The testing sector is a multi-faceted and sophisticated field.

High speeds, frequencies, accelerations - good to know that Hänchen cylinders of the 320, 300 and 120 series always keep up. There are many factors to be considered when selecting the right cylinder.

We have made this easy for our customers. Because Hänchen’s complete service ranges from personal consulting to the interactive product configurator HÄKO. From the planning phase to the start-up. From individual cylinders and clamping devices to entire drive systems including documentation. From standard applications to custom-made special solutions. Decades of experience will help us find the perfect solution for you.
**Hänchen. A family business in its third generation.**

The passion for hydraulic cylinders and drive systems is hereditary. At least with us it is. We are the third generation to continue the work of our grandfather Herbert Hänchen. With the same pioneering spirit, the same passion for first-class quality and the same enthusiasm for the smell of oil and metal.

Everything started in 1925 with repairing motors. Especially precise and long-lasting cylinders and crankshafts were needed. The solution was to hone the surface – a method we’re still using today. With success!

Our passion for robust and reliable products is why we’ve been building hydraulic cylinders for various applications, and also for testing purposes, for more than 60 years. Hydraulic drives are extremely reliable, extremely durable and, while being very compact, offer a high power density.

With more than 200 highly motivated employees, we have been developing, testing and manufacturing innovative solutions for our customers – in our own research and production departments in Germany. We are at home where durability, reliability and availability matter. Structure tests of Airbus aircraft, for instance, have been using Hänchen test cylinders since the very first A300.

Hänchen’s success story is still running smoothly. The reason for this is that our customers can be sure that we always use solutions tailored exactly to their requirements. This mutual trust is based on our know-how that has been growing for three generations, and which makes us a world-wide authority for drive solutions.

**Hydraulic solutions from a reputable company.**

The original Hänchen headquarters in Ruit near Stuttgart. In our certified company we create sustainable and future-oriented drive solutions.
Dynamics for test winners.

Efficient with varying test setups, compact, versatile, quick, sensitive and robust – the best choice for challenging tasks.

For example for checking the functional safety of systems, component parts or products. For structural testing of aircraft, refrigeration compressors, automobile exhaust systems and many more. Or for loading and movement simulation, such as operational profiles and flight profiles.

+ For every frequency range and for high lateral forces

The test cylinders convince with their stability and high inherent stiffness. They are suitable for high speeds and can reliably bear high lateral forces.

+ Operation without leak oil pump

Thanks to the elaborate sealing and guiding system, Hänchen cylinders don’t need leak oil pumps.

+ Bores with millimetre accuracy

The working areas can be designed individually for the respective requirements. This saves acquisition and operating costs for the required periphery and increases the energy efficiency, e.g. with regard to the system’s energy input and cooling power.

+ Modular system for efficient change of applications

Switching between different test setups simply, quickly and cost-efficiently:

Mounting parts and accessories such as spherical rod eyes, integrated position transducers, force transducers, mounting plates, accumulators or control valves fit cylinders with different forces, eliminating extra purchases – optimal utilization of the existing test environment.
Especially important for designing test cylinders:
Taking into account the lateral forces acting on the piston rod, and a cushioning to protect the cylinder.

+ Design according to the lateral forces

An important point to be considered when designing hydraulic cylinders is the ability to bear lateral forces or side loads acting on the piston rod. Beside the diameter, the elastic curve of a piston rod under lateral forces depends above all on the stroke length, the free piston rod end and the stroke position. So, the admissible lateral force in the retracted end position will always be higher than in the extended position.

Lateral forces on the piston rod

+ Protection against unforeseen movement

Every test cylinder of the 320 series is equipped with an emergency cushion in front of every end position. This serves to protect the cylinder.

The length of the emergency cushion is included in the stroke. The actual stroke without emergency cushion is called the effective stroke.

Emergency cushion
A dynamic test environment requires free-moving, low stick-slip hydraulic cylinders. Hänchen offers two test cylinder designs with especially low friction. High production accuracy with very little guide clearance guarantees wear-free use and thus a long service life.

**Servofloat® – with patented floating gap seal**

**Servofloat® design with patented floating gap seal for extremely low friction**

In the Servofloat® seal element (Domestic and foreign patents, US Pat. 4 406 463), the pressure in the cylinder chamber is discharged to the outside in a contact-free through a narrow no-contact throttle gap. This system requires no external pressure supply.

**Servobear® – with hydrostatic piston rod guide**

**Servobear® design with hydrostatic piston rod guide for highest side loads**

Servobear® combines seal and rod guide. The rod is “floating” on an oil film without touching the guide. The pressure is released through this narrow bearing gap. The pressure supply for the hydrostatic bearing is realized internally via the system pressure.

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**Guiding system in cover**

- PTFE wear rings
- Contact guiding elements

**Sealing system cover**

- Floating gap seal, functional oil seal, expelling ring

**Sealing system piston**

- No seal with throttle gap

**Guiding system on cover**

- Hydrostatic bearing
- No-contact guiding elements

**Sealing system on the cover**

- Functional oil seal, expelling ring

**Sealing system on the piston**

- No seal with throttle gap

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The functional oil flow with Servofloat® and Servobear®

In both designs, the contacting functional oil seal is not under pressure. This makes the residual friction in the entire pressure area constant and very low. The leak oil is discharged to the tank through the overflow oil connection without pressure, it should not be suctioned off.

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| Servofloat® | Guide values apply for chamber pressure (operating pressure) of 210 bar, fluid ISO VG 46 at 55 °C |
| Servobear® | Guide values apply for supply pressure (system pressure) of 280 bar, fluid ISO VG 46 at 55 °C |
Exactly as it should be. Perfect.

Your applications aren’t that challenging? Then our Economy series 120 and 300 are just right for you. In typical Hänchen quality, of course – high surface quality, geometrical accuracy of the component parts, and coordinated sealing elements – for highest technical requirements and safe, reliably controlled drives.

Economy single-rod cylinder
Economy double-rod cylinder
Premium double-rod cylinder

Performance map

The performance map of a hydraulic drive describes the dynamic movement of a hydraulic cylinder in a sine wave. Depending on the cylinder design, different performance classes can be reached.

Economy series 120 and 300: Slim test cylinders for simpler test tasks

Honed cylinder tubes, hard-chrome plated and honed piston rods, accurately fitting sealing elements – even with our Economy series, you can count on the high-quality processing that is typical for Hänchen cylinders.

Advantages:

- Optimal cost/performance ratio
- Especially suited for test tasks with long strokes
- As single-rod or double-rod cylinder
- With integrated position transducer
- Low dead weight
- Optionally available with mounting plate for control valve

Technical data

Type of effect: single-rod, double-rod
Sealing systems: basic design, Sirocco®, ServoFloat®
Speeds: up to 2 m/s

<table>
<thead>
<tr>
<th>Series with position transducer</th>
<th>Max. pressure (bar)</th>
<th>Bore (mm)</th>
<th>Force (kN)</th>
<th>Stroke (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economy single-rod cylinder</td>
<td>120/150*</td>
<td>40 – 180</td>
<td>15 – 360</td>
<td>1 – 1,500</td>
</tr>
<tr>
<td>Economy double-rod cylinder</td>
<td>300</td>
<td>30 – 240</td>
<td>19 – 462</td>
<td>1 – 1,500</td>
</tr>
</tbody>
</table>

* depending on mounting

You can find design and calculation assistance in our product configurator at www.haenchen-hydraulic.com
For the perfect cylinder, we need to know what you want.

Tests in salt spray fog, in climatic chambers or in a lab: We fit your cylinder up for anything. Tell us what you need – to make the perfect cylinder, we need to know what you want.

**Equipment system**

For the perfect combination, the cover type with the best sealing and guiding system with matching piston rod quality and the right sealing material is selected based on your application.

**Sealing system**

- Basic design: lip seal, wiper ring
- Servoclip*: compact seal, lip seal, wiper ring
- Servofloat*: floating gap seal, functional oil seal, wiper ring

**Guiding system**

- **Servoslide**: Synthetic guide
  - Simple movement, long-stroke oscillations ≤ 25 Hz
  - Side loads due to lateral movement
  - Blood friction properties
  - Vibration-damping
  - Low stick-slip
  - v ≤ 0.5 m/s
- **Metallic guide**
  - Simple movement
  - High temperatures
  - Universal application
  - v ≤ 0.5 m/s
- **Pipe**: Wear rings
  - Simple and controlled movement, long-stroke oscillations ≤ 25 Hz
  - Side loads due to lateral movement
  - Optimized friction properties
  - Vibration-damping
  - Mostly stick-slip-free
  - v ≤ 2 m/s
- **Servobear**: Hydrostatic bearing
  - Simple and controlled movement, short-stroke oscillations ≤ 25 Hz
  - Side loads due to lateral movement
  - For long strokes
  - Mostly stick-slip-free
  - v ≤ 3 m/s

For further details on this and other equipment features, please refer to our book "The Hydraulic Cylinder".

* The recommended cover type also depends on the series and the piston equipment.
The strong point of Hänchen cylinders is their extreme versatility. We provide reliable cylinders with the perfect performance for your static or dynamic application case.

**Low level of friction force**
Sensitive, free-moving or robust – we have the right cover type for your requirements.

**The perfect sealing system on the piston**
Beside the selected cover type, the right piston is also crucial for the dynamic movement of the cylinder. We select the right piston for your cover type, exactly meeting your requirements.

**Friction in dependence on sealing and guiding system in the cover**

<table>
<thead>
<tr>
<th>Sealing system</th>
<th>Guiding system</th>
</tr>
</thead>
<tbody>
<tr>
<td>basic design</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>Servocop®</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>Servofloat®</td>
<td>Servoslide®</td>
</tr>
<tr>
<td>functional oil seal</td>
<td>Servobear®</td>
</tr>
</tbody>
</table>

**Piston types for test engineering**

<table>
<thead>
<tr>
<th>SERIES</th>
<th>Economy: Single-rod cylinder</th>
<th>Economy: Double-rod cylinder</th>
<th>Premium: Double-rod cylinder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangular</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>compact seal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throttle gap</td>
<td>Oscillations, friction-friendly</td>
<td>Speed ≤ 4 m/s</td>
<td>Frequency ≤ 7 Hz</td>
</tr>
<tr>
<td>(no seal)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values measured on the double-rod cylinder (bore 46 mm without seal, piston rod Ø 40 mm) during sine operation according to VDMA24577 at 50 °C/HLPD46. The level of the friction force curves is lower than usual on the market.

All piston types use the metallic guide.
**Special Solutions**

**Example 1: Hydraulic cylinder with pressure protection tube**

For weight compensation or to obtain a resilience effect, sometimes initial loads must be applied to the test objects. This is a job for hydraulic cylinders with a pressurized protection tube. Drive and hydraulic spring are combined in one component part.

Additional pressure from an accumulator is applied to the free piston rod, the so-called protection tube side, of a double-rod cylinder. Thus, the working area A3, determined by the rod diameter, acts as a "protection tube spring". With its two chambers A1 and A2, the hydraulic cylinder works in addition to this continuous hydraulic force.

**Example 2: Synchronous cylinders**

Hydraulic cylinders with working areas of the same size are convenient for dynamic movement. Synchronous cylinders are the solution for constricted spaces or long-stroke test tasks.

Their length corresponds to that of cylinders with one-side piston rods. A large rod, in which a smaller rod is moving, transfers the force to the outside. This creates two working areas of the same size, A3 for extension and A2 for retraction.

**Example 3: Pressure intensifier**

With a hydraulic cylinder (primary cylinder) with a servo-hydraulic drive, any operational profile for the piston rod can be created. This operational profile creates a certain pressure pattern in the high-pressure chamber, which can be applied to a test object as test pressure.

Component parts can, for example, be vibrated with internal pressure – ideal for bursting tests of hollow objects such as hoses, pipes and containers. The test cylinder can work with hydraulic oil, while the high-pressure part uses water or other environmentally-friendly liquids.

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Special tasks? Individual solutions!

Our large team of developers is there for you when you need a special solution developed and manufactured – from small adjustments to complete new constructions. Whenever possible, we use minor modifications of our modular standard elements to adapt them to your requirements as cost-effectively as possible. If necessary, we’ll rise to the challenge and develop an entire new system for you. Here you can see some examples.

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1. Material test stand: Structure test of airplane wings using synchronous cylinders
2. Hydraulic cylinder with pressure protection tube in a test of the interface between airplane and landing gear
3. Pipe bursting test with pressure intensifiers
**CLAMPING DEVICE RATIO-CLAMP®**

The patented clamping device Ratio-Clamp® holds the rod in a standstill and locks it into position mechanically. The clamping effect is immediate, lasts for an unlimited period of time and doesn’t require an energy supply – suitable for various applications, as a safety element or for locking component parts into place. 100% reliable! If necessary, we can also develop a customized solution for you.

**Safe advantages**

- Immediate fixation of the rod, with zero play in case of load reversal
- Immediate clamping effect in case of a power failure without additional energy supply
- Allowance- and wear-free locking, even with vibrations of the application
- Clamping for an unlimited period of time
- Energy-efficient thanks to pressureless clamping process

**Application areas**

- Protecting people and machines in case of a power failure or plant shutdown
- Locks axes during certain processes, even for highly dynamic applications/test processes

**Sealing systems: Servocop® or pressure piston seal**

- In the friction-optimized Servocop® variant, the sealing elements on clamping sleeve and locking piston touch the rod and are pressurised, which causes low sliding friction. The max. speed of the rod is 1 m/s.
- Low-friction sensitive applications: Thanks to the pressure piston seal, no pressurized seal touches the rod – the sliding friction is very low, constant and independent of the releasing pressure. The max. speed of the rod is 2 m/s.

**Technical data**

Suitable for: all hydraulic cylinders, round rods
Certification: TÜV, DGUV test
Sealing systems: Servocop®, pressure piston seal

<table>
<thead>
<tr>
<th>Ratio-Clamp®</th>
<th>Standard version</th>
<th>Special solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rod Ø (mm)</td>
<td>16 – 240</td>
<td>up to 300</td>
</tr>
<tr>
<td>Force (kN)</td>
<td>1 – 450</td>
<td>up to 2,000</td>
</tr>
</tbody>
</table>

**Configuration**

Comprehensive consulting service and quick support:
We’re happy to help you anytime with any questions or challenges you might face – from the accessories to the equipment. Because we want to give you the best drive solution and smooth test scenarios for your individual requirements: by minimizing the time required for installation and maintenance, and providing the best functional reliability.

Basis for a successful business relationship.

Our know-how: Your benefit
• Consulting service for individual cylinders and engineering and project development for complex drive systems
• Design planning on-site or at one of our locations
• Small lot sizes possible
• Available 24/7: Häko, the product configurator with design assistance and calculation programs
  www.haenchen-hydraulic.com

Simply safe: Service with additional benefits
• Approval e.g. according to Lloyd’s (Register of Shipping) or customer-specific
• Realization as per your requirements, e.g. according to ATEX directives
• Drawings: 3D models complete with accessories – for a perfect fit without errors
• Documentation according to EG machine directive
• Operating manual in several languages
• Preliminary and final start-up on request

Short reaction time: We’re always there for you
• From the first quote up to helping in an emergency
• Broad range of field service options – we’ll come to you for consulting and service
• Quick availability of spare parts throughout the service life thanks to consistent documentation and a serial number on every single cylinder
• As good as new after repair

Everything included: Equipment available
• Sealing and assembly tools for correct seal replacement
• Hook wrench for holding the piston rod in place during installation
• Venting set with measuring coupling – venting makes the seal last longer
• Air filter for dirt protection or filtering air and gases, used e.g. for non-pressurized hydraulic cylinder spaces or oil containers up to 100 °C