

Be sure. **testo**

testo industrial services

Calibration & Test equipment management

Testo Industrial Services – More service, more security.

Your experts for calibration and test equipment management

IT-expert

Expert for
test equipment management

Trainer for
audit safety



Expert for thermodynamic calibrations

Sales expert

Testo Industrial Services

More service, more security.

Testo Industrial Services is a certified and accredited service provider for quality assurance in various industrial sectors. Originating as the calibration department of the parent company Testo SE & Co. KGaA, Testo Industrial Services was spun off as an independent subsidiary in 1999. With steady sales growth and more than 1,300 employees, we are now one of the most successful service providers in Germany and Europe.

Driven by the requirements of our customers and our innovative spirit, we have been constantly developing our service portfolio since the company was founded. Years of experience in measurement and calibration technology make Testo Industrial Services the optimal calibration service provider.

Our full-service concept is reflected in our complete service portfolio. In our accredited calibration laboratories, we ensure reliable measurement results. We calibrate almost all measurands with a very wide calibration range and with smallest measurement uncertainties. We work independently of manufacturers and thus offer you more service and more security.



► You can find a more detailed overview of the locations on our homepage at:
www.testotis.com/locations



Always near you – our locations

The Testo Industrial Services team is always at your side. We would like to get to know you - your company, your specific requirements and responsibilities. We would be pleased to show you our possibilities to solve your test equipment management related challenges in a personal meeting.

Headquarter Kirchzarten

Testo Industrial Services GmbH
Gewerbestr. 3
79199 Kirchzarten
Germany
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E-Mail: info@testotis.de
www.testotis.de

Subsidiaries

Testo Industrial Services AG
Switzerland
www.testotis.ch

Testo Industrial Services Ltd
United Kingdom
www.testotis.co.uk

Testo Industrial Services GmbH
Austria
www.testotis.at

Testo Industrial Services sp. z o.o.
Poland
www.testotis.pl

Testo Industrial Services Empr. S.A.U.
Spain
www.testotis.es

Testo Industrial Services Kft
Hungary
www.testotis.hu

Testo Industrial Services Sàrl
France
www.testotis.fr

Calibration Factory – Quality meets efficiency

Largest investment and consequence of continued growth

With the Calibration Factory, Testo Industrial Services has created new workplaces as well as more space for additional laboratories and at the same time it sets new standards in the field of calibration.



Around 200 new workplaces, more space for additional calibration laboratories and optimised order processing and logistics have been created on 4,200 square meters of floor space. Experienced employees, a lean production method and automated conveyor technology mean that quality meets efficiency here.



The completely automated shelf logistics make it possible to manage more than 6,800 transport containers with test equipment and to ensure an optimal material flow. Modern equipment, increased precision, and expansion of the calibration range: the Calibration Factory sets new standards for calibration.



The automation and digitalisation of processes are the main focus. In addition to a professional orientation of processes and quality standards, Testo Industrial Services focuses on a sustainable energy concept and ergonomic workplaces.



Quality meets efficiency



Expansion of calibration range



Increasing precision



Careful use of resources



Accreditation & Know-how – what makes us stand out

Accreditation as calibration laboratory

**Accredited according to DIN EN ISO/IEC 17025:2018
for more than 300 calibration methods**

- ✓ Traceability
- ✓ Verification of the measurement uncertainty
- ✓ Authenticity and acceptance
- ✓ Compliance with standards, guidelines and certifications
- ✓ Increase in manufacturer quality
- ✓ On-site or in our calibration laboratory



Provider for proficiency tests

Accredited according to DIN EN ISO/IEC 17043:2010

Based on our many years of metrological experience and our accreditation according to DIN EN ISO/IEC 17043, we offer you the conduction of proficiency tests and comparative measurements throughout Europe.



Know-how

With over 300 accredited calibration procedures we are one of the world's leading providers for calibration, test equipment management, qualification and validation services.



Quality from a single source

Our extensive range of services as well as our wealth of experience are the basis of our promise: More service, more security.



Customer in focus

We support you individually, precisely & as required - from single measurements and calibrations up to the management of complex requirements.



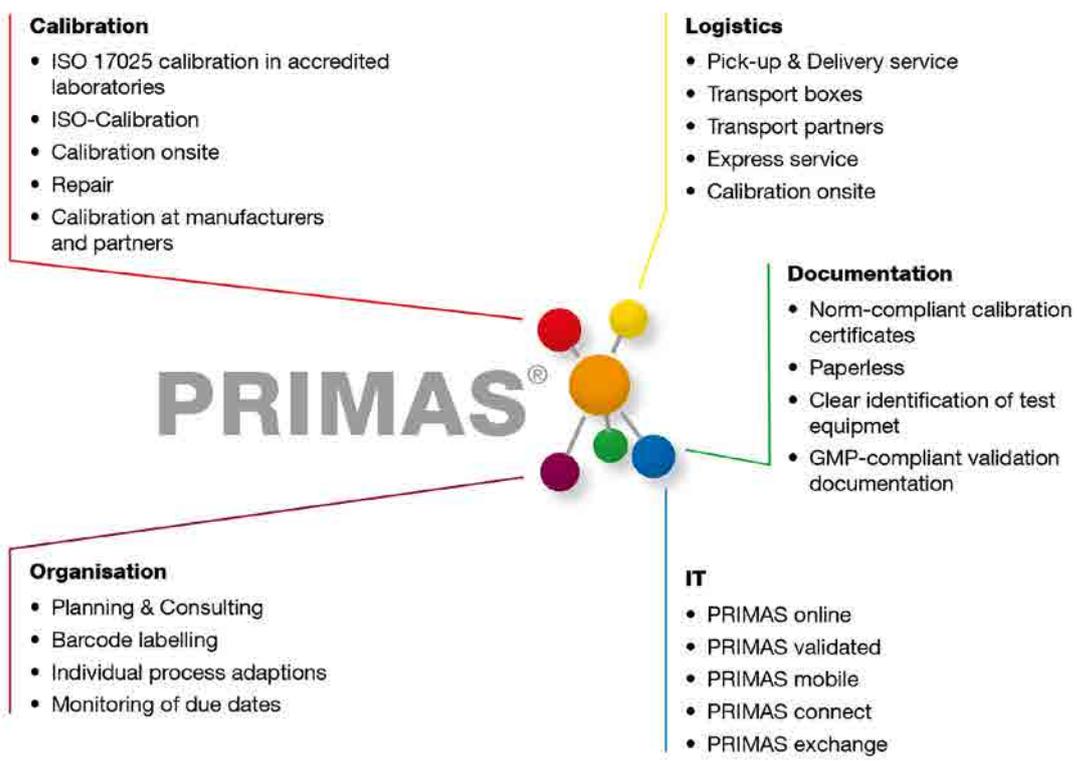


Test equipment management with PRIMAS – the individual solution

Everything from one source

Various normative requirements specify that individual test equipment management is almost indispensable in companies. Therefore, the external assignment of any test equipment management is a matter of trust. With the test equipment management from Testo Industrial Services, you are on the safe side - PRIMAS offers you the holistic solution, because it is based on the partnership between customers, Testo Industrial

Services, suppliers and logistic partners. In PRIMAS, calibration and documentation management are intertwined. The integration of our logistics solution and simplified organisation completes the test equipment management solution.



PRIMAS IT-Solutions

Everything at a glance

PRIMAS from Testo Industrial Services offers you the holistic-solution. Depending on the requirements profile in your company, our various PRIMAS IT solutions offer the optimum support for your quality assurance.

PRIMAS supports you in the timely calibration and testing of your quality-relevant measuring and testing equipment. Benefit from our PRIMAS IT solutions and manage your test equipment in an audit-proof way.

PRIMAS online

Ensures access to your test equipment data via the Internet independent of location and time without additional software installation.

Advantages:

- Quick and targeted location of your test equipment
- Effective work through multiple changes
- Individual setting options



PRIMAS validated

A validated, web-based system for the management of test equipment for companies with GxP compliance requirements from medical technology and pharmaceutical sectors.

Advantages:

- Maximum security and integrity of your test equipment data
- Optimised and efficient test equipment management processes
- Risk-based validation service
- Consideration of normative requirements



PRIMAS mobile

All test equipment data and calibration certificates of the test equipment can be called up directly at the site of use via smartphone using a scan function.

Advantages:

- Mobil access to the master data and certificates of the scanned test equipment
- Convenient further processing of data on the PC through synchronisation
- Avoidance of information loss through note function



PRIMAS connect

Allows automated access to test equipment data in Testo Industrials Services SAP System – even for users who are not registered with PRIMAS online.

Advantages:

- No waiting times due to automatic access via web service
- Quick access without prior login
- Simple and direct integration into existing customer systems



PRIMAS exchange

Enables simple, automated data exchange according to VDI/VDE 2623 between customer specific MES/CAQ systems and the calibration service provider.

Advantages:

- No manual maintenance effort in the customer system
- Calibration results can be supplied as raw measurement data
- Time saving of 5-10 minutes per certificate



Further services – We offer you more!

In addition to the core services of calibration, qualification, validation and test equipment management, Testo Industrial Services also offers other services: In addition to our pick-up and delivery service and repair service, we offer metrological testing

services, consulting services as well as suitability tests and comparative measurements. In this way, we not only safeguard your quality requirements, but also ensure that your production sequences and processes run smoothly.



Proficiency tests and comparative measurements

The experts at Testo Industrial Services carry out proficiency tests and comparative measurements, mastering every challenge you face and ensuring that your measurement procedures are valid. We are a DIN EN ISO/IEC 17043:2010 accredited provider of proficiency testing in the thermodynamic and dimensional environment. Comparative measurements are also carried out within a non-accredited framework. As a rule, proficiency tests and comparative measurements are carried out as interlaboratory comparisons. We also offer the option of carrying out individual bilateral comparisons.

▶ You can find more information about our proficiency services at:
www.testotis.de/en/further-services/proficiency-tests-and-comparative-measurements



Metrological testing services

Metrological testing services are essential components in the quality assurance of your measurement technology. In addition to calibrating your measuring devices, our metrological expertise enables us to offer testing services. These include HV tests, the preparation of initial sample test reports and the performance of machine capability analyses (MFU) and measuring system analyses (MSA). We carry out the necessary measurements to determine metrological characteristics on measuring devices and measuring standards and to confirm compliance with the defined specifications. Documentation is carried out by creating test protocols and test reports.

▶ You can find more information about our metrological testing services at:
www.testotis.de/en/further-services/metrological-testing-services



Consulting services – For companies with high product and process quality

We offer consulting services in the areas of quality management, production excellence and management systems/test process management for the automotive, aerospace and medical sectors. The core products of our consulting services include content on quality assurance (inspection process management & statistical process control), process efficiency (value stream mapping & Lean Six Sigma) and industry-specific management systems (IATF16949, ISO13485, ISO17025) as well as topics relating to digitalisation (inspection process management / manufacturing intelligence).



Test equipment management

We support you in implementing effective test equipment management to ensure that your devices and instruments work reliably and accurately. This is crucial to ensure the quality of your products and services.



Test planning & proof of suitability

We help you to optimise your inspection plans, increase the quality of your products and at the same time ensure conformity with the strict regulations of the AIAG and VDA 5 standards.



Statistical process control (SPC)

We work with you to develop SPC strategies that you can easily integrate into your day-to-day work and that enable you to achieve higher product quality and improved cost efficiency and customer satisfaction.



Process improvement

We provide you with methods and statistical tools (Six Sigma DMAIC) to specifically optimise processes, achieve sustainable changes and improvements, identify the actual causes of problems and develop targeted solutions



Quality management systems

We ensure that your processes and products meet the highest quality standards and support you in preparing for audits and help you to comply with quality standards such as IATF 16949, ISO 9001 and ISO/IEC 17025.

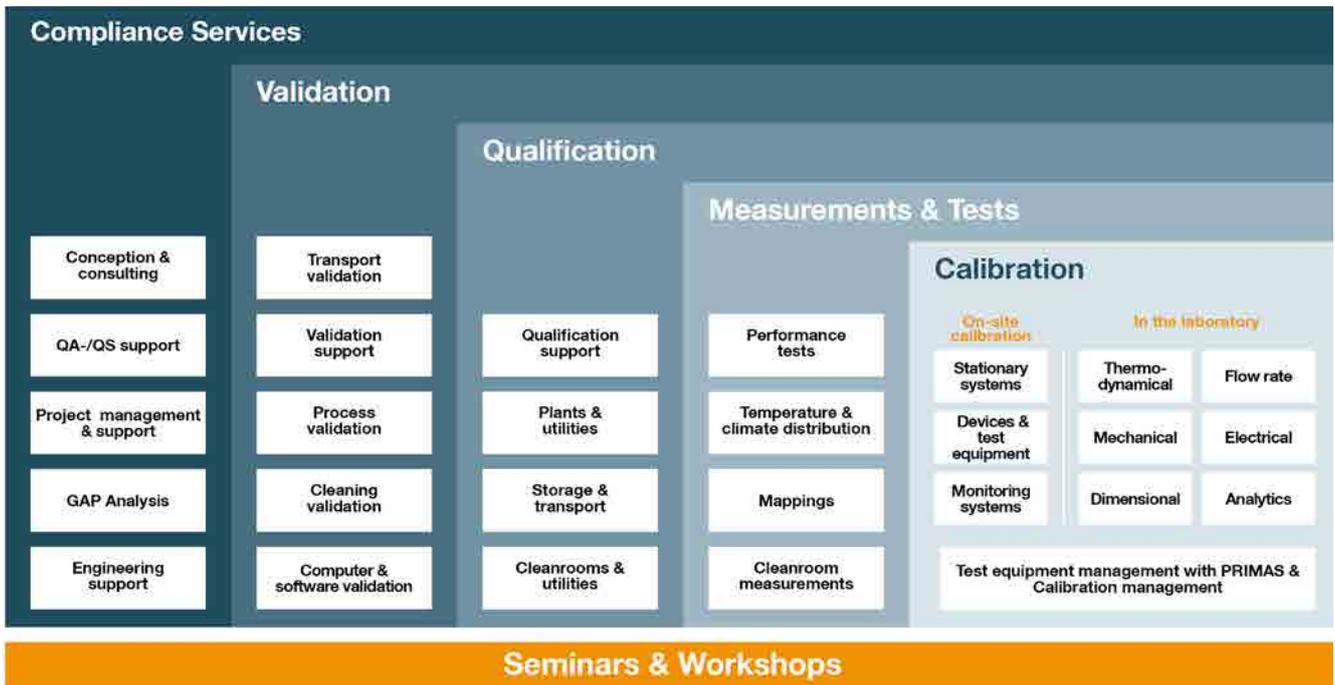
▶ Do you have questions or need advice on choosing the right consulting service?
Arrange an online appointment directly to work together on innovative solutions.



Full service for your GxP compliance

Services such as calibration, qualification and validation are the basis to correctly implement the high requirements of GMP-regulated quality standards. A sustainable benefit is created for you when qualified experts, individual documentation and highly accurate measurement technology define the service that is delivered on the part of your service provider.

With Testo Industrial Services as a full service provider you receive a cost-sensitive implementation of your requirements in the areas of calibration, qualification, validation and GMP compliance. Our competencies include full support – from the conception to the realization of projects.



Risk-based qualification of cleanrooms, plants and utilities

To ensure quality and robustness, we support you in the qualification of all devices and equipment in production. Even more complex new or conversion projects are in good hands with us.

- Design and implementation of all qualification tests in cleanrooms according to DIN EN ISO 14644 and VDI 2083: Classification measurements, recovery time measurements, volumetric flow rate determinations/room air exchange, filter leakage tests, flow measurements, visualization studies, and differential pressure measurements
- Professional and prompt documentation in our audit-proven format or adapted to customer-specific formats
- Risk management according to ICH Q9/EU GMP guideline part II
- Standard-compliant measurements and tests of air handling units, process gases, production plants, filling and packaging plants, water plants, sterilization and cleaning plants

► You can find a more information here:

www.testotis.com/services/qualification





Cleanroom qualification

We offer you professional support for all GMP measures in the area of cleanroom qualification. We carry out all qualification tests in accordance with Annex 1 of the EU GMP Guide, DIN EN ISO 14644 and VDI 2083. In addition we also carry out testing and qualification of safety cabinets, isolators and other clean air systems.

Find more information about our Cleanroom Solutions at:

www.testotis.com/cleanroom-qualification



GxP Services for warehouse, logistics & transport

With qualification and validation activities, we work with you to minimize the critical influencing factors and thus demonstrate compliance with GxP requirements.

- GSP Services: Risk-based storage qualification; climate mapping, temperature distribution studies, and stress testing; qualification of refrigeration & climate control systems (refrigerators, climate chambers, incubators, stability chambers)
- GDP Services: Risk-based qualification of refrigerated trucks and transport packaging; validation of the transport process; securing your cold chain processes; climate mapping, temperature distribution studies and stress tests

Find more information about our GDP/GSP Services at:

www.testotis.com/transport-and-storage-qualification



GMP-compliant validation

Use our know-how and personnel resources to ensure the reproducibility and effectiveness of your processes. Whether for individual tests or complete project coordination, we offer you adequate support.

We accompany you from the creation of the validation master plan to the continuous monitoring of your processes and revalidation.

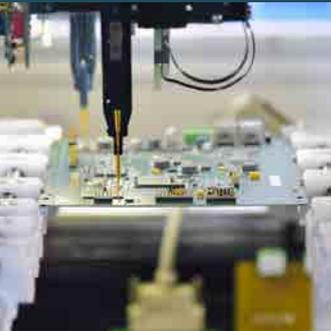
- Process validation
- Cleaning validation
- Transport validation
- Computer/Software validation (CSV)

Find more information about validation at:

www.testotis.com/services/validation



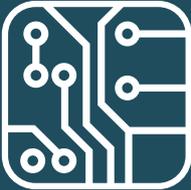
Calibration and test equipment management – for your industry

<p>Automotive</p> <p>Safe automobility</p>		<p>Medical technology</p> <p>Highest patient safety</p>	
	<p>Mechanical and plant engineering</p> <p>Ensuring the product quality</p>		<p>Aerospace</p> <p>Aviation safety</p>
<p>Pharma</p> <p>Effective medicines</p>		<p>Biotech & Life Sciences</p> <p>Safe procedures and processes</p>	
	<p>Energy supply and power stations</p> <p>Reliable electricity</p>		<p>Electrical industry</p> <p>Safety for automation</p>

▶ These and other industries can be found at:
www.testotis.com/industries



Calibration and test equipment management – Measurands at a glance

 Electrics		 Thermodynamics	
	 Mechanics		 Flow rate
 Length measuring technology		 Acoustics	
	 Analytics		 Other measured variables

▶ More info on the measured variables can be found at:
www.testotis.com/our-measured-variables





Thermodynamics – large temperature ranges with lowest measurement uncertainty



Temperature

We calibrate in a range of -196 to $+1,200$ °C with the lowest measurement uncertainties. All electronic temperature measuring instruments, resistance thermometers and thermocouples are calibrated in the liquid bath or in the tube furnace with a sodium heat pipe as well as in our modern temperature chambers.

Exemplary measuring devices:

Thermocouples, resistance thermometers, data loggers, climate monitoring systems, block calibrators, immersion and air sensors



Surface temperature

In addition to the classic temperature measuring devices, measuring devices are used to check the surface temperature. Furthermore, non-contact surface temperature measurements are carried out during the calibration of thermal imaging cameras and pyrometers. We calibrate non-contact measuring instruments in black liquid radiators in an accredited range from -18 to 350 °C , touching from -15 to 480 °.

Exemplary measuring devices:

Cross band probes, mushroom cap probes, other special probe designs, thermal imaging cameras, infrared measuring devices and pyrometers



Humidity

The exact calibration of humidity measuring instruments requires the highest metrological know-how. Testo Industrial Services' accredited humidity laboratory has one of the best measurement uncertainties in Europe, with an accuracy of 0.2 %RH in a measurement range of 2 to 98%RH.

Exemplary measuring devices:

Dew point mirrors, electronic/mechanical hygrometer, humidity data loggers, transducers, psychometers, pressure dew point meters



Calibration of reference instruments

The thermodynamic primary laboratory calibrates high-quality reference standards with the lowest measurement uncertainties. In addition, with our primary humidity generator we can offer accurate calibrations of humidity measuring instruments in the measuring range from 5 to 95 %rh (-25 to 95 °C frost/dew point).

Exemplary measuring devices: Fixed point cells, resistance thermometers, thermocouples, dew point mirrors/ hygrometer, humidity sensors



Block calibrators and temperature baths

Block calibrators or circulating thermostats are suitable measuring devices for carrying out independent temperature calibrations or checks. We offer you the right calibration for this: We calibrate your portable temperature calibrators (block calibrators) as well as your calibration baths or circulation/overflow thermostats in a measuring range between -100 °C and 1000 °C in our laboratory or directly on your premises.



Light intensity

In the field of occupational safety, the measurement of light intensity plays a decisive role, because good working conditions are paramount. This also includes checking the lighting conditions at the workplace. Therefore, luminous intensity meters are used in almost all industries. Testo Industrial Services has the competence to carry out calibrations of luminous intensity measuring instruments in a measuring range from 0 to 10,000 lx.

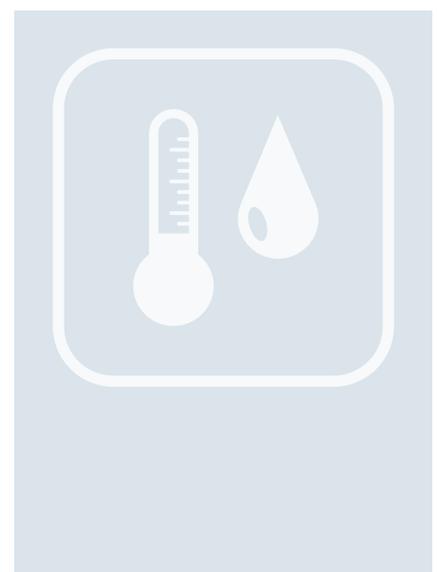
Exemplary measuring devices:

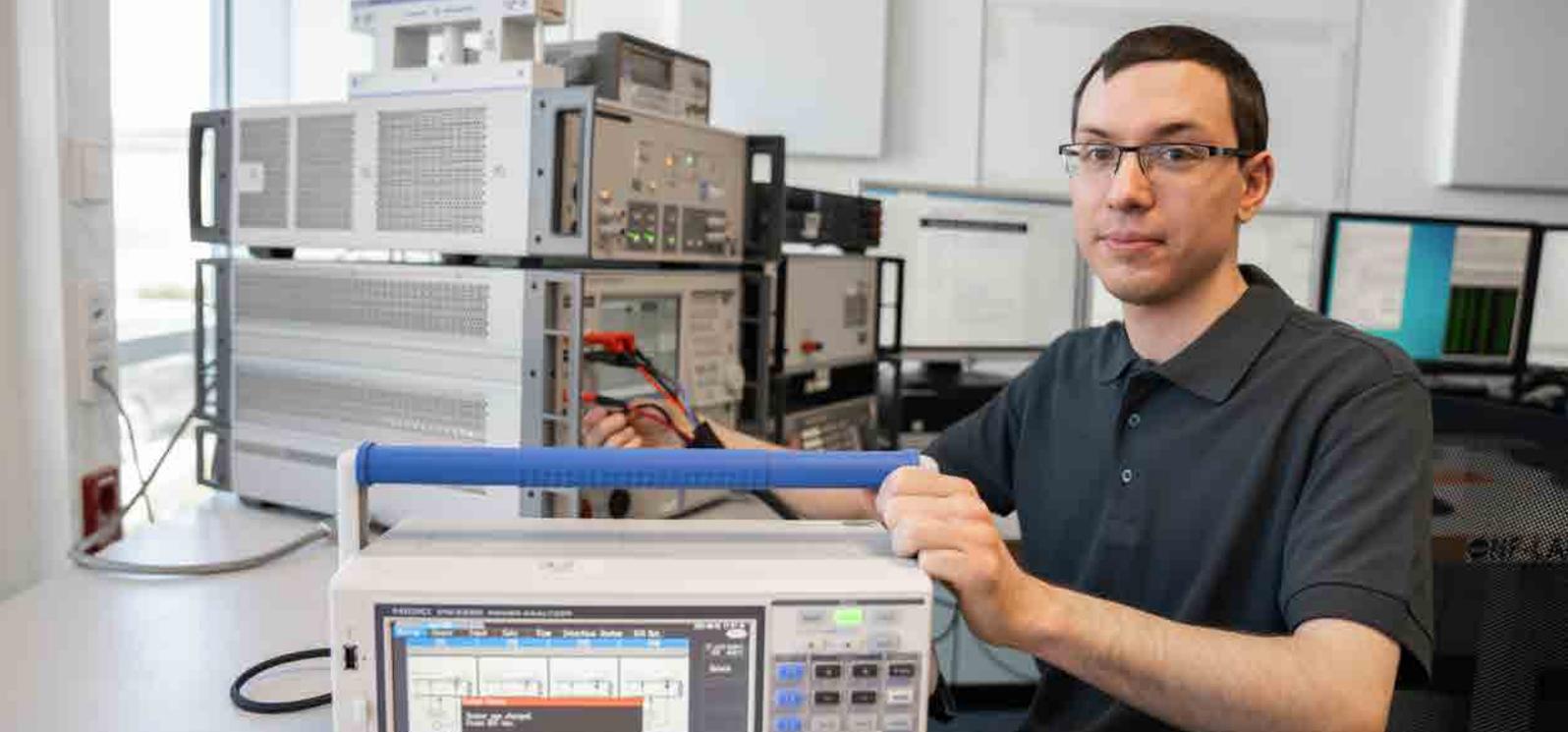
Lux probes

Further information on this topic

Benefit from our know-how and learn more about the thermodynamic measurand here:

▶ www.testotis.com/calibration/thermodynamic





Electrics – broad scope of accreditation and highest metrological know-how



Low frequency (LF)

In the low-frequency laboratory, various electrical measuring devices for direct and alternating current technology are calibrated with the lowest measurement uncertainties. The calibration of power measuring instruments is carried out in the direct measuring procedure via three measuring stations specially set up for this purpose. The traceability of these measuring stations takes place in our in-house reference laboratory.

Exemplary measuring devices:

Digital multimeter, safety testers, current clamps, oscilloscopes, power meters, measuring modules (IPETRONIK, CSM, ETAS, HBM, IMC, Klaric, counters, generators, current transformers, LCR meters, power supplies, measuring cards (NI), resistors, high-voltage dividers etc.)



High frequency (HF)

The field of high-frequency technology deals with rapidly changing current and voltage characteristics and their propagation. Typical measured variables in this area are HF power, HF reflection, modulation, frequency, and HF attenuation. These five basics quantities of high-frequency technology as well as quantities derived from them can be calibrated precisely and traceably in our accredited laboratory area on state-of-the-art measuring stations.

Exemplary measuring devices:

Spectrum and network analysers, signal generators, passive reflection standards, cable testers, passive HF components, calibration kits



EMC laboratory

Electromagnetic compatibility (EMC) measurement technology is concerned with measuring interference and testing the immunity of equipment. For this purpose, we can calibrate the most important EMC quantities with our broad scope of accreditation according to with procedures in accordance with current standards (DIN EN 61000-4-x, DIN EN 55016-1-x, CISPR 16-1-x).

Exemplary measuring devices:

EMI & EMC measuring receivers, ESD guns/generators with different discharge networks, burst/surge/powerfail generators, coupling and decoupling networks, network replicas, transformer clamps



Calibration of reference instruments

Our calibration laboratory for electrics has one of the smallest measurement uncertainties of all DAkkS-accredited laboratories. Resistance standards, for example, can be calibrated with a measurement uncertainty from $50 \cdot 10^{-9}$.

We calibrate your high-quality reference instruments of electrical LF metrology. Our reference standards are directly connected to the state institutes (PTB, METAS) and are used for traceability of your standards.



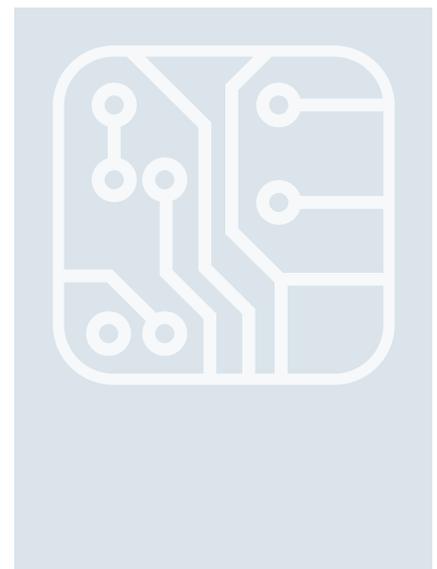
Repair service

Our full service ranges from calibration and adjustment to repair of your electrical measuring instruments. When repairing, we focus on the replacement of individual components, not the entire equipment. Our service includes safety, quality and functional tests, cleaning, spare parts procurement as well as repair of your electrical test equipment.

Further information on this topic

Benefit from our know-how and learn more about the electrical measurand here:

▶ www.testotis.com/calibration/electrical





Flow – independent of manufacturer and media



Flow of liquids

In a wide variety of industries, flow measurements of liquids directly determine production operations and quality. Testo Industrial Services has specially designed test benches that enable calibration of flow meters for liquids from 0.15 ml/min to 5,000 l/min. In addition to water, calibration can also be carried out with alcohol or various oils, for example.

Exemplary measuring devices:

Gear/oval gear meters, spindle flow meters, piston flow meters, swash plate, turbine, impeller, ultrasonic and Coriolis flow meters



Unique calibration range up to 5.000 l/min

Testo Industrial Services has extended the measuring range of flow meters. With the specially constructed test stand, ISO/factory calibrations and DAkkS calibrations of flow meters for water from 25 l/min up to 5,000 l/min can be carried out with a measurement uncertainty of up to ± 0.1 % of the measured value. During calibration according to the master-meter comparison method, water is conveyed into the circulation section by means of several pumps connected in parallel.



Flow of gases

The determination of flow for air and inert gases plays a decisive role in many industrial sectors and is often used directly for quality assurance measures. With our test benches we enable, among other things, the calibration of flow meters for gases as well as for flow meters with a strong dependence on pressure.

Exemplary measuring devices:

Piston flow meters, gas meters, turbine and impeller flow meters, Thermal mass flow meters, laminar flow elements (LFE), leak calibrators, leak sniffers



Flow velocity

In a specially developed wind tunnel, we calibrate your flow measuring instruments with the most accurate and reliable flow measuring method - laser Doppler anemometry (LDA). This LDA measuring method is characterised by its contactless and thus interference-free measurement, so that a high measuring accuracy of the respective measured flow velocity can be guaranteed. Flow probes of various designs can be calibrated in this channel.

Exemplary measuring devices:

Hot-wire anemometer, impeller anemometer, heat-ball anemometer, pitot tube



Calibration of volumetric flow hoods

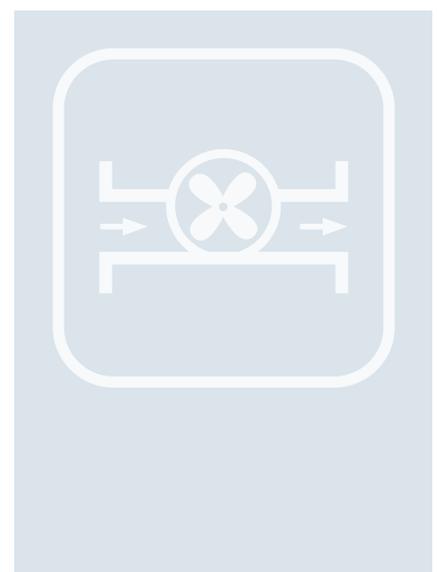
If technical gases, liquids or even compressed air are used in companies, precise consumption measurement using various volumetric flow meters is essential. With our many years of experience in the field of measurement technology through the Testo Group, we calibrate volumetric flow measuring bonnets with up to 1800 m³/h in another specially designed wind tunnel.

Exemplary measuring instruments: Testo volume flow measuring bonnet

Further information on this topic

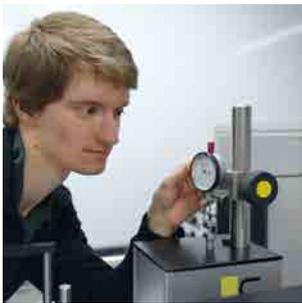
Benefit from our know-how and learn more about the flow measurand here:

 www.testotis.com/calibration/flow





Length measuring technology – high-precision calibration of all length measuring equipment



Indicating measuring equipment

In our laboratories, almost all types of indicating length measuring devices are calibrated at a constant temperature of $20\text{ °C} \pm 1\text{ K}$.

Exemplary measuring devices: Calipers, outside micrometers, 3-line inside micrometers, quick-response probes, height gauges, dial gauges, dial indicators, lever gauges, inductive probes, tape measures/rulers/flat rulers, angles/protractors, potentiometric displacement draw-wire sensors



Measuring robot for calipers

Our laboratory has a fully automated measuring robot, which calibrates calipers with very low measurement uncertainties for you within a very short time. In addition to the normative calibration scope such as external, internal, depth and step measurements, the light gap test and ease of movement test are also carried out fully automatically with the calibration robot up to measuring range of 300 mm.



Gauges and dimensional standards

Several horizontal linear encoders, with a maximum length of up to 1,000 mm for external measurements or up to 800 mm for internal measurements, are used in the dimensional laboratory of Testo Industrial Services as reference measuring equipment when calibrating length and dimensional standards.

Exemplary measuring devices: Thread limit plug gauges, limit plug gauges, thread rings, taper thread rings, taper thread plug gauges, setting gauges, test pins and setting rings



Gauge blocks

Gauge blocks are mostly used for checking calipers, outside micrometers, dial gauges or as high-precision measuring standards. Testo Industrial Services has DAkkS traceable gauge block test stations. We calibrate for you in conformity with standards according to VDI/VDE/DGQ 2618 sheet 3.1 in a measuring range from 0.5 mm to 150 mm:



Coordinate measuring technology

We have a large number of high-precision coordinate measuring machines (CMM) which are suitable for inspecting standard geometries and special geometries. These include special gauges, gear wheels, gearbox housings, turbine blades, cylindrical worms and much more. We achieve a minimum measurement uncertainty of $1.0 \mu\text{m} + L/350$ in a maximum measurement volume of 3,000x1,200x900 mm. With our know-how, we can carry out both ISO and DAkkS accredited calibrations, as well as create test reports for your workpieces and components.



Measuring microscopes

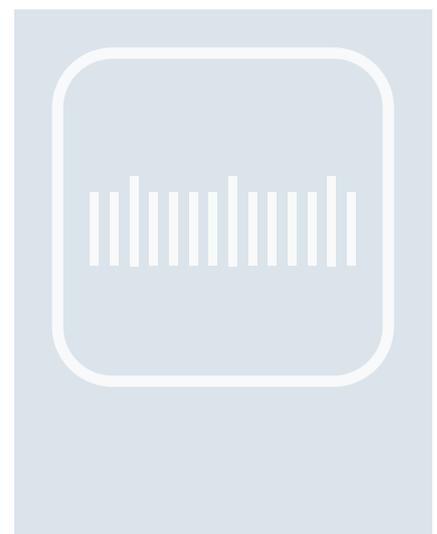
With our long-standing and exclusive cooperation with the measuring instrument manufacturer Keyence, Testo Industrial Services ensures the accuracy of your measuring instruments and in addition to calibration and adjustment programmes agreed with the manufacturer, also carries out accredited calibrations directly on your premises.

Exemplary measuring devices: Radius gauges, thread forming gauges, optical measurements according to customer drawings, accredited calibrations for optical measuring microscopes

Further information on this topic

Benefit from our know-how and learn more about the length measuring technology here:

www.testotis.com/calibration/dimensional





Mechanics – highest quality in the laboratory or on-site



Static pressure

In our laboratories we can offer you accredited calibrations up to a pressure of 1,200 bar. In addition, factory calibrations can be carried out with a pressure of up to 5,000 bar. Our laboratory is based on two different types of reference: pressure balances and pressure regulators. In addition, it is possible to perform application-specific pressure calibration of your sensors at different temperatures (-30°C to 120°C).

Exemplary measuring devices: Digital and analogue pressure gauges, pressure gauges with digital display, pressure transmitters with electrical output signal, pressure regulators, pressure calibrators



Dynamic pressure

Since the sensitivity of pressure sensors under dynamic input loads differs from purely static loads, they should be calibrated dynamically to simulate real operating conditions. Dynamic pressure calibrations are possible with our secondary calibrator in a measuring range between 10 and 300 bar for piezoelectric, -resistive and -capacitive sensors.

Example sensors: PCB Piezotronics 106B50, 106B51, 106B52, 112B05, 113B21, (...), Kistler 601CBA, 601CAA, 6052C, (...), AVL GP15DK, GU21D, GR15D (...)



Torque

Testo Industrial Services has the know-how and the equipment to carry out ISO and DAkkS accredited calibrations for your torque wrenches, torque testers and torque sensors according to normative specifications on our specially equipped calibration facility for torque with a measuring range of 0.01 Nm to 5,000 Nm.

Exemplary measuring devices: Torque wrenches/screwdrivers, torque transducers, torque testers



Rotation angle

With the help of our rotation angle test stand, we are ideally equipped for the calibration of your rotation angle sensors and measuring systems as well as torque and rotation angle spanners according to VDI/VDE 2648 sheets 1 and 2. For your rotary encoders, we can perform combined DAkkS-accredited calibrations with a rotational speed of < 0.2 1/min.

Exemplary measuring devices: Torque sensors with angle option, torque wrench tools with protractor, rotary encoder/encoder



Force

During the forming of various components, the measurement of the respective force is indispensable. Therefore, a wide variety of force measuring devices and force transducers must be calibrated at regular intervals. Testo Industrial Services features a force calibration device with a measuring range of up to 250 kN.

Exemplary measuring devices: Force gauges, strain gauge force transducers, piezo force transducers, load cells/hydraulic compression force transducer



Acceleration

Our calibration service includes accelerometers and vibration meters. We offer manufacturer-independent DAkkS-accredited acceleration calibrations. Calibration of individual solutions of contactless vibration frequency counters or vibro-pads is also possible. Calibration is carried out according to the principle of secondary comparison calibration in accordance with DKD-R 3-1 ISO 16063-21.

Exemplary measuring devices: Vibration transducers, calibrators and measuring instruments



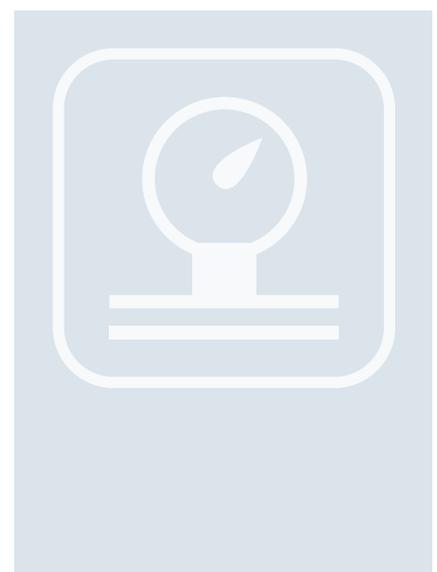
Calibration of pressure reference instruments

In our accredited laboratory, pressure measuring instruments such as for example pressure controllers, electrical reference standards as well as hand-held measuring devices can be calibrated. Our calibration services currently include calibrations from -1 to 250 bar with minimal measurement uncertainties.

Further information on this topic

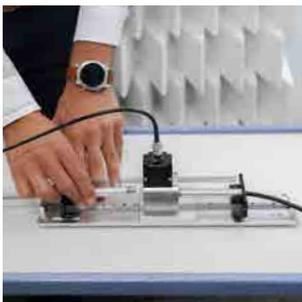
Benefit from our know-how and learn more about the mechanical measurand here:

▶ www.testotis.com/calibration/mechanical





Acoustics – Measuring sound in the free-field and pressure chamber



Pressure chamber

Acoustic measuring instruments can be calibrated in the pressure chamber of Testo Industrial Services. Pressure chamber calibration is possible from 31.5 Hz to 16 kHz in one-third octave or octave steps. The calibration of pressure microphones is designed according to DIN EN 61094-5 and our evaluations are based on DIN EN 61094-4.

Exemplary measuring devices: Sound level meter, 1/2" pressure chamber microphones or diffuse field microphones



Free-field chamber

Free-field calibration is possible from 125 Hz to 20 kHz in one-third octave or octave steps. It is especially suitable for the calibration of free-field microphones and sound level meters according to DIN EN 61094-8 and DIN EN 61672-3. The evaluations are carried out according to DIN EN 61094-4 as well as DIN EN 61672-1 and the frequency evaluation according to Z, A, C for sound level meters.

Exemplary measuring devices: externally polarised and electret microphones from any manufacturer; and Class 1 or Class 2 sound level meters



Calibrator/Pistonphone

The acoustic calibration of class 1 and class 2 calibrators and pistonphones can be carried out in the calibration laboratory of Testo Industrial Services. Using the substitution method, calibration is performed at fixed points of the calibration item at 250 Hz or 1000 Hz with a measurement span of 70 dB to 130 dB and is specially designed to meet the requirements of DIN EN IEC 60942.

Exemplary measuring devices: Acoustic calibrators, Pistonphones of any manufacturer





Analytics – Gas analyses and other chemical analyses



Gas analysis

Testo Industrial Services has a fully comprehensive measuring station for the calibration of your flue gas and gas analysis measuring instruments. Both ISO/factory calibrations and DAkkS calibrations can be carried out for CO/CO₂ ambient measuring devices. CO₂ measuring devices are calibrated at the measuring points 0 ppm, 1,000 ppm and 5,000 ppm, while CO measuring devices are calibrated at 0 ppm and 80 ppm. At the measuring station for gas leak testers, gas detectors and refrigerant leak testers, calibrations can be carried out at 1 vol. % for methane (CH₄) and for refrigerants (R143a) at leak rates of 3 g/a, 5 g/a and 10 g/a.

Exemplary measuring devices: Flue gas measuring devices, CO probes, CO/CO₂ measuring devices for ambient measurement, refrigerant and gas leak testers, gas detectors



Other chemical analyses

pH-meters can be calibrated with solutions at 2; 4; 7; 9; 10 and 11 pH.

Calibrations for conductivity meters are possible between 1.3; 5; 15; 100; 706; 1413 $\mu\text{S}/\text{cm}$ or 100 mS/cm . Frying oil testers are calibrated at 4 % TPM and 24 % TPM.



Expertise – our know-how

The correct calibration interval

Reducing costs and increasing quality at the same time. When it comes to testing and measuring equipment, it is important to weigh the fine line between the costs incurred and the possible risk. The choice of the correct calibration interval plays a decisive role. It is important to keep the risk of incorrect measurement as minimal as possible while not losing sight of economic factors. Only with the correct choice of the calibration cycle can the quality of the test equipment and thus the measurement be ensured. Relevant standards require calibration „at fixed intervals“ or „regularly.“ But how often is actually regular? Equipment manufacturers and calibration service providers can only provide advisory support. Only the company itself knows the locations of use, the test processes and the consequences of incorrect measurements. As a decision-making aid, it is recommended to do a utility analysis. In this analysis, the risks and general conditions such as frequency of use, place of use, consequences of incorrect measurements and in this analysis, the risks and general conditions, such as frequency of use, place of use, consequence of incorrect measurements and previous calibration results, are evaluated with points and the calibration interval is derived from this.

Influence criteria for interval determination:

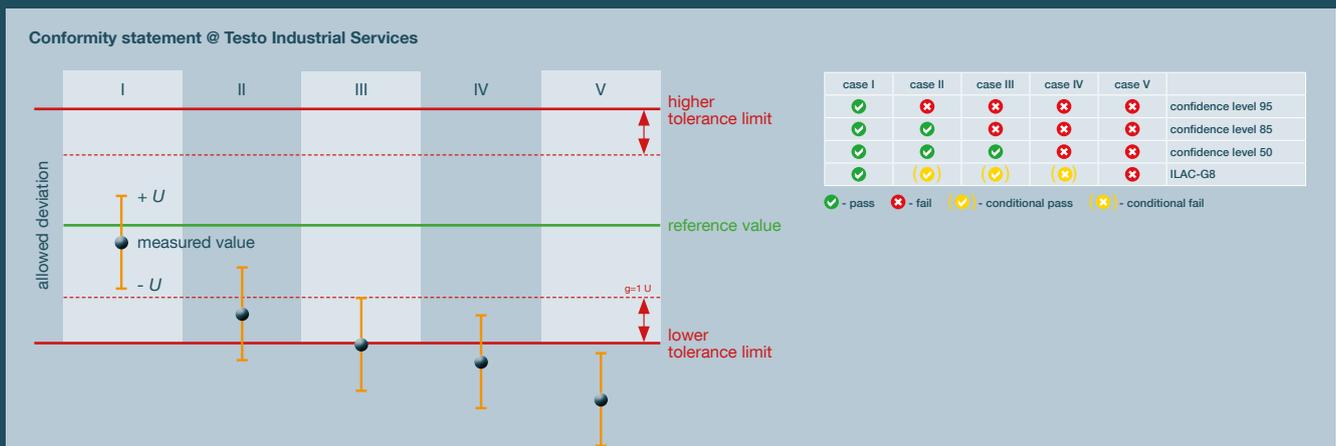
- Operating conditions
- Environmental influences
- Properties of the test equipment
- Requirements from customers, authorities and standards
- Manufacturer recommendation
- Experience with similar test equipment
- Extent of any consequential damage in case of defective test equipment

Conformity assessment

During calibration, the metrological properties of the calibration object are determined by comparison with precise laboratory standards. In the conformity assessment, these characteristics are compared with a previously defined specification limit to determine whether the measuring equipment functions as expected. The specification limit (or tolerance) of calibration is the limit which specifies the maximum deviation of the determined value of a measuring instrument from the nominal value (reference value). In order to assess the result of a measurement, the associated measurement uncertainty is considered in addition to the determined estimated value of the measurand. The measurement uncertainty is a quantitative measure of the scatter of measurement results.

The revised standard DIN EN ISO/IEC 17025:2018 „General requirements for the competence of testing and calibration laboratories“ introduces binding decision rules for the conformity assessment of measuring equipment. Decision rules specify the manner in which measurement uncertainty is to be taken into account in the conformity assessment of calibrations and thus define the maximum permissible risk of a false evaluation.

If a measuring equipment owner or user wishes to obtain a statement on the conformity of his measuring equipment with regard to a metrological property in the future, the laboratory and user must first agree on the decision rule to be applied.



Summarized for you

ISO certificate (factory calibration)

Since 1987, the QA systems of industrial companies have been certified, as well as those of service companies, banks, insurance companies, retailers, hospitals, etc. have been certified. In addition, there are other industry-specific laws, standards and guidelines in the pharmaceutical sector (CFR, GMP), in the food sector (HACCP), in medical technology (ISO 13485) and in the automotive sector (VDA, QS9000, IATF 16949). For all these directives and standards, the introduction and maintenance of a test equipment management system, including calibration, is an indispensable element.

The ISO certificates (factory certificates) from Testo Industrial Services are the cost-effective alternative to accredited calibration certificates. They meet the requirements of the:

- ISO 9001:2015
- ISO 10012:2003
- CFR
- ISO 13485:2016
- VDA
- GMP

Accredited calibration certificate according to DIN EN ISO/IEC 17025:2018 (DAkkS)

The German Accreditation Body (DAkkS GmbH) awards calibration and testing laboratories the competence to perform accredited calibrations according to DIN EN ISO/IEC 17025:2018. The calibration results obtained in these laboratories are the highest after those of the state institutes (in Germany, the PTB) - the most reliable and court-proof. Through international agreements and the globally valid accreditation basis DIN EN ISO/IEC 17025:2018, they are internationally recognized and valid.

For all users of measuring instruments who require a particularly high level of safety, accuracy and reliability, accredited calibration certificates (DAkkS) are the ideal solution. Frequently, test equipment in the following areas is secured with an accredited calibration:

- Factory and service standards
- IATF 16949 certified companies
- Acceptance and certification bodies
- Testing laboratories
- Accredited testing and calibration laboratories

▶ You can find our detailed professional articles at:
www.testotis.com/professional-article



▶ You can find our sample certificates at:
www.testotis.com/sample-certificates



References

PRIMAS connect for safe test equipment planning at DÜRR DENTAL



Testo Industrial Services has created PRIMAS connect, a digital and automated interface for test equipment planning at DÜRR DENTAL.

DÜRR DENTAL is a long-standing customer of ours who has worked with the PRIMAS online test equipment management solution for a long time. Although DÜRR DENTAL has its own CAQ system, they want to continue working with PRIMAS online. However, there are some challenges as the inspection planning is carried out via the internal CAQ system. The latest test equipment information is always needed for a daily production planning. Unfortunately, it has not yet been possible to guarantee automated data transfer.

Testo Industrial Services has managed to guarantee the automated data transfer between the CAQ system and PRIMAS online. With the connection of the CAQ system from DÜRR DENTAL via PRIMAS connect, the test equipment data from the PRIMAS online test equipment management system can be automatically retrieved from the CAQ system at any time and thus also transferred to the daily production planning.

Full service in the field of measurement technology at Miele



Testo Industrial Services offers a fully comprehensive and individualized calibration service for all measuring instruments for more than 1,500 Miele service technicians as well as a full service solution including a holistic measuring equipment pool procedure – Europe wide.

AS an appliance manufacturer, one of the services provided by Miele is validation and verification in accordance with the DIN EN ISO 15883 standard. This requires regular calibration of the measuring equipment in order to guarantee safety and quality. With Testo Industrial Services, Miele has now a full-service solution including a pool of measuring equipment. The measuring equipment pool procedure describes the smooth replacement of over 10,000 Miele measuring devices when servicing is required. As soon as a Miele test equipment needs to be calibrated, Testo Industrial Services not only takes care of the calibration but also of the replacement of the test equipment by Miele technicians. The development of the process for managing and distributing a pool of measuring equipment, ensures Miele's engineers always have access to fully calibrated equipment and were always able to meet their service requirements (calibration, maintenance and repair).

Qualification of clean rooms in sterile production for EVER Pharma Jena GmbH



Testo Industrial Services supports EVER Pharma Jena GmbH in the qualification/requalification of their clean rooms of GMP classes A to D on 1,600 sqm. Qualification is carried out in accordance with DIN EN ISO 14644 and the EU GMP guidelines (Annex 1 & 15).

EVER Pharma Jena GmbH is part of the EVER Pharma Group with headquarters in Austria. The focus of the group is on research, development, manufacturing and marketing of products in the fields of neurology and special injectables (such as oncology, intensive care, hormone therapy, pain therapy). Injectable drugs are manufactured at the site in Jena.

Testo Industrial Services took over the initial clean room qualification of the four sterile production in the new building of the company, which are distributed over three floors. In addition to the clean rooms, this also includes the corresponding airlock areas, sample train and weighing area as well as the surrounding CNC (Controlled-Not-Classified) area.

GxP-compliant qualification and validation for Grieshaber Logistics Group AG



At the Grieshaber Logistics Group AG, Testo Industrial Services took over the risk-based qualification of the warehouse areas and utilities. Part of this was summer and winter mapping and the implementation of a monitoring system.

Grieshaber Logistics Group is an internationally oriented contract logistics service provider with several state of the art logistics locations in the EU and Switzerland. The location in Rheinfeldern for example offers GxP compliant storage and packaging of pharmaceuticals on an area of 25,000 m². Storage here is optionally at < -18 °C, 2 - 8 °C or 15 - 25 °C.

The aim of the project was to draw up a holistic concept for GSP compliance together with Grieshaber Logistics Group, to establish this concept and to implement the qualification and validation measures derived from it. Any quality assurance measures should, in addition to the current state of the art, meet the relevant requirements in the area of EU-GxP legislation and be „FDA audit-proof“.



Find further references here:

 www.testotis.com/company/references

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