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**Appendix I: Lighting Breadth Calculations /
Cut Sheets**

Figure 6-3. General Characteristics of Commonly Used Light Sources*
 (This table is intended to show the wide range of parameters available for lamp products. A specific example has been chosen for each source type.)

Source Type and Correlated Color Temperature	Lamp Watts	Initial Lumens	Efficacy (LPW)	Lumen Maintenance	Life (hours)	CRI	Starting and Warmup Time (Minutes)	Dimming Range (Percent Light Output)
• Standard incandescent filament (2700°K)	100	1690	17	85	750	100	0	100-0
Tungsten-halogen (linear), 2850 K	300	6000	20	95	2000	100	0	100-0
Tungsten-halogen (reflector), 2850 K	90	1280	14	95	2500	100	0	100-0
Tungsten-halogen (low voltage reflector), 3000 K-3200 K	50	900*	18	95	4000	100	0	100-0
Fluorescent T-5 4 ft., 3000 K-4100 K	28	2900*	104	95	20,000	85	0	100-1
High output fluorescent T-5 4 ft., 3000 K-4000 K	54	5000*	93	95	20,000	85	0	100-1
Fluorescent T-8 4 ft., 3000 K-4100 K	32	2800	88	85	20,000	75	0	100-1
Reduced wattage T-12 4 ft., 3500 K	34	2800	82	85	20,000	73	0	N/A ¹
Simulene reduced wattage 8 ft., 3000 K-5000 K	60	6900	96	80	12,000	85	0	N/A ¹
High output reduced wattage 8 ft., 4100 K	95	8000	84	75	12,000	82	0	100-1
Compact fluorescent (long twin), 3000 K-4100 K	36	3300	87	85	20,000	82	1	100-5
• Compact fluorescent (double) (2700°K-4100 K)	26	1800	70	85	10,000	82	1	100-5*
Mercury vapor, 6900 K	175	7900	45	80	24,000	20	< 10	100-10
Metal halide, low wattage, 3200 K	100	8075	81	85	10,000	70	< 5	100-50 ²
Metal halide, high wattage, 4000 K	400	36,000	90	80	20,000	65	< 10	100-50 ²
HPS, low wattage, 2100 K	70	6300	90	90	24,000	21	< 5	100-50 ²
HPS, high wattage (diffuse), 2100 K	250	26,000	104	90	24,000	21	< 5	100-50 ²

* See manufacturers catalogs for specific data.
 1. Efficacy for lamp is shown. Ballasting is required for all lamps except standard incandescent and tungsten-halogen.
 2. Percent of initial lumens for lumen maintenance calculations.
 3. Time interval to reach usable light output.
 4. Four-pin lamp required.
 5. The important performance parameters for reflector lamps are beam angle and maximum center beam intensity.
 6. Dimming below the lower value results in significant color shift.
 7. Exact lamp length is 1149 mm.
 8. Lumen output measured at 35°C (95°F) ambient.
 9. Dimming ballasts are currently not available for this lamp.

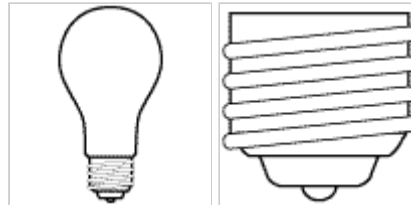


GE Consumer & Industrial
Lighting

Lighting Specification Bulletin

Standard Incandescent

Product Code: 41028
Description: 60A/W 48PK



Specification:

Firm Name :

Job Name :

General

Product Code	41028
Description	60A/W 48PK
Subcategory	Standard Incandescent

Physical

Bulb Type	A19
Base Type	Med
Filament Type	CC-6
Bulb Material	Soft Glass
Max Overall Length (In.)	4.43
Max Overall Length (mm)	113

Photometric

Average Life in Hours	1000
Lumens (Initial)	840
Lighted Center Length (In.)	3.12

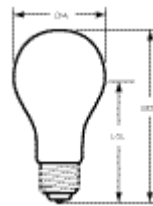
Electrical

Nominal Lamp Volts	120
Nominal Lamp Watts	60

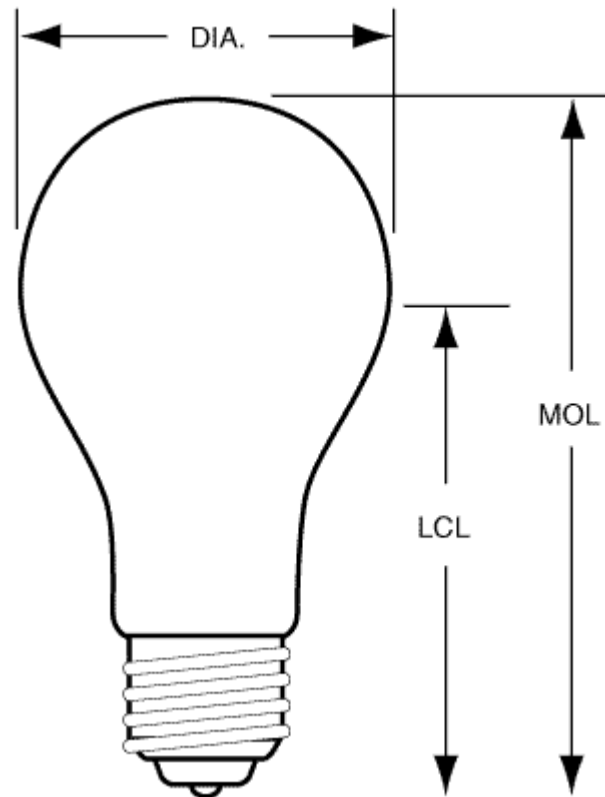
Miscellaneous

Additional Information	Soft White
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Dimensionalized Line Art - Small



Dimensionalized Line Art - Large



All values are design values or typical values when measured under laboratory conditions. Information provided is subject to change without notice. Where applicable, values are based on guidelines published in ANSI. For more information see Terms and Conditions in the li



GE Consumer & Industrial
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Lighting Specification Bulletin

Self-Ballasted Lamps Spiral®

Product Code: 15834

Description: FLE20HT3/2/827

Specification:

Firm Name :

Job Name :

General	
Product Code	15834
Description	FLE20HT3/2/827
Subcategory	Self-Ballasted Lamps Spiral®
Physical	
Bulb Type	HLX(T3)
Base Type	Med
Nominal Length (In.)	4.70
Nominal Length (mm)	119
Photometric	
Average Rated Life	8000
Lumens (Initial)	1200
Lumens (Mean)	965
Color Temperature (K)	2700
Color Rendering Index (Ra) CRI	82
Electrical	
Nominal Lamp Volts	120
Watts	20
Minimum Starting Temp (deg F)	5
Total Harmonic Distortion (THD)%	135
Miscellaneous	
Additional Information	RE 827 Phosphor, T3 Spiral®, Boxed

Footnotes

Fluorescent lamp lumens decline during life. Most one piece self ballasted lamps for incandescent sockets and plug-in lamps with screw-in adapters do not work with clip-on shades. Lumens on one piece self ballasted lamp systems are measured base up. Best performance if operated base up and at 77° F (25° C) ambient temperature. Use only on 120V 60Hz circuits. Do not use on dimming circuits or timers. Do not use in wet locations.

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➤ Reduced Wattage

Ballroom Incandescent Fixtures:

Fixture # from Schedule	Description	Location	Level/Floor	Size (Dia. X Ht.)	Qty.	Weight	Wattage (each)	Source
LD-12	Chandelier	Ballroom (CC)	Ballroom	14" x 24"	2	2000	124 x 60W	La Spec
LD-13	Chandelier	Ballroom (CC)	Ballroom	9' x 12'	6	550	40 x 60W	La Spec
LD-14	Chandelier	Ballroom (CC)	Ballroom	6 x 10'	8	300	24 x 60W	La Spec
LD-15	Wallsconce	Ballroom (CC)	Ballroom	12" x 36"	40	30	4 x 60W	La Spec

Original Incandescent Lamps:

Standard Incandescent (GE):	Description
	60A/W
	Volts 120
	Watts 60
	Average Life in Hours 1000
	Lumens (Initial) 850
	Color Rendering Index 100
	Bulb Type A19
	Base Type Med.
	Max Overall Length (in.) 4.43
	Temperature (K) 2700

Replacement Compact Fluorescent Lamps:

Self-Ballasted Lamps Spiral (GE):	Description
	FLE20HT3/2/827
	Volts 120
	Watts 20
	Average Life in Hours 8000
	Lumens (Initial) 1200
	Lumens (Mean) 965
	Color Rendering Index 82
	Bulb Type HLX(T3)
	Base Type Med.
	Max Overall Length (in.) 4.7
	Temperature (K) 2700

Calculations:

Total # Original Lamps:	840
Total Original Lumens/Lumens Required:	714000

Per Fixture	Qty.	Totals for all Fixtures of Same Type
LD-12		
Total # Original Lamps:	2	248
Total Original Lumens/Lumens Required:	2	210800
LD-13		
Total # Original Lamps:	6	240

Total Original Lumens/Lumens Required:	34000	6	204000
LD-14			
Total # Original Lamps:	24	8	192
Total Original Lumens/Lumens Required:	20400	8	163200
LD-15			
Total # Original Lamps:	4	40	160
Total Original Lumens/Lumens Required:	3400	40	136000

Lumens Required:	714000
Mean Lumens for New Lamps:	965
Total # New Lamps Required (overall):	740

Per Fixture	Qty.	Totals for all Fixtures of Same Type
LD-12		
Total Lumens > Lumens Required:	2	212300
Total # New Lamps:	2	220
LD-13		
Total Lumens > Lumens Required:	6	208440
Total # New Lamps:	6	216
LD-14		
Total Lumens > Lumens Required:	8	169840
Total # New Lamps:	8	176
LD-15		
Total Lumens > Lumens Required:	40	154400
Total # New Lamps:	40	160

Totals:	744980	lumens
	772	lamps

Results:

Total Original Lumens:	714000	lumens
New Total Wattage:	744980	lumens
Difference:	30980	lumens (more)
Total Original Wattage:	50400	W
New Total Wattage:	15440	W
Difference:	34960	W (less)
Ballroom Sq. Ft.:	23296	sq. ft.
Original Power Density:	2.16	W/sq. ft.
New Power Density:	0.66	W/sq. ft.
Difference:	1.50	W/sq. ft. (less)
Original Btu/h given off by lamps:	171955	Btu/h
New Btu/h given off by lamps:	52679	Btu/h

Difference:	119276	Btu/h (less)
Difference (tons):	9.94	Tons (less)
Original Ballroom Cooling Load:	39.2	Tons
New Ballroom Cooling Load with C.F.'s:	29.26	Tons

Costs:

Incandescent Lamp First Cost:	3.38 / lamp	
# Incandescent Lamps:	840	
Total First Cost for Incandescent Lamps:	\$2,839.20	
Compact Fluorescent Lamp First Cost:	8.70 / lamp	
# Compact Fluorescent Lamps:	772	
Total First Cost for Compact Fluorescent Lamps:	\$6,716.40	
Difference:	\$3,877.20	(more)
However, Cooling Saved:	10 tons	
Original Ballroom Cooling Sized at:	40 tons	
New Ballroom Cooling Sized at:	30 tons	
Initial Cost of Cooling (First Cost - \$ / Ton):	\$1,000.00	
Cost of Original Ballroom Cooling:	\$40,000.00	
Cost of New Ballroom Cooling:	\$30,000.00	
Difference:	\$10,000.00	(less)
Total F.C. Savings (Cooling Savings - Extra Lamp Expense):	\$6,122.80	

(Estimate, Mumma, Doas-Radiant Paper)

Also, if Lamps Replaced at Average Life Hours:		
Incandescent Average Life Hours:	1000	
C.F.'s Average Life Hours:	8000	
Incandescent Maintenance/Replacement Efforts per Year (Approximately):	4.24	~4 times a year
C.F. Maintenance/Replacement Efforts per Year (Approximately):	0.53	~1 in two years