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LED Fixture Datasheet Checklist

Questions listed on this page are listed again on sub-sequent pages with explanations, allowing you to keep this page handy as a single page reference.

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What is the operating temperature range specification?

Was it salt spray tested (for outdoor fixtures) in accordance with ASTM B117? For how long?

What is the lumen maintenance specification?

What LED is inside? Is it a brand name? Was it tested according to IESNA LM-80?

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Is the lumen specification for DELIVERED lumens out of the fixture?

Is the LPW specification for FIXTURE LPW (lumens / watt)?

Are IES files available?

How long has the company been in the LED business? Are you comfortable with them?

Has it been tested in accordance with the IESNA LM-79 standard – absolute photometry?

What is the maximum junction temperature (Tj) specification (at highest ambient temp)?

The junction temperature, known as Tj, is an important parameter used to measure the long term reliability of the LED. The maximum junction temperature specification from the LED manufacturer should not be exceeded even when the fixture is running at the highest ambient operating temperature, and is “in situ” - meaning “in the field”. For example, a recessed downlight has very little airflow. A streetlight in Arizona will run hotter than one in Canada.

What is the operating temperature range specification?

Some LED products are not capable of being operated in high ambient temperature conditions without violating maximum LED junction temperatures (Tj). In colder climates some drive electronics may not function properly. It is important to look at both temperature extremes to make sure the fixture is suitable for your application.

Was it salt spray tested (for outdoor fixtures) in accordance with ASTM B117? For how long?

Salt spray testing is required for all outdoor fixtures and is a test to determine if the product will corrode prematurely. LED technology promises to last longer, but only if the fixture can survive the environment in which it is placed. Some manufacturers run their salt spray tests for weeks. Others don't do any at all. Which one would you want to buy?

What is the lumen maintenance specification?

Lumen maintenance is expressed in hours and is defined by the term L_XB_Y, where X represents the percentage of light output still maintained, and Y represents the number of units that no longer meet the minimum criteria. For example, if a fixture has a lumen maintenance of 50,000 hours $L_{70}B_{10}$, it means that after 50,000 hours of use it will still provide 70% of its initial light output, but 10% of the fixtures will not meet this level of light output. Lightbulbs are typically rated using a B50 standard, meaning that at their rated life, 50% of the bulbs have already burned out. Most LED products do not even use the B number because it is assumed that all the LEDs will still be illuminated, but they will have dimmed down. At this time, most LED products have a lumen maintenance figure that is defined by 70% lumen maintenance (L_{70}). There has been discussion in the LED community to move to an L90 rating as well.

What LED is inside? Is it a brand name? Was it tested according to IESNA LM-80?

It is very important to recognize the brand of the LED in the fixture for two reasons. First and foremost, you are buying an LED product and expect it to last a long, long time. It is relatively easy to manufacture an LED. It is not easy to manufacture a reliable LED that is going to last and have stable color characteristics over time. Second, there is alot of intellectual property surrounding LED technology, and most of it is owned by the largest LED manufacturers. Specifying fixtures that use brand name LEDs minimizes the risk of patent infringement that could result in litigation and / or threaten future availability of replacement fixtures.

IESNA LM-80 is a new standard for predicting the life expectancy of an LED. With life expectancies exceeding 6 years of 24/7 use, it is not commercially practical to test LEDs for their full life and then rate them. LM-80 is a standard test procedure for predicting the life of an LED after as little as 6,000 hours. Making sure the LEDs have been tested according to LM-80 is one more step you can take to make sure the LEDs will perform properly over time.

What is the luminaire life expectancy and warranty?

The new Energy Star standards for solid state lighting require at least a 3 year warranty. If a manufacturer or agent can't provide at least a 3 year warranty on a product they are claiming will last 5 or 10 years – one has to wonder why.

What is the ingress protection rating? (ex. IP65)

IP ratings are “ingress protection” ratings. You must make sure the IP rating is appropriate for your application. Below is a table of what the IP codes mean.

First digit

The first digit indicates the level of protection that the enclosure provides against access to hazardous parts (e.g., electrical conductors, moving parts) and the ingress of solid foreign objects.

Level	Object size protected against	Effective against
0	—	No protection against contact and ingress of objects
1	>50 mm	Any large surface of the body, such as the back of a hand, but no protection against deliberate contact with a body part
2	>12.5 mm	Fingers or similar objects
3	>2.5 mm	Tools, thick wires, etc.
4	>1 mm	Most wires, screws, etc.

5	Dust protected	Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment; complete protection against contact
6	dust tight	No ingress of dust; complete protection against contact

Second digit

Protection of the equipment inside the enclosure against harmful ingress of water.

Level	Protected against	Details
0	not protected	—
1	dripping water	Dripping water (vertically falling drops) shall have no harmful effect.
2	dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15° from its normal position.
3	spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect.
4	splashing water	Water splashing against the enclosure from any direction shall have no harmful effect.
5	water jets	Water projected by a nozzle against enclosure from any direction shall have no harmful effects.
6	powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.
7	immersion up to 1 m	Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).
8	immersion beyond 1 m	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. NOTE: Normally, this will mean that the equipment is hermetically sealed. However, with certain types of equipment, it can mean that water can enter but only in such a manner that produces no harmful effects.

What is the power factor? (ex. PF >0.9)

Power factor applies to AC line driven products and is a ratio of “real” vs. “apparent” power and is not as important to you as it is to the utility company. The lower this number (1 being perfect), the worse it is for the utility. Well designed LED fixtures can have power factors greater than 0.9. The

new Energy Star standard for SSL products requires a minimum PF of 0.7 for residential applications, and 0.9 for commercial applications.

How much power does it consume in the “off” state?

You would be surprised at how much power can be consumed by some poorly designed electronic products when their switches are in the “off” position. Some products consume almost as much power in the “off” state as they do in the “on” state. Energy Star for SSL requires “off” state power draw to be less than 0.5 Watts.

Does it have a UL / CSA / applicable safety mark?

Self explanatory. If there is an applicable UL / CSA or other safety mark for the category of product you are considering, insist on it.

What is the CCT range? (ex. 3000K +/- 175K)

Correlated color temperature is a measure of the color of white light. Higher CCT results in more bluish light. Lower CCT results in warmer, yellowish / orange light – like an incandescent bulb. The unit of measure is degrees Kelvin (K). The eye is more sensitive to variations in CCT at lower color temperatures, so tighter tolerances (ex. +/- 175K) is better for fixtures that operate in these ranges (indoor LED lighting that looks like incandescent / halogen). Larger variations (up to +/- 500K) can be acceptable at higher CCT values such as those used for outdoor streetlights.

What is the chromaticity stability over time?

As mentioned above, LED technology is amazing, but only when executed correctly by skilled practitioners. Products may start out their lives looking the same color from fixture to fixture, but over time begin to look very different. Color stability over time is critical and is measured in McAdam Ellipses (also known as “steps”). 1 McAdam ellipse is noticeable, but barely. Variation of 3 to 4 McAdam ellipses is considered very good. 7 McAdam ellipses will be very noticeable.

What are the tolerances on specifications? (ex. + / - 10%)

Seeing tolerances on specifications does two things for you. First, it tells you how much variation you will see from fixture to fixture in any given parameter. Second, it tells you the manufacturer has actually taken the time to TEST their product for these parameters in a production environment – not just a single unit.

Is it a Lead-free fixture / RoHS compliant?

Lead is a hazardous substance. With today's technology there is no need for lead in LED products and it should not be used. Insist on a lead-free product. RoHS (reduction of hazardous substances) compliance should also be insisted upon. Sustainability is part of the attraction of LED technology. This philosophy should be carried all the way through – even to the packaging the product arrives in.

Is the lumen specification for DELIVERED lumens out of the fixture?

One would assume the lumen claims on manufacturer datasheets would indicate the amount of light actually coming out of the fixture. Unfortunately some manufacturers or importers simply use the lumen value claimed by the LED manufacturer (which is a measurement taken for a fraction of a second at room temperature). For example, manufacturer A uses 10 LEDs that, according to the LED manufacturer, should provide 50 lumens each. The fixture manufacturer simply multiples 50 lumens X 10 LEDs, and assumes their product is a 500 lumen product. This is not accurate. Any lumen data should be actual lumens exiting the fixture. The entire fixture (or LED replacement lamp) should be tested at a photometric lab – and you should request copies of the lab reports. This testing is not expensive. If the supplier can't provide photometric reports, you should consider another product.

Is the LPW specification for FIXTURE LPW (lumens / watt)?

Using the same numbers as above, if the LED manufacturer states their LED is rated at 50 lumens and it consumes 1 W of power, some fixture manufacturers will assume that if they use 10 LEDs X 50 lumens = 500 lumens, and they consume 1 W X 10 LEDs = 10 Watts, their lumens per watt (LPW) is 50. This does not account for many sources of loss including the optical system, electronic driver, and temperature rise. So be cautious when comparing one manufacturer to another. One might have significantly lower performance figures – but it doesn't mean they don't know what they're doing. It could mean one of them is not measuring accurately. LPW is usually included in photometric reports as well.

Are IES files available?

IES files will help tell the real story. These models help lighting designers model light sources in computer software. If a manufacturer has not taken the time to generate IES files for their product I would recommend staying away from that product. It is part of the photometric testing procedure,

and is not expensive to have done. Even if you don't need the files, the fact that they are / aren't available will tell you something.

How long has the company been in the LED business? Are you comfortable with them?

This speaks more to “What's the warranty on the company?”. Have they been in the LED business for a few years? Are they familiar with the standards, associations, etc? Are they simply importing product from overseas and putting it on a website? Do they have references? If so, how long ago did they buy the product? The longer the better.

Has it been tested in accordance with the IESNA LM79 standard – absolute photometry?

LM79 is a new standard for testing LED fixtures / products and is an excellent first step in providing a more equal playing field. By asking for a lab report done in accordance with LM79 you are taking a large step in validating the credibility of the supplier. This testing is NOT expensive, so if a supplier is not willing to provide a test report (which will contain alot of the specifications listed above), one must wonder why. USDOE accredited labs are already testing in accordance to this new standard, and it is printed on the reports.