

These guidelines cover metal ceiling suspension systems used primarily to support acoustical tile or acoustical lay-in panels and are based on Uniform Building Code Standard (UBCS) 47-18 (1988 edition) and on Title 24, CAC, requirements for schools. They are not intended to be a substitute for review by design professionals.

## CLASSIFICATION

The structural performance required from a ceiling suspension system shall be defined in terms of a suspension system structural classification. The load-carrying capacity shall be the maximum uniformly distributed load (pounds per linear foot) that a simply supported main runner section having a span length of 4 feet 0 inch is capable of supporting without a mid-span deflection exceeding 0.133 inch, or 1/360 of the 4-foot 0-inch span length. The structural classification listed in a Manufacturer's recommendations shall be determined by the capability of main runners. These classifications shall be:

- 1. Light-Duty Systems:** Used where ceiling loads other than acoustical tile or lay-in panels are not anticipated, such as residential or light commercial structures.
- 2. Intermediate-Duty Systems:** Used primarily for ordinary commercial structures in which some ceiling loads, due to light fixtures and air diffusers, are anticipated.
- 3. Heavy-Duty Systems:** Used primarily for commercial structures in which the quantities and weights of ceiling fixtures (lights, air diffusers, etc.) are greater than those for an ordinary commercial structure.

Cross runners shall be capable of carrying the design load (as dictated by job conditions) without exceeding the maximum allowable deflection equal to 1/360 of its span.

## LATERAL DESIGN REQUIREMENTS

Suspended ceilings that are designed and constructed to support ceiling panels or tiles, with or without lighting fixtures, ceiling mounted air terminals, or other ceiling mounted services shall comply with the requirements of this standard.

### Exceptions:

1. A ceiling area of 144 square feet or less surrounded by walls that connect directly to the structure above shall be exempt from the lateral load design requirements of these standards.
2. Ceilings constructed of lath and plaster or gypsum board, screw or nail attached to suspended members that support a ceiling on one level extending from wall to wall shall be exempt from the lateral load design requirements of these standards.

## MINIMUM DESIGN LOADS

### 1. Lateral Forces

Such ceiling systems and their connections to the building

structure shall be designed and constructed to resist a lateral force specified, for example, International Building Code (IBC). Where the ceiling system provides lateral support for nonbearing partitions, it shall be designed for the prescribed lateral force reaction from the partitions as specified in the Partitions section of these guidelines. Connection of lighting fixtures to the ceiling system shall be designed for a lateral force of 100 percent of the weight of the fixture.

### 2. Grid Members, Connectors and Expansion Devices

The main runners and cross runners of the ceiling system and their splices, intersection connectors, and expansion devices shall be designed and constructed to carry a mean ultimate test load of not less than 180 pounds or twice the actual load, whichever is greater, in tension with a 5-degree misalignment of the members in any direction and in compression. In lieu of a 5-degree misalignment, the load may be applied with a 1-inch eccentricity on a sample not more than 24 inches long on each side of the splice. The connectors at splices and intersections all shall be of the mechanical interlocking type. Where composition or configuration of ceiling system members or assemblies and their connections are such that calculations of their allowable load-carrying capacity cannot be made in accordance with established methods of analysis, their performance shall be established by test. Evaluation of test results shall be made on the basis of the mean values resulting from tests of not fewer than three identical specimens, provided the deviation of any individual test result from the mean value does not exceed plus or minus 10 percent.

### 3. Substantiation

Each ceiling system manufacturer shall furnish lateral loading systems, indicating the following: a. Maximum bracing pattern and minimum wire sizes. b. Tension and compression force capabilities of main runner splices, cross runner connections, and expansion devices. All tests shall be conducted by an approved testing agency.

## INSTALLATION

### 1. Vertical Hangers

Suspension wires shall not be smaller than No. 12 gage spaced at 4 feet on center or No. 10 gage spaced at 5 feet on center along each main runner unless calculations justifying the increased spacing are provided. Each vertical wire shall be attached to the ceiling suspension member and to the support above with a minimum of three turns. Any connection device at the supporting construction shall be capable of carrying not less than 100 pounds. Suspension wires shall not hang more than 1 in 6 out-of-plumb unless countersloping wires are provided. Wires shall not attach to or bend around interfering material or equipment. A trapeze or equivalent device shall be used where obstructions preclude direct suspension. Trapeze suspensions shall be a minimum of back-to-back 1-1/4 inch cold-rolled channels for spans exceeding 48 inches.

### 2. Perimeter Hangers

The perimeter ends of each cross runner and main runner