ENB-15.49 - Installation Standards for Suspended Ceiling System and Lighting Fixtures - UBC/25/#2

INSTALLATION STANDARDS FOR SUSPENDED CEILING SYSTEM AND LIGHTING FIXTURES
Administrative Rule Adopted by Bureau Pursuant to Rule-Making Authority
ARB-ENB-15.49

TOPIC: Wall and Ceiling Construction - UBC/25/#2

CODE: Structural Specialty Code: 1998 Edition

REVISED: March 1, 1999

REFERENCE: Section 2504 â€“ Structural Specialty Code

SUBJECT: Installation Standards for Suspended Ceiling System and Lighting Fixtures

QUESTION: What standards does the Bureau use to review and inspect suspended ceiling systems? What are the standards for permit application? When must existing ceilings be upgraded?

RESPONSE: The Bureau accepts suspended ceiling systems which are either engineered or which comply with the prescriptive design standard as detailed below.

I. New Suspended Ceilings - Prescriptive Design

The Bureau will accept suspended ceilings which comply with the following prescriptive design standards without an engineer or architect approved design.

A. Permit Application
The permit application for a suspended ceiling to be installed to this prescriptive standard shall include three copies of manufacturer's literature or ICBO Evaluation Reports identifying whether the suspension is light, intermediate, or heavy duty; provide a schedule of fixtures and other ceiling supported equipment and their weights; identify all connection devices and their loading capabilities.

B. General
Suspended ceilings installed to this prescriptive design shall use either a 2 foot by 2 foot or a 2 foot by 4 foot standard grid. Ceilings installed according to this prescriptive design shall not support partitions.

C. General Installation Requirements - UBC Standard 25-2

1. HANGERS: Hangers are to be a minimum of No.12 guge galvanized, soft annealed mild steel wire at 4 feet on center both ways unless calculations justifying increased spacing are provided. Hangers shall be attached to ceiling suspension members and to supports above with a minimum of three turns. Hangers to be plumb or splayed and shall not press against pipes or ducts. Wires more than one in six out of plumb shall have countersloping wires added. A trapeze or equivalent shall be used where obstructions preclude direct attachment to the structure. Trapeze suspensions shall be minimum of back to back 1-1/4 inch cold rolled channels when spans exceed 48 inches.

2. ATTACHMENT DEVICES: Hanger attachment devices to be capable of carrying five times the ceiling design load as shown by the manufacturer's literature or ICBO research report.

3. CARRYING CHANNELS AND MAIN RUNNERS: Carrying channels and main runners are to be level within 1/8 inch in 12 feet and leveling is to be performed with hangers taut; kinks or bends are not to be used as a way of leveling. Wire loops shall be tightly formed to prevent any vertical movement.

4. LIGHTING FIXTURE INSTALLATION: Deflection from lighting fixture installation shall be limited to 1/360 times the span between hangers. If the fixture causes a deflection in excess of 1/360, the fixture shall be independently supported as indicated in Section D.5. A ceiling fixture installation shall not cause the runners to rotate more than two degrees from the vertical (this is the equivalent of 1/32 inch out of horizontal for a standard tee).

5. SUPPORT OF LIGHTING FIXTURES OR MECHANICAL EQUIPMENT: Only "intermediate-duty" and "heavy-duty" ceiling systems as defined by UBC Standard 25-2 may be used to support lighting fixtures and mechanical services. Fixtures and mechanical services in light-duty ceilings shall be independently supported.

D. Lateral Bracing Requirements

1. WHERE REQUIRED: Lateral bracing shall be included for all suspended ceilings.

EXCEPTIONS: Lateral bracing is not required:

a. For ceiling areas of 144 square feet or less surrounded by walls which connect directly to the structure; or

b. For ceilings with a maximum of 12 inches between the grid and structural support.

2. HANGERS: Hangers shall conform to the requirements in part C of this document. In addition, all runners shall be independently supported at the perimeter within 8 inches of the wall or ceiling discontinuity; the wall angle or closure strip shall not be used for this purpose.

3. DIAGONAL BRACING WIRES AND VERTICAL STRUTS: Diagonal bracing wires are required within 6 feet of the wall and at 12 feet on center in each direction. Four No. 12 gauge wires shall be connected within 2 inches" of an intersection of a main runner with a cross runner and splayed 90 degrees from each other at an angle not exceeding 45 degrees from the plane of the ceiling. A strut fastened to the main runner shall be extended to and fastened to the structural members supporting the roof or floor above. The strut shall be adequate to resist the vertical component induced by the wires. Based on the maximum spacing of 12 feet on-center in each direction, the following strut sizes and corresponding maximum lengths may be used:

Strut Size	Maximum Length
3/4" diameter conduit (EMT)	8'-6"
1" diameter conduit (EMT)	10'-0"
Single 2-1/2" x 20 gauge metal stud (Imin = 0.18 in4)	11'-6"
Back-to-back 2-1/2" x 20 gauge metal studs screwed together at 24" o.c	15'-0"

Lateral force bracing members shall be spaced a minimum of six inches from all horizontal piping or duct work that is not provided with bracing restraints for horizontal forces. Bracing wires shall be attached to the grid and to the structure in such a manner that they can support a design load of not less than 200 pounds or the actual design load, whichever is greater, with a safety factor of 2.

4. PERIMETER MEMBERS: Members perpendicular to the wall shall be tied together (stabilized) to prevent their spreading. This shall be done immediately adjacent and parallel to the wall. The wall or closure angle shall not be used for this purpose, although to facilitate installation, runners may be attached to the closure angle at two adjacent walls with clearances between the wall and runner being maintained at the other two walls.

5. LIGHTING FIXTURES: Only "intermediate duty" and "heavy duty" ceiling systems as defined in UBC Standard 25-2 may be used for the support of lighting fixtures. Two slack wires are required for all fixtures.

All lighting fixtures shall be positively attached to the suspended ceiling systems. The attachment device shall have a capacity of 100 percent of the lighting fixture weight acting in any direction.

When "intermediate duty" systems are used, supplemental No. 12 gauge hangers shall be attached to the grid members within three inches of each corner of each fixture. Tandem fixtures may utilize common wires.

Where "heavy duty" systems are used, supplemental hangers are not required if 48 inch modular hanger pattern is followed. When cross runners are used without supplemental hangers to support lighting fixtures, these cross runners must provide the same carrying capacity as the main runner.

Lighting fixtures weighing less than 56 pounds shall have, in addition to the requirements outlined above, two No. 12 gauge hangers connected from the fixture housing to the structure above. These wires may be slack.

Earthquake clips may be used to connect recessed light fixtures weighing less than 56 pounds to suspended grid ceilings only under the following conditions:

a. The clips are UL listed (IEFT fixture fitting or IFFX fixture fitting in the UL electrical construction materials

directory) or are approved by the Bureau; and,

b. A minimum of four fasteners are used to connect each fixture to the ceiling system located within three inches of the grid intersection.

Lighting fixtures weighing 56 pounds or more shall be supported directly from the structure above by approved hangers.

Bolts, screws or rivets may also be used in lieu of clips to connect fixtures to ceiling systems provided the grid members are not rotated or deflected more than allowed per part C.4 of this document.

6. MECHANICAL SERVICES: Ceiling mounted air terminals or services weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

Terminals or services weighing 20 pounds but not more than 56 pounds, in addition to the above, shall have two No.12 gauge hangers connected from the terminal or service to the ceiling system hangers or to the structure above. These wires may be slack.

Terminals or services weighing more than 56 pounds shall be supported directly from the structure above by approved hangers.

II. New Suspended Ceilings - Engineered Design

A. General

An "engineered design" for a suspended ceiling shall be designed and certified by an architect or engineer, registered in the State of Oregon. The design shall comply with Part C and D of the Prescriptive Design provisions, above. Engineered systems may include support of lighting, mechanical systems and/or partitions.

B. Permit Application

The permit application for a suspended ceiling to be installed according to an engineered design shall include three copies of certified drawings and specifications, and one copy of calculations, prepared by a an architect or engineer registered in the State of Oregon. The submittal shall show that the ceiling system's capacity to resist vertical loads and seismic loads in compliance with applicable code chapters and standards; shall identify whether the suspension is light, intermediate, or heavy duty; and shall identify all connection devices and their allowable capacities. The submittal shall include appropriate substantiating data, manufacturer's literature and ICBO Evaluation Reports

C. Additional Considerations

PARTITIONS: Where the suspended ceiling system is required to provide lateral support for permanent or relocatable partitions, the connection of the partition to the ceiling system, the ceiling system members and their connections, and the lateral force bracing shall be designed to support the reaction force of the partition from prescribed loads applied perpendicular to the face of the partition. These partition reaction forces shall be in addition to the lateral loads for the ceiling and lighting fixtures. Partition connectors, the suspended ceiling system and the lateral force bracing shall all be engineered to suit the individual partition application and shall be shown or defined in the drawings or specifications.

III. Upgrading of Existing Ceilings

A. Ceilings without Seismic Bracing
Where existing ceilings are without seismic bracing, the ceiling system shall be brought into substantial compliance with current code requirements (including compression struts at the center of the splayed wires, attachment of slack wires to the structure, etc.) when a substantial amount (50% or more) of the ceiling tile is removed, altered or repaired as part of a general space alteration, or if all the ceiling is removed for washing, painting or replacement.

B. Ceilings without Compression Struts
Where existing ceilings have seismic bracing but do not have compression struts at the center of the splayed wires, attachment of slack wires to the structure, etc., these improvements will only be required when and where the grid is replaced, altered, raised or lowered.

Exceptions: These upgrades are not required when:

1. Replacing or cleaning tiles or panels.

2. Removing portions of tiles or panels and/or grid to alter ductwork, sprinkler pipe, etc.

3. Lateral bracing and fixture attachment will not be required when only those portions of a ceiling are removed to facilitate the installation of sprinkler piping.

Attachments:

SK-1 Cross-section/lateral bracing for suspended ceiling
SK-2 Three types of suspension systems
a. Direct hung suspension system
b. Indirect hung suspension system
c. Furring bar suspension system
SK-3 Directly supported fixture
SK-4 Heavy duty system
SK-5 Intermediate duty system

HISTORY
Updates July 1, 1996 edition
Replaces Code Guide UBC 47/#1 which replaced Policy & Procedure #=s D-36, D-37 & D-38.
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