



651

Wheel Tractor-Scraper

Technical Specifications

Configurations and features may vary by region. Please consult your Cat® dealer for availability in your area.

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651 Wheel Tractor-Scraper Specifications

Engine

Engine Model: Tractor	Cat® C18	
Rated Engine Speed: Tractor	2,000 rpm	
Net Power (SAE J1349:2011/ ISO 9249:2007) Tractor	436 kW	585 hp
Gross Power (SAE J1995:2014): Tractor	475 kW	637 hp
Engine Power (ISO 14396:2002): Tractor	469 kW	629 hp

Tractor – Two engine emission options are available:

1. U.S. EPA Tier 4 Final.
2. EU Stage V.

• Maximum Speed: Length × Width × Height.

Net power available at the flywheel when the engine is equipped with fan, air cleaner, aftertreatment, and alternator with engine speed at 2,200 rpm.

Safety Criteria Compliance Standards

Rollover Protection Structure (ROPS)	ISO 3471:2008 for up to 26 600 kg (58,643 lb)
Falling Object Protective Structure (FOPS)	ISO 3449:2005 Level II
Brakes	ISO 3450:2011
Steering System	ISO 5010:2007
Seat Belt	SAE J386:AUG2012
Forward Horn and Reverse Alarm	ISO 9533:2010
Exterior Sound power level for standard machine	ISO 6393:2008 is 116 dB(A)

Implement Cycle Times

Apron Lower	4.1 seconds
Apron Raise	4.4 seconds
Bail Lower	1.9 seconds
Bail Raise	1.7 seconds
Bowl Lower	4.5 seconds
Bowl Raise	4.2 seconds
Ejector Extend	9.2 seconds
Ejector Retract	7.8 seconds

Transmission

Forward 1	5.7 km/h	3.5 mph
Forward 2	10.5 km/h	6.5 mph
Forward 3	12.5 km/h	7.8 mph
Forward 4	17.0 km/h	10.6 mph
Forward 5	22.8 km/h	14.2 mph
Forward 6	30.9 km/h	19.2 mph
Forward 7	41.4 km/h	25.7 mph
Forward 8	56.1 km/h	34.9 mph
Reverse	10.8 km/h	6.7 mph

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Service Refill Capacities

Crankcase: Tractor	38.0 L	10.0 gal
Transmission System: Tractor	136.0 L	35.9 gal
Cooling System: Tractor	88.6 L	23.4 gal
Fuel Tank	1628.0 L	430.1 gal
Hydraulic System	150.0 L	39.6 gal
Diesel Exhaust Fluid: Tractor	30.5 L	8.1 gal

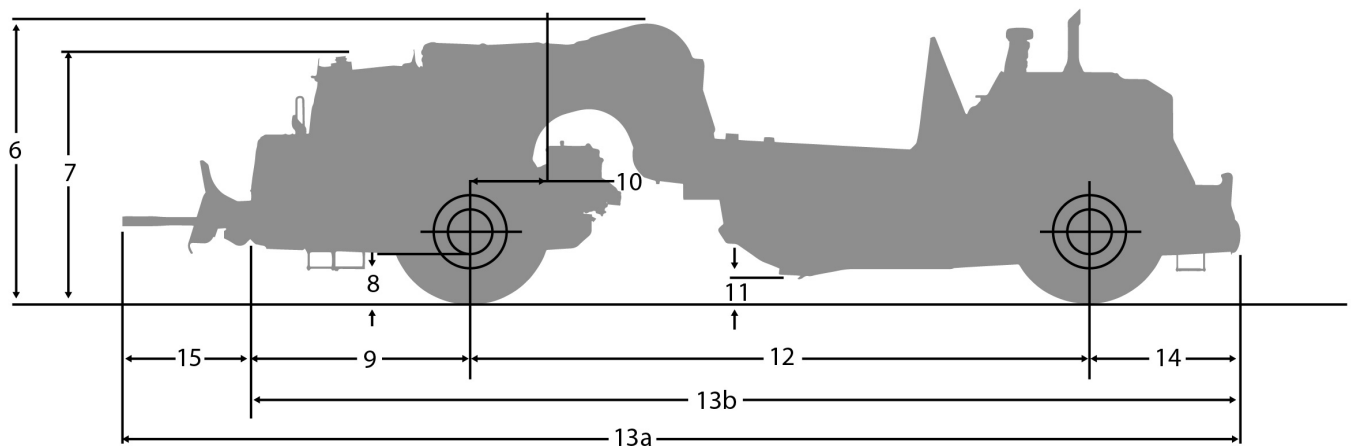
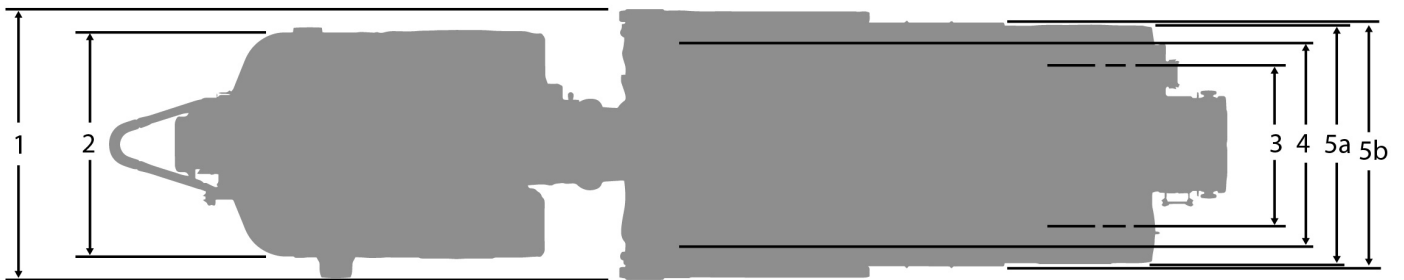
General Data

Fuel Tank Refill Capacity	860 L	227.2 gal
Shipping (Split Configuration):		
Tractor Width	3.90 m	12.8'
Tractor Height	4.52 m	14.8'
Scraper Width	4.08 m	13.4'
Scraper Height	3.90 m	12.8'
Scraper Capacity:		
Struck	24.5 m ³	32.0 yd ³
Heaped	33.6 m ³	44.0 yd ³
Rated Load		
	47 174 kg	104,000 lb
	46.4 tonnes	52.0 tons
Width of Cut	3.8 m	12.5'
Maximum Depth of Cut (Cushion Hitch Locked)		
	440 mm	17.3"
Maximum Depth of Spread (Cushion Hitch Locked)		
	530 mm	20.9"
Maximum Depth of Spread		
	660 mm	26.0"
Top Speed (Loaded)	56.1 km/hr	34.9 mph
180° Curb-to-Curb Turning Width (Right)		
	13.6 m	44.6'
Tire Size	40.5/75 R39 ** E-3	
Operating weight (Michelin Tires, Full Fuel, Without Operator)		
Unloaded	74 253 kg	163,700 lb
With Rated Load	121 427 kg	267,700 lb
Overall Length	17.97 m	58.96'

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Dimensions

All dimensions are approximate.



651			
1	Overall Machine Width	4.36 m	14.30 ft
2	Tractor Width	3.75 m	12.30 ft
3	Scraper Width	4.36 m	14.30 ft
4	Inside of Bowl Width	3.68 m	12.07 ft
5a	Outside Rear Tires Width	3.84 m	12.60 ft
5b	Outside Bowl Width	3.93 m	12.89 ft
6	Overall Machine Height	4.77 m	15.65 ft
7	Height to Top of Cab	3.92 m	12.86 ft
8	Tractor Ground Clearance	0.72 m	2.36 ft
9	Front of Tractor to Front Axle	4.55 m	14.93 ft
10	Axle to Vertical Hitch Pin	0.55 m	1.80 ft
11	Cutting Edge Height – Maximum	0.66 m	2.17 ft
12	Wheelbase	9.96 m	32.68 ft
13a	Overall Machine Length – Bail Down	17.97 m	58.96 ft
13b	Overall Machine Length – Bail Up or NA	17.05 m	55.94 ft
14	Rear Axle to Rear of Machine	2.46 m	8.07 ft

Typical Fixed Times Retarder Curves

TYPICAL FIXED TIMES FOR SCRAPERS

(Times may vary depending on job conditions)

Model	Loaded By	Load Time (Min.)	Maneuver and Spread or Maneuver and Dump (Min.)
613G	Self	0.9	0.7
623K	Self	0.9	0.7
621K	One D8	0.5	0.7
627K	One D8	0.5	0.6
621K	One D9	0.4	0.7
627K	One D9	0.4	0.6
627K/PP	Self	0.9*	0.6
631K	One D9	0.6	0.7
637K	One D9	0.6	0.6
631K	One D10	0.5	0.7
637K	One D10	0.5	0.6
637K/PP	Self	1.0*	0.6
657	One D11	0.6	0.6
657	Push Pull Self	1.1*	0.6
637K	Coal	0.8	0.7
657	Coal	0.8	0.6

*Load time per pair, including transfer time.

Note: Empty weights shown on the Wheel Tractor-Scraper charts include ROPS canopy. When calculating TMPH loadings, any additional weight must be considered in establishing mean tire loads.

USE OF RETARDER CURVES

The following explanation applies to retarder curves for Wheel Tractor-Scrapers and Articulated Trucks.

The speed that can be maintained (without use of service brake) when the machine is descending a grade with retarder fully on can be determined from the retarder curves in this section if gross machine weight and total effective grade are known.

Total Effective Grade (or Total Resistance) is grade assistance minus rolling resistance.

$$10 \text{ kg/metric ton (20 lb/U.S. ton)} = 1\% \text{ adverse grade}$$

Example:

15% favorable grade with 5% rolling resistance. Find Total Effective Grade.

$$\text{Total Effective Grade} = 15\% \text{ Grade Assistance} - 5\%$$

$$\text{Rolling Resistance} = 10\% \text{ Total Effective Grade Assistance}$$

Example Problem:

A 651 with an estimated payload of 47 175 kg (104,000 lb) descends a 10% total effective grade. Find constant speed and gear range with maximum retarder effort. Find travel time if the slope is 610 m (2,000 ft) long.

$$\begin{aligned} \text{Empty weight} + \text{payload} &= \text{Gross Weight} = 60\,950 \text{ kg} + 47\,175 \text{ kg} \\ &= 108\,125 \text{ kg (134,370 lb + 104,000 lb = 238,370 lb)} \end{aligned}$$

651 Wheel Tractor-Scraper Specifications

Retarder Curves

Solution: Using the retarder curve below, read from 108 125 kg (238,370 lb) (point A) on top of Gross Weight scale down the line to the intersection of the 10% Effective Grade line (point B).

Go across horizontally from point B to the intersection of the retarder curve (point C). Point C intersects at the 5 (5th gear) range.

Where point C intersects the retarder curve, read down vertically to point D on the bottom scale to obtain the constant speed: 21.7 km/h (13.5 mph).

Answer: The 651 will descend the slope at 21.7 km/h (13.5 mph) in 5th gear. Travel time is 1.68 minutes.

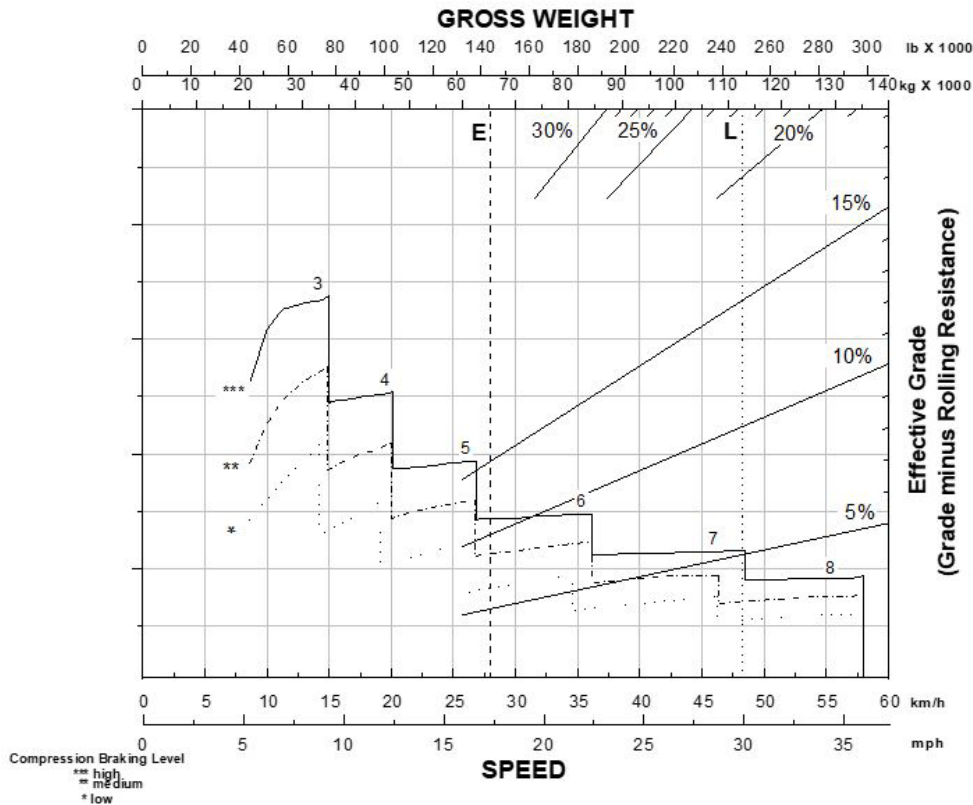
$$\frac{610 \text{ m}}{363 \text{ m/min}} = 1.68 \text{ min}$$

$$\frac{2000 \text{ ft}}{13.5 \text{ mph} \times 88^*} = 1.68 \text{ min}$$

* (mph x 88 = F.P.M.)

$$\frac{60 \times 610}{21.7 \times 1000} = T = (1.68)$$

Note: The basic Distance-Speed-Time formula is $60 D \div S = T$ (or “60 D Street”), where 60 is minutes, D is distance, S is speed, and T is time. In the above problem, $60 \times 610 \text{ m} \div 21.7 \text{ km/h} \times 1000 = T$.



KEY

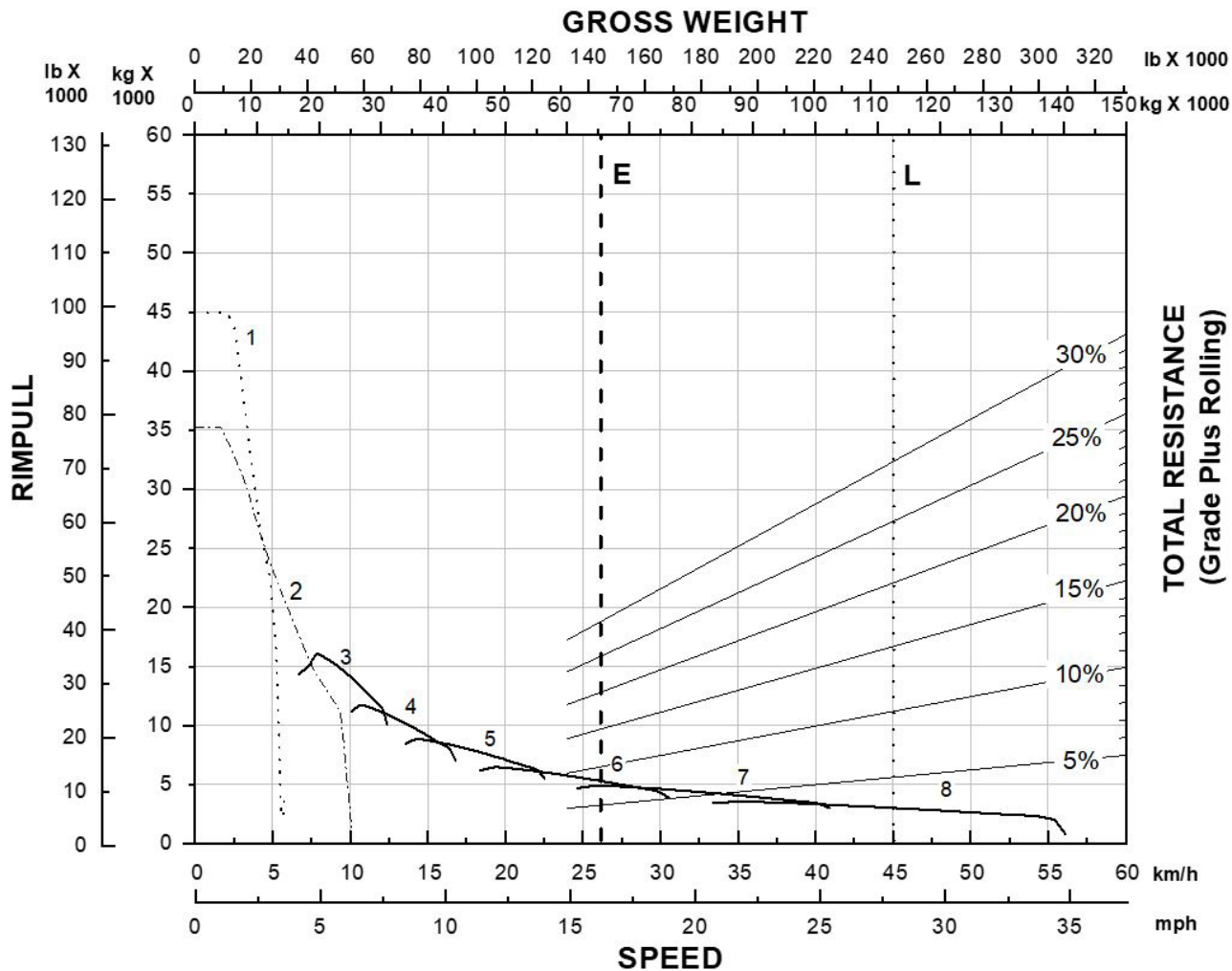
- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

KEY

- A — Loaded 108 125 kg (238,370 lb)
- B — Intersection with 10% effective grade line
- C — Intersection with retarder curve (5th gear)
- D — Constant speed 21.7 km/h (13.5 mph)

651 Wheel Tractor-Scraper Specifications

Rimpull-Speed-Gradeability Curve



*at sea level

KEY

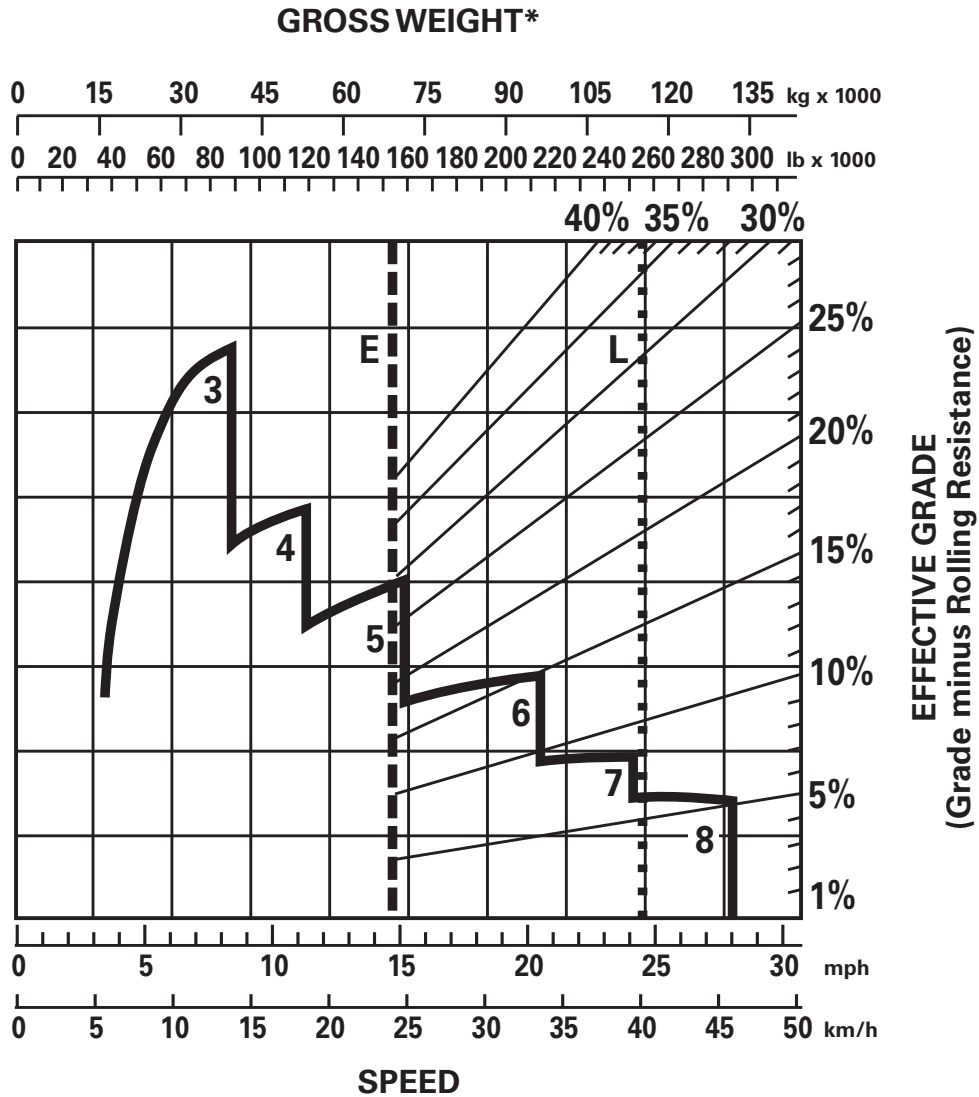
- 1 — 1st Gear Torque Converter Drive
- 2 — 2nd Gear Torque Converter Drive
- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

KEY

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)

651 Wheel Tractor-Scraper Specifications

Rimpull-Retarding Curve



*at sea level

KEY

- 3 — 3rd Gear Direct Drive
- 4 — 4th Gear Direct Drive
- 5 — 5th Gear Direct Drive
- 6 — 6th Gear Direct Drive
- 7 — 7th Gear Direct Drive
- 8 — 8th Gear Direct Drive

KEY

- E — Empty 72 804 kg (160,505 lb)
- L — Loaded 119 978 kg (264,505 lb)

651 Wheel Tractor-Scraper Specifications

Standard & Optional Equipment

Standard and optional equipment may vary. Consult your Cat dealer for details.

	Standard	Optional		Standard	Optional
POWER TRAIN – TRACTOR			OPERATOR ENVIRONMENT – TRACTOR		
Cat C18 (U.S. EPA Tier 4 Final and EU Stage V)	✓		HVAC system, heat, AC, defrost	✓	
Cat engine brake	✓		Thermostat control of HVAC system	✓	
Electric start, 24V	✓		Coat hook	✓	
Air cleaner, dry type	✓		Lunchbox platform with holding strap	✓	
Fan, hydraulic	✓		Diagnostic connection (2)	✓	
Ground level engine shutdown	✓		12V power ports (2)	✓	
Radiator	✓		Differential lock (1)	✓	
Guard, crankcase	✓		Dome courtesy light	✓	
Starting aid, ether	✓		Horn, electric	✓	
Braking system: primary and secondary, wet disc, hydraulic; parking, hydraulic-released, spring-applied	✓		T-handle implement control	✓	
Throttle lock	✓		Radio ready	✓	
Transmission: 8-speed planetary powershift, ECPC control, APECS software, programmable top gear selection, transmission hold, differential lock, guard – power train, ground speed control, machine speed limit	✓		ROPS/FOPS cab, pressurized	✓	
POWER TRAIN – SCRAPER			Keypad switches: rear engine start; throttle lock; wipers/washers; hazard lights; worklights on, off; information mode; messenger display; safety tab rocker switches, parking brake	✓	
Cat C15	✓		Seat belt, static two-piece	✓	
Cat engine brake	✓		Windows, sliding	✓	
Electric start, 24V	✓		Windows, laminated, zipped in	✓	
Fan, mechanical drive	✓		Windshield wipers, front and rear windows, includes washers	✓	
Ground level engine shutdown	✓		Door lock	✓	
Starting aid, ether	✓		Messenger display gauges, warnings include: coolant temp; engine oil temp; hydraulic oil temp; DPF temp; fuel level; park brake; implement lockout; brake system, regeneration required; throttle lock; system voltage; secondary steering; bail down; differential lock; apron float; transmission hold; high beam lights; action lamp; engine speed, rpm; gear selection; DPF fill levels	✓	
Braking system: primary and secondary, wet disc, hydraulic; 8-speed planetary powershift, ECPC control, guard – power train, APECS software, programmable top gear selection, transmission hold	✓		Powered access ladder		✓
ELECTRICAL – TRACTOR			Safety tab rocker switches	✓	
Alternator, 115 amp	✓		Seat – Cat Advanced Ride Management (ARM), Cat Comfort Series III, rotates 30 degrees	✓	
Batteries (4), 12V, 1,000 CCA, maintenance free	✓		Steering wheel, tilt, telescoping, padded	✓	
Electrical system, 24V	✓		Windows, right side emergency egress	✓	
Turn signals with hazard function	✓		Messenger display	✓	
Starting/charging receptacle	✓		FLUIDS		
ELECTRICAL – SCRAPER			Extended life coolant to -37° C (-34° F)	✓	
Alarm, backup	✓				
Batteries (4), 12V, 1,000 CCA, maintenance free	✓				
Lighting system: headlights – halogen, turn signals with hazard functions – LED, floodlights, (2) cutting edge and (1) bowl, side vision – halogen	✓				
Starting/charging receptacle	✓				

651 Wheel Tractor-Scraper Standard & Optional Equipment

Standard & Optional Equipment

Standard and optional equipment may vary. Consult your Cat dealer for details.

	Standard	Optional		Standard	Optional
OTHER STANDARD EQUIPMENT – TRACTOR			OTHER ATTACHMENTS		
Accumulators (brake and cushion hitch) with Canadian Registration Number (CRN)	✓		Camera arrangement – Work Area Vision System (WAVS)		✓
Fast oil change	✓		Cab beacon		✓
Vandalism locks	✓		Air horn		✓
Steering locks	✓		Air horn and beacon		✓
Heater, engine coolant 120V	✓		Wiring group		✓
Cushion push plate/bail – standard open bowl only	✓		STEERING ARRANGEMENTS		
OTHER STANDARD EQUIPMENT – SCRAPER			INTEGRATED TECHNOLOGIES		
Bowl	✓		Secondary steering (ground driven)		✓
Fast oil change	✓		SERVICE INSTRUCTIONS		
Vandalism locks	✓		Cat Production Measurement		✓
Rear hook/radiator guard – standard open bowl only	✓		Product Link™		✓
Guard, overflow – standard open bowl only	✓		Sequence Assist with Payload Estimator		✓
Heater, engine coolant 120V	✓		OTHER ATTACHMENTS		
Hydraulic position sensing cylinders (bowl lift and apron)	✓		Film arrangement – U.S. (ANSI)		✓
			Film arrangement – International (ISO)		✓



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

Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.

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