NORDMEYER SMAG
Mining & Drilling Technologies
HERBST
Spezialfahrzeugbau und Bergwerksmaschinen

# Technical Description

## NSMD – Blast Hole Drill BW50HY - SD

This document consists of 14 pages

| | | |
|---|---|---|
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| 1st Amendment: | | |
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## Contents page

# 1 Application

- The blast- hole drill BW50HY is designed for mining works underground in areas in which explosive gases resp. gas mixtures or liquids cannot be present.
- The blast- hole drill is only to be operated in secured areas with sufficient air ventilation.
- Energy for travelling is taken from a Diesel engine.
- Energy for working is taken from an electric motor.
- It is only to be used for the drilling of blast- holes.
- Applications which differ from the a. m. are not permitted.

# 2 Construction and functioning

## *2.1 Mechanical structure*

### 2.1.1 Chassis

The chassis consists of:

- A **frame** of steel profile- bars.
- Two **driving axles** equipped with LCB- brakes at front and rear of the frame. The differential gears of the axles are not lockable.
- Four rubber **tires**.
- A rigid **two-speed power take-off gear** splits and distributes the motor power to the axles. The take-off gear is meant for a further adaptation of the motor output to the roadway conditions for off-road and road.
- Three **cardan- shafts** for transmitting the diesel engine power via the power- shift gear into the power- split gear and further to the axles.
- The vehicle is driven by a water- cooled **diesel- engine.**
  At the diesel-engine a **3-speed power- shift gear** is directly flanged. The power shift gear is operated by the driver via an electric stick. The shifting will be done immediately.
- The exhaust noise is reduced by an **exhaust silencer**.
- The **driver's cabin** is mounted at the left side of the chassis. Inside the driver's cab there are all operating instruments that are required for driving the drill carriage. To relieve the driver of strain during travelling on bumpy ground, a spring loaded driver's seat with hydraulic shock damping is incorporated.
- A **hydrostatic steering- system** (description see "hydraulic- system"). The steering is done by means of a steering- wheel, connected at the steering- valve rigidly.
- A **hydraulic-brake system** (description see "hydraulic system) consists of a service brake system, a parking brake and an emergency brake.

The service brake is actuated by a foot pedal.
The parking brake and the emergency brake are actuated by pressing a push button.

- A **mechatronic gas- actuation** for adjusting the diesel- engine's rotation- rate. The operating is done by means of a food pedal.
- A **hydraulic oil tank** for store the hydraulic fluid (description see "hydraulic oil tank").
- The jumbo is adjustable and stabilized by 4 hydraulic **jacks**.
- An **electric system** (description see "electric system").
- A **dust- flushing and excavating system** for cleaning the bore- hole while drilling.
- A **hydraulic system** (description see "hydraulic system").

## 2.1.2 Drill- arm

The drill- arm consists of the following components:

- The **arm** is assembled via a **turntable** to the main frame. Thanks to an inside positioned **extendable cylinder** the extension of the arm is possible.
- At the end of the arm an **intermediate joint** is positioned which carries the **drill- boom carrier**. including an additional joint for the 90˚ slewing function to the left and the right side.
- Both joints are operated by **hydraulic differential cylinders** for the lifting and tilting functions and **two plunger cylinders** to move the slewing function of the drill- boom carrier.
- A **gear box** is fitted at the intermediate joint as well. It moves the drill- boom carrier. Thanks to this turning of $360^0$ is possible.
- The **drill- boom carrier** is able to compensate the boom angles by a tilting cylinder.
- On the drill- boom carrier an **intermediate boom** is located. It can shift along the drill- boom carrier's axis by a hydraulic- cylinder.
- On the intermediate boom the **drill boom** is located.
- The drill boom is moveable along the intermediate- booms axis by the same **hydraulic- cylinder** witch moves the intermediate- boom.
- The **drill drive** is able to be shifting along the drill- boom. It consists of a hydraulic drill drive. At the output shaft of the drifter the **drill rod** is fixed.
  Around its output shaft a flushing- head is mounted. The flushing medium (compressed air, added with a little water) passes the flushing- head, flows through the bore- holes of the output shaft and further trough the central bore- hole of the drill- rod and comes out through the flushing- holes of the drill- bit. Size and type of drill rod and drill bit are selected according the bore- hole diameter and the geological conditions. The drill drives rotation rate is to control step less.
- The drill- drive is pulled by roller chains actuated by the feed- gear box that is driven by a hydraulic motor.

- The supplying of flushing medium and electric energy to the electric drill- motor is made by hoses. For the properly guiding of the hoses to the drill- drive, a **hose- guidance** is mounted on the drill boom behind the drill- drive. The hose- guidance is to shift by chain system, driven by the feed-gear. The hose- guidance makes the half way than the drill- drive.
- The drill- rod is guided in five moveable and one rigid **rod guidance**. So an exact drilling is possible.

# 3 Electric system

## *3.1 Driving electric*

- The driving electric comprises all the necessary control- elements to operate the diesel- engine, the supporting jacks, the cable reel and the light- system. The individual circuits of the vehicle network are secured via protection switches and a main fuse.
- To start the diesel engine and for the supplying of the vehicles light- system a DC network is installed. The supply of the network is done by two batteries that are switched in series and a three-phase dynamo witch also recharges the batteries.
- The vehicle network is switched on via a manually actuated battery main- switch an electric battery- protection switch, witch – in case of danger- disconnects the batteries from the vehicle via the emergency push buttons and shut down the vehicle.
- At the front side, the vehicle has two headlamps that can be dipped. At the rear side of the vehicle there are two red triangular retro- reflectors, two reversing- lamps and two brake- lights.

## *3.2 Electric equipment*

The electric equipment mainly consists of the control- cabinet that is arranged on the left- hand side at the frame (behind the drivers- cab) and all other control- elements and sensors.

### 3.2.1 Remote control

- The control- system of the drill carriage consists of a remote control- panel witch is fitted with all necessary control- and display- elements for the drilling works.
- The remote control panel contains a portable transmitter to broadcast the control- commands and a receiver to pick up the operational status that is to be displayed. The receiver on the drill carriage serves to broadcast the control- commands to the drill carriage control- system and to transmit the operational status to the remote control- panel.
- Error messages of the system will be shown on the transmitter’s display.

### 3.2.2 Positioning aid

- The positioning- aid serves to support the drill- operator when positioning the drill-boom in exact drill- position.
- The BW50HY is equipped with an electronic parallel- leading system for the drill- boom.

- In case of semiautomatic works and high exactness an electronic positioning- aid system will be used.
- Thanks to this aid 3 further operation modes are possible in addition to a control of the individual axes (manual operation).

### *3.2.2.1 Parallel mode*

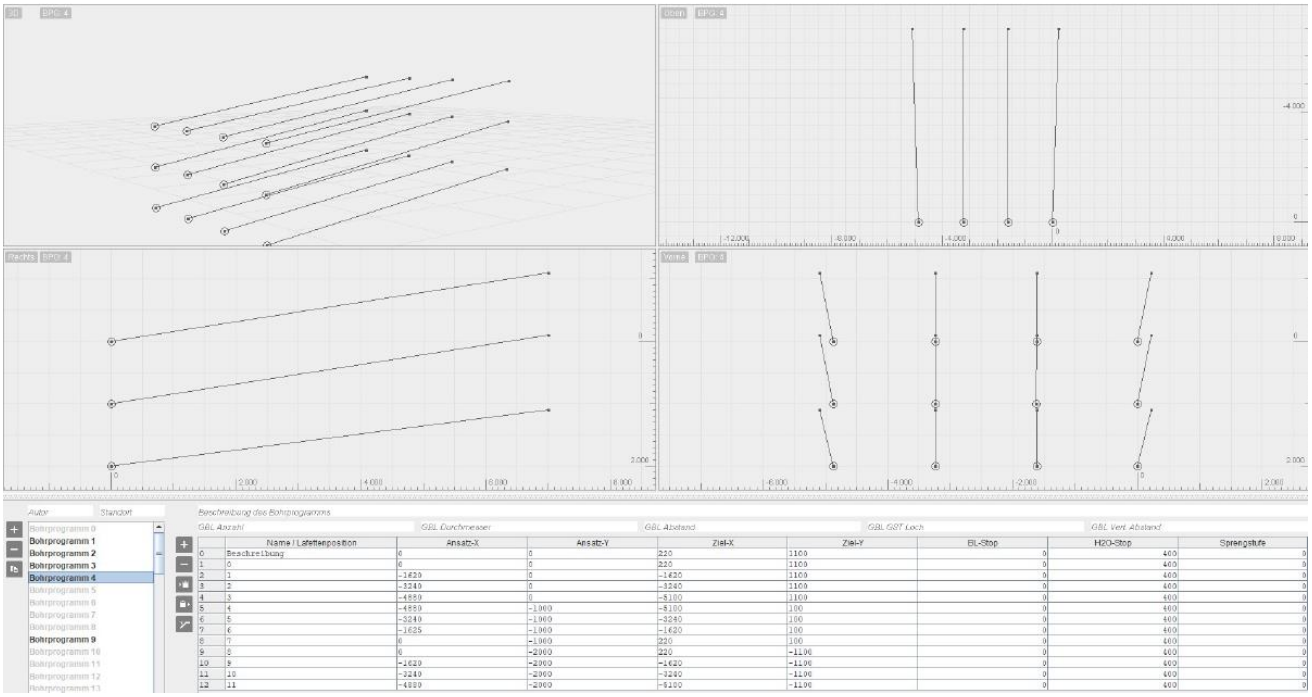
- Using this operation mode, the drill- boom will be kept parallel to its position in space that it had, when the parallel- mode has been activated. The operator only has to control the functions “Arm lifting/lowering” and “Arm slewing right/left”.

### *3.2.2.2 Automatic Positioning mode*

- When working under this operation mode, the drill arm aligns itself upon the control command of the operator as per coordinates which were stored as a data set (drilling program) in the board-computer.
- The operator selects the program, moves the drill arm to its basic- position, chooses the bore-hole that is to be triggered/targeted and gives the release for the movement. Then, the drill-arm approaches the chosen coordinates using the shortest possible way.

### *3.2.2.3 Target mode*

- This operation mode enlarges the positioning- mode in such a way that upon actuation of the functions "arm lifting/lowering" and "arm slewing" by the operator the boom aims at the coordinates of the bore hole bottom. In this way it is possible to find a more favourable position for the fixation of the drill- boom without leaving the program coordinates.



### 3.2.3 Cables

- The cables for control- and power- circuits consist of hardly inflammable cables type 2GM11X, 2GMB11Y and NSSHöu-J. For the transmission of commands and data from electronic sensors screened cables type UNITRONIK -FD-CP and PAAR- TRONIC- CY are used.

### 3.2.4 Emergency shut-down

- The emergency shut- down of the drill carriage consists of one each mushroom push button with rotary unlocking on the left- and right-hand side and at the rear end of the drill carriage as well as one on the remote control panel. Via an emergency- contactor combination, they shut down the electrical drives of the drill carriage. Furthermore, the vehicle batteries are disconnected from the machine's network via an electrical battery protection switch.

# 4 Hydraulic system

The hydraulic system consists of several independent circuits. The most important parts are the oil-tank with return- filter, refilling- and aeration- filter, temperature- and level- controller as well as variable tandem displacement- pumps, a tandem constant- pump, a pressure- filter, the control-blocks and the hoses-/tubes- system.

## *4.1 Hydraulic system "vehicle"*

The hydraulic system vehicle consists:

- An auxiliary steering system
- A 2 circuits service brake system and
- A parking brake / emergency brake
- The hydraulic energy is generated by a tandem- pump at the diesel- engine.
- The first pump supplies the brake- systems, the cable- reel and the jacks.
- The second pump supplies the auxiliary energy to the steering system.
- Both circuits are independent from each other.

### 4.1.1 Steering system

The steering system is designed according the generally accepted vehicle construction rules.

- It is designed as an auxiliary- powered steering system. That means in case of fault the further steering without auxiliary- power is possible.

### 4.1.2 Service brake

- The service brake is designed as fully hydraulic 2-circuit power-brake system.
- The braking pressures in the wheel cylinders are generated out of the hydraulic accumulators and modulated by means of the brake valve. The brake valve is actuated via a foot pedal.
- The accumulators are filled by a hydraulic pump. They are dimensioned in such a way that, in case the pump fails to provide the required pressure, at least 9 full brake applications are still possible. Afterwards, the drill carriage can only be stopped by means of the emergency brake.

### 4.1.3 Parking brake

- The parking brake is meant for a safe parking of the vehicle.
- It is designed as hydraulically operated spring- loaded brake.
- Here, the brake- force is generated by springs that become effective after pressure release of a piston and act on braking- lamellas.
- The parking- brake is fixed to the power take- off gear. The lamellas are running in an oil bath.

#### 4.1.4 Emergency brake

- This brake system serves to stop the vehicle in case of an emergency, when the service- brake fails completely.
- As an emergency- brake system, the parking- brake is used. It is designed to reduce the vehicle's speed down from travelling to a complete stop.

### *4.2 Hydraulic system "working"*

#### 4.2.1 Generally

- The hydraulic system "working" is meant for the adjusting of the arm, for driving the feeding-system for drilling, to drive the percussion system of the drifter, as well as to drive the rotating gear of the drill rod.

#### 4.2.2 Pressure generating

- The variable displacement- pump is driven by an electric motor and the tandem constant- pumps are driven directly by the diesel engine.

#### 4.2.3 Control

- All the other distribution valves are actuated electro-magnetically. The electric distribution valves are fitted with a manual emergency actuation.
- All parts are secured against excessive pressures.

#### 4.2.4 Hydraulic- oil tank

- The supplying of all hydraulic circuits is meant by a central oil tank.
- The oil tank is equipped with an electric temperature- and level- guard and a ventilation system.

#### 4.2.5 Hydraulic oil filtering

- All returned oil becomes filtered in a main filter before enter the oil tank. The main filter is equipped with a by-pass and a soil indicator.

## 5 Mud flushing

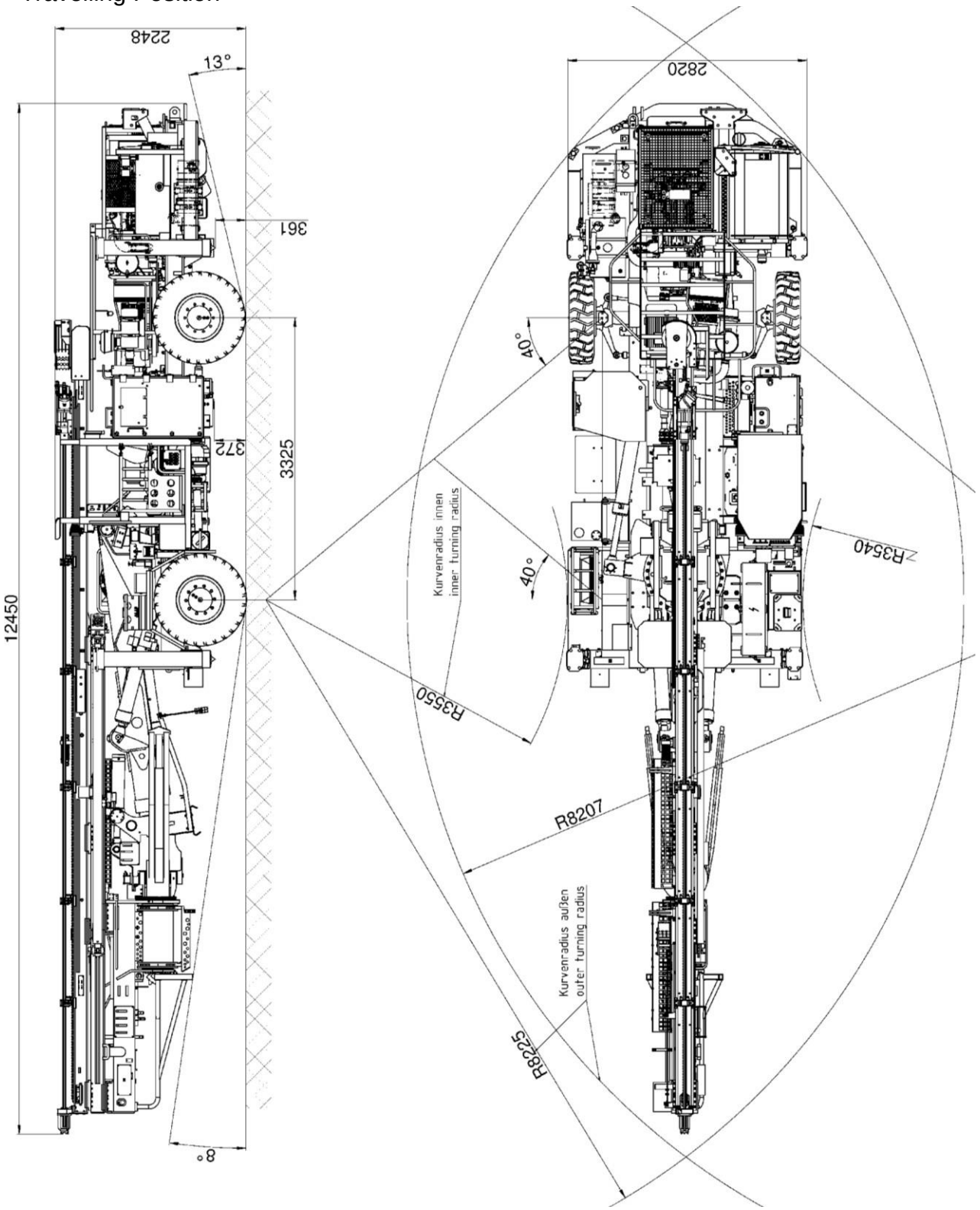
- The mud is to flush- out of the bore- hole by compressed air.

## 6 Dust suppression system

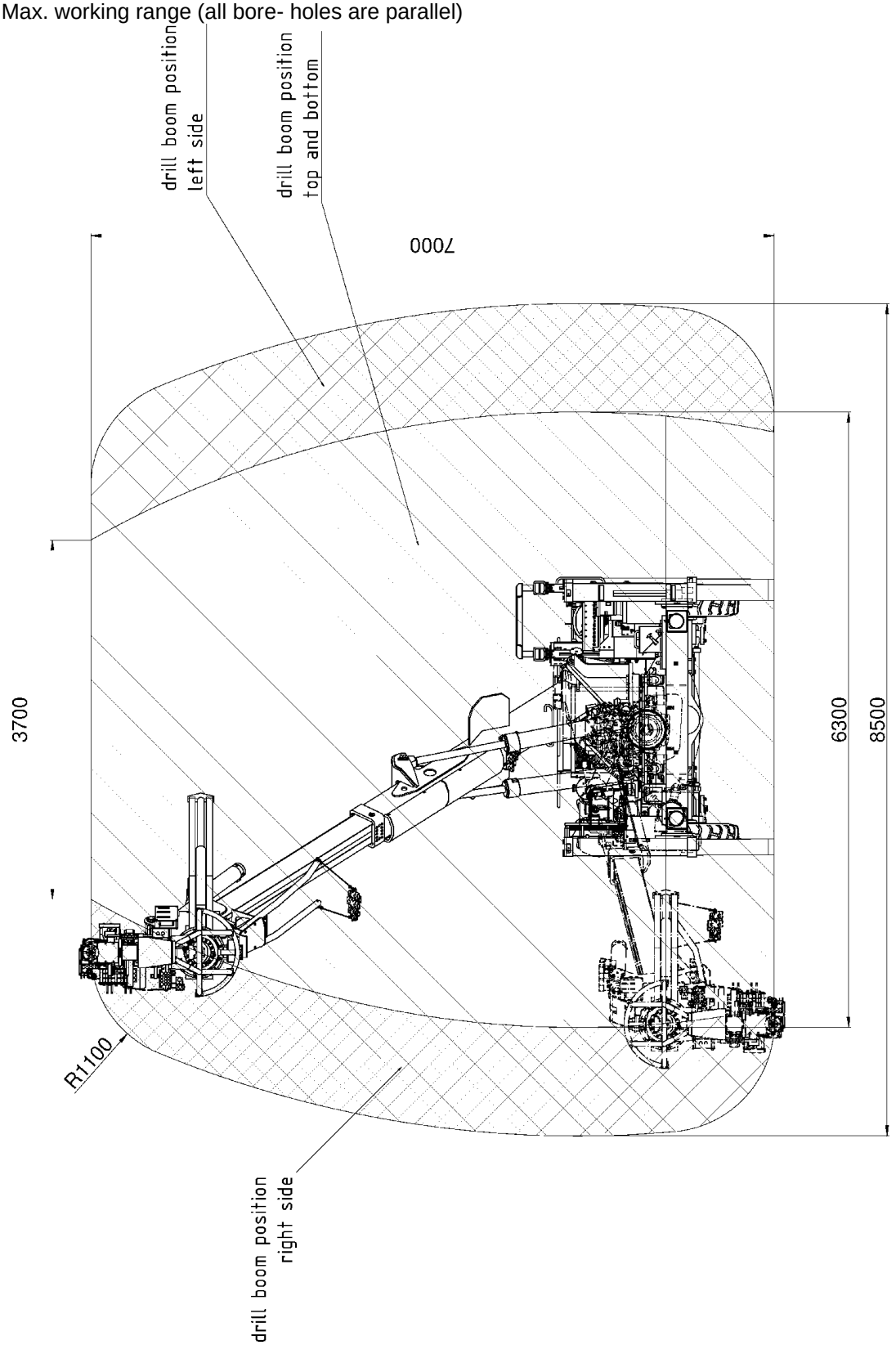
- The dust, which comes out of the bore- hole with the flushed mud, will be suppressed by a little water, mixed to the compressed air.
- The water comes from a water- tank on the machine. It becomes filtered and pressed into the air circuit by a little adjustable "metering- pump".

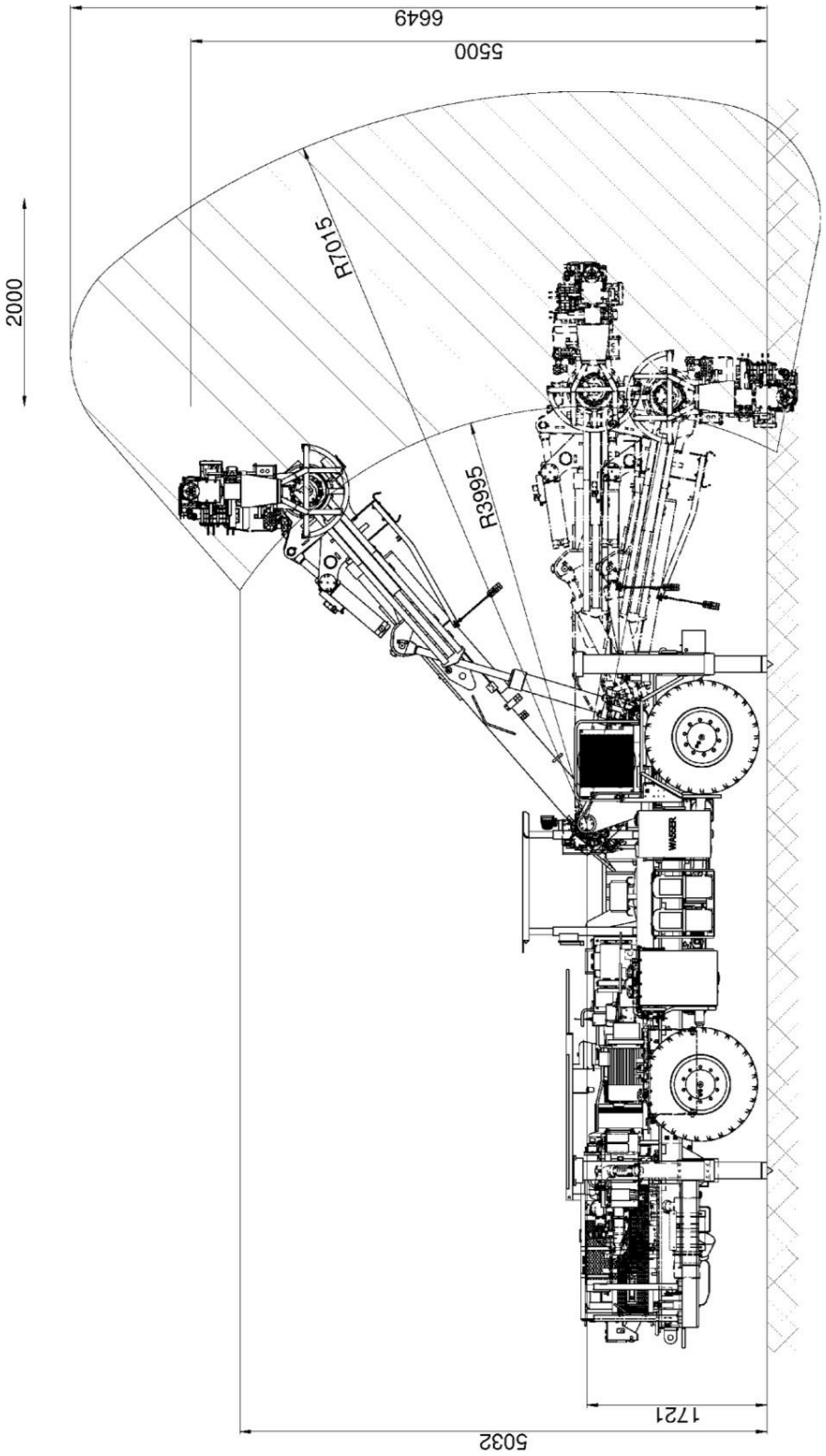
# 7 Drawings

Travelling Position



Max. working range (all bore- holes are parallel)




6649
5500
2000
R7015
R3995
1721
5032

# 8 Technical Data

| REQUIREMENTS AND CONDITIONS OF WORKING | - | |
|---|---|---|
| For operation in underground mines without requirements of explosive protection | - | yes |
| Max. gradient of the roadway | +/- % | 30 |
| Simultaneous gradient of lateral axis | +/- % | 15 |
| Environmental temperature | ° C | 40 |
| Fresh air of min. while diesel operation | m³/min | 76 |
| | | |
| **GENERAL TECHNICAL DATAS** | | |
| Max. length for travelling | mm | 12.450 |
| Max. width for travelling | mm | 2.820 |
| Max. high for travelling | mm | 2.250 |
| High of driver's cabin | mm | 2.250 |
| Clearance to ground | mm | min. 260 |
| Radius of curve, outer | mm | max. 8.225 |
| Radius of curve, inner | mm | approx. 3.560 |
| Max. speed on plain | km/h | approx. 18 |
| Max. working range (all bore- holes are parallel) | - | see drawing |
| | | |

| WORKING DATA OF THE MACHINE | | |
|---|---|---|
| Effective depth of the bore-holes | mm | 7.000 |
| Parallel working range for face drilling | mm | See drawings |
| Diameter of the boreholes (**to be determined in case of ordering**) | mm | 41 - 43 |
| Drill rod type / diameter/key | mm | Hex. 1¼" key |
| Diameter of the boreholes (**to be determined in case of ordering**) | mm | 44 - 46 |
| Drill rod type / diameter/key | mm | Hex. 1⅜" key |
| Diameter of the boreholes (**to be determined in case of ordering**) | mm | 48 - 49 |
| Drill rod type / diameter/key | mm | Hex. 1½" key |
| Drill rotation rate | 1/min | 0 – 400 |
| Rotating direction | - | counter clockwise |
| | | |
| Type of drill bits | - | ballistic buttons |

| **TECHNICAL DESIGN** | - | |
|---|---|---|
| **Driving motor** | - | Diesel |
| Manufacturer | - | KHD |
| EU- Exhaust stage | - | IV final |
| Fuel tank capacity | l | ca. 97 |
| **Performance-distributing-gearbox** | - | 2-Speed |
| Type of shifting | - | manual |
| **Front axle** | - | |
| Driven steering axle | - | yes |
| **Rear axle** | - | |
| Driven steering axle | - | yes |
| **Drive system for travelling**: Hydro-dynamic - mechanically | - | yes |
| **Steering system** | - | |
| Type of function | - | hydrostatic |
| Type of steering | - | Rear axle |
| **Service brake system** | - | |
| Kind of function: LCB (liquid cooled brake) | - | 2-Circuits |
| Minimum brake rate | % | 40 |
| **Parking brake** | - | |
| Kind of function | - | fail safe |
| Engaged to | - | both axles |
| Minimum brake rate | % | 40 |
| **Vehicle lightning** | - | |
| Head lamp, dimmable, LED-type (Speaker) | Pcs. | 2 |
| Reversing lamp, rear; LED-type (NORDIC LIGHTS) | Pcs. | 2 |
| Brake lamp, rear; LED-type (NORDIC LIGHTS) | Pcs. | without |
| Spot lamp, front; LED-type (NORDIC LIGHTS); At the canopy | Pcs. | 2 |
| Spot lamp, front; LED-type (NORDIC LIGHTS); To the roof | Pcs. | 2 |
| Triangular retro-reflector | Pcs. | 2 |
| Rotary warning lamp, yellow | Pcs. | 1 |
| Feeding cable to be supplied from mine site | m | Depending on diameter |

| | | |
|---|---|---|
| | - | |
| **Drill drive** | - | |
| Hydraulic rotary drill drive; Manufacturer | - | SMAG / ACOPCO |
| Type | - | Rotary / Impact |
| | | |
| **Mud conveying** | - | |
| Flushing by compressed air, added with variable water | - | yes |
| Flushing air volume | Nm³/Min | 1 |
| Max. flushing air pressure | bar | 10 |
| Driving performance | kW | 7,5 |

| **FIRE SUPPRESSION SYSTEM** | - | HRD |
|---|---|---|
| Manufacturer | - | Ansul |
| Type | - | |

| **PRIMARY TOOL EQUIPMENT** | - | |
|---|---|---|
| Drill rod (according the selected bore-hole diameter) | Pcs. | 3 |
| Drill bit (according the selected bore-hole diameter) | Pcs. | 20 |

| **REMARKS AND MISCELLANEOUS** | - | |
|---|---|---|
| Work requirements, to provide by customer for exploitation: | | |
| - Min. fresh-air volume while diesel operation (according EU-Regulations) | m³/min | 76 |
| - Diesel fuel (**low sulphur content required**) | | |
| - Electric supply 660V +5%/-5%; 60Hz; 3~**Specifications to agree, in case of ordering** | kW | 75 |
| - Feeding cable: **Specifications to agree, in case of ordering** | m | Not Included |
| - Feeding cable diameter | mm | 41 |
| - Connecting plug, to connect feeding cable to mines grid | Pcs. | 1 |