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.
Problem and Solution

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.

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.
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 ACMUs?

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.
**Frequently Asked Questions**

**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.

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

- **Diffusion with Broad Bandwidth Absorption:** To obtain diffusion with broad bandwidth absorption, dB12S or dB8S DiffusorBlox® should be used unfinished, stained or lightly painted.

- **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.

- **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.

- **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. It is important to install the acoustic cavity (open end of DiffusorBlox®) down so that you have a flat surface to apply the full bed of mortar. Having the open end of the block down also permits easy drainage of water for outdoor installations. 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 your local DiffusorBlox® licensee or 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.

How do I contact my local DiffusorBlox® licensee and/or RPG® directly?

RPG® can be contacted at 301.249.0044 or by e-mail at info@rpginc.com.
**Standard Unit Construction**

Constituent materials conforming to the following ASTM specifications:

1. Portland Cement: ASTM C-150
2. Blended Cements: ASTM C-595
3. Hydrated Lime, Type S: ASTM C-270+
4. Aggregate: ASTM C-331 or C-33, based on local availability

Standard gray block aggregate color (actual color may vary)

12" deep block (dB12S and dB12NS):
7-5/8" height x 15-5/8" wide x 11-5/8" deep

8" deep block (dB8S and dB8NS):
7-5/8" height x 15-5/8" wide x 7-5/8" deep

dB8S and dB12S units contain a fiberglass insert

**Product Options**, **

**Models**

- dB12S: 12” deep DiffusorBlox® with a resonator slot.
- dB12NS: 12” deep DiffusorBlox® without a resonator slot.
- dB8S: 8” deep DiffusorBlox® with a resonator slot.
- dB8NS: 8” deep DiffusorBlox® without a resonator slot.

**Color**

DiffusorBlox® can be produced in a wide variety of colors. Please contact RPG® directly for more information.

**Aggregate**

DiffusorBlox® can be produced in a wide variety of aggregates. Please contact RPG® directly for more information.

**Surface Texture**

The back surface of DiffusorBlox® can be ground or textured. Please contact RPG® directly for more information.

---

**Option Sheet**

*Note:*

All dimensions are allowed a tolerance of ± 1/16” due to material shrinkage and variations.

* Most options merit an increase or, in some cases, a decrease in pricing compared to the standard unit.

** Due to material availability, RPG® reserves the right to change options at any time. Therefore, any special options—whether listed or not—must be confirmed prior to submittal of P.O. and acceptance verified by RPG® Diffusor Systems, Inc.
A The Acoustical Concrete Masonry Unit shall be the model DiffusorBlox® dB12S as manufactured by RPG® Diffusor Systems, Inc., Upper Marlboro, MD 20774. Tel: 301-249-0044, Fax: 301-249-3912.

B The Acoustical Concrete Masonry Unit shall conform to the following:
1. For hollow load bearing units, ASTM C-90 for grade N, Type I or Type II units with the exceptions noted herein.
2. For hollow non-load bearing units, ASTM C-129 for Grade N, Type I or Type II units, with the exceptions noted herein.
3. DiffusorBlox® constituent materials shall conform to the following ASTM:
   a. Portland Cement: ASTM C-150
   b. Blended Cements: ASTM C-595
   c. Hydrated Lime, Type S: ASTM C-207+
   d. Pozzolans: ASTM C-618
   e. Aggregate: ASTM C-331 or C-33, based on local availability

C Other concrete unit constituents such as air-entering agents, pigments, water repellents, silica, etc. may be used provided their suitability for use in concrete has been established either by inclusion in ASTM Standards or through test and experience records substantiating that such particular mixtures and their proportions are not detrimental to the durability and/or performance of DiffusorBlox® units.

D The Acoustical Concrete Masonry Unit shall work on the one dimensional reflection phase grating principle, using an array of wells of equal width separated by dividers. The depths of the wells shall be based on the prime 7 quadratic residue theory sequence. A full sequence is achieved by alternating two types of block designated as Type A and Type B.

E Sound diffusion in the horizontal plane shall be provided by wells in the vertical position.

F Absorption coefficients and noise reduction coefficient for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM C 423 and ASTM E 795. Random incidence absorption coefficients for the product in a Type A mounting shall be as follows:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>NRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfinished, stained, or lightly painted</td>
<td>0.98</td>
<td>0.90</td>
<td>0.93</td>
<td>0.77</td>
<td>0.80</td>
<td>0.77</td>
<td>0.85</td>
</tr>
<tr>
<td>Fully sealed</td>
<td>0.76</td>
<td>0.51</td>
<td>0.57</td>
<td>0.34</td>
<td>0.24</td>
<td>0.26</td>
<td>0.41</td>
</tr>
</tbody>
</table>
G Transmission Loss (TL) and Sound Transmission Class (STC) for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 90 and ASTM E 413. TL and STC values for the product shall be as follows:

<table>
<thead>
<tr>
<th></th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully sealed</td>
<td>44</td>
<td>45</td>
<td>52</td>
<td>57</td>
<td>61</td>
<td>64</td>
<td>55</td>
</tr>
</tbody>
</table>

H Diffusion Coefficients for the product shall be measured in accordance with AES-4id-2001. The normal incidence diffusion coefficients are listed below at octave-band centers. The mean and standard deviation (SD) of the 1/3-octave-band coefficients are also tabulated.

<table>
<thead>
<tr>
<th></th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully sealed</td>
<td>0.63</td>
<td>0.69</td>
<td>0.74</td>
<td>0.71</td>
<td>0.70</td>
<td>0.74</td>
<td>0.70</td>
<td>0.07</td>
</tr>
</tbody>
</table>

I Where fire rated assemblies are indicated, materials shall be tested by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 119 and NFPA 251.

J Inset insulation shall be semi-rigid fiberglass conforming to ASTM C 1071, having 6.0 lb. per cubic foot density, and a Class A fire rating, each individually shaped to conform to the concrete block cores. Fiberglass inserts shall be pre-installed at the block plant prior to delivery.

K The overall dimensions shall be 7-5/8"(H) x 15-5/8"(W) x 11-5/8"(D).
Acoustical Concrete Masonry Unit

**A** The Acoustical Concrete Masonry Unit shall be the model DiffusorBlox® dB12NS as manufactured by RPG® Diffusor Systems, Inc., Upper Marlboro, MD 20774. Tel: 301-249-0044, Fax: 301-249-3912.

**B** The Acoustical Concrete Masonry Unit shall conform to the following:
1. For hollow load bearing units, ASTM C-90 for grade N, Type I or Type II units with the exceptions noted herein.
2. For hollow non-load bearing units, ASTM C-129 for Grade N, Type I or Type II units, with the exceptions noted herein.
3. DiffusorBlox® constituent materials shall conform to the following ASTM:
   a. Portland Cement: ASTM C-150
   b. Blended Cements: ASTM C-595
   c. Hydrated Lime, Type S: ASTM C-207+
   d. Pozzolans: ASTM C-618
   e. Aggregate: ASTM C-331 or C-33, based on local availability

**C** Other concrete unit constituents such as air-entering agents, pigments, water repellents, silica, etc. may be used provided their suitability for use in concrete has been established either by inclusion in ASTM Standards or through test and experience records substantiating that such particular mixtures and their proportions are not detrimental to the durability and/or performance of DiffusorBlox® units.

**D** The Acoustical Concrete Masonry Unit shall work on the one dimensional reflection phase grating principle, using an array of wells of equal width separated by dividers. The depths of the wells shall be based on the prime 7 quadratic residue theory sequence. A full sequence is achieved by alternating two types of block designated as Type A and Type B.

**E** Sound diffusion in the horizontal plane shall be provided by wells in the vertical position.

**F** Absorption coefficients and noise reduction coefficient for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM C 423 and ASTM E 795. Random incidence absorption coefficients for the product in a Type A mounting shall be as follows:

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Unfinished, stained, or lightly painted</th>
<th>Fully sealed</th>
</tr>
</thead>
<tbody>
<tr>
<td>125Hz</td>
<td>0.66</td>
<td>0.66</td>
</tr>
<tr>
<td>250Hz</td>
<td>0.53</td>
<td>0.53</td>
</tr>
<tr>
<td>500Hz</td>
<td>0.92</td>
<td>0.57</td>
</tr>
<tr>
<td>1000Hz</td>
<td>0.77</td>
<td>0.34</td>
</tr>
<tr>
<td>2000Hz</td>
<td>0.68</td>
<td>0.24</td>
</tr>
<tr>
<td>4000Hz</td>
<td>0.76</td>
<td>0.26</td>
</tr>
<tr>
<td>NRC</td>
<td>0.75</td>
<td>0.40</td>
</tr>
</tbody>
</table>
Transmission Loss (TL) and Sound Transmission Class (STC) for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 90 and ASTM E 413. TL and STC values for the product shall be as follows:

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>STC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully sealed</td>
<td>44</td>
<td>45</td>
<td>52</td>
<td>57</td>
<td>61</td>
<td>64</td>
<td>55</td>
</tr>
</tbody>
</table>

Diffusion Coefficients for the product shall be measured in accordance with AES-4id-2001. The normal incidence diffusion coefficients are listed below at octave-band centers. The mean and standard deviation (SD) of the 1/3-octave-band coefficients are also tabulated.

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.63</td>
<td>0.69</td>
<td>0.74</td>
<td>0.71</td>
<td>0.70</td>
<td>0.74</td>
<td>0.70</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Where fire rated assemblies are indicated, materials shall be tested by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 119 and NFPA 251.

The overall dimensions shall be 7-5/8"(H) x 15-5/8"(W) x 11-5/8"(D).
Acoustical Concrete Masonry Unit

The Acoustical Concrete Masonry Unit shall be the model DiffusorBlox® dB8S as manufactured by RPG® Diffusor Systems, Inc., Upper Marlboro, MD 20774. Tel: 301-249-0044, Fax: 301-249-3912.

B The Acoustical Concrete Masonry Unit shall conform to the following:
1. For hollow load bearing units, ASTM C-90 for grade N, Type I or Type II units with the exceptions noted herein.
2. For hollow non-load bearing units, ASTM C-129 for Grade N, Type I or Type II units, with the exceptions noted herein.
3. DiffusorBlox® constituent materials shall conform to the following ASTM:
   a. Portland Cement: ASTM C-150
   b. Blended Cements: ASTM C-595
   c. Hydrated Lime, Type S: ASTM C-207+
   d. Pozzolans: ASTM C-618
   e. Aggregate: ASTM C-331 or C-33, based on local availability

C Other concrete unit constituents such as air-entering agents, pigments, water repellents, silica, etc. may be used provided their suitability for use in concrete has been established either by inclusion in ASTM Standards or through test and experience records substantiating that such particular mixtures and their proportions are not detrimental to the durability and/or performance of DiffusorBlox® units.

D The Acoustical Concrete Masonry Unit shall work on the one dimensional reflection phase grating principle, using an array of wells of equal width separated by dividers. The depths of the wells shall be based on the prime 7 quadratic residue theory sequence. A full sequence is achieved by alternating two types of block designated as Type A and Type B.

E Sound diffusion in the horizontal plane shall be provided by wells in the vertical position.

F Absorption coefficients and noise reduction coefficient for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM C 423 and ASTM E 795. Random incidence absorption coefficients for the product in a Type A mounting shall be as follows:

<table>
<thead>
<tr>
<th></th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>NRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfinished, stained, or lightly painted</td>
<td>0.98</td>
<td>0.90</td>
<td>0.93</td>
<td>0.77</td>
<td>0.80</td>
<td>0.77</td>
<td>0.85</td>
</tr>
<tr>
<td>Fully sealed</td>
<td>0.76</td>
<td>0.51</td>
<td>0.57</td>
<td>0.34</td>
<td>0.24</td>
<td>0.26</td>
<td>0.41</td>
</tr>
</tbody>
</table>
DiffusorBlox®

**G** Diffusion Coefficients for the product shall be measured in accordance with AES-4id-2001. The normal incidence diffusion coefficients are listed below at octave-band centers. The mean and standard deviation (SD) of the 1/3-octave-band coefficients are also tabulated.

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>125Hz</td>
<td>0.63</td>
<td>0.69</td>
<td>0.74</td>
<td>0.71</td>
<td>0.70</td>
<td>0.74</td>
<td>0.70</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**H** Where fire rated assemblies are indicated, materials shall be tested by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 119 and NFPA 251.

**I** Inset insulation shall be semi-rigid fiberglass conforming to ASTM C 1071, having 6.0 lb. per cubic foot density, and a Class A fire rating, each individually shaped to conform to the concrete block cores. Fiberglass inserts shall be pre-installed at the block plant prior to delivery.

**J** The overall dimensions shall be 7-5/8"(H) x 15-5/8"(W) x 7-5/8"(D).
Acoustical Concrete Masonry Unit

**A** The Acoustical Concrete Masonry Unit shall be the model DiffusorBlox® dB8NS as manufactured by RPG® Diffusor Systems, Inc., Upper Marlboro, MD 20774. Tel: 301-249-0044, Fax: 301-249-3912.

**B** The Acoustical Concrete Masonry Unit shall conform to the following:
1. For hollow load bearing units, ASTM C-90 for grade N, Type I or Type II units with the exceptions noted herein.
2. For hollow non-load bearing units, ASTM C-129 for Grade N, Type I or Type II units, with the exceptions noted herein.
3. DiffusorBlox® constituent materials shall conform to the following ASTM:
   a. Portland Cement: ASTM C-150
   b. Blended Cements: ASTM C-595
   c. Hydrated Lime, Type S: ASTM C-207+
   d. Pozzolans: ASTM C-618
   e. Aggregate: ASTM C-331 or C-33, based on local availability

**C** Other concrete unit constituents such as air-entering agents, pigments, water repellents, silica, etc. may be used provided their suitability for use in concrete has been established either by inclusion in ASTM Standards or through test and experience records substantiating that such particular mixtures and their proportions are not detrimental to the durability and/or performance of DiffusorBlox® units.

**D** The Acoustical Concrete Masonry Unit shall work on the one dimensional reflection phase grating principle, using an array of wells of equal width separated by dividers. The depths of the wells shall be based on the prime 7 quadratic residue theory sequence. A full sequence is achieved by alternating two types of block designated as Type A and Type B.

**E** Sound diffusion in the horizontal plane shall be provided by wells in the vertical position.

**F** Absorption coefficients and noise reduction coefficient for the product shall be measured by an independent, accredited NVLAP facility according to the test methods as defined by ASTM C 423 and ASTM E 795. Random incidence absorption coefficients for the product in a Type A mounting shall be as follows:

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>NRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfinished, stained, or lightly painted</td>
<td>0.66</td>
<td>0.53</td>
<td>0.92</td>
<td>0.77</td>
<td>0.68</td>
<td>0.76</td>
<td>0.75</td>
</tr>
<tr>
<td>Fully sealed</td>
<td>0.66</td>
<td>0.53</td>
<td>0.57</td>
<td>0.34</td>
<td>0.24</td>
<td>0.26</td>
<td>0.40</td>
</tr>
</tbody>
</table>
DiffusorBlox®

**G** Diffusion Coefficients for the product shall be measured in accordance with AES-4id-2001. The normal incidence diffusion coefficients are listed below at octave-band centers. The mean and standard deviation (SD) of the 1/3-octave-band coefficients are also tabulated.

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125Hz</th>
<th>250Hz</th>
<th>500Hz</th>
<th>1000Hz</th>
<th>2000Hz</th>
<th>4000Hz</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>125Hz</td>
<td>0.63</td>
<td>0.69</td>
<td>0.74</td>
<td>0.71</td>
<td>0.70</td>
<td>0.74</td>
<td>0.70</td>
<td>0.07</td>
</tr>
</tbody>
</table>

**H** Where fire rated assemblies are indicated, materials shall be tested by an independent, accredited NVLAP facility according to the test methods as defined by ASTM E 119 and NFPA 251.

**I** The overall dimensions shall be 7-5/8\(^\circ\) (H) x 15-5/8\(^\circ\) (W) x 7-5/8\(^\circ\) (D).
DiffusorBlox®

dB12S Cutsheet

A Block
B Block

ISOMETRIC VIEW (TOP SIDE)

ISOMETRIC VIEW (UNDERSIDE)

BACK VIEW

TOP VIEW

RIGHT SIDE

FRONT VIEW

11 5/8"

7 5/8"

2" - 7 5/8"

Project:

Specifier:

Drawing Number:

Date:
dB12S Components

Underside View

Project:
Specifier:
Drawing Number:
Date:
Rebar

dB12NS, A Block

dB12NS, B Block

dB12NS Components

Exploded View

Project:

Specifier:

Drawing Number:

Date:
dB8S Components

Underside View

Project: ____________________________
Specifier: __________________________
Drawing Number: ____________________
Date: ______________________________

dB8S, A Block

dB8S, B Block

Fiberglass Inserts
DiffusorBlox®

System 1, Version 1

System 1, Version 2

System 1, Version 3

System 1, Version 4

Project:

Specifier:

Drawing Number:

Date:
System 2

Front Elevation

Base Course Assembly

dB12S

A Block  B Block
System 4

<table>
<thead>
<tr>
<th>Front Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>dB12NS</td>
</tr>
<tr>
<td>A Block  B Block</td>
</tr>
</tbody>
</table>

Base Course Assembly

---

**Project:**

**Specifier:**

**Drawing Number:**

**Date:**
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Project:**

**Specifier:**

**Drawing Number:**

**Date:**
## System 9

### Front Elevation

<table>
<thead>
<tr>
<th>A Block</th>
<th>B Block</th>
</tr>
</thead>
</table>

### Base Course Assembly

---

**Project:**

---

**Specifier:**

---

**Drawing Number:**

---

**Date:**

---
DiffusorBlox®

dB8NS Rebar Options

<table>
<thead>
<tr>
<th>IMPERIAL SIZE</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø0.3750</td>
<td>3</td>
</tr>
<tr>
<td>ø0.5000</td>
<td>4</td>
</tr>
<tr>
<td>ø0.6250</td>
<td>5</td>
</tr>
<tr>
<td>ø0.7500</td>
<td>6</td>
</tr>
<tr>
<td>ø0.8750</td>
<td>7</td>
</tr>
<tr>
<td>ø1.0000</td>
<td>8</td>
</tr>
<tr>
<td>ø1.1280</td>
<td>9</td>
</tr>
<tr>
<td>ø1.2700</td>
<td>10</td>
</tr>
<tr>
<td>ø1.4100</td>
<td>11</td>
</tr>
<tr>
<td>ø1.6930</td>
<td>14</td>
</tr>
<tr>
<td>ø2.2570</td>
<td>18</td>
</tr>
</tbody>
</table>

Project: ____________________________
Specifier: __________________________
Drawing Number: ____________________
Date: ______________________________
Absorption Coefficients

<table>
<thead>
<tr>
<th>Hz</th>
<th>NRC: 0.85</th>
<th>NRC: 0.75</th>
<th>NRC: 0.41</th>
<th>NRC: 0.40</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0.95</td>
<td>0.61</td>
<td>1.02</td>
<td>0.61</td>
</tr>
<tr>
<td>125</td>
<td>0.98</td>
<td>0.66</td>
<td>0.76</td>
<td>0.66</td>
</tr>
<tr>
<td>160</td>
<td>0.83</td>
<td>0.58</td>
<td>0.70</td>
<td>0.58</td>
</tr>
<tr>
<td>200</td>
<td>0.77</td>
<td>0.54</td>
<td>0.60</td>
<td>0.54</td>
</tr>
<tr>
<td>250</td>
<td>0.90</td>
<td>0.53</td>
<td>0.51</td>
<td>0.53</td>
</tr>
<tr>
<td>315</td>
<td>0.75</td>
<td>0.64</td>
<td>0.49</td>
<td>0.44</td>
</tr>
<tr>
<td>400</td>
<td>0.81</td>
<td>0.76</td>
<td>0.50</td>
<td>0.50</td>
</tr>
<tr>
<td>500</td>
<td>0.93</td>
<td>0.92</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td>625</td>
<td>0.86</td>
<td>0.82</td>
<td>0.52</td>
<td>0.52</td>
</tr>
<tr>
<td>800</td>
<td>0.80</td>
<td>0.79</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>1000</td>
<td>0.77</td>
<td>0.77</td>
<td>0.34</td>
<td>0.34</td>
</tr>
<tr>
<td>1250</td>
<td>0.82</td>
<td>0.78</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>1600</td>
<td>0.80</td>
<td>0.77</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>2000</td>
<td>0.80</td>
<td>0.68</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>2500</td>
<td>0.81</td>
<td>0.75</td>
<td>0.26</td>
<td>0.26</td>
</tr>
<tr>
<td>3150</td>
<td>0.77</td>
<td>0.77</td>
<td>0.26</td>
<td>0.26</td>
</tr>
<tr>
<td>4000</td>
<td>0.77</td>
<td>0.76</td>
<td>0.26</td>
<td>0.26</td>
</tr>
</tbody>
</table>
### Diffusion Coefficients

<table>
<thead>
<tr>
<th>Hz</th>
<th>DiffusorBlox®</th>
<th>Reflector</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>0.63</td>
<td>0.67</td>
</tr>
<tr>
<td>160</td>
<td>0.61</td>
<td>0.68</td>
</tr>
<tr>
<td>200</td>
<td>0.62</td>
<td>0.69</td>
</tr>
<tr>
<td>250</td>
<td>0.69</td>
<td>0.69</td>
</tr>
<tr>
<td>315</td>
<td>0.65</td>
<td>0.70</td>
</tr>
<tr>
<td>400</td>
<td>0.60</td>
<td>0.66</td>
</tr>
<tr>
<td>500</td>
<td>0.74</td>
<td>0.62</td>
</tr>
<tr>
<td>625</td>
<td>0.80</td>
<td>0.65</td>
</tr>
<tr>
<td>800</td>
<td>0.82</td>
<td>0.57</td>
</tr>
<tr>
<td>1000</td>
<td>0.71</td>
<td>0.44</td>
</tr>
<tr>
<td>1250</td>
<td>0.72</td>
<td>0.39</td>
</tr>
<tr>
<td>1600</td>
<td>0.63</td>
<td>0.36</td>
</tr>
<tr>
<td>2000</td>
<td>0.70</td>
<td>0.35</td>
</tr>
<tr>
<td>2500</td>
<td>0.76</td>
<td>0.30</td>
</tr>
<tr>
<td>3150</td>
<td>0.75</td>
<td>0.24</td>
</tr>
<tr>
<td>4000</td>
<td>0.74</td>
<td>0.17</td>
</tr>
</tbody>
</table>
Transmission Loss

Sound Transmission Class: 55
(12'' DiffusorBlox®, Slotted and fully sealed)

Measured According to ASTM C423 at Riverbank Acoustical Laboratories (RAL-TL92-211).

<table>
<thead>
<tr>
<th>Hz</th>
<th>Transmission Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
<td>44</td>
</tr>
<tr>
<td>160</td>
<td>42</td>
</tr>
<tr>
<td>200</td>
<td>42</td>
</tr>
<tr>
<td>250</td>
<td>45</td>
</tr>
<tr>
<td>315</td>
<td>46</td>
</tr>
<tr>
<td>400</td>
<td>51</td>
</tr>
<tr>
<td>500</td>
<td>52</td>
</tr>
<tr>
<td>625</td>
<td>53</td>
</tr>
<tr>
<td>800</td>
<td>57</td>
</tr>
<tr>
<td>1000</td>
<td>57</td>
</tr>
<tr>
<td>1250</td>
<td>57</td>
</tr>
<tr>
<td>1600</td>
<td>59</td>
</tr>
<tr>
<td>2000</td>
<td>61</td>
</tr>
<tr>
<td>2500</td>
<td>61</td>
</tr>
<tr>
<td>3150</td>
<td>63</td>
</tr>
<tr>
<td>4000</td>
<td>64</td>
</tr>
</tbody>
</table>