

Guide for Acoustical Ceilings

Beta Version

The Ceilings Book[™]

UP TO
1.10
NRC

UP TO
58
CAC

How to Use This Acoustical Guide

Welcome to Rockfon's *The Ceilings Book: Guide for Acoustical Ceilings*. This Guide provides building design and construction professionals with comprehensive information about how acoustical ceilings work in unison with other building components, such as partitions, plenum barriers, slabs, finishes and mechanical equipment, to provide acoustical quality for healthier, safer and more comfortable Indoor Environmental Quality. Rockfon's acoustical solutions can provide Noise Reduction Coefficient (NRC) ratings as high 1.10, and at the same time, Ceiling Attenuation Class (CAC) ratings as high as 58. This performance level is unmatched, providing solutions not previously possible so that projects can comply with stringent requirements in building standards and follow acoustical best practices.

The 4 Roles of Acoustical Ceilings

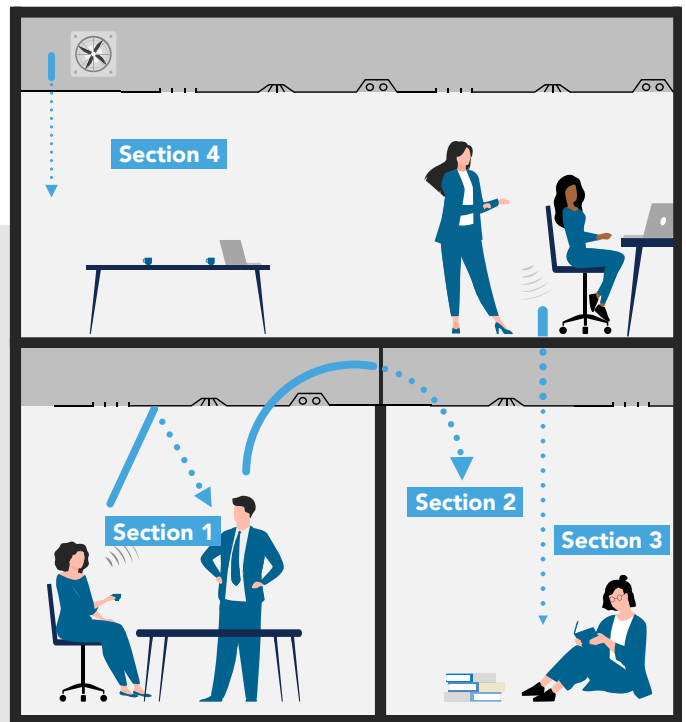


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Continuing Education

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Determining if a Space Requires Optimal, Enhanced or Basic Acoustical Solutions

The acoustical needs of rooms and spaces inside buildings vary based on what activities occur within them. This guide helps determine if an **Optimal**, **Enhanced** or **Basic** acoustical solution is required so that the appropriate Rockfon products and systems can be selected, specified and installed.

Consideration should be given separately to both Sound Absorption (NRC) and Sound Isolation (CAC), for one may be more or less important depending on how long people will spend in the space, how sensitive what they are doing is to noise and how loud the activities are in adjacent spaces. For example, a cafeteria might need **Optimal** sound absorption and only **Basic** sound isolation.

Acoustical Needs	Description	Room/Space Examples
Optimal	<ul style="list-style-type: none"> Careful listening over long periods of time Concentration for moderate to long periods Sound privacy important 	Lecture Halls, Conference/Meeting Rooms, Worship Spaces, Music Performance Halls, Patient Exam Rooms, Auditoriums, Open Offices
Enhanced	<ul style="list-style-type: none"> Mixture of listening types depending on current activity/task Brief and occasional concentration Moderate sound privacy expected 	Classrooms, Inpatient Rooms, Diagnostic and Treatment Rooms, Cinemas, Galleries, Laboratory, Library, Music Practice/Rehearsal Rooms, Private Offices
Basic	<ul style="list-style-type: none"> Only light, social listening Concentration not required Sound privacy not required 	Lobbies, Restaurants, Fitness Rooms, Recreation/Entertainment Rooms, Airport Terminals, Break Rooms, Cafeterias, Reception Areas, Lounges

Determining NRC and CAC Ratings for the Ceilings in a Project

Once it is determined whether the acoustical solution needs to be **Optimal**, **Enhanced** or **Basic**, it is easy to translate that into the correct acoustical metrics and performance levels.

Sound Absorption

Acoustical Needs of Space	NRC
Optimal	0.90 - 1.00+
Enhanced	0.80 - 0.85
Basic	0.70 - 0.75

Sound Isolation

Acoustical Needs of Space	CAC
Optimal	50+
Enhanced	40-49
Basic	30-39

Step 1: Absorb Noise Inside the Room

Use section 1 of this guide to determine if rooms and spaces require Optimal, Enhanced, or Basic sound absorption solutions. Section 1 provides Rockfon ceiling panel options for each performance level.

Step 2: Decrease Noise From Adjacent Rooms

Use section 2 of this guide to determine if the ceiling needs to decrease noise from adjacent rooms on the same floor. The CAC rating may or may not be relevant depending on whether the partition extends full height or terminates at ceiling level.

Use section 3 to determine if the suspended ceiling needs to decrease noise from rooms above or below.

Use section 4 to determine how to achieve desired background noise levels in the space when there is noisy mechanical equipment in the plenum.

Designing Your Acoustical Project

Understanding Acoustical Metrics

Sound Absorption - Noise Reduction Coefficient (NRC)

The most important role that acoustical ceilings play in everyday buildings, such as schools, healthcare facilities and offices, is providing high sound absorption to control noise and promote comfort and privacy. A ceiling's ability to absorb noise is described using Noise Reduction Coefficient (NRC), which varies from 0.0 (no sound absorption), up to 1.00 (high sound absorption). Building design standards often require ceilings to have an NRC rating of 0.90 or higher.

The stone wool core inside Rockfon's ceilings panels, with its three-dimensional fiber structure, provides high sound absorption. No other ceiling panel material outperforms the sound absorption performance of Rockfon's stone wool.

Sound Isolation - Ceiling Attenuation Class (CAC)

Whether or not acoustical ceilings need to take on a sound isolation role in buildings depends a lot on if the interior partitions extend full height as required by building design standards or terminate at ceiling level. When there is a common plenum above the ceiling, noise can transfer easily between rooms. Ceiling Attenuation Class (CAC) is a measure of a ceiling's ability to prevent this noise transfer. The higher the number, the less noise transfers between rooms. The CAC rating of the ceiling system should equal the Sound Transmission Class (STC) rating of the partition.

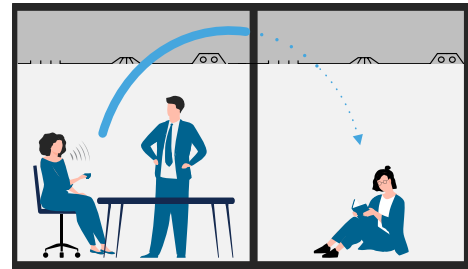
When partitions extend full height, the CAC rating of the ceiling panels is irrelevant.

Common Plenum vs Full Height Partitions



CAC only applies to **horizontal sound isolation** when the partition does not meet minimum standards and creates a common plenum above the ceiling.

CAC is a **double-pass metric** measured per ASTM E1414 and E413.



Building design standards require full height walls with **STC ratings 40, 45 or 50+ per ASTM E90**.

If the interior partitions extend full height as required in building design standards, CAC is irrelevant.

Sound Isolation – Sound Transmission Class (STC)

Sound Transmission Class (STC) applies to an architectural barrier's ability to reduce the amount of sound that can transmit through it. Higher STC ratings are better. STC ratings can apply to vertical barriers such as interior partitions, doors and windows. They can also apply to horizontal floor-ceiling assemblies. Building design standards typically require that partitions have STC ratings of 40, 45 or 50+ and floor-ceiling assemblies be a minimum of STC 50.

While the CAC rating of the ceiling should equal the STC rating of the partition when there is common plenum, the standard acoustical panel ceiling system cannot achieve this level of performance. An STC 45 rated partition that extends only to the underside of the suspended ceiling requires that the ceiling have a CAC rating of 45 as well. But acoustical ceilings cannot match the performance of the STC-rated partition by themselves. Additional noise control measures are required.

Project Checklist

Step 1: Absorb Noise Inside Room (See Section 1, page 6)

Reviewed applicable building design standard(s) or acoustics consultant’s recommendation report to understand ceiling Noise Reduction Coefficient (NRC) requirements by room type.

Selected Optimal sound absorption ceiling panels (NRC 0.90+) for spaces requiring careful listening or concentration or where there is potential for loud noise to disturb occupants.

Selected Enhanced sound absorption ceiling panels (NRC 0.85-0.80) for spaces where listening or concentration occurs occasionally or where long exposure to moderate noise could create discomfort.

Selected Basic sound absorption ceiling panels (NRC 0.75-0.70) for enclosed spaces with one occupant or open spaces mainly for social listening or where concentration is not required.

Step 2: Decrease Noise From Next Room (See Section 2, page 8)

Reviewed partition types for Sound Transmission Class (STC) ratings and understand which partitions extend full height to deck above. If partitions are full height, proceed to Step 3 below.

If partitions terminate in height near the ceiling level (common plenum), match the ceiling system CAC rating to the partition STC rating per the table below.

Partition STC	Rockfon Ceiling Panels	Plenum Barrier	Ceiling System CAC
50-59	1. Rockfon Sonar or Rockfon Alaska w/ HPM ¹ (CAC 33/35)	Vertical, double-layer	58 (Pg 13)
	2. Standard ceiling panels (no HPM ¹)	Vertical, double-layer	52 (Pg 14)
	3. Rockfon Sonar or Rockfon Alaska w/ HPM ¹ (CAC 33/35)	Vertical, single-layer	52–54 (Pg 15)
40-49	1. Standard ceiling panels (no HPM ¹)	Vertical, single-layer	40 (Pg 16)
	2. Standard ceiling panels (no HPM ¹)	Horizontal, both rooms	44–46 (Pg 17)
30-39	1. Sonar or Alaska w/ HPM (CAC 33/35)	None required	33–35 (Pg 18)
	2. Standard ceiling panels (no HPM ¹)	Horizontal, one room only	34–38 (Pg 19)

Step 3: Decrease Noise From Room Above (See Section 3, page 22)

If the project is single-story, proceed to step 4 below.

Review applicable building design standard(s) or acoustics consultant’s recommendation report to understand floor-ceiling assembly STC rating requirement(s).

Ensured that structural engineer incorporated floor slabs that are at most seven (7) STC points lower than the STC rating required for the overall floor-ceiling assembly.

Step 4: Decrease Noise from Equipment in Plenum (See Section 4, page 24)

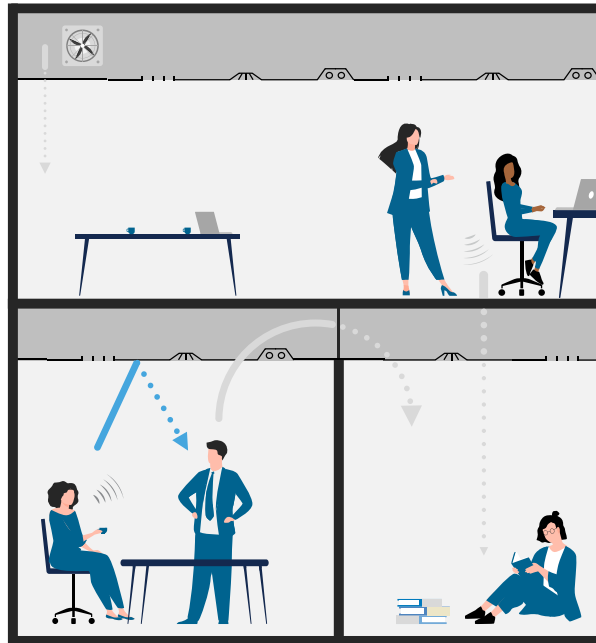
If there is no noisy mechanical equipment in the plenum above the ceiling, process complete.

If there is noisy mechanical equipment in the plenum above the ceiling, reviewed applicable building design standard(s) or acoustics consultant’s recommendation report to understand room background noise limits.

Ensured that mechanical engineer specified/scheduled maximum, radiated, octave band, sound power levels for the equipment using Rockfon’s HVAC noise design guide or ASHRAE’s Handbook.

Section 1: Absorb Noise Inside the Room

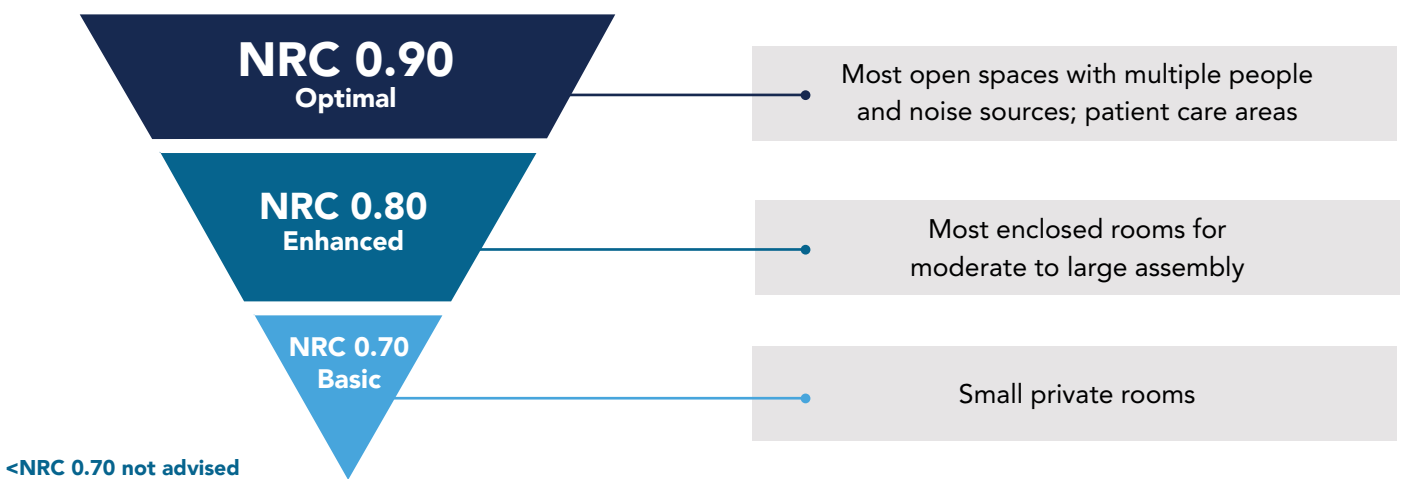
The primary role of acoustical ceilings is **Sound Absorption** for comfortable, healthy and safe interior room acoustics. This can mean shorter reverberation time for higher speech intelligibility in classrooms, lower noise levels for concentration in open offices or speech privacy between patient treatment areas.



Key Design Considerations

The sound absorbing capabilities of acoustical ceiling panels are quantified with Noise Reduction Coefficient (NRC) rating. Building design standards typically require that normally occupied spaces have sound-absorptive ceilings between NRC 0.70 (Basic) and NRC 0.90 (Optimal).

Requirements in Building Design Standards



Learning Deep Dive

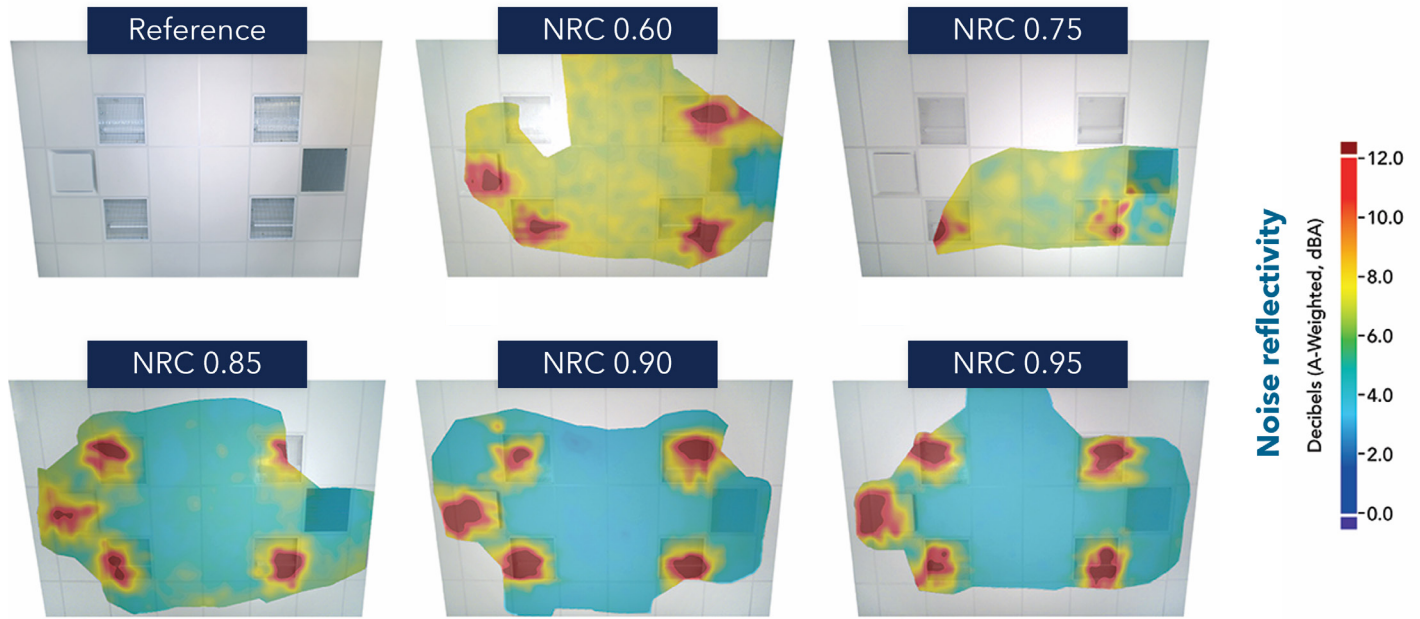
Scan the QR code or click [here](#) to learn more about ceiling sound absorption and listen to the effect of absorption.





Visualize Different NRC Ratings

Why do standards require ceilings with NRC ratings of 0.90? Noise color maps allow visualization of the amount of noise reflecting off acoustical ceilings with lower NRC ratings. Red shows loud noise reflecting off reflective, painted, metal, lights and air diffusers. Yellow shows noise reflecting off low NRC acoustical ceiling panels. Blue shows most noise being absorbed by high NRC acoustical ceilings. Ceilings with NRC ratings below 0.90 reflect more noise.



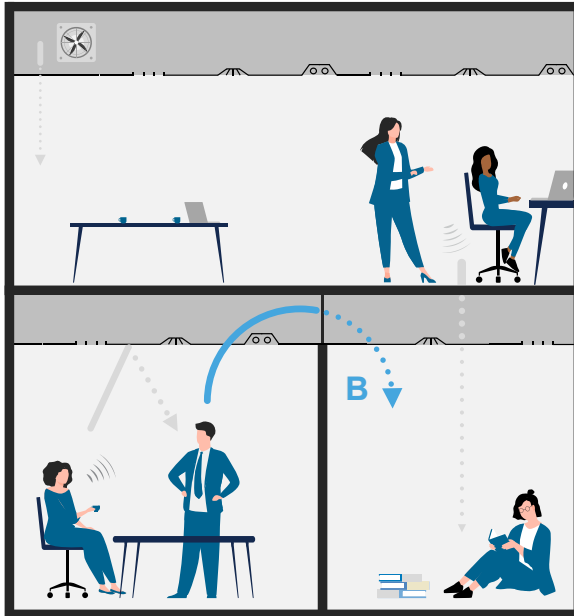
Rockfon Product Solutions

The table below indicates which Rockfon ceiling panels achieve **Optimal**, **Enhanced** and **Basic** sound absorption performance. As panel thickness increases, so do the NRC ratings. Rockfon's more popular ceiling panels have thicknesses of 5/8", 3/4" and 1". Specialty panels can be 1-1/2", 2" or 4" thick.

Optimal Acoustical Needs NRC 1.10 – 0.90		Enhanced Acoustical Needs NRC 0.85-0.80		Basic Acoustical Needs NRC 0.75-0.70	
Rockfon Industrial	NRC 1.05	Rockfon Sonar CAC 33 35	NRC 0.85	Rockfon Artic	NRC 0.75
Rockfon Facett	NRC 1.00	Rockfon Alaska CAC 33 35	NRC 0.85	Rockfon Education Standard	NRC 0.70
Rockfon Sonar	NRC 0.95	Rockfon Koral	NRC 0.85		
Rockfon Color All 3/4"	NRC 0.95	Rockfon Tropic	NRC 0.85		
Rockfon Cinema Black 1"	NRC 0.95	Rockfon Medical Air	NRC 0.85		
Rockfon Mono Acoustics TE	NRC 0.95	Rockfon Cinema Black 5/8"	NRC 0.85		
Rockfon Alaska	NRC 0.90	Rockfon Education Plus	NRC 0.80		
Rockfon Medical Plus	NRC 0.90				
Rockfon Medical Standard	NRC 0.90				
Rockfon Color All 5/8"	NRC 0.90				
Rockfon Education Premium	NRC 0.90				
Rockfon Hygienic Plus	NRC 0.90				

Section 2: Decrease Noise from Next Room

Whenever possible, interior partitions with STC ratings of 40-50+ should extend full height from the floor to the deck overhead when they are located between normally occupied rooms. This prevents a noise transfer path through the common plenum above the ceiling. When interior partitions do not extend full height as required by most building design standards, acoustical ceilings might also need to take on the role of sound isolation, decreasing the amount of sound transferring through that path. The main goals are to ensure speech is not understood in adjacent rooms (privacy) and that noise originating in adjacent rooms is not distracting or annoying.



Learning Deep Dive

Scan the QR code or click [here](#) to learn more about sound isolation between rooms.



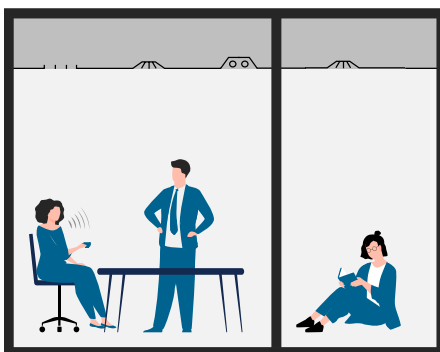
Rockfon's Plenum Barrier Board

Scan the QR code or click [here](#) to learn more or order a sample of Rockfon's Plenum Barrier Board™.



Key Design Considerations

The sound isolating capabilities of ceiling panels are quantified with **Ceiling Attenuation Class (CAC)**. Most building design standards do not require ceilings to have a CAC rating because they instead require the interior partitions to extend full height. If partitions terminate at ceiling level, leaving a common plenum, the CAC rating of the ceiling system should equal the Sound Transmission Class (STC) rating of the partition. The problem is acoustical ceiling panels alone cannot provide this level of sound isolation. They must be combined with some other noise control measure such as **Rockfon® Plenum Barrier Board™**.



Full Height Wall

STC 45, 50+

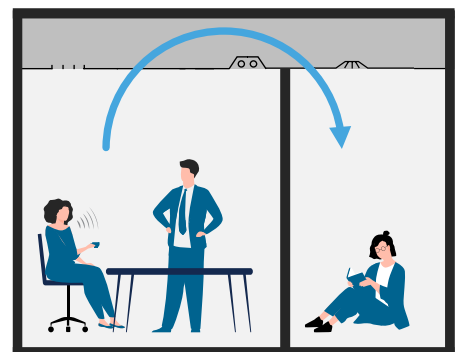
- Ceiling flanking **paths okay**
- Compliance with standards
- CAC irrelevant



Plenum Barrier

STC 40, 45, 50

- Ceiling flanking **paths okay**
- More standards are including
- Combined CAC = STC



Common Plenum

STC 40, 45, 50

- Ceiling flanking **paths problematic**
- **Noncompliance** with standards
- CAC insufficient



Penetrations through the Ceiling System for Building Services

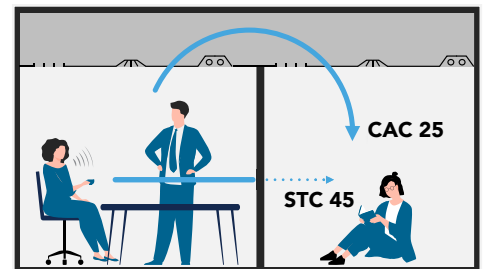
When multiple enclosed rooms share a common plenum above the ceiling, penetrations in the ceiling system for lights, return air grilles, supply air diffusers and many other devices can decrease the ceiling system CAC performance up to 10 points lower than the CAC rating of the ceiling panels. This means the transferring noise could be perceived as two times louder than without the penetrations. In the example below, the partition's construction is STC 45 but stops at ceiling height, leaving a noise path through the plenum. If a CAC 35 ceiling panel is specified, the penetrations in the ceiling system could result in CAC 25 performance in the building. This is a 20-point deficit compared to the partition STC rating, meaning the sound transferring through the plenum and ceilings is four times louder than the sound transferring through the partition.



Panel CAC From Lab Test



System CAC In Buildings

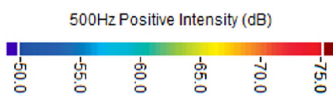


Color maps of noise leaking through the ceiling demonstrate the difference between basic design approaches. Red and yellow indicate noise from the adjacent room leaking through the ceiling. Using ceiling panels without a plenum barrier, results in the ceiling being the weak link between rooms. Supplementing the sound isolation provided by the ceiling with Rockfon's Plenum Barrier Board increases sound isolation up to CAC 58 and allows the ceiling panel to have an Optimal or Enhanced NRC rating.



Reference ceiling with four lights (center), air diffuser (left) and return grille (right).

Noise leakage



Common Mistake

Common plenum, CAC 35 ceiling panels, no plenum barrier, CAC 25

Rockfon's Approach

Rockfon Plenum Barrier Board and Rockfon ceiling panels, up to CAC 58

Rockfon's Approach to Sound Isolation

Compliance with Requirements in Building Design Standards

Building design standards such as The WELL Building Standard, Leadership in Energy and Environmental Design (LEED) and Facility Guidelines Institute's (FGI) Codes typically require interior partitions to extend continuously from floor slab to floor slab with assemblies that have been tested to achieve sound transmission class (STC) ratings of 40, 45 or 50+. This design approach prevents noise in one room from transmitting through the plenum above the ceiling into adjacent rooms. Rockfon recommends full height interior partitions in compliance with these standards when possible. When partitions are full height, the sound isolation, or CAC rating, of the ceiling is irrelevant. The partition is providing the required sound isolation.

Determining the STC Ratings for Partitions

Acoustical Needs of Space	Partition STC
Optimal	50+
Enhanced	40-49
Basic*	30-39

* Partitions performing below STC 40 are not typically permitted by standards



ROCKWOOL'S Acoustic Wall Assemblies Catalog

To review partition constructions by STC performance and select the appropriate ones for your project, download ROCKWOOL'S Acoustic Wall Assemblies Catalog and use the tables below to find specific partition assemblies on the noted pages. An example partition is shown, assembly number ISS-07, STC 45 on page 12 of ROCKWOOL'S catalog.

Scan the QR code to download the catalog

Optimal STC 50+		Enhanced STC 45-49		Enhanced STC 40-44	
STC	Assembly	STC	Assembly	STC	Assembly
50	ISS-21 Page 16	45	ISS-07 Page 12	40	ISS-01 Page 10
53	ISS-27 Page 18	47	ISS-15 Page 14	43	ISS-02 Page 10
55	ISS-33 Page 20	49	ISS-17 Page 15	44	ISS-06 Page 11

Interior Steel Stud Assemblies

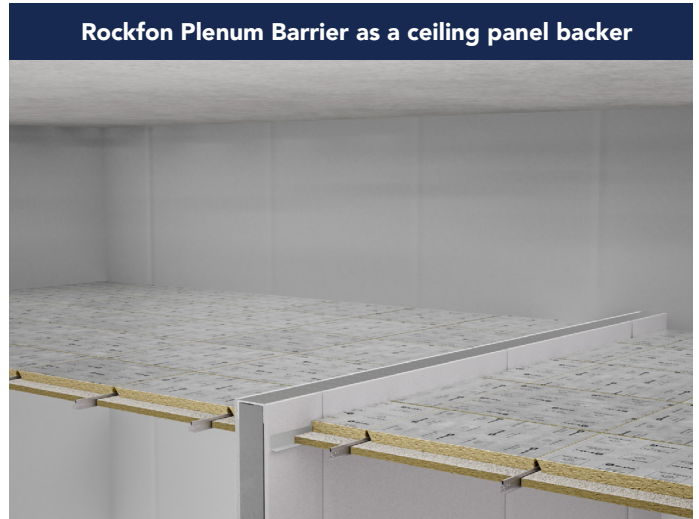
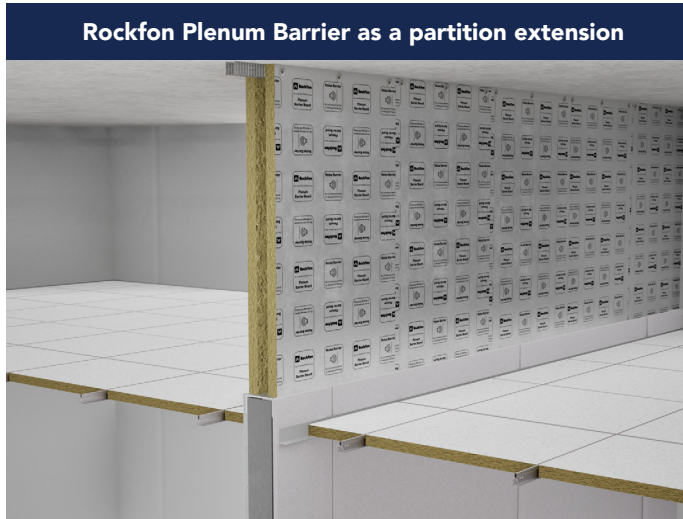
STC 45

Insulation Included:
ROCKWOOL AFB

Acoustics		Assembly Number: ISS-07	
STC:	45	OITC:	29
Report No.		J2247-11-303-11-R0	
Assembly Components			
Finish material	5/8" gypsum		
Size	3 5/8" Steel Stud		
Spacing	16" oc		
Product	AFB		
Thickness	3"		

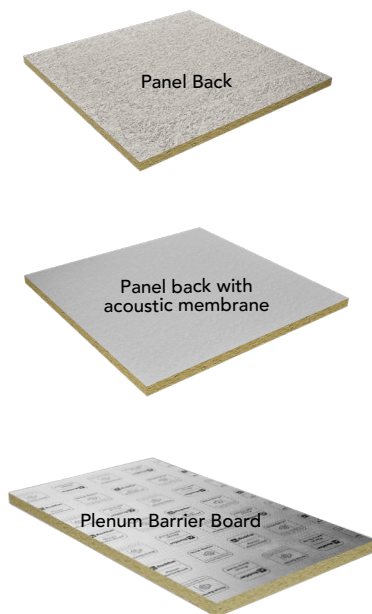
Plenum Barriers – An Alternative to Full Height Partitions

While full height partitions should be the default, there are projects in which they are not possible. Some plenums above the ceiling can be twenty or more feet high. Some users want partitions to terminate under the suspended ceiling so that they can be easily relocated as needs change. Sometimes, the partitions are already built and cannot be extended. For these projects, there is Rockfon Plenum Barrier Board. It can be oriented vertically as a partition extension or horizontally as a ceiling panel backer on top of Rockfon ceiling panels. The CAC rating of the ceiling and plenum barrier combination should equal the STC rating of the partition. Rockfon's plenum barrier solutions can achieve up to CAC 58 to match the performance of STC 58 partitions.



Rockfon Product Toolkit

When designing with Rockfon's stone wool products to achieve sound isolation performance requirements, know that the toolkit includes three basic elements: 1. standard ceiling panels of various thicknesses and absorption performances, 2. specialty ceiling panels that have a high-performance membrane (HPM) on the backsides to boost sound isolation and 3. a plenum barrier. With these three tools, acoustical performances from NRC 0.70 to 1.10 and CAC 20 to 58 can be achieved.



Ceiling Panels - Standard

Rockfon's standard ceiling panels are engineered for high sound absorption (NRC up to 1.10). They are used in open spaces or enclosed rooms when the partitions are full height.

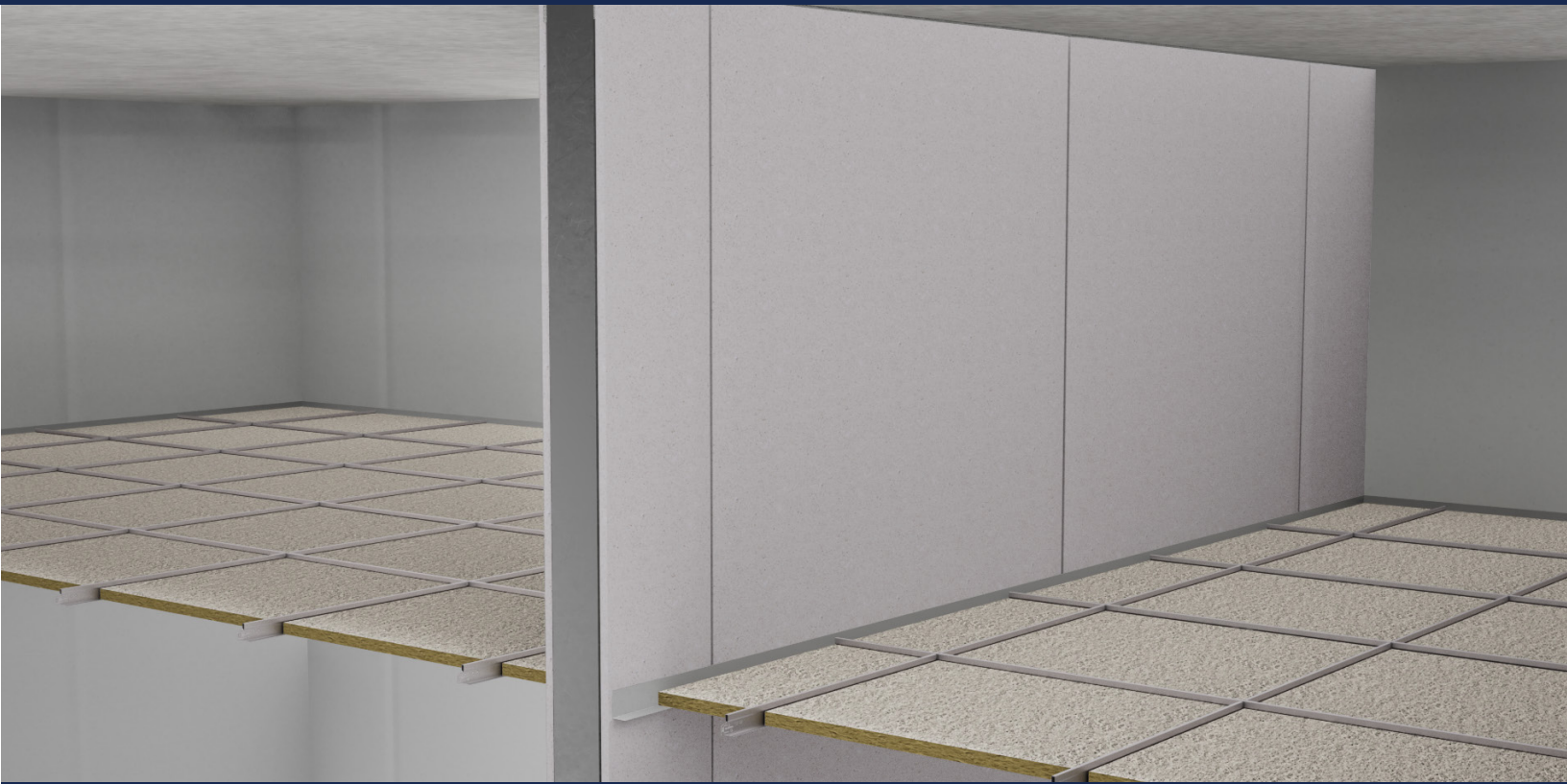
Ceiling Panels – High Performance Membrane (HPM)

Rockfon Sonar, Rockfon Alaska and Rockfon Medical Air ceiling panels have the option of a factory-applied, high-performance membrane (HPM) on the backside to increase the sound isolation performance up to CAC 33|35. Use these panels when partitions do not extend full height and some sound reduction between rooms is preferred, but speech privacy is not important.

Rockfon® Plenum Barrier Board

When sound privacy between enclosed rooms is important, but the partitions do not extend full height, Rockfon's Plenum Barrier Board can be used in combination with Rockfon's standard ceiling panels to achieve the high sound isolation ratings required in building standards.

Optimal Sound Isolation



Full Height Partition - STC 50+

Optimal Sound Absorption NRC 1.10 – 0.90

Ceiling Panel	Thickness	NRC	CAC
Rockfon Facett	1.5", 4"	1.10	Disregard**
Rockfon Industrial	2"	1.05	Disregard**
Rockfon Sonar*	1"	0.95	Disregard**
Rockfon Color All*	3/4"	0.95	Disregard
Rockfon Cinema Black	1"	0.95	Disregard**
Rockfon Alaska*	3/4"	0.90	Disregard**
Rockfon Color All	5/8"	0.90	Disregard**
Rockfon Medical Plus	3/4"	0.90	Disregard**
Rockfon Medical Standard	5/8"	0.90	Disregard**
Rockfon Education Premium	1"	0.90	Disregard**
Rockfon Hygienic Plus	3/4"	0.90	Disregard**

When to Use

Building design standards require that partitions separating occupied rooms requiring sound isolation or speech privacy be constructed full height from floor to underside of deck above. These standards do not require ceiling panels to have a CAC rating because the noise flanking path through the plenum is prevented by the upper part of the partition.

**Rockfon recommended ceiling panels*

***When the partition is full height, it provides the necessary sound isolation. CAC of the ceiling can be disregarded.*

Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Korall*	5/8"	0.85	Disregard**
Rockfon Tropic*	5/8"	0.85	Disregard**
Rockfon Medical Air	1"	0.85	Disregard**
Rockfon Cinema Black	5/8"	0.85	Disregard**
Rockfon Education Plus	3/4"	0.80	Disregard**

Basic Sound Absorption NRC 0.75 – 0.60

Ceiling Panel	Thickness	NRC	CAC
Rockfon Artic	5/8"	0.75	Disregard
Rockfon Education Standard	5/8"	0.70	Disregard



Rockfon Plenum Barrier Board as Partion Extension - Double Layer - Ceiling Panels with HPM**

Enhanced Sound Absorption NRC 0.85 – 0.80			
Ceiling Panel	Thickness	NRC	CAC
Rockfon Sonar CAC 33*	1"	0.85	58
Rockfon Sonar High CAC 35	1.5"	0.85	58
Rockfon Alaska CAC 33*	1"	0.85	58
Rockfon Alaska High CAC 35	1.5"	0.85	58

When to Use

Use double-layer, vertical Rockfon® Plenum Barrier Board™ when the partition does not extend full height, and Optimal Sound Isolation (CAC 50+) is required between adjacent rooms.

*Rockfon recommended ceiling panels

**HPM is Rockfon's factory applied High Performance Membrane that increases sound isolation

Optimal Sound Isolation



Rockfon Plenum Barrier Board as Partition Extension - Double Layer

Optimal Sound Absorption NRC 1.10 – 0.90

Ceiling Panel	Thickness	NRC	CAC
Rockfon Facett	1.5", 4"	1.10	52
Rockfon Industrial	2"	1.05	52
Rockfon Sonar*	1"	0.95	52
Rockfon Color All*	3/4"	0.95	52
Rockfon Cinema Black	1"	0.95	52
Rockfon Alaska*	3/4"	0.90	52
Rockfon Color All	5/8"	0.90	52
Rockfon Medical Plus	3/4"	0.90	52
Rockfon Medical Standard	5/8"	0.90	52
Rockfon Education Premium	1"	0.90	52
Rockfon Hygienic Plus	3/4"	0.90	52

When to Use

Use double-layer, vertical Rockfon® Plenum Barrier Board™ when the partition does not extend full height and Optimal Sound Isolation (CAC 50+) is required between adjacent rooms.

**Rockfon recommended ceiling panels*

Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Koral*	5/8"	0.85	52
Rockfon Tropic*	5/8"	0.85	52
Rockfon Medical Air	1"	0.85	52
Rockfon Cinema Black	5/8"	0.85	52
Rockfon Education Plus	3/4"	0.80	52

Basic Sound Absorption NRC 0.75 – 0.60

Ceiling Panel	Thickness	NRC	CAC
Rockfon Artic	5/8"	0.75	52
Rockfon Education Standard	5/8"	0.70	52



Rockfon Plenum Barrier Board as Partition Extension - Single Layer

Enhanced Sound Absorption NRC 0.85 – 0.80			
Ceiling Panel	Thickness	NRC	CAC
Rockfon Sonar CAC 33*	1"	0.85	52
Rockfon Sonar High CAC 35	1.5"	0.85	54
Rockfon Alaska CAC 33*	1"	0.85	52
Rockfon Alaska High CAC 35	1.5"	0.85	54

When to Use

Rockfon's single-layer, vertical, Plenum Barrier Board solution should be used when the partition does not extend full height, and Optimal Sound Isolation (CAC 55+) is required between adjacent rooms.

**Rockfon recommended ceiling panels*

Enhanced Sound Isolation



Rockfon Plenum Barrier Board as a Partition Extension - Single Layer

Optimal Sound Absorption NRC 1.10 – 0.90

Ceiling Panel	Thickness	NRC	CAC
Rockfon Facett	1.5", 4"	1.10	40
Rockfon Industrial	2"	1.05	40
Rockfon Sonar*	1"	0.95	40
Rockfon Color All*	3/4"	0.95	40
Rockfon Cinema Black	1"	0.95	40
Rockfon Alaska*	3/4"	0.90	40
Rockfon Color All	5/8"	0.90	40
Rockfon Medical Plus	3/4"	0.90	40
Rockfon Medical Standard	5/8"	0.90	40
Rockfon Education Premium	1"	0.90	40
Rockfon Hygienic Plus	3/4"	0.90	40

When to Use

Rockfon's single-layer, vertical, Plenum Barrier Board solution should be used when the partition does not extend full height and Enhanced Sound Isolation (CAC 40–49) is required between adjacent rooms.

**Rockfon recommended ceiling panels*

Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Koral*	5/8"	0.85	40
Rockfon Tropic*	5/8"	0.85	40
Rockfon Medical Air	1"	0.85	40
Rockfon Cinema Black	5/8"	0.85	40
Rockfon Education Plus	3/4"	0.80	40

Basic Sound Absorption NRC 0.75 – 0.60

Ceiling Panel	Thickness	NRC	CAC
Rockfon Artic	5/8"	0.75	40
Rockfon Education Standard	5/8"	0.70	40



Rockfon Plenum Barrier Board as a Ceiling Backer - Both Sides of Partition

Optimal Sound Absorption NRC 1.10 – 0.90

Ceiling Panel	Thickness	NRC	CAC
Rockfon Facett	1.5", 4"	1.10	46
Rockfon Industrial	2"	1.05	46
Rockfon Sonar*	1"	0.95	46
Rockfon Color All*	3/4"	0.95	45
Rockfon Cinema Black	1"	0.95	46
Rockfon Alaska*	3/4"	0.90	45
Rockfon Color All	5/8"	0.90	44
Rockfon Medical Plus	3/4"	0.90	45
Rockfon Medical Standard	5/8"	0.90	44
Rockfon Education Premium	1"	0.90	46
Rockfon Hygienic Plus	3/4"	0.90	45

When to Use

Lay Rockfon's Plenum Barrier Board horizontally on top of Rockfon ceiling panels when the partition does not extend full height and Enhanced Sound Isolation (CAC 40–49) is required between adjacent rooms.

**Rockfon recommended ceiling panels*

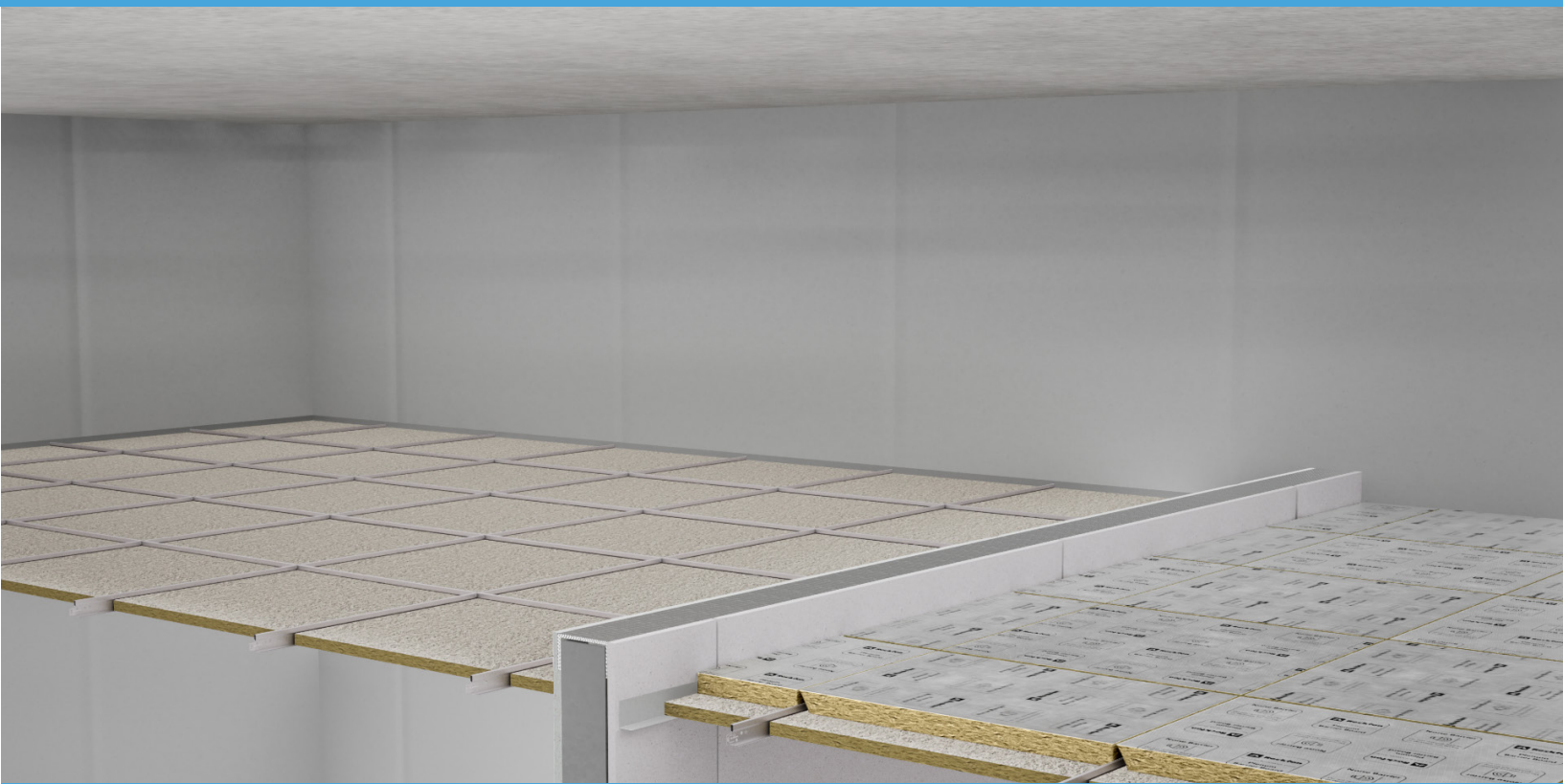
Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Korall*	5/8"	0.85	44
Rockfon Tropic*	5/8"	0.85	44
Rockfon Medical Air	1"	0.85	Disregard
Rockfon Cinema Black	5/8"	0.85	44
Rockfon Education Plus	3/4"	0.80	45

Basic Sound Absorption NRC 0.75 – 0.60

Ceiling Panel	Thickness	NRC	CAC
Rockfon Artic	5/8"	0.75	44
Rockfon Education Standard	5/8"	0.70	44

Basic Sound Isolation



Rockfon Plenum Barrier Board as Ceiling Panel Backer - One Side of Partition Only

Optimal Sound Absorption NRC 1.10 – 0.90

Ceiling Panel	Thickness	NRC	CAC
Rockfon Facett	1.5", 4"	1.10	38
Rockfon Industrial	2"	1.05	38
Rockfon Sonar*	1"	0.95	38
Rockfon Color All*	3/4"	0.95	37
Rockfon Cinema Black	1"	0.95	38
Rockfon Alaska*	3/4"	0.90	37
Rockfon Color All	5/8"	0.90	34
Rockfon Medical Plus	3/4"	0.90	37
Rockfon Medical Standard	5/8"	0.90	34
Rockfon Education Premium	1"	0.90	38
Rockfo Hygienic Plus	3/4"	0.90	37

When to Use

Lay Rockfon's Plenum Barrier Board horizontally on top of Rockfon ceiling panels when the partition does not extend full height and Basic Sound Isolation (CAC 30–39) is required between adjacent rooms.

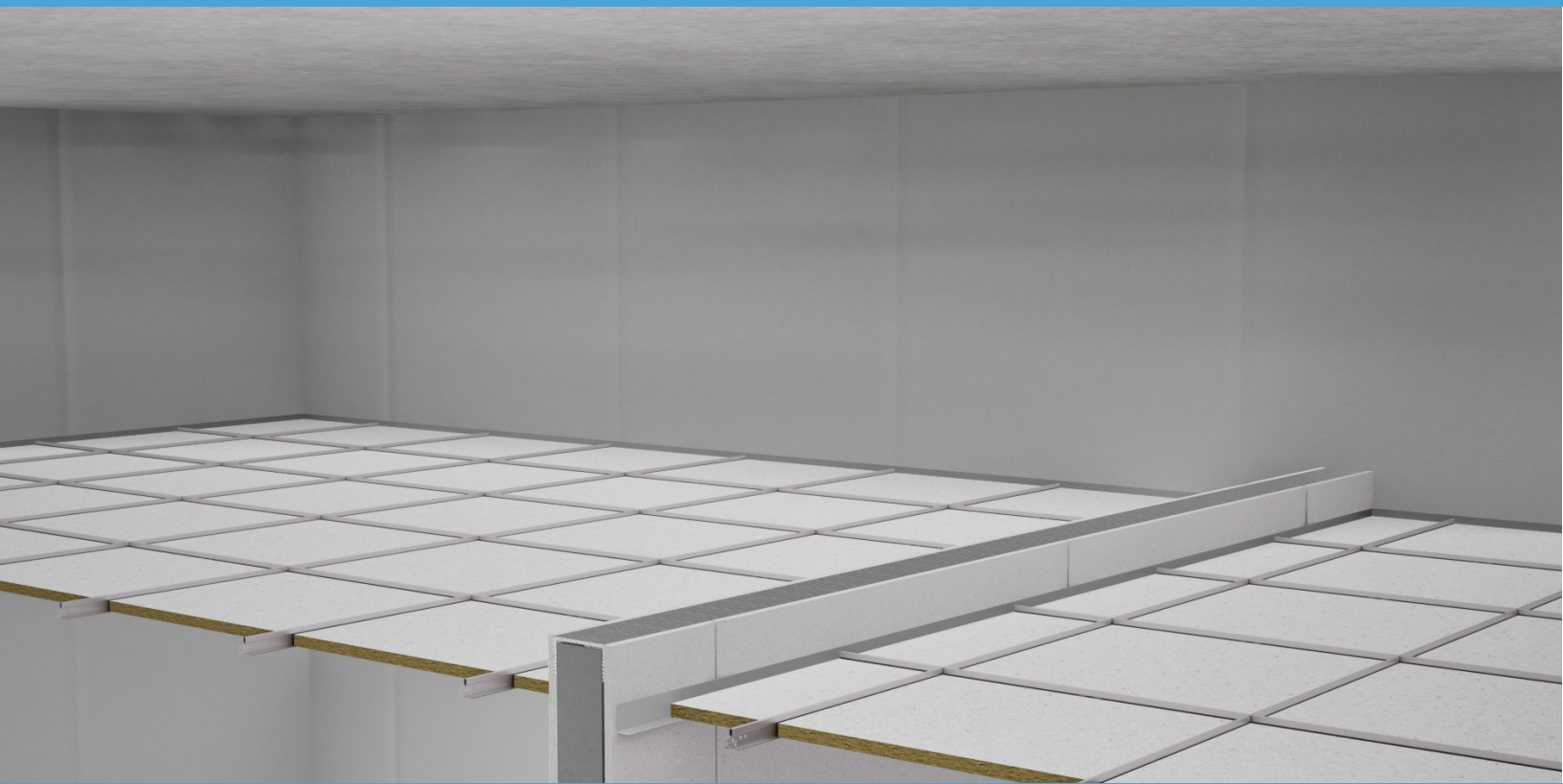
**Rockfon recommended ceiling panels*

Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Korall*	5/8"	0.85	34
Rockfon Tropic*	5/8"	0.85	34
Rockfon Medical Air	1"	0.85	38
Rockfon Cinema Black	5/8"	0.85	34
Rockfon Education Plus	3/4"	0.80	37

Basic Sound Absorption NRC 0.75 – 0.60

Ceiling Panel	Thickness	NRC	CAC
Rockfon Artic	5/8"	0.75	34
Rockfon Education Standard	5/8"	0.70	34



Rockfon Ceiling Panels with High Performance Membrane

Enhanced Sound Absorption NRC 0.85 – 0.80

Ceiling Panel	Thickness	NRC	CAC
Rockfon Sonar CAC 33*	1"	0.85	33
Rockfon Sonar High CAC 35	1.5"	0.85	35
Rockfon Alaska CAC 33*	1"	0.85	33
Rockfon Alaska High CAC 35	1.5"	0.85	35

When to Use

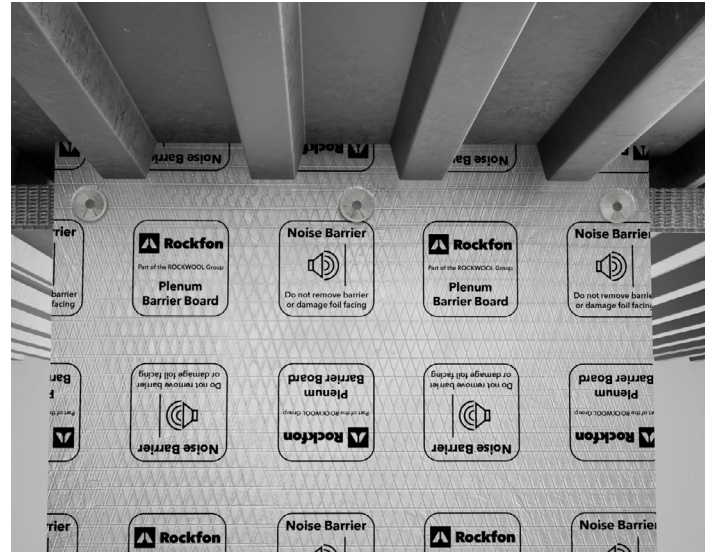
Rockfon's higher CAC ceiling panels should be used (without Plenum Barrier Board) when only a basic level of sound isolation and speech privacy are needed between adjacent rooms.

**Rockfon recommended ceiling panels*

Rockfon Plenum Barrier Board Design Considerations

Metal Deck

When the overhead surface is corrugated, such as with a metal deck, the Plenum Barrier Board is castle-cut on site by the contractor to fill the flutes.



Building MEP Systems

It is easy for the contractor to install Plenum Barrier Board around ducts, pipes and conduits.



Full-Height Metal Studs

If the metal studs framing the interior partition extend full height to the underside of the deck overhead, but the gypsum board does not, Rockfon Plenum Barrier Board can be screwed into the partition framing.



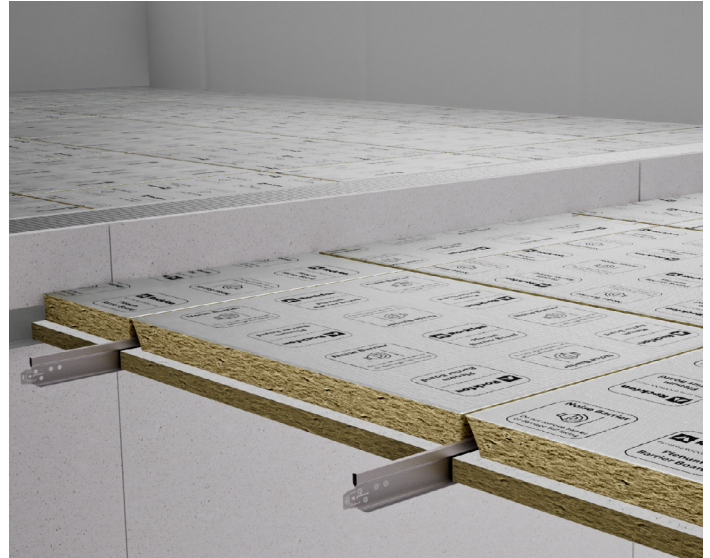
Tall Plenums

If the plenum above the ceiling is taller than 48", and the metal studs of the partition do not extend full height, then supplemental metal framing should be added. The contractor attaches the Plenum Barrier Board to the supplemental framing with screws.



Horizontal Application

When the Plenum Barrier Board is laid horizontally on top of Rockfon ceiling panels, two adjacent edges are bevel-cut on-site by the contractor. The other two edges retain their factory-cut square edges. The beveled cuts create space for the bulb of the metal ceiling grid while also allowing the top surface of the Plenum Barrier Board to extend over the grid and close any gaps through which noise could leak.



Plenum Barrier Installation Guides

For more detailed information about how Rockfon Plenum Barrier Board gets installed in different scenarios, consult the product's Installation Guides.



Scan the QR code or click [here](#) to explore Rockfon's Plenum Barrier Board Installation Guides.

Rockfon
Part of ROCKWOOL Group

Installation Guide
Rockfon® Plenum Barrier Board™
Partition Extension Application (Vertical Orientation)

Rockfon® Plenum Barrier Board™ Installation Guide

System Overview

Rockfon Plenum Barrier Board is a semi-rigid, stone wool board with a fiber-reinforced, aluminum foil facing adhered to one side. It is only available in a 24" x 48" x 1.5" thick size (standard). When Rockfon Plenum Barrier Board is installed above Rockfon suspension, stone wool acoustical ceilings and your metal partitions that terminate at the underside of the suspended ceiling, or extend slightly above the ceiling, it increases the sound insulation and airtightness between rooms. The ideal applications are when the suspended ceiling or frame continuously cover the top of metal partitions or when partitioned, demountable wall systems that only extend to the underside of the ceiling are used. Rockfon Plenum Barrier Board can also be used above this last option, provided that the partitions are supported by the underside of the ceiling and extend just above the ceiling. The installation guide covers the application of Rockfon Plenum Barrier Board in a vertical orientation in a vertical direction. Rockfon Plenum Barrier Board uses the existing paper backing in a horizontal orientation, refer to a separate installation guide.

Storage and Handling

Rockfon Plenum Barrier Board should be stored on its original pallet and needs to be kept protected against rain, snow, moisture. Protect the corners, edges and foil facing of the boards from damage as this can negatively affect acoustic performance after installation.

Site Conditions

Rockfon Plenum Barrier Board does not require pre-conditioning. Stone wool is inherently fire-resistant and can be installed in hot or cold temperatures and humid conditions. Boards should not be over-weight. Quantities of installed in areas where work with a still being performed.

Tools Required

- Slang Kwik with Minimum 2" Long Blade
- Metal Rules (24" inch or longer preferred)
- Spirit Measure
- Marker
- SDS Drive with Philips Tip Bit
- Work Lights
- Safety Gear (Wear installation with better PPE)
- Personal Protective Equipment

System Components

Rockfon Plenum Barrier Board
1/2" metal tape
1/2" metal top track
Insulation Studs
Self-tapping metal screws

Section 3: Decrease Noise From Room Above

Sound Isolation can be important between rooms on different floors too. While the main sound isolating barrier is the massive, concrete, floor slab, an acoustical ceiling suspended below it can improve the overall assembly performance and help to comply with acoustical requirements in building design standards.

The appropriate acoustical metric is the **Sound Transmission Class (STC)** rating of the floor-ceiling assembly. The CAC rating of the acoustical ceiling panel should not be used to predict the vertical sound isolation between two rooms on different floors.

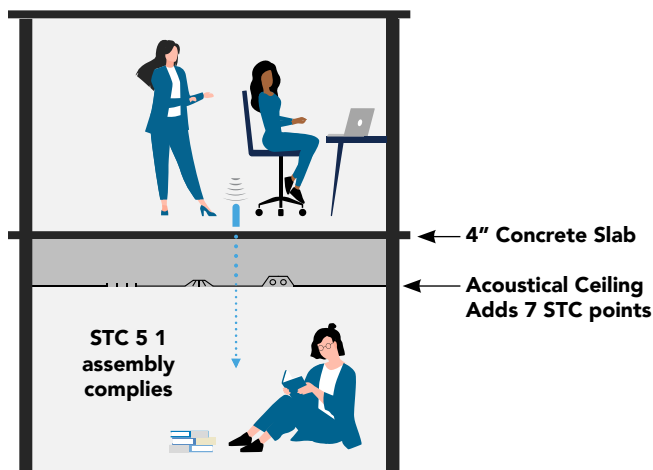


Main Points

- Rockfon's standard ceiling panels suspended under a 4" thick concrete floor slab complies with STC 50 floor-ceiling assembly requirements in building design standards.
- The CAC ratings of different acoustical ceiling panels do not significantly affect the STC rating of the floor-ceiling assembly.

Key Design Considerations

The sound isolating capabilities of a floor-ceiling assembly are quantified with Sound Transmission Class (STC) rating. Not all building design standards have floor-ceiling STC requirements. Those that do, most often require an STC 50 minimum rating. To achieve this with only a concrete slab (no ceiling), it will need to be at least 6" thick. However, if an acoustical ceiling is suspended below it, the slab only needs to be 4" thick. That is a substantial savings since the ceiling is required for sound absorption as well. Generally, a suspended acoustical ceiling increases the STC rating beyond that of the floor alone by 7 STC points.²



Concrete Thickness (Normal Weight)	Concrete Slab Rating ³	Improvement from Ceiling	Assembly Rating
4"	STC 44	+7 STC	STC 51
6"	STC 50	+7 STC	STC 57
8"	STC 57	+7 STC	STC 64

Learning Deep Dive

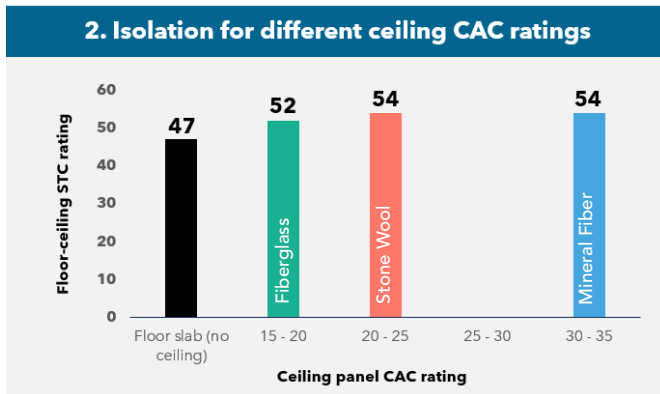
Scan the QR code or click [here](#) to learn more about how ceilings affect floor STC ratings.



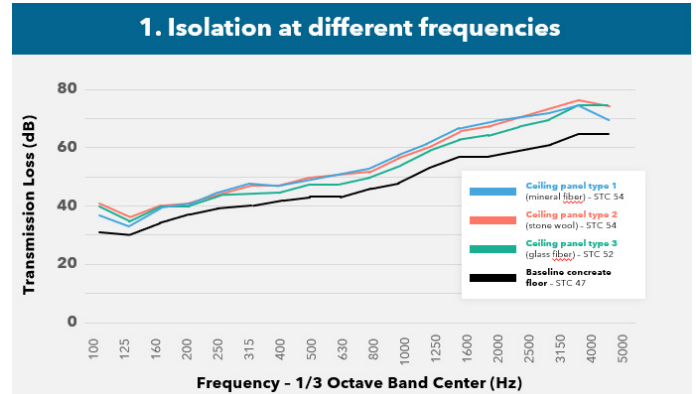


The Evidence: How Different Ceiling Panel Materials Perform

Rockfon studied the effect of acoustical ceiling panel material and CAC rating on the STC ratings of floor-ceiling assemblies.⁴ In an acoustical testing laboratory, a 15/16" metal, tee-bar, grid was suspended below a typical, concrete slab with vinyl composite tile (VCT) flooring on top. The STC rating of the baseline concrete slab was compared to the STC ratings with stone wool, mineral fiber and fiberglass ceiling panels, having a wide range of CAC ratings, installed in the grid.



The concrete slab had an STC 47 rating, not enough to comply with the STC 50 in standards. Despite the ceiling panels having a wide range of CAC ratings and weights, they all increased the STC rating of the assembly over the STC 50 minimum and about the same amount.



When comparing the transmission loss (TL) performance at different frequencies relative to the concrete slab alone (black line), all ceiling panel materials provide better sound isolation at all frequencies. The performance of the stone wool and mineral fiber panels overlap.

Rockfon Product Solutions

Suspending a Rockfon stone wool acoustical ceiling below a concrete slab will add seven (7) STC points to the STC rating of the slab alone. Simply subtract seven points from the desired assembly STC rating, typically STC 50, to know the needed STC rating of the floor slab. For example, if the building standard requires a minimum floor-ceiling rating of STC 50, then specify a concrete floor slab that achieves at least STC 43, or a 4" thick normal weight concrete slab. CAC ratings for these solutions are only given for general reference.



Basic

Rockfon's more popular ceiling panels combined with a normal weight concrete slab (STC 43+) complies with STC 50 requirements in standards (CAC 20-25).



Enhanced

Rockfon provides ceiling panels with high performance membranes (HPM) on the back for Basic sound isolation (CAC 33-35).



Optimal

For even higher sound isolation, lay Rockfon Plenum Barrier Board on top of Rockfon ceiling panels (CAC 44-46).

Section 4: Decrease Noise From Equipment in Plenum

When noisy mechanical equipment is inside the plenum, acoustical ceilings can be the only barrier to limit the noise intrusion and achieve goal **Background Noise Levels** inside the occupied rooms below. There is an industry-accepted prediction method to select an acceptable combination of equipment and acoustical ceiling based on the desired background noise levels for the functions occurring inside the rooms.



Main Points

- Rockfon has simplified the ASHRAE prediction method for ensuring noisy equipment in the plenum does not exceed goal background noise levels. Refer to the Learning Deep Dive below.
- Use the tables in Rockfon’s guides to specify maximum loudness levels for the equipment.
- If extra noise attenuation is needed, consider Rockfon’s HPM ceiling panel backer or using Rockfon Plenum Barrier as a ceiling panel backer.

Learning Deep Dive

Scan the QR code or click [here](#) to learn more about ceiling selection to achieve desired background noise levels inside rooms.



Step 1: Determine the Goal Background Noise

The industry-accepted method for predicting the background noise level inside a room when noisy mechanical equipment is above a suspended acoustical ceiling is defined in the ASHREA Handbook – HVAC Applications and in AHRI Standard 885.⁵ Step one is to find the goal background noise level for the room using the table below, which is based on information found in the ASHRAE Handbook. For example, a conference room in an office building would typically have a maximum background noise level of NC 30 or 35-40 dB(A).

ASHRAE Guidelines for Background Noise Levels

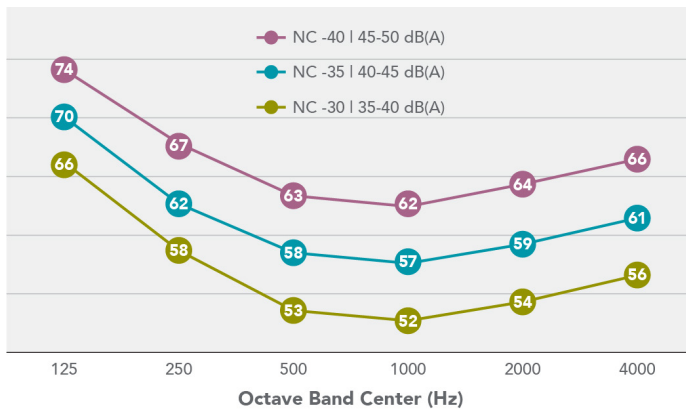
Noise Criterion (NC)	Decibels A-Weighted (dB(A))	Functions of Rooms and Spaces
30	35-40	Private offices, conference rooms, patient rooms, classrooms, lecture rooms
35	40-45	Courtrooms, hospital wards, medical procedure rooms
40	45-50	Open plan offices, lobbies, corridors and support spaces



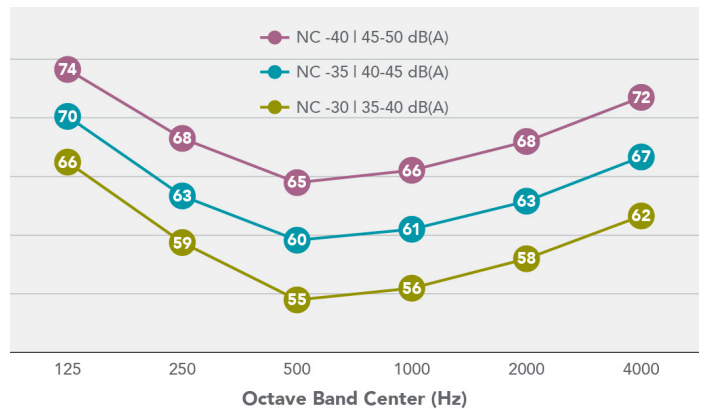
Step 2: Specify How Loud Equipment Can Be

Once the goal background noise level for the room is known, use the graphs below to determine the maximum permissible sound power levels for the equipment above Rockfon acoustical ceilings.⁶ The graph on the left is used for Rockfon ceiling panels that are less than 1" thick. The graph on the right is used for Rockfon ceiling panels 1" or thicker. For the conference room example in step1 with a goal background noise level of NC 30, and assuming a Rockfon ceiling panel of 1" or thicker, such as Rockfon Sonar, is being specified for its high NRC rating, the values of the green line from the graph on the right would be used; 66, 59, 55, 56, 58, 62. These are the maximum loudness (sound power) for the equipment above the ceiling. These values would be specified in the Mechanical division of the project specification, typically in section 23 36 00 Air Terminal Units. Different rooms with different goal background noise levels could merit a table of maximum sound level values in the specification or drawing schedules.

Maximum Radiated Sound Power Levels (dB) of Equipment Above Rockfon Ceiling Panels (<1" Thick)



Maximum Radiated Sound Power Levels (dB) of Equipment Above Rockfon Ceiling Panels (1" Thick or Greater)



Step 3: Specify the Ceiling System

ASHRAE warns not use ceiling panel CAC ratings as the primary prediction method for determining room background noise levels. Research shows that there is no correlation between the two.⁷ Rockfon's standard ceiling panels (left) will typically provide enough noise reduction to achieve background noise levels of NC-30 to and above if the equipment is not excessively loud or the goal background noise levels are not very low (< NC 30). Rockfon offers thicker and heavier ceiling panels with a high-performance membrane on the back to boost noise attenuation performance. Rockfon Plenum Barrier Board can also be laid on top of Rockfon standard ceiling panels for even higher sound isolation performance. CAC ratings of these solutions are only given for general reference.



Basic

Rockfon's standard ceiling panels used under typical conditions. (CAC 20-25)



Enhanced

Rockfon provides ceiling panels with high performance membranes (HPM) on the back for higher sound isolation. (CAC 33,35)



Optimal

For even higher sound isolation, lay Rockfon Plenum Barrier Board on top of Rockfon ceiling panels. (CAC 44-46)

1. HPM refers to Rockfon's factory-applied, High Performance Membrane on the back of the ceiling panel. See page 11 of this guide for more information.
2. Refer to "*Effects of Acoustical Ceiling Panel Type: Vertical Sound Isolation*" published in *The Construction Specifier*, April 30, 2021. Use the link or QR code to access the article.
3. Refer to "[*Compilation of Acoustics Information for Concrete Construction and Other Materials*](#)" by the National Ready Mixed Concrete Association (NRMCA) and the Ready Mixed Concrete (RMC) Research and Education Foundation, July 2022.
4. The supporting research refer to the proceedings of INTER-NOISE 2021, paper 2639, "The Effects of Acoustical Ceiling Panel Type and Penetrations for Services on Vertical Sound Isolation Inside Buildings" authored by Gary Madaras.
5. In the ASHRAE Handbook (2023) refer to the HVAC Applications volume, Chapter 49 Noise and Vibration Control, section 2.8 Mechanical Equipment Room Sound Isolation and Table 43 Ceiling/Plenum/Room Attenuations in dB for Generic Ceiling in T-Bar Suspension Systems. Also refer to Standard 885 (2008): [*Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets*](#) by the Air-Conditioning, Heating and Refrigeration Institute (AHRI), Appendix D, Section D1.6 Ceiling/Space Effect, Table D14 Uncorrected Ceiling/Space Effect Attenuation Values and Table D15 Ceiling/Space Effect Examples.
6. For a detailed explanation of how Rockfon derived these reference tables, refer to the Rockfon whitepaper "[*Selecting HVAC Equipment Above Rockfon Acoustic Ceilings so that Background Noise Requirements in Standards are Achieved*](#)" available on Rockfon's website.
7. Refer to ASHRAE RP-755 "[*Sound Transmission Through Ceilings From Air Terminal Devices in the Plenum: Final Report*](#)" conducted by the National Research Council Canada (NRCC). See section 13 Comparison of E90, E1414 (CAC) and CIL with RAT Power Insertion Loss starting on page 125.

Part of ROCKWOOL Group

Rockfon North America is part of ROCKWOOL Group, a world leader in the production of stone wool and stone wool solutions like building insulation, acoustical ceiling tiles and solutions, industrial and technical insulation for process industries, marine and offshore, wall and façade systems and horticultural substrate solutions.

We are committed to enriching the lives of everyone who comes into contact with our solutions. Our expertise is perfectly suited to tackle many of today's biggest sustainability and development challenges, from energy consumption and noise pollution to fire resilience, water scarcity and flooding. Our range of products reflects the diversity of the world's needs, while supporting our stakeholders in reducing their own carbon footprint.



Experience the Power of Stone Wool with Rockfon Ceilings

Inspired by nature, Rockfon stone wool ceiling tiles and panels deliver a high-performing solution for commercial spaces. Manufactured with primarily basalt rock, stone wool ceilings feature powerful sound absorption, fire resistance and durability with a low environmental impact. Our diverse design options allow architects and designers to express creativity while supporting occupant health. That's the Rockfon secret.



From natural stone to your ceiling

Scan the QR code or click [here](#) to learn how stone wool is made.



Why stone wool?

Scan the QR code or click [here](#) to learn about the benefits of stone wool.

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