

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.**



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.

BOX-ON-BOX RIGS

CONTAINERIZED RIGS FOR URBAN DRILLING



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



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**AUTOMATED
RIG TECHNOLOGY**



**HERRENKNECHT
VERTICAL**

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 doubles range 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 completion length of laterals and prevents top drive damage through its dampening effect. It can adapt to different drilling methods for all geologies.

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 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 cables and hoses extension system no disconnection of the backyard is necessary.
- › Further alternative options include a **two-directions stepping system** and a **telescopic catwalk**.



Modern driller's cabin to control rig and pipe handling operations



Hands-off pipe handler for safe handling of drill string and casing



Integrated extension system between rig and backyard for easy and fast skidding without disconnection of hoses and cables

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: twin profile
- › Height (erected): 51.8 m (170 ft)

SUBSTRUCTURE*

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

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

HOISTING SYSTEM*

- › Type: double cylinder system
- › Hoisting power: 1,600 kW (2,200 hp)
- › Stroke: 22 m (72 ft)
- › Brake: hydraulic lowering brake valves

Ultra sensitive operation due to multi-valve hydraulic control.

RIG POWER SUPPLY*

- › Hydraulic power unit: 4 x 500 kW (4 x 670 hp) drives all components including hoisting system, top drive, rotary table and pipe handling system

The rig can be operated with:

- a. power from the generator sets
- b. power from the grid
- c. generator supported grid power

b. and c. require an additional medium voltage switchgear unit.

TOP DRIVE*

- › Type: HV TD H 500-1000
- › Max. static load: 450 mt (500 sht)
- › Max. push load: 160 mt (175 sht)
- › Max. rotary speed: 220 rpm at 27,500 Nm (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: 4 mt at 1.5 m (8,820 lbs at 4.92 ft)
- › Rated power: 800 kW (1,000 hp)
- › Drive: hydraulic

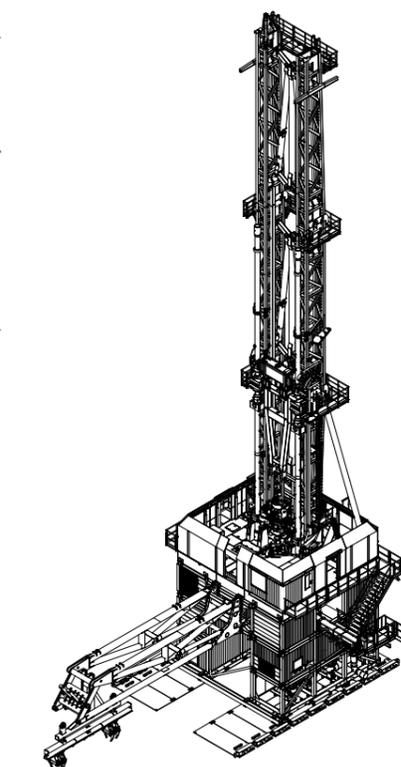
Including IBOP, pipe handler and dolly with torque pick-up.

ROTARY TABLE*

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

DRILLER'S CABIN*

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



PIPE HANDLING SYSTEM*

- › Type: horizontal-to-vertical pipe handler
- › Operating range: 73 mm - 620 mm (2 7/8" - 24 1/2")
- › Max. load: 4.5 mt (5 sht)
- › Max. tripping speed: 600 m/h (1,970 ft/h)
- › Drive: hydraulic

PIPE RACKING SYSTEM (OPTIONAL)*

- › Type: automated horizontal racking system with pipe boxes and pipe feeder (gantry crane)
- › Pipe feeder max. load: 4.5 mt (5 sht)
- › Max. tubular length: doubles range 2

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.

An integrated anti-collision system ensures a safe pipe handling process during all operations.

AUXILIARY CRANE

- › Type: PK 32080 M
- › Lifting moment: 298,000 Nm (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 tongs
- › 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