

Laser Lamps for General Illumination and Image Projectors

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What are Laser Lamps?

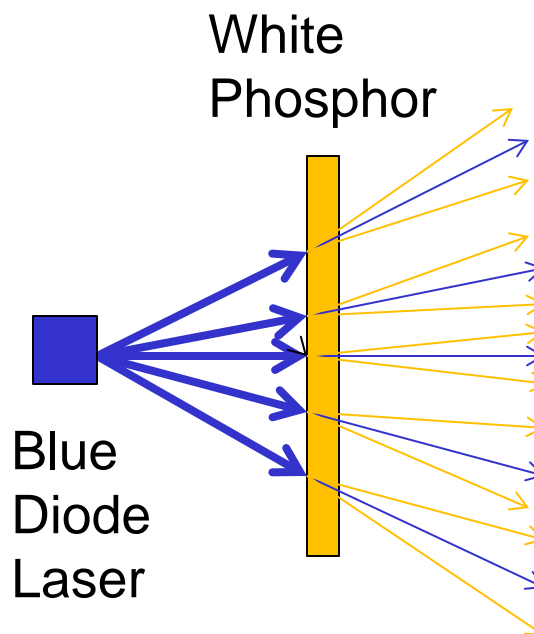
- Laser lamps are a new type of white-light source that can be more efficient than LEDs at higher output levels – The brightest lamps could be replaced with laser lamps
- Useful for high-bay warehouse lighting, projector lamps, spotlights, stadium lighting & car headlamps
- Subject of US Dept. of Energy efforts as part of The Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007

Laser Lamp Potential Benefits

- Lower energy consumption
- Longer lamp lifetimes - as much as 50,000 hours; should lead to fewer ladder accidents from lamp replacement
- No injuries from broken lamp glass
- New lighting formats and aesthetics
 - Projected video on walls in public spaces for art and information

Lamp Type: Remote Phosphor Pumped by a Blue Laser

- Blue laser pumps a remote, yellow phosphor to produce white light
- Very similar to LED lamp technology, but can be brighter due to the higher output of blue lasers



Lamp Type: Direct Multi-Color Laser

- 3 or 4 laser colors combine to directly produce white light
- Higher efficiencies than phosphors
- No phosphor lifetime issues
- Uses: endoscopic illuminators and more

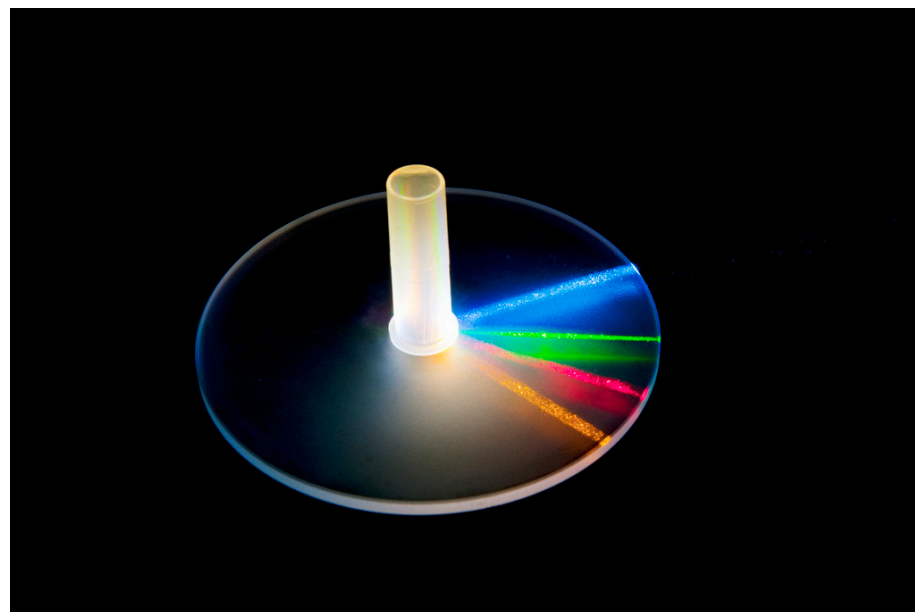
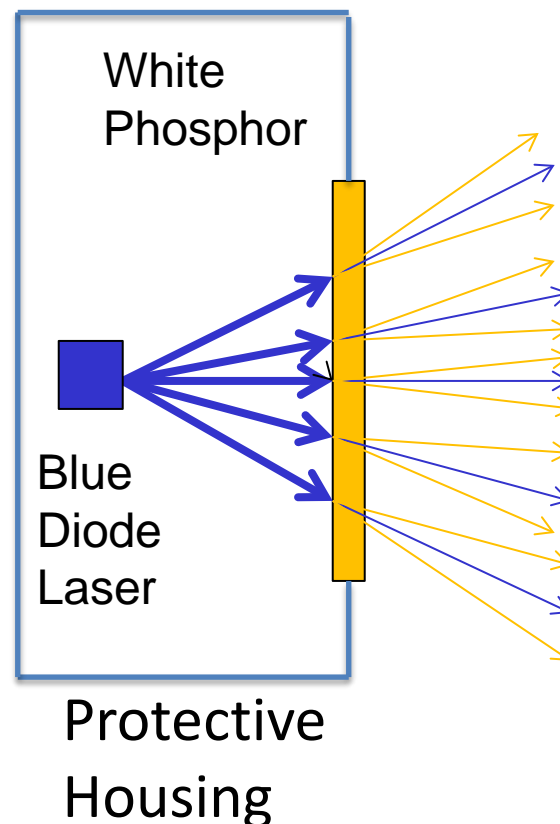


Photo: Sandia National Laboratory - US Dept. of Energy

Potential Health Risks of Laser Lamps

- Protective housing failure of laser lamps
 - Possibility of phosphor or diffuser burn-through
 - Component lifetime aging test reporting:
21 CFR § 1002.10(h)



Potential Health Risks of Laser Lamps

- Concerns about the reliability and uniformity of human physiological responses to bright light merit further study
- Blue-light disruption of circadian rhythms are a concern for some researchers
 - Do laser lamps have disruption effects similar to LEDs?

Laser Illuminated Projectors (LIPs)

- Laser lamps are used to replace halogen projector lamps
- Hybrid lamps combine LEDs with laser-pumped phosphors
- An ocular hazard zone exists in front of the lens of the brightest projectors



Photo: Wikipedia.org, public domain media file



Current Regulatory Status: Laser Illuminated Projectors (LIPs)

- CDRH issued LIPs guidance on Feb. 18, 2015
 - IEC 62471 risk group classification system was used, but with different qualification criteria
 - Risk Group 2 LIPs and lower are certified as per the LIPs guidance
 - Risk Group 3 LIPs for all installations require a variance

What does FDA want to do?

- FDA is studying the requirements of engineering controls for non-cinema Risk Group (RG) 3 LIPs in fixed and non-fixed installations, which could provide a virtual protective housing to protect the hazard zone in front of a RG3 projector lens

What does FDA want to do?

- FDA is contemplating engineering controls that could detect protective housing failures from reasonably foreseeable failure scenarios such as broken automotive headlights
- There is precedent: under 21 CFR 1040.30, Type T mercury vapor lamps have engineering controls to protect against hazardous protective housing failures

Questions

- What are your concerns regarding protective housing and optical component failures in these products and resultant safety issues?
- What is the best way to assure the safety of these products (e.g., existing FDA performance standard, a combination of the FDA performance standard and a lamp standard)?

Questions

- What is the Committee's opinion of the FDA virtual protective housing approach, using engineering controls to protect the nominal ocular hazard zone from human access?

