Acoustical Material & Understanding Sound

Material Composition

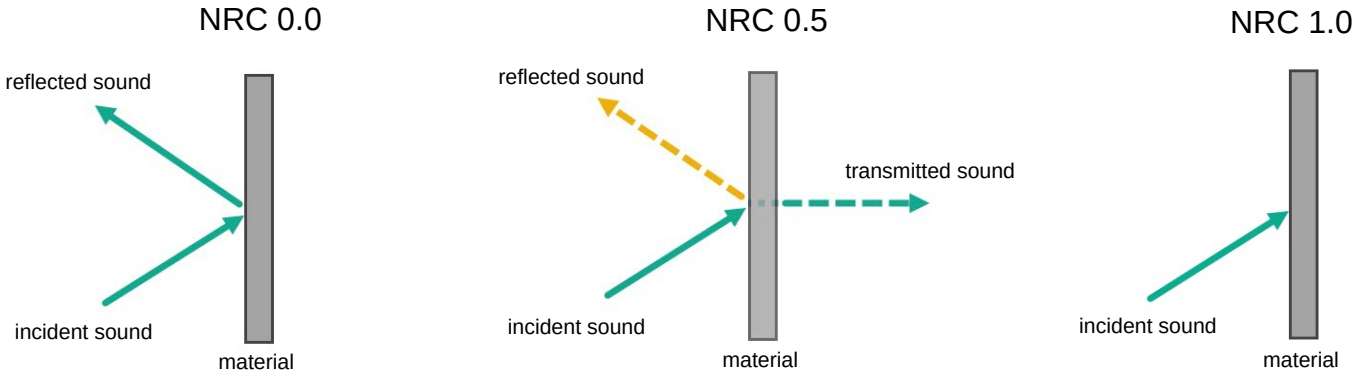
Lighting Elements cares about the environment, and we are proud to use recycled PET (polyethylene terephthalate) in our acoustically integrated luminaires and lighting systems. PET is a highly recyclable plastic resin and a form of polyester, mostly starting off in use as plastic bottles for beverages, salad dressings, frozen foods, cosmetics, and household cleaners. After recycling, usingthis material with our luminaires reduces sound travel in built spaces, and reduces waste from consumer products.

Lighting Elements uses at least 50% recycled content for our sound absorbers, and 100% of our sound absorbing material and fixture housing is recyclable.

NRC Ratings

As defined by ASTM C423, NRC (Noise Reduction Coefficient) rating is an average rating of how much sound an acoustic product can absorb (which can loosely be interpreted to relate to how much quieter a product can make your space). NRC ratings are on a range of 0 to 1. An NRC of 0 means that the product absorbs no sound. An NRC of 1means that the product absorbs all sound (or produces no echo/reverberation). The higher the NRC rating, the more sound the product will absorb. For general reference, hard materials such as marble, glass, or poured concrete will have an NRC of 0. Drywall has an NRC of 0.15, and most common ceiling tiles will have an NRC in the range of 0.7.

To obtain an NRC rating for a given material, it is testing in a sound isolation chamber along various sound frequencies(measured in Hz). A material's NRC rating is the average of its absorbency coefficients at 250, 500, 1000, and 2000 Hz. People can generally hear frequencies from 20 Hz to 20,000 Hz, though we hear sounds best between 1,000 and 5000 Hz.



Sound Frequency

Our ability to hear and interpret sound is based on not only intensity (loudness, typically measured in decibels), but also thefrequency. Roughly speaking the frequency range can be understood as low to high pitch. Some common sounds andtypical frequencies include:

- 20 to 80 Hz - The low range of sound, can sometimes be felt more than heard. The lowest note on a four stringbass guitar is in the 40 to 80 Hz range. Some HVAC equipment will reverberate in this range.
- 80 to 500 Hz - More typical for ambient noise from background machinery and air handling (although air diffusers can create sound in the 2000 to 4000 Hz range
- 440 to 480 Hz - telephone ringing
- 500 to 3000 Hz - Most important frequencies for human speech, although the full vocal range runs up to 8000 Hz and beyond. Typical range of conversation.

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Product Information

Our acoustically integrated fixtures use a layer of recycled PET fabric 9mm (3/8") thick in various colors as an acoustic dampener. Acoustic material has been tested to be flame resistant and formaldehyde free. Based on the configuration of the fixture, there will be different NRC ratings and Equivalent Surface Area (ESA). NRC ratings obtained based on test method GB/T20247-2006/ISO354:2003

NRC rating and ESA provided below serve as a rough estimate to compare possible efficiency of the luminaire to reduce sound reverberation and echo. As with any product, a truly accurate measure of effectiveness can only be acheived by measuring a built space with and without the acoustic element.

Luminaire Family	Luminaire Size	NRC Rating	Equivalent Surface Area (ft^2)
Andromeda Acoustic	Small (2ft dia)	0.35	Surface Mount: 3.1 ft^2 Pendant Mount: 6.2 ft^2
	Medium (3ft dia)	0.35	Surface Mount: 7.0 ft^2 Pendant Mount: 14.1 ft^2
	Large (4ft dia)	0.35	Surface Mount: 12.5 ft^2 Pendant Mount: 25.1 ft^2
	X-Large (5ft dia)	0.35	Surface Mount: 19.6 ft^2 Pendant Mount: 39.2 ft^2
Atmos Acoustic	Small (19” dia)	0.70	2.0 ft^2
	Medium (2ft dia)	0.70	3.1 ft^2
	Large (3ft dia)	0.70	7.0 ft^2
	X-Large (4ft dia)	0.70	12.5 ft^2
Atmos AD	Small (19” dia), 12” high	0.80	5.0 ft^2
	Small (19” dia), 24” high	0.80	9.9 ft^2
	Small (19” dia), 36” high	0.80	14.9 ft^2
	Small (19” dia), 48” high	0.80	19.9 ft^2
	Medium (2ft dia), 12” high	0.80	6.3 ft^2
	Medium (2ft dia), 24” high	0.80	12.6 ft^2
	Medium (2ft dia), 36” high	0.80	18.8 ft^2
	Medium (2ft dia), 48” high	0.80	25.1 ft^2
	Large (3ft dia), 12” high	0.80	9.4 ft^2
	Large (3ft dia), 24” high	0.80	18.8 ft^2
	Large (3ft dia), 36” high	0.80	28.3 ft^2
	Large (3ft dia), 48” high	0.80	37.7 ft^2
	X-Large (4ft dia), 12” high	0.80	12.6 ft^2
	X-Large (4ft dia), 24” high	0.80	25.1 ft^2
	X-Large (4ft dia), 36” high	0.80	37.7 ft^2
	X-Large (4ft dia), 48” high	0.80	50.2 ft^2
Atmos Hex Acoustic	Small (19”)	0.70	1.6 ft^2
	Medium (2ft)	0.70	2.6 ft^2
	Large (3ft)	0.70	5.8 ft^2
	X-Large (4ft)	0.70	10.4 ft^2

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Luminaire Family	Luminaire Size	NRC Rating	Equivalent Surface Area (ft^2)
Atmos Hex AD	Small (19”), 12” high	0.80	4.7 ft^2
	Small (19”), 24” high	0.80	9.4 ft^2
	Small (19”), 36” high	0.80	14.1 ft^2
	Small (19”), 48” high	0.80	18.8 ft^2
	Medium (2ft), 12” high	0.80	6 ft^2
	Medium (2ft), 24” high	0.80	12 ft^2
	Medium (2ft), 36” high	0.80	18 ft^2
	Medium (2ft), 48” high	0.80	24 ft^2
	Large (3ft), 12” high	0.80	9 ft^2
	Large (3ft), 24” high	0.80	18 ft^2
	Large (3ft), 36” high	0.80	27 ft^2
	Large (3ft), 48” high	0.80	36 ft^2
	X-Large (4ft), 12” high	0.80	12 ft^2
	X-Large (4ft), 24” high	0.80	24 ft^2
	X-Large (4ft), 36” high	0.80	36 ft^2
	X-Large (4ft), 48” high	0.80	48 ft^2
Atmos Square	Small (2ft)	0.70	4 ft^2
	Medium (3ft)	0.70	9 ft^2
	Large (4ft)	0.70	16 ft^2
Atmos Square AD	Small (2ft), 12” high	0.80	8 ft^2
	Small (2ft), 24” high	0.80	16 ft^2
	Small (2ft), 36” high	0.80	24 ft^2
	Small (2ft), 48” high	0.80	32 ft^2
	Medium (3ft), 12” high	0.80	12 ft^2
	Medium (3ft), 24” high	0.80	24 ft^2
	Medium (3ft), 36” high	0.80	36 ft^2
	Medium (3ft), 48” high	0.80	48 ft^2
	Large (4ft), 12” high	0.80	16 ft^2
	Large (4ft), 24” high	0.80	32 ft^2
	Large (4ft), 36” high	0.80	48 ft^2
	Large (4ft), 48” high	0.80	64 ft^2
Buco Acoustic	Small (14” dia)	0.35	Surface Mount: 1.0 ft^2 Pendant Mount: 2.0 ft^2
	Medium (18” dia)	0.35	Surface Mount: 1.7 ft^2 Pendant Mount: 3.3 ft^2
	Large (24” dia)	0.35	Surface Mount: 3.0 ft^2 Pendant Mount: 6.1 ft^2
	X-Large (32” dia)	0.35	Surface Mount: 5.5 ft^2 Pendant Mount: 11.1 ft^2

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Luminaire Family	Luminaire Size	NRC Rating	Equivalent Surface Area (ft^2)
Concord (lit)	4ft long, 8” high, lit	0.35	5.5 ft^2
	4ft long, 12” high, lit	0.35	8.3 ft^2
	4ft long, 16” high, lit	0.35	11.1 ft^2
	8ft long, 8” high, lit	0.35	11.1 ft^2
	8ft long, 12” high, lit	0.35	16.6 ft^2
	8ft long, 16” high, lit	0.35	22.2 ft^2
Concord (acoustic only)	4ft long, 8” high, acoustic only	0.65	5.5 ft^2
	4ft long, 12” high, acoustic only	0.65	8.3 ft^2
	4ft long, 16” high, acoustic only	0.65	11.1 ft^2
	8ft long, 8” high, acoustic only	0.65	11.1 ft^2
	8ft long, 12” high, acoustic only	0.65	16.6 ft^2
	8ft long, 16” high, acoustic only	0.65	22.2 ft^2
Lyra Acoustic	Small (14”)	0.35	Surface Mount: 1.2 ft^2 Pendant Mount: 2.3 ft^2
	Medium (18”)	0.35	Surface Mount: 1.9 ft^2 Pendant Mount: 3.8 ft^2
	Large (24”)	0.35	Surface Mount: 3.4 ft^2 Pendant Mount: 6.7 ft^2
	X-Large (32”)	0.35	Surface Mount: 6.2 ft^2 Pendant Mount: 12.5 ft^2
Ring Light Acoustic	Small (2ft dia)	0.35	Surface Mount: 3.1 ft^2 Pendant Mount: 6.2 ft^2
	Medium (3ft dia)	0.35	Surface Mount: 7.0 ft^2 Pendant Mount: 14.1 ft^2
	Large (4ft dia)	0.35	Surface Mount: 12.5 ft^2 Pendant Mount: 25.1 ft^2
	X-Large (5ft dia)	0.35	Surface Mount: 19.6 ft^2 Pendant Mount: 39.2 ft^2
Vibe Acoustic	Small (2ft dia)	0.70	2.2 ft^2
	Medium (3ft dia)	0.70	5.6 ft^2
	Large (4ft dia)	0.70	11.5 ft^2
Vulcan Acoustic (lit)	Small (22” total length, 12” segment)	0.35	4.3 ft^2
	Medium (43” total length, 24” segment)	0.35	8.3 ft^2
	Large (63” total length, 36” segment)	0.35	12.3 ft^2
Vulcan Acoustic (not lit)	Small (22” total length, 12” segment)	0.65	4.3 ft^2
	Medium (43” total length, 24” segment)	0.65	8.3 ft^2
	Large (63” total length, 36” segment)	0.65	12.3 ft^2

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