Herrenknecht Vertical
Automated Rig Technology

The exploration of new energy deposits is one of the global challenges for future energy supply. Whether the development of onshore and offshore oil and gas or deep geothermal energy is economically reasonable also depends on the drilling equipment used. Herrenknecht Vertical, a subsidiary of Herrenknecht AG, the market leader in mechanized tunnelling systems, designs and manufactures customized high-quality rigs for drilling, workover and decommissioning, meeting the needs of our customers and their projects. The hydraulic rig concepts for drilling to 8,000 meters incorporate comprehensive, safety-based automation, setting new standards of safety, efficiency and environmental protection.

Automated Rig Technology. Engineered and built for your performance.

Compact rigs for demanding projects
- Space-saving box-on-box substructure for minimum footprint and easy transport
- Push and pull capability
- Semi-automatic pipe handling system (hands-off-technology)
- Easy and safe casing operations
- Sophisticated noise-protection concept
- Effective drilling of multiple wells through skidding system (optional)
- Made in Germany

Headquarters in Germany, active worldwide. With more than 40 years of engineering and manufacturing experience, around 5,000 employees and 76 locations within the Herrenknecht Group, we support our customers globally.
Containerized box-on-box rigs for safe and efficient urban drilling

The Herrenknecht Vertical box-on-box rig, a containerized rig with cylinder hoisting system for drilling in urban areas for geothermal as well as oil and gas. The rig has a box-on-box substructure and a three-sectioned mast that is foldable in width, fulfilling standard European transport dimensions. It is designed for double ranges 2 and has a standard hook load of 350 or 450 metric tons (385 or 500 short tons). Upon request, the box-on-box rigs can also be designed with up to 750 metric tons (825 short tons) of hook load for drilling to about 8,000 meters (26,250 feet).

The box-on-box rigs feature a precise and sensitive hydraulic cylinder hoisting and rotary system, which allows for push and pull operations and gives direct feedback of the hole conditions to the driller. The hoisting system improves WOB control, enhances feedback of the hole conditions to the driller. The whole pipe handling process is controlled from the driller’s cabin via a PLC control system with integrated anti-collision system.

The box-on-box rigs offer different optional features, adaptable to individual project requirements:

- **An automated horizontal pipe racking system consisting of pipe boxes, a gantry crane and a horizontal make-up and break-out unit can be combined with the horizontal-to-vertical pipe handler.**
- **The rig can be equipped with a hydraulic skidding system for time-saving drilling of multiple wells from one location without rig moves between the wells.** The system consists of sliding plates below the substructure boxes and hydraulic cylinders that move the rig forwards and backwards.
- **Through the integrated cassetes and hoses extension system no disconnection of the cassetes is necessary.**
- **Further alternative options include a two-directions stepping system and a telescopic catwalk.**

The hydraulic rig incorporates a sophisticated noise protection concept with silent hydraulic components and noise capsulation, making it the quietest rig on the market. This enables 24/7 operations also in residential areas.

Based on a comprehensive safety concept, the rig has an integrated horizontal-to-vertical pipe handler that can handle a broad range of tubulars including casings up to 4.5 metric tons (5.0 short tons). Together with further automated equipment such as iron roughneck, hydraulic elevator and power slip or slip lifter, tubular handling can be realized hands-off. The complete pipe handling system is designed to handle drill pipe in doubles range 2, drill collars and casing. The controls are semi-automated and the system is operated by the pipe handling operator or the driller.

Integrated into the box-on-box substructure are a choke manifold, BOP closing unit, water tank, trip tank, mud line, hydraulic power unit and cooling unit.

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### Technical specifications

**HOOK LOAD**

- Max. hook load: 350 mt / 450 mt (385 sht / 500 sht) at saver sub

Upon request, the box-on-box rig can also be designed with up to 750 mt (825 sht) hook load.

**MAST**

- **Type:** box-on-box
- **Height (erected):** 9m (30 ft)
- **Clear height below RT:** 8.2m (27 ft)
- **Rig floor dimensions:** 9m x 10m (30 ft x 33 ft)
- **BOP handling:** 2× 25 mt (2× 27.5 sht)

**SUBSTRUCTURE**

- **Type:** twin profile
- **Height (erected):** 57.8m (187 ft)

**HOISTING SYSTEM**

- **Type:** double cylinder system
- **Hoisting power:** 1,800 kW (2,200 hp)
- **Stroke:** 22 m (72 ft)
- **Brake:** hydraulic lowering brake valves

**DRILLER’S CABIN**

- **Controls:** joystick, trackball and touch screen with camera control

**TOP DRIVE**

- **Type:** HV TD H 500-1000
- **Max. static load:** 450mt (500 sht)
- **Max. push load:** 160mt (175 sht)
- **Max. rotary speed:** 220rpm at 23,500 rpm (20,300 ft-lbs)
- **Max. continuous rotary torque:** 62,000 Nm (45,730 ft-lbs) at 97 rpm
- **Max. brake torque (intermittent):** 100,000 Nm (73,750 ft-lbs)
- **Link tilt capacity:** 4mt at 1.5m (8,820 lbs at 4.92 ft)
- **Rated power:** 800kW (1,000 hp) hydraulic
- **Drive:** Including IBOP, pipe handler and dolly with torque pick-up.

**ROTARY TABLE**

- **Table opening:** 953mm (37 1/2”)
- **Max. static load:** 450mt (500 sht)
- **Max. dynamic load:** 350mt (385 sht)
- **Drive:** hydraulic

**RIG POWER SUPPLY**

- **Hydraulic power unit:** 4× 500kW (4× 670 hp)

The rig can be operated with:

- **a. power from the generator sets**
- **b. power from the grid**
- **c. generator supported grid power**
- **d. and e. require an additional medium voltage switchgear unit**

**PIECE HANDLING SYSTEM**

- **Type:** horizontal-to-vertical pipe handler
- **Operating range:** 73mm - 420mm (2 3/4” - 16 1/2”)
- **Max. load:** 4.5mt (5 sht)
- **Max. tripping speed:** 600 mt/h (1,970 ft/h) hydraulic

**AUXILIARY CRANE**

- **Type:** PK 20200 M
- **Lifting moment:** 289,000 lm (220,000 ft-lbs)
- **Max. lifting capacity:** 8.5 mt (9.4 sht)
- **Slewing angle:** 400 degrees
- **Drive:** hydraulic
- **Control:** via a wireless remote control panel

**OPTIONAL EQUIPMENT**

- **Iron roughneck/manual rotary tong**
- **Power slips/slip lifter/manual slips**
- **Elevators**
- **Medium voltage switchgear unit/generators**
- **Mud tank system/mud pump units**
- **BOP/BOP closing unit**

Components manufactured by Herrenknecht Vertical