TECHNICAL NOTE

Methods of determination of technical parameter
Screen size (diagonal) 70”

- **Applied measuring and auxiliary means**
  Ordinary folding rule (length: 2m) with metrical scale, accuracy class III (+/- 1.4mm)

- **Applied testing method**
  The image height & image width will be evidenced: the screen’s width and height will be measured at the front side of the cube and the results will be noted down in millimetre [mm].

- **Expected result / tolerance**
  image width = 1400mm, image height 1050mm. Deviations are based on the tolerance of the method (ca. 2%) and the accuracy of measuring means.

*Additional information on screen sizes:*

The size of the screen’s diagonal states a certain dimensional quantity. At this the size is rather a classification than an indication of the exact size. The exact physical dimensions (width and height) are given in the according data sheets. E.g. sizes from 68” to 71” are commonly referred to as 70”, whilst sizes from 58” to 61” are described as 60”. This methodical approach has its seeds in the TV/broadcast industry.

**Luminance: min. 120 cd/m²**

- **Applied measuring and auxiliary means**
  **Maximum luminance**: test pattern “100% White” with native resolution SXGA+ (1400x1050 pixels),
  **Medium luminance**: test pattern with calibrating points for adjusting the measuring instrument.
  **Measuring instrument**: spectrometer type: Photoresearch PR655

- **Applied testing method**
  **Maximum luminance**: measurement of luminance in the centre of the screen.
Medium luminance: measurement at nine different points and average determination of the measured luminance values. New or reconditioned UHP-test lamps.
Measuring distance: 2m at exact 90° the screen surface.

- Expected result / tolerance
  Maximum luminance ought to be in the range of +/- 2% of the given reference value. Deviation might occur due to different stages of aging and general variation of the lamps.

Test pattern:

Maximum luminance is measured at point 5. Medium luminance is given as average of the measured values of the points 1 to 9.

Additional information on luminance:
Luminance describes the brightness of a light source or object. It expresses in numbers, how bright an object appears to the viewer but not how bright it is somewhere. Objective brightness is described by the so-called illumination. Cd/m² means candela per square meter and is the unit of measurement of a screen’s brightness, more precisely the luminance of a surface-emitting diode.
Resolution: min. SXGA+ 1400x1050

- **Applied measuring and auxiliary means**
  Test pattern „Dot-Pattern“ (each 2nd pixel black-white / continuous frame of 1 pixel in red) with native resolution SXGA+ (1400x1050 Pixel)

- **Applied testing method**
  Visual assessment whether each pixel is displayed natively and whether all pixel are displayed in full frame.

- **Expected result / tolerance**
  Clear presentation of each Sw / Ws pixel and the continuous frame in red. Through geometry adjustment for optimising the transitions, the marginal pixels could partly disappear (“in the Off”).

Aspect ratio: 4:3

- **Applied measuring and auxiliary means**
  Ordinary folding rule (length: 2m) with metrical scale, accuracy class III (+/- 1,4mm)

- **Applied testing method**
  The screen’s width and height will be measured at the front side of the cube and the results will be noted down in millimetre [mm]. The aspect ratio is calculated based on the measured height and width.

- **Expected result / tolerance**
  A width of 1400mm and a height of 1050mm are expected. This results in an aspect ratio of 1400/1050 = 1,333 which is equivalent to 4/3. Deviations are based on the tolerance of the method (ca. 2%) and the accuracy of measuring means.
Lamps: double lamp system with automatic lamp switching, without loss of picture

- **Applied measuring and auxiliary means**
  PC with control software „eyevis eyeCube“, current version

- **Applied testing method**
  The lamp change is triggered via software (simulation of lamp failure). The subsequent change of the lamps without loss of the image is demonstrated by an engineer at an operating device.

- **Expected result / tolerance**
  Automatic switch to stand-by lamp. Manual switch of the 2\textsuperscript{nd} lamp without loss of picture.

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Average lamp lifetime: min. 8,000 hrs

- **Applied measuring and auxiliary means**
  Definition of MTBF, manufacturer’s verification

- **Applied testing method**
  -none-

- **Expected result / tolerance**
  -none-
Contrast: min. 1,600:1

- **Applied measuring and auxiliary means**
  - **full-on / full-off contrast**: full white and full black picture in native resolution SXGA+ (1400x1050 pixels)
  - **ANSI contrast**: chessboard test pattern with 16 fields in native resolution SXGA+ (1400x1050 pixels)
  - **Measuring instrument**: Minolta Color-Analyser CA-100 with adapter for measuring directly on the screen's surface.
  - **Measuring environment**: complete dark environment. Reconditioned UHP-test lamps.

- **Applied testing method**
  - **full-on / full-off contrast**: Measurement of luminance for completely white and black image. Calculation of the contrast ratio.
  - **ANSI contrast**: Measurement of luminance of all white and black fields of the chessboard test pattern. Calculation of the contrast ratio by averaging the measured luminance values.

- **Expected result / tolerance**
  The measured full-on/full-off contrast shouldn’t fall below the reference value by more than 2%. Deviations are based on the tolerance of the method (ca. 2%) and the accuracy of measuring means as well as the given ambient conditions and lamp tolerances.

**Test pattern ANSI contrast:**

![Chessboard Test Pattern](image)
Additional information on contrast ratio:

The contrast ratio describes the ratio of the brightest point to the darkest point, i.e. of the brightest white to the darkest black. At this, two methods are known:

1.) full on / full off:

This method compares the maximum brightness of a fully white picture with the minimum brightness of completely black picture. The measured values cause the technically possible contrast ratio.

2.) ANSI contrast:

At this method the screen is divided into 16 areas where black and white fields alternate (see test pattern). The contrast ratio is caused by the medium brightness of the black and white areas. Unlike the full-on / full-off contrast, this method reflects the possible contrast within the picture.

Brightness uniformity: min. 95%

- **Applied measuring and auxiliary means**
  
  **SUR-25**: test pattern with 25 measuring points in native resolution SXGA+ (1400x1050 pixels)
  
  **Measuring instrument**: spectrometer type: Photoresearch PR655 or Minolta CR-100 Colour Analyser with adapter for adapter for measuring directly on the screen’s surface. Reconditioned UHP-test lamps.

- **Applied testing method**

  **SUR-25**: Determination of luminance at 25 points on the screen. Calculation of brightness uniformity through the ratio of the average brightness of the 15 marginal points to the average brightness of the 9 inner points.

- **Expected result / tolerance**

  According to SUR-25, the brightness uniformity shall not fall below the reference value by more than 2%.
Test pattern SUR-25:

Additional information on brightness uniformity:

Brightness uniformity specifies which level of luminance in percent can be reach at the marginal areas of a screen compared to the central area. For that either the average value or the smallest value of all measurements at the screen’s margin is used.

- **SUR-25 (Surface Uniformity Ratio):**
  At this method, the luminance is measured at 25 uniformly distributed measuring points. The brightness value is caused by the ratio of the average luminance of the 15 marginal measuring points to the average luminance of the 9 inner measuring points. This ratio reflects the perceived average homogeneity pretty good.
Luminance factor / horizontal viewing angle / half-gain angle (at 50% luminance): ±35°

Confirmation according to manufacturer’s data sheet, used model: BB 1100 NG 70"

**Additional information on luminance factor:**

The luminance factor (also called Gain-factor) is the ratio of the luminance of a screen sample for a given viewing angle to the luminance of a perfectly dispersing and reflecting screen (White standard). I.e. it describes by how far a certain screen reflects light stronger/weaker than a white reference screen.

As the luminance factor is only valid for a specific viewing angle, one needs a chart or scheme with multiple viewing angles and corresponding luminance factors for being able to describe the reflecting radiating characteristics of a screen properly.

The Half-Gain-Angle specify at which viewing angle the luminance decreased to 50%.

**Input signal: DVI-D or DVI I**

- **Applied measuring and auxiliary means**

  Definition of DVI interface

![DVI Interface Diagram](image_url)
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- **Applied testing method**
  Visual verification at device (Signal source has to disconnected).

- **Expected result / tolerance**
  DVI-D input exists.

Verification whether the required total resolution of the video wall (11,200x2,100 pixels) can be processed by the MWC

- **Applied measuring and auxiliary means**
  Test pattern “eyevis“ (continuous frame 1 white pixel) with native resolution SXGA+ (1400x1050 pixels)

Test pattern:
• **Applied testing method**
  The test pattern is defined as Desktop background at the wall controller. Option “tiled”: this results in a Desktop with 8x2 test pattern (1400x8 = 11200 / 1050x2=2100).

• **Expected result / tolerance**
  Clear presentation of the test pattern at each of the 16 cubes. Through geometry adjustment for optimising the transitions, the marginal pixels could partly disappear ("in the Off").
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Additional Support

For additional support for all eyevis products please contact:

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