Acoustic Solutions

ACOUSTIC SOLUTIONS

Live In Color

A Truly Integrated Approach To Light And Sound

Acoustic lighting harmoniously pairs high performance luminaires and sound-absorbing decorative felt. This combination is a compelling solution for mitigating reverberated sound and controlling ambient noise in open spaces – all while providing beautiful aesthetics and outstanding lighting performance.

Easy On The Eyes And Ears

Designing a workplace that people will enjoy is not only essential to the productivity and enjoyment of people in the space, but also their health and wellness.

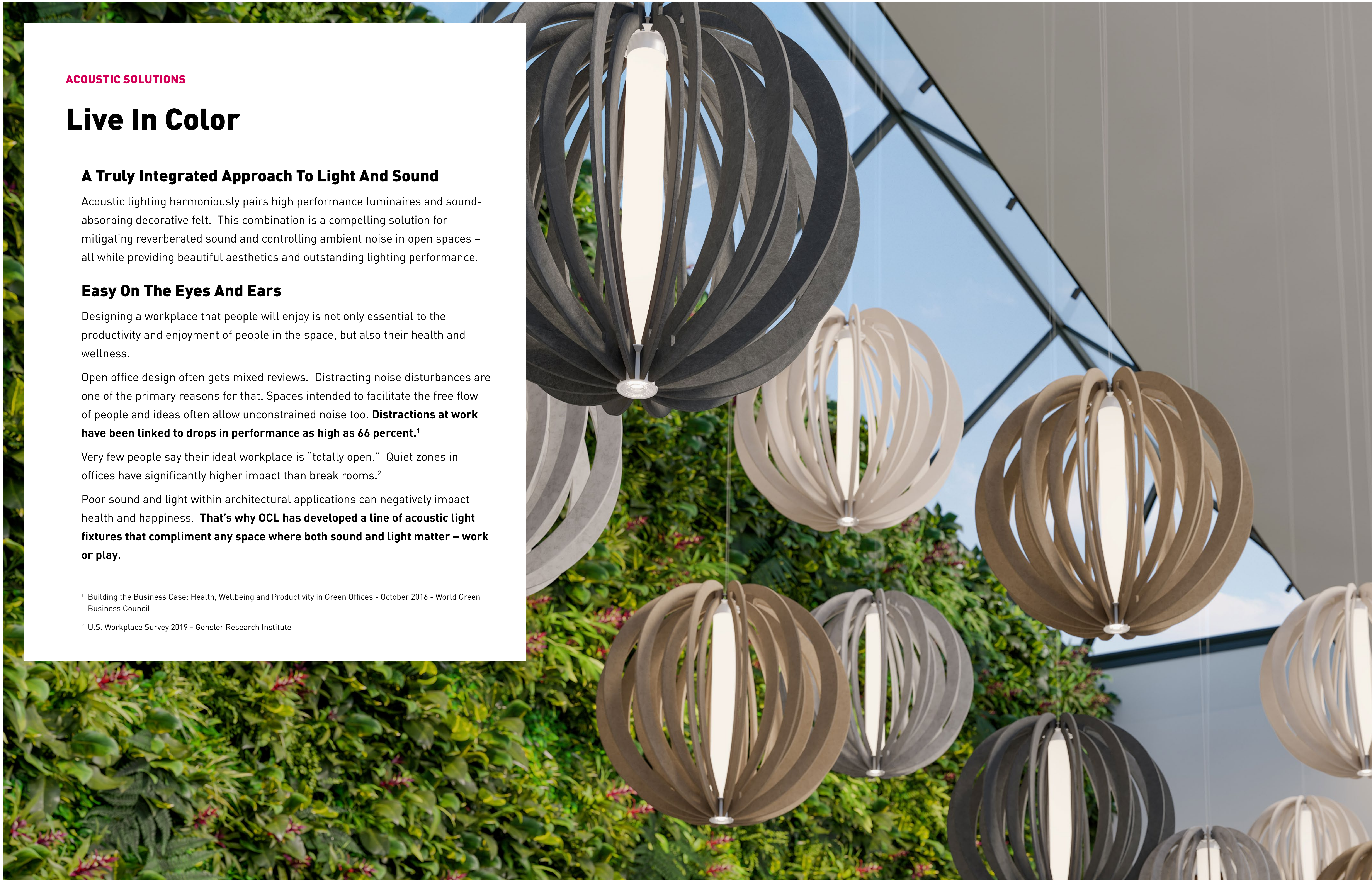
Open office design often gets mixed reviews. Distracting noise disturbances are one of the primary reasons for that. Spaces intended to facilitate the free flow of people and ideas often allow unconstrained noise too. **Distractions at work have been linked to drops in performance as high as 66 percent.**[1]

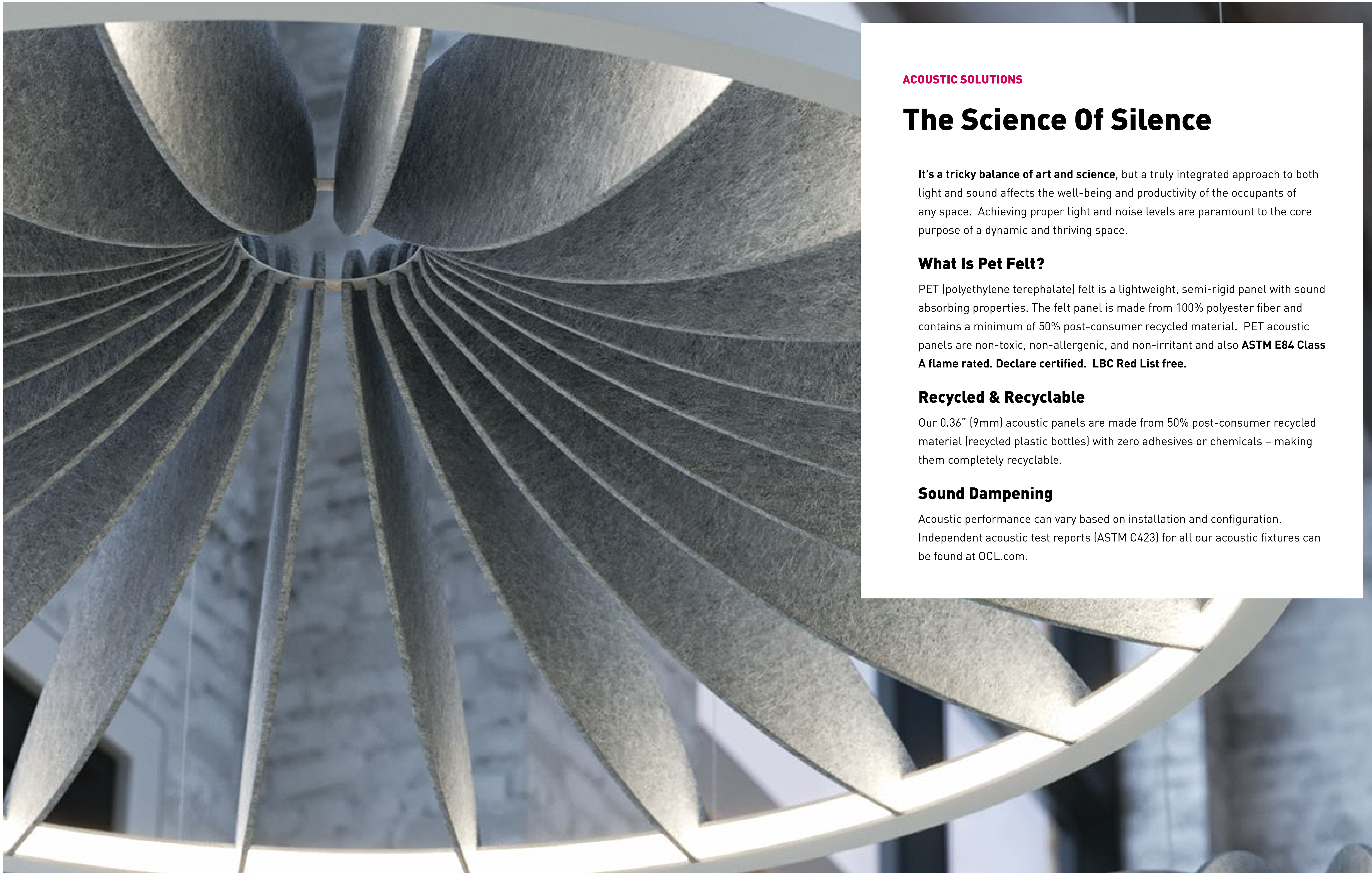
Very few people say their ideal workplace is "totally open." Quiet zones in offices have significantly higher impact than break rooms.[2]

Poor sound and light within architectural applications can negatively impact health and happiness. **That's why OCL has developed a line of acoustic light fixtures that compliment any space where both sound and light matter – work or play.**

[1] Building the Business Case: Health, Wellbeing and Productivity in Green Offices - October 2016 - World Green Business Council

[2] U.S. Workplace Survey 2019 - Gensler Research Institute





ACOUSTIC SOLUTIONS

The Science Of Silence

It's a tricky balance of art and science, but a truly integrated approach to both light and sound affects the well-being and productivity of the occupants of any space. Achieving proper light and noise levels are paramount to the core purpose of a dynamic and thriving space.

What Is Pet Felt?

PET (polyethylene terephalate) felt is a lightweight, semi-rigid panel with sound absorbing properties. The felt panel is made from 100% polyester fiber and contains a minimum of 50% post-consumer recycled material. PET acoustic panels are non-toxic, non-allergenic, and non-irritant and also **ASTM E84 Class A flame rated. Declare certified. LBC Red List free.**

Recycled & Recyclable

Our 0.36" (9mm) acoustic panels are made from 50% post-consumer recycled material (recycled plastic bottles) with zero adhesives or chemicals – making them completely recyclable.

Sound Dampening

Acoustic performance can vary based on installation and configuration. Independent acoustic test reports (ASTM C423) for all our acoustic fixtures can be found at OCL.com.

CASE STUDY

Open Office with Glowring Acoustic

Admitting the problem is the first step.

Acknowledging that what employees really want is a great experience from their workplace leads to higher employee engagement. More engaged employees are the key to business productivity and profit. According to a recent global survey by Oxford Economics, only 39 percent of company executives believe ambient noise affects employee productivity.[1]

Anyone who has worked in an office has experienced it. Employees drowning out chatter and ambient noise with headphones. Or even combating deafening silence with those same headphones - because yes, office spaces can also be too quiet. The ideal work environment has a healthy amount of background sound. Those that do their best work in the ambient hum of a coffee shop can attest. They just don't want the surrounding noise to be loud enough to be distracted by the conversation around them, and pulled out of their work.

[1] Managing The Sound And Mitigating The Fury: Strategies For Better Office Acoustics - January 2020 - FM Link

Product: Glowring 72" (x19)

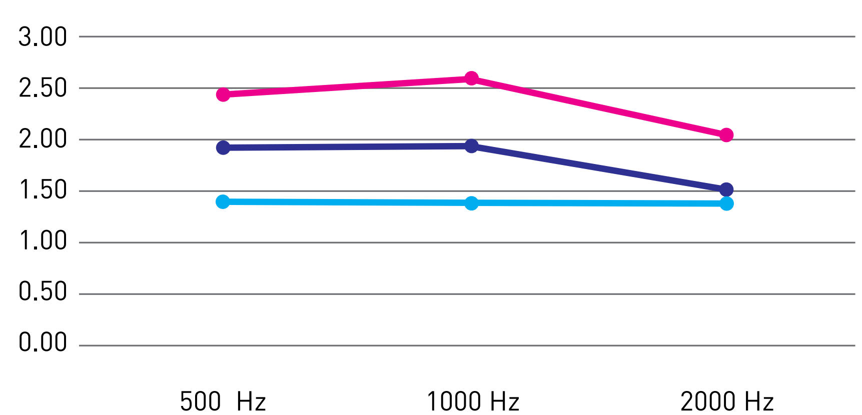
Room Type: Open Office

Room Size: 35'w x 20'h x 60'd

Room Materials: Concrete, drywall, glass

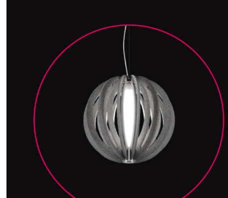
Mounting Height: 15' AFF

	500Hz	1000 Hz	2000 Hz
Baseline RT_{60}	2.39	2.56	2.03
Target RT_{60}	1.3	1.3	1.3
RT_{60} w/ Glowring	1.90	1.91	1.55



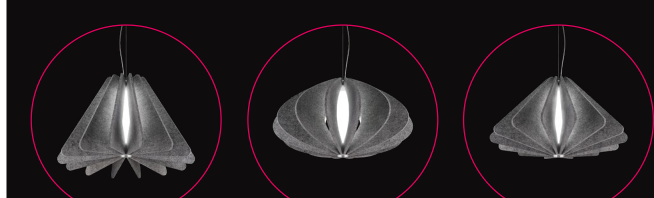
Sound Advice:

Architectural acoustical design is an endeavor that involves a lot of consideration. An educated, experienced, and qualified professional acoustician should lead the acoustical design of any critical listening space.



KWYET™ SPHERE

COMBINATION OF TUBIE LUMINAIRE & SOUND ABSORBING 0.36" (9MM) ACOUSTIC FINS IN 24 AVAILABLE COLORS / 21" OR 33" DIAMETER WITH SPHERE SHAPE / AVAILABLE IN STANDARD WHITE, TUNABLE WHITE, OR RGBW / 80+ & 90+ CRI (R9>50) / OPTIONAL PERFORMANCE DOWNLIGHT / EXTRUDED ACRYLIC DIFFUSER / DIE-CAST ALUMINUM END CAPS / CUSTOM SIZES, SHAPES, CLUSTERS, & CONFIGURATIONS POSSIBLE / ROHS COMPLIANT



KWYET™

COMBINATION OF TUBIE LUMINAIRE & SOUND ABSORBING 0.36” (9MM) ACOUSTIC FINS IN 24 AVAILABLE COLORS 36” DIAMETER WITH CONE, ANGLE, OR ELLIPSE SHAPE / AVAILABLE IN STANDARD WHITE, TUNABLE WHITE, OR RGBW / 80+ & 90+ CRI (R9>50) / OPTIONAL PERFORMANCE DOWNLIGHT / EXTRUDED ACRYLIC DIFFUSER / DIE-CAST ALUMINUM END CAPS / CUSTOM SIZES, SHAPES, CLUSTERS, & CONFIGURATIONS POSSIBLE / ROHS COMPLIANT

PETALS™

COMBINATION OF REV LUMINAIRE & SOUND ABSORBING 0.36" (9MM) ACOUSTIC PETALS [IN 24 AVAILABLE COLORS] OR 5MM FROSTED WHITE ACRYLIC PETALS / 80+ & 90+ CRI (R9>50) / 1.75" X 1.75" SQUARE PROFILE / 24", 36", 48", 60", & 72" DIAMETERS / EXTRUDED SILICONE DIFFUSER / EXTRUDED ALUMINUM BODY / FULLY WELDED SEAMS / AVAILABLE IN STANDARD WHITE, TUNABLE WHITE, & RGBW / CUSTOM SIZES, SHAPES, CLUSTERS, & CONFIGURATIONS POSSIBLE / ROHS COMPLIANT

STEALTH™ ACOUSTIC

0.36" (9MM) PET FELT ACOUSTIC PANEL IN 24 COLORS / UNIQUE ETCHED PANEL DESIGN HIDES SEAM IN LARGER SIZES / 1.75" SQUARE PROFILE / 24", 36", & 48" FLAT PANEL SIZES / 24", 36", 48", 60", & 72" ETCHED PANEL SIZES / EXTRUDED SILICONE DIFFUSER / EXTRUDED ALUMINUM BODY WITH FULLY WELDED CORNERS / AVAILABLE IN STANDARD WHITE, TUNABLE WHITE, & RGBW / CUSTOM SIZES, SHAPES, CLUSTERS, & CONFIGURATIONS POSSIBLE / ROHS COMPLIANT

FLAT PANEL

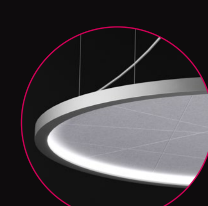
ETCHED PANEL

ACOUSTIC SOLUTION

REV™ ACOUSTIC

0.36" (9MM) PET FELT ACOUSTIC PANEL IN 24 COLORS / UNIQUE ETCHED PANEL DESIGN HIDES SEAM IN LARGER SIZES / 1.75" SQUARE PROFILE / 24", 36", & 48" FLAT PANEL SIZES / 24", 36", 48", 60", & 72" ETCHED PANEL SIZES / EXTRUDED SILICONE DIFFUSER / EXTRUDED ALUMINUM BODY WITH FULLY WELDED SEAMS / AVAILABLE IN STANDARD WHITE, TUNABLE WHITE, & RGBW / CUSTOM SIZES, SHAPES, CLUSTERS, & CONFIGURATIONS POSSIBLE / ROHS COMPLIANT

FLAT PANEL



ETCHED PANEL

GLOWRING™ ACOUSTIC

0.36" (9MM) PET FELT ACOUSTIC PANEL / UNIQUE ETCHED PANEL DESIGN HIDES SEAM IN LARGER SIZES / 24", 36", & 48" FLAT PANEL SIZES / 24", 36", 48", 60", & 72" ETCHED PANEL SIZES / 4" SQUARE PROFILE / SEAMLESS ONE-PIECE MOLDED DIFFUSER / FULLY-ENCLOSED TOP SURFACE TO ELIMINATE DUST & DEBRIS / OPTIONAL INNER OR OUTER FINISHED METAL TRIM / PERFORMANCE DIFFUSER ALLOWS HIGH TRANSMISSION, ZERO LED IMAGING, & LOW GLARE / 80+ & 90+ CRI (R9>50) / SURFACE & RECESSED MOUNT ALSO AVAILABLE / DECLARE LABEL / ROHS COMPLIANT

FLAT PANEL   ETCHED PANEL

ACOUSTIC SOLUTION

FLAT PANEL - AVAILABLE SEAMLESS UP TO 48"

ETCHED PANEL - AVAILABLE SEAMLESS UP TO 48"; WITH SEAM AND HARDWARE IN 60" & 72"

FREQUENTLY ASKED QUESTION

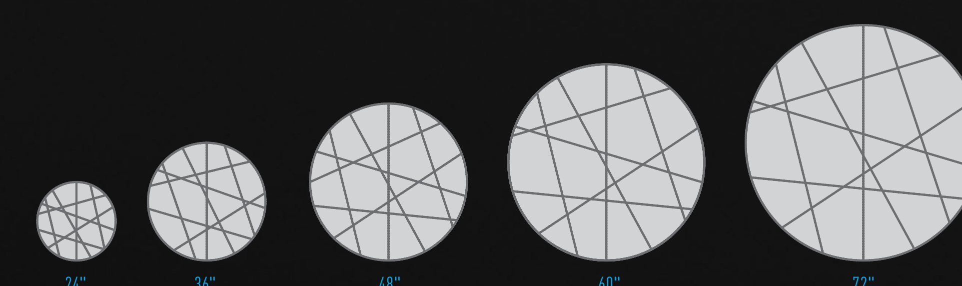
About Our Etched Acoustic Panel

Why is a seam necessary in larger sizes? Typically, sheets of acoustic PET felt are produced in 4' x 8' sheets (like a sheet of plywood or drywall). This limits our seamless acoustic offering to 48" or smaller. Fixtures over 48" requires two panels butted together with a seam and additional hardware to span the entire fixture.

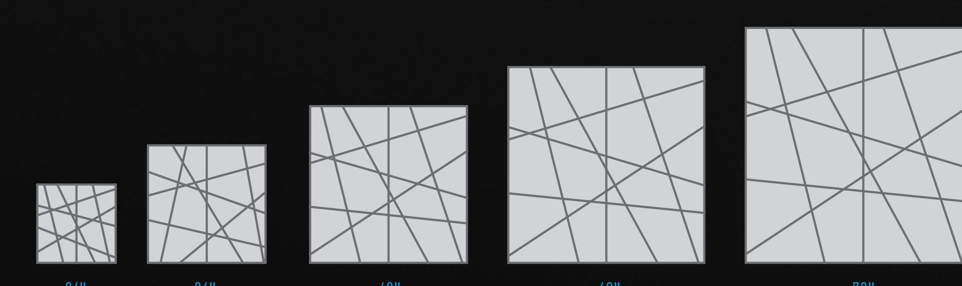
So we've developed a unique... and quite clever solution. We've hidden that seam within an "etched" bevel cut pattern - allowing larger scale acoustic panels on our fixtures, and a unique and fun pattern that conceals the seam needed to achieve this larger scale.

Our seam-cloaking technique allows for larger scale acoustic panels of 60" and 72" on Rev, Stealth, and Glowring - creating some of the largest scale standard acoustic lighting solutions in the market.

REV & GLOWRING ACOUSTIC PATTERN



STEALTH ACOUSTIC PATTERN



LIVE IN COLOR

Fresh Color Palette

ACOUSTIC COLORS:

PBK - PURE BLACK	**CHG** - CHARCOAL	**SLT** - SLATE	**SDG** - SHADOW GRAY
PIC - PEARL ICE	**CWH** - CLASSIC WHITE	**SLG** - SILVER GRAY	**NTL** - NATURAL LINEN
HZW - HAZELWOOD	**CFB** - CORNFLOWER BLUE	**DNB** - DENIM BLUE	**BRD** - BRICK RED
MNB - MIDNIGHT BLUE	**DPP** - DEEP PURPLE	**BRY** - BERRY	**CHR** - CHERRY RED
CRT - CARROT	**DWT** - DEEPWATER	**PNA** - PINEAPPLE	**LMS** - LIMESTONE
SFM - SEAFOAM	**EMG** - EMERALD GREEN	**CNM** - CINNAMON	**BLS** - BLUSH

These colors are for reference only. Please be aware that colors may vary per monitor. Contact your local rep with any questions.

Request a swatch sample via Swatchbox at ocl.com/finishes

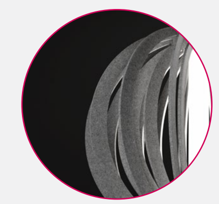
THE SCIENCE

Acoustic Lab Testing Results

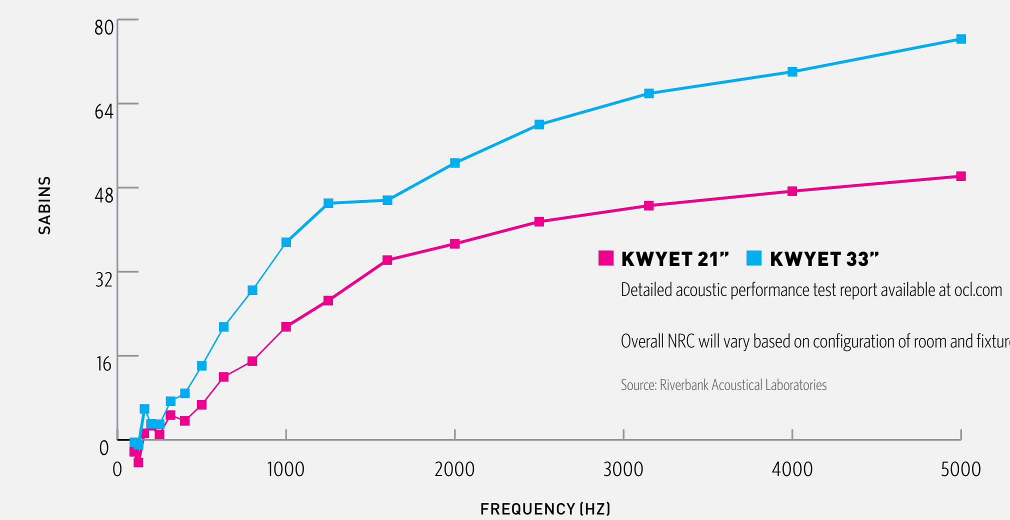
All of OCL's acoustic fixtures are independently tested by Riverbank Acoustical Laboratories.

The ASTM C423-09 test measures the amount of sound absorption and the sound absorption coefficients at frequencies spanning from 100 to 5000Hz. The results can be used to calculate the acoustical impact for specific room sizes and characteristics

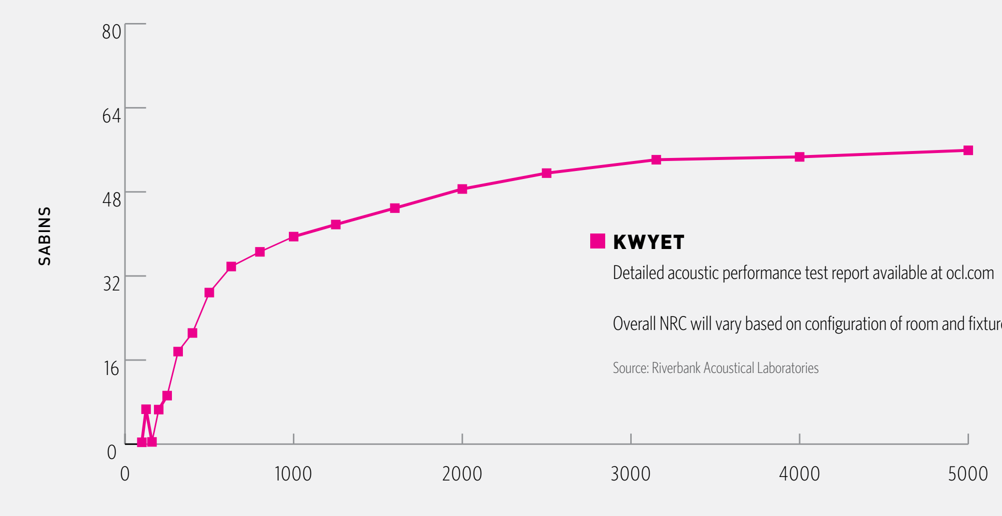
Certified acoustic test reports (ASTM C423) by product can be found at OCL.com.

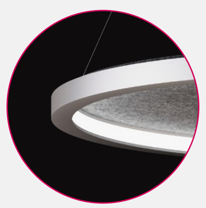


KWYET SPHERE (KW4) ACOUSTIC PERFORMANCE (4 UNITS):

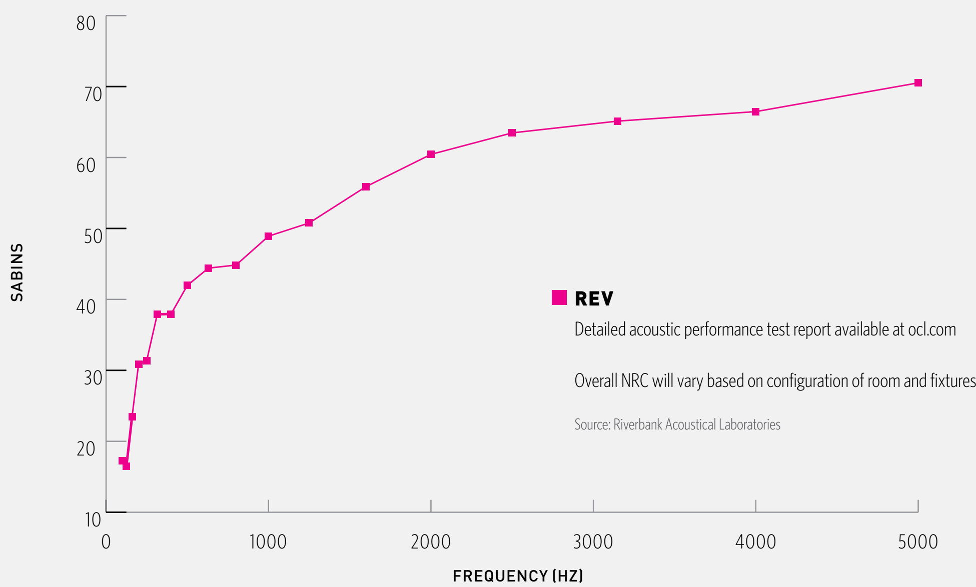


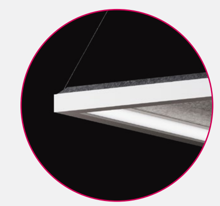
KWYET (KW1, KW2, KW3) PERFORMANCE (4 UNITS):



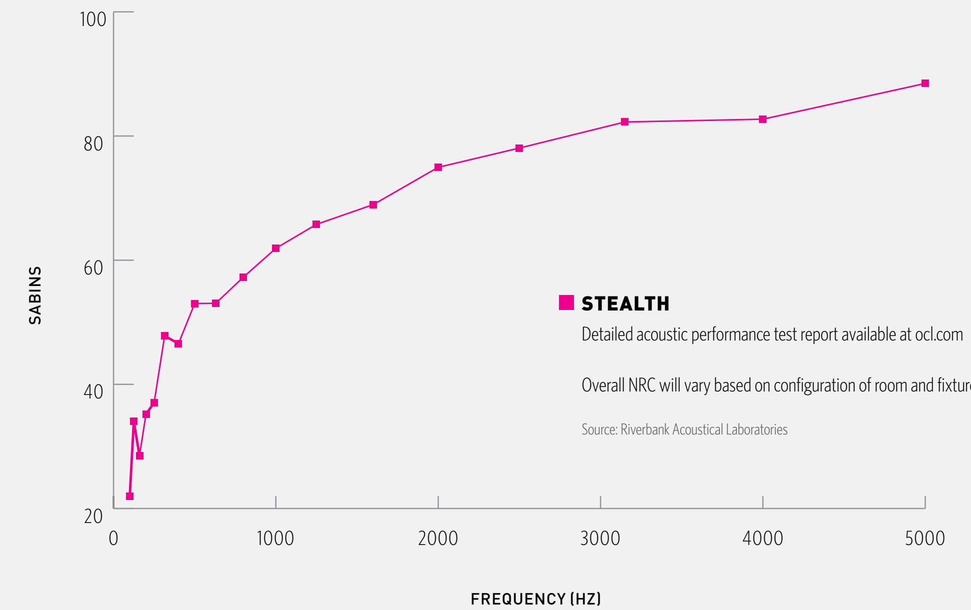


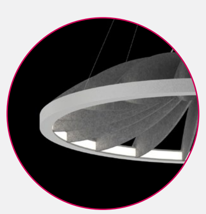
REV ACOUSTIC PERFORMANCE (4 UNITS):



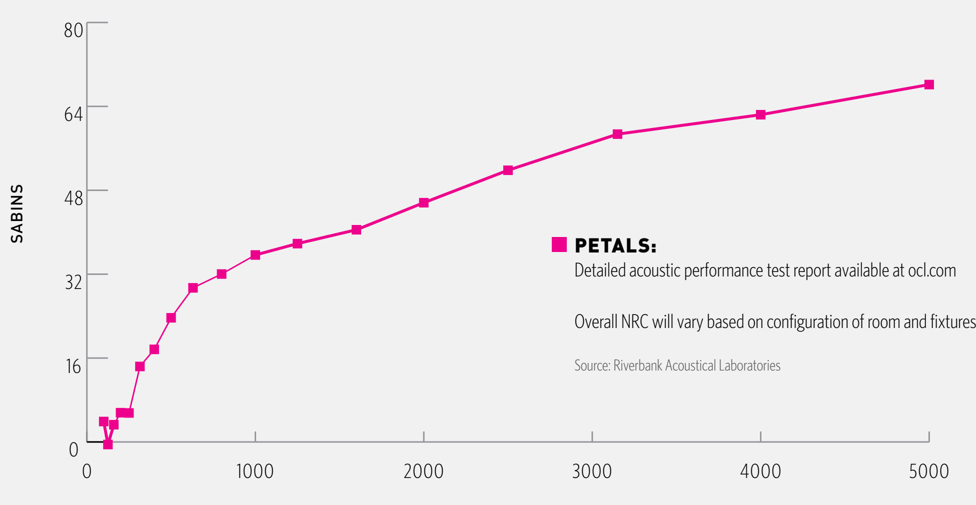


STEALTH ACOUSTIC PERFORMANCE (4 UNITS):

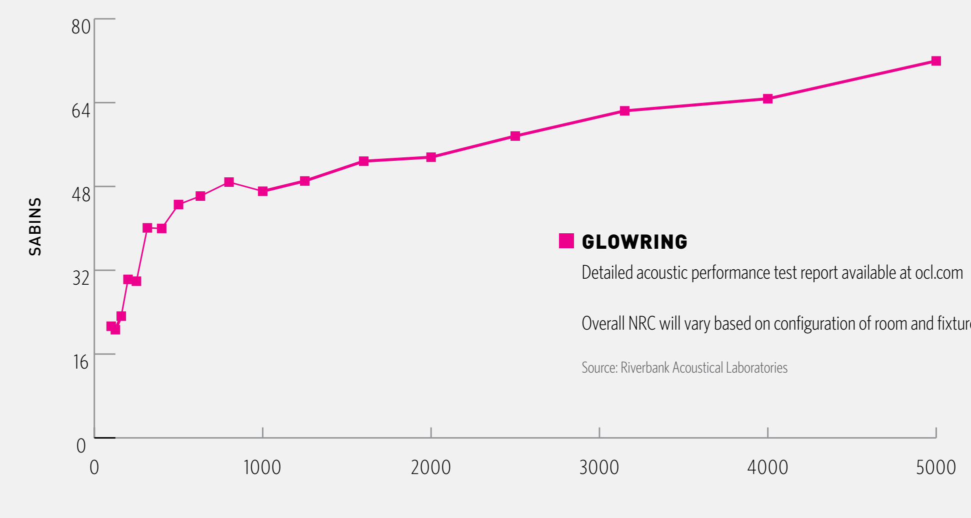




PETALS ACOUSTIC PERFORMANCE (4 UNITS):



GLOWRING ACOUSTIC PERFORMANCE (4 UNITS):



THE MORE YOU KNOW

Glossary & Terminology

REVERBERATION — the persistence of sound in an enclosed or partially enclosed space after the source of sound has stopped; by extension, in some contexts, the sound that so persists.

REVERBERATION TIME (T_{60}) — for airborne sound, the time it takes a reverberant sound field to decay 60 dB after the source is interrupted.

SOUND ABSORPTION — (1) the process of dissipating sound energy [in this case it is a process that converts incident sound energy into heat via friction, thus reducing the reverberation time in a room.] (2) the property possessed by materials, objects and structures such as rooms of absorbing sound energy.

SABIN — the unit of measure of sound absorption in the inch-pound system, previously defined by ASTM C423. Originally described as "one square foot of open window".

WALLACE SABINE EQUATION — (IP Units) $T_{60}=.049\frac{V}{a}$ Reverberation Time (T_{60}) at a given frequency is a function of the Volume in ft^3 (V) and the total Sabins (a) present in the room. (Assumes even distribution of sound and absorption; more accurate for large rooms).

ABSORPTIVE AREA (M²) — the unit of measure of sound absorption in SI units, tested in accordance with the current version of ASTM C423. The observed/measured area of sound absorption provided by the specimen according to Sabine's reverberation time equation.

SOUND ABSORPTION COEFFICIENT [DIMENSIONLESS]; Measured absorptive area (m2) of the test specimen divided by the test surface area covered by the specimen (in square meters) in a specified frequency band. Ideally, the fraction of the randomly incident sound power absorbed or otherwise not reflected.

NOISE REDUCTION COEFFICIENT (NRC) — a single-number rating derived from measured values of sound absorption coefficients historically defined by previous versions of Test Method C423. Although NRC has been formally retired by ASTM, the rating continues to be cited by the architecture industry. It provides an overall estimate of the sound absorptive effectiveness for a continuous acoustical material. It is the average of the sound absorption coefficients for the 250, 500, 1000, and 2000 Hz one-third octave bands rounded to the nearest multiple of 0.05.

SOUND ABSORPTION AVERAGE (SAA) — a single-number rating derived from measured values of sound absorption coefficients in accordance with the current version of ASTM C423. It provides an overall estimate of the sound absorptive property of an acoustical material. It is the average, rounded off to the nearest 0.01, of the sound absorption coefficients of a material for the twelve one-third octave bands from 200 Hz through 2500 Hz

FREQUENTLY ASKED QUESTION

Why No NRC For Spaced Objects?

By Eric Wolfram, Laboratory Manager, Riverbank Acoustical Laboratories

One Sabin of absorption is approximately equal to one square foot of perfect absorption (e.g. an open window where all sound leaves and none reflects back, or "perfect black" for light). Sophisticated acousticians will exuberantly correct this and state that this is not 100% accurate from a physics perspective. They are correct, but it is actually a "good enough" understanding for general use by non-expert people. This is similar to other physics analogies (e.g. "fabric" of space time, or Ohms law as a "water pipe"), which break down upon deeper understanding.

Sound absorption coefficients are defined as Sabins (ft^2 of absorption) per square foot of material (truly, square foot area covered by the sample). NRC is essentially an average of four mid-range coefficients (see full definition above).

A relevant analogy is that sound absorption coefficients (and therefore NRC) are like "cost per square foot" where the "cost" is sound absorption (Sabins). One can easily calculate "cost per square foot" for wall coverings, floor coverings, ceiling treatments, etc. However, we can't truly calculate "cost per square foot" for discrete objects such as chairs, light fixtures, lampshades, etc.

Let's say that the you sell chairs and an architect demands to know the "cost per square foot" of your chairs. You politely try to explain that the chairs are sold individually, or as a quantity of objects (with a slight discount). The architect informs you that they have been "doing this for 30 years" and they would like to know the "cost per square foot" for your chairs, thank you very much. They remind you that your competitor has already provided "cost per square foot" for their chairs. WHAT?!

So, you step back and try to think of how you can calculate this, to give the architect what they need to make an informed decision. We know the "cost," but what is the "square foot" for chairs? There are three possible ways to calculate "cost per square foot" for chairs:

A. Based on the total exposed surface area of the chair, as determined by the sum of all surface areas of all exposed parts, possibly exported from a CAD model. This is the most literal interpretation of the request, but how useful is the resulting number, really? Your chairs would look less expensive if you just gave them more surface area!

B. Since only the seat cushion is actually used, one could use the surface area of just the seat cushions in the calculation. However, this would give a wildly high number that may be misleading to the architect.

C. Lay out the array of chairs within the room, according to the pattern that will be used in the actual space, then determine the square foot area of FLOOR covered by the array of chairs. In this scenario the "cost per square foot" is the total cost of all chairs divided by the total floor surface covered by the array of chairs. This might just be what they want to know!

Coming back to our acoustical test results. ASTM C423 allows the presentation of results for spaced object tests in Sabins (ft^2) and m^2 absorptive area, but not absorption coefficient (Sabins per square foot). Without sound absorption coefficients, we can't calculate NRC (see definition of NRC above). There are three possible ways one could calculate sound absorption coefficients for spaced objects:

A. Based on the total exposed surface area of the set of objects. For complex shapes, this could be exported from a CAD model. This is the most literal interpretation of the request, based on the minimum area requirement defined in ASTM E795 for spaced object arrays, but how useful is the resulting number, really? This is Method 2 on RAL's calculation worksheet for J-mount test reports.

B. Since an incident sound wave may only have opportunity to pass through one face of the sample, one could use the surface area of just one of the larger faces in the calculation. However, this would give a wildly high number that is terribly misleading. RAL does not recommend this approach since it is not useful in comparison to other ceiling treatments. Also, it is more correct to think of the source as a sound "field" and not an individual incident "wave." The sound "field" encounters all exposed faces of the sample. This is Method 3 on RAL's calculation worksheet for J-mount test reports.

C. Define an imaginary horizontal plane that extends through the entire array of test samples as installed in the chamber, then measure the length & width to determine the square foot area of this plane. This represents the area of CEILING covered by the array of objects/baffles. This method provides an accurate comparison to other ceiling treatment options such as acoustical ceiling tile. This might just be what the architect wants to know when they ask for NRC! Acousticians could also use the resulting apparent absorption coefficients in their acoustical modeling applications by assigning these values to larger horizontal single-sided planes. Since this is the preferred calculation, this is Method 1 on RAL's calculation worksheet for J-mount test reports.

There is currently a movement at ASTM to solidify method C above as an optional "Apparent Absorption Coefficient" and "Apparent NRC" under ASTM C423. At this time, the standard prohibits all three approaches. There are persons who argue for each of the three options above, so it may be some time before the ASTM E33 committee settles the debate.

11902 Lackland Road   St. Louis, Missouri 63146   P 314.863.1895 F 314.863.3278
Detailed specification information available at ocl.com

A brand of legrand