

The Atlas Copco logo is positioned in the top right corner. It consists of the brand name "Atlas Copco" in a blue, italicized serif font, centered between two horizontal blue bars.

# Calibration

Stories of precision, safety and trust.



SE-ZKE

*Atlas Copco*

SE-ZKE

# Atlas Copco

## Precision for our future

Our lives are challenging and achievement-oriented. Every day we take on responsibilities – for ourselves, our families and our careers. Great strides are being made in research and development. Will we even still be steering our own cars in the near future? Are our children growing up in a healthy environment? Will we be able to cure cancer soon? We face various high demands on a daily basis. Safety and reliability play a great role. So it's all the more important that we can rely completely on the precision of machines and devices.

We are extremely aware of the great responsibility we have toward our customers. In our 19 accredited calibration laboratories worldwide – two of which are in Germany – we pass on our international know-how to our customers. Our laboratories in Essen and Dingolfing are all accredited by DAkkS GmbH (German Accreditation Authority). In this way, we can always guarantee the highest quality and precision.

The sustainable economic growth of our customers is our top priority. Just as important to us, however, is the preservation of our environment and our social responsibility toward our fellow human beings. It's the only way we can all look forward to a positive and successful future. At Atlas Copco we call this sustainable productivity.

### *Our standards ensure quality for you*

- DAkkS accreditation in accordance with DIN EN ISO/IEC 17025
- Quality: ISO 9001 certification
- Environment: ISO 14001 certification
- Occupational safety: OHSAS 18001 certification
- Flexible training: AZAV certification
- Accreditation for on-site calibrations





# Standards

## For the safety of our processes

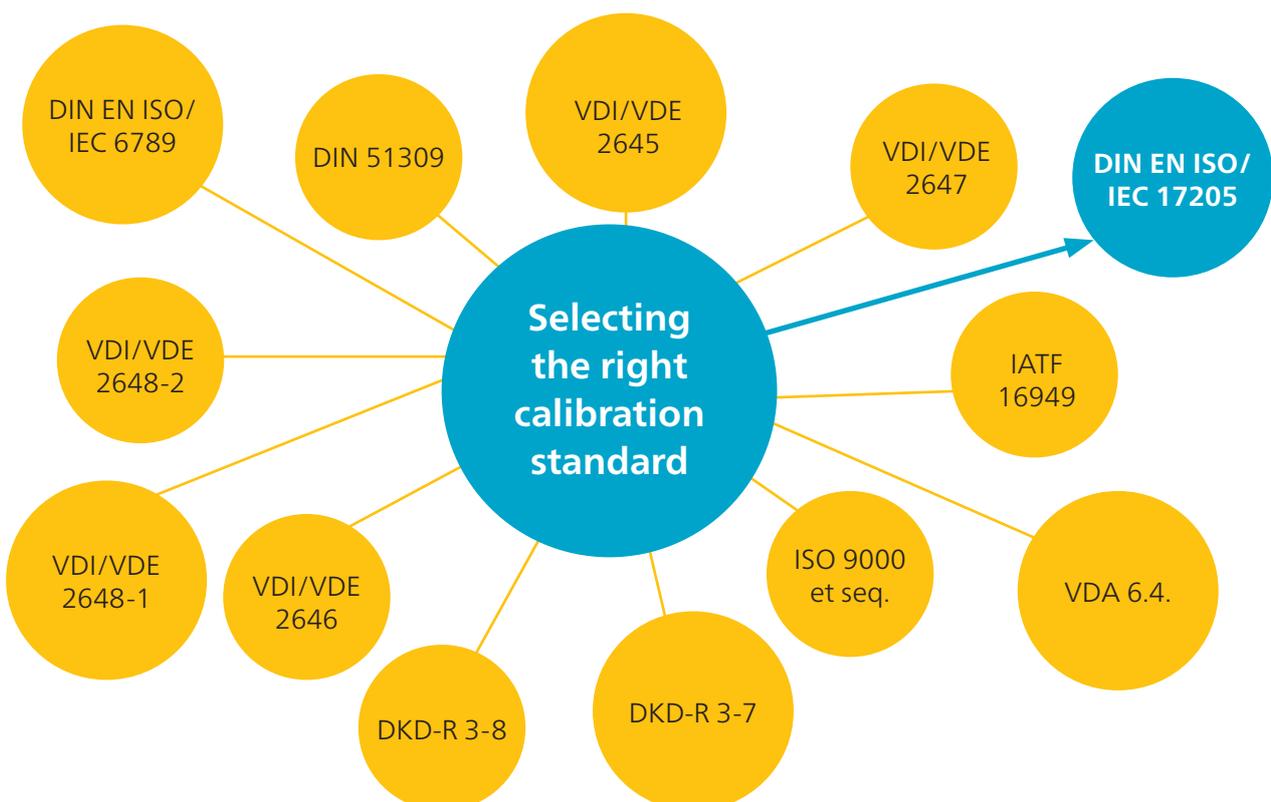
We are all familiar with DIN EN ISO 216. Or maybe not? No really, we all know it! For us, ISO 216 is the basis for ingenious discoveries like those of Albert Einstein, as well as for the great poets and thinkers of history. We are talking about a constant aspect ratio:  $1/\sqrt{2}$   
This results in the best-known standard today – DIN A4. This ratio was applied as early as 1786.

Standards and guidelines determine our everyday life, they create order and structure. As with many things in life, the automotive industry is a trailblazer for innovative products and processes. Within the framework of IATF 16949, new standards, for example, are being set in quality requirements for the automotive industry.

Our flexible accreditation ensures that you are always working with the state of the art and according to up-to-date standards and guidelines. For you, this means security when it comes to audits or questions of product liability. We are happy to be by your side as your strategic partner so that you are best situated for the future. That's why we at Atlas Copco also actively influence relevant standards and their practical implementation as part of the corresponding committees and boards.

### Facts

- Flexible accreditation from Atlas Copco
- Process analysis and process optimization by Atlas Copco
- Seminars on the topic of tightening technology
- Preparation for audits





# Torque

## For the longevity of our products

In athletics, the winner is sometimes decided by a fraction of a second. A fraction of a second can even turn a win into a new world record. We need to be sure that this measured result is accurate. It has taken humanity more than 3,000 years to get to this point. From the first beginnings of time measurement with water clocks to highly precise atomic clocks. Today, we are still passionate about precise mechanical clockworks, which are masterpieces of engineering.

For clock mechanisms to be precise, it is imperative that the torques affecting the components are known exactly. Only in this way can precision and longevity can be ensured. We encounter these demands on a completely different scale within automotive, machine and plant construction. Precise knowledge of the occurring torques, e.g. for screw connections, is decisive for long-term functionality. The measuring systems used to this end must therefore be adjusted and calibrated regularly so that "Made in Germany" can continue to inspire trust in future.

### *Facts*

- DAkkS accreditation in accordance with DIN EN 17025, EURAMET 14.01 and ILAC - MRA.
- Reliable calculation models verify the measurement uncertainty of the calibration equipment used.
- We also calibrate, adjust and maintain your torque measurement systems on site. This guarantees an undisturbed production process.
- Highest Level - best measurement uncertainty of up to 0.02 %.
- All references and measurement standards used for calibration are calibrated directly by PTB (National Metrology Institute of Germany) – or are directly traceable to national measurement standards and standard measuring devices of PTB.





# High torque

## Ensuring functionality and results

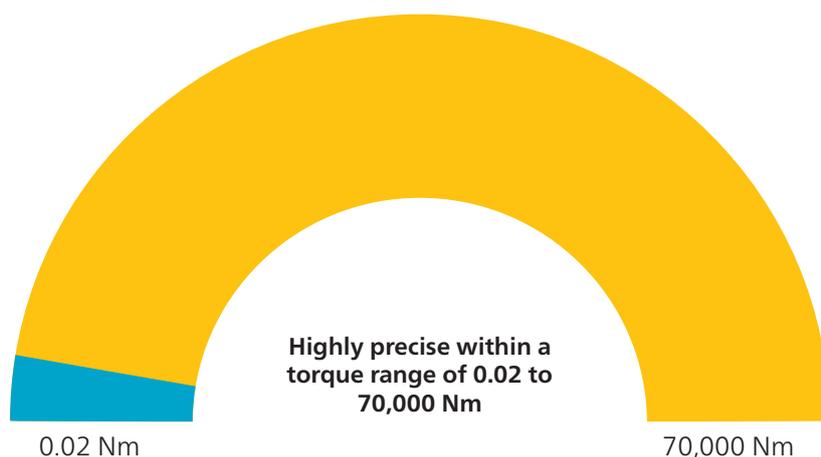
Hydraulic wrenches are often used in plant construction, in the chemical and petrochemical industry, in pipeline construction and in the construction of wind energy plants. With the help of high oil pressure, these wrenches produce very high torques, which often reach well above 20,000 Nm. But hydraulic wrenches work very slowly, which is why they are almost always only used for final tightening. Thus, these tools differ greatly from controlled electric screw systems. The latter usually work in two stages: with a very fast screw-in phase and a significantly slower and more precise final tightening.

Hydraulic wrenches are powered and controlled by special pump units, where the oil pressure usually reaches up to 700 bar. On the other hand, the pump pressure is set with a pressure gauge; it serves only as an auxiliary value for the approximate torque, which is set using a table (pressure vs. torque) accompanying the corresponding instrument. Testing is necessary, but dynamic testing is not possible. These wrenches are often used for critical applications and must therefore be tested and inspected to the same extent as normal electric or pneumatic screwdrivers. A dynamic test in accordance with VDI/VDE 2647 or 2645 is not appropriate however, as no direct dynamic procedures are being tested here, which is the case for electronically controlled tightening systems. The tightening processes should rather be considered "quasi-static", as the final tightening rarely exceeds more than a few degrees.

The result is that there are numerous competing providers on the market, many of whom operate quite differently, and often not according to the state of the art. Often, the test methods used do not even conform to the most basic requirements for ensuring functionality and results.

### Facts

- DAkkS accreditation in accordance with DKD 3-7 mod. up to 70,000 Nm





# Angle of rotation

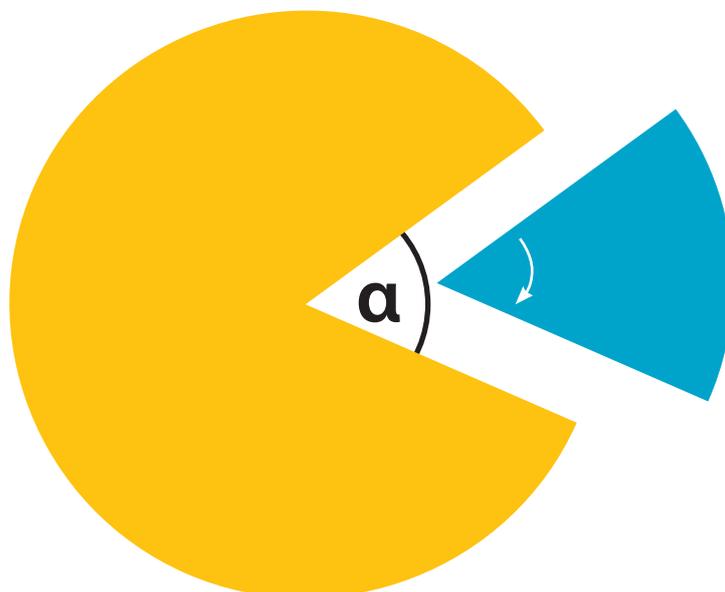
## For the safety of our mobility

We all want to get from one place to another flexibly, quickly and independently. Sometimes our career requires it, and sometimes we simply want to enjoy the freedom of travel. It's hard to imagine our daily lives without cars. But speed has long since ceased to be the only priority and safety and environmental concerns are becoming increasingly important.

The lightweight design of cars contributes to the conservation of energy and resources. However, the trend towards lightweight design also involves an increased number of screw connections that are critical for safety. They are exposed to high fluctuations in temperature and high levels of vibrations. The risk of accident and injury due to the failure of these connections must be kept as low as possible – it's our safety at stake, after all. Measuring equipment and reference instruments must meet the highest requirements in order to deliver exact results when determining the angle of rotation.

### Facts

- We calibrate direct and indirect rotation angle sensors, as well as digital angle measurement systems, in accordance with VDI/VDE 2648.
- Smallest measurement uncertainty up to two arcseconds in the lab and up to 10 arcseconds for on-site calibration.
- We transport your valuable measuring equipment safely, efficiently and with the environment in mind. Our service boxes offer a reliable dispatch system insured shipping with tracking function and overnight express on request.





ОТВАРТЕ  
OPEN

ЗАМКНІТЕ  
CLOSED

# Force

## For confidence in our technology

Being high above the clouds, feeling close to the sun – who isn't amazed by flying? And yet many of us feel uneasy as we board these giant flying machines. Whether we're travelling long-distance or flying around the world for work, we trust that highly qualified engineers are inspecting the condition of our aircrafts. The respect we have for flying is entirely justified.

Here, high quality awareness is required even in the manufacturing process and in the integrated measurement technology. During flight operation, extreme forces affect all aircraft components. The precise determination of the maximum load is one of the lengthiest and most arduous development stages in aircraft construction. All measuring instruments used are of course regularly calibrated and serviced, because the measurement procedures and analyses used are highly precise and achieve, for example, component tolerances within the micrometre range or help to integrate new materials such as composite materials.

### *Facts*

- Force measurement in accordance with DIN EN ISO 376 and DAkkS-DKD-R 3-3 within a wide measurement range from 10 N to 250 kN, with a measurement uncertainty of just  $5 \times 10^{-3}$ .
- 3 central workshops assist our German DAkkS-accredited calibration laboratories.
- Our services range from calibration to the supervision of entire production lines in your plant. The advantage for you: extremely short downtimes and maximum availability of your equipment.



