

Predator 220 Drilling Rig

220,000 lb (100,000 kg) hook load



Proven yet progressive

The Predator drilling system is designed to meet the more complex drilling and financial requirements of today's oil and gas industry. It has the capability and precise control to drill vertical, directional or horizontal holes with air or mud in unconventional formations.

Performance with an edge

The Predator drilling system combines the strength and reliability of more than 30 years of oil and gas rig design and support experience with a wide range of innovative "firsts" to the 100-ton, top-drive rig class.

Driven by customer input

Epiroc designed the Predator based on a wide variety of suggestions from large and small drilling contractors and producers about what they wanted in a new drilling system. The design applies new technology with innovative solutions for optimum performance, enhanced safety, and a solid financial return.

Built for the job

The Predator drilling system is a three-component package consisting of a mobile rig, substructure and a pipe skate. Components are designed and manufactured at Epiroc Drilling Solutions in Garland, Texas, and supported by a global network of Epiroc stores and distributors. Predator is built oilfield-tough and is licensed #4F-0460 API 4F 4th Edition.

Contact your Epiroc representative or visit epiroc.com to learn what the Predator Drilling System can do for your operation.



Advanced design for powerful benefits

Predator is a new generation of mobile top-drive drilling system that offers producers and contractors these advantages:

Reduced non-drilling time and cost

By improving mobility and reducing the time needed to rig up.

Enhanced safety

By reducing crew size and manual labor, using hands-free pipe and casing handling, and providing a simple, precise, on-demand control system.

Improved drilling performance

Backed by a 950 HP (708 kW) engine and hydraulic system with enough power and speed to maintain maximum production in even the most challenging drilling conditions.

Lower operating costs

Thanks to a hydraulic system that's built with premium, high-efficiency components and designed to utilize less power, thereby reducing fuel consumption.

Smaller environmental impact

With special leak and spill protection features, as well as a substructure design suited to zero-impact locations.

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.



A robust, military-grade control console monitor displays drilling parameter gauges, engine parameters and drilling system diagnostics.



The Driller has complete control over the connection process by clamping and extending the drill pipe to the top drive and threading it into the pipe for a secure connection before bringing the drill pipe in through the drill floor.



The pipe skate features rapid deployment and hands-free pipe handling from the pipe racks all the way to the pipe connection. Skate operations can be controlled from the ground or the rig work floor via a wireless remote controller.

Twin feed cylinders and inner/outer telescoping mast components handle drill string weight by channeling the loads through the bottom of the outer mast directly through the substructure to the ground. This eliminates the crown loads seen on conventional draw works rigs.

With 30,000 ft. lbs. of available torque, the Predator top drive can handle just about any well design. Top drive tip-out capability enables hands-free pipe handling from the pipe skate.



Carrier is hydrostatically driven via a hydraulic motor powered by the deck engine diesel hydraulic system, eliminating the need for a dedicated carrier engine.

Tri-axle drive on the carrier rear axle sets ensures positive traction for maneuvering in difficult oilfield terrain.

Technical specifications

Drill rig–220K hook load

Transport mode weights and dimensions

Overall length	46 ft 5 in (14.07 m)
Width	8 ft 6 in (2.59 m)
Height	14 ft 2 in (4.32 m)
Estimated weights with fluids ¹	117,000 lb (53,070 kg)
Handling clearances (on hole center) bottom of spindle to top of master bushing	58 ft 6 in (17.83 m)
Bottom of master bushing to ground level	10 ft 0 in (3.05 m)

Powertrain

Engine	Single deck-mounted engine used to power the drill in transport and drilling modes
Manufacturer and model rating	CAT C-27 950 hp (708 kW) @ 1,800 rpm
Cooling system	Separate cooler with hydraulic fan, on-demand electronic control and charge air cooler rated to 125° F (51° C)

Hydraulic System

Pump drive gear box	5-pad gear box with lubrication pump and cooler — direct drive from rig engine
Pumps	Maximum rated performance as used on Predator
Fast feed and rotation	576 hp @ 4,600 psi (429 kW @ 329 bar)
Normal feed	242 hp @ 4,600 psi (180 kW @ 329 bar)
Auxiliary functions	190 hp @ 4,500 psi (142 kW @ 322 bar)
Substructure	190 hp @ 4,500 psi (142 kW @ 322 bar)
Engine fan	93 hp @ 3,200 psi (69 kW @ 229 bar)
Hydraulic cooler fan	132 hp @ 2,800 psi (98 kW @ 193 bar)*
Absorber-replenisher ² (Patent # US 8,596,054)	225/2,250 psi (15.5/155 bar)
Charge for feed pump ³	1.5 hp @ 300 psi (1.1 kW @ 21 bar)
Cooling	Single cooler with hydraulic fan, on-demand electronic control, rated to 125° F (52° C)
Hydraulic tank	452 gal (1,711 liters)
Hydraulic filters	4 filters @ 3 micron
Hydraulic carrier drive (Patent # US 8,463,762,132)	The carrier uses a hydraulic drive system powered by the deck engine. The feed/rotation pump powers a hydraulic drive motor coupled to a clutch and manual transmission.

Mast

Length (transport length)	46 ft 5 in (14.07 m)
Width (road width)	8 ft 6 in (2.59 m)
Bottom of spindle to top of table	59 ft 1 in (18.01 m)
Bottom of saver sub to top of table	53 ft 5 in (16.28 m)
Design	Licensed #4F-0460 API 4F 4th Edition
Raising and lowering	Twin hydraulic cylinders
Feed system	Twin 4 in x 20 in (101.6 mm x 508 mm) steel tubes with large diameter Nylatron® sheaves on the top and bottom. Carriage powered up and down by twin hydraulic feed cylinders. The carriage is connected to the top drive carriage with high-strength steel cables.

¹ Weights are estimates and actual weights may differ.

² The absorber-replenisher replenishes oil to the hydrostatic circuit when the feed cylinders extend, and absorbs oil from the circuit when the feed cylinders retract — directing that hydraulic energy to power the cooling fan motor.

³ Pump capacity — total fan demand is about 70 hp (52 kW) max.

Technical specifications

Mast (continued)

Components	
Pulldown cables	7/8 in (22.2 mm) diameter, 75,000 lb (34,019 kg) breaking strength
Pullback cables	1-1/2 in (38.1 mm) diameter, 360,000 lb (163,293 kg) breaking strength
2 upper sheaves (Nylatron material)	45 in (1,143 mm) diameter
4 lower sheaves (Nylatron material)	20 in (508 mm) diameter
Performance rating	
Pullback (hoisting)	125 ton / 250,000 lb (113.4 tonnes / 113,400 kg)
Fast feed speed-up	0 – 96 ft/min (0 – 27.4 m/min) and 0 – 150 ft/min (0 – 45.7 m/min) with manual regeneration
Pulldown	25 ton / 50,000 lb (23 tonnes / 22,680 kg)
Fast feed speed-down	0 – 96 ft/min (0 – 29.3 m/min)
Top drive system (Twin hydraulic motors, top-drive mounted in a top-drive carriage with 90° tip-out feature)	
Specifications	Twin motor spur gear design with steel housing and pressure lubrication system. Rated for 100 ton (91 tonnes) operation with safety factor. Infinitely variable speed control in two torque ranges.
High torque range	30,000 lbf-ft (40.7 kNm) @ 0 – 90 rpm
High speed range	15,000 lbf-ft (20.3 kNm) @ 0 – 180 rpm
By-pass rotation – high torque range	25 rpm
By-pass rotation – high speed range	50 rpm
Spindle ID / lower connection	5 in (127 mm) / 6-5/8 FH box
Swivel	3,000 psi (215 bar) cartridge replacement chevron packings
Top drive carriage	Steel plate construction. Upper and lower feed cables are attached to the carriage. Top drive tip-out mechanism is part of the carriage. Carriage is guided on adjustable roller assemblies on feed carriage.
Top drive tip-out	0 – 90° twin cylinder top drive tip-out to 8000 lb (3 629 kg) load rating @ 0 – 45° with a 30 ft (9.1 m) pipe length.

Drill rig enclosure

Sheet steel drill enclosure reduces noise emissions and keeps power components cleaner. Open roof with hinged side panels facilitates maintenance operations.

Carrier rig mounting (5-pad gear box with lubrication pump and cooler – direct drive from rig engine.)

Performance	
Max. road speed / max. speed creep mode	62 mph (100 km/hr) / 4 mph (6 km/hr)
Max. gradeability	44%
Turning radius (curb-to-curb)	56 ft 6 in (7.22 m)
GVWR — 122,000 lb (55,338 kg)	
Front axles	22,000 lb (9,979 kg) each
Front suspension	44,000 lb (19,958 kg) – leaf spring
Front tires and wheels	4 x 445 / 65R 225 – (both U.S. and metric)
Rear axles	26,000 lb (11,793 kg) each
Rear suspension	78,000 lb (35,380 kg) walking beam
Rear tires and wheels	12 x 11R 22.5 14 ply – aluminum wheels
Brakes	Air brakes with maxi-brake system
Steering	TWR TAS-85 integral power steering gear
Frame twin	16 in (406 mm) H-beam frame members
*Hydraulic drive system Patent # US 8,463,762 B2	Transport power provided by a single, deck-mounted engine driving a hydraulic pump and motor. Power from the hydraulic motor runs through a clutch and manual transmission to the tridem rear axles.
Motor	500 hp (373 kW)
Clutch	15-1/2 in (394 mm) twin plate
Transmission	8-speed, low-low with reverse – manual
Dynamic braking	Hydrostatic braking – manual selection

Technical specifications

Substructure

Description

- Single-load, hydraulic substructure and BOP house elevate the rig over a 10 ft (3.08 m) BOP stack
- Includes hydraulic boom crane, hydraulic blocking/leveling jacks, catwalks, railings, stairways, large work floor with access ramps and a hydraulic rig elevation system
- Table, master bushing, circulation piping manifold and slips are mounted on the substructure and travel with it

Weights and dimensions

Design	Licensed #4F-0460 API 4F 4th Edition
Transport mode	
Overall length	49 ft 0 in (14.94 m)
Width	11 ft 0 in (3.35 m)
Height	11 ft 1 in (3.33 m)
Estimated weight (including breakout tools and options)	85,000 lb (38,636 kg)
Drilling mode	
Overall length (access ramps deployed, with stairways)	56 ft 6 in (17.22 m)
Width (including catwalks and stairways)	22 ft 4 in (6.81 m)
Height (including work floor railings)	14 ft 4 in (4.37 m)

Performance clearances and specifications

Capacity (drill string in the slips)	125 ton / 250,000 lb (113.4 tonnes / 113,400 kg)
Ground pressure (less rig)	2.8 psi (0.19 bar)
Ground pressure (including rig)	6.4 psi (0.46 bar)
Bottom of master bushing to ground (on hole center)	10 ft (3.08 m)

Blocking jacks

4 jacks with 22 in (539 mm) stroke to raise and level the substructure.

Deployment

Generator junction box	For lighting and deployment power pack
Catwalks and work floor	Work floor hydraulic crane
Work floor railings and stairways	Work floor hydraulic crane — uses rig hydraulic system
Rig elevation to drilling position	Hydraulic with remote control — uses rig hydraulic system

Catwalks, railings and stairways (designed to ISO / SAE standards)

Catwalks, stairways and work floor	Steel – open grip strut material
Work floor railings	Pre-formed steel tubing sections, drop-in sockets

Technical specifications

Work floor

Dimensions	10 ft x 22 ft / 220 ft ² (3 m x 6.7 m / 20.4 m ²)
Layout	10 ft x 10 ft (3 m x 3 m) fixed with two fold-up sections
Work floor opening	44 in (1 118 mm) with main table bushing removed
Table opening	Steel adapter for API master bushing – 27-1/2 in (699 mm)
Master bushing standard	17-1/2 in (445 mm) bushing with hydraulic slips optional 27-1/2 in (699 mm) bushing available
Driller's control console	Cast aluminum with sealed top plate. Mounted on a pedestal with height adjustment, swing and rotate motion. Console can be mounted on the work floor or in a drill cabin. Optional control package for Class 1, Division 2 rated. All control levers and switches are safe for pressure washing.
Display	19 in (457 mm) full-color flat screen. Military field rated for temperature, moisture and lighting conditions. Display module is attached to the back of the driller's console. The screens include a drill monitoring screen, drill status screen, and a utility screen. Optional package for display module is Class 1, Division 2 rated.

Breakout system

Slips	Hydraulic operated pipe slips with master bushing
Capacity	150 ton / 300,000 lb (136 tonnes / 136,364 kg)
Diameter range (may require component changes)	2-7/8 in to 13-3/8 in (73 mm to 339 mm)
Iron roughneck	Mounted on a roller trolley to move forward to hole center and back into mast when not in use. Hydraulic roughneck height adjustment of 14 in (356 mm). Roughneck clears hydraulic slips in low height position. Rigged up and down with floor crane. Jaw clamping force and makeup torque are adjustable from driller's console.
Capacity	3-1/2 in to 8-1/4 in diameter range (88.9 mm to 209 mm)
Torque control (make up)	Driller controlled with digital readout 0 – 60,000 lbf-ft (0 – 81.35 kNm)
Torque (breakout)	Fixed with digital readout 80,000 lbf-ft (108.5 kNm)
Upped and lower jaw clamping force control	Driller controlled with digital readouts 0 – 20,000 lb (0 – 9 091 kg)
Controls	Driller's console

Air/mud manifold

Mounted on the lower right side of the substructure for easy hook up at ground level.

Rating of components	3-1/2 in (88.9 mm) ID piping and valves @ 3,000 psi (88.9 mm @ 215 bar) 2 in (50.8 mm) plugged access port in vertical standpipe
Air hookups	Two primary compressors and booster compressor with dump driver, water injection and DHD lubricator ports
Mud hook ups	Two mud pump input lines with drain valve

Hydraulic floor crane

Hoist maximum capacity	7,000 lb (3,175 kg)
Capacity and reach – boom retracted	4,200 lb @ 14 ft (1,905 kg @ 4.2 m)
Capacity and reach – boom fully extended	2,500 lb @ 22 ft (1,134 kg @ 6.7 m)

Lighting package

Six high output oilfield flood lights positioned to light the work floor, drill rig deck, substructure, BOP house, pipe skate, catwalks and stairways

Locations	Right and left rear corners of work floor, left and right catwalks, under work floor, under substructure deck
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Optional water injection

Hydraulic powered tri-plex pump mounted on the substructure and piped into the air manifold for circulation water/foam

Capacity	0 – 30 gpm @ 2000 psi (114 l/min @ 138 bar)
Capacity and reach – boom fully extended	On/off flow control on driller's console

Technical specifications

Pipe skate

Description

- Single-load, hydraulic pipe and casing handling system attaches to substructure (hydraulic power supplied by rig hydraulic system)
- Includes hydraulic jacks for leveling and alignment
- Designed to work with Predator tip-out top drive system to load and trip drill pipe, drill collars and casing
- Left and right fold-out racks are standard

Weights and dimensions

Overall length	54 ft 6 in (16.61 m)
Width (in transport mode)	8 ft 6 in (2.59 m)
Width (left and right pipe racks fully deployed)	47 ft 11 in (14.61 m)
Height	4 ft 6 in (1.37 m)
Estimated weight (less pipe on tracks)	40,000 lb (18,144 kg)

Capacity

Lifting arm capacity	8,000 lb (3,629 kg)
Drill pipe & collar handling (Oilfield pipe and collars)	
Length	Range II and III drill pipe: 30 ft to 31 ft (9.1 m to 9.4 m) drill collars
Diameter	3-1/2 in to 5 in (89 mm to 127 mm) drill pipe / 4 in to 8-1/4 in (102 mm to 209 mm) drill collars
Casing handling (Oilfield threaded and coupled casing)	
Length	Range II and range III casing joints
Diameter	4-1/2 in to 24 in (114 mm to 610 mm)

Pipe racks

Left and right fold-out pipe racks for Range II and III pipe lengths. Racks deploy manually with hydraulic jacks for leveling and to tip racks to roll pipe on or off lifting arm.

Pipe rack capacity 4-1/2 in (114 mm) x Range III (left/right tracks)	30 pcs each side, maximum weight 90,000 lb (40,823 kg) per side
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Pipe control mechanism

Pipe stops to position single pieces of pipe for lifting arm. Flippers to move single pipe on or off of lifting arm, roller pipe trollies on lifting arm to contain and control bottom end of pipe and avoid thread damage.

Make-up/breakout	Hydraulic clamping jaws to hold upper end of pipe for make-up/breakout from top-drive spindle. Clamp extends and retracts to move pipe to/from spindle for loading/unloading.
Pipe arm positioning	Elevated at end of rig by two hydraulic cylinders that position pipe at work floor to thread up to top of drive spindle.
Control system	Skate controls are on driller's console and separate wireless remote control.

Technical specifications



Float base weight and dimensions

Transport	
Length	46.1 ft (14 m)
Width	10 ft (3.05 m)
Height	9.8 ft (2.99 m)
Deployed	
Length	60.6 ft (18.47 m)
Width	22.5 ft (6.86 m)
Height	9.8 ft (2.99 m)
Load 1 weight	
Base float	43,648 lb (19,840 kg)
Roughneck handler	1,496 lb (680 kg)
Roughneck	2,860 lb (1,300 kg)
Load 1 weight	
Ramp, left	2,761 lb (1,255 kg)
Ramp, right	2,761 lb (1,255 kg)
Ext. catwalk, left	583 lb (265 kg)
Ext. catwalk, right	583 lb (265 kg)
Air drilling skid	1,727 lb (785 kg)
Crane	2,541 lb (1,155 kg)



The Predator 220 drilling rig is designed and manufactured at Epiroc Drilling Solutions LLC in Garland, Texas, USA. The Predator 220 is licensed #4F-0460 API4F 4th Edition and API Q1-3730.



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