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# LM-80 Update

Spring TPC Meeting April, 2021  
Presented by Jeff Hulett, Vektrex



# LM-80 Document Update: Starting point – 2 PIFs

- Laser Diode PIF Scope:

The objective is to add support for laser diode packages and arrays that are intended for general illumination or visual indication. LM-80's scope will have to be expanded carefully to ensure applicability; for example, it may be necessary to require that only packages containing both the diode(s) and phosphor may be tested.

- Filament-Like LED Scope:

The objective is to ensure LM-80 is applicable for recently-developed filament-like LED packages and arrays. It is expected that some changes to LM-80's environmental conditions and maintenance test procedures sections may be required.



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# Expert, Active WG Participation => Scholarly Update

- LED and laser device manufacturers
- Testing labs
- Equipment manufacturers
- Consultants
- National standards organization
- Lighting manufacturers
- Government

Thank you:

Anton Belyaev

Carl Bloomfield

Eric Bretschneider

Aaron Feldman

KC Fletcher

Yuya Harada

Jianzhong, Jiao

Mihaly Kotrebai

Kurt Liepmann

Jeffrey Lockner

Cameron Miller

Yoshi Ohno

Emil Radkov

Seng Hup Teoh

Anders Thorseth

Ralph Tuttle

Yuqin Zong

And others

# Unprecedented COVID-19 Shutdown Enhanced Progress

- Weekly 2-hour remote meetings
  - Eliminated wasted time “catching up”
  - Allowed “deep-dive” in key areas
    - Light capture topic simulated extensively
- Open sharing of quantitative data
  - Nichia testing results
  - Filament bulb gas analysis
  - Improved decision making
- True “science-first” participation
  - Decisions based upon what will produce the best data in the most practical way

# Excellent Support From Headquarters

- Dawn De Grazio
  - Timely, precise editing
  - Was not afraid to challenge working group
- Pat McGillicuddy
  - Pushing document forward
  - Organizing ballots
  - Tracking deadlines
  - Being patient
- Alex Baker
  - Key inputs and commentary





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# LM-80 Changes In Detail



# LM-80-21 Changes

Change	Discussion
Scope expanded to include lasers and UV LEDs	Added lasers, WG decided not to add filament-like LEDs as these are better suited to testing as finished products. OLEDs were discussed but not added as these are difficult to instrument and test in chambers. The scope was reworded to include non-visible illumination sources such as horticultural and UV LEDs in the range of 200 to 2000nm.
Definitions updated to be more consistent	A lot of time and effort went into this area. Many definitions were updated to make them more consistent and exact, and to align them with IES LS-1-20 and CIE definitions.
$T_s \Rightarrow$ TMP	The $T_s$ point is now called the TMP temperature; it may be a point external to the package

# LM-80-21 Changes

Change	Discussion
<b>Air is now the required atmosphere</b>	Air is now required, LM-80 tests may no longer be performed in special atmospheres such as helium
<b>Extrapolation requirements in other documents should be reviewed</b>	Labs should review requirements in TM-21 and other applicable documents prior to commencing testing to ensure measurement intervals, test duration, etc. will meet those requirements.
<b>Optical measurements must now capture all light</b>	The DUT must now be coupled to the sphere to capture at least 98% of the DUT's light output. A goniospectroradiometer may also be used.
<b>Wavelength-related measurements clarified</b>	The requirements for chromaticity, peak wavelength, centroid wavelength, and dominant wavelength were made more explicit and matched to reporting requirements



# LM-80-21 Changes

Change	Discussion
<b>Spectral-Power Distribution requirement added</b>	The requirement for reporting SPD (using the electronic data format (SPDX) specified in ANSI/IES TM-27
<b>A self-absorption is required at each measurement interval</b>	This corrects for changes in the load board housing the DUTs
<b>Chromaticity coordinates may use CIE 1976 (<math>u'</math>, <math>v'</math>) or CIE 1931 (<math>x</math>, <math>y</math>)</b>	This was done to support the automotive industry, which uses $x$ , $y$ exclusively
<b>DUTs may be classified as failures if <math>V_f</math> or <math>I_f</math> shifts by 50%</b>	This allows test labs to remove DUTs that cannot be driven due to excessively high compliance
<b>TMP location must be documented with image or drawing</b>	This allows the test to be duplicated by another laboratory; it also allows a comparison measurement in a luminaire to use the same location

# LM-80-21 Changes

Change	Discussion
Data reporting clarified	Normalized measurements are now specifically allowed. Chromaticity measurements have also been clarified. These changes align LM-80 with typical laboratory practice
IES TM-27 Spectral Power Distributions added as optional item	This supports future use of the data for other research applications
Thermal modeling eliminated as a way to monitor TMP temperature	The group thought this was too inexact; no labs seem to be using this practice
Informative annex on COB devices added	Discusses pitfall and best practices for testing COB devices
Informative annex on laboratory best practices added	Discusses various best practices contributed by working group members

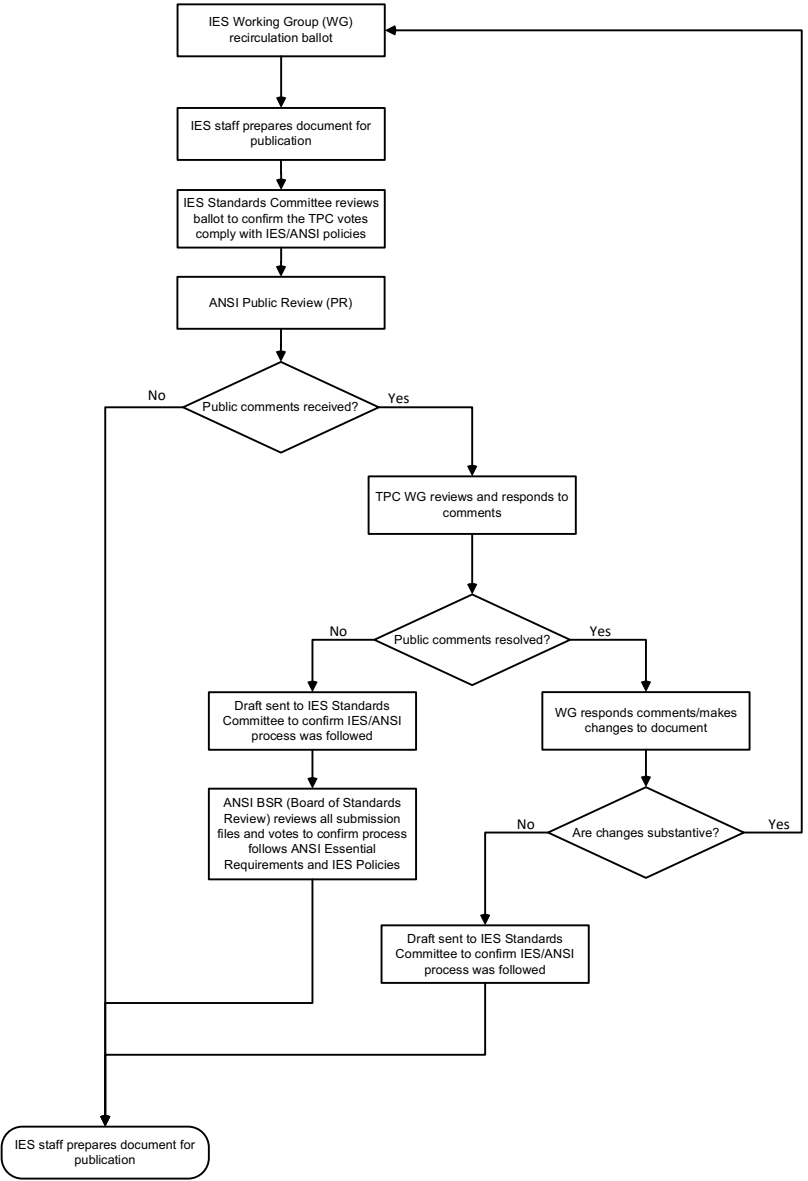


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# LM-80 Publication Process



# Document flow going forward





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# Thanks Everyone!

