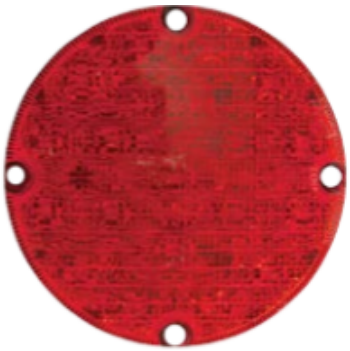
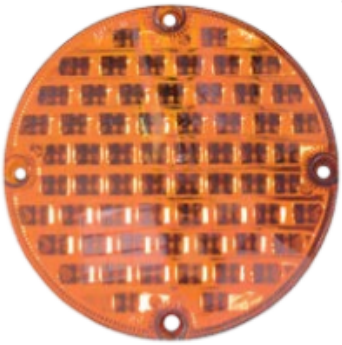
SoundOff Water Intrusion

Parts Update #17-08


SoundOff Lighting – 7” Round Product

The design of the 7” round lights and water intrusion was previously found to be improper screw torque and was mentioned in Tech Tip #15-0106.

New York Bus Sales found that there was an ongoing concern with customers regarding the torque at installation. This was communicated to SoundOff who sought to address the issue.

SoundOff found that improper torques have been used and “**lamps are designed for 10 in-lbs of installation torque by using a torque controlled driver. It has been evident that significantly higher torques are being used at line-side, bus garages and in the field during evaluations.**”

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Testing was done and their engineering designed a solution where "**the changes being made are to absorb the additional installation and inconsistent torque application seen at line side assembly, as well as torque applications during field installations."** They found that when installed and not properly torqued, that a "Cantilever Effect" was made to the light which could cause cracking at installation and in turn water intrusion (Illustration #1). As you can see there is a 3mm difference in the "Over Torque-Foam Fully Compressed" screw as compared to the "Uncompressed" Foam on the "Crush Sleeve" which caused the "Cantilever Effect." A "general practice" used both in production and in the field is to install the lights using the top hole of the light to position and then fully torqueing that screw followed by the bottom screw and then the horizontal screws. This method further affirmed the "Cantilever Effect." Knowing this, SoundOff engineers redesigned the "Crush Sleeve" to be slightly longer (Illustration #2) then the 3mm shown in Figure #1. Testing was performed with torque up to 30in/lbs and had no failures. The actual design changes are listed in Illustration #3 and the process for the testing are listed in Illustration #4.

PLEASE NOTE

TOOLING TO MAKE THESE CHANGES IN PRODUCTION WILL BE ARRIVING SOON AND PRODUCT WITH THE CHANGES IS ANTICIPATED TO BE AVAILABLE STARTING IN OCTOBER 2017

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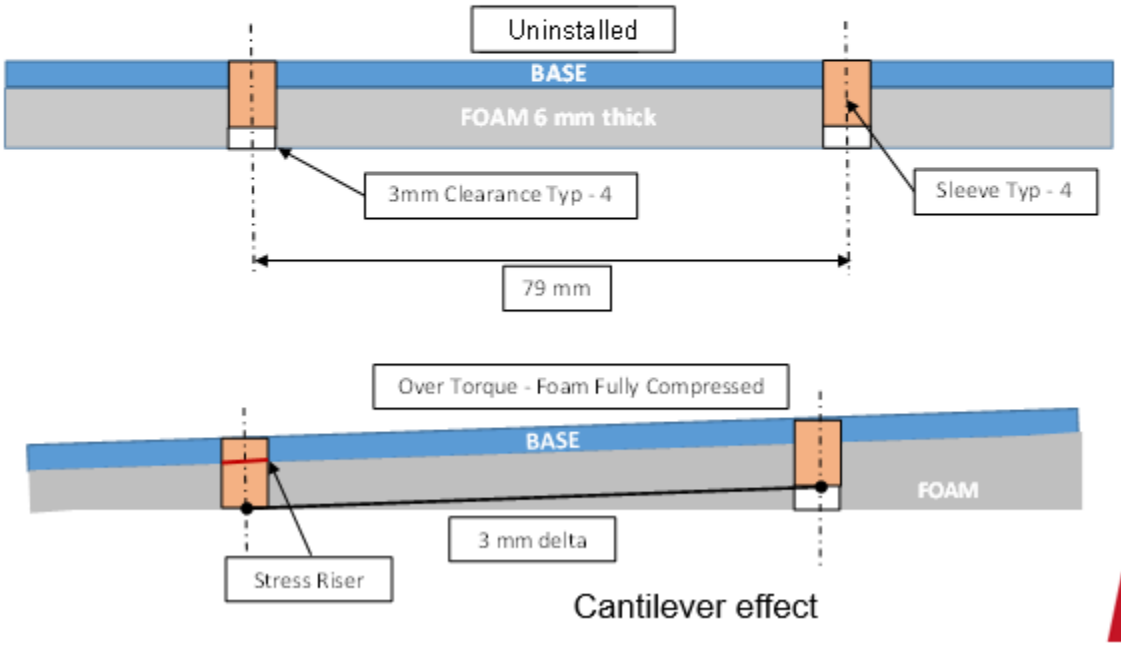
Cantilever Effect

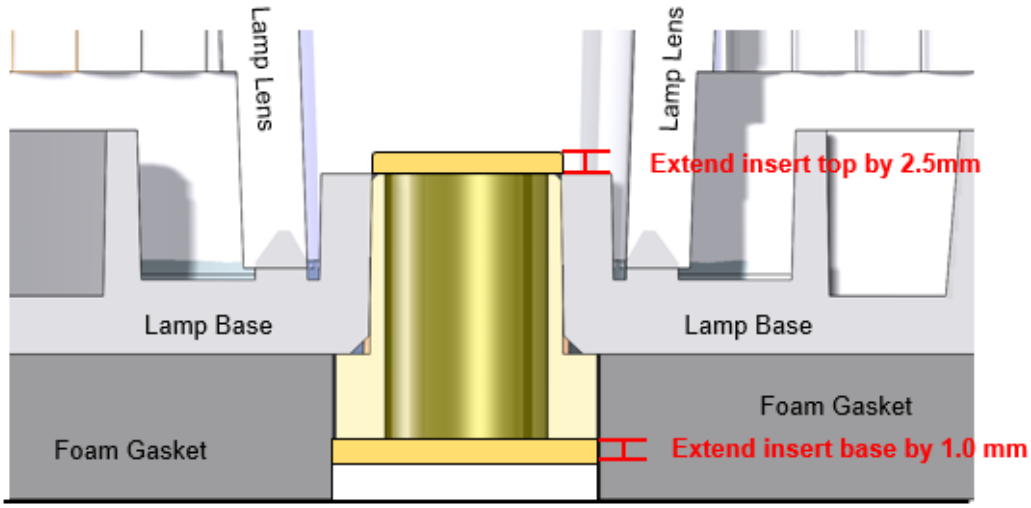
Over torqueing of screws during installation can cause lamps to crack at installation or propagate latent failures



Cantilever effect

Illustration #1

Design Modifications



Cross Section of lamp at insert

Illustration #2

Design Change Description

- Lengthen bottom of insert by 1.0 mm to: Reduce “cantilever” created when applying excess torque (described in following slides) during installation to bus skin.
- Lengthen top of insert by 2.5 mm to support increased screw contact with insert during installation to bus
- We also recommend the use of assembly screws length of 1.25” to assure proper installation torque and assist with installation technique
- These changes may not compensate for out of square/flatness on the bus skins or misaligned pilot holes.

Illustration #3

DOE Procedure

1. Utilize special sheet metal plate with pre-drilled holes at the four screw locations.
2. Use Stainless Steel Machine Screws, #10-24x1-1/4, Phillips Pan Head
3. Use Bosch 18V, 4.0 Ah electric driver for installation
4. Set torque driver to initial setting of 12in-lbs. (to be increased by 3in.-lbs. at each trial).
5. With the first light, align top screw hole in light (Position 1) with pre-drilled hole on sheet metal plate. Start screw four to five turns to hold light to plate with electric torque driver.
6. Align the other three holes and hold the light in place.
7. Start screw in bottom location (position 3) 4 - 5 threads.
8. Start screw in bottom location (position 2) 4 - 5 threads.
9. Start screw in bottom location (position 4) 4 - 5 threads.
10. Screw fastener to desired final torque at Position 1 using electric torque driver while holding light in place.
11. Screw fastener to desired final torque using electric torque driver in Position 3.
12. Screw fastener to desired final torque using electric torque driver in Position 2.
13. Screw fastener to desired final torque using electric torque driver in Position 4.
14. Remove fasteners in reverse order: 4, 2, 3, 1.
15. Perform these steps for all lights
16. Water test all lights in dunk tank, at 10-12inHg for at least 5 seconds. Note any leaks. See Figure 4.
17. If part passes water test, wipe dry and save part, if applicable repeat experiment steps at prescribed higher torque setting.
18. For failed parts, label and record location of leak (i.e.. screw location #), and remove part from further testing. Notify engineer.
19. Run lights through thermal cycling: 12 hours total, 2 hour cycles, -40°C to +85°C
20. Water test lights in dunk tank, at 10-12inHg for at least 5 seconds. Note any leaks.
21. If part passes water test, wipe dry and save part
22. For failed parts, label and record location of leak (i.e.. screw location #), and remove part from further testing. Notify engineer.

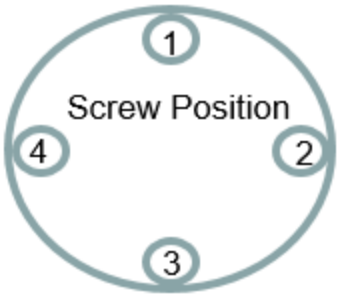


Figure 4

Illustration #4

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