Be Prepared!
37th Annual AHCA Seminar and Expo
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Ceiling Systems For High-Performing Healthcare Facilities

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AIA CES Provider Number:

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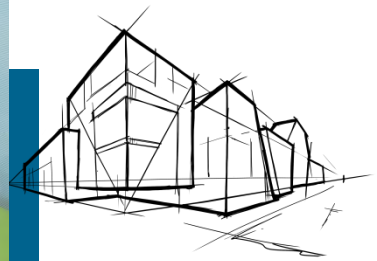
CEILING SYSTEMS FOR HIGH-PERFORMING HEALTHCARE FACILITIES



Rockfon®

Rockfon, a part of the ROCKWOOL Group

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

Whether it's energy consumption or water scarcity, we're 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're the world leader in this field, with more than 11,000 passionate experts spread across 39 countries.

80

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

Rockfon

ROCKWOOL: a sustainable company leader

The ROCKWOOL Group actively contributes towards achieving **10** out of the **17** goals established by the United Nations.

Your choice of insulation

ROCKWOOL

Technical insulation solutions for process industry, marine and offshore

ROCKWOOL

Firesafe insulation for all types of buildings including ROCKWOOL wall systems

ROCKWOOL

Core solutions Customized stone wool solutions to industrial partners

Rockfon

More stone wool secrets unveiled

Acoustics

Rockfon provides customers with a complete ceiling system offering, combining stone wool ceiling panels with suspension grid systems, accessories, specialty wood, and metal ceilings. With our solutions, your voice can be clearly heard in any type of space or situation.

1 in 4

In schools, up to 1 in 4 words cannot be understood in classrooms*

*Acoustical Society of America – Technical Committee on Architectural Acoustics

With stone wool, a little goes a long way

$35ft^3 = 23,600ft^2$

Just 35 cubic feet of stone wool corresponds to 23,600 square feet of 5/8” Rockfon ceiling tiles, which is the equivalent of acoustical ceilings in about 30 classrooms.

Rockfon

More than 125 years of experience

1893
Chicago Metallic Sash was formed.

1951
In 1951, Deutsche ROCKWOOL was established, and in 1954 production was started at the first factory outside Scandinavia, in Germany.

CHICAGO METALLIC

1967
Chicago Metallic Corporation expands to Europe.

1980s
During the 1980s, a wide range of new products based on the highly refined stone wool technology were introduced.

1988
In 1988, the first factory in North America is acquired in Ontario Canada, setting the base for future expansion in the region.

1996
In 1996, the ROCKWOOL Group became a public listed Company and shares were launched on the Copenhagen Stock Exchange.

2017
Expanded the Marshall County manufacturing facility for tile production.

1893 — 1930 — 1940 — 1950 — 1960 — 1970 — 1980 — 1990 — 2000 — 2010 — 2017

1935
In 1935, ROCKWOOL bought drawings and property rights for production and sale of stone wool used for insulation purposes throughout Scandinavia. In 1936, the first production line becomes operational.

CHICAGO METALLIC

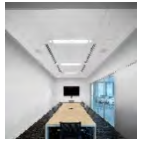
1954
Chicago Metallic Corporation began producing profiles for suspended ceilings.

Rockfon

1962
Rockfon acoustical stone wool ceiling company is started as a part of the ROCKWOOL Group.

1970s
Due to the oil crisis in the 1970s with rapidly increasing energy prices all over the world, many people had their eyes opened to the advantages of insulating their houses. The ROCKWOOL Group experienced an increase in turnover from $54 million in 1970 to $239 million in 1979.

1990s
During the 1990s, the company experienced its fastest geographical expansion rate. The ROCKWOOL Group continued its expansion across Europe, and in 2000 it started its expansion towards the Far East.



2013
Rockfon North America and Rockfon EA were created by splitting the newly acquired Chicago Metallic Corporation.

2015
In 2015, Jens Birgersson joins as CEO and launches the business transformation program which is successfully concluded one year later.

Rockfon

Rockfon - North America

Offices
Chicago, Illinois

Production Facilities
Chicago, Illinois
(Grid & Metal Ceilings)
Marshall County, Mississippi
(Stone Wool)

Warehouse Facilities:
Baltimore, Maryland
Los Angeles, California
Marshall County, Mississippi

The AHCA seminar has teamed with a registered provider of AIA-approved continuing education under Provider Number E240. All registered AIA CES Providers must comply with the AIA Standards for Continuing Education Programs.

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1 OBJECTIVE

Describe the importance of high NRC ceilings in a healthcare environment.

2 OBJECTIVE

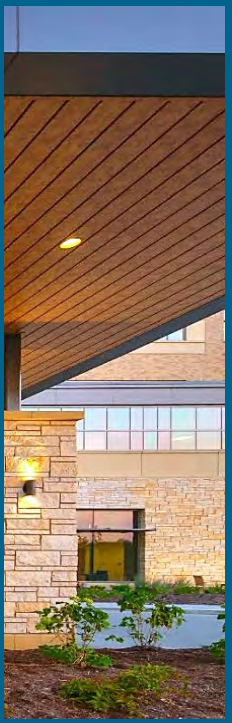
Identify how high-performing ceilings can impact infection control.

3 OBJECTIVE

Define the connection between high-performing ceilings and a project's sustainability goals.

4 OBJECTIVE

Discuss how high-performing ceilings can affect operations and maintenance in a healthcare setting.



1

Introduction to High-Performing Healthcare Settings

Introduction to High-Performing Healthcare Settings

A new consciousness about healthcare settings

- Because of the global pandemic of 2020, the world became a different place
- Struggles of hospital staff and patients were illustrated
- Few built environments are so important to get right

Introduction to High-Performing Healthcare Settings

The importance of evidence-based design

- Evidence-Based Design (EBD) is the process of basing decisions about the built environment on credible research to achieve the best possible outcomes
- The Center for Health Design has developed many guiding principles for high-performing healthcare facilities
- Materials have an important influence on the appearance, feeling, and performance of a building and its interior spaces

Introduction to High-Performing Healthcare Settings

Done right, the ceiling system adds these qualities to the healing environment:

- Enhances acoustic qualities and decreases unwanted noise
- Uses durable materials that hold up to infection control and cleaning measures
- Enhances natural lighting and provides proven natural light attributes
- Uses non-chemically treated materials to lessen the chemical load on patients trying to heal
- Uses non-organic materials that resist mold
- Adds to sustainability, a key aspect for any healthcare building's ceiling design

2

Importance of High NRC Ceilings in a Healthcare Environment

Importance of High NRC Ceilings in a Healthcare Environment

Impact of acoustics on patients

- Highly sound-absorptive ceilings can impact healthcare by:
  - Increasing patient sleep and recovery
  - Increasing patient and staff safety
  - Improving patient privacy and dignity
  - Relieving caregiver stress and increasing job satisfaction

Importance of High NRC Ceilings in a Healthcare Environment

Positive points of quiet setting and patients getting more sleep

- More involved and compliant with their care
- Less pain medication
- Less fall risk
- Lower complications and readmissions
- There is a direct connection between sleep and cost/quality of care

Importance of High NRC Ceilings in a Healthcare Environment

Wellness/stress reduction

- Study assessed impact of modifying room acoustics, switching between:
  - Highly sound absorptive ceiling panels
  - Low absorbing ceiling panels
- Study results found that in patients treated in conditions with sound absorbing ceiling tiles:
  - Patients had lower pulse amplitudes
  - Patients were more satisfied with care
  - The incidence of rehospitalization was lower

Importance of High NRC Ceilings in a Healthcare Environment

Impact of highly absorptive ceilings on alarm fatigue:

- Lower background noise levels
- Medical equipment alarms can be less loud
- Easier to recognize, identify, and locate alarm

Importance of High NRC Ceilings in a Healthcare Environment

Ability to focus and maintain accuracy

- Studies examined work performance of anesthesiologists and surgeons
- Compared quiet vs. noisy conditions
- Voices had to be raised by 25% to be heard in noisy rooms
- But speech discrimination was reduced by 23%
- Could increase errors by hospital staff

Importance of High NRC Ceilings in a Healthcare Environment

Less Pressure, Less Strain, More Patient Comfort

- Studies show that in spaces with high sound-absorbing ceiling panels:
  - Staff experience less pressure
  - Staff report less strain
  - Patients report more comfort
  - Patients heal better
- Studies showed in high sound-absorbing ceiling panels:
  - Staff experienced less pressure
  - Staff reported less strain

3

Achieving High-Performing Acoustic Ceiling Design

Achieving High-Performing Acoustic Ceiling Design

Achieving optimized acoustics based on 3 practices

- Select a ceiling system to optimize acoustic absorption
- Where needed, use walls, floor slabs, or plenum barriers to effectively optimize sound insulation or blocking between rooms
- Ensure that the background sound level is within the desired range

Standards, Guidelines and Building Rating Systems

- Facility Guidelines Institute (FGI) – Guidelines for the Design and Construction of Hospitals
- Leadership in Energy and Environmental Design (LEED)
- Green Globes Assessment Protocol for Commercial Buildings
- National Institutes of Health (NIH) – Design Requirements Manual

Accepted Standards for Healthcare Facilities*	Background Sound Requires mechanical system noise to be below a maximum permissible level	Absorption – NRC[4] Requires sound absorbing finishes, such as acoustic ceilings, to control reverberation and noise	Wall Insulation – STC[7] Requires full-height, STC rated walls between rooms to prevent noise transfer
Facilities Guidelines Institute (FGI) – Guidelines for the Design and Construction of Hospitals (2018)	✓ 45 dBA for Patient Rooms	✓	✓ STC 45 for Patient Rooms
Leadership in Energy and Environmental Design (LEED)[14]	✓ 35 - 45 dBA	✓	✓ STC 45 for Patient Rooms
Green Globes Assessment Protocol for Commercial Buildings[15]	✓ 45 dBA Patient Rooms	✓ Ceiling NRC 0.90 Reverb 0.50	✓ STC 50 for Healthcare
National Institutes of Health (NIH) – Design Requirements Manual	✓ NC[8] 40 - 45 for Laboratories	✓ Ceiling NRC 0.80 (min) in Laboratories	✓ STC 50 Between Areas NIC[10] 45 Within Areas

Achieving High-Performing Acoustic Ceiling Design

Room-to-room privacy

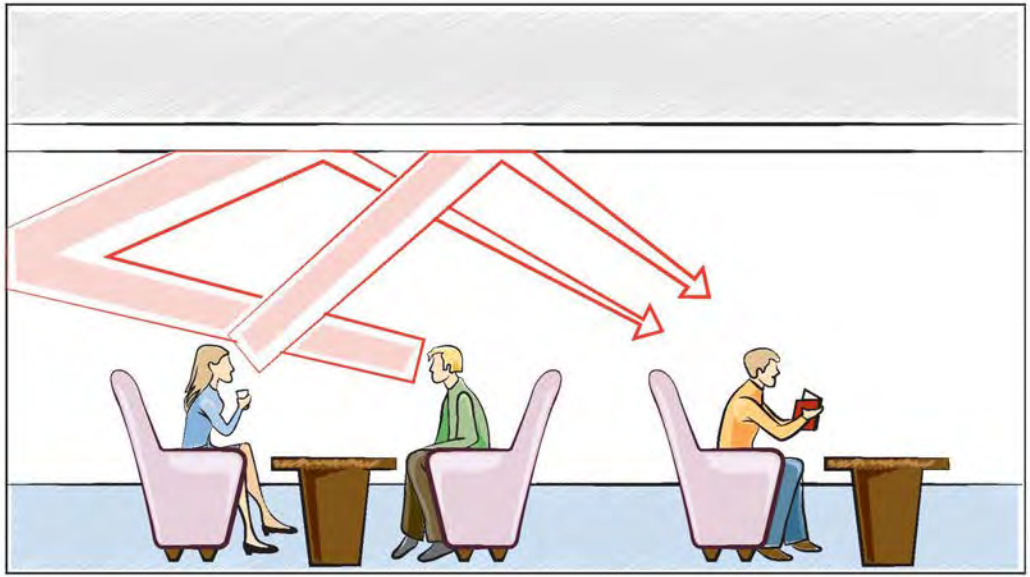
- Important that doctor and patient can talk in private environment
- Oral privacy complies with the oral privacy rules of the Health Insurance Portability and Accountability Act (HIPAA)
- Highly sound-absorptive ceilings should facilitate:
  - Speech intelligibility
  - Prevention of sound traveling into adjacent rooms

Achieving High-Performing Acoustic Ceiling Design

What is acoustic absorption?

Snippet: “Acoustic absorption occurs when an architectural surface—such as a suspended ceiling, wall-mounted panels or carpet—converts energy in sound waves into insignificant heat energy by means of friction inside the pores of the material.”

Snippet: “The more sound energy that is absorbed by the surface, the less that is reflected back into the room as noise, reverberation, echo or flutter.”



Achieving High-Performing Acoustic Ceiling Design

Why is acoustic absorption important?

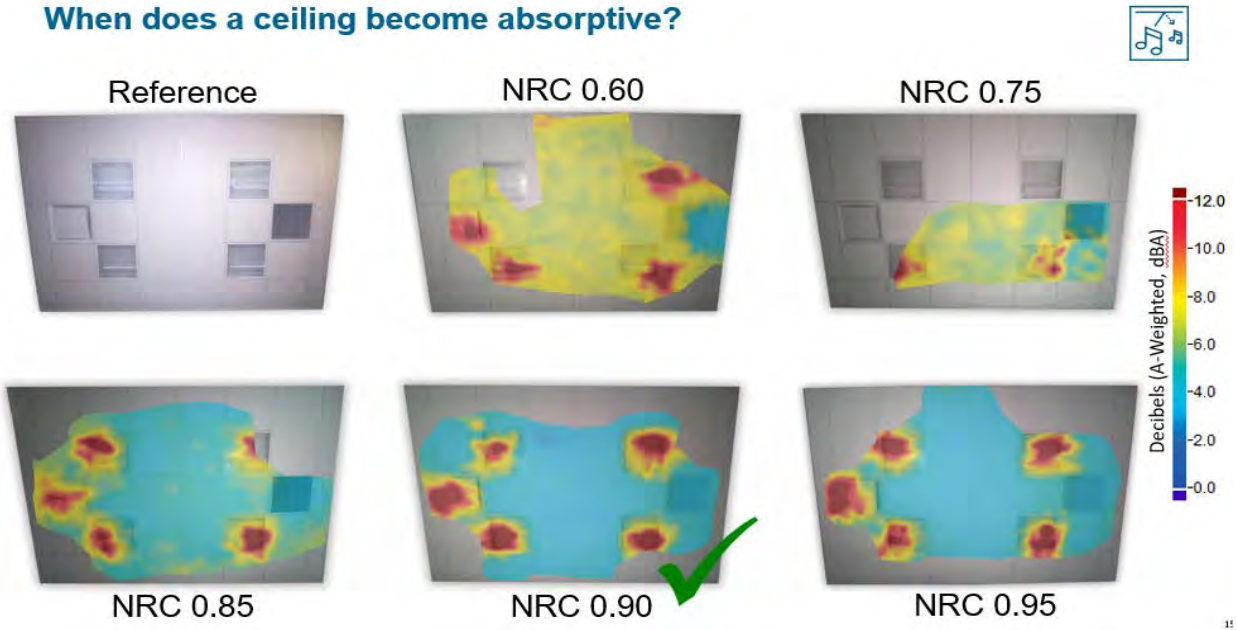
- When ceilings with a high Noise Reduction Coefficient (NRC) replace ceilings with less acoustic absorption, people perform much better
- **Center for Health Design – The Business Case for Building Better Hospitals with Evidence Based Design (2008) "Installing high-performing sound-absorbing ceiling tiles (NRC 0.90 or higher) is a priority design recommendation based on the strength of the evidence available and their impact on safety, quality and cost."**
- More specifically, this means reduced patient and staff stress, reduced patient sleep deprivation, and increased patient satisfaction.

Good 0.70+	Better 0.80+	Best 0.90+	Ceilings become absorptive at around 0.80	Ceilings below 0.80 reflect too much noise

Achieving High-Performing Acoustic Ceiling Design

Absorption color mapping

- Images show examples of color maps of sound being either reflected off a low NRC ceiling or being absorbed by a high NRC ceiling



A color map showing sound reflecting off a mineral-fiber panel acoustic ceiling with an NRC rating of 0.60 (yellow).

A color map showing sound being absorbed by a stone wool panel acoustic ceiling with an NRC rating of 0.95 (blue).

Achieving High-Performing Acoustic Ceiling Design

HCAHPS Patient Satisfaction Survey

- One of the lowest-scoring questions on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) satisfaction survey asks patients:

  “How quiet was the area around your room at night?”

Financial Reimbursement from Medicare/Medicaid

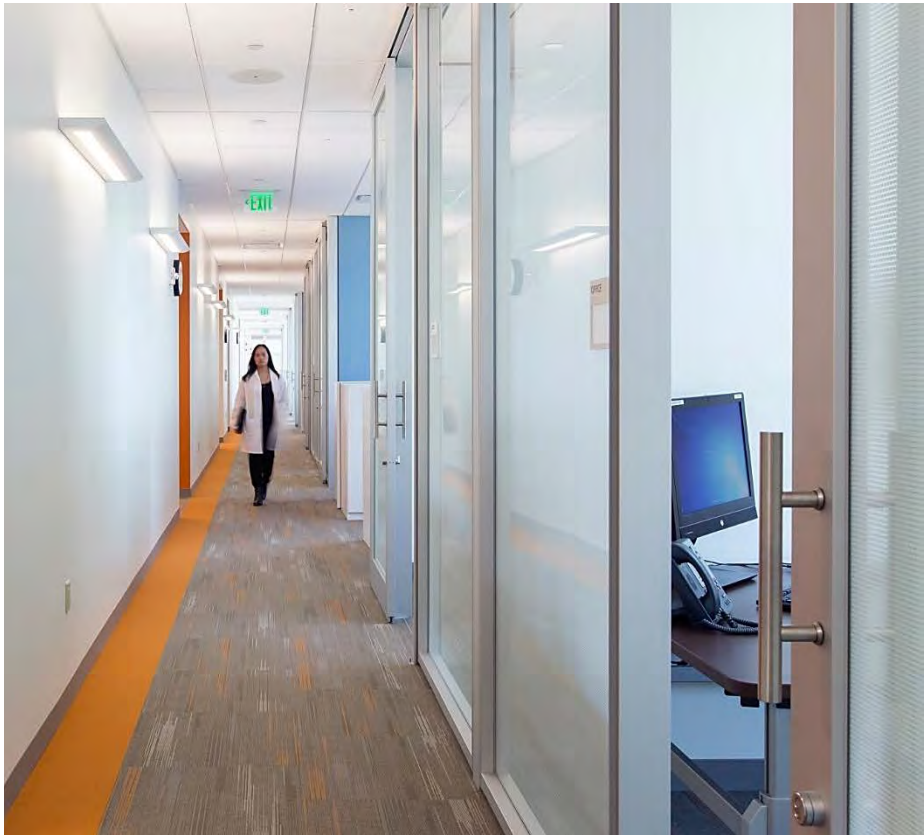
- Medicare reimbursements are tied to patient satisfaction
- With low survey results, hospital and healthcare facilities could lose funds

Case Study Kaiser Permanente: Taking a Healthy Approach to Ceilings

- Kaiser Permanente, Mission Bay Medical Offices San Francisco, California
- 9-story, 220,000-square-foot structure
- LEED® Gold certification
- Top priorities for ceiling specification:
  - Optimizing acoustics with sound-absorbing ceiling panels that deliver a high Noise Reduction Coefficient (NRC)
  - Contributing to the indoor environmental and air quality (IEQ/IAQ) with GREENGUARD® Gold certified products
  - Providing easy-to-clean materials that improve infection control

Case Study Kaiser Permanente: Taking a Healthy Approach to Ceilings

- **Products specified include:**
  - Acoustic stone wool ceiling panels
  - Torsion spring concealed metal ceiling panels
  - Metallic panels with ceiling suspension system
  - Coordinating trim
  - Light reflecting panels for majority of common areas LR value of 0.85



4

How High-Performing Ceilings Impact Indoor Air Quality

How High-Performing Ceilings Impact Indoor Air Quality

Ceiling tiles play a role in controlling mold

- Materials should not provide nourishment for potentially harmful microorganisms
- Surfaces should be easy to clean and disinfect without affecting their appearance or performance
- Ceiling panels also should be durable and demountable
- Stone wool ceiling products meet all of these criteria

How High-Performing Ceilings Impact Indoor Air Quality

Care and cleaning

- High-quality ceiling panels are manufactured for durability
- These panels can be vacuum-cleaned with a soft brush attachment
- Medical and hygienic ceiling panels can be cleaned with disinfectants
- Some high-performing ceiling panels can be steam cleaned for infection control
- The Centers for Disease Control (CDD) provides guidance on cleaning ceilings in health care facilities in a document titled: "Guidelines for Environmental Infection Control in Health-Care Facilities."

https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines-P.pdf

How High-Performing Ceilings Impact Indoor Air Quality

Clean materials, clean air

- Some products have biocides to enhance antimicrobial performance
- However, the overuse of antimicrobials can give rise to resistant bacteria
- Better to specify products without antimicrobial additives
- Perkins+Will white paper* states that antimicrobial additives in building materials may have negative impacts

** Understanding Microbial Ingredients in Building Materials, white paper by Perkins+Will in collaboration with Healthy Building Network*

How High-Performing Ceilings Impact Indoor Air Quality

Fewer pollutants in materials better for those with compromised immune systems

- Some patients have compromised immune systems
- Susceptible to pollutants emitted from materials
- High levels of pollutants and contaminants can lead to:
  - Loss of concentration
  - Bad odors
  - Irritation for staff, caregivers and visitors alike
- For best indoor air quality, specify ceiling panels that are GREENGUARD® GOLD Certified

5

How Ceiling System Specifications Impact Natural Daylighting

How Ceiling System Specifications Impact Natural Daylighting

Light is vital to human functioning

- Important for our psychological and physiological condition
- Acts as a stimulant to keep us alert and able to perform better cognitively
- Dodge Data & Analytics identified access to daylight as a key feature for healthier buildings
- LEED v4 rating system recognizes the power of natural light
- LEED compliance for Lighting Quality can be demonstrated with surface reflectance of ceilings

U.S. GREEN BUILDING COUNCIL
LEED
USGBC
LEED v4

How Ceiling System Specifications Impact Natural Daylighting

What is light reflectance (LR)?

- LR indicates the percentage of light that ceilings reflect
- LR rating of 0.80 means 80% of light is reflected
- Ceiling panel light reflectance has profound impact on patients and staff
- Panels should have smooth or lightly textured surface

How Ceiling System Specifications Impact Natural Daylighting

Ceiling color selection creates healthy, inviting spaces

- With color specification, a designer can:
  - Establish harmony, warmth or comfort with earth tones
  - Make healthcare feel like hospitality
  - Communicate elegance using metal reflectance colors
  - Go for a faux-wood ceiling to create a home like setting.

6

How Ceilings Specification Impacts Operations and Maintenance in Healthcare Facilities

How Ceilings Specification Impacts Operations and Maintenance in Healthcare Facilities

Challenges for hospital and healthcare facility specifications

- Materials need to be durable over longer periods to maintain visual continuity
- Endure regular cleaning and disinfecting
- Ceilings require access to services hidden behind

How Ceilings Specification Impacts Operations and Maintenance in Healthcare Facilities

Increasing energy efficiency

- Energy efficiency enhanced with high light reflectance ceiling
- Lower light loads and reduced cooling costs
- Reduced number of fixtures needed

How Ceilings Specification Impacts Operations and Maintenance in Healthcare Facilities

Reducing microbes, increasing mold control

- To deal with mold, reduce moisture
- To help prevent moisture problems, specify ceiling materials that will not absorb moisture
- Example: Stone wool and metal ceiling products are not organic, so they do not promote the growth of mold or bacteria

7

High-Performing Ceilings Enhance a Project's Sustainability Goals

High-Performing Ceilings Enhance a Project's Sustainability Goals

Indoor air quality

- Air pollution is "the invisible killer"
- OSHA says qualities of IAQ should include:
  - Comfortable temperature and humidity
  - Adequate supply of fresh outdoor air
  - Control of pollutants from inside and outside of building
- To support health, indoor air quality, and environmental quality, choose ceiling materials that are GREENGUARD GOLD certified for low emissions

High-Performing Ceilings Enhance a Project's Sustainability Goals

Recycled content

- Ceiling system can help support standards that call for recycled content
- Some metal suspension systems contain up to 90% recycled content
- Panels can also contain recycled materials
- Example: Stone wool ceiling panels can contain up to 43% recycled materials and are made from abundantly available basalt rock

High-Performing Ceilings Enhance a Project's Sustainability Goals

Acoustics

- Acoustic quality, already covered earlier in the course
- Acoustic quality is a major element in buildings that are healthy for occupants

8

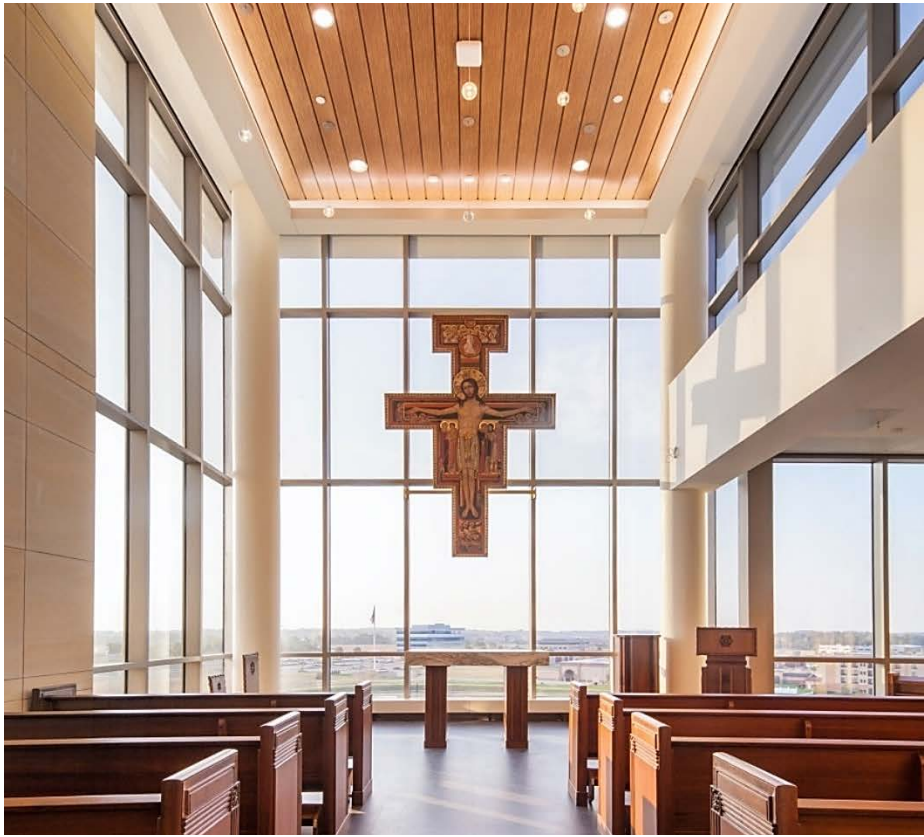
Putting it All Together - Solutions for Healthcare Spaces

Putting it All Together—Solutions for Healthcare Spaces

Different areas have different performance needs

- Specifying ceiling systems for healthcare facilities deserves serious attention
- Different areas in healthcare facilities have different performance needs
- Following are the Noise Reduction Coefficients needed

Good 0.70+	Better 0.80+	Best 0.90+



Putting it All Together—Solutions for Healthcare Spaces

Best Absorption (NRC 0.90 – 1.00)

- Patient care areas include:
  - Patient rooms and associated hallways and nurses' stations
  - Exam and treatment rooms
  - Diagnostics/imaging rooms
  - Clinics
  - Respite care rooms

Good 0.70+	Better 0.80+	Best 0.90+

Putting it All Together—Solutions for Healthcare Spaces

Best Absorption (NRC 0.90 – 1.00)

- Ceiling recommendations for patient care areas
- Best Absorption—NRC 0.90 – 1.00
- Light Reflectance —LR no less than .83 or greater
- Color—Typically white, with some accent color
- Air Quality
  - Mold resistant
  - No added anti-microbials
  - Able to be cleaned

Good 0.70+	Better 0.80+	Best 0.90+

Putting it All Together—Solutions for Healthcare Spaces

Better Absorption (NRC 0.80 – 0.90)

- Public areas in a healthcare facility include:
  - Lobbies
  - Waiting rooms
  - Public (non-patient) corridors
  - Cafeterias

Good 0.70+	Better 0.80+	Best 0.90+

Putting it All Together—Solutions for Healthcare Spaces

Better Absorption (NRC 0.80 – 0.90)

- Ceiling recommendations for public areas
  - Better absorption—NRC 0.80 – 0.90
  - Reverberation—Counter with ceiling clouds or islands
  - Color
    - Wood looks, high end, more like hospitality venues
    - Color in ceilings to help with wayfinding
  - Indoor air quality
    - Panels with no added microbials
    - Materials naturally resistant to mold
    - Cleanable panels are necessary for cafeteria areas

Good 0.70+	**Better 0.80+**	Best 0.90+

Putting it All Together—Solutions for Healthcare Spaces

Good Absorption (NRC 0.70-0.80)

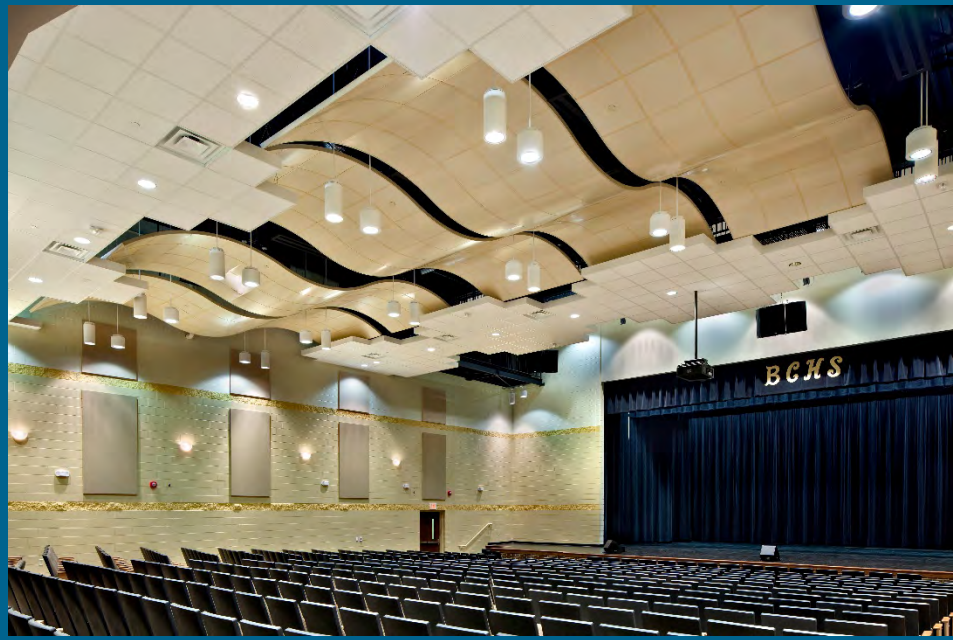
- Staff and non-patient areas
  - Doctors' offices
  - Employee break rooms
  - Employee restrooms
- Ceiling specification recommendations
  - Acoustics—Good absorption with an NRC 0.70-0.80)
  - Lighting —LR of .83 or higher, to eliminate strain on eyes
  - Indoor Air Quality
    - No added anti-microbials
    - Should be cleanable

Good 0.70+	Better 0.80+	Best 0.90+

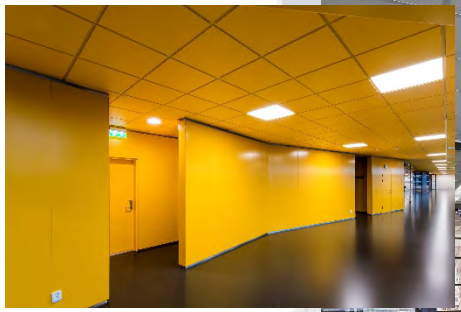
Case Study Video: Premier Medical Plaza

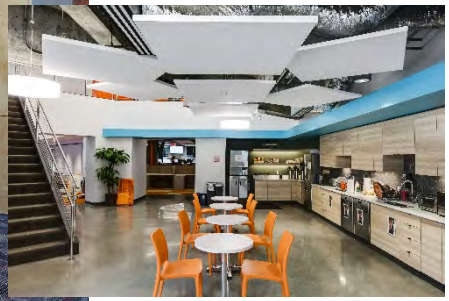
- The renovation of a retail space into a highly functioning medical practice
- Illustrates the importance of the ceiling specification in a high performing space

Rockfon Acoustic Solutions



Rockfon – Acoustic Stone Wool Ceilings





Stone wool ceiling panels, NRC 0.60 – 1.05

Rockfon – Suspension Systems

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

Rockfon – Acoustic Metal Ceilings

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

Questions?

Thank you

Other AIA-CES programs by Rockfon:

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

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SCAN ME