**SCOPE 13 ЛИК**

**Sofia, 23.07.2024**

**TECHNICAL UNIVERSITY - GABROVO**

**LABORATORY COMPLEX FOR TESTING, MEASUREMENT AND CALIBRATION**

**Management address:** 5300 Gabrovo, 4Hadji Dimitar Str.

**Laboratory address**: 5300 Gabrovo, 5 Doktor Iliev-Detskiya Str.

**To perform testing of:**

| **Type of the scope:** *flexible\** | | | |
| --- | --- | --- | --- |
| **№** | **Tested products** | **Type of test / characteristic** | **Testing methods**  **(standard / validated method)** |
| 1 | 2 | 3 | 4 |
| 1. | METALS AND METAL ALLOYS | 1.1.Tensile strength | БДС EN ISO 6892-1 |
| 1.2.Yield strength | БДС EN ISO 6892-1 |
| 1.3.Relative elongation at break | БДС EN ISO 6892-1 |
| 1.4.Relative contraction at break | БДС EN ISO 6892-1 |
| 1.5.Bending angle | БДС EN ISO 7438 |
| 1.6. Vickers hardness and microhardness testing | БДС ЕN ISO 6507-1 |
| 2. | WELDED JOINTS OF METALLIC MATERIALS | 2.1.Tensile strength – longitudinal to the weld seam | БДС EN ISO 5178 |
| 2.2.Yield strength – longitudinal to the weld seam | БДС EN ISO 5178 |
| 2.3.Relative elongation – longitudinal to the weld seam | БДС EN ISO 5178 |
| 2.4.Relative contraction – longitudinal to the weld seam | БДС EN ISO 5178 |
| 2.5.Bending angle | БДС EN ISO 5173 |
| 2.6.Tensile strength – longitudinal to the weld seam | БДС EN ISO 4136 |
| 2.7.Maximum strength – longitudinal to the weld seam | БДС EN ISO 4136 |
| 3. | LAMPS (LIGHT SOURCES) | 3.1. Power | БДС EN 13032-1, cl. 5.3, Table 2  БДС EN 60809 cl. 4.8 and Appendix С  БДС EN 13032-4+A1,  IES LM-79, CIE 121 |
| 3.2. Electric current | БДС EN 13032-1, cl. 5.3.,  Table 2  БДС EN 60809, cl. 4.8 and Appendix С  БДС EN 13032-4+A1,  IES LM-79, CIE 121 |
| 3.3. Electric voltage | БДС EN 13032-1, cl. 5.3.,  Table 2  БДС EN 60809, cl. 4.8 and  App. С  БДС EN 13032-4+A1,  IES LM-79, CIE 121 |
| 3.4. Luminous flux | БДС EN 13032-1–cl. 5.5, cl. 6.1.2, cl.1.3, Table 3  БДС EN 60809, App. С  БДС EN 13032-4 +A1,  IES LM-79, CIE 84 |
| 3.5. Luminous intensity, Light distribution (light distribution curves) | БДС EN 13032-1 – cl. 5.4, cl.5.7, cl.5.8, cl.6, cl.7, cl.8, Tables 2, 3 4, App. А,В  БДС EN 13032-4+ A1,  CIE 70 |
| 3.6. Correlated colour temperature | IES LM-79, CIE 13.3,  CIE 177:2007 |
| 3.7. Colour rendering index | МКО public № 13.3  МКО public № 177 |
| 3.8. Colour coordinates | БДС EN 60188, т.1.4.7, Appendices В and С  БДС EN 61167, cl. 4.5  БДС EN ISO 11664-3  IES LM-79;CIE 15 |
| 3.9. Power factor | БДС ЕN 13032-4, cl. 4.3  IES LM-79 |
| 3.10. Harmonic current constituents | БДС EN 61000-3-2 |
| 4 | LUMINARIES | 4.1. Power | БДС EN 13032-1, cl. 5.3, Table 2  БДС EN 60809 cl. 4.8 and App. С  БДС EN 13032-4+A1,  IES LM-79, CIE 121 |
| 4.2. Electric current | БДС EN 13032-1, cl. 5.3., Table 2  БДС EN 60809, cl. 4.8 and App. С  БДС EN 13032-4+ A1,  IES LM-79, CIE 121 |
| 4.3. Electric voltage | БДС EN 13032-1, cl. 5.3., Table 2  БДС EN 60809, cl. 4.8 и App. С  БДС EN 13032-4+ A1,  IES LM-79, CIE 121 |
| 4.4 Luminous flux | БДС EN 13032-1–cl. 5.5,  cl. 6.1.2, cl. 6.1.3, Table 3  БДС EN 60809, App. С  БДС EN 13032-4+ A1  IES LM-79, CIE 84 |
| 4.5. Luminous intensity, Light distribution (light distribution curves) | БДС EN 13032-1 – cl. 5.4, cl. 5.7, cl. 5.8, cl. 6, cl. 7, cl. 8, Tables 2, 3, 4, Appendices А,В  БДС EN 13032-4+ A1 |
| 4.6. Correlated colour temperature | IES LM-79, CIE 13.3  CIE 177 |
| 4.7. Colour rendering index | IES LM-79, CIE 13.3  CIE 177 |
| 4.8. Colour coordinates | БДС EN 60188, cl. 1.4.7, Appendix В, С  БДС EN 61167, т.4.5  БДС EN ISO 11664-3  IES LM-79, CIE 15 |
| 4.9. Power factor | БДС ЕN 13032-4, cl. 4.3 |
| 4.10. Harmonic current constituents | БДС EN 61000-3-2:2019 |
| 5 | LIGHTING INSTALLATIONS | 5.1. Illumination | БДС EN 12464-1,2БДС EN 13201-4CR 14380, cl. 9 and App. АБДС EN 1838, App. АБДС EN 12193, cl. 6 |
| 5.2. Brightness | БДС EN 12464-1,2  БДС EN 13201-4  CR 14380, т.9 и Appendix А  БДС EN 1838, App. А  БДС EN 12193, cl. 6 |
| 5.3. Illumination uniformity | БДС EN 12464-1,2  БДС EN 13201-4  CR 14380, cl. 9 and App. А  БДС EN 1838, App. А  БДС EN 12193, cl. 6 |
| 5.4. Brightness uniformity | БДС EN 12464-1,2  БДС EN 13201-4  CR 14380, cl. 9 and App. А  БДС EN 1838, App. А  БДС EN 12193, cl. 6 |

**Note:** The testing activities referred to in items 1, 2, 3 and 4 shall only be carried out in the laboratory.

The testing activities referred to in item 5 shall be carried out only on the customer’s premises.

*\*****Flexible scope:*** *Implementing a new version of standards/documents or standards/ documents replacing them is allowed. An updated list of standards/documents and their dated versions is provided by the laboratory.*

**Flexible scope references**:

1. IES LM-79 Electrical and Photometric Measurements of Solid-State Lighting Products

2. CIE 121 The Photometry & Goniophotometry of Luminaires

3. CIE 84 The Measurement of Luminous Flux

4. CIE 70 The Measurement of Absolute Luminous Intensity Distributions

5. CIE 13.3 Method of Measuring and Specifying Colour Rendering Properties of Light Sources

6. CIE 177 Colour Rendering of White LED Light Sources

7. CIE 15 Colorimetry

8. CR 14380 Lighting Applications - Tunnel Lighting

**To perform calibration of:**

| **Type of the scope:** *fixed* | | | | | |
| --- | --- | --- | --- | --- | --- |
| **№** | **Measuring instrument** | **Measured value,**  **unit of measure** | **Measurement  range** | **Measurement**  **uncertainty** | **Calibration method** |
| **1** | **2** | **3** | **4** | **5** | **6** |
| 1. | Vernier instruments for measuring length (callipers, depth gauges and height gauges) | Length, m | от 0 mm  до 300 mm | from 0,0297 mm  to 0,0326mm | МК L-01 C |
| 2. | Dial calliper instruments for measuring length (dial calliper, dial depth gauges, dial height gauges) | Length, m | от 0 mm  до 300 mm | from 0,012 mm  to 0,014 mm | МК L-01 C |
| 3. | Electronic calliper instruments for measuring length (electronic callipers, electronic depth gauges, electronic height gauges) | Length, m | от 0 mm  до 300 mm | from 0,0085 mm  to 0,0114 mm | МК L-01 C |
| 4. | Micrometers, micrometric instruments for measuring length (micrometers, lever micrometers:  -analogue;  -dial;  -electronic) | Length, m | от 0 mm  до 300 mm | from 0,003 mm  to 0,0047 mm | MK L-02 М |
| 5. | Callipers with indicating devices (gauges, indicator callipers) | Length, m | from 0 mm  to 300 mm | from 0,0015 mm  to 0,0065 mm | MK L-02 М |
| 6. | Dial indicators:  -gear dial indicators  -lever gear dial indicators  Measuring heads:  - spring measuring head,  - optical measuring head | Length, m | from 0 mm  to 100 mm | from 0,0061 mm  to 0,0065 mm  from 0,0012 mm  to 0,0018 mm  from 0,00031 mm  to 0,0011 mm | MK L-03 I |
| 7. | Internal micrometers:  - two-contact internal micrometer  - three-contact internal micrometer | Length, m | from 6 mm  to 300 mm | from 0,006 mm  to 0,0146 mm  from 0,0029 mm  to 0,0043 mm | MK L-04 IM |
| 8. | Gauge blocks for length measurement | Length, m | from 0,5 mm  to 100 mm | from 0,00018 mm  to 0,00039 mm | MK L-05 GB |

**Note:** The calibration activity shall be carried out only on the premises of the laboratory.

**Fixed scope references:**

1. МК L-01 C Methodology for calibration of callipers 2023.

2. MK L-02 М Methodology for calibration of micrometers 2023.

3. MK L-03 I Methodology for calibration of measuring heads for linear measurements 2023.

4. MK L-04 IM Methodology for calibration of internal micrometers 2023.

5. MK L-05 GB Methodology for calibration of gauge blocks 2024.