

Experience,  
Above All™

**Armstrong®**  
World Industries

# Acoustical Design & Solutions Guide



# At Armstrong, We See Sound

Acoustics are essential to great design and occupant well-being. That's why we offer the highest quality acoustical ceiling panels and acoustical wall panels. We can help you get the acoustics right in any space from wall-to-wall ceilings, to exposed structure solutions, and walls – with no sacrifice to aesthetics and no limitations to imagination.

At Armstrong, we are acoustics.



## Shaping Sound

Some artists work in oils. Others in watercolors. At Armstrong, we work in sound. Because, when placed in the capable hands of architects, designers, and acousticians, sound becomes a medium in and of itself – being shaped, directed, and manipulated. Sound can be sculpted to form the perfect composition for any space or activity.

Managing acoustics is more than a technical process. It's a craft that requires expertise, precision, vision – and a complex palette of materials and techniques – to raise auditory experiences to an art form.

We see sound so you can hear the difference.





# Getting the Right Acoustic Solutions for Your Spaces

Ultima® ceiling panels  
 Colder Products Company  
 Global Headquarters  
 Hagen, Christensen  
 & McIlwain Architects

## Solutions



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## Continuous Ceilings

# Acoustical solutions for wall-to-wall spaces

For continuous ceilings, choosing a ceiling panel that provides both sound absorption and sound blocking is best to reduce noise and improve speech privacy. Armstrong® Total Acoustics® ceilings provide the ideal combination of sound absorption and sound blocking in one ceiling panel. With Total Acoustics ceilings, you'll have the flexibility to meet acoustical needs as the space evolves.

With three levels of sound absorption and high sound-blocking, panels with Total Acoustics performance make it easy to choose the right ceiling for every space, every time.

Ultima® High NRC ceiling panels  
Cassels Brock & Blackwell  
Gensler

### Sound Blocking

Ceiling Attenuation Class (CAC) is a measure for rating the performance of a ceiling system as a barrier to airborne sound transmission through a common plenum between adjacent closed spaces.



## Total Acoustics®

**NRC + CAC = Total Acoustics**

### BEST

NRC 0.80+ | CAC 35+

### BETTER

NRC 0.70-0.75 | CAC 35+

### GOOD

NRC 0.60-0.65 | CAC 35+

### Sound Absorption

Noise Reduction Coefficient (NRC) is a measure for rating the overall sound absorption of a material installed inside a building where sound waves strike surfaces at various angles of incidence.





Calla® Shapes for DesignFlex®  
Perkins + Everitt  
Evans Taylor Foster  
Childress Architects

# Sound absorption is not a substitute for sound blocking

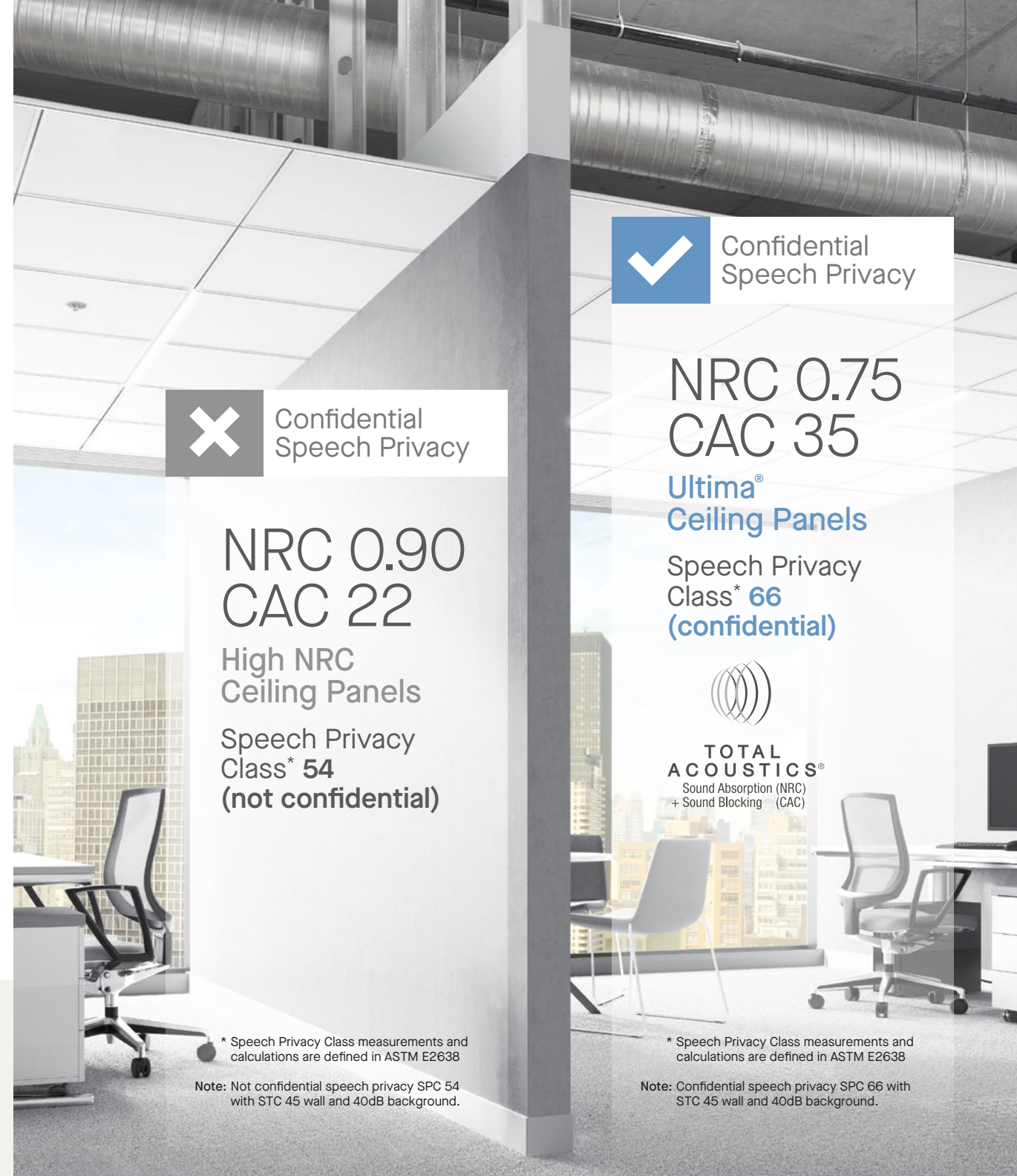
Total Acoustics® ceilings provide the ideal combination of sound absorption and sound blocking in one ceiling panel.

Ceilings with high NRC only can absorb sound within the space – but cannot block sound from leaving or entering the space.

Ceilings with a CAC of 35+ will help block sound from traveling to adjacent spaces through the plenum, providing improved sound isolation, speech privacy, and design flexibility.



Designing an open plan space that doesn't require confidential speech privacy? Consider High NRC only ceiling options to control noise and reverberation time within the space.



Confidential Speech Privacy

NRC 0.90  
CAC 22

High NRC Ceiling Panels

Speech Privacy Class\* 54  
(not confidential)

\* Speech Privacy Class measurements and calculations are defined in ASTM E2638

Note: Not confidential speech privacy SPC 54 with STC 45 wall and 40dB background.



Confidential Speech Privacy

NRC 0.75  
CAC 35

Ultima® Ceiling Panels

Speech Privacy Class\* 66  
(confidential)



TOTAL ACOUSTICS®  
Sound Absorption (NRC)  
+ Sound Blocking (CAC)

\* Speech Privacy Class measurements and calculations are defined in ASTM E2638

Note: Confidential speech privacy SPC 66 with STC 45 wall and 40dB background.

# Did you know?

It costs up to 50% less to use a Total Acoustics® ceiling than to install plenum barriers or finish walls to the deck.

Running HVAC duct work, plumbing, and conduit in the plenum above the ceiling makes finishing walls to the deck costly and impractical.



Want help? Request a complimentary Custom Acoustical Report to help get the acoustics right.



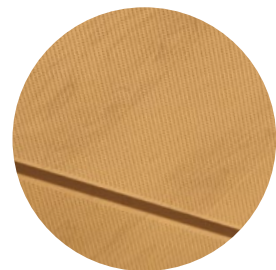


WoodWorks® Grille with  
Calla® infill panels  
Children's Research Hospital  
Evans Taylor Foster  
Childress Architects

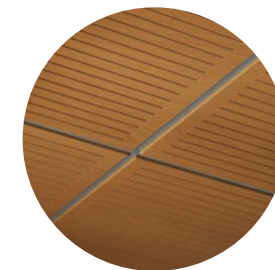
## Your Choice

**BEST  
BETTER  
GOOD**  
Performance

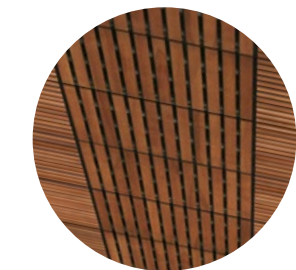
Pair these wood, metal,  
GRG, and wood-fiber ceilings  
with an infill panel to reach  
the level of performance  
your space needs.



WoodWorks®  
Tegular/  
WoodWorks®  
Shapes



WoodWorks®  
Channeled  
Tegular



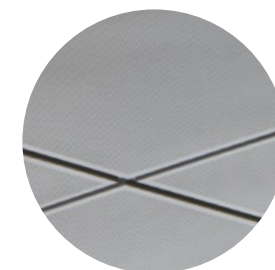
WoodWorks®  
Grille Tegular



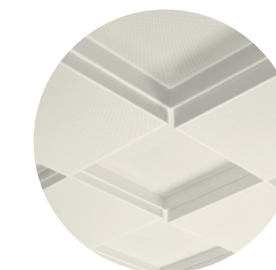
MetalWorks™  
Immix



CastWorks™  
Metaphors®



MetalWorks™  
Tegular



MetalWorks™  
3D



Tectum® DesignArt™ -  
Lines Tegular



Tectum®  
Tegular

Acoustical performance for these ceilings  
is determined by the product, perforation,  
infill panel, and installation method.





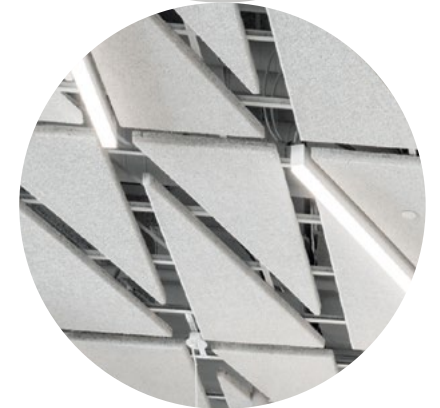
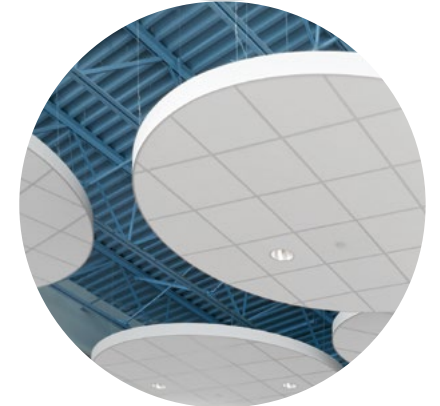
## Exposed Structures

# Acoustical solutions for industrial-look spaces

Exposed structure spaces with no ceiling can create acoustical problems – noise distractions can make the modern workplace less effective and less productive, inhibit students’ ability to learn, and cause dissatisfaction among restaurant clientele struggling to hear and be heard.

Attach treatments to decks and hide them or bring sound-absorbing design into the space.

Achieve the best of both worlds – optimized experiences in the workplace, educational facilities, and hospitality venues – with the right look and less noise in your open ceiling space.



Custom Tectum® Finale™  
Maria Weston Chapman  
Middle School  
HMFH Architects, Inc



**Get Inspired:**  
View exposed structure  
spaces on the photo gallery.





Custom  
MetalWorks™ Blades  
Adobe North Tower  
Gensler

**Reverberation Time (RT)**  
RT is the time it takes the sound to fade away after the source of the sound has ceased.

# Controlling acoustics with blades and baffles

The sound absorption rating (NRC) of an installation is directly correlated to the depth and on-center spacing of the blades. As the design changes so do the acoustics.

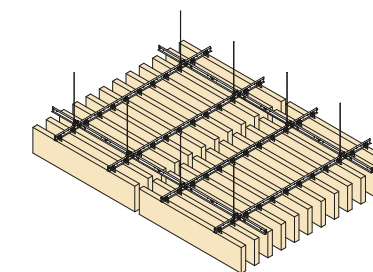
## SoundScapes® Blades Acoustical Comparison

NRC ratings based on Panel Depth & O.C. Spacing

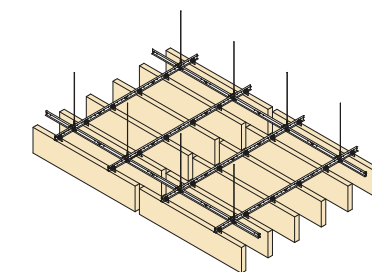
|     | 6" O.C. | 12" O.C. | 18" O.C. | 24" O.C. |
|-----|---------|----------|----------|----------|
| 5"  | 0.80    | 0.50     | 0.40     | 0.30     |
| 10" | 1.15    | 0.80     | 0.60     | 0.50     |

NOTE: Tested per ASTM C423 without infill panels. Spacing of blades, blade depth, and acoustical infill panels will impact acoustical performance. Contact TechLine for a custom reverberation time report at: [techline@armstrongceilings.com](mailto:techline@armstrongceilings.com)

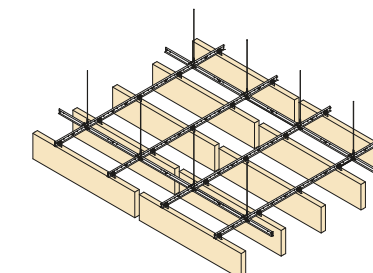
## Compare



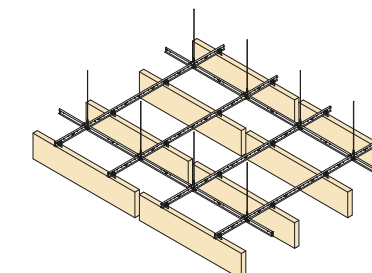
1.15 NRC –  
6" O.C. Blade Spacing



0.80 NRC –  
12" O.C. Blade Spacing



0.60 NRC –  
18" O.C. Blade Spacing



0.50 NRC –  
24" O.C. Blade Spacing



Want help? Request a complimentary Custom Acoustical Report to help get the acoustics right.





Custom CastWorks™ GRG walls  
 UC Riverside School  
 of Medicine  
 Hensel Phelps,  
 CO Architects

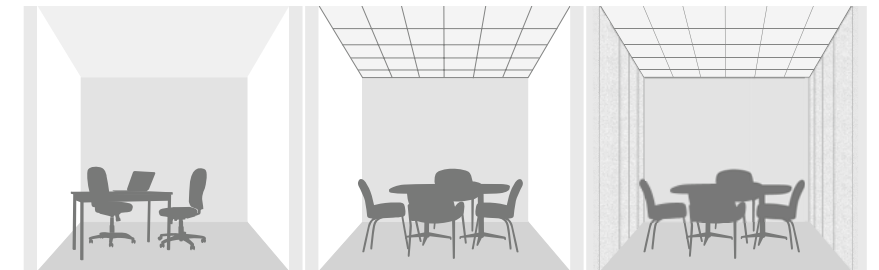
**Sound Transmission Class (STC)**  
 STC is a measure for rating the performance of a wall system as a barrier to airborne sound transmission between adjacent closed spaces, such as offices. STC is the wall equivalent of CAC.

# Wall Applications

## Enhance design and acoustics with walls and partitions

Acoustical wall treatments offer an additional option to further reduce noise. Measures for walls are stated in STC and NRC values. Adding wall treatments, in addition to an acoustical ceiling, can reduce reverberation time by 87%.

## Compare



|                            | No Treatment (Drywall Ceiling)                      | Acoustical Ceiling (Ultima® 0.70/35) | Acoustical Ceiling (Ultima 0.75/35) and two Soundsoak® 60 Walls (NRC 0.60) |
|----------------------------|---|--------------------------------------|--|
| In-Room Sound Quality      | Noise Reduction Coefficient (NRC)                   | 0.05                                 | 0.75   |
|                            | Reverberation Time (RT)                             | 2.05 seconds                         | 0.49 seconds   |
|                            | Reverberation Time (RT) Improvement                 | Reference                            | 76%  |
| Room-to-Room Sound Quality | Shared Wall STC Rating                              | 38                                   | 43   |
|                            | Ceiling Attenuation Class (CAC) Value               | 50                                   | 35   |
|                            | Speech Privacy Class – SPC At 40dB Background Sound | 67 (confidential)                    | 64 (confidential)  |



**Want help?** Request a complimentary Custom Acoustical Report to help get the acoustics right.

Comparisons based on 320 SF Closed Conference Room (20' x 16'), 10' ceiling height, drywall, vinyl floor.





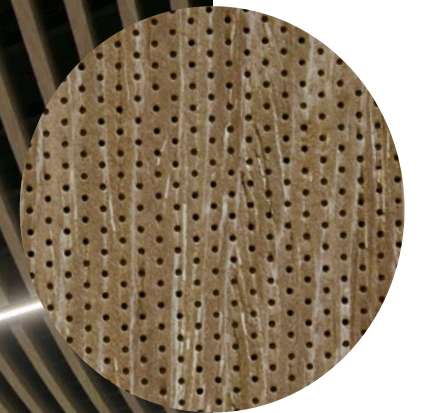
Tectum® DesignArt™ –  
Shapes direct-attach  
wall panels

## Wall options for every space and design

Walls offer a wide range of design and acoustical performance options to effectively control noise in any space.



**Need More Information?**  
Download a PDF of the  
perforation brochure.



Custom WoodWorks®  
micro-perforated ceiling  
and wall panels





## Acoustic Design For Education

# Making the grade

Good acoustical design in schools addresses high performing learning environments for students and for teachers. Excessive reverberation and noise in a classroom interferes with a student's ability to clearly hear their teacher. In fact, studies indicate that students typically hear only 3 out of every 4 words in the classroom. Good acoustical design promoting high speech intelligibility is key to understanding and learning.



School Zone® Fine Fissured™ ceiling panels

Ultima® ceiling panels  
SCU Sobrato Hall  
ZGF Architects



AcoustiBuilt® Seamless Acoustical Ceiling System  
North Bend Elementary  
PBK

### ANSI/ASA S12.60 American National Standard

### Acoustical Performance Criteria, Design Requirements and Guidelines for Schools

#### Background Sound

Max 35dBA (from HVAC)

#### Reverberation Time

< 0.60 seconds

Sound blocking between spaces/classrooms is critical to minimize distraction and preserve speech privacy. A ceiling with a CAC of 35+ and wall STC of 50+ will work together to provide proper noise isolation.



**Learn More:**  
Browse recommended  
solutions and resources





## Acoustic Design For Healthcare

# Caring for outcomes

Healthcare facilities require effective acoustic design as a functional necessity for speech privacy, in compliance with the federally mandated HIPAA privacy rule. This means that wherever patient information is being discussed in the presence of others, speech sounds must be controlled or absorbed. Therefore, administrative areas where multiple patients are seen will need spaces with high NRC, CAC, and STC ratings to prevent the unwanted and unlawful dissemination of a patient's private information.

TechZone® with Optima® Field Panels  
 MetalWorks™ Blades - Classics  
 United Healthcare  
 Administrative Building  
 Neenan Archistruction

Calla® Shapes for DesignFlex®  
 Children's Research Hospital  
 Evans Taylor Foster Childress Architects



### FGI Facilities Guidelines Institute

### Guidelines for the Design and Construction of Hospitals (2022)

#### Background Sound

Up to 45dBA for patient rooms

#### Reverberation Time

0.5 to 0.6 seconds for patient rooms

Sound blocking between healthcare spaces is critical to maximize sound isolation and create speech privacy. A ceiling with a CAC of 35+ and wall STC of 45+ will work together to provide proper noise isolation.

Optima® Tegular ceiling panels  
 Penn State Health Pediatric Hospital  
 Greenfield Architects  
 Noelker and Hull Associates



**Learn More:**  
 Browse recommended solutions and resources





## Acoustic Design For Office Spaces

# Doing the job well

Good acoustic design in contemporary workplace environments addresses both quiet concentration and energetic collaboration. Studies have shown that noise at the office reduces worker effectiveness, raises stress, and lowers employee satisfaction. To address these issues, speech privacy and excessive reverberation time can be directly addressed using appropriate acoustical design solutions.

Tectum® DesignArt™ – Lines ceiling panels  
801 Second Avenue Office  
LMN Architects

MetalWorks™  
Blades – Classics  
and Fine Fissured™  
ceiling panels  
RedThread  
QA+M  
Architecture



Ultima®  
ceiling panels  
RedThread  
QA+M  
Architecture

LEED®

Leadership in Energy and Environmental Design

Background Sound

35dBA to 48dBA for open-plan spaces

Reverberation Time

0.6 seconds maximum for private offices

Sound blocking between office spaces is critical to minimize distraction and preserve speech privacy. For private offices, a ceiling with a CAC of 35+ and wall STC of 35+ will work together to provide proper noise isolation.



**Learn More:**  
Browse recommended solutions and resources





## We're serious about acoustics

We offer the most comprehensive portfolio of acoustical solutions in the industry. Over the last century, Armstrong has helped to shape the acoustical codes, standards, and testing that have improved the built environment for occupants today.

From our in-house third party certified NVLAP accredited acoustics lab to our extensive offering of UL® certified acoustical ceiling options. Nobody knows acoustics like Armstrong.

Lyra® PB Ceiling Panels  
Minneapolis American Indian Center  
Cunningham & Full Circle  
Indigenous Planning + Design

## Keep learning

Continue learning about acoustics and earn CEUs with on-demand and rep-hosted courses:

[armstrongceilings.com/ceu](https://armstrongceilings.com/ceu)

[armstrongceilings.com/findarep](https://armstrongceilings.com/findarep)





## How Can We Help You?

1 877 276 7876

Customer Service Representatives  
7:45 a.m. to 5:00 p.m. EST  
Monday through Friday

**TechLine** – Custom reverberation and privacy index calculation reports, 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](mailto:techline@armstrongceilings.com)

Photo above: Optima® Create!

Cover photo (Left to Right): CastWorks® GRG walls, SoundScapes® Blades, Ultima® High NRC ceiling panels

[armstrongceilings.com/acoustics](http://armstrongceilings.com/acoustics)

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A Ceiling for Every Space® Visual Selection Tool  
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