



ACOUSTIC LIGHTING CASE STUDY

Public Building – Lobby



LumiScapes by Cooledge Suspended FABRICloud 2x3 grid with shadow image in lobby waiting area features an eye-catching image while providing illumination for the space.

- Luminaire Size: 2 @ 8' x 12' (2.4m x 3.6m)
- Light Output/Flux: 289 lm/sqft (3,210 lm/m²)
- Image: Shadow
- CRI: 94
- R9: 92

IMMERSIVE ILLUMINATION

Cooledge Luminous Ceiling products deliver “immersive illumination” that includes superior color rendering qualities AND significant levels of comfortable, glare-free light that brings the feeling of the outdoors...inside.

FABRICloud literally brings that outside feeling to interior spaces with a collection of configurable nature scenes to enhance open spaces.



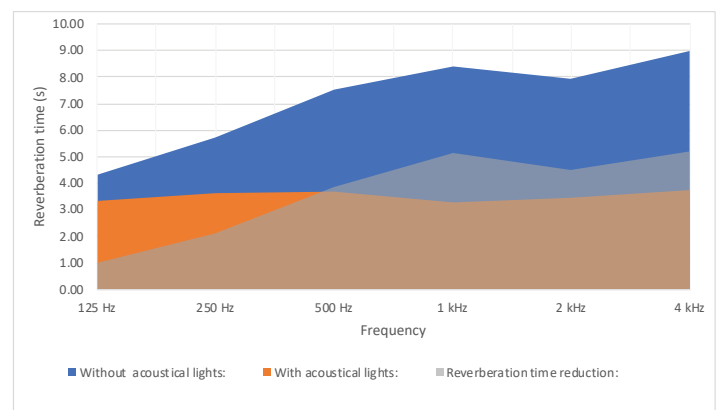
Photometric Rendering

- Illuminance (floor): 185 lux (17 fc)
- Glare: Max. UGR <19

NOISE REDUCTION

A key measurement of the success of acoustic materials is the effective increase in absorbing area created by their addition and the decrease in reverberation time or time for noise to be reduce by 60dB.

Most critical are the values at the mid-frequencies (500Hz-1000Hz) where speech hearing is most attuned to human speech.



Reverberation Time

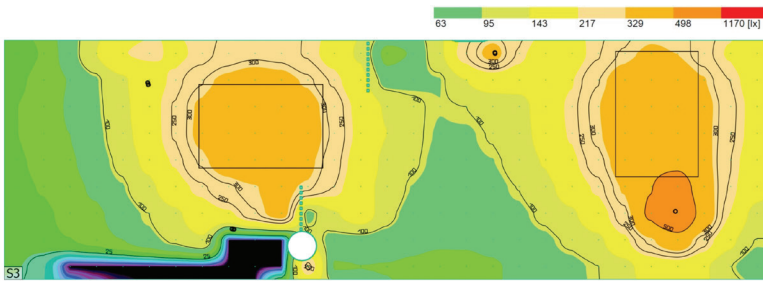
For 500Hz – 1000Hz:

- Avg. Decrease in Reverberation Time: ~4.48s
- % Increase in Sabins (Absorption Area): 56%

ROOM DIMENSIONS & PROPERTIES

Room Dimensions	(m)	(ft)	Surface	Type	(m ²)	(sqft)
Length	22.0	72.2	Floor	Terrazo	152.2	1,638
Width	13.0	42.7	Ceiling	Plaster	152.2	1,638
Height	3.5	11.5	Wall	Stone	226.3	2,436
			LumiScapes by Cooledge FABRICloud (2x3)	Suspended	17.3	186

LIGHTING PERFORMANCE



Glare evaluation according to UGR											
		70	70	50	30	70	70	50	50	30	
p Ceiling		50	30	50	30	30	50	30	50	30	
p Walls		20	20	20	20	20	20	20	20	20	
p Floor		20	20	20	20	20	20	20	20	20	
Room size X Y		Viewing direction at right angles to lamp axis					Viewing direction parallel to lamp axis				
2H	2H	10.9	12.3	11.2	12.5	12.7	11.0	12.4	11.3	12.6	12.8
	3H	12.5	13.7	12.8	14.0	14.3	12.6	13.9	13.0	14.1	14.4
	4H	13.2	14.3	13.5	14.6	14.9	13.3	14.5	13.6	14.7	15.0
	6H	13.7	14.7	14.0	15.1	15.4	13.8	14.9	14.2	15.2	15.5
	8H	13.8	14.9	14.2	15.2	15.5	14.0	15.1	14.4	15.4	15.7
4H	12H	13.9	15.0	14.3	15.3	15.6	14.1	15.1	14.5	15.5	15.8
	2H	11.6	12.8	11.9	13.1	13.3	11.7	12.8	12.0	13.1	13.4
	3H	13.4	14.4	13.8	14.7	15.0	13.5	14.5	13.9	14.8	15.2
	4H	14.2	15.1	14.6	15.4	15.8	14.3	15.2	14.7	15.5	15.9
	6H	14.8	15.6	15.2	16.0	16.4	15.0	15.7	15.4	16.1	16.5
8H	8H	15.0	15.8	15.5	16.2	16.6	15.2	15.9	15.6	16.3	16.7
	12H	15.2	15.9	15.6	16.3	16.7	15.4	16.0	15.8	16.5	16.9
	4H	14.5	15.2	14.9	15.6	16.0	14.6	15.3	15.0	15.7	16.1
	6H	15.3	15.9	15.7	16.3	16.8	15.4	16.0	15.9	16.4	16.9
	8H	15.6	16.1	16.1	16.6	17.1	15.7	16.3	16.2	16.7	17.2
12H	12H	15.8	16.3	16.3	16.8	17.3	16.0	16.5	16.5	16.9	17.4
	4H	14.5	15.2	15.0	15.6	16.0	14.6	15.3	15.1	15.7	16.1
	6H	15.3	15.9	15.8	16.3	16.8	15.5	16.0	16.0	16.5	16.9
	8H	15.7	16.2	16.2	16.6	17.1	15.9	16.3	16.4	16.8	17.3
	Variation of the observer position for the luminaire distances S										
S = 1.0H		+0.1 / -0.1					+0.1 / -0.1				
S = 1.5H		+0.2 / -0.3					+0.2 / -0.3				
S = 2.0H		+0.3 / -0.6					+0.3 / -0.6				
Standard table		BK06					BK06				
Correction Summand		-1.6					-1.5				
Corrected glare indices referring to 17460lm Total luminous flux											

UGR diagram (SHR: 0.25)

ACOUSTIC PERFORMANCE

Sabin Absorption Area (m²)

Frequency	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Floor area	1.5	1.5	3.0	3.0	3.0	3.0
Ceiling area	21.3	15.2	9.1	7.6	6.1	4.6
Wall area	2.3	2.3	2.3	2.3	4.5	4.5
Cooledge Luminaires	7.4	11.1	15.0	20.0	18.0	16.8
ΣSw	32.5	30.1	29.5	33.0	31.6	28.9

Sabin Absorption Area (sqft)

Frequency	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Floor area	16.4	16.4	32.8	32.8	32.8	32.8
Ceiling area	229.4	163.8	98.3	81.9	65.5	49.1
Wall area	24.4	24.4	24.4	24.4	48.7	48.7
Cooledge Luminaires	80.0	119.0	161.8	215.8	193.4	180.4
ΣSw	350.1	323.6	317.2	354.8	340.5	311.1

Absorption Values per Frequency

Surface	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
Floor	0.01	0.01	0.02	0.02	0.02	0.02
Ceiling	0.14	0.10	0.06	0.05	0.04	0.03
Wall	0.01	0.01	0.01	0.01	0.02	0.02
Cooledge Luminaires	0.43	0.64	0.87	1.16	1.04	0.97

Using simplified Sabin's Law formula

(*) Absorption value source: 1. E.J. Evans and EN Bazley, "Sound Absorbing Materials," HM Stationary Office, London, 1964.; 2. S.M. Levy (2012) "Construction calculation manual (p. 528). Waltham, MA, Butterworth-Heinemann; 3. O.A. Hassan (2009) "Building acoustics and vibration: Theory and practice (pp. 731-740), New Jersey, World Scientific.; 4. P.S. Acoustics dr. ir. P. Schevenels, "Akoestiek in gebouwen-de praktijk" 2019.; 5. Cooledge Lighting Inc., acoustical measurements external laboratory data.