



DRILLMEC
DRILLING TECHNOLOGIES

HH 102
HYDRAULIC DRILLING RIG
SEMITRAILER MOUNTED

Doc.n: DT-298-08

Rev 00

Page 1 of 15



DRILLMEC
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TECHNICAL DOCUMENTATION FRONT SHEET		Page 1 of 15
<u>DOCUMENT TITLE</u>	HH 102 SEMITRAILER	
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<u>DOCUMENT NUMBER</u>	DT-298-08	
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INCLUDING:
ONE 7TS600 MUD PUMP
ONE TANK

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1	DESIGN AND COSTRUCTION AREA	3
2	BASIC RIG	3
3	MAST	4
3.1	TELESCOPIC MAST	4
3.2	CROWN BLOCK	4
3.3	STAND PIPE AND RIG MANIFOLD	5
4	SUBSTRUCTURE	5
4.1	MOUSE HOLE	6
4.2	AUTOMATIC SLIP	6
5	TRAILER	6
5.1	AIR SYSTEM FOR BRAKE AND SUSPENSION	7
5.2	LEVELLING JACKS / RAISING MAST CONTROL PANEL	7
6	TOP DRIVE	7
6.1	TOP DRIVE DOLLY	8
6.2	DOUBLE HOOK	8
6.3	CIRCULATION SWIVEL	8
7	ENGINE	9
8	HYDRAULIC SYSTEM	9
8.1	HYDRAULIC CIRCUIT	10
9	WORKING TABLE	10
10	RIG LIGHTING SYSTEM	10
11	DRILLER CONTROL CABIN	11
11.1	CONTROL PANEL	11
11.2	WEIGHT INDICATOR	11
11.3	DRILLING STRUMENTATION	11
12	OTHER EQUIPMENT	12
12.1	HYDRAULIC POWER TONG	12
12.2	MODULAR PIPE VERTICAL CONTAINER SYSTEM	12
12.3	SERVICE HOIST JIB	13
12.4	TOOL BOX	13
12.5	PRESSURE BALANCED FEED SYSTEM	13
12.6	INSIDE BOP VALVE (KELLY COCK)	14
12.7	CATWALKS	14
12.8	CASING MAKE-UP DEVICE	14
12.9	ELEVATOR LINK	14
12.10	MANUAL TONG	14
12.11	TORQUE WRENCH	15



1 DESIGN AND COSTRUCTION AREA

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.

HH-102 Hydraulic Drilling Rig is designed for fast moving operation.

The rig and its accessories are designed to operate in climate temperatures from - 20°C to plus 40 °C.

The electric equipment explosion proof and devices is designed to satisfy the requirements of API RP 500.

2 BASIC RIG

DRILLMEC semitrailer mounted high mobility rotary drilling & workover rig **Drillmec HH-102** fully hydraulic operated. These followings are the main characteristics:

<i>Equipment</i>	<i>Characteristic</i>
• Drill pipe stands handling	Range 3 (single)
• Max pull	220,000 lbs (100 metric ton)
• Mast clear height from ground level	87,9 ft (26,8m)
• Drilling floor height from ground level	16 ft (4,8m)
• Top drive torque	26,035 lbs-ft (3530 daNm)
• Top drive stroke	52 ½" ft (16 m)
• Max pull down	44,000 lbs (20 metric ton)
• Max power	600 hp (447.5 kW)
• Weight in transport condition	99,200 lbs (45 metric ton)

3 MAST

(DMC Code: Group 01894210)

3.1 TELESCOPIC MAST

The HH-102 hoisting system is based on telescopic mast fabricated in compliance with API 4F, operating as a hydraulic hoist. Made by high strength steel, welded box type and composed by two independent sections: bottom section is fixed to drill floor on trailer and telescopic section is running up and down.

- Raising and lowering of mast by means of hydraulic jack with built-in safety device.
- Telescopic mast is running up and down by hydraulic jack.
- Ladder and handrails to crown block to facilitate lubrication and maintenance
- Safety belt with line hooked up a clutch attachment, to the crown block, to avoid possible operator's fall
- Auxiliary hydraulic winch c/w a jib crane installed on the side of bottom mast section to handle materials on the rig floor and to lift materials from the ground to the rig floor

<i>EQUIPMENT – TEC DATA</i>		Qty
• Max pull	220,000 lb (100 metric ton)	---
• Distance between mast and well center	24 in – (0,61 m)	
• Hydraulic jacks for raising and lowering of mast		2
• Hydraulic jack for mast telescopic		1
• Pull down	20000 kg	
• Max casing Handling	RANGE 3	
Max load auxiliary jib crane		
• Max load on center well	6000kg	
• Max load on mouse hole	4000 kg	
• Max load inside container limit	2000 kg	

3.2 CROWN BLOCK

(DMC Code: Group 01893232)

Crown block is fixed to mast telescopic section complete with

<i>EQUIPMENT – TEC DATA</i>		Qty
Sheaves of crown block		4
• Diameter	25 1/2” – (648 mm)	
• Grooves	34 mm	2
Wire line sheave		1
• Diameter	25” (633 mm)	
• Grooves	5/8”	

3.3 STAND PIPE AND RIG MANIFOLD

(DMC Code: to be assigned)

One (1) stand pipe manifold DRILLMEC

The stand pipe will be complete with gooseneck c/w API connection.

The standpipe manifold is fixed on control cabin frame

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
Stand pipe		1
• Pipe diameter	4" OD	---
• Working pressure	5000 psi	---
Rig manifold		
• Union assy	4" FIG. 1502	3
• Gate valve	4" – 5000 psi W.P.	3
• Gate valve	2" – 5000 psi W.P.	4
• Union assy	2" FIG. 1502	6
• Hammer joint with diaphragm		1
• Female plug	2" NPT	1
• Low torq valve	2" – 5000 PSI	3
• Kill line	2" – 5000 PSI	1
• Head circulate line	2" - 5000 PSI	1
• Reverse circulate line	2" - 5000 PSI	1
• Trip tank line	2" – 5000 PSI	1
• Cement line	2" - 5000 PSI	1
• Cement pump line	2" - 5000 PSI	2
Rotary hose		1
• ID	3 1/2"	---
• Working pressure	5000 psi WP	---
• Total length	48 ft – 15. 24m	---
• Connection	4" FIG. 1502 (male x female)	---
Vibrator hose (above control cabin)		1
• ID	3 1/2"	---
• Working pressure	5000 psi WP	---
• Total length	12 ft – 3. 65 m	---
• Connection	4" FIG. 1502 (male x female)	---

4 SUBSTRUCTURE

(DMC Code: Group 01894217)

One (1) Substructure DRILLMEC made of high-grade steel. The substructure and drill floor are directly connected to rig trailer. Due to its specific design, this type of substructure can be easily set also over large existing cellars and the ample space under the substructure floor facilitates the BOP installation.

The substructure is complete with:

- The lower section of the substructure is equipped with rails and trolley to facilitate the sliding of BOP to the well centerline
- One stairway from drill floor to trailer
- The rotary table is flush with the working floor
- One ramp for casing



- One set of handrails
- Our supply includes steel skids to be placed below the semitrailer leveling jacks
- Control cabin frame

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
1. Drill floor height	16 ft (4,88m)	
2. Control cabin (height, width, length)	8-1/2ft (2.59m)x 8ft (2.43m) x 19 7/8 ft (6m)	1

4.1 MOUSE HOLE

(DMC Code: Group 01893354)

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.

Max. pipe size: 12”.

4.2 AUTOMATIC SLIP

(DMC Code: To be assigned)

One (1) Set of automatic slips to hang to fit API master bushing and operated from driller's panel to hang drill pipes complete of a powerful pneumatically operated cylinder to provide pressure rising and pressure setting of slips.

With slip for 3.1/2”,4” and 5” drill pipe size.

5 TRAILER

(DMC Code:Group 01894366)

One (01) DRILLMEC semitrailer heavy duty type for off-road operation, with:

- Welded frame made of high-grade steel
- Braking system consisting of a double circuit air operated brake plus one (1) additional manually operated brake
- Pneumatic operated front and rear suspension for perfect leveling
- Lighting and road signs
- Lighting system 24v
- Mast support in over-the-road position.
- Tool box
- Walkways and handrails
- Bumper
- Stairs from ground to semitrailer
- King pin for connection to truck, size: 2” and 3 ½” (will be changed the king pin position: more close to the end)
- Front neck for 3-axle wheel factor

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
Semitrailer approximate overall dimension (Length x Width x	15.3 m x 2.7 m x 4.5 m	



<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
Height)		
Axles semitrailer		3
Tires singles	MICHELIN 173F XS 525/65 R20,5 16 x 20.5	6+1spare
King pin	3 ½” (changeable)	1
Hydraulic leveling jacks with mechanical safety locking		4
Hydraulic jack for maintenance on wheel		1
• Max push	66000 lbs (30000 kg)	

5.1 AIR SYSTEM FOR BRAKE AND SUSPENSION

This air system must connected to truck. This air circuit is utilized for:

- Air brake system
- Leveling shock absorber
- Automatic brake when disconnect truck
- Double level to active and unprime automatic brake

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
1. Tank for air brake	26.4 gal (100 l)	1
2. Tank for air shock absorber	26.4 gal (100 l)	1

5.2 LEVELLING JACKS / RAISING MAST CONTROL PANEL

(DMC Code: Group 01893134)

One control panel for leveling semitrailer and raising mast is mounted in the back of the trailer near tires, complete with:

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
1. Levers commutation (drilling/ installation)		1
2. Levers for leveling jacks (stabilizers)		4
3. Levers for raising mast		1
4. Levers for telescopic mast		1
5. Oil pressure gauge		1

6 TOP DRIVE

(DMC Code: TO BE ASSEGNED)

Top drive driven by 4 top-head hydraulic motors assembled on a special dolly sliding on mast guide.

Top drive has a special patented device that allows the driller from the control cabin to tilt out the complete top drive from well center to mouse hole

Double shock absorber system , spring type and cup spring type mounted on the power swivel body.

The top drive is equipped with an hydraulic brake



Arranged for future application of hydraulically controlled Torque Wrench, IBOP valve and Drillmec’s casing make-up device

<i>EQUIPMENT – TEC DATA</i>	
• I.D. full opening:	3”
• Variable speed	0 to 154 rpm
• Torque range	0 to 26,000 lbft – (with 100% efficiency)
• Max torque	26,000 lbft (35826 Nm) to 66 RPM
• Stroke	52’ 6”
• Casing Clearance	52’ 6”
• Max. pull up	220,000 lbs
• Max. pull down	44,000 lbs
• Max. working pressure	5000 psi

6.1 TOP DRIVE DOLLY

(DMC Code: Group 01894310)

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.

6.2 DOUBLE HOOK

(DMC Code: Group 01894290)

One (1) double hook installed on bottom shaft with the following features:

- Hi-tensile forged heat treated steel
- Suitable to use elevator link
- Equipped with special roller bearing
- Equipped with special air system for the counterbalance of double hook and thread soft landing system

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
• Static hook load capacity	100 metric ton (220,000 lbs)	

6.3 CIRCULATION SWIVEL

(DMC Code: Group 01900101)

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

- Suitable to drill with air, mud, water and foam
- Wash pipe 3” ID x 5000 psi working pressure
- The packing and wash pipe are designed with quick connections to easily execute maintenance operations.
- The system include standpipe and rotary hose connected to power swivel gooseneck. All pipe

and hammer union will be welded to be suitable for working pressure of 5000 psi.

7 ENGINE

(DMC Code: 01894381)

One (1) Diesel engine C18 – ACERT ,with hoisting power of 600 hp at 1800 RPM continuous rate, water cooled and equipped with:

- RPM and working hours gages
- Muffler with spark arrests
- Heavy duty radiator
- Blower fan
- Alternator
- Heavy duty air cleaner
- Governor
- Base rails
- Fuel pump
- Instruments panel
- Remote shut off
- Electric and pneumatic starter: if possible (the application will be checked with Caterpillar)
- Air regulator
- Water separator for fuel Racor Type
- Emergency shut off
- Air compressor connected to principal tank of air system
- NOT fuel tank: the fuel system will be centralized
- Sound proof of diesel engine

8 HYDRAULIC SYSTEM

(DMC Code: Group 01894223)

Hydraulic power pack realized with a special coupling between engine and hydraulic pumps this system is used to:

- raising mast
- top drive
- leveling jacks
- hydraulic winch
- power tong
- torque wrench

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
1. Hydraulic pumps DENISON P7W		4
• Displacement	7.23 cu in/rev (118.8 cm³/rev)	
• Max pressure (continuous)	5000 psi (350 bar)	---
2. Hydraulic pumps DENISON T6DCCM B28		1

 DRILLMEC <small>DRILLING TECHNOLOGIES</small>	HH 102 HYDRAULIC DRILLING RIG SEMITRAILER MOUNTED	Doc.n: DT-298-08 Rev 00 Page 10 of 15

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
• Displacement	89.7 ml/rev	
• Max pressure (continuos)	3045 psi (210 bar)	
B17		
• Displacement	58.3 ml/rev	
• Max pressure (continuos)	3480 psi (240 bar)	
B08		
• Displacement	26.4 ml/rev	
• Max pressure (continuos)	3480 psi (240 bar)	
3. Hydraulic pumps CASAPPA HDP30		1
• Max delivery	3.14 cu in (51.59cm3/rev)	---
• Max pressure (continuos)	3300 psi (230 bar)	---
4. Oil tank total capacity	449 gal (1700 l)	1
• Oil level indicator, dipstick, filler, drain plug, thermometer		---

8.1 HYDRAULIC CIRCUIT

(DMC Code: Group 01893170)

- Hydraulic cylinder for pull up/down inside mast structure connected to special hydraulic block divider specially made according to Drillmec specifications by first class supplier.
- Hydraulic motor series and cylinders complete with all control devices to move all services for complete rig functionality.
- Hydraulic oil heat exchangers suitable for operation at environment temperature of 55°C. Verify the possibility of vertical mounting layout on chassis.
- hydraulic system arranged with controls on control panel, valve and piping for future application of IBOP valve and Drillmec’s casing make-up device on top drive.

9 WORKING TABLE

No powered table (in substitution of rotary table) complete with master bushing and reducers with internal API cone for slips to hang drill pipes, drill collars and casings as follows:

- Master bushing movable to have full opening through 32 1/2” (825,5mm)
- Complete with adapter for 20 1/2” opening API:
 - Insert Bowl 2.3/8” – 7” (Drillmec code: 0190 0134)
 - Insert Bowl 9.5/8” – 10 3/4” (Drillmec code: 0189 2714)

10 RIG LIGHTING SYSTEM

(DMC Code: 01894360)

<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
1. Lighting for Drilling floor and substructure		---
• Metal Jodure light (power / V / Hz)	400W – 110 v – 50 Hz	2
2. Lighting for carrier/semitrailer		---
• Metal Jodure light (power / V / Hz)	400W – 110 v – 50 Hz	2
3. Lighting for control cabin		---



<i>EQUIPMENT – TEC DATA</i>		<i>Qty</i>
• Neon	36W	6
• Metal Jodure light (power / V / Hz)	400W – 110 v – 50 Hz	5
4. Lighting for pipe racks		
• Metal Jodure light (power / V / Hz)	70W – 110 v – 50 Hz	1
5. Emergency Lighting		---

11 DRILLER CONTROL CABIN

(DMC Code: to be assigned)

The driller control cabin is fabricated from heavy-duty steel, according to ergonomic high standard level. The cabin is installed on skid it is raised to drilling floor by hydraulic jacks (equipped with connection to the main power pack). The access platform to drill floor is flush without steps or stairs, and it is designed in order to include:

- Rig floor manifold;
- Suitable to accept the choke remote control panel (not included in our supply);
- Suitable to accept computerized system to allow the controls management and rig operation visualizing (not included in our supply).
- Two door
- Complete with wipers
- Complete with bouble type level near the main control panel and electronic level
- Large window to see center of well (Window of doghouse will be more inclined of previus HH102)

11.1 CONTROL PANEL

(DMC Code: Group 01894241)

L-shaped control panel mounted inside driller control cabin with all controls for drilling operation, motors, make-up and break-out automatic sequences, weight indicator, mud pump gauges (the right position will be defined with customer) etc.

11.2 WEIGHT INDICATOR

(DMC Code: Group 40390641)

Make: WAGNER Type: 13-2 FS

Main features:

- 12” quadrant
- N° 6 lines
- Max Pull 108850 kg (239974 lb) with Pressure 99 bar (1408 psi)

Complete with damper assy and damper saddle

11.3 DRILLING STRUMENTATION

The instrumentation could be composed by following items (scale of measurement depends on customer request; Mud pump’s instrumentation should be equipped with quick connection system):



11.3.1 MUD PRESSURE SYSTEM

(DMC Code: Group 40390966)

One (1) Mud pressure system complete with 6" liquid filled gauge, 50 ft hose, diaphragm sensor complete with 1502 union & sub for standard service upto 15 psi, hand pump, and fluid.

11.3.2 MUD PUMP SPM GAUGE

(DMC Code: Group 40390970)

Two (2) Meter 5", 0 to 200 spm's analog.

11.3.3 DIGITAL MUD PUMP STROKE

(DMC Code: Group 40390971)

One (1) Digital pump stroke counter and totalizer for (2) pumps

11.3.4 RPM ANALOG

(DMC Code: Group 40390969)

One (1) Wagner Analog 5" RPM 0 to 150/300 RPM

11.3.5 PROXIMITY DETENTION SYSTEM

(DMC Code: Group 01902304)

One (1) Proximity detection system for Top Drive RPM and Pump Stroke

12 OTHER EQUIPMENT

12.1 HYDRAULIC POWER TONG

(DMC Code: to be assigned)

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

- Double hydraulic rotating clamps to close drill pipes and collars joints (from 3.1/2" to 11"), max torque: 18,000 kgm (130,000 Lbft).
- 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, 1200mm vertical stroke, operated from driller's panel.

12.2 MODULAR PIPE VERTICAL CONTAINER SYSTEM

(DMC Code: Group 01893268)

Eleven (11) Modular vertical racking system made by vertical bin with unique patented configuration designed to contain all the drill pipes and drill collars to be used (suitable for Range 3 DP).

The concept makes transport as well as drilling operations and string extraction from the well very easy and fast. The system is composed by vertical container.

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.

12.2.1 DRILL PIPES HANDLING SYSTEM

- a. By means of the jib you take the drill pipe from the vertical container and put it down in the mouse hole. The joints may have a different length from the standard range used, in fact they are suspended at the right height by means of the hydraulic clamp installed in the mouse hole.
- b. Top drive slides out from the well center and is positioning over the mouse hole; is taking the joint and later is lifting and moving it over the well center in order to add it to the drilling string.
- c. The automatic drilling system makes the operator free to handle other pipes while drilling. If he wants, he may move another drill pipe in the mouse hole. This drill pipe is ready to be taken from the power swivel as per item b.

For the tripping out operations you work backwards.

12.3 SERVICE HOIST JIB

(DMC Code: Group 01894239)

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

- Possibility to operate on center well for all material as necessary.
- Possibility to lift material out of substructure frame and operate on working floor or in well center.
- Lifting capacity on working floor, mouse hole and Drill collar parking area 6.000 kg.
- Lifting capacity out of working floor at maximum distance from mast on ground level 2.000 kg.
- Jib crane hydraulically moved by a mobile hydraulic control panel.

12.4 TOOL BOX

(DMC Code: Group 40460013)

One (1) large tool box complete with tools (spanners, pliers, screw drivers, lubrication set, grease gun, oil cans, etc...).

12.5 PRESSURE BALANCED FEED SYSTEM

(DMC Code: Group 01893159)

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.

12.6 INSIDE BOP VALVE (KELLY COCK)

(DMC Code: Group 01903123)

Hydraulically operated from control panel.

Main technical data:

Max working pressure: 690 bar (10000 psi)

12.7 CATWALKS

(DMC Code:01894260)

Two (2) Section Catwalks 480mm Wide X 380mm High X 17000mm Long.
Includes rails for dolly to raise pipe to drill floor.

Quantity: One (01)

12.8 CASING MAKE-UP DEVICE

(DMC Code:01894229)

Q.ty One (1) Casing make-up device set to handle 9 5/8" + 7" casing sizes.

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

12.9 ELEVATOR LINK

(DMC Code:40414912)

Set of elevator link 2.1/4" x 96" with load capacity of 250 tons.

Quantity: one (1)

12.10 MANUAL TONG

12.10.1 Manual tong 3.1/2" - 13.3/8"

Make: BLOHM - VOSS or equivalent

Code/Type: 40414742 / 70601

Manual tong type BV - 55, complete with short lever and hanger assembly, less lug jaws for pipe range 3.1/2" – 13.3/8". Torque rating 55000 lbs·ft (74580 N·m)



Quantity: One (1)

12.11 TORQUE WRENCH

(DMC Code:01894311)

Q.ty One (1) Hydraulic torque wrench to be used during tripping operation to fast make-up and break-out operations for DP tool joint size from 3 1/2" to 7" OD. The hydraulic wrench is mounted underneath the top drive and is composed of:

- Rotating hydraulic top clamp (hydraulically operated by driller cabin);
- lower hydraulic clamp;
- Suspension double hydraulic jack with 790 mm (2ft 7in) stroke.

Main technical data:

Max make-up torque: 4785 kgm (36,200 ftlbs) to 250 bar

Max break-out torque: 7,000 kgm (50,700 lbs-FT) to 250 bar

Hydraulic jacks stroke: 790 mm (2ft 7in)