DH350 Drilling Rig

350,000 lb (158,757 kg) hook load

Epiroc

Ready for the future of energy

Efficient, economical and highly mobile, the Epiroc DH350 drilling rig is designed to exceed today's energy industry standards. Smart automation-friendly features require fewer crewmembers, while allowing for a safer work environment.

Key benefits

Fast rig-up
The unconventional DH350 features hydraulic-powered hoisting, rotating and pipe handling operations — along with fully hydraulic rig-up and leveling/walking operations.

Future-focused design
Combined with Epiroc's unique CANBus operating system, the DH350 is well suited for automated functions such as feeding tubulars to the unique tip-out top drive, as well as auto make/break of drill pipe and BHA components. Planned DH350 automation projects also open up possibilities for future autonomous drilling operations.

Trusted heritage
Epiroc draws on more than 40 years of experience in the design and manufacture of hydraulic-powered surface drilling rigs. The DH350 combines those years of experience into one of the most advanced hydraulic hoist drilling rigs available today.

Contact your Epiroc representative or visit epiroc.com for more about how the DH350 can boost your efficiency and productivity.

Meet the next generation of rig design

The DH350 drilling rig is a major step forward in hydraulic hoist/top-drive drilling rigs. Benefits for contractors and operators include:

Reduced non-drilling time and cost
Fewer loads, greater mobility and faster rig-up.

Enhanced safety
By reducing crew size and creating safer conditions for rig operation

Improved drilling performance
By using our CANBus operating system for maintaining precise drilling control parameters of Weight-on-bit drilling torque and rotation speed.

Lower operating costs
Of a superior hydraulic-powered hoisting and rotation system, resulting in greater fuel efficiency and less downtime.

Smaller environmental impact
With built-in spill protection features and a smaller location footprint.

Substructure

The substructure load can be quickly set at the beginning of the rig-up process. Four leveling jacks/walkers quickly pin to the substructure.

Telescoping mast

The telescoping mast is trailer-mounted for efficient transport and fast rig up/down. Once the trailer is positioned adjacent to the substructure, the mast is hydraulically transferred to the substructure during rig-up operation.

Pipe handler

The pipe handler is mounted on axles for ease of transport and quick placement next to the substructure during rig-up.

Power unit

The power unit is packaged in an oilfield skid and mounted across the substructure as the final rig-up operation. This provides a self-contained walking rig.

Service and support

Epiroc offers several types of service agreements to meet your operational requirements and maximize your productivity:

Variable-price repairs
Service when you need it

Fixed-price repairs
Service with controlled costs

Equipment audit
Scheduled equipment quality control

Preventive maintenance programs
Peace of mind so you can focus on your core business

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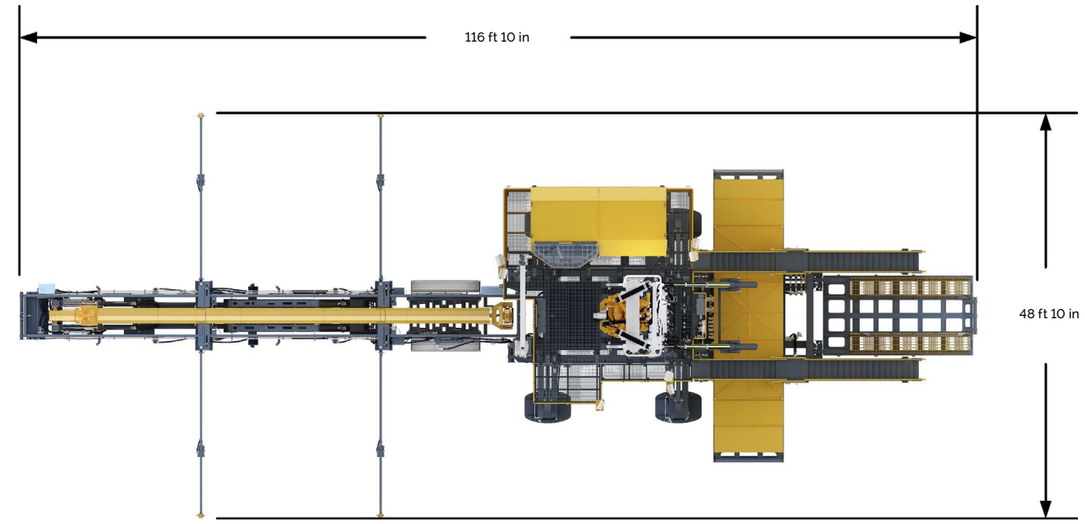
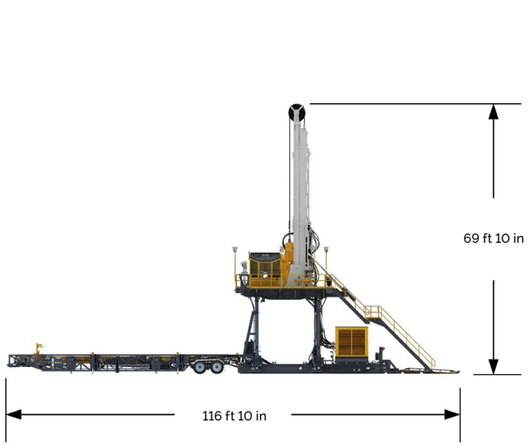
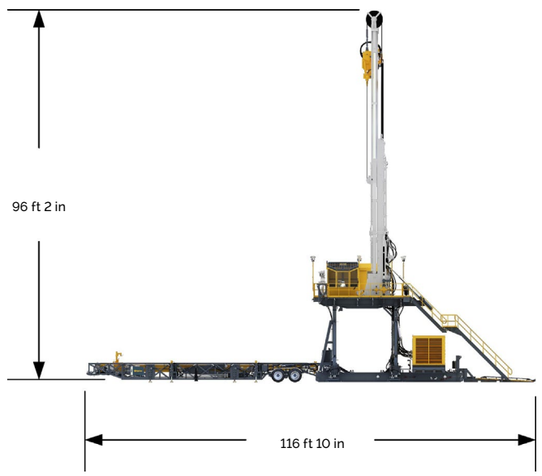
Overall rig dimensions

Overall drilling location footprint – mast normal condition	
Height	69 ft 10 in (21.3 m)
Width	48 ft 10 in (14.9 m)
Length	116 ft 10 in (35.5 m)
Overal drilling location footprint – mast extended condition	
Height	96 ft 2 in (29.3 m)
Width	48 ft 10 in (14.9 m)
Length	116 ft 10 in (35.5 m)







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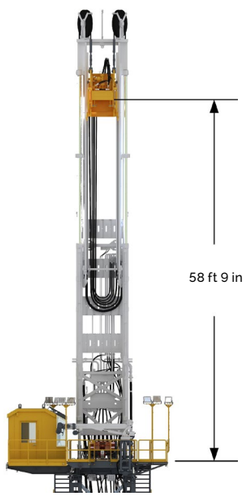
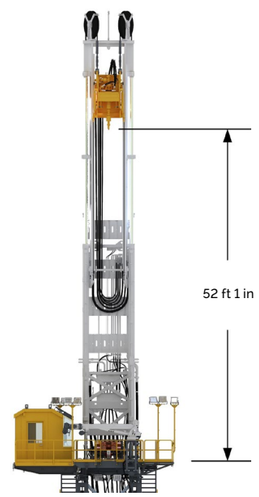
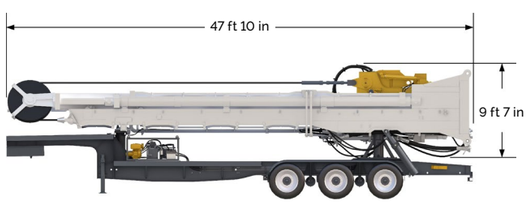
Mast

Transport weight and dimensions without mast trailer (H x W x L)	Approximately 68,000 lb (30,844 kg); 47 ft 10 in x 9 ft 11 in x 9 ft 7 in (14.6 m x 3 m x 2.9 m)
Drilling mode footprint dimensions (H x W x L)	74 ft 1 in x 10 ft x 9 ft 7 in (22.6 m x 3 m x 2.9 m)
Max ID width and depth	28.25 in (717.6 mm)
Bottom of spindle to top of table	58 ft 9 in (17,907 m)
Bottom of spindle with kelly cock, float sub and 4 1/2 dp saver sub to top of table	52 ft 1 in (15.9 m)
Feed cylinder w/position sensor-rod (diameter/length/psi)	8.07 in (205 mm) rod, 316 in (8,026 mm) stroke, 5000 psi (345 bar)
Pullback sheave diameter	55.12 in (1,400 mm)
Pullback cable (diameter/length)	2.04 in (52 mm) rope diameter, 504 in (12,822 mm) length, 545,594 lbs (247,477 kg) breaking strength
Pulldown sheave diameter	20.13 in (511 mm)
Pulldown cable (diameter/length)	7/8 in (22 mm) diameter, 424.5 in (10,782 mm) length, 75,000 lbs (34,019 kg) breaking strength
Load cell pin diameter	3-1/2 in (95 mm) diameter
Fast feed down speed	180 ft/min (54.86 m/min)
Slow feed up speed	0-123 ft/min (0-37.49 m/min)
Slow speed up regen speed	0-180 ft/min (0-54.86 m/min)
By pass rotation rpm @ high torque/@ low torque	No by pass. Low speed range : 80 rpm at 30,000 lb-ft (40.67 kNm) or high speed range : 160 rpm at 15,000 lb-ft (20.33 kNm)
Top drive max tip out angle @ what load rating	0 to 90°, twin cylinder tip out to 10,000 lbs (4,536 kg) load rating
Electrical box function on side of mast	Slow feed, load cell, feed cyl position, feed cylinder pressure sensor, carriage supply switch, filter switch, counterbalance valve, e-stop, regen valve & etc.
Mast raise cylinder specs (stage/rod diameter/psi)	3 stage: 3.5 in (89 mm), 5.75 in (146 mm) & 7.25 in (184 mm) rod diameter/3000 psi (207 bar)
Mast trailer	
Front (crown) mast cylinder raise specs (stage rod diameter and stroke/psi)	2 stage/2.75" (70 mm), 4.25" (108 mm) rod diameter; 4000 psi (276 bar)
Rear (lower mast) mast cylinder raise specs (stage rod diameter and stroke/psi)	2 stage/2.75" (70 mm), 4.25" (108 mm) rod diameter; 4000 psi (276 bar)
Hydraulic power unit specs (electric start engine hp, fuel capacity, hydraulic tank capacity, hydraulic pump flow/psi)	10 hp (7.45 kw) diesel electric start engine, 3 gpm (11.35 lpm) flow, 10 gal (37.85 L) reservoir, 4000 psi (276 bar), 10 micron return filter







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Power unit

Weight	62,000 lbs (28,123 kg) approximately
Dimensions (H x W x L)	9 ft 7 in (2.92 m) x 8 ft 6 in (2.59 m) x 35 ft 6 in (10.82 m)
Engine	
Type	Caterpillar C32 Diesel
Rating	1,200 hp (895 Kw) @ 1,800 rpm
Emissions Rating	EPA Tier 4 Final
Cooling System	Integrated cooling package w/CAC, Radiator, FOC, and 72 in (1,829 mm) fan with 162cc (0.162 L) hydraulic drive motor
Limiting Ambient Temperature	125˚ F (52˚ C) ambient temperature at sea level
Pump drive	
Torsional Coupling	Dual stage spring coupling w/bearing-supported output
Driveshaft	Cardan shaft, 1810 series
Gearbox	Custom 3 shaft, 6 pad gearbox 1:1 ratio with pressure-lubricated gears and splines
Hydraulic pump	
Function	**Displacement and flow (each)**
Feed and rotation	16.47 in³/rev (269.89 cc/rev), 127 gpm (481 lpm) @ 1800 rpm
Auxiliary functions and flushing	16.47 in³/rev (269.89 cc/rev), 127 gpm (481 lpm) @ 1800 rpm
CAC and HOC fan pump	4.94 in³/rev (80.95 cc/rev), 38.5 gpm (146 lpm) @ 1800 rpm
Starting assist and flushing	8.54 in³/rev (139.94 cc/rev), 66.5 gpm (252 lpm) @ 1800 rpm
Slow feed	2.44 in³/rev (39.98 cc/rev), 19 gpm (72 lpm) @ 1800 rpm
Sump pump drive pump	3.89 in³/rev (63.74 cc/rev), 19 gpm (72 lpm) @ 1800 rpm
DC power hydraulic start assit pump	1.21 in³/rev (19.82 cc/rev), 3.1 gpm 12 (lpm) @ 600 rpm
Location	**Power and pressure (each)**
Pump drive gearbox	333.5 hp @ 4,500 psi (248.69 kw @ 310 bar)
Pump drive gearbox	222.2 hp @ 3,000 psi (165.69 kw @ 207 bar)
Pump drive gearbox	112 hp @ 5,000 psi (83.51 kw @ 345 bar)
Pump drive gearbox	19 hp @ 500 psi (14.16 kw @ 34 bar)
Mounted on hoc fan pump	50 hp @ 4,500 psi (29.81 kw @ 310 bar)
Mounted on cac fan pump	28 hp @ 2,500 psi (20.87 kw @ 172 bar)
Mounted with dc start pilot motor	4,000 psi (276 bar)
Hydraulic system	
Capacity	870 gal (3,293 L) fluid capacity, 1,000 gal (3,785 L) total volume
Outlet valves	Hydrower butterfly valves w/limit switches on all outlets
Filtration system	Qty (2) centrifugal pumps constantly circulate fluid through filters and cooler
Cooling System	Integrated cooling package w/HOC, gearbox oil cooler, and 72 in (1,829 mm) fan w/162cc (0.162 L) hydraulic drive motor
External Connections	Connection panel with thread-on quick connectors for fast, leak-free setup
Electrical system	
Wiring	24V with charging terminal, shutoff switches for starters and control box
Batteries	Qty (6) 8D AGM batteries, wired in (3) 24V pairs.
Control Box	30 in x 42 in (762 mm x 1,067 mm) NEMA 4X, 13 stainless steel electrical box with Parker controllers
Instrumentation	MD3 displays engine status and diagnostic info

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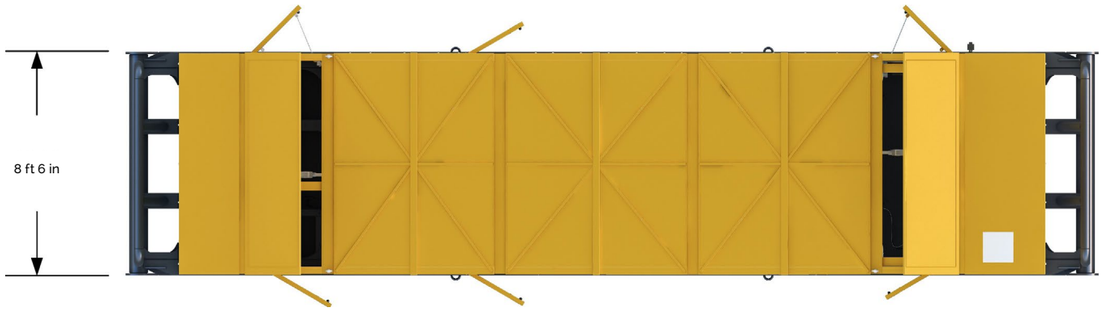
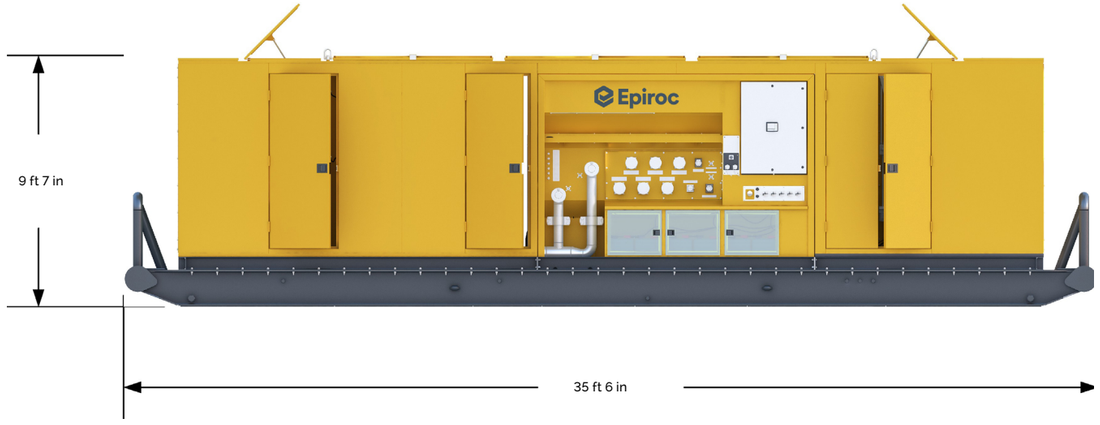
Power unit (continued)

Enclosure	
Material	Durable, welded and painted steel sheet
Ventilation	Airflow is directed by inlet and exit louvers, manual side vent doors, and automatic roof vent doors to direct hot air away from engine intake and rig floor.
Service access	(6) entry doors for routine inspection and maintenance. (3) removable roof panels for major service*
Lighting and Electrical	Interior is fully lit by (4) LED strip lights, and (3) interior electrical outlet locations are provided. Customer to provide 120VAC 15A power source required; external male receptacle provided.





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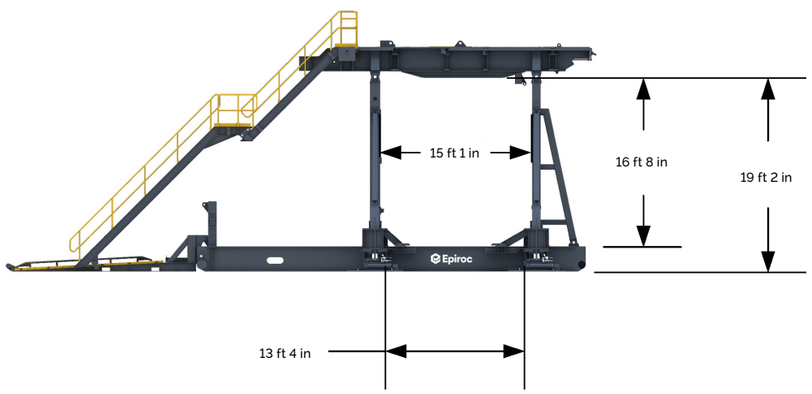
Substructure

Transport weight and dimensions (H x W x L)	80,000 lbs (36,287 kg) & 9' 11" x 12 ft x 43' 7" (3 m x 3.7 m x 13.3 m) approximately
Drilling mode footprint dimensions (W x L)	26 ft 4 in x 58 ft 1 in (8.02 m x 17.70 m)
Ground pressure	
Lower box beams	36 psi (2.48 bar) calculated value
Jack/walker pads	73 psi (5.03 bar) front jacks / 45 psi (3.10 bar) rear jacks calculated value
Combined	22 psi (1.51 bar) calculated value
Bop clearance envelope (H x W x L)	
Where H = height, W = driller side to off driller side (above bottom box beams,but include a reference dim ID between bottom box beams), L = powerpack to pipe pandler	19 ft 2 in x 6 ft 2 in x 13 ft 4 in (5.8 m x 1.9 m x 4 m)
Jacks/walkers: 4 each, 360 degress walking capability, total jacking capacity of the rig weight plus the 350,000 lb (158,757 kg) rated hookload capacity, or 650,000 lb (294,835 kg) maximum walking/jacking load.	
Weight of each walker leg	6,741 lbs (3,058 kg); total x 4 = 26,965 lbs (12,232 kg)
Jacking cylinder rod diamter / stroke / psi	8 in (203 mm) diameter / 12 in (305 mm) stroke / 3,000 psi (207 bar)
Walking cylinder rod diameter / stroke / psi	2.5 in (63.5 mm) diameter / 18 in (457 mm) stroke / 3,000 psi (207 bar)
Walking speed	200 ft (61 m)/8 hr
Electrical boxes and function mounted on substructure	Electrical box-1: walking / levelling / roughneck / crane control Electrical box-2: lighting system
Work floor-dimensions with driller's cab	Area with cabin – 306 ft² (28.7 m²) approximately
Work floor-dimensions with open console	Area with console – 278 ft² (25.8 m²) approximately
Bare table opening with bushings removed	3 ft 8 in x 3 ft 8 in (1.1 m x 1.1 m)
Weights and dimensions of shiploose	
Stairs: bottom and top (H x W x L) Qty each (2)	Bottom: 3,358 lbs (1,523 kg) and 17 ft 7 in x 3 ft 2 in x 18 ft 8 in (5.4 m x 1 m x 5.7 m) Top - 1,732 lbs (786 kg) and 12 ft 11 in x 2 ft 8 in x 11 ft 8 in (3.9 m x 0.8 m x 3.6 m)
Mud boat (H x W x L)	6,972 lbs (3,162 kg) and 3 ft 7 in x 9 ft 9 in x 20 ft 2 in (1.1 m x 3 m x 6.1 m)
Lights (H x W x L)	87.54 lbs (39.70 kg) and .8 in x 1 ft 6 in x 1 ft 4 in (0.2 m x 0.5 m x 0.4 m) Total = 11 x 87.54 lbs (39.7 kg) = 963 lbs (437 kg)
Light pole (H x W x L)	56 lbs (25 kg) and 7 ft 7 in x .9 ft x 1 ft 4 in (2.3 m x 0.3 m x 0.4 m) Total = 4 x 56 lbs (25 kg) = 224 lbs (100 kg)
Roughneck assembly (H x W x L)	4,200 lbs (1,905 kg) and 3 ft 9 in x 5 ft 10 in x 4 ft 11 in (1.1 m X 1.8 m x 1.5 m)
Power slip assembly with 4 1/2 in pipe set up (H x W x L)	320 lbs (145 kg) and 1 ft 10 in x 1 ft 11 in x 2 ft 5 in (0.55 m x 0.58 m x 0.7 m)
Deck crane capacity and weight	9,500 lbs (4,309 kg) and 2,312 lbs (1,049 kg)



Technical specifications

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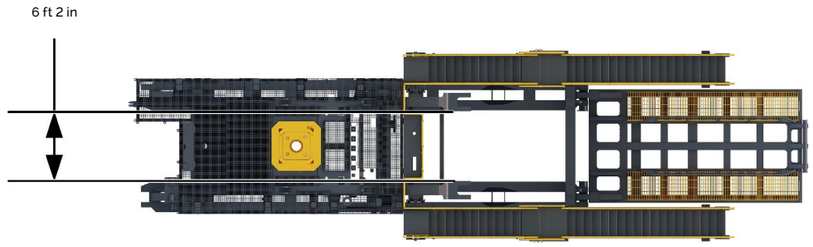

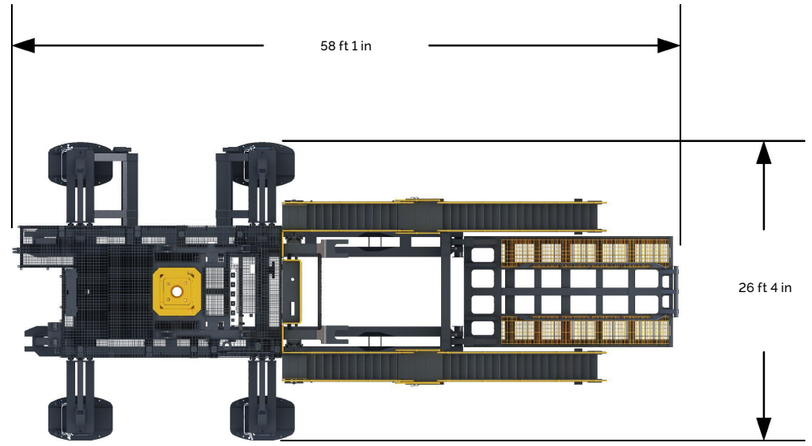

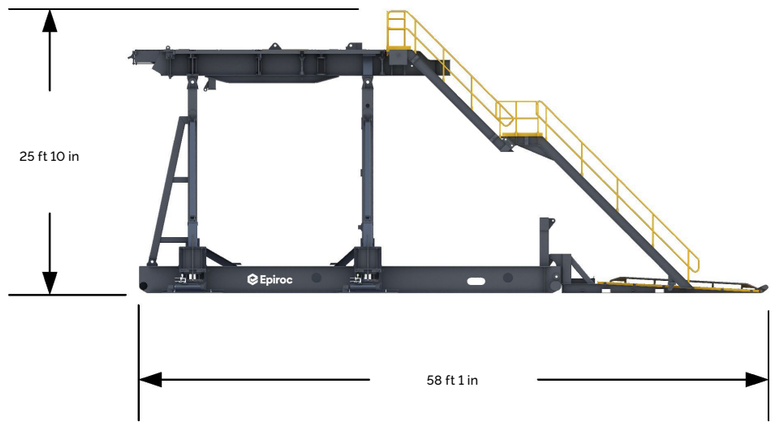

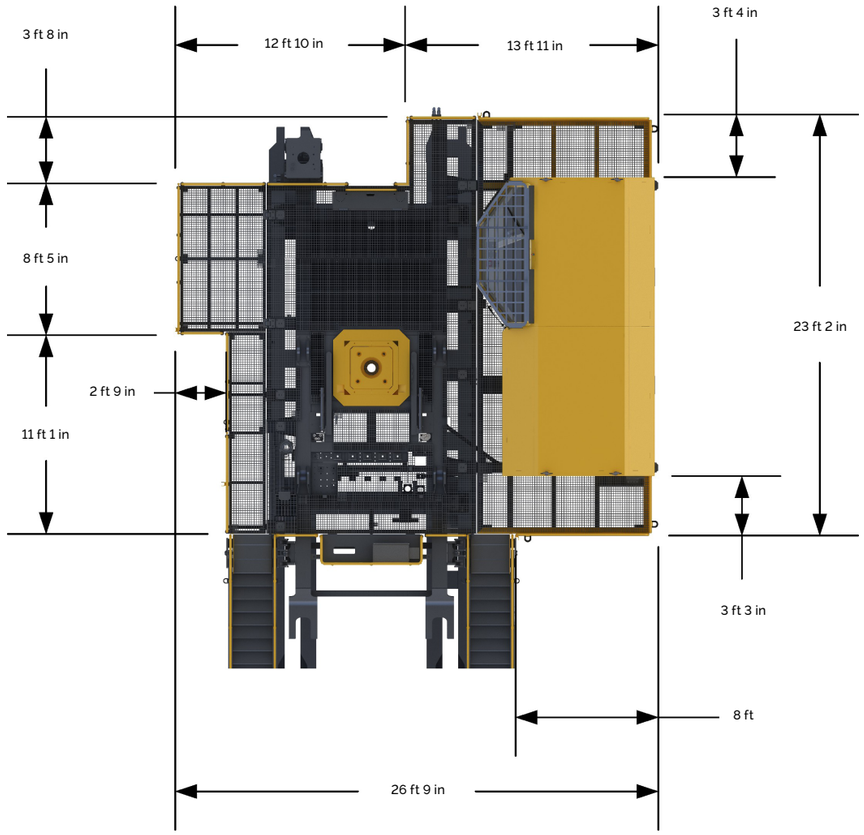

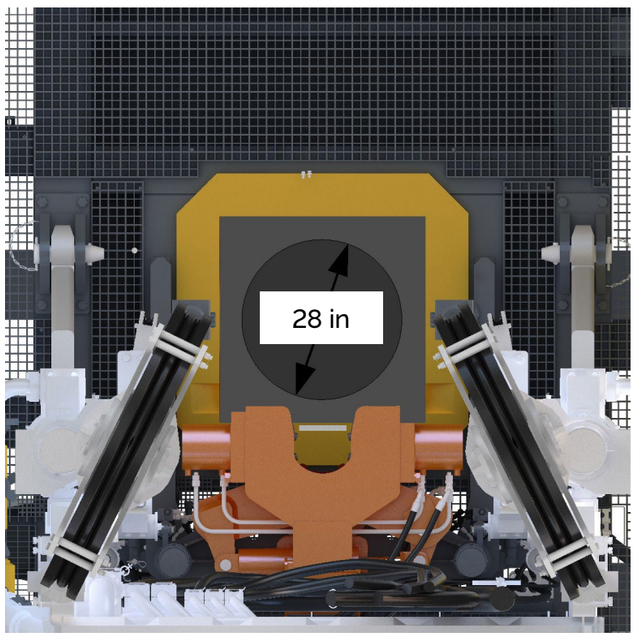

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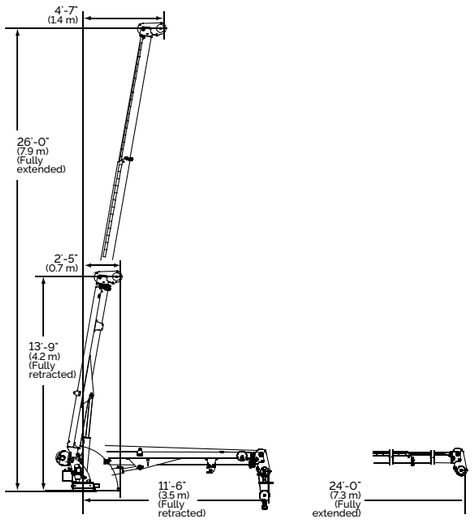
Rig floor handling equipment — substructure

IMT Hydraulic Deck Crane Model 9500 25 ft

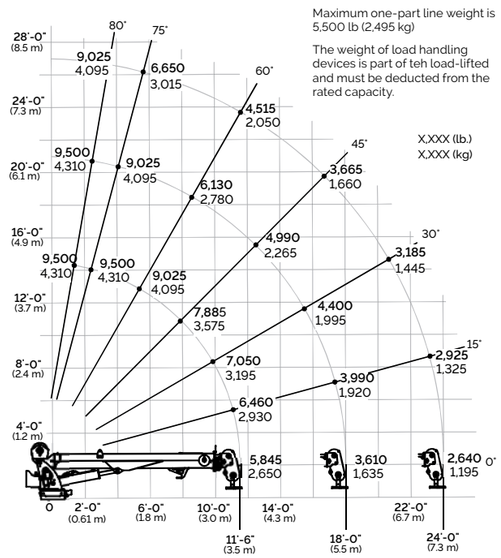
General specifications	
Crane rating Crane rating (ft-lb) is the rated load multiplied by the respective distance (ft) from centerline of rotation with all extensions retracted and lower boom in horizontal position	67,000 ft-lb (9.3 tm)
Horizontal reach – flip sheave up (from centerline of rotation)	24 ft 9 in (7.5 m)
Horizontal reach –flip sheave down (from centerline of rotation)	23 ft 10 in (7.3 m)
Hydraulic extensions, qty (2)	75 in (191 mm)
Crane weight	2,260 lb (1,025 kg)
Crane storage height	41.2 in (104.7 cm)
Mounting space required (crane base)	20 in x 21 in (50.8 cm x 53.3 cm)
System operating pressure	3,200 psi (221 bar)
Center of gravity • Horizontal from centerline of rotation • Vertical from bottom of crane base	 43.8 in (111.3 cm) 21.9 in (54.3 cm)
Tie-down bolt pattern (8 bolts)	14.75 in x 14.75 in (37.5 cm x 37.5 cm)

Performance characteristics		
	Specifications	Speed
Rotation	400˚ (7.0 radius)	30 seconds
Lower boom elevation	-10˚ to +80˚ (-0.17 to +1.4 radius)	12 seconds to raise or lower
Extension cylinders, qty (2)	102 in x 102 in (259 cm x 259 cm)	33 seconds to extend or retract
Winch speed (single line)		60 ft/min (18.3 m/min)

Dimensions for 25 ft 9500 and 10000 crane



Hydraulic capacities for 25 ft 9500 crane



Wire rope data
Diameter: 0.44 in (11.2 mm), non-rotation resistant
Minimum breaking load: 20,400 lb (9,253.3 kg)

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Rig floor handling equipment — substructure (continued)

FH80 FloorHand (Iron Roughneck)	
Size range	4 in – 8-1/2 in (101.6 mm – 215.9 mm) OD*
Make-up torque	65,000 ft-lbs (88,300 Nm)
Break-out torque	88,000 ft-lbs (108,500 Nm)

Benefits and features

Safety:
- Replaces manul tong handling
- Reduces physical exposure to the rig
- One size fits all — eliminating size component change-overs

Economics:
- Best value in the industry
- Least amount of standard operational spare parts
- Simple and easy to maintain

Efficiency:
- Simple logic for operating the FloorHand
- Fast, repetitive and reliable make-up torque

Controls:
- Simple logic for operating handles for FloorHand and manipulator arm
- Optional remote operation through standalone panel, integrated into driller's console or wireless through a belly pack

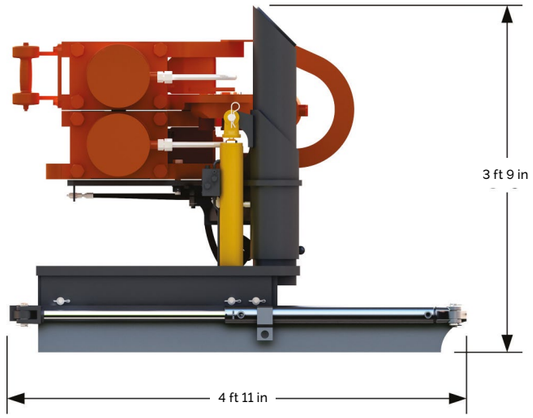
Wrench clamping:
- Opposing clamp cylinders self adjust to varying pipe sizes — eliminating the need for manual adjustments

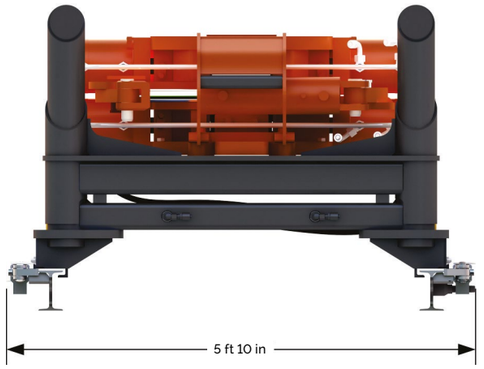
Torque setting:
- Set torque once on the first connection
- Ft-lb read-out directly from gauge
- Torque adjustment and gauge located on FloorHand

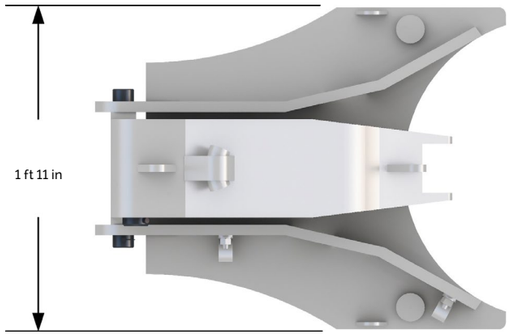
Universal die block:
- One size fits all — eliminating die block change outs
- Uses standard tong dies
- Centering buttons for pipe alignment

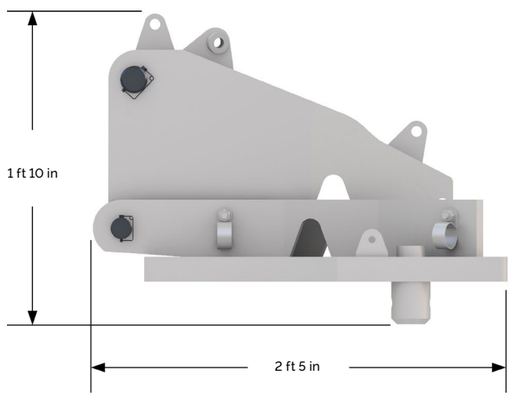
DEN-CON Power slips

- Fitted for the DH350 API 27-1/2 in (698.5 mm) rotary bushings
- Hydraulically operated from the driller's console
- DH350 power slips can be set up for 2-7/8 in (73 mm) to 13-3/8 in (339.7 mm) pipe/collars/casing. Options available for up to 20 in (508 mm) tubular size with the 27-1/2 in (698.5 mm) rotary bushings









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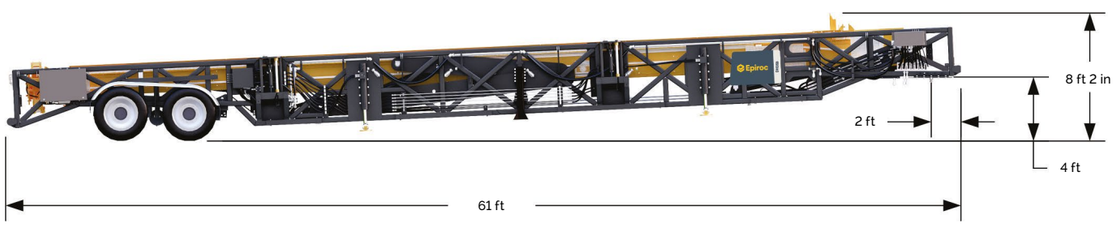
Pipe skate

Drilling mode footprint	
Weight	56,000 lbs (25,401 kg)
Drilling mode in rest condition (H x W x L)	6 ft 6 in x 48 ft 10 in x 61 ft (2 m x 14.9 m x 18.6 m)
Drilling mode in working condition (H x W x L)	31 ft 11 in x 48 ft 10 in x 64 ft 6 in (9.7 m x 14.9 m x 19.7 m)
Pipeskate in transport condition (H x W x L)	8 ft 2 in x 8 ft 7 in x 60 ft 11 in (2.5 m x 2.6 m x 18.6 m)
Clamp size range (per each set)	
1	Up to 5 in (127 mm)
2	5 in – 10 in (127 mm – 254 mm)
3	10 in – 15 in (254 mm – 381 mm)
4	16 in – 20 in (406 mm – 508 mm)
Weight handling capacity	
Lifting arm	10,000 lb (4,536 kg)
Drill pipe and collar handling	Oil field pipe and collars
Length	Range II and III drill pipe 30 ft – 31 ft (9.1 m – 9.4 m) drill collars
Diameter	2-7/8 in – 5-1/2 in (73 mm – 140 mm) diameter range II and III upset drill pipe 4-1/2 in – 8 in (114 mm – 203 mm) diameter drill collars
Casing handling	Oil field threaded and coupled casing
Length	Range II and III casing joints
Diameter	4-1/2 in – 20 in (114 mm – 508 mm)
Pipe racks	
Left & right fold out pipe racks for range II and III pipe lengths Racks deploy manually with hydraulic jacks for levelling and to tip racks to roll pipe on or off lifting arm. Pipe rack capacity 4 1/2 in X range III (left/right racks)	53 pcs each side, maximum weight 96,000 lbs (43,545 kg) per side
Chain drive-chain size	ANSI RS120, LG: 104 ft (31.7 m)
Leveling jacks ground pressure	476.2 psi (32.8 bar)
Leveling jack cylinder rod diameter/stroke/psi	2-3/4 in (70 mm)/28 in (711 mm)/3,000 psi (207 bar)
Pipe rack cylinder ground pressure	486.7 psi (33.55 bar)
Pipe rack cylinder rod diameter/stroke/psi	2-3/4 in (70 mm)/28 in (711 mm)/3,000 psi (207 bar)
Boom lift cylinder rod diameter/stroke/psi	3-3/4 in (95 mm)/108-7/8 in (2765 mm)/3,000 psi (207 bar)
Boom push cylinder rod diameter/stroke/psi	2-1/2 in (63 mm)/48-1/2 in (1232 mm)/3,000 psi (207 bar)
Boom extend cylinder rod diameter/stroke/psi	3 in (76 mm)/30 in (762 mm)/3,000 psi (207 bar)
Pipe length handling capacity	Up to 48 ft (14.6 m)



350,000 lb (158.757 kg) hook load

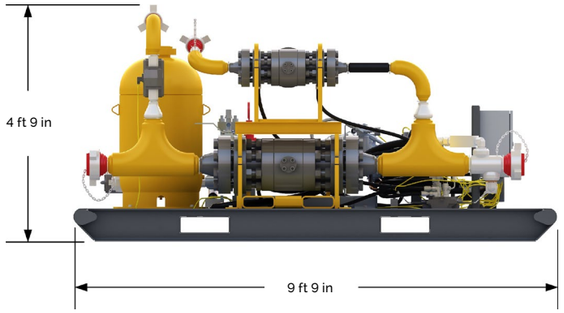
Driller's cabin

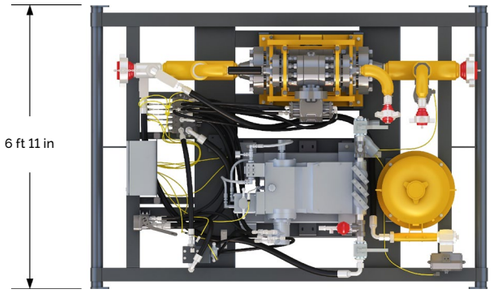
Transport weight	15,000 lbs (6,804 kg)
Dimensions (H x W x L)	10 ft 3 in x 10 ft x 23 ft 9 in (3.2 m x 3 m x 7.2 m)
Exterior features	Walkway on either side
Interior features	
Monitor specifications; display resolution; connectivity information	19 in (483 mm) bright active matrix sunlight readable TFT display, 1000 nits; SXGA (1280 x 1024) resolution; armour resistive touch screen fanless design; bottom-exit connectors Optical bonding for added shock & vibration protection and/or reduced solar reflectivity; 4GB SO-DIMM DDR3L – extended temp RAM 64GB Solid state hard drive; Windows 7 and 64 Bit OS Fully enclosed/fully sealed, gasket sealed NEMA 4X (IP66) Stainless steel enclosure WiFi 802.11 b/g/n; I/O Ports 1 USB type A male to type A female 15 foot (4.6 m) cable; 2 ethernet port 15 foot (4.6 m) cables 9-32 VDC Power with Illuminated power button Manual full range dimmer Wide operational temperature range, -40°F to 140°F (-40°C to +60°C)
Screens/gauges-information displayed	Drilling, status, diagnostics, alarms, live hydraulic circuit animation, CAN layout, controllers I/Os, product videos and digital contents
Climate co ntrol	AC (Rated 31,000 BTU/h @ 800 cfm) and heater
Storage spaces	3 cabinets for storage and two desks (one above cabinets and one above transformer)
Electrical outlets	4 110 VAC outlets inside cabin, 2 110 VAC GFCI (ground fault condition) outlets outside
Electrical input/transformer	480 VAC / 1 PH / 100 A

Options

Air drilling skid

Pressure rating	5,000 psi (345 bar)
Weight	5,050 lbs (2,291 kg)
Dimensions (H x W x L)	4 ft 9 in x 6 ft 11 in x 9 ft 9 in (1.4 m x 2.1 m x 3 m)
DHD lube	33 gal (124.9 L) lubricator, 2 in (50.8 mm) manifold lubricator
Water injection	
Dynaset	Hydraulic powered water pump max discharge of 47.5 gpm @ 1885 psi (179.8 lpm @ 130 bar) and pumping power of 39 kw
FMC	Hydraulic powered 0 - 30 gpm @ 2000 psi (0 - 114 lpm @ 137.9 bar) tri-plex water injection pump, mounted on substructure and piped into the air manifold
Length of connection hoses	
Valve/piping 5,000 psi (345 bar), 3 in (76.2 mm) inlet piping with hydraulic actuated ball valves	19 ft 2 in (5.8 m)
5,000 psi (345 bar), 2 in (50.8 mm) blow by blowdown piping with hydraulic actuated ball valves	19 ft 2 in (5.8 m)





HI Kalibre kelly cock

Connections-api thread size-pin-box	6-5/8 FH pin x 6-5/8 FH box
Length	26.87 in (682 mm)
Weight	240 lbs (109 kg)
PSI rating	10,000 psi (689.5 bar)
Hydraulic open/close controlled from driller's console	Mud/air control, mud/air vent, kelly valve control, blow-by valve, water injection pump control and DHD lube control

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