BCD Building Codes Division
Department of Consumer and Business Services

Suspended Ceiling Systems

Code/edition/section: 2022 Oregon Structural Specialty Code (OSSC)—Sections 808.1 and 1613.1
American Society Civil Engineers (ASCE) 7-2016—Section 13.5.6

Date: Issued—July 1, 2010
Last updated—Oct. 1, 2022

Subject: Construction requirements for suspended ceiling systems

Question:

What are the minimum requirements of the OSSC for the construction of suspended ceiling systems?

Answer:

Suspended acoustical tile and lay-in panel ceiling systems

Seismic Design Categories A or B: In accordance with OSSC Section 808.1.1.1, suspended acoustical tile and lay-in panel ceiling systems in structures assigned to Seismic Design Category (SDC) A or B shall conform to the basic minimum requirements established in ASTM C635 and C636.

Seismic Design Categories C, D, E or F: In accordance with Section OSSC 808.1.1.1, suspended acoustical tile and lay-in panel ceiling systems in structures assigned to SDC C, D, E, or F shall conform to the basic minimum requirements established in ASTM C635 and C636, and shall comply with one of the following in accordance with OSSC Section 1613.1.1:

1. Prescriptive design and construction in or attached to Risk Category I, II, or III buildings or other structures:
   a. SDC C – ASTM E580 Section 4 in accordance with ASCE 7 Section 13.5.6.2.1.
   b. SDC D, E or F – Compliance with ASTM E580 Section 5 in accordance with ASCE 7 Section 13.5.6.2.2 as modified by OSSC Section 1613.4.12.

      Installation in accordance with the latest edition of NWCB Technical Document 401[1] is deemed to comply with this requirement.
2. Engineered design and construction in accordance with OSSC Section 1604.1. For purposes of seismic design, suspended ceilings are considered architectural, nonstructural components, subject to ASCE 7 Chapter 13, including Sections 13.5.2, 13.5.6, 13.5.6.1 and 13.5.6.3 in accordance with OSSC Section 1613.1.
3. Seismic qualification by testing based on a nationally recognized testing standard procedure approved by the building official, such as ICC-ES AC156[2], in accordance with ASCE 7 Section 13.2.5.
4. Seismic qualification by experience data based on nationally recognized procedures in accordance with ASCE 7 Section 13.2.6.

Specialty suspended ceiling systems: Specialty suspended ceiling systems include, but are not limited to, those incorporating arched, curved, curvilinear, or sloped ceilings; or having no direct connection to the surrounding walls or supports, such as "free floating" or "cloud" ceiling elements. Specialty suspended ceiling systems shall be installed using a project-specific, engineered design in accordance with OSSC Chapter 16 and are outside the scope of this interpretation.

Upgrading of existing suspended ceiling system: (*Applies to all Risk Categories*) The repair or alteration of existing suspended ceiling systems shall comply with OSSC Chapter 34. Additionally, municipalities may have related local seismic rehabilitation regulations outside the authority of the state building code (See OSSC Section 101.2.2.1 and 3401.2).

Power actuated fasteners (PAFs) in concrete for suspended ceiling systems: Refer to Statewide Code Interpretation No. 11-01 *Power actuated fasteners in concrete for suspended ceilings.*

Analysis:

The OSSC and ASCE 7 provide the requirements for engineered design and installation of suspended ceiling systems, as well as prescriptive installations by referencing ASTM standards. Prescriptive installations complying with the OSSC, ASCE 7, applicable portions of ASTM E580, ASTM C635 and ASTM C636 are summarized in the NWCB Technical Document 401[1]. The specific code sections relating to this interpretation are:

OSSC Section 808.1 requires suspended acoustical tile or lay-in panel ceiling systems conform to generally-accepted engineering practices, the provisions of Chapter 8, and other applicable requirements of the OSSC, and points to Section 1613.1.1 for those systems in structures assigned to SDCs C, D, E and F.

OSSC Section 808.1.1.1 requires suspended acoustical tile or lay-in panel ceiling systems be installed in accordance with the provisions of ASTM C635 and ASTM C636.

OSSC Section 1604.1 requires buildings, structures and parts thereof be designed and constructed in accordance with strength design, load and resistance factor design, allowable stress design, empirical design or conventional construction methods, as permitted by the applicable material chapters and referenced standards.

OSSC Section 1613.1 requires that every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7 as modified by Section 1613.4. The SDC for a structure is permitted to be determined in accordance with Section 1613 or ASCE 7.

OSSC Section 1613.1.1 requires suspended acoustical tile or lay-in panel ceiling systems in structures assigned to SDCs C through F meet the prescriptive seismic design provisions of ASCE 7 Section 13.5.6.2 unless otherwise engineered or seismically qualified in accordance with ASCE 7 Chapter 13.

OSSC Section 1613.4.11 amends ASCE 7 Section 13.5.6.2.2 for clarification and reiteration of ASTM E580 Section 5.2.8.1 by adding the following Item c for suspended acoustical tile or lay-in panel ceiling systems in SDCs D through F:

"c. Ceiling areas of 1,000 square feet (93 m^2) or less shall be exempt from the lateral force bracing requirements of ASTM E580 Section 5.2.8."

ASCE 7 Section 13.5.6 addresses the prescriptive seismic design and installation of suspended acoustical tile and lay-in panel ceiling systems with subsections 13.5.6.2.1 and 13.5.6.2.2, referencing ASTM E580, and providing additional prescriptive requirements for SDCs D through F.

ASCE 7 Section 13.1.3 assigns an Importance Factor of 1.5 for the seismic design of suspended ceiling systems in or attached to Risk Category IV buildings or other structures.

ASTM E580 Section 5.7 requires a design professional to consider the seismic interaction effects of suspended ceiling systems in or attached to essential facilities (Risk Category IV).

Contact: Visit the division website to contact a building code specialist.

[1] Northwest Wall & Ceiling Bureau (NWCB) Technical Document 401, Suspension Systems for Acoustical Lay-in Ceilings for Seismic Design Categories D, E & F, available at nwcb.org

[2] ICC Evaluation Service Acceptance Criteria 156 (ICC-ES AC156), Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components