Uniform Building Code

For Head-of-Wall, Vertical Shaft Walls and Wall Backing
Excerpts from the 1997 Uniform Building Code

FIRE-RESISTIVE JOINT SYSTEM is an assemblage of specific materials or products that are designed, tested and fire resistive in accordance with UBC Standard 7-1 to resist, for a prescribed period of time, the passage of fire through joints.

SECTION 706 - FIRE-RESISTIVE JOINT SYSTEMS

706.1 General. Joints installed in or between fire-resistive walls, fire-resistive floor or floor-ceiling assemblies and fire-resistive roof or roof-ceiling assemblies shall be protected by an approved fire-resistive joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the floor, roof or wall in between which it is installed. Fire-resistive joint systems shall be tested in accordance with Section 706.2.

EXCEPTION: Fire-resistive joint systems are not required for joints in the following locations:

1. Floors within a single dwelling unit.
2. Floors where the joint is protected by a shaft enclosure in accordance with Section 711.
3. Floors with atriums where the space adjacent to the atrium is included in the volume of the atrium for smoke-control purposes.
4. Floors within malls.
5. Floors within open parking structures.
6. Mezzanine floors.
7. Walls that are permitted to have unprotected openings.
8. Roofs where openings are permitted.

Such material or construction assembly shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.

706.2 Fire-resistive Joint Systems. Fire-resistive joint systems shall be tested in accordance with UBC Standard 7-1 under the following conditions:

1. Joint systems shall be installed full height in wall assemblies and full length in floor and roof assemblies.
2. Floor and roof assemblies shall be tested with a minimum positive pressure differential of 0.01 inch of water column (2.5 Pa).
3. Wall assemblies shall be tested with a minimum positive pressure differential of 0.01 inch of water column (2.5 Pa) measured at the mid-height of the wall assembly.
4. Joint systems shall contain a splice. For wall assemblies, the splice shall be located above the mid-height of the wall assembly.

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5. Joint systems shall be tested at the maximum joint width for which they are designed. Joint systems designed to accommodate movement shall be expanded to the maximum joint opening width for which they are intended to function.
6. Joint systems designed to be load-bearing shall be loaded to the maximum design load in accordance with their intended application.
7. Joint systems designed to accommodate movement shall be preconditioned by cycling between the minimum and the maximum joint opening width for which they are intended to function for the number of cycles specified in Table 7-D.
8. Nonsymmetrical wall joint systems shall be tested in accordance with Sections 706 and 709.5.

Table 7-D	
PRECONDITIONING CYCLES FOR FIRE RESISTIVE JOINT SYSTEMS	
Type of Joint System	**Number of Cycles**
Expansion/Contraction	**500**
Seismic	**100**
Wind Sway	**500**

Shaft Wall Enclosures

Excerpts from the 1997 *Uniform Building Code and* 1998 *California Building Code*

SECTION 711 - SHAFT ENCLOSURES

711.1 General. Openings through floor shall be enclosed in a shaft enclosure of fire-resistive construction having the time period set forth in Table 6-A for "shaft enclosures" except as permitted in Section 711.3, 711.5 and 711.6. See also Section 304.6 for shafts in Group B Occupancies, Section 306.6 for shafts in Group F Occupancies, Section 307.6 and 307.11.2.3 for shafts in Group H Occupancies, Section 309.6 for shafts in Group M Occupancies and Section 311.6 for shafts in Group S Occupancies.

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711.2 Extent of Enclosures. Shaft enclosures shall extend from the lowest floor opening through successive floor openings and shall be enclosed at the top and bottom.

EXCEPTIONS:

1. Shafts extending through or to the underside of the roof sheathing, deck or slab need not be enclosed at the top.
2. Shafts need not be enclosed at the bottom when protected by fire dampers when conforming to approved recognized standards, installed at the lowest floor level within the shaft enclosure.

Shaft enclosures shall be constructed to continuously maintain the required fire-resistive integrity.

Excerpts from Table 6-A

TABLE 6-A — TYPES OF CONSTRUCTION—FIRE RESISTIVE REQUIREMENTS (In Hours)
For details, see occupancy section in Chapter 3, types of construction sections in this chapter and sections referenced in this table.

Building Element	TYPE 1	TYPE II			TYPE III		TYPE IV	TYPE IV	
	Noncombustible				Noncombustible				
	Fire-resistive	Fire-resistive	1-Hr	N	1-Hr	N	H.T.	1-Hr	N
6. Shaft Enclosures	2	2	1	1	1	1	1	1	1

UNIFORM BUILDING CODE (UBC) 1997
CALIFORNIA BUILDING CODE (CBC) 1998
HANDRAIL, GRAB BAR, TUB AND SHOWER SEAT BACKING REQUIRMENTS
CBC Table 16-B

Handrail Vertical and Horizontal Load

"The mounting of handrails shall be such that the completed handrail and supporting structure are capable of withstanding a load of at least 200 pounds (890 kN) applied in any direction at any point on the rail."

UBC Section 1106.6.3 Grab bar and Seat Reinforcement

"Where walls are located to permit installation of grab bars and seats complying with Section 4.17.4, 4.21.4, 4.22.3, or 4.22.4 of CABO/ANSI A117.1, reinforcement shall be provided for the installation of grab bars and seats."

CBC 1115B.6.1.2 Seat

An in-tub seat or a seat at the head end of the tub shall be provided as shown in Figures 11B-8 and 11B-9B. The structural strength of seats and attachments shall comply with Section 1115B.8.3. Seats shall be mounted securely and shall not slip.

CBC 111B.6.1.3 Grab bars

Grab bar complying with Sections 115B.8.2, 1115B.8.3, and 1115B.8.4 shall be provided as shown in figures 11B-9A and 11B-9B.

CBC Section 1115.B.8.3 Structural Strength.

"The structural strength of grab bars, tub and shower seats, fasteners and mounting devious shall meet the following specifications:

Bend stress in a grab bar or seat induces by the maximum bending moment from the application of a 250 pound 1112 N) point load shall be less than the allowable stress for the material of the grab bar or seat.

Shear stress inducted in a grab bar or seat by the application of a 250 pound (1112 N) point load shall be less than the allowable shear stress for the material of the grab bar or seat, and its mounting bracket or other support is considered be fully restrained, then direct and torsional shear stresses shall not exceed the allowable shear stress.

Shear force induced in the fastener or mounting device from the application of a 250 pound (1112 N) point load shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.

Tensile force induced in a fastener by direct tension force of a 250 pound (1112 N) point load, plus the maximum moment from the application of a 250 pound (1112 N) point load, shall be less than the allowable withdrawal load between fastener and supporting structure.

Grab bars shall not rotate within their fittings."

REQUIREMENTS OF THE AMERICANS WITH DISABILITIES ACT (ADA) CODE

Federal register/Vol. 56, No. 144/Friday , July 26, 1991 final rule

Section 36.401 implements the new construction requirements of ADA. The act includes a failure to design and construct facilities for first occupancy later than 30 months after the date of enactment (i.e., after January 26, 1993).

Paragraph 36.401 (A) (1) restates the general requirement for accessible new construction. *"Any public accommodation or other private entity responsible for design and construction must ensure that facilities conform to this requirement"*.

4.26 Handrails, grab bars and tub and shower seats.

4.26.3 Structural strength.

1. Bending stress in a grab bar or seat induced by the maximum bending moment from the application of 250 LBF shall be less than the allowable stress for the material of the grab bar or seat.
2. Shear stress induced in a grab bar or seat by the application of 250 LBF shall be less than the allowable shear stress for the material of the grab bar or seat. If the connection between the grab bar or seat and its mounting bracket or other support is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stresses, which shall not exceed the allowable shear stress.
3. Shear force induced in a fastener or mounting devise from the application of 250 LBF shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.
4. Tensile force induced in a fastener by a direct tension force of 250 LBF plus the maximum moment from the application of 250 LBF shall be less than the allowable withdrawal load between the fastener and the supporting structure.

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Wall reinforcement for the future installation of grab bars and handrails shall be installed around toilets, bathtubs, shower stalls and where grab bars are provided. The reinforcement shall be of sufficient length to meet the requirement of the grab bar and handrail installation specified herein. The reinforced wall shall be capable of supporting at least a 250 pound point load.

Standard 7.1
Fire Test Procedures

SECTION 7.107 - FIRE-ENDURANCE TEST

The fire-endurance test on the sample with its applied load, if any, shall be continued until failure occurs, or until the sample has withstood the test conditions for a period equal to that herein specified in the conditions of acceptance for the given type of construction.

For the purpose of obtaining additional performance data, the test may be continued beyond the time the fire-endurance classification is determined.

SECTION 7.108 - HOSE STREAM TEST

7.108.1 **General.** Where required by the conditions of acceptance, a duplicate sample shall be subjected to a fire-exposure test for a period equal to one half of that indicated as the resistance period in the fire-endurance test, but not for more than one hour, immediately after which the sample shall be subjected to the impact, erosion and cooling effects of a hose stream directed first at the middle and then at all parts of the exposed face, changes in direction being made slowly.

7.108.2 **Exemption.** The hose stream test shall not be required in the case of constructions having a resistance period, indicated in the fire-endurance test, of less than one hour.

7.108.3 **Optional Program.** The submitter may elect, with the advice and consent of the testing body, to have the hose stream test made on the sample subjected to the fire-endurance test and immediately following the expiration of the fire-endurance test.

7.108.4 **Stream Equipment and Details.** The stream shall be delivered through a 2 1/2 - inch (64 mm) hose discharging through a National Standard Claypipe of corresponding size equipped with a 1 1/8-inch (28.6 mm) discharge tip of the standard-taper smoothbore pattern without shoulder at the orifice. The water pressure and duration of application shall be as prescribed in Table 7-1-A.

7.108.5 **Nozzle Distance.** The nozzle orifice shall be 20 feet (6096 mm) from the center of the exposed surface of the test sample if the nozzle is so located that when directed at the center, its axis is normal to the surface of the test sample. If otherwise located, its distance from the center shall be less than 20 feet (6096 mm) by an amount equal to 1 foot (305 mm) for each 10 degrees of deviation from the normal.

TABLE 7-1-A CONDITIONS FOR HOSE STREAM TEST		
	WATER PRESSURE AT BASE OF NOZZLE (pounds per square inch)	DURATION OF APPLICATION (minutes per 100 sq. feet) EXPOSED AREA
Resistance Period	x 6.89 for kPA	X 0.0108 for min./m2
8 hr and over	45	6
4 hr and over if less than 8 hr	45	5
2 hr and over if less than 4 hr	30	2 1/2
1 1/2 hr and over if less than 1 1/2 hr	30	1 1/2
1 hr and over if less than 1 1/2 hr	30	1
Less than 1 hrs, if desired	30	1

SECTION 7.109 --TIME OF TESTING

The material or construction shall not be tested until a large proportion of its final strength has been attained and, if it contains moisture, until the excess has been removed to achieve an air-dry condition in accordance with the requirements given in this section. Protect the testing equipment and sample undergoing the fire test from any condition of wind or weather that might lead to abnormal results. The ambient air temperature at the beginning of the test shall be within the range of 50°F to 90°F. The velocity of air across the unexposed surface of the sample, measured just before the test begins, shall not exceed 4.4 feet per second as determined by an anemometer place at right angles to the unexposed surface. If mechanical ventilation is employed during the test, an airstream shall not be directed across the surface of the specimen.

TESTS OF NONBEARING WALLS AND PARTITIONS

SECTION 7.113 -- SIZE OF SAMPLE

The area exposed to fire shall not be less than 100 square feet, with neither dimension less than 9 feet. The test specimen shall be restrained on all four edges.

For construction joints, the area of the test specimen may be less than 100 square feet provided the length of the joint is not less than 9 feet. The test specimen shall be of sufficient size so as to produce a representative construction joint for which evaluation is desired.

SECTION 7.114 -- CONDITIONS OF ACCEPTANCE

The test shall be regarded as successful if the following conditions are met:

1. The wall or partition shall have withstood the fire-endurance test without passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired.
2. The wall or partition shall have withstood the fire and hose stream test as specified in Section 7.108, without passage of flame, of gases hot enough to ignite cotton waste, or of the hose stream. The assembly shall be considered to have failed the hose stream test if an opening develops that permits a projection of water from the stream beyond the unexposed surface during the time of the hose stream test.
3. Transmission of heat through the wall or partition during the fire-endurance test shall not have been such as to raise the temperature on its exposed surface more than 250°F above its initial temperature.