SLOPED CEILINGS
TECHNICAL GUIDE

AR姆STRONG® CEILING PANELS ACCEPTABLE IN SLOPED INSTALLATIONS

Mineral Fiber Lay-in, Tegular, and Vector® Ceiling Panels
Fiberglass Lay-in, Tegular, and Vector Ceiling Panels
MetalWorks™ Tegular and Vector Ceiling Panels
WoodWorks® Tegular Ceiling Panels

[Not all panel sizes can be installed in a sloped configuration. Panels over 4’ in length must be evaluated on a case by case basis.]

ARムSTRONG SUSPENSION SYSTEMS ACCEPTABLE IN SLOPED INSTALLATIONS

Prelude® XL®
Suprafine® XL
Silhouette® 1/4” XL
Silhouette® 1/8” XL
Interlude® XL

ACCESSORIES:

WALL MOLDINGS:

BERC2 — Beam End Retaining Clip
PMHDC — Maximum Hold Down Clip
7808 2” Angle Molding
7800 Hemmed Angle

IMPORTANT SAFETY INFORMATION

Safe installation of a sloped ceiling requires project specific evaluation for compliance with building codes. The final design and installation parameters are the responsibility of the design team. Armstrong has evaluated certain design configurations and supplied the following recommendations based on our testing:

• The maximum ceiling slope shall not exceed 30°
• Use of a maximum hold down clip is required for all sloped ceiling applications except Metalworks Vector which have integrated spring clips in the panel.
• Main beams MUST NOT be installed perpendicular to the slope as this may result in suspension system failure.
• Main beams must be spaced a maximum of 4’ on center.
• Panels installed at a slope will tend to slide downhill. Shims must be used to prevent this.
• Vector panels MUST be installed with the access kerf (side A) oriented toward the top of the slope. Panels may fall out if not configured with the A side at the top of the slope.
• Maintenance personnel who may be removing and replacing specific panels must be trained on how to properly replace the panel with proper clips and orientation.
Designing and installing a sloped suspended ceiling can provide the opportunity to enhance daylighting, conserve energy, and contribute to LEED EQ Daylighting credits.

Sloped ceilings are not addressed in current building codes. Current building code states that suspended ceiling main beams must be leveled to within 1/4” on a 10’ span. Alternate designs are acceptable when approved by the Authority Having Jurisdiction. This is the responsibility of the Project Design Team.

**Actual construction of a sloped suspended ceiling may require engineering documents by code officials/authorities having jurisdiction in your area.**

Armstrong Ceilings has examined sloped ceilings utilizing ceiling panels for Seismic Design Categories C, D, E, F. We have conducted full-scale seismic shake table testing on multiple sloped ceiling designs at the Structural Engineering Earthquake Simulation Lab located at the State University of New York at Buffalo. Armstrong Ceilings can provide documentation of these test results to design professionals, code officials, and building departments on a project specific basis in the form of a Seismic White Paper. For more information on seismic design, please reference our **Seismic Design: What You Need to Know Brochure.**

Since each sloped ceiling design is unique, general detail drawings accompany these guidelines. Project shop drawings are the responsibility of the contractor. The structural engineer of record is responsible for verifying and approving the use of Armstrong Ceilings components in these unique installations.

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**SLOPED CEILING INSTALLATION GUIDELINES**

The following guidelines are in addition to the requirements set forth in ASTM C636 and ASCE 7.

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**ANGLE GUIDELINES**

- Maximum ceiling slope angle shall not exceed 30°.

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**MAXIMUM HOLD DOWN CLIP GUIDELINES**

The Maximum Hold Down Clip is required for all sloped ceiling applications except MetalWorks™ Vector ceiling panels which have integrated spring clips in the panel.

**Metalworks Vector Spring Clip**

- The use of the Maximum Hold Down Clip will reduce the accessibility of the panel.
**SHIM GUIDELINES**

- Panels will tend to slide downhill, especially on steeper angles.
- If needed, place 1/8" or 3/32" shims (depending on panel type) between the panel edge and the web of the cross tee at the lower edge of each panel to center the panel in the suspension system opening.

**SUSPENSION SYSTEM GUIDELINES**

- Install main beams parallel (up/down the incline) the slope.
- DO NOT INSTALL MAIN BEAMS PERPENDICULAR TO THE SLOPE AS THIS MAY RESULT IN SUSPENSION SYSTEM FAILURE.
- Main beams should be spaced 4'-0" on center, maximum.
- If I-beams, joists, or trusses are running up the slope and do not have purlins between them, bridge the beams, joists, or trusses with a material capable of supporting the ceiling system load.

**HANGER WIRE GUIDELINES**

- 12 gauge hanger wire must comply with ASTM C636 requirements.
- Hanger wires should be suspended vertically and plumb.
- If lateral force bracing is required in severe seismic areas, it shall remain vertical and the splay wires shall be installed at maximum 45° to the horizontal.

**Lateral Force Bracing (Compression Posts and Splay Wires)**
Sloped Ceilings Perimeter Solution Matrix

<table>
<thead>
<tr>
<th>Suspended Ceiling Slope</th>
<th>Non-Seismic Areas</th>
<th>Seismic Cat. C, D, E, F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 30°</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Perimeter Solution Options**

- **OPTION 1:** Wall angles at the top and bottom of the slope should be re-bent to the correct angle by the contractor or at a local sheet metal shop.
  - 2" wall angle Item 7808 should be used. **NOTE:** If 7/8" molding is field bent upwards, the result is no room to mount your cross tees to the angle, unless you back cut the web and bulb severely, which impacts loading.

- **OPTION 2:** Wall angles are painted and wall shimmed to achieve the correct angle.
  - 7/8" wall angle Item 7800 should be used.
  - The field crafted wall shim must keep the angle 90° to the slope.

- **OPTION 3 (SEISMIC):** Wall angles are painted and wall shimmed to achieve the correct angle.
  - 7/8" wall angle Item 7800 should be used.
  - The field crafted wall shim must keep the angle 90° to the slope in order to use Seismic Rx® BERC2 clips.

**Floating Sloped Ceiling Perimeters**

- Non-Seismic Considerations: Refer to ASTM C636 for standard practice for installation.
- Seismic Considerations: If sloping a floating cloud, project specific engineering is required.

**Vector® Ceiling Panel Considerations**

- Ultima® and Optima® Vector ceiling panels in a sloped installation must have the access kerf (A) oriented towards the top of the slope.
### Quick Reference Guide for Seismic Sloped Ceilings

<table>
<thead>
<tr>
<th>Panel Type</th>
<th>Mineral Fiber and Fiberglass Lay-In, Tegular, and Vector Ceiling Panels</th>
<th>Woodworks® Tegular Panels*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seismic Category</td>
<td>Seismic C</td>
<td>Seismic D, E, F</td>
</tr>
<tr>
<td>Grid ASTM Class</td>
<td>Intermediate Duty (0° &lt; slope &lt; 15°)</td>
<td>Heavy - Duty</td>
</tr>
<tr>
<td></td>
<td>Heavy - Duty (15° &lt; slope &lt; 30°)</td>
<td>Heavy - Duty</td>
</tr>
<tr>
<td>Perimeter Support Wires 8&quot; or Less from Wall</td>
<td>None Required</td>
<td>Required</td>
</tr>
<tr>
<td>Wall Clearance</td>
<td>3/8&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Minimum Wall Molding Width</td>
<td>7/8&quot;</td>
<td>2&quot; or 7/8&quot; with BERC2 Clip</td>
</tr>
<tr>
<td>Fastened Perimeter Tee Connections</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Lateral Force Bracing (splay wires/rigid bracing) for Ceiling Areas &gt; 1,000 ft²</td>
<td>None Required</td>
<td>Required</td>
</tr>
<tr>
<td>Compression Posts for Ceiling Areas &gt; 1,000 ft²</td>
<td>None Required</td>
<td>Required</td>
</tr>
<tr>
<td>Seismic Separation Joints for Ceiling Areas &gt; 2,500 ft²</td>
<td>None Required</td>
<td>Required</td>
</tr>
<tr>
<td>Maximum Weight per ft²</td>
<td>3.0 lbs/ft² (Intermediate-Duty Grid)</td>
<td>4.0 lbs/ft²</td>
</tr>
<tr>
<td></td>
<td>4.0 lbs/ft² (Heavy-Duty Grid)</td>
<td></td>
</tr>
<tr>
<td>Maximum Hold Down Clip Configuration</td>
<td>See page 9 for layout configuration</td>
<td>See page 10 for layout configuration</td>
</tr>
</tbody>
</table>

*Safety cables are required for 2’ x 4’ and 2’ x 6’ panels

### Quick Reference Guide for Non-Seismic Sloped Ceilings

<table>
<thead>
<tr>
<th>Non-Seismic Sloped Ceiling Requirements</th>
<th>Intermediate-Duty or Heavy-Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perimeter Support Wires 8&quot; or Less from Wall</td>
<td>None Required</td>
</tr>
<tr>
<td>Wall Clearance</td>
<td>None Required</td>
</tr>
<tr>
<td>Minimum Wall Molding Width</td>
<td>None Required</td>
</tr>
<tr>
<td>Fastened Perimeter Tee Connections</td>
<td>None Required</td>
</tr>
<tr>
<td>Lateral Force Bracing (splay wires/rigid bracing) for Ceiling Areas &gt; 1,000 ft²</td>
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</tr>
<tr>
<td>Compression Posts for Ceiling Areas &gt; 1,000 ft²</td>
<td>None Required</td>
</tr>
<tr>
<td>Seismic Separation Joints for Ceiling Areas &gt; 2,500 ft²</td>
<td>None Required</td>
</tr>
<tr>
<td>Maximum Hold Down Clip Configuration</td>
<td>None required.</td>
</tr>
</tbody>
</table>
Seismic Categories C, D, E, F Sloped Ceiling Layouts for Mineral Fiber and Fiberglass Lay-In, Tegular, Vector and Concealed Ceiling Panels and Metalworks™ Tegular and Vector Ceiling Panels

Seismic Category C Sloped Ceiling Layout for Slopes ≤ 15°

Mains should run parallel to the slope.

Category C  
Slope < 15°

Seismic Category C Sloped Ceiling Layout for 15° < Slope ≤ 30°

Mains should run parallel to the slope.

*Heavy-duty grid must be used.

Category C  
15° < Slope ≤ 30°
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SLOPED CEILING LAYOUTS

Seismic Category D, E, F Sloped Ceiling Layout for Slopes $\leq 15^\circ$

Mains should run parallel to the slope.

Category D, E, F  
Slope $\leq 15^\circ$

Seismic Category D, E, F Sloped Ceiling Layout for $15^\circ < $ Slope $\leq 30^\circ$

Mains should run parallel to the slope.

Category D, E, F  
$15^\circ < $ Slope $\leq 30^\circ$
Woodworks Tegular Seismic Category C, D, E, F Sloped Ceiling Layout for $0^\circ < \text{Slope} \leq 30^\circ$

Mains should run parallel to the slope.

WoodWorks Tegular  
Category C, D, E, F

- Cross Tee
- Main Beam
- BERC2 Clip
- PMHDC

Floating / Unattached Side

Attached Side

High Slope

Floating / Unattached Side

Low Slope

Attached Side
1 877 276 7876
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TechLine – Technical information, detail drawings, CAD design assistance, installation information, other technical services – 8:00 a.m. to 5:30 p.m. EST, Monday through Friday. FAX 1 800 572 8324 or email: techline@armstrongceilings.com

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