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USE OF LIGHT MEASUREMENT TECHNOLOGY IN NON-DESTRUCTIVE TESTING

Penetrant Testing (PT)

Magnetic Particle Testing (MT)

NON-DESTRUCTIVE TESTING

STANDARDS AND REGULATIONS

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Technical requirements for measuring devices

- **EN ISO 3059**

  Non-destructive testing - Penetrant testing and Magnetic particle testing - Viewing conditions

- **ASTM 2297**

  Standard Guide for Use of UV-A and Visible Light Sources and Meters used in the Liquid Penetrant and Magnetic Particle Methods

Characterization of measuring devices

- **ISO/CIE 19476**

  Characterization of the performance of illuminance meters and luminance meters

- **EN 13032**

  Light and lighting - Measurement and presentation of photometric data from lamps and luminaires

- **CIE 220**

  Characterization and calibration methods of UV radiometers

Technical requirements for UV lamps

- **ASTM 3022**

  Standard Practice for Measurement of Emission Characteristics and Requirements for LED UV-A Lamps Used in Fluorescent Penetrant and Magnetic Particle Testing

- **RRES 900061**

  Rolls-Royce Engineering Specification - Requirements for the control of Ultra - Violet sources utilizing Light Emitting Diodes (LED's) for Non Destructive Testing methods

- **AITM 6-1001**

  Airbus Test Method for Inspection Processes, Penetrant Inspection

NON-DESTRUCTIVE TESTING

AREAS OF APPLICATION

Non-destructive testing (NDT) using **penetrant testing (PT)** and **magnetic particle testing (MT)** methods is used in various branches of industry to identify material defects or damage such as cracks, pores or weld defects. Some areas of application are listed below.

- **Mechanical Engineering**

  Machines and components are checked for material defects during manufacture to ensure the performance or safety of the machine.

- **Oil and Gas Industry, Chemical**

  Pipes, tanks and other equipment are checked for corrosion, cracks or other damage to prevent leaks or failures.

- **Construction**

  Steel structures, bridges, buildings and other structures are inspected to ensure structural integrity and safety.

- **Power Generation**

  In power plants, especially in nuclear power plants, components such as steam generators, turbines and pipelines are checked for material defects to ensure safe operation.

- **Aviation Industry**

  Aircraft components such as wings, engines and landing gear are checked for cracks or other damage to ensure flight safety.

- **Railway Transport**

  Rails, rail vehicles and other components are checked for material defects to avoid accidents or breakdowns.

NON-DESTRUCTIVE TESTING

USER

In most companies, non-destructive testing (NDT) is carried out by **specialized departments or teams that have the necessary technical qualifications and equipment** . The exact name may vary from company to company. It is advisable to check with the specific company for the exact name and responsibility of the NDT. Alternatively, external service providers can also be used.

Internal

- **Quality Assurance**
- **Testing Laboratory**
- **Inspection Department**
- **NDT Department**
- **Product Development**

External

- **NDT Service Provider**

NON-DESTRUCTIVE TESTING

REQUIREMENTS FOR THE MEASURING DEVICES - DIN EN ISO 3059

The performance of the **non-destructive testing system must be checked regularly to ensure inspection quality and reliability** . This check includes both the **intensity of the UV-A radiation** and the **illuminance** . Appropriate combination devices are available on the market for the measurement.

Illuminance

- V(λ) adapted as specified in IEC 60050-845,
- Further requirements for light meters according to CIE 069 (note: currently ISO/CIE 19476)
- UV-A radiation must not affect the measurement

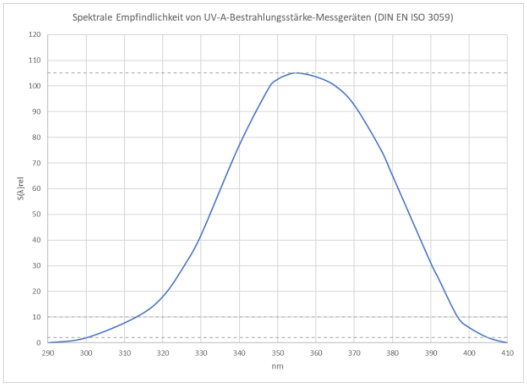
Irradiance

- UV-A radiation source - maximum at 365 ± 5 nm
- Spectral sensitivity of the meter

  S(λ) rel < 105 % @ 355 nm < λ (max. S(λ) rel) < 375 nm

  S(λ) rel @ 313 nm < 10 %

  S(λ) rel @ 405 nm < 2 %



The solution: **MAVOLUX LUX / UVA – KIT** (M538G)

NON-DESTRUCTIVE TESTING

REQUIREMENTS FOR THE ILLUMINANCE AND IRRADIANCE - DIN EN ISO 3059

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Test Procedure, Activity	Minimum Illuminance lx	Maximum Illuminance lx	Minimum Irradiance µW /cm²	Remark
Dye penetrant and non-fluorescent magnetic particle testing				
Removal of excess penetrant	350			
Testing and evaluation	500			
in some cases	1000			
Fluorescent procedures				
Removal of excess penetrants		100	100	
Testing and evaluation		20	1000	< 5000 µW/cm²

General Requirements

- **Measurement** must be carried out under test conditions
- **Light sources** must be in a stable state - for mercury discharge lamps at least 10 minutes after switching on
- **Test area** must be evenly illuminated / irradiated
- There must be no blinding light or other sources of visible light or UV-A radiation in the **field of view of the examiner**
- For **penetrant testing** , the combination of high UV-A irradiation values with a long irradiation period should be avoided

NON-DESTRUCTIVE TESTING

REQUIREMENTS FOR THE CALIBRATION OF THE MEASURING DEVICES - DIN EN ISO 3059

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Kalibrierschein

Calibration certificate

Deutschen Kalibrierdienst DKD

Kalibrierzeichen / Calibration mark

Gegenstand / Object: Kombimessgerät für Lux und UV-A / Combined meter for lux and UV-A

Hersteller / Manufacturer: GOSSEN Foto- und Lichtmesstechnik GmbH

Typ / Type: Mavomaster mit Mavoprobe LUX / UVA

Seriennummer / Serial Number: 22C12345 22C12346

Auftraggeber / Customer: GOSSEN Foto- und Lichtmesstechnik GmbH

Auftrags-/ Service-Nr. / Order / Service Number: 2207001

Anzahl der Seiten des Kalibrierscheines / Number of pages of the certificate: 4

Datum der Kalibrierung / Date of calibration: 01.07.2022

Datum der Ausstellung / Date of issue: 01.07.2022

Freigabe des Kalibrierscheins durch / Approval of the certificate of calibration by: Kai Hanel

- The **calibration** of the irradiance and illuminance meters is **specified in DIN EN ISO 3059** .

- **Calibration interval** according to manufacturer information, but **at least every 12 months**
- Calibration **traceable** to national, European or international standards
- Calibration of the **UV-A radiation meter** with narrow-band radiation **at 365 nm**
- **Calibration of the entire system** if this consists of exchangeable sensors and display units (display units and sensors)
- **Documentation** of the calibration with **certificate**

- **GOSSEN – Combined meter LUX / UV-A and ISO 17025 calibration / recalibration from a single source!**

The solution: **DAkkS calibration certificate**
version for NDT / NDT – illuminance and irradiance UV-A (365 nm) (H997N)

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-K-20315-01-00

NON-DESTRUCTIVE TESTING

BACKGROUND INFORMATION - COMPENDIA, CATALOGUE, FOLDER

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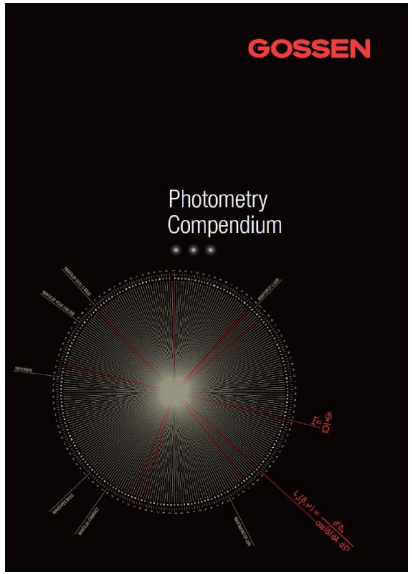
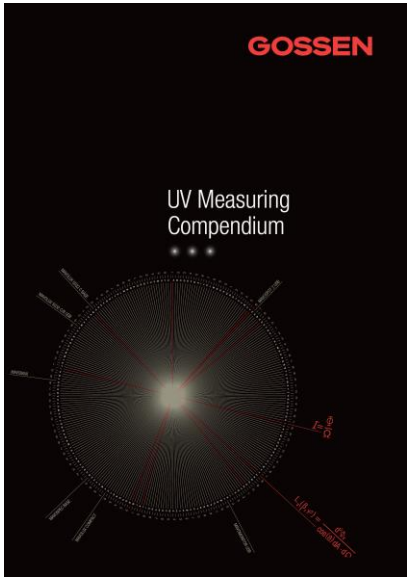
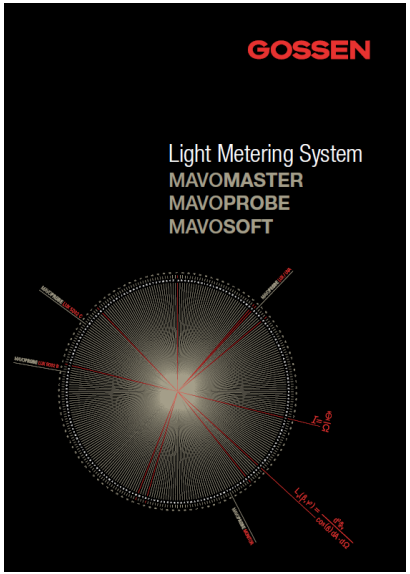


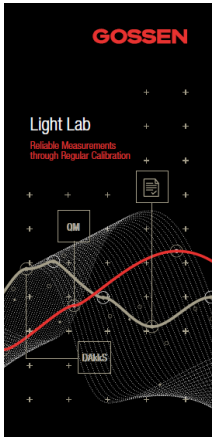
Measurement of illuminance



Measurement of irradiance



Measuring device MAVOLUX LUX/UVA



Calibration

NON-DESTRUCTIVE TESTING

ADVERTISEMENT – ZFP-ZEITUNG (DGZFP, ÖGZFP, SGZP), NDT SOCIETIES

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Posted in the ZfP-Zeitung

Issue 184
Issue 185
Issue 186

Magazine of the DACH societies

NDT - Societies

- **DGZfP** German Society for Non-Destructive Testing eV www.dgzfp.de
- **ÖGfZP** Austrian Society for Non-Destructive Testing www.oegfzp.at
- **SGZP** Swiss Society for Non-Destructive Testing www.sgzp.ch
- **ASNT** American Society for Non-Destructive Testing Inc www.asnt.org
- **EFNDT** European Federation for Non-Destructive testing www.efndt.org
- **ICNDT** International Committee for Non-Destructive Testing www.icndt.org

Thank you for your attention!

If you have any further questions or suggestions, please contact me.

GMC INSTRUMENTS

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