6090 FS

Hydraulic Shovel

General Data

Operating weight		
Face Shovel	980 tonnes	1,080 tons
Engine output		
SAE J1995	3360 kW	4,500 hp
Standard bucket capacity		
Face Shovel (SAE 2:1)	52.0 m^3	68.0 yd^3

Features

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

Operating Weight

Shovel		
Standard track pads	2000 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

Diesel Engines

Cummins QSK60 Tier 2		
Make and model	2 × QSK60 2-stage	
Total rated net power ISO 3046/1	3360 kW 1,800 min^{-1}	4,500 hp 1,800 min^{-1}
Total rated net power SAE J1349	3360 kW 1,800 min^{-1}	4,500 hp 1,800 min^{-1}
Total rated net power SAE J1995	3360 kW 1,800 min^{-1}	4,500 hp 1,800 min^{-1}
Number 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	
Maximum altitude without deration – above sea level	4880 m	16,000 ft
Emission certification	U.S. EPA Tier 4 Interim	
Fuel tank capacity	15 100 L	4,000 gal

- Hydraulically driven radiator fan with electronically controlled fan speed
- Micro processed engine control
- Heavy-duty air filters with automatic dust evacuation
- Two-stage fuel filter includes 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 hours

6090 FS Hydraulic Shovel Specifications

Electric Motors – 6090 AC FS

Type	2 × Squirrel cage induction motors
Total Output	3200 kW
Voltage	6.6 kV ± 10% (other on request)
Total Rated Current I_N	332A
Frequency	50 Hz (60 Hz on request)
Revolutions	1,500 min^{-1} (1,800 min^{-1} at 60 Hz)
Maximum starting current	780A

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

Electrical System (diesel drive)

System voltage	24V
Batteries in series/parallel installation	6 × 210 Ah – 12V each 630 Ah – 24V in total
Alternators	2 × 175A each
Working spot lights	12 × high brightness LED lights

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

Hydraulic System with Pump Managing System

Main pumps	8 × variable flow axial piston pumps	
Maximum oil flow		
Diesel version	8 × 936 L/min	8 × 247 gal/min
AC version	8 × 943 L/min	8 × 249 gal/min
Maximum pressure, attachment	310 bar	4,495 psi
Maximum pressure, travel	360 bar	5,220 psi
Swing pumps	6 × reversible swash plate pumps	
Maximum oil flow		
Diesel version	6 × 488 L/min	6 × 129 gal/min
AC version	6 × 496 L/min	6 × 131 gal/min
Maximum pressure, swing pumps	350 bar	5,080 psi
Total volume of hydraulic oil – approximately	13 000 L	3,450 gal
Hydraulic tank capacity – approximately	10 000 L	2,640 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)

Hydraulic Oil Cooling

Oil flow of cooling pumps		
Diesel version	4 × 975 L/min	4 × 258 gal/min
AC version	4 × 1000 L/min	4 × 264 gal/min
Diameter of fans	4 × 1524 mm	4 × 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

Swing System

Swing drives	6 compact planetary transmissions with axial piston motors
Parking brakes	Wet multiple disc brake, spring-loaded/ hydraulically released
Maximum swing speed	
Diesel version	3.9 rpm
AC 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

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

Operator's Cab

Operator's eye level – approximately	8.8 m	28 ft 10 in
Internal dimensions of cab		
Length	2200 mm	7 ft 3 in
Width	1600 mm	5 ft 3 in
Height	2150 mm	7 ft 1 in
Internal dimensions of amenity cab		
Length	1600 mm	5 ft 3 in
Width	1600 mm	5 ft 3 in
Height	2150 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 according 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 includes large colored BCS screen with transflective 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

6090 FS Hydraulic Shovel Specifications

Undercarriage

Travel speed (2 stages)		
1st stage – maximum	1.6 km/h	0.99 mph
2nd stage – maximum	2.2 km/h	1.37 mph
Maximum tractive force	4338 kN	974,880 lbf
Gradeability of travel drives – maximum	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

Automatic Lubrication System

Capacity of grease container	1000 L	264 gal

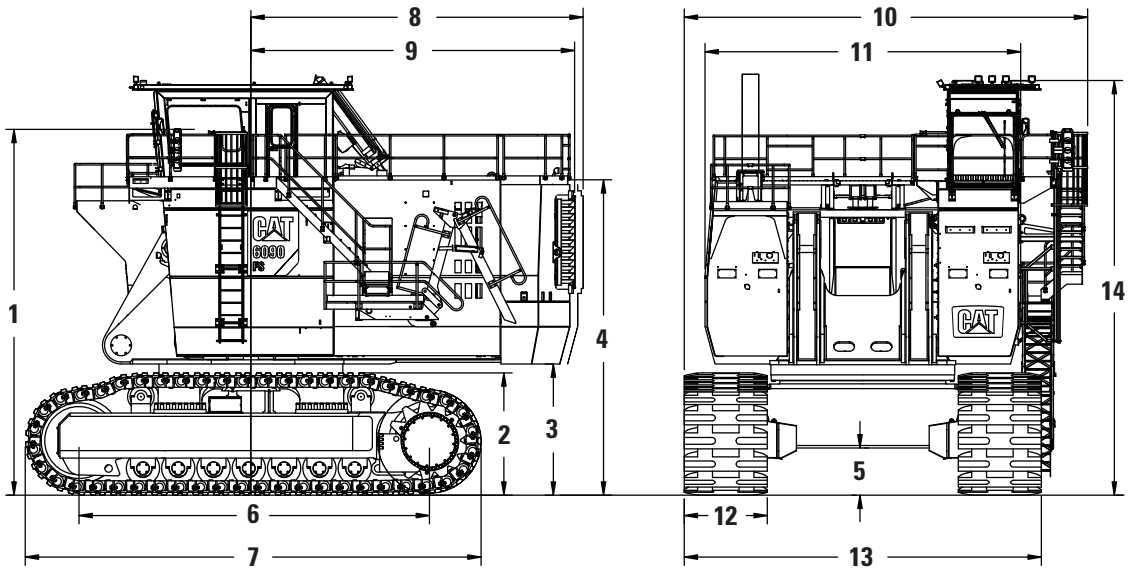
- Dual-circuit system with hydraulically driven heavy-duty pump and electronic time relay control to adjust the pause/lube times
- Connected to the lubrication system are the swing roller bearing with internal gearing, and all pivot points of attachment, bucket and cylinders
- System failures displayed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

Attachment

- 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 wear package consisting 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

Dimensions

All dimensions are approximate.

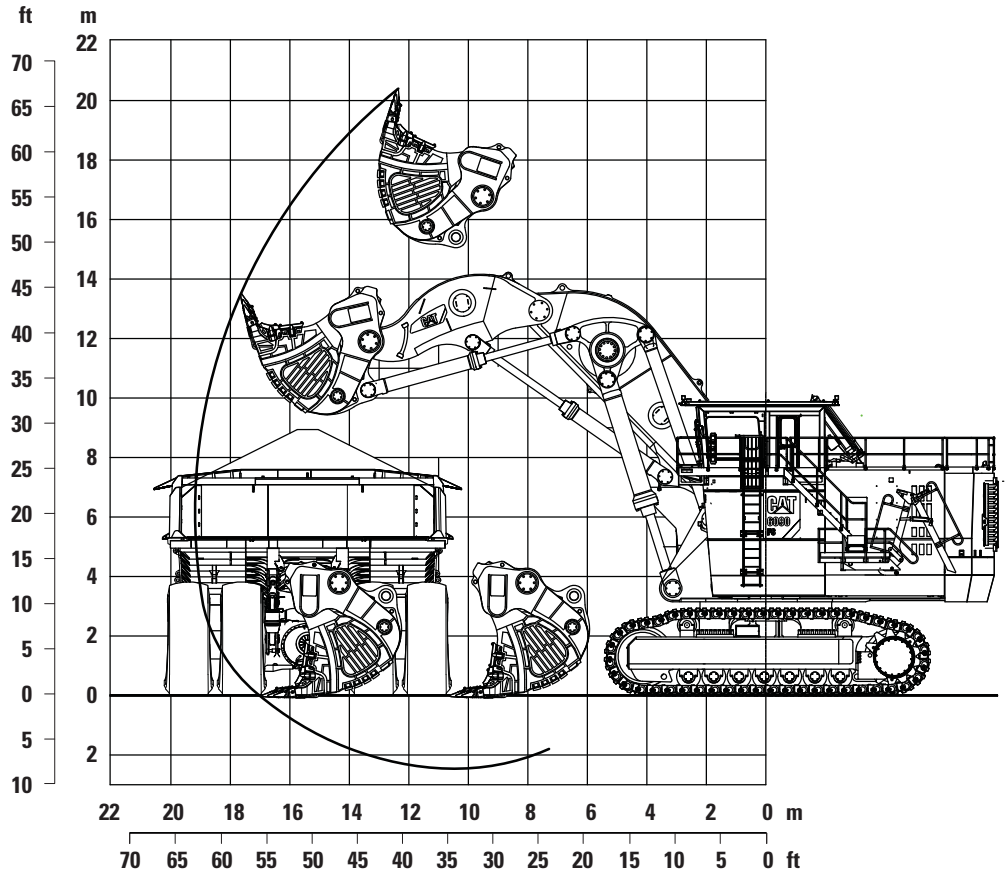


1	8800 mm	28 ft 10 in	**8**	8050 mm	26 ft 5 in
2	2945 mm	9 ft 8 in	**9**	7800 mm	25 ft 7 in
3	3150 mm	10 ft 4 in	**10**	9720 mm	31 ft 11 in
4	7470 mm	24 ft 6 in	**11**	7600 mm	24 ft 11 in
5	1135 mm	3 ft 9 in	**12**	2000 mm	6 ft 7 in
6	8445 mm	27 ft 8 in	**13**	8600 mm	28 ft 3 in
7	10 980 mm	36 ft 0 in	**14**	9990 mm	32 ft 9 in

6090 FS Hydraulic Shovel Specifications

Working Range – TriPower Face Shovel Attachment (FS)

All dimensions are approximate.



Boom	9.5 m	31 ft 2 in
Stick	**5.8 m**	**19 ft**
Working Range		
Maximum digging height	20.2 m	66 ft 3 in
Maximum digging reach	19.0 m	62 ft 4 in
Maximum digging depth	2.3 m	7 ft 7 in
Maximum dumping height	14.5 m	47 ft 7 in
Crowd distance on level	6.2 m	20 ft 4 in

Boom	9.5 m	31 ft 2 in
Stick	**5.8 m**	**19 ft**
Digging Forces		
Maximum crowd force	3300 kN	741,610 lbf
Maximum crowd force at ground level	3200 kN	719,140 lbf
Maximum breakout force	2400 kN	539,350 lbf

Face Shovels								
Type	**Iron Ore Shovel**		**Heavy Rock Shovel**		**Heavy Rock Bucket 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	54.0 m^3	70.6 yd^3	59.8 m^3	78.2 yd^3
Capacity SAE/CECE 2:1	**37.0 m^3**	**48.4 yd^3**	**42.0 m^3**	**54.9 yd^3**	**47.0 m^3**	**61.5 yd^3**	**52.0 m^3**	**68.0 yd^3**
Total width	5600 mm	18 ft 4 in	5600 mm	18 ft 4 in	6170 mm	20 ft 3 in	6170 mm	20 ft 3 in
Inner width	5100 mm	16 ft 9 in	5100 mm	16 ft 9 in	5600 mm	18 ft 4 in	5600 mm	18 ft 4 in
Opening width	2700 mm	8 ft 10 in	2700 mm	8 ft 10 in	2650 mm	8 ft 8 in	2650 mm	8 ft 8 in
Number of teeth	6		6		6		6	
Weight including universal wear kit	77 000 kg	169,750 lb	79 500 kg	175,270 lb	84 300 kg	185,850 lb	86 000 kg	189,600 lb
Maximum 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

Optional Equipment

Optional equipment may vary. Consult your Cat dealer for details.

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 1800 mm (5 ft 11 in)

Additional optional equipment available on request.

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Materials and specifications are subject to change without notice.

Featured machines in photos may include additional equipment.

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at www.cat.com

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