

DiffusorBlox®

1D Diffusion



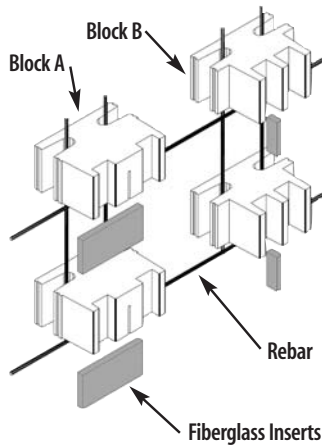
*The Next Generation of Acoustical Concrete Masonry
From The Acoustical Industry's Leading Innovator*

Now for the first time in the history of architectural acoustics, a new acoustical concrete masonry unit offers unprecedented economy by making it possible to incorporate complete acoustical performance into the structural walls of music, speech, athletic, and multipurpose facilities. DiffusorBlox® simultaneously offer a distinctive appearance, extended low frequency absorption, sound isolation, and sound diffusive reflection control.



The Sound of Innovation™

Problem and Solution



Problem

In 1917, Straub patented CinderBloX, the first concrete masonry unit (CMU). In 1965, slotted blocks were introduced to provide low frequency absorption. While useful for noise control, the flat or split face of these blocks actually creates reflection problems which degrade acoustics. This interference and their commercial appearance prohibit use in music and speech facilities.

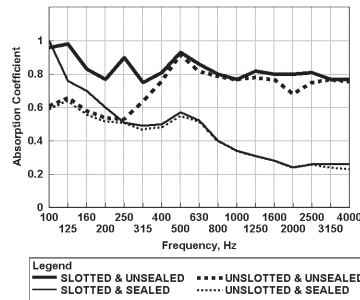
Solution

In 1990, RPG® patented DiffusorBloX®, a unique, cost effective acoustical block that integrates with and installs as easily as conventional CMU. It provides an attractive interior finish treatment, plus extended low frequency absorption and sound diffusion to minimize interfering reflections.

Performance Specifications

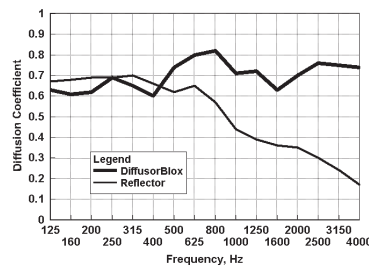
Absorption

Now you can use CMU to effectively control noise over a wide frequency range. DiffusorBloX® are the only acoustical CMU to utilize two slotted Helmholtz resonator chambers, as well as the phase grating pressure gradient absorption mechanism to provide 100% absorption at 100 Hz. Painting reduces the high frequency absorption, but does not affect diffusion or low frequency absorption. Slotted and unfinished, stained or lightly painted DiffusorBloX® have a Noise Reduction Coefficient (NRC) of 0.85. Non-slotted and unfinished, stained or lightly painted DiffusorBloX® have a NRC of 0.75. Slotted and fully sealed DiffusorBloX® have a NRC of 0.41. Non-slotted and fully sealed DiffusorBloX® have a NRC of 0.40.



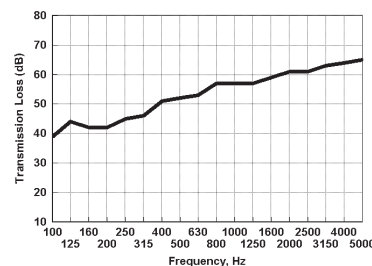
Diffusion

Traditional slotted masonry offers low frequency absorption, but actually creates reflection problems which degrade speech intelligibility and corrupt sound quality. DiffusorBloX® solve this problem by uniformly scattering sound in many directions so the sound level in any one direction is minimized. Their shape is based on the reflection phase grating (RPG). These surfaces are designed using number theory sequences which insure uniform diffusion over a wide frequency range.



Isolation

As noise pollution continues to escalate, we need powerful tools to reflect, absorb, and diffuse offending noise sources. DiffusorBloX® help environmentally by isolating noise sources like power transformers, HVAC, highway traffic, railroads, outdoor amphitheaters, airports, and machinery. 12" slotted and fully sealed DiffusorBloX® offer a Sound Transmission Class (STC) of 55, allowing them to be used in demanding sound isolation applications.



FEATURES

- QRD® sound diffusion
- Two low frequency absorption mechanisms: Helmholtz and Pressure Gradient
- High sound isolation
- Distinctive textured appearance
- Production by local block producers
- Can be painted
- Available as 12" reinforced block and 8" block
- Available with or without low frequency absorption slots
- Can be used with conventional block structural piers for high flexural strength
- Structural and load bearing

BENEFITS

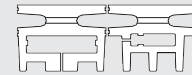
- Distinctive appearance complements architectural designs
- Can be used for all noise control, speech, and music applications
- Simultaneously offers structure, absorption, and diffusion in the same CMU, resulting in unprecedented economy

APPLICATIONS

Broadcast studios, Recording studios, Arenas, Gymnasiums, Auditoriums, Residential noise control, Music practice rooms, Performance facilities, Convention centers, Amphitheaters, Transportation facilities, Classrooms, Highway barriers, Power generation facilities

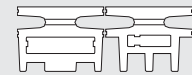
SPECIFICATIONS

- 12" Reinforced Block:
7-5/8" (H) x 15-5/8" (W) x 11-5/8" (D)



Model: **dB12S**

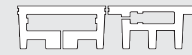
Acoustics: Diffusion and LF Absorption



Model: **dB12NS**

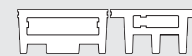
Acoustics: Diffusion

- 8" Block:
7-5/8" (H) x 15-5/8" (W) x 7-5/8" (D)



Model: **dB8S**

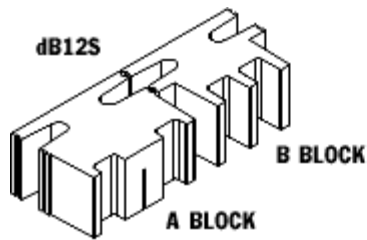
Acoustics: Diffusion and LF Absorption



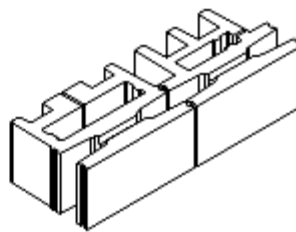
Model: **dB8NS**

Acoustics: Diffusion

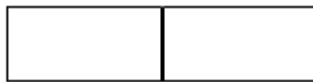
- DiffusorBloX® conform to ASTM C-90, Grade N Type 1, with a net compressive strength of 1900 psi. No individual unit shall be less than 1700 psi.



ISOMETRIC VIEW (TOP SIDE)



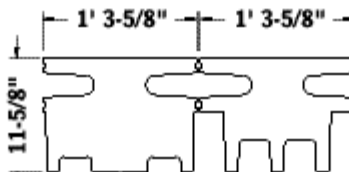
ISOMETRIC VIEW (UNDERSIDE)



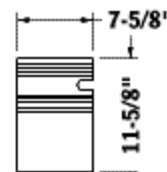
BACK VIEW



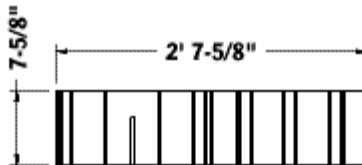
LEFT SIDE



TOP VIEW



RIGHT SIDE



FRONT VIEW

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dB12S (12" Slotted) Cutsheet

Specifications

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- [Transmission Loss](#)

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dB12S
(12" Slotted)
[dB12S Components](#)
(Exploded View)
[dB12S Components](#)
(Underside View)

dB12NS
(12" Non-slotted)
[dB12NS Components](#)
(Exploded View)

dB8S
(8" Slotted)
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(Exploded View)
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(Underside View)

dB8NS
(8" Non-slotted)
[dB8NS Components](#)
(Exploded View)

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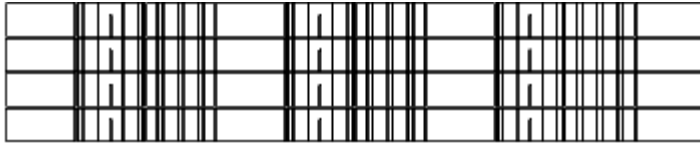
Patent Numbers

- 4,964,486
- 5,027,920
- 2,027,658
- 5,226,267
- 5,193,318

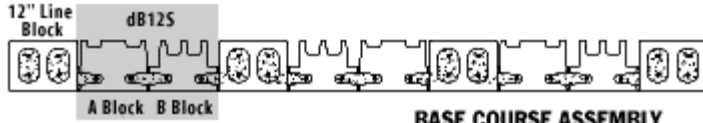
Search:



System 1, Version 1

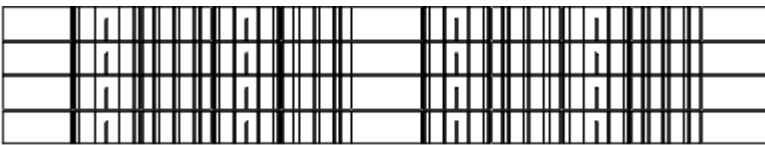


FRONT ELEVATION

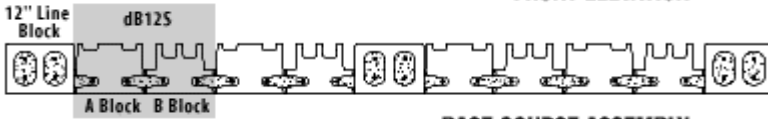


BASE COURSE ASSEMBLY

System 1, Version 2



FRONT ELEVATION

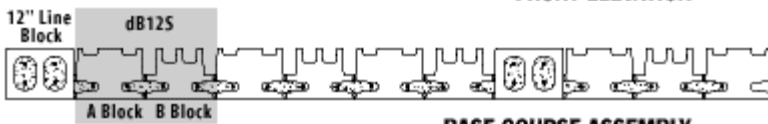


BASE COURSE ASSEMBLY

System 1, Version 3



FRONT ELEVATION



BASE COURSE ASSEMBLY

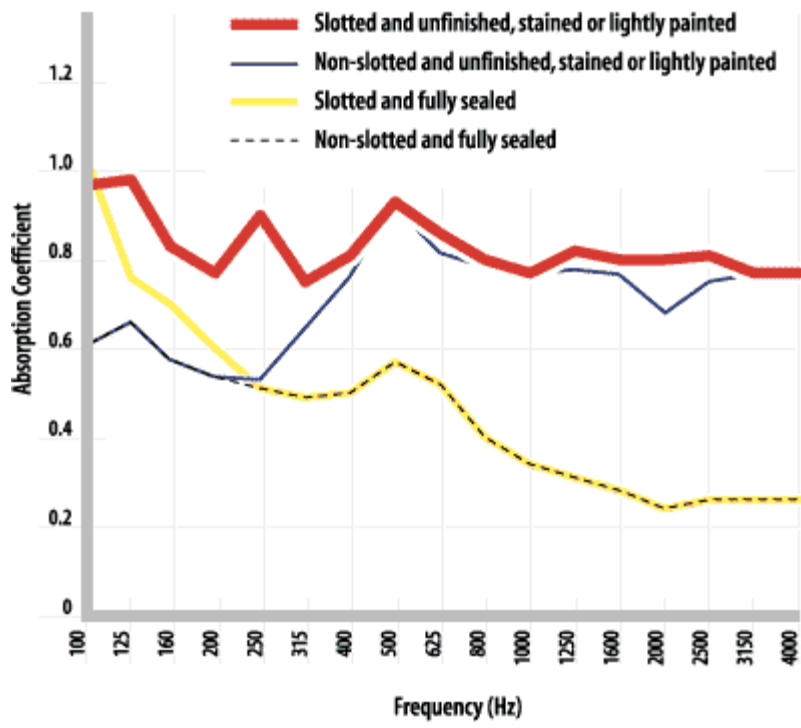
System 1, Version 4

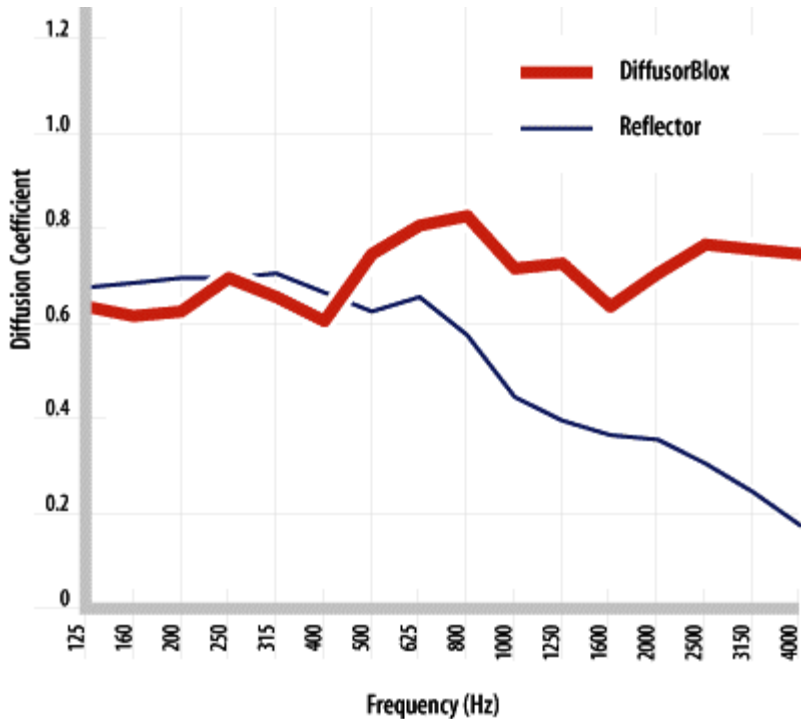


FRONT ELEVATION



BASE COURSE ASSEMBLY





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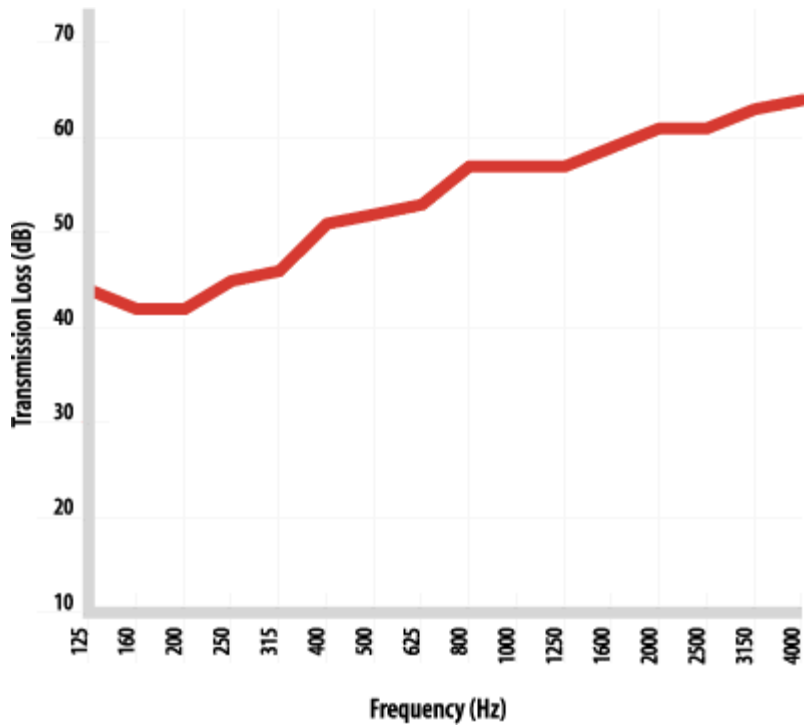


Hz	DiffusorBlox	Reflector
125	0.63	0.67
160	0.61	0.68
200	0.62	0.69
250	0.69	0.69
315	0.65	0.70
400	0.60	0.66
500	0.74	0.62
625	0.80	0.65
800	0.82	0.57
1000	0.71	0.44
1250	0.72	0.39
1600	0.63	0.36
2000	0.70	0.35
2500	0.76	0.30
3150	0.75	0.24

4000

0.74

0.17



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The Transmission Loss data are for the 12" dB12S system, with fiberglass inserts, fully grouted and reinforced. The 8" db8S was not tested, since this is a veneer block only, not capable of reinforcement, and is typically used in conjunction with a structural wall.

Hz	Transmission Loss (dB)
125	44
160	42
200	42
250	45
315	46
400	51
500	52
625	53
800	57
1000	57
1250	57
1600	59
2000	61
2500	61

3150

63

4000

64

What are DiffusorBlox®?

DiffusorBlox® are the first acoustical concrete masonry units (ACMU) that simultaneously address the absorptive and diffusive sound control requirements of critical listening and performance facilities, as well as the sound isolation and absorptive requirements in noise generating applications such as HVAC, power plants, transportation, etc.

How does DiffusorBlox® differ from other ACMU's?

Conventional ACMU simply provide low frequency absorption, using slotted resonators. While effective for noise control at mid-to low frequencies, conventional ACMU present a large reflective surface, which causes significant specular reflections that degrade speech intelligibility, contribute to excessive mid to high frequency reverberation times and corrupt sound quality. The slotted CMU face presents an industrial appearance, which is not conducive to general architectural applications in which aesthetics are important. Thus conventional ACMU are not the best choice in facilities in which speech and music are important.

DiffusorBlox® are the only patented ACMU that provide absorption as well as sound diffusion to control interfering specular reflections not addressed by conventional ACMU. To provide low frequency absorption, DiffusorBlox® utilize two independent slotted resonators, as well as a new QRD® pressure-gradient viscous loss absorption mechanism for improved performance. DiffusorBlox® are designed to provide 100% absorption at 100 Hz! Diffusion is provided by the number-theoretic reflection phase grating (RPG) surface topology, which has found widespread application over the past 15 years in architectural acoustics. Therefore, through a combination of mid and high frequency porous absorption, along with internal resonant cavities and QRD® viscous low frequency absorption, DiffusorBlox® provide absorption over a wide range of frequencies.

The innovative and unique surface topology of DiffusorBlox® have found acceptance by the architectural community for use in critical listening and performance facilities, thus overcoming the aesthetic stigma of conventional ACMU.

The combination of sound diffusion, sound isolation, absorption and aesthetics make DiffusorBlox® the only choice for music or speech facilities.

How many different model types of DiffusorBlox® are there?

There are four basic models of DiffusorBlox®. Each model consists of an 'A' and 'B' block:

dB12S: 12" block with a resonator slot and acoustical chamber, rear vertical rebar cavity and rear horizontal rebar slot.

dB12NS: 12" block with no resonator slot or acoustical chamber, rear and front vertical rebar cavities and rear horizontal rebar slot.

dB8S: 8" block with resonator slot and acoustical chamber.

dB8NS: 8" block with no resonator slot or acoustical chamber, vertical rebar cavity.

Are there any finish options with DiffusorBlox®?

DiffusorBlox® are made using standard aggregates just like any other CMU. Virtually any aggregate mix or color that can be used for a standard line block may also be used for DiffusorBlox®. Various grinding and texturing options exist as well as several additives for waterproofing or graffiti control. DiffusorBlox® can be produced unfinished or integrally stained. On site DiffusorBlox® can be lightly painted, stained or fully sealed with a sealer, primer and finish coat of paint.

What applications are ideal for the use of DiffusorBlox®?

Noise Control: In noise control applications, absorption is of prime concern. Therefore, dB12S or dB8S DiffusorBlox® with the low frequency slots should be used. Because of the increased surface area of the DiffusorBlox® topology they offer significant mid and high frequency random incidence absorption.

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Sound Control: In sound control applications, diffusion with or without absorption may be required. Therefore, several combinations and finishes may be selected:

1. Diffusion with Broad Bandwidth Absorption:
To obtain diffusion with broad bandwidth absorption, dB12S or dB8S DiffusorBlox® should be used unfinished, stained or lightly painted.
2. Diffusion with Low Frequency Absorption:
To obtain diffusion with only low frequency absorption, dB12S or dB8S should be used with the surface completely sealed with sealer, primer and finish coats of paint.
3. Diffusion with Mid/High Frequency Absorption:
To obtain diffusion with only mid/high frequency absorption, dB12NS or dB8NS should be used unfinished, stained or lightly painted.
4. Diffusion without Absorption:
To obtain diffusion without absorption, dB12NS or dB8NS should be used with the surface completely sealed with sealer, primer and finish coats of paint.

What are the differences between the 12" and 8" DiffusorBlox®?

The 8" block do not contain the rear 4" vertical rebar cavity and horizontal rebar slot.

The 12" block can be used in 5 Systems with or without structural piers/pilasters:

System 1: Piers of conventional 12" CMU are used to separate 1, 2, 3, or more dB12S DiffusorBlox® depending on the structural flexural strength desired.

System 2: dB12S slotted DiffusorBlox® are used with vertical and horizontal rebar.

System 3: Piers of dB12NS DiffusorBlox® are used to separate 1, 2, 3, or more dB12S DiffusorBlox® depending on the structural flexural strength required.

System 4: All dB12NS DiffusorBlox® are used with rear vertical and horizontal rebar and front vertical rebar.

System 5: Piers of conventional 12" CMU are used to separate 1, 2, 3 or more dB12NS DiffusorBlox® depending on the structural flexural strength required.

The 8" block can be used in 6 Systems with or without structural piers:

System 6: Piers of conventional 8" CMU are used to separate 1, 2, 3, or more dB8S DiffusorBlox® depending on the structural flexural strength desired.

System 7: dB8S slotted DiffusorBlox® are used without any vertical or horizontal reinforcement.

System 8: Piers of dB8NS DiffusorBlox® are used to separate 1, 2, 3, or more dB8S DiffusorBlox® depending on the structural flexural strength required.

System 9: All dB8NS DiffusorBlox® are used with vertical rebar.

System 10: Piers of conventional 8" CMU are used to separate 1, 2, 3 or more dB8NS DiffusorBlox® depending on the structural flexural strength required.

System 11: dB8S slotted DiffusorBlox® are used as a veneer application on a structural CMU wall.

How is a wall built with 'A' & 'B' block?

Whenever possible, a panel or wall of DiffusorBlox® should be made using both A and B block in repeating order (ABAB..). For aesthetic or ergonomic purposes, a panel may begin and end with the same block (ABABA). In this example, there will be left over 'B' blocks. Therefore, for economy the next

panel should begin and end with a 'B' block (BABAB) to ensure that an equal quantity of each block is used and there is no waste.

Is the use of rebar and/or pilaster columns necessary for a stack bond block such as DiffusorBlox®?

Both the 8" and 12" versions of DiffusorBlox® have structural capabilities without the use of rebar and pilaster columns. Just as with any other CMU, many factors such as local zoning regulations, use of space, height and run of wall etc., may require the use of additional reinforcement to be incorporated into a DiffusorBlox® wall. RPG® can provide drawings illustrating how such materials and/or systems may be used with DiffusorBlox®. However, it is highly recommended that you contact a Structural Engineer when you have questions regarding the use of such materials and/or systems.

What size rebar should be used with DiffusorBlox®?

Rebar is classified by its gauge. Typical sizes range from #3 to #18. The diameter of a #6 rebar is 3/4". Structural engineers use the gauge of rebar in their calculations for flexural strength. DiffusorBlox® can accommodate typically used rebar to form walls of varying flexural strength.

What is the compressive strength of DiffusorBlox® and do they meet local structural codes?

The National Concrete Masonry Association, of Reston, VA, has independently tested DiffusorBlox® and they meet all ASTM requirements. DiffusorBlox® are also periodically tested by RPG®'s licensed producers to assure continual adherence to ASTM specifications. A full NCMA report is available on request.

How much does Diffusorblox® weigh?

Diffusorblox® can be produced using many different densities of aggregate with varying weight depending on the geographical location. It is recommended that you contact the local DiffusorBlox® licensee for exact weights.

How are Diffusorblox® shipped?

Diffusorblox® are shipped banded on wooden pallets. Depending on the weather and distance which they are shipped, they may be wrapped in plastic. Depending on size and weight, Diffusorblox® come 40 to 60 block per pallet. In most cases, the licensee will ship using their own trucks, usually flat beds equipped with air ride and crane.

Does anything need to be done to DiffusorBlox® prior to installation?

Short of inspecting for any damage that may have occurred during shipping, DiffusorBlox® come ready to install. The CMU industry allows for about a 5% typical breakage. All slotted block (dB12S & dB8S) come with pre-installed fiberglass acoustical inserts, which should not be removed.

How are DiffusorBlox® installed by a mason?

As with any other CMU, DiffusorBlox® are typically installed to form a wall by using standard masonry tools and materials. DiffusorBlox® are installed in a stacked bond that utilizes both vertical and horizontal rebar and mortar for additional structural integrity. Because of weight constraints, DiffusorBlox® is produced as a two-block system, containing an 'A' and 'B' block. Blocks should be ordered and installed in pairs, since they form a critical sequence of wells and dividers necessary for optimal acoustic performance. Due to the complex surface topology, joints should simply be cut and brushed. 8" DiffusorBlox® are typically used for veneering to an existing wall or to form a light duty wall. 12" DiffusorBlox® are used to form a wall with greater flexural strength.

How can I get more information on Diffusorblox®? RPG® is currently taking full advantage of the Internet with our newly re-designed Web site. You will find the most intuitive and complete presentation of RPG® product information online. As with any RPG® product, you may view various project profiles highlighting DiffusorBlox®. These profiles include comments from the Architect, Consultant and Client. In addition, you may view and print product option sheets, CSI specifications, Cut Sheets, Mounting details and many other useful documents. If you are still in need of additional information, you may contact [RPG® directly](#).

How do I order DiffusorBlox®?

RPG® has a network of licensed producers across the country who can take

your order directly. You may also contact your local DiffusorBlox® licensee or RPG® directly.

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