

What is the Effect of Properly Fastening the Driver to the Heatsink?

Most of the electricity in solid-state lighting generates about 70% heat and 30% light. This is a critical issue, and certainly, if the heat isn't driven away it can raise the temperature level within the LED system jeopardizing the performance, efficiency, and reliability of the LEDs.

Therefore, thermal management in high-powered LED systems is a crucial design consideration. Appropriate thermal management essentially limits the junction temperature to a value that helps ensure the aspired LED lifetime.

One of the most important aspects of thermal management is the heat sink, a passive heat exchanger used to transfer the heat generated by a mechanical or an electronic device to a fluid medium, usually air or a liquid coolant. In this way, the heatsink regulates and maintains the system's temperature at an optimal level.

Here we'll discuss how to properly fasten the LED driver to the heatsink, in order to sustain a good thermal contact quintessential for optimized thermal conductivity.

Properly tightening the screws and clamps is a critical design issue, and if ignored, it can lead to poor thermal contact risking the entire heatsink design.

The best approach obviously is to have enough number of evenly distributed screws across the driver or the board to make sure the LED board is making the best possible contact with the heatsink.

In the case of drivers, it isn't necessary to have all screws, it can also be clips, brackets, and clamps as well. However, having a liberal number of them is the bottom line to ensure that enough pressure is being applied to the LED driver, which enables a reliable thermal contact between the LED board and the heatsink.

It is also important for LED designers to be certain that the screws are tightened in a crisscross manner, and not just in the corners. Only fastening the corners can lead to improper thermal management issues. Ideally, the screws should be tightened almost in a similar way like it is in a head gasket of a car, familiar with most mechanical engineers.

Another factor to take into account is to make sure that the LED board isn't over tightened. Uneven and excessive tightening is something that LED system designers should keep in mind because the driver, if over tightened, can create a bowing effect in the center which produces unwanted air gaps and affects the desired thermal contact.

Interestingly, studies illustrate a staggering 34.1°C difference in thermal conductivity between a loosely fastened module and a properly tightened LED design. A variation of 34.1°C is actually huge, rather alarming, and it will essentially reduce the life of a driver by almost 60% - 70%.

Hopefully, not every case will be that severe but the point to remember is that a loosely connected LED board can be a pressing threat to the overall performance of the LED fixture.

[Thermal management](#) is a critical design parameter, and system designers should consider it with the same priority as the electrical framework. This is necessary because irregular thermal contact can affect the performance, efficiency, and lifetime of a LED module in an adverse way.