The **mass per unit area standards** are available from Helmut Fischer GmbH of Sindelfingen, Germany. These can be traced to the International System of Units; the international prototype meter and the international prototype kilogram.





Traceable Mass per Unit Area Standards with DKD* Calibration Certificate.

Why Calibrate?

"Where necessary to ensure valid results, measuring equipment shall be calibrated [...] against measurement standards traceable to international or national measurement standards." (DIN ISO 9001:2000 7.6 a).

Why DKD Calibration Certificates?

The purpose of monitoring the measurement devices is to secure the correct instrument functions in the context of a QM system (ISO 9001). A Fischer calibration standard with a DKD calibration certificate secures the trueness of the instrument calibration with the certainty of being able to ensure traceability to the International System of Units in international trade.

What Exactly Is Contained In The DKD Calibration Certificate?

- The national emblem identifies the DKD calibration certificate as an official document. Calibration laboratories are subject to strict conditions and the Accreditation Body of the German Calibration Service verifies their adherence regularly.
- 2 The calibration mark shows the accreditation number of our laboratory, the number of the calibration certificate and the year and month of issue. It is also included on the standards case.
- 3 At this location, one finds information about the object of calibration and the calibration order.
- 4 Calibration stamp, date and signature confirm the validity of the measurement data.
- 5 Here, the object of calibration is described in greater detail. In our case, these are always metallic foils or coatings.

- 6 Tracing your standards is done via a reference measurement using X-ray fluorescence analysis against gravimetrically measured reference standards.
- 7 The table is the core segment of the calibration certificate. It contains the readings. The first three columns are used for identifying the individual calibration standards. The same letter code, material and nominal value that can be found on the standard are stated here.
- B The readings obtained during calibration according to the accredited method with the associated uncertainty are found in the following two columns. They are stated in the unit of mass per unit area [mg/cm²] and constitute the actual calibration quantity. The mass per unit area is the quantity that is determined by the X-ray fluorescence instrument. The incident X-ray beam (A) on the sample excites the atoms of a certain sectional area (B) to fluorescence. The intensity of the fluorescence radiation (C) received by the detector is a measure for the number of excited atoms, i.e., its mass on the respective element of area.



How Is Traceability Ensured?

The image sequence shows how the coating thicknesses are traced to nationally and internationally recognized measurement standards using X-ray fluorescence analysis and gravimetric analysis.



Measurement objects

X-ray fluorescence measuring instrument Calibration standards

Kalibrierdienst [German Calibration Service]; Accreditation Body in Germany

*DKD = Deutscher

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9 If the material density is known, the thickness can be deduced easily from the mass per unit area. A certain number of atoms per area indicates a small thickness if packed densely and a greater thickness if packed less densely.

The correlation is:

thickness [µm] = $\frac{10 \cdot mass \text{ per unit area [mg/cm^2]}}{\text{density [g/cm^3]}}$

The coating thicknesses that result from the measured mass per unit area based on the stated material density are listed in the last three table columns in μm and $\mu "$ [1 μm = 39.37 $\mu "$]. Because the thickness is always computed from the readings, it may differ from the nominal value. The computed thickness as stated in the columns Dicke/ Thickness applies.



Mass per unit area





10 Listed here are the countries that have signed

the agreements of the European co-operation for

Accreditation (EA) and/or of the International

Laboratory Accreditation Cooperation (ILAC) and

where, therefore, the DKD calibration certificate

is recognized without problems.





Accreditation certificate

International International kilogram prototype meter prototype in Paris

The DKD calibration laboratory, accredited since July 2003 as the first institute in Germany for the measured quantity "mass per unit area". Accredited according to DIN EN ISO/IEC 17025, accreditation number DKD-K-33101. This accreditation entitles the bearer to issue DKD calibration certificates for mass per unit area calibration standards that are used for calibrating X-ray fluorescence instruments for coating thickness measurements in the name of the Deutsche Kalibrierdienst (German Calibration Service).

Which Calibration Intervals Should Be Observed? For measuring instruments

According to DIN ISO 9001 7.6, the user is required to verify the correct instrument functions at regular intervals. This can be done through a repeatability measurement using the Fischer calibration standards in a control chart. The determination of the intervals for this test is the user's responsibility.

For measure standards

Dependent on the frequency of use, the environmental conditions and the accuracy, it is up to the user to determine suitable intervals. We consider re-calibration intervals of 12 to 24 months to be reasonable for our calibration standards.

Who Needs DKD Calibration Certificates?

All companies that work with a QM system in an international environment – e.g., ISO 9001. This will apply to the automotive industry and its suppliers, the aeronautics, telecommunications and information technology.

Which Of Our Standards Are Available With A DKD Calibration?

Pure element foils as well as pure element single and dual coating standards as well as sets of standards. A detailed list of all standards and standards sets available with a DKD calibration certificate can be found at: www.fischer-kalibriernormale.de

International acceptance of the DKD calibration certificates through the Accreditation Bodies of the following countries:

Argentina Brazil Costa Rica Canada Cuba Mexico USA Germany Egypt Belgium Denmark Great Britain Estonia Finland France Greece Ireland Israel Italy Lithuania The Netherlands Norway Austria Poland Portugal Rumania Sweden Switzerland Slovakia Slovenia Spain Czech Republic Turkey South Africa Australia China India Indonesia Japan Malaysia New Zealand Philippines Singapore Taiwan Thailand Vietnam

Albredtierungs Rat

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