

Weights Competence



**Our Expertise**

Your Cornerstone for Reliable Results

**METTLER TOLEDO**

# Our Unique Know-how Ensures the Highest Accuracy

For our weights, we source only the finest quality austenitic steel which offers the highest resistance to corrosion over the course of a weight's lifetime. Our unique manufacturing process involves melting the steel under vacuum, traditional mechanical polishing, final stage electrolytic polishing, fully automated cleaning processes and final calibration using state-of-the-art mass comparators. The process has been perfected over years of experience to bring you accurate weights of the highest quality, with a stability that remains unmatched in the market.



### Custom Materials

Our specially produced super-austenitic stainless steel is cast under vacuum to reduce undesired trace elements, remove dissolved gases and improve oxide cleanliness. This optimizes the physical properties of the steel; e.g. density is highly reproducible.



### Expert Polishing

In a two-stage process, our highly experienced polishers first mechanically polish each weight by hand. Their special skills and expertise ensure a consistent, high quality finish as the perfect preparation for the second stage electrolytic polishing.



### Robot Calibration

Substantial investment in cutting-edge robot technology, combined with decades of experience, guarantees the highest standard of weight calibration. Computer-controlled processes eliminate human error, producing consistent and reproducible results with low uncertainty values.



# Electrolytic Polishing

## Ensures Stability and Longevity

**METTLER TOLEDO's proprietary electrolytic polishing process eliminates microscopic protrusions in the weight's surface which is far more even compared to mechanical polishing. Thanks to the enhanced properties of the passive oxide film, long-term stability of the weight is improved.**

The weight is connected to the anode of a DC circuit and immersed in a temperature-controlled bath of customized electrolyte which acts as the cathode. By applying a controlled current to the system, a microscopic amount of the weight's surface is transferred to the electrolyte to provide the following benefits:

- Stable weight value due to reduction in surface roughness
- Higher accuracy as all trace elements have been removed (e.g. graphite)
- Better corrosion resistance thanks to the dense oxide layer covering the weight<sup>1)</sup>



### Durable Weight Properties

The current density and immersion time are precisely adjusted to produce a weight in the upper tolerance range for accuracy. This minimizes the impact of weight loss incurred through normal use to provide a far longer working life.



### Computer-controlled Calibration

Under full computer control, individual weight measurements are transferred automatically to the electrolytic polishing machine. The software evaluates the required parameters to adjust each weight to the targeted tolerance.

### Electrolyte Bath ▶

The electrochemical process removes microscopic protrusions from the weight's surface to produce an extremely smooth finish and adjust accurately the weights to the required values.

<sup>1)</sup> Source: ASTM, Designation B912-02



Anode +

Cathode -

# Microgram Weights

## Pushing the Boundaries of Engineering

**At the extreme end of weights engineering, the nominal values of the microgram weights range from 0.05 mg to 0.5 mg with an outstanding level of calibration uncertainty of just 0.0002 mg (0.2 micrograms). The microgram weights range was developed largely in response to the needs of the nanotechnology market which typically involves the manufacture of objects with dimensions of less than 100 nanometers (smaller than one ten-millionth of a meter), for example computer chips and microscopic devices.**

METTLER TOLEDO developed a unique automated manufacturing process to ensure precise and reproducible shapes for each nominal weight; the smallest nominal weight, 0.05 mg, uses wire with a diameter of just 0.05 mm – the width of a human hair. Calibrating the microgram weights with a robotic comparator, such as METTLER TOLEDO's 'a5' system, helps to achieve the lowest possible uncertainty values.

### Compact Kit Format

Separate storage box and individual aluminum containers for each weight in a range from 0.5 mg up to 0.5 mg.

### Flexibility

Space for customer specific additions, such as 1 mg weights.

### Process Efficiency

Removable magazine with integrated wind-shield for required acclimatization and pre-weighing preparations.

### Accessories

Tweezers with ceramic tips and special hook for proper handling.





## “It’s the biggest thing to hit the smallest weights!”

**On 18 September 2012, the United Kingdom’s National Measurement Office became the world’s first mass calibration laboratory to be accredited to ISO 17025 for the calibration of mass standards down to 0.05 mg, with uncertainties as low as 0.0002 mg.**

John Pain, Calibration Manager, worked in collaboration with METTLER TOLEDO to achieve this pioneering distinction. He commented: “It’s never been done before, there was no blueprint or procedure to copy. We had to develop an effective method to calibrate weights so small that you can hardly see them, along with new methods of calculating uncertainties that would satisfy UKAS requirements. The relationship with METTLER TOLEDO was excellent: when one of the top calibration labs in the world teams up with a world class manufacturer... the outcome is special.”

The two organizations offer a combined supply and calibration service to customers worldwide.



John Pain with the new microgram weights and METTLER TOLEDO’s ‘a5’ comparator



0205



National  
Measurement  
Office

# Heavy Capacity Weights For Industrial Precision

**It is not only balances in laboratories which require regular testing; scales and weighing platforms in industrial environments are also subject to regulations to ensure measurements are reliable and within the law. In accordance with the regulations, the weights used for such tests, which may be up to 2 tons, must be calibrated using a weight from a higher weight class.**

METTLER TOLEDO offers a range of high capacity weights in OIML Class F suitable for calibrating weights in Class M and lower. The high-grade stainless steel weights range from 100 kg to 2 t and have a mirror-polished surface which guarantees long term weight stability suitable for repeated calibration procedures. The high capacity weights are available in a range of shapes to suit the different needs of calibration laboratories.



#### Easy Stacking

Safely stackable reference weights allow straightforward calibration of small and large test weights.

#### Test Weight Calibration

Test weights, such as this 1000 kg Class M1 cast iron weight, must be calibrated using a reference weight in a higher class.

► [www.mt.com/industrial-weights](http://www.mt.com/industrial-weights)



#### **Cylindrical Weights**

The individual weights are available in different nominal values and have an integrated eyebolt for easy lifting by a crane. The high-gloss finish is protected with a sturdy aluminum box.



#### **Rectangular Weights**

These weights can be easily combined to achieve different total reference weights and also save on storage space. They are designed to have a low center of gravity to ensure safe stacking.



#### **Disc Weights**

The discs are available in standard units of 50 kg and offer maximum flexibility for combining to create a total reference weight. The uniform design ensures convenient handling.

# Weights, Volume, Buoyancy

## All Precisely Measured

**Accurately calibrated weights are the basis of all accurate weighing results. Balances, scales and weighing platforms should always be checked with reference weights you can trust. At our accredited mass calibration laboratories, we follow strict procedures for cleaning, calibration and adjustment in accordance with ISO/IEC 17025 requirements. Mass correction, uncertainty and traceability are fully documented in an official calibration certificate.**

For highly specialized applications, METTLER TOLEDO also offers a design and engineering service to custom-make items according to individual requirements which includes weights, and buoyancy and volume artifacts.



### **Buoyancy Set**

METTLER TOLEDO's buoyancy cylinders, one hollow and one tubular, having accurately calibrated volumes enabling you to accurately and efficiently measure air density.

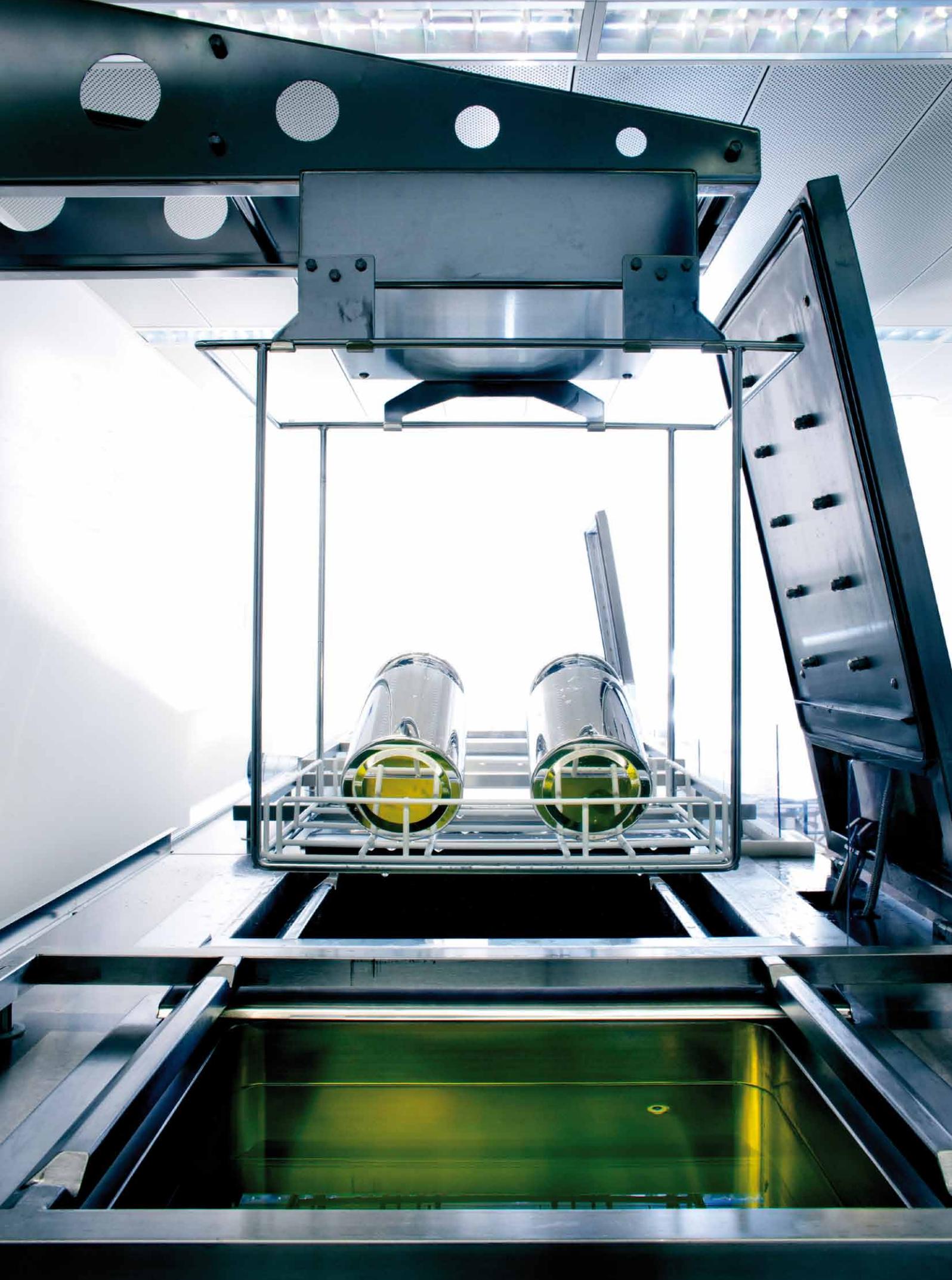


### **Silicon Spheres**

These silicon spheres have a homogeneous atomic structure and serve as a reference for specialized volume measurement.

### **Computer Controlled Cleaning ▶**

Two 20 kg weights are undergoing cleaning in a total of six different baths of customized liquids. Each weight is cleaned and stabilized in a fully automated process prior to calibration to ensure uniform surface conditions.



# Our Expertise

## From Micrograms to Tons

METTLER TOLEDO has an extensive weight portfolio, from low capacity weights for the laboratory to high capacity weights for industrial applications – all available in appropriate weight classes to meet your individual requirements.



### Laboratory Weights

- Single weights and weight sets
- 0.05 mg - 50 kg, OIML Classes E0 - M1
- 1 mg - 20 kg, ANSI/ASTM Classes 1,4
- Positive tolerances with «Stay-in-Tolerance» lifetime guarantee for Signature Line weights



### CarePacs®

- Manufacturer recommended weight sets with two selected weights for testing balance weighing ranges up to 8 kg
- Easy and quick to use testing approach supported by manufacturer SOPs
- Test against process tolerances as low as 0.03 %



### Industrial Weights

- 1 kg - 5 tons, OIML Classes F1 - M3
- Stackable heavy capacity cast iron weights for safe stacking and handling
- Stainless steel grip handle weights are available for the highest quality requirements in regulated industries

[www.mt.com/weights](http://www.mt.com/weights)

For more information



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