

Pioneering Underground Technologies

# HERRENKNECHT DIRECT PIPE®

One-pass trenchless installation  
of pipelines in all geologies



# Herrenknecht Direct Pipe®

Reaching the goal  
in a single step.

Selection of the optimum construction method is based on time and cost parameters as well as geological ground conditions. Key specifications include appropriate construction site installation and the ability to drill through soil formations where HDD is not applicable or risky. Crossing sensitive areas safely above ground is a matter of course for us. Underground,

Direct Pipe® opens up a new application potential by combining the advantages of Microtunnelling and Pipe Thruster technology. A prefabricated pipeline is installed almost continuously in one step, concurrently with the excavation. A cutterhead adjusted to the geology requirements and a cone crusher remove possible obstacles.



**Equipment set-up at the launch pit:**  
Pipe Thruster,  
Direct Pipe® machine,  
pipeline and control container.

## PRODUCT HIGHLIGHTS

Sophisticated interaction between the Herrenknecht Pipe Thruster and Microtunnelling equipment.

One-pass operation of soil excavation and pipeline installation.

The Herrenknecht Pipe Thruster pushes the Direct Pipe® machine and the pipeline forward underground.

Permanent borehole support by the Direct Pipe® machine and the pipeline.

Inclines and gradients as well as curved drilling profiles can be negotiated precisely.





**PIPELINE DIAMETER RANGE\***

Pipeline diameter (OD)	30" - 32" (762 - 813 mm)	34" - 36" (864 - 914 mm)	38" - 42" (966 - 1,067 mm)	44" - 52" (1,118 - 1,321 mm)	54" - 60" (1,372 - 1,524 mm)
Direct Pipe® Machine	AVN600DP AVN700DP	AVN800DP (B)	AVN800DP (A)	AVN1000DP	AVN1200DP
> Torque of machine:	33/40 kNm	55 kNm	90 kNm	150 kNm	258 kNm
> Excavation diameter:	805/890 mm	990 mm	1,140 mm	1,325 mm	1,540 mm
> Max. pipeline/drilling length:	500 m	500 m (800 m)	1,000 m	2,000 m	2,000 m
> Min. overburden:	2-3x outer diameter of Direct Pipe® Machine				
> Max. water pressure:	≤ 3 bar = Standard; 3-4 bar = Modified standard; ≥ 4 bar = Special design				
> Geology:	Clay, silt, sand, gravel, cobbles, boulders, rock (up to 150MPa = 21.750psi)				
> Pipeline material:	Steel				
> Coating material:	Polypropylene (PP), Polyethylene (PE), Glass-fiber Reinforced Plastic (GRP), Fusion Bonded Epoxy (FBE), Concrete				

\* Values noted are typical and can vary from project to project.



Do not hesitate to contact us directly for your special requirements or request our "Direct Pipe®" animation on CD-ROM. [directpipe@herrenknecht.com](mailto:directpipe@herrenknecht.com) | <http://www.herrenknecht.com/en/directpipe/>

# Fast and efficient pipeline installation.

In a similar way to the pipe jacking process, Herrenknecht Direct Pipe® machines excavate the borehole. The excavated material is transported via a slurry circuit which runs inside the pipeline to the separation plant above ground. The Pipe Thruster takes over the function of the main jacking station and pushes the pipeline with the Direct Pipe® machine forward. The required force is transmitted via two hydraulic Pipe Thruster cylinders over the entire length of the pipeline to the cutterhead.

Protection for the pipeline coating. Herrenknecht and independent partners have successfully tested various pipeline coating materials and proved that the clamping unit does not damage the coating. The coated pipeline only comes into contact with the inner surface of the clamping inserts of the Pipe Thruster which is large enough to keep the load along the coating at a tolerable margin. The clamping inserts are lined with a special rubber which compensates for unevenness on the pipe and its coating.

**The Pipe Thruster** clamps the pipeline and pushes it through the launch seal.



The German Federal Ministry of Education, Science, Research and Technology promoted the development of the method and implementation of the pilot project in Worms, Germany.

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Federal Ministry  
of Education  
and Research



HERMES  
AWARD  
2008

TOP 5 nominees for the  
Hermes Award 2008



Winner of the IPLOCA New  
Technologies Award 2009

**Breakthrough at the target side:** the machine can be dismantled – the pipeline is installed.



**Control cabin next to the launch pit** – remote-controlled installation of the pipeline.

### One-pass operation for tunnelling and pipeline installation.

① Using the Direct Pipe method, the drilling route is typically an arc from the surface of the terrain, underneath an obstacle to be drilled under, to the opposite terrain surface, like in HDD. Compared with the jacking frame generally used for pipe jacking, the Herrenknecht Pipe Thruster ③ acts like a jacking unit. The required bore hole is excavated by the slurry-supported Direct Pipe® machine, which is based on a Herrenknecht micromachine (AVN). This machine is deployed at the front end of the pipeline. Afterwards, the one-pass excavation and pipeline installation starts. The Pipe Thruster grips the pipeline and pushes it together with the TBM into the ground.

The excavated material is removed via the slurry circuit (bentonite suspension) of the Direct Pipe® machine to the separation plant on the surface. Thus, the slurry fluid not only discharges the excavated material but also supports the tunnel face. The overcut created by the cutterhead is filled with high-viscosity lubricant (bentonite suspension). This reduces the friction between the bore hole wall and the pipeline.

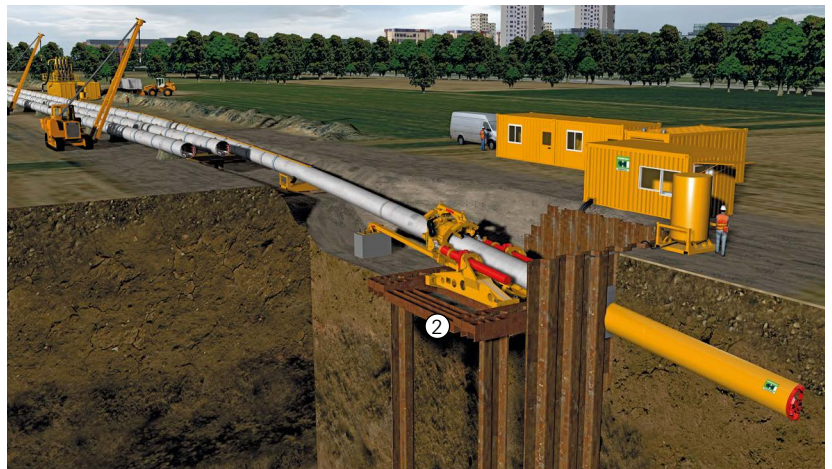
With the support of a Herrenknecht Navigation System (U.N.S.), accurate curved drilling profiles including lateral curves, are possible using a gyro-compass for the horizontal orientation and a hydraulic water leveling system for the vertical orientation.

### Launch pit with construction site equipment.

② The Pipe Thruster is placed in a shallow launch pit near the surface. The horizontal and vertical push forces are transferred into the soil by a suitable anchorage, e.g. sheet piles. The control container is placed beside the launch pit. The benefit of the Direct Pipe® method is the simplicity of the required launch and target pits.

### Small target pit for recovery of the machine.

④ There are very low space requirements for the target pit thus projects can be realized even in densely populated urban areas. When the Direct Pipe® machine has reached its target, the entire pipeline has been installed. The machine can be recovered from a simple target pit in sections of approx. 3 meters. In a final step, the feed and slurry lines inside the pipeline are dismantled and the pipeline is ready for connection with the pipeline grid.



# Herrenknecht

A world leader in groundbreaking tunnelling technology.

Herrenknecht is a technology and market leader in the area of mechanized tunnelling systems. As the only company worldwide, Herrenknecht delivers cutting-edge tunnel boring machines for all ground conditions and in all diameters – ranging from 0.10 to 19 meters. Under the umbrella of the Herrenknecht Group, a team of innovative specialists has formed to provide integrated solutions around mechanized tunnel construction with project-specific additional equipment and services. Pioneering technology by Herrenknecht is always involved when paving the way for the future underground – whether for tunnelling, mining or exploration. Herrenknecht ensures safe and fast progress when constructing modern infrastructures in all areas of application. Exactly where they are needed.



**Headquarters in Germany, active worldwide.** With more than 3,100 project references, we are a market leader all around the globe.



**HERRENKNECHT AG**  
77963 Schwanau  
Germany  
Phone +49 7824 302-0  
Fax +49 7824 3403  
pr@herrenknecht.com  
www.herrenknecht.com