



TECHNICAL DOCUMENTATION FRONT SHEET		Page 1 of 16
<u>DOCUMENT TITLE</u>	<i>Hydraulic Drilling Rig HH75 Jack up</i>	
<u>PACKAGE DESCRIPTION</u>	<i>Hydraulic Drilling Rig HH75 mounted on jack up, HPU diesel driven, Rig instrumentation, Optional equipment.</i>	
<u>DOCUMENT NUMBER</u>	<i>DT-163-13</i>	
<u>FILE IDENTIFICATION</u>	<i>DT-163-13 Rev 00 Hydraulic Drilling Rig HH75 Jack up</i>	

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GENERAL

The rig is designed in accordance with API Specifications and all construction will be in accordance with API recommended standards governing fabrication, welding, coating, storage, etc., of land drilling rigs.

Rig suitable to work at ambient temperature from -20°C to $+40^{\circ}\text{C}$.

Mast manufactured in accordance API spec 4F (3rd edition), PSL-1.

Hazardous area distribution and extension are compliant with API RP 500.

Documentation:

Documentation in English for below specified equipment:

- Operation and Maintenance Manual (3 copies for each)
- Spare Parts Manual (3 copies for each)
- Data Book in according to API 4F (3rd edition), PSL-1, SR3 (1 copy)
- Certificate of Conformity, Origine and Warranty (1 copy for each)



1 HYDRAULIC DRILLING RIG HH75

Rotary hydraulic drilling rig type HH-75 with 75,000 kg (165,200 lbs) pull-back capacity and telescopic two section mast, assembled on jack up skid, complete with hydraulic stabilizers. Set up to be easily secured via a quick release locking system to be mounted on a truck or trailer for moving.

1.1 TELESCOPIC MAST

Make: Drillmec

Code: 0189 6331

Quantity: One (1)

Telescopic mast made by high strength steel, manufactured in accordance API spec 4F (3rd edition), PSL-1.

composed by two sections as follows:

- main bottom section with inside the guides to slide the telescopic section
- telescopic section, sliding inside the main bottom section, complete with crown block
- stroke: 15 m (49 ft) suitable for DP R2
- max. static hook load capacity: 165,347 lbs (75 metric ton)

Raised and lowered by two chrome-plated telescopic double-acting hydraulic cylinders, without disassembling the drilling floor.

Manual type greasing system: the greasing can be done while rig moving (no crane or climbing is necessary)

1.2 CROWN BLOCK

Make: Drillmec

Code: 0189 6330

Quantity: One (1)

Crown block fixed to mast telescopic section, with hydraulic rotating system, to reduce the overall height during transportation.

Crown block assembly manufactured in accordance with API spec 4F (3rd edition), PSL-1; crown block sheaves manufactured in accordance with API spec 8C (5th edition), PSL-1.

Technical data

- | | |
|---|---|
| <ul style="list-style-type: none"> • Sheaves of crown block ○ Diameter ○ Grooves | <p>Qty
4</p> <p>760 mm (30")</p> <p>34 mm</p> |
|---|---|

1.3 STAND PIPE ON MAST – 3000 PSI

Make: Drillmec

Code: 0189 6326

Quantity: One (1)

Stand pipe 3" ND – 3000 PSI WP, complete with:

- One (1) rotary hose 2 1/2" ND, 4000 PSI, length 12 350 mm
- One (1) vibrator hose 2 1/2" ND, 4000 PSI, length 3 050 mm
- One (1) discharge hose 2"



- One (1) gate valve 3" ND, 3000 PSI

1.4 SERVICE HOIST JIB

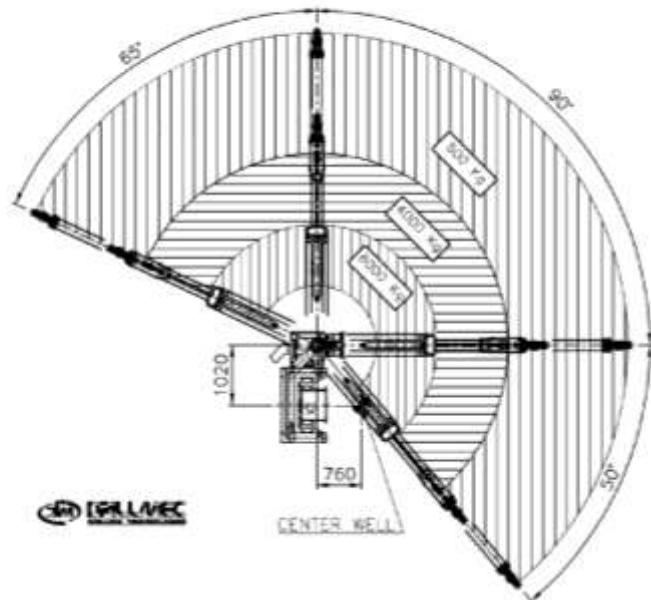
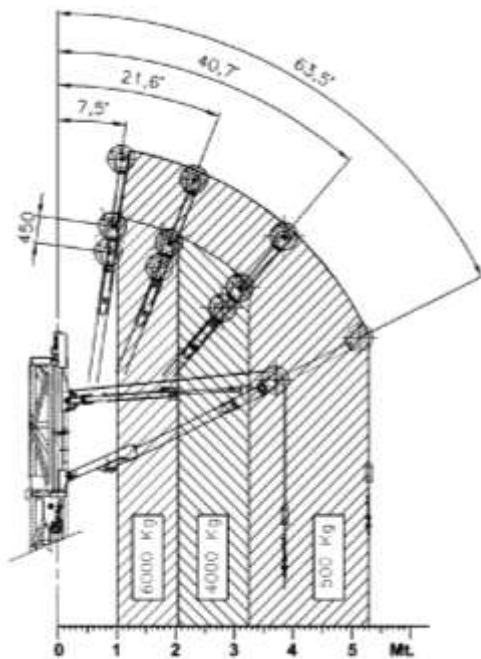
Make: Drillmec

Code: 0189 6318

Quantity: One (1)

Service hydraulic hoist jib installed on fixed part of telescopic mast with following characteristics:

- Suitable for the handling of DP and DC from vertical pipe bins to mouse hole
- Possibility to operate on centre well for all material as necessary.
- Possibility to lift material out of substructure frame and operate on working floor or in well centre.
- Lifting capacity on working floor and mouse hole 6.000 kg.
- Jib crane hydraulically moved by a mobile hydraulic control panel.
- The arm of jib crane will be self retractable type (no crane necessary to fold it)





1.5 TOP DRIVE SYSTEM

Make: Drillmec

Code: 0189 8125

Quantity: One (1)

Power swivel driven by 4 top-head hydraulic motors assembled on a cradle sliding on mast guide complete with a patented device that can easily move complete power swivel from well center to mouse hole center controlled by main control panel.

This device, tested for many years both in oil/gas and water job-site all around the world, permits to save time and manpower with significant impact on safety during all tripping in/out operations for drill pipes, drill collars, casing and tubular.

Power swivel complete with end part replaceable goose neck, made of wear resistant steel and suitable for drop-line application.

Equipped with hydraulic brake.

- I.D. full opening: 3"
- Variable speed: 0 to 150 rpm
- Torque range: 0 to 3600 kg·m (100 % efficiency)
- Stroke: 15 m
- Max. pull up: 165,347 lbs (75 metric tons)
- Max. pull down: 44,092 lbs (20 metric tons)

1.5.1 DIRECT CIRCULATION SWIVEL

Make: Drillmec

Quantity: One (1)

The main characteristics of the direct circulation swivel are the following:

- Suitable to drill with air, mud, water and foam.
- Wash pipe about 3" ID, working pressure 5000 psi.

The packing and wash pipe studied with quick connections to easy execute maintenance operations.

1.5.2 FLOATING AND ROTATING DOUBLE HOOK

Make: Drillmec

Quantity: One (1)

Floating and rotating double hook installed on power swivel shaft with following characteristics:

- Static lifting capacity: 165,347 lbs (75 metric tons)
- High iron tensile forged heat treated iron.
- Suitable to utilise elevator links 200,000 lbs.
- Equipped with roller bearing.



1.5.3 AIR COUNTERBALANCE SYSTEM

Make: Drillmec

Quantity: One (1)

Air system for the counterbalance of double hook and thread soft landing system (adjustable from driller control cabin).

1.5.4 I-BOP VALVE

Make: Drillmec

Quantity: One (1)

Inside BOP valve, hydraulically operated from control panel.
Max working pressure: 10,000 psi (690 bar).

1.5.5 TOP DRIVE DOLLY

Make: Drillmec

Quantity: One (1)

Built with high resistance steel and hydraulically operated, allow the tilting of the top drive from center well to mouse hole for pipe handling. Integrated with top drive and assembled on the mast.

1.5.6 TOP DRIVE BRAKE

Make: Drillmec

Quantity: Two (2)

The top drive is equipped with hydraulic brake able to contrast the max top drive torque.

1.6 DRILLING FLOOR

Make: Drillmec

Code: 0189 6317

Quantity: One (1)

Drilling floor frame made of high-grade steel, directly connected to mast.
The rotary table is flush with the working floor.

- Drilling floor height: 2,7 m
- Clear height under rotary beams: 2,15 m
- Suitable to install working table 32 1/2"
- Complete with V-door

1.7 JACK UP SKID

Make: Drillmec

Code: 0189 6304

Quantity: One (1) set

All the rig components are mounted on jack up skid, made with high resistance electrically welded steel, in order to avoid any flexion/deformation of the whole system. In transport condition the Rig



on the jack up skid will be installed on truck or trailer (customer supplied).

1.8 HYDRAULIC JACKS FOR JACK-UP SKID

Make: Drillmec

Code: 0189 1120

Quantity: Four (4)

Hydraulic outriggers (two on front, two on rear), suitable for quick rig leveling and independently controlled each one, complete with non-return valve.

1.9 BASE FRAME

Make: Drillmec

Code: 0189 8127

Quantity: One (1)

Base frame designed with footprint of drilling rig.

Complete with:

- Slide on front for rig trailer
- Machine base frame

1.10 WALKWAYS, HANDRAILS, STAIRWAYS

Make: Drillmec

Code: 0189 6388

Quantity: One (1)

Complete set of walkways, handrails and stairways.

1.11 HYDRAULIC POWER UNIT

Make: Drillmec

Code: 0189 6340

Quantity: One (1)

Hydraulic power unit complete with:

- One deck mounted CATERPILLAR C15 ACERT DIT-ATAAC or equivalent, 540 hp at 1800 RPM.
- Transfer case (takes the power from the deck-mounted diesel engine through a cardan-shaft and gives power to the hydraulic pumps)
- Hydraulic pumps
- Hydraulic tank
- Distributors
- Filtering system
- Valves
- Manometers
- Rigid and flexible pipes
- All necessary accessories in order to assure the correct working conditions.



1.12 HYDRAULIC SYSTEM

Make: Drillmec

Code: 0189 6308

Quantity: One (1)

Hydraulic system, suitable to feed the following equipment:

- Pull up - pull down
- Top drive torque and rotation
- Hydraulic power tong
- Mouse hole clamp
- All hydraulic cylinders
- Service winch of jib crane
- Rig services

1.13 WORKING TABLE

Make: Drillmec

Code: 0189 2155

Quantity: One (1)

Working table with max passage 32 ½", (no motor drive)

1.14 HYDRAULIC CLAMP OF MOUSE HOLE

Make: Drillmec

Code: 0189 3225

Quantity: One (1)

Hydraulic clamp installed in the mouse hole and located underneath the drill floor and centered with the mouse hole. It's furnished complete with steel guide to help the pipes to enter the hydraulic clamp.

Pipe size range: 60 – 300 mm.

1.15 HYDRAULIC POWER TONG

Make: Drillmec

Code: 0189 6092

Quantity: One (1)

Operated from driller's panel, to make-up and break-out drill pipe, and 8" drill collars, consisting of:

- Double hydraulic rotating clamps to close drill pipes and collars joints, max torque: 8.000 kg.m.
- Set of hydraulic cylinders for removing the power tongs from well center and parking out;
- Vertical hydraulic cylinder to suspend the power tongs at variable position, operated from driller's panel.



1.16 POWER SLIP LIFTER

Make: Drillmec

Code: 0189 3157

Quantity: One (1) set

Automatic slips operated from the control panel to fit API master bushing operated from driller's panel to hang drill pipes, drill collars and casing complete of a powerful hydraulically operated cylinder to provide pressure raising and pressure setting of slips.

1.17 AUXILIARY EQUIPMENT

Make: Drillmec

Code: 0189 6320

Quantity: One (1) set

1.17.1 SLIPS FOR POWER SLIP LIFTER

Slips for power slip lifter:

- One (1) slip for 2 7/8" OD DP
- One (1) slip for 3 1/2" OD DP
- One (1) slip for 4 1/2" OD DP
- One (1) slip for 5" OD DP

Manual slip:

- One (1) slip for 3 3/4" OD DC
- One (1) slip for 4 3/4" OD DC
- One (1) slip for 6 1/2" OD DC
- One (1) slip for 5 1/2" OD Casing
- One (1) slip for 7" OD Casing
- One (1) slip for 9 5/8" OD Casing

1.17.2 MASTER BUSHING AND BOWLS

Master bushing and reducers for working table 32 1/2" as follows:

- One (1) Master bushing 32 1/2" – 22 1/2"
- One (1) Insert bowl 22 1/2" – 15"
- One (1) Insert Bowl 15" – 12 1/4"
- One (1) Insert Bowl 15" – 10 1/8"

1.17.3 BIT BREAKER PLATES

Bit breaker plates set for the following bit sizes:

- 4.3/4"



- 6.1/8”
- 8.1/2”
- 12.1/4”

1.17.4 HANDLING EQUIPMENT

One (1) DP handling tool, c/w an elevator that is connected to the jib crane line and allows the handling of the drill pipes. Set of jaws for 3.1/2”, 4.1/2” and 5” drill pipe.

DC handling device will be supplied by the Customer.

1.18 BIT BREAK-OUT DEVICE

Make: Drillmec

Code: 0189 3148

Quantity: One (1)

Device for bit break-out composed of a manual tong, model B+V BV-65 "DB" type tong or equivalent, complete with jaws suitable for range 3.1/2” – 17”, actuated by an hydraulic cylinder controlled from main control panel, with torque indicator and manual torque regulator.

1.19 VERTICAL PIPE BINS

Make: Drillmec

Code: 0189 8126

Quantity: One (1) set

The Modular vertical racking system made by eleven (11) vertical bins with unique patented configuration designed to contain all the drill pipes and drill collars to be used.

The concept makes transport as well as drilling operations and string extraction from the well very easy and fast.

The total storage depends on the size and length of drill pipes used; replacing empty container with loaded ones, it is possible to reach greater depth. The system is protected by an international patent. The bottom part of the container is designed in order to install and uninstall very quickly the bins, when necessary.

CONFIGURATION#1 – Vertical pipe bins for 5” OD DP:

Pipe bins qty:	Ten (10)
Total DP storage capacity:	100 single joint 5” OD DP Range 2
Max DC storage capacity:	19 single joint 6 1/2” OD DC

CONFIGURATION#2 – Vertical pipe bins for 4 1/2” OD DP:

Pipe bins qty:	Eleven (11)
Total DP storage capacity:	110 single joint 4 1/2” OD DP Range 2
Max DC storage capacity:	19 single joint 6 1/2” OD DC

CONFIGURATION#3 – Vertical pipe bins for 3 1/2” OD DP:

Pipe bins qty:	Eleven (11)
Total DP storage capacity:	154 single joint 3 1/2” OD DP Range 2
Max DC storage capacity:	19 single joint 6 1/2” OD DC



Pipe bin frame is the same for configuration#1-2-3: customer will define pipe bins configuration and Drillmec will supply internal reducing spacers.

Handling sequence:

For trip in:

- 1) The pipes (vertically stored) are moved from pipe bins to mouse hole by jib crane and the pipe handling tool. The operator engages the handling tool on pipe body: then the pipe is moved by jib crane from pipe bins to mouse hole
- 2) The mouse hole, with hydraulic clamp, hangs pipe.
- 3) The top drive (controlled by driller cabin) tilt-out from center line well axis, and is aligned with pipe hanged in mouse hole.
- 4) The top drive shaft spins-in with pipe in mouse hole
- 5) The mouse hole clamp is released
- 6) The top drive lifts up with the pipe
- 7) The top drive is tilted in, returning aligned with center line well axis
- 8) The drill pipe on top drive is stabbed on the drill pipe on rotary table slips
- 9) The final make up can be effected by mean of automatic power tong (at drilling floor level)

For trip out:

The tripping out operations are carried out backward.

1.20 PIPE BINS BASE FRAME

Make: Drillmec

Code: 0189 3239

Quantity: One (1)

Base frame suitable to support the whole weight of pipe bins with drill pipe stored and to allow a right vertical positioning of pipe bins

1.21 WATER AND FOAM INJECTION

Make: FMC

Code: 0189 6354

Quantity: One (1)

Injection pulse pump brand FMC WBCD1122 for foam drilling (adjustable flow) hydraulically powered and controlled by main control panel.

Main features:

- Capacity: 35,4 gpm (@ 600 rpm)
- Pressure: 1000 psi max

1.22 HAMMER OIL INJECTION PUMP

Make: Drillmec

Code: 0185 2294

Quantity: One (1)

Hammer oil injection pump c/w oil tank.



1.23 MUD-AIR MANIFOLD – INSTALLED ON RIG’S SKID

Make: Drillmec

Code: 0189 6321

Quantity: One (1)

The rig is supplied with a mud-air manifold with max. working pressure of 3000 psi. Connections for external mud pump and compressor are included. Rig manifold will be fixed to rig’s skid.

1.24 SELF ELEVATING DRILLER CABIN

Make: Drillmec

Code: 0189 7102

Quantity: One (1)

The driller control cabin is fabricated from heavy-duty steel, according to ergonomic high standard level. The cabin is installed on skid and is raised to drilling floor level by hydraulic jacks. The access platform to drill floor is flush without steps or stairs.

Complete with:

- Access door
- Window to see center of well, complete with wipers
- Transport and lifting skid complete with four (4) hydraulic lifting jacks.
- Control panel for driller cabin elevation

In transport condition the driller cabin will be installed on truck or trailer (customer supplied).

1.25 MAIN CONTROL PANEL

Make: Drillmec

Code: 0189 6305

Quantity: One (1)

Driller cabin including main control panel, with all controls for drilling operations, power engine, mud pumps, monitors for drilling parameters, make-up and break-out automatic sequences, weight indicator etc...

1.25.1 SIDE CONTROL PANEL

Make: Drillmec

Quantity: One (1)

Side control panel to control mast raising and lowering, 4 independently controlled rig outriggers, crown block rotation system (the crown block is tiltable to reduce overall dimensions in transport conditions).

Hydraulic connections to rig hydraulic circuit are included.



1.26 RIG INSTRUMENTATION

Make: Drillmec

Code: 0189 6307

Quantity: One (1)

1.26.1 PRESSURE BALANCED FEED SYSTEM

Drilling conditions can change from foot to foot so you need the best balance between max. drilling speed and min. wear on bits and tools. The rig solves this problem with a pressure balanced feed system that senses the amount of down feed at any instant depending on the formation the bit is drilling and adjust feed automatically and instantly.

1.26.2 WEIGHT INDICATOR

WEIGHT INDICATOR FS METRIC SCALE 0-108850KG, n.6 lines with quadrant preset.

Press. 99 bar (1408 psi) pull/kg 108850 (239974 lb).

Complete with damper assy F-168 and damper saddle A-530.

1.27 CASING MAKE UP DEVICE

Make: Drillmec

Code: 0189 8124

Quantity: One (1) set

Casing make-up device set to handle 5" - 13⁵/₈" casing sizes.

The device is located underneath top drive double hook, hydraulically operated from main control panel, which allows the casing rotation with adjustable torque, according to API specification. This device is designed to allow fluid circulation during casing running in order to avoid block and tackle with drilled hole wall.

Complete with :

- Casing make-up device rotating tool for casing size 5" to 7"
- Casing make-up device rotating tool for casing size 7⁵/₈" to 9⁵/₈"
- Set of insert slips for 5 1/2" casing
- Set of insert slips for 7" casing
- Set of insert slips for 9 5/8" casing

Elevator link and casing elevator are customer supply.

1.28 ELECTRIC SYSTEM LIGHTING SYSTEM

Make: Drillmec

Code: 0189 6333

Quantity: One (1)

Electric system of rig complete with lighting system



1.29 LIGHTING SYSTEM

Make: Drillmec

Code: 0189 6332

Quantity: One (1)

Lighting system composed by:

<i>Technical data</i>		<i>Qty</i>
• Lighting for Driller cabin and Drilling floor		
○ Metal Jodure light on driller cabin roof	400 W 220 V 50 Hz	4
○ Neon (two inside and one out side driller cabin)	36 W 220 V 50 Hz	3
• Lighting for Trailer and Drilling Floor		
○ On drilling floor	60W - 24 V 50 Hz	2
○ On trailer	60W - 24 V 50 Hz	2
○ On mast	60W - 24 V 50 Hz	1
○ On service jib crane	60W - 24 V 50 Hz	1

1.30 PNEUMATIC SYSTEM

Make: Drillmec

Code: 0189 6309

Quantity: One (1)

Pneumatic system to service the rig air operated equipment.

1.31 TOOL BOX

Make: Drillmec

Code: 4046 0013

Quantity: One (1)

Tool box complete with combination wrenches and tools for ordinary maintenance .

1.32 DRILLING MATE SYSTEM

Make: Drillmec

Code: 0189 8129

Quantity: One (1)

The proposed DMS Manager is a highly customized solution for Drillmec Rigs, developed with the specific purpose of monitoring the main parameters, warnings and alarms.

The core of the system is SIMATIC S7 Siemens Modular Controllers. This PLC have been optimized for control tasks and designed for ruggedness and long-term availability.

To pick-up signals from the rig, will be installed pressure sensors, temperature sensors, level sensors, proximity sensors.

Alarms and warnings are configurable and modifiable only by authorized users with password access to the system. All the alarms are stored in the database that can be viewed at any time.



All the parameters and alarms will be displayed on the main monitor in the Driller Cabin.
It will be provided an output of the data in modbus protocol.

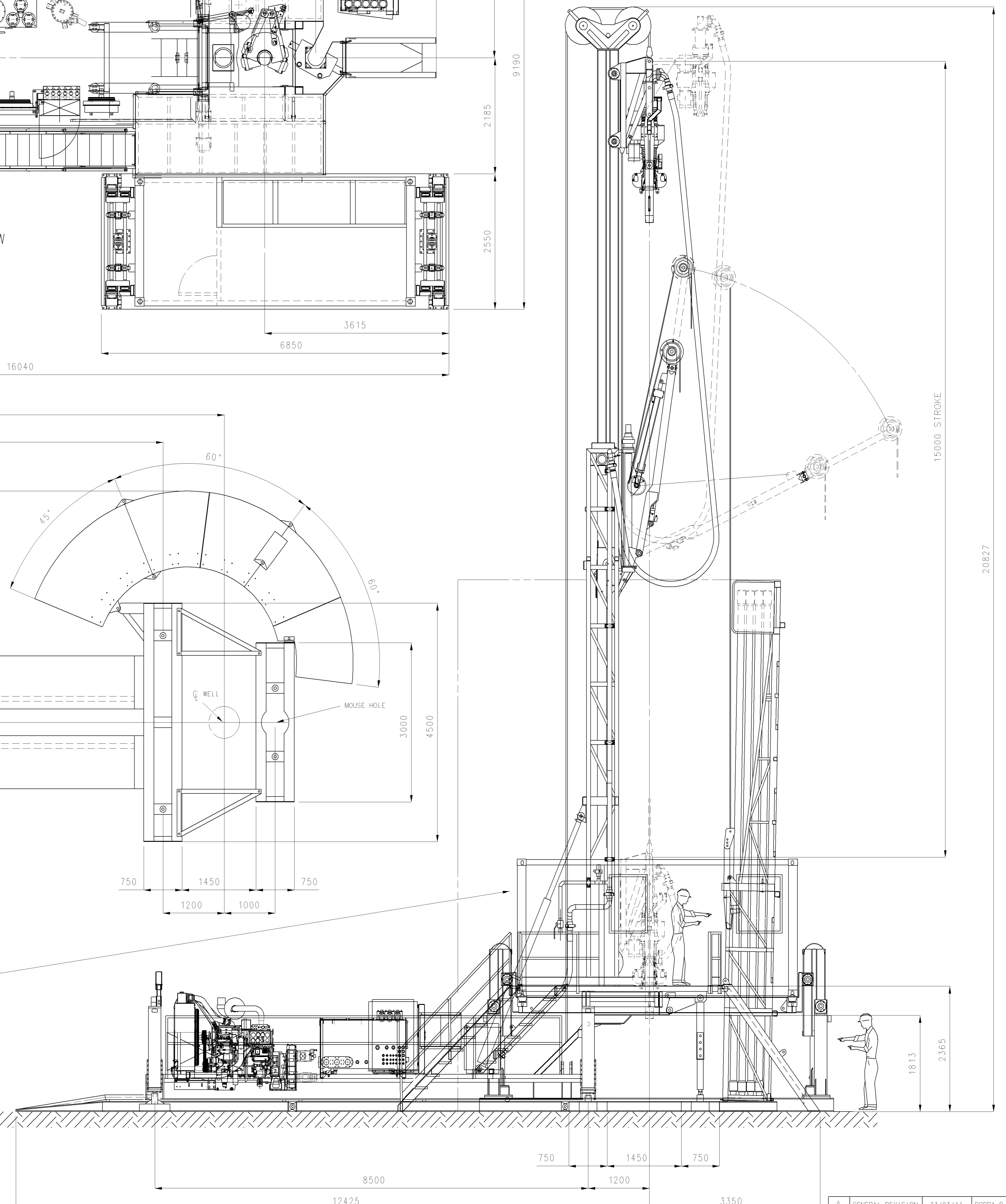
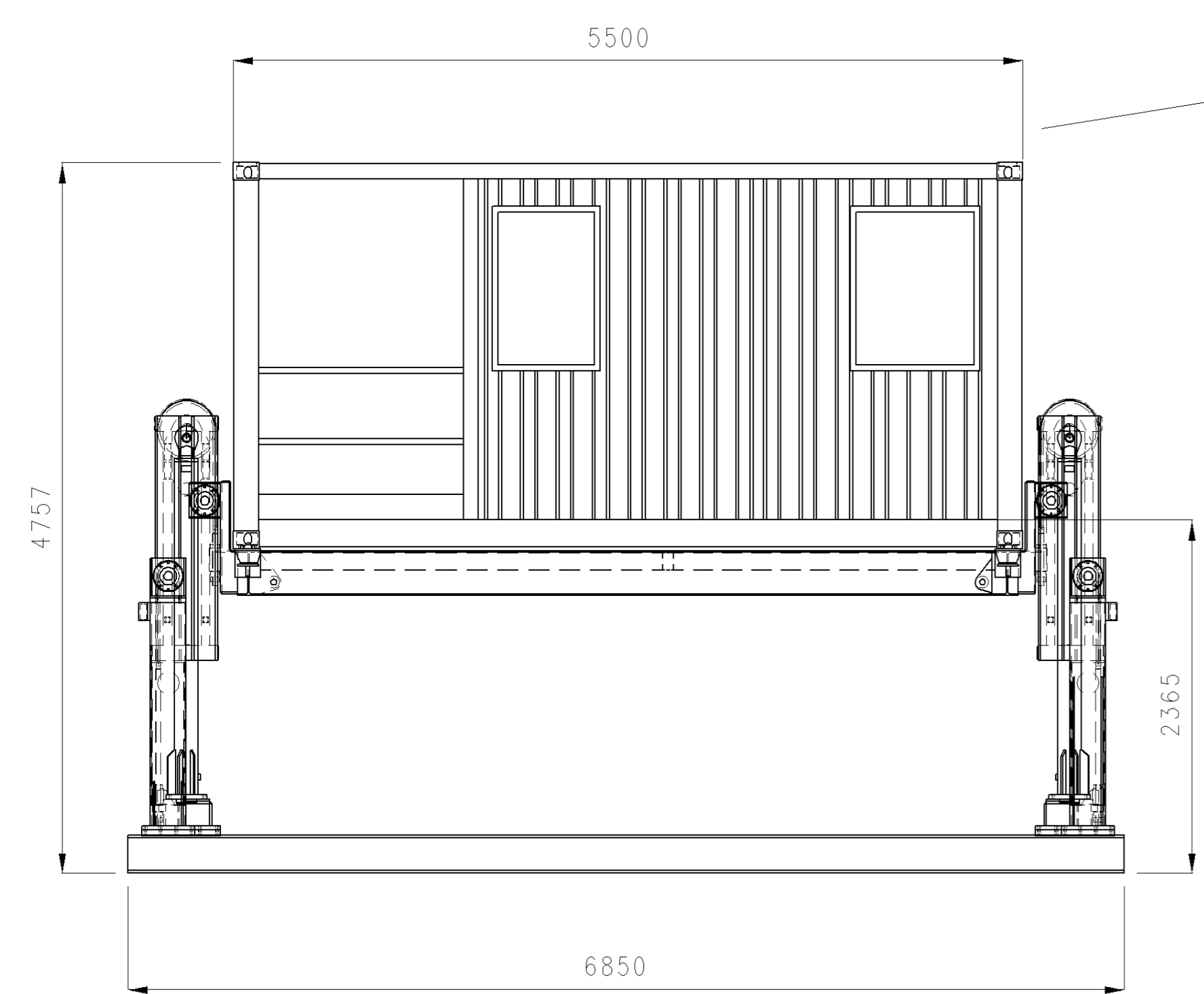
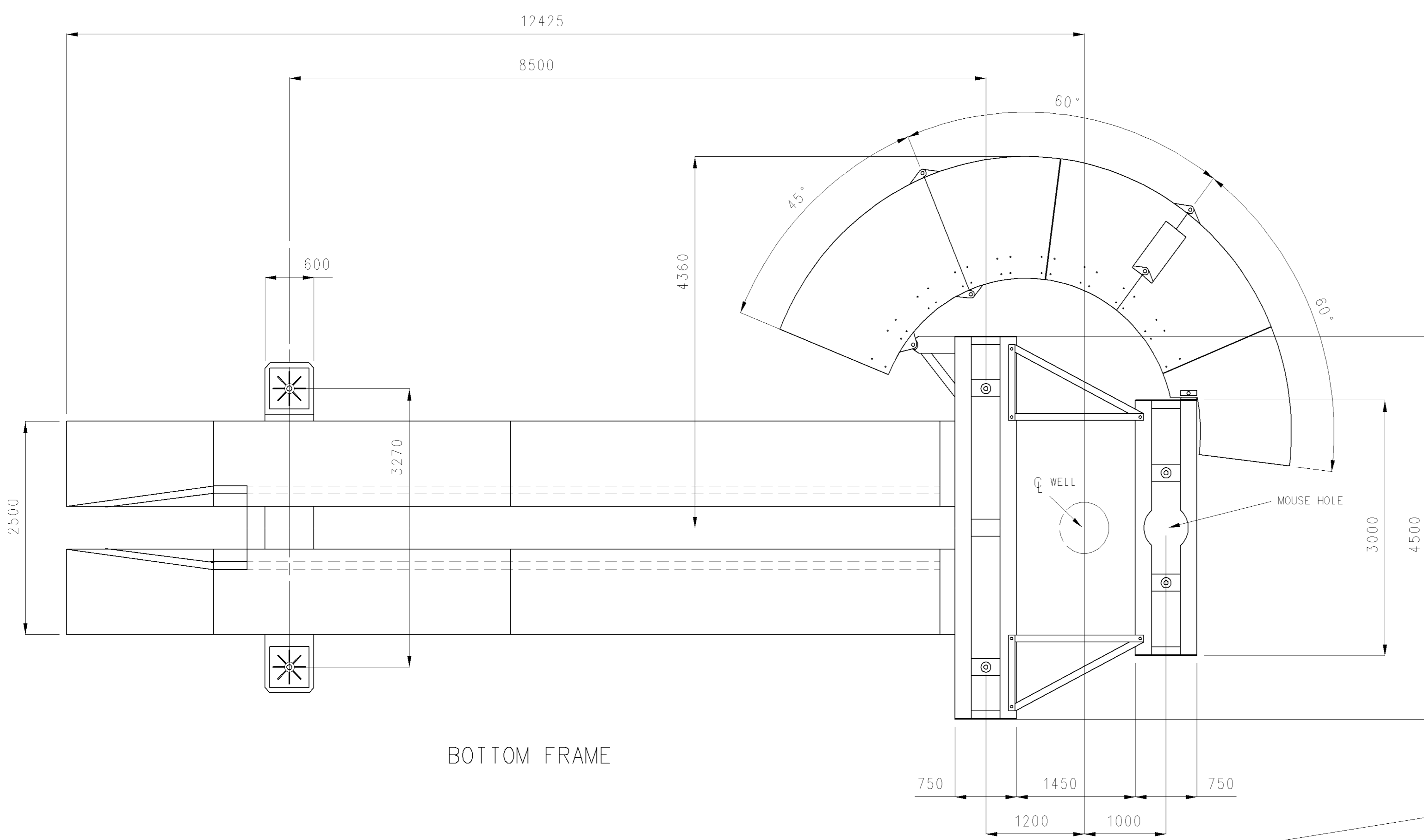
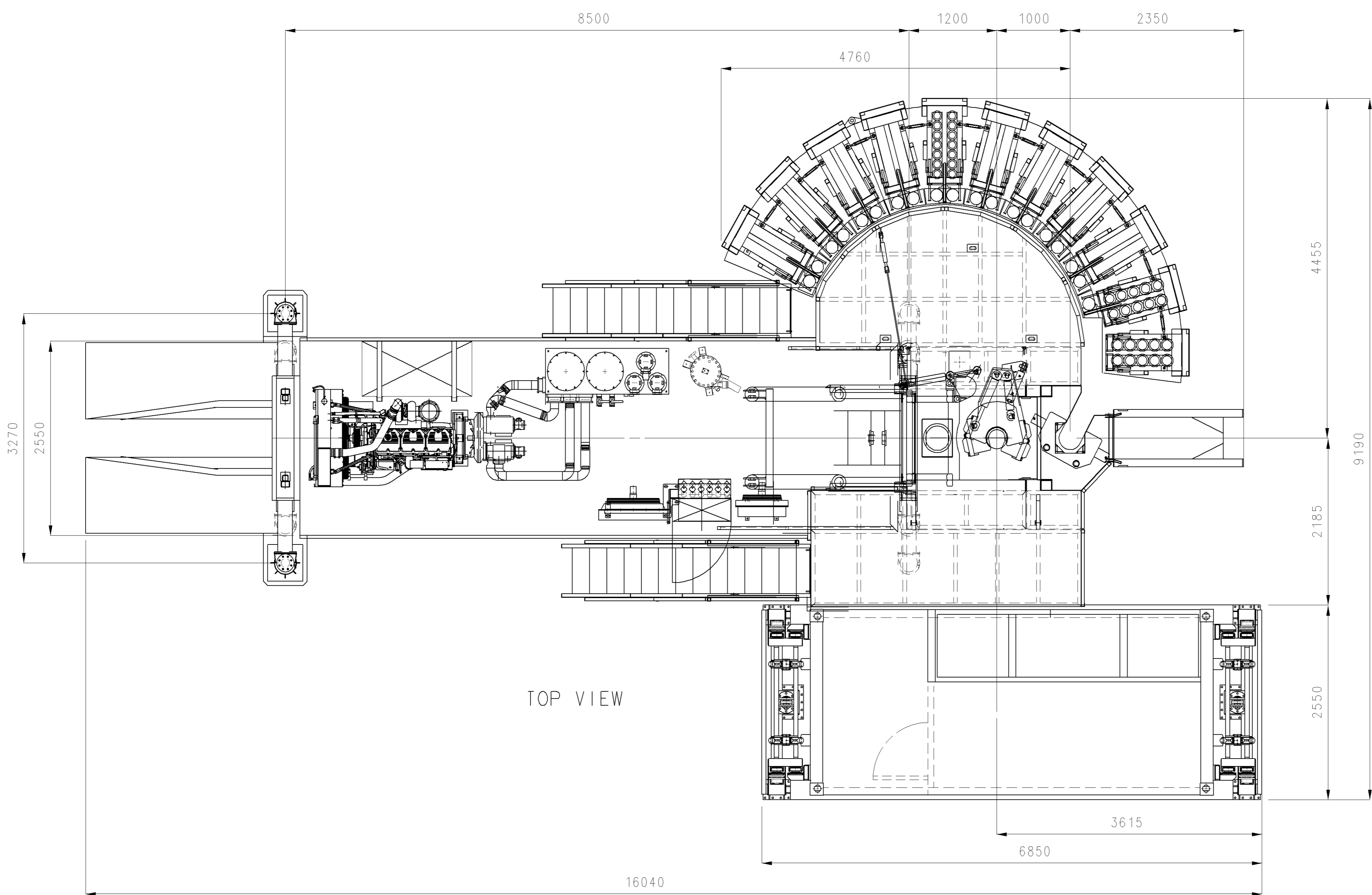
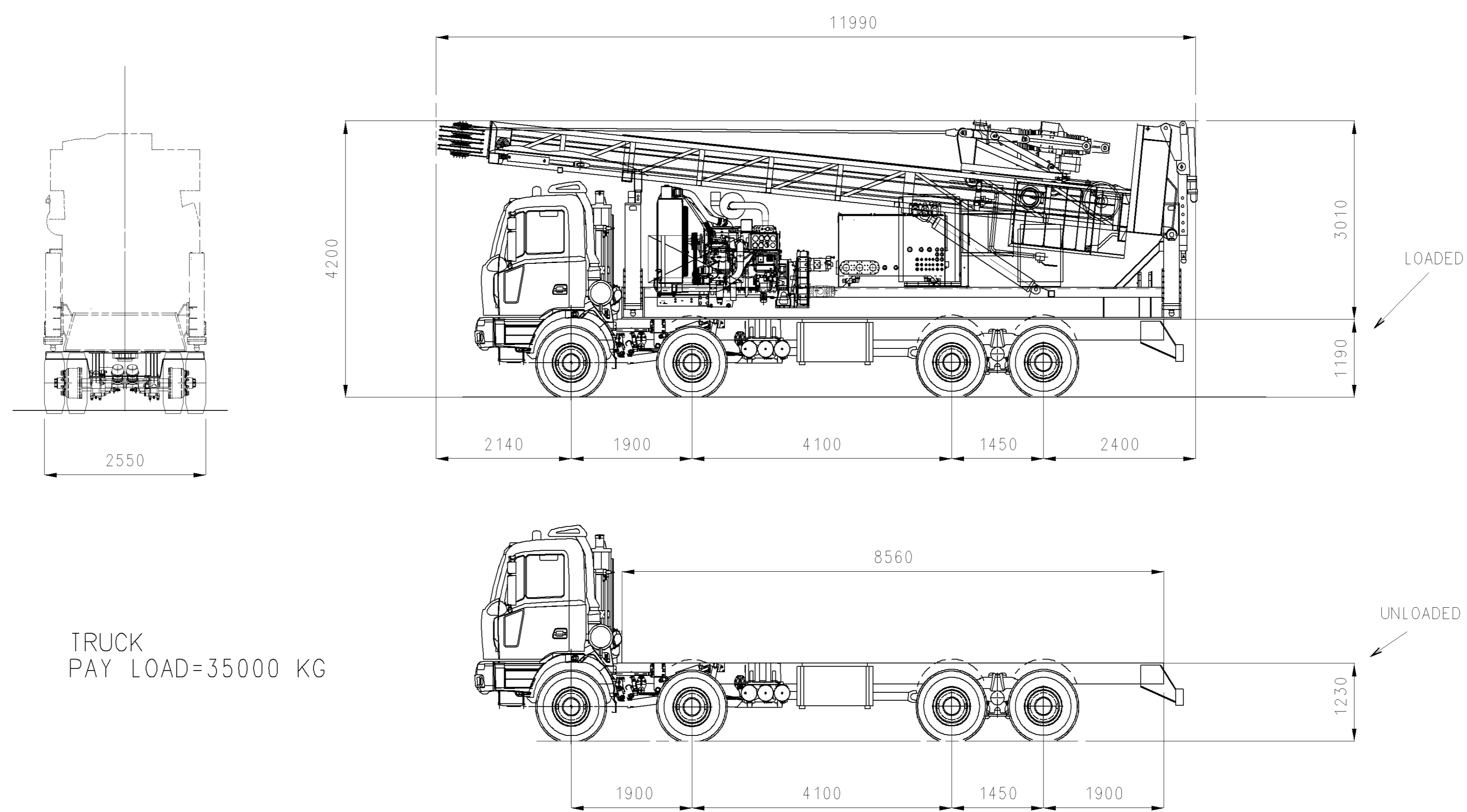
Parameters:

- Pull-up
- Pull-down
- Top Drive Torque
- Top Drive RPM
- Power Tong Torque
- Power Tong force clamp
- Mouse Hole engaged

Alarms and Warnings:

- Main oil pressure
- Service oil pressure
- Pilot oil pressure
- Air pressure
- Water pressure
- Oil tank temperature
- Oil tank level
- Clogged filter
- Engine warning
- Emergency shutdown

TRANSPORT CONFIGURATION



PRELIMINARY

DRILLMEC DRILLING TECHNOLOGIES	
<small>Via I Maggio, 12 29027 Gorigo di Podestano (Piacenza) - Italy -</small>	
PROJECT DESCRIPTION: G-75	
DESCRIPTION: GENERAL ASSEMBLY	SCALE: /
DRAWN: BORRA B.	CHECKED: TIBERI A.
DATE: 02/03/11	DATE: 02/03/11
APPROVED: FERRARI S.	ACCEPTED: /
DATE: 02/03/11	DATE: /
DRILLMEC CODE NUMBER: S000 5120	REV: /
CUSTOMER CODE: /	SHEET: /
REV: /	A