



SUBJECT

Bracing requirements for Fixed, Interim, Mobile, Movable, Other and Temporary Equipment

PIN: xxx

Effective: xx/xx/xxxx



PURPOSE

To maintain sanitary conditions in the hospital and/or for routine service or maintenance some hospital equipment is required to be moved from its usual fixed or stationary position. Other equipment is required to be moved from location to location for operational purposes. To establish which equipment is required to be anchored, restrained, or permitted to be unanchored to meet the operational needs of the hospital, new definitions were added to the 2019 California Building Code. This PIN clarifies what is needed to be shown on the construction documents to identify which equipment falls in each classification and whether it is required to be anchored or restrained, and if required to be restrained, what constitutes an acceptable restraint.

BACKGROUND

Section 1617A.1.18 of the CBC modifies the requirements in ASCE/SEI 7-16 (ASCE 7) Section 13.1.4 which exempts nonstructural components from the supports and attachments requirements with exceptions to the exemptions in ASCE 7. This has caused some confusion as there are equipment that were previously required to be anchored that may now remain unanchored or untethered, depending on where the equipment is stored. This PIN seeks to express the code intent and at the same time provide a template for designers to follow to facilitate plan review and inspection in the field.

POLICY

To facilitate plan review and construction, all construction documents should include an equipment schedule identifying all applicable equipment, its classification (fixed, movable, mobile, other, countertop, interim or temporary), utility connections and reference to support and attachment.

EQUIPMENT. Equipment as used in this part and all applicable parts of the California Building Standards Code shall be classified as fixed equipment, mobile, movable, countertop, interim, temporary or other equipment.

(1) **COUNTERTOP EQUIPMENT** means equipment that typically remains on countertop, work bench, shelf or support other than the floor during its service life.

(2) **ESSENTIAL EQUIPMENT** means equipment that failure of which will significantly impair operations during or after a disaster. The facility shall determine which equipment is essential. Essential equipment shall also include equipment that is required to provide the eight basic services of the hospital.

(3) **FIXED EQUIPMENT** means equipment that are directly attached to the building or directly connected to a service distribution system/utility and that typically remains in one fixed location during its service life or use.

(4) **INTERIM EQUIPMENT** means temporary equipment that will be in use greater than 180 days but only for the duration of the construction project that it is related to.

(5) **MOBILE EQUIPMENT** means equipment, with or without wheels or rollers, that is typically used in a different location than where it is stored and moved from one location in the building to another during ordinary use.

(6) **MOVABLE EQUIPMENT** means equipment that are directly attached to the building and/or directly connected to a service distribution system/utility, with or without wheels or rollers, that typically remains in one fixed location during its service life or use, but is required to be periodically moved to facilitate cleaning or maintenance.

(7) **OTHER EQUIPMENT** means equipment that is not directly connected to a building service distribution system, with or without wheels or rollers, and is typically used at a single location during its service life.

(8) **TEMPORARY EQUIPMENT** means equipment that is used to replace fixed or movable equipment during replacement, maintenance, or repair for a time of service as defined in Section 108 of the California Building Code (CBC).

PATIENT CARE VICINITY (California Electrical Code Section 517.2): A space, within a location intended for the examination and treatment of patients, extending 6ft beyond the normal location of the patient bed, chair, table, treadmill, or other device that supports the patient during examination and treatment and extending vertically to 7 ft 6 in. above the floor.

ASCE 7-16 Section 13.1.4: *The section is replaced as follows:*

The following nonstructural components and equipment shall be anchored in accordance with this section. Design and detailing shall be in accordance with Chapter 13 except as modified by this section.

1. *Fixed Equipment: Equipment shall be anchored if it is directly attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, "directly attached" shall include all electrical connections except plugs for 110/220-volt receptacles having a flexible cable/cord. Equipment that is connected to the building plumbing system with a shut-off valve in proximity to the equipment shall not be considered as directly attached provided the inside diameter of the pipe/tubing is less than ½ inches.*
2. *Movable Equipment: Equipment is subjected to the same requirement as fixed equipment, but is permitted to be anchored by re-attachable anchors or restraints in a manner approved by the enforcement agency. Utilities and services at the equipment shall have flexible connections to allow for necessary movement.*
3. *Mobile equipment: Equipment heavier than 400 lb that has a center of mass located 4 ft or more above the adjacent floor or roof level that directly support the equipment shall be restrained in a manner approved by the enforcement agency when not in use and is stored, unless the equipment is stored in an equipment storage room.*
4. *Countertop Equipment: Countertop Equipment shall be subject to the same anchorage or restraint requirements for fixed, movable, mobile or other equipment as applicable.*
5. *Temporary Equipment: Equipment for uses greater than 30 days but less than or equal to 180-days and where this section requires supports and attachments, the following shall apply:*
 - a. *Seismic design for supports and attachments for temporary equipment shall meet the requirements of Chapter 13; however, the calculated F_p may be reduced by 50%. It is acceptable to use ballasts for seismic bracing supports and attachments and to limit the design criteria to overturning unless directly or indirectly supported by the building structure.*
 - b. *Temporary piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of temporary piping, conductors and ductwork is not required.*
6. *Interim Equipment:*
 - a. *Seismic design for supports and attachments for interim equipment shall meet the requirements of Chapter 13. It is acceptable to use ballasts for seismic or wind bracing supports and attachments.*
 - b. *Piping, conductors and ductwork shall be supported. Seismic design for supports and attachments of piping, conductors and ductwork is not required.*
7. *Other Equipment: Equipment shall be anchored where any of the following apply:*
 - a. *Essential to hospital operations and weight of equipment is greater than 100 lb.*

- b. Could fall within the patient care vicinity as defined in Article 517.2 of the California Electrical Code.*
 - c. Could fall and block a required means of egress.*
 - d. Weight of equipment is greater than 400 lb.*
 - e. Weight of equipment is greater than 200 lb. and center of mass located greater than 4 ft measured from the finished floor.*
8. *Equipment with hazardous contents.*
9. *Other architectural, mechanical and electrical components stated in Chapter 13.*

Exemptions:

- 1) *Furniture except storage cabinets as noted in Table 13.5-1*
- 2) *Nonstructural components and equipment, that are attached to the building, provided that the component weighs 20 lb or less or, in the case of a distributed system, 5 lb/ft or less. Seismic design and seismic details need not be provided.*
- 3) *Seismic design need not be provided for discrete architectural, mechanical and electrical components and equipment that are attached to the building and anchorage is detailed on the plans, provided that the component weighs 400 lb or less, and the center of mass is located 4 ft or less above the adjacent floor or roof level that directly support the component and flexible connections are provided between the component and associated ductwork, piping and conduit where required.*

Fixed Equipment

1. Fixed equipment includes but is not limited to: Mechanical, electrical and plumbing equipment, medical, laboratory or other equipment that is not intended to be moved for cleaning or use.
2. Design requirements:
 - a. Weight > 400 lb: Provide support and attachment details on the drawings and submit seismic design calculations.
 - a. Weight \leq 400 lb and has a center of mass located 4 ft or more: Provide support and attachment details on the drawings and submit seismic design calculations.
 - b. Weight \leq 400 lb and has a center of mass located less than 4 ft: Provide support and attachment details on the drawings. Calculations need not be provided for OSHPD review.
3. Acceptable supports and attachments materials: Per CBC and ASCE 7 Section 13.4. Materials must be addressed by a national standard (e.g. AISC, AISI, ACI) or have a valid evaluation services report (e.g. ICC-ES ESR, IAPMO UES ER).
4. Equipment supports and attachments deemed to comply provided the assembly is shake table tested per ICC ES AC-156 or equivalent.

Movable Equipment

Movable equipment is equipment that is directly attached to the building or services as defined in fixed equipment. The difference is that movable equipment is occasionally moved for cleaning or servicing.

Movable equipment may include but is not limited to: Kitchen equipment, refrigerators, ductless hoods, sterilizers or laboratory equipment.

1. Design requirements:
 - a. Weight > 400 lb: Provide support and attachment details on the drawings and submit seismic design calculations.
 - b. Weight \leq 400 lb and has a center of mass located 4 ft or more: Provide support and attachment details on the drawings and submit seismic design calculations.
 - c. Weight \leq 400 lb and has a center of mass located less than 4 ft: Provide support and attachment details on the drawings. Calculations need not be provided for OSHPD review.
2. Acceptable support/attachment materials:
 - a. Materials must be addressed by a national standard (e.g. AISC, AISI, ACI),
 - b. Have a valid evaluation services report such as ICC-ES ESR, IAPMO UES ER, etc.
 - c. Successfully tested to not less than 2 times the LRFD seismic design demand

- d. Manufacturer's load rating is not less than 4 times the seismic design demand.
- 3. Additional considerations: Movable equipment may be restrained in a manner that allows for limited movement under the following conditions:
 - a. Connections to utilities are provided with sufficient slack to accommodate the movement; and
 - b. Consequential damage resulting from contact with other nearby equipment, structure, or architectural components is deemed acceptable by facility administrators and OSHPD.
- 4. Equipment supports and attachments deemed to comply provided the assembly is shake table tested per ICC ES AC-156 or equivalent.

Mobile Equipment

- 1. Mobile equipment may include but is not limited to: carts, wheeled shelving, I.V. Poles, equipment with or without wheels not hard-wired or hard-plumbed, surgery consoles, anesthesia machines, mobile C-arms, and mobile X-ray machines.
- 2. Design Requirements:
 - a. Weight > 400 lb and has center of mass located 4 ft or more:
 - i. Not stored in equipment storage room: Provide support and attachment details on the drawings and submit seismic design calculations.
 - ii. Stored in equipment storage room: Restraint is not required.
 - b. Weight > 400 lb and center of mass located less than 4 ft: Restraint is not required.
 - c. Weight \leq 400 lb (any center of mass, stored or not stored in equipment storage room): Restraint is not required.
 - d. Additional Considerations: Mobile equipment when required to be restrained shall be done in a manner that allows for movement as necessary provided that: Consequential damage resulting from contact with other nearby equipment, structure, or architectural components is deemed acceptable by facility administrators and OSHPD.

Countertop Equipment

Countertop equipment when required to be anchored is subject to the same requirements for acceptable support/attachment material and additional considerations as described above for fixed, movable, mobile, or other equipment. Center of mass shall be measured from the finished floor.

When restraint is provided, but not required for countertop equipment, it is not required to be shown on the drawings or subject to OSHPD review. Examples of such

equipment include, but are not limited to, coffee makers, printers, fax machines, microwaves, and desktop monitors.

Other equipment

Other equipment: Equipment that is not included under fixed, movable, mobile, countertop or exempt items. The difference between fixed/movable and other is that the other equipment is with 110v plugs or not connected to building distribution system. Example of such equipment include floor supported laboratory equipment with 110v plugs.

1. Design Requirements:

- a. Weight > 20 lb and could fall within the patient care vicinity as defined in Article 517.2 of the California Electrical Code: Provide support and attachment details on the drawings. Seismic design calculations are required if center of mass greater than 4 ft.
- b. Weight > 20 lb and could fall and block a required means of egress: Provide support and attachment details on the drawings. Seismic design calculations are required if center of mass greater than 4 ft.
- c. Weight > 100 lb and Essential Equipment: Provide support and attachment details on the drawings and submit seismic design calculations. Seismic design calculations are not required if center of mass is 4 ft or less.
- d. Weight > 200 lb and center of mass located 4 ft or more: Provide support and attachment details on the drawings and submit seismic design calculations.
- e. Weight > 400 lb: Provide support and attachment details on the drawings and submit seismic design calculations.

2. Acceptable support/attachment materials:

- a. Materials must be addressed by a national standard (e.g. AISC, AISI, ACI),
- b. Have a valid evaluation services report such as ICC-ES ESR, IAPMO UES ER, etc..
- c. Successfully tested to not less than 2 times the LRFD seismic design demand.
- d. Manufacturer's load rating is not less than 4 times the seismic design demand.

3. Additional considerations: Other equipment may be restrained in a manner that allows for limited movement under the following conditions:

- c. Connections to utilities are provided with sufficient slack to accommodate the movement; and

- d. Consequential damage resulting from contact with other nearby equipment, structure, or architectural components is deemed acceptable by the facility and OSHPD.
4. Equipment supports and attachments deemed to comply provided the assembly is shake table tested per ICC ES AC-156 or equivalent.

Essential Equipment:

Essential equipment list shall be shown on the drawings for countertop and other equipment classifications with equipment weight greater than 100 lb.

Exempt Equipment:

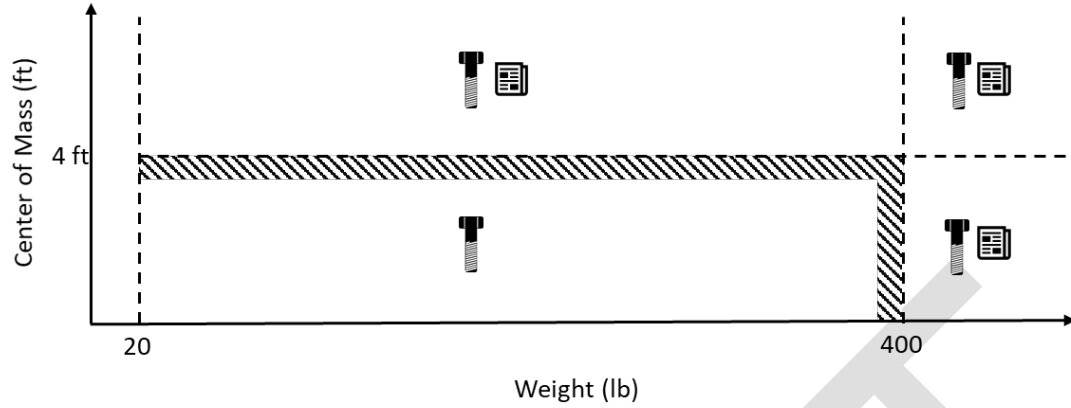
If an exempt item's seismic bracing is shown on a drawing, engineered design or calculations is not required. If there is a change to the exempt items, it shall be considered as a non-material alteration.

Paul Coleman

Date

POLICY INTENT NOTICE (PIN)

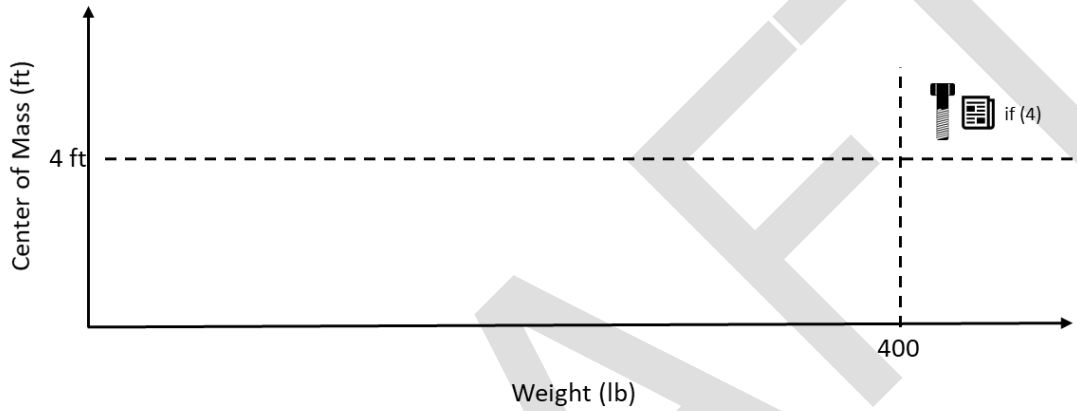
Fixed or Movable



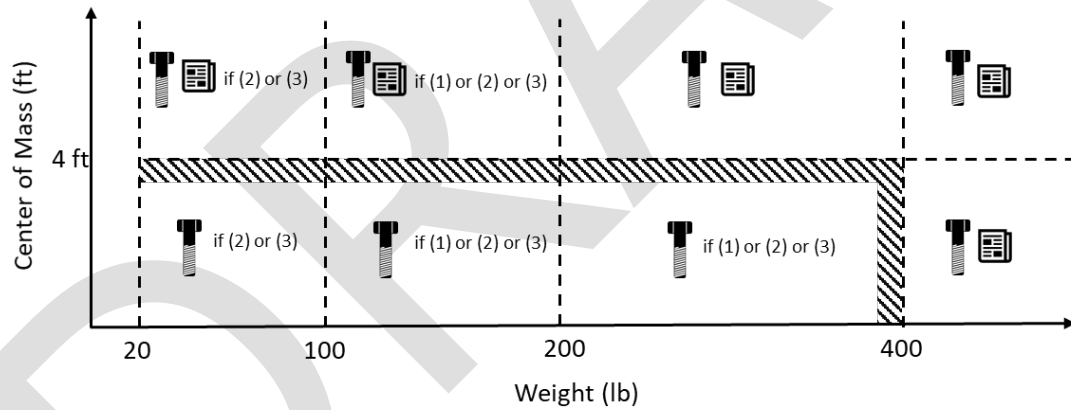
Support and attachment detail drawings are required

Seismic design calculations are required

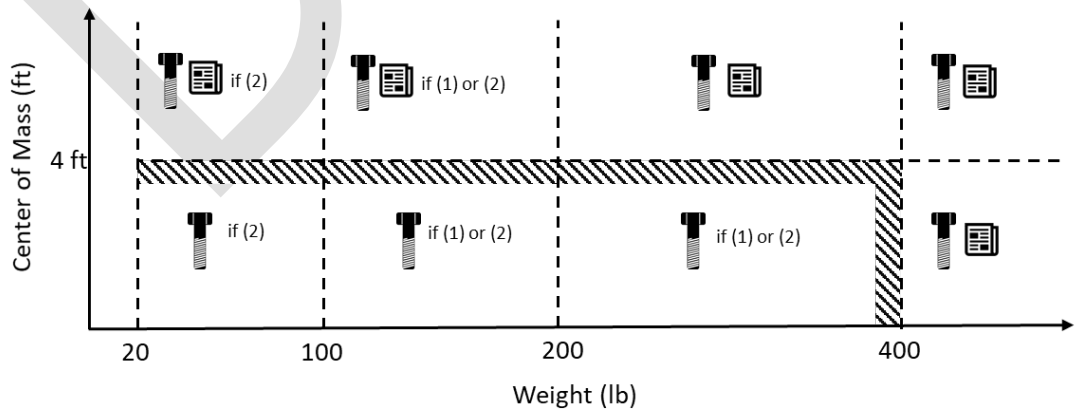
Mobile



Countertop



Other



- 1) Required if equipment is essential to hospital operations
- 2) Required if the equipment could fall within the patient care vicinity as defined in Article 517.2 of the CEC.
Required if the equipment could fall and block a required means of egress
- 3) Equipment shall be anchored regardless of the classification if it is permanently attached to the building utility services such as electricity, gas, or water. For the purposes of this requirement, "permanently attached" shall include all electrical connections except plugs for 110/220 volt receptacles having a flexible cable. Equipment that is connected to the building plumbing system with a shut-off valve in proximity to the equipment shall not be considered as permanently attached provided the inside diameter of the pipe is less than ½ inches.
- 4) Not stored in equipment storage room: Provide support and attachment details on the drawings and submit seismic design calculations.

Table 1: Example of Equipment Schedule

ID	Description	Operating Weight (lb)	Width (in)	Height (in)	Depth (in)	Center of mass (in)	Detail	Classification							
								Fixed	Movable	Mobile	Countertop	Temporary	Interim	Other	
5	Rack, Server, Freestanding	500	24	72	37	36	xxx	X							
13	Table, Imaging, Rad/Fluoro, C-arm	938	22	40	80	24	xxx		X						
22	Stretcher, Crib, Pediatric	425	38	72	72	50	N/A			X					
30	Navigation System, Surgical, Robotic	5530	36	62	66	40	xxx			X					
37	Dispenser, Medication, Host (Main)	500	23	54	26	24	xxx	X							
41	Microscope, ENT, Floor Standing	450	25	68	44	40	N/A			X					
42	Vision Cart	838	26	76	36	27	N/A			X					
45	GC85A Patient Table	1276	95	35	32	40	xxx	X							
57	HV Generator	296	19	23	30	13	N/A	X							