

# RD20 III

Proposal and specification package





# Efficiency beyond compare

The RD20 III is a unique deephole drilling rig with actual pullback capability of 120,000 lb (54,446 kg). Clearances under the spindle of the derrick allow the use of Range III casing with handling tools. The streamlined design eliminates several major working components for gains in efficiency, as well as increased service life.

## + Key benefits

### Efficient carriage feed system

On the RD20 III, the feed carriage is raised and lowered by two cylinders inside the derrick. It carries both pullback and pulldown sheaves so that a single wrap of cable over the sheaves provides the normal 2-to-1 travel ratio between the rotary head and the feed cylinder stroke. This eliminates the traveling blocks and crown sheaves found on conventional machines, increasing overall efficiency to the high 90% range (compared to 80-85% on competitive machines). In addition, this design allows the sheave diameter/cable diameter ratio to be increased so that mechanical losses due to cable bending and flexing over the sheaves are virtually eliminated — further enhancing mechanical efficiency and safety.

### Smart derrick design

With larger-diameter sheaves, the RD20 III is able to incorporate anti-friction roller bearings, which provide higher mechanical efficiency and longer feed system life. Whereas competitive rigs require a longer, larger derrick to support 120,000 lb. (54,446 kg) of pullback, the RD20 III is designed with no fixed crown on the derrick. Carriage feed cables are anchored in the derrick so that only the lower half of the derrick experiences any pulldown or pullback loads. This feature allows the upper half of the derrick and crown to be substantially reduced structurally, minimizing the weight and material required. During most drilling functions, the RD20 III derrick structure operates in tension rather than in compression, as seen when pulling heavy loads in a conventional derrick design.

Note: An optional CEMARK/ATEX Certification package is available separate of the drilling apparatus.

Contact your Epiroc representative or visit [epiroc.com](http://epiroc.com) for more about how the RD20 III can enhance your profitability.



## Technical specifications

### Standard RD20 III model

Derrick dimensions	
Length	61 ft 11-1/2 in (18.88 m)
Width	48-1/2 in (1,231.9 mm)
Depth	41 in (1,041.4 mm)
Top of table to spindle	51 ft 6 in (15.7 m)
Table to ground	Rig sitting on tires: 44 in (1,117.6 mm) Jacks fully extended: 92 in (2,336.8 mm)

### Derrick raising cylinders

Two 6 in (152 mm) bore x 52-1/2 in (1334 mm) stroke hydraulic cylinders for raising and lowering of derrick

### Patented carriage feed system (manually engaged regen is standard)

The rotary head is pulled up and down by two hydraulic cylinders, heavy-duty cables and a carriage assembly.

Hydraulic cylinders	5-1/2 in (139.7 mm) bore x 288 in (7,315 mm) stroke
Pulldown	30,000 lb (13,608 kg)
Pullback	120,000 lb (54,446 kg)
Fast feed up	Regen on: 106 ft/min (32.29 m/min) Regen off: 72 ft/min (21.9 m/min)
Fast feed down	180 ft/min (54.9 m/min)
Drill feed rate	29 ft/min (8.8 m/min)
Cable	Pullback: 1-1/4 in (32 mm) Pulldown: 7/8 in (22mm)
Carriage sheaves	32 in (813 mm) dia. lightweight, high strength Nylatron

### Centralizer table (rotary table)

Folds up as derrick is lowered for travel/is lowered as derrick is raised for drilling. Two stabilizer jacks for leveling and load support. Removable pins allow it to be opened for casing and drill tool handling. Master bushing is similar to an API 17-1/2 in (445 mm) rotary table. Bushing and adapters are removable for a 26 in (660.4 mm) maximum opening which handles a 20 in (508 mm) casing.

### Breakout wrench (RD20 XC high-torque 50,000 ft-lbs)

Type	Hydraulically powered, self-adjusting
Rating	20,000 ft-lb (27, 120 N-m) torque with torque gauge in console

### Casing hoist

Lifting capacity	7,500 lb (3,401 kg)
Line speed	106 ft/min (32.3 m/min)

### Jib boom and hoist

Type	Hydraulic drum hoist
Maximum lifting capacity	4,000 lb (1,814 kg) bare drum
Maximum line speed	225 ft/min (68.6 m/min) bare drum

### Rotation

Model	4SF-2-12 spur gear head
RPM	0 - 120
Torque	8,000 ft-lb (10,848 N-m) maximum
Swivel	3 in (76 mm) swivel with adjustable chevron packing
Piping	Circulation piping rated at 1,500 psi (10.3 MPa) working pressure. 3 in (76 mm) manifold provided for auxiliary compressor and booster connection. Remotely operated main air valve and blowdown valves. *RD20 XC 3,000 psi (20,684 kPa) mud piping

### Power pack

The engine, compressor and hydraulic pumps are mounted on a "floating" power pack. The frame, which is independent from the chassis mainframe, allows the power pack to float, assuring proper alignment of power components.

### Deck engine

Standard	Caterpillar C18 Tier 4F, 755 hp / 563 kW @ 1,800 rpm
Export option	Cummins QSK-19C Tier 2
HP/RPM	755 hp / 563 kW @ 1,800 rpm
Engine cooling package	Rated @ 125° F (52° C) ambient at sea level, Air Cleaners: 2-stage, dry type
Exhaust system	Silenced and insulated for safety and reduced noise levels

## Technical specifications

### Standard RD20 III model (continued)

HR2.5 screw model compressor (Ingersoll-Rand)	
Volume	1,250 CFM (35.4 m³/min)
Pressure range	120 psi to 350 psi (827 kPa to 2,413 kPa) Operational RPM: 1,800
Power source	Driven by 755 HP / 565 kW engine

### Standard equipment (hydraulics)

100 gal (378.5 L) hydraulic oil reservoir	
Filtration	Hydraulic oil filtered to 10-micron
Pumps	Mounted on a 4-hole pump-drive gearbox

### 2 main piston pumps (rotary head rotation and fast feed system)

Output	48.5 GPM (183.5 L/min) each or 97 GPM (367 L/min) total @ 5,000 psi (34.5 MPa @ 2,490 rpm)
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### Vane pump (2-stage)

Stage 1	52.2 GPM (197.6 L/min) @ 1,000 - 3,000 psi (6.9 - 20.7 MPa @ 2,490 RPM) Function: Cooler fan
Stage 2	30.3 GPM (114.6 L/min) @ 3,000 psi (20.7 MPa @ 2,490 RPM)
Function	Supply 11-spool hydraulic valve to operate water injection, levelling jacks, drill string blowdown and regulation pipe changer, casing hoist, bypass derrick raising cylinder B/O wrench and rotation

### Piston pump (drilling feed circuit)

Output	12.5 GPM (47 L/min) @ 5,000 psi (34.5 MPa @ 2,490 RPM)
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### Auxiliary pump (2-spool valve supply to operate drum hoist and jib boom)

Output	34 GPM (128.7 L/min) @ 2,500 psi (17.2 MPa @ 1,980 RPM)
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### Standard equipment (continued)

#### Cooling package (single side-by-side radiator, hydraulic oil and compressor oil cooler mounted on RD20 III)

Ambient rating at sea level	125° F (52° C)
Fan drive and type	Hydraulic motor drive, two speed settings; suction type

#### Charge air cooling (turbo charge air cooler installed on drill end of powerback base)

Sucks air from the drill end and blows towards the front of the drill, cooling turbo air for current EPA engine requirements

#### Leveling jacks (7-point leveling system)

Five hydraulic leveling jacks	5 in (127 mm) bore x 48 in (1219 mm) stroke with 18 in (457 mm) OD pad (one on front bumper, two behind front wheels, two at drilling end of the unit)
Two table stabilization jacks	6 in x 8 in (152 mm x 203 mm) stroke with 18 in (457 mm) pad (mounted on drilling table)

#### Operator console

Non-incendive electrical switches. Lockable aluminum cover protects against tampering.

#### Night lights

Nine 70 watt	Derrick illumination, centralizer, pipe loader: Jib boom powerpack
Two 650 lumen	Control console, pipe loader controls

#### Tool box mounted under cooler

Width	42 in (1,067 mm)
Height	20 in (508 mm)
Depth	16-1/2 in (419 mm)

#### Weights and dimensions

Height	Derrick down: 13 ft 10 in (5.76 m) Derrick up: 62 ft 6 in (19.05 m)
Width	10 ft 6 in (3.2 m)
Weight	88,000 lb (39,916 kg)

#### Standard tools for 4/12 in (114 mm) OD drill pipe with 2-1/8 in (54 mm) IF threads

1	Centralizer bushing pipe (5-1/2 in (139.7 mm) OD drill 56963465; split bushing, 4-1/2 in (114 mm) change pipe 56963473; clamp, rod locking 50248194; element (main hydraulic filter 54448014); fork Chuck, 3.5 flats, 14.5 diameter 56963457; rod handling tool 52162476; lifting bail - 2-7/8 in (73 mm) IF 52162450; adjustable wrench 58490180; locking pin 50219955; washtube wrench Kit 57400202
2	Element (KF3 filter 57336406; oil filter 36860336)
3	Maintenance/operation manuals; parts books (physical and on CD)



## Technical specifications

### Optional equipment

#### Deck engine disconnect (Epiroc make)

Located between the deck engine and compressor.  
Manually disengages the compressor from the power train. (Only available on Cummins engine)

#### Hydraulic table jacks

Optional hydraulic table jacks provide foot pads mounted to cylinders with 8 in (203 mm) stroke to hydraulically support the working table

#### Collar handling package

The drill-collar handling package includes drill-collar centralizer bushing, fork chuck for drill-collars and drill-collar handling tool.

#### Drill pipe carousel\*

The carousel holds seven pieces of 4-1/2 in (114 mm) OD x 30 ft (9.14 m) long drill pipe

#### Water injection

Pump type	Cat pump: three cylinder, piston FMC pump: three cylinder, piston
Capacity	Cat pump: 0 – 25 GPM (95 lJ/min) FMC pump: 0 – 35 FPM (132.4 L/min)
Maximum pressure	Cat pump: 550 psi (3,792 kPa) with or without foam injection pulse pump FMC pump: 1,000 psi (6,895 kPa)

#### 100 gal auxiliary fuel tank

This option replaces the toolbox

#### Mud manifold (provides support for an off-board mud pump when no on-board mud pump is supplied)

Piping	3 in (76.2 mm)
Capacity	Standard: 1500 psi (10,342 kPa) XK Package: 3,000 psi (20,684 kPa)

#### DHD lubrication – 60 gal (227 L) container

Type	Positive displacement pump
Feed	Manually adjustable

#### Carrier (designed for Epiroc)

Standard carrier accessories include: air horn, dual head lights, ICC highway marker lights, combination brake, turn and tail lights, direction lights on the front and rear, ICC hazard switch, aluminum bus-type rearview mirrors, bostrom seat, header and defroster, electric windshield wiper, adjustable side windows, tool kit, engine block heater and illuminated license bracket.

Wheelbase	281 in (7,137 mm)
GVWR	113,000 lb (51,364 kg)
Weight	Front: 44,000 lb (19,958 kg) Rear: 69,000 lb (31,364 kg)
Cummins engine	425 HP (317 kW) with Jacobs exhaust brake – EPA 16 emission spec.
Multi-plate clutch	15-1/2 in (393.7 mm)
Electrical system	12-volt Delco-Remy, negative ground
Transmission	Fuller RTO-14908LL, 10-speed forward, 3-reverse
Front axles	One axle: 22,000 lb (9,979 kg) Two axles: 44,000 lb (19,958 kg)
Front springs	44,000 lb (19,958 kg) leaf-type capacity
Rear axles (Eaton DP-451 P)	46,000 lb (20,865 kg)
Tandem suspension	Hendrickson R-450
Brake system (air 8 wheel)	Front axles: 16-1/2 in x 6 in (419 x 152 mm) Rear axles: 16-1/2 x 7 in (419 x 178mm) (Eaton 4-channel ABS) 18.7 cubic feet (5,295 mm <sup>3</sup> ) air compressor
Brakes	Service: dual air brake system on all wheels Parking: spring-loaded brake chambers on rear axles controlled by hand valve
Drive lines	Spicer series 1710 and 1810
Steering	Dual TRW TAS-85 integral power steering with booster cylinder on second axle
Frame (wide flange H-Beam)	16 in x 57 lb/ft (406 mm x 84.8 kg/m) with additional steel reinforcement package
Fuel tank	60 gal (227.1 L)
Exhaust	Opposite cab side, front up
Cab	One man, offset to left, reverse-slope windshield 32 in (813 mm) wide

\* The carousel is mounted outside the derrick and is hydraulically positioned under the tophead for drill pipe loading. A special carousel holding five drill pipe and one collar is also available. Rig cannot be transported with pipe in the carousel.

## Technical specifications

### Optional equipment (continued)

#### Standard instruments

Speedometer, AMP meter, water temperature gauge, oil pressure gauge, low air pressure warning buzzer and air temperature gauge.

#### Tires (on/off highway)

Front: 425/65R22.5 (20-ply) radials Rear: 11R22.5 LR (G) (14-ply)

#### Disk wheels

Front: 22-1/2 x 13 in (571.5 x 330.2 mm) Rear: 22-1/2 x 8-1/4 in (571.5 x 209.5 mm)

### Standard RD20 XC model

#### Rig performance

Hookload	120,000 lb (54.4 tonnes)
Pulldown	30,000 lbf (13,636 kg)
Fast feed	Up: 106 ft/min (2.51 m/min) Down: 180 ft/min (54.9 m/min)
Drill feed	29 ft/min (8.8 m/min)
Torque	8,000 lb-ft (10.8 kNm)
Speed	0 – 120 rpm
Spindle	3 in (76.2 mm)
Swivel type	Multi chevron packings
Opening	2-1/2 in (63.5 mm)

#### Carrier

Reinforced twin H-beam main frame	
5-axle, custom carrier	425 HP (317 kW) diesel engine
8-speed transmission	Manual with lo - lo and reverse
Tridem rear axles with lockers	23,000 lb (10,433 kg) each
Tandem front steering axles	22,000 lb (9,979 kg) each

#### Derrick (317 kW diesel engine)

Length	61 ft 11-1/2 in (18.88 m)
Width	48-1/2 in (1,232 mm)
Depth	41 in (1,04 m)
Top of table to spindle	51 ft 6 in (15.7 m)
Table to ground	Rig sitting on tires: 44 in (1,118 mm) Jacks fully extended: 92 in (2,337 mm)

#### Rig dimensions

Height	Derrick down: 13 ft 10 in (4.22 m) Derrick up: 62 ft 6 in (19.05 m)
Width	8 ft 4 in (2.54 m)
Shipping weight (less tooling)	90,000 lb (40,823 kg)

#### Unique specifications, tip out links

Forged steel	150 ton (136 tonnes)
Length	60 in (1,524 mm)
Tip out	Hydraulic cylinder on each link
Angle	0 – 80° from vertical
Control	Driller's console

#### Table and master bushing (folding with twin hydraulic jacks)

Max opening	26 in (660 mm)
API split master bushing	17-1/2 in (445 mm)
Capacity	120,000 lb (54.4 tonnes)

## Standard RD20 XC model (continued)

### High torque make up and break out wrenches (dual metal chain wrenches hydraulic cylinder actuated flip-over wrench heads)

Wrench torque	50,000 lbf-ft (67.8 kNm)
Adjustable size range	3 – 8-1/4 in (76 – 210 mm)
Height (BO and MU adjustable)	13 in (330 mm)
Control	Driller's console

### Circulation manifold – fluid

Capacity	3,000 psi (206.8 bar)
Diameter	3 in (76.2 mm)
Main valve	Hydraulically actuated
Mixer line	Manually actuated
Pressure gauge in line air/mud hose	3 in (76.2 mm)

### Circulation manifold – air

Capacity	1,500 psi (103.4 bar)
Diameter	2-1/2 in (63.5 mm)
Main valve	Hydraulically actuated
Blow down	Electrically actuated
Isolation valve	Manually actuated
Aux. comp in	1,500 psi (103.4 bar)
To booster	3 in (76.2 mm)
From booster	2-1/2 in (63.5 mm)
Air/mud hose	3 in (76.2 mm)

### Drill pipe elevators

Forged steel	100 ton (90.7 tonnes)
Size	2 -7/8 – 5 in (73 – 127 mm)* - Available sizes
Actuation	Hydraulic cylinders open/close and lock

\*Bored to suit pipe specific size.

These machine specifications are those in effect at the time of this printing. However, Epiroc is constantly striving for product improvements and enhancements. Accordingly, the right is reserved to make such changes in specifications and design that the Company considers in conformity with this policy or are due to unavailability of materials or assemblies. Final confirmation of current specifications should be made by contacting Epiroc, Garland, Texas, USA.

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