



[SHAPER SENSE]
ACOUSTIC LIGHTING

EAT•N

Powering Business Worldwide

INIMITABLE

/i'nimədəb(ə)l/

adjective
so good or unusual as to be impossible to copy; unique.

Shaper Sense is a new line of lighting products that integrate lighting and acoustic sound absorption materials together. Partnering with FilzFelt, a natural materials and acoustics leader, has led to innovative, award winning, yet simple product designs that meet the needs of open spaces where unwanted noise has become an issue. The solution based strategy of high performance lighting along with the industries highest level of sound absorbing materials and the widest array of color selections, within simple forms, give maximum freedom in design.

Introducing Shaper Sense:
A new line of award winning acoustic lighting products.



Best of NeoCon Gold –
Lighting: Hospitality
and Decorative



Illuminating Engineering
Society (IES) Progress
Report Selection 2019



Architect Magazine –
2019 Spring Collection
Selection



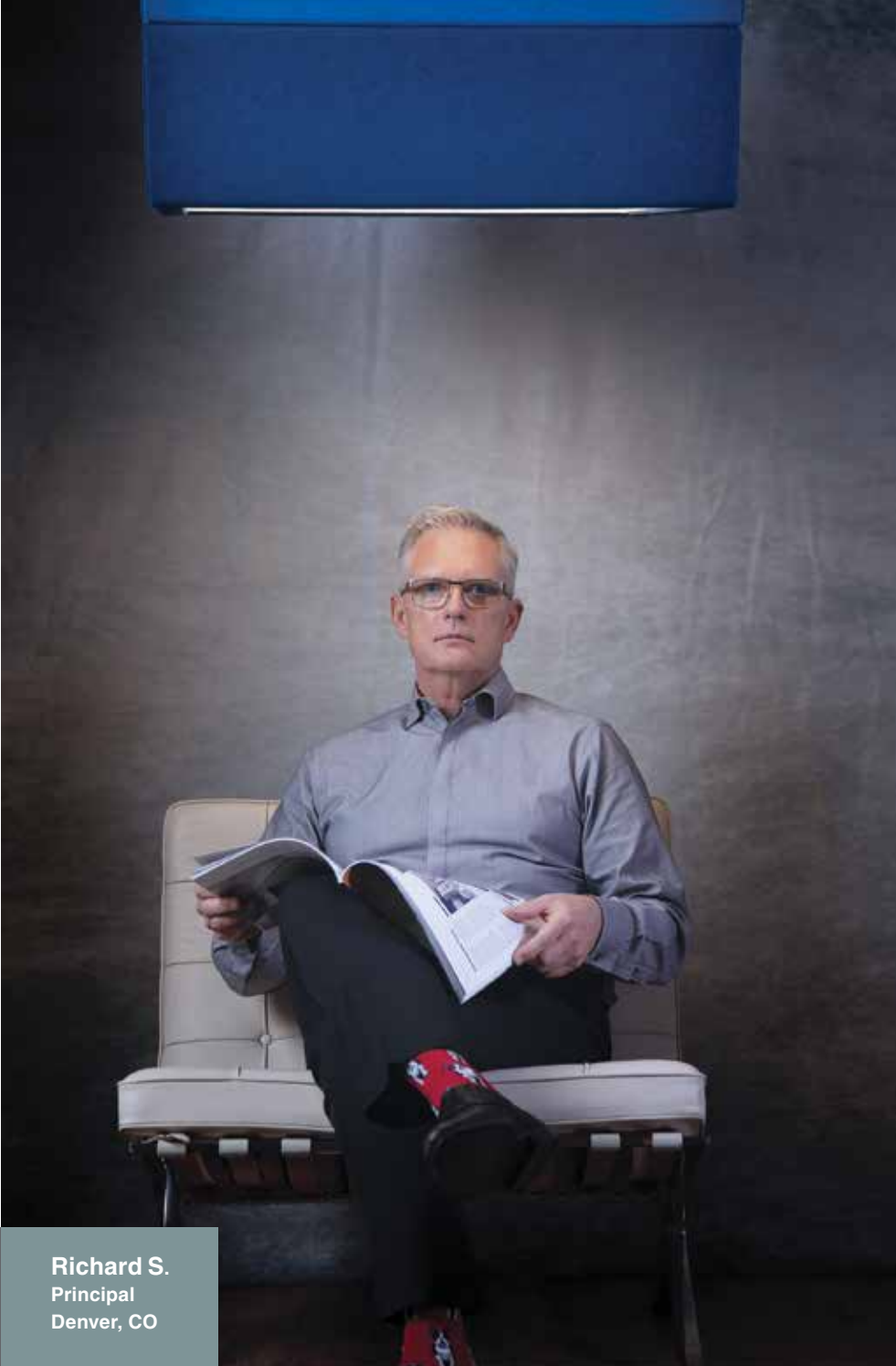
Product Innovation Award
(PIA) – Architectural
Products Magazine



Product Innovation Award
(PIA) – Architectural SSL
Magazine

"Great design, great acoustics, and great finish options all in one. Finally, lighting and acoustic solutions integrated into one seamless design with performance for the workplace. A win for our clients. A win for design."

Richard S.
Principal
Denver, CO



WHAT IS SHAPER? AND DOES IT MAKE SENSE?

SHAPER

The ethos of decorative products that solve customer problems through differentiated design and integrated technology.

INTRODUCING SHAPER SENSE

An ensemble of products that coalesce the physical senses of sight, sound, and touch, to produce outputs of illuminance, sound absorption, and texture with controls, from one platform.

SENSE

A sense is a physiological capacity of organisms that provide data for perception.

The decorative collection of Shaper Sense fixtures are designed to invoke the human senses of sight, hearing, and touch. In partnership with industry leading acoustic and natural materials company, FilzFelt™, the edgelit luminaires are an ensemble of integrated LED lighting and acoustic products with 100% Wool Design Felt.



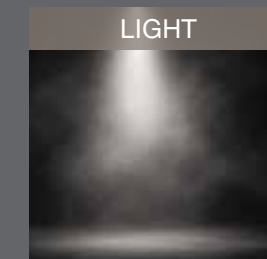
SEE



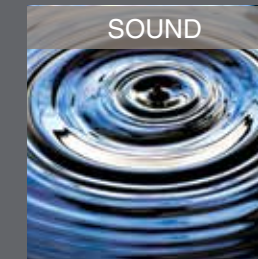
HEAR



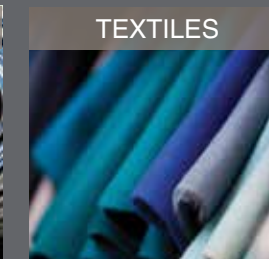
TOUCH



LIGHT



SOUND



TEXTILES

This combination provides a collection of products of high aesthetic appeal, visual performance, and quality acoustic surrounds. The simple shapes (Box and Trapezoid) combined with 62 dynamic felt color selections, allow designers to choose and form countless looks, creating their own solutions for a space.

A CONFLUENCE OF LIGHT + SOUND

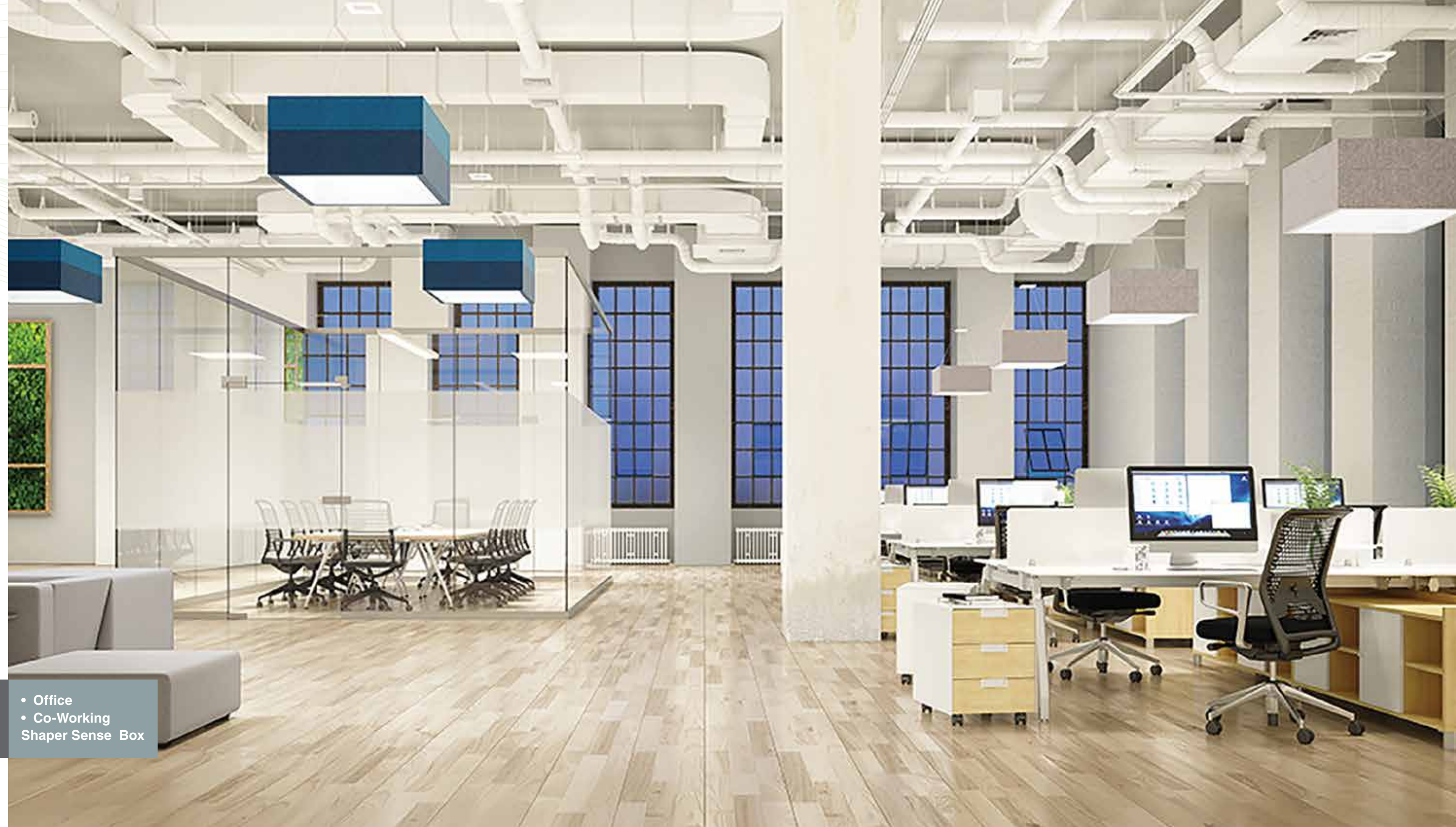
Workspace office design has gone through a revolution from high wall cubicles to flexible-modular open office plans that promote collaboration and communication. A byproduct of this design has resulted in some unwanted noise causing disruption and distractions that can lead to lower productivity and dissatisfaction of the workspace environment.

By addressing the physiological components of lighting and noise from Maslow's Hierarchy of Needs applied to workplace strategy, the development of integrating lighting and sound absorption materials from one platform becomes an ideal solution to help combat increasing noise and disruption in the work place.

The Shaper Sense family of products provides simplistic shapes, with dynamic color selections that can match other materials in the space or become a highlight on their own. In spaces that use FilzFelt sound absorbing products, Shaper Sense products are a natural complement to the environment. The natural material colors can be used in these large-scale voluminous fixtures to be calming, as well as using the vibrant color selections to make loud visual statements that can help create visual collaboration cues, way finding purpose, or space delineation. The optional addition of Wavelinx wireless controls platform, adds a third layer of flexible and desirable architectural space solutions.

The first series of products utilize a square light engine that is surrounded by acoustic materials in a box shape and trapezoid shape. Each shape has different color elements that can be selectable. The Shaper Sense Box fixture has a top panel that can have different felt colors, or can simply have the same felt color. The trapezoid has opposing pairs of panels for different felt color selection, or can be the same.

Color is a strong design element. Shaper Sense products partnered with Filzfelt, provides the widest palette of colors available for acoustic lighting solutions. Using color can help distinguish spacial design and can be highly impactful. In this scenario - color helps to distinguish collaborative spaces vs. work stations. The same product is used, but color helps define visual insight.



- Office
 - Co-Working
- Shaper Sense Box**

THE **filzfelt** DIFFERENCE

FilzFelt is an industry leading natural textile and acoustic products company that provides industry leading material performance. The color palette offering of 60+ 100% Wool Design Felt colors choices are used in the Shaper Sense products, creating thousands of dynamic color variable options. This lets the design teams add value and design choices that work for their spaces. FilzFelt's 100% Wool Design Felt, is moisture resistant, self-extinguishing and known for its thermal and acoustic insulation properties and its highly saturated and lightfast colors. Wool felt is a nonwoven textile that has warmed, sheltered, protected and comforted human beings for centuries.

This natural material has inherent durability and beauty that cannot be achieved with synthetic fibers. The 100% Wool Design Felt brings this ancient fabric into the 21st century where it balances beauty, utility and sustainability while meeting the challenging needs of modern spaces. Warranty on FilzFelt acoustic materials are 5 years.



WHO IS FILZFELT? | WHAT IS FELT? | HOW IS FELT MADE?

MILLER TIME

Felt is produced in buildings termed as "mills". Traditionally these mills were located in rural areas where the wool was easily attainable adjacent to a source of water. Producing wool felt is an extensive and specialized where only a handful of wool felt mills exist today utilizing the same process (and many times, the machinery) that has been used for over a century.



SHEEP!

Wool is a natural fiber harvested from sheep. Sheep's wool is highly regarded for its crimped, elastic fibers that are easily felted to form a fabric that cannot be pulled apart. This translates into durability, excellent dye ability, resistance to flame and compression, and thermal and sound insulation. Plus, this natural fiber is a rapidly renewable resource (it grows back!) and is 100% biodegradable.

FilzFelt's felts are manufactured from Merino wool that is typically sourced primarily from Australia, New Zealand, and South Africa. Merino sheep are prized for their fine hair and considered to be the highest quality sheep's wool. Most sheep are sheared once a year (in spring or early summer) as it takes a full year to grow back.

"I get a haircut once a year"



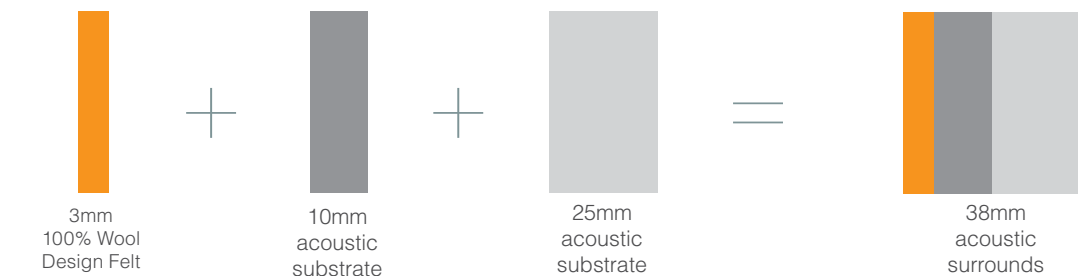
CHOICES... OVER 60+ OF THEM!

100% Wool Design Felt - Over 60 color choices.

Wool felt is one of the oldest man-made textiles and to produce felt, raw wool undergoes a wet "felting" process, which involves matting, condensing and pressing the fibers. Design Felt is a high quality natural material, comes in highly saturated colors, and is perfect for demanding design applications. The proprietary process for developing the widest range of various felt colors is what propels FilzFelt to be an industry leader. 100% Wool Design Felt is 100% biodegradable, contains no formaldehyde, 100% VOC free, no chemical irritants, free of harmful substances 100% Wool Design Felt contributes to LEED® v4

WHY IT WORKS

Our definition of "Substrate" is a recycled PET plastic made from items like plastic bottles. These are broken down and made into sound absorbing materials that are industry leading. These substrates contain a minimum of 60% recycled content, and are 100% recyclable in themselves. The "Shaper Sense" products use sound absorbing substrates in combination with sound absorbing colorful felt to bring a richness and depth to the aesthetic value of the product, that sets itself apart.



FilzFelt Materials

3mm 100% Wool Design Felt
25mm acoustic substrate
10mm acoustic substrate

Shaper Sense

38mm acoustic surrounds



PICK ME!

The Shaper Sense Box has a top panel from which over 60+ of the 100% Wool Design Felt choices can be selected. The bottom panel also allows for the same number of selections of colors. These can then be the same for a uniform look, or very different... creating contrast and depth.



MONO-TONE

Light Level 1 – 30W

2480 lumens 3000K @ 90 CRI 3000K 90

3084 lumens 3500K @ 80 CRI 3500K 80

3028 lumens 4000K @ 80 CRI 4000K 80

Light Level 2 – 39W

3172 lumens 3000K @ 90 CRI 3000K 90

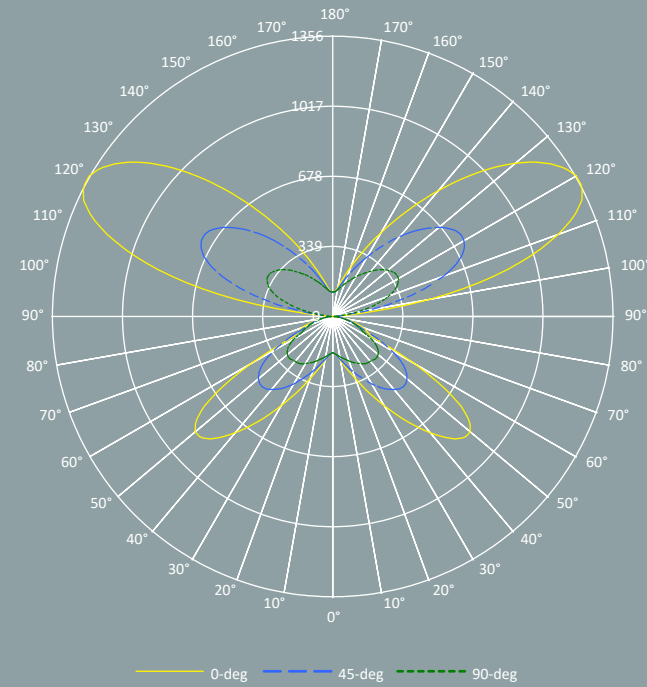
3944 lumens 3500K @ 80 CRI 3500K 80

3873 lumens 4000K @ 80 CRI 4000K 80



TWO-TONE

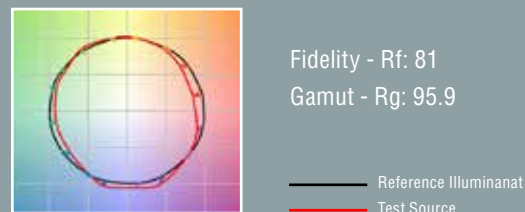
THE SHAPE OF LIGHT – POLAR PLOT



Test Method: LM-79-08
Catalog Number: ShSe-BOX-2-L35-80-UNV-STD
Description: SHAPER SENSE BOX LIGHT LEVEL 2
Light Source: 3500K CCT, 80 CRI LEDs

Summary
Luminaire Lumens: 3955 lumens
Efficacy: 101.7 lumens/watt
Input Watts (W): 38.8

Color Vector Graphics - TM-30

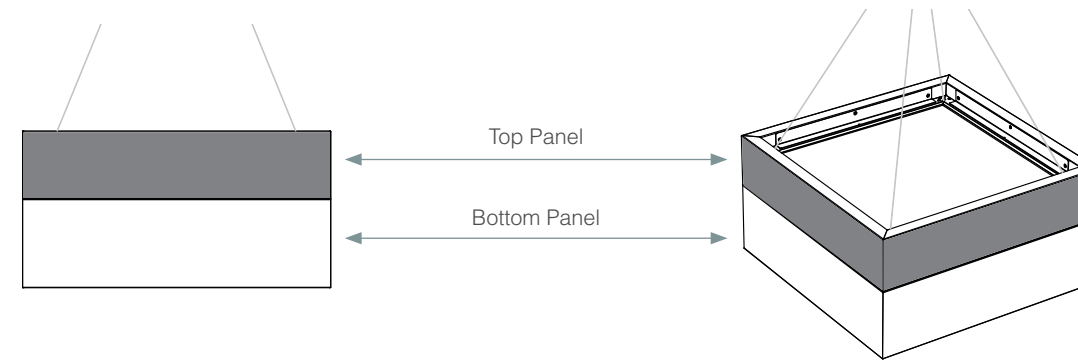


HOW TO PICK

SHAPER SENSE BOX COLORS

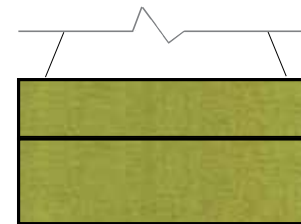
For contrasting colors, choose different colors for the top panel and the bottom panel.
 For a monochromatic effect, select the same color for both top and bottom panels.

Select Top Panel + Color Selection from chart on page 28.
 Select Bottom Panel + Color Selection from chart on page 28.



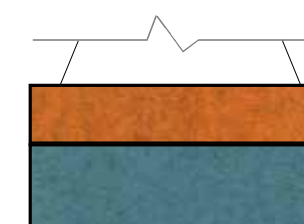
EXAMPLE OF MONO-TONE

Top Panel TP713 = 713 Kiwi
 Bottom Panel BP713 = 713 Kiwi

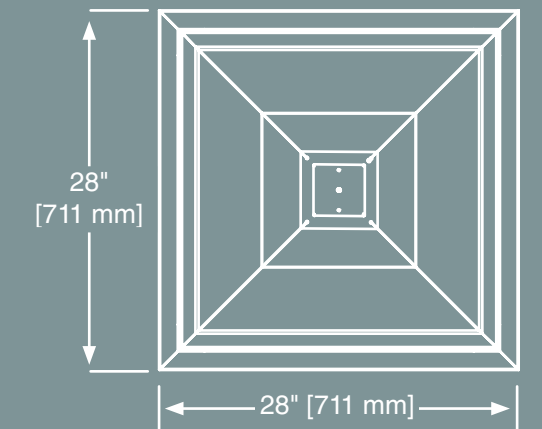
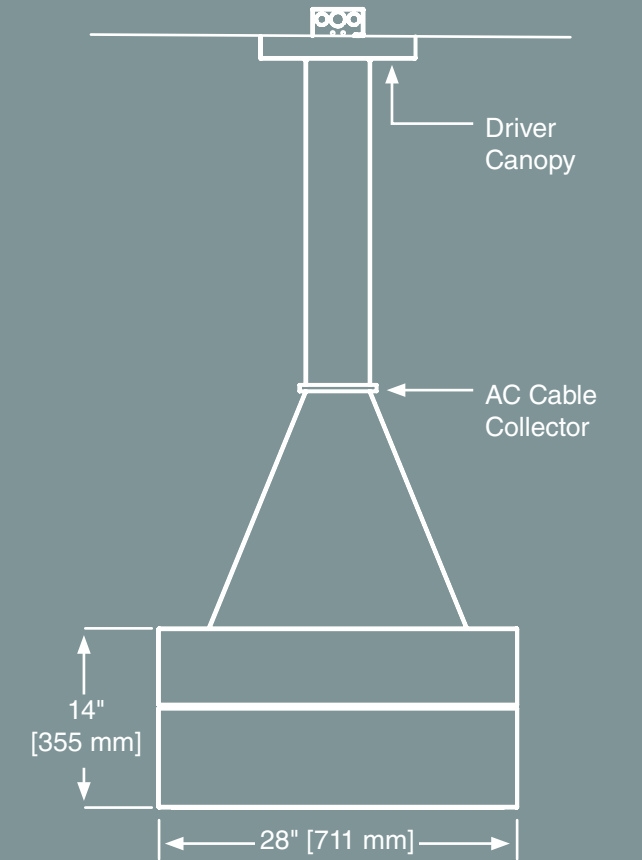


EXAMPLE OF TWO-TONE

Top Panel TP116 = 116 Orange
 Bottom Panel BP312 = 312 Lagune



See page 28 for color selection numbers



NO...PICK ME!

The Shaper Sense Trapezoid has opposing pairs of panel from which over 60+ of the 100% Wool Design Felt choices can be selected. From one side, a solid panel look is created. Turn the corner, and a contrast of color can be achieved. Or, select all panels to be the same for a uniform look



Light Level 1 – 30W

2487 lumens 3000K @ 90 CRI 3000K 90

3092 lumens 3500K @ 80 CRI 3500K 80

3036 lumens 4000K @ 80 CRI 4000K 80

Light Level 2 – 39W

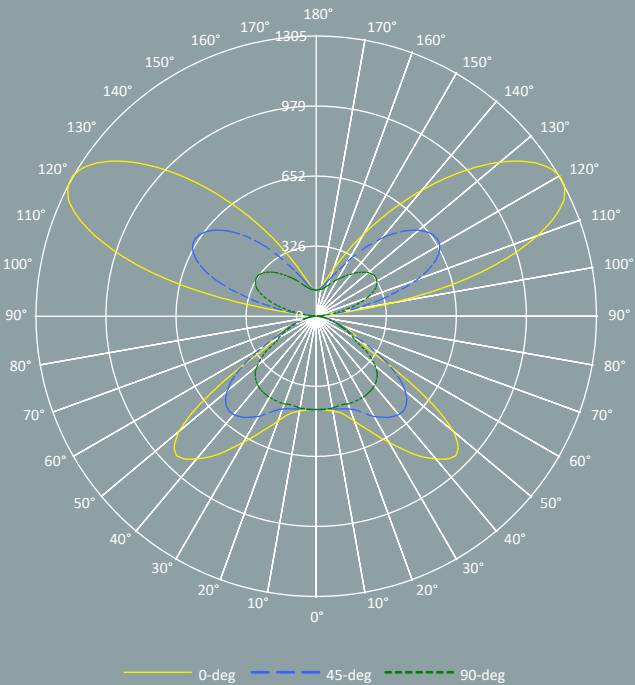
3182 lumens 3000K @ 90 CRI 3000K 90

3955 lumens 3500K @ 80 CRI 3500K 80

3884 lumens 4000K @ 80 CRI 4000K 80



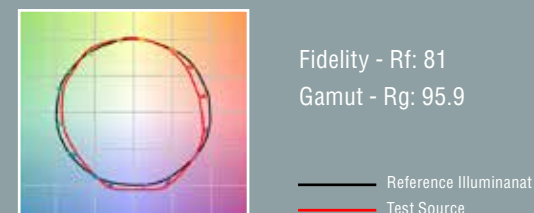
THE SHAPE OF LIGHT – POLAR PLOT



Test Method: LM-79-08
Catalog Number: ShSe-TRAP-2-L35-80-UNV-STD
Description: SHAPER SENSE TRAPEZOID LIGHT LEVEL 2
Light Source: 3500K CCT, 80 CRI LEDS

Summary
 Luminaire Lumens: 3955 lumens
 Efficacy: 101.9 lumens/watt
 Input Watts (W): 38.8

Color Vector Graphics - TM-30

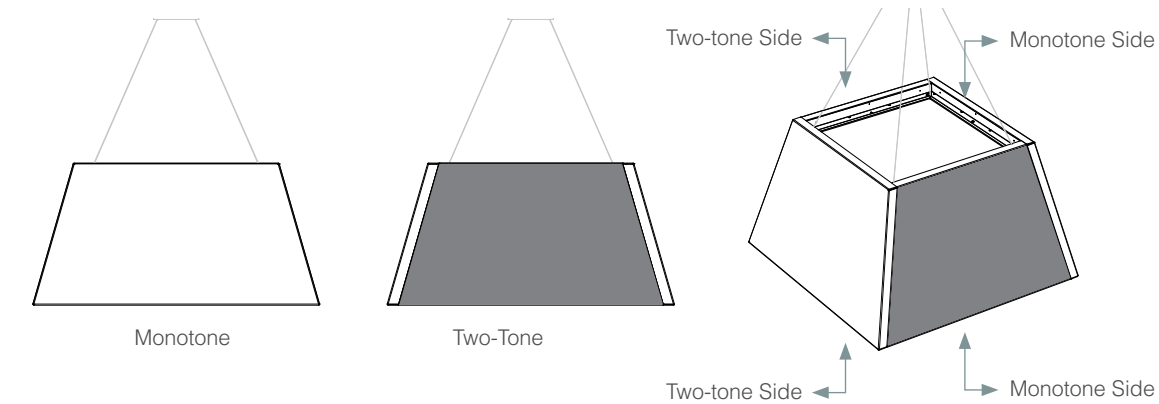


HOW TO PICK

SHAPER SENSE TRAPEZOID COLORS

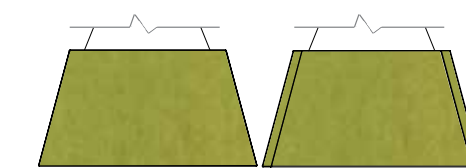
For contrasting colors, choose different colors for the top panel and the bottom panel.
 For a monochromatic effect, select the same color for both top and bottom panels.

Select side AA Panels + Color Selection from chart page 29.
 Select side BB Panels + Color Selection from chart page 29.



EXAMPLE OF MONO-TONE

Side AA = 713 Kiwi
 Side BB = 713 Kiwi

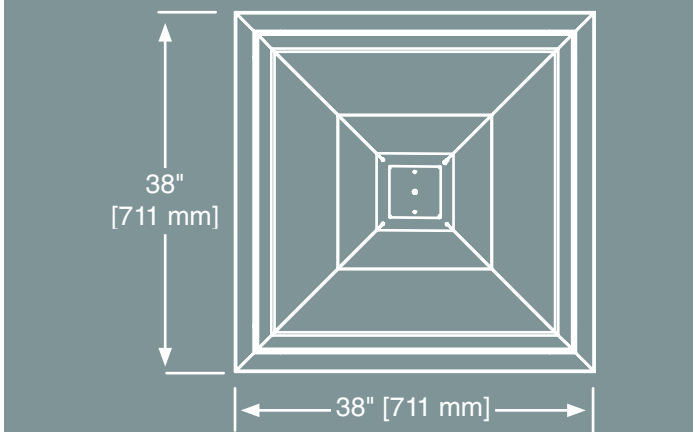
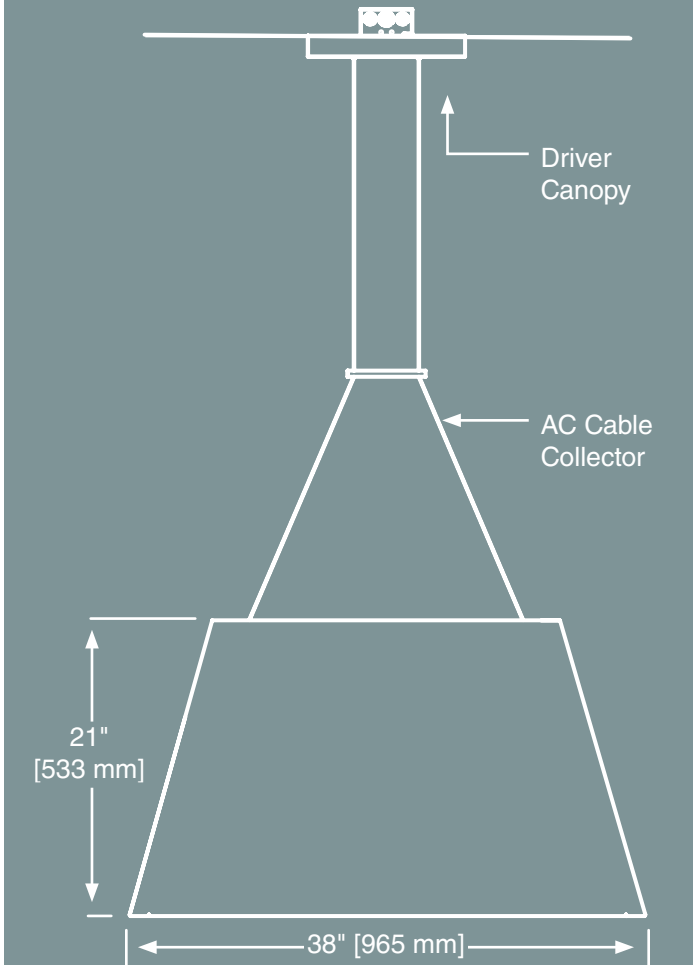
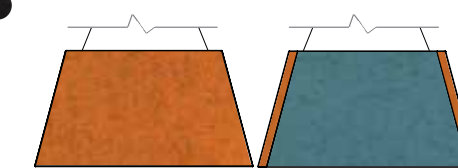


See page 29 for color selection numbers



EXAMPLE OF TWO-TONE

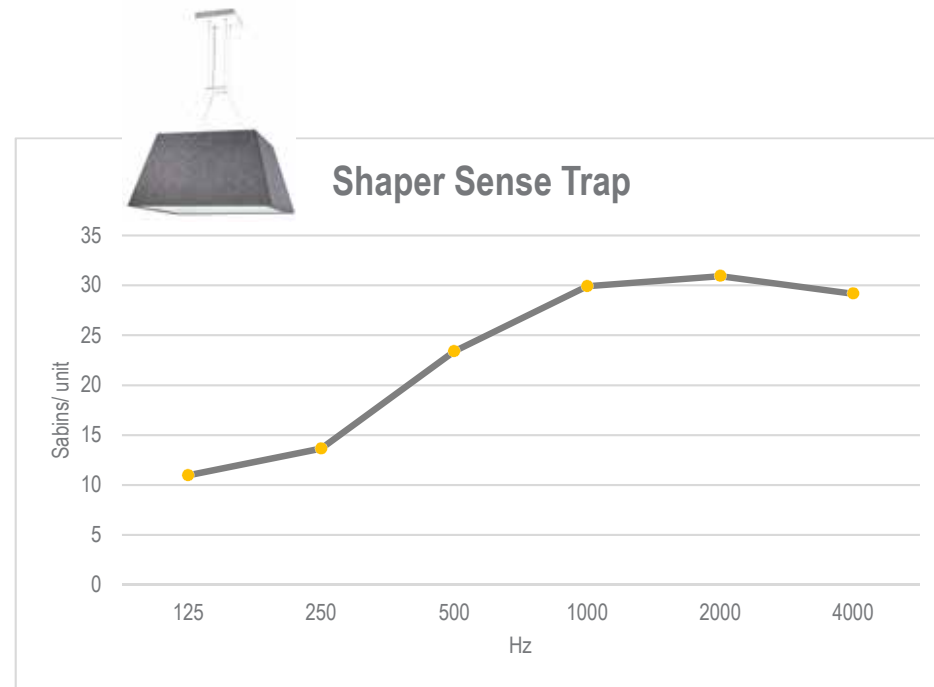
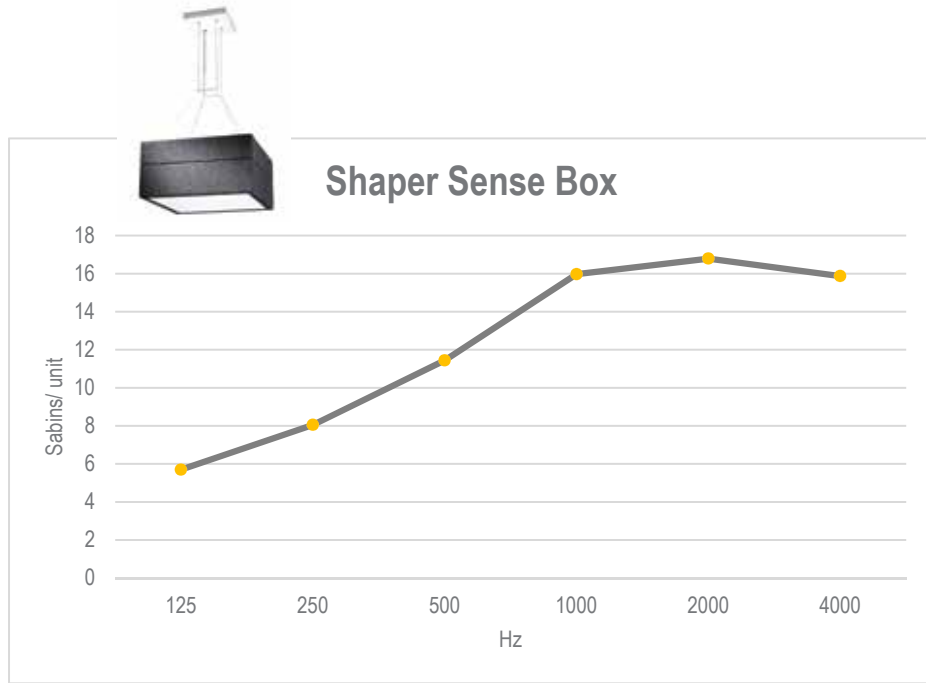
Side AA116 = 116 Orange
 Side BB312 = 312 Lagune



SOUND VALUES

For the Shaper Sense Box and Trapezoid fixtures the Noise Reduction Coefficient and Sound Absorption Average are calculated based on a range of frequency bands pertinent to human speech.

Testing Testing 1,2,3
Acoustic testing performed at industry leading NVLAP accredited labs.



Shaper Sense Box
Apparent Noise Reduction Coefficient (NRC): 1.2
Apparent Sound Absorption Average (SAA): 1.19

Hz	Sabins/ Unit
125	5.7
250	8.05
500	11.44
1000	15.97
2000	16.79
4000	15.87

Shaper Sense Trap
Apparent Noise Reduction Coefficient (NRC): 1.4
Apparent Sound Absorption Average (SAA): 1.38

Hz	Sabins/ Unit
125	10.97
250	13.65
500	23.39
1000	29.91
2000	30.93
4000	29.16



In spaces that use FilzFelt sound absorbing products, Shaper Sense products are a natural complement to the space. The calm natural material colors can be used in these large-scale voluminous fixtures to be calming, as well as using the vibrant color selections to make loud visual statements that can help create visual collaboration cues, or way finding purpose, or space delineation. Used in conjunction together help reduce unwanted reverberation.

- Open Space
 - Hospitality
- Shaper Sense Box

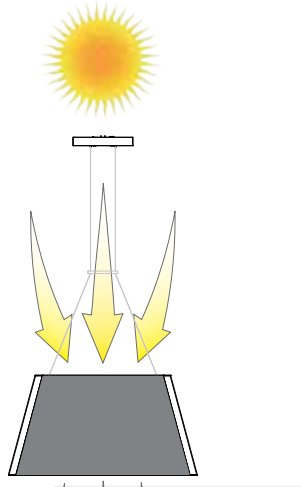
I SEE YOU!

The concept of OPEN design takes a step further in the development of a translucent light engine that is edge lit using high powered LEDs. The Shaper Sense Box and Trapezoid fixtures allow natural daylight to pass through preventing a dark and ominous feel from these large scale products. When the fixtures are on, they provide uplight and downlight for ambient task lighting. And when using the daylight harvesting feature from the wireless sensor platforms, can maintain illuminance as day turns to night.

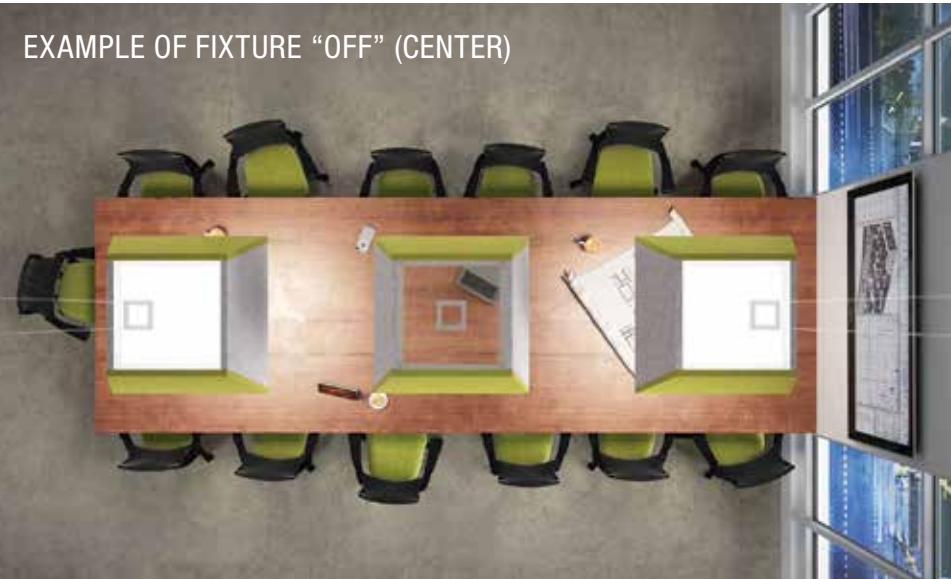
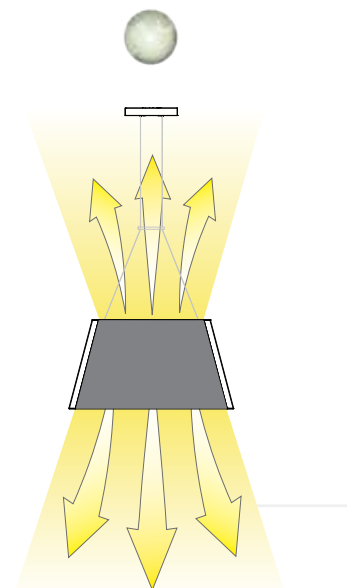
85% translucent lens



A window... Natural Light can pass through. the light engine "OFF"



Illuminated Light fully "ON"



EXAMPLE OF FIXTURE "OFF" (CENTER)

- Conference Room
- Collaboration Space

Shaper Sense Trapezoid

A great use for the Shaper Sense products are in conference rooms that tend to be open and airy. Reverberation in these spaces can be high, and when the main agenda for this application of room is to communicate, Shaper Sense acoustic lighting products are a natural fit.



WIRELESS SENSING SENSORS

Shaper Sense acoustic lighting products are able to use Eaton's wireless controls platforms of WaveLinx and LumaWatt Pro.

WAVELINX

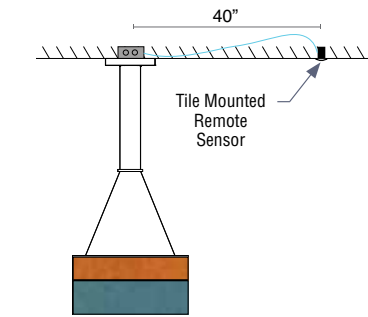
The WaveLinx tile mount sensor option is an integral part of the WaveLinx Wireless Connected Lighting System and offers 3 amp relay control and continuous 0-10V dimming of Shaper Sense luminaires. The tile mount sensor provides daylight dimming and control for a single luminaire or can be daisy chained for group luminaire control. The sensor's control module allows simple electrical Junction Box mounting via 1/2" knock out or direct connection to the junction box attached to the Shaper luminaire. The WaveLinx Tile mount daylight sensor operates on a wireless mesh network based on IEEE 802.15.4 standards and is controlled by a WaveLinx Wireless Area Controller.

LUMAWATT PRO

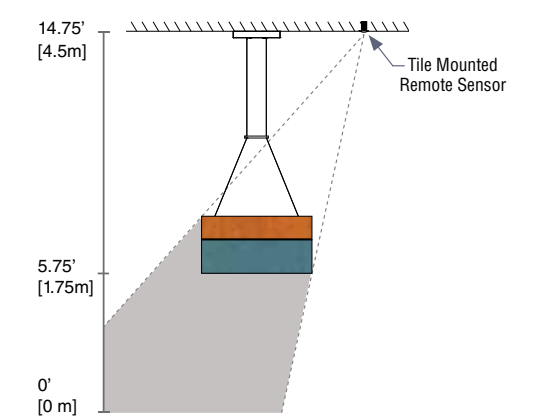
The LumaWatt Pro Tile mount sensor option is field installed to a single luminaires junction box or daisy chained to a group of luminaires, providing lighting control and sensing in an independent, fault-proof, resilient networks of powerful end-points. Sensors have profiles stored internally containing all of the variables for the application once a configuration is set and is able to manage the fixture without connectivity to the system. The sensors gather data from four on-board inputs: Passive infrared occupancy detection, daylight, temperature, and electrical current use. Wireless gateways communicate with the sensors and transmit the data using industry-standard wired technology to the Energy Manager, for powerful, familiar dashboards of information tailored for access on a connected computer. Energy Managers connect to optional cloud-based applications, maximizing the dense, data-rich sensing within the footprint of the luminaire for management of the building environment, and much more.

SENSOR MOUNTING AND COVERAGE

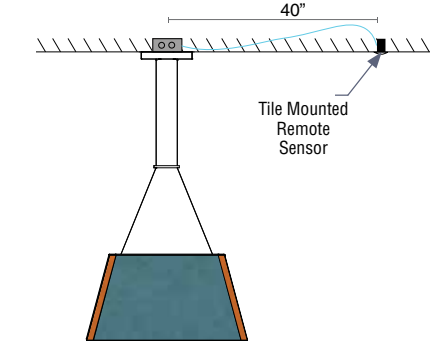
Sensor mounting and coverage for BOX



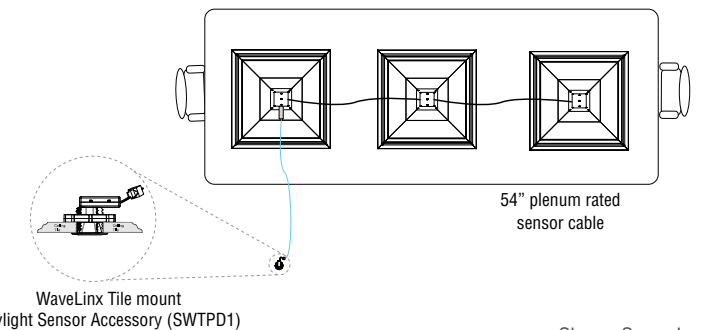
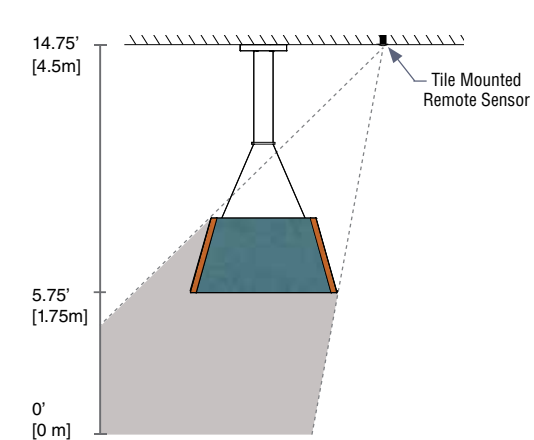
Reduced Occupancy Detection Area for BOX



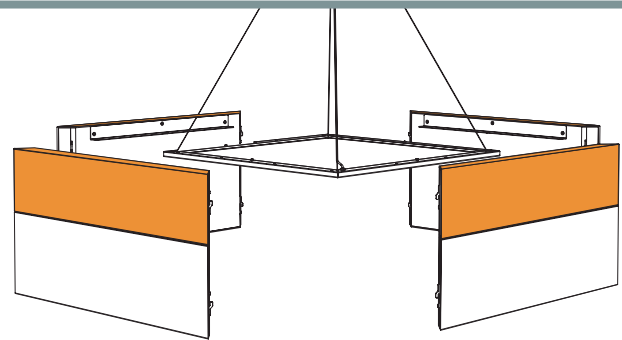
Sensor mounting and coverage for TRAPEZOID



Reduced Occupancy Detection Area for TRAPEZOID

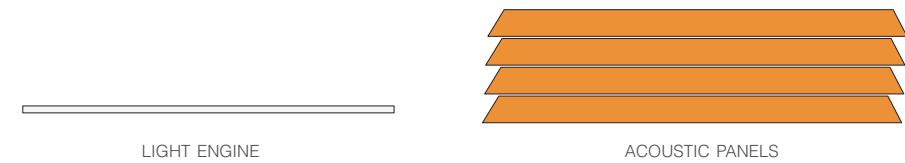


SHUT THE BOX UP... FLAT PACK DESIGN AND THEN SOME

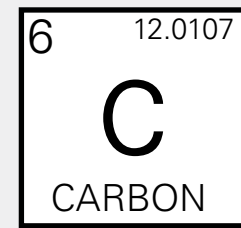


Part of the ingenious and patented design is how the product assembles and ultimately ships. Each acoustic light fixture consists of one translucent light engine and four acoustic panels. They arrive to the job site in two separate boxes. By having individual acoustic panels, they can be laid flat, and be "flat packed" to minimize transportation costs as well as less impact on the environment.

PARTS FOR ONE FIXTURE



The unique use of recycled sound absorption materials, renewable felt that is 100% recyclable, and minimalistic industrial design, contribute to a lower transportation costs, and even lower carbon foot print (less CO2 emissions affecting our planet.). Shaper Sense products just feel good to use.



REDUCED CARBON FOOT PRINT
(We know this is really about carbon emissions – but the logo is too cool).

HEAR TO RECYCLE

The sound absorbing substrate used in the Shaper Sense products are made from recycling plastics. The acoustic substrate from FilzFelt, contains a minimum of 60% recycled content and is 100% recyclable.



RECYCLED MATERIALS



SUSTAINABLE



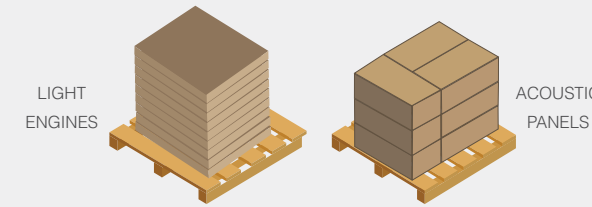
ECO FRIENDLY



SHIP THIS! (NOT THAT)

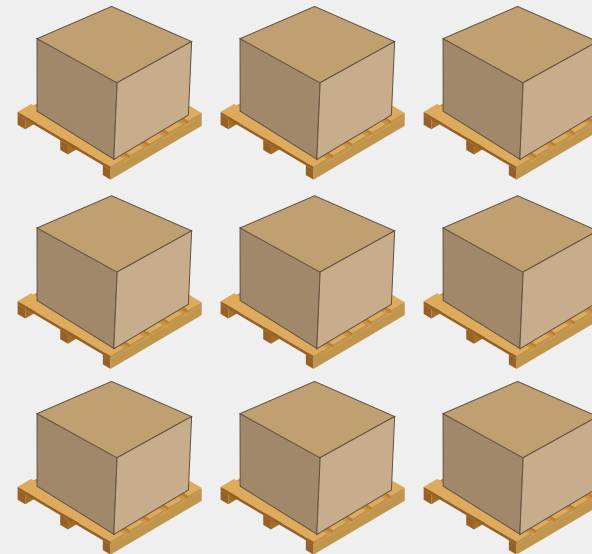
CASE STUDY: PALLET COMPARISON

The Shaper Sense products stack up well against the competition. The flat pack design allows more fixtures on to a pallet, and thus less pallets and environmental impacts for a project. The Shaper Sense Box, fixture for instance, can fit 9 complete products on to **two pallets**. The competition (assuming one large fixture per pallet), would need **nine individual pallets**.



9 Shaper Sense Box fixtures – fits on 2 pallets

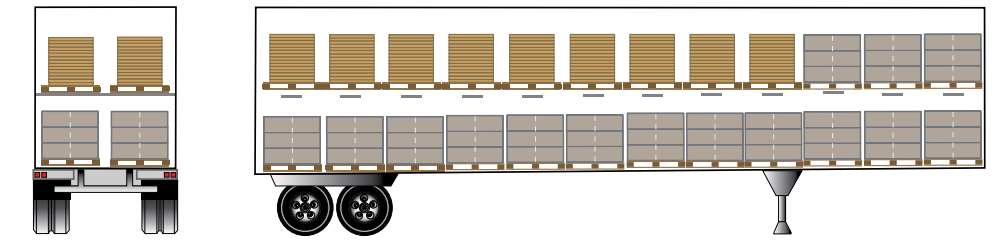
VS.



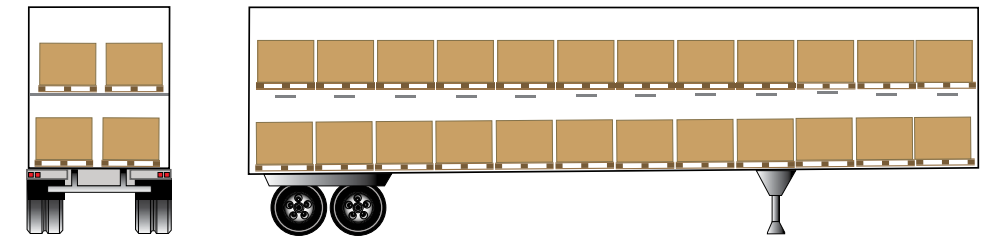
9 large scale acoustic lighting fixtures – fits on 9 pallets

CASE STUDY: TRUCK LOAD COMPARISON

SHAPER SENSE PRODUCTS - 270 BOX / 200 TRAP FIXTURES AT MAXIMUM CAPACITY



COMPETITOR X - 48 ACOUSTIC FIXTURES AT MAXIMUM CAPACITY

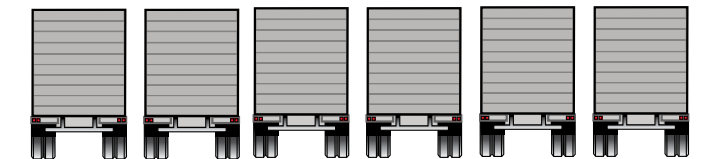


SHAPER SENSE (1) FULL TRUCK LOAD

1/6



COMPETITOR X (6) FULL TRUCK LOAD



ASSUMPTIONS

53 ft Semi-flat bed truck, 45"x48" pallet, 48 pallets fill full capacity in Semi-flatbed truck

Competitors X - 1 large fixture / pallet

Shaper Sense Box - 15 light engines/ pallet + 9 acoustic panels/ pallet, Shaper Sense Trap -

15 light engines/ pallet + 6 acoustic panels/ pallet

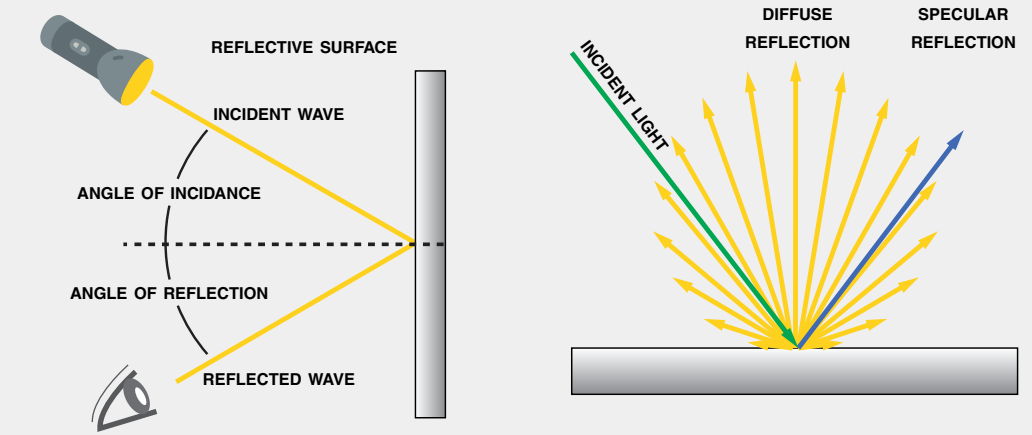
LIGHT WAVES + SOUND WAVES...

A REFLECTION

Sound waves and light waves act the same way. In Lighting, when light waves reflect on hard surfaces, they create a pleasing ambient and diffuse lighting. When sound waves reflect on hard surfaces, it causes the overlapping echo-ness, of reverberation that is not pleasing and can make it hard to discern speech. When beautiful hard surface spaces are designed, sound absorption material became less. The concept of adding acoustic materials on a light fixture provides an aesthetically and pleasing way to provide sound absorption back into the space and in increments that are beneficial to the spacing of lighting fixtures.

HOW LIGHT REFLECTS...

When light reflects, it either gets absorbed or reflects depending on the reflectance value of the surface it hits. In lighting, there is specular reflectance and diffuse reflectance. Specular reflectance takes the incident light and reflects back the same amount as a specular reflection. Diffuse reflectance sends the light uniformly in all directions regardless of the incident direction. This can create soft light, rather than poignant light reflection. In lighting, the reflectance through diffusion can create soft ambient lighting effects that are soothing.



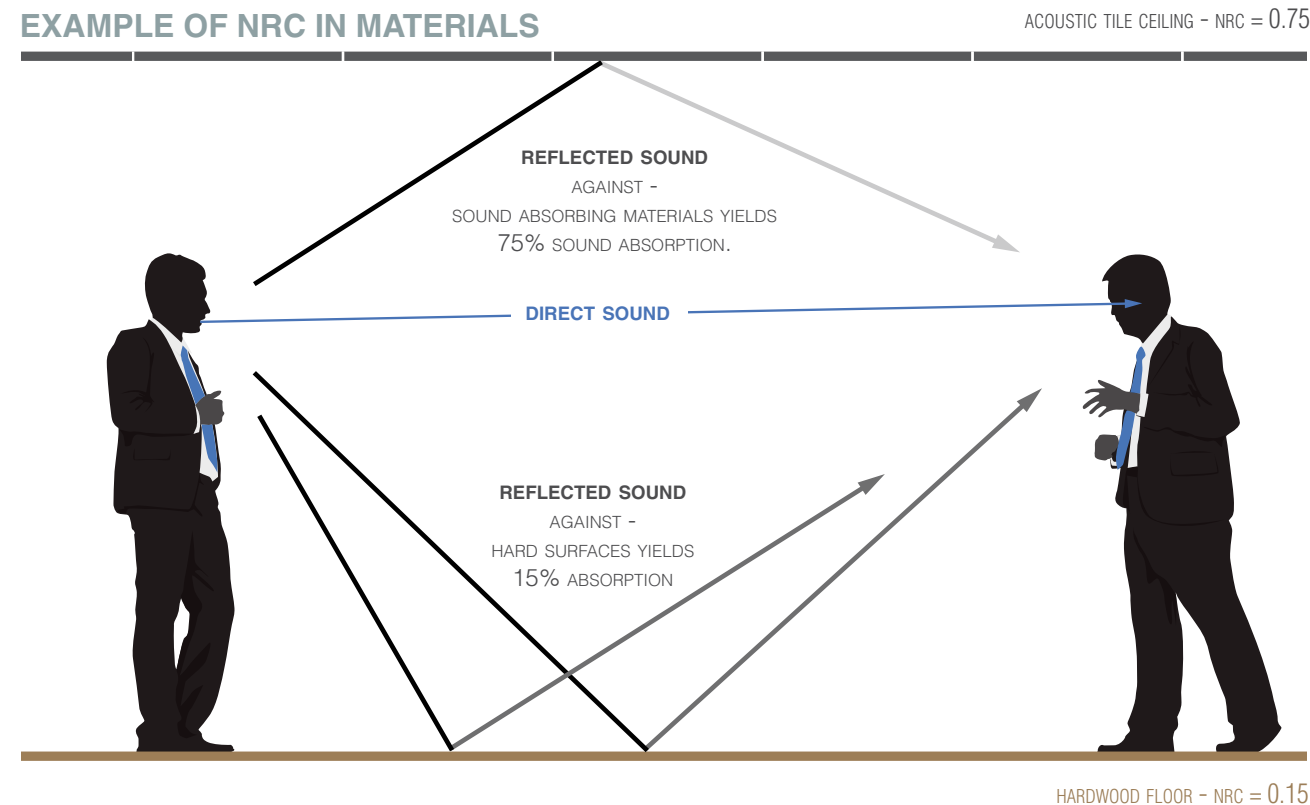
HOW SOUND REFLECTS...

+ 100% sound absorption yields an NRC = 1.0

+ 0% sound absorption yields an NRC = 0

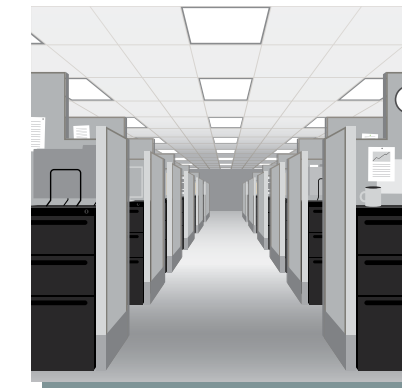
This example shows a ceiling tile that has an NRC equal to 0.75, which means it stops 75% of the sound from going through. In the same way, when sound hits a hardwood floor, only 15% of the sound is absorbed, thus allowing 85% to reflect. This can cause multiple echoes of reflected sound, called reverberation, which can be uncomfortable. Using more sound absorption materials in a space can reduce reverberation.

Sound hits a surface, gets absorbed, then reflects the excess. If a surface does not absorb sound well, then sound continues to reflect, though eventually it will stop reflecting.



WHAT'S SO GREAT ABOUT SOUND ABSORBING LIGHT FIXTURES?

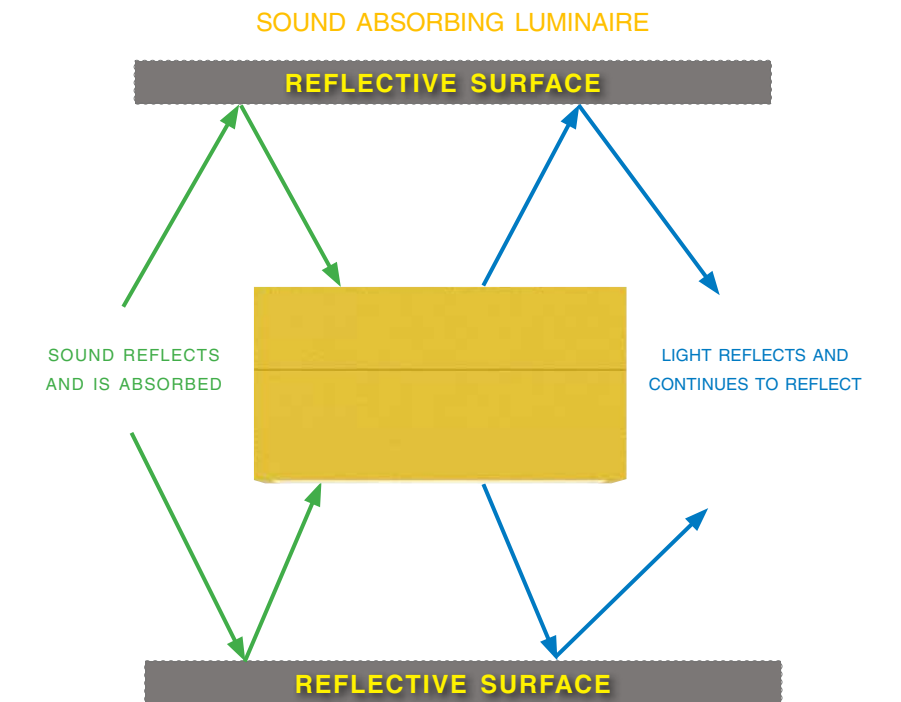
When new open office and space designed evolved in taking down the cubicle walls and opening up the ceiling plane, the sound absorbing materials, often the acoustic ceiling tiles, went out the window as well. By adding sound absorption materials onto the light fixture, we can add back in sound absorption in increments of a lighting layout,



CLOSED OFF OFFICE DESIGN WITH ACOUSTIC TILE CEILING



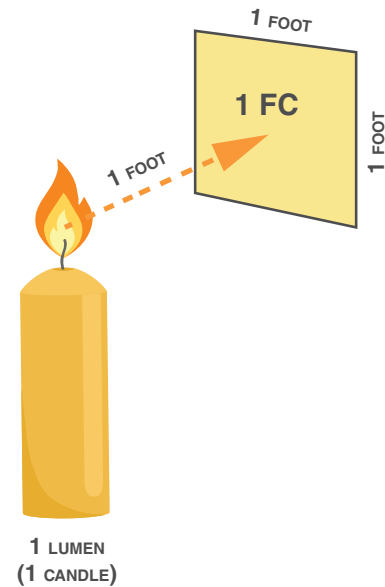
THE OPEN OFFICE AND TAKING ACOUSTIC TILES OUT OF THE DESIGN



LIGHTING 101

LIGHT:

Visible light is the portion of the **electro-magnetic spectrum** that is perceived by the **human** eye, and is responsible for the sense of **sight**.

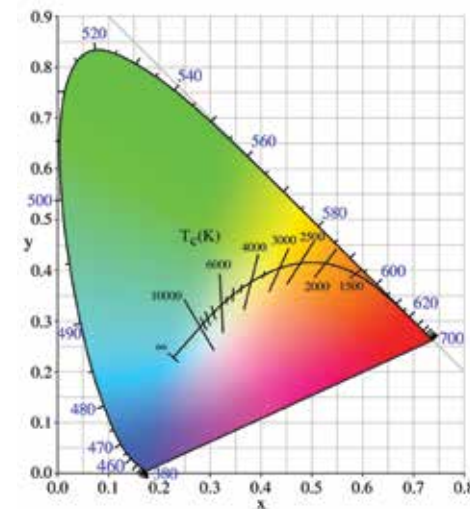


FOOTCANDLE (fc):

Noun: **footcandle**; plural noun: **footcandles** is the imperial unit of illumination, or lumen density incident on a surface. One footcandle is equal to 10.764 lux (SI units), and represents the illuminance cast on a surface by a one-candela (12.57 lumen) omnidirectional source one foot away.

LUMEN (lm):

The SI unit of luminous flux. One lumen is the amount of flux emitted into a unit solid angle (1 steradian) by a one-candela omnidirectional point source. Luminous flux (lumens) is radiant power (watts) multiplied by the luminous efficacy curve of the human eye. This accounts for our eyes perceiving different wavelengths with different sensitivities across the visible spectrum.



CCT: CORRELATED COLOR TEMPERATURE:

The correlated color temperature (CCT) of a light source is the temperature, in kelvin, to which an ideal blackbody radiator must be heated in order to emit light that resembles the chromaticity of the light source in question. As a blackbody radiator is heated, the chromaticity of the "white" light emitted changes from red-orange towards blue. The continuous curved line defining the color change over temperature is referred to as the Planckian locus.

The CIE 1931 x,y chromaticity space, also showing the chromaticities of black-body light sources of various temperatures (Planckian locus), and lines of constant correlated color temperature.

LIGHTING 101

CRI: COLOR RENDERING INDEX:

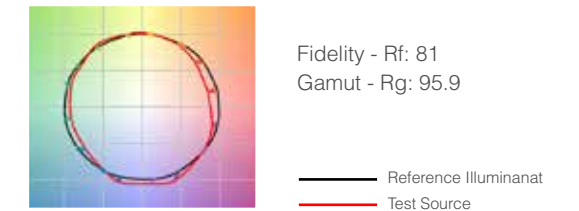
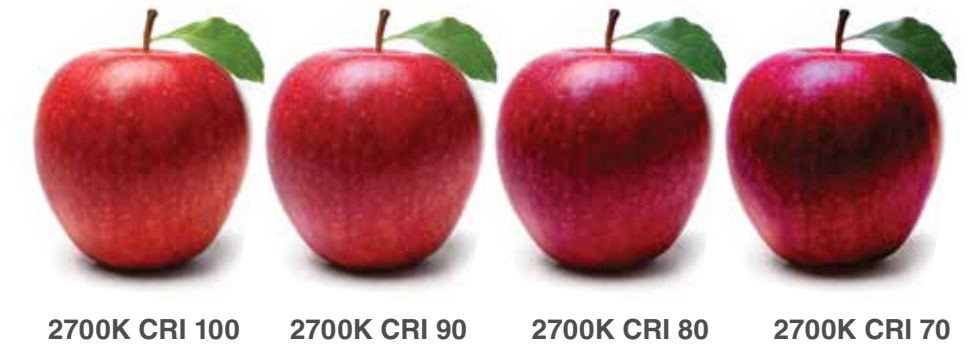
Color rendering index (CRI) is a quantitative measure of the ability of a light source to reveal the colors of objects faithfully in comparison with daylight or incandescent reference illuminant. For example, imagine going to a grocery store and having apples look grayish-red, that would indicate that the lights in the store render some colors poorly and may have a low CRI. If you took that same apple outside it would look a more natural.

Rf: Fidelity Index:

the fidelity index expands on the concepts of the CRI by introducing 99 new color samples for consideration across a more broad range of hues and saturations than CRI. This is a better overall indication of the lights ability to render colors accurately.

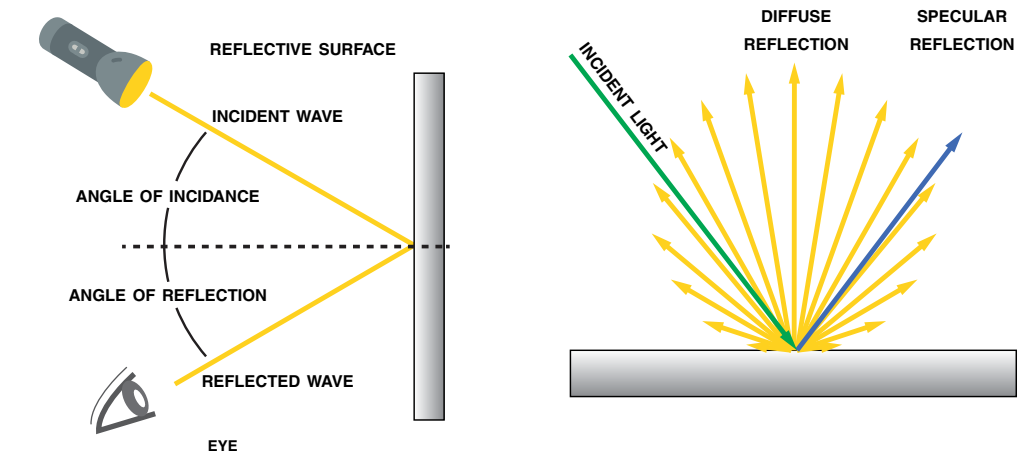
Rg: Gamut Index:

the gamut index indicates the change in saturation of colors. A gamut index of 100 indicates that, on average, the light source does not change the saturation of colors relative to the reference illuminant. If the Rg is less than 100, the light source renders colors as less saturated, and if it is higher than 100, then it renders colors more saturated. This value is averaging the effect of all colors considered, so the detailed TM-30 data should be referenced to understand the change in chroma across hues.



DIFFUSE LIGHTING AND REFLECTION:

Light reflects off of diffuse and specular surfaces. White surfaces are good for reflection as well as hard surfaces. When light reflects off of these, it continues and it dissipates. These multiple lighting reflections create diffuse lighting which creates soft inter-reflected light. This can be more comfortable than direct lighting which can be more intense and sometimes harsh.



SOUND - THE NEW LANGUAGE

The work place landscape and culture has shifted over the past number of years to adjust to changing demographics, technologies, and work styles that combine focused work as well as team work setting. This has lead to investigation of noise in the work place and productivity and better solutions to help with this problem. To understand the integrated lighting and acoustic products from Shaper Sense, a new language and terminology is being introduced and learned as well. Here are just some of the new functional vocabulary:

ABC'S OF ACOUSTICS





A ABSORB **B** BLOCK **C** COVERUP

These 3 techniques are the base line on acoustic design. Different materials and technologies can help account for the most beneficial acoustic soundscapes. Shaper Sense products currently focus on "A" – absorption – which directly affects Reverberation and RT.

RT - REVERBERATION Is the prolongation of reflected sound

RT60 – REVERBERATION TIME Is the number of seconds required for the intensity of the sound to drop from the starting level, by an amount of 60 dB

Table of common reverberation times based on application space. Ideal office space setting is between 0.6 and 0.8

Application	Ideal Reverberation Range
 Café 0.8 to 1.2	0.8 to 1.2
 Open Workspace 0.75 to 1.2	0.75 to 1.2
 Private Meeting Room 0.6 to 1.0	0.6 to 1.0
 Private Office 0.6 to 0.8	0.6 to 0.8

Courtesy of FilzFelt

NRC - NOISE REDUCTION COEFFICIENT

Is a scalar representation of the amount of sound energy absorbed upon striking a particular surface.

SAA - SOUND ABSORPTION AVERAGE

This is the average of the absorption coefficients for the twelve one-third octave bands from 200 to 2500 Hz... The higher the SAA or the NRC value, the better the material absorbs sound

Examples of noise reduction properties within materials:

MATERIAL	NRC VALUES
Marble	0
Brick - Painted	0.02
Concrete (block), painted	0.05
Brick, unpainted	0.05
Concrete (smooth), painted	0.05
Steel	0.1
Glass	0.1
Wood	0.15
Plywood	0.15
Concrete (smooth), unpainted	0.2
Carpet, indoor-outdoor	0.2
Carpet, heavy on concrete	0.3
Concrete (block), unpainted	0.35
Carpet, heavy on foam rubber	0.55
Fiberglass, 1" Semi-rigid	0.75
Fiberglass, 3-1/2" batt	0.95
FilzFelt Acoustic Baffles	1.2
Shaper Sense Box	1.2
Shaper Sense Trapezoid	1.4

The Noise Reduction Coefficient (NRC) is the amount of sound absorbed when a sound wave strikes a surface. An NRC of zero indicates perfect reflection; and NRC of one indicates 100% sound absorption. Lighting Acoustic fixtures have taken on new shapes and geometries that the testing labs are not familiar with. Traditionally, NRC is calculated for flat materials. Because of this paradigm, and the request by the industry to state NRC, test labs have performed these tests on these geometries, which are yielding results higher than 1.0. Currently the test method is following ASTM 423C-17. NRC is the term most recognized and used by the architectural and building industry, but not recognized by ASTM. ASTM has moved to Sound Absorption Average, SAA, that covers more frequency bands within the framework of sound. The conversation around sound is really about reducing Reverberation Time in a space – to improve speech intelligibility.

NAME THAT SOUND: OTHER COMMONLY USED TERMS AND EXAMPLES:

Db - DECIBELS A unit used to measure the intensity of a sound.

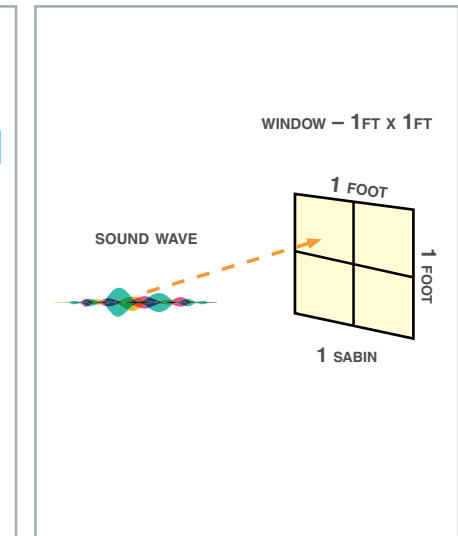
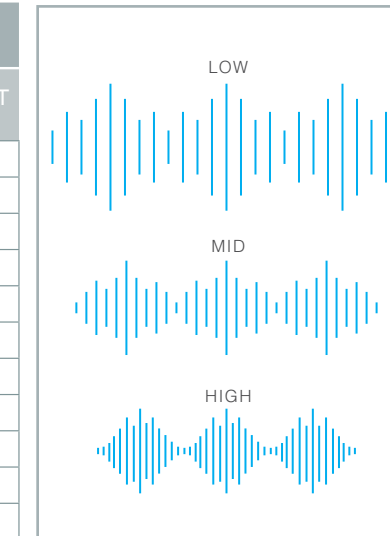
"DECIBEL DB"	DESCRIPTION
0	a mosquito 10 ft away
13	ordinary light bulb hum
40	whisper
50	typical office noise level
40-60	normal conversation
80	heavy traffic at 10am
85	beginning of hearing damage, earplugs should be worn
110	night club - dance floor
116	human body perceiving low vibration
130-135	large train horn
150	rock concert
165	727 taking off
198-202	human death from sound
220	space shuttle landing
235	5.0 Richter scale earthquake
320	volcanic eruption

Fr - FREQUENCY The rate at which a vibration occurs that constitutes a wave, either in a material (as in sound waves), or in an electromagnetic field (as in radio waves and light), usually measured per second.

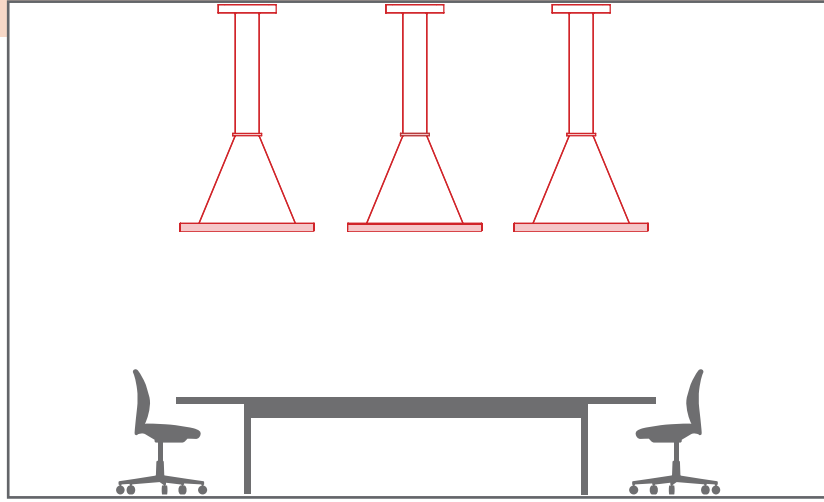
Hz - HERTZ The SI unit of frequency, equal to one cycle per second.

Sb - SABIN Unit of sound absorption (the process by which a material, structure or object takes in sound energy, as opposed to reflecting or transmitting the energy). One sabin indicates the equivalent absorption of one square foot (or square meter in SI units) of a perfect 100% sound absorber.

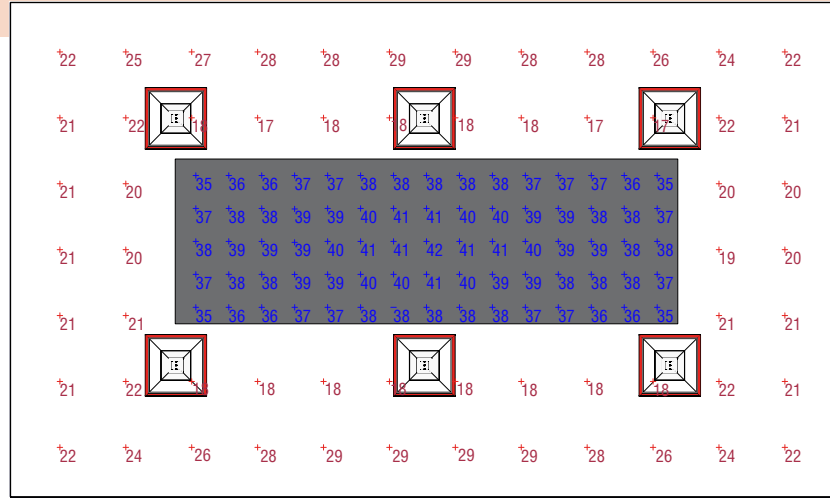
EX. TEST REPORT : SPECIMEN ABSORPTION		
FREQUENCY [HZ]	SABINS	SABIN/UNIT
315	45.89	15.30
400	52.77	17.59
500	70.77	23.59
630	78.65	26.22
800	86.33	28.78
1000	91.79	30.60
1250	95.97	31.99
1600	97.55	32.52
2000	95.34	31.78
2500	94.56	31.52
3150	91.80	30.60



EXAMPLES OF FREQUENCY BANDS OF HUMAN SPEECH. AS A COMMON SOUND SOURCE, IF THESE BANDS OF CAN BE ABSORBED, THE REFLECTED SOUND THAT MAKES A SPACE UNCOMFORTABLE CAN BE REDUCED.



LIGHT FIXTURE WITHOUT SOUND ABSORBING MATERIALS.



RT60 : LIGHT FIXTURES WITHOUT ACOUSTIC SOUND ABSORPTION

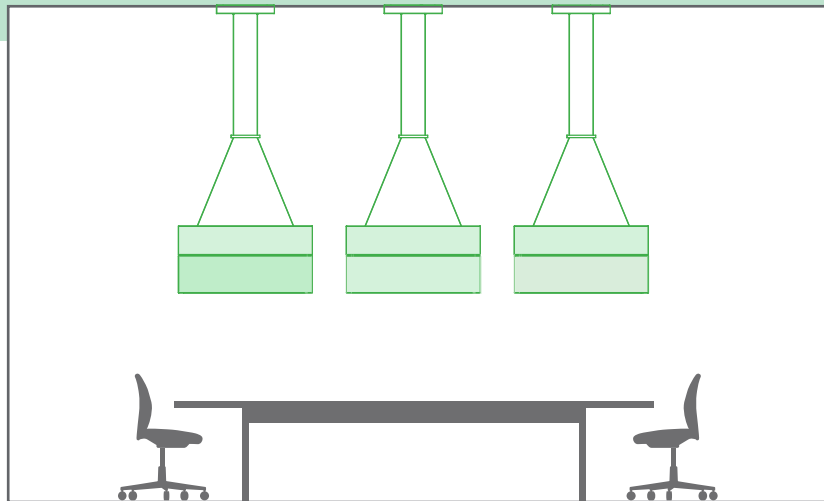
FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
0.76	0.97	1.15	1.11	0.91	0.85	1.04

The frequencies are represented in octave bands that are related to human speech. The results are the RT60 for each frequency in seconds. In this calculation, it is without sound absorbers around the light engines.

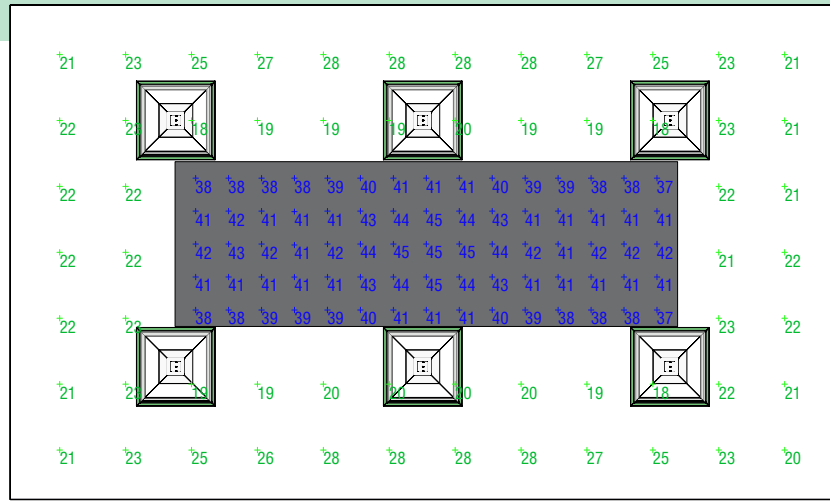
LIGHTS, SOUND, CALC!

BOX

Lighting calculations and the effect on placement of the product relative to sound absorption are shown here. Sound testing labs compute a Sabin/ unit report that produces a value corresponding to a frequency band. This frequency range is put into the perspective of human speech octave, and how we measure reverberation. Here we show those values in a typical conference room, with and without acoustic substrate surrounds. The layout can be similar to how we lay out lighting to get uniform distributions as well as effective sound absorption, or lower reverberation.



LIGHT FIXTURE WITH SOUND ABSORBING MATERIALS.
NRC = 1.2
SAA = 1.19



RT60 : LIGHT FIXTURES WITH ACOUSTIC SOUND ABSORPTION

FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
0.67	0.82	0.84	0.74	0.64	0.62	0.76

The frequencies are represented in octave bands that are related to human speech. The results are the RT60 for each frequency in seconds. In this calculation, the light fixtures include sound absorbers around the light engines in a box shape configuration and uniform layout.

Ambient lighting calculations performed on the floor and table (2.5 AFF). Ratios remain comfortable relative to task and ambient light levels.

LIGHTING CALCULATION STATISTICS						
DESCRIPTION	SYMBOL	AVG	MAX	MIN	MAX/MIN	AVG/MIN
SQUARE CALCS @ TABLE	+	40 fc	43 fc	35 fc	1.2 : 1	1.1 : 1
SQUARE CALCS @ FLOOR	+	25 fc	29 fc	17 fc	1.7 : 1	1.5 : 1
BOX CALCS @ TABLE	+	41 fc	45 fc	37 fc	1.2 : 1	1.1 : 1
BOX CALCS @ FLOOR	+	23 fc	28 fc	18 fc	1.6 : 1	1.3 : 1

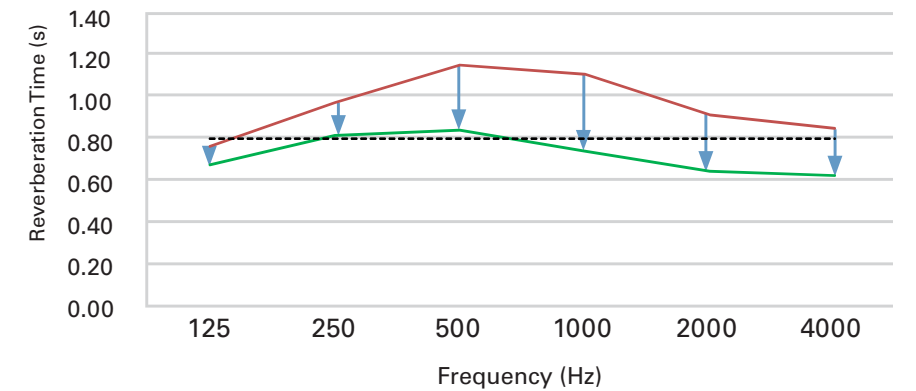
% IMPROVEMENT IN REVERBERATION (RT60)

FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
12%	16%	27%	33%	30%	27%	27%

EX. 58% REVERBERATION DECREASE (RT60) USING 6 SHAPER SENSE BOX FIXTURES AT 8.5 FT SPACING.

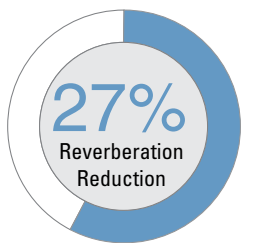
The percentages represent the % improvement in reverberation per octave band, and then an average value over the entire range. It is recommended to use between 0.6 to 0.8 as an Reverberation Time goal for office settings.

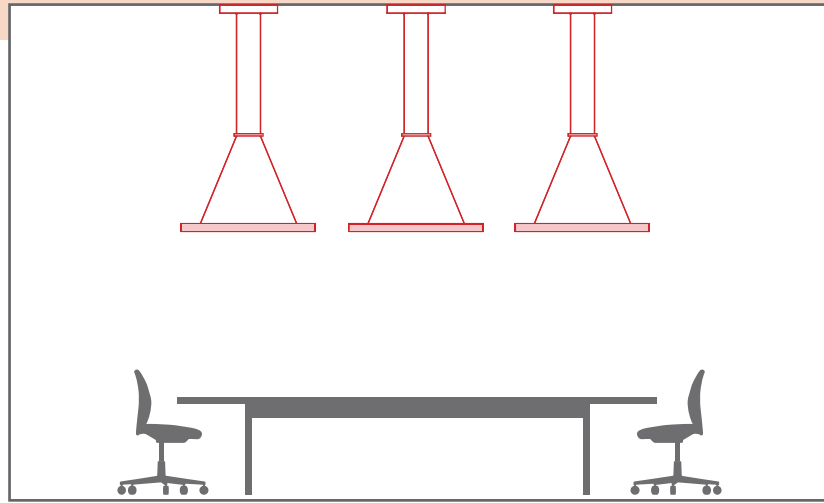
Reverberation Time (RT60)



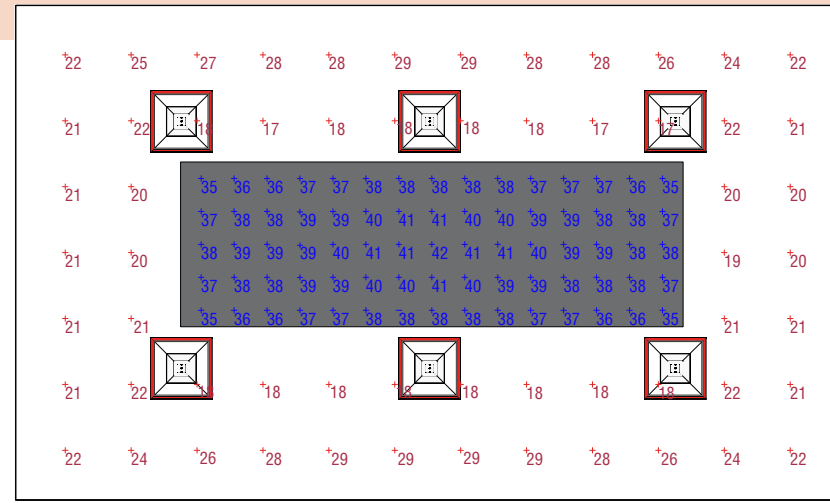
- RT60 (without acoustic treatment)
- RT60 (with acoustic treatment)
- - - GOAL

RT60 GOAL (typical. office) **0.8**





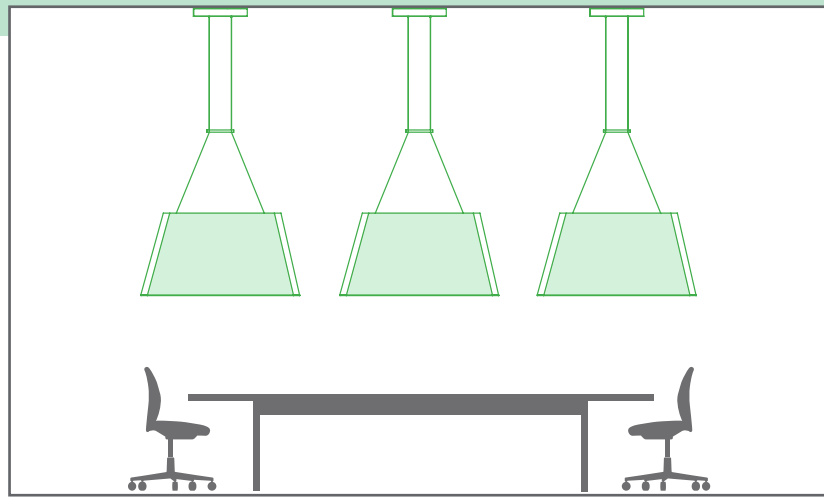
LIGHT FIXTURE WITHOUT SOUND ABSORBING MATERIALS.



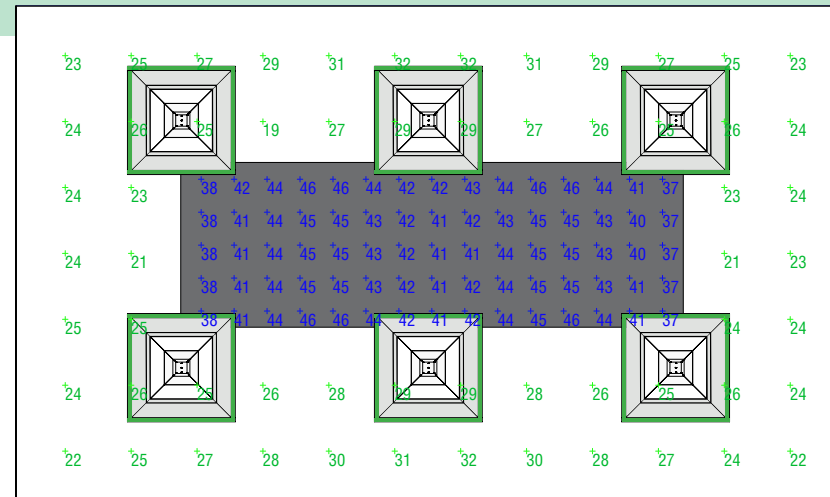
RT60 : LIGHT FIXTURES WITHOUT ACOUSTIC SOUND ABSORPTION

FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
0.76	0.97	1.15	1.11	0.91	0.85	1.04

The frequencies are represented in octave bands that are related to human speech. The results are the RT60 for each frequency in seconds. In this calculation, it is without sound absorbers around the light engines.



LIGHT FIXTURE WITH SOUND ABSORBING MATERIALS.
NRC = 1.4
SAA = 1.38



RT60 : LIGHT FIXTURES WITH ACOUSTIC SOUND ABSORPTION

FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
0.64	0.75	0.68	0.60	0.53	0.52	0.64

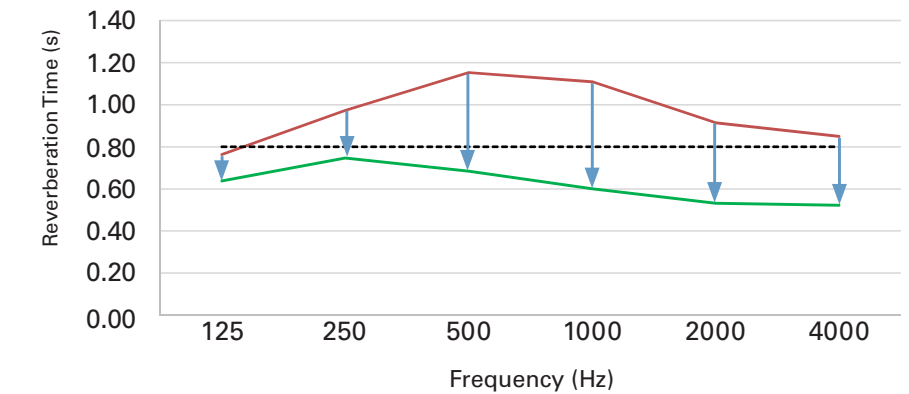
The frequencies are represented in octave bands that are related to human speech. The results are the RT60 for each frequency in seconds. In this calculation, the light fixtures include sound absorbers around the light engines in a Trapezoid shape.

LIGHTS, SOUND, CALC!

TRAPEZOID

Lighting calculations and the effect on placement of the product relative to sound absorption are shown here. Sound testing labs produce a Sabin/ unit report that produces a value corresponding to a frequency band. This frequency range is put into the perspective of human speech octave, and we measure reverberation. Here we show those values in a typical conference room, with and without acoustic substrate surrounds. The layout can be similar to how we lay out lighting to get uniform distributions as well as effective sound absorption, or lower reverberation.

Reverberation Time (RT60)



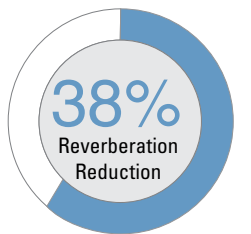
% IMPROVEMENT IN REVERBERATION (RT60)

FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
16%	23%	41%	46%	42%	39%	38%

EX. 38% REVERBERATION DECREASE (RT60) USING 6 SHAPER SENSE TRAPEZOID FIXTURES.

The percentages represent the % improvement in reverberation per octave band, and then an average value over the entire range. It is recommended to use between 0.6 to 0.8 as an Reverberation Time goal for office settings.

- RT60 (without acoustic treatment)
- RT60 (with acoustic treatment)
- - - GOAL
- RT60 GOAL (typical. office) **0.8**



Ambient lighting calculations performed on the floor and table (2.5 AFF). Ratios remain comfortable relative to task and ambient light levels.

LIGHTING CALCULATION STATISTICS

DESCRIPTION	SYMBOL	AVG	MAX	MIN	MAX/MIN	AVG/MIN
SQUARE CALCS @ TABLE	+	40 fc	43 fc	35 fc	1.2 : 1	1.1 : 1
SQUARE CALCS @ FLOOR	+	25 fc	29 fc	17 fc	1.7 : 1	1.5 : 1
TRAP CALCS @ TABLE	+	43 fc	46 fc	37 fc	1.2 : 1	1.2 : 1
TRAP CALCS @ FLOOR	+	26 fc	32 fc	21 fc	1.5 : 1	1.2 : 1

TECHNICAL SPECIFICATIONS

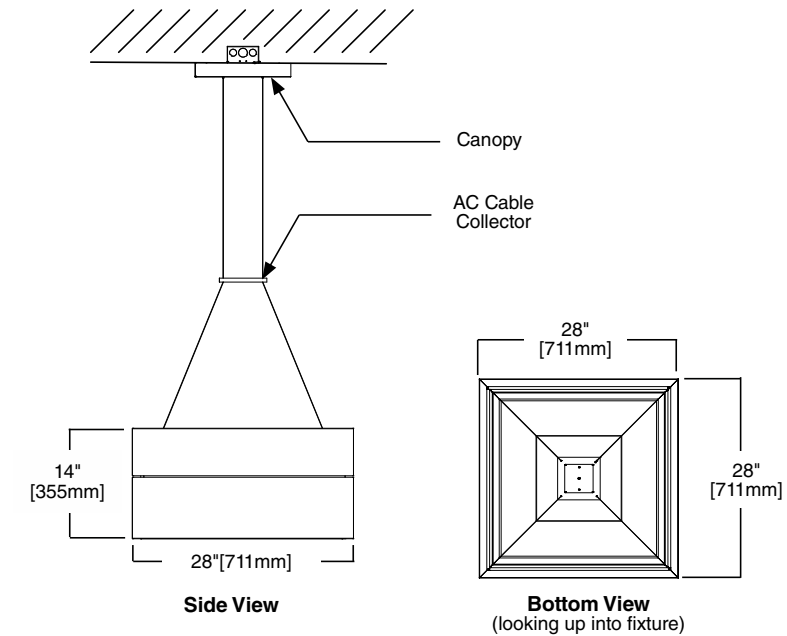
BOX



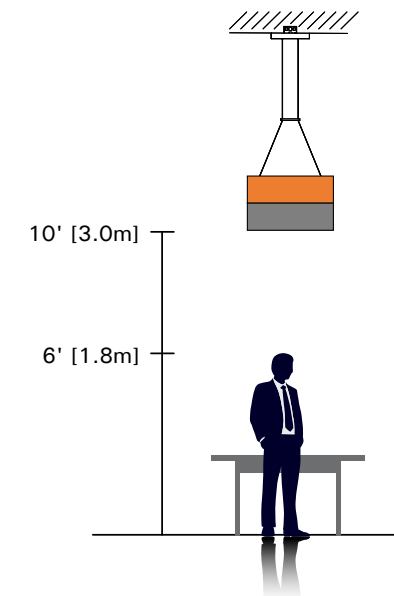
Felt Color Selections for Top and Bottom Panels

136 Weinrot	209 Bordeaux	102 Kirsche	201 Rot	125 Tomate	179 Hellrot
180 Terracotta	173 Mango	105 Rost	116 Orange	151 Hellorange	124 Gelb
131 Honig	274 Senf	203 Vanille	384 Lind	378 Oliv	732 Farn
377 Maigrün	713 Kiwi	343 D'Grün	156 Lodén	448 Moos	548 Türkis
312 Lagune	308 Petrol	686 Enzian	282 D'Blau	540 Ozean	626 Azur
272 Royal	286 H'Blau	284 Himmel	613 Gletscher	437 Aubergine	269 Violett
255 Flieder	265 Lavendel	242 Pink	503 Magnolie	231 Rosa	534 Rosè
250 Trüffelbraun	497 D'Braun	476 Schoko	220 Rehbraun	385 Schlamm	415 Schilf
331 Sahara	467 Sand	160 Beige	1150 Weiß	110 Rohweiß	100 Wollweiß
200 Natur	408 Taupe	175 Graphit	425 Taubengrau	423 Hellgrau	170 Asche
426 Schwarz	300 Anthrazit				

Dimensions



Scale



Series
ShSh = Shaper Sense

Shape/Family
BOX=Box

Light Level¹

1-L30-90=2480 lumens, 30W, 3000K, 90 CRI
1-L35-80=3084 lumens, 30W, 3500K, 80 CRI
1-L40-80=3028 lumens, 30W, 4000K, 80 CRI
2-L30-90=3172 lumens, 39W, 3000K, 90 CRI
2-L35-80=3944 lumens, 39W, 3500K, 80 CRI
2-L40-80=3873 lumens, 39W, 4000K, 80 CRI

Voltage

UNV = Universal Voltage (120-277)

Mounting

CNPY = Canopy mount (works for surface, open structure, and gypsum ceilings)

Dimming

STD = 0-10V

Controls

SWTPD1 = Wavelinx Wireless Tile
LWTPD1 = LumaWatt Pro Wireless Tile

Voltage

UNV - 120 - 277V

Finish

Top Panel Selection (TP)²

TP100 = TP Panel Wollweiss
TP110 = TP Panel Rohweiss
TP150 = TP Panel Weiss
TP160 = TP Panel Beige
TP170 = TP Panel Asche
TP175 = TP Panel Graphit
TP200 = TP Panel Natur
TP220 = TP Panel Rehbraun
TP250 = TP Panel Trüffelbraun
TP300 = TP Panel Anthrazit
TP102 = TP Panel Kirsche
TP105 = TP Panel Rost
TP116 = TP Panel Orange
TP125 = TP Panel Tomate
TP136 = TP Panel Weinrot
TP156 = TP Panel Lodén
TP203 = TP Panel Vanille
TP274 = TP Panel Senf
TP312 = TP Panel Lagune
TP331 = TP Panel Sahara
TP385 = TP Panel Schlamm
TP408 = TP Panel Taupe
TP415 = TP Panel Schilf
TP437 = TP Panel Aubergine
TP448 = TP Panel Moos
TP503 = TP Panel Magnolie
TP534 = TP Panel Rose
TP540 = TP Panel Ozean
TP613 = TP Panel Gletscher
TP626 = TP Panel Azur
TP686 = TP Panel Enzian

TP713 = TP Panel Kiwi
TP732 = TP Panel Farn
TP124 = TP Panel Gelb
TP131 = TP Panel Honig
TP151 = TP Panel Hellorange
TP173 = TP Panel Mango
TP179 = TP Panel Hellrot
TP180 = TP Panel Terracotta
TP201 = TP Panel Rot
TP209 = TP Panel Bordeaux
TP231 = TP Panel Rosa
TP242 = TP Panel Pink
TP255 = TP Panel Flieder
TP265 = TP Panel Lavendel
TP269 = TP Panel Violett
TP272 = TP Panel Royal
TP282 = TP Panel D'Blau
TP284 = TP Panel Himmel
TP286 = TP Panel H'Blau
TP308 = TP Panel Petrol
TP343 = TP Panel D'Grun
TP377 = TP Panel Maigrun
TP378 = TP Panel Oliv
TP384 = TP Panel Lind
TP423 = TP Panel Hellgrau
TP425 = Top Panel Taubengrau
TP426 = TP Panel Schwarz
TP467 = TP Panel Sand
TP476 = TP Panel Schoko
TP497 = TP Panel D'Braun
TP548 = TP Panel Türkis

Bottom Panel Selection (BP)³

BP100 = BP Panel Wollweiss
BP110 = BP Panel Rohweiss
BP150 = BP Panel Weiss
BP160 = BP Panel Beige
BP170 = BP Panel Asche
BP175 = BP Panel Graphit
BP200 = BP Panel Natur
BP220 = BP Panel Rehbraun
BP250 = BP Panel Trüffelbraun
BP300 = BP Panel Anthrazit
BP102 = BP Panel Kirsche
BP105 = BP Panel Rost
BP116 = BP Panel Orange
BP125 = BP Panel Tomate
BP136 = BP Panel Weinrot
BP156 = BP Panel Lodén
BP203 = BP Panel Vanille
BP274 = BP Panel Senf
BP312 = BP Panel Lagune
BP331 = BP Panel Sahara
BP385 = BP Panel Schlamm
BP408 = BP Panel Taupe
BP415 = BP Panel Schilf
BP437 = BP Panel Aubergine
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BP503 = BP Panel Magnolie
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BP626 = BP Panel Azur
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BP732 = BP Panel Farn
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BP384 = BP Panel Lind
BP423 = BP Panel Hellgrau
BP425 = Top Panel Taubengrau
BP426 = BP Panel Schwarz
BP467 = BP Panel Sand
BP476 = BP Panel Schoko
BP497 = BP Panel D'Braun
BP548 = BP Panel Türkis

Notes: 1. 3000K – only in 90 CRI, 3500K only available in 80 CRI, 4000K only available in 80 CRI.
2. Selection for BOX top panel color. See diagram on page 3 for clarification.
3. Selection for BOX bottom panel color. See diagram on page 3 for clarification.

TECHNICAL SPECIFICATIONS

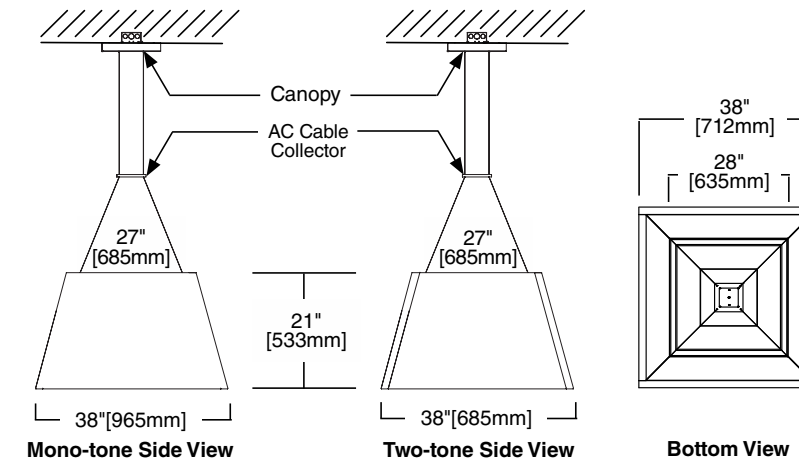
TRAPEZOID



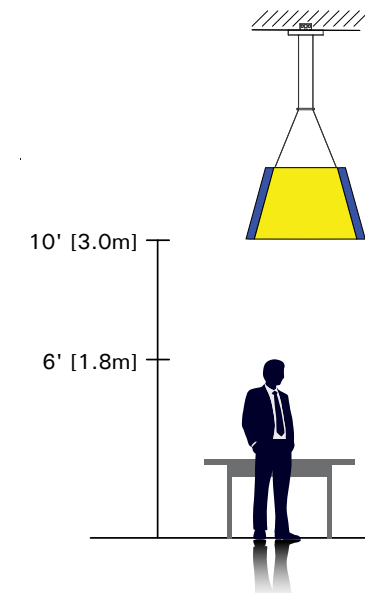
Felt Color Selections for Side AA and Side BB Panels

136 Weinrot	209 Bordeaux	102 Kirsche	201 Rot	125 Tomate	179 Hellrot
180 Terracotta	173 Mango	105 Rost	116 Orange	151 Hellorange	124 Gelb
131 Honig	274 Senf	203 Vanille	384 Lind	378 Oliv	732 Farn
377 Maigrün	713 Kiwi	343 D'Grün	156 Loden	448 Moos	548 Türkis
312 Lagune	308 Petrol	686 Enzian	282 D'Blau	540 Ozean	626 Azur
272 Royal	286 H'Blau	284 Himmel	613 Gletscher	437 Aubergine	269 Violett
255 Flieder	265 Lavendel	242 Pink	503 Magnolie	231 Rosa	534 Rosè
250 Trüffelbraun	497 D'Braun	476 Schoko	220 Rehbraun	385 Schlamm	415 Schilf
331 Sahara	467 Sand	160 Beige	1150 Weiß	110 Rohweiß	100 Wollweiß
200 Natur	408 Taupe	175 Graphit	425 Taubengrau	423 Hellgrau	170 Asche
426 Schwarz	300 Anthrazit				

Dimensions



Scale



Series
ShSh = Shaper Sense

Shape/Family
TRAP=Trapezoid

Light Level¹

1-L30-90=2487 lumens, 30W, 3000K, 90 CRI
1-L35-80=3092 lumens, 30W, 3500K, 80 CRI
1-L40-80=3036 lumens, 30W, 4000K, 80 CRI
2-L30-90=3181 lumens, 39W, 3000K, 90 CRI
2-L35-80=3955 lumens, 39W, 3500K, 80 CRI
2-L40-80=3884 lumens, 39W, 4000K, 80 CRI

Voltage

UNV = Universal Voltage (120-277)

Mounting

CNPY = Canopy mount (works for surface, open structure, and gypsum ceilings)

Dimming

STD = 0-10V

Controls

SWTPD1 = Wavelinx Wireless Tile
LWTPD1 = LumaWatt Pro Wireless Tile

Voltage

UNV - 120 - 277V

Finish

Mono-tone Side Panel²

AA100 = AA Panel Wollweiss
AA110 = AA Panel Rohweiss
AA150 = AA Panel Weiss
AA160 = AA Panel Beige
AA170 = AA Panel Asche
AA175 = AA Panel Graphit
AA200 = AA Panel Natur
AA220 = AA Panel Rehbraun
AA250 = AA Panel Trüffelbraun
AA300 = AA Panel Anthrazit
AA102 = AA Panel Kirsche
AA105 = AA Panel Rost
AA116 = AA Panel Orange
AA125 = AA Panel Tomate
AA136 = AA Panel Weinrot
AA156 = AA Panel Loden
AA203 = AA Panel Vanille
AA274 = AA Panel Senf
AA312 = AA Panel Lagune
AA331 = AA Panel Sahara
AA385 = AA Panel Schlamm
AA408 = AA Panel Taupe
AA415 = AA Panel Schilf
AA437 = AA Panel Aubergine
AA448 = AA Panel Moos
AA503 = AA Panel Magnolie
AA534 = AA Panel Rose
AA540 = AA Panel Ozean
AA613 = AA Panel Gletscher
AA626 = AA Panel Azur
AA686 = AA Panel Enzian

AA713 = AA Panel Kiwi
AA732 = AA Panel Farn
AA124 = AA Panel Gelb
AA131 = AA Panel Honig
AA151 = AA Panel Hellorange
AA173 = AA Panel Mango
AA179 = AA Panel Hellrot
AA180 = AA Panel Terracotta
AA201 = AA Panel Rot
AA209 = AA Panel Bordeaux
AA231 = AA Panel Rosa
AA242 = AA Panel Pink
AA255 = AA Panel Flieder
AA265 = AA Panel Lavendel
AA269 = AA Panel Violett
AA272 = AA Panel Royal
AA282 = AA Panel D'Blau
AA284 = AA Panel Himmel
AA286 = AA Panel H'Blau
AA308 = AA Panel Petrol
AA343 = AA Panel D'Grun
AA377 = AA Panel Maigrun
AA378 = AA Panel Oliv
AA384 = AA Panel Lind
AA423 = AA Panel Hellgrau
AA425 = Top Panel Taubengrau
AA426 = AA Panel Schwarz
AA467 = AA Panel Sand
AA476 = AA Panel Schoko
AA497 = AA Panel D'Braun
AA548 = AA Panel Turkis

Two-tone Side Panel³

BB100 = BB Panel Wollweiss
BB110 = BB Panel Rohweiss
BB150 = BB Panel Weiss
BB160 = BB Panel Beige
BB170 = BB Panel Asche
BB175 = BB Panel Graphit
BB200 = BB Panel Natur
BB220 = BB Panel Rehbraun
BB250 = BB Panel Trüffelbraun
BB300 = BB Panel Anthrazit
BB102 = BB Panel Kirsche
BB105 = BB Panel Rost
BB116 = BB Panel Orange
BB125 = BB Panel Tomate
BB136 = BB Panel Weinrot
BB156 = BB Panel Loden
BB203 = BB Panel Vanille
BB274 = BB Panel Senf
BB312 = BB Panel Lagune
BB331 = BB Panel Sahara
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BB423 = BB Panel Hellgrau
BB425 = Top Panel Taubengrau
BB426 = BB Panel Schwarz
BB467 = BB Panel Sand
BB476 = BB Panel Schoko
BB497 = BB Panel D'Braun
BB548 = BB Panel Turkis

Notes: 1. 3000K – only in 90 CRI, 3500K only available in 80 CRI, 4000K only available in 80 CRI.
2. Selection for TRAP Mono-Tone color side panel. See diagram on page 3 for clarification.
3. Selection for TRAP Two-Tone color side panel. See diagram on page 3 for clarification.

Lighting Product Lines

Ametrix
AtLite
Corelite
Ephesus
Fail-Safe
Halo
Halo Commercial
Invue
io
Iris
Lumark
Lumière
McGraw-Edison
Metalux
MWS
Neo-Ray
Portfolio
RSA
Shaper
Streetworks
Sure-Lites

Controls Product Lines

Fifth Light Technology
Greengate
iLight (International Only)
iLumin
Zero 88

Connected Lighting Systems

Distributed Low-Voltage Power
HALO Home
iLumin Plus
LumaWatt Pro
WaveLinx



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Aurora, CO 80011
P: 303-393-1522
www.eaton.com/lighting

Canada Sales
5925 McLaughlin Road
Mississauga, Ontario L5R 1B8
P: 905-501-3000
F: 905-501-3172

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Shaper Sense is dedicated to MNK