

Excelitas X-Cite® Liquid Light Guide

Troubleshooting Guide

Proper handling and installation of liquid light guides

Liquid light guides have a typical useful life of 4000 hours of operation when handled properly and installed in a well-maintained X-Cite® LED or lamp light source. The formation of bubbles is one of the most common reasons for a light guide to degrade prematurely and result in a sudden reduction in illumination intensity. Bubbles can form without warning, and if they occur within the first 1500 to 2000 hours of use, it is typically due to overheating and/or mechanical stress to the light guide. Below are some simple tips to avoid overheating and stressing the light guide.

1. Always fully insert the light guide into the X-Cite® unit (i.e. up to the white line); this ensures contact with a heat sink to conduct heat away from the light guide.



Incorrect



Correct

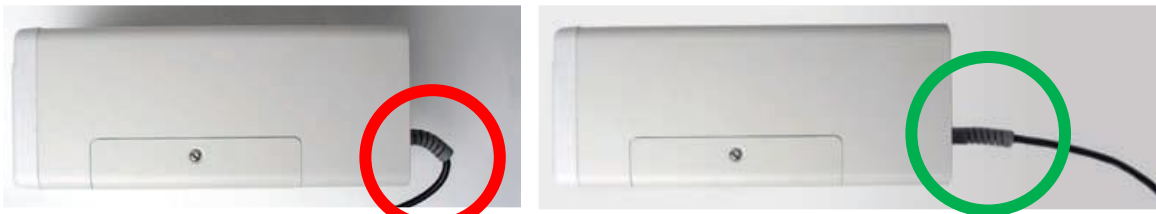
2. Always allow adequate clearance at the rear of the X-Cite unit and microscope to prevent excessive bending and/or crushing of the light guide against walls. Minimum bend radius to prevent immediate damage to the LLG is 40mm, however, a bend radius of at least 75mm is recommended for a light guide while "in use". Sharper bends can cause heat to build up and cause problems longer term.



Incorrect

Correct

3. Always place the X-Cite unit close enough to the microscope so that there is some slack in the light guide and no sharp bends.



Incorrect

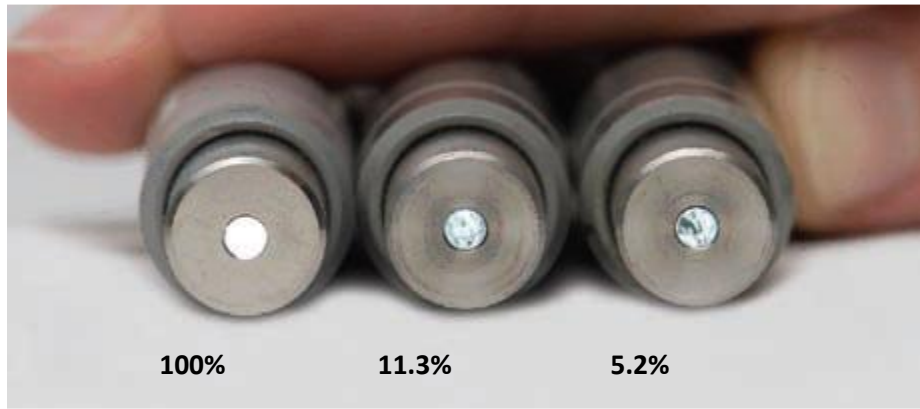
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4. Never leave an endcap on the output end of the light guide when the other end is connected to the X-Cite unit; if the unit is turned on in this condition, the cap will overheat, melt and/or permanently discolor the quartz end of the light guide.
5. Do not expose the light guide to extreme temperatures (above 35°C, below -5°C) for extended periods of time during use, transport or storage; this may cause degradation of the seals and allow air bubbles to form in the liquid.

What does a bubble look like?

Depending on the size and location in the light guide, a bubble may or may not be obvious. To check for bubbles:

1. Disconnect the LLG from the X-Cite® and microscope adapter.
2. Hold one end towards a bright window or overhead room light - DO NOT use an X-Cite or any other focused light source for this test!
3. Look at the quartz at the other end of the LLG
 - a. Bubble-free: quartz end will appear as a bright, solid circle; you may also be able to see a thin circular outline at the quartz/liquid interface.
 - b. Bubbles at/near the quartz end: appear as dark spots, as small as 0.5mm in diameter or even as larger more defined spheres.
 - c. Bubbles in the middle of the light guide: may not be well-defined spots, but will appear as dark shadows.
 - d. In extreme cases where the bubble is blocking the entire diameter of the light guide, no light will come through, even when pointing the distal end at a light source.



Appearance and % output of light guides with bubbles relative to an LLG without bubbles (100%).

Can a bubbled light guide recover?

Yes, light guides with small bubbles can sometimes recover. Disconnect the light guide from the X-Cite unit, and leave the light guide undisturbed on a shelf for 1-2 weeks. For this to be effective, it is important to catch the bubble when it is small.

When should light guides be replaced?

It is usually time to replace a light guide when:

- Illumination is low and replacing the lamp does not improve brightness
- Dark or uneven areas become visible in the field of view (a bubble is blocking part of the light)
- A section of the light guide becomes noticeably warmer than the rest of the guide (a bubble is blocking transmission of light, forcing the light guide to absorb the energy)
- It is 2-3 years old OR has been in use for 4000-6000 hours (2-3 lamp changes), when handled properly in a well-maintained unit.

** This Guide was extracted from the X-Cite 120 Troubleshooting Guide by Excelitas.*

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