

# [ SHAPER SENSE ]

ACOUSTIC LIGHTING

# INIMITABLE

/iˈnɪmədəb(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 line of award winning acoustic lighting products.



"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.

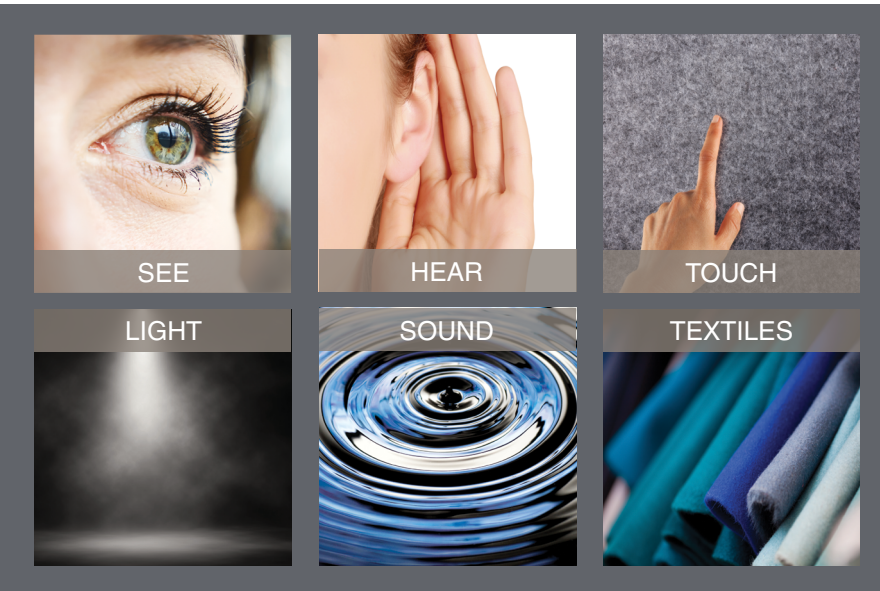
## INTRODUCING SHAPER SENSE

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.



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 96 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 and bottom 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<sup>•</sup> DIFFERENCE

FilzFelt is an industry leading natural textile and acoustic products company that provides industry leading material performance. The color palette offering of 96 100% 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.

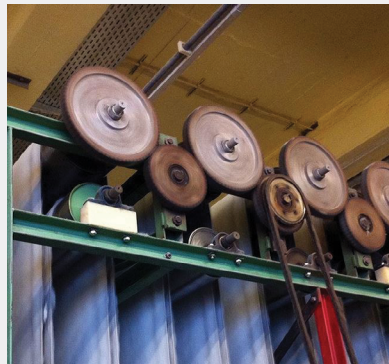
This natural material has inherent durability and beauty that cannot be achieved with synthetic fibers. The 100% Wool Design Felt brings this ancient fabric into the 21st century where it balances beauty, utility and sustainability while meeting the challenging needs of modern spaces. Warranty on FilzFelt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



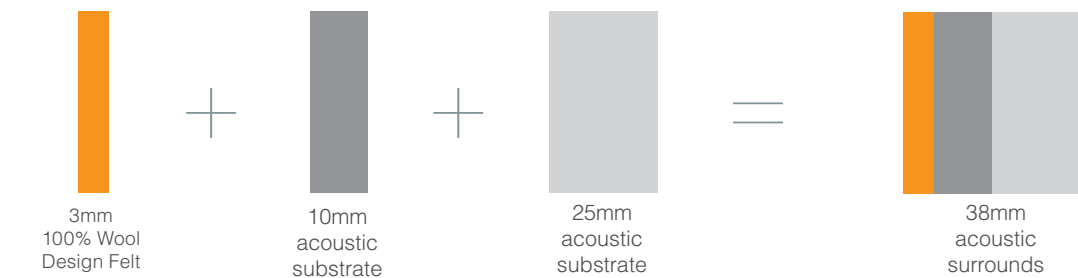
# CHOICES... 96 OF THEM!

100% Wool Design Felt - 96 felt color choices on par and trend.

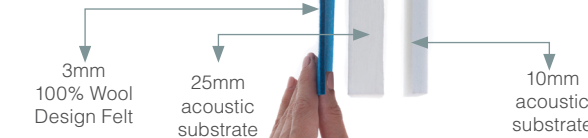
Wool felt is one of the oldest man-made textiles and to produce felt, raw wool undergoes a wet "felting" process, which involves matting, condensing and pressing the fibers. 100% Wool Design Felt is a high quality natural material, comes in highly saturated colors, and is perfect for demanding design 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



Shaper Sense

38mm acoustic surrounds





# PICK ME!

The Shaper Sense Box has a top panel from which 96 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.



## 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

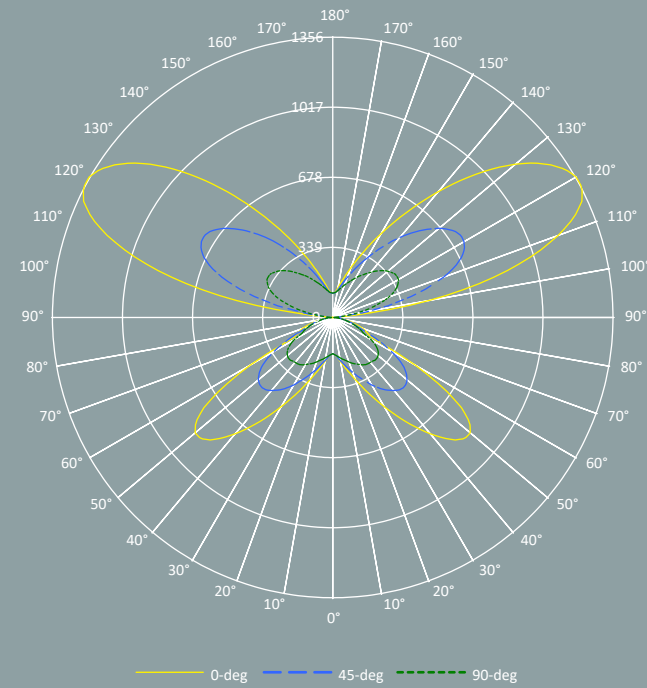
3172 lumens    3000K @ 90 CRI    3000K    90

3944 lumens    3500K @ 80 CRI    3500K    80

3873 lumens    4000K @ 80 CRI    4000K    80



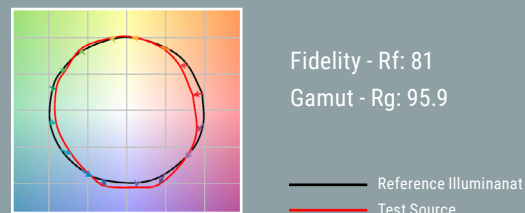
## THE SHAPE OF LIGHT – POLAR PLOT



**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

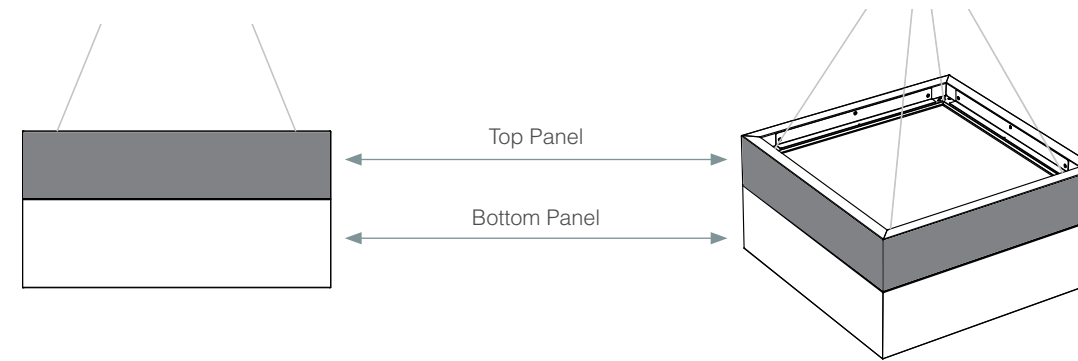


# HOW TO PICK

## SHAPER SENSE BOX COLORS

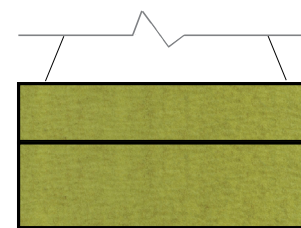
For contrasting colors, choose different colors for the top panel and the bottom panel.  
 For a monochromatic effect, select the same color for both top and bottom panels.

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



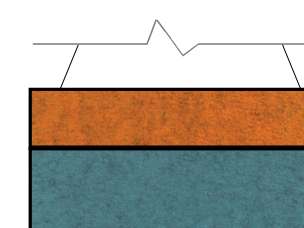
### EXAMPLE OF MONO-TONE

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

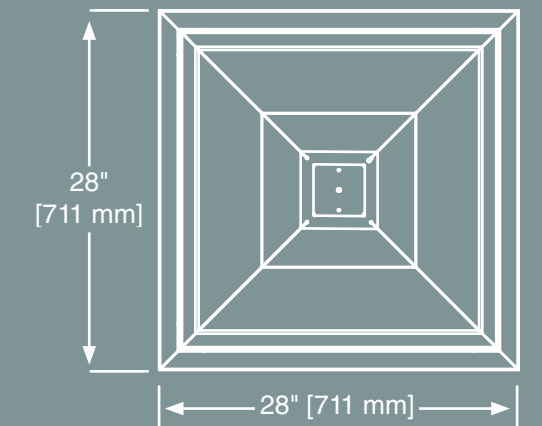
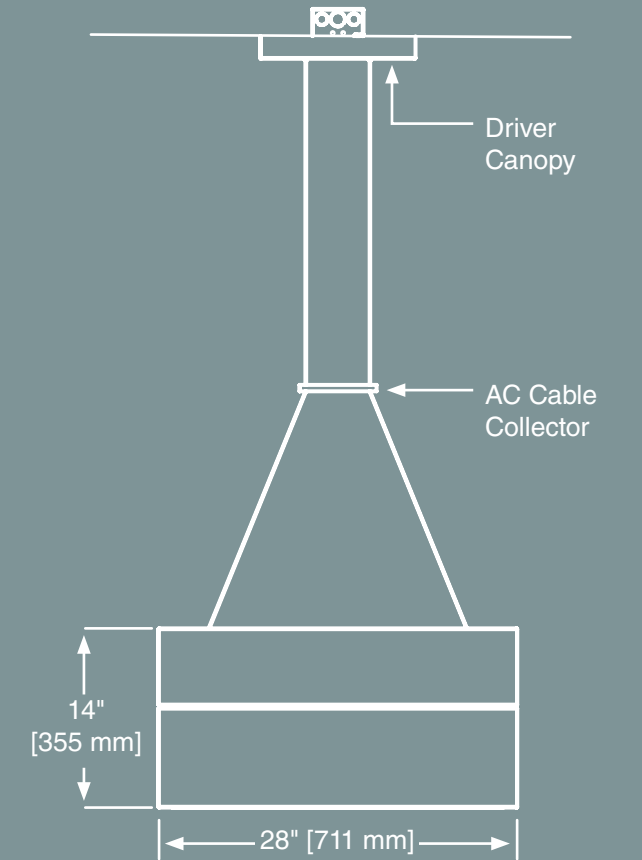


### EXAMPLE OF TWO-TONE

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 96 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

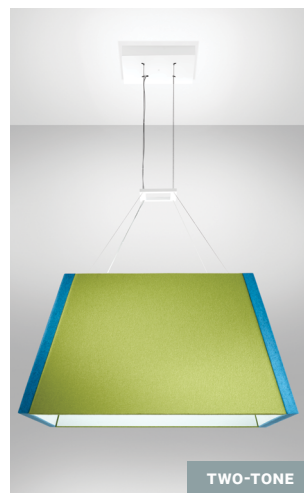
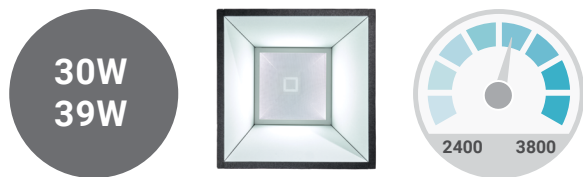
3036 lumens    4000K @ 80 CRI    4000K    80

## Light Level 2 – 39W

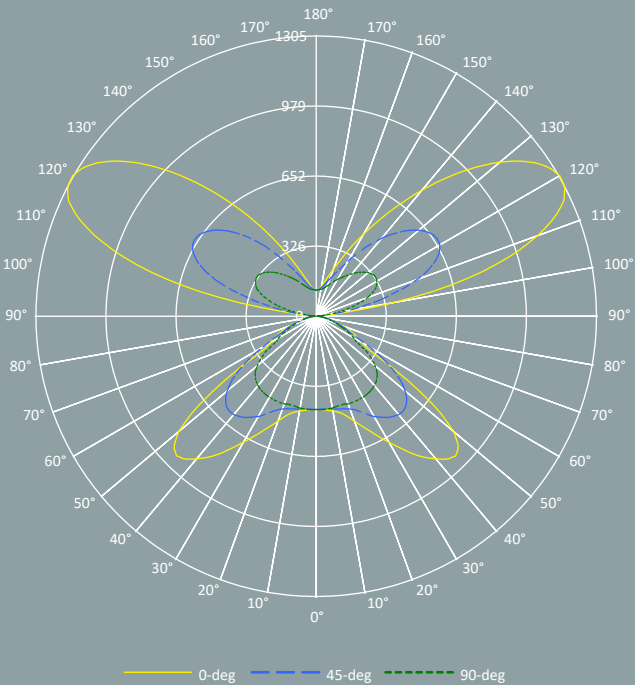
3182 lumens    3000K @ 90 CRI    3000K    90

3955 lumens    3500K @ 80 CRI    3500K    80

3884 lumens    4000K @ 80 CRI    4000K    80



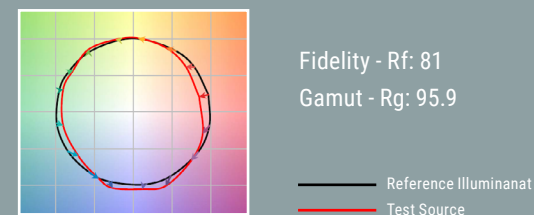
## THE SHAPE OF LIGHT – POLAR PLOT



**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

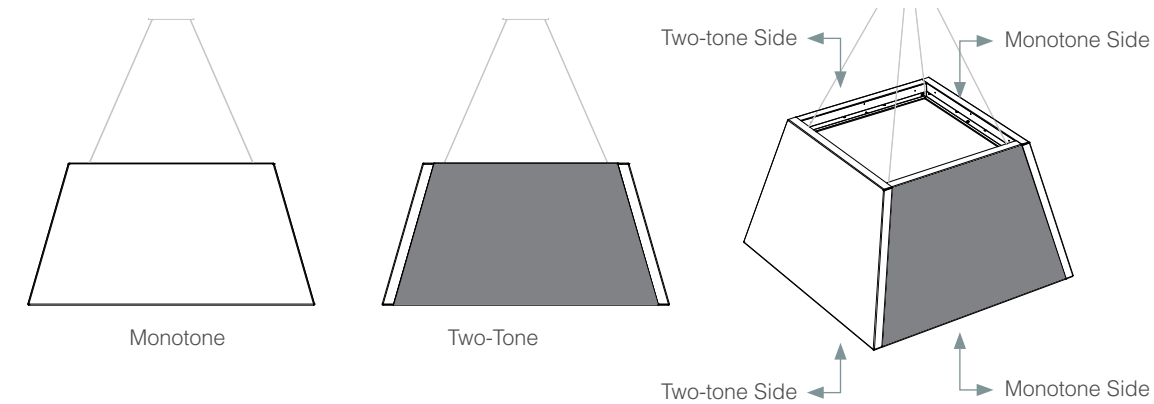


# HOW TO PICK

SHAPER SENSE TRAPEZOID COLORS

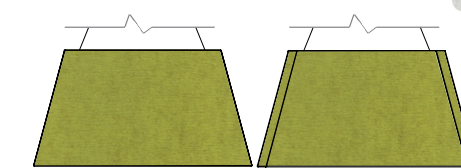
For contrasting colors, choose different colors for the top panel and the bottom panel.  
 For a monochromatic effect, select the same color for both top and bottom panels.

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



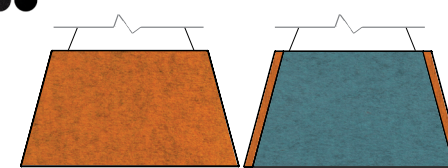
### EXAMPLE OF MONO-TONE

Side AA = 713 Kiwi  
 Side BB = 713 Kiwi

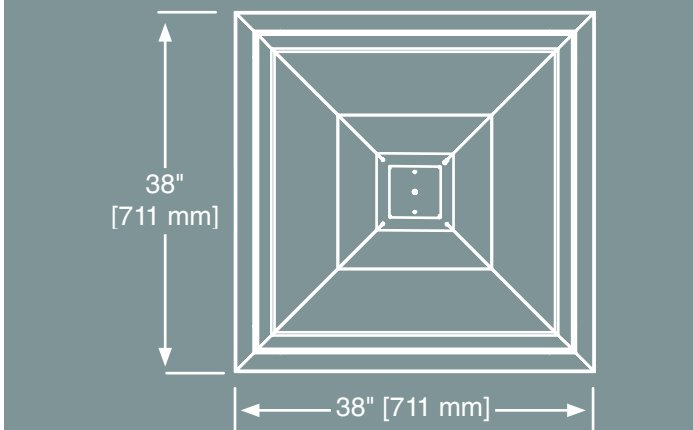
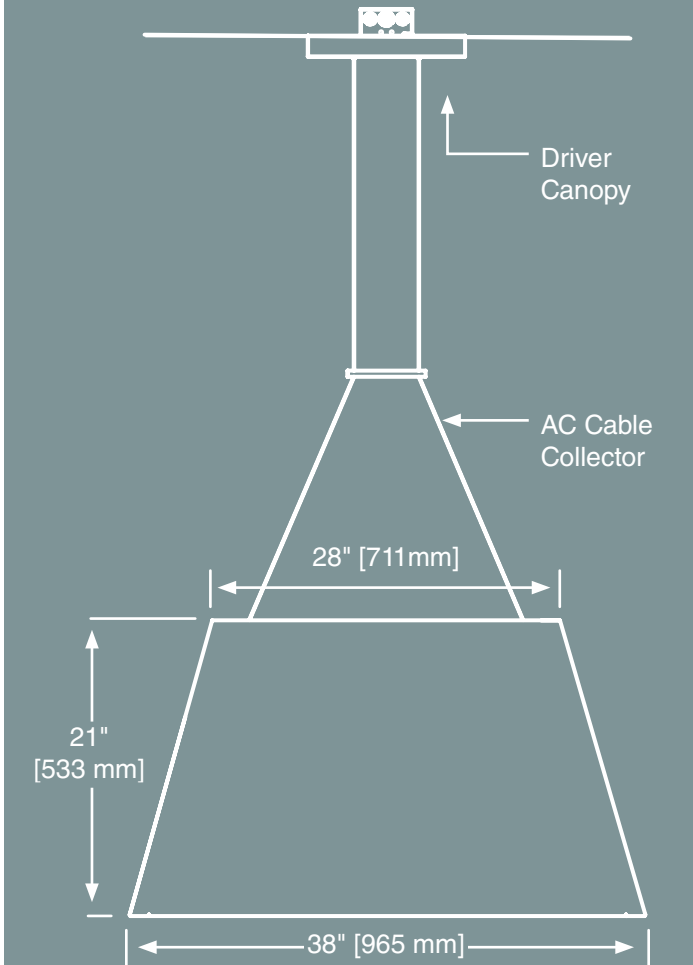


### EXAMPLE OF TWO-TONE

Side AA116 = 116 Orange  
 Side BB312 = 312 Lagune



See page 29 for color selection numbers



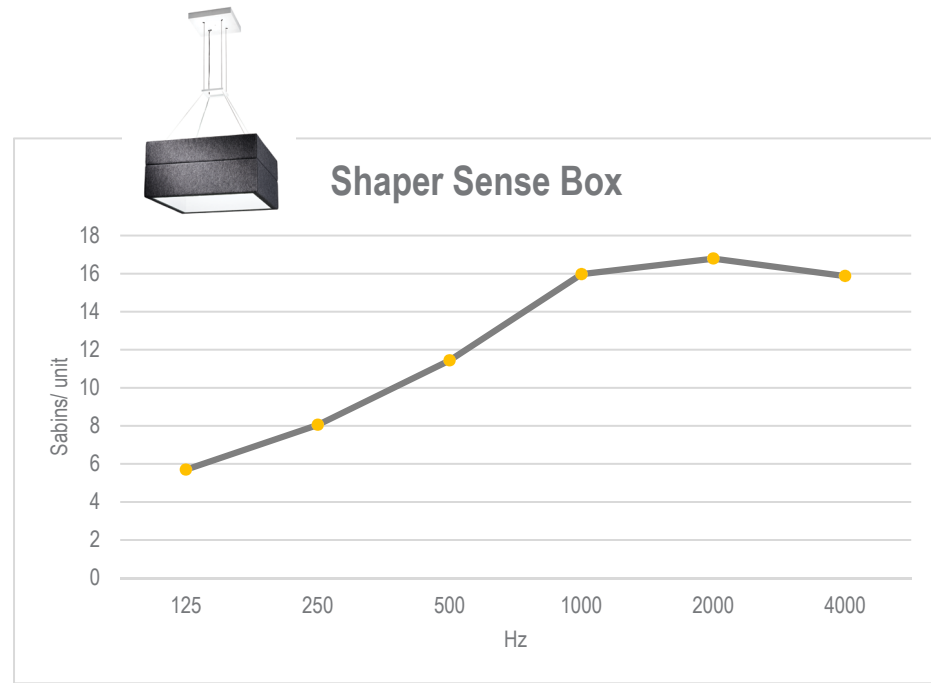
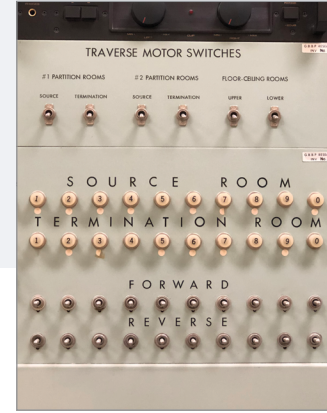


# SOUND VALUES

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.

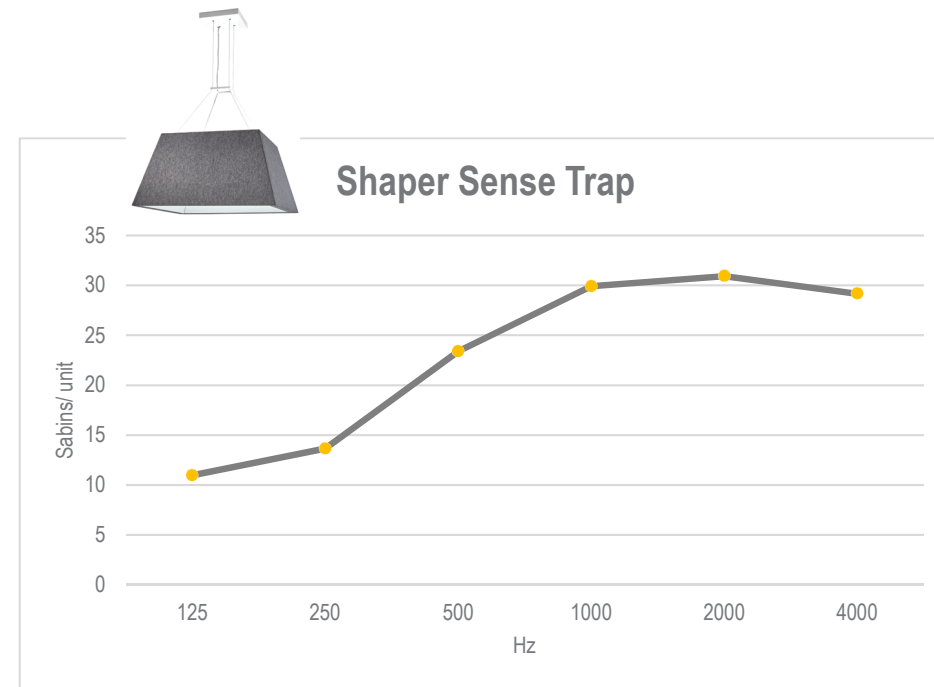
## Testing Testing 1,2,3

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 these products help reduce unwanted reverberation.

- Open Space
  - Hospitality
- Shaper Sense Box



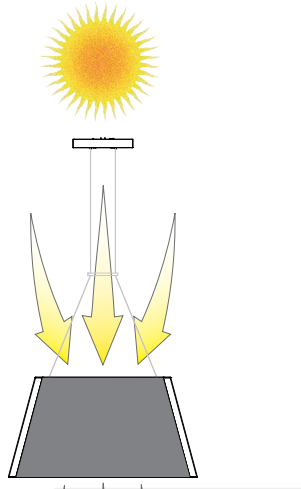
# I SEE YOU!

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.

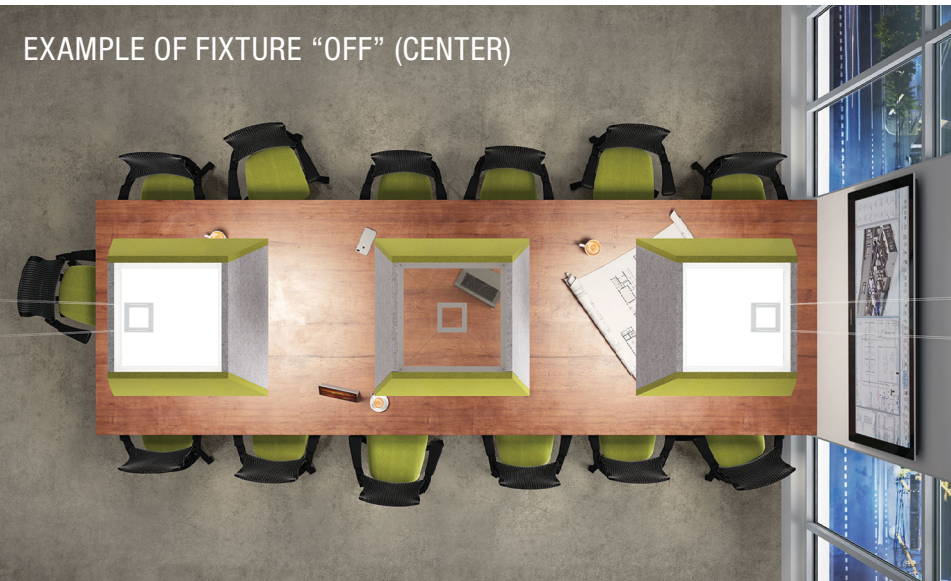
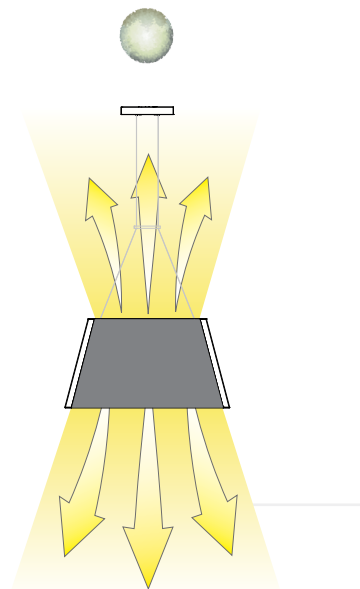
85% translucent lens



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



Illuminated light fully "ON"



- 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 is to communicate, Shaper Sense acoustic lighting products are a natural fit.



# WIRELESS SENSING SENSORS

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

## WAVELINX

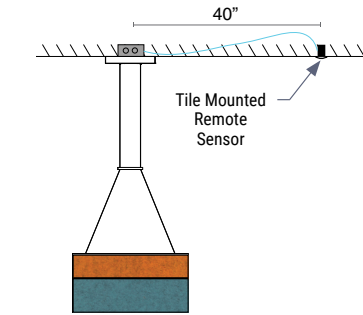
The WaveLinx tile mount sensor option is an integral part of the WaveLinx Wireless Connected Lighting System and offers 3 amp relay control and continuous 0-10V dimming of Shaper Sense luminaires. The tile mount sensor provides daylight dimming and control for a single luminaire or can be daisy chained 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

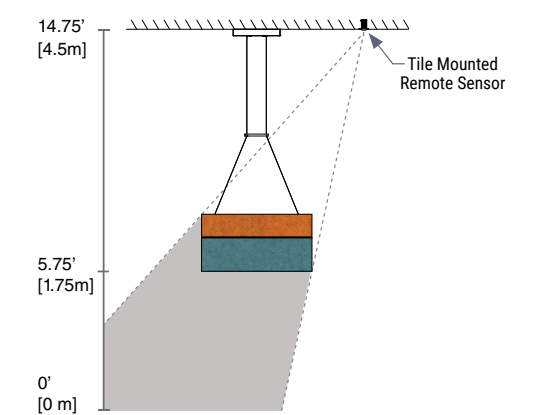
The LumaWatt Pro Tile mount sensor option is field installed to a single luminaires junction box or daisy chained to a group of luminaires, providing lighting control and sensing in an independent, fault-proof, resilient networks of powerful end-points. Sensors have profiles stored internally containing 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

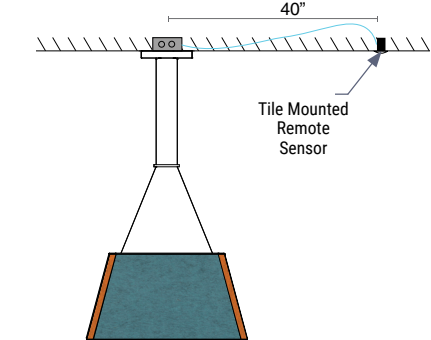
Sensor mounting and coverage for BOX



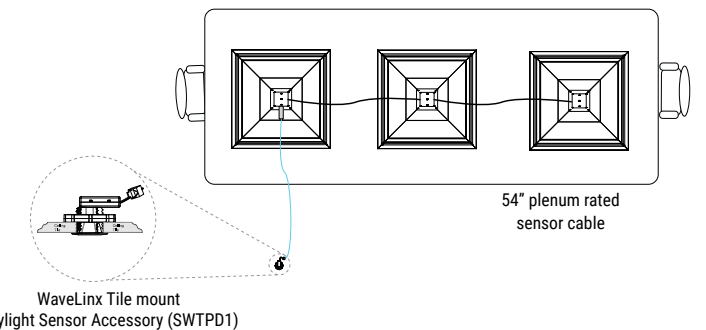
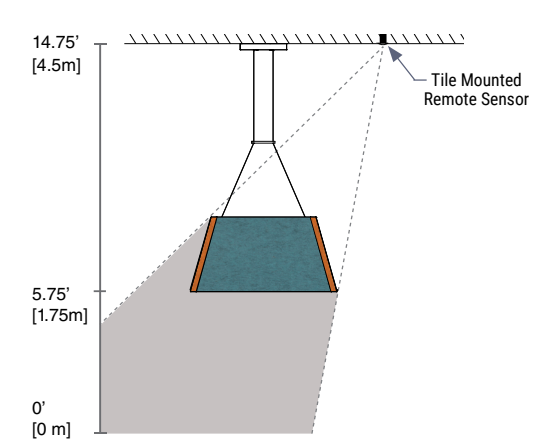
Reduced Occupancy Detection Area for BOX



Sensor mounting and coverage for TRAPEZOID

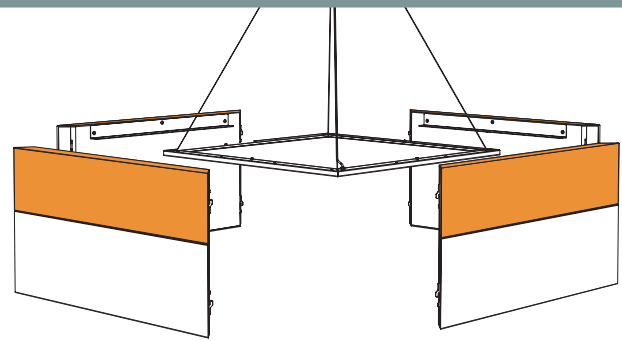


Reduced Occupancy Detection Area for TRAPEZOID



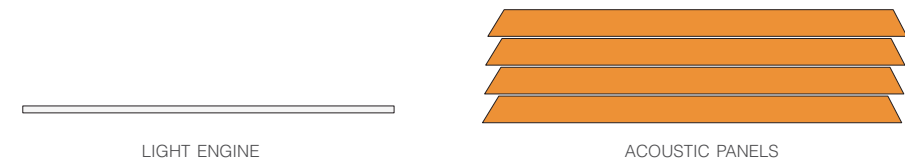


# SHUT THE BOX UP... FLAT PACK DESIGN AND THEN SOME

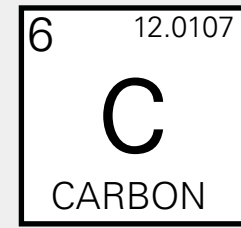


Part of the ingenious and patented design is how the product assembles and ultimately ships. Each acoustic light fixture consists of one translucent light engine and four acoustic panels. They arrive to the job site in two separate boxes. By having individual acoustic panels, they can be laid flat, and 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 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



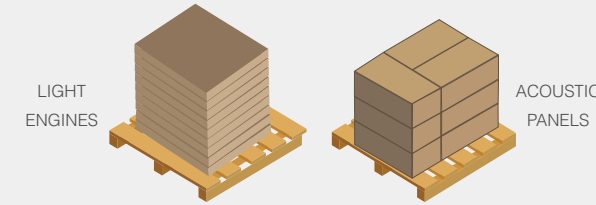
ECO FRIENDLY



# SHIP THIS! (NOT THAT)

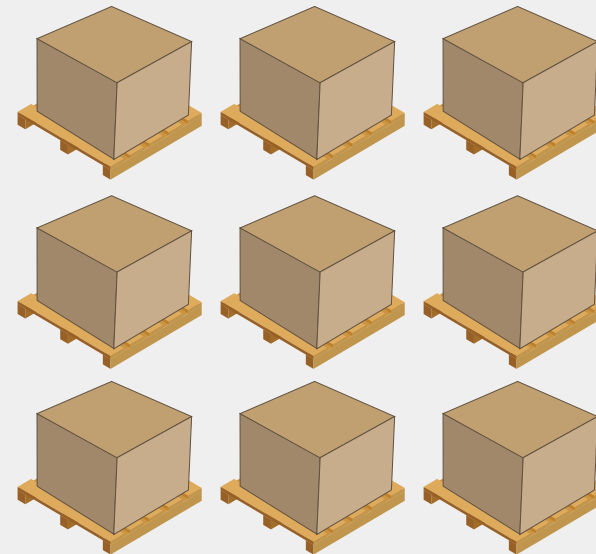
## CASE STUDY: PALLET COMPARISON

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

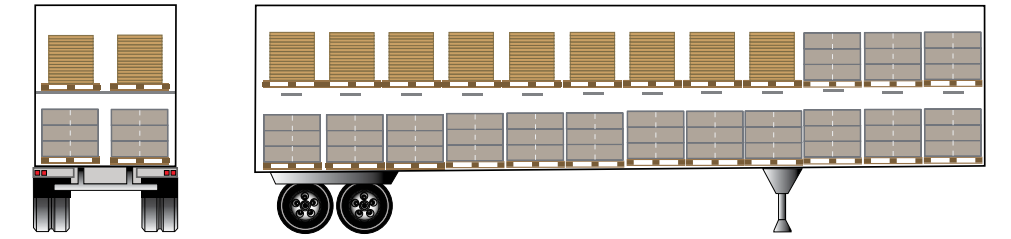
VS.



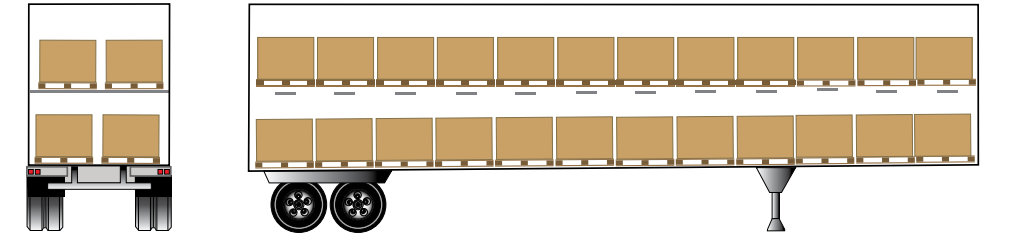
9 large scale acoustic lighting fixtures – fits on 9 pallets

## CASE STUDY: TRUCK LOAD COMPARISON

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

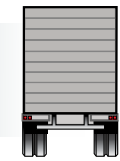


COMPETITOR X - 48 ACOUSTIC FIXTURES AT MAXIMUM CAPACITY



SHAPER SENSE (1) FULL TRUCK LOAD

1/6



COMPETITOR X (6) FULL TRUCK LOADS



## 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...

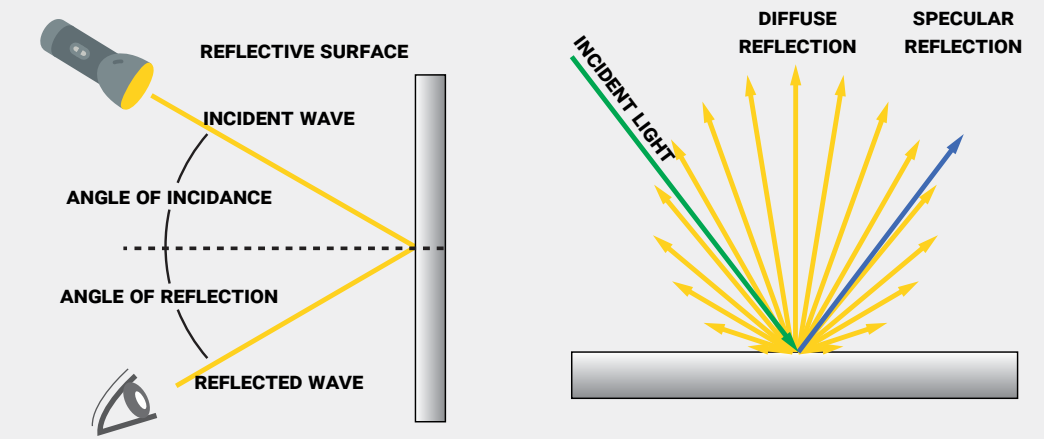
## A REFLECTION

Sound waves and light waves act similarly. In LIGHTING, when light waves reflect on hard surfaces, like gypsum for example, they create a pleasing and diffused light. In SOUND, "When sound reflects on hard surfaces, it causes overlapping reflections that are either experienced as echoes (distinct reflections that reduce intelligible speech), or build up as reverberation, which makes communication generally more difficult. When beautiful hard surface spaces are designed, sound absorption materials become difficult to incorporate." - Scott Pfeiffer, Partner at Threshold Acoustics

The concept of adding acoustic materials on a light fixture provides an aesthetically pleasing way to provide sound absorption back into the space 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.

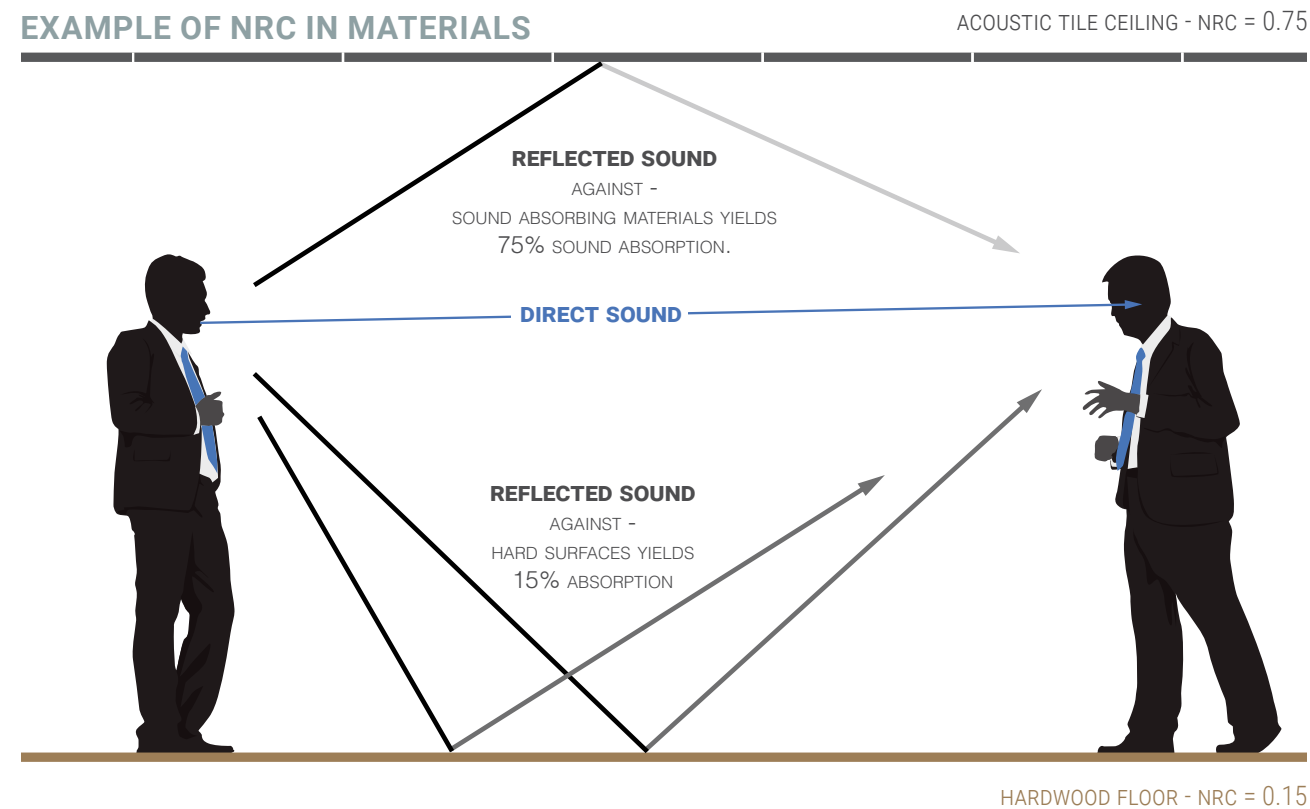


### HOW SOUND REFLECTS...

- 100% sound absorption yields an NRC = 1.0
- 0% sound absorption yields an NRC = 0

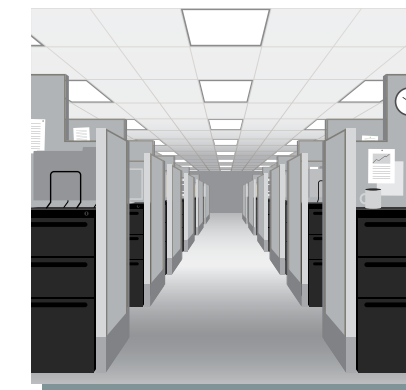
This example shows a ceiling tile that has an NRC equal to 0.75, which means it stops 75% of the sound from going through. In the same way, when sound hits a hardwood floor, only 15% of the sound is absorbed, thus allowing 85% to reflect. This can cause multiple echoes of reflected sound, called reverberation, 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 becoming 100% absorbed.

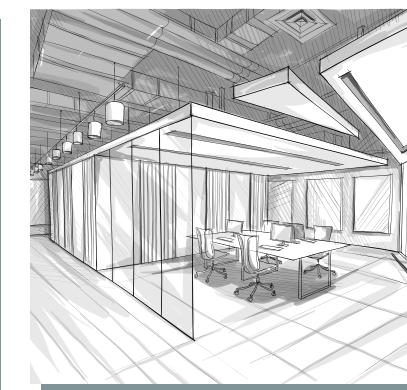


### WHAT'S SO GREAT ABOUT SOUND ABSORBING LIGHT FIXTURES?

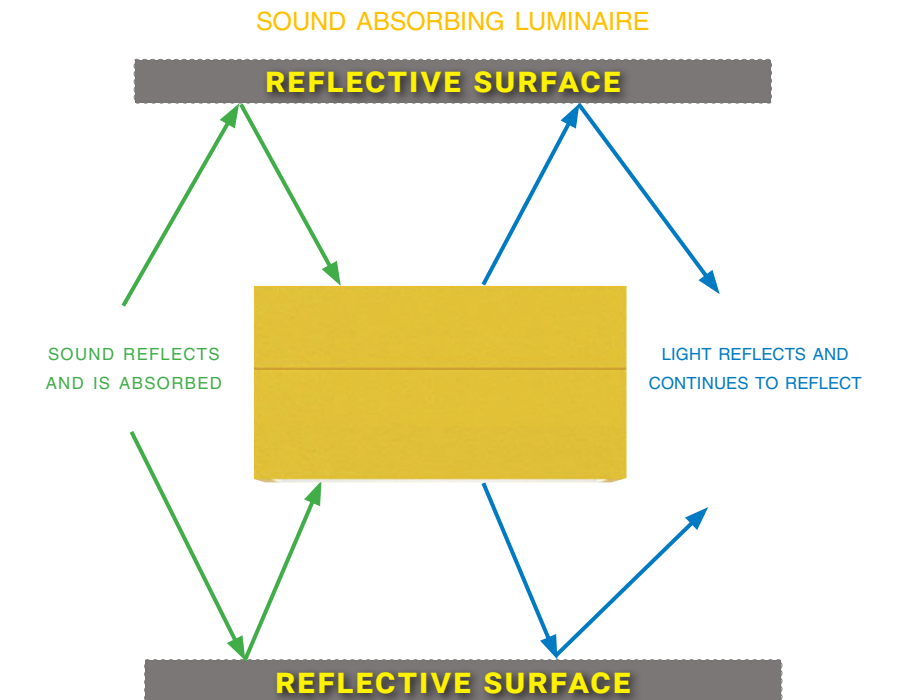
When new open office and space design evolved in taking down the cubicle walls and opening up the ceiling plane, the sound absorbing materials, often the acoustic ceiling tiles, went out the window as well. By adding sound absorption materials onto the light fixture, sound absorption materials can be added back into spaces 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

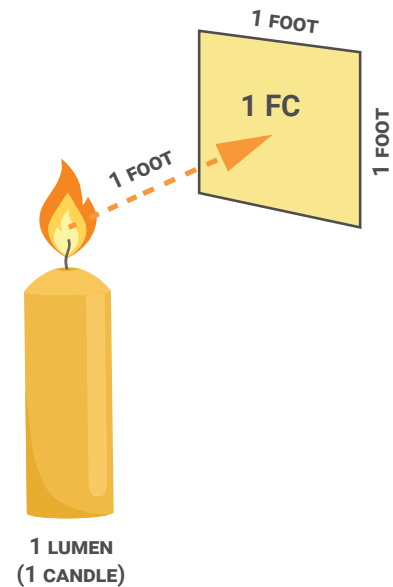




# LIGHTING 101

## 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**.

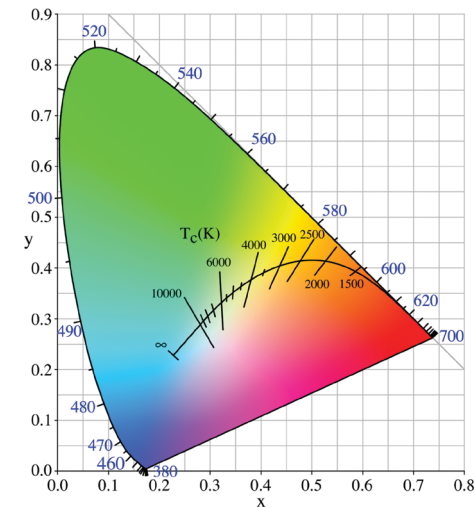


## FOOTCANDLE (fc):

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 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.

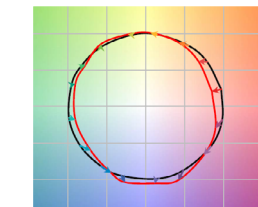
### Rg: Gamut Index:

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.



2700K CRI 100    2700K CRI 90    2700K CRI 80    2700K CRI 70

Example of fidelity and gamut values compared to test source.

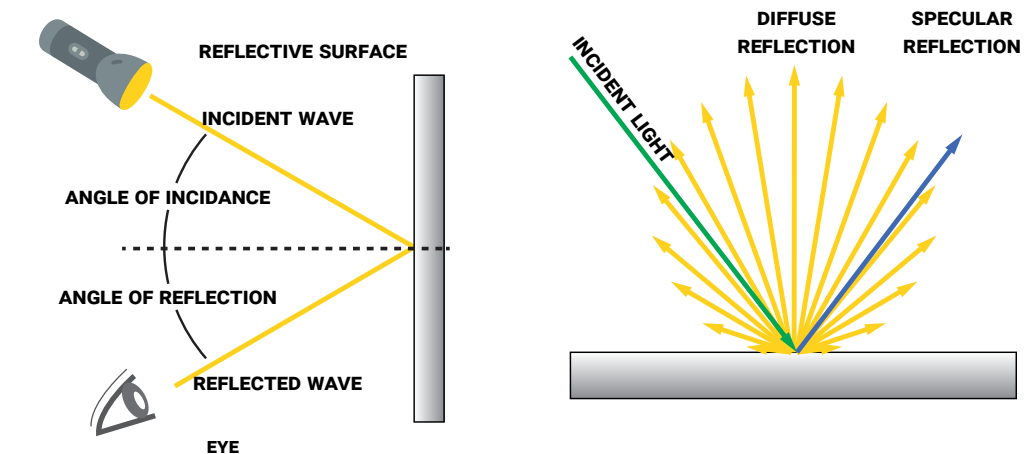


Fidelity - Rf: 81  
Gamut - Rg: 95.9

— Reference Illuminant  
— Test Source

## 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

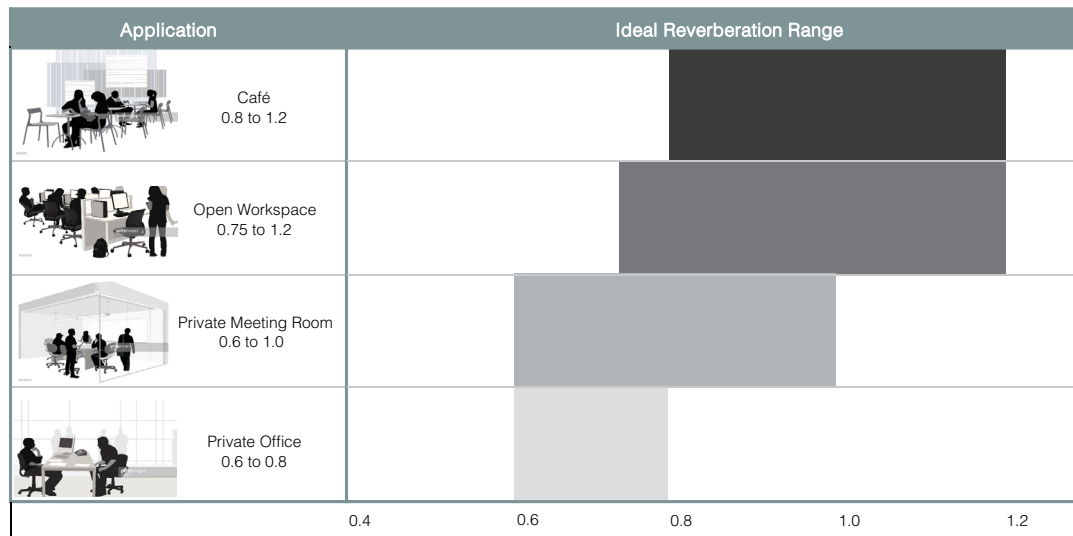
**A** ABSORB **B** BLOCK **C** COVERUP

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.

**REVERBERATION** - sound that lingers due to reflection in an interior space

**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



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
<b>FilzFelt Acoustic Baffles</b>	<b>1.2</b>
<b>Shaper Sense Box</b>	<b>1.2</b>
<b>Shaper Sense Trapezoid</b>	<b>1.4</b>

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 - DECIBEL** A unit used to measure the intensity of a sound.

Examples of decibels in every day life:

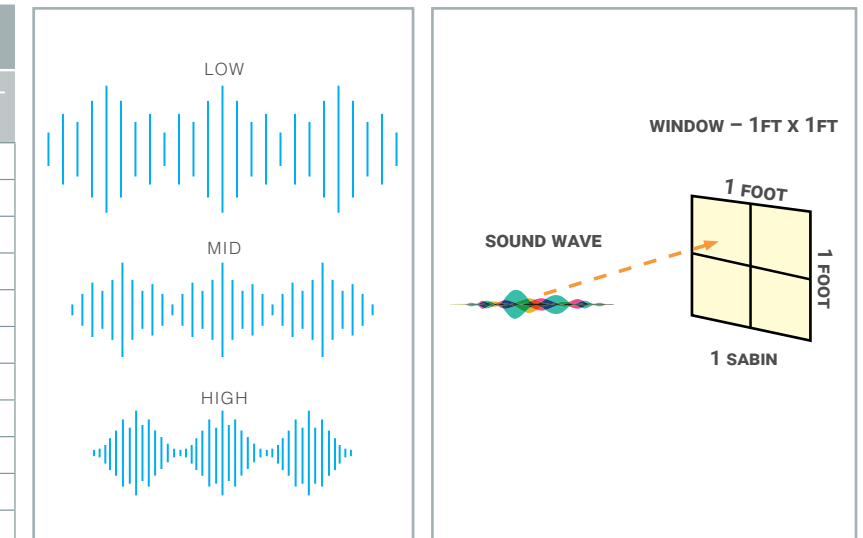
"DECIBEL, dB"	DESCRIPTION
0	a mosquito 10 ft away
13	ordinary light bulb hum
40	whisper
50	typical office noise level
40-60	normal conversation
80	heavy traffic at 10am
85	beginning of hearing damage, earplugs should be worn
110	night club - dance floor
116	human body perceiving low vibration
130-135	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.

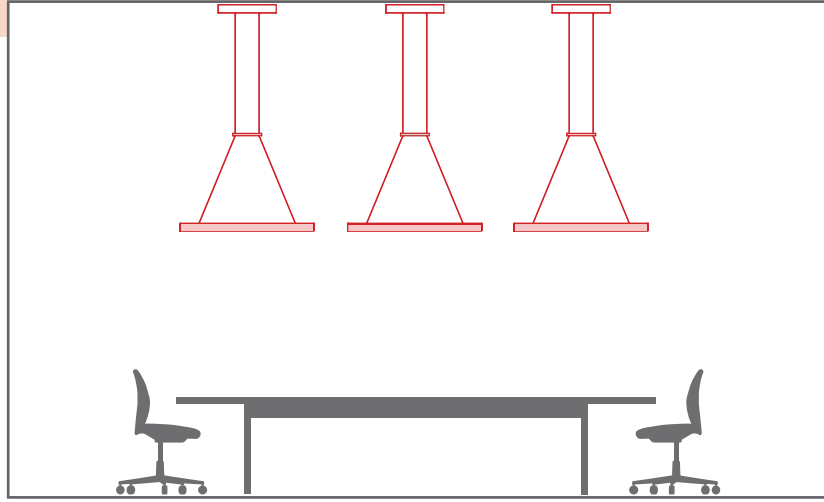
**Sb - SABIN** Unit of sound absorption (the process by which a material, structure or object takes in sound energy, as opposed to reflecting or transmitting the energy). One sabin indicates the equivalent absorption of one square foot (or square meter in SI units) of a perfect 100% sound absorber.

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

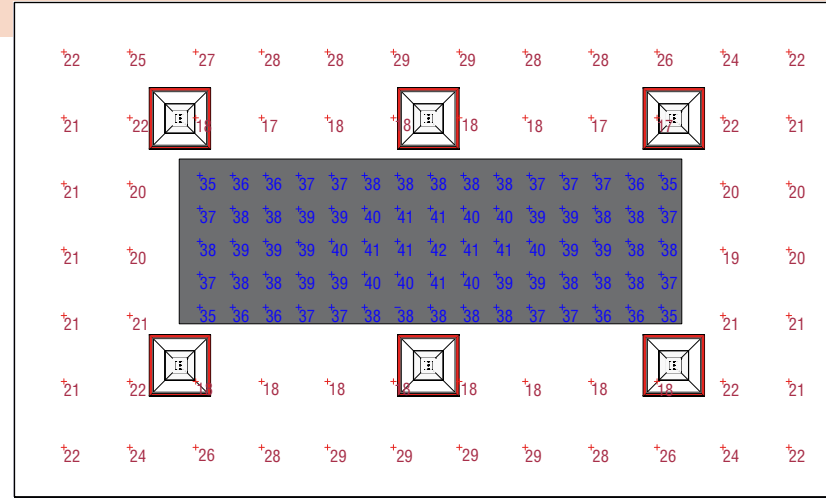


EXAMPLES OF FREQUENCY BANDS OF HUMAN SPEECH. AS A COMMON SOUND SOURCE, IF THESE BANDS OF CAN BE ABSORBED, THE REFLECTED SOUND THAT MAKES A SPACE UNCOMFORTABLE CAN BE REDUCED.





LIGHT FIXTURE WITHOUT SOUND ABSORBING MATERIALS



**RT60 : LIGHT FIXTURES WITHOUT ACOUSTIC SOUND ABSORPTION**

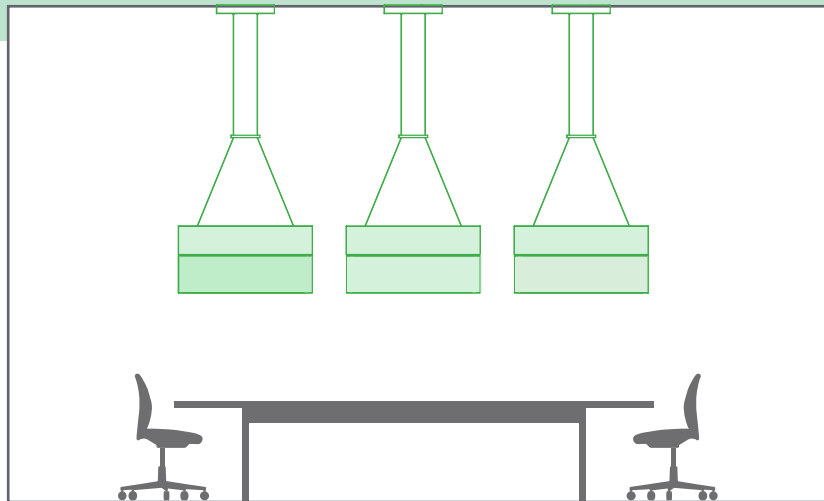
FREQUENCY (Hz)						AVG
125	250	500	1000	2000	4000	250-2k
0.76	0.97	1.15	1.11	0.91	0.85	1.04

These 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.

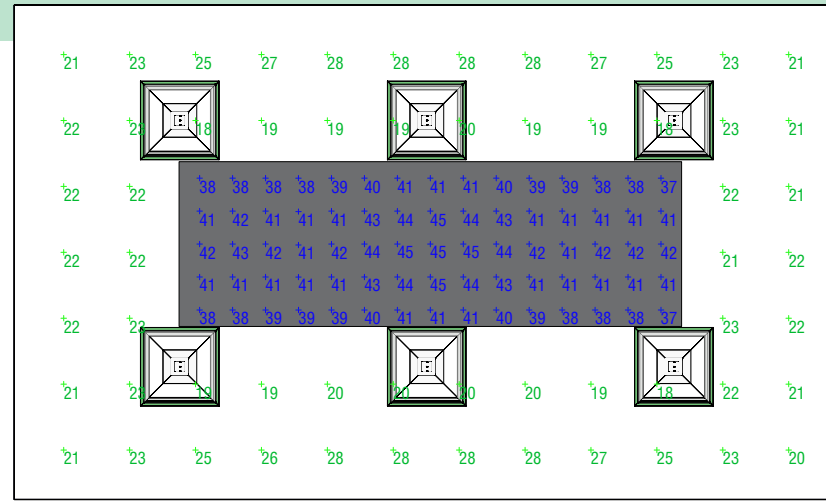
# LIGHTS, SOUND, CALC!

## 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

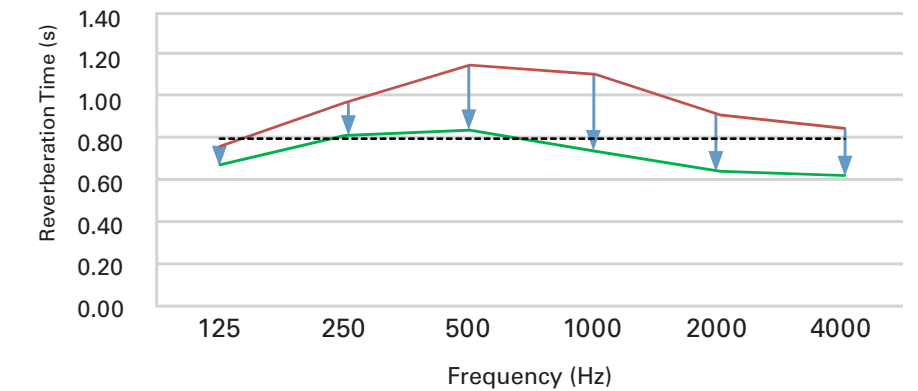


**RT60 : LIGHT FIXTURES WITH ACOUSTIC SOUND ABSORPTION**

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

These 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.

**Reverberation Time (RT60)**



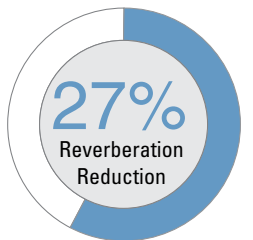
**% IMPROVEMENT IN REVERBERATION (RT60)**

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.

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

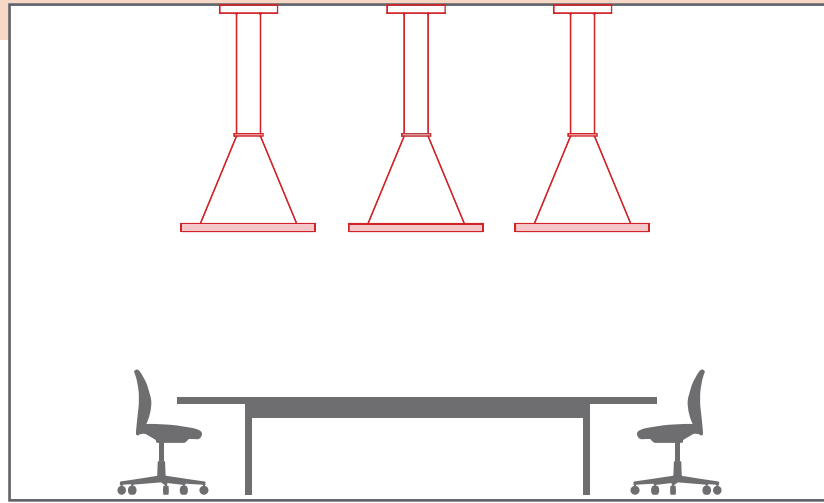
RT60 GOAL (typical. office) **0.8**



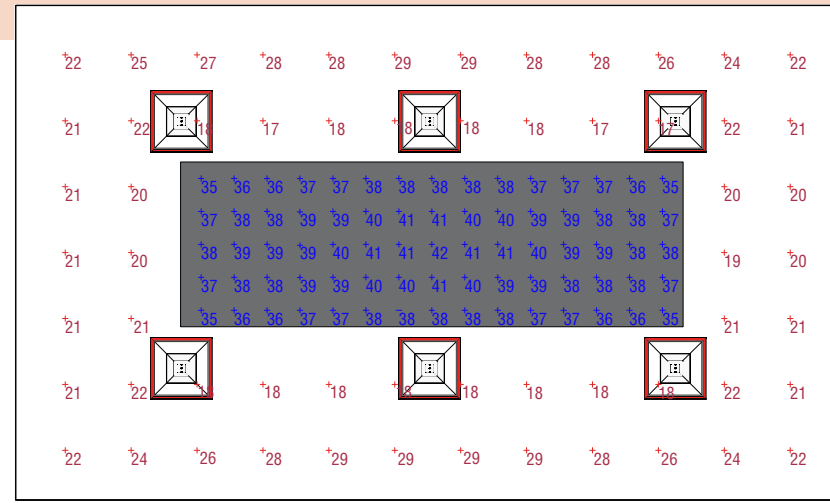
Ambient lighting calculations performed on the floor and table (2.5 AFF). Ratios remain comfortable relative to task and ambient light levels.

**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
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



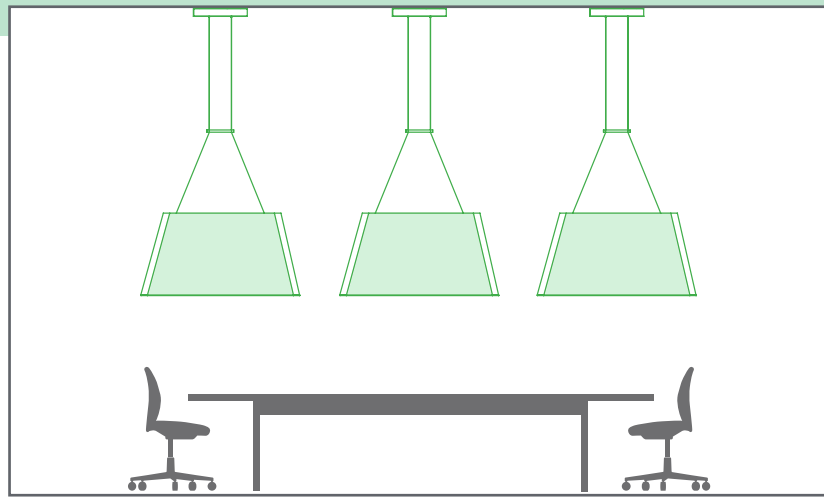
LIGHT FIXTURE WITHOUT SOUND ABSORBING MATERIALS



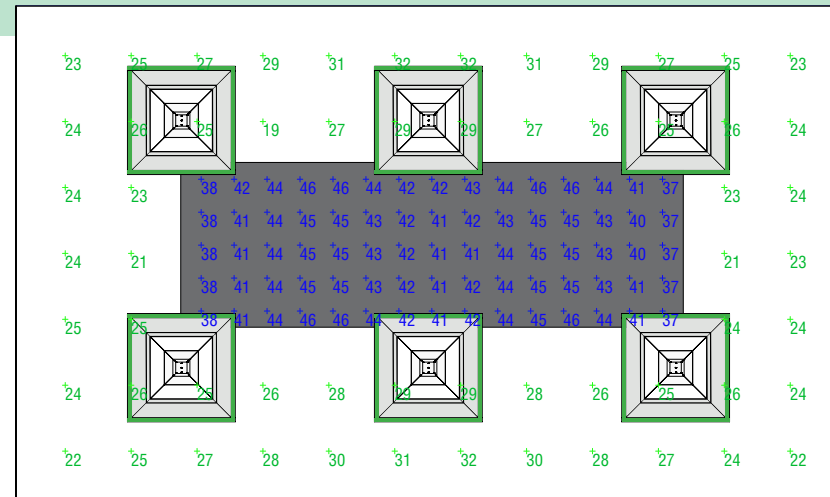
**RT60 : LIGHT FIXTURES WITHOUT ACOUSTIC SOUND ABSORPTION**

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

These 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

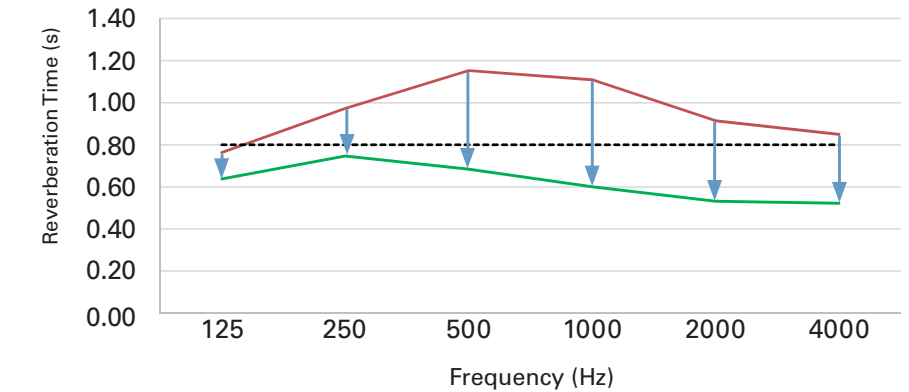
These frequencies are represented in octave bands that are related to human speech. The results are the RT60 for each frequency in seconds. In this calculation, the light fixtures include sound absorbers around the light engines in a Trapezoid shape.

# 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)**



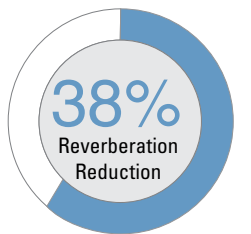
**% IMPROVEMENT IN REVERBERATION (RT60)**

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

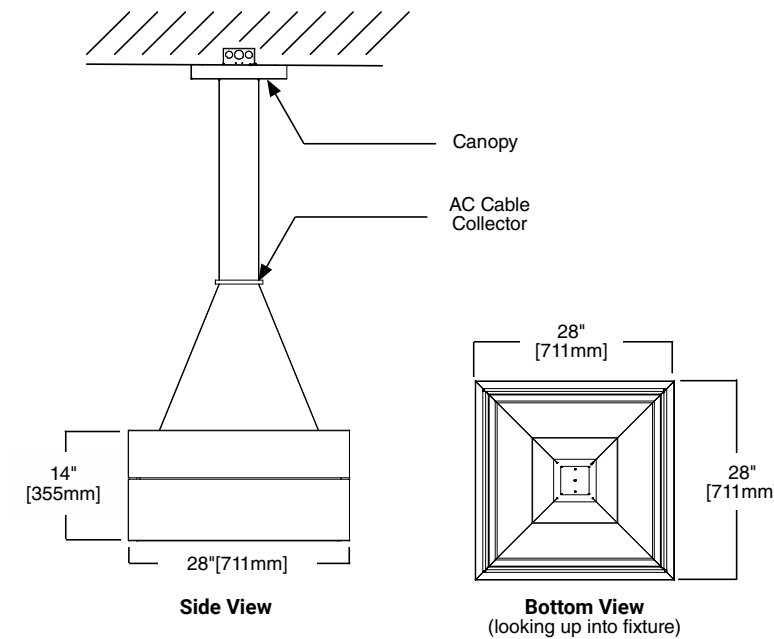
## BOX

### Felt Color Selections for Top and Bottom Panels

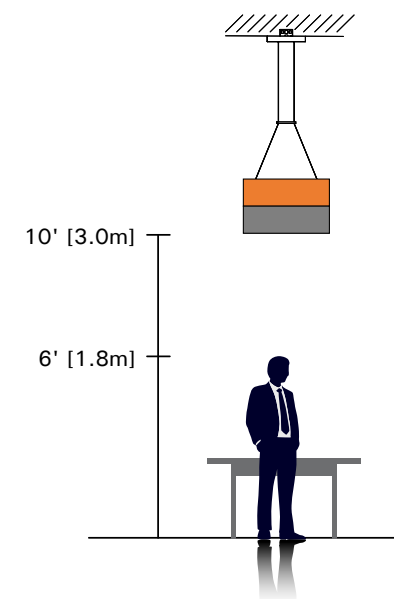
487 Pfirsich	023 Koralle	945 Drachenfrucht	221 Himbeere	136 Weinrot	209 Bordeaux	102 Kirsche	201 Rot	125 Tomate	179 Hellrot
180 Terracotta	173 Mango	105 Rost	573 Kupfer	116 Orange	495 Abricot	124 Gelb	131 Honig	509 Kamel	550 Ocker
274 Senf	108 Zitrone	403 Mais	535 Sesam	203 Vanille	027 Kartause	384 Lind	713 Kiwi	377 Maigrün	732 Farn
378 Oliv	260 Sprießen	156 Loden	343 D'Grün	435 Smaragd	625 Pinie	248 Jade	472 Minze	575 Salbei	483 Adria
548 Türkis	312 Lagune	345 Pazifik	308 Petrol	698 Dunst	405 Stahl	215 Meer	540 Ozean	533 Indigo	282 D'Blau
111 Traube	626 Azur	647 Kobalt	686 Enzian	272 Royal	286 H'Blau	995 Wasser	458 Bekwölkt	284 Himmel	613 Gletscher
551 Eis	113 Immergrün	099 Lila	667 Amethyst	242 Pink	640 Granat	634 Erröten	671 Pfingstrose	255 Flieder	269 Violett
437 Aubergine	250 Trüffelbraun	220 Rehbraun	411 Alpaka	190 Natur-meliert	200 Natur	331 Sahara	311 Mandel	467 Sand	481 Sandstein
100 Wollweiss	110 Rohweiss	160 Beige	529 Champagner	150 Weiss	428 Silber	427 Stein	021 Beton	170 Asche	423 Hellgrau
408 Taupe	175 Graphit	425 Taubengrau	446 Kohle	300 Anthrazit	426 Schwarz				



### Dimensions



### Scale



Series  
ShSh = Shaper Sense

Shape/Family  
BOX=Box

#### Light Level<sup>1</sup>

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

v

#### 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)<sup>2</sup>

TP487=Pfirsich  
TP023=Koralle  
TP945=Drachenfrucht  
TP221=Himbeere  
TP136=Weinrot  
TP209=Bordeaux  
TP102=Kirsche  
TP201=Rot  
TP125=Tomate  
TP179=Hellrot  
TP180=Terracotta  
TP173=Mango  
TP105=Rost  
TP573=Kupfer  
TP116=Orange  
TP495=Abricot  
TP124=Gelb  
TP131=Honig  
TP509=Kamel  
TP550=Ocker  
TP274=Senf  
TP108=Zitrone  
TP403=Mais  
TP535=Sesam  
TP203=Vanille  
TP027=Kartause  
TP384=Lind  
TP713=Kiwi  
TP377=Maigrün  
TP732=Farn  
TP378=Oliv  
TP260=Sprießen  
TP156=Loden  
TP343=D'Grün

##### Bottom Panel Selection (BP)<sup>3</sup>

BP487=Pfirsich  
BP023=Koralle  
BP945=Drachenfrucht  
BP221=Himbeere  
BP136=Weinrot  
BP209=Bordeaux  
BP102=Kirsche  
BP201=Rot  
BP125=Tomate  
BP179=Hellrot  
BP180=Terracotta  
BP173=Mango  
BP105=Rost  
BP573=Kupfer  
BP116=Orange  
BP495=Abricot  
BP282=D'Blau  
BP124=Gelb  
BP131=Honig  
BP509=Kamel  
BP550=Ocker  
BP274=Senf  
BP108=Zitrone  
BP403=Mais  
BP535=Sesam  
BP284=Himmel  
BP027=Kartause  
BP384=Lind  
BP713=Kiwi  
BP377=Maigrün  
BP732=Farn  
BP378=Oliv  
BP260=Sprießen  
BP156=Loden  
BP343=D'Grün

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.

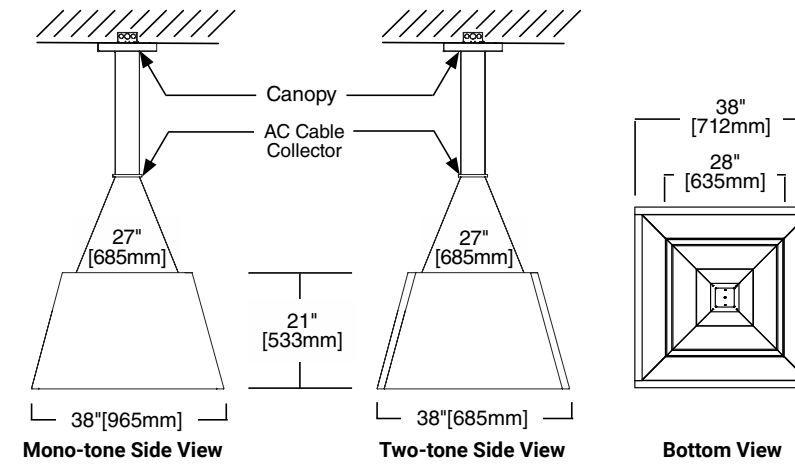
# TECHNICAL SPECIFICATIONS

## TRAPEZOID

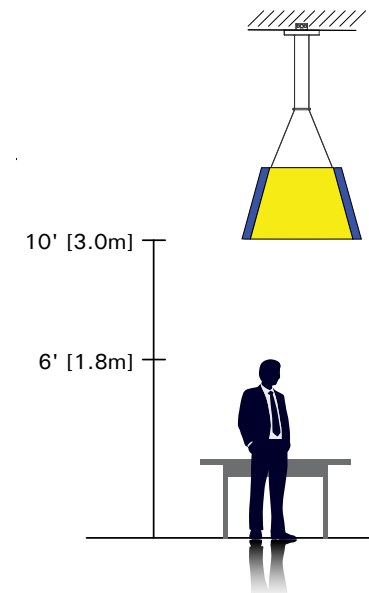
### Felt Color Selections for Side AA and Side BB Panels

487 Pfirsich	023 Koralle	945 Drachenfrucht	221 Himbeere	136 Weinrot	209 Bordeaux	102 Kirsche	201 Rot	125 Tomate	179 Hellrot
180 Terracotta	173 Mango	105 Rost	573 Kupfer	116 Orange	495 Abricot	124 Gelb	131 Honig	509 Kamel	550 Ocker
274 Senf	108 Zitrone	403 Mais	535 Sesam	203 Vanille	027 Kartause	384 Lind	713 Kiwi	377 Maigrün	732 Farn
378 Oliv	260 Sprießen	156 Loden	343 D'Grün	435 Smaragd	625 Pinie	248 Jade	472 Minze	575 Salbei	483 Adria
548 Türkis	312 Lagune	345 Pazifik	308 Petrol	698 Dunst	405 Stahl	215 Meer	540 Ozean	533 Indigo	282 D'Blau
111 Traube	626 Azur	647 Kobalt	686 Enzian	272 Royal	286 H'Blau	995 Wasser	458 Bekwölkt	284 Himmel	613 Gletscher
551 Eis	113 Immergrün	099 Lila	667 Amethyst	242 Pink	640 Granat	634 Erröten	671 Pfingstrose	255 Flieder	269 Violett
437 Aubergine	250 Trüffelbraun	220 Rehbraun	411 Alpaka	190 Natur-meliert	200 Natur	331 Sahara	311 Mandel	467 Sand	481 Sandstein
100 Wollweiss	110 Rohweiss	160 Beige	529 Champagner	150 Weiss	428 Silber	427 Stein	021 Beton	170 Asche	423 Hellgrau
408 Taupe	175 Graphit	425 Taubengrau	446 Kohle	300 Anthrazit	426 Schwarz				

### Dimensions



### Scale



Series  
ShSh = Shaper Sense

Shape/Family  
TRAP=Trapezoid

#### Light Level<sup>1</sup>

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 Panel<sup>2</sup> (AA)

AA487=Pfirsich	AA435=Smaragd	AA255=Flieder
AA023=Koralle	AA625=Pinie	AA269=Violett
AA945=Drachenfrucht	AA248=Jade	AA437=Aubergine
AA221=Himbeere	AA472=Minze	AA250=Trüffelbraun
AA136=Weinrot	AA575=Salbei	AA220=Rehbraun
AA209=Bordeaux	AA483=Adria	AA411=Alpaka
AA102=Kirsche	AA548=Türkis	AA190=Natur-meliert
AA201=Rot	AA312=Lagune	AA200=Natur
AA125=Tomate	AA345=Pazifik	AA331=Sahara
AA179=Hellrot	AA308=Petrol	AA311=Mandel
AA180=Terracotta	AA698=Dunst	AA467=Sand
AA173=Mango	AA405=Stahl	AA481=Sandstein
AA105=Rost	AA215=Meer	AA100=Wollweiss
AA573=Kupfer	AA540=Ozean	AA110=Rohweiss
AA116=Orange	AA533=Indigo	AA160=Beige
AA495=Abricot	AA282=D'Blau	AA529=Champagner
AA124=Gelb	AA111=Traube	AA150=Weiss
AA131=Honig	AA626=Azur	AA428=Silber
AA509=Kamel	AA647=Kobalt	BB647=Kobalt
AA550=Ocker	AA686=Enzian	AA021=Beton
AA274=Senf	AA272=Royal	AA170=Asche
AA108=Zitrone	AA286=H'Blau	AA423=Hellgrau
AA403=Mais	AA995=Wasser	AA408=Taupe
AA535=Sesam	AA458=Bekwölkt	BB458=Bekwölkt
AA203=Vanille	AA284=Himmel	AA425=Taubengrau
AA027=Kartause	AA613=Gletscher	AA446=Kohle
AA384=Lind	AA551=Eis	AA300=Anthrazit
AA713=Kiwi	AA113=Immergrün	AA426=Schwarz
AA377=Maigrün	AA099=Lila	
AA732=Farn	AA667=Amethyst	
AA378=Oliv	AA242=Pink	
AA260=Sprießen	AA640=Granat	
AA156=Loden	AA634=Erröten	
AA343=D'Grün	AA671=Pfingstrose	

##### Two-tone Side Panel<sup>3</sup> (BB)

BB487=Pfirsich	BB435=Smaragd	BB255=Flieder
BB023=Koralle	BB625=Pinie	BB269=Violett
BB945=Drachenfrucht	BB248=Jade	BB437=Aubergine
BB221=Himbeere	BB472=Minze	BB250=Trüffelbraun
BB136=Rehbraun	BB575=Salbei	BB220=Rehbraun
BB209=Bordeaux	BB483=Adria	BB411=Alpaka
BB102=Kirsche	BB548=Türkis	BB190=Natur-meliert
BB201=Rot	BB312=Lagune	BB200=Natur
BB125=Tomate	BB345=Pazifik	BB331=Sahara
BB179=Hellrot	BB308=Petrol	BB311=Mandel
BB180=Terracotta	BB698=Dunst	BB467=Sand
BB173=Mango	BB405=Stahl	BB481=Sandstein
BB105=Rost	BB215=Meer	BB100=Wollweiss
BB573=Kupfer	BB540=Ozean	BB110=Rohweiss
BB116=Orange	BB533=Indigo	BB160=Beige
BB495=Abricot	BB282=D'Blau	BB529=Champagner
BB124=Gelb	BB111=Traube	BB150=Weiss
BB131=Honig	BB626=Azur	BB428=Silber
BB509=Kamel	BB647=Kobalt	BB427=Stein
BB550=Ocker	BB686=Enzian	BB021=Beton
BB274=Senf	BB272=Royal	BB170=Asche
BB108=Zitrone	BB286=H'Blau	BB423=Hellgrau
BB403=Mais	BB995=Wasser	BB408=Taupe
BB535=Sesam	BB458=Bekwölkt	BB175=Graphit
BB203=Vanille	BB284=Himmel	BB425=Taubengrau
BB027=Kartause	BB613=Gletscher	BB446=Kohle
BB384=Lind	BB551=Eis	BB300=Anthrazit
BB713=Kiwi	BB113=Immergrün	BB426=Schwarz
BB377=Maigrün	BB099=Lila	
BB732=Farn	BB667=Amethyst	
BB378=Oliv	BB242=Pink	
BB260=Sprießen	BB640=Granat	
BB156=Loden	BB634=Erröten	
BB343=D'Grün	BB671=Pfingstrose	

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  
Trellix



**Cooper Lighting Solutions**  
1121 Highway 74 South  
Peachtree City, GA 30269  
P: 770-486-4800  
cooperlighting.com

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

© 2021 Cooper Lighting Solutions  
All Rights Reserved  
Printed in USA  
Publication No. BR524004EN  
September 2021

Cooper Lighting Solutions is a registered trademark.

All other trademarks are property of their respective owners.

Product availability, specifications, and compliances are subject to change without notice.

Special Thanks to Color Cord Company  
Shaper Sense is dedicated to MNK  
Ref: Sound Business