RD20III

Proposal and Specification Package

Epiroc

RD20 III specifications

Oil & Gas-Proposal & Specifications Package

Standard Equipment

The RD20III is a unique deephole drilling rig designed for applications in the 120,000 lb. (54,446 kg) range.

The heart of the RD20III is the patented carriage feed system. This feed system, plus the derrick structure, provide several customer advantages that previously have not been available on machines in this class.

The two main benefits the RD20III offers the customer are: 1) the RD20III provides an actual 120,000 lb./ 54,446 kg pullback capability, and 2) the RD20III boasts a derrick with clearances under the spindle to handle Range III casing with handling tools.

The carriage feed system eliminates the traveling block and crown sheaves found on competitive machines.

On the RD20III, the feed carriage structure is raised and lowered by two cylinders inside the derrick. The carriage carries both pullback and pulldown sheaves so that a single wrap of cable over the sheaves provides the normal two-to-one travel ratio between the rotary head and the feed cylinder stroke. This single wrap of cable on the sheave provides a gain in mechanical efficiency that was unobtainable with traveling blocks and crown sheaves on conventional machines.

An additional gain in mechanical efficiency and safety is achieved by being able to increase the sheave diameter/ cable diameter ratio so that the mechanical losses due to cable bending and flexing over the sheaves are virtually eliminated. With larger diameter sheaves, the RD20III is able to incorporate anti-friction roller bearings, which provide higher mechanical efficiency and longer feed system life.

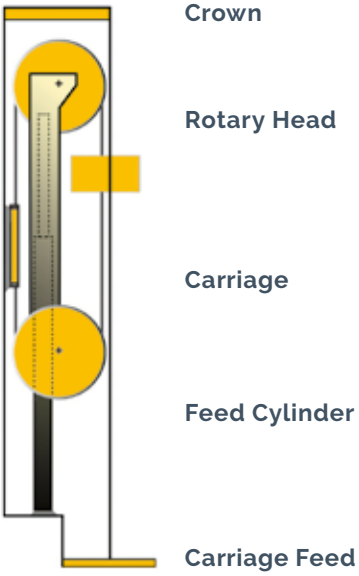
Whereas competitive rigs require a longer, larger derrick to support 120,000 lb./54,446 kg of pullback, the RD20III is designed with no fixed crown on the derrick, and carriage feed cables anchored in the derrick so that only the lower half of the derrick experiences any pulldown or pullback loads. This feature allows the upper half of the derrick and crown to be substantially reduced structurally, minimizing weight and material in the derrick and on the drill rig. During most drilling functions, the RD20III derrick structure is actually operating in tension rather than in compression, as seen when pulling heavy loads in a conventional derrick design.

The carriage feed system in the RD20III provides an overall efficiency in the high-90% range. This is a significant improvement over the 80-85% efficiency seen on most competitive machines. Coupled with efficiency gains, Atlas Copco has simplified the machine by eliminating several major working components and increasing the service life expectancy of primary components currently in the carriage feed system. The RD20 is available with optional CEMARK/ATEX Certification Package separate of the drilling apparatus.

RD20 III—Standard Equipment

Derrick Dimensions

Length	61 ft. 11 ½ in	(18.88 m)
Width	48 ½ in	(1231.9 mm)
Depth	41 in	(1041.4 mm)
Top of Table to Spindle	51 ft. 6 in	(15.70 m)
Table to Ground (rig sitting on tires)	44 in	(1117.6 mm)
Table to Ground (jacks fully extended):	92 in	(2336.8 mm)



Derrick Raising Cylinders

Two 6 in. (152 mm) bore x 52 ½ in. (1334 mm) stroke hydraulic cylinders for raising and lowering of derrick

Patented Carriage Feed System

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

Hydraulic Cylinders	5 ½ 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.)
Fast Feed Up (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.)
Pullback Cable	1 ¼ in	(32 mm cable)
Pulldown Cable	⅞ in	(22 mm cable)
Carriage Sheaves	32 in (813 mm) dia. lightweight, high strength Nylatron	

Centralizer Table (Rotary Table)

The unique RD2011I centralizer table folds up as the derrick is lowered for travel and is lowered as the derrick is raised for drilling. The centralizer table has two stabilizer jacks that provide easy leveling and excellent load support. The table has removable pins that allow it to be opened for casing and drill tool handling.

The centralizer features a master bushing similar to an API 17 ½ in. (445 mm) rotary table. The bushing and adapters are removable to gain a 26 in. (660.4 mm) maximum opening which easily handles a 20 in. (508 mm) casing. The drilling platform provides a safe, convenient work area with good, clear access.

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.) maximum

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 to 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.

RD20 III—Standard Equipment

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

Compressor

Make: I	Ingersoll-Rand
Model	HR2.5 screw
Volume	1,250 CFM (35.4 m^3/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

Hydraulics

Hydraulic Oil Reservoir		
Capacity	100 gallons	(378.5 L)
Filtration	Hydraulic oil filtered to 10-micron	
Pumps	Mounted on a 4-hole pump-drive gearbox Engine input at 1,800 rpm increased to 2,490 rpm by pump drive	
Main Piston Pumps (2)		
Output	48.5 gpm (183.5 L/min) each or 97 GPM (367 L/min) total at 5,000 psi (34.5 MPa)@ 2,490 rpm	
Functions	Rotary head rotation and fast feed system	
Vane Pump (2-stage)		
Stage 1	52.2 GPM (197.6 L/min) at 1,000 psi to 3,000 psi (6.9 MPa to 20.7 MPa) @ 2,490 RPM Function: Cooler fan	
Stage 2	30.3 GPM (114.6 L/min) at 3,000 psi (20.7 MPa)@ 2,490 RPM	
Function	Supply 11-spool hydraulic valve to operate: Water injection, Leveling jacks, Drill string blowdown and regulation Pipe changer, Casing hoist, Bypass derrick raising cylinder B/O wrench, Rotation	
Piston Pump		
Output	12.5 gpm (47 L/min) at 5,000 psi (34.5 MPa)@ 2,490 rpm	
Function	Drilling feed circuit	
Auxiliary Pump		
Output	34 gpm (128.7 L/min) at 2,500 psi (17.2 MPa)@ 1,980 rpm	
Function	2-spool valve supply to operate drum hoist and jib boom	

Cooling Package

Single side-by-side radiator, hydraulic oil, and compressor oil coolers are mounted on the RD20111 and are powered by a hydraulic motor. The cooler package has a 125°F (52°C) ambient rating at sea level.	
Fan Drive	Hydraulic motor, two speed settings
Fan Type	Suction

Charge Air Cooling

Turbo Charge Air Cooler installation on drill end of powerpack 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

The RD20III utilizes a 7-point leveling system, including five 48 in. (1219 mm stroke hydraulic leveling jacks and two manually operated stabilizer jacks mounted on the centralizer table.	
One Each	5 in (127 mm) bore x 48 in (1219 mm) stroke with 18 in (457 mm) OD pad located on the front bumper
Two Each	5 in / 127 mm bore x 48 in / 1,219 mm stroke with 18 in / 457 mm OD pad located behind the front wheels
Two Each	5 in (127 mm) bore x 48 in (1219 mm) stroke with 18 in (457 mm) OD pads located at the drilling end of the unit
Two Each	6 in x 8 in stroke / 152 mm x 203 mm Hydraulically operated table stabilization jacks with 18 in. (457 mm) pads mounted on the drilling table

Operator Console

Non-incendive electrical switches. A lockable, aluminum cover protects the operator console from tampering.

RD20 III—Standard Equipment

Night Lights

Nine 70 Watt	Derrick illumination, centralizer, pipe loader: Jib boom Power pack
Two 650 Lumen	Control console, pipe loader controls

Tool Box Mounted Under Cooler

Dimensions Width	Height: 20 in. (508 mm) Width: 42 in. (1067 mm)	
Depth	16 ½ in	(419 mm)

Weights and Dimensions

Height Derrick Down	13 ft 10 in	(5.76 m)
Height Derrick Up	62 ft. 6 in.	(19.05 m)
Width	106 ft/min	(2.51 m)
Weight	≈ 88,000 lb. (40,000 kg) less tooling	

Standard Tools

For 4 1/2 in. (114 mm) OD drill pipe with 2 1/8 (54 mm) IF threads:	
1	Centralizer Bushing Pipe (5 ½ in (139.7 mm) OD Drill) 56963465
1	Split Bushing, 4 ½ in (114 mm) change pipe 56963473
1	Clamp, Rod Locking 50248194
1	Element - main hydraulic filter 54448014
2	Element- KF3 filter 57336406
2	Element- oil filter 36860336
1	Fork Chuck, 3.5 flats, 14.5 diameter 56963457
1	Rod handeling tool 52162476
1	Lifting Bail - 2 ⅞ (73 mm) IF 52162450
1	Adjustable Wrench 58490180
1	Locking Pin 50219955
1	Washtube Wrench Kit 57400202
3	Maintenance/Operation Manuals
3	Parts Books
3	Parts Books on CD

RD20 III—Optional Equipment

Deck Engine Disconnect

Make	Epiroc
Description	Located between the deck engine and compressor. Manually disengages the compressor from the power train. (Available on Cummins engine only.)

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 the following items:

Drill-collar centralizer bushing

Fork chuck for drill-collars

Drill-collar handling tool

Drill Pipe Carousel*

The carousel holds seven pieces of 4 ½ in (114 mm) OD x 30 ft (9.14 m) long drill pipe.

* 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.

RD20 III—Optional Equipment

Water Injection

Cat Pump	Three cylinder, piston	
Capacity	0 to 25 GPM (95 IJ min)	
Pressure	550 psi (3,792 kPa) maximum (\With or without foam injection pulse pump.)	
FMC Pump	Three cylinder, piston	
Capacity	0 to 35 GPM (132.4 L/min)	
Pressure	1,000 psi (6,895 kPa) maximum	

100 Gal Auxiliary Fuel Tank

This option replaces the tool box		

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	1500 psi (10,342 kPa) (3000 psi XC package (20,684 kPa)	

DHD Lubrication

Injection lubrication with 60-gallon (227 L) container,		
Type	Positive displacement pump	
Feed	Manually adjustable	

Carrier

The RD20III is mounted on a custom-built carrier specifically designed for Epiroc.		
Wheelbase	281 in (7137 mm)	
GVWR	113,000 lb	(51,364 kg)
Front	44,000 lb	(19,958 kg)
Rear	69,000 lb	(31,364 kg)
Engine	Cummins 425 HP (317kw) w/Jacobs exhaust brake - EPA 16 emission spec.	
Clutch	15 ½ in	(393.7 mm) multi-plate
Electrical System	12-volt Delco-Remy, negative ground	
Transmission	Fuller RTO-14908LL, 10-speed forward, 3-reverse	
Front Axles	22,000 lb (9,979 kg) capacity each axle. Two steering axles with 44,000 lb. (19,958 kg) total capacity.	
Front Springs	44,000 lb	19,958 kg) capacity leaf type
Rear Axles	Eaton DP-451 P (46,000 lb)	(20,865 kg)
Tandem Suspension	Hendrickson R-450	
Brake System	Air 8 wheel, 16 ½ in (419 mm) x 6-in. (152 mm) front axles 16 ½ in. (419 mm) x 7 in. (178 mm) rear axles, Eaton 4-channel ABS 18.7 cubic feet (5295 mm^3) air compressor	
Service Brakes	Dual air brake system on all wheels	
Parking Brakes	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	16 in. (406 mm) x 57 lb/ft (84.8 kg/m) wide flange H-Beam with additional steel reinforcement package.	
Fuel Tank	60-gallon (227.1 L) capacity	
Exhaust	Opposite cab side, front up	
Cab	One man, offset to left, reverse-slope windshield, 32 in. (813 mm) wide	

Standard Carrier Accessories

Air horn
Dual head lights
I.C.C. highway marker lights
Combination brake, turn, and tail lights
Direction lights, front and rear
I.C.C. hazard switch
Aluminum bus-type rear view mirrors 5 in x 16 in (127 mm x 406 mm)
Bostrom seat
Heater and defroster
Electric windshield wiper

RD20 III—Optional Equipment

Standard Carrier Accessories (continued)

Adjustable side windows
Tool kit
Engine Block Heater
Illuminated license bracket

Standard Instruments

Speedometer
Amp meter
Water temperature gauge
Oil pressure gauge
Low air pressure warning buzzer
Air temperature gauge

Tires

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

Disk Wheels

Front	22-1/2 x 13
Rear	22-1/2 x 8.25

RD20 XC

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)
Fast feed down	180 ft/min	54.9 m/min
Drill feed	29 ft/min	8.8 m/min
Torque	8,000 lbf-ft	10.8 kNm
Speed	0-120 rpm	0-120 rpm
Spindle	3 in	76.2 mm
Swivel Type	Multi chevron packings	
Opening	2 ½ in	63.5 mm

Carrier

Twin H-beam main frame - reinforced	120,000 lb	54.4 tonnes
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 each	10,433 kg each
Tandem front steering axles	22,000 lb each	9,979 kg each

Derrick

Length	61 ft 11 ½ in	18.88 m
Width 4	48 ½ in	317 kW diesel engine
Depth	41 in	1.04 m
Top of table to spindle	51 ft 6 in	5.7 m
Table to ground (rig sitting on tires)	44 in	1,118 mm
Table to ground (jacks fully extended)	92 in	92 in

Rig Dimensions

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

RD20 XC

RD20 XC 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 & Master Bushing

Design	folding with twin hydraulic jacks	
Max opening	26 in	660 mm
API split master bushing	17 ½ in	445 mm
Capacity	0-80° from vertical	54.4 tonnes

High Torque Make Up & Break Out Wrenches

Design	dual petol chain wrenches hydraulic cylinder actuated flip -over wrench heads	
Wrench Torque	50,000 lbf -ft	67.8 kNm
Adjustable size range	3 to 8 ¼ in	76-210 mm
Height adj. BO	13 in	330mm
Height adj. MU	13 in	330mm
Control	driller's console	

Circulation Manifold

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
Capacity	3,000 psi	206.8 bar

Circulation Manifold – Air

Capacity	1,500 psi	103.4 bar
Diameter	2 ½ in	63.5 mm
Main valve	hydraulically actuated	
Blow down	electrically actuated	
Isolation valve	manually actuated	
Aux . comp . in	3,000 psi	63.5 mm
To Booster	3in	76.2 mm
From Booster	2 ½ in	63.5 mm
Air/Mud hose	3 in	76.2 mm
Capacity	1,500 psi	206.8 bar

Elevators

Forged Steel	100 ton	90.7 tonnes
Size	2 7Al - 5 in	2 7Al - 5 in
Actuation	hydraulic cylinders open/close & lock	

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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