

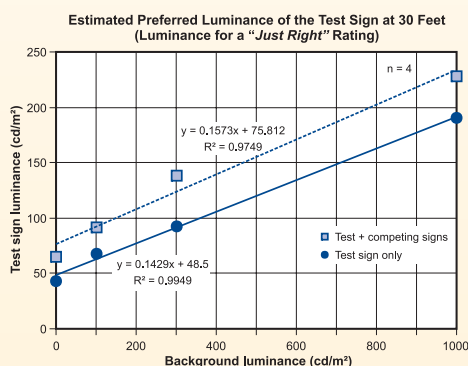
Luminance Requirements for Lighting Signage



The promise of energy and maintenance cost savings makes light-emitting diodes (LED) a viable technology to displace neon and fluorescent light sources in lighted signage applications such as backlit channel-letter signs.

To become a successful replacement for traditional light sources, LEDs must gain user acceptance by meeting certain subjective criteria, including brightness, an important element to a sign's attention-grabbing capabilities and legibility. No luminance standards for lighted signs based on visibility exist in North America.

Businesses commonly install brighter signs to compete with signs from adjacent businesses. A field survey in Troy, N.Y. showed the luminance of typical red channel-letter signs may reach 400 cd/m². This may exceed the luminance needed to read a sign and may result in higher energy use and light pollution and trespass.



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Experiments

The LRC conducted two human factors laboratory experiments to determine a suitable range of luminance for red channel-letter signs under typical background light levels and viewing distances, and whether the sign is seen in isolation or adjacent to similar competing signs.



Results

- Preferred sign brightness is a function of background luminance. Brighter backgrounds call for brighter signs. For the conditions tested, the most preferred sign luminance ranged from ~40 cd/m² for the dimmest backgrounds to ~190 cd/m² for the brightest.
- If adjacent signs are present, a higher sign brightness is preferred. In the range tested, the incremental sign luminance or its acceptability rating was not a function of the adjacent signs' luminance. The most preferred sign luminance ranged from ~65 cd/m² for the dimmest backgrounds to ~230 cd/m² for the brightest. Acceptability ratings were similar to the above when competing signs were not present.
- Increased viewing distance indicated a preference for brighter signage.

Understanding more fully the luminance requirements of lighted signage for different colors in the field will lead to the development of optimal design criteria for creating more energy-efficient and visually effective signs.

LRC Solid-State Lighting Program

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