938G
Wheel Loader

Cat® 3126 DITA Diesel Engine		
Flywheel Power	119 kW	160 hp
Maximum Flywheel Power	128 kW	172 hp
Bucket Capacities	2.1 to 2.8 m^3	2.75 to 3.65 yd^3
Operating Weight	13 181 kg	29,060 lb

3126 Engine

The six-cylinder, direct injection, turbocharged and aftercooled engine is built for power, reliability, low maintenance, excellent fuel economy and low emissions.

Powerful performance. The 3126 DITA Engine develops flywheel power of 119 kW (160 hp), and meets all current worldwide emissions standards.

- The four-stroke cycle design delivers long power strokes and efficient fuel combustion with low emissions.
- Precisely engineered and stringently tested to maintain a tradition of quality.
- Profit-boosting performance, heavy-duty durability and reliability.
- Built-in serviceability and excellent fuel economy.

Torque rise. The unit injected fuel system provides a controlled fuel delivery increase as the engine lugs back from rated speed. This results in increased horsepower above rated power. A combination of increased torque rise and maximum horsepower improves response, provides greater rimpull, more lift force and faster cycle times. The 128 kW (172 hp) maximum flywheel power occurs at 1,700 rpm when power is needed during the working cycle.

Turbocharger. Waste gate design enhances performance and engine efficiency, especially at high altitudes, by packing more air in the cylinders for excellent combustion.

Jacket water aftercooler reduces smoke and emissions by providing a cooler, more efficient combustion. This also extends the life of the piston rings and bore.

Air intake heating (optional on some configurations) eases cold starts. When coolant temperature is above 10¡ C, the air intake heater does not operate. When below 10¡ C, the length of the heating period automatically adjusts to the temperature.

Individual, high-pressure unit injectors atomize fuel efficiently for fast response, increased fuel economy with low emissions. The radius cone injector nozzle provides excellent contact with the cylinder head sleeve to ensure tightness with the combustion chamber.

Fuel pre-filter and water separator element combined with two high efficiency fuel filters (in series), ensure excellent fuel cleanliness, provide extended injector life, fuel system durability, and protection.

Engine

Four-stroke cycle, six-cylinder 3126 turbocharged and aftercooled diesel engine.

Ratings*	kW	hp
Flywheel @ 2,200 rpm	119	160
Maximum flywheel @ 1,700 rpm	128	172

The following ratings apply at 2,200 rpm when tested under the specified standard conditions for the specified standard:

Flywheel power	kW	hp	PS
Caterpillar	119	160	Ñ
ISO 9249	119	160	Ñ
SAE J1349	119	160	Ñ
EEC 80/1269	119	160	Ñ
DIN 70020	Ñ	Ñ	166

Maximum torque (net) @ 1,200 rpm	874 Nm	645 lb-ft
Total torque rise		69%

Dimensions

Bore	110 mm	4.3 in
Stroke	127 mm	5.0 in
Displacement	7.2 liters	439 in^3

Exhaust emissions

The 3126 meets the following emissions requirements:

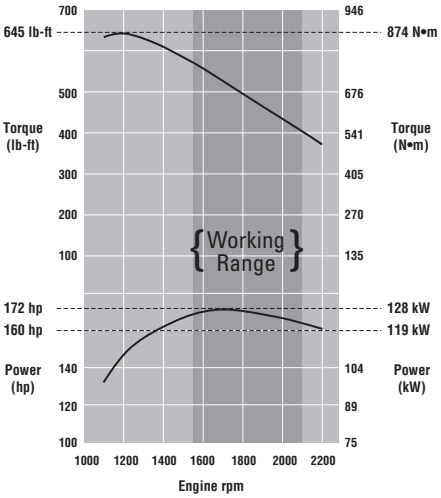
- EU
- US EPA Tier 1
- Japan MOC

*Power rating conditions

- based on standard air conditions of 25¡ C (77¡ F) and 99 kPa (29.32 in Hg) dry barometer
- used 35¡ API gravity fuel having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 30¡ C (86¡ F) [ref. a fuel density of 838.9 g/L (7.001 lb/U.S. gal)]
- flywheel power advertised is the power available when the engine is equipped with fan, alternator, air cleaner, and muffler
- no derating required up to 2300 m (7,500 ft) altitude

Features

- direct-injection fuel system with individual adjustment-free unit injectors for cylinders
- water jacket aftercooled
- 3-ring aluminum-alloy/forged steel 2-piece articulated pistons, cam-ground, tapered and cooled by oil spray
- Chrome Ceramic Surface (CSS) ring package, designed for high load/high temperature applications
- induction-hardened, forged crankshaft
- uniflow cylinder head design with two alloy-steel valves per cylinder
- deep-skirted cast cylinder block
- tapered connecting rods
- oscillating roller-followers
- direct-electric 24-volt starting and charging system with two 12-volt, 950 CCA Caterpillar maintenance-free batteries, heavy-duty starter and a 50-amp alternator



High Torque Rise

The unit-injected fuel system delivers a controlled increase of fuel as the engine lugs back from rated speed. This results in horsepower greater than rated power. The combination of increased torque rise and maximum horsepower improves response, provides greater rimpull, more lift force and faster cycle times. Maximum flywheel power of 128 kW (172 hp) occurs at 1,700 rpm when power is needed during the working cycle.

Transmission

Countershaft power shift transmission with four speeds forward and three reverse.

Maximum travel speeds (standard 20.5-R25 XTLA 1★ L2 tires)		km/h	mph
Forward	1	7.4	4.6
	2	13.4	8.3
	3	23.4	14.5
	4	39.4	24.5
Reverse	1	7.4	4.6
	2	13.4	8.3
	3	23.4	14.5

Features

- single lever to control both speed and direction
- separate control to lock in neutral
- single-stage, single-phase torque converter
- automatic shift capability
- quick gear kickdown button
- F-37 high energy friction material provides extended clutch life
- externally mounted controls with quick disconnects for easy diagnostic checks
- high contact ratio gears are precision ground for quiet operation
- transmission cooler bypass valve

Axles

Fixed front, oscillating rear (±13¡).

Features

- maximum single-wheel rise and fall: 420 mm (16.5")
- conventional differentials, enclosed brakes and final drives included
- threaded nuts to set bearing pre-load
- Patented Duo-Cone Seals between axle shaft and housing
- uses SAE 30W (oil change interval: 2,000 hours or one year)
- limited slip and NoSPIN differentials available
- Traction Control System available

Brakes

Meet the following standards: OSHA, SAE J1473 OCT90, ISO 3450-1996.

Service brake features

- full-hydraulic actuated, oil-disc brakes
- completely enclosed and sealed
- adjustment-free
- separate circuits for front and rear axles
- dual pedal braking system
- left pedal functions as brake or brake/neutralizer

Parking brake features

- mechanical, shoe-type brake
- mounted on transmission output
- pull-cable operated

Final Drives

Planetary final drives consist of ring gears and planetary carrier assemblies.

Features

- ring gears are pressed in and doweled to axle housings
- carrier assemblies include:
  - Ð planet gears with full-floating bronze sleeve bearings
  - Ð planet shafts
  - Ð retaining pins
  - Ð bearings
  - Ð sun gear shafts
  - Ð planetary carriers

Loader Hydraulic System

Open-centered, interrupted series system with full-flow filtering. System is completely sealed. Pilot-operated controls.

Implement system, vane-type pump		
Output at 2597 rpm and 6900 kPa (1,000 psi) with SAE 10W oil at 66¡ C (150¡ F)	163 liters/min	43 gpm
Relief valve setting	24 800 kPa	3600 psi
Cylinders, double acting: lift, bore and stroke	127 x 693 mm	5.0 x 27.25"
Cylinder, double acting: tilt, bore and stroke	139.7 x 527 mm	5.5 x 20.75"

Pilot system, variable displacement piston-type pump*		
Output at 2,597 rpm and 6900 kPa (1,000 psi) with SAE 10W oil at 66¡ C (150¡ F)	102 liters/min	27 gpm
Working pressure	3000 kPa	435 psi

*Common with steering pump.

Hydraulic cycle time	seconds
Raise	6.0
Dump	1.4
Lower, empty, float down	2.8
Total	10.2

Features

- completely enclosed system
- low effort, pilot-operated controls
- full-flow filtering
- reusable couplings with O-ring face seals
- pilot shutoff valve disables bucket functions
- tilt-out hydraulic oil cooler is standard
- Caterpillar XT hoses
- pressure taps
- Automatic Ride Control system available

Steering

Full hydraulic power steering. Meets SAE J1511 FEB94 and ISO 5010:1992

Ratings

Minimum turning radius (over tire)	5480 mm (18')
Steering angle, each direction	40¡
Hydraulic output at 2597 rpm and 6900 kPa (1,000 psi)	102 liters/min (27 gpm)
Relief valve setting	22 800 kPa (3,306 psi)

Features

- center-point frame articulation
- load sensing hydraulic steering pump
- front and rear wheels track
- flow-amplified, closed-center, pressure-compensated system
- steering-wheel operated metering pump controls flow to steering cylinders
- full-flow filtering
- adjustable steering column

Tires

Tubeless, nylon, loader-design tires.

Choice of

- 20.5-25, 12 PR (L-2)
- 20.5-25, 12 PR (L-3)
- 20.5-R25 GP-2B 1★ (L-3) steel radial
- 20.5-R25 XTLA 1★ (L-2) standard
- 20.5-R25 XHA 1★ (L-3) steel radial
- 555/70-R25 XLD70 1★ (L-3) low profile

Note:
In certain applications (such as load-and-carry work) the loader's productive capabilities might exceed the tires' tonnes-km/h (ton-mph) capabilities. Caterpillar recommends that you consult a tire supplier to evaluate all conditions before selecting a tire model.

Low profile tires will have the following affect on specs:

Width over tires	+17 mm	+0.7 "
Ground clearance	-44 mm	-1.7 "
Vertical bucket dimension	-44 mm	-1.7 "
Dig depth	+44 mm	+1.7 "
Reach	+80 mm	+3.1 "
Operating weight	+20 kg	+44 lb
Straight tip load	+15 kg	+33 lb
Full turn static tip load	+13 kg	+29 lb
Run out speeds	-7 %	
Rimpull	+9 %	
Departure angle	-3 %	

Cab

Caterpillar cab and Rollover Protective Structure (ROPS) are standard in North America, Europe and Japan.

Features

- meets OSHA and MSHA limits for operator and sound exposure with doors and windows closed (according to ANSI/SAE J1166 MAY90)
- ROPS meets the following criteria:
  Ð SAE J394
  Ð SAE 1040 APR88
  Ð ISO 3471-1:1986
  Ð ISO 3471:1994
- also meets the following criteria for Falling Objects Protective Structure:
  Ð SAE J231 JAN81
  Ð 3449:1992 LEVEL II

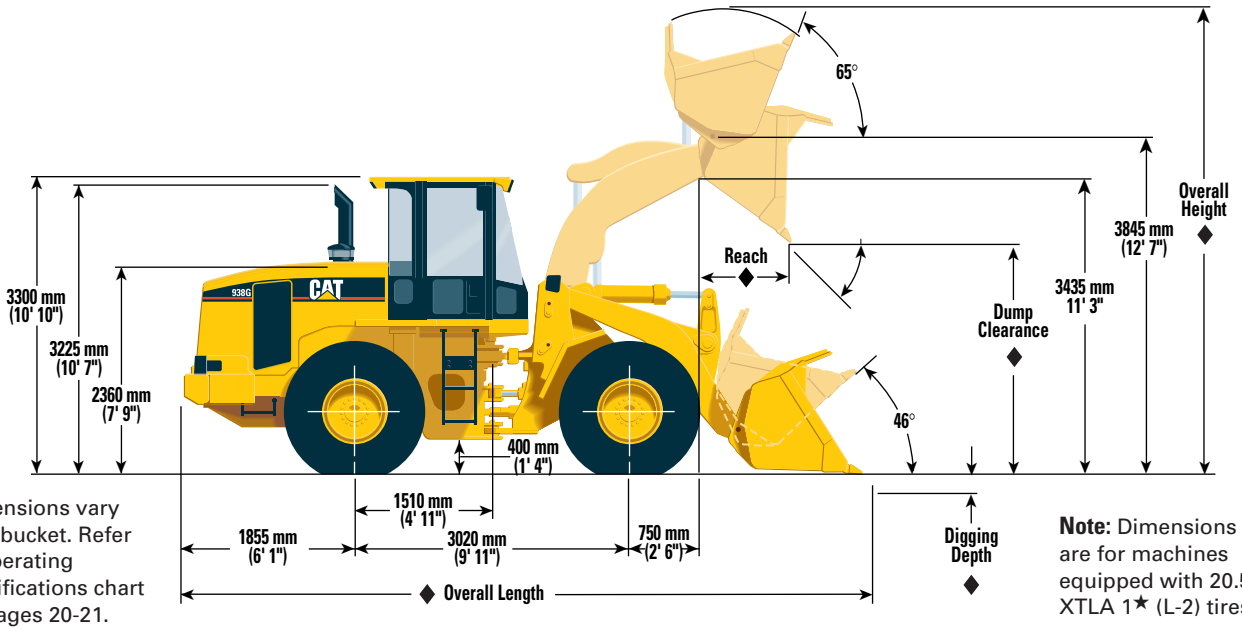
Note:
When properly installed and maintained, the cab offered by Caterpillar when tested with doors and windows closed according to ANSI/SAE J1166 MAY90, meets OSHA and MSHA requirements for operator sound exposure limits in effect at time of manufacture. The operator sound pressure level is 75 dB(A) when measured per ISO 6394 or 86/662/EEC.

Service Refill Capacities

	Liters	Gallons
Fuel tank (dry fill)	254	67
Cooling system	48	12.7
Crankcase	20	5.3
Transmission	30	7.9
Differentials and final drives		
front	24	6.3
rear	27	7.1
Hydraulic system (including tank)	90	23.8
Hydraulic tank	76	20.1

Dimensions

All dimensions are approximate



◆ Dimensions vary with bucket. Refer to operating specifications chart on pages 20-21.

Note: Dimensions listed are for machines equipped with 20.5 R25 XTLA 1★ (L-2) tires.

Tread width for all tires 2020 mm (80")

	Width over tires		Ground clearance		Change in vertical dimensions	
	mm	inches	mm	inches	mm	inches
20.5-25 12 PR (L-2)*	2605	103	424	17	24	0.94
20.5-25 12 PR (L-3)*	2600	102	378	15	-22	-0.87
20.5 R25 GP-2B 1★ (L-3)	2595	102	410	16	10	0.39
20.5 R25 XTLA 1★ (L-2)	2600	102	400	16	Ñ	Ñ
20.5 R25 XHA 1★ (L-3)	2595	102	406	16	6	0.24
555/70-R25 XLD70 1★ (L-3)	2615	103	356	14	-44	-1.7

* Specs may vary with tire manufacturer.

Supplemental Specifications

	Change in Operating Weight		Change in Articulated Static Tipping Load	
	kg	lb	kg	lb
Remove cab only, ROPS	-198	-430	-191	-420
20.5-25 12 PR (L-2)*	-60	-130	-39	-80
20.5-25 12 PR (L-3)*	-85	-180	56	120
20.5 R25 GP-2B 1★ (L-3)	127	280	86	190
20.5 R25 XTLA 1★ (L-2)	Ñ	Ñ	Ñ	Ñ
20.5 R25 XHA 1★ (L-3)	-170	-370	114	250
555/70-R25 XLD70 1★ (L-3)	+20	+40	+13	+30

* Specs may vary with tire manufacturer.

Note: Tire options include tires and rims.

Bucket Controls

Pilot-operated lift and tilt circuits.

Lift circuit features

- four positions: raise, hold, lower and float
- adjustable automatic kickout from horizontal to full lift

Tilt circuit features

- three positions: tilt back, hold and dump
- adjustable automatic bucket positioner to desired loading angle, eliminates need for visual spotting
- doesnÕt require visual spotting

Controls

- two lever control (standard)
- three lever control (optional)
- joystick (optional) combines lift and tilt controls
- joystick (optional) with auxillary third valve lever
- remote F-N-R switch (optional) available with all valve/lever combinations
- lever lockout

Operation Specifications

		General Purpose Buckets									Material Handling
		Bolt-on Edges	Bolt-on Adapters & Segments	Bolt-on Adapters	Bolt-on Edges	Bolt-on Adapters & Segments	Bolt-on Adapters	Bolt-on Edges	Bolt-on Adapters & Segments	Bolt-on Adapters	Bolt-on Edges
Rated capacity (¤)	m^3	2.8	2.8	2.7	2.5	2.5	2.3	2.3	2.3	2.1	2.8
	yd^3	3.65	3.65	3.5	3.25	3.25	3.0	3.0	3.0	2.75	3.65
Struck capacity (¤)	m^3	2.41	2.41	2.04	2.11	2.11	2.01	1.97	1.97	1.87	2.42
	yd^3	3.15	3.15	3.02	2.76	2.76	2.63	2.58	2.58	2.45	3.17
Width (¤)	mm	2705	2775	2775	2705	2775	2775	2705	2775	2775	2705
	ft/in	8' 11"	9' 1"	9' 1"	8' 11"	9' 1"	9' 1"	8' 11"	9' 1"	9' 1"	8' 11"
Dump clearance at full	mm	2720	2615	2615	2790	2685	2685	2825	2755	2755	2720
lift and 45¡ discharge**	ft/in	8' 11"	8' 7"	8' 7"	9' 2"	8' 10"	8' 10"	9' 3"	9' 0"	9' 0"	8' 11"
Reach at full lift	mm	1055	1160	1160	985	1090	1090	1020	1125	1125	1055
and 45¡ discharge**	ft/in	3' 6"	3' 10"	3' 10"	3' 3"	3' 7"	3' 7"	3' 4"	3' 8"	3' 8"	3' 6"
Reach with lift arms	mm	2390	2540	2540	2290	2440	2440	2240	2390	2390	2390
horizontal and bucket level	ft/in	7' 10"	8' 4"	8' 4"	7' 6"	8' 0"	8' 0"	7' 4"	7' 10"	7' 10"	7' 10"
Digging depth (¤)	mm	50	50	25	50	50	25	50	50	25	50
	in	2"	2"	1"	2"	2"	1"	2"	2"	1"	2"
Overall length**	mm	7325	7475	7475	7225	7375	7375	7175	7325	7325	7325
	ft/in	24' 0"	24' 6"	24' 6"	23' 8"	24' 2"	24' 2"	23' 7"	24' 0"	24' 0"	24' 0"
Overall height with bucket	mm	5285	5285	5285	5190	5190	5190	5140	5140	5140	5270
at full raise (¤)	ft/in	17' 4"	17' 4"	17' 4"	17' 0"	17' 0"	17' 0"	16' 10"	16' 10"	16' 10"	17' 4"
Loader clearance circle with	mm	12 000	12 160	12 160	11 950	12 100	12 100	11 920	12 070	12 070	12 000
bucket in carry position (¤)	ft/in	39' 4"	39' 11"	39' 11"	39' 3"	39' 8"	39' 8"	39' 1"	39' 7"	39' 7"	39' 4"
Static tipping load straight* (¤)	kg	10 517	10 387	10 586	10 668	10 538	10 742	10 742	10 611	10 642	10 447
	lb	23,190	22,900	23,340	23,520	23,230	23,680	23,680	23,390	23,460	23,030
Static tipping load	kg	9189	9059	9246	9330	9199	9391	9397	9267	9308	9128
full 40¡ turn* (¤)	lb	20,260	19,970	20,380	20,570	20,280	20,700	20,720	20,430	20,520	20,120
Breakout force*** (¤)	kN	110.1	110.1	117.3	120.3	120.3	128.9	126.1	126.1	135.6	110.1
	lb	24,770	24,770	26,390	27,060	27,060	29,000	28,370	28,370	30,510	24,770
Operating weight* (¤)	kg	13 181	13 289	13 196	13 110	13 218	13 125	13 077	13 185	13 092	13 166
	lb	29,060	29,300	29,090	28,900	29,140	28,940	28,830	29,070	28,860	29,030

Specifications and ratings conform to all applicable standards recommended by the Society of Automotive Engineers. SAE Standards J732c govern loader ratings and are denoted in the text by (¤).

* Static tipping load and operating weight shown are based on standard machine configuration with sound-suppression cab and ROPS, 20.5 R25 XTLA 1★ (L-2) tires, full fuel tank, coolant, lubricants and operator.

** Dump clearance, reach and overall length dimensions for bucket equipped with teeth reflect actual dimensions. SAE J732C allows dimensions for bucket with teeth to reflect the dimension using the cutting edge. Caterpillar Inc. uses actual equipped bucket dimensions.

*** Measured 102 mm (4.0"): behind tip of cutting edge with bucket hinge pin as pivot point in accordance with SAE J732C.

**** All buckets shown can be used on the high lift arrangement. High lift column shows changes in specifications from standard lift to high lift. Add or subtract as indicated to or from specifications given for appropriate bucket to calculate high lift specifications.