

# Water is our well- spring

Research and development  
for a better quality of life

**KNOW  
HOW**  
INSTALLED

starts  
here

Companies that wish to set new standards with their products have to continually question the limits of what is possible. Thanks to targeted investments in research and development, Geberit is the global driving force in the field of sanitary technology. **We combine cutting-edge technologies with comprehensive know-how in order to sustainably increase our customers' quality of life.**





  
Materials  
technology

  
Sound  
insulation

  
Hygiene

  
Electronics

  
Hydraulics

  
Fire protection

  
Surface  
technology

  
Virtual  
engineering

  
Statics

  
Process  
engineering

People who use a sanitary product from Geberit have very little idea how much technological expertise has gone into its development. This know-how forms the basis for future innovations at Geberit. We are continually working on better solutions for our customers and partners in ten technological areas that are relevant to us. In addition to **hydraulics**, these include **materials technology, sound insulation, statics, fire protection, hygiene, electronics, surface technology, process engineering and virtual engineering**. Bringing these competencies together under one roof, makes us the driving force in the field of sanitary technology.

**Where there are people**  
The Geberit brand stands for innovation and reliability, which is why our products and systems carry the label "Know-How Installed". Our solutions have to work – perfectly and for decades, even under the most difficult conditions. People's expectations when it comes to the comfort of sanitary products are constantly increasing. This spurs us on. We are constantly searching for new technologies and materials in order to improve our products and processes. This is probably why Geberit can be found all over the world where people live, work, study, are cared for, attend football games and concerts, be it in cold and warm environments – simply everywhere.

**Combined knowledge**  
People from 16 different professions currently work in the Technology & Innovation department:  
  
acoustician, master chemist, chemical scientist, production engineer, electrical engineer, development engineer, experimental physicist, solid-state physicist, building services engineer, plastics engineer, plastics technologist, mechanical engineer, patent lawyer, polymer physicist, materials scientist and toolmaker.

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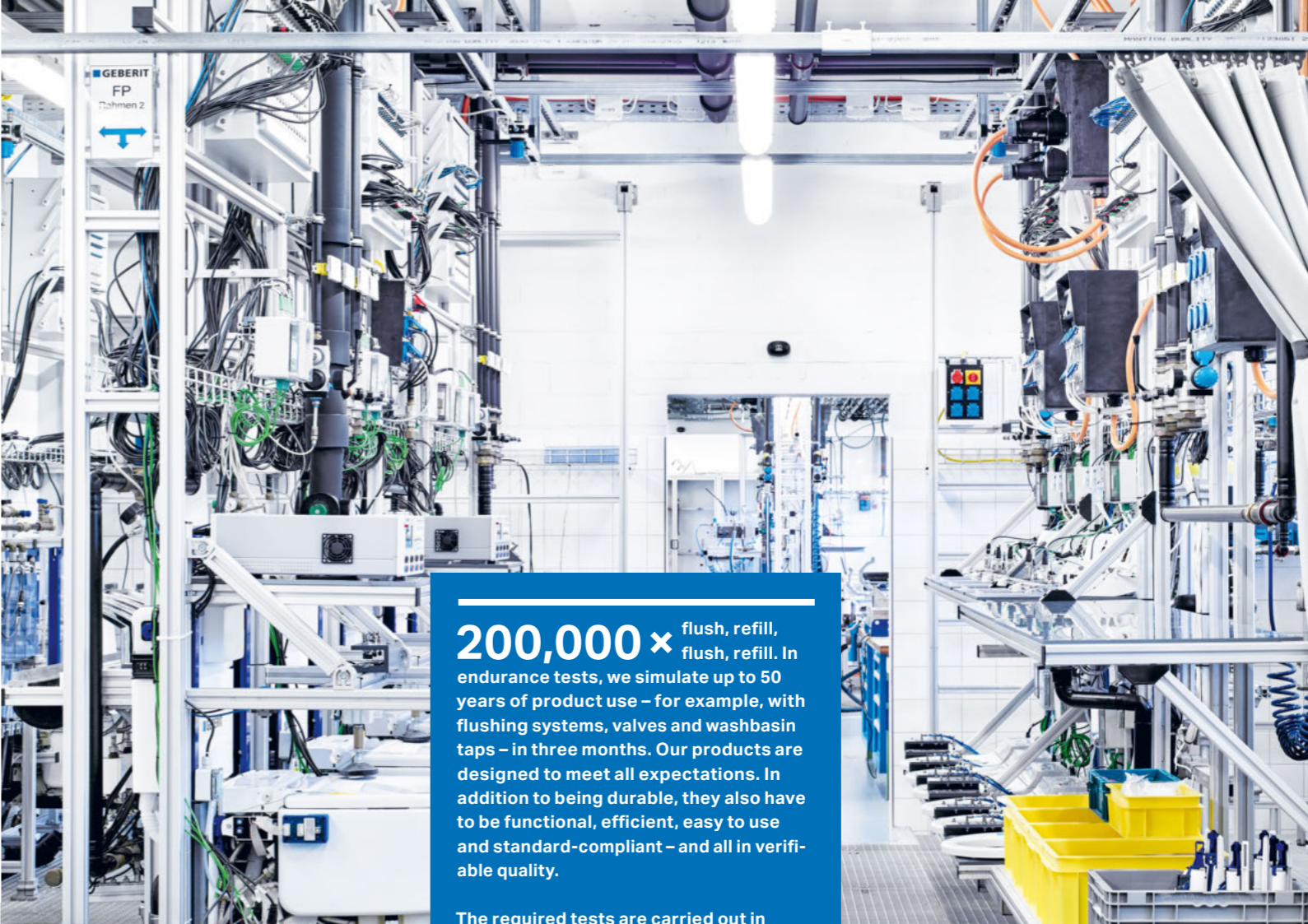


## How do you simulate 50 years in three months?

A lot of what we do is hidden, professionally installed behind walls. This includes the filling of cisterns with fresh water and the drainage into the sewage system. Incidentally, the company founder, Caspar Melchior Albert Gebert, first built a cistern in 1905 – it was made of wood and lead. Since then, we have continually improved the benefits and performance of sanitary hydraulics. Today, no other company knows as much about the application of this technology as Geberit.

### From small buildings to skyscrapers

Water doesn't just have to drain reliably from toilets, the same applies to bathtubs, showers, washbasins, dishwashers, washing machines and flat roofs. Anywhere in buildings where there is water – and this regardless of the building type and size, so in skyscrapers and industrial buildings as well. Compared to a single-family home, these buildings place maximum demands on hydraulics due to their dimensions and their industrial processes. However, no matter how high the peak loads, Geberit has the solution.



**200,000 ×** flush, refill, flush, refill. In endurance tests, we simulate up to 50 years of product use – for example, with flushing systems, valves and washbasin taps – in three months. Our products are designed to meet all expectations. In addition to being durable, they also have to be functional, efficient, easy to use and standard-compliant – and all in verifiable quality.

The required tests are carried out in our accredited 800-square-metre sanitary technology laboratory. This features a waste water tower – a 24-metre-high structure that corresponds to eight storeys. Virtually any construction situation can be reconstructed here. Other areas include the flushing laboratory, the endurance testing laboratory and the temperature cycle laboratory, the waste water laboratory, the foul water laboratory and the supply laboratory. Anything that receives a seal of quality from these laboratories meets the most stringent requirements.



## How does a product material prove its quality?

Because our products are installed for decades, selecting the best possible product materials is decisive for product quality. Thermoplastics, which offer virtually endless moulding and colouring possibilities, are particularly well suited for cisterns and pipes. The plastic granules are available in off-the-shelf quality or are adapted to our needs. However, we also develop plastics in our laboratories according to our own formulations. All product materials used undergo intensive testing and checks in a process that involves inspecting their chemical, mechanical and thermal properties using state-of-the-art techniques.

### Approval testing

Drinking water pipes, for example, have to meet very strict approval criteria in order to receive the corresponding approval mark from regional authorities. Fatigue tests are carried out as part of this process. Here, the product materials and pipes are subjected to above-average stress, such as a high dose of chlorine, hot water up to 95 °C or excessive internal pressure. Only after these and all other tests are passed is the product ready for industrial series production – and ready for use in the various building types.

Our materials technology know-how enables us to continually develop optimised new products, such as the highly sound-insulating drainage plug-in system Geberit Silent-Pro. The significantly increased inherent weight and the stiffness of the mineral-reinforced plastic reduce the natural vibration of the piping system and therefore the sound emission – much to the delight of your flatmates and neighbours.



“Materials technology is the hidden know-how installed in the product.”

Gerhard Gielenz,  
Head of Polymer Technology

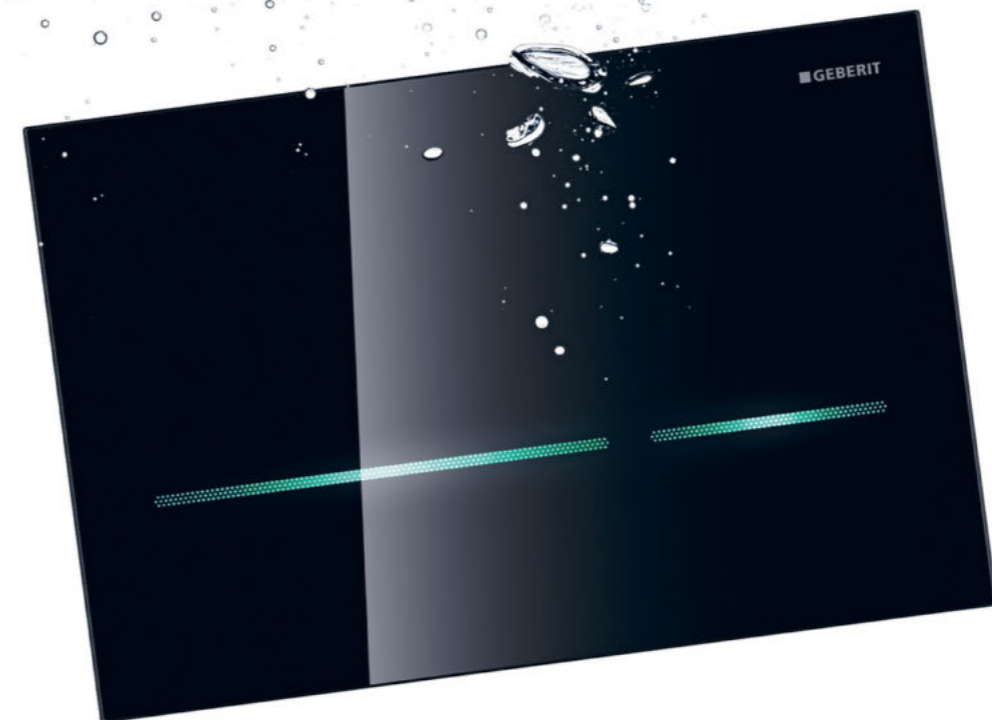
## How does a smartphone ensure clean water?

Drinking water hygiene can become a serious issue when rooms or entire building sections are unused for weeks or months on end. At certain temperatures, bacteria can multiply in the water supply lines. When these are used again, bacteria can be released, such as in the shower. Geberit has a simple yet effective solution for preventing this germ formation. With the sanitary flush unit, the pipes are periodically rinsed before germs and bacteria multiply to dangerous levels. All without chemicals – and programmed using our smartphone app.

### Hygiene, technologically guaranteed

Hygiene is also critical in places where countless people converge each day, such as in public buildings, hospitals, airports and railway stations. Urinal flush controls with IR sensors and the touchless washbasin taps are particularly invaluable here because they make it more difficult for bacteria and other germs to be transferred. In this regard, Geberit combines its expertise in materials technology, surface technology and electronics to constantly develop even better solutions to improve hygiene in sanitary facilities.

## Electronics in a waterbath?



Safely insulating the electronics against moisture, reducing energy consumption to the lowest possible level and guaranteeing maximum functional reliability are just some of the challenges that we are confronted with each day. This is why only products that pass the numerous tests carried out under climatically extreme conditions in Geberit's electronics laboratory are launched on the market. Depending on the specifications, we carry out tests at temperatures from  $-20$  to  $+70$  °C and humidities of between 30 and 99 per cent. Milder conditions? No chance!

### Sensors feel everything

The various functions found in shower toilets are illustrative of the developments that have taken place in the field of electronics. When you approach the shower toilet, the WC lid lifts up and the seat heating and the storage water heater for the shower are activated. The shower arm cleaning function, dryer and odour extraction unit are also triggered automatically. When you walk away from the toilet, it flushes automatically without you having to touch anything and the lid closes once again. High-tech for maximum comfort and hygiene.

## Why are our surfaces so irresistible?

The oldest ceramic finds are estimated to be some 30,000 years old. The material is indispensable in sanitary applications to this day because fired sanitary ceramic is extremely robust. With the appropriate glaze and the right care, it retains its original sheen for many years – even with heavy use and when very abrasive cleaning agents are used.

### Multifunctional and resistant

Surfaces in bathrooms and toilets are judged on the basis of various characteristics, including colour, sheen, how they feel and how they are affected by dirt and limescale deposits, sweat marks and fingermarks. Not only that, cleaning effort should be minimal. All these criteria are considered when developing new products,

in addition to the original functionality of the toilet, bidet, washbasin, bathtub and shower. The product surfaces therefore undergo special testing and are continuously optimised at our laboratories.

## How loud is too loud?

What a perfect evening! Great restaurant, top-notch food and wonderful company. You return to your hotel room and head straight to bed so that you are fit for your early-morning meeting. Alas, you cannot sleep a wink due to the constant noise of toilets flushing. Inconceivable? Far from it! Flushing toilets can drive you up the wall – both in hotels and residential buildings. To keep sanitary noises to a minimum, specialists test all products using state-of-the-art acoustic methods at Geberit's building technology and acoustics laboratory. The results are then incorporated into the product development process. And all so that a successful day can be followed by a peaceful night's sleep.



## Three questions for Oliver Wolff

Head of Building Physics

### Oliver Wolff, how important is sound insulation in sanitary facilities?

Very – and it is becoming more and more important. For example, architects and sanitary engineers on building sites are interested in questions like: Does our system comply with the building project's sound insulation requirements? If our specialists on site cannot resolve this question conclusively, we can find the answer using estimates, calculations and measurements from our database. If this is not enough, we reconstruct the construction situation and examine the installation in our building technology and acoustics laboratory.

### Your building technology and acoustics laboratory is unique worldwide. In what way, exactly?

The lab's size, concept and equipment are what make it unique. We have 19 test rooms just for acoustics. We are also able to reproduce any real-life situation. And because sound does not change when there are more than four floors, we can make statements for any building height. Our equipment is outstanding. For example, we have multichannel systems that simultaneously take measurements using 48 microphones. We have a laser scanning vibrometer for non-contact vibration measurement. The acoustic camera makes sound sources in pipes visible. And we make sound recordings of products being used. This makes it possible for us to listen to a wide variety of sounds again at any time, check how they sound and analyse them without loss of information. Our analysis programs are just as important, of course.

### Can the sound of a toilet flush be described in words?

You can only describe it in words. Although there are algorithms that attempt to measure how sound is perceived, this is difficult. We perform listening tests using sound recordings from various products. Although the test subjects do not know what they are listening to, they have to verbally judge the sounds. We gather statistics on this and replicate the preferred values as part of sound design. With potato crisps, for example, the recipe for success is "fresh and crunchy". With the AquaClean Mera shower toilet, this would be "quiet, thorough, pleasant".



## A polar bear on our toilet?

**400 kg** – that's the weight of a full-grown polar bear. According to EU standards, that's the weight that wall-hung WCs and bidets – in other words, those that do not rest directly on the floor – have to be able to bear. Wall-hung urinals and washbasins have to be able to support a weight of 150 kilograms. Needless to say, both our ceramic sanitary appliances and our load-bearing installation frames comply with these standards. How do we determine their load-bearing capacity? Not using polar bears, that's for sure. We start off by examining the statics on the computer using simulation programs – but that is not enough.

**Zero tolerance with tolerance values**  
The only thing that counts in the end is the real test in Geberit's building technology and acoustics laboratory, where our experts

carry out between 80 and 120 statics tests each year and also test new installation systems. Using a 3D measuring arm, a force framework and a pressure cylinder, we analyse how products respond to loads. Only if the test results do not exceed the tight tolerance values does a new development go into series production. We have to be absolutely ruthless in this respect. You never know, maybe you will want to plonk yourself down on the toilet with a little bit more vigour one day.



## How can a sleeve stop a fire?

When there is a fire, the discharge pipes and the points where they pass through walls and ceilings are critical. The risk of the fire spreading to other rooms and floors is high at these openings, and the lightweight discharge pipes themselves also catch fire quickly. Our specialists were faced with the challenge of finding a solution that stops a fire in its tracks at these weak points.

### A "stop sign" for fires

That's why the fire protection sleeve has been developed, a highly effective product that surrounds a discharge pipe at the point where it passes through walls and ceilings. At temperatures in excess of 150 °C, the intumescent material in the sleeve swells up and reliably seals the wall or ceiling opening. How well it does so is revealed by certified tests in a

special furnace at a materials testing institute, where pipes and fire protection sleeves are exposed to fire and temperatures of over 1,000 °C for 90 minutes. Temperature sensors prove that the fire protection sleeves stop the fire, which means that the fire brigade has more time to save lives and prevent property damage in an emergency.





## What do a racing car and sanitary products have in common?

They really do have something in common. When developing a new racing car, all the necessary simulations are performed on the computer before the first bodywork is manufactured and tested in the wind tunnel. Things are no different when it comes to sanitary technology from Geberit. Whether a new discharge pipe, trap, WC ceramic appliance or shower channel, a prototype is constructed only after

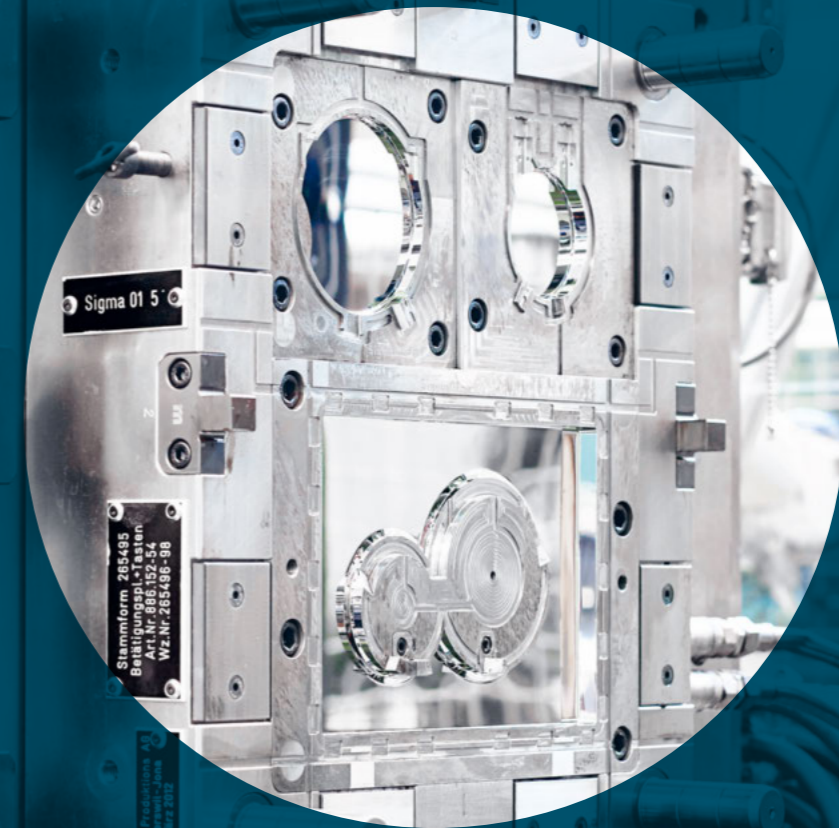
a thorough analysis has been carried out. Before this, we examine all the relevant characteristics on the computer. Like in Formula One, this enables us to make the development process substantially more efficient.

### The virtual past life of our products

In powerful specialised simulation programs, we allow virtual water to flow through virtual installations: through valves, ceramic pans and traps – and even through entire piping systems. We monitor flows

and turbulence as well as the pressure and velocity distribution of the water – and, of course, the development of noise. The procedures shown on screen enable us to optimise the mechanical, hydraulic and acoustic properties of the individual components. The toilet flush, for example, not only has to be thorough, but quiet too. Only then does the 3D printer create a testable prototype from the model. The prototype then undergoes a range of further tests before the product goes into series production, ready for use in the real world.

## How do you turn an idea into a useful product?



No matter how convincing an idea for a product might be or how far it has been developed, no Geberit product goes into series production until it can be manufactured economically and sustainably. Our product developers and process engineers therefore work closely together. In simulation programs and with the aid of prototypes, they jointly define the final design and the required material thicknesses. Additive manufacturing processes – such as 3D printing and laser sintering – considerably speed up the development process. The prototypes for our tests are therefore more or less created overnight. Only when we know exactly how and with which tools the production pro-

cess meets all the specifications does industrial production begin – and the idea becomes a product.

### Even more efficient and ecologically sound

The first round of production is out of the way. Time to put our feet up? Not a bit of it! The processes are continually questioned and brought into line with the latest technological developments, enabling us to not just improve product quality, but also continually make production more efficient and more ecologically sound. In other words, we are manufacturing faster and faster, but also ever more sustainably. After all, it is not just the product that is innovative at Geberit, the journey to get there is too.



**Felix Klaiber**  
Head of Technology & Innovation

“Innovation in our field primarily relates to innovations in the technological areas that are relevant to us – and not to product development. In addition to that, we test products and systems. And we constantly transform ideas into new materials, new concepts and new techniques and processes.”

**Geberit's success is based on the company's wide-ranging activities. The development of new technologies plays a major role here. The work in this area provides a basis for future innovative product generations. "The pipeline is full," says Felix Klaiber. We take a look back – and forward.**

**Felix Klaiber, how does Geberit come up with new ideas and innovations?**

Innovations come from various sources. What's important is that you engage with customers and users directly. Ideas also come from the construction industry – by us finding out what would make installation easier. Intensive market observation and critical reflection when it comes to our technological areas also kick-start innovations. The staff from all the areas within Geberit also provide valuable ideas. All channels are open, so to speak.

**What have been the greatest technological changes over the past decade?**

One of the most significant developments is virtual engineering. Geberit is probably the industry leader in this area. Take, for example, the innovative geometry of the ceramic appliance for the AquaClean Mera shower toilet. To achieve this, we simulated mechanical-structural, acoustic and flow-related phenomena on the computer. We brought them to life on the screen and saw how changes in shape affect flow behaviour and sound. This resulted in the creation of the ceramic appliance's rimless, asymmetrical interior, which ensures an optimal flush.

**So virtual engineering and 3D printing complement each other perfectly.**

Absolutely. Thanks to virtual engineering, all the required data is already recorded and therefore available for additive processes. 3D printing and other processes are becoming increasingly important because they speed up development. This is something we have already been using for over ten years. We also work on research projects in the area of 3D printing in close collaboration with universities.

**Does the technical standardisation of products conflict with the desire to have as much free rein as possible when it comes to innovations?**

Of course, unbridled freedom in development would be great, but standards are useful. They ensure that products and services satisfy generally accepted standards while at the same time laying the foundations for approvals and certifications required by the market. As market leader, Geberit also assumes responsibility in this area and is a member of various standards committees. We therefore actively shape our technological environment. However, our innovative strength is also reflected in our patents: on average, we obtain 25 patents each and every year!

**Let's take a look into the future. What challenges will your field be confronted with?**

Sanitary technology deals with water, our most valuable resource. One of the challenges is to use water as economically as possible. Our solutions therefore have to be extremely functional. Hygiene is also a major issue in this regard, be it in connection with drinking water or when it comes to our shower toilets.

**What's happening on a technological level?**

Because the demands in terms of comfort in the bathroom are growing all the time, so too are the requirements when it comes to the surfaces of the bathroom equipment, for example. As a result, we make surfaces more robust, even easier to clean and therefore even more durable. Parallel to this, innovations when it comes to product materials and our production processes give

rise to new and attractive product solutions.

**What does the bathroom of the future look like?**

On the one hand, urban living space is getting more expensive all the time. On the other hand, the bathroom is increasingly becoming a place for all the senses. The requirements when it comes to this room are therefore also increasing. We develop intelligent sensor technology, top-quality materials and functional all-round solutions that meet high design standards. Our aim is to combine exceptional comfort and performance.

Learn more on  
→ [www.geberit.com](http://www.geberit.com)



**A look at a tensile test at Geberit's materials laboratory. At the end of the test series, the adhesive that best holds the various layers of a multilayer pipe together is revealed. Our materials technologists carry out such systematic tests prior to every change in the composition of the material.**

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