



Luminance & Illuminance Compliance

St. James Tower – Manchester

Contents

Introduction 3

1.CIE limits for Illuminated signs..... 4

 1.1 LED Tape Dimensions..... 4

 1.2 Illuminance - Calculation..... 5

 1.2.1 LED Aston 1615 RGB 5

 1.2.2 LED Captain RGB 5

2. Pre and Post-Curfew limits..... 6

 2.1 Calculation parameters..... 6

 2.2 Calculation summary 6

Conclusions 7

Introduction

This document has as main purpose to demonstrate that the designed system complies with CIE limits for illuminated signs/outdoor lighting, which in an urban environment specifies a maximum of 1000cd/m² and that the system also complies with the luminance levels of 25lux pre-curfew and 5lux post-curfew in the surrounding buildings.

1.CIE limits for Illuminated signs

1.1 LED Tape Dimensions

There two types of tape specified, a standard 16mm wide to be used in the canopy and reception areas and a large 35mm wide tape to make the roof perimeter.

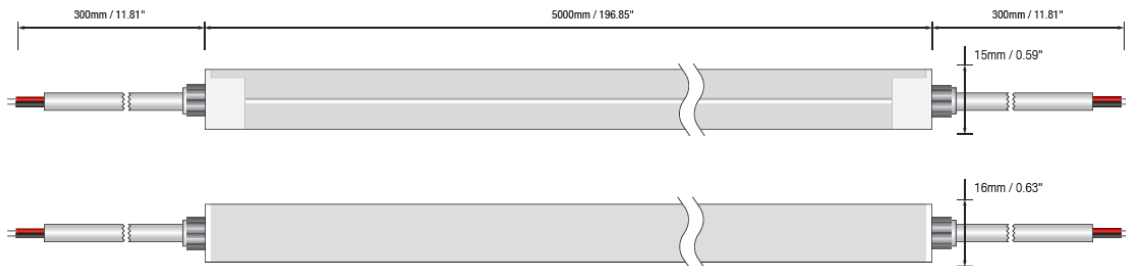


Fig. 1 – LED Aston RGB tape dimensions – Lower level

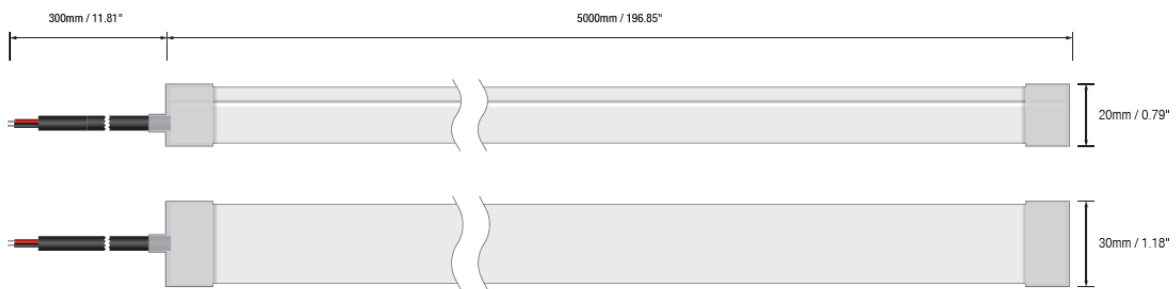


Fig. 2 – LED Captain RGB tape dimensions – Roof Perimeter

1.2 Illuminance - Calculation

Demonstration of the maximum output allowed for LED Aston RGB tape and LED Captain RGB tape.

1.2.1 LED Aston 1615 RGB

- Typical illuminance – 246lm/m
- Typical peak luminance – 75.6 cd/m
- Typical candela per square meter (full RGB) – 4780cd/m²

As the values above exceeds the limit of 1000cd/m² specified by the CIE, the RGB tape will have to be provided with a dimmed output managed by the control gear specified.

In order to comply the LED Aston 1615 RGB tape will have to be dimmed to a maximum of 20%. Calculation proving it will comply:

- Typical illuminance at 20% output – **49lumen/meter**
- Typical peak luminance – 15 candelas
- Typical candela per square meter (full RGB) – **937.5cd/m²**
 - o Area of emission – 16mm x 1000mm = 16000mm² = 0.016mm²
 - o cd/m² = 15cd/0.016mm² = 937.50cd/m²

Based on the calculations above, the LED Aston 1615 RGB tape will have to be dimmed to a maximum of 20%. **Any dimming equal or below the 20% will comply with the CIE normative.**

1.2.2 LED Captain RGB

- Typical illuminance – 352lm/m
- Typical peak luminance – 108 cd/m
- Typical candela per square meter (full RGB) – 3601cd/m²

As the values above exceeds the limit of 1000cd/m² specified by the CIE, the RGB tape will have to be provided with a dimmed output managed by the control gear specified.

In order to comply the LED Captain RGB tape will have to be dimmed to a maximum of 25%. Calculation proving it will comply:

- Typical illuminance at 25% output – **90lumen/meter**
- Typical peak luminance – 28 candelas
- Typical candela per square meter (full RGB) – **933.3cd/m²**
 - o Area of emission – 30mm x 1000mm = 30000mm² = 0.030mm²
 - o cd/m² = 28cd/0.030mm² = 933.33cd/m²

Based on the calculations above, the LED Aston 1615 RGB tape will have to be dimmed to a maximum of 25%. **Any dimming equal or below the 25% will comply with the CIE normative.**

2. Pre and Post-Curfew limits

In order to comply with the regulations, the illuminance at any given window opposite to the position of the illuminated building **must not exceed the 25lux pre-curfew and 5lux on post-curfew** hours.

2.1 Calculation parameters

The calculations made assumed the maximum output allowed for both types of tape, 20% for Aston and 25% for the Captain.

In the calculation, the measuring planes were set higher than St. James tower, to ensure that the illuminance would comply not only the existing surrounding buildings but will also comply with any building that may arise in the future.

Measuring planes height – 63meters.

The lighting calculation can be checked on the “St. James Tower - Lighting Design.pdf”

2.2 Calculation summary

Maximum illuminance levels registered:

- George street
 - o 0.46lux, 55m to 60m AFFL
 - o Maximum building height across the street – circa 30 meters
- Charlotte Street
 - o 1.44lux, 10m AFFL
 - o Maximum building height across the street – circa 18 meters
- Faulkner Street
 - o 0.73lux, 55m to 60m AFFL
 - o Maximum building height across the street – circa 54 meters
- Chain Street
 - o 4.83lux, 55m to 60mm AFFL
 - o Maximum building height across the street – circa 18 meters

Considering the values above, it can be confirmed that **the project proposed will comply with the standards for both pre and post-curfew limits.**

Conclusions

In order to comply with the applicable regulations, the LED Aston 1615 RGG tape will be set to a dimming level up to 20% of its maximum output, whilst the LED Captain RGB tape to a maximum of 25% of its maximum output.