



Technical Note 1: Selecting the correct LED Series Light Source for a glass prismatic lens



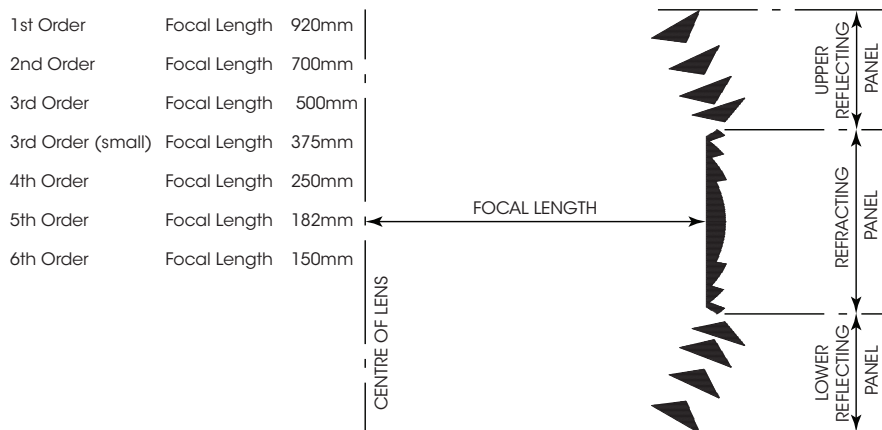
Lens description

In general, classic lenses fall into two types; revolving and stationary. Both types typically consist of a central refracting (dioptric) section with reflecting (catoptric) sections around the central section. The combination of refracting and reflecting elements makes a catadioptric lens.

In a revolving lens the dioptric section is circular with refracting prisms placed in concentric rings. Outside the central dioptric section there are circular or part circular concentric reflecting prisms. Dioptric and catoptric sections combine to concentrate the light into a narrow (pencil) beam. Several lenses may be placed next to one another around a central light source that is permanently lit, which will produce several pencil beams pointing in different directions. The beams sweeping past the eye as the lenses rotate provide a flashing character that is determined by the speed of rotation and the positioning of the lenses. The duration of each flash is determined by the size of the light source, the focal length of the lens and the speed of rotation. A slower rotation will produce a longer flash which will have a greater range than a shorter flash. Since the beams sweep the horizon, mariners will see the flashes at different times depending on their bearing from the light.

In a stationary lens, the dioptric refractors form a central belt, with catoptric reflecting prisms above and below. This arrangement concentrates the light into a horizontal fan beam spread up to 360 degrees around the horizon. The light source is switched on and off to provide a flashing character, the flash duration being determined by the mechanism controlling the intermittent power to the light source. One advantage of this control is that the flashing of several lights can be synchronised, since mariners in different positions all see the flash at the same time.

The greater the focal length of the lens, the larger the lens area will be, providing greater magnification and greater range. This is true of both revolving and stationary lenses. However, a pencil beam produced by a revolving lens is vastly brighter than a fan beam produced by a similar sized stationary lens.

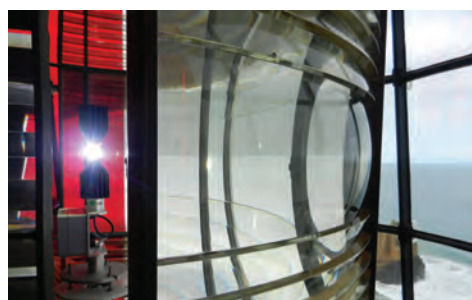


With the introduction of the SL-LED series of light sources, it is possible to switch off the parts of the light source that are to landward or in sectors where the light is not required, thereby saving power.

The tables provide a guide to the ranges that may be possible for a given light source. It is however recommended that each station is surveyed so that details of astragal width, glazing and general condition of the lens can be taken into account. Sealite is able to provide this service. Please fill in the check list provided with lens measurements and pictures.

Pictured below left to right:

Cape Byron
Split Point
Cape Byron - 1st order bi-valve or clam lens - SL-LED-324
Cape Byron



Typical Performance of Sealite LED Light Sources within Classic Rotating Optics

1st Order f = 920mm Lens area 19400 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216²	2,665,000	0.16	26	0.08	25	0.05	24	0.04	24	0.03	23
SL-LED-324²	2,197,000	0.30	26	0.15	26	0.10	25	0.08	24	0.05	24

2nd Order f = 700mm Lens area 12700 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216²	1,744,000	0.21	25	0.10	24	0.07	24	0.05	23	0.03	22
SL-LED-324²	1,438,000	0.39	26	0.20	25	0.13	24	0.10	24	0.07	23

3rd Order f = 500mm Lens area 8460 sq cm

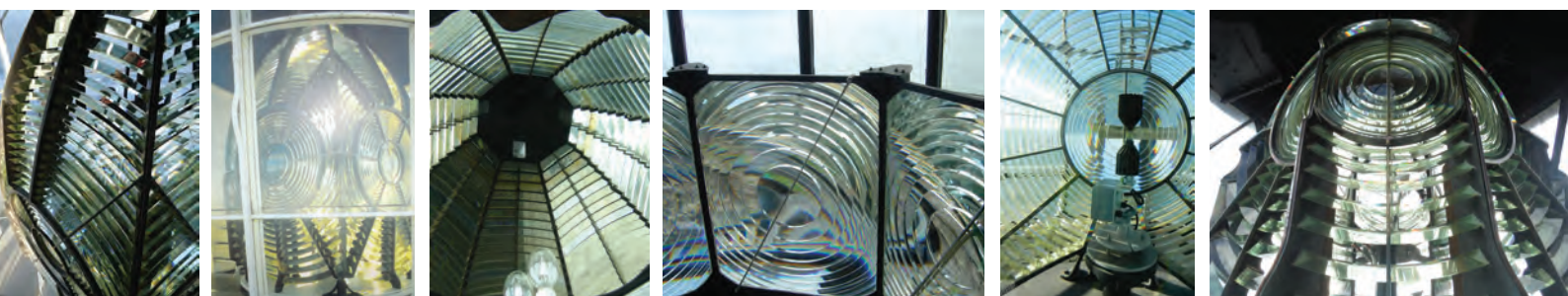
Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216²	1,937,000	0.29	26	0.14	25	0.10	24	0.07	24	0.05	23
SL-LED-324³	958,000	0.55	25	0.28	24	0.18	24	0.14	23	0.09	23

Sm 3rd Order f = 375mm Lens area 4110 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216²	941,000	0.38	24	0.19	24	0.13	23	0.10	23	0.06	22
SL-LED-324³	465,000	0.74	23	0.37	23	0.25	22	0.18	22	0.12	21

Pictured below left to right:

- 1st Order 3 panel
- 1st Order 3 panel
- 1st Order 8 panel upper reflector
- 1st Order 8 panel without reflectors
- 1st Order bi-value or cam lens
- 2nd Order GP3 – 2 panel



4th Order f = 250mm Lens area 1840 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216 ²	421,200	0.58	23	0.29	22	0.19	22	0.14	21	0.10	21
SL-LED-324 ³	125,000	1.10	20	0.55	20	0.37	19	0.28	19	0.18	18

5th Order f = 187.5mm Lens area 940 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216 ²	215,200	0.77	21	0.38	21	0.26	20	0.19	20	0.13	19

6th Order f = 150mm Lens area 497 sq cm

Sealite Light Source	Peak Intensity (cd)	Rotational Speed (RPM)									
		0.5		1		1.5		2		3	
		Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)	Flash (s)	Range (M)
SL-LED-216 ²	68,300	0.96	18	0.48	18	0.32	18	0.24	17	0.16	17

Notes:

1. Light Source power must be limited to 80W maximum when run continuously.
2. Light Source power must be limited to 108W maximum when run continuously.
3. Light Source power must be limited to 162W maximum when run continuously.
4. All intensity and range figures include glazing and astragal losses (15%) and service conditions allowance (25%) as per IALA Recommendation E-200: 2008.
5. The term 'Flash' refers to the flash duration in seconds at 50% of peak intensity.
6. The term 'Night Range' refers to the nighttime nominal range in nautical miles with an atmospheric transmissivity (t) of 0.74.
7. The performance figures stated are meant only as a general guide.

Performances of optics vary widely, as do their dimensions. For a more accurate estimate of individual optic performance, refer to IALA Recommendation E200-5. Specific lens dimensions will be required and can be used in conjunction with light source dimensions and luminance figures given in the Sealite LED Light Source table

Pictured below left to right:

- 1st Order with drum for long eclipse
- 3rd Order GP2 - 4 panel red filter on glazing
- 3rd Order GP2 - 2 panel & author
- 3rd Order GP3 - 2 panel with additional reflector panels per beam
- 3rd Order GP3 - 2 panel
- 3rd Order mould glass panel
- 4th Order small 2 panel
- 4th Order 12 panel



Typical Performance of Sealite LED Light Sources within Classic Fixed Optics

1st Order f = 920mm Lens height 250cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	117,000	18-20
SL-LED-324 ¹	157,000	19-21

2nd Order f = 700mm Lens height 202cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	94,500	18-19
SL-LED-324 ¹	127,000	19-20

3rd Order f = 500mm Lens height 165cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	109,400	18-20
SL-LED-324 ¹	103,800	19-20

Sm 3rd Order f = 375mm Lens height 115cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	76,300	17-19
SL-LED-324 ¹	51,100	16-18

4th Order f = 250mm Lens height 77cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	51,100	16-18
SL-LED-324 ¹	34,200	15-17

5th Order f = 187.5mm Lens height 55cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	36,500	16-17

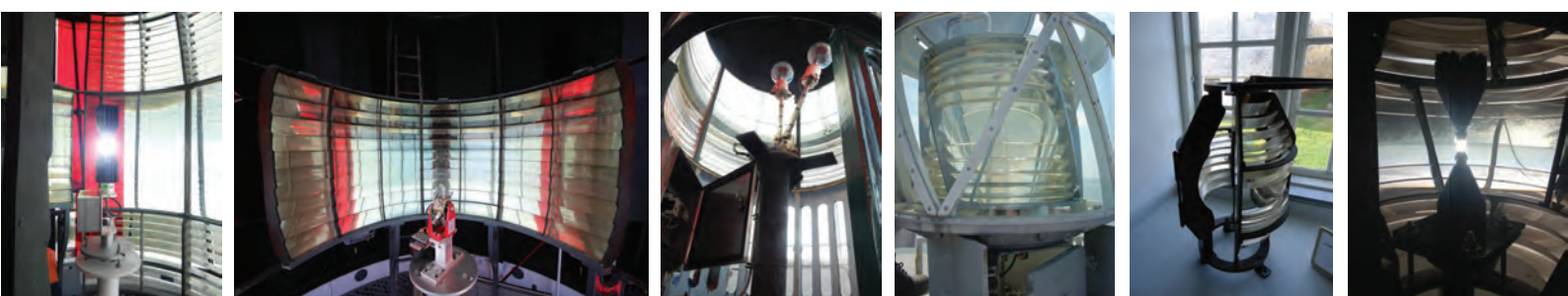
6th Order f = 150mm Lens height 40cm

Sealite Light Source	Peak Intensity (cd)	Nighttime Range (M)
SL-LED-216 ¹	26,500	15-16

Notes:

1. Only for flash character duty cycle of 1:2 or less.
2. Figures quoted are for flash durations of between 0.2 and 2.0 seconds. They include glazing and astragal losses (15%) and service conditions allowance (25%) as per IALA recommendations E-200:2008.
3. The term 'Flash' refers to the flash duration in seconds at 50% of peak intensity.
4. The term 'Nighttime Range' refers to the nighttime nominal range in nautical miles with an atmospheric transmissivity (t) of 0.74.
5. The performance figures stated are meant only as a general guide. Performances of optics vary widely, as do their dimensions. For a more accurate estimate of individual optic performance, refer to IALA Recommendation E200:2008. Specific lens dimensions will be required and can be used in conjunction with light source dimensions and luminance figures given in the Sealite brochure.

Pictured below left to right:
 1st Order drum lens with sector on glazing & SL-LED-324
 1st Order rear reflector
 2nd Order 360° drum lens
 3rd Order small lens in lantern housing
 4th Order 270° drum lens
 4th Order 360° with SL-LED-40



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