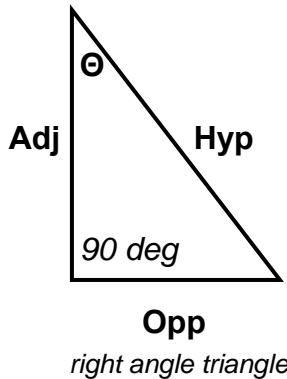


Trigonometry / Geometry



$Adj^2 + Opp^2 = Hyp^2$ AKA $A^2 + B^2 = C^2$

$TAN(\Theta) = Opp/Adj$

$\Theta = Adj/Opp (TAN)^{-1}$

$COS(0deg)=1$ $COS(45deg)=0.7$ $COS(90deg)=0$

Area of a circle = $\pi \times Radius^2$

Perimeter of a Circle = $\pi \times Diameter$

$\pi = 3.14$

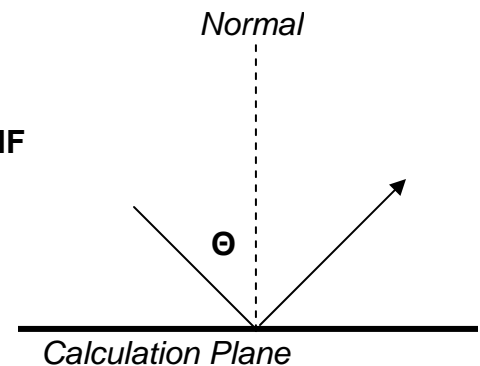
Point-by-Point Calculation

- to determine direct illuminance at any given point

FC facing the fixture = $\frac{Candle\ Power}{Distance^2} \times MF$

FC horiz or vert to the fixture = $\frac{Candle\ Power}{Distance^2} \times COS(\Theta) \times MF$

Θ = the angle of incidence
MF = maintenance factor



Lumen Method Calculation

- to determine an average illuminance of a room

Rectilinear Room $RCR = \frac{5 \times MH \times (L+W)}{Area}$

Irregular Room $RCR = \frac{2.5 \times MH \times (Perimeter\ Length)}{Area}$

FC = $\frac{(Qty\ of\ Fixtures) \times (Lumens\ per\ Lamp) \times (\#\ of\ Lamps\ per\ Fixture) \times CU \times MF}{Area}$

Qty of Fixtures = $\frac{FC \times Area}{(Lumens\ per\ Lamp) \times (\#\ of\ Lamps\ per\ Fixture) \times CU \times MF}$

MF = maintenance factor
MH = mounting height
CU = coefficient of utilization

TABLE 15
RECOMMENDED ILLUMINANCE VALUES

Activity	General Lighting			Task Lighting		
	Public Spaces	Simple Orientation	Occasional Visual Task	Large Visual Task	Small Visual Task	Very Small Visual Task
	3 fc	5 fc	10 fc	30 fc	50 fc	100 fc
GENERAL						
<i>Circulation</i>						
Corridors		•				
Elevators		•				
Lobbies			•			
Stairs		•				
<i>Service</i>						
Toilets and washrooms		•				
<i>Storage</i>						
Active			•			
Inactive		•				
HOSPITALITY FACILITIES						
Bathrooms, for grooming				•		
Bedrooms, for reading				•		
Cleaning			•			
Dining			•			
Kitchen, critical seeing					•	
Laundry				•		
Sewing						•
INDUSTRY						
<i>Assembly</i>						
Simple				•		
Moderately difficult					•	
Difficult						•
<i>Inspection</i>						
Simple				•		
Moderately difficult					•	
Difficult						•
<i>Locker rooms</i>			•			

INTERIOR LIGHTING FOR DESIGNERS

Activity	General Lighting			Task Lighting		
	Public Spaces	Simple Orientation	Occasional Visual Task	Large Visual Task	Small Visual Task	Very Small Visual Task
	3 fc	5 fc	10 fc	30 fc	50 fc	100 fc
OFFICES						
Accounting				•	*	
Conference rooms				•		
Drafting, high contrast					•	
Drafting, low contrast						•
General/private offices				•	**	
Lounges and reception			•			
RESIDENCES						
Bathrooms, for grooming				•		
Bedrooms, for reading				•		
Conversation areas	•					
Dining		•				
Kitchen, critical seeing					•	
Laundry				•		
Sewing					•	
SCHOOLS						
<i>Assembly</i>						
Auditoria			•			
Social activity		•				
<i>Classrooms</i>						
General				•		
Lecture demonstration						•
Science laboratories					•	
STORES						
Circulation			•			
Feature displays						•
Merchandise displays					•	
Sales transactions				•	***	
Wrapping and packaging				•		

*If #4 pencil or harder leads are used for handwritten tasks.

**If tasks involve poor copies, photographs, maps, or 6 point type.

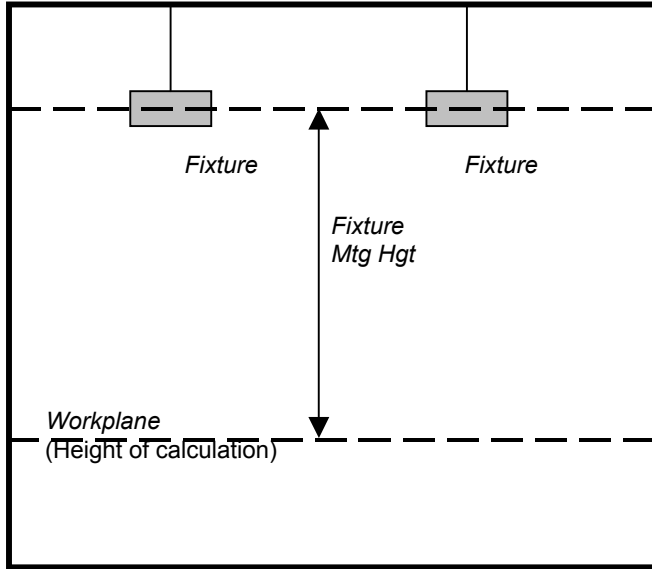
***If handwritten carbon copies.

Based on the IESNA Lighting Design Guide, *IES Lighting Handbook, 9th Ed.* Used with permission from the Illuminating Engineering Society of North America.

Lumen Method Calculation

Project: _____

Room/Area: _____



Room Cavity Ratio:

Room Width (W): _____

Room Length (L): _____

Fixture Mtg Height (MH): _____

$$RCR = \frac{5 \times (MH) \times (L+W)}{L \times W}$$

$$RCR = \frac{5 \times (\quad) \times (\quad + \quad)}{\quad \times \quad}$$

RCR = _____

Irregular Room

$$RCR = \frac{2.5(MH) \times (Perimeter Length)}{Area}$$

Calculation:

Fixture Description: _____ CU: _____

Lamp: _____ Lamps per Fixture: _____ Lumens per Lamp: _____

$$FC = \frac{(Qty \ of \ Fixtures) \times (Lumens \ per \ Lamp) \times (\# \ of \ Lamps \ per \ Fixture) \times CU \times MF}{L \times W}$$

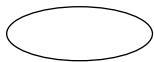
$$FC = \frac{(\quad) \times (\quad) \times (\quad) \times (\quad) \times (\quad)}{(\quad) \times (\quad)}$$

FC = _____

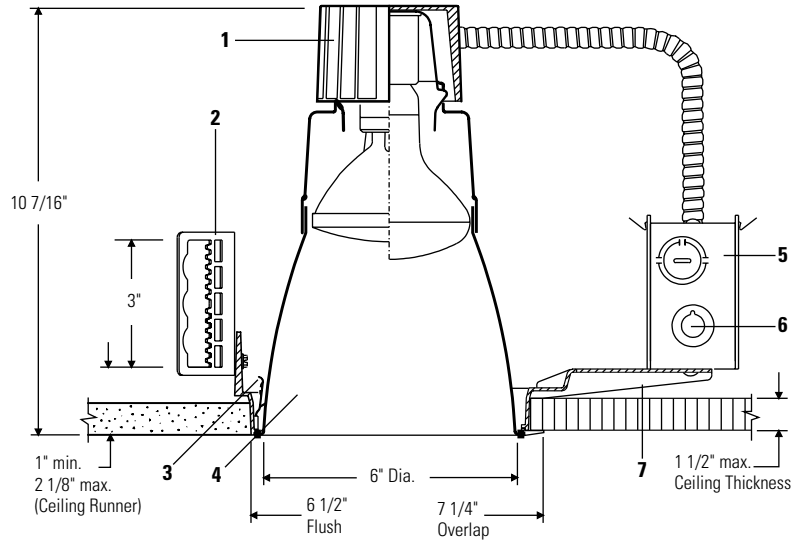
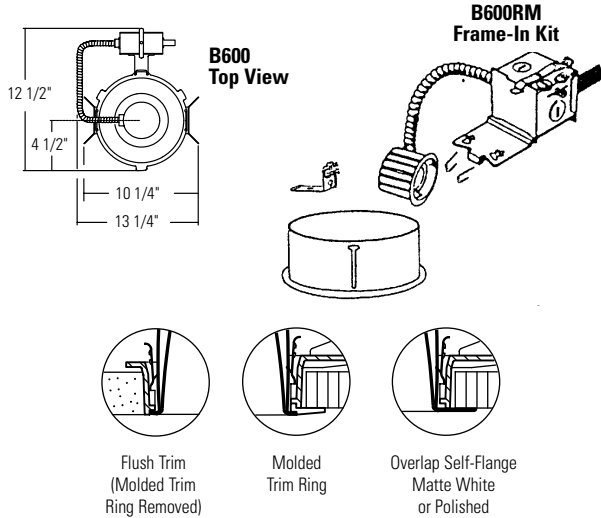
$$Qty \ of \ Fixtures = \frac{FC \times L \times W}{(Lumens \ per \ Lamp) \times (\# \ of \ Lamps \ per \ Fixture) \times CU \times MF}$$

$$Qty \ of \ Fixtures = \frac{(\quad) \times (\quad) \times (\quad)}{(\quad) \times (\quad) \times (\quad) \times (\quad)}$$

Qty of Fixtures = _____



Calculite® Incandescent Open Downlight **B7705**



B600 Ceiling Cutout: 6 9/16" Dia.
B600 RM Ceiling Cutout: 6 1/2" Dia.

Reflector Trim	Frame-In Kit	Lamp
B7705CLW Specular Clear finish with white flange	B600	PAR30 75W (for short neck PAR30 use socket extender #1968)
B7705CLP Specular Clear finish with polished flange		BR30 85W
B7705CL Specular Clear finish with molded trim ring (flangeless)	Remodeler Frame-In Kit	Lamp
B7705 <input type="checkbox"/> Add suffix for other finishes (see options)	B600RM (For use in existing ceilings with 3/8" min. to 2" max thickness.)	Same as B600

Features

- Socket Cup:** Die-cast aluminum cup effectively dissipates heat and assures lamps maintain proper optical alignment to reflector. Snaps onto reflector neck for easy tool-less installation. Contains medium base porcelain socket, nickel plated screw shell wired with No 18 SF1 leads to J-Box.
- Mounting Brackets:** Adjusts vertically from inside of fixture. Durable 16 ga. steel construction. Use with standard 3/4" or 1 1/2" lathing channels (by others), EMT pipe (by others), or Lightolier accessory mounting bars.
- Retaining Springs:** Precision tooled springs secure reflector to mounting frame for quick tool-less installation.
- Reflector:** 16 ga. Specular Alzak® aluminum, 45° visual cutoff to lamp and lamp image. Available with white or polished flange, or with removable white molded trim ring (field paintable).
- Junction Box:** 14 ga. steel, 4" x 3" x 2" box allows inspection from below eliminating need for access from above.
- Thermal Protector:** Meets NEC and UL requirements. Insulation must be kept 3" away from fixture sides and wiring compartments and must not be placed above fixture in a manner which will entrap heat.
- Mounting Frame:** Die-cast aluminum suitable for dry or plaster ceilings. Provides flangeless trim in plaster ceiling.

Other Reflector Finish Options

Comfort Clear Diffuse **CCD**
 Specular Gold **GD**
 Specular Black **BK**

Flange Options

White **W**
 Polished Flange **P**
 Flangeless Leave Blank (molded trim ring)

Options and Accessories

18" Mounting Bars **1950** (set of 2)
27" Mounting Bars **1951** (set of 2)

Options and Accessories (continued)

T-Bar Anchor Clips **1956** (set of 4, for 1950 & 1951 bars)
Wood Joist Mtg. Bars **7994** (see MBA specification sheet)
Sloped Ceiling Adapters **7920** (see SCA specification sheet)
Existing Ceiling Clips **7998** (set of 2)
Step Down Transformer **7997**
Socket Extender **1968** (for short neck PAR30 Lamps)
Chicago Air Plenum **LC** (add suffix to Frame-in Kit)

Electrical

B600 UL Listed for through branch circuit wiring with max. of (8) No. 12 or 60°C supply conductors for end of run.
B600RM UL Listed for No. 12 AWG 60°C supply conductors.

Labels

UL Listed for damp locations), I.B.E.W.

Alzak® is a registered trademark of ALCOA.

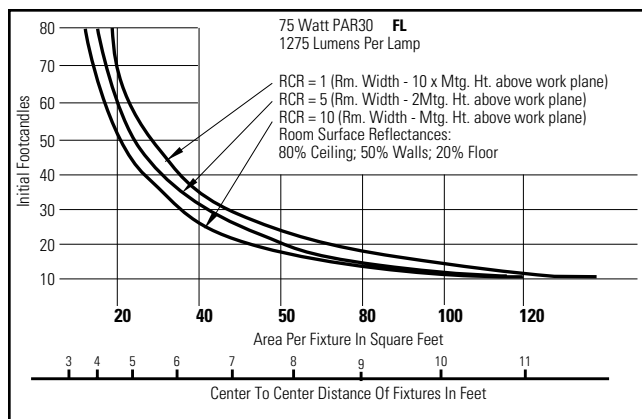
Job Information	Type:
Job Name:	
Cat. No.:	
Lamp(s):	
Notes:	

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LIGHTOLIER®



B7705CL PAR30 75W FL



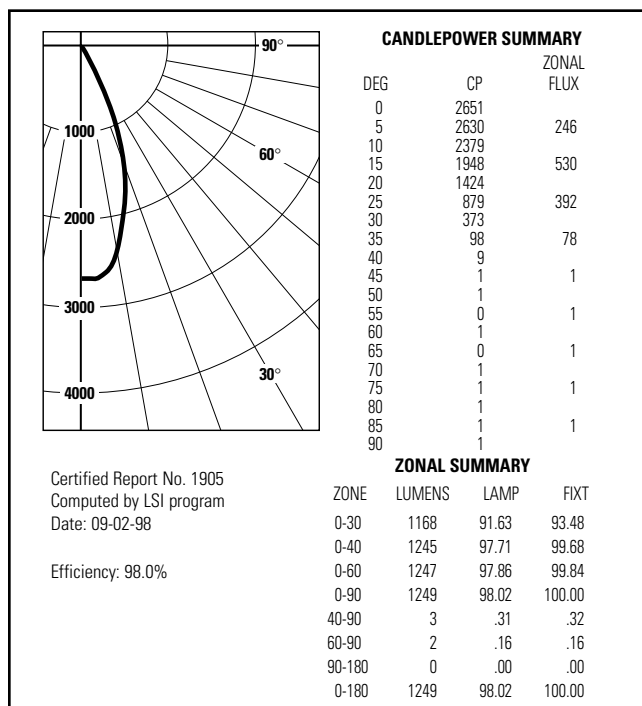
Use quick calculator chart to determine spacing of luminaires for desired level of illumination.

Conversion Factors:

75W PAR30 (Gold): F.C. X 1.0; (Black): F.C. x 0.6

50W PAR30 (Clear or Gold): F.C. X 0.7; (Black): F.C. x 0.4

Spacing Ratio = 0.7



Room Cavity Ratio	% WALL REFLECTANCE															
	80			70			50			30			10			0
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0
1	1.11	1.10	1.08	1.09	1.08	1.06	1.05	1.04	1.03	1.02	1.01	1.00	.98	.96	.97	.96
2	1.07	1.04	1.02	1.05	1.03	1.01	1.02	1.00	.98	.99	.98	.96	.97	.96	.95	.93
3	1.03	1.00	.97	1.01	.99	.97	.99	.97	.95	.97	.95	.94	.95	.94	.92	.91
4	.99	.96	.94	.99	.96	.93	.97	.94	.92	.95	.93	.91	.93	.91	.90	.89
5	.96	.92	.90	.95	.92	.89	.94	.91	.89	.92	.90	.88	.91	.89	.87	.86
6	.93	.90	.87	.93	.89	.87	.91	.89	.86	.90	.88	.86	.89	.87	.85	.84
7	.90	.87	.84	.90	.86	.84	.89	.86	.84	.88	.85	.83	.87	.84	.83	.82
8	.88	.84	.82	.87	.84	.81	.86	.83	.81	.86	.83	.81	.85	.82	.80	.79
9	.85	.81	.79	.84	.81	.79	.84	.81	.78	.83	.80	.78	.82	.80	.78	.77
10	.83	.79	.76	.82	.79	.76	.82	.78	.76	.81	.78	.76	.81	.76	.75	.75

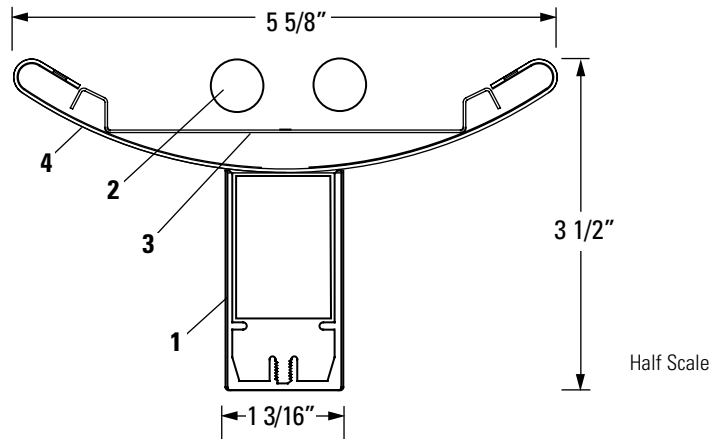
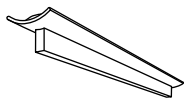
20% Floor Cavity Reflectance

Conversion Factor: For 50W and 75W PAR30 units with clear or gold reflector, multiply C.U.'s by 1.0; with black reflector, multiply C.U.'s by 0.6.

Job Information **Type:**

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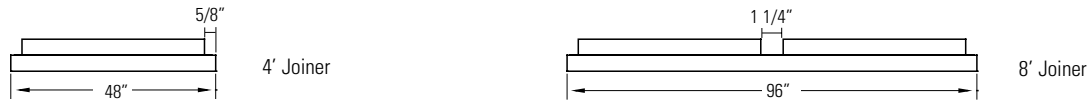


Ordering Information

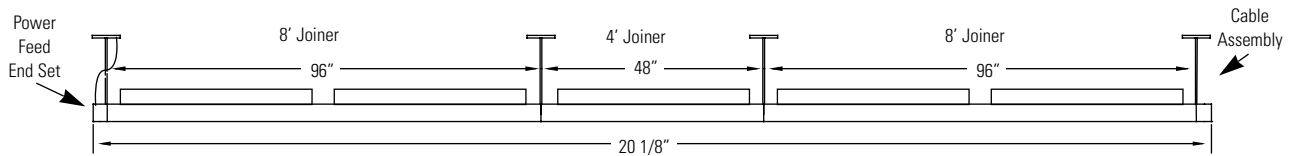
Style	Lamps	Length	Type	Wattage	Voltage	Finish
SC	2 2 = 2 T5 lamps	4 = 4 foot 8 = 8 foot	J = Joiner	28 = 28 watt 54 = 54 watt	1 = 120 volt 2 = 277 volt	WH = White enamel AL = Aluminum enamel

Complete ordering instructions on back.

Fixture Lengths & Mounting Locations



Sample Run



Features

- Housing:** Extruded aluminum. Die-cast end plate mechanically attached with no exposed fasteners.
- Lamping:** Two T5 (28 or 54 watt as specified) fluorescent lamps per 4' section. Provided by others.
- Reflector:** Die-formed specular aluminum reflector.
- Shielding:** Die-formed 20 gauge CRS.

Electrical

Specify 120 volt or 277 volt. 3 conductor, 18 gauge wire. Color-coded quick connectors allow ease of connection for joiner modules. For special circuiting, consult factory. Ballast is class "P" electronic, class "A" sound rating, less than 10% THD, thermally protected, end of lamp life cutoff.

Mountings

Cable suspension - 4 1/2" diameter canopy finished white enamel, 1/16" diameter stainless steel aircraft cable adjustable up to 36." Griplock® with cable adjustment. Draw tight connector to create hairline seam between joiner modules.

Finish

Powder coated baked white or aluminum enamel. Custom colors available, consult factory.

Options and Accessories

L, T, X, Inline joiner blocks and emergency battery pack available.

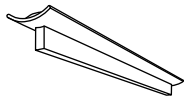
Labels

UL, ULc and IBEW.

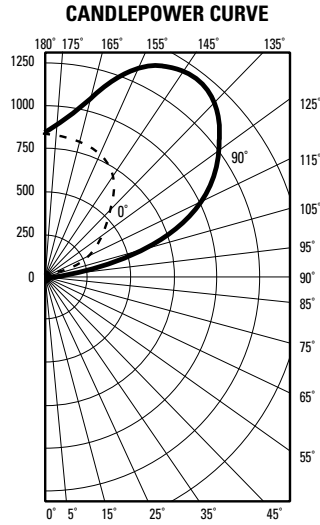
Job Information	Type:
Job Name:	
Cat. No.:	
Lamp(s):	
Notes:	

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Performance



REPORT NO: LRL 299-1D
CAT NO: SC241281WH
LAMPS: 2 F28T5
LUMENS: 2900
EFFICIENCY: 82.3%

ZONE DEG.	CANDLEPOWER				
	0	22	45	67	90
		CANDELAS			
180	828	828	828	828	828
175	827	836	848	868	870
165	811	880	963	1056	1062
155	761	909	1076	1273	1329
145	668	905	1201	1423	1466
135	540	859	1177	1363	1409
125	422	821	1094	1298	1264
115	268	651	918	1023	1029
105	141	479	578	557	557
95	33	128	129	121	117
90	10	15	12	11	12
85	0	0	0	0	0
75	0	0	0	0	0
65	0	0	0	0	0
55	0	0	0	0	0
45	0	0	0	0	0
35	0	0	0	0	0
25	0	0	0	0	0
15	0	0	0	0	0
5	0	0	0	0	0
0	0	0	0	0	0

Calculations are for 28 watt T5 lamps, for 54 watt T5 lamps multiply by 1.7

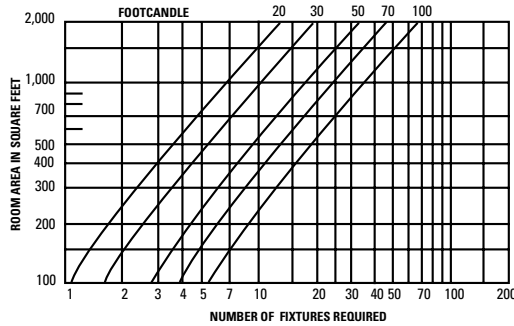
COEFFICIENTS OF UTILIZATION

		% EFFECTIVE CEILING CAVITY REFLECTANCE								
		80			70			50		
		WALL REFLECTANCE								
ROOM CAVITY RATIO										
	70	50	30	70	50	30	50	30	10	
0	78	78	78	67	67	67	46	46	46	
1	71	68	65	61	58	56	40	38	37	
2	65	59	55	55	51	47	35	33	31	
3	59	52	47	50	45	40	31	28	26	
4	54	46	40	46	39	34	27	24	22	
5	49	40	34	42	35	30	24	21	18	
6	45	36	30	38	31	26	21	18	16	
7	41	32	26	35	28	23	19	16	14	
8	38	29	23	32	25	20	17	14	12	
9	35	26	20	30	22	18	16	12	10	
10	33	24	18	28	21	16	14	11	9	

20% FLOOR CAVITY REFLECTANCE

DISTRIBUTION			
Zone	Lumens	% Lamp	% Luminaire
0-90	0	0.0	0.0
90-180	4776	82.3	100.0
0-180	4776	82.3	100.0

Quick Calculator and Ceiling Brightness

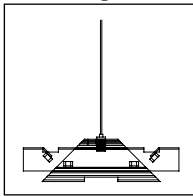


1. Find room area on vertical axis.
2. Move across chart to footcandle curve.
3. Move down to horizontal axis and read number of fixtures required.

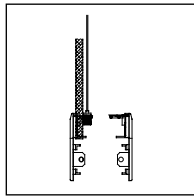
Suspension Length	12"	18"	24"
Footlamberts Above Fixture	165	112	85.7
Footlamberts Between Fixtures	24.7	26.3	32.2
Ceiling Brightness Ratio	6.7	4.3	2.7

Reflectances of 80% ceiling, 50% walls and 20% floor. Light loss factor is .85, Room size is 50' x 50', Run Spacing 10'. Ceiling Height 9' to 12'. Values are taken from the center of the room.

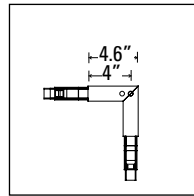
Mounting & Joiner Block Accessories



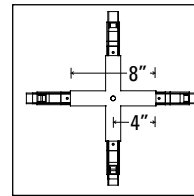
Cable Assembly
SC36



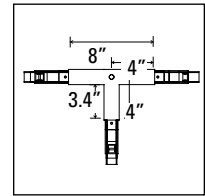
Power Feed End Set
SE36WH (white)
SE36AL (aluminum)



"L" Block with suspension
SL36WH (white)
SL36AL (aluminum)



"X" Block with suspension
SX36WH (white)
SX36AL (aluminum)



"T" Block with suspension
ST36WH (white)
ST36AL (aluminum)

Inline block available (SI36WH or SI36AL).

Ordering Instructions

Individual Fixtures:

1. Order one JOINER MODULE.
2. Order one POWER FEED END SET.
3. Order one CABLE ASSEMBLY.

Continuous Rows:

1. Determine run length.
2. Order the appropriate number of JOINER MODULES for the complete run.
3. Order one POWER FEED END SET per run.
4. Order one CABLE ASSEMBLY per JOINER MODULE.
5. Maximum run length for a 2 light cross section, 54 watt, 120 volt is 88 feet.

Square/Rectangle Patterns:

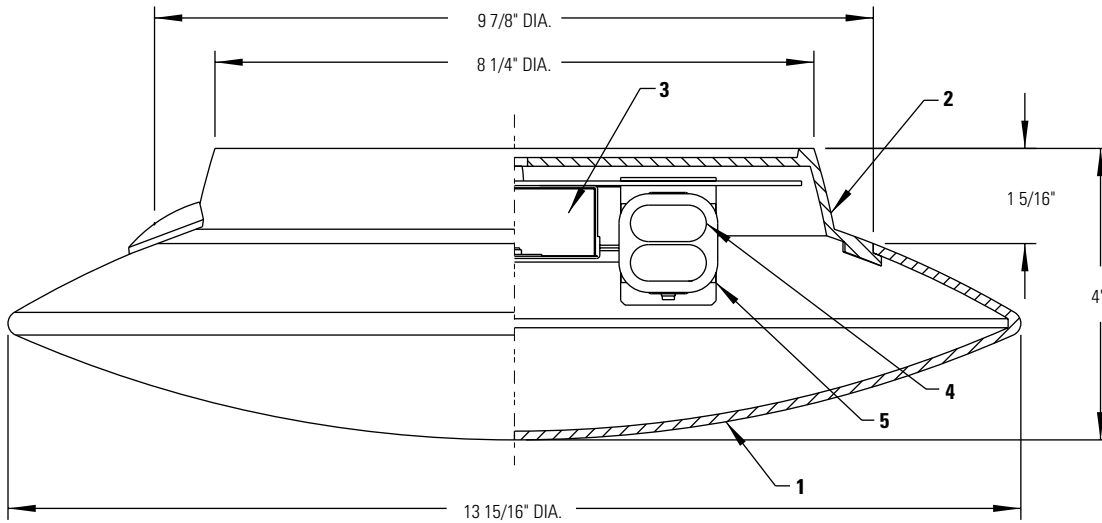
1. Order appropriate number of JOINER MODULES to complete the pattern size.
2. Order number and type of JOINER BLOCKS required.
3. Order one CABLE/CORD ASSEMBLY or POWER FEED END SET to power the pattern.
4. For patterns that exceed amperage limits, order the appropriate number of CABLE/CORD FEEDS.

Job Information	Type:
------------------------	--------------

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Specification Decorative Discus™ 6700MS213U



Ordering Information

Cat. No.	Finish	Wattage.	Voltage	Lamping (Quad Tube, 4-Pin G24-q-1)		
				General Electric F13DBX/* /4P	Osram/Sylvania CF13DD/E/*	Philips PL-C13W/* /A/4P
6700MS213U	Matte Silver	13W	120V-277V	*Designates manufacturer's color temperature.		

Features

- Diffuser:** Acrylic, injection molded and bonded into one piece assembly; 0.12" minimum thickness; 70% light transmission. Lights evenly without discernible hot spots. Integral tabs provide "twist-lock" installation; no loose hardware, no tools required.
- Housing:** Polycarbonate, injection molded. Shatter resistant. Integral bosses retain diffuser without loose hardware.
- Ballast:** Electronic; High power factor; Class P. See Electrical/Ballast.
- Lamp:** 13W Quad Tube, Compact Fluorescent (by others).
- Lamp Socket:** Polycarbonate, 4-Pin, G24q-1 base.

Mounting

Ceiling or wall (ADA compliant). Mounts to standard 4" outlet box.

Options

- + Shatter resistant polycarbonate diffuser with tamperproof set screw. Add TPR to end of catalog number.
- + Designates made to order only. Consult factory for lead times.

Electrical/Ballast

	13W Quad Tube	
	120v	277V
Total Input Watts:	32	32
Max. Line Current:	.27	.12
Power Factor:	>.98	>.98
Ballast Factor:	.98	.98
THD:	<10%	<10%
Starting Temp:	0°F	0°F

Labels

UL Listed, Suitable for Damp Locations.

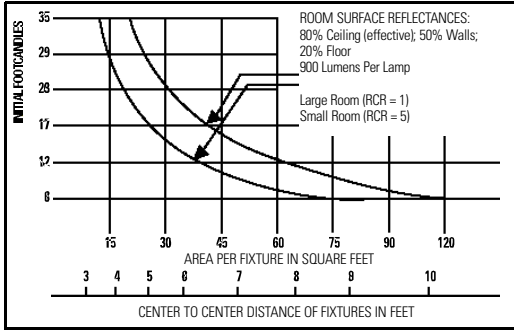
Job Information	Type:
Job Name:	
Cat. No.:	
Lamp(s):	
Notes:	

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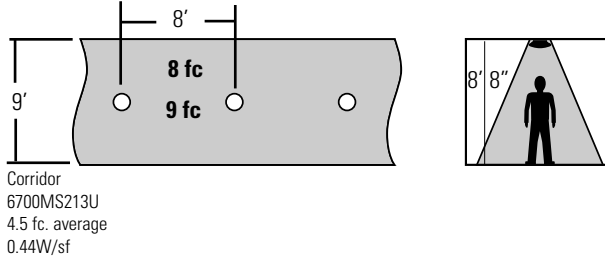
LIGHTOLIER®



Specification Decorative Discus™ 6700MS213U



Use quick calculator chart to determine the spacing of 2 light, 13 Watt units for desired level of illumination.



SPACING RATIO = 1.3

CERTIFIED TEST REPORT NO. 1854FR
COMPUTED BY LSI PROGRAM **TEST-LITE**
LIGHTOLIER SURFACE UTILITY FLUORESCENT "DISCUS"
Cat. 6700MW213U WITH TWIST LOCK DIFFUSER
2-13W QUAD TUBE GE LAMPS. LUMEN RATING = 900 LMS.
ESI BALLAST #ES-2/1-CFQ-13/10-UNVD, 120VAC

CANDLEPOWER SUMMARY

ANGLE	MEAN CP	LMS	ANGLE	MEAN CP	LMS
0	188		90	18	
5	188	18	95	16	18
10	185		100	16	
15	182	51	105	17	18
20	176		110	20	
25	169	79	115	23	23
30	161		120	26	
35	152	95	125	29	26
40	141		130	33	
45	129	100	135	36	28
50	116		140	38	
55	102	91	145	39	24
60	87		150	40	
65	72	72	155	39	18
70	58		160	39	
75	44	47	165	38	10
80	33		170	34	
85	24	27	175	30	3
90	18		180	29	

ZONAL LUMENS AND PERCENTAGES

ZONE	LUMENS	% LAMP	% LUMINAIRE
0-30	147	8.19	19.70
0-40	242	13.48	32.41
0-60	433	24.08	57.90
0-90	579	32.19	77.42
40-90	336	18.72	45.01
60-90	146	8.12	19.52
90-180	169	9.39	22.58
0-180	748	41.58	100.00

** EFFICIENCY = 41.6% **

Date: May 31, 2002
Prepared for: Lightolier, Fall River, MA

TESTED ACCORDING TO IES PROCEDURES. TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST LUMINOUS OPENING OF LUMINAIRE.

COEFFICIENTS OF UTILIZATION
% EFFECTIVE CEILING CAVITY REFLECTANCE

ROOM CAVITY RATIO	% EFFECTIVE CEILING CAVITY REFLECTANCE																								
	80					70					50					30					10				
	% WALL REFLECTANCE																								
	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0						
1	.41	.39	.38	.39	.38	.36	.36	.35	.33	.33	.32	.31	.30	.29	.28	.30	.29	.28	.27						
2	.36	.33	.31	.34	.32	.30	.31	.29	.28	.29	.27	.26	.26	.23	.24	.26	.23	.24	.23						
3	.32	.28	.26	.30	.27	.25	.28	.25	.23	.25	.24	.22	.23	.22	.20	.23	.22	.20	.19						
4	.28	.25	.22	.27	.24	.21	.25	.22	.20	.23	.21	.19	.21	.19	.18	.21	.19	.18	.17						
5	.25	.22	.19	.24	.21	.18	.22	.19	.17	.20	.18	.16	.19	.17	.15	.19	.17	.15	.14						
6	.22	.19	.16	.22	.18	.16	.20	.17	.15	.18	.16	.14	.17	.15	.13	.17	.15	.13	.12						
7	.20	.17	.14	.19	.16	.14	.18	.15	.13	.16	.14	.12	.15	.13	.12	.15	.13	.12	.11						
8	.18	.15	.12	.17	.14	.12	.16	.13	.12	.15	.13	.11	.14	.12	.10	.14	.12	.10	.09						
9	.17	.13	.11	.16	.13	.11	.15	.12	.10	.14	.11	.10	.13	.11	.09	.13	.11	.09	.08						
10	.15	.12	.10	.14	.12	.09	.13	.11	.09	.12	.10	.08	.12	.09	.08	.12	.09	.08	.07						

20% FLOOR CAVITY REFLECTANCE

Job Information **Type:**

Lightolier a Genlyte Thomas Company www.lightolier.com
631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710
We reserve the right to change details of design, materials and finish.
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