



## Position Statement on Temporal Light Artefacts

2 July 2019

The Global Lighting Association (GLA) advises against overly strict flicker and stroboscopic visibility measure (SVM) requirements for lighting products that would add unnecessary costs to most lighting products.

GLA supports the use of the [NEMA 77:2017](#) guidelines<sup>1</sup> for limits on Temporal Light Artefacts metrics as this is the only existing Standards Development Organisation (SDO) publication that has developed acceptance criteria.

GLA rejects any stricter criteria unless SDO science-based publications establish the need for stricter criteria based on peer reviewed research findings.

### About flicker and stroboscopic effect

**Temporal Light Artefacts** (TLAs) are undesired effects in the visual perception of a human observer induced by temporal light modulations. Two well-known examples of such effects are **flicker** and **stroboscopic effect**.

---

*Light Sources:*

**Table 6**  
**Guidelines for P<sub>st</sub> and SVM Acceptance Criteria**

Application area	P <sub>st</sub> limit	SVM limit
Outdoor	≤ 1.0	None
Indoor	≤ 1.0	≤ 1.6

Until recently, several metrics such as Modulation Depth, Flicker Index and Flicker Percentage were used. However, none of these metrics were suitable to predict human perception which is affected by modulation depth, frequency, wave shape and duty cycle. New metrics have been developed to include all these influences and to predict human perception.

The term ‘flicker’<sup>2</sup> refers to variation in the luminance or spectral distribution of a light source (i.e. visible without motion of eye, light source or illuminated objects) generally visible in the frequency range less than 80Hz. The widely accepted metric used to measure the perception of flicker is *short term flicker severity* ( $P_{st}^{LM}$ ).

‘Stroboscopic effect’<sup>3</sup> is the apparent discrete movement of moving objects in flickering light as perceived by a stationary observer. This effect can occur when light is fluctuating at a rate above 80Hz. Stroboscopic Visibility Measure (SVM) is the widely accepted metric developed to predict human perception of stroboscopic effect.

SVM is not applicable for industrial applications (e.g. rotating machines) or to predict interference with devices with an optical input (e.g. cameras, barcode scanners). SVM is based on visibility and has been determined from measurements involving around 200 human observers.

Measurement of these new metrics is described by IEC: [IEC TR61547-1, edition 2](#) for  $P_{st}^{LM}$  and [IEC TR63158, edition 1](#) for SVM.

The global lighting industry supports the use of these new metrics in specifications as well as in research, including future research to investigate potential links between temporal light modulations and health-related effects. (See for example [LightingEurope position paper](#), [NEMA position paper](#).)

## GLA Recommendations

With respect to Temporal Light Artefacts and regulatory initiatives, GLA provides the following advice:

### 1. Parameters

- The terms Modulation Depth, Flicker Index or Flicker Percentage should not continue to be used as they are not suitable to predict human perception and are not widely accepted by the scientific community.

---

<sup>2</sup> [CIE TN 006:2016 contains a widely accepted definition of flicker](#)

<sup>3</sup> [CIE TN 006:2016 contains a widely accepted definition of stroboscopic effect](#)

- The use of definitions and terminology according to [CIE TN 006:2016](#) is strongly recommended. As above, these definitions include the metrics  $P_{st}^{LM}$  and SVM.

## 2. Regulatory limits

- The global lighting industry would accept the limits recommended in NEMA 77:2017.
- The implementation of limits that are more stringent than those recommended by NEMA 77: 2017 without compelling peer reviewed research findings will add unnecessary costs to products. This is unacceptable to the global lighting industry and would likely be regarded as unacceptable by consumers.
- Scientific research to define acceptance criteria for various applications are still in progress.
- Although measurement methods have been published, there are few test institutes capable and accredited to test to these new metrics.