

Specialty and Decorative Ceilings

Code Requirements

See last page for Seismic Code Reference Standards.

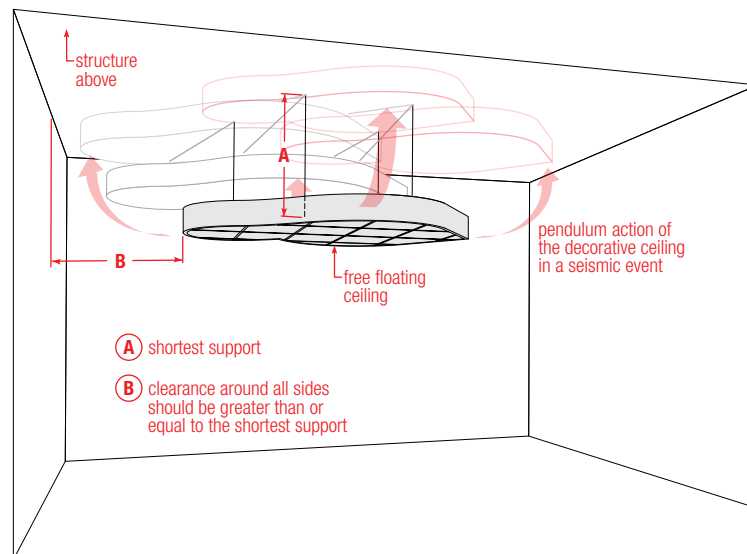
The International Building Code (IBC) defines the requirement for specialty/decorative suspended ceilings and clouds.

ASCE/SEI 7 considers these architectural components. Generally, architectural components and their supports and attachments must be installed and designed in the same manner as an acoustical suspended ceiling is installed. However, there are exceptions, the definitions can be obscure, and the actual construction of a specialty and decorative ceiling in a seismic design category is left for interpretation.

USG has a long history of product development and innovation for suspended ceiling systems in seismic applications and continues to commit significant resources to this endeavor. We have thoroughly examined our specialty ceiling offerings for seismic design categories C-F. The findings of this study and our recommendations are presented in this technical guide to assist in the interpretation of this important requirement. USG teamed with the Pacific Earthquake Engineering Research Center (PEER) University of California, Berkeley to conduct full-scale dynamic seismic shake-table testing to evaluate and qualify the seismic performance of USG specialty ceilings. This testing proved that the assemblies offered are approved for use and provide a code-compliant solution meeting International Building Code (IBC) requirements, including installations in all seismic design categories. There are many factors that affect the application of specialty and decorative ceilings in a seismic design category and USG recommends that the design team, consulting engineers and code officials work together to analyze these factors and determine the appropriate construction and application of specialty and decorative ceilings. Because codes continue to evolve, check with a local official prior to designing and installing a ceiling system.

General Guidelines

- Any specialty or decorative suspended ceiling that is attached to the perimeter wall on all four sides should be designed and installed in the same manner as an acoustical suspended ceiling is installed in a seismic design category.
- Any specialty or decorative ceiling larger than 1,000 sq. ft. should include horizontal restraint (splay wires or rigid bracing) within 2 in. of cross tee intersection and splayed 90° apart at 45° along with compression posts or struts.
- When a specialty or decorative ceiling is free-floating, then the length of the shortest support shall not be greater than the lateral clearance around the ceiling such that the system will not come into contact with another building element through the pendulum action of the system in a seismic event.
- Suspension wires that are a minimum of no. 12 gauge galvanized, soft-annealed, mild steel wire shall be used.¹



¹ 18-Gauge Stainless Steel Wire and 1/32" Multi-Stranded Aircraft Cable shall not be used.

Seismic Design Matrix

Specialty or Decorative Ceiling >1,000 sq. ft.

Size	Specialty or decorative ceiling larger than 1,000 Sq.Ft.			
Orientation	Connected to walls on all 4 sides		Free-floating	
Seismic Design Category	Category D, E and F	Category C	Category D, E and F	Category C
Requirement	All seismic design category D, E and F acoustical seismic design requirements apply to the suspension system.	All seismic design category C acoustical seismic design requirements apply to the suspension system.	Cross bracing along with horizontal restraint (splay wires or rigid bracing) within 2 in of cross tee intersection and splayed 90° apart at 45° and compression posts or struts at 12 ft. o.c.	No seismic design category C acoustical seismic design requirements apply if a 360° range of motion in the horizontal plane exists.
BILLO™ 3-Dimensional Panels	●	●	●	●
CELEBRATION™ Canopies	●	●	●	●
CELEBRATION™ Snap-In	●	●	●	●
CELEBRATION™ Torsion Spring	●	●	●	●
CELEBRATION™ Planks and Large Sizes	●	●	●	●
Compásso™ Perimeter Trim	●	●	●	●
C² Paired COMPÁSso™ Channels	N/A	N/A	N/A	N/A
COMPÁSso™ Slim Perimeter Trim	N/A	N/A	N/A	N/A
CURVATURA™ 3-Dimensional System¹	●	●	●	●
GEOMETRIX™ 3-Dimensional Metal Ceiling Panels	●	●	●	●
GEOMETRIX™ Wall-Mount Solution	●	●	●	●
GRIDWARE™ Suspension System	●	●	●	●
LIBRETTO™ Gridless Metal Ceiling System	●	●	●	●
PANZ® Metal Ceiling Panels	●	●	●	●
PANZ® Planks and Large Sizes	●	●	●	●
PARALINE® Linear Metal Ceiling System	●	●	●	●
TOPO™ 3-Dimensional System	●	●	●	●
TRANSLUCENTS™ Luminous Ceiling Panels	●	●	●	●
TRANSPARENCIES™ Luminous Ceiling System	●	●	●	●
TRUE™ Wood	●	●	●	●
WIREWORKS™ Open-Cell Ceiling Panels	●	●	●	●

¹CURVATURA™ One-Directional Systems shall not be used in seismic design categories C, D, E and F.

Seismic Design Matrix

Specialty or Decorative Ceiling <1,000 sq. ft.

Size	Specialty or decorative ceiling less than 1,000 Sq.Ft.				
Orientation	Connected to walls on all 4 sides		Free-floating		
Seismic Design Category	Category D, E and F	Category C	Category D, E and F	Category C	
Requirement	All seismic design category D, E, and F acoustical seismic design requirements apply to the suspension system except horizontal restraint (splay wires or rigid bracing) within 2 in of cross tee intersection and splayed 90° apart at 45° and compression posts or struts.	All seismic design category C acoustical seismic design requirements apply to the suspension system.	No seismic design category D-F acoustical seismic design requirements apply if a 360° range of motion in the horizontal plane exists. Cross bracing is recommended for free-floating specialty and decorative ceilings with short suspensions.	No seismic design category C acoustical seismic design requirements apply if a 360° range of motion in the horizontal plane exists.	
Specialty / Decorative Ceiling	BILLO™ 3-Dimensional Panels	●	●	●	●
	CELEBRATION™ Canopies	●	●	●	●
	CELEBRATION™ Snap-In	●	●	●	●
	CELEBRATION™ Torsion Spring	●	●	●	●
	CELEBRATION™ Planks and Large Sizes	●	●	●	●
	Compásso™ Perimeter Trim	N/A	N/A	N/A	N/A
	C² Paired COMPÁSso™ Channels	N/A	N/A	N/A	N/A
	COMPÁSso™ Slim Perimeter Trim	●	●	●	●
	COMPOSITIONS™ Decorative Clouds	N/A	N/A	●	●
	CURVATURA™ 3-Dimensional System ¹	●	●	●	●
	GEOMETRIX™ 3-Dimensional Metal Ceiling Panels	●	●	●	●
	GEOMETRIX™ Wall-Mount Solution	●	●	●	●
	GRIDWARE™ Suspension System	●	●	●	●
	LIBRETTO™ Gridless Metal Ceiling System	●	●	●	●
	PANZ® Metal Ceiling Panels	●	●	●	●
	PANZ® Planks and Large Sizes	●	●	●	●
	PARALINE® Linear Metal Ceiling System	●	●	●	●
	TOPO™ 3-Dimensional System	●	●	●	●
	TRANSLUCENTS™ Luminous Ceiling Panels	●	●	●	●
	TRANSPARENCIES™ Luminous Ceiling System	●	●	●	●
TRUE™ Wood	●	●	●	●	
WIREWORKS™ Open-Cell Ceiling Panels	●	●	●	●	

¹ CURVATURA™ One-Directional Systems shall not be used in seismic design categories C, D, E and F.

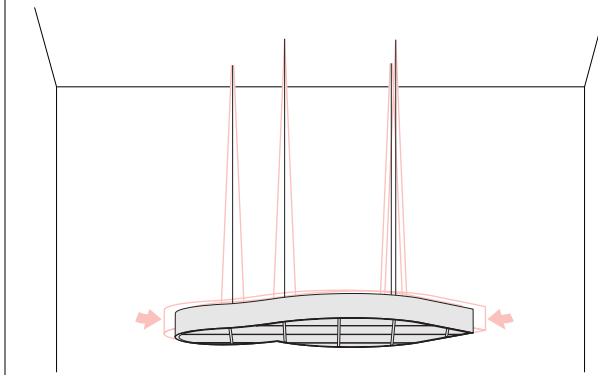
Free-Floating Islands

Distance Effect

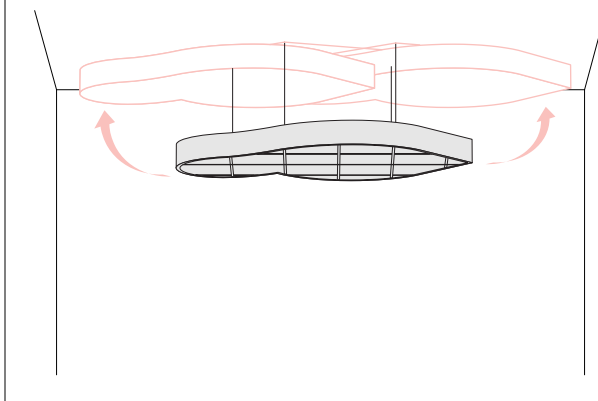
Suspension Length

Dynamic seismic shake-table tests have concluded that free-floating specialty and decorative ceilings that are suspended by lengthy distances¹ are generally less susceptible to the forces generated by a seismic event. Free-floating specialty and decorative ceilings with short suspensions are generally more susceptible to forces generated by a seismic event. Therefore specialty or decorative ceilings that have a short suspension should be evaluated for *cross bracing* even while it may not come into contact with another building element through the pendulum action of the system in a seismic event.

Long Suspension



Short Suspension



¹Lengthy distances are generally greater than 14 ft.

Free-Floating Islands

Installation

Guidelines

- Suspension wires that are a minimum of no. 12 gauge galvanized, soft-annealed, mild steel wire shall be used.
- Rigid cross braces may be used in place of suspension wires.
- Wires shall not attach to or bend around interfering material or equipment.
- Crossbracing shall be installed at the perimeter of the specialty or decorative ceiling and shall not exceed 45° from the horizontal axis.
- Crossbracing shall be installed in opposite directions and extent to the structure.
- Multiple linear crossbracing assemblies shall be installed for large specialty or decorative ceilings.
- Cross bracing wires must be taut.
- Cross bracing must be independent of any other suspension requirement.

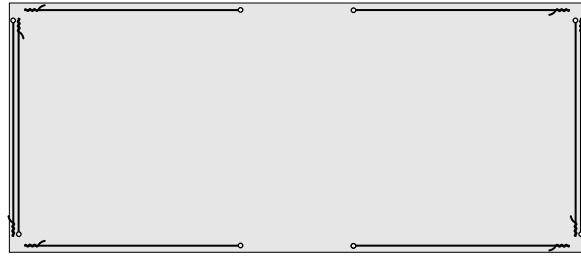
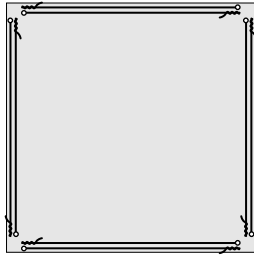


Free-Floating Islands

Cross Bracing Application

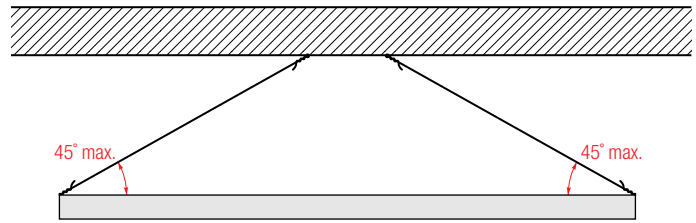
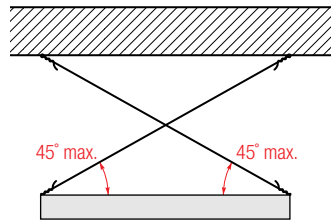
Small Specialty and Decorative Ceilings

Top

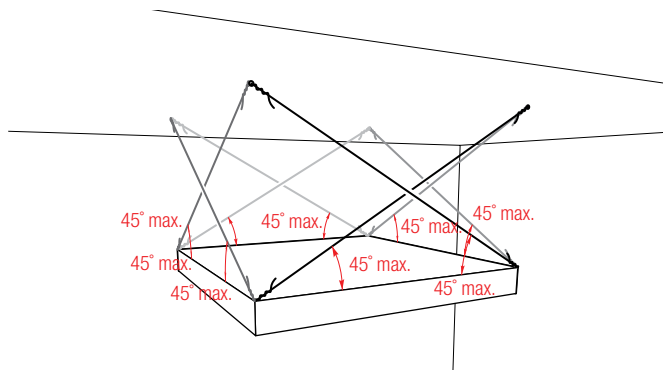


- connection at ceiling structure
- ▬ connection at floating ceiling

Profile



Isometric

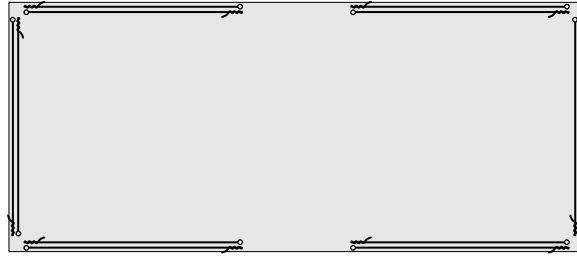


Free-Floating Islands

Cross Bracing Application

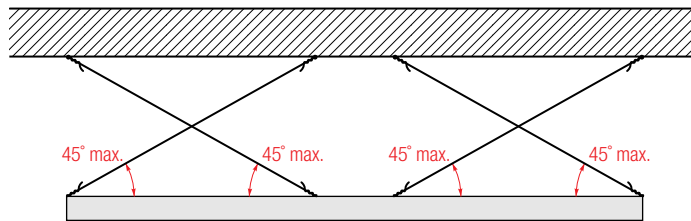
Large Specialty and
Decorative Ceilings

Top

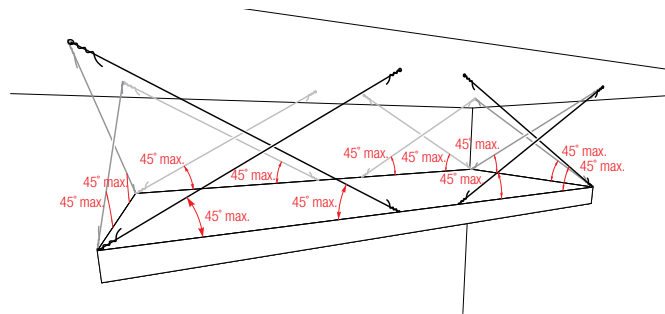


- connection at ceiling structure
- ⌘ connection at floating ceiling

Profile



Isometric



General Seismic Requirements

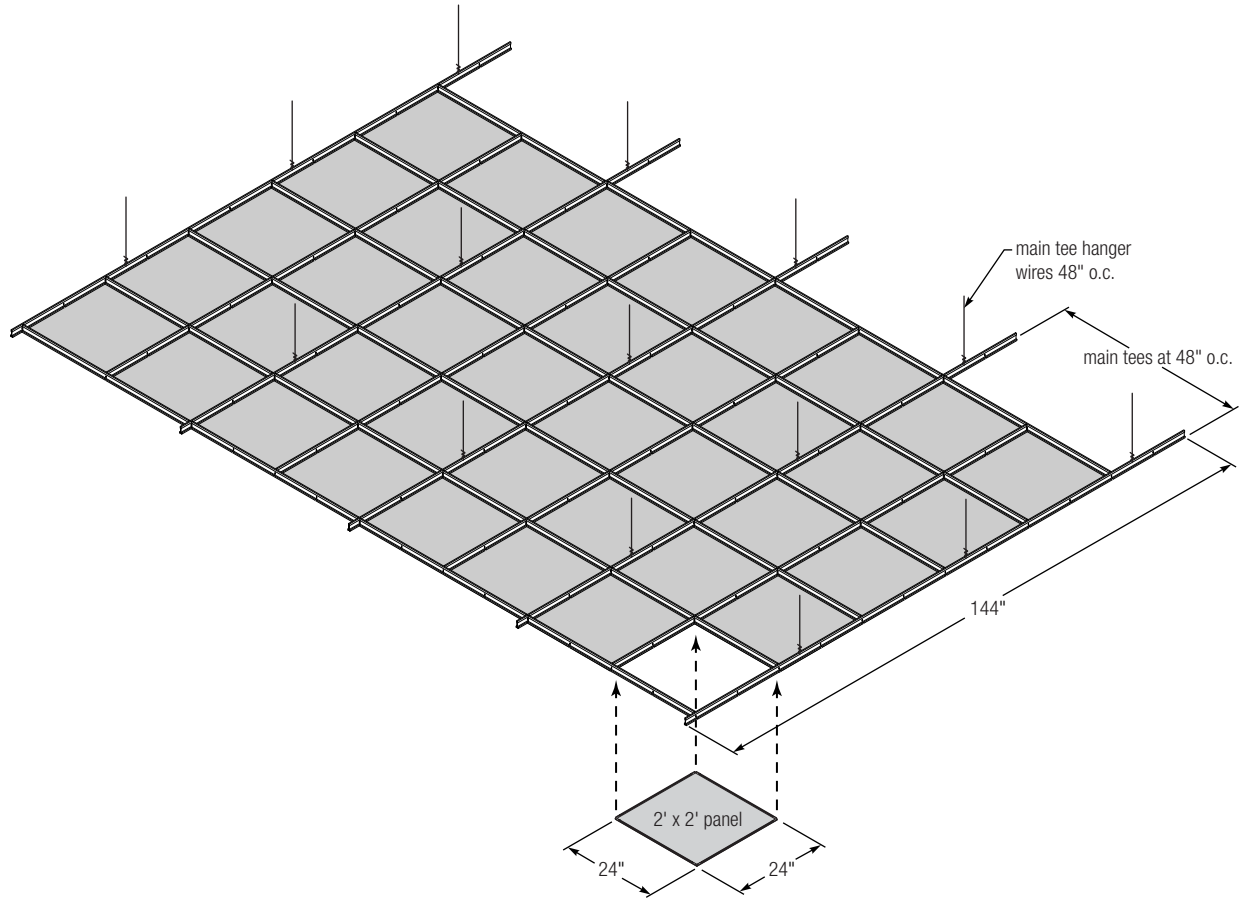
Specialty and Decorative Ceilings

Guidelines	USG Specialty Ceiling Products	Size	Seismic Design Categories C, D E F
	BILLO™		Hold down clips required
	CELEBRATION™ Planks	2' x 6'	2' x 2' grid layout; cross tees required
		2' x 8'	2' x 2' grid layout; cross tees required
	CELEBRATION™ Large Sizes	30" x 60"	30" x 30" grid layout; cross tees required
	GEOMETRIX™		Hold down clips required
	PANZ® Planks	2' x 8'	Stabilizer bar required
	TRANSLUCENTS™		Hold down clips required
	TRANSPARENCIES™		Hold down clips required
	True Wood		Hold down clips required
	Curvatura™ One-Directional System		Not to be used in Seismic Design Categories C, D E and F.
	18-Gauge Stainless Steel Wire and 1/32" Multi-Stranded Aircraft Cable		Not to be used in Seismic Design Categories C, D E and F.

Planks and Large-Size Panels

Application

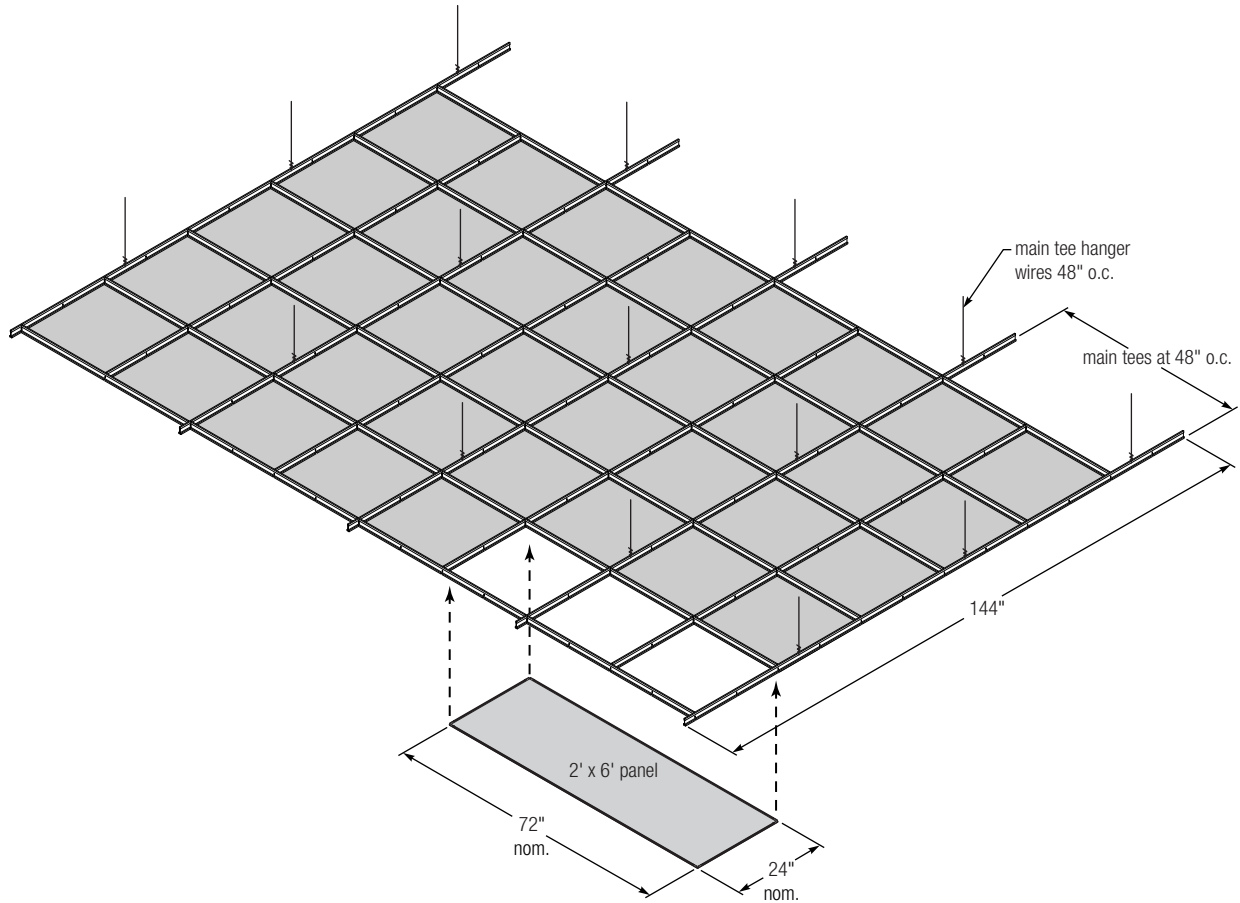
CELEBRATION 2' x 2' Planks Installed in a 2' x 2' Grid Layout



Planks and Large-Size Panels

Application

CELEBRATION 2' x 6' Planks Installed in a 2' x 2' Grid Layout¹

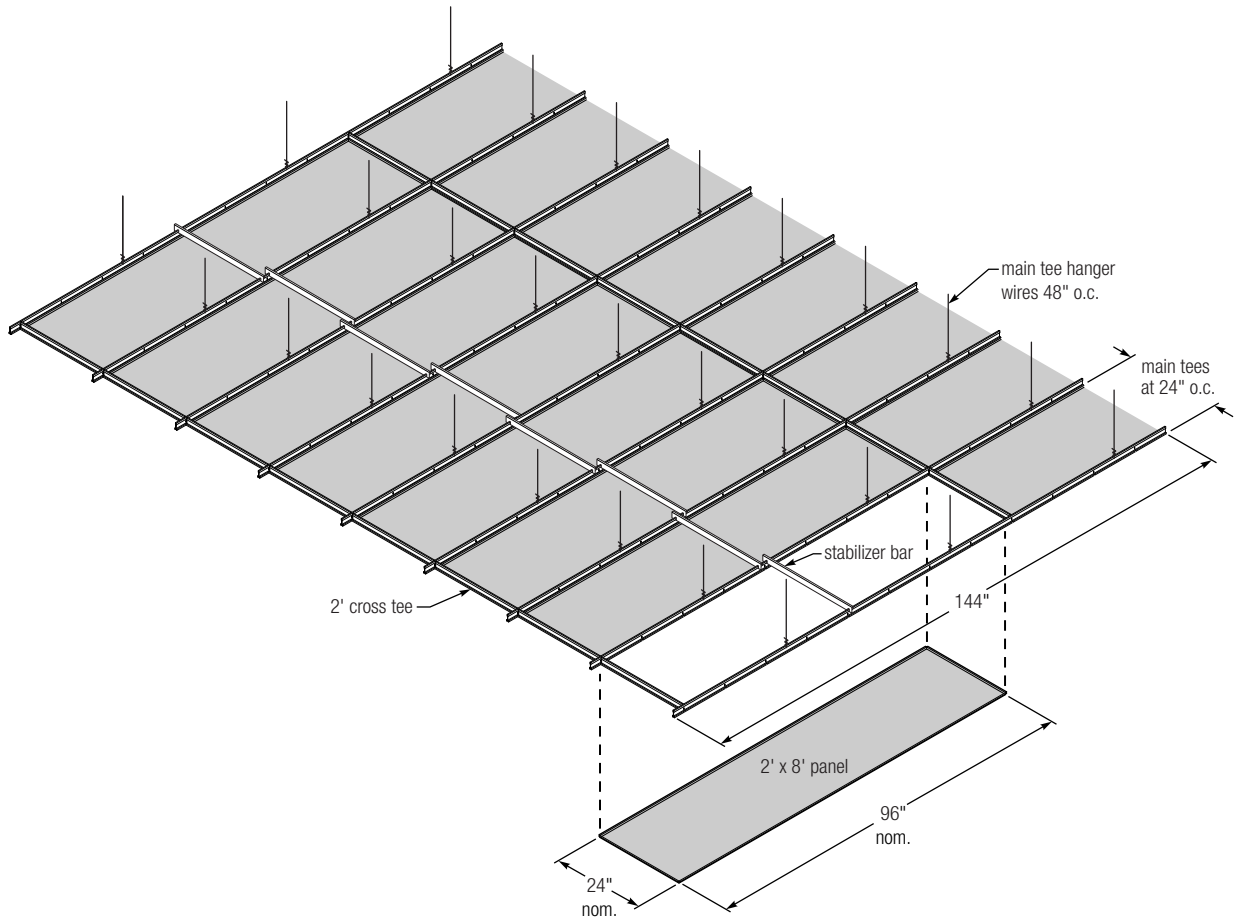


¹ 2' x 6' planks shall be installed in a 2' x 2' grid layout in seismic design categories C, D E and F.
2' x 6' planks may be installed in a 2' x 6' grid layout in other applications.

Planks and Large-Size Panels

Application

CELEBRATION 2' x 8' Planks Installed in a 24" oc Grid Layout with Stabilizer Bars

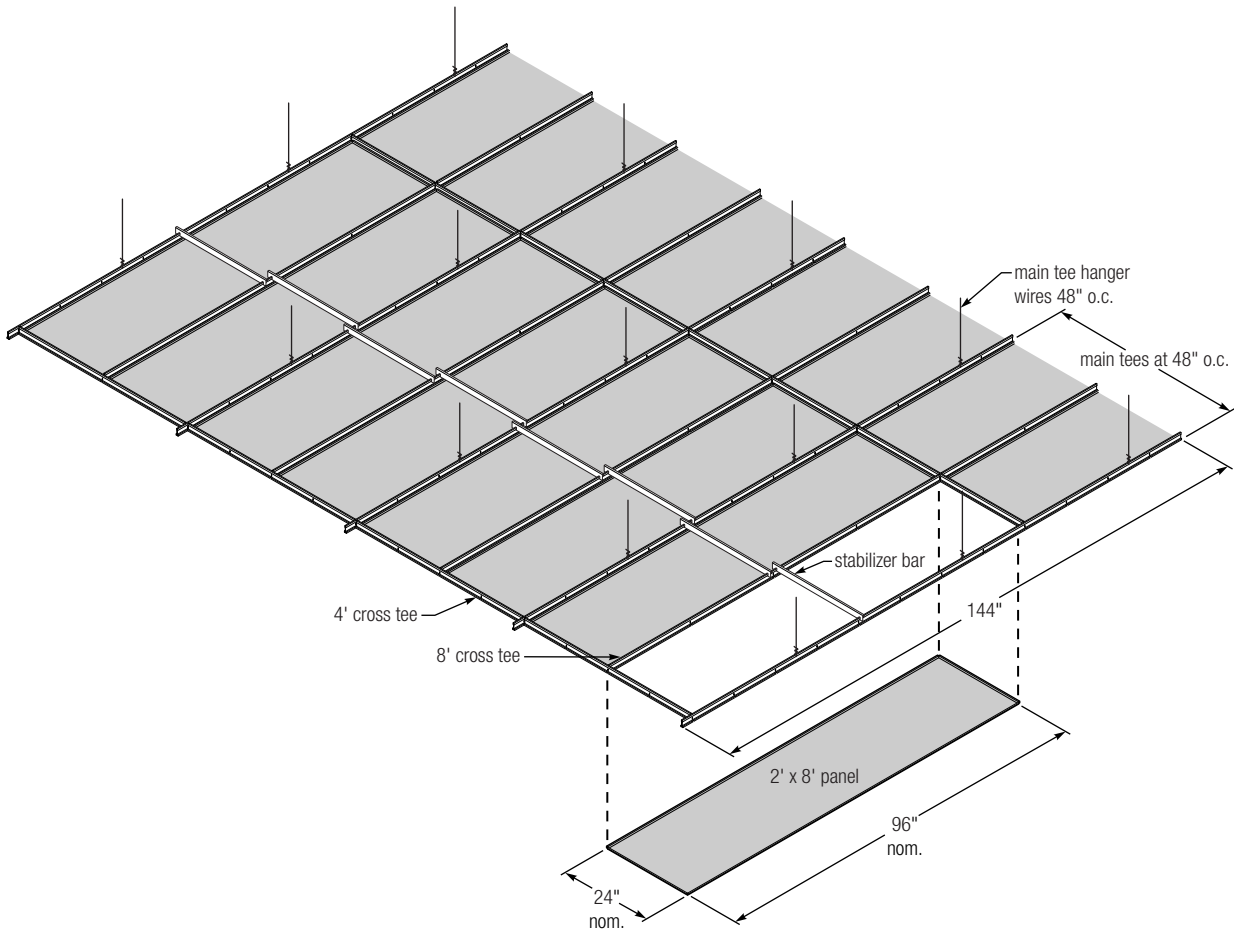


Note: A stabilizer bar is required for all module sizes greater than 60". For more information about stabilizer bars please refer to SC2540.

Planks and Large-Size Panels

Application

PANZ 2' x 8' Planks Installed in a 48" oc Grid Layout with Stabilizer Bars

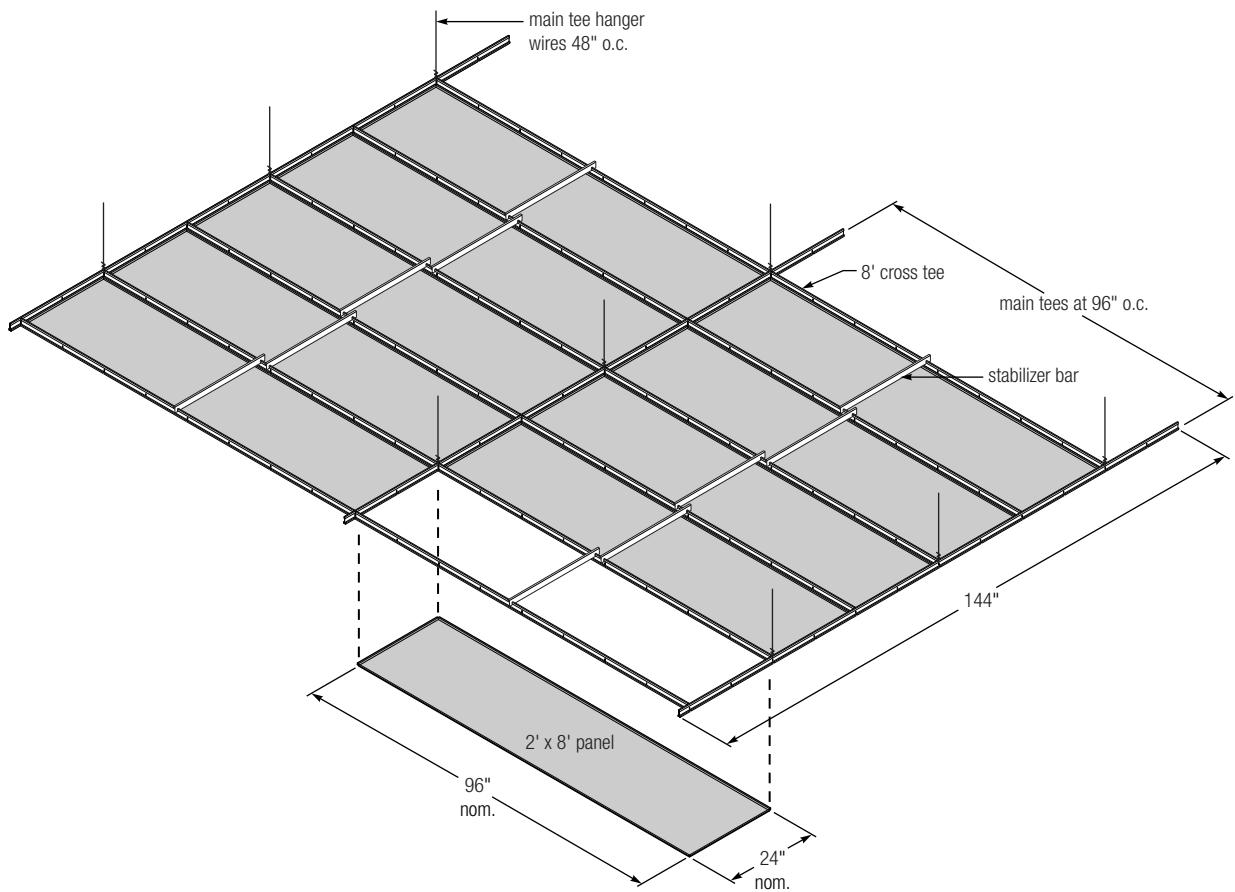


Note: A stabilizer bar is required for all module sizes greater than 60". For more information about stabilizer bars please refer to SC2540.

Planks and Large-Size Panels

Application

PANZ 2' x 8' Planks Installed in a 96" oc Grid Layout with Stabilizer Bars

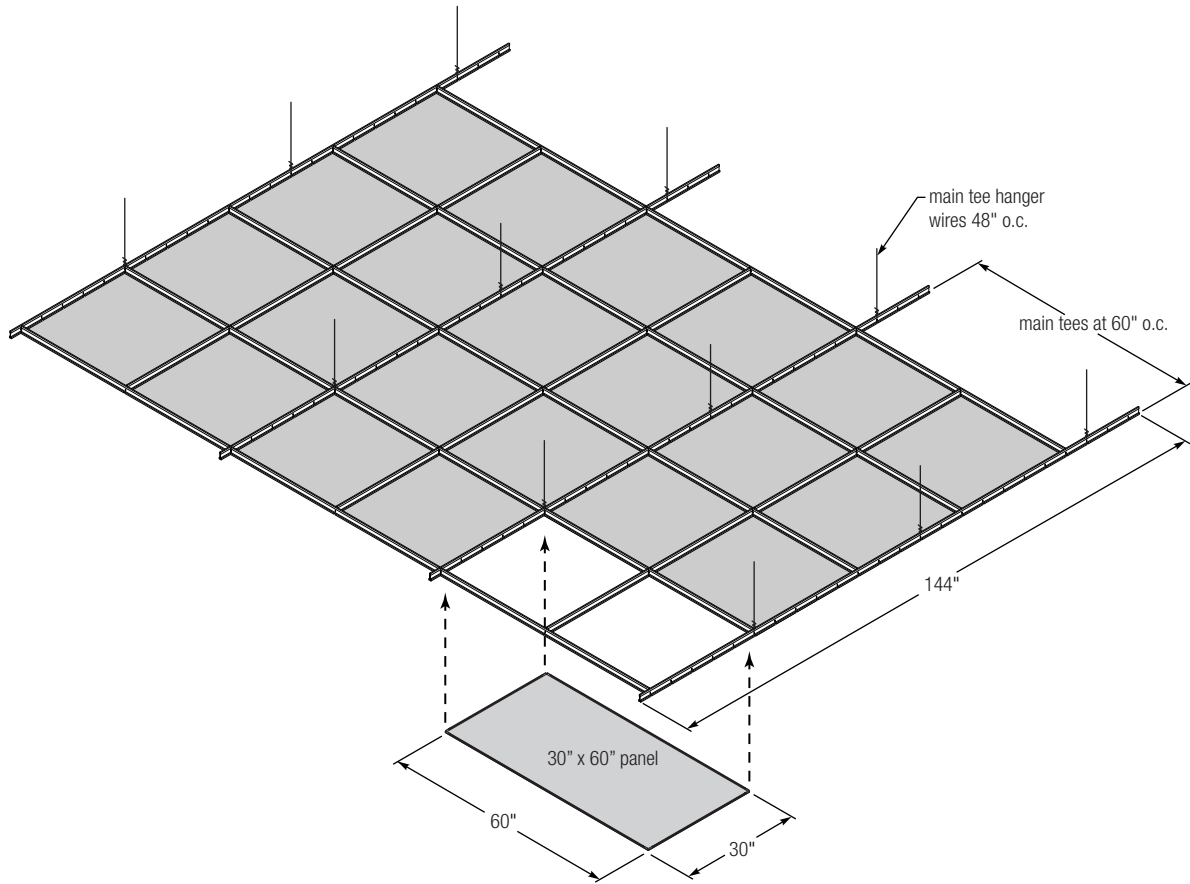


Notes:

- A stabilizer bar is required for all module sizes greater than 60". For more information about stabilizer bars please refer to SC2540.
- Max. load 12 lbs./LF (17.9 kg/m) for intermediate duty main tees and 16 lbs./LF (23.8 kg/m) for heavy duty main tees. To establish the maximum lbs./ft.² of ceiling, divide the load given by the main tee spacing in feet.

Application

CELEBRATION 30" x 60" Panels Installed in a 30" x 30" Grid Layout¹



¹ 30" x 60" panels shall be installed in a 30" x 30" grid layout in seismic design categories C, D E and F.

30" x 60" panels may be installed in a 30" x 60" grid layout in other applications.

Note: Max. load 12 lbs./LF (17.9 kg/m) for intermediate duty main tees and 16 lbs./LF (23.8 kg/m) for heavy duty main tees. To establish the maximum lbs./ft.² of ceiling, divide the load given by the main tee spacing in feet.

Seismic Code Reference Standards

Installation Guidelines for Suspended Ceilings				
International Building Code (IBC)	2003 IBC ↓	2006 IBC ↓	2009 IBC ↓	2012 IBC ↓
American Society of Civil Engineers (ASCE)	ASCE7-02 ↓	ASCE7-05 ↓	ASCE7-05 ↓	ASCE7-10 ↓
Ceilings Interior Systems Construction Association (CISCA) or ASTM International (ASTM)	CISCA Zones 0-2 CISCA Zones 3-4	CISCA Zones 0-2 CISCA Zones 3-4	CISCA Zones 0-2 CISCA Zones 3-4	ASTM E580

International Building Code (IBC) defines Seismic Design Categories A, B, C, D, E, and F.
www.iccsafe.org

ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures
 American Society of Civil Engineers/Structural Engineer Institute (ASCE/SEI)
www.asce.org

Guidelines for Seismic Restraint for Direct-hung Suspended Ceiling Assemblies (Zones 3-4) Recommendations for Direct-hung Acoustical Tile and Lay-in Panel Ceilings (Zones 0-2)
 CISCA Ceilings & Interior Systems Construction Association (CISCA)
www.cisca.org

ASTM International E580/E580M Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
 ASTM International (formerly American Society for Testing and Materials)
www.astm.org

Further References

USG Seismic Ceiling Resource Center
 Seismic Technical Guides
seismicceilings.com

Information
 See usg.com for the most up-to-date product information.

Installation
 Must be installed in compliance with ASTM C636, ASTM E580, CISCA, and standard industry practices.

Code Compliance
 The information presented is correct to the best of our knowledge at the date of issuance. Because codes continue to evolve, check with a local official prior to designing and installing a ceiling system. Other restrictions and exemptions may apply. This is only intended as a quick reference.

Purpose
 This seismic technical guide (STG) is intended as a resource for design professionals, to promote more uniform criteria for plan review and jobsite inspection of projects. This STG indicates an acceptable method for achieving compliance with applicable codes and regulations, although other methods proposed by design professionals may be considered and adopted.

ICC Evaluation Service, Inc., Report Compliance
 Suspension systems manufactured by USG Interiors, Inc., have been reviewed and are approved by listing in ICC-ES Evaluation Report ESR-1222. Evaluation Reports are subject to reexamination, revision and possible cancellation. Please refer to usgdesignstudio.com or usg.com for current reports.

L.A. Research Report Compliance
 DOWN brand suspension systems manufactured by USG Interiors, Inc., have been reviewed and are approved by listing in the following L.A. Research Report number: 25764.

Note
 The University of California does not endorse specific products.

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Safety First!
 Follow good safety/industrial hygiene practices during installation. Wear appropriate personal protective equipment. Read MSDS and literature before specification and installation.

