Development Services

Suspended Ceiling Inspection Checklist

Seismic Design Categories D, E and F

The greater Puget Sound area falls under seismic-design category D, unless otherwise determined by a geological engineer in accordance with ASCE 7, as referenced in IBC 1613. Suspended-acoustical ceilings are to be installed in accordance with ASTM C 635, ASTM C 636, ASTM E 580/E 580M, and the manufacturer's installation instructions (IBC 808.1.1).

In addition to the manufacturer's specifications, category D, E and F ceilings are to be designed and installed according to CISCA 3-4 and to those requirements listed in ASCE 7-10, 13.5.6.2.2 as referenced by IBC Section 1613.1. Requirements detailed in standards published after the date of this checklist may be considered as an alternate method when approved by the Building Official prior to installation. Please verify the following before calling for the ceiling-grid inspection.

Wall Molding

- ☐ Moldings have a horizontal flange of at least two inches. Unless otherwise required, the two-inch wall angle is required at the attached and unattached perimeters (ASTM E580 Section 5.2.2).

  Exception: Ceilings 144 square feet or less and surrounded by walls that connect directly to the structure above are exempt from the two-inch wall angle requirement (CISCA 3-4, pg. 1, ASCE 7-16, 13.5.6.2.2).

- ☐ Perimeter clips may be used in lieu of the two-inch wall angle when approved by the City of Bellevue prior to installation or where part of the suspending-ceiling listing.
- ☐ When used, perimeter clips shall be installed per their listing.
- ☐ The ceiling grid is attached to the molding at two adjacent walls. (ASTM E580 Section 5.2.3)
- ☐ Unattached ends of the grid system have ¾ inch minimum to 1¼ inch maximum clearance from the wall, and rest on and are free to slide on the molding. (ASCE 7-10, 13.5.6.2.2)

Hangers

- ☐ Suspension wires are minimum 12-gauge when spaced at four feet. (ASTM C636 Section 2.1.6, ASTM E580 Section 5.2.7.1)
- ☐ Hanger wire attachment devices are capable of supporting 100 lbs. (CISCA 3-4, pg.1)
- ☐ Connections at main beam and at structure are secured with a minimum of three full turns (360°) or wraps in three inches. (ASTM C 636 Section 2.3.4)

Perimeter Support

- ☐ Terminal ends of each main beam and cross tee are supported maximum eight inches. (ASTM E580 Section 5.2.6)
- ☐ Support off wall or ceiling discontinuity with 12-gauge wire or approved wall support. These wires are plumb to within one in six and may attach to the adjacent wall or to the structure above.
- ☐ Clips may not be used as alternate to the perimeter wires. (Testing has shown that unbraced sections between and/or adjacent to pods can allow movement up to 3/8 inch per section. With the required ¾ inch gap at the two-inch wall angle and movement of 3/8 inch per section, movement within only four sections will be greater than the two-inch wall angle and can result in failure of the whole system.)
- ☐ Connections at main beam and at structure are secured with a minimum of three full turns (360°) or wraps in three inches. (ASTM C 636 Section 2.3.4)

Perimeter Spacers

- ☐ Ends of main runners and cross tees are tied together (spreader bars or equivalent) to prevent spreading. (ASTM E580 Section 5.2.4)
- ☐ Clips may be used in lieu of spreader bars when approved by the City of Bellevue prior to installation.

Suspended Ceiling System

- ☐ General note: ASTM C636, CISCA and the manufacturer determine the duty classification of a grid system by the load carrying capacity of the main runners.
- ☐ Evaluation reports for the manufacturer's system are on site and available for the installer and the inspector. (Contact ICC Evaluation Services, http://www.icc-es.org/Evaluation_Reports/)
- ☐ Main beams are heavy duty. (ASCE 7-10: 13.5.6.2.2, ASTM E580: 5.1)
- ☐ Main-beam and cross-tee intersections and splices have connection strengths of a minimum 180 lbs. in compression and in tension. (CISCA 3-4, pg. 1 section 3, #2)

- ☐ Cross tees supporting light fixtures have the same load carrying capacity as the main beams or are installed with supplemental hangers within three inches of each corner of each fixture. (CISCA 3-4, pg. 2, section 2) (See Light Fixtures.)
- ☐ Cross tees supporting mechanical services have the same load carrying capacity as the main beam or are installed with supplemental hangers within three inches of each corner of each fixture*. (CISCA 3-4, pg. 2, section 3) (See Mechanical Services.)

  *The City of Bellevue has determined that it is acceptable practice to apply the same supplemental wire application, as is allowed for light fixtures, to mechanical services in addition to the requirements in the Mechanical Services portion of this checklist.

Lateral Force Bracing

- ☐ Ceilings constructed of lath and plaster or screw-applied gypsum board attached to suspended members designed for this use, which are on one level and extend from wall to wall, are exempt from lateral load design requirements. (ASCE 7-10 Section 13.5.6)
- ☐ Ceiling areas greater than 1000 square feet have lateral force bracing.
- ☐ Rigid bracing may be used instead of diagonal splay wires. (IBC 1613.1, ASCE 7-10, 13.5.6.2.2)
- ☐ Bracing must limit ceiling movement to less than ¼ inch at the point of attachment. (IBC 1613.1, ASCE 7-10: 13.5.6.2.2, ASTM E580: 5.2.8.4)
- ☐ Splay wire bracing is in clusters of four 12-gauge wires attached to the main beam within two inches of the cross-tee intersection. Wires are arrayed 90º from each other at an angle not exceeding 45º from the plane of the ceiling. (CISCA 3-4 pg. 2, section 1, #3)
- ☐ A strut, with stiffness adequate to resist the vertical loads imposed, is attached to the suspension system and to the structure above at each bracing location (CISCA 3-4 pg. 2, sec 1, #3). Install struts specified by the manufacturer for proprietary systems, select an approved strut from Table 1 or provide an engineered strut.
- ☐ Attach strut to grid with minimum (two) #8 self-drilling, self-tapping steel screws and to structure with (two) #6 wood screws, single shot pin or (two) #8 self-drilling, self-tapping steel screws per construction conditions. (Doesn't apply to conduit-type struts.)
- ☐ Horizontal-restraint points are no more than 12 feet on center in each direction, and the first point must be within six feet of each wall unless otherwise required. (CISCA 3-4, pg. 2, sect. 1, #3)
- ☐ Attachment of the bracing wires to the main beam and to the structure are capable of supporting the greater of 200 lbs. or the actual design loads with a safety factor of 2. (CISCA 3-4, pg. 2, sec 1, #3)

- ☐ Bracing members are spaced a minimum of 6 inches from all horizontal piping or duct work that is not provided with bracing restraints for horizontal forces. (CISCA 3-4, pg. 2, sec 1, #3)

Light fixtures

- ☐ All fixtures are positively attached to the suspension system. The attachment device is able to withstand 100 percent of the weight of the fixture acting in any direction. (CISCA 3-4 pg. 2, sect. 2)
- ☐ Cross runners supporting the ends of lighting have the same carrying capacity (16lb./ft.) as the main tees or require supplemental No. 12 gauge hanger wires attached to the grid members within three inches of each corner of each fixture supported by a cross tee. (CISCA 3-4 pg. 2, sect. 1 and 2)
- ☐ Fixtures weighing 56 lbs. or less have two 12-gauge wires attached at diagonal corners. These wires may be slack. (ASTM E580 Section 5.3.5)
- ☐ Fixtures weighing in excess of 56 lbs. are independently supported from the building structure. (ASTM E580 Section 5.3.6)
- ☐ Pendant mounted fixtures are supported directly from the structure using nine-gauge wires. They may not use the ceiling suspension system for support. (ASTM E580 Section 5.3.7)

Mechanical Services

- ☐ Mechanical services less than 20 lbs. are positively attached to the suspension system main beams or to cross tees with the same load carrying capacity. (CISCA 3-4, pg. 2, section 3)
- ☐ City of Bellevue option: Where cross runners don't have the same carrying capacity as the main tees, attach supplemental No. 12-gauge hanger wires to the grid members within three inches of each corner of each fixture supported by a cross tee.
- ☐ Terminals or services weighing 20 lbs. to 56 lbs. have two 12-gauge wires connecting them to the ceiling-system hangers or to the structure above. (ASTM E580 Section 5.4.2)
- ☐ Terminals or services weighing more than 56 lbs. are independently supported. (ASTM E580 Section 5.4.3)

Partition Attachment

- ☐ Partitions attached to the ceiling-suspension system are laterally braced to the building structure. This bracing is independent of any ceiling's splay-wire bracing. (IBC 1613.1, ASCE 7-10, 13.5.6.2.2)
- ☐ Attached partitions cannot cross seismic-separation joints.

Penetrations

- ☐ Ceilings without rigid bracing have two-inch oversized trim rings to allow one-inch horizontal movement in all horizontal directions at sprinkler heads and other penetrations. Alternatively, a swing joint that can accommodate one inch of ceiling movement in all horizontal directions at the top of the sprinkler head extension. (ASTM E580 Section 5.2.8.5)

Seismic Separation Joints

- ☐ Ceiling areas greater than 2,500 square feet have seismic-separation joints or full-height partitions unless analyses are performed to demonstrate that the closure trims and angles provide enough clearance to accommodate the additional ceiling movement. Each area to provide ¾ inch clearance as detailed above under Wall Molding. Refer to manufacturer for seismic-separation joint or provide alternate system to the city for review.
  (IBC 1613.1, ASCE 7-10 Section 13.5.6.2.2b, ASTM E580 Section 5.2.9.1)
- ☐ Lateral-force bracing would be required within six feet of the joint as if it were a stand-alone ceiling.
- ☐ Perimeter wires and/or hanger wires would be required at each side of the seismic-separation joint as if it were a stand-alone ceiling.
- ☐ Maintain connection of grid to two adjacent walls as noted under the Wall Molding section. Where multiple seismic-separation joints create a condition where a wall connection is not possible, lateral-force bracing or equivalent will be provided to satisfy the adjacent wall requirement.
- ☐ Perimeter spacers (spreader bars) or equivalent are installed at either side of joint.

Height Transitions

- ☐ Changes in ceiling-plane elevation have positive bracing. (IBC 1613.1, ASCE 7-10, 13.5.6.2.2)

Cable Trays

- ☐ Cable trays and electrical conduits are independently supported and braced independently of the ceiling. (IBC 1613.1, ASCE 7-10, 13.5.6.2.2)
- ☐ Coordinate with electrical and mechanical inspectors and contractors for location and clearance requirements for electrical equipment and disconnects.

City of Bellevue Approved Struts

TABLE 1
Maximum Compression Strut Lengths for 180 lb. Seismic Load

¾-inch x ½-inch x 0.059-inch channel	26 inches
1½-inch x 9/16-inch x 0.059-inch channel	33 inches
(Two) ¾-inch x ½-inch x 0.059-inch channel, back to back	39 inches
(Two) 1½-inch x 9/16-inch x 0.059-inch channel, back to back	44 inches
1-5/8-inch x 1¼-foot x 0.0197-inch channel	106 inches
(Two) 1-5/8-inch x 1¼-inch x 0.0197-inch channel, back to back	120 inches
½-inch diameter EMT conduit, 0.042-inch wall thickness	47 inches
¾-inch diameter EMT conduit, 0.049-inch wall thickness	61 inches
1-inch diameter EMT conduit, 0.057-inch wall thickness	78 inches
1¼-inch diameter EMT conduit, 0.065-inch wall thickness	102 inches
1½-inch diameter EMT conduit, 0.065-inch wall thickness	120 inches
Engineering is required for struts longer than 120 inches and is to include the maximum height, type of material, and the connection to the grid and structure above.	