



Cat[®] 6090 FS

Hydraulic Shovel

Specifications

General Data

Operating weight

Face Shovel	980 tonnes	1,080 tons
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Engine Output

SAE J 1995	3 360 kW	4,500 HP
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Standard Bucket Capacity

Face Shovel (SAE 2:1)	52.0 m ³	68.0 yd ³
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Features

- TriPower shovel attachment
- Independent oil-cooling system
- Spacious walk-through machine house
- 5-circuit hydraulic system
- Electronic-hydraulic servo control
- New Board Control System (BCS)
- Torque control in closed-loop swing circuit
- Automatic central lubrication system
- Xenon working lights

Operating Weight

Shovel

Standard track pads	2 000 mm (6 ft 7 in)
Operating weight	980 000 kg (2,160,510 lb)
Ground pressure	25.8 N/cm ² (37.4 psi)

Additional track pads available on request

Electrical System (diesel drive)

System voltage	24 V
Batteries in series / parallel installation	6 x 210 Ah - 12 V each 630 Ah - 24 V in total
Alternators	2 X 175 A each
Working spot lights	12 x high brightness Xenon lights

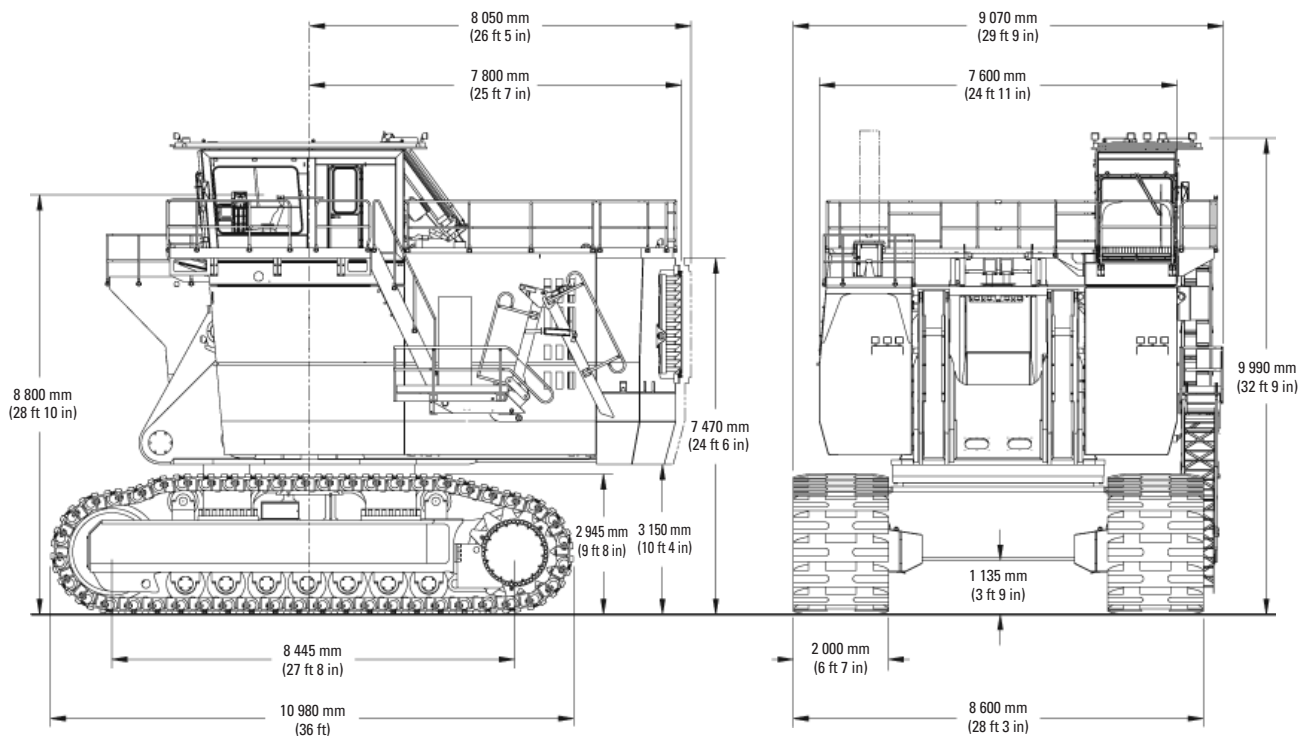
- Battery isolation relays
- Emergency stop switches accessible from ground level, in engine module and in operator's cab

Hydraulic Oil Cooling

Oil flow of cooling pumps	
Diesel Version	4 x 975 l/min (4 x 258 US gal/min)
Electric Version	4 x 1 000 l/min (4 x 264 US gal/min)
Diameter of fans	4 x 1 524 mm (4 x 60 in)

- Cooling system is fully independent of all main circuits, i.e. controlled cooling capacity is available whenever engine is running
- Gear-type cooling pumps supplying high-volume, low-pressure oil to aluminum coolers
- Fan speed is thermostatically controlled
- Extremely high cooling efficiency to ensure optimum oil temperature

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Electric Motors (optional)

Type	2 x Squirrel cage induction motors
Total Output	3 200 kW
Voltage	6.6 kV +/- 10% (other on request)
Total Rated Current I_N	332 A
Frequency	50 Hz (60 Hz on request)
Revolutions	1,500 min ⁻¹ (1,800 min ⁻¹ at 60 Hz)
Max. starting current	780 A

- Custom-made electric motors with increased gap between rotor and stator to withstand severe mining conditions
- Power limit control by Pump Management System

Automatic Lubrication System

Capacity of grease container	1 000 l (264 US gal)
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- Dual-circuit system with hydraulically driven heavy-duty pump and electronic time relay control to adjust the pause / lube times
- Connected to the lubrication system are the swing roller bearing with internal gearing, and all pivot points of attachment, bucket and cylinders
- System failures displayed by Board Control System
- Grease filters (200 µm) between service station and container as well as directly behind grease pump

Diesel Engines

Cummins® QSK60 Tier 2

Make and model	2 x QSK60 2-stage
Total rated net power ISO 3046/1	3 360 kW (4,500 HP) 1,800 min ⁻¹
Total rated net power SAE J1349	3 360 kW (4,500 HP) 1,800 min ⁻¹
Total rated net power SAE J1995	3 360 kW (4,500 HP) 1,800 min ⁻¹
No of cylinders (each engine)	16
Bore	159 mm (6.25 in)
Stroke	190 mm (7.48 in)
Displacement	60.2 l (3,674 in ³)
Aspiration	2-stage turbocharged; aftercooled and intercooled
Max. altitude without deration	4 880 m (16,000 ft) a.s.i.
Emission certification	US EPA Tier 4i
Fuel tank capacity	15 100 l (4,000 US gal)

- Hydraulically driven radiator fan with electronically controlled fan speed
- Microprocessed engine control
- Automatic rev. reduction
- Heavy-duty air filters with automatic dust evacuation
- Two-stage fuel filter incl. water separator
- Additional high-capacity water separator
- Pre-lube starting system
- Eliminator with centrifuge for engine oil filtration
- Engine-oil-change interval of 1,000 hrs

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Hydraulic System with Pump Managing System

Main pumps	8 x variable flow axial piston pumps
Max. oil flow	
Diesel version	8 x 936 l/min (8 x 247 US gal/min)
Electric version	8 x 943 l/min (8 x 249 US gal/min)
Max. pressure, attachment	31 MPa = 310 bar (4,495 psi)
Max. pressure, travel	36 MPa = 360 bar (5,220 psi)
Swing pumps	6 x reversible swash plate pumps
Max. oil flow	
Diesel version	6 x 488 l/min (6 x 129 US gal/min)
Electric version	6 x 496 l/min (6 x 131 US gal/min)
Max. pressure, swing circuit	33 MPa = 330 bar (4,790 psi)
Total volume of hydraulic oil	Approx. 13 000 l (3,450 US gal)
Hydraulic tank capacity	Approx. 10 000 l (2,640 US gal)

- Pump Managing System contains:
 - Electronic load limit control
 - Flow on demand from main pumps depending on joystick position
 - Automatic regulation of main pumps to zero flow without demand
 - Automatic rpm reduction of engine speed during working breaks
 - Reduced oil flow of main pumps at high hydraulic oil temperature or engine temperature
- Pressure cut-off for main pumps
- Cooling of pump transmission gear oil
- Filters:
 - Full-flow high-pressure filters (100 µm) for the main pumps, installed directly behind each pump
 - High pressure filters (100 µm) for the closed swing circuit
 - Full-flow filters (10 µm) for the complete return circuit
 - Full-flow filters (10 µm) for the cooling return circuit
 - Pressure filters (40 µm and 6 µm) for servo circuit
 - Transmission oil filters (40 µm)

Undercarriage

Travel speed (2 stages)	1 st stage 2 nd stage	Max. 1.6 km/h (0.99 mph) Max. 2.2 km/h (1.37 mph)
Max. tractive force	4 338 kN (442 t = 974,880 lb)	
Gradability of travel drives	Max. 44%	
Track pads (each side)	48	
Bottom rollers (each side)	7	
Support rollers (each side)	2 plus a skid plate in between	
Travel drives (each side)	1 planetary transmission with 2 two-stage axial piston motors	
Parking brake	Wet multiple disc brake, spring applied / hydraulically released	

- Cast double-grouser combined pad-links with bushings connected by hardened full floating pins
- All running surfaces of sprockets, idlers, rollers and pad links, as well as teeth contact areas of sprocket and pad links, are hardened
- Fully hydraulic, self-adjusting track tensioning system with membrane accumulator
- Automatic hydraulic retarder valve to prevent over-speed on downhill travel
- Acoustic travel alarm
- Idlers, bottom rollers and support rollers are connected to the automatic lubrication system

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Retractable Service Station

Retractable service station installed underneath the engine module and easily accessible from ground

Equipped with:

- Quick couplings for:
 - Diesel fuel
 - Engine coolant - left / right
 - Pump transmission gear oil - left / right
 - Engine oil (oil pan) - left / right
 - Engine oil (additional tank - optional) - left / right
 - Hydraulic oil tank
 - Grease container
- Cat jump-start socket
- Indicator lights for fuel tanks left / right full and grease container full

Attachments

- Boom and stick are torsion-resistant, welded box design of high-tensile steel with massive steel castings at pivot areas
- Welding procedures allow for internal counter-welding (double prep weld) wherever possible
- Boom and stick are stress-relieved after welding
- Inspection hole in boom and stick
- Catwalks with rails at boom
- Pressure-free lowering of boom and stick by means of a float valve
- Shovel attachment with unique *TriPower* kinematics ensuring the following main features:
 - Horizontal automatic constant-angle bucket guidance
 - Vertical automatic constant-angle bucket guidance
 - Automatic roll-back limiter to prevent material spillage
 - Kinematic assistance to hydraulic forces
 - Constant boom momentum throughout the entire lift arc
 - Crowd force assistance
- All buckets are equipped with a universal wear package suitable for all standard applications, which consists of:
 - Special liner material covering main wear areas inside and outside of bucket
 - Lip shrouds between teeth
 - Wing shrouds on side walls
 - Heel shrouds at bottom edges
- Special wear packages for highly abrasive materials on request

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Operator's Cab

Operator's eye level	Approx. 8.8 m (28 ft 10 in)
Internal dimensions of cab	Length: 2 200 mm (7 ft 3 in) Width: 1 600 mm (5 ft 3 in) Height: 2 150 mm (7 ft 1 in)
Internal dimensions of amenity cab	Length: 1 600 mm (5 ft 3 in) Width: 1 600 mm (5 ft 3 in) Height: 2 150 mm (7 ft 1 in)

- Pneumatically cushioned and multi-adjustable comfort seat with lumbar support, seat heating, safety belt, head and armrests
- Safety switch in seat cushion to automatically neutralize the hydraulic controls when operator leaves the seat
- Joystick controls integrated in independently adjustable seat consoles
- Fold-away auxiliary seat with safety belt
- FOPS (rock guard; approved acc. to DIN ISO 3449) integrated into cab structure
- All-round safety glass, armored windshield and sliding side window
- Windshield with parallel intermittent wiper / washer
- Roller blind at windshield
- Robust instrument panel incl. large colored BCS screen with transfective technology
- Board Control System (BCS); electronic monitoring and data logging system for vital signs and service data of engines, hydraulic system and lubrication system
- Machine access via retractable boarding ladder, hydraulically operated

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Swing System

Swing Drives	6 compact planetary transmissions with axial piston motors	
Parking Brakes	Wet multiple disc brake, spring-loaded / hydraulically released	
Max. swing speed	Diesel version	3.9 rpm
	Electric version	4.1 rpm
Swing ring	Triple race roller bearing with sealed internal gearing	

- Closed-loop swing circuit with torque control
- Hydraulic braking of the swing motion by counteracting control
- All race ways of swing ring as well as grease bath for internal gearing supplied by automatic central lubrication system

Optional Equipment

General

- Export crating
- Finishing as per end user's corporate colors
- Customizing of logos as per customer's specification

Superstructure

- Hydraulic service crane on superstructure with auxiliary engine
- Mesabi radiators instead of standard radiators
- 2nd retractable boarding ladder on right-hand side of engine module
- Various cold-weather packages
- Additional lighting

Cab

- Various heating and air conditioning systems
- Outside-mounted sun shields
- Additional instrumentation

Undercarriage

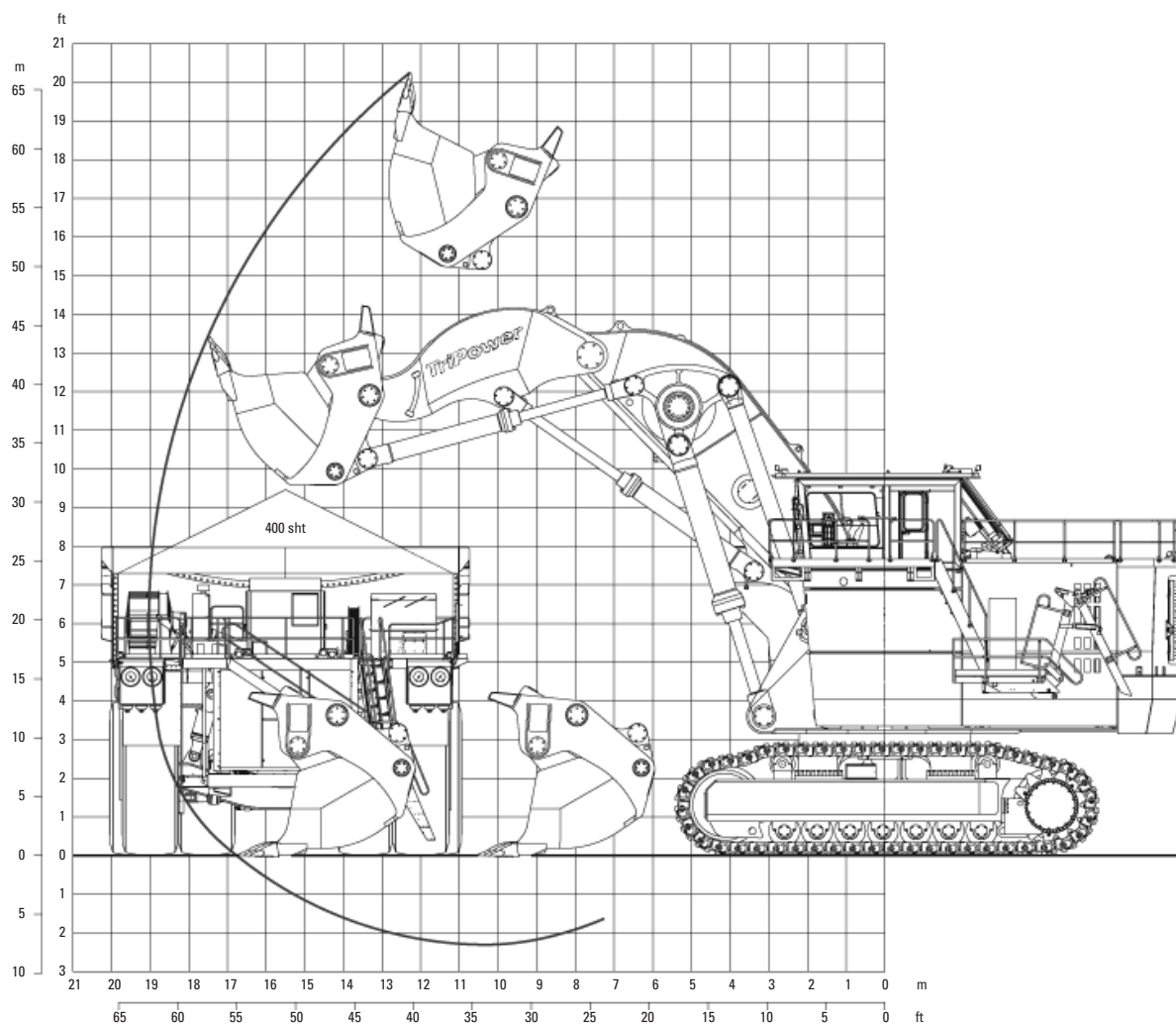
- Track pad width 1 800 mm

Additional optional equipment available on request

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TriPower Face Shovel Attachment (FS)

Working Diagram – Boom 9.5 m (31 ft 2 in) - Stick 5.8 m (19 ft)



Working Range

Max. digging height	20.2 m	66 ft 3 in
Max. digging reach	19.0 m	62 ft 4 in
Max. digging depth	2.3 m	7 ft 7 in
Max. dumping height	14.5 m	47 ft 7 in
Crowd distance on level	6.2 m	20 ft 4 in

Digging Forces

Max. crowd force	3 300 kN	741,610 lb
Max. crowd force at ground level	3 200 kN	719,140 lb
Max. breakout force	2 400 kN	539,350 lb

Face Shovels

Type	Iron ore shovel	Heavy rock shovel	Oil sand shovel	Standard rock shovel
Tooth system	on request	on request	on request	on request
Capacity SAE / PCSA 1:1	43.5 m ³ (56.9 yd ³)	48.4 m ³ (63.3 yd ³)	52.0 m ³ (68.0 yd ³)	59.8 m ³ (78.2 yd ³)
Capacity SAE / CECE 2:1	37.0 m³ (48.4 yd³)	42.0 m³ (54.9 yd³)	45.0 m³ (58.9 yd³)	52.0 m³ (68.0 yd³)
Total width	5 600 mm (18 ft 4 in)	5 600 mm (18 ft 4 in)	5 610 mm (18 ft 5 in)	6 170 mm (20 ft 3 in)
Inner width	5 100 mm (16 ft 9 in)	5 100 mm (16 ft 9 in)	5 175 mm (17 ft)	5 600 mm (18 ft 4 in)
Opening width	2 700 mm (8 ft 10 in)	2 700 mm (8 ft 10 in)	2 560 mm (8 ft 5 in)	2 650 mm (8 ft 8 in)
No. of teeth	6	6	6	6
Weight incl. universal wear kit	77 000 kg (169,750 lb)	79 500 kg (175,270 lb)	82 000 kg (180,780 lb)	84 000 kg (185,190 lb)
Max. material density (loose)	2.6 t/m ³ (4,380 lb/yd ³)	2.2 t/m ³ (3,710 lb/yd ³)	2.0 t/m ³ (3,370 lb/yd ³)	1.8 t/m ³ (3,030 lb/yd ³)

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