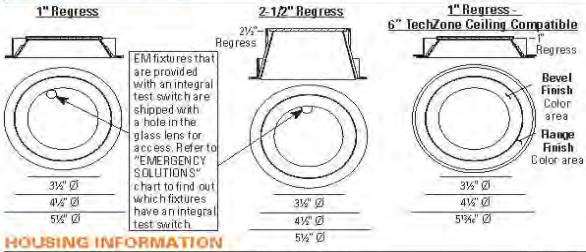
Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S303**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

BeveLED 2.1

DOWNLIGHT 3021

TRIM INFORMATION

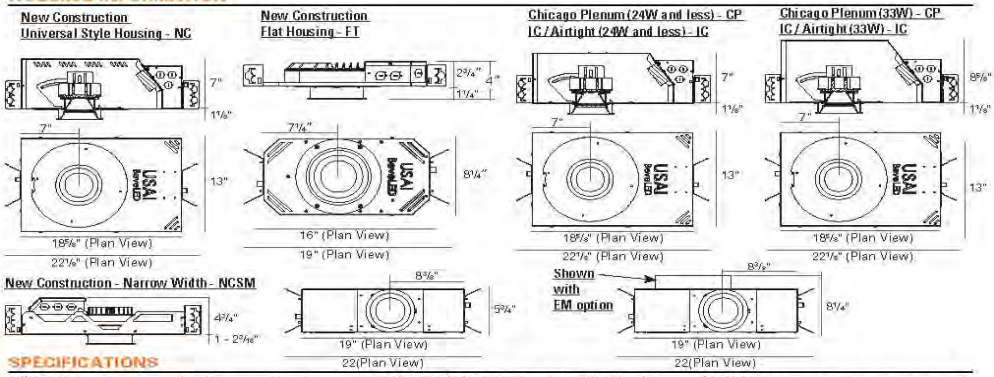


3021 Emergency Solutions

Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
FT	N/A			X
NCSM*	Above ceiling access required		X	
NC 25° or 50° optic	Through aperture	X		
NC 90° optic	Through aperture		X	
NC Wet Location	Through aperture		X	
CP	N/A			X
IC	N/A			X

* NCSM + DIML8 cannot be offered with EM

HOUSING INFORMATION



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. 2-1/2" regress available for maximum glare control. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with integral solite lens standard; frosted lens available as an option.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 25°, 50° or 90° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 16W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML8A logarithmic control is intended for use with Lutron control systems; DIML8B linear control is intended for use with non-Lutron controls. DIML15 and DIML8 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with an integral test switch are provided with a hole in the glass lens as per the drawing above. Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. SPECIAL NOTE FOR NCSM HOUSING: DIML8 cannot be combined with EM options in NCSM housing. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 16W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less. NCSM with TZ option is compatible with 6" TechZone ceiling systems. When using DIML8, NCSM housing can NOT be used with thru-branch circuit wiring.

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made.Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years

NOTES:
* Not for use in corrosive environment.
* Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3021-B1-S-10-LRTD4-9024-C3-30KS-50-NCSM-VOLT-DIML6*
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S304A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

BeveLED 2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

DOWNLIGHT 3021

1" Regress | 2-1/2" Regress

BeveLED 2.1 Recessed Downlight - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installations.

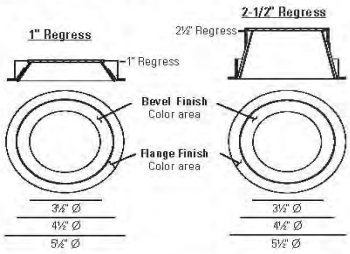
DELIVERED PERFORMANCE

BeveLED 2.1 DOWNLIGHT	9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Lumens per Watt	93	68	86	67	86	67	80	63	71	57
Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
Delivered Lumens	**775**	**600**	**1025**	**800**	**1375**	**1075**	**1925**	**1500**	**2400**	**1875**
Color Consistency	2-Step MacAdam Ellipse									

Performance based on 3000K

CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K



HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3021W - B1- S - 10 - LRTD4 - 9012 - C3 - 27KS - 50 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		LENS	FLANGE FINISH	
3021	_____	-	_____	-	_____	-	_____
3021 Round Downlight 1" or 2-1/2" Regress	**W**	Wet location [1]	**B1**	1" Regress Bevel, Painted Die Cast Matches Flange Finish	**S** Solite (provided standard)	**01**	Clear Matte (AC Bevel only)
	EML	Integral Emergency Test Switch [2]	**AB1**	1" Regress Bevel, Black Anodized	**F** Frosted	**02**	Black Anodized (AB Bevel only)
	TZ	6" TechZone ceiling compatible (NCSM only)	**AC1**	1" Regress Bevel, Clear Matte Anodized		**10**	White
			B2	2-1/2" Regress Bevel, Painted Die Cast Matches Flange Finish		**13**	Statuary Bronze
			AB2	2-1/2" Regress Bevel, Black Anodized [3]		**21**	Black
			AC2	2-1/2" Regress Bevel, Clear Matte Anodized [3]		**28**	Metalized Grey
						RAL	Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.
[2] See table on page 2
[3] Not for use with FT or NCSM housing.

HOUSING ORDERING INFORMATION

HOUSING CODE	WATTAGE	ENGINE CODE	COLOR	REFLECTOR	HOUSING TYPE	SELECT ONE VOLTAGE	DIMMING DRIVER OPTIONS	ACCESSORIES
LRTD4	-	C3	-	-	-	-	-	-

LRTD4	WATTAGE	C3	COLOR	REFLECTOR	HOUSING TYPE	VOLTAGE	DIMMING DRIVER OPTIONS	ACCESSORIES
LRTD4	**9009** 9W LED, **9012** 12W LED, **9016** 16W LED, **9024** 24W LED, **9033** 33W LED. See performance chart for precise lumen information.	C3	**22KS** 2200K, 80+ CRI; **27KS** 2700K, 80+ CRI; **30KS** 3000K, 80+ CRI; **35KS** 3500K, 80+ CRI; **40KS** 4000K, 80+ CRI; **27KH** 2700K, 90+ CRI; **30KH** 3000K, 90+ CRI. 2 Step MacAdam ellipse is standard for all	**25** 25° beam; **50** 50° beam; **90** 90° beam	**FT** Flat Housing, New Construction; **NCSM** New Construction, Narrow Width; **NC** New Construction, all in one; **CP** Chicago Plenum; **IC** Insulation-Contact Rated / Airtight. See emergency solutions chart for EM options with these housings.	**120V** 277V	**For use with 120V or 277V**: **DIML2** 0-10V dim, 10% (provided standard); **DIML4** Lutron A 3-wire/ECO, 1%; **DIML4E** Lutron 5 ECO, 5% [4]; **DIML4H** Lutron H ECO, 1% Fade [4]; **DIML6A** EldoLED 0-10V Lutron, 0.1%; **DIML6B** EldoLED 0-10V Linear, 0.1%; **DIML7** EldoLED DALI, 0.1%; **DIML8** EldoLED DMX, 0.1% [5,6]	**CB27** 27" C-Channel Bars; **CB52** 52" C-Channel Bars; **EML** Emergency battery [7]; **EMLW** Emergency battery, wet location [7]; **TZ** 6" TechZone ceiling compatible [8]
						120V	**For use with 120V only**: **DIML3** Lutron A 2-wire, 1% 120V only; **DIML9** TRIAC 2-wire, 15% 120V only [4,6]; **DIML10** ELV 2-wire, 15% [4,5] 120V only	
						347V	**For use with 347V only**: **DIML15** 0-10V dim, 1%, 347 only	

[4] N/A with 9W.
[5] N/A with 33W
[6] N/A with FT housing
[7] See emergency solutions chart for more details on EM options.
[8] With NCSM housing only

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3021-B1-S-10-LRTD4-9016-C3-30KS-50-NCSM-VOLT-DIML2
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S304A**
15.54.0		
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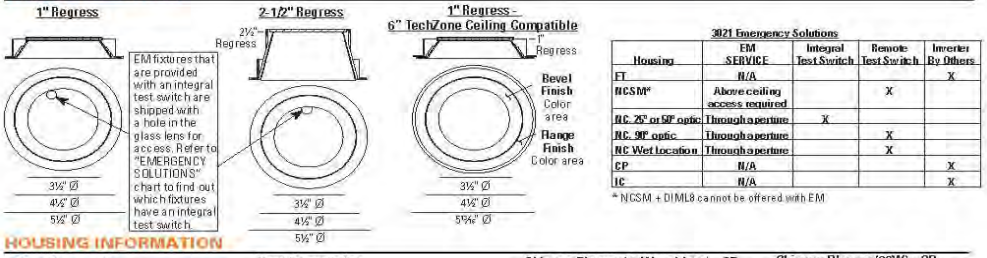
BeveLED 2.1 — DOWNLIGHT 3021

TRIM INFORMATION

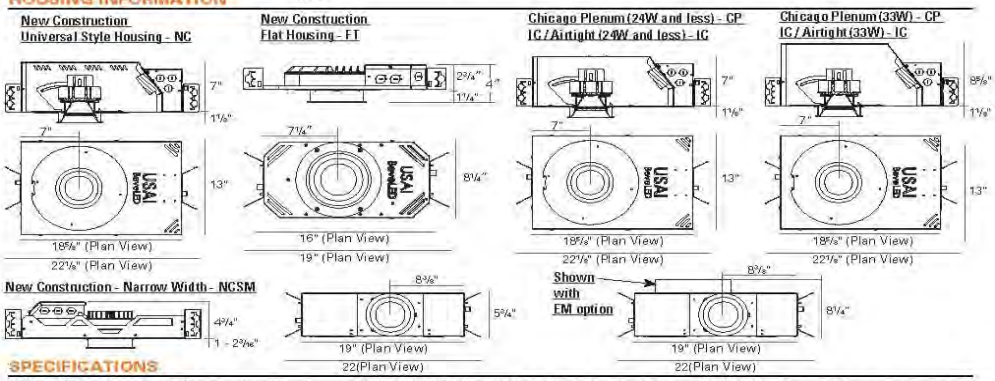


3021 Emergency Solutions

Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
FT	N/A			X
NCSM*	Above ceiling access required		X	
NC 26° or 50° optic	Through aperture	X		
NC 90° optic	Through aperture		X	
NC Wet Location	Through aperture		X	
CP	N/A			X
IC	N/A			X

* NCSM + DIML8 cannot be offered with EM

HOUSING INFORMATION



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. 2-1/2" regress available for maximum glare control. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with integral solite lens standard; frosted lens available as an option.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 25°, 50° or 90° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 18W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML6 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with an integral test switch are provided with a hole in the glass lens as per the drawing above. Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. SPECIAL NOTE FOR NCSM HOUSING: DIML8 cannot be combined with EM options in NCSM housing. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 18W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less. NCSM with TZ option is compatible with 6" TechZone ceiling systems. When using DIML8, NCSM housing can NOT be used with thru-branch circuit wiring.

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made. Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years

NOTES:
* Not for use in corrosive environment.
* Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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F 845-561-1130

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3021-B1-S-10-LRTD4-9016-C3-30KS-50-NCSM-VOLT-DIML2
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S304B**
15.54.0		
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BeveLED2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

DOWNLIGHT 3021

1" Regress | 2-1/2" Regress

BeveLED 2.1 Recessed Downlight - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installations.

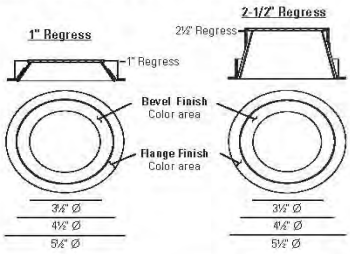
DELIVERED PERFORMANCE

BeveLED 2.1 DOWNLIGHT	9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Lumens per Watt	93	68	86	67	86	67	80	63	71	57
Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
Delivered Lumens	**775**	**600**	**1025**	**800**	**1375**	**1075**	**1925**	**1500**	**2400**	**1875**
Color Consistency	2-Step MacAdam Ellipse									

Performance based on 3000K

CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K



HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3021W - B1- S - 10 - LRTD4 - 9012 - C3 - 27KS - 50 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		LENS	FLANGE FINISH	
3021	_____	-	_____	-	_____	-	_____
3021 Round Downlight 1" or 2-1/2" Regress	**W** Wet location [1] **EML** Integral Emergency Test Switch [2] **TZ** 6" TechZone ceiling compatible (NCSM only)		**B1** 1" Regress Bevel, Painted Die Cast Matches Flange Finish **AB1** 1" Regress Bevel, Black Anodized **AC1** 1" Regress Bevel, Clear Matte Anodized **B2** 2-1/2" Regress Bevel, Painted Die Cast Matches Flange Finish **AB2** 2-1/2" Regress Bevel, Black Anodized [3] **AC2** 2-1/2" Regress Bevel, Clear Matte Anodized [3]		**S** Solite (provided standard) **F** Frosted	**01** Clear Matte (AC Bevel only) **02** Black Anodized (AB Bevel only) **10** White **13** Statuary Bronze **21** Black **28** Metalized Grey **RAL** Custom Color (specify RAL #)	

[1] Wet location, use with B1 trims only.
[2] See table on page 2
[3] Not for use with FT or NCSM housing.

HOUSING ORDERING INFORMATION

HOUSING CODE		WATTAGE		ENGINE CODE		COLOR		REFLECTOR		HOUSING TYPE		SELECT ONE VOLTAGE		DIMMING DRIVER OPTIONS		ACCESSORIES
LRTD4	-	_____	-	C3	-	_____	-	_____	-	_____	-	_____	-	_____	-	_____

LRTD4		C3							
	9009 9W LED, **9012** 12W LED, **9016** 16W LED, **9024** 24W LED, **9033** 33W LED, See performance chart for precise lumen information.		**22KS** 2200K, 80+ CRI **27KS** 2700K, 80+ CRI **30KS** 3000K, 80+ CRI **35KS** 3500K, 80+ CRI **40KS** 4000K, 80+ CRI **27KH** 2700K, 90+ CRI **30KH** 3000K, 90+ CRI 2 Step MacAdam ellipse is standard for all	**25** 25° beam **50** 50° beam **90** 90° beam	**FT** Flat Housing, New Construction **NCSM** New Construction, Narrow Width **NC** New Construction, all in one **CP** Chicago Plenum **IC** Insulation-Contact Rated / Airtight See emergency solutions chart for EM options with these housings.	**120V** **277V**	**For use with 120V or 277V** **DIML2** 0-10V dim, 10% (provided standard) **DIML4** Lutron A 3-wire/ECO, 1% **DIML4E** Lutron 5 ECO, 5% [4] **DIML4H** Lutron H ECO, 1% Fade [4] **DIML6A** EldoLED 0-10V Lutron, 0.1% **DIML6B** EldoLED 0-10V Linear, 0.1% **DIML7** EldoLED DALI, 0.1% **DIML8** EldoLED DMX, 0.1% [5,6]	**CB27** 27" C-Channel Bars **CB52** 52" C-Channel Bars **EML** Emergency battery [7] **EMLW** Emergency battery, wet location [7] **TZ** 6" TechZone ceiling compatible [8]
						120V	**For use with 120V only** **DIML3** Lutron A 2-wire, 1% 120V only **DIML9** TRIAC 2-wire, 15% 120V only [4,6] **DIML10** ELV 2-wire, 15% [4,5] 120V only	
						347V	**For use with 347V only** **DIML15** 0-10V dim, 1%, 347 only	[7] See emergency solutions chart for more details on EM options. [8] With NCSM housing only

[4] N/A with 9W.
[5] N/A with 33W
[6] N/A with FT housing

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'BeveLED 2.1'
Specification:	3021-B1-S-10-LRTD4-9016-C3-27KS-50-NCSM-VOLT-DIML2
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S304B**
15.54.0		
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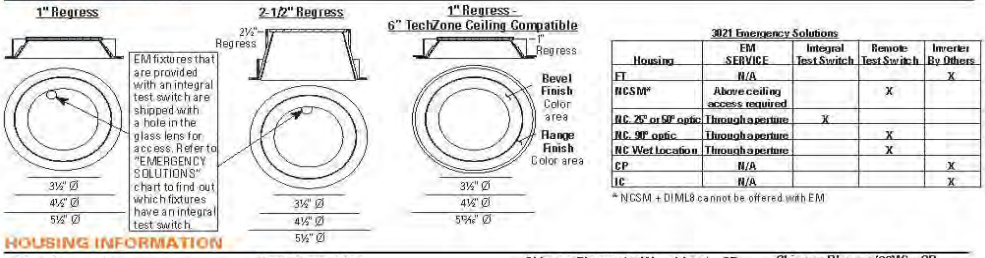
BeveLED 2.1

DOWNLIGHT 3021

TRIM INFORMATION

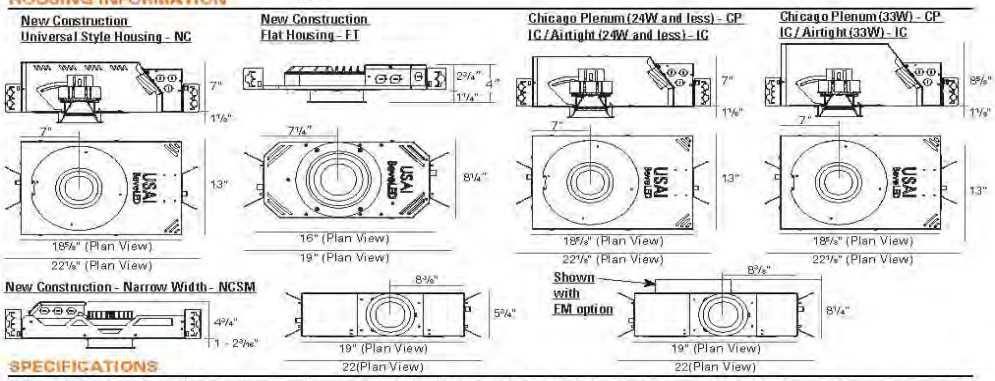


3021 Emergency Solutions

Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
FT	N/A			X
NCSM*	Above ceiling access required		X	
NC 25° or 50° optic	Through aperture	X		
NC 90° optic	Through aperture		X	
NC Wet Location	Through aperture		X	
CP	N/A			X
IC	N/A			X

* NCSM + DIML8 cannot be offered with EM

HOUSING INFORMATION



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. 2-1/2" regress available for maximum glare control. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with integral solite lens standard; frosted lens available as an option.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 25°, 50° or 90° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 16W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML6 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with an integral test switch are provided with a hole in the glass lens as per the drawing above. Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. SPECIAL NOTE FOR NCSM HOUSING: DIML8 cannot be combined with EM options in NCSM housing. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 16W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less. NCSM with TZ option is compatible with 6" TechZone ceiling systems. When using DIML8, NCSM housing can NOT be used with thru-branch circuit wiring.

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made. Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years

NOTES:
* Not for use in corrosive environment.
* Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

USAI Lighting
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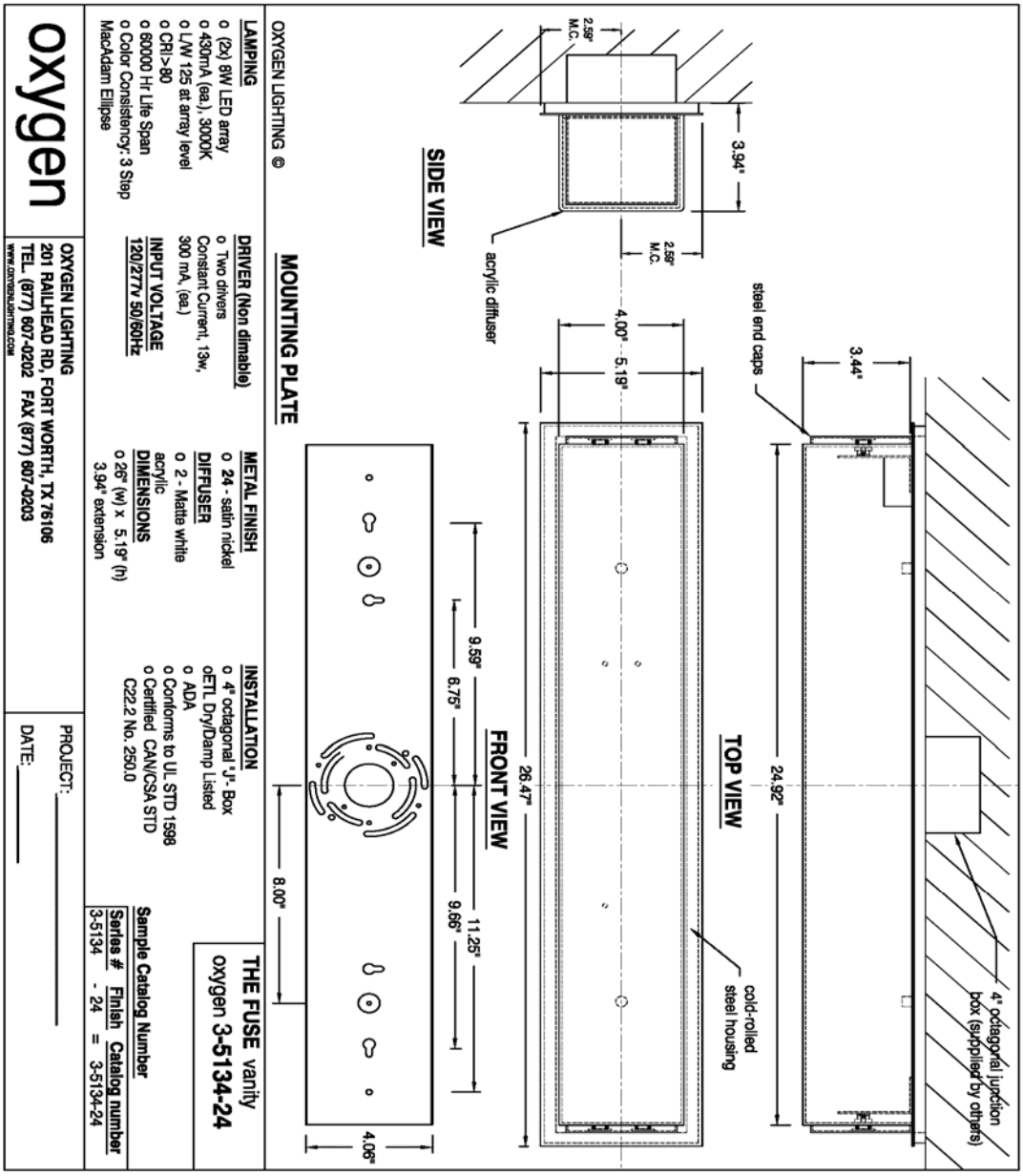
info@usailighting.com
1126 River Road
New Windsor, NY 12553
T 845-565-8500
F 845-561-1130

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3021-B1-S-10-LRTD4-9016-C3-27KS-50-NCSM-VOLT-DIML2
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S305**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2



CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	OXYGEN LIGHTING 'Fuse Vanity'
	Specification:	3-513-24
	Approved Alternates:	Birchwood, Visa Lighting
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S305**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	OXYGEN LIGHTING 'Fuse Vanity'
	Specification:	3-513-24
	Approved Alternates:	Birchwood, Visa Lighting
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 2 of 7

Type:

1. BASE MODEL

LP3.5RT	3-1/2" trimmed with flush lens
LP3.5RTDL[2]	3-1/2" trimmed with drop (reveal) lens
LP3.5RTRL	3-1/2" trimmed with regressed lens
LP3.5RMUD	3-1/2" trimless, mud-in with flush lens
LP3.5RHF	3-1/2" trimless, hidden-flange with flush lens
LP3.5RPF	3-1/2" perimeter, flush-mount
LP3.5RPR	3-1/2" perimeter, regressed-mount

[1]Skip CEILING TYPE (leave blank); go to OVERALL RUN LENGTH
[2]Accent Downlight(s) not available with drop (reveal) lens

2. RUN LENGTH/ SIZE

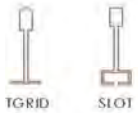
___ Individual (2', 3', 4', 5', 6', 7' or 8')
___ Continuous row or Configuration[3] *(enter total linear length, ex: 20')*

[3]A configuration is a custom shape (rectangle square, L, etc.) with mitered corners. Must choose quantity of mitered corners in Additional Options.

All lengths are nominal and may vary based on lamping and other specification selections. Consult factory when exact lengths are required.

3. CEILING TYPE

DRY	Drywall
TGRID	T-Grid
SLOT	Slot T-Bar
ATZ/TGRID	Armstrong® Techzone T-Grid
ATZ/SLOT	Armstrong® Techzone Slot T-Grid
OTHER	Additional ceiling types may be available. Contact factory.



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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 3 of 7

4. LAMPING – PRIMARY

NONE	**None.** *Select when specifying only Downlight Lamping*
LED[4]	*Pair lamping with CCT (where applicable), ex: MED/2700K*
LOW[5]	Low-output, high-performance LED – 517 delivered lm/ft, 7.4 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
MED	Medium-output, high performance LED – 689 delivered lm/ft, 9.8 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
HI[5]	High-output, high-performance LED – 861 delivered lm/ft, 12.2 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
TUNE[5]	Tunable white LED, 2700K-5700K – 574 delivered lm/ft, 8.2 W/lf, 70 lm/W *(must select DMX driver below; controller not included)*
DECOR[5]	Decorative constant voltage LED, 230 delivered lm/ft, 4.4 W/lf, 52 lm/W **3000K 3500K 4000K**
RGB	Color-changing RGB LED, 5 W/lf *(must select DMX driver below; controller not included)*

[4] *LED board options may be limited and/or substituted to accomodate requests for exact, non-standard overall run lengths (ex: 3' 9"). Consult factory.*

[5] *Performance calculations are extrapolated estimates based on the actual IES test results of MED option at 3500K.*

[6] *Performance calculations are extrapolated MAXIMUM estimates for mid-range CCTs based on the actual IES test results of MED option at 3500K. Cooler and warmer CCT settings will provide lower delivered lumens, lower lm/W and higher W/lf.*

FLUORESCENT	*Lamps not provided*
1T5	Standard output, 1-lamp profile T5
1T5HO	High output, 1-lamp profile T5
1T5S[7]	Standard output, 1-lamp profile T5, staggered
1T5HOS[7]	High output, 1-lamp profile T5, staggered

[7] *For staggered lamping, EXT lens is recommended for maximum diffusion properties*

5. DRIVER – PRIMARY

NONE	**None.** *Select when specifying only Downlight Lamping*
LED	
0/10V/	0-10V dimming *(Pair driver with dimming % below, ex: 0/10V/10%)* **10%** Standard dimming to 10% **1%** Dimming to 1% **0%** Premium dimming to 0%
DALI	DALI dimming to 0%
DMX	DMX dimming to 0%
HILUME/A3	Lutron Hi-Lume® A L3D EcoSystem® or three-wire control, dimming to 1%
FLUORESCENT	
STD	Standard, non-dimming, <10% THD
FL/0/10V	Dimming, 0-10V
HILUME	Lutron Hi-Lume® dimming
BALLASTAR	Step-dimming

Driver/ballast options may be limited with 347 voltage. Consult factory.
Driver/ballast specifications provided upon request to assist with control system integration.
Consult ballast manufacturer for lamp compatibility.

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 4 of 7

6. LENS/LOUVER – PRIMARY

NONE	None. *Select when specifying only Downlight Lamping*
WD[1]	Frosted *(LEDs may be visible when dimmed)*
EXT	Extra diffuse
EXT/ASY/LED[2]	Extra diffuse with asymmetric distribution, flush *(LED lamping only)*
LV[3]	Bladed, specular aluminum louver

[1]Available only with fluorescent lamping
[2]Available only with LP3.5PT, LP3.5R/MUD and LP3.5R/HF
[3]When specified with LED lamping, a lightly frosted, high-transmission lens is fitted between louver and LED board

EXT/ASY/LED

Reflector and LED board are angled providing asymmetric distribution on wall surface

7. ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping*
MR16/LED	GU5.3 base for retrofitting with MR16 LED *(lamps not included)* *Lamp transformer and compatibility shall be checked by others.* *ALW will provide transformer information on submittal drawings.*
CZEN800	LED COB Downlight, 9.5 W, 790 lm, 40° beam, 3000K
CZEN1000[1]	LED COB Downlight, 12.7 W 1040 lm, 40° beam, 3000K

[1]No angle adjustment
lm = raw lumens. Watts include driver loss.

8. DRIVER – ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping OR MR16/LED*
0/10V/	0-10V dimming *(Pair driver with dimming % below, ex: 0/10V/10%*
	10% Standard dimming to 10% **1%** Dimming to 1% **0%** Premium dimming to 0%
HILUME/A3	Lutron Hi-Lume® A L3D EcoSystem® or three-wire control, dimming to 1%

Driver/ballast options may be limited with 347 voltage. Consult factory.
Driver specifications provided upon request to assist with control system integration.

9. ACCESSORY – ACCENT DOWNLIGHT

NONE	None.
LSS	Linear spread lens
SOL	Solite lens
HEX	Hexcell louver
SNT	Snoot

Select one only. For different accessory types on different downlights, contact factory.

10. QUANTITY – ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping OR MR16/LED driver*
___	Enter total quantity downlights per run length

For total quantity considerations, please note each downlight requires 7.25" of linear length in the housing.

11. FINISH

AL	Standard, natural "Ultimatte" aluminum
BK	Black powdercoat
WH	White powdercoat
RAL/___	Specify RAL powdercoat code *(ex: #RAL/3003)*

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www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 4 of 4

LIGHTPLANE 3.5 – LP3.5R

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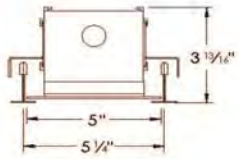
ALW ARCHITECTURAL LIGHTING WORKS

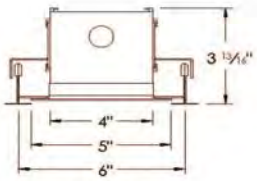
SPECIFICATIONS
Page 6 of 7

DIMENSIONS

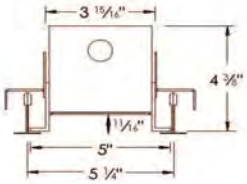
TRIMMED



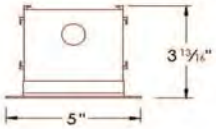
LP3.5RT
TGRID



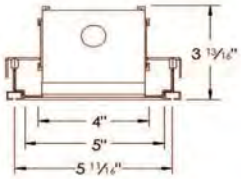
LP3.5RT
ATZ/TGRID



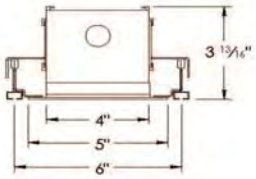
LP3.5TRL
TGRID



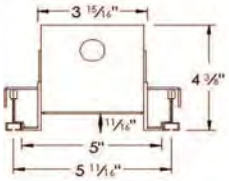
LP3.5RT
DRY



LP3.5RT
SLOT

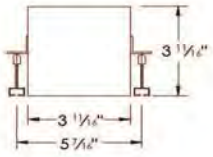


LP3.5RT
ATZ/SLOT

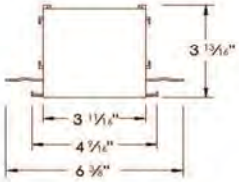


LP3.5TRL
SLOT

TRIMLESS

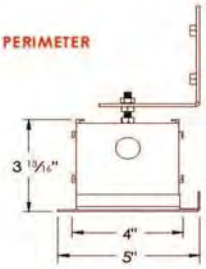


LP3.5RHF
TGRID AND SLOT

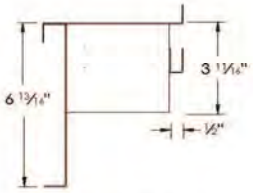


LP3.5RMUD
DRY

PERIMETER



LP3.5RPF



LP3.5RPR

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Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306B**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW
ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 2 of 7

Type:

1. BASE MODEL

LP3.5RT	3-1/2" trimmed with flush lens
LP3.5RTDL[2]	3-1/2" trimmed with drop (reveal) lens
LP3.5RTRL	3-1/2" trimmed with regressed lens
LP3.5RMUD	3-1/2" trimless, mud-in with flush lens
LP3.5RHF	3-1/2" trimless, hidden-flange with flush lens
LP3.5RPF	3-1/2" perimeter, flush-mount
LP3.5RPR	3-1/2" perimeter, regressed-mount

[1]Skip CEILING TYPE (leave blank); go to OVERALL RUN LENGTH
[2]Accent Downlight(s) not available with drop (reveal) lens

2. RUN LENGTH/ SIZE

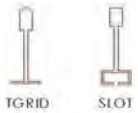
___ Individual (2', 3', 4', 5', 6', 7' or 8')
___ Continuous row or Configuration[3] *(enter total linear length, ex: 20')*

[3]A configuration is a custom shape (rectangle square, L, etc.) with mitered corners. Must choose quantity of mitered corners in Additional Options.

All lengths are nominal and may vary based on lamping and other specification selections. Consult factory when exact lengths are required.

3. CEILING TYPE

DRY	Drywall
TGRID	T-Grid
SLOT	Slot T-Bar
ATZ/TGRID	Armstrong® Techzone T-Grid
ATZ/SLOT	Armstrong® Techzone Slot T-Grid
OTHER	Additional ceiling types may be available. Contact factory.



Continued on Next Page...

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306B**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 3 of 7

4. LAMPING – PRIMARY

NONE	None. *Select when specifying only Downlight Lamping*
LED*	*Pair lamping with CCT (where applicable), ex: MED/2700K*
LOW[1]	Low-output, high-performance LED – 517 delivered lm/ft, 7.4 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
MED	Medium-output, high performance LED – 689 delivered lm/ft, 9.8 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
HI[2]	High-output, high-performance LED – 861 delivered lm/ft, 12.2 W/lf, 70 lm/W **2700K 3000K 3500K 4000K**
TUNE[3]	Tunable white LED, 2700K-5700K – 574 delivered lm/ft, 8.2 W/lf, 70 lm/W *(must select DMX driver below; controller not included)*
DECOR[3]	Decorative constant voltage LED, 230 delivered lm/ft, 4.4 W/lf, 52 lm/W **3000K 3500K 4000K**
RGB	Color-changing RGB LED, 5 W/lf *(must select DMX driver below; controller not included)*

*LED board options may be limited and/or substituted to accomodate requests for exact, non-standard overall run lengths (ex: 3' 9"). Consult factory.

[1]Performance calculations are extrapolated estimates based on the actual IES test results of MED option at 3500K.

[2]Performance calculations are extrapolated MAXIMUM estimates for mid-range CCTs based on the actual IES test results of MED option at 3500K. Cooler and warmer CCT settings will provide lower delivered lumens, lower lm/W and higher W/lf.

FLUORESCENT	*Lamps not provided*
1T5	Standard output, 1-lamp profile T5
1T5HO	High output, 1-lamp profile T5
1T5S[1]	Standard output, 1-lamp profile T5, staggered
1T5HOS[1]	High output, 1-lamp profile T5, staggered

[1]For staggered lamping, EXT lens is recommended for maximum diffusion properties

5. DRIVER – PRIMARY

NONE	None. *Select when specifying only Downlight Lamping*
LED	
0/10V/	0-10V dimming *(Pair driver with dimming % below, ex: 0/10V/10%* **10%** Standard dimming to 10% **1%** Dimming to 1% **0%** Premium dimming to 0%
DALI	DALI dimming to 0%
DMX	DMX dimming to 0%
HILUME/A3	Lutron Hi-Lume® A L3D EcoSystem® or three-wire control, dimming to 1%
FLUORESCENT	
STD	Standard, non-dimming, <10% THD
FL/0/10V	Dimming, 0-10V
HILUME	Lutron Hi-Lume® dimming
BALLASTAR	Step-dimming

Driver/ballast options may be limited with 347 voltage. Consult factory.
Driver/ballast specifications provided upon request to assist with control system integration.
Consult ballast manufacturer for lamp compatibility.

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306B**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 4

LIGHTPLANE 3.5 – LP3.5R

Recessed

ALW ARCHITECTURAL LIGHTING WORKS

SPECIFICATIONS
Page 4 of 7

6. LENS/LOUVER – PRIMARY

NONE	None. *Select when specifying only Downlight Lamping*
WD[1]	Frosted *(LEDs may be visible when dimmed)*
EXT	Extra diffuse
EXT/ASY/LED[2]	Extra diffuse with asymmetric distribution, flush *(LED lamping only)*
LV[3]	Bladed, specular aluminum louver

[1]Available only with fluorescent lamping
[2]Available only with LP3.5PT, LP3.5R/MUD and LP3.5R/HF
[3]When specified with LED lamping, a lightly frosted, high-transmission lens is fitted between louver and LED board

EXT/ASY/LED

Reflector and LED board are angled providing asymmetric distribution on wall surface

7. ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping*
MR16/LED	GU5.3 base for retrofitting with MR16 LED *(lamps not included)* *Lamp transformer and compatibility shall be checked by others.* *ALW will provide transformer information on submittal drawings.*
CZEN800	LED COB Downlight, 9.5 W, 790 lm, 40° beam, 3000K
CZEN1000[1]	LED COB Downlight, 12.7 W 1040 lm, 40° beam, 3000K

[1]No angle adjustment
lm = raw lumens. Watts include driver loss.

8. DRIVER – ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping OR MR16/LED*
0/10V/	0-10V dimming *(Pair driver with dimming % below, ex: 0/10V/10%*
	10% Standard dimming to 10% **1%** Dimming to 1% **0%** Premium dimming to 0%
HILUME/A3	Lutron Hi-Lume® A L3D EcoSystem® or three-wire control, dimming to 1%

Driver/ballast options may be limited with 347 voltage. Consult factory.
Driver specifications provided upon request to assist with control system integration.

9. ACCESSORY – ACCENT DOWNLIGHT

NONE	None.
LSS	Linear spread lens
SOL	Solite lens
HEX	Hexcell louver
SNT	Snoot

Select one only. For different accessory types on different downlights, contact factory.

10. QUANTITY – ACCENT DOWNLIGHT

NONE	None. *Select when specifying only Linear Lamping OR MR16/LED driver*
___	Enter total quantity downlights per run length

For total quantity considerations, please note each downlight requires 7.25" of linear length in the housing.

11. FINISH

AL	Standard, natural "Ultimatte" aluminum
BK	Black powdercoat
WH	White powdercoat
RAL/___	Specify RAL powdercoat code *(ex: #RAL/3003)*

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S306A**
15.54.0		
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LIGHTPLANE 3.5 – LP3.5R

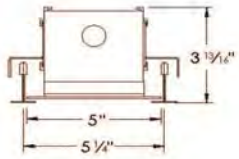
Recessed

ALW ARCHITECTURAL LIGHTING WORKS

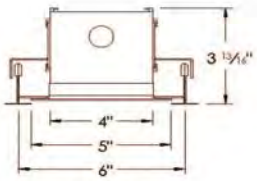
SPECIFICATIONS
Page 6 of 7

DIMENSIONS

TRIMMED



LP3.5RT
TGRID



LP3.5RT
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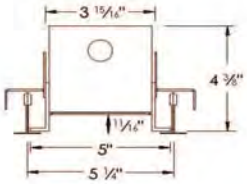
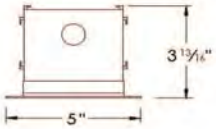
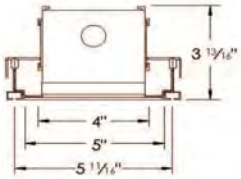


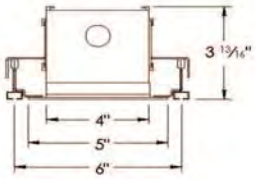
LP3.5TRL
TGRID



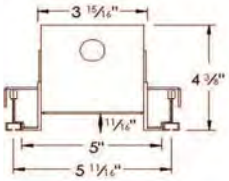
LP3.5RT
DRY



LP3.5RT
SLOT

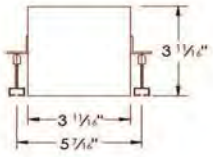


LP3.5RT
ATZ/SLOT

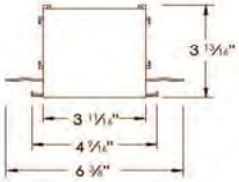


LP3.5TRL
SLOT

TRIMLESS

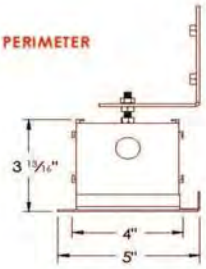


LP3.5RHF
TGRID AND SLOT

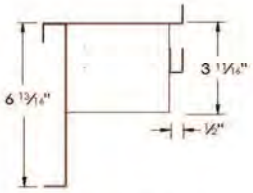


LP3.5RMUD
DRY

PERIMETER



LP3.5RPF



LP3.5RPR

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ALW 'LP3.5R'
Specification:	↓T.LENGTH PER ARCH'L DWGS-TGRID-LED/LOW-LED0-10V-10%-EX
Approved Alternates:	Focal Point, Ledalite, Mark Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S307**
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12-Feb-16	Alpharetta, GA	Page: 1 of 3

ECOSENSE®

TRŌV

OVERVIEW • SPECIFICATIONS

INTERIOR + EXTERIOR | L50 ASYM

DATE | PROJECT | FIRM | TYPE

THE L50 INCLUDES PATENTED OPTICAL DESIGN THAT DELIVERS THE WIDEST RANGE OF BEAM ANGLE OPTIONS FOR PRECISE COVE, WALL GRAZING, WALL WASHING OR LINE OF LIGHT APPLICATIONS. EXCLUSIVE FLIP TO FLAT™ HINGE DESIGN PROVIDES FLEXIBILITY WHEN MANAGING SMALL COVE DETAILS. TROV OFFERS SMOOTH, FLICKER FREE DIMMING DOWN TO 0%.

FEATURES :

- DIM TO 0%. ELV REVERSE PHASE
- 24 BEAM ANGLES
- MULTI-VOLT
- FLIP TO FLAT™
- 6 CCT OPTIONS
- 80+ AND 90+ CRI OPTIONS
- IP54 INTERIOR AND IP66 EXTERIOR OPTIONS

PERFORMANCE	WATTS	CCT*	OPTIC	LUMEN OUTPUT	EFFICACY
	2W	4000K	ASYM	98 lm/LF (321 lm/m)	49 lm/W
	4W	4000K	ASYM	282 lm/LF (925 lm/m)	71 lm/W
	6W	4000K	ASYM	440 lm/LF (1443 lm/m)	73 lm/W
	8W	4000K	ASYM	606 lm/LF (1988 lm/m)	76 lm/W
	10W	4000K	ASYM	720 lm/LF (2361 lm/m)	72 lm/W

* MORE CCT, POWER, AND OPTIC OPTIONS ON PAGE 2. ALL LUMEN DATA IS FROM 80CRI FIXTURES. PLEASE SEE PHOTOMETRY SPEC SHEET FOR ADDITIONAL LUMEN DATA.

COLOR RENDERING INDEX	80+, 90+
COLOR CONSISTENCY	2-STEP MACADAM ELLIPSE

LUMEN DEPRECIATION / RATED LIFE

WATTS	L70 @ 25C	L70 @ 50C	L90 @ 25C	L90 @ 50C
2W-10W	>150,000	>70,000	>50,000	>25,000

* CALCULATIONS FOR LED FIXTURES ARE BASED ON MEASUREMENTS THAT COMPLY WITH IES LM-80 TESTING PROCEDURES AND IES TM-21 CALCULATOR

ELECTRICAL

POWER CONSUMPTION: 2W*/LF (6.6W/M) ; 4W/LF (13.2W/M) ; 6W/LF (19.8W/M) ; 8W/LF (26.4W/M) ; 10W/LF (33W/M)
* 3W/LF (9.9W/M) at 220V -277V

MAX FIXTURE RUN LENGTH

	2W/LF		4W/LF		6W/LF		8W/LF		10W/LF	
Volts	Max Run all 1'	Max Run all 4'	Max Run all 1'	Max Run all 4'	Max Run all 1'	Max Run all 4'	Max Run all 1'	Max Run all 4'	Max Run all 1'	Max Run all 4'
120	214	214	186	186	152	152	114	114	91	91
220	374	392	340	340	277	277	209	209	95	167
277	374	494	374	428	349	349	263	263	95	190

POWER FACTOR	4W, 6W, 8W, 10W >0.9, 2W<0.9
OPERATING VOLTAGE	MULTIVOLT: 110-277VAC, 50/60 Hz
DRIVER	INTEGRAL TO FIXTURE; DE-RATED POWER AND SYNCHRONOUS START-UP AT FULL BRIGHTNESS
STARTUP TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
OPERATING TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
STORAGE TEMPERATURE	-40°F TO 176°F (-40°C TO 80°C)

CONTROL	DIMMING	110-277VAC, ELV TYPE 0.07% -100%, REVERSE PHASE, TRAILING EDGE
PHYSICAL	DIMENSIONS	W 1.6" x H 2" x L 12'/48" : (41.6mm x 50.5mm x 304.2mm/1201mm)
	HOUSING /LENS	EXTRUDED ALUMINUM, CLEAR POLYCARBONATE, STAINLESS STEEL FASTENERS, PLASTIC ENDCAPS RUBBER OVERMOLD FOR CABLE ASSEMBLY
	WEIGHT	1.52LBS. / 0.69KG (1FT) | 4.95LBS. / 2.25KG (4FT)
	CONNECTORS	INTEGRAL MALE/ FEMALE CONNECTORS
	ENVIRONMENT	INDOOR • ETL CERTIFIED FOR DRY/DAMP LOCATIONS IP54 OUTDOOR • ETL CERTIFIED FOR WET LOCATIONS IP66
	BEAM ANGLE	GRAZING, WASHING, COVE, ASYMETRIC, LINE OF LIGHT
	MOUNTING OPTIONS	INTEGRAL MOUNTING AND ADJUSTABLE AIMING FROM 0°-180° IN 15° INCREMENTS.
FIXTURE RATING & CERTIFICATIONS	CE, ETL CERTIFIED RoHS COMPLIANT	
LIMITED WARRANTY	5 YEARS	

ECOSENSE LIGHTING INC.
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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	ECOSENSE 'Trov'
Specification:	L50-I-48" (12" AT END OF RUN ONLY IF REQ'D)-08-30-80-VOLT-ASYM
Approved Alternates:	Color Kinetics, Lumenpulse, Winona
Lamping:	Integral to fixture

Project Number: 15.54.0	Alpharetta Conference Center & The hotel at Avalon	Type: **S307**
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ECOSENSE®

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ORDERING

INTERIOR + EXTERIOR | **L50 ASYM**

DATE | PROJECT | FIXTURE TYPE

MODEL/ SIZE	INTERIOR/ EXTERIOR	LENGTH	POWER	CCT		CRI	VOLTAGE	OPTICS	
L50	I	12"	02	WHITE CCT	MONO COLOR	80	MULT (110-277VAC)	GRAZING	WASHING
	E	48"	04	22	RD	90*		9 x 29	25 x 25 40 x 48
			06	27	GR	Blank For Color		9 x 59	25 x 33 40 x 60
			08	30	BL			15 x 15	25 x 45 40 x 90
			10	35	AM			15 x 23	25 x 75 45 x 15
				40				15 x 35	39 x 9 70 x 40
				50				15 x 65	55 x 25 70 x 70
									40 x40
								COVE	LINE OF LIGHT
								120**	LOL
								Asym	

EXAMPLE L50-I-48-10-27-90-MULT-15x65

*90 CRi not available in 2200K or 5000K **120 is only available with Exterior option. See L35 spec sheet for interior cove options.

WIRING OPTIONS (MVOLT): 110-277VAC

Power Cable Assembly, TROV, Leader/Jumper, 10 foot CBL-3P-L-UNV-10*
Power Cable Assembly, TROV, Jumper, 5 foot CBL-3P-L-UNV-05**
Power Cable Assembly, TROV, Jumper, 1 foot CBL-3P-L-UNV-01**
Power Cable Assembly, TROV, Male and Female terminator caps CBL-3P-L-UNV-CAPS

*Two (2) terminators are included with the 10' power cable. One Leader need per circuit/fixture run. Cables are not plenum rated.
** If using the 5' or 1' power cable assembly as a leader to power a run one set of CBL-3P-L-UNV-CAPS will also be need per cable.

0-10V CONTROL OPTIONS

100-120VAC / 277VAC Linear Dimming Control Module 0-10V - Plenum Rated LDCM-PL-120-277-010V-GR

All products come standard with ELV dimming capabilities. 0-10V Control options required for operation at 0-10V.

OPTIONAL ACCESSORIES

Mounting

Mounting Track, TROV, 48 inch ..... MNT-L-TRK-48 ..... Mounting Track needed = Total run length. Mounting track is field cuttable.
Mounting Track, TROV, 12 inch ..... MNT-L-TRK-12 ..... Track can be continuously mounted and have any length fixture attach to it.
Mounting Track Clip, TROV, Set of 2 ..... MNT-L-CLIP ..... Clips needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
90 Degree L bracket, TROV, Set of 2 ..... MNT-L-LBKT ..... L-Brackets needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
Angle Locking Clip, TROV, Pack of 10 ..... MNT-L-ANGLOCK ..... Angle Locks needed = 12" fixtures need 1 and 48" fixtures need 2.
Mounting, Fine Adjustment Bracket, TROV ..... MNT-L-FAB* ..... Fine Adjustment Brackets needed = 12" fixtures need 1 and 48" fixtures need 2.

*Fine Adjustment Bracket is highly recommended for Grazing Optics.

Wall Mount Arm

Wall Mount Arm, 6 inch, TROV WMA-L-CA-06
Wall Mount Arm, 12 inch, TROV WMA-L-CA-12
Wall Mount Arm, 18 inch, TROV WMA-L-CA-18
Wall Mount Arm, 24 inch, TROV WMA-L-CA-24
Wall Mount Arm End Plate Set, TROV, Includes Left and Right ..... WMA-L-END
Wall Mount Arm Joiner Plate, TROV ..... WMA-L-JNR

Wall Mount Arms needed = For individual fixture installations two arms and one end set Will be needed per fixture. For continuous run installation one endset will be needed per run. Each end set contains one left and one right end plate. One joining set wll be needed per joint. One arm per fixture will be need plus one extra arm to complete the run. For example: A 10ft run made with two 4ft and two 1ft fixtures will contain; 1 x WMA-L-END, 3 x WMA-L-JNR, and 5 x WMA-L-CA-12. Leader cables are not included with wall mount arms, end sets, or joiners sets.

Masking Plates

Masking Plate, 3 inch high, 12 inch, L50 & L35 ..... MP-L50-3H-12
Masking Plate, 3 inch high, 48 inch, L50 & L35 ..... MP-L50-3H-48

Masking Plates needed = One 12" lens is needed per 12" fixture and one 48" lens is needed per 48" fixture.

Landscape Stake

Landscape Stake, 6 inch, TROV, Set of 2 ..... LS-L-STK-06
Landscape Stake, 12 inch, TROV, Set of 2 ..... LS-L-STK-12
Landscape Stake, 18 inch, TROV, Set of 2 ..... LS-L-STK-18

Landscape Stakes needed = 12" and 48" fixtures both need one set of 2.

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Manufacturer:	ECOSENSE 'Trov'
Specification:	L50-I-48" (12" AT END OF RUN ONLY IF REQ'D)-08-30-80-VOLT-ASYM
Approved Alternates:	Color Kinetics, Lumenpulse, Winona
Lamping:	Integral to fixture

CD+M Lighting Design Group
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Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S307**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 3

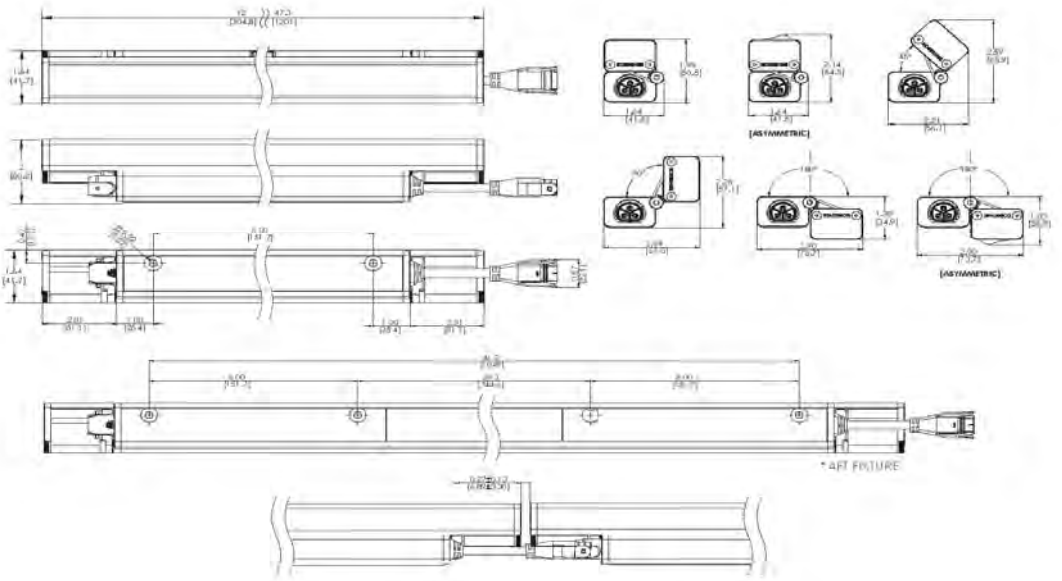
ECOSENSE

TRŌV

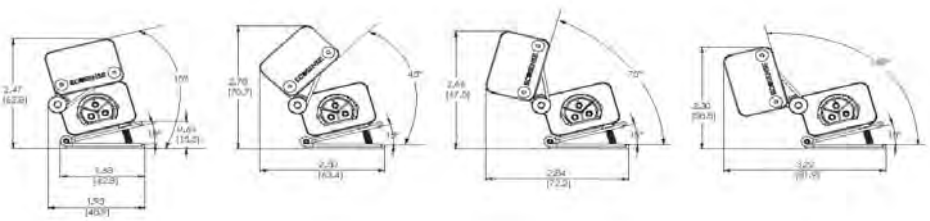
DIMENSIONS + MOUNTING

INTERIOR + EXTERIOR | LSO ASYM

DATE | PROJECT | SIBM | TYPE



Fine Adjustable Bracket



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CD+M Lighting Design Group
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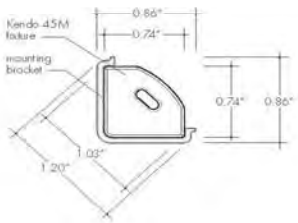
Manufacturer:	ECOSENSE 'Trov'
Specification:	L50-I-48" (12" AT END OF RUN ONLY IF REQ'D)-08-30-80-VOLT-ASYM
Approved Alternates:	Color Kinetics, Lumenpulse, Winona
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 3

Kendo 45M | Linear illumination system

luminii

Extruded aluminum linear illumination system, Kendo 45M is available in sections up to 116" long. Specifically designed LED engine provides constant illumination levels from the beginning to the end of the runs. The Kendo 45M can be easily recessed or surface mounted for general illumination, architectural accents, under and above cabinet lighting, display cases and many other applications. Available with 72" wire leads or quick-connect end feed. Class 2 listed for damp locations. Approved for closet/storage space installation per NEC 410.16(A)(3) and 410.16(C)(5).



Made in USA

dimmable

Finish options

Black powder-coated

Bronze powder coated

Silver anodized

White powder coated

Technical information

Output Options

Output type	SO (LL36)	MO (LLX18)	HO (LLX22)	VHO (LL72)
Lumens at 2900K (Clear lens)	176 lm/ft	253 lm/ft	336 lm/ft	378 lm/ft
Average power consumption at 4'	3.2 W/ft	4.8 W/ft	5.4 W/ft	6.5 W/ft
Maximum system length	90'	25'	23'	18'
Operating Voltage	24VDC	24VDC	24VDC	24VDC

CCT/LUMEN MULTIPLIER

Color temperature	Multiplier	CRI
2200 K	0.83	70+
2700 K	0.81	98
2900 K	1.00	97
3000 K	1.14	91
3500 K	0.98	95
4100 K	1.06	93

Ordering code

MODEL	LENGTH	CCT	OUTPUT	LENS	MOUNTING	FINISH	POWER FEED
K45M	12	22K	SO	C	F	SA	F1
K45M - Kendo 45M	12"- 116" (4" increments)	22K - 2200 K 27K - 2700 K 29K - 2900 K 30K - 3000 K 35K - 3500 K 41K - 4100 K	SO - Standard MO - Medium HO - High VHO - Very-High	C - Clear HF - Half-Frosted F - Frosted SI - Satin Ice	F - Fixed mounting brackets NB - No brackets	SA - Silver BK - Black BZ - Bronze WH - White (BK,BZ,WH finishes will have an upcharge and require longer lead times)	F1 - 72" wire leads F2 - 72" wire leads at one end and quick connect at other F3 - Single quick connect F4 - Dual quick connect

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	LUMINII 'Kendo 45M'
Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 3

luminii

Kendo 45M | Linear illumination system

Power consumption per fixture length

Based on operation with PSD series of power supplies

Nominal length	Actual length	SO W/ft	SO Total wattage	MO W/ft	MO Total wattage	Actual length	HO W/ft	HO Total wattage	VHO W/ft	VHO Total wattage
12"	12-14/16"	3.33	8.25	5.00	5.00	13"	5.60	5.60	6.75	6.75
16"	16-12/16"	3.25	4.00	5.00	7.00	16-3/16"	5.60	7.50	6.75	9.00
20"	20-10/16"	3.25	5.25	4.95	8.50	20-9/16"	5.60	9.30	6.75	11.25
24"	24-10/16"	3.25	6.50	4.95	9.90	23-14/16"	5.55	11.10	6.75	13.50
28"	28-8/16"	3.25	7.75	4.95	11.00	28-4/16"	5.55	13.50	6.75	16.75
32"	32-7/16"	3.25	8.50	4.90	13.25	32-10/16"	5.55	15.00	6.75	19.00
36"	36-6/16"	3.25	9.75	4.90	14.70	35-15/16"	5.50	16.50	6.65	19.95
40"	40-5/16"	3.25	10.25	4.90	16.00	40-4/16"	5.50	18.00	6.65	22.20
44"	44-4/16"	3.20	11.75	4.85	17.50	44-10/16"	5.50	19.80	6.65	24.40
48"	48-3/16"	3.20	12.80	4.85	19.40	47-15/16"	5.45	21.80	6.55	26.20
52"	52-2/16"	3.20	13.30	4.85	21.00	52-5/16"	5.45	23.00	6.55	28.50
56"	56-1/16"	3.20	14.80	4.80	22.50	55-15/16"	5.45	25.50	6.55	30.50
60"	60"	3.20	16.00	4.80	24.00	59-15/16"	5.40	27.00	6.45	32.25
64"	63-15/16"	3.20	17.00	4.80	25.50	64-5/16"	5.40	28.50	6.45	34.40
68"	67-14/16"	3.15	18.00	4.75	27.00	68-11/16"	5.40	30.00	6.45	36.55
72"	71-13/16"	3.15	18.90	4.75	28.50	72"	5.35	32.10	6.40	38.40
76"	75-12/16"	3.15	19.00	4.75	30.00	76-6/16"	5.35	33.90	6.40	40.50
80"	79-11/16"	3.15	21.50	4.70	31.50	80-11/16"	5.35	35.00	6.40	43.00
84"	83-10/16"	3.15	22.05	4.70	32.90	84 "	5.25	36.70	6.25	43.75
88"	87-9/16"	3.15	23.00	4.70	34.00	88-6/16"	5.25	38.20	6.25	46.00
92"	91-8/16"	3.10	24.00	4.65	35.50	92-11/16"	5.25	39.60	6.25	48.00
96"	95-8/16"	3.10	24.80	4.65	37.20	96"	5.20	41.60	6.15	49.20
100"	99-6/16"	3.10	26.30	4.65	39.00	100-5/16"	5.20	43.20	6.15	51.25
104"	103-4/16"	3.05	27.10	4.60	40.20	104-11/16"	5.20	44.00	6.15	53.00
108"	107-3/16"	3.05	28.00	4.60	41.40	108"	5.10	45.90	6.00	54.00
112"	111-3/16"	3.05	28.50	4.60	43.00	112-6/16"	5.10	47.00	6.00	56.00
116"	115-2/16"	3.05	30.00	4.55	44.20	116-7/16"	5.10	48.50	6.00	58.00

Power supply

See fixture and power supply instructions & spec sheet for wiring information. Dimming possible in select models - view luminii website for list of compatible dimmers.

MODEL	POWER	OUTPUT	DIMMING	LOCATION
PSV	40	24V	U2DIM	D
PSV - PSV Series	40 - 40 W 60 - 60 W 96 - 96 W	24 - 24 VDC	U2DIM - Dimming 1-10V U2ND - Non Dimming	D - Dry Location IP65 - Wet Location

MODEL	POWER	OUTPUT	INPUT
PSD	48	24	
PSD - PSD Series	48 - 48 W 96 - 96 W 288 - 288 W (3x 96W)	24 - 24 VDC	Blank - 120 V 240 - 240 V 277 - 277 V

MODEL	MODEL
LTEA4U1UKL-CV240	L3DA4U1UKL-CV240
Lutron - Hi-Lume A-series LTE	Lutron - Hi-Lume A-series L3D

Manufacturer:	LUMINII 'Kendo 45M'
Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
Lamping:	Integral to fixture

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308A**
15.54.0		
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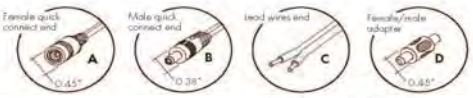
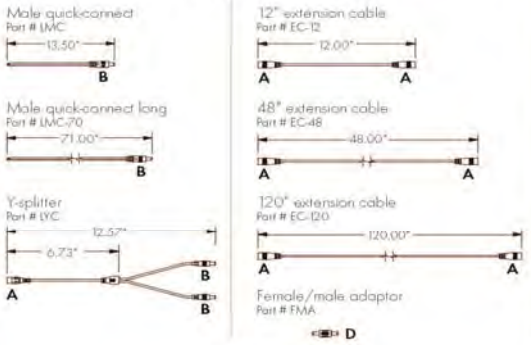
luminii

Kendo 45M | Linear illumination system

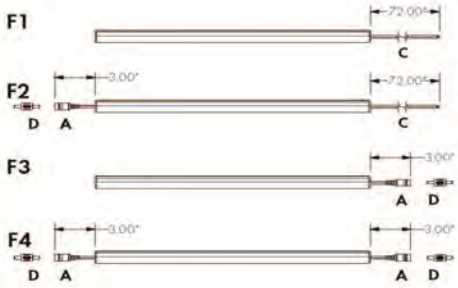
Connectors



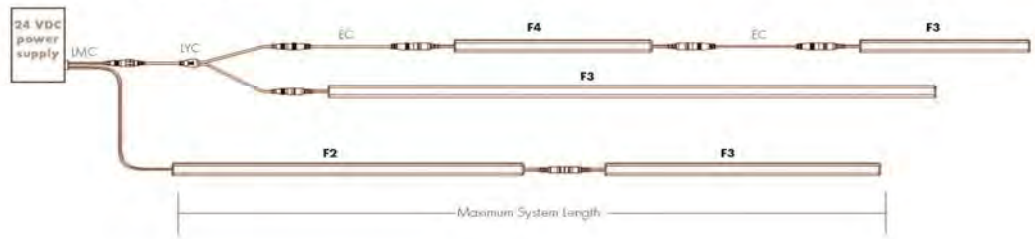
Linking and extension cable options



Powerfeed options



Sample layout of powerfeed connections



CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	LUMINII 'Kendo 45M'
	Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
	Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308B**
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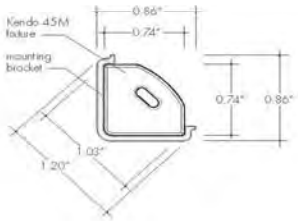
Kendo 45M | Linear illumination system

luminii

Extruded aluminum linear illumination system, Kendo 45M is available in sections up to 116" long. Specifically designed LED engine provides constant illumination levels from the beginning to the end of the runs. The Kendo 45M can be easily recessed or surface mounted for general illumination, architectural accents, under and above cabinet lighting, display cases and many other applications. Available with 72" wire leads or quick-connect end feed. Class 2 listed for damp locations. Approved for closet/storage space installation per NEC 410.16(A)(3) and 410.16(C)(5).



Made in USA

dimmable

Finish options

Black powder-coated

Bronze powder coated

Silver anodized

White powder coated

Technical information

Output Options

Output type	SO (LL36)	MO (LLX18)	HO (LLX22)	VHO (LL72)
Lumens at 2900K (Clear lens)	176 lm/ft	253 lm/ft	336 lm/ft	378 lm/ft
Average power consumption at 4'	3.2 W/ft	4.8 W/ft	5.4 W/ft	6.5 W/ft
Maximum system length	90'	25'	23'	18'
Operating Voltage	24VDC	24VDC	24VDC	24VDC

CCT/LUMEN MULTIPLIER

Color temperature	Multiplier	CRI
2200 K	0.83	70+
2700 K	0.81	98
2900 K	1.00	97
3000 K	1.14	91
3500 K	0.98	95
4100 K	1.06	93

Ordering code

MODEL	LENGTH	CCT	OUTPUT	LENS	MOUNTING	FINISH	POWER FEED
K45M	12	22K	SO	C	F	SA	F1
K45M - Kendo 45M	12"- 116" (4" increments)	22K - 2200 K 27K - 2700 K 29K - 2900 K 30K - 3000 K 35K - 3500 K 41K - 4100 K	SO - Standard MO - Medium HO - High VHO - Very-High	C - Clear HF - Half-Frosted F - Frosted SI - Satin Ice	F - Fixed mounting brackets NB - No brackets	SA - Silver BK - Black BZ - Bronze WH - White (BK,BZ,WH finishes will have an upcharge and require longer lead times)	F1 - 72" wire leads F2 - 72" wire leads at one end and quick connect at other F3 - Single quick connect F4 - Dual quick connect

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	LUMINII 'Kendo 45M'
Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308B**
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luminii

Kendo 45M | Linear illumination system

Power consumption per fixture length

Based on operation with PSD series of power supplies

Nominal length	Actual length	SO W/ft	SO Total wattage	MO W/ft	MO Total wattage	Actual length	HO W/ft	HO Total wattage	VHO W/ft	VHO Total wattage
12"	12-14/16"	3.33	8.25	5.00	5.00	13"	5.60	5.60	6.75	6.75
16"	16-12/16"	3.25	4.00	5.00	7.00	16-3/16"	5.60	7.50	6.75	9.00
20"	20-10/16"	3.25	5.25	4.95	8.50	20-9/16"	5.60	9.30	6.75	11.25
24"	24-10/16"	3.25	6.50	4.95	9.90	23-14/16"	5.55	11.10	6.75	13.50
28"	28-8/16"	3.25	7.75	4.95	11.00	28-4/16"	5.55	13.50	6.75	16.75
32"	32-7/16"	3.25	8.50	4.90	13.25	32-10/16"	5.55	15.00	6.75	19.00
36"	36-6/16"	3.25	9.75	4.90	14.70	35-15/16"	5.50	16.50	6.65	19.95
40"	40-5/16"	3.25	10.25	4.90	16.00	40-4/16"	5.50	18.00	6.65	22.20
44"	44-4/16"	3.20	11.75	4.85	17.50	44-10/16"	5.50	19.80	6.65	24.40
48"	48-3/16"	3.20	12.80	4.85	19.40	47-15/16"	5.45	21.80	6.55	26.20
52"	52-2/16"	3.20	13.30	4.85	21.00	52-5/16"	5.45	23.00	6.55	28.50
56"	56-1/16"	3.20	14.80	4.80	22.50	55-15/16"	5.45	25.50	6.55	30.50
60"	60"	3.20	16.00	4.80	24.00	59-15/16"	5.40	27.00	6.45	32.25
64"	63-15/16"	3.20	17.00	4.80	25.50	64-5/16"	5.40	28.50	6.45	34.40
68"	67-14/16"	3.15	18.00	4.75	27.00	68-11/16"	5.40	30.00	6.45	36.55
72"	71-13/16"	3.15	18.90	4.75	28.50	72"	5.35	32.10	6.40	38.40
76"	75-12/16"	3.15	19.00	4.75	30.00	76-6/16"	5.35	33.90	6.40	40.50
80"	79-11/16"	3.15	21.50	4.70	31.50	80-11/16"	5.35	35.00	6.40	43.00
84"	83-10/16"	3.15	22.05	4.70	32.90	84 "	5.25	36.70	6.25	43.75
88"	87-9/16"	3.15	23.00	4.70	34.00	88-6/16"	5.25	38.20	6.25	46.00
92"	91-8/16"	3.10	24.00	4.65	35.50	92-11/16"	5.25	39.60	6.25	48.00
96"	95-8/16"	3.10	24.80	4.65	37.20	96"	5.20	41.60	6.15	49.20
100"	99-6/16"	3.10	26.30	4.65	39.00	100-5/16"	5.20	43.20	6.15	51.25
104"	103-4/16"	3.05	27.10	4.60	40.20	104-11/16"	5.20	44.00	6.15	53.00
108"	107-3/16"	3.05	28.00	4.60	41.40	108"	5.10	45.90	6.00	54.00
112"	111-3/16"	3.05	28.50	4.60	43.00	112-6/16"	5.10	47.00	6.00	56.00
116"	115-2/16"	3.05	30.00	4.55	44.20	116-7/16"	5.10	48.50	6.00	58.00

Power supply

See fixture and power supply instructions & spec sheet for wiring information. Dimming possible in select models - view luminii website for list of compatible dimmers.

MODEL	POWER	OUTPUT	DIMMING	LOCATION
PSV	40	24V	U2DIM	D
PSV - PSV Series	40 - 40 W 60 - 60 W 96 - 96 W	24 - 24 VDC	U2DIM - Dimming 1-10V U2ND - Non Dimming	D - Dry Location IP65 - Wet Location

MODEL	POWER	OUTPUT	INPUT
PSD	48	24	
PSD - PSD Series	48 - 48 W 96 - 96 W 288 - 288 W (3x 96W)	24 - 24 VDC	Blank - 120 V 240 - 240 V 277 - 277 V

MODEL	MODEL
LTEA4U1UKL-CV240	L3DA4U1UKL-CV240
Lutron - Hi-Lume A-series LTE	Lutron - Hi-Lume A-series L3D

Manufacturer:	LUMINII 'Kendo 45M'
Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
Lamping:	Integral to fixture

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www.cdmlight.com

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S308B**
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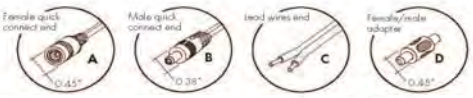
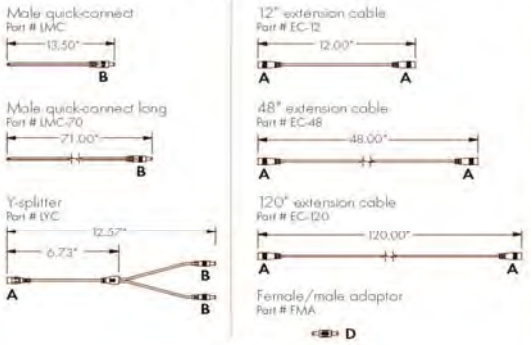
Kendo 45M | Linear illumination system

luminii

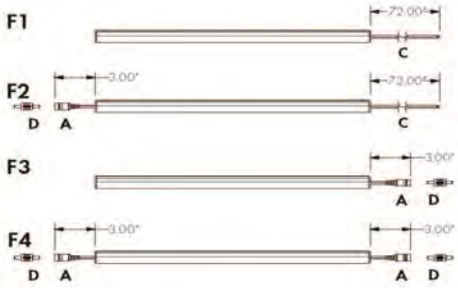
Connectors



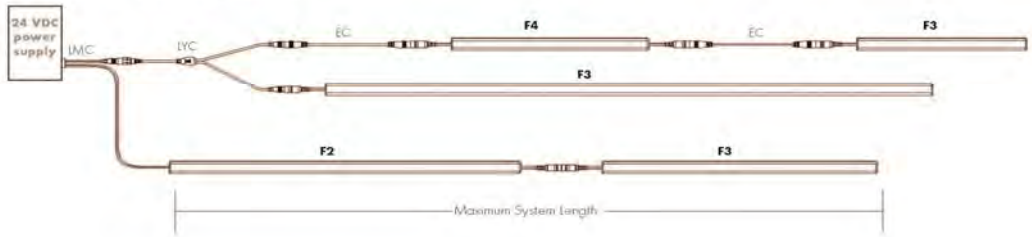
Linking and extension cable options



Powerfeed options



Sample layout of powerfeed connections



CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	LUMINII 'Kendo 45M'
	Specification:	ENGHTS PER ARCH'L DWGS-30K-HO-F-F-SA-F*/PS*-**-24VDC-NON-
	Approved Alternates:	Moda Lighting, Color Kinetics, LED Linear
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S309**
15.54.0		
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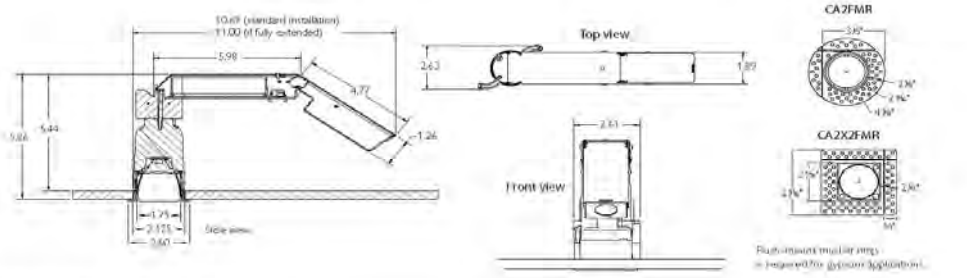
C2L04

Calculite 1.75" Aperture, 400 Lumen LED

Catalog number
Notes
Type



Ordering Guide: Frame-in Kits

Frame-in Kit Series	Lumen Package (nominal)	Style	Color Temp	Beam Spread	Installation Style[2]	Input Voltage
C2L	**04** (400 Lumens)	**DL** (Downlight flanged) **DLFT** (Downlight flush-mount)[1]	**30K** (3000K) **27K** (2700K)	**12** (12 degrees) **17** (17 degrees) **25** (25 degrees) **38** (38 degrees) **47** (47 degrees)	**R** (Install-from-below)	**1** (120V) **UZ10V** (universal with 0-10V dimming)

[1]requires "FT" series reflectors and mud ring (ordered separately)

Ordering Guide: Reflectors

Reflector Series	Style	Finish	Flange
C2L (Round)	**DL** (Downlight-50° cutoff) **DLLS** (Downlight with linear spread lens-75° cutoff) **LW** (Lensed Wall Washer)[1] [2]	**BK** (Black) **CCD** (Comfort Clear Diffuse) **CCZ** (Champagne Bronze) **WH** (Painted White)	**P** (aperture-matching) **FT** (Flush mount)*
C2X2L (Square)	**DL** (Downlight-50° cutoff) **LW** (Lensed Wall Washer)[1]	**BK** (Black) **WH** (Painted White)	**P** (Aperture-matching) **FT** (Flush-mount)*

[1]17° beam spread recommended
[2]18" max installation from vertical surface recommended

*requires "FT" series frame-in kit

PHILIPS
LIGHTOLIER

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	LIGHTOLIER 'Calculite'
	Specification:	C2L-04-DL-30K-38-R-UZ10V-C2L-DL-CCD-P
	Approved Alternates:	Prescolite, Lucifer, LF Illuminations
	Lamping:	Integral to Fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S309**
15.54.0		
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C2L04

Calculite 1.75" Aperture, 400 Lumen LED

Features

Aperture: 1.75" (44 mm) I.D., 2.50" (63mm) O.D.
Input Wattage: 11W max. (C2L04)
Fixture Output: Aluminum. Provides 50° cutoff to source & source image. Self-flanged.

Beam Spread options:

Beam Spread	Spacing Criterion	Delivered Lumens	Efficacy	CBCP
12°	0.2	328 lm	29.8 lm/w	5099
17°	0.3	412 lm	37.3 lm/w	3282
25°	0.4	382 lm	36.0 lm/w	1995
38°	0.6	377 lm	34.9 lm/w	936
47°	0.7	331 lm	30.0 lm/w	544

Reflector Cone: Aluminum. Provides 50° cutoff to source & source image. Twist & lock installation within frame-in kit ensures snug fit to ceiling.
Reflector Flange: Thickness: 0.09" (2.4 mm). Width (flanged) 0.37" (9.5 mm). Width "flush-mount) 0.19" (4.8 mm)
Required Depth: 5.91" (150 mm). 5.5" plenum depth required for Non-IC installation: see above for fixture dimensions
Ceiling Cutout: 2.125" (54mm)
Installation: Hinged design allows fixture to be installed from below ceiling. Two screws actuate pivoting installation arms.
Vertical installation only (as shown in above drawings).
Thick Ceiling Capability: 3/8" - 2".
Optical Accessories: One (1) accessory as defined in "Accessories-Optical" below. Accessories install securely to top of reflector housing. Proper positioning ensured via offset dia cut.
Field Accessibility: LED array, beam spreads (optics) and driver are field interchangeable/replaceable
Fixture Weight: 1.8 Lbs.

Electrical

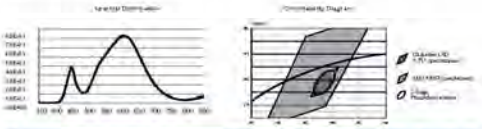
Power connection: Integral connection between driver and LED array
Junction Box: UL listed for 6 No 12 AWG, 90°C through branch circuit connectors. Allows inspection from below. Compatible with 2-1 conduit connector for daisy chaining.
Minimum Starting Temperature: -20°C
Maximum Operating Temperature: 60°C
Input Voltage: 120V

Input Frequency: 60Hz
Input Current: .09A
LED Drive Current: 670mA

Input Power: 11W **LED Power:** 9.1W
THD: <20% **Power Factor:** >0.9
FCC Rating: Part 15 / Class B driver

Technology

Array: 4-chip LED array featuring 2-step SDCM binning control
Photometric Performance: Tested in accordance to IESNA LM-79-2008
Color Consistency: 2 SDCM (max.)
Spectral Power Distribution:



Ra	R1	R2	R3	R4	R5	R6	R7	R8	R9
81.0	80.2	87.1	91.0	78.9	78.3	81.0	85.6	64.5	20.8

R10	R11	R12	R13	R14
67.7	74.9	62.1	81.4	84.2

Dimming Capability: ELV dims to nominal 10% lumen output
See LED-DIM specification sheet for dimming system compatability
Emergency Capability (Inverter): Yes.
See LED-LMI specification sheet

Rated Life

LED Array: 50,000 hours at 70% lumen maintenance (L70, B50). Based on IESNA LM-80-2008.
Driver: 50,000 hours

Labels

UL, cUL, I.B.E.W, AirSeal
17°, 25° & 38° & 47° beams suitable for wet location
12° beam suitable for damp location
5 year warranty

PHILIPS
LIGHTOLIER

Manufacturer:	LIGHTOLIER 'Calculite'
Specification:	C2L-04-DL-30K-38-R-UZ10V-C2L-DL-CCD-P
Approved Alternates:	Prescolite, Lucifer, LF Illuminations
Lamping:	Integral to Fixture

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S310**
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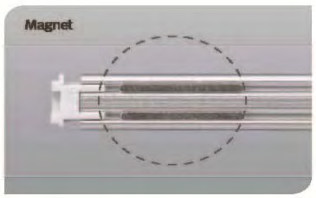
Product Features

- Super Slim liner LED with standard output
- Quick connection system between fixtures
- Many lengths available
- Various mounting methods including magnetic
- To be used with constant voltage DC 24V driver
- Dimmable with available accessories

Specification

- Voltage : DC 24V
- Operating temperature : 32~113F (0~45° C)
- Lamp life : 40,000hr/70%
- Available color : 2400K, 2700K, 3000K, 3500K, 4000K, 6000K
- Color rendering : Ra ⟩ 85
- Energy efficiency : 75lm/W
- Degree of protection IP20



CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	FEELUX 'Flx Stic NDV'
Specification:	W-NDV*-30K-24/NDV-BRACKET1/ NVD3-30K-24V-S/ NVD-END-CAP/
Approved Alternates:	Moda llhgitng Tivoli Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S310**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 5

FLX Stix NDV
Standard Output

FLX Stix NDV 1W (3 15/16")

FLX Stix NDV 3W (7 13/32")

FLX Stix NDV 4W (11 7/32")

FLX Stix NDV 7W (22 1/4")

FLX Stix NDV 11W (33 17/64")

FLX Stix NDV 15W length (44 7/32")

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	FEELUX 'Flx Stic NDV'
	Specification:	W-NDV*-30K-24/NVD-BRACKET1/ NVD3-30K-24V-S/ NVD-END-CAP/
	Approved Alternates:	Moda llhgitng Tivoli Lighting
	Lamping:	Integral to fixture

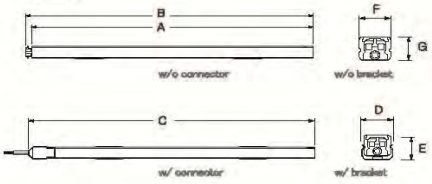
Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S310**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 5

Various options

Easy connection

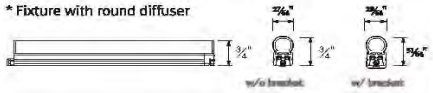
Dimension

* Fixture

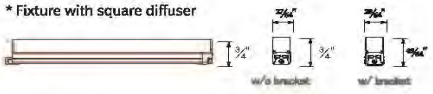


Model Name	Power Input (V)	Lamp Power (W)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)
NDV1-[Color]K-24V	DC 24	1.2	95	100	117	12	11	10.6	9
NDV3-[Color]K-24V	DC 24	2.4	188	193	210	12	11	10.6	9
NDV4-[Color]K-24V	DC 24	3.5	280	285	302	12	11	10.6	9
NDV7-[Color]K-24V	DC 24	7	560	565	582	12	11	10.6	9
NDV11-[Color]K-24V	DC 24	10.5	840	845	862	12	11	10.6	9
NDV15-[Color]K-24V	DC 24	14	1118	1123	1140	12	11	10.6	9

* Fixture with round diffuser



* Fixture with square diffuser



* Inline Dimmer

Model Name	Power Input (V)	Lamp Power (W)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)
NDV1-[Color]K-24V	DC 24	95	3 47/64	3 15/16	4 39/64	15/32	7/16	27/64	23/64
NDV3-[Color]K-24V	DC 24	188	7 15/32	7 9/16	8 17/64	15/32	7/16	27/64	23/64
NDV4-[Color]K-24V	DC 24	280	11 1/32	11 7/32	11 57/64	15/32	7/16	27/64	23/64
NDV7-[Color]K-24V	DC 24	560	22 3/64	22 1/4	22 29/32	15/32	7/16	27/64	23/64
NDV11-[Color]K-24V	DC 24	840	33 3/64	33 17/64	33 15/16	15/32	7/16	27/64	23/64
NDV15-[Color]K-24V	DC 24	1118	44 1/64	44 7/32	44 7/8	15/32	7/16	27/64	23/64

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	FEELUX 'Flx Stic NDV'
Specification:	W-NDV*-30K-24/NVD-BRACKET1/ NVD3-30K-24V-S/ NVD-END-CAP/
Approved Alternates:	Moda llhgitng Tivoli Lighting
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S310**
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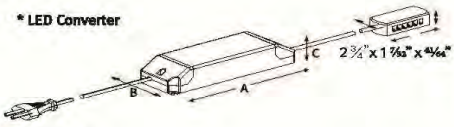
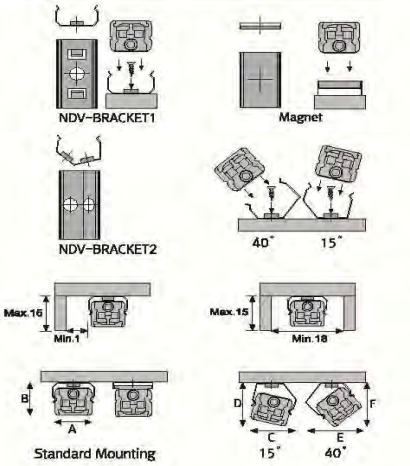


Model Name	A (mm)	B (mm)	C (mm)
FLC15-24V/XL	121	45	16
FLC30-24V/XL	150	41	31
FLC75-24V/XL	180	60	32

Installation



Max. Connection

- DIVA2 : 55Watt in one row (Single power feed)
- LED Driver

LED Driver / Model Name	Max. units for LED Driver		
	24V/15W	24V/30W	24V/75W
NDV1-[Color]K-24V	12	25	62
NDV3-[Color]K-24V	5	10	25
NDV4-[Color]K-24V	4	7	18
NDV7-[Color]K-24V	2	4	10
NDV11-[Color]K-24V	1	2	6
NDV15-[Color]K-24V	1	2	5

	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)
Flat type	11.9	11.2	13.5	13.5	14.5	13
Round type	11.9	19.8	15.7	15.7	18.8	20.3
Square type	11.9	19.6	15.5	15.8	18.8	20.3

	A(In)	B(In)	C(In)	D(In)	E(In)	F(In)
Flat type	15/32	7/16	17/32	17/32	37/64	53/64
Round type	15/32	25/32	5/8	5/8	47/64	51/64
Square type	15/32	49/64	39/64	5/8	47/64	51/64

Accessories

ⓐ Connecting cables (Between DIVA2 & DIVA2)

NDVPTC	NDVPTC1	NDVPTC2	NDVPTC4	NDVPTC6
5 29/32"	11 13/16"	23 5/8"	47 1/4"	70 27/64"

ⓑ Power feed : NDVPC (98 27/64")
Power feed (Between DIVA2 & 6-way distributor)

ⓒ Mounting bracket : NDV-BRACKET1
Included in fixture

ⓓ Angle bracket (15°& 40°) : NDV-BRACKET2

Manufacturer:	FEELUX 'Flx Stic NDV'
Specification:	FLX-STIX-NDV-4W-NDV*-30K-24/NVD-BRACKET1/ NVD3-30K-24V-S/
Approved Alternates:	Moda llhgitng Tivoli Lighting
Lamping:	Integral to fixture

CD+M Lighting Design Group
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Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S310**
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ⓔ Sidefeed for Seamless Extension (3W) : NDV3-[Color]K-24V-S
The dimension is the same as NDV3-[Color]K-24V

ⓕ End cap : NDV-END-CAP
Included in fixture

ⓖ LED Driver with 6way distributor, with power cord (70 ⅝")

Part No	FLC15-24V/XL	FLC30-24V/XL	FLC75-24V/XL
Capacity	15W 24V	30W 24V	75W 24V

ⓗ Dimming Interface (1-10V) : FDC-L10 (Max. 100W)

ⓘ Inline Dimmer : NDVDIM (Max 55W in a row)

ⓙ Round Diffuser

NDV-1W-RM	NDV-3W-RM	NDV-4W-RM	NDV-7W-RM	NDV-11W-RM	NDV-15W-RM
1W	3W	4W	7W	11W	15W

ⓚ Square Diffuser

NDV-1W-SM	NDV-3W-SM	NDV-4W-SM	NDV-7W-SM	NDV-11W-SM	NDV-15W-SM
1W	3W	4W	7W	11W	15W

ⓛ Y connector (2 way distributor)

ⓜ Connecting bracket : NDV-BRACKET3
Included in fixture

ⓝ Power bracket : NDV-BRACKET4
Provided with power feed (NDVPC)

Manufacturer:	FEELUX 'Flx Stic NDV'
Specification:	W-NDV*-30K-24/NDV-BRACKET1/ NVD3-30K-24V-S/ NVD-END-CAP/
Approved Alternates:	Moda llhgitng Tivoli Lighting
Lamping:	Integral to fixture

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S311**
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BeveLED 2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

ADJUSTABLE 3231

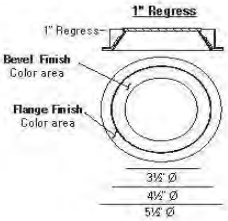
1" Regress

BeveLED 2.1 Recessed Adjustable - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installa-

DELIVERED PERFORMANCE

BeveLED 2.1 ADJUSTABLE		9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
	Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
25° Performance Data	Lumens per Watt	91	72	78	60	78	61	72	56	64	52
	Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
	Delivered Lumens	**825**	**650**	**925**	**725**	**1250**	**975**	**1725**	**1350**	**2175**	**1700**
10° Performance Data	Lumens per Watt			83	71	84	70	78	65	71	59
	Source Lumens			1150	1000	1575	1300	2175	1800	2725	2275
	Delivered Lumens			**1000**	**850**	**1350**	**1125**	**1875**	**1550**	**2350**	**1950**
	Color Consistency	2-Step MacAdam Ellipse									

Note: 25° data includes solite glass lens. 10° does not include lens.



CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3231W - B1 - S - 10 - LRTA4 - 8412 - C3 - 27KS - 25 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM OPTION: 3231 ____ - BEVEL STYLE: ____ - LENS: ____ - FLANGE FINISH: ____

3231 Round Adjustable 1" Regress

W Wet location[1]

[1] Wet location, use with B1 trims only.

BEVEL STYLE
- **B1** 1" Regress Bevel, Painted Die Cast. Matches Flange Finish
- **AB1** 1" Regress Bevel, Black Anodized
- **AC1** 1" Regress Bevel, Clear Matte Anodized

LENS
- **N** No Glass (use for 10°)
- **S** Solite (use for 25°)
- **F** Frosted
- **C** Clear

FLANGE FINISH
- **01** Clear Matte (AC Bevel only)
- **02** Black Anodized (AB Bevel only)
- **10** White
- **13** Statuary Bronze
- **21** Black
- **28** Metalized Grey
- **RAL** Custom Color (specify RAL #)

OPTICAL ACCESSORIES (Order separately)

Refer to optical accessories matrix on next page for resulting beamspreads when accessory lens is combined with 10° and 25° optics

- **AL10E**
- **AL15E**
- **AL30E**
- **AS61E**
- **AL20F**
- **AL30F**
- **AL40F**
- **AL55F**
- **AL80F**
- **AS61F**

Clearly specify quantity in your order

HOUSING ORDERING INFORMATION

HOUSING CODE: LRTA4 - WATTAGE: ____ - ENGINE CODE: ____ - COLOR: ____ - REFLECTOR: ____ - HOUSING TYPE: ____ - SELECT ONE VOLTAGE: ____ - DIMMING DRIVER OPTIONS: ____ - ACCESSORIES: ____

LRTA4

WATTAGE
- **8109** 9W LED
- **8412** 12W LED
- **8416** 16W LED
- **8424** 24W LED
- **8433** 33W LED

See performance chart for precise lumen information.

- **8412** 12W LED
- **8416** 16W LED
- **8424** 24W LED
- **8433** 33W LED

See performance chart for precise lumen information.

ENGINE CODE
- **C3**
- **C2**

COLOR
- **22KS** 2200K, 80+ CRI
- **27KS** 2700K, 80+ CRI
- **30KS** 3000K, 80+ CRI
- **35KS** 3500K, 80+ CRI
- **40KS** 4000K, 80+ CRI
- **27KH** 2700K, 90+ CRI
- **30KH** 3000K, 90+ CRI

- **27KS** 2700K, 80+ CRI
- **30KS** 3000K, 80+ CRI
- **35KS** 3500K, 80+ CRI
- **40KS** 4000K, 80+ CRI
- **27KH** 2700K, 90+ CRI
- **30KH** 3000K, 90+ CRI

2 Step MacAdam ellipse is standard for all.

REFLECTOR
- **25** 25° beam
- **10** 10° beam

HOUSING TYPE
- **NC** New Construction, all in one
- **CP** Chicago Plenum
- **IC** Insulation-Contact Rated / Airtight

See emergency solutions chart for EM options with these housings

SELECT ONE VOLTAGE
- **120V**
- **277V**
- **120V**
- **347V**

DIMMING DRIVER OPTIONS

For use with 120V or 277V
- **DIML2** 0-10V dim, 10% (provided standard)
- **DIML4** Lutron A 3-wire/ECO, 1%
- **DIML4E** Lutron 5 ECO, 5%[2]
- **DIML4H** Lutron H ECO, 1% Fade[2]
- **DIML6A** EldoLED 0-10V/Lutron, 0.1%
- **DIML6B** EldoLED 0-10V Linear, 0.1%
- **DIML7** EldoLED DALI, 0.1%
- **DIML8** EldoLED DMX, 0.1%[3]

For use with 120V only
- **DIML3** Lutron A 2-wire, 1% 120V only
- **DIML9** TRIAC 2-wire, 1.5% 120V only[2,3]
- **DIML10** ELV 2-wire, 1.5% 120V only[2,3]

For use with 347V only
- **DIML15** 0-10V dim, 1% 347 only

[2] N/A with 9W
[3] N/A with 33W

ACCESSORIES
- **CB27** 27" C-Channel Bars
- **CB52** 52" C-Channel Bars
- **EML** Emergency battery[4]
- **EMLW** Emergency battery, wet location[4]

[4] See emergency solutions chart for more details on EM options.

USAI Lighting

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1126 River Road
New Windsor, NY 12553

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'BeveLED 2.1'
Specification:	3231-B1-S-10-LRTA4-8416-C3-27KS-25-NC-VOLT-DIML2
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S311**
15.54.0		
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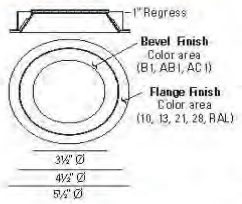
BeveLED 2.1

ADJUSTABLE 3231

ADDITIONAL TRIM INFORMATION

1" Regress



BeveLED 2.1 Optical Accessories Matrix

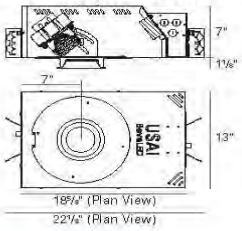
if you want...	and you have... 10°	25°
15° beam	AL10E	N/A
20° beam	AL15E	N/A
25° beam	AL30E	N/A
35° beam	N/A	AL20F
40° beam	N/A	AL30F
45° beam	N/A	AL40F
55° beam	N/A	AL55F
60° beam	N/A	AL80F
20x60° beam	AS61E	N/A
40x60° beam	N/A	AS61F
	size E	size F

3131 Emergency Solutions

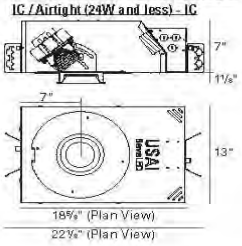
Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
NC	Through aperture		X	
CP	N/A			X
IC	N/A			X

HOUSING INFORMATION

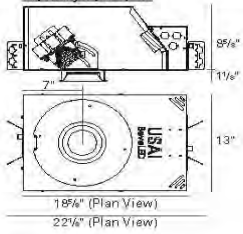
New Construction
Universal Style Housing - NC



Chicago Plenum (24W and less) - CP
IC / Airtight (24W and less) - IC



Chicago Plenum (33W) - CP
IC / Airtight (33W) - IC



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. Custom color flanges available (provide RAL#).

TRIM LENS: 25° trim is shipped with integral solite lens. 10° does not come with a solite lens unless selected as an option. Frosted lens option available for both. 10° wet location is provided with a clear lens.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 10° or 25° beam distribution. Note: 10° optic requires dedicated 10° light engine.

ADJUSTMENT: True hot aiming with center beam optics is adjustable, with a completely tool-less mechanism. 0°-40° lockable vertical tilt with 362° lockable rotation.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 16W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML8 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

ACCESSORY HOLDER: Snap in accessory holder shipped with fixture.
10° accepts "E" size lens, maximum 2.
25° accepts "F" size lens, maximum 2.

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 16W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less.

CEILING CUT OUT: 5-1/16"Ø

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made. Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

USAI Lighting
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T 845-565-8500
F 845-561-1130

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3231-B1-S-10-LRTA4-8416-C3-27KS-25-NC-VOLT-DIML2
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S312**
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NANOLED NXT

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

DOWNLIGHT 1" REGRESS LN10RDT / LN10RDL

LN10RDT | LN10RDL (Trimless)

NanoLED NXT Recessed Downlight - Available with up to 1000 delivered lumens at 20W (50LPW). The NanoLED NXT provides maximum delivered lumens and optical performance through the optimization of thermal, optical and LED science in the smallest possible aperture. Use for direct replacement and substitution of MR16 sources.

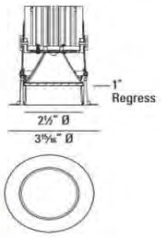
DELIVERED PERFORMANCE

NANOLED NXT DOWNLIGHT	14 Watts		20 Watts	
	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Color Rendering Index				
Lumens per Watt	52	42	50	32
Source Lumens	1100	875	1500	1200
Delivered Lumens	**775**	**625**	**1000**	**800**
Color Consistency	2-Step MacAdam Ellipse			

Performance based on 3000K

CCT MULTIPLIER	2700K		3000K		3500K	4000K
	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Color Rendering Index						
Multiplier for Lumen Output	1.00	0.73	1.00	.80	1.15	1.07

1" Regress Trim



Plan View

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: **LN10RDT - BM- MTG214- 27KS - 25 - 10 - LSP55 - 120V - DIML2 - CB27 - BOFC**

TRIM ORDERING INFORMATION

TRIM	OPTION	BAFFLE OPTIONS	LIGHT ENGINE	WATTAGE	COLOR	REFLECTOR	TRIM FINISH
LN10RD	_____	_____	MTG2	_____	_____	_____	_____

LN10RD Round Downlight 1" Regress	**T** With Trim **L** Trimless [1]	**BM** Black Matte Baffle **WM** White Matte Baffle **BV** Black Vertical Groove Baffle **WV** White Vertical Groove Baffle **MA** Clear Matte Baffle [1] **BA** Black Anodized Baffle[1]	**MTG2**	**14** 14W LED **20** 20W LED	**Standard CRI 80+** **27KS** 2700K, 80+ CRI **30KS** 3000K, 80+ CRI **35KS** 3500K, 80+ CRI **High CRI 90+** **27KH** 2700K, 90+ CRI **30KH** 3050K, 90+ CRI 2 Step MacAdam ellipse is standard	**25** 25° Distribution **35** 35° Distribution **50** 50° Distribution	**10** White **13** Statuary Bronze **21** Black **28** Metalized Grey **RAL** Special Color (specify RAL#)

[1] Trimless and Anodized baffles are not wet listed

HOUSING ORDERING INFORMATION

HOUSING	VOLTAGE	DRIVER [2]	ACCESSORIES	OPTICAL ACCESSORIES
_____	_____	_____	_____	_____

New Construction **LSP55** DL only / Max. ceiling thickness: 1-1/2" **LNC61** DL, Adj, WW / Max. ceiling thickness: 7/8" **LNC63** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LNC65** DL, Adj 20° / Max. ceiling thickness: 1-1/2" **LSH43** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **IC / Airtight** **LIC1** DL, Adj, WW / Max ceiling thickness: 7/8" **LIC3** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LIC5** DL, Adj 20° / Max. ceiling thickness: 1-1/2" **Chicago Plenum** **LCP1** DL, Adj, WW / Max. ceiling thickness: 7/8" **LCP3** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LCP5** DL, Adj 20° / Max. ceiling thickness: 1-1/2" See next page for all housing dimensions	**120V** **277V**	**DIML2** 0-10V Low voltage 10% **DIML3** Lutron Hi-Lume 1% 2-wire, 120V only **DIML4** Lutron Hi-Lume 1% 3-wire/ECO **DIML6A** ELDO 0-10V 0.1%, logarithmic **DIML6B** ELDO 0-10V 0.1%, linear **DIML7** ELDO DALI 0.1% **DIML9** TRIAC 15%, 120V only **DIML10** ELV 15%, 120V only [2] On/off driver provided if left blank	**CB27** 27" C-Channel Bars **CB52** 52" C-Channel Bars **TZ** TechZone ceiling compatible (LSH43 housing only) **EML** Emergency battery [3,4] **EMLW** Emergency battery, wet location [3,4] [3] Requires above ceiling access for service. [4] Not for use with LCP and LIC housings.	**AL20C** **AL30C** **AL40C** **AL55C** **AL80C** **AS61C** Refer to optical accessories matrix on next page for resulting beamspreads whenaccessory lens is combined with 25°, 35° and 50° optics **BOFC** Borosilicate Frosted **SOFC** Solite Frosted **PRFC** Prismatic Frosted **HEXC** Hex Cell Louver 1/8"

USAI Lighting

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CD+M Lighting Design Group
www.cdmlight.com

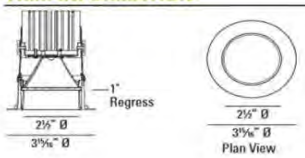
Manufacturer:	USAI 'NanoLed Nxt'
Specification:	LN10RD-T-WM-MTG2-14-30KS-50-10-LSH43-*-DIML2
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to Fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S312**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

NANOLED NXT

DOWNLIGHT 1" REGRESS LN10RDT / LN10RDL

TRIM INFORMATION



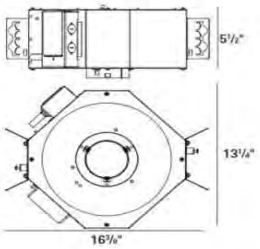
NanoLED Optical Accessories Matrix

if you want…	and you have….		
	25°	35°	50°
30° beam	AL20C	N/A	N/A
35° beam	AL30C	N/A	N/A
40° beam	AL40C	AL20C	N/A
45° beam	AL55C	AL40C	N/A
55° beam	AL80C	AL80C	AL80C
35x55° beam	AS61C	N/A	N/A
45x55° beam	N/A	AS61C	N/A
Borosilicate Frosted Lens	BOFC	BOFC	BOFC
Solite Frosted Lens	SOFC	SOFC	SOFC
Prismatic Frosted Lens	PRFC	PRFC	PRFC
1/8" Hexcell Louver	HEXC size C	HEXC size C	HEXC size C

HOUSING INFORMATION

New Construction

LSP55 - DL only
(Max. Ceiling Thickness - 1½")

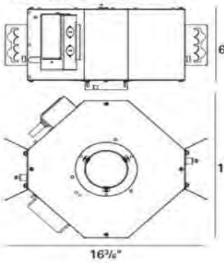


New Construction

LNC61 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

LNC63 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LNC65 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")

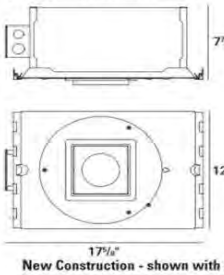


IC / Airtight

LIC1 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

LIC3 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LIC5 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")

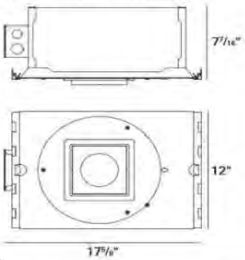


CP / Chicago Plenum - CCEA Approved

LCP1 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

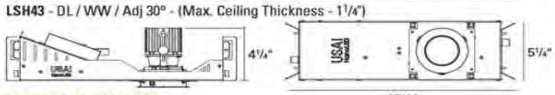
LCP3 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LCP5 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")



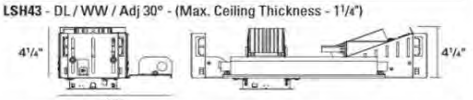
New Construction

LSH43 - DL / WW / Adj 30° - (Max. Ceiling Thickness - 1¼")



New Construction - shown with EML

LSH43 - DL / WW / Adj 30° - (Max. Ceiling Thickness - 1¼")



SPECIFICATIONS

TRIM: 2-1/2" round aperture with a 1" regressed lens and 3/4" flange, retained by three mounting clips. Trim finish is available in White, Statuary Bronze, Black, and Metalized Grey finishes. Custom color flanges available (provide RAL#).

BAFFLE OPTIONS: Black or white matte high temperature nylon baffles available with or without vertical grooves. Clear matte and black anodized aluminum baffles also available.

TRIM LENS: Solite lens provided standard.

REFLECTOR: Interchangeable tool-less reflector system allows for flexibility while maintaining design consistency. Available in 25°, 35° or 50° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 14W (775 delivered lumens) and 20W (1000 delivered lumens). Engine is field replaceable through the aperture with a screwdriver.

COLOR: NanoLED NXT is available in 3 color temperatures (2700K, 3000K, 3500K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ and 90+ color rendering index available.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: Solid state electronic constant current driver with a high power factor provided standard. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. NOTE: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-lutron controls. DIML2 and DIML6 dimming drivers source 2mA.

EMERGENCY: Emergency lighting battery pack with remote test switch requires above ceiling access. Bodine BSL17C-C2 provides 260mA for 90 minutes; delivers ~550-600 lumens. EMLW wet location option also available. EM not available with LCP and LIC housings.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers.

HOUSING: Universal housing style allows the ability to swap trim styles between Downlight, Adjustable and Wall Wash. See Plug-and-Play limitations on drawings above. Fabricated of 20 ga. black powder coated steel with thru wire J-box, 2 in 2 out at min. 90°C, #12 AWG thru branch circuit wiring.

ACCESSORY HOLDER: 360° rotating, "C" size accessory holder. Maximum 2 lenses.

CEILING CUT OUT: 3-1/2" Ø

LISTINGS: Dry/Damp. *Wet listed for trimmed only. NRTL Tested to UL Standards. IBEW Union made.

WARRANTY: 5 years

NOTES:
- Trimless for drywall installation only.
- Interior use only.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'NanoLed Nxt'
Specification:	LN10RD-T-WM-MTG2-14-30KS-50-10-LSH43-*-DIML2
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to Fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S312A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

NANOLED NXT

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

DOWNLIGHT 1" REGRESS LN10RDT / LN10RDL

LN10RDT | LN10RDL (Trimless)

NanoLED NXT Recessed Downlight - Available with up to 1000 delivered lumens at 20W (50LPW). The NanoLED NXT provides maximum delivered lumens and optical performance through the optimization of thermal, optical and LED science in the smallest possible aperture. Use for direct replacement and substitution of MR16 sources.

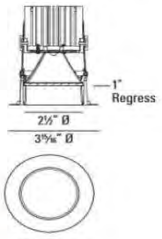
DELIVERED PERFORMANCE

NANOLED NXT DOWNLIGHT	14 Watts		20 Watts	
	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Color Rendering Index				
Lumens per Watt	52	42	50	32
Source Lumens	1100	875	1500	1200
Delivered Lumens	**775**	**625**	**1000**	**800**
Color Consistency	2-Step MacAdam Ellipse			

Performance based on 3000K

CCT MULTIPLIER	2700K		3000K		3500K	4000K
	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Color Rendering Index						
Multiplier for Lumen Output	1.00	0.73	1.00	.80	1.15	1.07

1" Regress Trim



Plan View

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: **LN10RDT - BM- MTG214- 27KS - 25 - 10 - LSP55 - 120V - DIML2 - CB27 - BOFC**

TRIM ORDERING INFORMATION

TRIM	OPTION	BAFFLE OPTIONS	LIGHT ENGINE	WATTAGE	COLOR	REFLECTOR	TRIM FINISH
LN10RD -	____	- ____	- MTG2	____	- ____	- ____	- ____

LN10RD Round Downlight 1" Regress	**T** With Trim **L** Trimless [1]	**BM** Black Matte Baffle **WM** White Matte Baffle **BV** Black Vertical Groove Baffle **WV** White Vertical Groove Baffle **MA** Clear Matte Baffle [1] **BA** Black Anodized Baffle [1]	**MTG2**	**14** 14W LED **20** 20W LED	**Standard CRI 80+** **27KS** 2700K, 80+ CRI **30KS** 3000K, 80+ CRI **35KS** 3500K, 80+ CRI **High CRI 90+** **27KH** 2700K, 90+ CRI **30KH** 3050K, 90+ CRI 2 Step MacAdam ellipse is standard	**25** 25° Distribution **35** 35° Distribution **50** 50° Distribution	**10** White **13** Statuary Bronze **21** Black **28** Metalized Grey **RAL** Special Color (specify RAL#)

[1] Trimless and Anodized baffles are not wet listed

HOUSING ORDERING INFORMATION

HOUSING	VOLTAGE	DRIVER [2]	ACCESSORIES	OPTICAL ACCESSORIES
- ____	- ____	- ____	- ____	- ____

New Construction **LSP55** DL only / Max. ceiling thickness: 1-1/2" **LNC61** DL, Adj, WW / Max. ceiling thickness: 7/8" **LNC63** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LNC65** DL, Adj 20° / Max. ceiling thickness: 1-1/2" **LSH43** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **IC / Airtight** **LIC1** DL, Adj, WW / Max ceiling thickness: 7/8" **LIC3** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LIC5** DL, Adj 20° / Max. ceiling thickness: 1-1/2" **Chicago Plenum** **LCP1** DL, Adj, WW / Max. ceiling thickness: 7/8" **LCP3** DL, Adj 30°, WW / Max. ceiling thickness: 1-1/4" **LCP5** DL, Adj 20° / Max. ceiling thickness: 1-1/2" See next page for all housing dimensions	**120V** **277V**	**DIML2** 0-10V Low voltage 10% **DIML3** Lutron Hi-Lume 1% 2-wire, 120V only **DIML4** Lutron Hi-Lume 1% 3-wire/ECO **DIML6A** ELDO 0-10V 0.1%, logarithmic **DIML6B** ELDO 0-10V 0.1%, linear **DIML7** ELDO DALI 0.1% **DIML9** TRIAC 15%, 120V only **DIML10** ELV 15%, 120V only [2] On/off driver provided if left blank	**CB27** 27" C-Channel Bars **CB52** 52" C-Channel Bars **TZ** TechZone ceiling compatible (LSH43 housing only) **EML** Emergency battery [3,4] **EMLW** Emergency battery, wet location [3,4] [3] Requires above ceiling access for service. [4] Not for use with LCP and LIC housings.	**AL20C** **AL30C** **AL40C** **AL55C** **AL80C** **AS61C** Refer to optical accessories matrix on next page for resulting beamspreads whenaccessory lens is combined with 25°, 35° and 50° optics **BOFC** Borosilicate Frosted **SOFC** Solite Frosted **PRFC** Prismatic Frosted **HEXC** Hex Cell Louver 1/8"

USAI Lighting

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CD+M Lighting Design Group
www.cdmlight.com

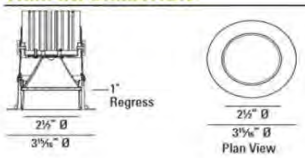
Manufacturer:	USAI 'NanoLed Nxt'
Specification:	LN10RD-T-WM-MTG2-14-30KS-50-10-LSH43-*-DIML2-WET
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to Fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S312A**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

NANOLED NXT

DOWNLIGHT 1" REGRESS LN10RDT / LN10RDL

TRIM INFORMATION



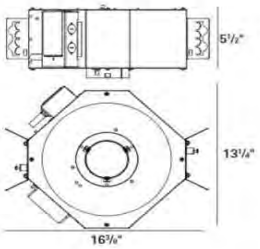
NanoLED Optical Accessories Matrix

if you want...	and you have.... 25°	35°	50°
30° beam	AL20C	N/A	N/A
35° beam	AL30C	N/A	N/A
40° beam	AL40C	AL20C	N/A
45° beam	AL55C	AL40C	N/A
55° beam	AL80C	AL80C	AL80C
35x55° beam	AS61C	N/A	N/A
45x55° beam	N/A	AS61C	N/A
Borosilicate Frosted Lens	BOFC	BOFC	BOFC
Solite Frosted Lens	SOFC	SOFC	SOFC
Prismatic Frosted Lens	PRFC	PRFC	PRFC
1/8" Hexcell Louver	HEXC size C	HEXC size C	HEXC size C

HOUSING INFORMATION

New Construction

LSP55 - DL only
(Max. Ceiling Thickness - 1½")

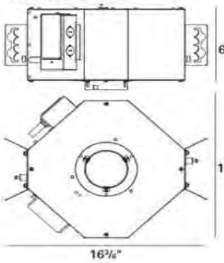


New Construction

LNC61 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

LNC63 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LNC65 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")

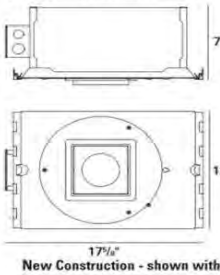


IC / Airtight

LIC1 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

LIC3 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LIC5 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")

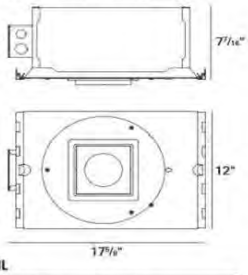


CP / Chicago Plenum - CCEA Approved

LCP1 - DL / ADJ / WW
(Max. Ceiling Thickness - ⅞")

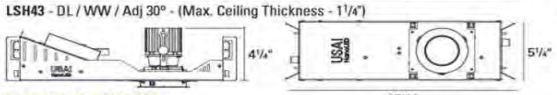
LCP3 - DL / ADJ 30° / WW
(Max. Ceiling Thickness - 1¼")

LCP5 - DL / ADJ 20°
(Max. Ceiling Thickness - 1½")



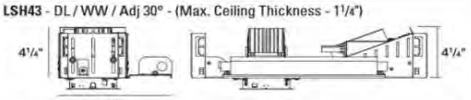
New Construction

LSH43 - DL / WW / Adj 30° - (Max. Ceiling Thickness - 1¼")



New Construction - shown with EML

LSH43 - DL / WW / Adj 30° - (Max. Ceiling Thickness - 1¼")



SPECIFICATIONS

TRIM: 2-1/2" round aperture with a 1" regressed lens and 3/4" flange, retained by three mounting clips. Trim finish is available in White, Statuary Bronze, Black, and Metalized Grey finishes. Custom color flanges available (provide RAL#).

BAFFLE OPTIONS: Black or white matte high temperature nylon baffles available with or without vertical grooves. Clear matte and black anodized aluminum baffles also available.

TRIM LENS: Solite lens provided standard.

REFLECTOR: Interchangeable tool-less reflector system allows for flexibility while maintaining design consistency. Available in 25°, 35° or 50° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 14W (775 delivered lumens) and 20W (1000 delivered lumens). Engine is field replaceable through the aperture with a screwdriver.

COLOR: NanoLED NXT is available in 3 color temperatures (2700K, 3000K, 3500K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ and 90+ color rendering index available.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: Solid state electronic constant current driver with a high power factor provided standard. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. NOTE: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-lutron controls. DIML2 and DIML6 dimming drivers source 2mA.

EMERGENCY: Emergency lighting battery pack with remote test switch requires above ceiling access. Bodine BSL17C-C2 provides 260mA for 90 minutes; delivers ~550-600 lumens. EMLW wet location option also available. EM not available with LCP and LIC housings.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers.

HOUSING: Universal housing style allows the ability to swap trim styles between Downlight, Adjustable and Wall Wash. See Plug-and-Play limitations on drawings above. Fabricated of 20 ga. black powder coated steel with thru wire J-box, 2 in 2 out at min. 90°C, #12 AWG thru branch circuit wiring.

ACCESSORY HOLDER: 360° rotating, "C" size accessory holder. Maximum 2 lenses.

CEILING CUT OUT: 3-1/2" Ø

LISTINGS: Dry/Damp. *Wet listed for trimmed only. NRTL Tested to UL Standards. IBEW Union made.

WARRANTY: 5 years

NOTES:
- Trimless for drywall installation only.
- Interior use only.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'NanoLed Nxt'
Specification:	LN10RD-T-WM-MTG2-14-30KS-50-10-LSH43-*-DIML2-WET
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to Fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S313**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

BeveLED 2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

WALL WASH 3751

1" Regress

BeveLED 2.1 Recessed Wall Wash - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installations.

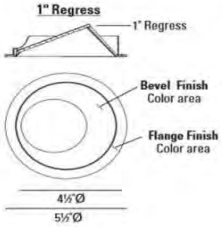
DELIVERED PERFORMANCE

BeveLED 2.1 Wall Wash	9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Lumens per Watt	83	65	71	55	71	55	66	52	58	47
Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
Delivered Lumens	**750**	**575**	**850**	**675**	**1125**	**875**	**1575**	**1225**	**1975**	**1550**
Color Consistency	2-Step MacAdam Ellipse									

Performance based on 3000K

CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K



HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3751W - B1 - 10 - LRTW4 - 6012 - C3 - 27KS - W2 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		FLANGE FINISH	
3751	_____	-		-		
3751 Round Wall Wash 1" Regress	W	Wet location [1]	B1	1" Regress Bevel, Painted Die Cast Matches Flange Finish	01	Clear Matte (AC Bevel only)
	TZ	6" TechZone ceiling compatible (NCSM only)	AB1	1" Regress Bevel, Black Anodized	02	Black Anodized (AB Bevel only)
			AC1	1" Regress Bevel, Clear Matte Anodized	10	White
					13	Statuary Bronze
					21	Black
					28	Metalized Grey
					RAL	Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.

HOUSING ORDERING INFORMATION

HOUSING CODE		WATTAGE		ENGINE CODE		COLOR		REFLECTOR		HOUSING TYPE	SELECT ONE VOLTAGE		DIMMING DRIVER OPTIONS		ACCESSORIES
LRTW4	-		-	C3	-		-	W2	-			-		-	

LRTW4		C3							
	6009 9W LED,		22KS 2200K, 80+ CRI	W2 Wall Wash Optic 2.1 Style	FT Flat Housing New Construction	120V 277V	For use with 120V or 277V	CB27 27" C-Channel Bars
	6012 12W LED,		27KS 2700K, 80+ CRI		NCSM New Construction Narrow Width		DIML2 0-10V dim, 10% (provided standard)	CB52 52" C-Channel Bars
	6016 16W LED,		30KS 3000K, 80+ CRI		NC New Construction, all in one		DIML4 Lutron A 3-wire/ECO, 1%	EML Emergency battery [5]
	6024 24W LED,		35KS 3500K, 80+ CRI		CP Chicago Plenum		DIML4E Lutron 5 ECO, 5% [2]	EMLW Emergency battery, wet location [6]
	6033 33W LED,		40KS 4000K, 80+ CRI		IC Insulation-Contact Rated / Airtight		DIML4H Lutron H ECO, 1% Fade [2]	TZ 6" TechZone ceiling compatible [6]
			27KH 2700K, 90+ CRI				DIML6A EldoLED 0-10V Lutron, 0.1%	
			30KH 3000K, 90+ CRI				DIML6B EldoLED 0-10V Linear, 0.1%	
							DIML7 EldoLED DALI, 0.1%	
	See performance chart for precise lumen information.		2 Step MacAdam ellipse is standard for all		See emergency solutions chart for EM options with these housings		DIML8 EldoLED DMX, 0.1% [3,4]	
						120V	For use with 120V only	
							DIML3 Lutron A 2-wire, 1% 120V only	
							DIML9 TRIAC 2-wire, 15% 120V only [2,3]	
							DIML10 ELV 2-wire, 15% 120V only [2,3]	
						347V	For use with 347V only	
							DIML15 0-10V dim, 1% 347 only	

[2] N/A with 9W
[3] N/A with 33W
[4] N/A with FT housing
[5] See emergency solutions chart for more details on EM options.
[6] With NCSM housing only

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info@usailighting.com
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CD+M Lighting Design Group
www.cdmlight.com

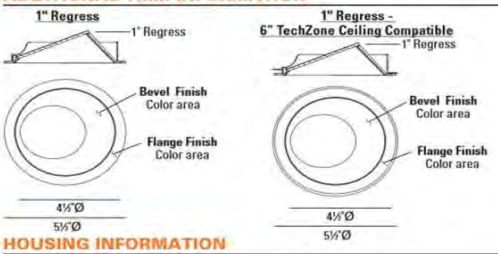
Manufacturer:	USAI Lighting "BeveLED 2.1"
Specification:	3751-B1-10-LRTW4-6024-C3-30KS-NC-VOLT-DIML2
Approved Alternates:	Whitegoods, Edison Price, Kurt Versen
Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S313**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

BeveLED 2.1

WALL WASH 3751

ADDITIONAL TRIM INFORMATION

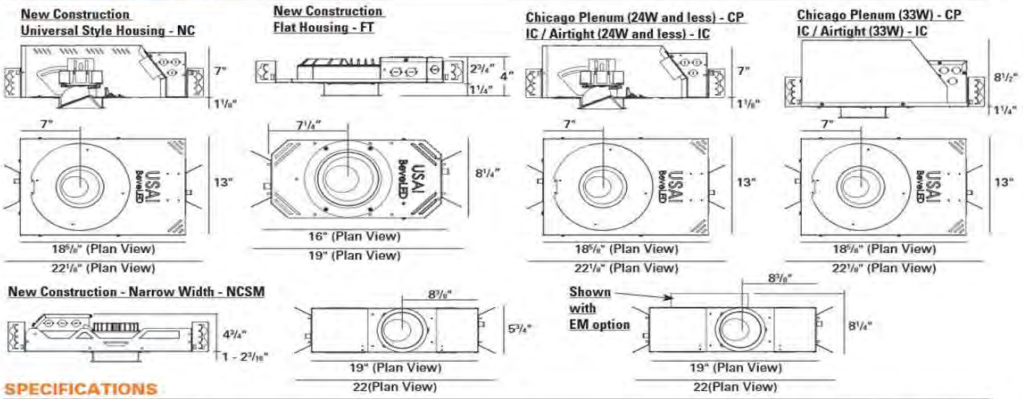


3751 Emergency Solutions

Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
FT	N/A			X
NCSM*	Above ceiling access required		X	
NC	Through aperture		X	
CP	N/A			X
IC	N/A			X

* NCSM + DIML8 cannot be offered with EM

HOUSING INFORMATION



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1° regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with soff finish or with contrasting painted flange. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with micro diffusion wall wash lens.

REFLECTOR: Proprietary precision injection molded wall wash reflector.

ADJUSTMENT: 362° horizontal locking in 90° increments.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 16W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML6 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. SPECIAL NOTE FOR NCSM HOUSING: DIML8 cannot be combined with EM options in NCSM housing. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 16W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less. NCSM with TZ option is compatible with 6" TechZone ceiling systems. When using DIML8, NCSM housing can NOT be used with thru-branch circuit wiring.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made.

WARRANTY: 5 years

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI Lighting "BeveLED 2.1"
Specification:	3751-B1-10-LRTW4-6024-C3-30KS-NC-VOLT-DIML2
Approved Alternates:	Whitegoods, Edison Price, Kurt Versen
Lamping:	Integral to fixture

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SECTION 26 51 04 - LANDSCAPE LIGHTING CUTSHEETS

Type	Issue Date
S101	February 12, 2016
S102	February 12, 2016
S103	February 12, 2016
S104	February 12, 2016

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S101**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 3

Specification Sheet

lumenarea™ pure-v P100V

CONSTRUCTION

A Housing - Made of one piece diecast, low copper, 360 aluminum alloy, fitting system locates the LED module frame.

B LED module frame - Made of one piece diecast, low copper, 360 aluminum alloy. The hinge LED module frame has a safety latch for quick toolless access to internal components.

Acrylic lens - Made of one piece injection moulded clear UV stabilized acrylic equipped with internal refractor prisms.

C Mounting arm - Consist of four arms made of moulded aluminum welded to a cylindrical moulded aluminum holder bolted to the LED module frame, fits on a Ø4" [102 mm] tenon and is fixed by six stainless steel set screws.

OPTICS

D LED module (29W each) - High performance LEDs - IP67 dust and water repellent case with integral heatsink and U.V. stabilized injection molded polycarbonate collimator. Offers IES types II, III, IV or V photometric distributions. L70 lumen maintenance at 25°C is 70,000 hrs. Initial lumen output is 3000 lm and initial efficacy is 115 lm/W @ 700mA. Typical LEDs Color temperature is 4000K standard with 3000K or 5000K optional with CRI of 70. Wattages are 29W to 87W.

ELECTRICAL COMPONENTS

E Electronic Class 2 dry & damp LED driver - Easily accessible, the driver is mounted on a removable heavy gauge galvanized steel tray, is equipped with a weatherproof quick disconnect wiring system and is factory pre-wired and tested. The driver is CSA and UL approved and is environment rated dry & damp. Output voltage: 24VDC.

IP67 rated LED quick connectors - Made of PVC nitrile, used between electrical components for quick and easy maintenance.

FINISH

All surfaces are chemically treated against corrosion through a multi-stage immersion process. The polyester powder finish is applied by a thermostatic process offering an excellent protection conforming to ASTM G7, D-2247 and B117/D1654 standards. Standard colors are textured black, bronze and white and smooth silver finish. Consult lumenpulse's "Color Selection Guide" for others.

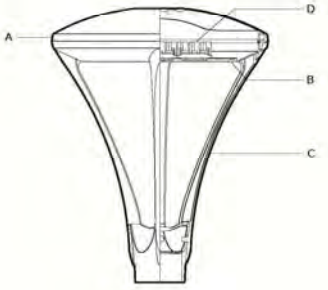
HARDWARE

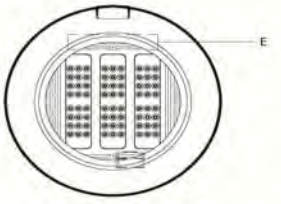
All exterior hardware is made of stainless steel.

WARRANTY

This product has a five year limited warranty on the finish and against any manufacturing defect. The driver and its components are covered by the manufacturer's warranty.

The PURE luminaire series is CSA and ANSI/UL certified and designed for use in wet locations.





Buttom view of LEDs modules

5A

Weight:	31,5 lb (14,3 kg)	EPA	0,79 sq ft
		with 5A	1,10 sq ft

L-70 LM-79 LM-80

DARK-SKY FRIENDLY FLAT LENS ONLY — IP67 OUTDOOR RATED LED MODULE ONLY — ETL US

1/2

MARCH 2011
R - 21-MAY-15 / JB

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5-year limited warranty.

Consult www.lumenpulse.com for our complete Standard Terms and Conditions of Sales.

lumenpulse

Manufacturer:	Lumenarea + Spaulding Lighting
Specification:	P100V-LE4-58L-***-A11-WW+RTA-10-40-A-A1-**-Q18
Approved Alternates:	Lumec - Urbanscape
Lamping:	Integral to fixture

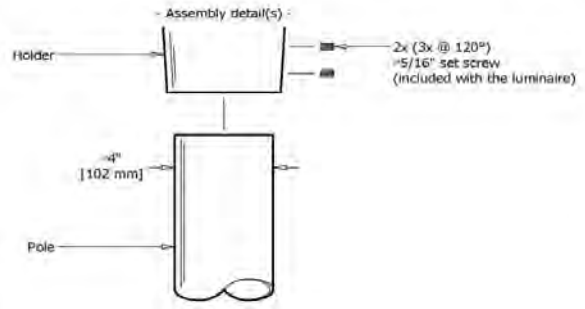
CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S101**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 3

Specification Sheet

lumenarea™ pure-v
P100V

Assembly detail(s) :



Specification guide :

Ex.: LE3 - 87L - 120 - E12 - CW/SA

IES distribution

LED module: ☐ LE2 ☐ LE3 ☐ LE4 ☐ LE5

Wattage — LED (4000K) / Lumen output:
☐ 29L 3000 lm
☐ 58L 6000 lm
☐ 87L 9000 lm

Voltage:
☐ 120
☐ 240
☐ 277
☐ 347* * c/w transformer

Color:
Standard Colors
☐ A11 Textured black
☐ B11 Textured bronze
☐ C11 Textured white
☐ E12 Silver SandText
Special Colors
☐ D11 Textured beige
☐ E20 Silver charcoal
☐ G11 Textured grey blue
☐ H11 Textured blue
☐ H21 Textured dark blue
☐ J11 Textured dark turquoise
☐ J21 Textured turquoise
☐ K11 Textured forest green
☐ K21 Textured dark forest green
☐ K31 Textured dark green
☐ K42 Fine textured dark green
☐ M11 Textured red
☐ M21 Textured burgundy
☐ X11 Fine textured patina
☐ CC Custom color * * Consult manufacturer

Other components:
Optional
☐ WW 3000K color temperature
☐ CW 5000K color temperature
☐ SA Small acrylic lens

Consult manufacturer:
Dimmable LED

IMPORTANT NOTICE Lumenpulse assumes no responsibility for problems that may occur when combining third-party products with Lumenarea.

Type	Quantity	Model	Distribution	Wattage	Voltage	Color	Other components
		P100V	–	–	–	–	–

Submitted on _____ for ☐ Information ☐ Approval

Other(s) ___

Project ___
Distributor ___
Your order # ___
Representative ___
Our order # ___ **For lumenpulse use.**

2/2

MARCH 2011
R - 21-MAY-15 / JB

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5-year limited warranty.

Consult www.lumenpulse.com for our complete Standard Terms and Conditions of Sales.

lumenpulse

Lumenpulse reserves the right to make changes to this product at any time without prior notice and such modification shall be effective immediately.

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Lumenarea + Spaulding Lighting
	Specification:	P100V-LE4-58L-***-A11-WW+RTA-10-40-A-A1-**-Q18
	Approved Alternates:	Lumec - Urbanscape
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S101**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 3

RTA

Round Tapered Aluminum

- Round tapered aluminum shafts
- One-piece construction
- Side or tenon mounting available
- Ground provision standard
- Galvanized anchor bolts and template included (Group 1 = 3-bolt design, Group 2 = 4-bolt design)
- Nut covers standard
- Gasketed hand hole cover standard (Group 1: (2"x4"), Group 2: (20' = 3"x5", all others = 4"x6")
- Lektrocote® finish standard

POLES

ORDERING INFORMATION

Catalog Number	Pole Height ft	Pole Height m	Shaft Base Dim.	Wind Load Rating[1] 80 MPH	90 MPH	100 MPH	110 MPH	120 MPH	Shaft Size	Wall Thick.	Bolt Circle[2]	Bolt Sq.	Anchor Bolt Size	Bolt Proj.	Pole Wt (lbs)
Group 1															
RTA-10-40-A-XX-XX[2]	10	3.05	4"	4.6	3.4	2.5	1.9	-	4 x 3"	.125"	7"	6.06"	3/4 x 17 x 3"	3.25"	24
RTA-12-40-A-XX-XX[2]	12	3.66	4"	3.3	2.3	1.5	1.0	-	4 x 3"	.125"	7"	6.06"	3/4 x 17 x 3"	3.25"	27
RTA-14-40-A-XX-XX[2]	14	4.27	4"	2.2	1.4	0.8	N/R	-	4 x 3"	.125"	7"	6.06"	3/4 x 17 x 3"	3.25"	32
RTA-16-50-A-XX-XX[2]	16	4.88	5"	3.3	2.2	1.5	1.0	-	5 x 3"	.125"	8"	6.93"	3/4 x 17 x 3"	3.25"	35
RTA-18-50-A-XX-XX[2]	18	5.49	5"	2.3	1.4	0.7	N/R	-	5 x 3"	.125"	8"	6.93"	3/4 x 17 x 3"	3.25"	42
RTA-20-50-A-XX-XX[2]	20	6.10	5"	1.5	0.6	N/R	N/R	-	5 x 3"	.125"	8"	6.93"	3/4 x 17 x 3"	3.25"	47
Group 2															
RTA-20-60-B-XX-XX	20	6.10	6"	11.8	8.8	6.9	4.5	3.2	6 x 4"	.188"	9 - 10"	6.36 - 7.07"	1 x 36 x 4"	4.25"	90
RTA-25-70-B-XX-XX	25	7.62	7"	11.6	8.7	6.7	4.1	3.1	7 x 4"	.188"	10 - 11"	7.07 - 7.78"	1 x 36 x 4"	4.25"	120
RTA-30-80-B-XX-XX	30	9.14	8"	11.8	8.9	6.9	3.8	2.8	8 x 4.5"	.188"	11 - 12"	7.78 - 8.48"	1 x 36 x 4"	4.25"	150
RTA-35-80-C-XX-XX	35	10.67	8"	9.9	7.3	5.6	2.9	1.8	8 x 4.5"	.250"	11 - 12"	7.78 - 8.48"	1 x 36 x 4"	4.25"	205
RTA-40-80-C-XX-XX	40	12.5	8"	8.4	6.1	3.3	1.7	-	8 X 4.5"	.250"	11 - 12"	7.78 - 8.48"	1 x 36 x 4"	4.25"	260

1 Allowable gust factor 1.3; To determine maximum pole loading weight, multiply allowable EPA by 30 lbs; Example: RTA-20-60-B pole in 80 MPH zone = 354 lbs. (11.8 x 30); Published allowable EPA values based upon calculations of Spaulding Lighting; Allowable EPA values for projects requiring AASHTO methodology are available upon request

2 Dimension is from bolt center to bolt center; Group 1 poles feature a 3-bolt base design; Group 2 poles feature a 4-bolt base design

Note Factory supplied template must be used when setting anchor bolts; Hubbell Lighting will deny any claim for incorrect anchorage placement resulting from failure to use factory supplied template and anchor bolts

ORDERING INFORMATION

ORDERING EXAMPLE: RTA-10-40-A-**A1-DB-Q18**

Complete part number requires shaft above plus mounting type, finish, and appropriate options below.

MOUNTING TYPE		MOUNTING TYPE (con't)	
AX[1,2]	Side - single	TA	Tenon (2 3/8" OD)
BX[1,2]	Side - double at 90°	QT	Open top (for post-top luminaires)
CX[1,2]	Side - double at 180°		
DX[1,2]	Side - triple at 90°		
EX[1,2]	Side - triple at 120°		
FX[1,2]	Side - quad at 90°		

FINISH	
DB	Dark Bronze
BL	Black
WH	White
GR	Gray
PS	Platinum
RD	Red (premium color)
FG	Forest Green (premium color)
CC	Custom Color (consult factory)

OPTIONS		OPTIONS (con't)	
Q18[3]	20A GFCI receptacle & cover	Q30[3]	2" coupling
Q22[3]	Extra hand hole	Q42	2nd mode vibration damper
Q26[3]	1/2" coupling	LAB	Less anchor bolts
Q27[3]	3/4" coupling		

1 DRILL PATTERNS: Replace X with the following numbers to indicate the appropriate arm/hole pattern: 2 = CL1, CR1, MSV, RCS (Raven), RCL (Raven)

2 MSV luminaires require 3.25" diameter poles or larger

3 Specify option location using logic found in pole introduction pages; The location of all options must start a minimum of one foot above the hand hole, be located one foot apart from one another and in one foot increments; Consult factory for any exceptions

SPAULDING LIGHTING

633

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Lumenarea + Spaulding Lighting
	Specification:	P100V-LE4-58L-***-A11-WW+RTA-10-40-A-A1-**-Q18
	Approved Alternates:	Lumec - Urbanscape
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S102**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

IWAY
BOLLARD

SPECIFICATION SHEET PAGE 1 OF 1
Project name:
Type:

General information

Luminaire characteristics:
Power input: 24.5W.
Lumens: 840 to 888lm (delivered)
Luminaire efficacy: 34 to 36lm/W

Source: White LED, 3000K: 85CRI and 4000K: 80CRI.
Lumen maintenance: >80% of initial lumens at 50 000 hours (L80) LM-80 (LED) / LM-79 tested.

Optics: 360° symmetrical optic with a super-pure aluminum reflector. For version with no upward light emission contact factory.

Body: Die cast aluminum cylindrical body and stainless steel rods fixed to the base.

Electrical: Universal high efficiency electronic power supply, rated 50 000 H. 120-277V.

Mounting: Ground anchored.

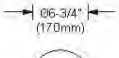
Finish: Gray (RAL9007)

Weight: 15.48lbs (9.86kg.)

Warranty: 5 years limited warranty.

Certification: cULus listed.

Ratings: IP66, IK10.



TOP VIEW

SIDE VIEW

ORDERING INFO RESET

- UNV - 15
MODEL | VOLTAGE | FINISH

MODEL	VOLTAGE	FINISH
○ I.BW78 - 4000K	● UNV - 120-277V	● 15 - Gray
○ I.BW79 - 3000K		

ACCESSORIES (TO BE ORDERED SEPARATELY)

- ○ **I.B513** - Fixing plate with anchor bolts Ø10⅞" (275mm) x h: 7" (178mm)
- ○ **I.X023-02** - Black screen for asymmetrical 180° emission
- ○ **I.X087-00** - Frosted diffuser

DUE TO CONTINUOUS IMPROVEMENTS, THE INFORMATION HEREIN MAY BE CHANGED WITHOUT NOTICE. LAST UPDATE: JULY 27, 2015 MGD - R6

iGuzzini NORTH AMERICA

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www.iguzzini-na.com

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Iguzzini "IWay Bollard"
	Specification:	IBW79-UNV-15-IB513
	Approved Alternates:	Erco, Zannen, Bega
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S103**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Compact floodlight

Housing: Luminaire constructed of a one piece die-cast aluminum housing. LED module paired with inner reverse-tapered casting to provide maximum heat transfer to outer housing. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: Optical system consists of a reflector of pure anodized aluminum. The lens and optical assembly are secured by a die cast aluminum trim ring using (3) stainless steel captive fasteners.

Mounting: Provided with two piece die-cast aluminum canopy and die-cast aluminum swivel. Mounts directly to a custom BEGA 538 recessed wiring box. This box can be shipped ahead of the luminaire.

Electrical: 13W LED luminaire, 13 total system watts, -40°C start temperature. Remote 24V DC driver required. Standard LED color temperature is 4000K with an 80 CRI. Available in 3000K (80 CRI); add suffix K3 to order.

Note: Due to the dynamic nature of LED technology, LED luminaire data in this catalog is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. These luminaires are available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

CSA certified to U.S. and Canadian standards for wet locations. Protection class IP65.

Weight: 2.0 lbs.

Remote 24 V driver Options:
580 Remote 25 W LED driver and box
591 Remote 50 W dimming LED driver and box

Luminaire Lumens: 630
Tested in accordance with LM-79-08

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:

Compact floodlight - **wide beam**

	Lamp	β	A	B	C	D		
7607LED.538*	13 W LED	48°	4⅛	5⅝	4⅜	3½	**755**	**050**

*Remote 24 V DC driver required.
β = beam angle. 180° glare shield. flat beam

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 FAX (805) 566-9474 www.bega-us.com

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	BEGA
	Specification:	7607 LED .538*-K3 + 755 + 580
	Approved Alternates:	Lumascape, We-ef, Winscape
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S104**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Recessed wall luminaire

Type:
BEGA Product #:
Project:
Voltage:
Color:
Options:
Modified:

Housing: Constructed of die cast and extruded aluminum with integral wiring compartment. Mounting tabs provided. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: One piece die cast aluminum faceplate, 1/8" thick. Clear tempered glass with translucent white ceramic coating. Faceplate is secured by two (2) socket head, stainless steel, captive screws threaded into stainless steel inserts in the housing casting. Continuous high temperature O-ring gasket for weather tight operation.

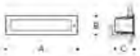
Electrical: 3.4W LED luminaire, 4.6 total system watts, -25° C start temperature. Integral 120V through 277V electronic LED driver, 0 -10V dimming. The LED and driver are mounted on a removable plate for easy replacement. Standard LED color temperature is 3000K (available in 4000K; add suffix K4). Through Wiring: Maximum four (4) No. 12 AWG conductors (plus ground) suitable for 75° C. Provided with 1/2" NPT threaded conduit entries.

Note: Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. These luminaires are available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations and for installation within 3 feet of ground. Type non-IC. Protection class: IP64.

Luminaire Lumens: 28
Tested in accordance with LM-79-08



	Lamp	A	B	C
2190 LED	3.4W LED	6	2½	4¼

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805)684-0533 FAX (805)566-9474 www.bega-us.com

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	BEGA
Specification:	2190 LED-BLK
Approved Alternates:	Winona, WE-EF, Ligman
Lamping:	Integral to fixture

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SECTION 26 51 05 - ARCHITECTURAL LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY:

A. Section Includes:
1. Digital-Network Lighting Control System
2. Fluorescent Electronic Dimming Ballasts

B. Related Sections:
1. Section 26 51 01 – Architectural Light Fixtures
2. Section 26 51 02 – Architectural Exterior Lighting Cutsheets
3. Section 26 51 03 – Architectural Interior Lighting Cutsheets
4. Section 26 51 04 – Landscape Lighting Cutsheets

1.2 REFERENCES:

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) (www.ansi.org and www.ieee.org)
1. C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits

B. ASTM International (ASTM) (www.astm.org)
1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight

C. National Electrical Manufacturers Association (NEMA):
1. WD1 (R2005) - General Color Requirements for Wiring Devices
2. WD6 – Dimensional Specifications
3. Ballast standards

D. Underwriters Laboratories, Inc. (UL) (www.ul.com):
1. 94 – Flammability Rating
2. 489 (2002) - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
3. UL498 – Standard for Attachment Plugs and Receptacles
4. 508 (1999) - Standard for Industrial Control Equipment
5. UL514C – Standard for Non-metallic Outlet Boxes, Flush Device Boxes, and Covers
6. 916 – Energy Management Equipment
7. 924 (2003) - Emergency Lighting and Power Equipment
8. 935 (2005) - Fluorescent Ballasts
9. 1472 (1996) - Solid-State Dimming Controls
10. 1598C – Light Emitting Diode (LED) Retrofit Luminaire Conversion Kits
11. 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.3 SYSTEM DESCRIPTION:

A. Quantum includes computer-based software that provides control, configuration, monitoring and reports. System includes:
1. Lighting Management Panel
2. Quantum Manager - light management computer
3. Q-Admin - light management computer software

4. GreenGlance – energy savings display software
5. Factory assembled dimming and switching panels and power interfaces and power modules
6. Low voltage wall stations and control interfaces and sensors
7. Solid-state high frequency fluorescent dimming ballasts
   a. 3-Wire (Line Voltage Controlled) Dimming Ballasts
   b. 2-Wire (Line Voltage Controlled) Dimming Ballasts
   c. 0-10 V (Low Voltage Controlled) Dimming Ballasts
   d. Digital (Low Voltage Controlled) Dimming Ballasts
8. Permanently installed occupancy/vacancy sensors and power packs

1.4 SUBMITTALS:

A. Submit under provisions of Section 01 33 00.

B. Specification Conformance Document: Indicate whether the submitted equipment:
   1. Meets specification exactly as stated
   2. Meets specification via an alternate means and indicate the specific methodology used

C. Shop Drawings; include:
   1. Schematic (one-line diagram) of system
   2. Load Schedules
   3. Sequence of Operations

D. Product Data: Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

E. Sequence of Operation to describe how each area operates and how any building wide functionality is described.

1.5 CLOSEOUT SUBMITTALS:

A. Sustainable Design Closeout Documentation
   1. Lighting Control System Manufacturer to provide Enhanced Start-up documentation that details the start-up procedure being performed including a process to follow, details on tests performed and an area that documents any test results

1.6 QUALITY ASSURANCE:

A. Manufacturer: Minimum 10 years' experience in manufacture of lighting management systems

B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standards, including in-house engineering for product design activities

C. Lighting control system components:
   1. Listed by UL specifically for the required loads. Provide evidence of compliance upon request

1.7 PROJECT CONDITIONS:

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
   1. Ambient temperature

a. Lighting Control system: 0 degrees to 40 degrees C (32 degrees to 104 degrees F)
b. Q-Manager, system computer: 10 degrees to 35 degrees C (50 degrees to 90 degrees F)
c. Fluorescent dimming ballasts: 10 degrees to 60 degrees C (50 degrees to 140 degrees F)

2. Relative humidity: Maximum 90 percent, non-condensing
3. Lighting control system must be protected from dust during installation

1.8 WARRANTY:

A. Provide Manufacturer's Warranty
1. Enhanced 8-year limited parts warranty, Includes
a. Years 1-2:
1) 100 Percent Replacement Parts for Manufacturer Lighting System Components
2) 100 Percent Manufacturer Labor Coverage to Troubleshoot and Diagnose a Lighting Issue
3) First-Available Onsite or Remote Response Time
4) Remote Diagnostics for Applicable Systems
5) 4-Hours of Remote Programming for Applicable Systems
b. Years 3-5: 50% Replacement Parts Coverage
c. Years 6-8: 25% Replacement Parts Coverage
d. 24 Hours Per Day, 7 Days Per Week Telephone Technical Support, Excluding Manufacturer Holidays

B. Provide Manufacturer's Support and Maintenance Plan for 5 years covering 100 percent parts and 100 percent labor and additional benefits as described below beginning 2 years after system startup completion
1. Support and Maintenance Plan, Includes:
a. 100 Percent Parts for Manufacturer Lighting System Components
b. 100 Percent Manufacturer Labor Coverage for Troubleshooting and Diagnosis of Lighting Issues
c. 24 Hours Per Day, 7 Days Per Week Telephone Technical Support, Excluding Manufacturer Holidays
d. First-Available Onsite or Remote Response Time
e. Remote Diagnostics for Applicable Systems
f. 4-Hours of Remote Programming for Applicable Systems

C. Software is covered by a 1-year parts and labor warranty.

D. Provide manufacturer's warranty covering 5 years with factory startup on ballasts and ballast modules from date of purchase

1.9 MATERIAL SUBMITTALS

A. Make ordering of new equipment for expansions, replacements, and spare parts available to end-user

B. Make new replacement parts available for minimum of 10 years from date of manufacture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Basis of design product: Lutron Quantum or subject to compliance and prior approval with specified requirements of this section, one of the following:
   1. Cooper Fifth Light
   2. Crestron Green Light
   3. Acuity NLight/Fresco

B. Substitutions: Under provisions of Division 1
   1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
   2. Any substitutions provided by the contractor shall be reviewed at the contractor's expense by the electrical engineer at a rate of $200.00 per hour.
   3. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power wiring) with deviations for the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

2.2 GENERAL:

A. Lighting Controls: Ten-year operational life while operating continually at any temperature in an ambient temperature range of 0 degrees C (32 degrees F) to 40 degrees C (104 degrees F) and 90 percent non-condensing relative humidity.

B. Designed and tested to withstand discharges without impairment of performance when subjected to discharges of 15,000 volts per IEC 801-2.

2.3 DIMMING / RELAY PERFORMANCE REQUIREMENTS:

A. Electrolytic capacitors to operate at least 20 degrees C below the component manufacturer's maximum temperature rating when device is under fully-loaded conditions in 40 degrees C (104 degrees F) ambient temperature.

B. Load Handling Thyristors (SCRs and triacs), Field Effect Transistors (FETs), and Isolated Gate Bipolar Transistors (IGBTs): The component's maximum current rating to be at least two times the dimmer's/relay's rated operating current.

C. Capable of withstanding repetitive inrush current of 50 times operating current without impacting lifetime of dimmer/relay.

D. Design and test dimmers/relays to withstand line-side surges without impairment to performance.
   1. Panels: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 3,000 amps per ANSI/IEEE C62.41 and per IEC 61000-4-5 surge requirements.
   2. Other power handling devices: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 200 amps per ANSI/IEEE C62.41.

E. Utilize air gap off to disconnect the load from line supply

F. Power failure memory and dimmer/relay recovery:
   3. When power is interrupted and subsequently returned, within 3 seconds lights will automatically return to same levels (dimmed setting, full on, or off) prior to power interruption.

G. Dimmers
   4. Provide real-time cycle-by-cycle compensation for incoming line voltage variations including changes in RMS voltage (plus or minus 2 percent change in RMS voltage/cycle), frequency shifts (plus or minus 2 Hz change in frequency/second), dynamic harmonics, and line noise.
   5. Systems not providing cycle-by-cycle compensation to include external power conditioning equipment as part of dimming system.
   6. Each dimmer to incorporate electronic "soft-start" default at initial turn-on that smoothly ramps lights up to the appropriate levels within 0.5 seconds.
   7. Control all light sources in smooth and continuous manor. Dimmers with visible steps are not acceptable.
   8. Each dimmer to be assigned a load type that will provide a proper dimming curve for the specific light source.
   9. Possess ability to have load types assigned per circuit, configured in field.
   10. Minimum and maximum light levels user adjustable on circuit-by-circuit basis.
   11. Line Voltage Dimmers; Meet following load-specific requirements:
      a. Magnetic Low Voltage (MLV) transformer:
         1) Contain circuitry designed to control and provide a symmetrical AC waveform to input of magnetic low voltage transformers per UL 1472, Section 5.11.
         2) Dimmers using unipolar load current devices (such as FETs or SCRs) to include DC current protection in the event of a single device failure.
      b. Electronic Low Voltage (ELV) transformer:
         1) Dimmer to operate electronic low voltage transformers via reverse phase control. Alternately, forward phase control dimming may be used if dimming equipment manufacturer has recommended specific ELV transformers being provided.
      c. Neon and cold cathode transformers:
         1) Magnetic transformers: UL listed for use with normal (low) power factor magnetic transformers. Electronic transformers: Must be supported by the ballast equipment manufacturer for control of specific ballasts being provided.
   12. Low Voltage Dimming Modules; Meet following requirements:
      a. Coordination between low voltage dimming module and line voltage relay: Capable of being electronically linked to single zone.
      b. Single low voltage dimming module; capable of controlling following light sources:
         1) 0-10V analog voltage signal
            a. Provide Class 2 isolated 0-10V output signal conforming to IEC 60929
            b. Sink current via IEC 60929
            c. Source current
         2) 10-0V reverse analog voltage signal
         3) DSI digital communication
         4) DALI broadcast communication IEC 60929:
            a. Logarithmic intensity values in compliance with IEC 60929
            b. Linear intensity values for use with LED color intensity control
         5) PWM IEC 60929

B. Non-dim circuits to meet the following requirements:
   1. Rated life of relay at full load: Minimum 1,000,000 cycles

2. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits
3. Fully rated output continuous duty for inductive, capacitive, and resistive loads

2.4 POWER PANELS

A. Product: Lutron GP, LP, XP, DCI, CCP Series

B. Mechanical:
1. Listed to UL 508 (United States) as industrial control equipment.
2. Delivered and installed as a UL listed factory assembled panel.
3. Field wiring accessible from front of panel without need to remove dimmer assemblies or other components.
4. Panels passively cooled via free-convection, unaided by fans or other means.
5. Ship panels with each dimmer in mechanical bypass position by means of jumper bar inserted between input and load terminals. Jumpers to carry full rated load current and be reusable at any time. Mechanical bypass device to allow for switching operation of connected load with dimmer removed by means of circuit breaker.

A. Electrical:
1. Panels contain branch circuit protection for each input circuit unless the panel is a dedicated feed-through type panel or otherwise indicated on the drawings
2. Branch circuit breakers; meet following performance requirements:
   a. Listed to UL 489 as molded case circuit breaker for use on lighting circuits
   b. Contain visual trip indicator; rated at 18,000 AIC, 277 V Switching
   c. Thermal-magnetic construction for overload, short-circuit, and over-temperature protection. Use of breakers without thermal protection requires dimmers/relays to have integral thermal protection to prevent failures when overloaded or ambient temperature is above rating of panel.
   d. Accept tag-out/lock-out devices to secure circuit breakers in off position when servicing loads
   e. Replaceable without moving or replacing dimmer/relay assemblies or other components in panel
   f. UL listed as switch duty (SWD) so that loads can be switched on and off by breakers
3. Minimum UL listed Short Circuit Current Rating SCCR of 45,000A

B. Architectural Lighting Control Panel:
1. Dimmers designed and tested to specifically control incandescent/tungsten, magnetic low voltage, electronic low voltage, neon/cold cathode, fluorescent dimming ballasts, and non-dim loads
2. Utilize universal 16A continuous-use UL listed dimmer
3. Utilize multiple load type low voltage dimming module
4. Limit current rise time to minimum 350 µsec as measured from 10-90 percent of load current waveform and minimum 525 µsec as measured from 0-100 percent of load current waveform at 50 percent rated dimmer capacity at a 90 degree conduction angle. Current rise to be minimum 400 µsec as measured from 10-90 percent of load current waveform and minimum 600 µsec as measured from 0-100 percent of load current waveform at 100 percent rated dimmer capacity at a 90 degree conduction angle
5. Load faults only affect the given circuit

C. Light Duty Commercial Lighting Control Panel:
1. Surface mounted
2. Utilize multiple load type 16A feed continuous-use UL listed dimming/switching modules

3. For switching only circuits, utilize 1,000,000 cycle relay
4. Utilize multiple load type low voltage dimming module

D. Lutron XP Softswitch Series Switching Panels:
1. Surface mounted
2. Rated life of relay: Minimum 1,000,000 cycles
3. Load switched in manner that prevents arcing at mechanical contacts when power is applied to and removed from load circuits
4. Fully rated output continuous duty for inductive, capacitive, and resistive loads

E. DC Dimming Panels:
1. Meet recommended electrical noise levels of MRI system manufacturers
2. Lamps: Free from audible noise and flicker throughout entire dimming range
3. In case of control system failure, supervisory circuit shall shut down power to load
4. Automatically detect and compensate for lamp failures to maintain consistent DC voltage level

F. Lutron Circuit Selector Panel Processor:
1. Provide following capabilities:
   a. Operate circuits directly from panel processor for system diagnostics and provide feedback of system operation
   b. Electronically assign each circuit to any zone in lighting control system
   c. Determine normal/emergency function of panel and set emergency lighting levels
2. Where indicated on Drawings, panels to provide two control links. Each circuit to be capable of transferring control based on independent programming between architectural control system and theatrical controls utilizing the USITT DMX-512 1990 or ESTA DMX-512A protocol
3. React to changes from control within 20 milliseconds

G. Diagnostics and Service:
1. Replacing dimmer/relay does not require re-programming of system or processor
2. Dimmers/relays: Include diagnostic LEDs to verify proper operation and assist in system troubleshooting
3. Dimming/relay panels: Include tiered control scheme for dealing with component failure that minimizes loss of control for occupant
   a. If lighting control system fails, lights to remain at current level. Panel processor provides local control of lights until system is repaired
   b. If panel processor fails, lights to remain at current level. Circuit breakers can be used to turn lights off or to full light output, allowing non-dim control of lights until panel processor is repaired
   c. If dimmer fails, factory-installed mechanical bypass jumpers to allow each dimmer to be mechanically bypassed. Mechanical bypass device to allow for switching operation of connected load with dimmer removed by means of circuit breaker

2.5 FLUORESCENT ELECTRONIC DIMMING BALLASTS

A. General:
1. Ten-year operational life while operating with a case temperature range of 10 degrees C (50 degrees F) to 75 degrees C (167 degrees F) and 90 percent non-condensing relative humidity
2. Designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC 801-2

3. Electrolytic capacitors to operate at least 20 degrees C below the capacitor's maximum temperature rating when the ballast is under fully-loaded conditions and case temperature is 75 degrees C (167 degrees F)
4. Programmed Rapid Start Type
5. Maximum inrush current of 7 amperes for 120V ballasts and 3 amperes for 277V ballasts
6. Current crest factor (CCF) less than 1.7
7. Meet ANSI C82.11 High frequency ballast standard
8. Will not interfere with infrared devices operating at frequencies between 38 kHz and 42 kHz
9. Withstand up to a 6,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A
10. Manufactured in a facility that employ ESD reduction practices in compliance with ANSI/ESD S20.20
11. Inaudible in a 27 dBA ambient
12. No visible change in light output with a variation of plus/minus 10 percent line voltage input
13. Total Harmonic Distortion less than 10 percent and meet ANSI C82.11 maximum allowable THD requirements
14. Actively prevent overheating in T5-HO linear fluorescent lamp applications
15. Ballasts to track evenly across:
    a. Multiple lamp lengths
    b. All light levels

B. 3-Wire Control
1. Continuous dimming from 100 percent to 5 percent relative light output.
2. Provide integral fault protection to prevent ballast failure in the event of a mis-wire

C. 2-Wire Control
1. Product: Lutron Tu-wire
2. Continuous dimming from 100 percent to 5 percent relative light output

D. 0-10V Control
1. Product: Lutron TVE
2. Continuous dimming from 100 percent to 10 percent relative light output

E. Digital Control
1. Product: Lutron Hi-lume 3D
2. Continuous dimming from 100 percent to 5 percent: ballast factors per fixture schedule specifications
3. Monitor and report lamp and ballast status
4. Lights automatically return to the setting prior to power interruption
5. Each ballast responds independently to:
    a. Up to 32 occupant sensors
    b. Up to 64 personal control inputs
    c. 2 daylight sensors
6. Unique internal reference number visibly displayed on ballast cover
7. Averages 2 independent daylight harvesting inputs internally
8. Responds to digital load shed command
    a. Automatically scales light output proportional to load shed command
        1) Example: If light output is at 30 percent and a load shed command of 10 percent is received, the ballast automatically sets the maximum light output at 90 percent and lowers current light output by 3 percent to 27 percent

2.6 LED DRIVERS

A. General Requirements:
1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
3. Provide integral recording of operating hours and maximum operating temperature to aid in troubleshooting and warranty claims.
4. Designed and tested to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.
5. Manufactured in a facility that employs ESD reduction practices in compliance with ANSI/ESD S20.20.
6. UL 8750 recognized or listed as applicable.
7. UL Type TL rated where possible to allow for easier fixture evaluation and listing of different driver series.
8. UL 1598C listed for field replacement as applicable.
9. Designed and tested to withstand Category A surges of 4,000 V according to IEEE C62.41.2 without impairment of performance.
10. Class A sound rating; Inaudible in a 27 dBA ambient.
11. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.
12. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
13. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 1 percent or 100 to 5 percent as applicable.
14. Meet NEMA 410 inrush requirements.
15. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
16. LED driver may be remote located up to 100 feet (30 m) from LED light engine depending on power outputs required and wire gauge utilized by installer.

B. 3-Wire Control:
1. Mis-wiring control wires and/or lamp wires can cause a driver to fail. Lutron includes fault protection circuitry in its drivers to survive common mis-wires.
2. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
3. Operate from input voltage of 120 V through 277 V at 50/60 Hz.

C. Digital Control (when used with compatible lighting control systems):
1. Employ power failure memory; LED driver to automatically return to the previous state/light level upon restoration of utility power.
2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
3. Automatically go to 100 percent light output upon loss of control link voltage and lock out system commands until digital control link voltage is restored. Manufacturer to offer UL 924 compliance achievable through use of external Lutron Model LUT-ELI-3PSH interface upon request.
4. Each driver responds independently per system maximum:
   a. Up to 32 occupant sensors.
   b. Up to 16 daylight sensors.
5. Responds to digital load shed command. (Example: If light output is at 30 percent and a load shed command of 10 percent is received, the ballast automatically sets the

maximum light output at 90 percent and lowers current light output by three percent to 27 percent).

2.7 POWER INTERFACES

A. Product: PHPM-PA-DV, PHPM-PA-120, PHPM-3F-DV, PHPM-3F-120, PHPM-SW-DV, PHPM-WBX-DV, PHPM-WBX-DV, NGRX-PB. GRX-FDBI. ELVI-1000. GRX-TVI. HP-2., HP-4., HP-6.

B. Electrical:
1. Phase independent of control input
2. Dimmer to meet limited short circuit test as defined in UL 508

C. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.

2.8 POWER MODULES

A. Preset lighting control with zone override:
1. Intensity for each zone indicated by means of one illuminated bar graph per zone
2. User-programmable zone and scene names
3. Astronomical time clock and programmer interface
    c. Provide access to:
        1) Scene selections
        2) Fade zone to a level
        3) Fine-tuning of preset levels with scene raise/lower
        4) Lock out scenes and zones
        5) Fine-tuning of light levels with individual zone raise/lower
        6) Terminal block for wired infrared signal input
        7) Enable/disable wall station
    b. Light intensity with real time energy savings by digital display
    c. Fade time indicated by digital display for current scene while fading
    d. Integral wide angle infrared receiver
    e. For temporary local overrides, individual raise/lower buttons to allow zones to be adjusted without altering scene values stored in memory
    f. Direct low-voltage control of digital ballasts (120V, 220/240V, and/or 277V lighting):
        1) Electronically link a digital fluorescent lighting ballast to a zone for both dimming and turn on/off
        2) Electronically assign daylight sensors to digital ballasts and line voltage dimmers for proportional daylight harvesting
        3) Single integral controller with Class 1 or Class 2 isolated digital output signal conforming to IEC 60929; capable of direct (no-interface) control

B. Preset shade control with zone override:
1. Preset expandable shade control: Provide up to 3 columns of shade control
2. For temporary local overrides, individual raise/lower buttons to allow zones to be adjusted without altering scene values stored in memory

2.9 LIGHTING MANAGEMENT PANEL

A. Provide Lighting Management Panel in a pre-assembled NEMA listed enclosure with terminal blocks listed for field wiring

B. Enables Q-Admin Light Management software to control and monitor EcoSystem dimming ballast, EcoSystem modules, Power Panels, GRAFIK Eye QS, and Sivoia QS window treatments
   1. Lighting Management Panel utilizes Ethernet connectivity to Q-Manager
      a. Dedicated Network Environment is used to connect Q-Manager with Lighting Management Panels

C. Integrate control station devices, power panels, shades, preset lighting controls, and external inputs into single customizable, multiple failsafe lighting control system, operable manually, automatically or through computer control

D. Astronomical time clock

E. Solar clock to track the position of the sun to control the shades to limit penetration of direct sunlight

F. Maintains a backup of the programming in a non-volatile memory capable of lasting more than ten years without power

G. BACnet Integration License for Lights
   1. Provide ability to communicate by means of BACnet IP communication to Lutron Quantum system from a user-supplied 10BASE-T or 100BASE-T Ethernet network
   2. Each Lighting Management Panel processor requires license for BACnet integration
   3. Basic BACnet integration license for lights
      a. The BACnet integrator can command:
         1) Area light output
         2) Area enable or disable afterhours mode
         3) Area load shed level
         4) Area load shed enable/disable
      b. The BACnet integrator can monitor:
         1) Area on/off status
         2) Area occupancy status
         3) Area fault
         4) Area load shed status
         5) Area instantaneous energy usage

H. BACnet Integration License for Shades
   1. Provide ability to communicate by means of BACnet IP communication to Lutron Quantum system from a user-supplied 10BASE-T or 100BASE-T Ethernet network
   2. Each Lighting Management Panel processor requires license for BACnet integration
   3. Basic BACnet integration license for shades
      c. The BACnet integrator can activate area shade group presets
      d. The BACnet integrator can monitor area shade group presets
   4. Shade assignment and grouping will be self-discoverable with 3rd party building management software.

2.10 LIGHT MANAGEMENT SYSTEM COMPUTER

A. Server
   1. Used for 24 hour per day, 7 day per week programming, monitoring, control, graphics, and data logging of digital network lighting controls
   2. Used to handle client machine request in multi-computer systems
   3. Computer to be provided by the lighting control system manufacturer
   4. Computer software preinstalled and tested prior to shipping

2.11 LIGHTING MANAGEMENT SYSTEM SOFTWARE

A. Provide system software license and hardware that is designed, tested, manufactured, and warranted by a single manufacturer

B. Configuration Setup
   1. Used to make system programming and configuration changes
   2. Windows based, capable of running on either central server or a remote client over TCP/IP connection
   3. Allow manufacturer user to:
      a. Capture system design
         1) Geographical layout
         2) Load Schedule Zoning
         3) Shade Grouping
         4) Equipment Schedule
         5) Equipment assignment to lighting management panels
         6) Daylighting design
      b. Define the configuration for the following in each area:
         1) Lighting Scenes
         2) Shade Group Presets
         3) Control Station Devices
         4) Interface and Integration Equipment
         5) Occupancy/After Hours
         6) Partitioning
         7) Daylighting
         8) Emergency Lighting
         9) Nitelights
      c. Start-up
         1) Addressing
         2) Daylighting

C. Control and Monitor
   1. Basic System View
      a. The Q-Admin system navigation and status reporting is performed using a tree view of the building
   2. Optional Graphical Floorplan View
      a. The Q-Admin system navigation and status reporting is performed using customized CAD based drawings of your building. Pan and Zoom feature allows for easy navigation. Basic system view is always available. Contact Lutron for custom pricing
   3. Control of Lights & Shades
      a. Area lights can be monitored for on/off status
      b. All lights in an area can be turned on/off or sent to a specific level
      c. For areas that have been zoned, these areas may be sent to a predefined lighting scene, and individual zones may be controlled
      d. Area lighting scenes can be modified in real-time, changing the levels zones go to when a scene is activated
      e. Area shades can be monitored for current preset or position
      f. Area shades can be opened/closed, sent to a preset, or sent to a specific position
   4. Occupancy
      a. Area occupancy can be monitored
      b. Area occupancy can be disabled to override occupancy control or in case of occupancy sensor problems
      c. Area occupancy settings including level lights turn on to when area is occupied, and level lights turn off to when area is unoccupied can be changed in real-time

5. Daylighting
   a. Daylighting can be enabled / disabled. This can be used to override the control currently taking place in the space
   b. Daylight target levels can be changed for each daylit area. This is particularly useful when new departments move into a space
6. Load Shedding
   a. Load shedding allows the building manager to monitor whole building lighting power usage and apply a load shed reduction to selected areas, thereby reducing a building's power usage
7. Scheduling
   a. Schedule time of day and astronomic timeclock events to automate functions for lights and shades
8. Reporting allow the building manager to gather real-time and historical information about the system as follows:
   a. Energy Reports – Show a comparison of cumulative energy used over a period of time for one or more areas
   b. Power Reports – Show power usage trend over a period of time for one or more areas
   c. Activity Report – Shows what activity has taken place over a period of time for one or more areas. Activity includes occupant activities (i.e. areas going occupied/unoccupied, wall controls being pressed), building manager operation (controlling/changing areas using the control & monitor tool), and device failures (keypads, ballasts, etc. not responding)
   d. Lamp Failure Report – Shows which areas are currently reporting lamp failures
9. Diagnostics
   a. Diagnostics allows the building manager to check on the status of all equipment in the lighting control system. Devices will be listed with a reporting status of OK, missing, or unknown
10. Administration
    a. Users – Allows new user accounts to be created and existing user accounts to be edited
    b. Publish Graphical Floorplan – Allows admin user to publish new graphical floorplan files, allowing users to monitor the status of lights, occupancy of areas, and daylighting status
    c. Back-up Project Database – Allows admin user to backup the project database. The project database holds all the configuration information for the system, including keypad programming, area scenes, daylighting, occupancy programming, emergency levels, night lights, and timeclock. The Control and Monitor tool can be used to adjust some of these settings, and thus it is important to back-up the project database prior to changing settings in the Design and Setup tool
11. Publish Project Database – Allows the admin user to send a new project database to the server and download the new configuration to the system. The project database holds all the configuration information for the system, including keypad programming, area scenes, daylighting, occupancy programming, emergency levels, night lights, and timeclock

D. Energy Savings display software
   1. Provide software from a single manufacturer that can collect and display energy savings from all of the lighting components in the lighting control system

E. Open Loop Solar Adaptive Algorithm
   1. Primary Goals of the shade control system are:
      a. Optimize daylight

b. Provide manual override capability for occupants via wall mounted keypad or simple remote control
c. Maximize occupants connectivity with outdoors by optimizing view
d. Provide diffuse daylight and minimize direct sunlight in the space to reduce solar heat gain and maximize occupants' comfort in the space
e. Reduce glare
f. Shades along same façade will, start, stop and track in unison to maintain a consistent exterior aesthetic

F. Hardware
1. Independent operation of solar tracking program through non-windows based operating system provided in one or more Quantum light management panels

G. Control Software
1. Control software shall incorporate a solar tracking software that:
a. Calculates the sun's position in the sky relative to the building and then calculates when shade movement is necessary by façade
b. Calculates the position of the shade to limit direct sunlight penetration to a predetermined limit
2. Control software shall be controlled using the following inputs for start-up:
a. Building location
b. Façade orientation
c. Window Dimensions
d. Solar depth of penetration
e. Number of shade movements per day

3. Control software shall require minimal long term maintenance and service. System will not require user to make daily changes to programming or overall system functionality, unless desired by the owner

H. User Interface
1. PC Graphic User Interface
a. User Interface will provide access to all adjustable parameters of solar depth of penetration and number of shade movements per day
2. Manual Override
a. Temporary override of the control program shall be capable through optional manual keypads
b. Keypads shall be capable of providing manual control of shades in a particular area

2.12 LOW-VOLTAGE WALL STATIONS

A. System Wall Stations
1. Allows controls of any devices part of the Lutron System
2. Product: seeTouch. Preset Lighting Controls with Zone Override.
3. Electronics:
a. Use RS485 wiring for low voltage communication
4. Functionality:
a. Upon button press, LEDs to immediately illuminate
b. LEDs to reflect the true system status. LEDs to remain illuminated if the button press was properly processed or the LEDs turn off if the button press was not processed
c. Allow for easy reprogramming without replacing unit
d. Replacement of units does not require reprogramming

5. Color:
   a. Match NEMA WD1, Section 2
6. Provide faceplates with concealed mounting hardware
7. Engrave wall stations in English with appropriate button, zone, and scene engraving descriptions
8. Silk-screened borders, logos, and graduations to use graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning
9. Software Configuration:
   a. Customizable control station device button functionality:
      1) Buttons can be programmed to perform single defined action
      2) Buttons can be programmed to perform defined action on press and defined action on release

10. Control station device LEDs to support logic that defines when it is illuminated:
    a. Scene logic (logic is true when all zones are at defined levels)
    b. Room logic (logic is true when at least one zone is on)
    c. Pathway (logic is true when at least one zone is on)
    d. Last scene (logic is true when spaces are in defined scenes)

11. General:
    a. Class 2 (low voltage)
    b. Integral IR receiver for personal control
    c. Immediate local LED response upon button activation to indicate that a system command has been requested
    d. Wall stations can be replaced without reprogramming
    e. Color:
    f. Match NEMA WD1, Section 2 White

12. One Button Control
    a. Toggle on/off and master raise/lower control for group of fixtures

13. Four Button Control
    a. Recall 4 Scenes plus all on or all off for one group of fixtures
    b. Master raise/lower control entire group of fixtures

2.13 LOW VOLTAGE CONTROL INTERFACES

A. Contact Closure Interface; Lutron Model QSE-IO:
   1. The contact closure input device will accept both momentary and maintained contact closures
   2. The contact closure output device can be configured for maintained or pulsed outputs

B. Contact Closure Input Interface; Lutron QS seeTouch keypads Model QSWS2:
   1. The contact closure input device will accept both momentary and maintained contact closures

C. RS232 and Ethernet Interface; Lutron Model QSE-CI-NWK-E
   1. Provide ability to communicate via ethernet or RS232 to audiovisual equipment, touchscreens, etc.
   2. Provide control of:
      a. Lights scene selections
      b. Shade Group Presets
      c. Fine-tuning of shade preset or light scenes levels with raise/lower
      d. Simulate system wall station button presses and releases

3. Provide status monitoring of:
   a. Light scene-status
   b. Shade Group status
   c. Wall station button presses and releases
   d. Wall station LEDs

2.14 SENSORS

A. Infrared Receivers
1. Use Class 2 wiring for low voltage communication
2. Can be replaced without reprogramming
3. 360 degree reception of wireless infrared remote controls
4. Immediate local LED response upon reception of hand held transmitter communication
5. Constructed with plastic meeting UL94 HB
6. Mountable on lighting fixtures or recessed acoustical ceiling tiles
7. Constructed via sonic welding
8. Color:
   a. Match NEMA WD1, Section 2 White

B. Interior Daylight Sensors
1. Use Class 2 wiring for low voltage communication
2. Can be replaced without reprogramming
3. Open-loop basis for daylight sensor control scheme
4. Stable output over temperature from 0 degrees to 40 degrees C
5. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection
6. Provide linear response from 0 to 500 foot-candles
7. Integral IR receiver for personal control
8. Constructed with plastic meeting UL94 HB
9. Mountable on lighting fixtures or recessed acoustical ceiling tiles
10. Constructed via sonic welding
11. Color:
    a. Match NEMA WD1, Section 2 White

C. Exterior Daylight Sensors
1. Calibrated with independent turn-on and turn-off thresholds; minimum 2 foot-candles difference between the turn-on and turn-off thresholds
2. Enclosed in weatherproof housing with shading and lens protection visor

D. Infrared Partition Sensor
1. Provide contact closure based on status of the partition wall (open/close)

2.15 ACCESSORIES

A. Emergency Lighting Interface; Lutron LUT-ELI
1. Provides total system listing to UL924 when used with Lutron Quantum system
2. Senses all three phases of building power
3. Provides an output to power panels or Digital Ballast Interfaces if power on any phase fails and sends all lights controlled by these devices to an emergency light level setting 100 percent intensity. Lights to return to their previous intensities when normal power is restored
4. Accepts a contact closure input from a fire alarm control panel

B. Infrared Transmitters:

1. Provide wireless remote control
2. Designed for use in conjunction with compatible infrared receiver and lighting control; compatibility dependent on that receiver, not transmitter
3. Operate up to 15 meters (50 feet) within line-of-sight to that receiver
4. “Learnable” by other variable frequency remote controls

2.16 WIRING DEVICE ACCESSORIES

A. General
1. Provide receptacle, telephone jack, and cable TV jack, and wall plate kits that are designed, tested, manufactured, warranted, and provided by a single manufacturer unless otherwise noted
2. Provide seamless faceplates with no visible means of attachment
3. Color:
   a. Match NEMA WD1, Section 2. Non-NEMA Standard Color Custom color to be selected by Architect.

B. Receptacle Components
1. Receptacles listed to UL 498, CSA C22.2 #42-99, NOM–003–SCFI
2. Receptacles NEMA configuration type 15 Amp 20 Amp
3. Isolated ground NEMA configuration type receptacles 15 Amp 20 Amp
4. Dimmable receptacles NEMA configuration type half duplex dimmable full duplex dimmable 15 Amp
5. Ground-fault interrupter NEMA WD-6 design configuration type receptacles 15 Amp 20 Amp

C. Telephone Jack and Cable TV Components
1. Comply with NEC Articles 800-3 and 820-13 by providing an appropriate barrier (partition) to isolate jack from high-voltage wiring when ganged with a dimmer, fan-speed control, switch, or receptacle
2. Telephone jacks meet FCC Part 68, paragraph F standards to ensure compatibility with U.S. telephone systems
3. Telephone jacks: designed to mate with standard 4- or 6-conductor modular jacks, and be compatible with 2, 4, or 6 conductor lines
4. Cable TV jacks: coaxial type, designed for use with standard 75-Ohm cables
5. Field customizable multi-port frame capable of expanding to six connections

D. Wall Plates
1. Listed to UL 514C, CSA C22.2 #42.1-00
2. Provide an adapter plate for proper device alignment and wall plate attachment
3. Product: Architectural style face plates: Vareo Designer style face plates: Claro Gloss, Matte Finish Designer style face plates: Claro Satin Color as selected by the Architect Wall plate styles and colors to be provided as defined on the project drawings and schedules

2.17 SOURCE QUALITY CONTROL

A. Perform full-function testing on all completed assemblies at end of line. Statistical sampling is not acceptable

B. Perform full-function testing on 100 percent of all ballasts at the factory

C. Audit burn-in at 40 degrees C (104 degrees F) ambient temperature of dimming assemblies and panels at full load for two hours

D. Perform burn-in at 40 degrees C (104 degrees F) ambient temperature on 100 percent of all ballasts at the factory

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install equipment in accordance with manufacturer's installation instructions

B. Provide complete installation of system in accordance with Contract Documents

C. Provide dedicated network between Q-Manager computer and Quantum Lighting Management Panels

D. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent

E. Define each dimmer's/relay's load type, assign each load to a zone, and set control functions

F. Mount exterior daylight sensors to point due north with constant view of daylight

G. Ensure that daylight sensor placement minimizes sensors view of electric light sources; ceiling mounted and fixture-mounted daylight sensors shall not have direct view of luminaries

H. Season lamps at full intensity according to lamp manufacturer's recommendation

I. Systems Integration:
   1. Equipment Integration Meeting Visit
      a. Facility Representative to coordinate meeting between Facility Representative, Lighting Control System Manufacturer and other related equipment manufacturers to discuss equipment and integration procedures

3.2 SERVICE AND SUPPORT:

A. Startup and Programming:
   1. Provide factory certified field service engineer to make minimum of three site visits to ensure proper system installation and operation under following parameters
      a. Qualifications for factory certified field service engineer:
         1) Minimum experience of 2 years training in the electrical/electronic field
         2) Certified by the equipment manufacturer on the system installed
      b. Make first visit prior to installation of wiring. Review:
         1) Low voltage wiring requirements
         2) Separation of power and low voltage/data wiring
         3) Wire labeling
         4) Lighting Management Panel locations and installations
         5) Control locations
         6) Computer jack locations
         7) Load circuit wiring
         8) Network wiring requirements
         9) Connections to other equipment and other Lutron equipment
         10) Installer responsibilities
         11) Power Panel locations
      c. Make second visit upon completion of installation of Network Lighting Control System:

1) Verify connection of power wiring and load circuits
2) Verify connection and location of controls
3) Energize Lighting Management Panels and download system data program
4) Address devices
5) Verify proper connection of panel links (low voltage/data) and address panel
6) Download system panel data to dimming/switching panels
7) Check dimming panel load types and currents and supervise removal of by-pass jumpers
8) Verify system operation control by control
9) Verify proper operation of manufacturers interfacing equipment
10) Verify proper operation of manufacturers supplied PC and installed programs
11) Configure initial groupings of ballast for wall controls, daylight sensors and occupant sensors
12) Initial calibration of sensors
13) Obtain sign-off on system functions

d. Make third visit to demonstrate and educate Owner's representative on system capabilities, operation and maintenance

2. Startup
   a. Q-Admin configuration
      1) Naming and association of areas and lighting zones
   b. After Hours Start-up
      1) Provide factory certified Field Service Engineer to perform manufacturer's start-up procedures outside normal working hours (Monday through Friday, 7a.m. to 5 p.m.)

B. Training of customer representatives for Q-Admin
   1. Configuration Software used to make system programming and configuration changes
   2. Control and Monitor
   3. Green Glance

C. Tech Support
   1. Provide factory direct technical support hotline 24 hours per day, 7 days per week

3.3 FIELD QUALITY CONTROL:

B. Manufacturer Services
   1. Aim and Focus Visit
      a. Facility Representative to coordinate on-site meeting with Lighting Control System Manufacturer and Lighting Design Consultant to make required lighting adjustments to the system for conformance with the Lighting Design Consultant's original design intent

3.4 CLOSEOUT ACTIVITIES:

A. Training Visit
1. Lighting Control System Manufacturer to provide 1day additional on-site system training to site personnel

B. On-site Walkthrough
1. Lighting Control System Manufacturer to provide a factory certified Field Service Engineer to demonstrate system functionality to the Commissioning Agent

3.5 MAINTENANCE:

A. Capable of providing on-site service support within 24 hours anywhere in continental United States and within 72 hours worldwide except where special visas are required

B. Offer renewable service contract on yearly basis, to include parts, factory labor, and annual training visits. Make service contracts available up to ten years after date of system startup

C. System Optimization Visit
1. Lighting Control System Manufacturer to visit site 6 months after system start-up to evaluate system usage and discuss opportunities to make efficiency improvements that will fit with the current use of the facility

3.6 DEMONSTRATION

A. Demonstrate lighting control system specified in this Section to the Owner and Commissioning Agent including each step of control for each lighting control zone and dimming zone.

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

3.7 COMMISSIONING OF ELECTRICAL SYSTEMS

A. Sub-Contractor shall provide manpower, tools, and testing equipment for commissioning of the electrical systems including equipment start-up, functional performance testing, training, opposite season testing and warranty review testing.

B. Commissioning Authority shall prepare installation checklists and functional performance tests for use by Sub-Contractor in testing and demonstrating system operation. Commissioning Authority shall verify installation checklists and shall witness testing and demonstration of system operation.

END OF SECTION 26 51 05

SECTION 266010

LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section shall comply with the provisions of Section 260100.

B. Provide a building lightning protection system complete with air terminals, conductors, down conductors, bonding connections and grounding electrodes, to the extent specified, shown and detailed.

C. The system shall be installed by a company with a minimum of five years' experience in the lightning protection field.

D. All equipment shall be as manufactured by East Coast Lightning Equipment, Inc., Winsted, CT, Independent Protection Co. of Goshen, Indiana or by an approved equal.

E. L. P. Installer shall submit proof of current U. L. listing and L. P. I. Certification.

1.2 CODES, STANDARDS AND REGULATIONS

A. All work shall be in compliance with the provisions of Underwriters' Laboratories, Inc., (U.L.) Installation Requirements Codes, U.L. 96A; National Fire Protection Associates (NFPA) Lightning Protection Standard No. 780 and the Lightning Protection Institute (LPI) Installation Requirements, LPI-175.

B. Materials shall comply in weight, size and composition with the requirements of U.L., NFPA and LPI relating to this type structure.

C. The Underwriters' Laboratories "Master Label Certification" shall be furnished along with the Lightning Protection Institute's Certification as evidence that the installation has met all code requirements.

1.3 SHOP DRAWINGS

A. Shop drawings shall show all air terminals, conductors, bonding connections and grounding methods. Description of all equipment shall be included.

B. Locations of air terminals, grounding equipment and conductors shall be shown on 1/8" = 1'-0" drawings which shall be included with the shop drawing submittal.

PART 2 - PRODUCTS

2.1 AIR TERMINALS

A. Provide the required number of air terminals on the roof and other prominent parts of the building.

B. Air terminals shall extend a minimum of 10" above the object, which it protects. They shall have a proper base support for the surface on which they are used and shall be securely anchored to the surface.

2.2 CONDUCTORS

A. Conductors shall be commercially pure copper cable complying with the weight and construction requirements of the lightning protection codes and shall be coursed to interconnect with air terminals and provide a two-way to ground. The angle of any turn shall not exceed 90 degrees and a horizontal or downward course shall be maintained.

B. Provide the required number of down conductors evenly distributed on the outer walls of the building. Building copper downlead cables up in the column construction tie wrapped to rebar. Splicing is permitted as required with 2-bolt pressure U. L. 96 listed clamps.

2.3 FASTENERS

A. Conductor fasteners shall be of non-corrosion metal having ample strength to support the conductor.

B. Fasteners shall be spaced on not more than 3’-0" centers for horizontal and 3'-0" for vertical runs.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ground connections shall be made in accordance with requirements of the lightning protection codes. Soil conditions shall determine the type of ground to be used. Buildings more than 100’ AFG shall have a counterpoise (ground loop conductor) installed per code requirements.

B. The installation shall be made in a neat inconspicuous manner with all conductors coursed to conceal the equipment as much as possible.

END OF SECTION 266010

SECTION 266100

EMERGENCY SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section shall comply with the provisions of Section 260100.

B. Provide all labor and material necessary to install a standby diesel engine-generator set in a complete and operating condition.

C. The engine-generator set shall be suitable for outdoor use and complete with weather-protective enclosure and components.

D. Codes and Standards:
1. The generator set shall be listed to UL 2200 or submitted to an independent third party certification process to verify compliance as installed.
2. The generator set shall conform to the requirements of the following codes and standards:
   a. CSA C22.2, No. 14-M91 Industrial Control Equipment.
   b. EN50082-2, Electromagnetic Compatibility-Generic Immunity Requirements, Part 2: Industrial.
   c. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.
   d. IEC8528 part 4, Control Systems for Generator Sets.
   e. IEC Std 61000-2 and 61000-3 for susceptibility, 61000-6 radiated and conducted electromagnetic emissions.
   f. IEEE446 Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
   g. NFPA 70, National Electrical Code, Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
   h. NFPA 99, Essential Electrical Systems for Health Care Facilities.
   i. NFPA 110, Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit. Component level type tests will not substitute for this requirement.

1.2 SUBMITTALS

A. Furnish information showing manufacturers' model numbers, dimensions and weights for the engine, generator and major auxiliary equipment.

B. Submit copies of pertinent drawings and schematic diagrams for approval and include the following:
1. Engine generator set including plans and elevations clearly indicating entrance points for each of the interconnections required.
2. Engine generator/exciter control cubicle.
3. Fuel consumption rate at various loads, ventilation and combustion CFM requirements.

4. Exhaust mufflers and vibration isolators.
5. Battery charger, battery and battery racks.
6. Day tank fuel connection points.
7. Automatic load transfer control switch.
8. Actual electrical diagrams including schematic diagrams and inter-connection wiring diagrams for all equipment to be provided.
9. Legends for all devices on all diagrams.
10. Sound attenuated housing.

C. The specified standby KW shall be for continuous electrical service during interruption of the normal utility source and shall be certified by the manufacturer for the actual unit supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. The equipment shall be as manufactured by Caterpillar, Cummins or Kohler of the size and ratings indicated.

B. Equipment shall include weather-protective housing for outdoor use.

C. Motor starting performance and voltage dip determinations shall be based on the complete generator set. With a maximum instantaneous voltage dip of 35%, as measured by a digital RMS transient recorder in accordance with IEEE standard 115. Motor starting performance and voltage dip determination that does not account for all components affecting total voltage dip i.e. engine, alternator, voltage regulator and governor will not be acceptable. As such, the generator set shall be prototype tested to optimize and determine performance as a generator set system.

2.2 ENGINE

A. The engine shall be governed at a speed of 1800 rpm, and shall be equipped with the following:
1. Electronic isochronous governor capable of 0.25% steady-state frequency regulation.
2. 24-volt positive-engagement solenoid shift-starting motor.
3. 30-ampere automatic battery charging alternator with a solid-state voltage regulation.
4. Positive displacement, full-pressure lubrication oil pump, cartridge oil filters, dipstick, and oil drain.
5. Dry-type replaceable air cleaner elements for normal applications.
6. Engine-driven or electric fuel-transfer pump including fuel filter and electric solenoid fuel shutoff valve capable of lifting fuel.

B. The turbocharged engine shall be fueled by diesel.

C. The engine shall be liquid-cooled by Unit Mounted Radiator 122°F/50°C.

D. The engine shall be EPA certified from the factory.

2.3 ALTERNATOR

A. The alternator shall be salient-pole, brushless, 2/3-pitch, 10 lead, self-ventilated with drip-proof construction and amortisseur rotor windings and skewed for smooth voltage waveform. The ratings shall meet the NEMA standard (MG1-32.40) temperature rise limits. The insulation shall be class H per UL1446 and the varnish shall be a fungus resistant epoxy. Temperature rise of the rotor and stator shall be limited to Standby 130°C. The excitation system shall be of brushless construction controlled by a solid- state voltage regulator capable of maintaining voltage within ±.25%% at any constant load from 0% to 100% of rating. The AVR shall be capable of proper operation under severe nonlinear loads and provide individual adjustments for voltage range, stability and volts-per-hertz operations. The AVR shall be protected from the environment by conformal coating. The waveform harmonic distortion shall not exceed 5% total RMS measured line-to-line at full rated load. The TIF factor shall not exceed 50.

B. The alternator shall have a single maintenance-free bearing, designed for 40000 hour B10 life. The alternator shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

C. The generator shall be inherently capable of sustaining at least 250% of rated current for at least 10 seconds under a 3-phase symmetrical short circuit without the addition of separate current-support devices.

2.4 GENERATOR

A. The generator shall be rated for continuous standby service at ratings indicated with 0.8 power factor, 277/480 volts, three-phase, four wire, 60 hertz, 1800 RPM.

B. The generator shall be a three phase, 60 hertz, single bearing, rotating field, synchronous type built to NEMA standards. A voltage regulator shall be provided to match the characteristics of the generator and engine. Voltage regulation shall be +/- 2% from no load to full rated load. Readily accessible voltage-droop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of +/- 5%. Generator and exciter shall be inherently capable of parallel operation with other power sources of equivalent electrical characteristics, and stator shall include a twelve lead, reconnectable bus system for each load reconnection. Generator shall be brushless permanent magnet, and shall sustain short circuit current at 300% of rated current up to 10 seconds.

2.5 COOLING SYSTEM

A. A radiator with blower type fan shall be provided to maintain safe operation at 110 degrees F. ambient temperature. Air flow restriction from the radiator shall not exceed 0.5" H20. Provide ductwork with flexible connecting section between radiator and discharge louver frame. Provide an engine coolant heater with thermostat to maintain coolant temperature at not lower than 60 degrees F. Heater shall operate on 120 VAC. Heater shall have an oil pressure disconnect to turn heater off when engine is operating.

B. The engine cooling system shall be pretreated by the system supplier for the inhibition of internal corrosion and freezing. Obtain necessary connection to heater from base building panel in core (HM or L as necessitated by voltage required).

2.6 DOUBLE WALL SECONDARY CONTAINMENT SUB BASE FUEL TANK

A. A sub-base fuel tank used in conjunction with a diesel powered generator set will support the generator set for a period of 24 hours at 100% of rated load and 34 hours at 75% of rated load.

B. The sub-base fuel system is listed under UL 142, subsection entitled Special Purpose Tanks EFVT category, and will bear their mark of UL Approval according to their particular classification.

C. The above ground steel secondary containment rectangular tank for use as a sub base for diesel generators is manufactured and intended to be installed in accordance with the Flammable and Combustible Liquids Code—NFPA 30, the Standard for Installation and Use of Stationary Combustible Engine and Gas Turbines—NFPA 37, and Emergency and Standby Power Systems—NFPA 110.

D. Primary Tank. It will be rectangular in shape and constructed in clam shell fashion to ensure maximum structural integrity and allow the use of a full throat fillet weld.
   1. Steel Channel Support System. Reinforced steel box channel for generator support, with a load rating of 5,000 lbs. per generator mounting hole location. Full height gussets at either end of channel and at generator mounting holes shall be utilized.
   2. Exterior Finish. The exterior coating has been tested to withstand continuous salt spray testing at 100 percent exposure for 244 hours to a 5 percent salt solution at 92-97° F. The coating has been subjected to full exposure humidity testing to 100 percent humidity at 100° F for 24 hours. Tests are to be conducted in accordance with The American Standard Testing Methods Society.

E. Venting. Normal venting shall be sized in accordance with the American Petroleum Institute Standard No 2000, Venting Atmospheric and Low Pressure Storage Tanks not less than 1-1/4" (3 cm.) nominal inside diameter.

F. Emergency Venting. The emergency vent opening shall be sized to accommodate the total capacity of both normal and emergency venting and shall be not less than that derived from NFPA 30, table 2-8, and based on the wetted surface area of the tank. The wetted area of the tank shall be calculated on the basis of 100 percent of the primary tank. The vent is spring-pressure operated: opening pressure is 0.5/psig and full opening pressure is 2.5 psig. The emergency relief vent is sized to accommodate the total venting capacity of both normal and emergency vents.

G. Fuel Fill. There shall be a 2" NPT opening within the primary tank and lockable manual fill cap.

H. Fuel Level. A direct reading, UL listed, magnetic fuel level gauge with a hermetically sealed vacuum tested dial shall be provided to eliminate fogging.

I. Low Fuel Level Switch. Consists of a 30 watt float switch for remote or local annunciation of a (50% standard) low fuel level condition.

2.7 SOUND-ATTENTUATED ENCLOSURE

A. All enclosures are to be constructed from high strength, low alloy steel, aluminum or

galvanized steel.

B. The enclosure shall be finish coated with powder baked paint for superior finish, durability and appearance. Enclosures will be finished in the manufacturer's standard color.

C. The enclosures shall allow the generator set to operate at full load in an ambient of 40°C - 45°C with no additional derating of the electrical output.

D. Enclosures shall be equipped with sufficient side and end doors to allow access for operation, inspection, and service of the unit and all options. Minimum requirements are two doors per side. When the generator set controller faces the rear of the generator set, an additional rear facing door is required. Access to the controller and main line circuit breaker must meet the requirements of the National Electric Code.

E. Doors must be hinged with stainless steel hinges and hardware and be removable.

F. Doors shall be equipped with lockable latches. Locks must be keyed alike.

G. The enclosure roof shall be pitched to prevent accumulation of water.

H. A duct between the radiator and air outlet shall be provided to prevent re-circulation of hot air.

I. The complete exhaust system shall be internal to the enclosure or optional with external mounted silencer.

J. All acoustical insulation shall be fixed to the mounting surface with pressure sensitive adhesive or mechanically fastened. In addition, all acoustical insulation mounted on a horizontal plane shall be mechanically fastened. The acoustical insulation shall be flame retardant.

K. The enclosures shall include an exhaust scoop to direct the cooling air in a vertical direction.

2.8 INDOOR UNIT EXHAUST SYSTEM

A. A critical type silencer/muffler, companion flanges and flexible stainless steel exhaust fittings shall be provided according to the manufacturer's recommendations. Mounting shall be supported by building structure. The silencer shall be mounted so that its weight is not supported by the engine. Exhaust pipe size shall be sufficient to ensure that exhaust back-pressure does not exceed the maximum limitations specified by the engine manufacturer.

B. The muffler and all indoor exhaust piping shall be lagged to maintain a surface temperature not to exceed 150 degrees F. The insulation shall be installed so that it does not cover or interfere with the functioning of the flexible exhaust fitting. Insulation shall be supplied under Division 23.

2.9 AUTOMATIC STARTING SYSTEM

A. A DC electric starting system with positive engagement shall be provided. The motor voltage shall be as recommended by the engine manufacturer.

B. Fully automatic generator set start-stop controls in the generator control panel shall be provided. Controls shall provide shutdown for low oil pressure, high water temperature, over-speed and over-crank. Controls shall include a 45 second single cranking cycle limit with lockout.

C. A belt driven battery charging alternator shall be provided with transistorized voltage regulator. Voltage shall match the electric starting system.

D. A lead-acid storage battery set of the heavy duty starting type shall be provided. Battery voltage shall be compatible with the starting system. The battery set shall be rated as required by generator manufacturer in amp hours. Necessary cables and clamps shall be provided.

E. Battery racks shall be provided for each battery and shall conform to NEC 480-7,a,1. They shall be constructed of metal and so treated as to be resistant to deteriorating action by battery electrolyte. Further, construction shall be such that non-conducting insulation material directly supports the cells.

F. A current limiting battery charger shall be provided to automatically recharge batteries. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressor, DC ammeter, DC voltmeter, equalize timer and fused AC input. AC input voltage shall be 120 volts, single phase. Amperage output shall be no less than 10 amperes. Alarm shall be provided for low-battery voltage and battery charger fault in the charger. Control circuit shall be wired from charger to generator control panel by electrical contractor for indication on control panel. Obtain power for battery charger from base building panel in core (HM or L as necessitated by voltage required).

2.10 GENERATOR CONTROL PANEL

A. A generator mounted NEMA 1 type vibration isolation control panel shall be provided. Panel shall contain, but shall not be limited to, the following equipment:
1. Frequency Meter, 3 1/2", dial type.
2. Voltmeter, 3 1/2", 2% accuracy.
3. Ammeter, 3 1/2", 2% accuracy.
4. Ammeter/Voltmeter phase selector switch.
5. Automatic starting controls as specified.
6. Voltage level adjustment rheostat.
7. Contacts for remote alarms wired to terminal strips.
8. Individual fault indicator lights for low oil pressure, high water temperature, over-speed, over-crank and low water temperature.
9. Three position function switch marked, RUN-STOP and REMOTE.
10. Running time meter, oil pressure, battery charging ammeter and water temperature gauges.

B. Remote Annunciator Panel. The remote annunciator shall meet NFPA 110, Level 1 requirements and enable remote viewing of the generator status. The panel shall be connected to the generator controller via either network communication wires or via hard wired connections. Options shall be available to provide ATS source position, loaded test, and retransfer. The panel shall have the capability to be either flush-mounted or surface-mounted. The annunciator shall meet UL508 requirements.

C. Provide annunciator at front desk and at the Security Office.

2.11 MAIN LINE CIRCUIT BREAKERS

A. Provide main-line, molded case circuit breakers sized as shown and mounted upon the generator. The outputs of the generator shall be protected by load circuit interrupting and protection devices. They shall operate both manually for normal switching functions and automatically during overload and short-circuit conditions.

B. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards as established by U.L., NEMA and the N.E.C.

C. The life safety system circuit breaker shall be mounted 180° from standby system breakers to provide separation, as required by NFPA 110.

2.12 AUTOMATIC LOAD TRANSFER SWITCHES

A. Furnish and install automatic transfer switches system(s) with 4 Pole - Switched Neutral [V], amperage as shown. Each automatic transfer shall consist of an inherently double throw power transfer switch mechanism and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.

2.13 CODES AND STANDARDS - The automatic transfer switches and controls shall conform to the requirements of:

A. UL 1008 - Standard for Transfer Switch Equipment

B. IEC 947-6-1 Low-voltage Switchgear and Control gear; Multifunction equipment; Automatic Transfer Switching Equipment

C. NFPA 70 - National Electrical Code

D. NFPA 99 - Essential Electrical Systems for Health Care Facilities

E. NFPA 110 - Emergency and Standby Power Systems

F. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

G. NEMA Standard ICS10-1993 (formerly ICS2-447) - AC Automatic Transfer Switches

H. UL 508 Industrial Control Equipment

I. CSA C22.2 No. 178 certification

2.14 ACCEPTABLE MANUFACTURERS

A. Automatic transfer switches shall be by the manufacturer or by ASCO. Any alternate shall be submitted for approval to the consulting engineer at least 10 days prior to bid date. Alternate bids shall include a line-by-line clarification of the specification marked with "D" for deviation; "E" for exception, and "C" for comply.

2.15 MECHANICALLY HELD TRANSFER SWITCH

A. The transfer switch shall be electrically operated and mechanically held with double throw construction, and operated by a momentarily energized solenoid-driven mechanism. Main operators shall include overcurrent disconnect devices; linear motors or gears shall not be acceptable.

B. All transfer switch sizes shall use only one type of main operator for ease of maintenance and commonality of parts.

C. The switch shall be positively locked and unaffected by momentary outages, so that contact pressure is maintained at a constant value and contact temperature rise is minimized for maximum reliability and operating life.

D. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand and close-on capability and be protected by separate arcing contacts.

E. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. Switches rated 600 amps and higher shall have front removable and replaceable contacts. All stationary and moveable contacts shall be replaceable without removing power conductors and/or bus bars.

F. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof, which are not intended for continuous duty, repetitive switching or transfer between two active power sources, are not acceptable.

G. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor plate with fully rated AL-CU pressure connectors shall be provided.

2.16 ENCLOSURE

A. The ATS shall be furnished in a NEMA 1 (A) enclosure.

B. All standard door mounted switches and long life super bright type indicating LEDs described in section 3 shall be integrated into a flush-mounted, interface membrane or equivalent in the enclosure door for easy viewing & replacement. The panel shall be capable of having manual locking feature to allow the user to lockout all membrane mounted control switches to prevent unauthorized tampering. This cover shall be mounted with hinges and have a latch that may be padlocked. The membrane panel shall be suitable for mounting by others when furnished on open type units.

2.17 CONTROLLER DISPLAY AND KEYPAD

A. A four line, 20 character LCD display and dynamic 4 button keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the communications interface port. The following parameters shall only be adjustable via a password protected programming on the controller (dip switches shall not be acceptable):

1. Nominal line voltage and frequency

2. Single or three phase sensing
3. Operating parameter protection
4. Transfer operating mode configuration (Open transition, Closed transition, or Delayed transition)

All instructions and controller settings shall be easily accessible, readable and accomplished without the use of codes, calculations, or instruction manuals.

2.18 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING

A. Voltage (all phases) and frequency on both the normal and emergency sources shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter	Dropout/Trip	Pickup/Reset
Under voltage	75 to 98%	85 to 100%
Over voltage	105 to 135%	95 to 100% of trip
Under frequency	85 to 99%	95 to 99%
Over frequency	105 to 120%	101 to 105%
Voltage unbalance	5 to 20%	3% to 18%

B. Repetitive accuracy of all settings shall be within ± 0.5% over an operating temperature range of -20°C to 70°C.

C. An adjustable dropout time for transient voltage and frequency excursions shall be provided. The time delays shall be 0.1 to 9.9 seconds for voltage and 0.1 to 15 seconds for frequency.

D. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via the communications interface port.

E. The controller shall be capable of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or BAC). Unacceptable phase rotation shall be indicated on the LCD; the service required LED and the annunciation through communication protocol and dry contacts. In addition, the phase rotation sensing shall be capable of being defeated, if required.

F. The controller shall be capable of detecting a single phasing condition of a source, even though a voltage may be regenerated by the load. This condition shall be considered a failed source.

G. Source status screens shall be provided for both normal & emergency to provide digital readout of voltage on all 3 phases (phase to phase and phase to neutral), frequency, and phase rotation.

2.19 TIME DELAYS

A. An adjustable time delay of 0 to 10 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Capability shall be provided to extend this time delay to 60 minutes by providing an external 12

or 24 VDC power supply.

B. A time delay shall be provided on transfer to the emergency source, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. A time delay shall be provided on re-transfer to normal. The time delays shall be adjustable from 0 to 60 minutes. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive external relay(s) for selective load disconnect control. The controller shall be capable of controlling a maximum of 9 individual output time delays to step loads on after a transfer occurs. Each output may be individually programmed for their own time delay of up to 60 minutes. Each sequence shall be independently programmed for transferring from normal to emergency and transferring from emergency to normal.

The controller shall also include the following built-in time delays for the following operations:

1. 0 to 60 minute time delay on failure to acquire the acceptable electrical parameters from the emergency source.
2. 0 to 60 minute time delay for a failure to synchronize on an in-phase operation.
3. 60 minute time delay for the load disconnect position for delayed transition operation.

F. All time delays shall be adjustable in 1 second increments.

G. All time delays shall be adjustable by using the display and keypad or with a remote device connected to the communications interface port through a security-password system.

H. All time delays shall be adjustable by using the display and keypad or with a remote device connected to the communications interface port through a security-password system.

I. Each time delay shall be identified and a dynamic countdown shall be shown on the display.

2.20 ADDITIONAL FEATURES

A. The controller shall have 3 levels of security. Level 1 shall allow monitoring of settings and parameters only. The Level 1 shall be capable of restricted with the use of a lockable cover. Level 2 shall allow test functions to be performed and Level 3 shall allow setting of all parameters.

B. Membrane-type switches shall be provided for the test functions and be maintained until the end test function is activated. The test function shall be allowed through password security. It shall be possible to defeat the password requirement by way of a circuit board mounted dip switch setting. The test function shall be load, no load or auto test. The auto test function shall request an elapsed time for test. At the

completion of this time delay the test shall be automatically ended and a retransfer sequence shall commence. All loaded tests shall be immediately ended and retransfer shall occur if the emergency source fails and the normal source is acceptable.

C. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

D. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of two contacts, closed when the ATS is connected to the normal source and two contacts closed, when the ATS is connected to the emergency source.

E. LED indicating lights shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

F. LED indicating lights shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal (green) and emergency sources (red), as determined by the voltage, frequency and phase rotation sensing trip and reset settings for each source.

G. A membrane switch shall be provided on the membrane panel to test all indicating lights and display when pressed.

H. Provide the ability to select “commit/no commit to transfer" to determine whether the load should be transferred to the emergency generator if the normal source restores before the generator is ready to accept the load.

I. Terminals shall be provided for a remote contact which opens to signal the ATS to transfer to emergency and for remote contacts which closes to inhibit transfer to emergency and/or retransfer to normal. Both of these inhibit signals can be activated through the keypad or the communications interface port. A “not-in-auto" LED shall indicate anytime the controller is inhibiting transfer from occurring.

J. An in-phase monitor shall be a standard feature in the controller. The monitor shall control transfer so that motor load inrush currents do not exceed normal starting currents, and shall not require external control of power sources. The in-phase monitor shall be specifically designed for and be the product of the ATS manufacturer. The in-phase monitor shall be capable of being enabled or disabled for the user interface.

K. Engine Exerciser - The controller shall provide an internal engine exerciser. The engine exerciser shall allow the user to program up to 21 different exercise routines based on a calendar mode. For each routine, the user shall be able to:
1. Enable or disable the routine.
2. Enable or disable transfer of the load during routine.
3. Set the start time:
   - time of day
   - day of week
   - week of month (1^{st}, 2^{nd}, 3^{rd}, 4^{th}, alternate or every)

4. Set the duration of the run.
5. At the end of the specified loaded exercise duration, the switch shall transfer the load back to normal and run the generator for the specified cool down period. All loaded exercises shall be immediately ended and retransfer shall occur if standby source fails. The next exercise period shall be displayed on the main screen with the type of exercise, time and date. The type of exercise and the time remaining shall be displayed when the exercise is active. It shall be possible of ending the exercise event with a single-button push.

L. Date and time - The date shall automatically adjust for leap year and the time shall have the capability of automatically adjusting for daylight saving and standard times.

M. System Status - The controller shall have a default display the following on:
1. System status
2. Date, time and type of the next exercise event
3. Average voltage of the preferred and standby sources

Scrolling through the displays shall indicate the following:
1. Line to line and line to neutral voltages for both sources
2. Frequency of each source
3. Load current for each phase
4. Single or three phase operation
5. Type of transition
6. Preferred source
7. Commit or no commit modes of operation
8. Source/source mode (Utility/Gen; Gen/Gen; Utility/Utility)
9. In phase monitor enable/disable
10. Phase rotation
11. Date and time

N. Controllers that require multiple screens to determine system status or display “coded" system status messages, which must be explained by references in the operator’s manual, are not permissible.

O. Self-Diagnostics - The controller shall contain a diagnostic screen for the purpose of detecting system errors. This screen shall provide information on the status input signals to the controller which may be preventing load transfer commands from being completed.

P. Communications Interface - The controller shall be capable of interfacing, through a standard communications with a network of transfer switches and generators. It shall be able to be connected via an RS-485 serial communication (up to 4000 ft. direct connect or multi-drop configuration), an Ethernet connectivity (over standard 10baseT Ethernet networks utilizing a RJ-45 port or remotely utilizing a dial-up modem). This module shall allow for seamless integration of existing or new communication transfer devices and generators. Monitoring software shall allow for the viewing, control and setup of parameters of the genset and transfer switch network through a standard personal computer utilizing current Microsoft operating systems. Separate and specific transfer switch software interfaces shall not be acceptable.

Q. The transfer switch shall also be able to interface to 3rd party applications using Modbus RTU and Modbus TCP/IP open standard protocols utilizing Modbus register maps. Proprietary protocols shall not be acceptable.

R. The controller shall contain a USB port for downloading the controller's parameters and settings; exercise event schedules; maintenance records and event history. The file designator shall be the unique serial number of the transfer switch.

S. Data Logging - The controller shall have the ability to log data and to maintain the last 2000 events, even in the event of total power loss. The following events shall be time and date stamped and maintained in a non-volatile memory. The controller shall be able to display up to the last 99 events. The remaining events shall be downloadable to be displayed on a computer.

1. Event Logging
   Data, date and time indication of any event
2. Statistical Data
   Total number of transfers*
   Total number of fail to transfer*
   Total number of transfers due to preferred source failure*
   Total number of minutes of operation*
   Total number of minutes in the standby source*
   Total number of minutes not in the preferred source*
   Normal to emergency transfer time
   Emergency to normal transfer time
   System start date
   Last maintenance date

* The statistical data shall be held in two registers. One register shall contain data, since startup and the second register shall contain data from the last maintenance reset.

T. External DC Power Supply - An optional provision shall be available to connect up to two external 12/24 VDC power supply to allow the LCD and the door mounted control indicators to remain functional when both power sources are dead for extended periods of time. This module shall contain reverse battery connection indication and circuit protection.

2.21 TESTS AND CERTIFICATION

A. Upon request, the manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The ATS manufacturer shall be certified to ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, and installation and servicing in accordance with ISO 9001.

2.22 SERVICE REPRESENTATIVE

A. The manufacturer shall maintain a national service organization of employing personnel located throughout the contiguous United States. The service center's

personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

2.23 ACCESSORIES

A. Supervised Transfer Control Switch. The supervised transfer control switch shall provide a door mounted, three position, selector switch with Auto, Manual and Transfer positions.

The alarm module shall be required in order to activate this option.

1. With the controller set to the automatic mode and the selector switch in the auto position, the user transfer switch shall operate normally.
2. With the controller set to the automatic mode and the selector switch in the manual position, the user shall be required to toggle the selector switch to initiate a transfer from the emergency to the normal position.
3. With the controller set to the non-automatic mode and the selector switch in the manual position, the user shall be required to toggle the selector switch to the transfer position to initiate a transfer either direction. In this mode, the ATS shall not automatically transfer to an acceptable source in the case of source failure, without the user toggling the selector switch to the transfer position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mount generator on 4 inch thick re-enforced 3000 psi concrete pad. Concrete shall be 1 foot larger in all directions than footprint of generator.

3.2 MANUFACTURING

A. The unit shall be shipped to the job by the manufacturer's authorized dealer having a parts and service facility within a 120 mile radius of the job. In addition, and in order not to penalize the Owner for unnecessary or prolonged periods of time for service or repairs to the emergency system, the bidding generator set supplier must have replacement parts in stock at all times. Certified proof of this requirement shall be available from the dealer and a personal inspection of the dealer's facilities may be made by the Architect or his appointed representative to substantiate claims made by the generator set supplier.

3.3 TESTING

A. Prior to acceptance of the installation, equipment shall be tested to show it is free of any defects and will start automatically and be subjected to full load test through the use of portable, dry-type load banks supplied for this purpose at the job by the generator set supplier.

B. The load bank shall be capable of definite and precise incremental loading and shall not be dependent on the generator control instrumentation to read amperage and voltage of each phase. Rather, the test instrumentation will serve as a check of the generator set meters.

C. Saltwater brine tanks or those load banks requiring water as a source for cooling are not acceptable for this purpose and are disallowed and shall not be utilized for this test.

D. Load bank testing shall be done in the presence of the Owner or his appointed representative only after the unit is permanently installed in accordance with the Contract Documents. Testing shall be for a period of eight (8) hours under full load.

3.4 STARTUP AND INSTRUCTIONS

A. On completion of the installation, start-up shall be performed by the engine manufacturers' trained dealer service representative.

B. Operating and maintenance instruction manual shall be furnished and procedures explained to operating personnel.

3.5 SYSTEM SERVICE CONTRACT

A. The supplier of the standby power system must furnish a copy of, and make available to the Owner, his standard service contract which, at the Owner's option, may be accepted or refused. This contract will accompany any documents, drawings, catalog cuts, specification sheets, wiring or outline drawings, etc. submitted for approval. This contract shall be for the complete power system.

3.6 GUARANTEE

A. Equipment provided under this Section shall be guaranteed against defective parts and workmanship under terms of the manufacturer's and dealer's standard warranty. But in no event shall it be for a period of less than five (5) years from date of initial startup of the system and shall include labor and travel time for necessary repairs at the job.

END OF SECTION 266100

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SECTION 266500

SURGE PROTECTION DEVICE

PART 1- GENERAL

1.1 DESCRIPTION

A. All work in this Section shall comply with the provisions of Section 260100.

1.2 CODES AND REGULATIONS

A. The following codes and regulations shall govern the design of the transient suppression system:
1. Underwriters Laboratories UL 1449 Second Edition and 1283
2. Underwriters Laboratories UL 489 and UL 198
3. Underwriters Laboratories 248-1
4. National Electrical Manufacturers Association (NEMA LS1-1992 Guidelines)
5. ANSI/IEEE C62.41-1991 and C62.45-1992
6. National Fire Protection Association (NFPA 70 [NEC], 75, and 78)
7. ANSI/IEEE C62.1 and C62.11
8. Canadian Standards; (CUL)
9. Federal Information Processing Standards Publication 94 (FIPS PUB 94)

B. The unit shall be UL 1449 Second Edition Listed and CUL Approved as a Transient Voltage Surge Suppressor and UL 1283 Listed as an Electromagnetic Interference Filter.

1.3 SUBMITTAL

A. The manufacturer shall furnish an equipment manual that details the installation, operation and maintenance instructions for the specified unit as part of the submittal.

B. Provide electrical and mechanical drawings that show unit dimensions, weights, mounting provisions, connection details and layout diagram of the unit as part of the submittal.

C. Provide data showing UL 1449 Second Edition product listing, and certified documentation of applicable Location Category Testing in full compliance with NEMA LS 1-1992, paragraphs 2.2.10 and 3.10 as part of the submittal.

D. Provide certified documentation of the unit’s Single Pulse Surge Current Capacity Testing as part of the submittal.

E. Provide certified documentation of the unit’s Minimum Repetitive Surge Current Capacity Testing as part of the submittal.

1.4 MANUFACTURER'S

A. These specifications are based on Current Technology's selenium-enhanced SL3250 series suppression filter systems. No other manufacturers will be considered. Provide a unit of each switchboard.

PART 2- PRODUCTS

2.1 GENERAL

A. The unit shall be designed for parallel connection to the facility's wiring system. The suppression filter system shall be designed and manufactured in the USA by a qualified manufacturer of suppression filter system equipment. The qualified manufacturer shall have been engaged in the commercial design and manufacture of such products for a minimum of five (5) years.

B. Unit shall not require disconnection of power to customer equipment for testing and/or maintenance.

C. The power conditioning and transient suppression device must be UL Listed under the NEW UL 1449 Second Edition as a complete entity. Listed UL suppression level of 330, 400, 500, 600, 700, 800, 1000, must be clearly stated. Other numbers are not acceptable.

D. The primary suppression path shall not be to ground.

E. Scheduled parts replacement or preventive maintenance shall not be required.

F. High Performance Suppression System. The unit shall include an engineered solid-state high performance suppression system utilizing a predetermined number of selenium cells and arrays of non-linear voltage dependent metal oxide varistors with similar operating characteristics. To maximize current density the device shall contain sufficient thermal mass allowing the device the ability to dissipate large amounts of average power that may be caused from sustained over voltage events and voltage swells as well as repetitive transient impulses.

SEL150 Series					
System Voltage	120/240	120/208	220/380	277/480	347/600
Thermal Mass per enhanced mode	250 in^2	250 in^2	490 in^2	586 in^2	778 in^2

The suppression system components shall optimally share surge currents in a seamless, low-stress manner assuring maximum performance and proven reliability. The suppression system shall not utilize gas tubes, spark gaps, silicon avalanche diodes or other components which might short or crowbar the line, thus leading to interruption of normal power flow to or system upset of connected loads.

G. Under excessive Maximum Continuous Operating Voltage (MCOV) conditions, the device shall be capable of dissipating large amounts of average power that may be caused by overvoltage events and voltage swells as well as repetitive transient impulses. This data shall be published in accordance with NEMA LS-1-1992, section 2.2.6.

SEL150						
% Overvoltage	160%	170%	180%	190%	195%	200%
Line impedance of power system = 0.1 ohms						
# of cycles	1000	60	12	5	4	3.5

Line impedance of power system = 0.3 ohms						
# of cycles	>3600	300	60	20	15	11
Line impedance of power system = 0.7 ohms						
# of cycles	>3600	>3600	500	200	80	60

H. The unit shall include a high frequency extended range power filter and shall be UL 1283 listed as an Electromagnetic Interference Filter. The filter noise rejection and attenuation values shall be in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, Paragraphs 2.2.11 and 3.11. The filter shall reduce fast rise-time, high frequency, error-producing transients and electrical line noise to harmless levels, thus eliminating disturbances which may lead to electronic system upset. The filter shall provide the following minimum noise attenuation:

1. 50dB @ 50 KHz
2. 44dB @ 100KHz
3. 34dB @ 500KHz
4. 33dB @ 1MHz
5. 34dB @ 5MHz
6. 36dB @ 10MHz
7. 47dB @ 50MHz
8. 53dB @ 100MHz

I. All full magnitude transient current shall be conducted utilizing low-impedance copper bus bar. No plug-in or printed circuit board component modules or quick-disconnect terminals shall be used in surge current-carrying paths.

J. The unit shall include mechanical or compression lugs for each phase, neutral and ground, if applicable. Phase, neutral and ground conductor wire size shall be #2 AWG Copper.

K. The unit shall include long-life, solid state, externally visible phase indicators that monitor the on-line status of each phase of the unit.

2.2 PHYSICAL REQUIREMENTS

A. Standard unit shall be supplied in a NEMA 4 metallic enclosure. Enclosure sizes and weights shall be 27”H x 22”W x 12”D / 100 lbs.

B. Unit shall have Mastermind Monitoring as indicated in 2.6 below.

C. Pilot lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.

D. The device shall have a NEMA designed and certified safety interlocked integral disconnect switch located within the unit with an externally mounted metal manual operator. The switch shall disconnect all ungrounded circuit conductors from the distribution system to enable testing and maintenance without interruption to the facility’s distribution system. The switch shall be rated for 600Vac. The TVSS device shall be UL1449 Second Edition listed with the integral disconnect switch and the UL1449 Second Edition Suppression Voltage Ratings shall be provided. The integral disconnect switch shall be capable of withstanding, without failure, the published maximum surge current magnitude without failure or damage to the switch.

2.3 ENVIRONMENT REQUIREMENTS

A. The unit shall not add appreciably to air conditioning load. Heat load shall not exceed 0.2kVA (0.682 BTU/hr.).

B. Average power consumption shall be less than 0.2kVA. Average power factor inefficiencies or harmonic distortion shall not result from use (THD - 0%).

C. The unit shall not generate any audible noise.

D. No appreciable magnetic fields shall be generated. Unit shall be capable of use in computer rooms without danger to data storage systems or devices.

E. Operating temperature range: -40 to +60 C (-40 to +140 F).

F. Storage temperature range: -40 to +85 C (-40 to +185 F).

G. Reliable operation with 5% to 95% non-condensing relative humidity.

H. Capable operation up to 13,000 feet above sea level.

2.4 ELECTRICAL REQUIREMENTS

A. The power conditioning and transient suppression capability shall be bi-directional and treat both positive and negative surge transients, yielding line control and short flicker ride-through. Unit shall be parallel connected and not limited by load current. Unit shall be unlimited in kVA capability.

B. The power handling capacity of the unit shall exceed 150,000A L-N, 150,000A L-G, 150,000A N-G, 150,000A L-L and 300,000A per phase as outlined in NEMA LS1-1992. Independent 3rd party test results must be provided to substantiate published values.

In compliance with NEMA LS-1-1992, paragraphs 2.2.9 and 3.9, the suppression filter system shall be single pulse surge current tested in all modes at rated surge currents by an industry-recognized independent test laboratory. Single pulse surge current capacities of 200,000 amps or less are established by single-unit testing of all components within each mode. Due to present industry test equipment limitations, single pulse surge current capacities over 200,000 amps are established via testing of individual components or sub-assemblies within a mode. The test shall include a UL1449 Second Edition surge defined as a 1.2 X 50 microsec, 6000V open circuit voltage waveform and an 8 X 20 microsec, 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current (for units rated over 200,000A per mode, components or sub-assemblies are tested) magnitude with an approximated 8 X 20 microsec waveform. To complete the test, another UL1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage measured from the two UL1449 surges does not vary by more than 10%.

C. Per ANSI/IEEE C62.41-1991 and ANSI/IEEE C62.45-1992, all suppression filter systems shall be repetitive surge current capacity tested in every mode utilizing a 1.2 x 50 microsec, 20 KV open circuit voltage, 8 x 20 microsec, 10 KA short circuit current Category C3 bi-wave at one minute intervals without suffering either performance degradation or more than 10% deviation of clamping voltage at the specified surge current for not less than 12,000 impulses.

D. Joule ratings shall not be accepted in lieu of the UL 1449 test results.

E. The unit shall be capable of passing the entire UL duty/cycle and life test for a minimum of ten (10) times with less than 1% degradation. The system shall not be limited to a low finite number of impulses.

F. The UL 1449 certified suppression level after all duty/cycle and life tests shall have peak voltage phase to neutral ratings of 400 volts or less for units protecting 240 or 208 volt equipment and 800 volts or less for units protecting 380 or 480 volt equipment.

G. The effective speed and/or response time shall be instantaneous with no discernible overshoot for the applied UL test voltage and simultaneous current waveforms. Units which require "turn on" time are not acceptable.

H. All main internal and external wiring, including terminals on suppressor elements, shall be of #2 wire or larger, or bus bar of 3/4 inch width or larger. Small conductors, printed circuit boards, 1/4 inch 3AG, MDL or similar instrument fuses shall not be used in main or suppression current carrying paths.

I. Each suppression element shall be individually fused such that the failure of a single component or the operation of a single fuse element remains isolated and does not render the entire mode, or product, deficient by more than 10%.

For systems utilizing a hybrid technology, each element type shall be individually fused. Every electrical current carrying conductor shall be fused such that every fault is isolated at the point of the fault or at the device level. Fusing shall be present in all modes, including Neutral-to-Ground. All overcurrent / fault current protection shall be UL248-1 Recognized as a stand-alone fuse. All fusing must be UL248-1 Recognized and tested at 200kAIC. Testing shall be inclusive of all available product voltages. In accordance with UL248-1, all fuses and overcurrent / fault current devices must be tested with a 0.2 power factor. All fuses and overcurrent / fault current protection devices shall consist of self-arch-quenching, sand-encapsulated UL248-1 Recognized fuse arrays. Each fuse shall be individually sealed in a manner that eliminates cross arching. The device shall be capable of withstanding the full single pulse surge current capacity for every mode without the operation or failure of overcurrent / fault current protection or fuses. The unit shall incorporate 200,000 AIC time-delay fuses for the Selenium System to satisfy both NEC 240-21 and 110-9. Each suppression element of the ISB Filter System shall contain individually fused MOVs to ensure that the failure of a single component or the operation of a single fuse element remains isolated and does not render the entire mode or product deficient by more than 20%. A failure in excess of 20% during the ten year warranty period will require free replacement of the ISB Filter System by the manufacturer.

J. The Maximum Continuous Operating Voltage (MCOV) shall be greater than 115% of nominal voltage for all SELect products. The suppression filter systems maximum continuous operating voltages shall be in compliance with test and evaluation procedures outlined in NEMA LS 1-1992, paragraphs 2.2.6 and 3.6.

K. Operating frequency range shall be 47 to 63 Hertz.

L. All protected modes shall be as defined per NEMA LS-1-1992, paragraph 2.2.7. Following IEEE Standard 1100-1992, section 9.11.2 recommendations, units shall provide protection in all modes. WYE configured systems shall provide Line-to-Neutral,

Line-to-Ground, Line-to-Line and Neutral-to-Ground protection. DELTA configured systems shall provide Line-to-Line protection and Line-to-Ground protection.

M. The suppression filter system clamping voltages shall be in compliance with test and evaluation procedures outlined in NEMA LS-1-1992, paragraphs 2.2.10 and 3.10. Maximum clamping voltages for units without and with an integral disconnect shall be as follows.

SEL150					
System Voltage	Mode	B3 Ringwave	6kV / 500A Comb. Wave	B3/C1 Comb. Wave	C3 Comb. Wave
120/240	L-N	300 / 325	300 / 300	400 / 400	575 / 700
120/208	L-G	400 / 425	325 / 325	425 / 425	625 / 725
	N-G	375 / 375	325 / 325	475 / 425	750 / 700
	L-L	350 / 450	625 / 600	775 / 825	950 / 1150
277/480	L-N	500 / 525	700 / 700	825 / 825	1075 / 1125
	L-G	825 / 875	725 / 750	800 / 850	1025 / 1150
	N-G	700 / 700	650 / 700	900 / 850	1200 / 1150
	L-L	675 / 725	1375 / 1350	1675 / 1650	1950 / 2100

2.5 TESTING REQUIREMENTS

A. Provide data confirming that the following tests have been performed. The data shall indicate the results of the tests conducted.

1. Each design configuration shall have a UL 1449 Second Edition Suppression Voltage Rating that has been tested and assigned by Underwriters Laboratories utilizing the following waveforms and procedure. The test shall be initiated with a surge of 6,000V / 500A, using waveshapes defined within ANSI/IEEE C62.41-1991 as a 1.2 X 50 microsecond open circuit voltage waveform and an 8 X 20 microsecond short circuit current waveform, to benchmark the unit's suppression voltage. The unit shall then be subjected to 10 positive polarity and 10 negative polarity 1.2 X 50 microsecond 6,000V open circuit voltage waveforms and an 8 X 20 microsecond 3,000A short circuit current waveforms. For comparison with the initial benchmark voltage reading, another ANSI/IEEE surge defined as 1.2 X 50 microsecond 6000V open circuit voltage waveform and an 8 X 20 microsecond 500A short circuit current waveform shall be applied. Deviation from initial to final clamping value may not exceed 10%.
2. In compliance with NEMA LS-1-1992, Paragraphs 2.2.9 and 3.9, each design configuration shall have the maximum single pulse surge current capacity per mode verified through testing. The test shall include a UL1449 Second Edition surge defined as a 1.2 X 50 microsecond 6000V open circuit voltage waveform and an 8 X 20 microsecond 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a single pulse surge of maximum rated surge current magnitude with an approximated 8 X 20 microsecond waveform. To complete the test, another UL1449 surge shall be applied to verify the unit's survival. Survival is achieved if the suppression voltage found from the two UL1449 surges does not vary by more than 10%.
3. Each design configuration shall have a repetitive surge current capacity rating which shall be verified through testing. The test shall include a UL1449 Second Edition surge defined as a 1.2 X 50 microsecond 6000V open circuit voltage waveform and an 8 X 20 microsecond 500A short circuit current waveform to benchmark the unit's suppression voltage, followed by a repetitive number of ANSI/IEEE C62.41-1991

Category C3 surges defined as a 1.2 X 50 microsecond 20,000V open circuit voltage waveform and an 8 X 20 microsecond 10,000A short circuit current waveform. To complete the test, another UL1449 surge shall be applied to verify survival. Survival is achieved if the suppression voltage resulting from the two UL1449 surges do not vary by more than 10%. Proof of such testing shall be the test log generated by the surge generator.

4. Each design configuration shall be short circuit tested in accordance with the type of fusing utilized in the suppression path. Testing shall include application of a sustained overvoltage that causes the unit to enter a bolted fault condition. This bolted fault condition shall occur with the full rated AIC current of the fuse available. The fuse shall fail in a safe manner with no physical or structural damage to the unit and any failure shall be self-contained within the unit.
5. Each design configuration shall be surge tested with fusing in series to verify that a transient of maximum surge current capacity magnitude is fully suppressed without fuse failure, operation, or degradation.
6. The unit shall be factory tested at the applicable Maximum Continuous Operating Voltage to assure proper field operation.
7. Each unit shall be thoroughly factory tested before shipment. Testing of each unit shall include, but shall not be limited to, UL manufacturing and production-line tests, quality assurance checks, MCOV and clamping voltage verification tests.

2.6 OPTIONS

A. ADVANCED Monitoring: Provide an integral monitoring option as specified below:
   1. Provide 2 sets of form “C” dry contacts (normally open and normally closed) to facilitate connection to a building management system or other remote monitoring system. The contacts shall be normally open or normally closed and shall change state upon failure of the suppression system or power loss in any of the phases.
   2. Provided a display event counter that makes available the cumulative number of transients the device has been subjected to. The detection circuitry must be current sensing to eliminate erroneous counts that may be produced from stray voltages and noise signals, both conducted and radiated.
   3. Provide a battery powered audible alarm that detects and provides notification of single or multiple phase failure of the suppression filter system. The alarm shall have a silence switch as well as a test switch for ensuring positive function and an alarm LED that illuminates when the alarm is disabled. The monitoring unit shall have an easily replaceable, commonly available battery for backup to ensure audible alarm function in the event of a total power failure. The unit shall have a battery backed-up monitor LED which shall illuminate when battery requires replacement.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The unit must be installed in accordance with the manufacturer's printed instruction to maintain warranty. All local and national codes must be observed.

B. Units shall be installed of the same voltage rating as the intended protected equipment, at no more than 6 feet from the panel to which it is connected with as few wire bends as possible. Provide overcurrent protection where required by the AHJ.

C. Diagnostic Signature Card - The unit shall include a Diagnostic Signature Card listing factory-established benchmark suppression voltage values for all modes of protection. The suppression voltage values shall be established during final production line testing utilizing the DTS-2 Diagnostic Test Set. This Diagnostic Signature Card shall provide space for subsequent field testing allowing comparison of the initial factory benchmark testing with subsequent field testing suppression voltage values.

D. Start-Up Testing - Upon completion of installation, a factory-certified local service technician shall provide testing services. The following tests shall be performed: (a) voltage measurements from Line-to-Ground, Line-to-Neutral, Line-to-Line and Neutral-to-Ground (no neutral in DELTA configurations) at the time of the testing procedure, (b) impulse injection to verify the system suppression voltage tolerances for all suppression paths. Impulse testing shall be completed while the unit is off-line to isolate the unit from the distribution system. Test results should be recorded and compared to factory benchmark test parameters supplied with each individual unit. A copy of the start-up test results and the factory benchmark testing results shall be supplied to the engineer and the owner for confirmation of proper suppression filter system function. In addition, the integrity of the neutral-ground bond should be verified through testing and visual inspection. The Warranty shall initiate after the owner has accepted the testing results and taken possession of the equipment.

3.2 WARRANTY

A. Provide a Ten Year Limited Warranty from date of acceptance of startup testing by the owner as indicated above.

B. The contractor shall provide a letter from the manufacturer's representative to the engineer, at the time of permanent power, certifying that all TVSS units have been tested and installed per the manufacturer's recommendation.

END OF SECTION 266500

SECTION 269200

MOTOR CONTROLS AND WIRING

PART 1 - GENERAL

1.1 SCOPE

A. All work specified in this Section shall comply with the provisions of Section 260100.

B. All motors shall be provided under Division 23.

C. A motor starter shall be provided under this Section for each motor except for those specified in Division 23 to be furnished with integral starters. Motor starters shall be installed either in a Motor Control Center or separately mounted adjacent to the motor served.

D. Motor power wiring is defined as those conductors between the energy source and the motor. This power wiring shall be terminated at the motor terminals.

E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 15 unless specifically shown on the electrical drawings.

F. Power wiring shall be connected through all line voltage control devices such as firestats and thermostats.

PART 2 - PRODUCTS

2.1 MOTOR STARTERS

A. Starters for motors 1/3 horsepower or smaller shall be manual unless remote or automatic starting is required, in which case the starters shall be magnetic, full voltage, non-reversing, single-speed, unless otherwise indicated. All other starters shall be magnetic.

B. Each starter for a three-phase motor shall be furnished with three (3) overload relays sized for the full load running current of the motor actually provided. Provide an external "HAND-OFF-AUTO" selector switch with green "RUNNING" light. Provide a red pilot light to indicate motor "STOPPED". Each pilot light shall have a legend plate indicating reason for signal.

C. Each overload relay shall have a normally open alarm contact which will close only when actuated by an overload (not to be confused with N.O. or N.C. auxiliary contacts). These contacts shall be properly wired to their respective blue pilot light provided on the starter front cover and having a "TRIPPED" legend plate.

D. Individually mounted motor starters shall be in a NEMA Type 1 general purpose enclosure in unfinished areas and shall be flush mounted in all finished areas. All starters mounted in exterior areas shall have a NEMA 3R enclosure. Each starter shall have a laminated nameplate to indicate Division 23 unit number, function and circuit number.

E. A control power transformer shall be provided at each motor starter for connection to the to the controls provided under Division 23. The control power transformer shall be

mounted inside the motor starter enclosure. All control transformers at 50 VA or greater shall have primary fusing. Coordinate all control equipments with Division 23 and equipment manufacturers.

F. All motor starters, push buttons and pilot lights shall be of the same manufacturer as the switchboard and shall be General Electric, Square D, Siemens I.T.E, Joslyn Clark Controls or Cutler-Hammer.

2.2 COMBINATION STARTERS

A. Combination starters shall consist of a circuit breaker and a motor starter mounted in a common NEMA Type 1 general purpose enclosure.

B. The motor starter components shall be as specified in Paragraph 2.1 for motor starters.

C. The circuit breaker component shall be a minimum 22,000 RMS interrupting capacity and shall be as required in Section 26 20 00.

2.3 MOTOR CONTROL CENTER

A. The Motor Control Center shall consist of a combination starter for each motor, plus other associated equipment. Combination starters shall be plug-in circuit breaker or switch and fuse type, as scheduled, with voidable cover interlock, provision for padlocking the cover closed and provision for padlocking the operating handle in either the open or closed position. Switches shall be quick-make, quick-break type of quantity, size and poles as scheduled. All switches shall be rated at 600 volts, fused as scheduled. Circuit breakers shall have the interrupting capacity scheduled with 22,000 RMS minimum.

B. Motor starters shall be mounted in individual steel compartment immediately below the breaker or the switch and fuse associated with it. A mechanical interlock shall prevent opening the starter compartment door unless the device is in the off position.

C. Each section in the Motor Control Center shall include an individual 480/120 volt control circuit transformer, with fused secondary.

D. Provide a control terminal strip in the Motor Control Center. The control wiring from these terminal strips, external to the Motor Control Center, to the respective control device, shall be included in Division 23.

E. All circuit breakers, motor starters, push buttons and pilot lights shall be of the same manufacturer as the main switchboard.

F. Each starter shall have a laminated nameplate engraved to indicate Division 23 unit number, function and Motor Control Center circuit number.

G. The Motor Control Center shall be General Electric, Square D, Siemens I.T.E., or Cutler-Hammer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide power wiring to and install all motor starters, unless integrally factory mounted on

a piece of equipment.

B. Provide power wiring to all motors except packaged units that are prewired between the starter and motor.

C. Where line voltage control devices are mounted at, on or inside a unit, such as aquastats, firestat for single phase devices, etc., the power wiring to the unit shall be connected through such a control device.

D. On final inspection, it shall be demonstrated to the Architect or his representative, that each overload relay control circuit is properly wired and functioning correctly by manually tripping each overload relay individually, one at a time. This inspection procedure shall not involve removing any wiring or disconnecting any current carrying parts.

END OF SECTION 239200

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