



Architectural Downlighting Solutions



WHY PORTFOLIO

Portfolio offers the most complete vocabulary of recessed and surface mount downlights in the industry. Housings utilizing incandescent, tungsten-halogen compact fluorescent, and high intensity discharge sources with coordinated round and square apertures range from 3-1/2" through 13" can be combined within a facility with a common appearance. Many housings are modular accepting a wide range of optics including open, open with baffle, open wall wash, lens wall wash, and lens trims.

GLARE CONTROL

Designing the finest luminaire requires a careful blending of optical design, thermal management, lamp control, and construction features to achieve balanced performance. Peripheral vision is extremely sensitive to brightness caused by high angle light and is perceived as glare. Glare reduces visual acuity and diminishes the viewer's ability to see in an otherwise well lit space. Glare control is the single most important design factor when developing downlighting luminaires.

CUTOFF ANGLE

Unlike outdoor luminaires indoor lighting does not have industry standards for measuring glare control forcing optical engineers to depend on long-standing practices that are ultimately subjective. The cutoff angle of a lamp or physical cutoff in a luminaire is defined as the angle between nadir and the line that first conceals the direct view of the lamp (**figure 1a**). Cutoff to the lamp image or optical cutoff is the angle from nadir in which the light redirected from the reflective surfaces is just concealed (**figure 1b**).

OPTICAL DESIGN – CONGRUENT VS. INCONGRUENT OPTICS

The total output of a downlight optical system is the combination of light directly from the lamp and light reflected from the reflector surfaces. When the optical cutoff is greater than the physical cutoff the reflector is considered incongruent. Although incongruent optics may have high measured efficiency the high angle light is not directed to the work plane reducing useful light in the beam (**figure 2a**). It also produces glare that reduces visual acuity.

If the reflector is designed so the outline of both the direct and the reflected beam coincide the reflector is considered congruent. This is the most effective type of reflector because spill light has been eliminated and all the light is utilized with the beam (**figure 2b**). Comparing published efficiency and cutoff data without knowing if the optic is congruent can result in calculation errors during the specification process. To achieve brightness control while maintaining efficiency Portfolio pioneered the use of equal cutoff to lamp and lamp image and is used in all Portfolio optical systems (**figure 3**).

DIRECTIONAL LUMINAIRES

Directional luminaires pose further challenges to the optical engineer. Portfolio also pioneered the use of center beam optics that ensures maximum output and glare free performance at all adjustment angles. (**figure 4**). All Portfolio directional downlights have greater than 360° rotation and 30° tilt and locks into any aiming position. Many directional housings accept optional beam modifying lens and filters.

THE FINEST REFLECTORS

Portfolio takes great care transitioning optical designs into high quality reflector systems. Only the highest purity 3002 aluminum alloy is used resulting in better reflectance, deeper and longer lasting color and spectral consistency. All reflector finishes use the Alzak® process that provides a consistent durable finish over the lifetime of the fixture. Portfolio reflectors are offered in the widest range of standard and premium colors that integrate into any décor.

REFLECTOR TRIM RING STYLES

Portfolio reflectors are offered in up to four trim ring styles including self flanged, molded trim ring, metal trim ring, and rimless. Self flanged and removable metal or molded trim rings provide a 5/8" nominal overlap accommodating commercial construction variations while providing a gap free appearance around the flange or visible cut edge of the ceiling tile.

GRUVI™ OPEN WALL WASH

The Geometric Reflector for Uniform Vertical Illumination or GRUVI™ is a patented optical element used in combination with a standard Portfolio downlight cone providing high angle illumination to the top of the wall along with a strong downlight component (**figure 5**). The GRUVI™ open wall wash offers an economical solution on projects where one housing is installed to accommodate all downlighting needs including wall washing.

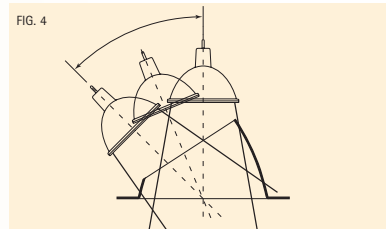
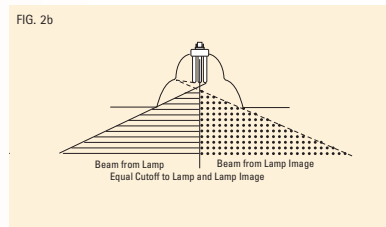
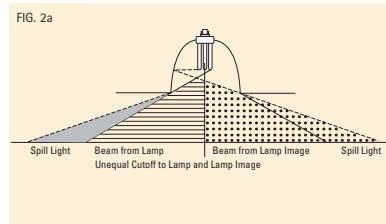
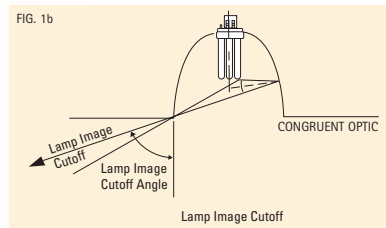
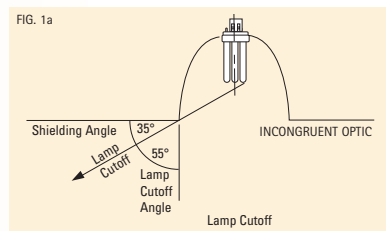


FIG. 6



FIG. 7



FIG. 8



FIG. 9



FIG. 10



FIG. 11



GRADIENT KICKER™ OPEN WALL WASH

The new Portfolio Gradient Kicker™ (figure 6) open wall wash offers unparalleled performance integrating the luminous output of the bare lamp, downlight cone, and kicker reflector providing high levels of vertical illumination that is free from visual noise. The passive downlight cone eliminates undesirable flashback and glare. In contrast to the GRUVI™ open wall wash, the Gradient Kicker™ directs more light on the vertical surfaces and has less downlight component similar to a lens wall wash. The wall becomes the luminous element redirecting light back into the space.

TRIM RETENTION

Downlight and directional reflectors use positive trim retention that holds the trim ring tight to the ceiling preventing gaps and light leaks around the flange (figure 7 and 8). This method is superior to traditional friction springs that loosen over time.

VERSATILITY

To increase the versatility of the product line many of the Portfolio housings accept a wide variety of lamps, reflector types, and accessories. A field adjustable lamp socket support mechanism allows for rapid and accurate height adjustment maintaining proper focus for all lamp and reflector combinations. Once the reflector is installed normal fixture maintenance will not cause repositioning of the lamp.

PRODUCT TESTING / CERTIFICATION

Proper thermal management is essential to achieve rated lamp life and lumen output. This is especially critical for compact fluorescent fixtures using amalgam type lamps (figure 9). All Portfolio fixtures are tested in our UL certified lab and are UL listed and CSA certified under UL standard 1598. In addition to agency compliance testing Portfolio products are also rigorously tested to insure reliability and performance. These tests include acoustical, electrical, long-term aging, and photometric testing.

TYPICAL SPECIFICATIONS

Portfolio uses both open frame and enclosed housing styles to best suite applications requirements. All housings feature corrosion resistant die cast plaster frames or plaster grounds with extra deep collars allowing installation in thicker ceilings and assuring the unit is leveled properly. Junction boxes feature separate 1/2" and 3/4" trade size pry outs and are listed for eight #12 AWG 90° rated conductors. Universal mounting brackets allow for five inches of adjustment and accepts 1/2" EMT, C-channels, bar hangers and T-bar fasteners to simplify and speed installation. Brackets and junction boxes are galvanized or painted after fabrication. Hardware and fasteners are brass, stainless steel, or zinc plated to resist corrosion. Housings are painted optical flat black to reduce stray light inside the fixture (figure 10).

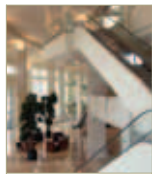
ELECTRICAL – CFL

Proper lamp control gear is essential for driving discharge lamps and achieving peak performance. Portfolio compact fluorescent downlights use universal voltage input and multi wattage output electronic ballasts standard. High frequency drive of 4-pin lamps provide quick run up times, flicker free operation, and low noise. Compact fluorescent housings are available with 2 or 3 wire dimming ballast, two-circuit operation, and master satellite wiring options. Emergency ballasts are also available that provide backup lighting during power outages. In addition to traditional remote test switch stations, Portfolio pioneered the concept of integrating the test switch within the downlight cone providing a cleaner ceiling appearance (figure 11).


ELECTRICAL – HID

Portfolio metal halide downlights and directionals are available with both magnetic and electronic ballasts. Housings using electronic metal halide ballast have been completely redesigned to take full advantage of this ballast option and are smaller, lighter weight, and more economical than traditional construction.

CFL COMPATIBILITY GUIDE





RECESSED DOWNLIGHT


	Open Narrow Beam	Open Medium Beam	Open Wide Beam	Lens Downlight 	Cross Blade
4" Vertical	C4026 4051	C4013 4051	C4018 4051	C4013 4081 C4018 4081 C4026 4081	
6" Vertical	C6018 6001	C6042 6001	C6018 6051 C6042 6051 C6042 6451	C6042 6081	
6" Horizontal			C6113 6251 C6213 6251 C6118 6251 C6218 6251 C6126 6251 C6226 6251 C6142 6151	C6113 6281 C6213 6281 C6118 6281 C6218 6281 C6126 6281 C6226 6281 C6142 6181	C6113 6281 C6213 6281 C6118 6281 C6218 6281 C6126 6281 C6226 6281 C6142 6181
6"					
7" Vertical	C7018 7001 C7726 7071	C7018 7051 C7042 7001 C7042 7401	C7042 7051 C7042 7451	C7042 7081	
7" Horizontal			C7213 7251 C7118 7251 C7218 7251 C7126 7251 C7226 7251 C7142 7151 C7242 7351	C7213 7281 C7118 7281 C7218 7281 C7126 7281 C7226 7281 C7142 7181 C7242 7381	C7213 7281 C7118 7281 C7218 7281 C7126 7281 C7226 7281 C7142 7181 C7242 7381
7"					
8" Vertical		C8042 8001 C8042 8401		C8042 8081	
8" Horizontal			C8242 8351	C8242 8381 C8518 8581 C8526 8581	C8518 8551 C8526 8551
9" Vertical			[Induction] QD9 9951		
9" Horizontal			C9142 9451 C9157 9451 C9170 9451 C9242 9251 C9257 9351	CL9142 9281 CL9142 10002 CL9142 10012 CL9242 9281 CL9242 10002 CL9242 10012	
13" Horizontal			[Induction] QD13 1301	[Induction] QD13 1381	[Induction] QD13 1351

	OPEN WALL WASH	LENS WALL WASH	SLOPE CEILING/ DIRECTIONAL	SURFACE	
				Ceiling Mount Round Downlight	Ceiling Mount Round Wall Wash
	C4013 4011 C4018 4011 C4026 4011 C4013 40111 C4018 40111 C4026 40111				
	C6018 6011 C6042 6011 C6018 60111 C6042 60111 C6042 64111			C16032 6000 C16032 6050	C16032 6010
	C6113 6211 C6213 6211 C6118 6211 C6218 6211 C6126 6211 C6226 6211 C6142 6111				
		CLW6132 6491			
	C7018 7011 C7042 7011 C7042 7411 C7018 70111 C7042 70111 C7042 74111			C17032 7000 C17032 7050 C17042 7400 C17042 7450	C17032 7010 C17042 7410
	C7213 7211 C7118 7211 C7218 7211 C7126 7211 C7226 7211 C7142 7111 C7242 7311				
		CLW7218 7491 CLW7226 7491 CLW7142 7491	CA7042 7471		
	C8042 8011 C8042 8411 C8042 80111 C8042 84111				
	C8242 8311 [Cross Blade] C8518 8511 C8526 8511				
	C9142 9411 C9157 9411 C9170 9411 C9242 9211 C9257 9311			C19232 9250 C19242 9250	C19232 9210 C19242 9210 [Induction] QD19 9950

INCANDESCENT COMPATIBILITY GUIDE

	OPEN DOWNLIGHT			WALL WASH	 LENS DOWNLIGHT	LENS WALL WASH	ELLIPSOIDAL DOWNLIGHT
	A-Lamp Medium Beam	A-Lamp Wide Beam	R-PAR	A-Lamp	A-Lamp / PAR		A-Lamp
	4"	HD4 4501 HD4MRI 4501	HD4 4551 HD4MRI 4551	HD4 4201 HD4MRI 4201 HD4 4301	HD4 4511 HD4MRI 4511	HD4 4781	
6"	HD6 6701 HD6MRI 6701	HD6 6751 HD6MRI 6751	HD6 6301 HD6MRI 6301 HD6 6501 HD6MRI 6501 HD6 6601 HD6MRI 6601	HD6 6711 HD6MRI 6711	HD6 6781	HLW6 6481	H7604T 1651
7"	HD7 7701 HD7MRI 7701 HD7 7801 HD7MRI 7801 HD7 7901 HD7MRI 7901	HD7 7751 HD7MRI 7751	HD7 7601 HD7MRI 7601 HD7 7651 HD7MRI 7651 HD7TA 7501	HD7 7711 HD7MRI 7711 HD7 7811 HD7MRI 7811 HD7 7911 HD7MRI 7911	HD7 7781	HLW7 7481	
9"					H6004T		


LOW VOLTAGE


	DOWNLIGHT	DIRECTIONAL				
	MR16	PAR56	MR16	AR70	AR111	PAR36
	3"	HD3MR 3401 HD3MR 3400PIN		HA3MR 3451 HA3MR 3471 HA3MR 3470PIN		
4"			H7493T SA91 9471	H7493T SA93 9471	H7493T SA94 9471 H7493TDT SA94 9471	H7493T SA96 9471 H7493TDT SA96 9471
6"			HA6LV SA91 6471	HA6LV SA93 6471	HA6LV SA94 6471 HA6LVDT SA94 6471	HA6LV SA96 6471 HA6LVDT SA96 6471
7"		HA7P56LV 7471				


	SHALLOW PLENUM DOWNLIGHT	SHALLOW PLENUM WALL WASH	ELLIPSOIDAL / HIGH WATT QUARTZ DOWNLIGHT	HIGH WATT QUARTZ SLOPE/ DIRECTIONAL	DIRECTIONAL	DIRECTIONAL/ ACCENT SHALLOW	PULL DOWN DIRECTIONAL	SURFACE
	A-Lamp	A-Lamp	T4 E11 Quartz	T4 E11 Quartz	PAR	PAR / Side Prong PAR	PAR	Ceiling Mount A-Line/PAR
			H7482T 1450		H7443T 9471 H7493T SA99 9471			
	H7601T 1641 H7601TMRI 1641 H7701T 1640BA H7701TMRI 1640BA	H7603T 1661 H7603TMRI 1661	H7682T 1651 H7684T 1651		HA6 6471	HA6S 6471 HA6S3 6471	H4788T	H8600 1600 H8600 3600 H8600 4655 H8605 3600 H8605 4655
	H7801T 1841 H7901T 1840BA	H7803T 1861	HD7250QT4 HD7500QT4	HA7250QT4 HA7500QT4	HA7 7471 HA7P56 7471		H7856T 6870P H7854T 6870P	H8800 1800 H8800 4800 H8800 4855

	LENS WALL WASH	PULL DOWN DIRECTIONAL	FRAMING PROJECTOR
		MR16	
	HA3MR 3481		
		H4781T	
			H7066T

HID COMPATIBILITY GUIDE

	RECESSED DOWNLIGHT – ELECTRONIC BALLAST				SHALLOW DOWNLIGHT	WALL WASH DOWNLIGHT/ SHALLOW DOWNLIGHT
	T6 G12 MH	PAR20/ PAR30L MH	PAR38 MH	ED17 MH	ED17 MH	ED17 MH
4" Electronic	M439T6 4951 M470T6 4951	MD439 4201 MD439 4301 MD470 4301		MD450 4751 MD470 4751		MD450 4711 MD470 4711
6" Electronic		MD639 6501 MD670 6501	MD670P38 6601 MD6100P38 6601	MD650 6701 MD650 6751 MD670 6701 MD670 6751 MD6100 6701 MD6100 6751	MD6S50 6141 MD6S70 6141	MD650 6711 MD670 6711 MD6100 6711
7" Electronic			MD770P38 7601 MD7100P38 7601	MD750 7701 MD750 7751 MD770 7701 MD770 7751 MD7100 7701 MD7100 7751	MD7S50 7741 MD7S70 7741 MD7S100 7741	MD750 7711 MD770 7711 MD7100 7711 MD7S50 7740WW MD7S70 7740WW MD7S100 7740WW
9" x 7" Electronic						

	RECESSED DOWNLIGHT – MAGNETIC BALLAST					SHALLOW DOWNLIGHT
	T6 G12 MH	PAR20/ PAR30L MH	PAR38 MH	ED17/ ED28 MH	ED17/ ED23.5 HPS	ED17 MH
4" Magnetic	M4T6 4951	MD4 4201 MD4 4301		MD4 4751		
6" Magnetic		MD6 6501	MD6X 6601	MD6 6701 MD6 6751 M7600T	M7600T	MD6S 6141
7" Magnetic			MD7X 7601	MD7 7701 MD7 7751 M7800T	M7800T	MD7S 7741
9" Magnetic				M7000T M7010T	M7010T	
12" Magnetic				M7210T	M7210T	

	ELLIPSOIDAL DOWNLIGHT		DIRECTIONAL	SHALLOW DIRECTIONAL	LENS ROUND		LENS SQUARE	
	ED28 MH	ED23.5 HPS	PAR20/ PAR30L/ PAR38 MH	PAR20/ PAR30L MH	ED17/ ED28 MH	ED17/ ED23.5 HPS	ED17/ ED28 MH	ED17/ ED23.5 HPS
4" Magnetic			MA4 9471					
6" Magnetic			MA6X 6471	MA6S 6471				
7" Magnetic	M7815T	M7815T	MA7X 7471					
9" Magnetic	M7015T	M7015T			M6022T M6023T M6024T	M6042T M6043T M6044T		
13" Magnetic					M6235T M6236T	M6254T M6255T	M5322T M5323T M5324T M5335T M5336T	M5341T M5342T M5343T M5354T M5355T

LENS DOWNLIGHT		LENS WALL WASH	DIRECTIONAL / SHALLOW DIRECTIONAL			PULL DOWN DIRECTIONAL	PULL DOWN LENS WALL WASH
PAR20/ PAR30L/ ED17 MH	PAR38	T6 G12/ PAR30L/ PAR38 MH	CDM-R111 MH	PAR20/ PAR30L MH	PAR38 MH	PAR38 MH	ED17 MH
MD439 4781 MD450 4781 MD470 4781		M439T6 M470T6		MA439			
MD639 6781 MD650 6781 MD670 6781 MD6100 6781		MLW639 MLW670 MLW6100	MA639AR	MA639 MA670 MA6539	MA670P38 MA6100P38		
MD750 7781 MD770 7781 MD7100 7781	MD770P38 7781 MD7100P38 7781	MLW739 MLW770 MLW7100		MA739 MA770	MA770P38 MA7100P38	MAP770P38E MAP7100P38E	
							MSL9X750E MSL9X770E MSL9X7100E

LENS SHALLOW DOWNLIGHT	WALL WASH DOWNLIGHT	WALL WASH SHALLOW	LENS DOWNLIGHT		LENS WALL WASH	PULL DOWN DIRECTIONAL
ED17 MH/HPS	ED17 MH	ED17 MH	PAR20/ PAR30L/ ED17 MH	PAR38	T6 G12/ PAR30L/ PAR38 MH	PAR38 MH
	MD4 4711		MD4 4781		M4T6 4983	
	MD6 6711		MD6 6781		MLW6 6483	
	MD7 7711	MD7S 7740WW	MD7 7781	MD7X 7781	MLW7 7483	M7854T 6870
M6043S						

SURFACE							
Ceiling Mount Round MH	Ceiling Mount Soft Square MH	Ceiling Mount Round HPS	Ceiling Mount Soft Square HPS	Wall Mount Round MH	Wall Mount Soft Square MH	Wall Mount Round HPS	Wall Mount Soft Square HPS
				M8605	M8615	M8605	M8615
SMD7X							
M8000	M8010	M8000	M8010	M8005	M8015	M8005	M8015

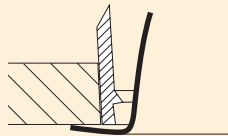
TRIM RING SELECTION

Portfolio offers the widest range of trim ring options in the industry including self flanged, molded and metal trim rings, and rimless. The self-flanged versions are available with an optional white painted flange. The metal trim rings are available in a wide range of painted and plated finishes and in most cases can be removed from the optic and field painted to match any décor.



SELF FLANGED TRIM RING

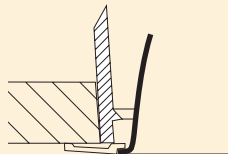
Self-flanged trims feature a one-piece optical system with the flange formed from the downlight cone. This construction eliminates gaps and light leaks between the reflector cone and trim ring. The flange has a 3-degree taper providing a tight fit to the ceiling surface eliminating gaps between the trim ring and ceiling. A self flanged trim ring is not available with baffle option.



WMH (Warm Haze) with Self-Flanged

MOLDED TRIM RING

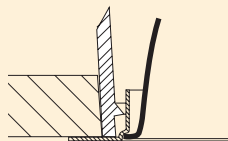
The molded trim ring is available in matte white and matches most white ceiling finishes. It drops over the reflector cone and is captured between the reflector cone and ceiling surface. The molded trim ring has some flex and can accommodate subtle variations in ceiling flatness.



Standard LI Reflector with White Molded Trim

METAL TRIM RING

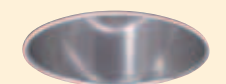
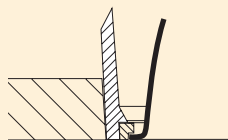
An optional 4, 6, or 7-inch nominal diameter formed metal trim can be ordered as an accessory. The metal trim ring field replaces the molded trim ring. The metal trim ring accessory is available in many painted and plated finishes and can be painted in the field.



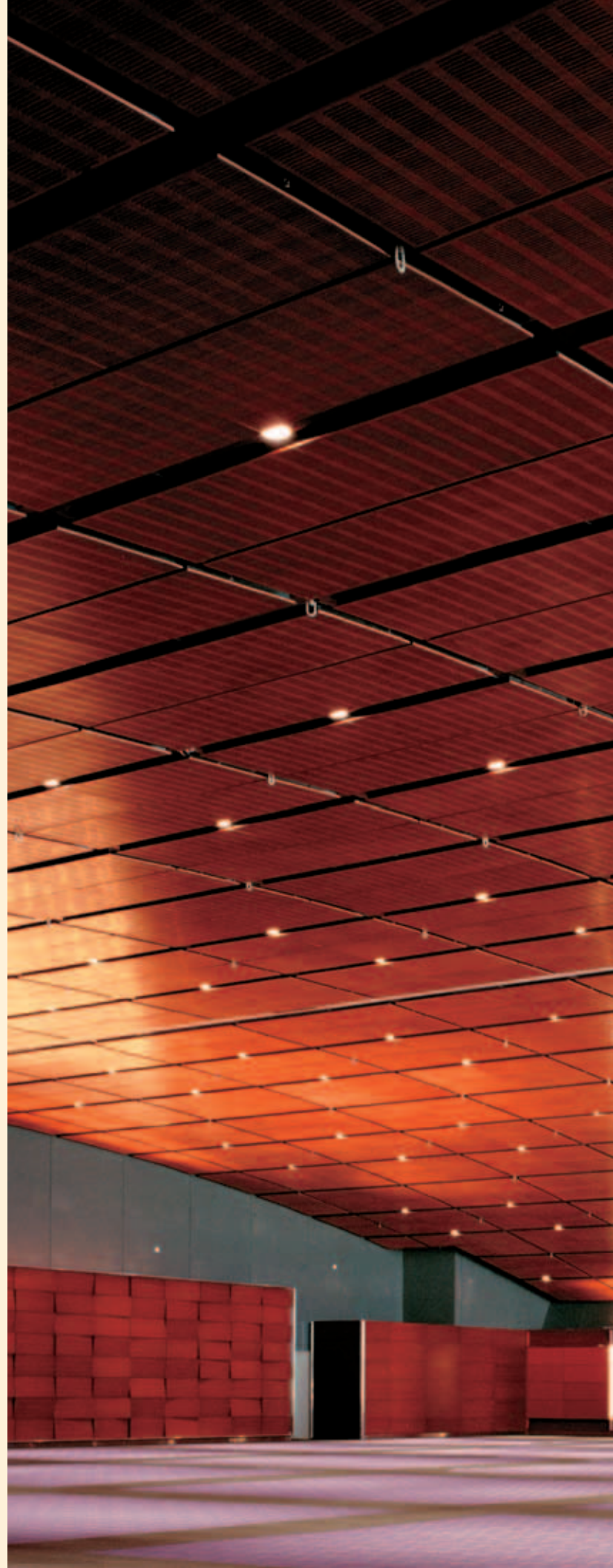
Standard LI Reflector with Metal Trim Ring

RIMLESS TRIM RING

Rimless offers a clean contemporary appearance with the flange of the reflector cone flush with the finished ceiling. Rimless trim rings are ordered separately as an accessory and replace the molded trim ring shipped with the optic.



Standard LI Reflector with TRRG (Rimless) option



SCALABLE APERTURES

To meet the challenges of today's commercial spaces Portfolio offers scalable apertures providing consistent visual appearance across lamp types and optical distributions.



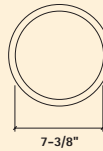
The 3-inch nominal aperture downlights feature low voltage MR16 type lamps with precise beam control and are suitable for both ambient and accent lighting. Includes a 1-1/4" pinhole providing minimal visual impact.



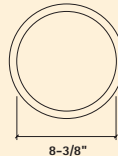
The 4-inch nominal aperture is the smallest downlight series supporting all optical distributions and lamp types including incandescent, compact fluorescent, and high intensity discharge. Use for accent and task lighting and with lower ceiling heights.



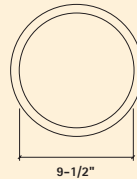
The 6-inch nominal aperture is the most versatile and popular downlight series meeting all optical distribution needs and is available with all and lamp types including incandescent, compact fluorescent, and high intensity discharge.



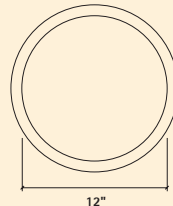
The 7-inch nominal aperture downlight series provides greater efficiency for average ceiling heights or for longer throws in higher ceilings. Available in all optical distributions and lamp types including incandescent, compact fluorescent, and high intensity discharge.



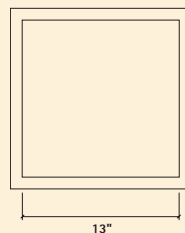
The 8-inch nominal aperture downlights are used for higher ceiling applications when high efficiency, high output, and long throws are required.



The 9-inch nominal aperture series is used with high wattage compact fluorescent and high output high intensity discharge lamps



The 12-inch nominal aperture series provides for highest optical efficiency and supports higher wattage high intensity discharge lamps. Use in very high ceiling spaces including terminals, shopping malls, and convention spaces.

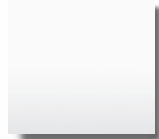


The 13-inch nominal aperture square downlights feature lensed optical elements combined with high intensity discharge lamp provide wide distribution and high levels of illumination.

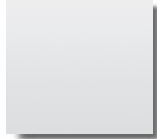
Sample Reflector Finishes



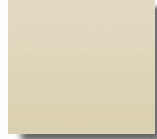
Gloss White (W)
Painted white finish for a neutral daytime ceiling look.



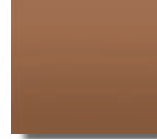
Low Iridescent Clear Compact Fluorescent (LI)
A clear specular Alzak® finish precisely anodized to provide iridescence suppression for use with compact fluorescent lamps.



Haze (H)
A clear semi-specular Alzak® finish to provide subtle luminance.



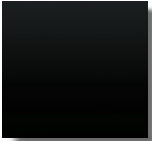
Gold (G)
A champagne gold specular Alzak® finish which provides visual warmth.



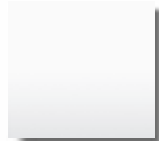
Cognac (K)
A warm copper color in a specular Alzak® finish. A good choice for wood ceilings or anywhere that a rich look is desired. Similar to "Bronze" by other manufacturers.



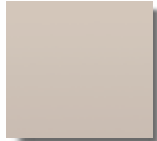
Graphite (GP)
A gunmetal gray in a specular Alzak® finish. If you like Black Alzak®, but not the way that dust shows on it; then you'll appreciate Graphite.



Black (B)
A specular Alzak® finish providing maximum aperture darkness.



Low Iridescent Clear HID/Incandescent (LI)
A clear specular Alzak® finish precisely anodized to provide iridescence suppression for HID lamps and comparable appearance with incandescent sources.



Warm Haze (WMH)
A semi-specular Alzak® to provide visual identity, with a hint of gold to add warmth.



Wheat (WH)
A more robust version of gold which adds significant visual warmth.



Cognac Haze (KH)
Same as Cognac, but with a semi-specular Alzak® finish.



Graphite Haze (GPH)
Same as Graphite, but with a semi-specular Alzak® finish.

Printed colors can only approximate the reflector finish. Refer to actual reflector finish samples when making a selection. Inherent manufacturing variation may cause slight finish differences.

