

**H-CFRP hydraulic cylinders**  
lightweight, robust, non-corrosive



**HANCHEN**®



## Hänchen innovation. H-CFRP hydraulic cylinders.

The essential advantages of H-CFRP are the tremendous weight reduction and the high load capacity of these components. This makes it possible to realize energy-efficient drives.

### Some examples for the application of H-CFRP hydraulic cylinders:

- Mechanical and plant engineering, test engineering: Up to 50% less energy consumption having the same power.
- Mobile hydraulics, wind energy: Extreme weight reduction enables larger distance ranges for concrete pumps, as well as higher cage loads for elevating work platforms.
- Offshore, shipbuilding, environment engineering: High corrosion resistance enables longer maintenance intervals.
- Test engineering, robotics: Lower accelerated masses enable higher dynamics – accelerations, frequencies, amplitudes.
- Medical engineering: Suitable for areas with strong magnetic fields.
- Machine tools: The very low negative coefficient of thermal expansion and the temperature resistance guarantee the machine's precision at all times.

### H-CFRP. The new material.

Developed by Hänchen, H-CFRP is a high load capacity composite made of carbon fiber and other components, refined to form a construction material.

With this material, we design and produce components for hydraulic cylinders such as cylinder tubes, piston rods, and protection tubes without metal sliding surfaces.



**The material.**  
Design is everything.

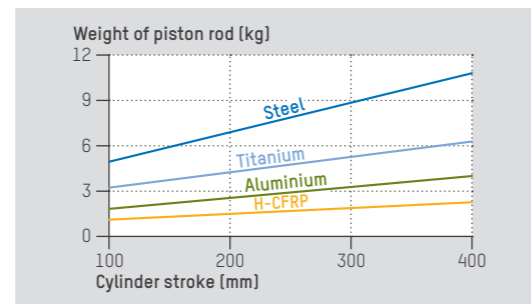


Just contact us, we will be pleased to help you! You can find our contact addresses on the back.

When producing components for cylinders, the carbon fibers are selected and designed as required. The resulting hybrid materials made of metals and carbon fiber reinforced plastics (CFRP) withstand the very high stress to which they are exposed in hydraulic applications. Hydraulic cylinders made of H-CFRP have several advantages:

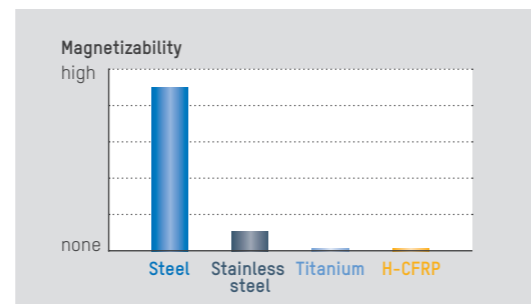
**H-CFRP is lightweight**

Compared with steel, H-CFRP means a mass reduction of up to 80 % for cylinder tubes, and up to 75 % for piston rods. The weight reduction is especially noticeable for long strokes.



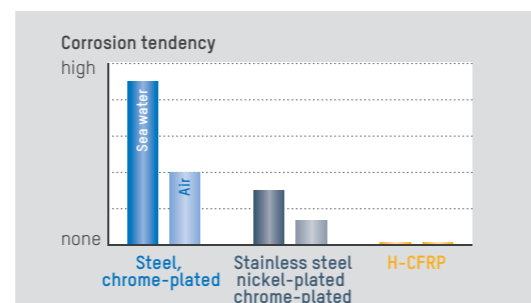
**H-CFRP is non-magnetic**

Carbon is a non-magnetizable material. This is relevant e.g. for cylinders with a piston rod made of H-CFRP and a magnetostrictive position transducer, resulting in a shorter installation length.



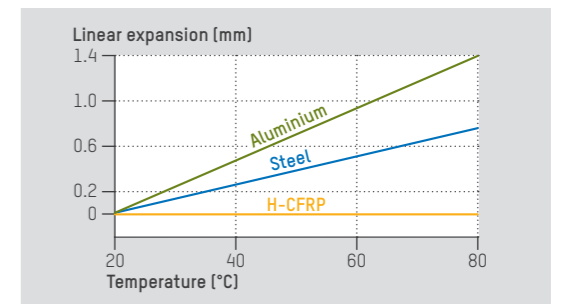
**H-CFRP does not corrode**

The high corrosion resistance of carbon in combination with non-corroding metals makes H-CFRP a reliable material. The use of epoxy resins for the matrix, and high-quality fiber, prevents chemical attacks caused by strong alkaline or acid substances.



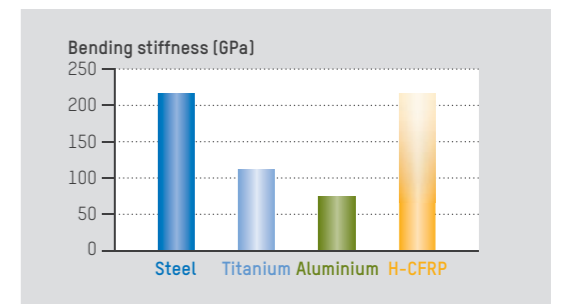
**H-CFRP does not expand**

Carbon fibers have a very low negative coefficient of thermal expansion in longitudinal direction. This makes H-CFRP an interesting material for very precise applications.



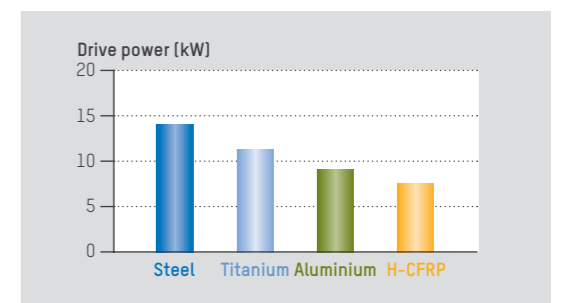
**H-CFRP is bending-resistant**

The tenacity and stiffness of the anisotropic material H-CFRP are considerably higher in the direction of the fiber than in the perpendicular direction. Depending on the fiber direction, there are different elasticity modules, which permit higher lateral forces.



**H-CFRP is energy-efficient**

With moved or accelerated components the energy efficiency can be improved due to the reduced weight. Depending on the application, the load capacity can be increased, or the required drive power reduced. In particular, H-CFRP piston rods make it possible to use smaller hydraulic components while maintaining the performance, and realizing a higher dynamic.





### H-CFRP design

#### + Piston rod

The piston rod of an H-CFRP cylinder is produced in a single piece, made exclusively of carbon, without a metal sliding surface. The piston is firmly embedded.

The piston rods are available as single-rod or double-rod, in the Hänchen series 120, 300 and 320. They can be combined with a steel cylinder tube.

#### + Cylinder tube

The H-CFRP cylinder tube is round-headed without a metallic inner tube. The design of the H-CFRP cylinder tubes of the series 120 and 300 is identical.

The cylinder tubes of series 320 are equipped with an integrated pressure supply and leak oil ports.

### Properties

#### + Dimensions, hydraulic parameters

- bore up to 200 mm
- stroke length up to 1,500 mm
- forces up to 400 kN
- suitable for temperatures between -40 °C and 80 °C

#### + Surface

As a counter-sliding surface for seals and high hydraulic pressures, the functional hard surface is applied to the piston rod and the cylinder tube during the production process.

Cross-hatching is used to refine the sliding surfaces.

### Mounting

#### + Piston rod

Metallic materials are used for force-transmitting elements such as the threads at the ends of piston rods. These are solidly embedded into the H-CFRP piston rod, thus creating a high-strength compound.

This enables customary mounting elements for force transmission to be attached, such as spherical rod eyes or rod flanges.

#### + Cylinder tube

H-CFRP cylinder tubes can be mounted on the cap side or on the head side using a flange.

The H-CFRP protection tube can be load-bearing for pivoted mounts attachments, or non-load-bearing.

### Material selection

#### + Selection of an appropriate material

For hydraulic cylinders, Hänchen offers various steel alloys and lightweight construction materials. A suitable material must be selected depending on the respective application case.

	Steel	Titanium	Aluminium	H-CFRP
Tenacity	++	+	-	++
Stiffness	++	-	--	++
Corrosion resistance	--	++	+	++
Weight	--	-	+	++
Magnetism	--	++	++	++
Temperature resistance	200 °C	200 °C	100 °C	80 °C

**Herbert Hänchen GmbH & Co. KG**  
Brunnwiesenstr. 3, 73760 Ostfildern  
Postfach 4140, 73744 Ostfildern  
Fon +49 711 44139-0  
Fax +49 711 44139-100  
info@haenchen.de  
www.haenchen.de



**HÄNCHEN®**