

HOW TO CHOOSE A SORAA BULB?

Quick guide to choose the right
bulb for your application

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This guide is made to help end customers choosing the most appropriate Soraa bulb for their application.

On this document you will find guidance regards different aspects of the lamps, like the form factor and base, color of the light, rendering of colors, beam angle, etc.

However the selection of certain factors, such as the color (CCT) or the color rendering (CRI), might be subjective and the end user/designer has to use his/her own criteria.

Generally there are two different scenarios when purchasing new LED bulbs:

- A. It is an **existing installation**, the existing bulbs are old and inefficient, and they are going to be replaced by LED bulbs.

- B. It is a **new installation**, and it will have LED bulbs from day 1.

The first step in both scenarios is knowing which bulb do we need.

In Scenario A, we normally need to know which bulb we already have, and will just have to retrofit it with the **Soraa equivalent**.

In Scenario B, we could have freedom to choose any type of bulb if planning from the scratch, or maybe we already have the light fixtures, and those will tell us which bulb we need to use.

2. FORM FACTOR / LAMP BASES (1/2)

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The physical size and shape of the bulbs is really important!

In order to ensure that LED lamps fit into new/existing fixtures, they must meet the ANSI and IEC standard for lamps. Some LED lamps exceed this form factor and do not fit into some existing fixtures. **All of Soraa's lamps comply with the ANSI and IEC standard.**



Also the base of the lamp is important, as it gives electrical contact and generally is where the lamp is physically held.

2. FORM FACTOR / LAMP BASES (2/2)

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Soraa's portfolio includes the following lamps, **make sure that you use only the correct type of lamp – both size/shape and base wise.**



MR16
Base GU5.3



MR16
Base GU10



AR11
Base G53



PAR36
Base G-53 STC



PAR20, PAR30S, PAR30L & PAR38
Base E26 & GU24



BR30 & A19
Base E26

You can see the detailed dimensions and specifications for each bulb on www.soraa.com/products/lamps

3. HALOGEN EQUIVALENCY

On the specification sheet of each Soraa bulb, and also on each product page on our website, you can find the halogen equivalency for each lamp model. You can choose the equivalent to the halogen lamp you are trying to replace, to get the same effects.

We set the equivalency to halogen following the guidelines of Energy Star.

3000K	Halogen Equivalent	Watts	Beam	Lumens	CBCP	Model #	Code	Snap Compatible	Spec Sheet	LM79	IES
Brilliant 6W CRI 85 R9 >0 Indoor/Outdoor	35W	6	25	375	2070	SM16-06-25D-830-03	01163	⊗			
	35W	6	36	375	980	SM16-06-36D-830-03	01175	⊗			
Brilliant 7.5W CRI 85 R9 >0 Indoor/Outdoor	50W	7.5	10	500	7320	SM16-07-10D-830-03	00921	⊙			
	50W	7.5	25	525	2900	SM16-07-25D-830-03	00933	⊗			
	50W	7.5	36	525	1370	SM16-07-36D-830-03	00945	⊗			
Brilliant 9W CRI 85 R9 >0	75W	9	25	590	3260	SM16-09-25D-830-03	00957	⊗			
	75W	9	36	590	1540	SM16-09-36D-830-03	00965	⊗			

4. CCT – COLOR

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What does the color terminology "CCT" Mean?

CCT stands for CORRELATED COLOR TEMPERATURE. It is a measure of how "warm" humans perceive the white light from a lamp.

It is measured in degrees Kelvin (K). 2200K is considered candlelight, 10000K is considered daylight at high-noon. Restaurants tend to like 2700K, for their homes, most people prefer 3000K.

Soraa bulbs are offered in 2700K, 3000K and 4000K. You can achieve intermediate (or lower) CCTs if you use the accessories Soraa SNAP lenses.



2700K



3000K



4000K

5. VIVID OR BRILLIANT? (1/2)

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What does the color terminology "CRI" Mean?

Color Rendering Index (CRI) is a measure of how well the light from a lamp renders the colors of a scene.

It is on a scale of 100, with 100 being perfect.

VIVID lamps have a CRI greater than 95.

BRILLIANT lamps have a CRI greater than 85.

The advantage of BRILLIANT lamps is that they are more efficient (they consume the same power, but give out more light) than the VIVID.

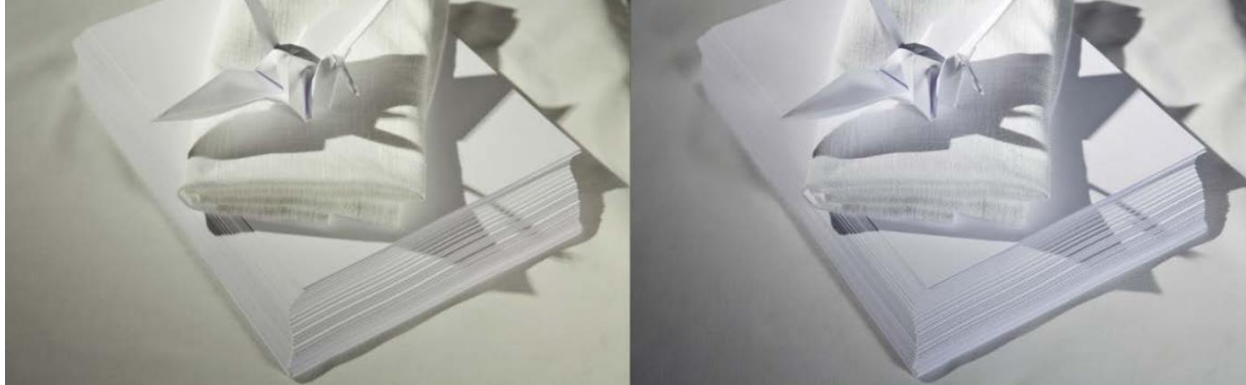
VIVID lamps are recommended for applications where color rendering is critical, such as retail applications and for lighting art.

BRILLIANT lamps are recommended in applications that need that extra bit of light and are less color critical.

Both VIVID and BRILLIANT render WHITES perfectly, on a natural way.

5. VIVID OR BRILLIANT? (2/2)

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White materials appear yellow and dingy when illuminated by other LED lamps (left). SORAA (both VIVID and BRILLIANT) lamps (right) bring out the bright white properly.



Colors are more saturated and glowing against whiter whites, as shown in the example at right, illuminated by SORAA VIVID 95 CRI/95 R9 lamps. Other LED lamps (left) give colors and whites a less appealing appearance.

6. BEAM ANGLE (1/5)

Which beam angle should I use in my application?

Professionals like architects and lighting designers normally run lighting designs with a software, for large projects. Soraa has available photometric files (IES files) for each lamp, so they can be used in the simulations.

For quick calculations, the results can easily be calculated manually.



In order to do that, we need to understand 4 concepts: CBCP, Beam diameter, Field diameter and Foot-candles.

6. BEAM ANGLE (2/5)

1. Center Beam Candle Power, or CBCP: This refers to the light intensity at the center of the beam, and is usually designated in units of Candela. This can be found on the Spec Sheet of every Soraa lamp:

SPECIFICATIONS BY MODEL NUMBER* SORAA LED MR16 7.5W

Model #	Product Code	CCT (K)	Beam Angle	CBCP (Cd)	Halogen Equivalent	Total Flux (Lm)	Efficacy (Lm/W)	McA	JA8-2016-E	SNAP
VIVID SERIES										
SM16-07-10D-927-03	00919	2700	10	5710	50	390	52	3	YES	YES
SM16-07-25D-927-03	00931	2700	25	2260	50	410	55	3	YES	-
SM16-07-36D-927-03	00943	2700	36	1070	50	410	55	3	YES	-

2. Beam Angle: As you move outwards from the center of the beam, the light intensity drops. The "beam angle" refers to the angle from the center axis of the beam at which the intensity has dropped to half of the CBCP.

3. Field Angle: As you move further outwards, the intensity continues to drop. The field angle: refers to the angle from the center axis of the beam at which the intensity has dropped to 10% of the CBCP. The quantity of light that falls within the field angle (CBCP, beam and field) is considered to be "useful" lumens.

6. BEAM ANGLE (3/5)

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4. Foot-candles: The intensity of light on a surface is measured in LUX (in metric units) or FOOT-CANDLES (in English units)



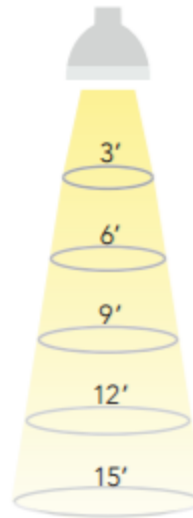
In the spec sheet for your Soraa lamp you can find a **cone diagram**, that will tell you the beam and field diameters at different distances, and will help you to get the conversion factor from CBCP to lux (or foot-candles).

6. BEAM ANGLE (4/5)

On the specs, you can see the cone diagram for every product:

10 DEGREE BEAM

Beam Dia at 50% CBCP (ft)	Field Dia at 10% CBCP (ft)	Foot-candles (% of CBCP)
0.5	1.1	11.1%
1.0	2.1	2.8%
1.6	3.2	1.2%
2.1	4.2	0.7%
2.6	5.3	0.4%



25 DEGREE BEAM

Beam Dia at 50% CBCP (ft)	Field Dia at 10% CBCP (ft)	Foot-candles (% of CBCP)
1.3	2.2	11.1%
2.7	4.4	2.8%
4.0	6.6	1.2%
5.3	8.7	0.7%
6.7	10.9	0.4%

For each beam angle there is a table with 3 columns, in which you can read the values of the Beam diameter, Field diameter and Foot-candles at each distance.

6. BEAM ANGLE (5/5)

Practical example, using the MR16 7.5W VIVID 2700K in 10D and 25D

10 DEGREE BEAM

Beam Dia at 50% CBCP (ft)	Field Dia at 10% CBCP (ft)	Foot-candles (% of CBCP)
0.5	1.1	11.1%
1.0	2.1	2.8%
1.6	3.2	1.2%



25 DEGREE BEAM

Beam Dia at 50% CBCP (ft)	Field Dia at 10% CBCP (ft)	Foot-candles (% of CBCP)
1.3	2.2	11.1%
2.7	4.4	2.8%
4.0	6.6	1.2%

SPECIFICATIONS BY MODEL NUMBER* SORAA LED MR16 7.5W

Model #	Product Code	CCT (K)	Beam Angle	CBCP (Cd)	Halo Equi
VIVID SERIES					
SM16-07-10D-927-03	00919	2700	10	5710	
SM16-07-25D-927-03	00931	2700	25	2260	
SM16-07-36D-927-03	00943	2700	36	1030	

By looking to the cone diagram we know that, at 9ft:
 The beam of the **10D** lamp will have a diameter of 1.6ft, and its field a diameter of 3.2ft.
 The beam of the **25D** lamp will have a diameter of 4ft, and its field a diameter of 6.6ft.

The **25D** lamp has 2260cd, so at 9ft we will get $2260 \times 0.012 = 27$ footcandles on the brightest spot.

The **10D** lamp has 5710cd, so at 9ft we will get $5710 \times 0.012 = 68$ footcandles on the brightest spot.

At the same distance, a narrow beam will give us higher brightness than a wider beam, but it will cover a smaller area.

7. TRANSFORMER AND DIMMER COMPATIBILITY

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Please visit www.soraa.com/resources/compatibility to see compatibility tables for all our products with different transformers, dimmers and fixtures.

Lamps that work directly at 120V AC, have dimming compatibility sheets.

Lamps that require a transformer, will have a transformer compatibility sheet, and a dimming compatibility sheet that shows the results when tested different transformer/dimmer combinations.

In general we recommend to de-rate transformers and dimmers. More details can be found on the compatibility lists and on the FAQ section on our website www.soraa.com/resources/faqs

For any technical questions, including compatibility, please send us an email at techsupport@soraa.com

7.1 COMPATIBILITY FOR 12V LAMPS

Transformer Compatibility

SORAA 12V lamps are made to work with 12V AC magnetic (MLV) and electronic (ELV) transformers and 12V DC transformers.

If multiple lamps are installed on one transformer, they need to be connected in parallel. They cannot be installed in series.

- 12V AC Magnetic transformers and 12V DC transformers are in general compatible.
- 12V AC Electronic transformers generally have a minimum load, and SORAA recommends using only transformers that have been tested and found compatible. In general we recommend to use transformers with very little or no minimum load (0W).
- Please see compatibility tables for each product.

Dimmer Compatibility

SORAA 12V lamps are made to work with trailing edge (reverse phase) and leading edge (forward phase) phase cut dimmers.

Electronic dimmable transformers need trailing edge dimmers, while Magnetic transformers need leading edge dimmers.

There might be a minimum wattage load on the transformer/dimmer. If this minimum load is not met, there might be compatibility issues.

Maximum number of lamps on a dimmer/transformer

The following need to be considered when determining the amount of lamps on a dimmer/transformer.

1. SORAA tests have been carried out with 1 lamp unless stated otherwise.
2. There is a repetitive, very brief current spike the LED lamp will see twice per cycle. This current spike has to be provided by the transformer and/or dimmer, and will affect the recommended lamp load on each transformer or dimmer.
3. Ultimately the transformer/dimmer manufacturer is the only one with authority to rate their product, but SORAA can give an Engineering estimate.
4. We have added the maximum amount of MR16 lamps we recommend for each transformer in the transformer compatibility tables.
5. For dimmers, we recommend to use a 2.0 de-rating factor for leading edge dimmers with magnetic transformers; and a 4.0 de-rating factor for trailing edge dimmers driving Low Voltage lamps on electronic transformers.

For example for a 500W leading edge dimmer it would mean $500/2=250W$ of LED, so an estimated maximum of 33 lamps 7.5W.

For example for a 400W trailing edge dimmer it would mean $400/4=100W$ of LED, so an estimated maximum of 13 lamps 7.5W.

Distance between transformer and lamp(s)

- 12V AC Magnetic transformers and 12V DC transformers do not have a limitation regards the maximum length of the wires between transformer and lamp. Only the voltage drop has to be taken into account (losses because of the inner resistance of the conductors).
- 12V AC Electronic transformers have a limitation in the length of the wires between transformer and lamp(s). This length is usually stated by the transformer manufacturer on its specs or on the transformer itself, and generally it is limited to 2 meters (6 feet).

7.2 COMPATIBILITY FOR MAINS VOLTAGE LAMPS

Dimmer Compatibility

SORAA mains voltage lamps are made to work with trailing edge (reverse phase) and leading edge (forward phase) phase cut dimmers. However, for Soraa MR16-GU10 230V lamps the use of leading edge dimmers is not recommended.

There might be a minimum wattage load on the dimmer. If this minimum load is not met, there might be compatibility issues.

On the Soraa website you can find a dimmer compatibility list for each Soraa bulb. We recommend ensuring that the dimmer/bulb combination is compatible before installation.

Maximum number of lamps on a dimmer

The following need to be considered when determining the amount of lamps on a dimmer.

1. SORAA tests have been carried out with 1 lamp unless stated otherwise.
2. There is a repetitive, very brief current spike the LED lamp will see twice per cycle. This current spike has to be provided by the dimmer, and will affect the recommended lamp load on each dimmer.
3. Ultimately the dimmer manufacturer is the only one with authority to rate their product, but SORAA can give an Engineering estimate.
4. We recommend to use a 5.0 de-rating factor for dimmers loaded with our mains voltage lamps.

For example for a 500W dimmer it would mean $500/5 = 100W$ of LED, so an estimated maximum of 13 lamps 7.5W.