordance with this section.

1910A.5.1 General. Test loads or torques and acceptance criteria shall be shown on the construction documents.

If any anchor fails testing, all anchors of the same type shall be tested, which are installed by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume the initial test frequency.

1910A.5.2 Testing procedure. The test procedure shall be as permitted by an approved evaluation report using criteria adopted in this code. All post-installed anchors shall be tension tested.

Exception: [OSHPD 1 & 4] Torque-controlled post-installed anchors shall be permitted to be tested using torque based on an approved test report using criteria adopted in this code.

Exception: [DSA-SS] Torque-controlled post-installed anchors and screw type anchors shall be permitted to be tested using torque based on an approved test report using criteria adopted in this code.

Alternatively, manufacturer's recommendation for testing may be approved by the enforcement agency, based on an approved test report using criteria adopted in this code.

1910A.5.3 Test frequency. When post-installed anchors are used for sill plate bolting applications, 10 percent of the anchors shall be tested.

When post-installed anchors are used for other structural applications, all such anchors shall be tested.

When post-installed anchors are used for nonstructural components, such as equipment anchorage, 50 percent or alternate bolts in a group, including at least one-half the anchors in each group, shall be tested.

The testing of the post-installed anchors shall be done in the presence of the special inspector and a report of the test results shall be submitted to the enforcement agency.

Exceptions:

1. Undercut anchors that allow visual confirmation of full set shall not require testing.
2. Where the factored design tension on anchors is less than 100 lbs and those anchors are clearly noted on the approved construction documents, only 10 percent of those anchors shall be tested.
3. Where adhesive anchor systems are used to install reinforcing dowel bars in hardened concrete, only 25 percent of the dowels shall be tested if all of the following conditions are met:
 - a. The dowels are used exclusively to transmit shear forces across joints between existing and new concrete.
 - b. The number of dowels in any one member equals or exceeds 12.

- c. The dowels are uniformly distributed across seismic force resisting members (such as shear walls, collectors and diaphragms).

Anchors to be tested shall be selected at random by the special inspector/inspector of record (IOR).

4. Testing of shear dowels across cold joints in slabs on grade, where the slab is not part of the lateral force-resisting system shall not be required.
5. Testing is not required for power actuated fasteners used to attach tracks of interior non-shear wall partitions for shear only, where there are at least three fasteners per segment of track.

1910A.5.4 Test loads. Required test loads shall be determined by one of the following methods:

1. Twice the maximum allowable tension load or one and a quarter ($1\frac{1}{4}$) times the maximum design strength of anchors as provided in an approved evaluation report using criteria adopted in this code or determined in accordance with Chapter 17 of ACI 318.

Tension test load need not exceed 80 percent of the nominal yield strength of the anchor element ($= 0.8 A_{se} f_{ya}$).

2. The manufacturer's recommended installation torque based on an approved evaluation report using criteria adopted in this code.

1910A.5.5 Test acceptance criteria. Acceptance criteria for post-installed anchors shall be based on an approved evaluation report using criteria adopted in this code. Field tests shall satisfy the following minimum requirements.

1. Hydraulic ram method:

Anchors tested with a hydraulic jack or spring loaded apparatus shall maintain the test load for a minimum of 15 seconds and shall exhibit no discernible movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.

For adhesive anchors, where other than bond is being tested, the testing apparatus support shall not be located within 1.5 times the anchor's embedment depth to avoid restricting the concrete shear cone type failure mechanism from occurring.

2. Torque wrench method:

Torque-controlled post-installed anchors tested with a calibrated torque wrench shall attain the specified torque within $\frac{1}{2}$ turn of the nut; or one-quarter ($\frac{1}{4}$) turn of the nut for a $\frac{3}{8}$ inch sleeve anchor only.

[DSA-SS] Screw-type anchors tested with a calibrated torque wrench shall attain the specified torque within one-quarter ($\frac{1}{4}$) turn of the screw after initial seating of the screw head.

SECTION 1911A EXISTING CONCRETE STRUCTURES

1911A.1 Existing concrete structures.

The structural use of existing concrete with a core strength less than 1,500 psi (10.3MPa) is not permitted in rehabilitation work.

For existing concrete structures, sufficient cores shall be taken at representative locations throughout the structure, as designated by the architect or structural engineer, so that knowledge will be had of the in-place strength of the concrete. At least three cores shall be taken from each building for each 4,000 square feet (372 m²) of floor area, or fraction thereof. Cores shall be at least 4 inches (102 mm) in diameter. Cores as small as 2.75 inches (70 mm) in diameter may be allowed by the enforcement agency when reinforcement is closely spaced and the coarse aggregate does not exceed $\frac{3}{4}$ inch (19 mm).

1911A.2 Crack repair by epoxy injection. Crack repair of concrete and masonry member by epoxy injection, shall conform to all requirements of ACI 503.7.

1911A.3 Concrete strengthening by externally bonded fiber reinforced polymer (FRP). Design and construction of externally bonded FRP systems for strengthening concrete structures shall be in accordance with ACI 440.2R.

Exceptions:

1. Near-Surface Mounted (NSM) FRP bars shall not be permitted.
2. Strengthening of shear walls and diaphragms (including chords and collectors) shall be considered as an alternative system.

Design capacities, reliability, serviceability of FRP materials shall be permitted to be established in accordance with ICC-ES AC 125. Minimum inspection requirements of FRP composite systems shall be in accordance with ICC-ES AC 178.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE

CHAPTER 27 – ELECTRICAL

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC- CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter																					
Adopt entire chapter as amended (amended sections listed below)			X																		
Adopt only those sections that are listed below																					
Chapter / Section																					
2702.2.15			X																		
2702.2.17			X																		
2702.2.18			X																		

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 27

ELECTRICAL

SECTION 2701 GENERAL

2701.1 Scope. This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of the *California Electrical Code*.

SECTION 2702 EMERGENCY AND STANDBY POWER SYSTEMS

[F] 2702.1 Installation. Emergency power systems and standby power systems shall comply with Sections 2702.1.1 through 2702.1.7.

[F] 2702.1.1 Stationary generators. Stationary emergency and standby power generators required by this code shall be listed in accordance with UL 2200.

[F] 2702.1.2 Electrical. Emergency power systems and standby power systems required by this code or the *California Fire Code* shall be installed in accordance with the *California Fire Code*, NFPA 70, NFPA 110 and NFPA 111.

[F] 2702.1.3 Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. Standby power systems shall automatically provide secondary power within 60 seconds after

primary power is lost, unless specified otherwise in this code.

[F] 2702.1.4 Load duration. Emergency power systems and standby power systems shall be designed to provide the required power for a minimum duration of 2 hours without being refueled or recharged, unless specified otherwise in this code.

[F] 2702.1.5 Uninterruptable power source. An uninterrupted source of power shall be provided for equipment when required by the manufacturer's instructions, the listing, this code or applicable referenced standards.

[F] 2702.1.6 Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

[F] 2702.1.7 Group I-2 occupancies. In Group I-2 occupancies, in new construction or where the building is substantially damaged, where an essential electrical system is located in flood hazard areas established in Section 1612.3, the system shall be located and installed in accordance with ASCE 24.

[F] 2702.2 Where required. Emergency and standby power systems shall be provided where required by Sections 2702.2.1 through 2702.2.16.

[F] 2702.2.1 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by Section 415.5.

[F] **2702.2.2 Elevators and platform lifts.** Standby power shall be provided for elevators and platform lifts as required in Sections 1009.4, 1009.5, 3003.1, 3007.8 and 3008.8.

[F] **2702.2.3 Emergency responder radio coverage systems.** Standby power shall be provided for emergency responder radio coverage systems required in Section 915 and the *California Fire Code*. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

[F] **2702.2.4 Emergency voice/alarm communication systems.** Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] **2702.2.5 Exit signs.** Emergency power shall be provided for exit signs as required in Section 1013.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] **2702.2.6 Group I-2 occupancies.** Essential electrical systems for Group I-2 occupancies shall be in accordance with Section 407.10.

[F] **2702.2.7 Group I-3 occupancies.** Emergency power shall be provided for power-operated doors and locks in Group I-3 occupancies as required in Section 408.4.2.

[F] **2702.2.8 Hazardous materials.** Emergency and standby power shall be provided in occupancies with hazardous materials where required by the *California Fire Code*.

[F] **2702.2.9 High-rise buildings.** Emergency and standby power shall be provided in high-rise buildings as required in Sections 403.4.8.

[F] **2702.2.10 Horizontal sliding doors.** Standby power shall be provided for horizontal sliding doors as required in Section 1010.1.4.3. The standby power supply shall have a capacity to operate not fewer than 50 closing cycles of the door.

[F] **2702.2.11 Means of egress illumination.** Emergency power shall be provided for means of egress illumination as required in Section 1008.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] **2702.2.12 Membrane structures.** Standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in Section 3102.8.2. Standby power shall be provided for a duration of not less than 4 hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of the *California Fire Code*.

[F] **2702.2.13 Pyrophoric materials.** Emergency power shall be provided for occupancies with silane gas in accordance with the *California Fire Code*.

[F] **2702.2.14 Semiconductor fabrication facilities.** Emergency power shall be provided for semiconductor fabrication facilities as required in Section 415.11.10.

[F] **2702.2.15 High-rise buildings and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access.** Emergency and standby power shall be provided in high-rise buildings and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access in accordance with Sections 403.4.7 and 403.4.8.

[F] **2702.2.15 Smoke control systems.** Standby power shall be provided for smoke control systems as required in Sections 404.7, 909.11, 909.20.6.2 and 909.21.5.

[F] **2702.2.16 Underground buildings.** Emergency and standby power shall be provided in underground buildings as required in Section 405.

2702.2.17 Group L-Occupancy. Emergency power shall be provided in Group L occupancies in accordance with this chapter and Section 453.4.6.1.

[F] 2702.2.18 Gas detection systems. Emergency or standby power shall be provided for gas detection systems in accordance with the California Fire Code.

[F] **2702.3 Critical circuits.** Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

[F] **2702.4 Maintenance.** Emergency and standby power systems shall be maintained and tested in accordance with the *California Fire Code*.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE

CHAPTER 30 – ELEVATORS AND CONVEYING SYSTEMS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	X							X	X			X	X	X							
Adopt entire chapter as amendeded (amended sections listed below)			X								X										
Adopt only those sections that are listed below				X	X	X	X														
Chapter / Section																					
3001.1				X	X	X															
3001.2			X																		
3001.3						X	X														
3001.4			X																		
3001.5			X																		
3002.4a – 3002.4.7a			X																		
3002.5			X																		
3002.10 – 3002.10.5			X																		
3003.2 – 3003.2.1.2			X																		
3005.4.1			X																		
3006.2			X																		
3006.3			X																		
3007.1			X																		
3007.6.1			X																		
3008.2.1			X																		
3008.7.1			X																		
3009											X										

The state agency does not adopt sections identified with the following symbol: †
The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 30

ELEVATORS AND CONVEYING SYSTEMS

SECTION 3001 GENERAL

3001.1 Scope. This chapter governs the design, construction, installation, alteration and repair of elevators and conveying systems and their components.

3001.2 Referenced standards. Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to *California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders*, ASME A90.1, ASME B20.1, ANSI MH29.1, ALI ALCTV and ASCE 24 for construction in flood hazard areas established in Section 1612.3.

3001.3 Accessibility. Passenger elevators and platform (wheelchair) lifts required to be accessible or to serve as part of an accessible means of egress shall comply with Section 1009 and either *Chapter 11A for applications listed in Section 1.8.2.1.2 regulated by the Department of Housing and Community Development or Chapter 11B for applications listed in Section 1.9.1 regulated by the Division of the State Architect—Access Compliance.*

3001.4 Change in use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with *California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.*

3001.5 Elevators utilized to transport hazardous materials. *Elevators utilized to transport hazardous materials shall also comply with the California Fire Code Section 2703.10.4*

SECTION 3002 HOISTWAY ENCLOSURES

3002.1 Hoistway enclosure protection. Elevator, dumb-waiter and other hoistway enclosures shall be shaft enclosures complying with Section 713.

3002.1.1 Opening protectives. Openings in hoistway enclosures shall be protected as required in Chapter 7.

Exception: The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I Emergency Recall Operation.

3002.1.2 Hardware. Hardware on opening protectives shall be of an approved type installed as tested, except that approved interlocks, mechanical locks and electric contacts, door and gate electric contacts and door-operating mechanisms shall be exempt from the fire test requirements.

3002.2 Number of elevator cars in a hoistway. Where four or more elevator cars serve all or the same portion of a building, the elevators shall be located in not fewer than two separate hoistways. Not more than four elevator cars shall be located in any single hoistway enclosure.

3002.3 Emergency signs. An approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire. The sign shall read: IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE. USE EXIT STAIRS.

Exceptions:

1. The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with Section 1009.4.
2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008.

3002.4 Elevator car to accommodate ambulance stretcher. Where elevators are provided in buildings four or more stories above, or four or more stories below, grade plane, not fewer than one elevator shall be provided for fire department emergency access to all floors. The elevator car shall be of such a size and arrangement to accommodate an ambulance stretcher 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall be not less than 3 inches (76 mm) in

height and shall be placed inside on both sides of the hoistway door frame.

The following California sections replace the corresponding model code section for applications specified in section 1.11 for the Office of the State Fire Marshal.

3002.4a General stretcher requirements. All buildings and structures with one or more passenger service elevators shall be provided with not less than one medical emergency service elevator to all landings meeting the provisions of Section 3002.4a.

Exceptions:

1. Elevators in structures used only by maintenance and operating personnel.
2. Elevators in jails and penal institutions.
3. Elevators in buildings or structures where each landing is at ground level or is accessible at grade level or by a ramp.
4. Elevator(s) in two-story buildings or structures equipped with stairs of a configuration that will accommodate the carrying of the gurney or stretcher as permitted by the local jurisdictional authority.
5. Elevators in buildings or structures less than four stories in height for which the local jurisdictional authority has granted an exception in the form of a written document.

3002.4.1a Gurney size. *The medical emergency service elevator shall accommodate the loading and transport of an ambulance gurney or stretcher [maximum size 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners] in the horizontal position.*

3002.4.2a Hoistway doors. *The hoistway landing openings shall be provided with power-operated doors.*

3002.4.3a Elevator entrance openings and car size. *The elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance gurney or stretcher with not less than 5-inch (127 mm) radius corners, in the horizontal, open position, shall be provided with a minimum clear distance between walls or between walls and door excluding return panels not less than 80 inches by 54 inches (2032 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm) with a 42-inch (1067 mm) side slide door.*

Exception: *The elevator car dimensions and/or the clear entrance opening dimensions may be altered where it can be demonstrated to the local jurisdictional authority's satisfaction that the proposed configuration will handle the designated gurney or stretcher with equivalent ease. Documentation from the local authority shall be provided to the Occupational Safety and Health Standards Board.*

3002.4.4a Elevator recall. The elevator(s) designated the medical emergency elevator shall be equipped with a key switch to recall the elevator nonstop to the main floor. For the purpose of this section, elevators in compliance with Section 3003.2 shall be acceptable.

3002.4.5a Designation. Medical emergency elevators shall be identified by the international symbol (Star of Life) for emergency medical services.

3002.4.6a Symbol size. The symbol shall not be less than 3 inches (76 mm) in size.

3002.4.7a Symbol location. A symbol shall be permanently attached to each side of the hoistway door frame on the portion of the frame at right angles to the hallway or landing area. Each symbol shall be not less than 78 inches (1981 mm) and not more than 84 inches (2134 mm) above the floor level at the threshold.

3002.5 Emergency doors. Emergency doors in blind hoistways as described in ASME A17.1, Section 2.11.1.2, and access panels as described in ASME A17.1, Section 2.11.1.4, are prohibited in accordance with California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.

3002.6 Prohibited doors. Doors, other than hoistway doors and the elevator car door, shall be prohibited at the point of access to an elevator car unless such doors are readily openable from the car side without a key, tool, special knowledge or effort.

3002.7 Common enclosure with stairway. Elevators shall not be in a common shaft enclosure with a stairway.

Exception: Elevators within open parking garages need not be separated from stairway enclosures.

3002.8 Glass in elevator enclosures. Glass in elevator enclosures shall comply with Section 2409.2.

3002.9 Plumbing and mechanical systems. Plumbing and mechanical systems shall not be located in an elevator hoistway enclosure.

Exception: Floor drains, sumps and sump pumps shall be permitted at the base of the hoistway enclosure provided they are indirectly connected to the plumbing system.

3002.10 Photoelectric tube bypass switch.

3002.10.1 Elevators equipped with photoelectric tube devices which control the closing of automatic, power-operated car or hoistway doors, or both, shall have a switch in the car which, when actuated, will render the photoelectric tube device ineffective.

3002.10.2 The switch shall be constant-pressure type, requiring not less than 10 pounds (44.5N) or more than 15 pounds (66.7 N) pressure to actuate.

3002.10.3 The switch shall be located not less than 6 feet (1829 mm) or more than 6 feet 6 inches (1981 mm) above the car floor and shall be located in or adjacent to the operating panel.

3002.10.4 The switch shall be clearly labeled **TO BE USED IN CASE OF FIRE ONLY**.

3002.10.5 Switches shall be kept in working order or be removed when existing installations are arranged to comply with Section 3002.10.5, Exception 1 or 2.

Exceptions:

1. Elevators installed and maintained in compliance with Section 3003.
2. Where alternate means acceptable to the fire authority having jurisdiction are provided that will ensure the doors can close under adverse smoke conditions.

SECTION 3003 EMERGENCY OPERATIONS

[F] 3003.1 Standby power. In buildings and structures where standby power is required or furnished to operate an elevator, the operation shall be in accordance with Sections 3003.1.1 through 3003.1.4.

[F] 3003.1.1 Manual transfer. Standby power shall be manually transferable to all elevators in each bank.

[F] 3003.1.2 One elevator. Where only one elevator is installed, the elevator shall automatically transfer to standby power within 60 seconds after failure of normal power.

[F] 3003.1.3 Two or more elevators. Where two or more elevators are controlled by a common operating system, all elevators shall automatically transfer to standby power within 60 seconds after failure of normal power where the standby power source is of sufficient capacity to operate all elevators at the same time. Where the standby power source is not of sufficient capacity to operate all elevators at the same time, all elevators shall transfer to standby power in sequence, return to the designated landing and disconnect from the standby power source. After all elevators have been returned to the designated level, at least one elevator shall remain operable from the standby power source.

[F] 3003.1.4 Venting. Where standby power is connected to elevators, the machine room ventilation or air conditioning shall be connected to the standby power source.

[F] 3003.2 Fire fighters' emergency operation. Elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.

3003.2.1 Floor numbers. Elevator hoistways shall have a floor number not less than 4 inches (102 mm) in height, placed on the walls and/or doors of the hoistway at intervals such that a person in a stalled elevator, upon opening the car door, can determine the floor position.

3003.2.1.1 Fire signs. All automatic elevators shall have not less than one sign at each landing printed on a contrasting background in letters not less than 1/2 inch (12.7 mm) high to read: **IN CASE OF FIRE USE STAIRWAY FOR EXIT. DO NOT USE ELEVATOR.**

3003.2.1.2 Call and car operation buttons. Automatic passenger elevators shall have call and car operation buttons within 60 inches (1524 mm) of the floor. Emergency telephones shall also be within 60 inches (1524 mm) of the floor.

[F] **3003.3 Standardized fire service elevator keys.** All elevators shall be equipped to operate with a standardized fire service elevator key in accordance with the *California Fire Code*.

**SECTION 3004
CONVEYING SYSTEMS**

3004.1 General. Escalators, moving walks, conveyors, personnel hoists and material hoists shall comply with the provisions of Sections 3004.2 through 3004.4.

3004.2 Escalators and moving walks. Escalators and moving walks shall be constructed of approved noncombustible and fire-retardant materials. This requirement shall not apply to electrical equipment, wiring, wheels, handrails and the use of 1/28-inch (0.9 mm) wood veneers on balustrades backed up with noncombustible materials.

3004.2.1 Enclosure. Escalator floor openings shall be enclosed with shaft enclosures complying with Section 713.

3004.2.2 Escalators. Where provided in below-grade transportation stations, escalators shall have a clear width of not less than 32 inches (815 mm).

Exception: The clear width is not required in existing facilities undergoing alterations.

3004.3 Conveyors. Conveyors and conveying systems shall comply with ASME B20.1.

3004.3.1 Enclosure. Conveyors and related equipment connecting successive floors or levels shall be enclosed with shaft enclosures complying with Section 713.

3004.3.2 Conveyor safeties. Power-operated conveyors, belts and other material-moving devices shall be equipped with automatic limit switches that will shut off the power in an emergency and automatically stop all operation of the device.

3004.4 Personnel and material hoists. Personnel and material hoists shall be designed utilizing an approved method that accounts for the conditions imposed during the intended operation of the hoist device. The design shall include, but is not limited to, anticipated loads, structural stability, impact, vibration, stresses and seismic restraint. The design shall account for the construction, installation, operation and inspection of the hoist tower, car, machinery and control equipment, guide members and hoisting mechanism. Additionally, the design of personnel hoists shall include provisions for field testing and maintenance that will demonstrate that the hoist device functions in accordance with the design. Field tests shall be conducted upon the completion of an installation or following a major alteration of a personnel hoist.

**SECTION 3005
MACHINE ROOMS**

3005.1 Access. An approved means of access shall be provided to elevator machine rooms, control rooms, control spaces and machinery spaces.

3005.2 Venting. Elevator machine rooms, machinery spaces that contain the driving machine, and control rooms or spaces that contain the operation or motion controller for elevator operation shall be provided with an independent ventilation or air-conditioning system to protect against the overheating of the electrical equipment. The system shall be capable of maintaining temperatures within the range established for the elevator equipment.

3005.3 Pressurization. The elevator machine room, control rooms or control space with openings into a pressurized elevator hoistway shall be pressurized upon activation of a heat or smoke detector located in the elevator machine room, control room or control space.

3005.4 Machine rooms, control rooms, machinery spaces, and control spaces. Elevator machine rooms, control rooms, control spaces and machinery spaces outside of but attached to a hoistway that have openings into the hoistway shall be enclosed with fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both. The fire-resistance rating shall be not less than the required rating of the hoistway enclosure served by the machinery. Openings in the fire barriers shall be protected with assemblies having a fire protection rating not less than that required for the hoistway enclosure doors.

Exceptions:

1. For other than fire service access elevators and occupant evacuation elevators, where machine rooms, machinery spaces, control rooms and control spaces do not abut and have no openings to the hoistway enclosure they serve, the fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, shall be permitted to be reduced to a 1-hour fire-resistance rating.
2. For other than fire service access elevators and occupant evacuation elevators, in buildings four stories or less above grade plane where machine room, machinery spaces, control rooms and control spaces do not abut and have no openings to the hoistway enclosure they serve, the machine room, machinery spaces, control rooms and control spaces are not required to be fire-resistance rated.

3005.4.1 Automatic sprinkler system. *Automatic sprinklers shall not be required to be installed in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room where all the following are met:*

1. Approved smoke detectors shall be installed and connected to the building fire alarm system in accordance with Section 907 in the area where the

installation of fire sprinklers was exempted per this section.

2. Activation of any smoke detector located in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room shall cause the actuation of the building fire alarm notification appliances in accordance with Section 907.
3. Activation of any smoke detector located in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room shall cause all elevators having any equipment located in that elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room to recall nonstop to the appropriate designated floor in accordance with CCR Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.
4. The elevator machine room, elevator machinery space, elevator control space, or elevator control room shall be enclosed with fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 712, or both. The fire-resistance rating shall not be less than the required rating of the hoistway enclosure served by the machinery. Openings in the fire barriers shall be protected with assemblies having a fire protection rating not less than that required for the hoistway enclosure doors. The exceptions to Section 3005.4 shall not apply.
5. The building fire alarm system shall be monitored by an approved supervising station in accordance with Section 907.
6. An approved sign shall be permanently displayed in the area where the installation of fire sprinklers was exempted per this section in a conspicuous location with a minimum of 1½-inch letters on a contrasting background, stating:

NO COMBUSTIBLE STORAGE
PERMITTED IN THIS ROOM

By Order of the Fire Marshal [or name of fire authority]

3005.5 Shunt trip. Where elevator hoistways, elevator machine rooms, control rooms and control spaces containing elevator control equipment are protected with automatic sprinklers, a means installed in accordance with Section 21.4 of NFPA 72 shall be provided to disconnect automatically the main line power supply to the affected elevator prior to the application of water. This means shall not be self-resetting. The activation of automatic sprinklers outside the hoistway, machine room, machinery space, control room or control space shall not disconnect the main line power supply.

3005.6 Plumbing systems. Plumbing systems shall not be located in elevator equipment rooms.

SECTION 3006 ELEVATOR LOBBIES AND HOISTWAY OPENING PROTECTION

3006.1 General. Elevator hoistway openings and enclosed elevator lobbies shall be provided in accordance with the following:

1. Where hoistway opening protection is required by Section 3006.2, such protection shall be in accordance with Section 3006.3.
2. Where enclosed elevator lobbies are required for underground buildings, such lobbies shall comply with Section 405.4.3.
3. Where an area of refuge is required and an enclosed elevator lobby is provided to serve as an area of refuge, the enclosed elevator lobby shall comply with Section 1009.6.
4. Where fire service access elevators are provided, enclosed elevator lobbies shall comply with Section 3007.6.
5. Where occupant evacuation elevators are provided, enclosed elevator lobbies shall comply with Section 3008.6.

3006.2 Hoistway opening protection required. Elevator hoistway door openings shall be protected in accordance with Section 3006.3 where an elevator hoistway connects more than two stories in Group A, E, H, I, L, R-1, R-2 and R-2.1 occupancies, high-rise buildings, and other applications listed in Section 1.11 regulated by the Office of the State Fire Marshal, and more than three stories for all other occupancies. Hoistway opening protection is required to be enclosed within a shaft enclosure in accordance with Section 712.1.1 when any of the following conditions apply:

1. The building is not protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Group A occupancies;
3. Group E occupancies;
4. Group H occupancies;
5. Group I occupancies;
6. Group L occupancies;
7. Group R-1, R-2 and R-2.1 occupancies; and
8. High-rise buildings.

See Section 403.6 for additional requirements for high-rise buildings.

Exceptions:

1. Protection of elevator hoistway door openings is not required where the elevator serves only open parking garages in accordance with Section 406.5.
2. Protection of elevator hoistway door openings is not required at the level(s) of exit discharge, provided the level(s) of exit discharge is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1.

3. Enclosed elevator lobbies and protection of elevator hoistway door openings are not required on levels where the elevator hoistway opens to the exterior.

3006.3 Hoistway opening protection. Where Section 3006.2 requires protection of the elevator hoistway door opening, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway shaft enclosure doors from each floor by fire partitions in accordance with Section 708. In addition, doors protecting openings in the elevator lobby enclosure walls shall comply with Section 716.5.3 as required for corridor walls. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1.
2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway shaft enclosure doors from each floor by smoke partitions in accordance with Section 710 where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the smoke partitions shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.5.9. Penetrations of the enclosed elevator lobby by ducts and air transfer openings shall be protected as required for corridors in accordance with Section 717.5.4.1.
3. Additional doors shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such door shall comply with the smoke and draft control door assembly requirements in Section 716.5.3.1 when tested in accordance with UL 1784 without an artificial bottom seal.
4. *[SFM] When approved, in other than Group I-2 occupancies* elevator hoistway shall be pressurized in accordance with Section 909.21.
5. *[SFM] Enclosed elevator lobbies are not required where the hoistway door has a fire-protection rating as required by Section 708.7 and the hoistway door opening is also protected by a listed and labeled smoke containment system complying with ICC ES AC 77.*

3006.4 Means of egress. Elevator lobbies shall be provided with at least one means of egress complying with Chapter 10 and other provisions in this code. Egress through an elevator lobby shall be permitted in accordance with Item 1 of Section 1016.2.

SECTION 3007 FIRE SERVICE ACCESS ELEVATOR

3007.1 General. Where required by Section 403.6.1, every floor of the building shall be served by fire service access elevators complying with Sections 3007.1 through 3007.9. Except as modified in this section, fire service access elevators shall be installed in accordance with this chapter and

California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.

3007.2 Automatic sprinkler system. The building shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, except as otherwise permitted by Section 903.3.1.1.1 and as prohibited by Section 3007.2.1.

3007.2.1 Prohibited locations. Automatic sprinklers shall not be installed in machine rooms, elevator machinery spaces, control rooms, control spaces and elevator hoistways of fire service access elevators.

3007.2.2 Sprinkler system monitoring. The sprinkler system shall have a sprinkler control valve supervisory switch and water-flow-initiating device provided for each floor that is monitored by the building's fire alarm system.

3007.3 Water protection. An approved method to prevent water from infiltrating into the hoistway enclosure from the operation of the automatic sprinkler system outside the enclosed fire service access elevator lobby shall be provided.

3007.4 Shunt trip. Means for elevator shutdown in accordance with Section 3005.5 shall not be installed on elevator systems used for fire service access elevators.

3007.5 Hoistway enclosures. The fire service access elevator hoistway shall be located in a shaft enclosure complying with Section 713.

3007.5.1 Structural integrity of hoistway enclosures. The fire service access elevator hoistway enclosure shall comply with Sections 403.2.3.1 through 403.2.3.4.

3007.5.2 Hoistway lighting. When fire-fighters' emergency operation is active, the entire height of the hoistway shall be illuminated at not less than 1 footcandle (11 lux) as measured from the top of the car of each fire service access elevator.

3007.6 Fire service access elevator lobby. The fire service access elevator shall open into a fire service access elevator lobby in accordance with Sections 3007.6.1 through 3007.6.5. Egress is permitted through the elevator lobby in accordance with Item 1 of Section 1016.2.

Exception: Where a fire service access elevator has two entrances onto a floor, the second entrance shall be permitted to open into an elevator lobby in accordance with Section 3006.3.

3007.6.1 Access to smokeproof enclosure. The fire service access elevator lobby shall have direct access *from the enclosed elevator lobby to a smokeproof enclosure complying with Section 909.20.*

Exception: Access to *smokeproof enclosure* shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance Section 716.5.3.

3007.6.2 Lobby enclosure. The fire service access elevator lobby shall be enclosed with a smoke barrier having a

suction outlet or suction outlets of the existing swimming pool, toddler pool, or spa be upgraded so as to be equipped with antientrapment grates, as specified in the ANSI/APSP-16 performance standard or a successor standard designated by the federal Consumer Product Safety Commission.

*Authority: Health and Safety Code Section 18942(b)
Reference: Health and Safety Code Section 115928 AB 3305 (Statutes 1996, c.925); AB 2977 (Statutes 2006, c.478); AB 478 (Statutes 2007, c.596)*

3109.5 Entrapment avoidance. Suction outlets shall be designed and installed in accordance with ANSI/APSP-7.

3109.6 Informative documents.

1. *The Legislature encourages a private entity, in consultation with the Epidemiology and Prevention for Injury Control Branch of the department, to produce an informative brochure or booklet, for consumer use, explaining the child drowning hazards of, possible safety measures for, and appropriate drowning hazard prevention measures for, home swimming pools and spas, and to donate the document to the department.*
2. *The Legislature encourages the private entity to use existing documents from the United States Consumer Product Safety Commission on pool safety.*
3. *If a private entity produces the document described in Subdivisions 1 and 2 and donates it to the department, the department shall review and approve the brochure or booklet.*
4. *Upon approval of the document by the department, the document shall become the property of the state and a part of the public domain. The department shall place the document on its Web site in a format that is readily available for downloading and for publication. The department shall review the document in a timely and prudent fashion and shall complete the review within 18 months of receipt of the document from a private entity.*

SECTION 3110 AUTOMATIC VEHICULAR GATES

3110.1 General. Automatic vehicular gates shall comply with the requirements of Sections 3110.2 through 3110.4 and other applicable sections of this code.

3110.2 Definition. The following term is defined in Chapter 2:
VEHICULAR GATE.

3110.3 Vehicular gates intended for automation. Vehicular gates intended for automation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

3110.4 Vehicular gate openers. Vehicular gate openers, where provided, shall be listed in accordance with UL 325.

SECTION 3111 PHOTOVOLTAIC PANELS AND MODULES

3111.1 General. Photovoltaic panels and modules shall comply with the requirements of this code and the *California Fire Code*.

3111.1.1 Rooftop-mounted photovoltaic panels and modules. Photovoltaic panels and modules installed on a roof or as an integral part of a roof assembly shall comply with the requirements of Chapter 15 and the *California Fire Code*.

3111.2 Access and pathways. *Roof access, pathways and spacing requirements shall be provided in accordance with California Fire Code Sections 605.11.1 through 605.11.1.3.3. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduit, or mechanical equipment.*

Exceptions:

1. *Detached, nonhabitable Group U structures including, but not limited to, detached garages serving Group R-3 buildings, parking shade structures, carports, solar trellises and similar structures.*
2. *Roof access, pathways, and spacing requirements need not be provided where the fire code official has determined rooftop operations will not be employed.*

3111.2.1 Solar photovoltaic systems for Group R-3 buildings. *Solar photovoltaic systems for Group R-3 buildings shall comply with California Fire Code Sections 605.11.1.2.1 through 605.11.1.2.5.*

Exceptions:

1. *These requirements shall not apply to structures designed and constructed in accordance with the California Residential Code.*
2. *These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (2: 12) or less.*

3111.2.3 Other than Group R-3 buildings. *Access to systems for buildings other than those containing Group R-3 occupancies shall be provided in accordance with Sections 3111.2.3.1 through 3111.2.3.3.*

Exception: *Where it is determined by the fire code official that the roof configuration is similar to that of a Group R-3 occupancy, the residential access and ventilation requirements in Sections 3111.2.2.1 through 3111.2.2.5 shall be permitted to be used.*

3111.2.3.1 Access. *There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.*

Exception: *Where either axis of the building is 250 feet (76 200 mm) or less, the clear perimeter around the edges of the roof shall be a minimum 4-foot-wide (1290 mm).*

3111.2.3.2 Pathways. *The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:*

1. *The pathway shall be over areas capable of supporting the live load of fire fighters accessing the roof.*
2. *The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof.*
3. *Shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes or ventilation hatches.*
4. *Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.*

3111.2.3.3 Smoke ventilation. *The solar installation shall be designed to meet the following requirements:*

1. *Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.*
2. *Smoke ventilation options between array sections shall be one of the following:*
 - 2.1. *A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or gravity-operated dropout smoke and heat vents on not less than one side.*
 - 2.2. *A 4-foot (1290 mm) or greater in width pathway and bordering all sides of nongravity-operated dropout smoke and heat vents on not less than one side.*
 - 2.4. *A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) “venting cutouts” every 20 feet (6096 mm) on alternating sides of the pathway.*

3111.3 Ground-mounted photovoltaic arrays. *Ground-mounted photovoltaic arrays shall comply with this section and the California Electrical Code. Setback requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground-mounted photovoltaic arrays.*

(25 mm) high, “Children under the age of 14 shall not use pool without a parent or adult guardian in attendance.”

Exception: “No lifeguard sign” requirement does not apply to spray grounds that have no standing water.

3120B.5 Artificial respiration and cardiopulmonary resuscitation sign. An illustrated diagram with text at least $\frac{1}{4}$ inch (6 mm) high of artificial respiration and cardiopulmonary resuscitation procedures shall be posted.

3120B.6 Emergency sign. The emergency telephone number 911 with numbers not less than 4 inches (102 mm), the number of the nearest emergency services and the name and street address of the pool facility with numbers and text not less than 1 inch (25 mm) shall be posted.

3120B.7 Warning sign for a spa pool. A warning sign for spa pools shall be posted stating, “CAUTION” and shall include the following language in letters at least 1 inch (25 mm) high:

1. Elderly persons, pregnant women, infants and those with health conditions requiring medical care should consult with a physician before entering the spa.
2. Unsupervised use by children under the age of 14 is prohibited.
3. Hot water immersion while under the influence of alcohol, narcotics, drugs or medicines may lead to serious consequences and is not recommended.
4. Do not use alone.
5. Long exposure may result in hyperthermia, nausea, dizziness or fainting.

3120B.8 Emergency shut off. In letters at least one inch (25 mm) high a sign shall be posted at the spa emergency shut off switch stating, “EMERGENCY SHUT OFF SWITCH.”

3120B.9 No use after dark. Where pools were constructed for which lighting was not required, a sign shall be posted at each pool entrance on the outside of the gate(s) stating, “NO USE OF POOL ALLOWED AFTER DARK.”

3120B.10 Keep closed. A sign shall be posted on the exterior side of gates and doors leading into the pool enclosure area stating, “KEEP GATE CLOSED.” or “KEEP DOOR CLOSED.”

[DSA-AC] Additional requirements may apply. Refer to Chapter 11B for accessibility provisions applicable to public accommodations, commercial buildings and public housing.

3120B.11 Diarrhea. The pool operator shall post at the entrance area of a public pool a sign in letters at least 1 inch (25 mm) high that clearly states that persons with diarrhea and persons who have had diarrhea within the prior 14 days shall not enter the pool water.

3120B.12 Wave pools. A sign in letters at least 1 inch (25 mm) high shall be posted that describes the requirements for wave pools as described in Section 115952, Health and Safety Code.

3120B.13 Spray ground sign. A sign shall be posted at each spray ground and be visible from any part of the spray ground that states, “CAUTION: WATER IS RECIRCULATED. DO NOT DRINK.”

3120B.14 Exit. Where automatic gaseous chlorine chemical feeders are used, a sign shall be posted at the pool area entrance which shows in a diagrammatic form an emergency evacuation procedure. Designated emergency exits shall be marked “EXIT.”

3120B.15 Gaseous oxidizer. Where automatic gaseous chlorine chemical feeders are used, a warning sign with the appropriate hazard identification symbol shall be posted on the exterior side of the door entering the chemical feeder room or area. The sign shall state, “DANGER: GASEOUS OXIDIZER - (specific chemical name)” or as otherwise required by the California Fire Code.

3120B.16 Turn on before entering. Where automatic gaseous chemical feeders are used, a sign shall be posted at the switch to the light and ventilation system for the gaseous chemical feeder room stating, “TURN ON BEFORE ENTERING,” or as otherwise required by the California Fire Code or the California Electrical Code.

3120B.17 Direction of flow.

3120B.17.1. The direction of flow for the recirculation equipment shall be labeled clearly with directional symbols such as arrows on all piping in the equipment area.

3120B.17.2. Where the recirculation equipment for more than one pool is located on site, the equipment shall be marked as to which pool the system serves.

3120B.17.3. Valves and plumbing lines shall be labeled clearly with the source or destination descriptions.

SECTION 3121B INDOOR POOL VENTILATION

Indoor pools, dressing rooms and toilet rooms shall be ventilated according to the requirements in Chapter 4 of the California Mechanical Code.

SECTION 3122B POOL EQUIPMENT ENCLOSURE

For pools constructed on or after January 1, 2013, pool equipment shall be enclosed as follows:

1. All equipment installed for recirculation, filtration and disinfection of pool water shall be installed so that access is limited to persons authorized by the pool owner or operator; and
2. Pool equipment shall be mounted on a continuous slab of concrete or other equivalent easily cleanable and nonabsorbent material; and
3. Floors shall be sloped a minimum of $\frac{1}{4}$ inch (6.4 mm) per foot to a drain.

SECTION 3123B GENERAL REQUIREMENTS

3123B.1 System description. Each pool shall be provided with a separate recirculation system designed for the continuous recirculation, filtration and disinfection of the pool water. The system shall consist of pumps, filters, chemical feeders, skimmers or perimeter overflow systems, valves, pipes, connections, fittings and appurtenances.

Exception: Pools using fresh water equivalent in flow to the requirements of Section 3124B.

Note: Fresh makeup pool water shall conform to the water quality standards of Section 65531, Chapter 20, Title 22, California Code of Regulations.

3123B.2 Equipment. All pumps, filters, chemical feeders, skimmers and supplemental equipment shall comply with the applicable requirements established by the NSF/ANSI 50-2012 performance standard effective September 2012.

3123B.3 Installation. All equipment related to pool operations shall be installed and maintained according to this chapter and in accordance with the equipment manufacturer's written instructions.

3123B.4 Equipment access. All filters, valves, pumps, strainers and equipment shall be readily accessible for repair and replacement.

SECTION 3124B TURNOVER TIME

The recirculation system shall have the capacity to provide a complete turnover of pool water in:

1. One-half hour or less for a spa pool; and
2. One-half hour or less for a spray ground; and
3. One hour or less for a wading pool; and
4. Two hours or less for a medical pool; and
5. Six hours or less for all other types of public pools.

SECTION 3125B RECIRCULATION PIPING SYSTEM AND COMPONENTS

3125B.1 Line sizes. Pipes shall be sized so flow velocity of piping systems including all pipes and fittings other than inlet devices or venturi throats shall not exceed 6 feet per second (1.829 m/s) in any suction or copper piping and 8 feet per second (2.438 m/s) in any portion of the return system.

3125B.1.1 Materials. All piping, tubing and fittings shall comply with the applicable standards for potable water system materials set forth in Chapter 6 of the California Plumbing Code.

3125B.2 Gauges. A pressure and vacuum gauge shall be provided for each pump system. Each gauge shall have a scale range approximately $1\frac{1}{4}$ times the maximum anticipated working pressure or vacuum and shall be accurate within 2

percent of scale. The pressure gauge located on the filter shall be marked with the clean start up pressure reading.

3125B.3 Flow meter. A flow meter shall be provided on each recirculation system accurate to within 10 percent of flow and installed according to the manufacturer's written instructions with increments in the range of normal flow.

3125B.4 Basket strainer. A basket strainer shall be provided on the suction side of the recirculation pump. A basket strainer will not be required on pumps connected to vacuum filters where the filter elements are not removed for cleaning.

3125B.5 Backwash piping. Piping, including necessary valves conforming to Section 3125B.1, shall be provided for each filter vessel or element which requires periodic backwashing.

3125B.6 Valves. Valves shall not be located in any deck area surrounding a pool. Valves shall be installed on all recirculation, backwashing and drain system lines which require shut-off isolation, adjustment or control of the rate of flow. Each valve shall be installed in the equipment area and labeled as to its purpose.

SECTION 3126B RECIRCULATION PUMP CAPACITY

3126B.1 Pool recirculation pumps shall have the following total dynamic head capacities:

1. **Pressure diatomaceous earth filters.** At least 60 feet (18,288 mm); and
2. **Vacuum diatomaceous earth filters.** Twenty inches (508 mm) vacuum on the suction side and 40 feet (12,192 mm) total dynamic head; and
3. **Rapid sand filters.** At least 45 feet (13,716 mm); and
4. **High rate sand filters.** At least 60 feet (18,288 mm); and
5. **Cartridge filters.** At least 60 feet (18,288 mm).

3126B.2. Pumps with other total dynamic head capacities shall be permitted provided the turnover times are maintained as required in Section 3124B.

SECTION 3127B WATER SUPPLY INLETS

3127B.1 General. Each pool shall be supplied with potable water by means of a permanently installed pipeline from a public water supply system holding a permit from the California Department of Public Health or from a source approved by the enforcing agent.

3127B.2 Backflow prevention. There shall be no direct connection between any potable water supply system and the pool or its piping system unless protected by a backflow prevention device in accordance with Chapter 6 of the California Plumbing Code.

3127B.3 Makeup water. Automatic makeup water flow controls with a manual override control shall be provided to maintain the proper pool water level.

CHAPTER 35

REFERENCED STANDARDS

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in *Chapter 1, Scope and Administration, Division 1, Sections 1.1.5 and 1.1.7, and in Chapter 1, Scope and Administration, Division II, Section 102.4, as applicable.*

[DSA-SS, DSA-SS-CC & OSHPD 1 & 4] Reference to other chapters. *In addition to the code sections referenced, the standards listed in this chapter are applicable to the respective code sections in Chapters 16A, 17A, 18A, 19A, 21A and 22A.*

Standard reference number	Title	Referenced in code section number
ADM1—2015	Aluminum Design Manual: Part 1—A Specification for Aluminum Structures	1604.3.5, 2002.1
ASM 35—00	Aluminum Sheet Metal Work in Building Construction (Fourth Edition)	2002.1

AAMA American Architectural Manufacturers Association
1827 Waldon Office Square, Suite 550
Schaumburg, IL 60173

Standard reference number	Title	Referenced in code section number
1402—86	Standard Specifications for Aluminum Siding, Soffit and Fascia	1404.5.1
AAMA/WDMA/CSA 101/I.S.2/A440—08	North American Fenestration Standard/Specifications for Windows, Doors and Skylights	1709.5.1, 2405.5
501.4-09	<i>Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts</i>	2410.1
501.6-09	<i>Recommended Dynamic Test Method for Determining the Seismic Drift Causing Glass Fallout from a Wall</i>	2410.1

ACI American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331

Standard reference number	Title	Referenced in code section number
216.1—14	Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	Table 721.1(2), 722.1
318—14	Building Code Requirements for Structural Concrete	1604.3.2, 1615.3.1, 1615.4.1, 1704.5, Table 1705.3, 1705.3.2, 1705.12.1, 1808.8.2, Table 1808.8.2, 1808.8.5, 1808.8.6, 1810.1.3, 1810.2.4.1, 1810.3.2.1.1, 1810.3.2.1.2, 1810.3.8.3.1, 1810.3.8.3.3, 1810.3.9.4.2.1, 1810.3.9.4.2.2, 1810.3.10.1, 1810.3.11.1, 1901.2, 1901.3, 1902.1, 1903.1, 1904.1, 1904.2, 1905.1, 1905.1.1, 1905.1.2, 1905.1.3, 1905.1.4, 1905.1.5, 1905.1.6, 1905.1.7, 1905.1.8 1906.1, 2108.3, 2206.1, Table 1705A.2.1, Table 1705A.3, 1810A.3.10.4, 1901.3.4.4, 1903A, 1904A, 1905A, 1910A.5.4, 1909.2, 1909.3
355.2—07	<i>Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary</i>	1616A.1.19
355.4—11	<i>Qualification of Post-Installed Adhesive Anchors in Concrete</i>	1616A.1.19
440.2R-08	<i>Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures</i>	1911A.3
503.7—07	<i>Specification for Crack Repair by Epoxy Injection</i>	1911A.2
506—05	<i>Guide to Shotcrete</i>	1908A.1, 1908A.3, 1908A.12, 1911A.2
[DSA-SS] 506.2—13	<i>Specification for Shotcrete</i>	1908A.1, 1908A.9

REFERENCED STANDARDS

ACI—continued

530—13	Building Code Requirements for Masonry Structures	1405.6, 1405.6.1, 1405.6.2, 1405.10, 1604.3.4, 1705.4, 1705.4.1, 1807.1.6.3, 1807.1.6.3.2, 1808.9, 2101.2, 2106.1, 2107.1, 2107.2, 2107.3, 2107.4, 2108.1, 2108.2, 2108.3, 2109.1, 2109.1.1, 2109.2, 2109.2.1, 2109.3, 2110.1, 2114.7, 2114.8, 2107A.5, 2107A.6
530.1—13	Specifications for Masonry Structures	1405.6.1, 1705.4, 1807.1.6.3, 2103.1, 2103. 2.1, 2103.3, 2103.4, 2105.1

AISC

American Institute of Steel Construction
One East Wacker Drive, Suite 700
Chicago, IL 60601-18021

Standard reference number	Title	Referenced in code section number
341—10	Seismic Provisions for Structural Steel Buildings	1613.4.1, 1705.12.1.1, 1705.12.1.2, 1705.13.1.2, 2205.2.1.1, 2205.2.1.2, 2205.2.2, 2206.2.1, 1705A.2.1, 1707.2.2, 1708.3, 2212.2, 2205A, 2206A
358-10	<i>Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications including Supplements No.1 & 2</i>	2205A, 2206A.2, 2212.3, 3413A
360—10	Specification for Structural Steel Buildings	722.5.2.2.1, 1604.3.3, 1705.2.1, 2203.1, 2203.2, 2205.1, 2205.2.1.1, 2206.1, 1705A.2.1, Table 1705A.2.1, 2212.1.1, 2204A.4, 2212A.1.2, 2212A.2.1

AISI

American Iron and Steel Institute
1140 Connecticut Avenue, 705
Suite 705
Washington, DC 20036

Standard reference number	Title	Referenced in code section number
AISI S100—12	North American Specification for the Design of Cold-formed Steel Structural Members, 2012	1604.3.3, 1905.1.8, 2203.1, 2203.2, 1905A.1, 1913.3.8, 2210A.2, 2211A.1, 2212A.1.2
AISI S110—07/ S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems—Special Moment Frames, 2007 with Supplement 1, dated 2009 (Reaffirmed 2012)	2210.2
AISI S200—12	North American Standard for Cold-Formed Steel Framing-General Provisions	2203.1, 2203.2, 2211.1, Table 2603.12.1, Table 2603.12.2
AISI S210—07(2012)	North American Standard for Cold-Formed Steel Framing-Floor and Roof System Design (Reaffirmed 2012)	2211.5
AISI S211—07/ S1-12(2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007 including Supplement 1, dated 2012 (Reaffirmed 2012)	2211.4
AISI S212—07(2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (Reaffirmed 2012)	2211.2
AISI S213—07/ S1-09 (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (Reaffirmed 2012)	2211.6
S214—12	North American Standard for Cold-formed Steel Framing-Truss Design, 2012	2211A.3, 2211.3.1, 2211.3.2, 2212.5.1.2
AISI S220—11	North American Standard for Cold-formed Steel Framing-Nonstructural Members.	2203.1, 2203.2, 2211.1, Table 2506.2, Table 2507.2
AISI S230—07/ S3-12(2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement 3, dated 2012 (Reaffirmed 2012)	1609.1.1, 1609.1.1.1, 2211.7

ALI

Automotive Lift Institute
P.O. Box 85
Courtland, NY 13045

Standard reference number	Title	Referenced in code section number
ALI ALCTV—2011	Standard for Automotive Lifts—Safety Requirements for Construction, Testing and Validation (ANSI)	3001.2

ASTM—continued

E84—2016	Test Methods for Surface Burning Characteristics of Building Materials. 202, 402.6.4.4, 406.7.2, 703.5.2, 720.1, 720.4, 803.1.1, 803.1.4, 803.10, 803.11, 806.7, 1404.12.1, 1407.9, 1407.10.1, 1409.9, 1409.10.1, 1510.6.2, 1510.6.3, 2303.2, 2603.3, 2603.4.1.13, 2606.3.5.4, 2603.7.1, 2603.7.2, 2603.7.3, 2604.2.4, 2606.4, 2612.3, 2614.3, 3105.4
E90—09	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 1207.2, 1207.2.1
E96/E96M—2013	Test Method for Water Vapor Transmission of Materials. 202
E108—2011	Test Methods for Fire Tests of Roof Coverings. 1505.1, 2603.6, 2610.2, 2610.3
E119—2012A	Standard Test Methods for Fire Tests of Building Construction and Materials 703.2, 703.2.1, 703.2.3, 703.3, 703.4, 703.6, 704.12, 705.7, 705.8.5, 711.3.2, 714.3.1, 714.4.1, 715.1, 716.2, Table 716.3, 716.5.6, 716.5.8.1.1, Table 716.6, 716.6.7.1, 717.5.2, 717.5.3, 717.6.1, 716.6.2.1, Table 721.1(1), 1409.10.2, 2103.1, 2603.5.1
E136—2012	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C. 703.5.1
E283—04	Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen 202
E330—02	Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference. 1409.10.2, 1709.5.2
E331—00 (2009)	Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference. 1403.2
E492—09	Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-ceiling Assemblies Using the Tapping Machine 1207.3
E580—14	<i>Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 1615.10.13, 1615A.1.16, 1616.1.16, 1616A.1.21</i>
E605—93 (2011)	Test Method for Thickness and Density of Sprayed Fire-resistive Material (SFRM) Applied to Structural Members. 1705.14.4.1, 1705.14.4.2, 1705.14.4.5, 1705.14.5
E648—04	<i>Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 804.4.1, 804.4.2</i>
E662—09	<i>Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials 804.4.1, 804.4.2</i>
E681—2009	Test Methods for Concentration Limits of Flammability of Chemical Vapors and Gases 202
E736—00 (2011)	Test Method for Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members 704.13.2, 1705.14.6
E814—2013	Test Method of Fire Tests of Through-penetration Firestops 202, 714.3.1.2, 714.3.2, 7143.4.1.1.2
E970—2010	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source 720.3.1
E1300—12AE1	Practice for Determining Load Resistance of Glass in Buildings 2404.1, 2404.2, 2404.3.1, 2404.3.2, 2404.3.3, 2404.3.4, 2404.3.5
E1354—2013	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter 424.2
E1592—05(2012)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 1504.3.2
E1602—02(2010)E1	Guide for Construction of Solid Fuel-burning Masonry Heaters. 2112.2
E1886—05	Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials 1609.1.2
E1966—07A(2011)	Test Method for Fire-resistant Joint Systems. 202, 715.3
E1996—2012A	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 1609.1.2, 1609.1.2.2
E2072—10	Standard Specification for Photoluminescent (Phosphorescent) Safety Markings 1025.3
E2174—10AE1	Standard Practice for On-Site Inspection of Installed Fire Stops 1705.17.1
E2178—13	Standard Test Method for Air Permeance of Building Materials 202
E2273—03(2011)	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies. 1408.4.1
E2307—2010	Standard Test Method for Determining Fire Resistance of a Perimeter Joint System Between an Exterior Wall Assembly and Floor Assembly Using the Intermediate-scale, Multistory Test Apparatus. 715.4
E2393—10A	Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barrier 1705.17.2
E2397—11	Standard Practice for Determination of Dead Loads and Live Loads Associated with Green Roof Systems. 1607.12.3.1
E2404—2013E1	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics 803.1.4

REFERENCED STANDARDS

ASTM—continued

E2556—10	Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment	1404.2, 2510.6
E2568—09e1	Standard Specification for PB Exterior Insulation and Finish Systems	1408.2
E2570—07	Standard Test Method for Evaluating Water-resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) for EIFS with Drainage	1408.4.1.1, 1705.16.1
E2573—12	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	803.13
E2599—11	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation Materials and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics	2614.3
E2632/E2632M—13	<i>Standard Test Method for Evaluating the Under-Deck Fire Test Response of Deck Materials</i>	709A.3, 709A.4, 709A.4.1, 709A.5
E2634—11	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	1903.4
E2707—15	<i>Standard Test Method for Determining Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure</i>	707A.3, 707A.3.1, 708A.3
E2726/E2726—12a	<i>Standard Test Method for Evaluating the Fire-Test-Response of Deck Structures to Burning Brands</i>	709A.3, 709A.4, 709A.4.2
E2751—11	Standard Practice for Design and Performance of Supported Glass Walkways	2409.1
E2886/E2886M—14	<i>Standard Test Method for Evaluating the Ability of Exterior Vents to Resist the Entry of Embers and Direct Flame Impingement</i>	706A.2, 706A.3
E2957—15	<i>Standard Test Method for Resistance to Wildfire Penetration of Eaves, Soffits and Other Projections</i>	707A.5, 707A.6, 707A.8, 707A.9
F547—(2012)	Terminology of Nails for Use with Wood and Wood-based Materials	Table 2506.2
F606—14	<i>Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators and Rivets</i>	2213A.1
F1292—99	<i>Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment</i>	11B-1008.2.6.2
F1292—04	<i>Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment</i>	11B-1008.2.6.2
F1487—01	<i>Standard Consumer Safety Performance Specification for Playground Equipment for Public Use</i>	202-USE ZONE
F1951—99	<i>Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment</i>	11B-1008.2.6.1
F1346—91 (2010)	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs	3109.4, 3109.4.1.8
F1667—11AE1	Specification for Driven Fasteners: Nails, Spikes and Staples	Table 721.1(2), Table 721.1(3), 1507.2.6, 1507.17.5, 2303.6, Table 2506.2
F2006—00 (2005) 10	Standard/Safety Specification for Window Fall Prevention Devices for Nonemergency Escape (Egress) and Rescue (Ingress) Windows	1015.8
F2090—10	Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms	1015.8, 1015.8.1
F2200—2013	Standard Specification for Automated Vehicular Gate Construction	3110.3
G152—06	Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials	1504.6
G154—06	Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials	1504.6
G155—05a	Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials	1504.6

AWC

American Wood Council
222 Catocin SE, Suite 201
Leesburg, VA 20175

Standard reference number	Title	Referenced in code section number
AWC WCD No. 4—2003	Wood Construction Data—Plank and Beam Framing for Residential Buildings	2306.1.2
AWC WFCM—2015	Wood Frame Construction Manual for One- and Two-Family Dwellings	1609.1.1, 1609.1.1.1, 2301.2, 2308.2.4, 2309.1
ANSI/AWC NDS—2015	National Design Specification (NDS) for Wood Construction with 2012 Supplement	202, 722.1, 722.6.3.2, Table 1604.3, 1711.1.1, 1711.1.2.1, 1809.12, 1810.3.2.4, Table 1810.3.2.6, 1905.1.8, 1905A.1.8, 2302.1, 2304.13, 2306.1, 2306.2, Table 2306.2(1), Table 2306.2(2), Table 2306.3(1), Table 2306.3(2), 2307.1
AWC STJR—2015	Span Tables for Joists and Rafters	2306.1.1, 2308.4.2.1, 2308.7.1, 2308.7.2
ANSI/AWC PWF—2015	Permanent Wood Foundation Design Specification	1805.2, 1807.1.4, 2304.10.5.2
AWC SDPWS—2015	Special Design Provisions for Wind and Seismic	202, 2305.1, 2305.2, 2305.3, 2306.2, 2306.3, Table 2306.3(1), Table 2306.3(3), 2307.1

ICC—continued

ICC-ES AC 70—15*	Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements	1616A.1.20
ICC-ES AC 77	Acceptance Criteria for Smoke Containment Systems Used with Fire-resistance-rated Elevator Hoistway Doors and Frames	707.14.1
ICC-ES AC 106—15*	Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry	1616A.1.19
ICC-ES AC 125—15*	Acceptance Criteria for Concrete, and Reinforced and Unreinforced Masonry Strengthening Using Externally Bonded Fiber-Reinforced Polymer (FRP) Composite Systems	1911A.3
ICC-ES AC 156—15*	Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components	1705A.13.3
ICC-ES AC 178—15*	Acceptance Criteria for Inspection and Verification of Concrete, and Reinforced and Unreinforced Masonry Strengthening Using Fiber-Reinforced Polymer (FRP) Composite Systems	1911A.3
ICC-ES AC 193—15*	Acceptance Criteria for Mechanical Anchors in Concrete Elements	1616A.1.19
ICC-ES AC 232—15*	Acceptance Criteria for Anchor Channels in Concrete Elements	1616A.1.19, 1901.3.2
ICC-ES AC 308—15*	Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements	1616A.1.19, 1901.3.3
ICC-ES AC 331	Acceptance Criteria for Smoke and Heat Vents	910.3.1
ICC-ES AC 358—15*	Acceptance Criteria for Helical Foundation Systems and Devices	1810A.3.1.5.1
ICC-ES AC 446—15*	Acceptance Criteria for Headed Cast-in Specialty Inserts in Concrete	1616A.1.19, 1901.3.2
SBCCI SSTD 11—97	Test Standard for Determining Wind Resistance of Concrete or Clay Roof Tiles	1504.2.1.1, 1504.2.1.2

* Refers to International Building Code, 2015 as a reference standard.

ISO

International Organization for Standardization
 ISO Central Secretariat
 1 ch, de la Voie-Creuse, Case Postale 56
 CH-1211 Geneva 20, Switzerland

Standard reference number	Title	Referenced in code section number
ISO 8115—86	Cotton Bales—Dimensions and Density	Table 307.1(1), Table 415.11.1.1.1
ISO 8336—09	Fiber-Cement Flat Sheets - Product Specification and Test Methods	1404.10, 1405.16.1, 1405.16.2, Table 2509.2
ISO 9001—15	Quality Management Systems - Requirements	1705A.13.3
ISO 17020-12	Conformity Assessment - Requirements for the Operation of Various Types of Bodies Performing Inspection	1704A.2
ISO 17025—05	General Requirement for Competence of Testing and Calibration Laboratories	1703A.4

MHI

Material Handling Institute
 8720 Red Oak Blvd. Suite 201
 Charlotte, NC 28217

Standard reference number	Title	Referenced in code section number
ANSI MH29.1—08	Safety Requirements for Industrial Scissors Lifts3001.2

NAAMM

National Association of Architectural Metal Manufacturers
 800 Roosevelt Road, Bldg. C, Suite 312
 Glen Ellyn, IL 60137

Standard reference number	Title	Referenced in code section number
FP 1001—07	Guide Specifications for Design of Metal Flag Poles	1609.1.1

NCMA

National Concrete Masonry Association
 13750 Sunrise Valley
 Herndon, VA 22071-4662

Standard reference number	Title	Referenced in code section number
TEK 5—84 (1996)	Details for Concrete Masonry Fire Walls	Table 721.1(2)



National Fire Protection Association
 1 Batterymarch Park
 Quincy, MA 02169-7471

Standard reference number	Title	Referenced in code section number
11—10	Low-, Medium- and High-Expansion Foam	904.7
12—11	Standard on Carbon Dioxide Extinguishing Systems	904.8, 904.11
12A—09	Standard on Halon 1301 Fire Extinguishing Systems	904.9
13—16	Installation of Sprinkler Systems, as amended*	708.2, 903.3.1.1, 903.3.2, 903.3.8.2 903.3.8.5, 904.11, 905.3.4, 907.6.4, 1019.3

***NFPA 13, Amended Sections as follows:**

**Revise Section 2.2 and add publications as follows:
 2.2 NFPA Publications.**

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2013 California edition.

Revise Section 8.15.1.2.15 as follows:

8.15.1.2.15 Exterior columns under 10 ft² (0.93 m²) in total area, formed by studs or wood joist, with no sources of ignition within the column, supporting exterior canopies that are fully protected with a sprinkler system, shall not require sprinkler protection.

Add new Section 8.15.5.3 to read as follows:

8.15.5.3 Automatic sprinkler system. Automatic sprinklers shall not be required to be installed in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room where all the following are met:

1. Approved smoke detectors shall be installed and connected to the building fire alarm system in accordance with Section 907 in the area where the fire sprinkler was removed per this section.
2. Activation of any smoke detector located in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room shall cause the actuation of the building fire alarm notification appliances in accordance with 907.
3. Activation of any smoke detector located in the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room shall cause all elevators having any equipment located in that elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room to recall nonstop to the appropriate designated floor in accordance with CCR Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.
4. The elevator machine room, elevator machinery space, elevator control space, or elevator control room shall be enclosed with fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 712, or both. The fire-resistance rating shall not be less than the required rating of the hoistway enclosure served by the machinery. Openings in the fire barriers shall be protected with assemblies having a fire protection rating not less than that required for the hoistway enclosure doors. The exceptions to Section 3005.4 shall not apply.
5. The building fire alarm system shall be monitored by an approved supervising station in accordance with 907.
6. An approved sign shall be permanently displayed in the room where the fire sprinkler was removed per this section in a conspicuous location with a minimum of 1½ inch letters on a contrasting background, stating:

**NO COMBUSTIBLE STORAGE
 PERMITTED IN THIS ROOM**
 By Order of the Fire Marshal [or name of fire authority]

Add new Section 8.15.5.6.1 as follows:

8.15.5.6.1 The sprinkler required at the top and bottom of the elevator hoistway by 8.15.5.6 shall not be required where permitted by Chapter 30 of the California Building Code.

Revise Section 8.15.7.1* as follows:

8.15.7.1* Unless the requirements of 8.15.7.2 or 8.15.7.3 are met, sprinklers shall be installed under exterior roofs, canopies, porte-cochere, balconies, decks, or similar projections exceeding 4 ft (1.2 m) in width.

Revise Section 8.15.7.2* as follows:

8.15.7.2* Sprinklers shall be permitted to be omitted where the exterior canopies, roofs, porte-cocheres, balconies, decks, or similar projections are constructed with materials that are noncombustible, limited-combustible, or fire retardant treated wood as defined in NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*.

Delete Section A.8.15.7.2 of Annex

NFPA—continued

Revise Section 8.15.7.3

8.15.7.3 Sprinklers shall be permitted to be omitted from below the canopies, roofs, balconies, decks, or similar projections are combustible construction, provided the exposed finish material on the roof, or canopy is noncombustible, limited-combustible, or fire retardant treated wood as defined in NFPA 703, *Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials*, and the roofs, or canopies contains only sprinklered concealed spaces or any of the following unsprinklered combustible concealed spaces:

- (1) *Combustible concealed spaces filled entirely with noncombustible insulation.*
- (2) *Light or ordinary hazard occupancies where noncombustible or limited-combustible ceilings are directly attached to the bottom of solid wood joists so as to create enclosed joist spaces 160 ft³ (4.5 m³) or less in volume, including space below insulation that is laid directly on top or within the ceiling joists in an otherwise sprinklered attic [See 11.2.3.1.5.2(9)].*
- (3) *Concealed spaces over isolated small roofs, or canopies not exceeding 55 ft² (5.1 m²).*

Delete language to Section 8.15.7.4 and reserve Section number.

8.15.7.4. Reserved.

Revise Annex Section A.8.15.7.5 as follows:

A.8.15.7.5 The presence of planters, newspaper machines and *similar items*, should not be considered storage.

Add Section 8.15.7.6 as follows:

8.15.7.6 *Sprinklers may be omitted for following structures:*

- (1) *Solar photovoltaic panel structures with no use underneath. Signs may be provided, as determined by the enforcing agency prohibiting any use underneath including storage.*
- (2) *Solar photovoltaic (PV) panels supported by framing that have sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency.*

Add new Sections 8.16.1.1.4 and 8.16.1.1.5 as follows:

8.16.1.1.4 *Where a system includes floor control valves, a hydraulic design information sign containing information for the floor shall be provided at each floor control valve. A hydraulic design information sign shall be provided for each area calculated. The installing contractor shall identify a hydraulically designed sprinkler system with a permanently marked weatherproof metal or rigid plastic sign secured with corrosion resistant wire, chain, or other approved means. Such signs shall be placed at the alarm valve, dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area.*

8.16.1.1.5 *Control valves, check valves, drain valves, antifreeze valves shall be readily accessible for inspection, testing, and maintenance. Valves located more than 7 feet above the finished floor shall be provided with a means of opening and closing the valve from the floor level.*

Add new Sections 8.16.1.6, 8.16.1.6.1, 8.16.1.6.1.1, 8.16.1.6.1.2, 8.16.1.6.1.3 and 8.16.1.6.2, as follows:

8.16.1.6 Sectional Valves.

8.16.1.6.1 Private fire service main systems shall have sectional control valves at appropriate points in order to permit sectionalizing the system in the event of a break or for the making of repairs or extensions.

8.16.1.6.1.1 *Sectional control valves are not required when the fire service main system serves less than six fire appurtenances.*

8.16.1.6.1.2 *Sectional control valves shall be indicating valves in accordance with Section 6.6.1.3.*

8.16.1.6.1.3 *Sectional control valves shall be located so that no more than five fire appurtenances are affected by shut-down of any single portion of the fire service main. Each fire hydrant, fire sprinkler system riser, and standpipe riser shall be considered a separate fire appurtenance. In-rack sprinkler systems shall not be considered as a separate appurtenance.*

8.16.1.6.1.4 *The number of fire appurtenances between sectional control valves is allowed to be modified by the authority having jurisdiction.*

8.16.1.6.2 A valve shall be provided on each bank where a main crosses a body of water or outside the building foundation(s) where the main or section of main runs under a building.

Add new Section 9.1.3.9.1.1 as follows:

9.1.3.9.1.1 *Power-driven studs used for attaching hangers to the building structure are prohibited in Seismic design Categories C, D, E and F*

Revise Section 9.3.5.11.4 as follows:

9.3.5.11.4 *Where threaded pipe is used for sway bracing, it shall have a wall thickness of not less than Schedule 40.*

Replace Section 9.3.5.12.5 as follows:

9.3.5.12.5 *Lag screws or power-driven fasteners shall not be used to attach braces to the building structure.*

Replace Section 9.3.5.12.6 as follows:

9.3.5.12.6 *Fastening methods other than those identified in 9.3.5.12 shall not apply to other fastening methods, which shall be acceptable for use if certified by a registered professional engineer to support the loads determined in accordance with the criteria in 9.3.5.9. Calculations shall be submitted to the authority having jurisdiction.*

NFPA—continued

Revise Section 9.3.5.12.8.4 as follows:

9.3.5.12.8.4 Concrete anchors other than those shown in Table 9.3.5.12.2(a) through Table 9.3.5.12.2(f) and identified in 9.3.5.11.11 shall be acceptable for use where designed in accordance with the requirements of the building code and certified by a registered professional engineer.

Revise Section 9.3.6.1(3) as follows:

9.3.6.1*(3) No. 12, 440 lb (200 Kg) wire installed at least 45 degrees from the vertical plane and anchored on both sides of the pipe. Power-driven fasteners for attaching restraint is allowed to be used provided that the restraint component does not support the dead load.

Revise Section 10.4.3.1.1 as follows:

10.4.3.1.1 Pipe joints shall not be located under foundation footings. The pipe under the building or building foundation shall not contain mechanical joints.

Exceptions:

1. Where allowed in accordance with 10.4.3.2
2. Alternate designs may be utilized where designed by a registered professional engineer and approved by the enforcing agency.

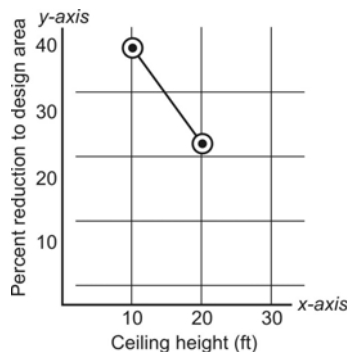
Revise Section 11.2.3.1.5.2(9) as follows:

11.2.3.1.5.2(9) Exterior columns under 10 ft² (0.93 m²) in total area, formed by studs or wood joist, with no sources of ignition within the column, supporting exterior canopies that are fully protected with a sprinkler system.

Revise Section 11.2.3.2.3.1 as follows:

11.2.3.2.3.1 Where listed quick-response sprinklers, excluding extended coverage quick-response sprinklers, are used throughout a system or portion of a system having the same hydraulic design basis, the system area of operation shall be permitted to be reduced without revising the density as indicated in Figure 11.2.3.2.3.1 when all of the following conditions are satisfied:

- (1) Wet pipe system.
- (2) Light hazard occupancy.
- (3) 20 ft (6.1 m) maximum ceiling height.
- (4) There are no unprotected ceiling pockets as allowed by 8.6.7 and 8.8.7 exceeding 32 ft² (3 m²).



Note: $y = \frac{-3x}{2} + 55$

For ceiling height ≥ 10 ft and ≤ 20 ft, $y = \frac{-3x}{2} + 55$

For ceiling height < 10 ft, $y = 40$

For ceiling height > 20 ft, $y = 0$

For SI units, 1 ft = 0.31 m.

Revise Section 11.2.3.2.3.2 as follows:

11.2.3.2.3.2 The number of sprinklers in the design area shall never be less than seven.

Revise Section 12.1.1.2 as follows:

12.1.1.2 Early suppression fast-response (ESFR) sprinklers shall not be used in buildings with automatic heat or smoke vents unless the vents use a standard-response operating mechanism with a minimum temperature rating of 360°F (182°C) or 100°F (56°C) above the operating temperature of the sprinklers, whichever is higher.

Revise Section 25.1 as follows:

25.1 Approval of Sprinkler Systems and Private Fire Service Mains.

The installing contractor shall do the following:

- (1) Notify the authority having jurisdiction and the property owner or property owner’s authorized representative of the time and date testing will be performed.
- (2) Perform all required testing (see Section 25.2).

NFPA—continued

- (3) Complete and sign the appropriate contractor’s material and test certificate(s) (*see Figure 25.1*).
- (4) Remove all caps and straps prior to placing the sprinkler system in service.
- (5) Upon system acceptance by the authority having jurisdiction a label prescribed by Title 19 California Code of Regulations, Chapter 5 shall be affixed to each system riser.

Revise Section 25.4 as follows:

25.4 Instructions.

The installing contractor shall provide the property owner or the property owner’s authorized representative with the following:

- (1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.
- (2) NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2013 California Edition*.
- (3) Title 19, California Code of Regulations, Chapter 5, “Fire Extinguishing Systems.”

Revise Section 25.5.1 as follows:

25.5.1 The installing contractor shall identify a hydraulically designed sprinkler system with a permanently marked weatherproof metal or rigid plastic sign secured with corrosion resistant wire, chain, or other approved means. Such signs shall be placed at the alarm valve, dry pipe valve, preaction valve, or deluge valve supplying the corresponding hydraulically designed area. *“Pipe schedule systems shall be provided with a sign indicating that the system was designed and installed as a pipe schedule system and the hazard classification(s) included in the design.”*

Revise Section 25.5.2 as follows:

25.5.2 The sign shall include the following information:

- (1) Location of the design area or areas
- (2) Discharge densities over the design area or areas
- (3) Required flow and pressure of the system at the base of the riser
- (4) Occupancy classification or commodity classification and maximum permitted storage height and configuration
- (5) Hose stream allowance included in addition to the sprinkler demand
- (6) The name of the installing contractor
- (7) Required flow and pressure of the system at the water supply source.
- (8) Required flow and pressure of the system at the discharge side of the fire pump where a fire pump is installed.
- (9) Type or types and number of sprinklers or nozzles installed including the orifice size, temperature rating, orientation, K-Factor, sprinkler identification number (SIN) for sprinkler heads when applicable, and response type.
- (10) The minimum discharge flow rate and pressure required from the hydraulically most demanding sprinkler.
- (11) The required pressure settings for pressure reducing valves.
- (12) For deluge sprinkler systems, the required flow and pressure at the hydraulically most demanding sprinkler or nozzle.
- (13) The protection area per sprinkler based on the hydraulic calculations
- (14) The edition of NFPA 13 to which the system was designed and installed.

Revise Section 25.6.1 as follows:

25.6.1 *The installing contractor shall provide a general information sign used to determine system design basis and information relevant to the inspection, testing, and maintenance requirements required by NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2013 California Edition.*

13D—16

Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes as amended*903.3.1.3

***NFPA 13D, Amended Sections as follows:**

Revise Section 6.2.2 to read as follows:

6.2.2 Where a well, pump, tank or combination thereof is the source of supply for a fire sprinkler system, the configuration for the system shall be one of the following:

- (1) The water supply shall serve both domestic and fire sprinkler systems.
 - (a) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest sprinkler on the system. The connection shall return water to the tank.
 - (b) Any disconnecting means for the pump shall be approved.
 - (c) A method for refilling the tank shall be piped to the tank.
 - (d) A method of seeing the water level in the tank shall be provided without having to open the tank.
 - (e) The pump shall not be permitted to sit directly on the floor.

NFPA—continued

(2) A stand-alone tank is permitted if the following conditions are met:

- (a) The pump shall be connected to a 220-volt circuit breaker shared with a common house hold appliance (E.g. range, oven, dryer),
- (b) The pump shall be a stainless steel 240-volt pump,
- (c) A valve shall be provided to exercise the pump. The discharge of the exercise valve shall drain to the tank, and
- (d) A sign shall be provided stating: “Valve must be opened monthly for 5 minutes.”
- (e) A means for automatically refilling the tank level, so that the tank capacity will meet the required water supply duration in minutes, shall be provided.
- (f) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest sprinkler on the system. The connection may return water to the tank.
- (g) Any disconnecting means for the pump shall be approved.
- (h) A method for refilling the tank shall be piped to the tank.
- (i) A method of seeing the water level in the tank shall be provided without having to open the tank.
- (j) The pump shall not be permitted to sit directly on the floor.

Add new Section 6.2.2.1 as follows:

6.2.2.1 Where a fire sprinkler system is supplied by a stored water source with an automatically operated means of pressurizing the system other than an electric pump, the water supply may serve the sprinkler system only.

Add new Section 6.2.4 as follows:

6.2.4 Where a water supply serves both domestic and fire sprinkler systems, 5 gpm (19 L/min) shall be added to the sprinkler system demand at the point where the systems are connected, to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler. For multipurpose piping systems, the 5 gpm (19 L/min) demand shall be added at the domestic connection nearest the design area. This demand may be split between two domestic connections at 2.5 gpm (10 L/min) each.

Revise Section 8.3.4 to read as follows:

8.3.4* Sprinklers shall not be required in detached garages, open attached porches, carports with no habitable space above, and similar structures.

Add new Sections 8.3.10 and 8.3.10.1 as follows:

8.3.10 Solar photovoltaic panel structures

8.3.10.1 Sprinklers shall be permitted to be omitted from the following structures:

- (1) Solar photovoltaic panel structures with no use underneath. Signs may be provided, as determined by the enforcing agency prohibiting any use underneath including storage.
- (2) Solar photovoltaic (PV) panels supported by framing that have sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency.

13R—16

Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height as amended* 903.3.1.2, 903.3.5.1.1, 903.3.5.1.2, 903.4

***NFPA 13R, Amended Sections as follows:**

Revise Section 2.2 and add publications as follows:

2.2 NFPA Publications.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2013 California edition.

Add new Sections 6.6.10 and 6.10.1 as follows:

6.6.10 Solar photovoltaic panel structures

6.6.10.1 Sprinklers shall be permitted to be omitted from the following structures:

- (1) Solar photovoltaic panel structures with no use underneath. Signs may be provided, as determined by the enforcing agency prohibiting any use underneath including storage.
- (2) Solar photovoltaic (PV) panels supported by framing that have sufficient uniformly distributed and unobstructed openings throughout the top of the array (horizontal plane) to allow heat and gases to escape, as determined by the enforcing agency.

Revise Section 11.4 as follows:

11.4 Instructions.

The installing contractor shall provide the property owner or the property owner's authorized representative with the following:

- (1) All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.

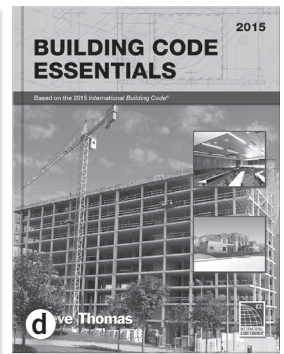
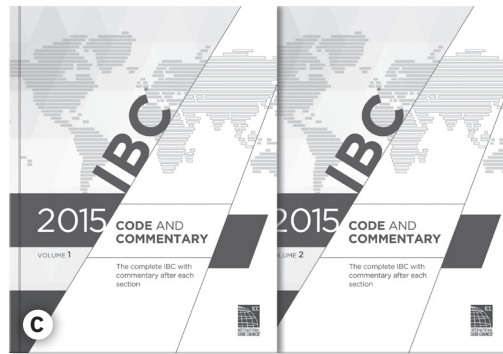
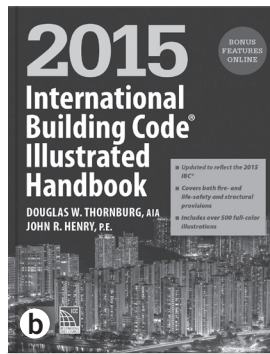
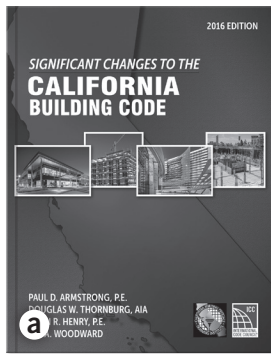
HISTORY NOTE APPENDIX

California Building Code Title 24, Part 2, California Code of Regulations (CCR)

HISTORY:

For prior code history, see the History Note Appendix to the *California Building Code* 2013 Triennial Edition, effective January 1, 2014.

1. (BSC 05/15, SFM 06/15, DSA-AC 01/15, DSA-SS 02/15, HCD 03/15, OSHPD 02/15 & 04/15, SLC 01/15) - Adopt the 2015 edition of the *International Building Code* published by the International Code Council, for incorporation into the 2016 *California Building Code*, CCR Title 24, Part 2 with amendments for State regulated occupancies, effective on January 1, 2017.
2. Errata to correct editorial errors within the preface as well as throughout various chapters in this code. Effective January 1, 2017.
3. Rulemaking file numbers BSC EF 01-17, HCD EF 01-17: Emergency regulations amend Sections 107.2.7, 110.3.8.1, Table 1607.1, 2304.12.2.5, and 2304.12.2.6. Approved as an emergency on January 27, 2017, effective upon filing with Secretary of State on January 30, 2017.
4. Rulemaking file number DSA-SS/CC EF 01-17: Emergency regulations amend Sections 1.9.2.1, 1.9.2.2, 107.2.7, 110.3.8.1, 1616.5.1.2 – 1616.5.1.5, Table 1607A.1, 2304.12.2.5, and 2304.12.2.6 approved as an emergency on January 27, 2017, effective upon filing with Secretary of State on January 30, 2017.
5. Errata to correct editorial errors throughout the code. Effective September 1, 2017.
6. 2016 Intervening Cycle update; BSCC 01/16, CDPH 01/16, DSA-SS 02/16, OSHPD 02/16, SFM 01/16— Approved by the California Building Standards Commission on August 14, 2017. Published on January 1, 2018, and effective July 1, 2018.
7. 2016 Intervening Cycle update; DSA-AC 01/16— Approved by the California Building Standards Commission on October 17, 2017. Published on January 1, 2018, and effective July 1, 2018.



Count on ICC for Your California Building Code Tools

a. Significant Changes to the California Building Code, 2016

Key changes are identified then followed by in-depth discussion and helpful visuals. Based on the popular Significant Changes to the I-Codes series from ICC and Cengage Learning, this full-color guide is a valuable resource for learning the newest CBC. The book identifies critical changes from the 2013 to 2016 editions and adds expert discussion with a detailed illustration for each change.

SOFT COVER #5521S16
PDF DOWNLOAD #8950P733

Turbo Tabs for 2016 California Building Code

Flip right to the most commonly used sections of the code! Full-page inserts feature key sections of the code printed on the tabs in an easy-to-read format.

#0001TL16CA

500+ COLOR ILLUSTRATIONS! b. 2015 International Building Code® Illustrated Handbook

An easy-to-use visual guide to the 2015 IBC®

- Bonus features online
- Expanded topics
- 500+ color illustrations
- New 7.5" x 9.5" format

Thoroughly revised to reflect the 2015 IBC, this full-color guide makes it easy to understand and apply complex IBC provisions and achieve compliance. The Handbook provides all the information you need to get construction jobs done right, on time, and up to the requirements of the 2015 IBC.

HARD COVER #4000S15
PDF DOWNLOAD #8950P685

c. 2015 IBC Code and Commentary, Volumes 1 and 2 (Chapters 1–35)

This helpful publication contains the full text of the 2015 IBC, including tables and figures, followed by corresponding commentary at the end of each section to help code users understand the intent of the code provisions and learn how to apply them effectively.

SOFT COVER #3010S15
PDF DOWNLOAD #870P15
SOFT + PDF COMBO #3010SP15

2015 IEBC® Code and Commentary is also available.

d. Building Code Essentials: Based on the 2015 IBC *Detailed full-color illustrations enhance comprehension of code provisions*

Explores those code provisions essential to understanding the application of the IBC in a straightforward and easy-to-read format. The user-friendly approach of the text simplifies critical concepts so that users can achieve a more complete understanding of the code's intent. Full-color illustrations, examples and simplified tables assist the reader in visualizing the code requirements. This up-to-date, step-by-step guide's topic organization reflects the intent of the IBC and facilitates understanding and application of the code provisions.

SOFT COVER #4031S15
PDF DOWNLOAD #8950P596

Order Your California Code Tools Today!
1-800-786-4452 | www.iccsafe.org/books



**INTERNATIONAL
CODE
COUNCIL®**

People Helping People Build a Safer World®

NEW EDITIONS!

2015 IBC SEAOC STRUCTURAL/SEISMIC DESIGN MANUALS

ICC has again partnered with the Structural Engineers Association of California to publish this popular series of Structural/Seismic Design Manuals (SSDM). Each volume provides a step-by-step approach to applying the structural provisions of the 2015 IBC and referenced standards. The series is an excellent reference and study guide for the NCEES Structural Exam. The manuals are filled with invaluable examples to assist civil and structural engineers, architects, academics, and students.



2015 SSDM, VOLUME 1: CODE APPLICATION EXAMPLES

Changes to this volume include clarification of more complex sections and additional commentary in some design examples.

#9011S151

2015 SSDM, VOLUME 2: EXAMPLES FOR LIGHT FRAME, TILT-UP AND MASONRY BUILDINGS

Contains updated references including: 2015 NDS and SDPWS; ACI 318-14; TMS 402-13 and TMS 602-13; and AISI standards 100, 200, 201, 211, and 213 updated to 2012 editions. Design examples have additional commentary added for the more complex sections.

#9011S152

2015 SSDM, VOLUME 3: EXAMPLES FOR CONCRETE BUILDINGS

All references are updated to ACI 318-14 with complex sections clarified and additional commentary in some design examples.

#9011S153

BUY ALL 3 OF THE NEW 2015 VOLUMES AND SAVE!

This collection includes 2015 SSDM Volumes 1, 2 and 3.

#9011S15

ALSO AVAILABLE AND APPLICABLE TO THE 2015 IBC:

2012 SSDM, VOLUME 4: EXAMPLES FOR STEEL FRAMED BUILDINGS

#9011S124

2012 SSDM, VOLUME 5: EXAMPLES FOR SEISMICALLY ISOLATED BUILDINGS AND BUILDINGS WITH SUPPLEMENTAL DAMPING

#9011S125

2015/2012 MATERIALS COLLECTION, SSDM VOLUMES 1-4

This collection includes 2015 SSDM Volumes 1-3, and 2012 SSDM Volume 4.

#9011S156

2015/2012 COMPLETE COLLECTION, SSDM VOLUMES 1-5

This collection includes 2015 SSDM Volumes 1-3, and 2012 SSDM Volumes 4 and 5.

#9011S157

Order your **Structural/Seismic Design Manuals** today!

1-800-786-4452 | www.iccsafe.org/books