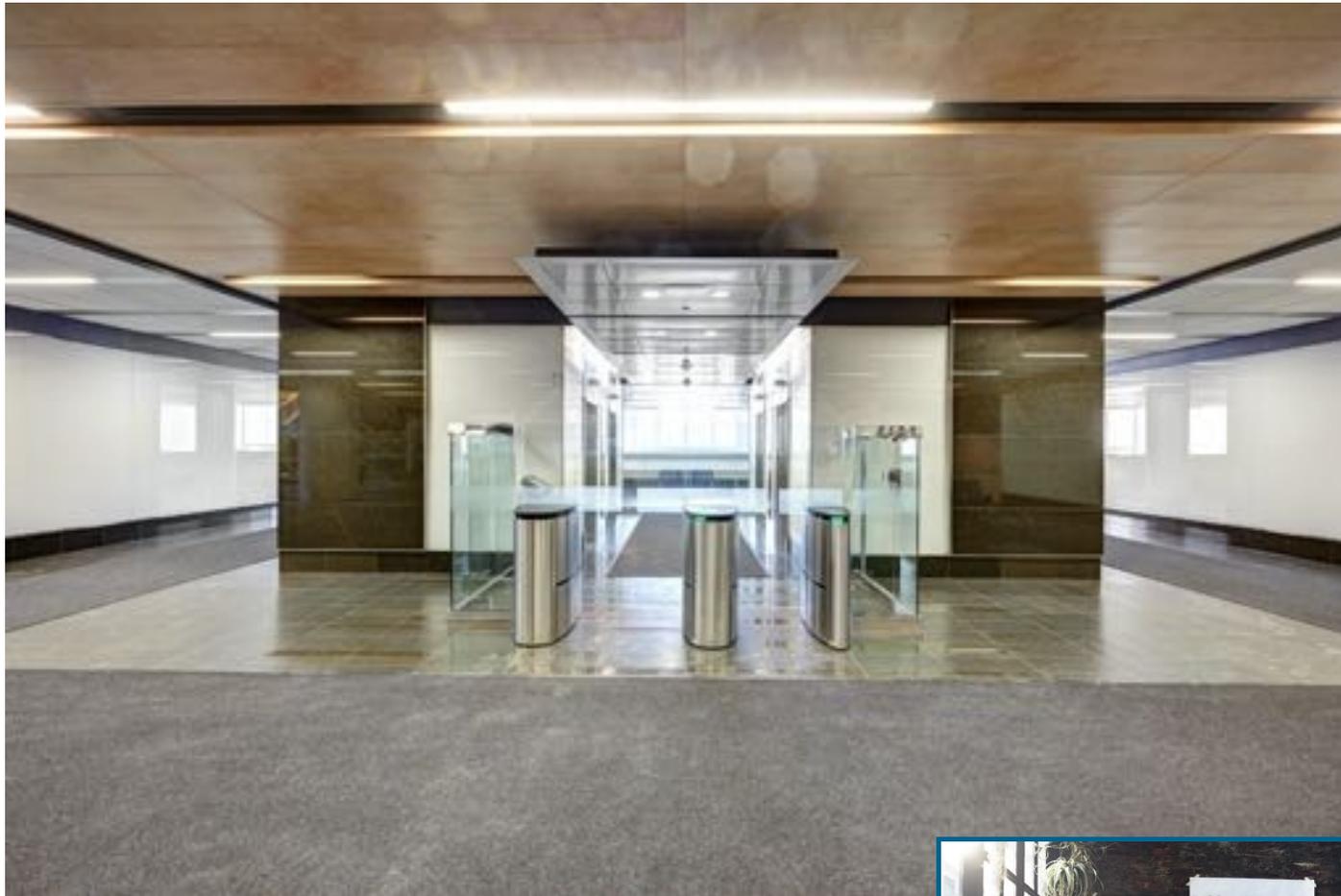


Designing with Metal Ceilings



Rockfon, a part of the ROCKWOOL Group

80

**ROCKWOOL Group's
years of experience in
the stone wool
manufacturing industry**

At ROCKWOOL, we are committed to enriching the lives of everyone.

Whether it is energy consumption or water scarcity, we are developing products to tackle the world's biggest sustainability and development problems. Our products span everything from building insulation to horticultural systems.

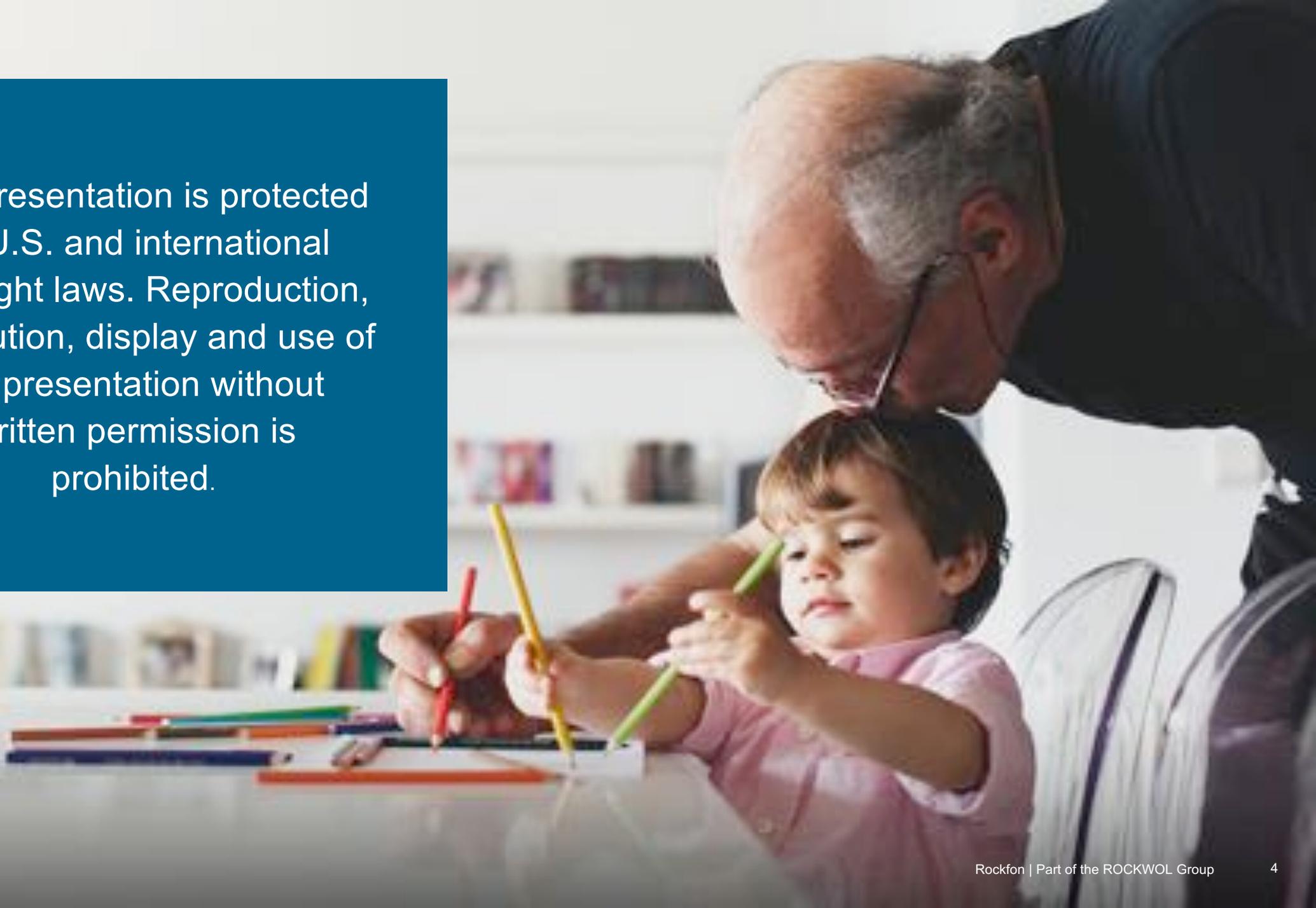
Our heritage is rooted in stone wool. We are the world leader in this field, with more than 11,000 passionate experts spread across 39 countries.

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Learning Objectives

After completing this course, you should be able to:

1. Discuss the benefits of suspended ceilings.
2. Explain how suspended metal ceilings can contribute to the health and well-being of building occupants.
3. Describe the range of options for the size, style, and percentage of perforations in suspended metal ceilings, and how these perforations contribute to acoustic performance and aesthetics.
4. Demonstrate how to use the Optimizing Absorption matrix to select the right absorption performance (NRC) for a project.
5. Review the special wind and seismic design considerations for exterior applications of suspended metal ceilings.

Summary

- **Uses of suspended ceilings**
- **Performance attributes of metal ceilings**
- **Design attributes of metal ceilings**
- **Versatility of metal ceilings**
- **Questions**



(60 Minutes)

Use of Suspended Ceilings



Use of Suspended Ceilings

Plenum: Area above the dropped ceiling

Why use a suspended ceiling:

- Aesthetics, acoustics
- Simple access to plenum
- Concealing HVAC, piping, wiring



Materials used for Suspended Ceilings



Wood



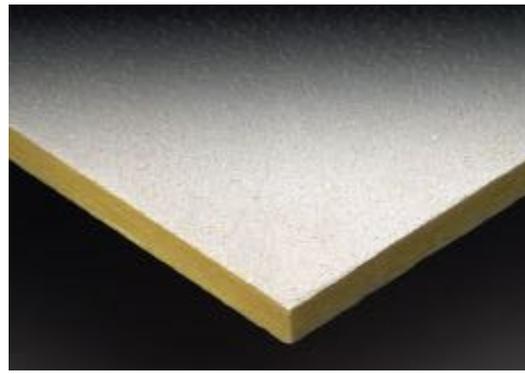
**Gypsum
plaster of Paris**



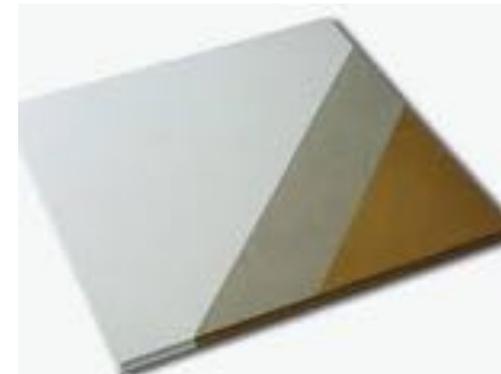
**Mineral fiber
wet felt or cast**



Metal



**Fiberglass
silica sand, limestone**



**Stone wool
basalt and slag**



Fire performance



- Fire-resistant materials create a **safer indoor environment**.
- Acoustical and thermal insulating materials typically must have a Class A rating.

- **Class A** = Flame Development 0–25 and Smoke Developed 0–450
- **Class B** = Flame Development 26–75 and Smoke Developed 0–450
- **Class C** = Flame Development 76–200 and Smoke Developed 0–450



Sustainability



Aluminum

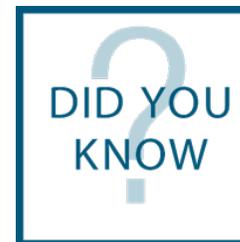
- Lighter
- Inherent corrosion resistance
- Recycled content 25–90 percent post-consumer

Steel

- Original base material in metal ceilings
- The finish creates corrosion resistance
- Minimum 25 percent recycled content

Both feature

- High life-cycle return versus non-metal systems
- 100 percent recyclable at the end of their useful life
- No VOCs



Unlike plastic and paper products, both aluminum and steel can be recycled indefinitely.



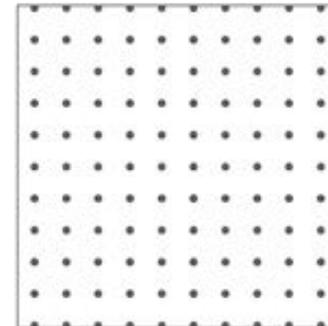
Acoustics

Acoustical properties

- Absorption and blocking in one product
- Perforations and open reveals allow for sound absorption: NRC

Perforation considerations and designs

- Shape: round, square, rectangular
- Spacing: diagonal, staggered, straight
- Scale: large versus small holes and visual impact
- Border: width or none
- Patterns: consistent or random



Perforations



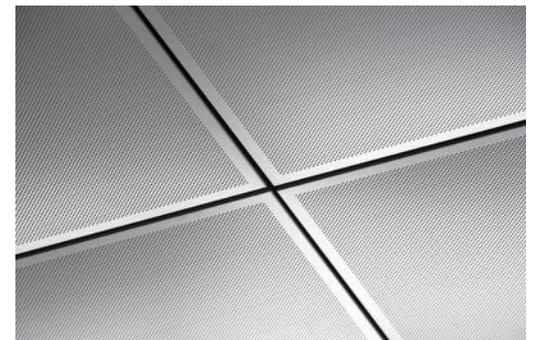
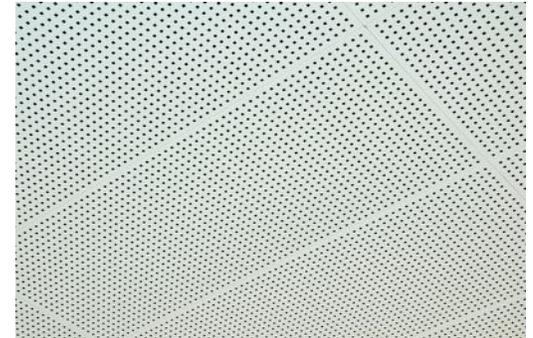
Round, straight, with border



Square, straight



Round, large, diagonal



Optimizing Absorption

Noise Reduction Coefficient (NRC)



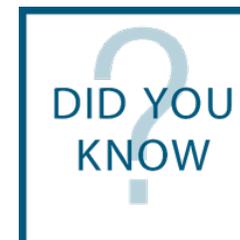
- The average of the sound absorption coefficients in the mid frequencies (250, 500, 1,000, and 2,000 Hertz octave bands).
- Tested per ASTM C 423 in an independent NVLAP lab.
- Varies between 0.0 and 1.0 in 0.05 increments; the higher, the better.
- Higher NRC ratings mean speech is more intelligible and noise is absorbed faster as it travels across an open space or down a corridor.

NRC CATEGORIES

BEST NRC 0.90

BETTER NRC 0.80

GOOD NRC 0.70



Improving acoustics in open-plan offices can increase concentration levels by 48 percent.

Design Considerations: Optimizing Absorption



NRC: Good, Better, Best

<u>Sensitivity to Noise</u>	High	BETTER NRC 0.80	BEST NRC 0.90	BEST NRC 0.90
	Medium	GOOD NRC 0.70	BETTER NRC 0.80	BETTER NRC 0.90
	Low	GOOD NRC 0.70	GOOD NRC 0.70	BETTER NRC 0.80
		Low	Medium	High

Potential for Noise Inside the Room

Source: The values in this table are based on the acoustic criteria sections of current standards, guidelines, and building rating systems, including ANSI/ASA S12.60-2010 (schools), WELL Building Standard 2016 and GSA PBS-P100 2016 (office buildings), The FGI Guidelines 2014 (health-care facilities), and LEED v4 ID+C (sustainable buildings).



Design creativity



Suspension

- Visible: standard suspension products
 - Create lines and patterns
 - Accentuate the lines with various suspension width and designs
- Concealed:
 - Smooth, minimalistic visuals

Flexibility

- Sizing: standard 2-foot x 2-foot to very large custom dimensions

Variety

- Panels, planks, linear, open cell, curved
- Layers and textures

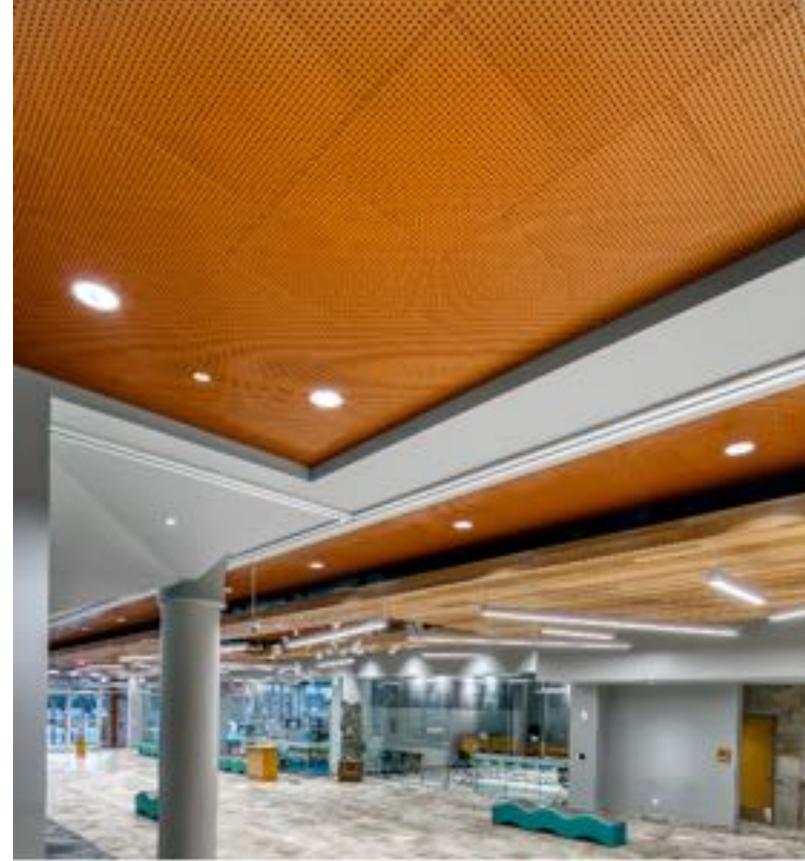
Suspension



Visible



Concealed

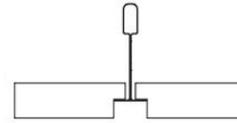


Creating the Look: Visible Suspension



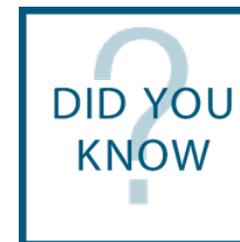
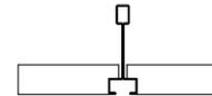
Grid-based systems

- Panels sit or lay into the system and are installed from above the suspension



Create additional visual interest

- Industry-standard 9/16-inch or 15/16-inch suspension
- Custom profiles with additional width up to 1½ inches
- Reveal “bolt slot” suspension
 - Creates a single-centered shadow
- Double-reveal suspension
 - Creates two shadows



The first known use of suspended ceilings is found in 14th century Japanese architecture.

Creating the Look: Concealed Suspension



Typical concealed systems

- Install from below
- Clip or snap into the mounting system or specialized suspension profiles
- Use springs or brackets to hang below the structure

Torsion spring



Snap-in



Hook-on



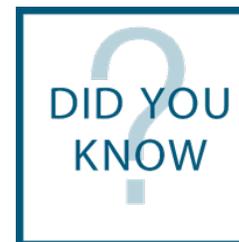
Flexibility: Sizing and Scale



2-foot x 2-foot panels



2-foot x 10-foot planks



The term *plank* refers to panels with a length that is more than two times its width.

Variety

Shapes, sizes, and motion through the ceiling plane



Layers



Linear



Open: baffles



Open Cell

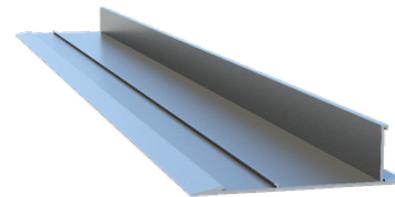
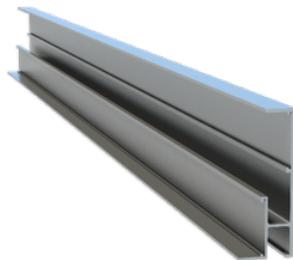
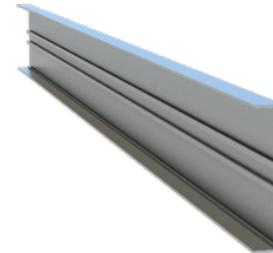
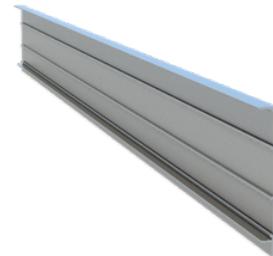


Curved



Variety Continued: Perimeter Trim

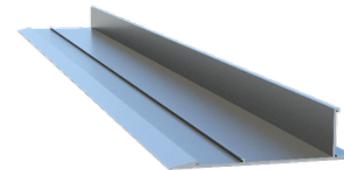
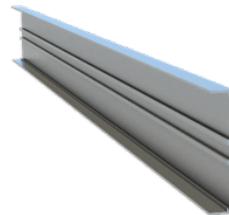
- Used to accentuate areas
- Can integrate with soft acoustic tiles
- Smooth transition between heights
- Ability to transition between different ceiling finishes



Perimeter Trim: Continued



Different perimeter trim edge details help achieve a variety of design looks.





Aesthetics



Painted finishes

- Coil coat versus post paint
 - Wet paints and powder coats
- Standard
- Premium
- Custom color-matching

Metallic finishes

- Anodized
- Chrome and reflective finishes

Wood look

- The look of wood without the headache
- Vinyl wood finish
- Dye-sublimation process

Edges

- Square
- Bevel
- Reveal
- Concealed

Perforations

Finishes: Painted



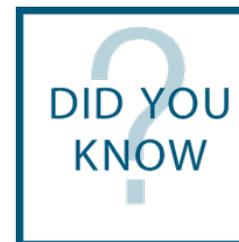
Ignite creativity:
bold vibrant accents



Create intimacy:
dark tones



Make spaces feel larger:
light tones



Color evokes physical and psychological reactions.

Finishes: Wood Looks



Light maple tones



Darker teak and oak tones



Traditional tongue and groove looks



Finishes: Reflective and Metallic



Create a unique visual impact with light and reflections.

Reflective



Metallic



Edge Details and Lines



Beveled edges: fine lines



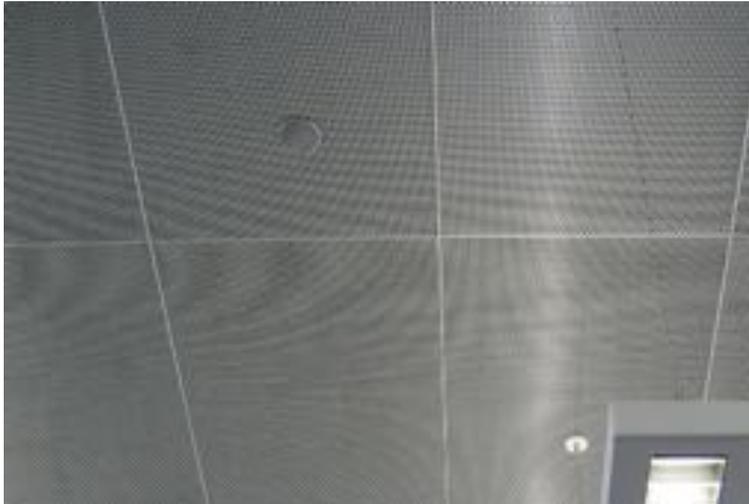
Unique perforations: visual interest



Reveal edges: bold lines

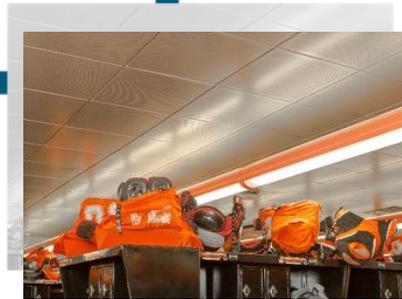


Fine perforations: visual texture





Durability



Corrosion resistance

- Aluminum and galvanized coatings for steel

Mold and mildew, indoor air quality

- Does not provide a food source for growth

Cleanable

- Finishes that can withstand chemical exposure
- Stainless steel

Finishes

- Wood-look without the difficulties of true wood
- Not susceptible to temperature changes and humidity like true wood-based products

Versatility



Interior

- Large-scale spaces
- Ease of access



Exterior/wind

- Wind loads
- Finish longevity



Seismic

- Codes and standards
- Compliant testing



Integration

- Ease of installation
- Mechanical systems





Interior

Grand spaces with impact



Maintain plenum access





Exterior/Wind



Wind uplift

- Uplift ratings 30/60/90 psf
- Positive and negative pressures

Finishes

- UV exposure
- Wood looks without the maintenance

Applicable Standards

- UL 580: Standard for Tests for Uplift Resistance of Roof Assemblies

Exterior



Applications: soffits, eaves, and overhangs



Minimal exposure: parking

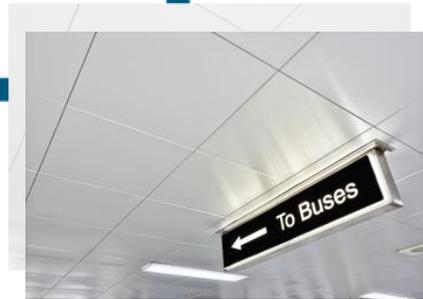


Visual continuity: exterior to interior





Seismic



Metal ceiling systems often require additional approvals

- International Building Code (IBC)
- National Building Code of Canada (NBCC)
- Provincial/State Building Code
 - California Building Code (CBC), City of LA, OSHPD

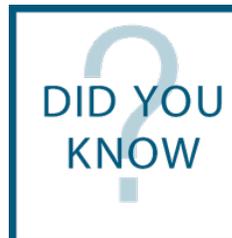
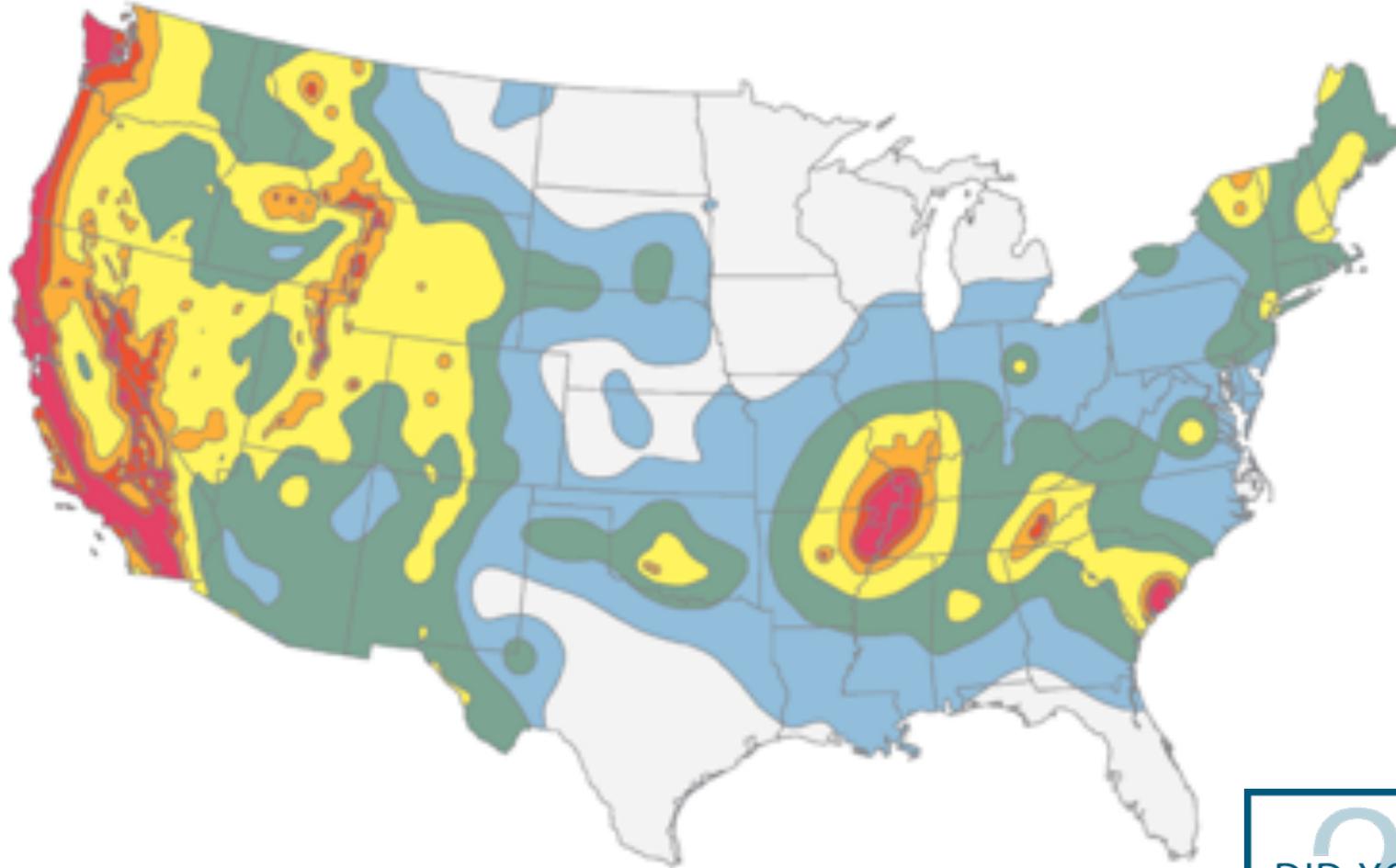
Proactive conversations

- Engineer of Record
- Local Code Officials/Authorities having Jurisdiction (AHJ)
- Systems that are based on standard ceiling suspension often rely on the compliance and listings of the standard components
- Specialty listing reports with third-party certification bodies aid in acceptance and sign-off

Seismic



Hazard: Seismic



Magnitude 2 earthquakes and smaller occur several hundred times per day.

Sources: USGS, The IRIS Consortium



Integration



Considerations

- Not all systems use standard suspension.
- Traditional light fixtures might not integrate.
- Many metal systems' finished surfaces are below suspension.
 - Additional trim may be required.
 - Flange-style fixtures including can and pendant lighting integrate best.
- Open systems allow for unique integration.

Integration



Standard integration



Open integration



Pendant lighting



Summary of Metal Ceilings



Metal Ceilings Summary



Fire Performance



Aesthetics



Sustainability



Durability



Seismic



Acoustics



Interior



Integration



Design Creativity

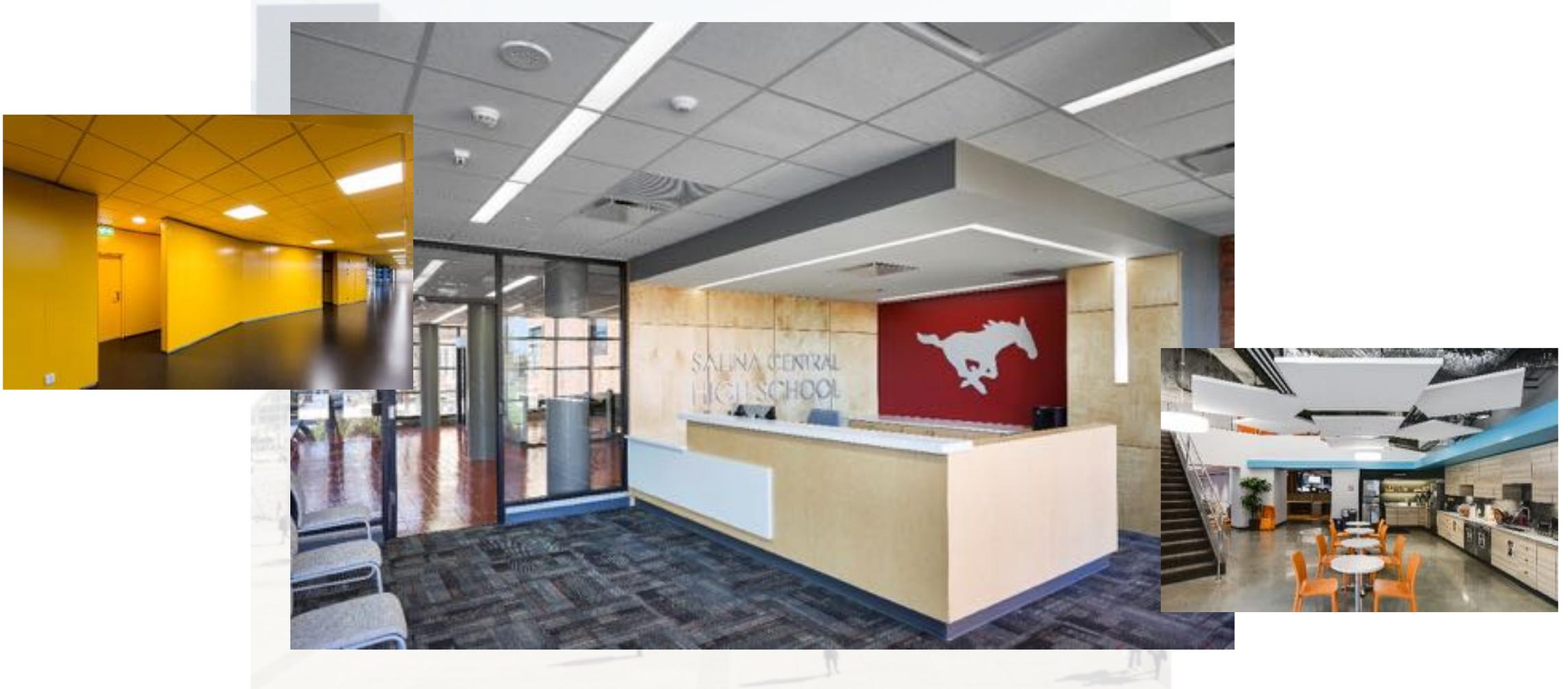


Exterior/Wind

Acoustic Solutions

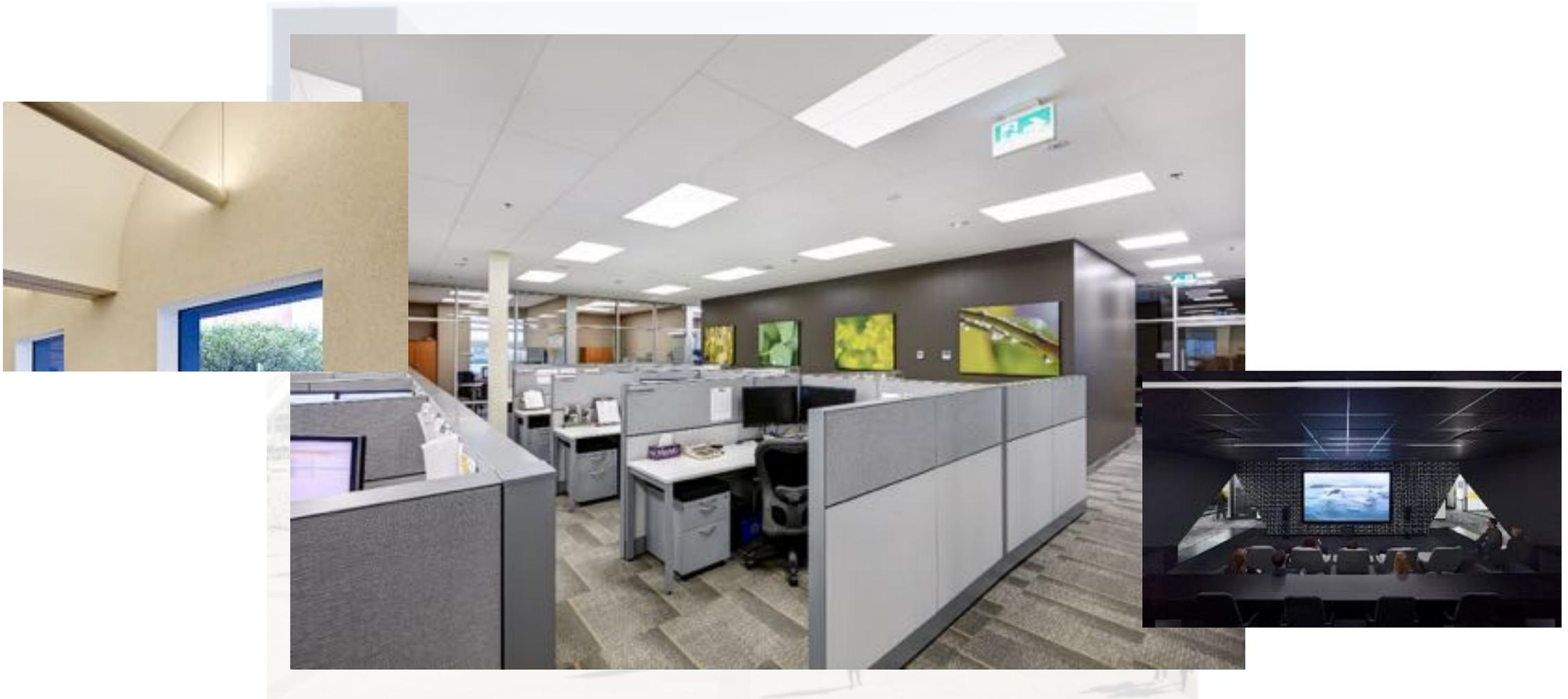


Acoustic Stone Wool Ceilings



Stone wool ceiling panels, NRC 0.60–1.05

Suspension Systems



15/16 inch, 9/16 inch, cleanroom, bolt slot, drywall, specialty systems

Acoustic Metal Ceilings



Linear, panels, planks, perimeter trim, curved, open cell

Questions?

**Please contact:
Rockfon**

Phone: 1-800-323-7164

Email: cs@rockfon.com

Website: rockfon.com

Thank you

Other AIA-CES programs by Rockfon:

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2. Designing with Metal Ceilings
3. Ceiling Systems for High Performing Schools
4. Optimized Acoustics in Buildings
5. Acoustic and Aesthetic Suspended Ceiling Solutions Using Stone Wool

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