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# OVAB Europe White Paper

## Viewing Angle Measurement

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# Viewing Angle Measurement | Introduction



- The technical specification ‘viewing angle’ of a LED display defines at which angle a minimum of acceptable viewing quality can be guaranteed
- The viewing angle is an important KPI for LED displays, as it gives the customer a possibility to select a display according to the dedicated specifications of the individual Digital Signage installation
- The viewing angle is usually measured with a standardized technical method. However, there does not exist a standardized and binding method to interpret and disclose the results of the measurement
- The white paper gives an overview of the different methods and their implications for the definition of LED display viewing angles. It also includes an OVAB Europe recommendation for the standardized measurement and disclosure of the viewing angle.

# Viewing Angle Measurement | Definition



- The viewing angle is a technical specification to describe the maximum angle at which a display can be viewed with acceptable visual performance
- The viewing angle is defined as the angle where the measured light intensity is 50% of its maximum value
- The white paper concerns LED displays only





- Most widely used method of measurement
- Technical instrument: Spectroradiometer
- Measurement unit: candela (cd), candela per square meter ( $\text{cd}/\text{m}^2$ , or NIT)
- Method: The spectroradiometer is moved on a circular path around the LED display to measure the different level of luminosity according to the relative viewing angle until the measured light intensity is 50% of its maximum value
- Problem: The number of LEDs in the relative viewing angle will increase compared to the measurement setup in the  $0^\circ$  position resulting in a higher candela measurement for the actual viewing angle
- Solution: Mathematically recalibrate the side effect of the increasing display surface that is subject to the measurement

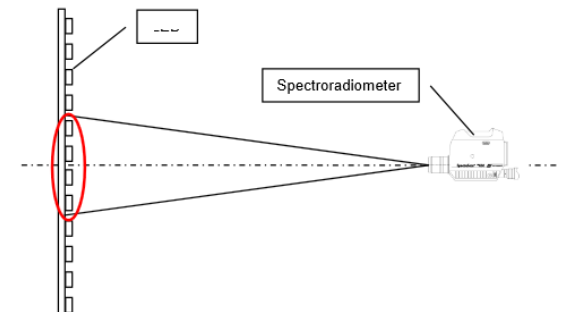


Fig. 1: Measuring LED display brightness by using a spectroradiometer (Barco)

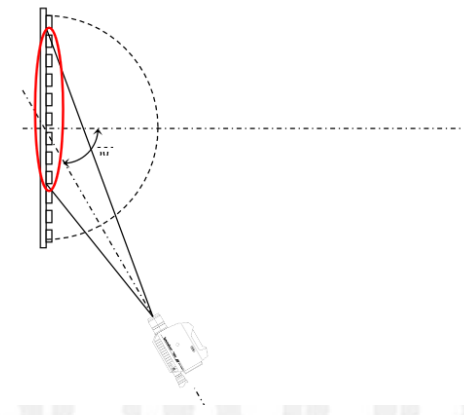


Fig. 2: Measuring LED display brightness under  $60^\circ$  angle (Barco)

# Viewing Angle Measurement | Luminance



- Measurement method that rules out the side effect of increasing display surface from the beginning due to its methodological approach
- Technical instrument: lux meter
- Measurement unit: lux
- Method: The lux meter is moved on a circular path around the LED display to measure the different level of luminance according to the relative viewing angle until the measured light intensity is 50% of its maximum value



# Viewing Angle Measurement | Recommendation



1. Make the customer aware of the different implication that a certain technical specification has
2. Use the most accurate and widely used measurement method to define the technical specifications of the display
3. For the measurement of the loss of brightness under a widening viewing angle use one of the following methods:
  - a. Luminosity measurement with mathematical corrective
  - b. Luminance measurement





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