City of Walnut Creek

Development Review Services

1666 N. Main Street, Walnut Creek, CA 94596

(925) 943-5834 *phone* (925) 256-3500 *fax*

Issued December 19, 2019 ***Information Bulletin No. IB-008***

Guidelines for Acoustical Tile Suspended Ceilings

Applicable Suspended Ceiling Systems:

- Metal suspension systems for acoustical tile and lay-in-panel ceilings

Guidelines Do Not Apply To Following Systems:

- Systems such as gypsum board, screwed or nailed to suspended systems
- Suspended lath and plaster ceilings

Applicable Codes and Standards:

- California Building Code (CBC) Section 808
- California Building Code (CBC) Section 1613.1
- American Society of Civil Engineers (ASCE) 7-10 Section 13.5.6
- ASTM C635
- ASTM C636
- ASTM E580

Background:

- CBC Section 808.1 requires suspended acoustical ceiling systems to be installed in accordance with ASTM C635 and ASTM C636
- CBC Section 1613.1 requires all non-structural components (example: suspended ceilings) that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance ASCE 7-10
- ASCE 7-10 Section 13.5.6.2.2 requires Acoustical tile or lay-in panel ceilings in Seismic Design Categories D, E, and F to be designed and installed in accordance with ASTM C635, ASTM C636, and ASTM E580 Section 5 as modified by ASCE 7-10 Sections 13.5.6.2.2 (a) & (b).

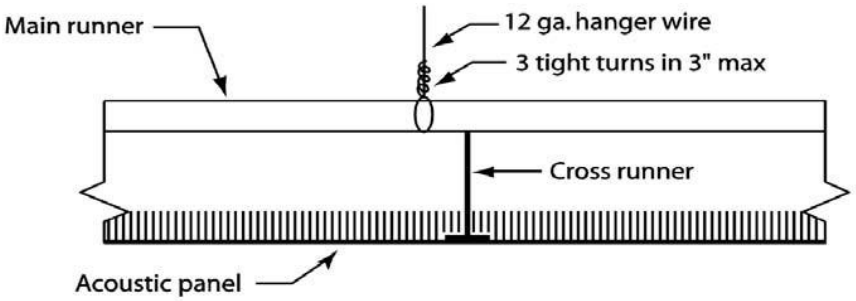
FIGURE 1 Damaged Ceiling System

FIGURE 2 Collapsed Light Fixtures

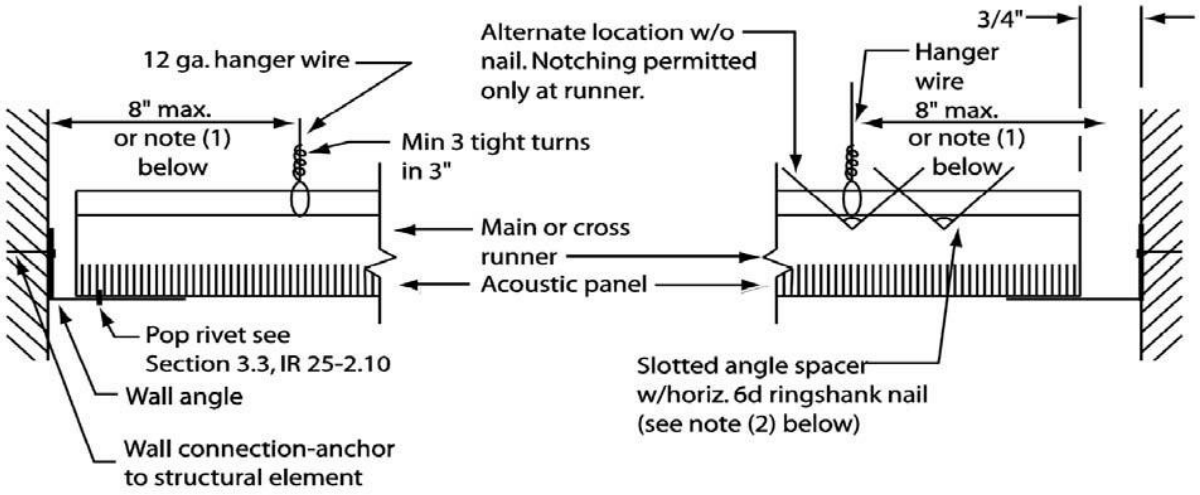
Summary of requirements for Acoustical Tile or Lay-in Panel Ceilings

ITEM	SEISMIC DESIGN CATEGORIES D, E, & F	ASTM 580 (2006)
Ceiling Area (A) < 144 Square Feet		
	DO NOT REGULATE FOR SEISMIC PROVISIONS	
144 Square Feet < Ceiling Area (A) < 1000 Square Feet		
Duty Rating	Heavy Duty Load Rating as defined in ASTM C635 is required	5.1.1
Grid Connections	Minimum main tee connection and cross tee intersection strength of 180lbs	5.1.2
Vertical Suspension Wires	• Vertical hanger wire must be a minimum 12-guage	• 5.2.7.1
	• Vertical hanger wires maximum 4 feet on center	• 5.2.7.1
	• Vertical hanger wires must be sharply bent and wrapped with three turns in three inches or less.	• 5.2.7.2
	• Any connection device from the vertical hanger wire to the structure above must sustain a minimum load of 100 lb.	• 5.2.7.2
	• All vertical hanger wires may not be more than 1 in 6 out of plumb without having additional wires counter-splayed.	• 5.2.7.3
	• Wires may not attach to or bend around interfering equipment without the use of trapezes	• 5.2.7.4
Lateral Bracing	• **Not required under 1000 sq. ft. For ceiling areas under 1000 sq. ft., perimeter and tee connections are presumed to be sufficiently strong to maintain integrity whether bracing is installed or not.**	• 5.2.8
Perimeter	• Perimeter closure (molding) width must be a minimum of 2 inches.	5.2.2
	• Proprietary solutions using approved perimeter clips may utilize perimeter closures less than 2 inches. (**ASCE 7-10 para. 13.5.6.2.2 a)**	Amended by ASCE 7-10: 13.5.6.2.2
	• Two, adjacent sides must be connected to the wall or perimeter closure	5.2.3
	• A minimum clearance of 3/4 inch must be maintained on the other two adjacent sides.	5.2.3
	• Perimeter tees must be supported by vertical hanger wires not more than 8 inches from the wall.	5.2.6
	• Perimeter tee ends must be tied together not more than 8 inches from the wall to prevent spreading.	5.2.4
Light Fixtures	• Light fixtures must be positively attached to the grid by at least two connections each capable of supporting the weight of the lighting fixture. (NEC, para. 5.3.1)	NEC -5.3.1
	• Surface mounted light fixtures shall be positively clamped to the grid.	5.3.2
	• Clamping devices for surface mounted light fixtures shall have safety wires to the grid or the structure above	5.3.2
	• When cross tees with a load carrying capacity of less than 16 lb/foot are used, supplementary hanger wires are required.	5.3.3
	• Light fixtures and attachments weighing 10 lb or less require one 12 gauge minimum hanger wire connected to the housing (e.g. canister light fixture) and connected to the structure above. This wire may be slack.	5.3.4
	• Light fixtures weighing 10 to 56 lb require two number 12 gauge minimum hanger wires attached to the fixture housing and connected to the structure above. These wires may be slack.	5.3.5
	• Light fixtures greater than 56 lb require independent support from the structure by approved hangers.	5.3.6
	• Pendent hung light fixtures shall be supported by a minimum 9-gauge wire or other approved alternate.	5.3.7
	• Rigid conduit is not permitted for the attachment of fixtures.	5.3.8
Mechanical Services	• Flexibly mounted mechanical services weighing less than 20 lb must be positively attached to main runners or cross runners with the same load carrying capacity as the main runners.	5.4.1
	• Flexibly mounted mechanical services weighing more than 20 lb but less than or equal to 56 lb require two 12 gauge (minimum) hanger wires. These wires may be slack.	5.4.2
	• Flexibly mounted mechanical services greater than 56 lb require direct support from the structure.	5.4.3
Supplemental Requirements	• Direct concealed systems must have stabilizer bars a maximum of 60 inches on center with stabilizer bars within 24 inches of the perimeter.	5.2.5
	• Bracing is required for ceiling plane elevation changes.	5.2.8.6
	• Cable trays and electrical conduits shall be supported independently of the ceiling.	5.2.8.7
	• Seismic separation joints or full height partitions are required for ceiling areas greater than 2,500 sq. ft.	5.2.9.1
	• All ceiling penetrations and independently supported fixtures or services must have closures that allow for a 1-inch movement.	5.2.8.5
	• An integral ceiling sprinkler system may be designed by the licensed design professional to eliminate the required spacing of penetrations.	5.2.8.8
	• A licensed design professional must review the interaction of non- essential ceiling components with essential ceiling components to prevent the failure of the essential components.	5.7.1
Partitions	• Partition bracing must be independent of the ceiling.	5.5.1
1000 Square Feet < Ceiling Area (A) < 2500 Square Feet		
Lateral Bracing	• Lateral force bracing (splay wires or rigid bracing) is required within 2 inches of main tee / cross tee intersection and splayed 90 degrees apart in the plan view, at maximum 45 degree angle from the horizontal and located 12 ft. on center in both directions, starting 6 ft. from walls.	5.2.8.1 5.2.8.2

	• Lateral force bracing must be spaced a minimum of 6 inches from unbraced horizontal piping or ductwork.	5.2.8.3
	• Lateral force bracing connection strength must be a minimum of 250 lb.	5.2.8.3
	• Unless rigid bracing is used or calculations have shown that lateral deflection is less than 1/4 inch, sprinkler heads and other penetrations shall have a minimum of 1 inch clear space in all directions.	5.2.8.5
	•	
2500 Square Feet < Ceiling Area (A)		
Special Considerations	• Seismic separation joints with a minimum or 3/4-inch axial movement or full height partitions with the usual 2-inch closure and other requirements.	5.2.9.1



(A) Typical hang wire grid



(B) Perimeter details - typical

Notes: (1) 1/4 of the length of the end runner whichever is less.
(2) Nails at the end of horizontal struts are to be placed with nail head toward centerline
of span of strut.
(3) Hanger wire not required for cross runners less than 8" long between main runner and wall.

Figure 3 Suspended Ceiling Hanger System
(For Illustration Purpose Only, Courtesy of DSA IR 25-2.13)

Compression Struts:

Compression struts shall not replace hanger wires. The sizes of compression struts must be shown on construction documents by the engineer or architect. Attach compression struts to main runners within 2" of cross runner. Details of attachment at both ends must be designed and shown on construction documents by the engineer or architect. The attachment at the top shall be capable of supporting four times the weight of the strut.

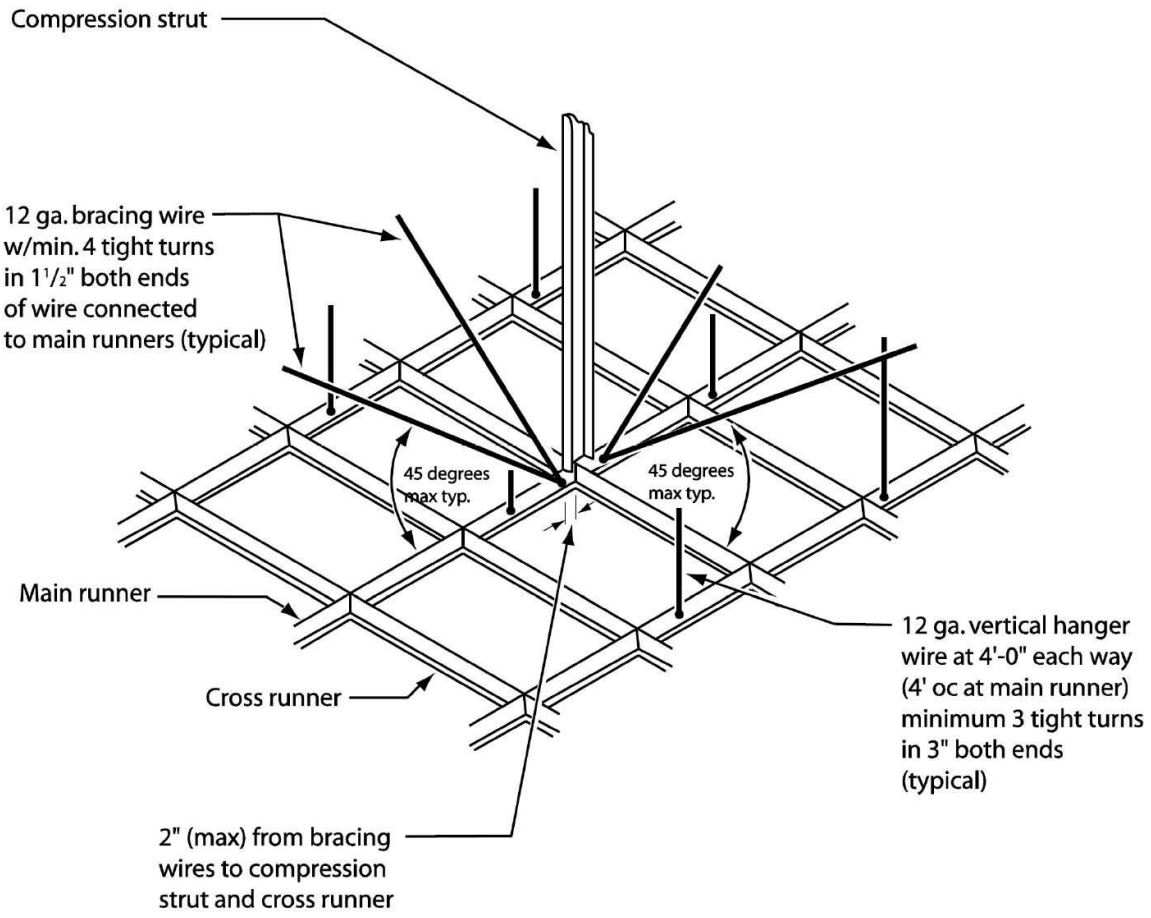


Figure 4 Suspended Ceiling Bracing Assembly
(For Illustration Purpose Only, Courtesy of DSA IR 25-2.13)