

# Fixture Thermal Compatibility

Procedure to determine fixture thermal  
compatibility with Soraa Gen3 products

Revised: January 2018

Alan Swe

Soraa, Inc.

**SORAA**

# 1) Method 1: Thermal Measurements

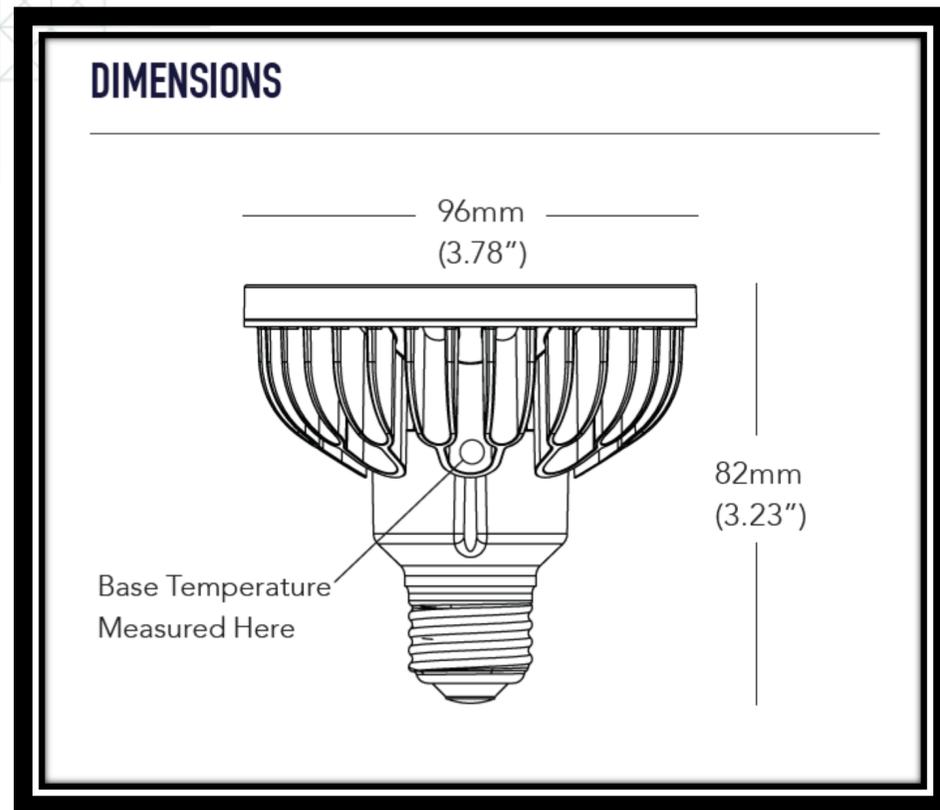
Determining Fixture Compatibility Through Thermal Measurement

# Method 1: Thermal Measurement

---

- Temperature of Soraa lamp in fixtures are measured to determine if a lamp is thermally compatible with the fixture.
- Equipment and materials needed:
  - Thermocouple (T-type or K-type recommended); Example: <http://www.omega.com/pptst/5TC.html>
  - Thermocouple thermometer compatible with thermocouple selected; Example: <http://www.omega.com/subsection/handheld-thermocouple-thermometer.html>
  - Thermally conductive epoxy; Example: [http://www.arcticsilver.com/arctic\\_silver\\_thermal\\_adhesive.htm](http://www.arcticsilver.com/arctic_silver_thermal_adhesive.htm)
- In this procedure, a thermocouple is mounted onto a reference point on the Soraa lamp to verify its thermal performance in a fixture. This reference point is defined in the diagram typically found on the second page of the lamp data sheet for that lamp, which can be downloaded from <https://www.soraa.com/products/lamps> (see [1] on next slide for example).
- Adhere the bead end of the thermocouple onto the temperature reference point of the lamp using a thermally conductive adhesive. For best results, make sure the entire thermocouple bead is covered with epoxy, and there is little to no gap between the thermocouple bead and the lamp case surface. Thermocouple wire gauge of 36 is recommended, which should be able to route through most fixtures. See [2] on the next slide for thermocouple mounting example.
- If a hole has to be made in a fixture to route the thermocouple wires, (in fully-enclosed fixtures, for example), the hole must be sealed (using epoxy, silicone, or tape) for more accurate thermal measurements.
- Once the epoxy has completely cured, mount the lamp into the fixture (ideally installed in its original location) to be evaluated and turn on the power to the fixture. Leave the lamp running in the fixture for at least three hours to allow the temperature to stabilize. After a minimum of three hours, record the thermocouple temperature using the thermocouple thermometer.
- **Temperature at the reference point should not exceed the maximum operating temperature specified in the data sheet for that lamp for ambient room temperature of 25°C.**
- Note that thermal data, when available, should always be the main factor in determining fixture thermal compatibility.

# Method 1: Figures



[1]: Example of reference temperature point from lamp spec sheet found on Soraa's website.



[2]: Thermocouple mounting on a PAR30 lamp.

# 2) Method 2: Identifying Fixture Characteristics

Determining Thermal Compatibility Through  
Fixture Characteristics

# Method 2, Section 1: Overview

---

- In the case where measuring lamp temperature is not feasible, another way to assess fixture thermal compatibility is to first identify two physical characteristics of the fixture being evaluated.
  - Note that Method 1, which directly measures lamp temperature, is the more accurate and hence preferred method for determining fixture thermal compatibility.
- There are two main features which have to be identified for all fixtures being evaluated for thermal compatibility with Sora Gen3 lamps. This section will identify if any of the two features, open-front and open-back, are present in the fixture under evaluation.
- At the end of this section, user will be able to identify (answer “Yes” or “No”) if the fixture is open-front and if the fixture is open-back.

# Method 2, Section 2: Open-Front

---

- An open-front fixture is a fixture without a glass cover or any accessory directly in front of the lamp lens.
- This includes lens accessories which have openings or which go over the lamp optic (lens area), but may not entirely block or cover the front of the lamp lens (see [3] for example).
- Examples: UV filters, glass covers, louvers, diffusers, etc. These lens covers and accessories enclose or cover the front of the lamp lens and will have to be removed for the fixture to be considered open-front.
- Fixtures without any lens accessories or covers described above are considered open-front fixtures.



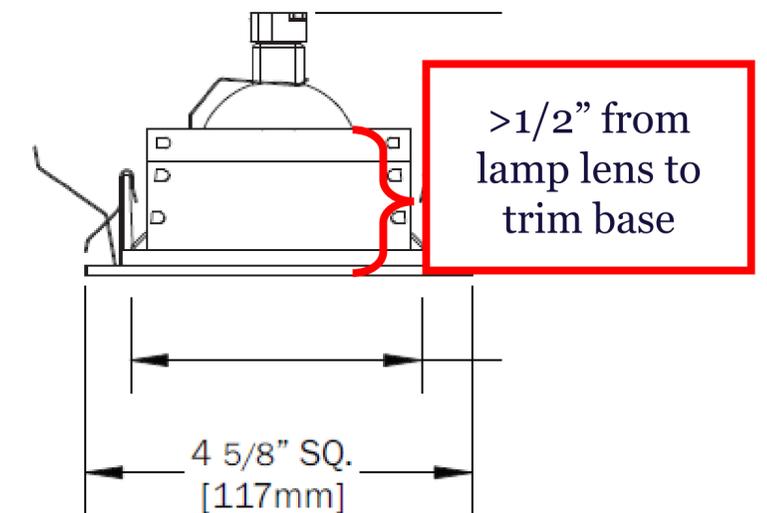
[3] Although covering only a very small portion of the lamp lens, this lens holder counts as a lens accessory and will not be recommended for use with 9W MR16 lamps.

# Method 2, Section 2: Open-Front (continued)

- Snoots (see [4] for example) are considered lens accessories which fully enclose the front of the lamp. Even though they do not cover any portion of the front of the lamp lens, due to their long and narrow construction, fixtures with snoots are not identified as open-front.
- If a fixture is designed such that it extends beyond the lamp lens, or the lamp sits deeply inside a fixture ( $>1/2"$ ), it can be thermally equivalent to having a lens or accessory in front of the lamp (see [5] for example).
- For recessed fixtures, some lamps may sit deep enough inside the housing such that it can be considered a fully-enclosed fixture, even if no trim is used.
- Fixtures with any of the above features are NOT considered open-front fixtures.



[4]: Examples of snoots.



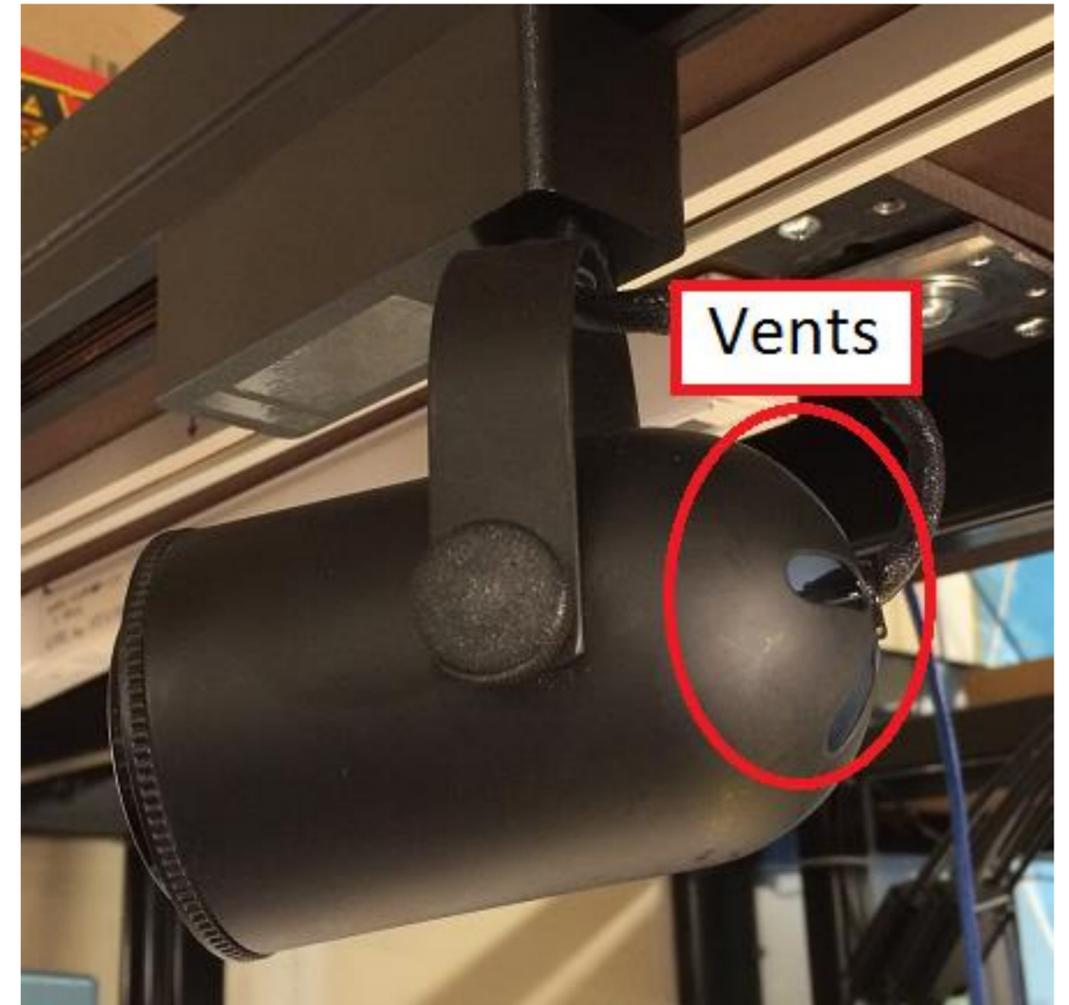
[5]: Example of a trim which sits the lamp deep inside a recessed housing.

# Method 2, Section 3: Open-Back

---

- Fixtures with open backs have the back of the lamp (which houses the driver part of the lamp) completely exposed to ambient conditions, making most of the lamp from the heat sink to the connector pin visible.
- Any holes or openings on any part of the fixture (other than the front opening) are considered vents. Fixtures with such openings or vents are considered open-back.
- Fixtures with openings or vents in them as described above are considered open-back fixtures.
- Recessed fixtures are NOT considered open-back as the ceiling/plenum area where it is installed is assumed to have no airflow.

[6] Example of fixture with vents.



# Method 2, Section 4: Determining Fixture Classification

- Characteristics identified in Sections 2 and 3 of Method 2 will be used to further classify fixtures before determining lamp compatibility in the next section.
- At the end of this section, user will be able to classify fixtures as Open, Partially-Enclosed, or Fully-Enclosed.
- User will also be advised on ways to work with fixtures to ensure compatibility with the widest range of lamps.

# Method 2, Section 4: Classify Fixture Based On Fixture Characteristics

- Based on the results from Sections 2 and 3, fixtures may fall into the following categories:

Open Front?	Open Back?	Fixture Classification	Brief Description
Yes	Yes	Open (1)	<ul style="list-style-type: none"> <li>Lamp is fully-exposed to the environment</li> <li>No glass cover or lens accessory</li> </ul>
No	Yes	Partially-enclosed (2)	<ul style="list-style-type: none"> <li>Open fixture with lens accessory</li> </ul>
Yes	No – but with openings or vents	Partially-enclosed (3)	<ul style="list-style-type: none"> <li>Openings in fixture to allow for some airflow</li> </ul>
No			
Yes	No	Partially-enclosed (4)	<ul style="list-style-type: none"> <li>Fixture sealed in the back, but lens is exposed (no glass cover or lens accessory)</li> </ul>
No	No	Fully-enclosed (5)	<ul style="list-style-type: none"> <li>No vents or openings</li> <li>Front (lens) has a glass cover or lens accessory</li> </ul>

**Table 1: Fixture Classification**

# Method 2, Section 5: Lamp Compatibility

---

- At the end of this section, user will be able to identify which lamps are compatible with fixtures based on their classification in Section 4.

# Method 2, Section 5: Lamp Compatibility (continued)

- Please refer to the table below to determine lamp and fixture thermal compatibility:

	7W Flood	7W Spot	9W Flood
Open [1]			
Partially-Enclosed [2]			
Partially-Enclosed [3]		Compatible with open-front	Compatible with open-front
Partially-Enclosed [4]			
Fully-Enclosed [5]			

**Table 2: MR16 Compatibility**

# Section 6: Notes On Improving Thermal Compatibility

- Open fixtures (fixture classification 1 from Table 1) are the best fixtures for Soraalamps and are thermally compatible with all Soraalamps as they allow lamps to run cool.
- It is best to run fixtures without any lens accessories and have an “Open-Front” configuration as described in Section 2: Open-Front. In some fixtures, this is as simple as removing an optional glass cover, which can change a fixture’s classification (based on Table 1 in Section 4) and opens the fixture to be compatible with a wider variety of lamps.
- Thermal data, when available, should always be the main factor in determining fixture thermal compatibility. When in doubt, or if thermal data is in conflict with Table 2, always go by thermal data (Method 1).