

R1600G

Underground Mining Loader



Engine

Engine Model	Cat® 3176C EUI ATAAC		
Gross Power – SAE J1995 (1st gear/2-4th gear)	185/200 kW	248/268 hp	
Net Power – SAE J1349 (1st gear/2-4th gear)	165/180 kW	221/241 hp	

Operating Specifications

Nominal Payload Capacity	10 200 kg	22,487 lb
Gross Machine Operating Weight	40 000 kg	88,185 lb
Bucket Capacities		
Bucket Capacities	4.2-5.9 m ³	5.5-7.7 yd ³

R1600G Features

One Supplier

Caterpillar designed and manufactured major power and drive train components for reliability and performance.

Reliable and Durable Engine

The Cat® 3176C EUI ATAAC diesel engine delivers the perfect balance between power, robust design and economy.

Power Shift Transmission

Reliable and rugged design to deliver power and efficiency for peak power train performance.

Powerful Hydraulics

Perfect balance between low effort controls and powerful forces for smooth and fast cycle time.

Durable Structures

The heavy duty frame is designed and built to absorb twisting, impact and high loading forces for maximum durability and reliability.

Comfortable Cab

Ergonomically designed for all-day comfort, control and productivity.

Aggressive Bucket Design

Engineered for optimal loadability and life in tough mining application. Various sizes and configurations available to match material and mine conditions.

Enhanced Serviceability

Designed with improved service points and grouped service locations to simplify maintenance and repair.

Built in Safety

Safety is not an after thought, but an integral part of all machine and system design.

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The R1600G underground loader is designed for high production, low cost-per-ton loading and tramming in underground mining applications. Compact design with agile performance, rugged construction and simplified maintenance ensures excellent productivity, long life and low operating costs.

Engineered for performance, designed for comfort, built to last.

Power Train – Engine

The Cat® 3176C engine is built for power, reliability and efficiency.

Engine

The Cat® 3176C is a proven engine that delivers reliability and durability. The efficient and powerful engine delivers maximum loading and tramping performance in most demanding mining applications. Complete system integration of the engine and transmission ensures fuel efficiency and smooth operation.

High Torque Rise

Provides unequalled lugging force while digging, tramping and traversing steep grades. Torque rise effectively matches transmission shift points for maximum efficiency and fast cycle times.

Turbocharged and Aftercooled

Air-to-air aftercooling provides improved fuel economy by packing cooler, denser air into cylinders for more complete combustion of fuel and lower emissions.

Electronic Unit Injection

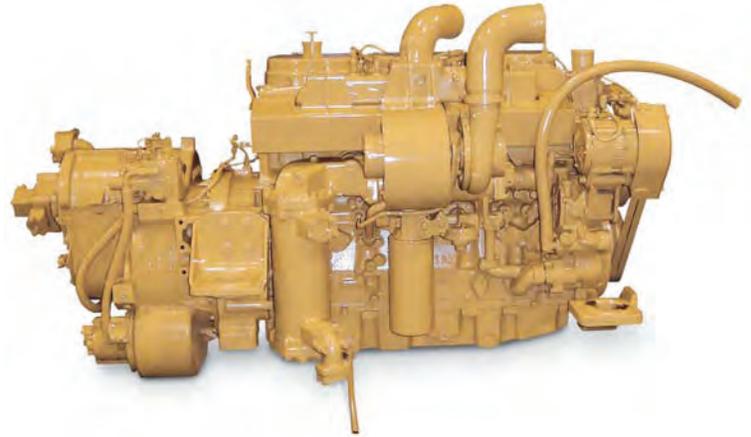
The electronically controlled unit injection fuel system senses operating conditions and regulates fuel delivery for optimum fuel efficiency. The proven high-pressure fuel system provides improved response times and more efficient fuel burn with lower emissions and less smoke.

Pistons

Oil cooled pistons increase heat dissipation and promote longer piston life.

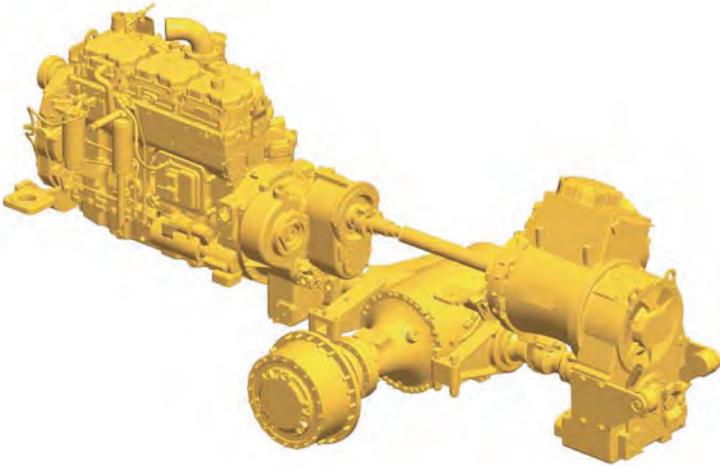
Radiator

Modular radiator with swing-out grill provides easy access for cleaning or repair. Built in sight gauge allows for quick, safe coolant level checks.



Power Train – Transmission

More power to the ground for greater productivity.



Power Shift Transmission

The Cat four-speed planetary power shift transmission is matched with the 3176C diesel engine to deliver constant power over a wide range of operating speeds.

Robust Design

Designed for rugged underground mining conditions, the proven planetary power shift transmission is built for long life between overhauls.

Torque Converter

High capacity torque converter delivers more power to the wheels for superior power train efficiency.

Electronic Autoshift Transmission

The electronic auto shift transmission increases operator efficiencies and optimizes machine performance. The operator can choose between manual or auto shift modes.

Transmission Neutralizer

Using the left brake pedal, the operator can engage the service brakes and neutralize the transmission, maintaining high engine rpm for full hydraulic flow, enhancing digging and loading functions.

Final Drives

Cat final drives work as a system with the planetary power shift transmission to deliver maximum power to the ground. Built to withstand the forces of high torque and impact loads, double reduction final drives provide high torque multiplication to further reduce drive train stress.

Axles

Heavy duty axles are built rugged for long-life in the most demanding environments.

Oscillating Rear Axle

Oscillating rear axle ensures four-wheel ground contact for maximum traction and stability at all times.

Differential

No spin rear differential reduces tire wear and maximizes traction in uneven terrain.

Brakes

Fully enclosed oil immersed disc brakes incorporate independent service and parking brake pistons. Hydraulic actuated independent circuits provide improved performance and reliability.



Hydraulics

Cat hydraulics deliver the power and control to keep material moving.

Hydraulic System

Powerful Cat hydraulics deliver exceptional digging and lifting forces and fast cycle times.

Lift and Tilt System

High hydraulic flow rates provide fast hydraulic cylinder response and powerful lift forces. Large-bore tilt and lift cylinders deliver exceptional strength, performance and durability.

Pilot Controls

Low effort, pilot operated joystick implement control with simultaneous lift and tilt functions optimizes operating efficiency. Optional hydraulic controls enable an ejector bucket to be controlled from a switch on the bucket control joystick.

Steering System

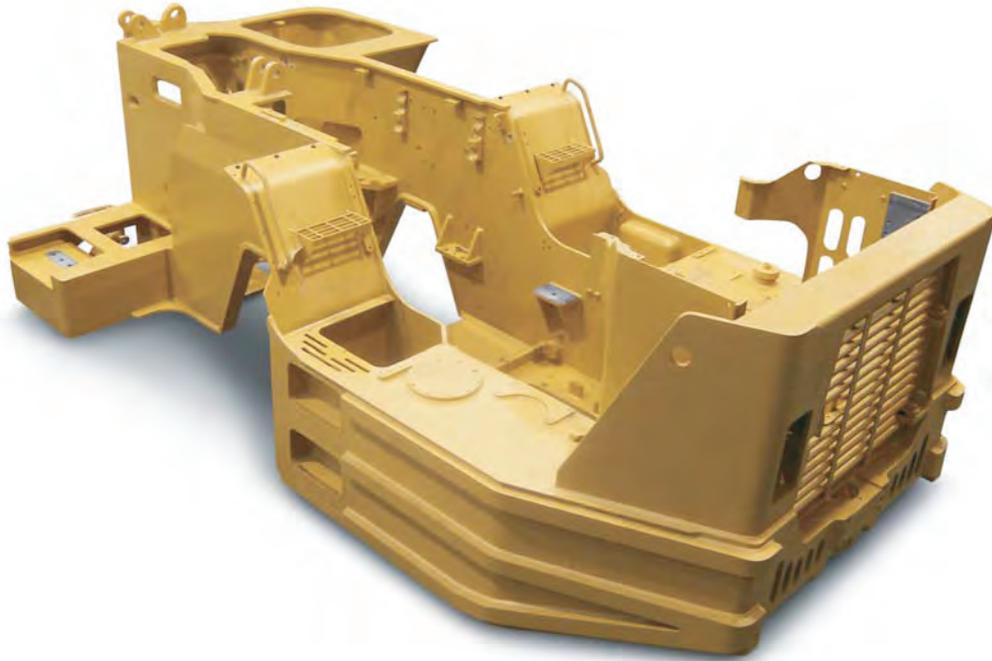
STIC™ control system integrates steering and transmission functions into a single controller for maximum responsiveness and smooth control.

Optional Ride Control

Automatic Ride Control enhances machine ride and performance at speeds above 5 km/h (3 mph).

Cat Hydraulic Hose

Field proven Cat high pressure XT™ hydraulic hose is exceptionally strong and flexible for maximum system reliability and long life in the most demanding conditions. Reusable couplings with O-ring face seals provide superior, leak free performance and prolong hose assembly life.



Structures

Rugged Cat structures – the backbone of the R1600G's durability.

Frame Design

The frame is engineered to withstand extreme forces generated during loading and tramming cycles. A precision manufacturing process ensures every structure is consistently built to high quality. Deep penetration and consistent welds throughout the frame ensures structures are solidly fused to provide a sturdy platform for the linkage and the axles. The bores and the surfaces are precisely machined for perfect alignments for the pins and precision mating surfaces for major components resulting in durable frames that allow complete machine rebuild for 2nd or 3rd life.

Z-Bar Loader Linkage

Proven Z-Bar loader linkage geometry generates powerful breakout force and an increased rack back angle for better bucket loading and material retention. Heavy duty steel lift arms with cast steel cross tube ensures extreme loads encountered during loading and tramming are efficiently dissipated for long service life.

Sealed Pins

Sealed colleted pins are fitted to all bucket and lift arm hinge points for longer pin and bushing life. This reduces maintenance costs and extends service intervals. The sealed joints retain lubrication and prevent contaminant entry.

Hitch

Spread hitch design widens the distance between upper and lower hitch plates to distribute forces and increase bearing life. Thicker hitch plates reduce deflection. The wide opening provides easy service access. Upper and lower hitch pins pivot on roller bearings to distribute horizontal and vertical loads over a greater surface area. Shim adjusted preload reduces maintenance time. An on-board steering frame lock pin is fitted to prevent articulation during maintenance and service.

Operator Comfort

Ergonomically designed for all-day comfort, control and productivity.

The operator station is ergonomically designed for total machine control in a comfortable, productive and safe environment. All controls, levers, switches and gauges are positioned to maximize productivity and minimize operator fatigue.

Protective Structure

Integral to the cab and frame, the Rollover Protective Structure (ROPS) and the Falling Objects Protective Structure (FOPS), are resiliently mounted to the frame to isolate the operator from vibration for a more comfortable ride.

Optional Enclosed Cab

Optional sound-suppressed ROPS cab provides a quiet, secure working environment. Large window openings offer excellent visibility in all directions. Enclosed design provides fresh, pressurized, temperature-controlled air circulation with air condition for a more comfortable working environment.

STIC™ Steering and Transmission Integrated Control

STIC™ provides effortless control of the complete mobility of the machine by single controller. Simple side-to-side motion articulates the machine. Directional shifting (forward/neutral/reverse) is controlled using a three position rocker switch. The thumb operated buttons control gear selection.

Dual-Pedal Braking

Dual brake pedals function as a brake and a transmission neutralizer so the operator can maintain high engine rpm for full hydraulic flow and fast cycle times.

Monitoring System

Cat® Electronic Monitoring System (Cat EMS) continuously provides critical machine data to keep the machine performing at top production levels.

- **Message Center.** Three-category warning system alerts operator of abnormal machine health conditions.
- **Gauge Cluster.** Maintains a constant display of vital machine functions.
- **Speedometer/Tachometer Module.** Monitors three systems: engine speed, ground speed and gear indicator.

Pilot Controls

Low-effort pilot operated joystick controls integrate steering, transmission and implement functions for smoother, faster cycles with less operator fatigue.

Suspension Seat

Ergonomic, fully adjustable suspension seat provides optimal operator comfort. Thick cushions reduce pressure on lower back and thighs. Wide, retractable seat belts provide a secure, comfortable restraint.



Loader Bucket Systems

Rugged performance and reliability in tough underground mining applications.



Buckets

Aggressive Cat bucket designs deliver unmatched productivity in the most demanding applications. Underground mining buckets are designed for optimal loadability and structural reliability to help lower your cost-per-ton.

Bucket Selection

Cat underground loader buckets are available in two styles to meet a range of loading, hauling and dumping conditions.

- Dump buckets
- Ejector buckets

Bucket Capacities

Buckets are available in a range of sizes and capacities to suit most material types and densities.

Optional Wear Packages

Weld-on wear plates in high wear areas are standard. Additional wear packages, including sacrificial wear strips and Cat heel shrouds protect the edges from damage and reduce the need for costly bucket rebuilds.

Optional Cutting Edges

Cat half arrow and cast half arrow cutting edges extend bucket life in high wear applications.





Serviceability

More time for production.

Service Access

Easy access to daily service points simplifies servicing and reduces time spent on regular maintenance procedures.

Ground-Level Access

Allows convenient servicing to all tanks, filters, lubrication points and compartment drains.

Air Filters

Radial seal air filters are easy to change, reducing time required for air filter maintenance.

Sight Gauges

Fluid level checks are made easier with sight gauges.

Diagnostics

Cat Electronic Technician (Cat ET) service tool enables quick electronic diagnosis of machine performance and key diagnostic data for effective maintenance and repairs.

Sealed Electrical Connectors

Electrical connectors are sealed to lock out dust and moisture. Harnesses are covered for protection. Wires are color and number coded for easy diagnosis and repair.

S·O·SSM

S·O·SSM helps avoid minor repairs becoming major ones.

Customer Support

Cat® dealer services keep underground mining equipment productive.



Cat dealers offer solutions, services and products that help lower costs, enhance productivity and manage your operation efficiently. From the selection of Cat equipment until the day you rebuild, trade or sell it, the support you get from your Cat dealer makes the difference that counts.

Dealer Capability

Cat dealers will provide the level of support you need, on a global scale. Dealer expert technicians have the knowledge, experience, training and tooling to handle your repair and maintenance needs, when and where you need them.

Product Support

When Cat products reach the field, they are supported 24/7 by a worldwide network of reliable and prompt parts distribution facilities, dealer service centers, and technical training facilities to keep your equipment up and running.

Service Support

Cat equipment is designed and built to provide maximum productivity and operating economy throughout its working life. Cat dealers offer a wide range of service plans that will maximize return on your investment, including:

- Preventive Maintenance Programs
- Diagnostic Programs, such as S·O·SSM and Technical Analysis
- Rebuild and Reman Options
- Customer Support Agreements

Technology Products

Cat dealers offer a range of advanced technology products designed to improve efficiency, productivity and lower costs.

Operator Training

Today's complex products require operators have a thorough understanding of machine systems and operating techniques to maximize efficiency and profitability. Your Cat dealer can arrange training to improve productivity, decrease downtime, reduce operating costs, enhance safety, and improve your return on investment.

Application Awareness

Application and site-specific factors, such as: material density, loading position, grades, speeds, and haul road design influence operating and maintenance costs. Your Cat dealer can provide you with the understanding to optimize productivity and the total cost of ownership.

www.cat.com

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



Safety

Designed with safety as the first priority.

Product Safety

Caterpillar has been and continues to be proactive in developing mining machines that meet or exceed safety standards. Safety is an integral part of all machine and systems designs.

Engine Shut Off Switch

A secondary engine shutoff switch is located at ground level.

Integral ROPS Cab

Integral to the cab and frame, the ROPS is resiliently mounted to the frame to isolate the operator from vibration for a more comfortable ride.

Brake Systems

Four corner oil-cooled braking system provides excellent control. The service brake system is actuated by modulated hydraulic pressure, while the parking brake function is spring applied and hydraulic released. This system assures braking in the event of loss of hydraulic pressure.

Standard Safety Features

Anti-skid upper deck surfaces, ground level compartment sight gauges, increased visibility, 3-point access to cab and machine, push out safety glass, suspension seat, inertia reel retractable seat belt, lift arm support pins, hot and cold side of engine, steering frame lock, hinged belly guards.

SAFETY.CAT.COM™

For more complete information on safety, please visit <http://safety.cat.com>.

R1600G Underground Mining Loader Specifications

Engine

Engine Model	Cat® 3176C EUI ATAAC	
Rated Power	2,100 rpm	
Gross Power – SAE J1995 (1st gear/2-4th gear)	185/200 kW 248/268 hp	
Net Power – SAE J1349 (1st gear/2-4th gear)	165/180 kW 221/241 hp	
Net Power – ISO 9249 (1st gear/2-4th gear)	165/180 kW 221/241 hp	
Net Power – 80/1269/EEC (1st gear/2-4th gear)	165/180 kW 221/241 hp	
Bore	125 mm	4.9 in
Stroke	140 mm	5.5 in
Displacement	10.3 L	629.4 in ³

- Power ratings apply at a rated speed of 2,100 rpm when tested under the reference conditions for the specified standard.
- Ratings based on SAE J1995 standard air conditions of 25° C (77° F) and 100 kPa (29.61 Hg) barometer. Power based on fuel having API gravity of 35 at 16° C (60° F) and an LHV of 42 780 kJ/kg (18,390 BTU/lb) when engine used at 30° C (86° F).
- Engine derate will commence at an altitude of 3000 m (9,842.5 ft).
- Compliant with U.S. Environmental Protection Agency Tier 2 emissions standards.

Operating Specifications

Nominal Payload Capacity	10 200 kg	22,487 lb
Gross Machine Operating Weight	40 000 kg	88,185 lb
Static Tipping Load Straight Ahead Lift Arms Horizontal	28 100 kg	61,950 lb
Static Tipping Load Full Turn Lift Arms Horizontal	23 500 kg	51,809 lb
Breakout Force (SAE)	19 280 kg	42,505 lb

Weights

Empty	29 800 kg	65,698 lb
Front Axle	12 516 kg	27,593 lb
Rear Axle	17 284 kg	38,105 lb
Loaded	40 000 kg	88,185 lb
Front Axle	28 000 kg	61,729 lb
Rear Axle	12 000 kg	26,456 lb

Transmission

Forward 1	5 km/h	3.1 mph
Forward 2	8.7 km/h	5.4 mph
Forward 3	15.2 km/h	9.5 mph
Forward 4	22.1 km/h	13.7 mph
Reverse 1	5.7 km/h	3.5 mph
Reverse 2	9.9 km/h	6.2 mph
Reverse 3	17.2 km/h	10.7 mph
Reverse 4	23.8 km/h	14.8 mph

Hydraulic Cycle Time

Raise	7.6 Seconds
Dump	1.6 Seconds
Lower, empty, float down	2 Seconds
Total Cycle Time	11.2 Seconds

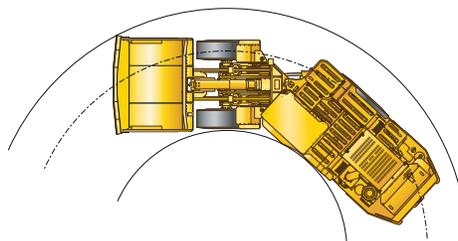
Bucket Capacities

Dump Bucket – 1	4.8 m ³	6.3 yd ³
Dump Bucket – 2	4.2 m ³	5.5 yd ³
Dump Bucket – 3	5.6 m ³	7.3 yd ³
Dump Bucket – 4	5.9 m ³	7.7 yd ³
Ejector Bucket	4.8 m ³	6.3 yd ³

Turning Dimensions

Outside Clearance Radius*	6638 mm	261.3 in
Inner Clearance Radius*	3291 mm	129.6 in
Axle Oscillation	10°	
Articulation Angle	42.5°	

* Clearance dimensions are for reference only.



Tires

Tire Size	18.00 × 25 – 28 PLY STMS L5S
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Service Refill Capacities

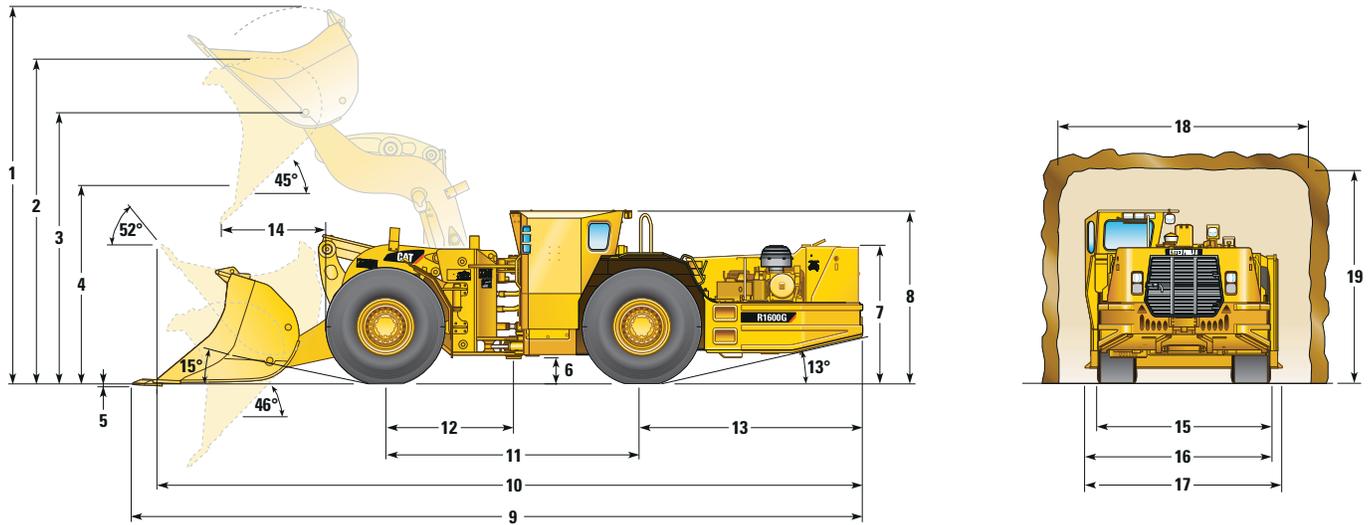
Engine Crankcase with Filter	36.1 L	9.5 gal
Transmission	47 L	12.4 gal
Hydraulic Tank	125 L	33 gal
Cooling System	53 L	14 gal
Front Differential and Final Drives	70 L	18.5 gal
Rear Differential and Final Drives	70 L	18.5 gal
Front Differential and Final Drives (with Axle Oil Cooler)	80 L	21.1 gal
Rear Differential and Final Drives (with Axle Oil Cooler)	80 L	21.1 gal
Fuel Tank	400 L	105.7 gal
Secondary Fuel Tank (If Equipped)	330 L	87.2 gal

Standards

Brakes	ISO 3450, AS2958.1, CAN-CSA424.30-M90
Cab/FOPS	BS EN ISO 3449, SAE J231, AS2294.3
Cab/ROPS	ISO 3471, SAE J1040, AS2294.2, EN13510

Dimensions

All dimensions are approximate.



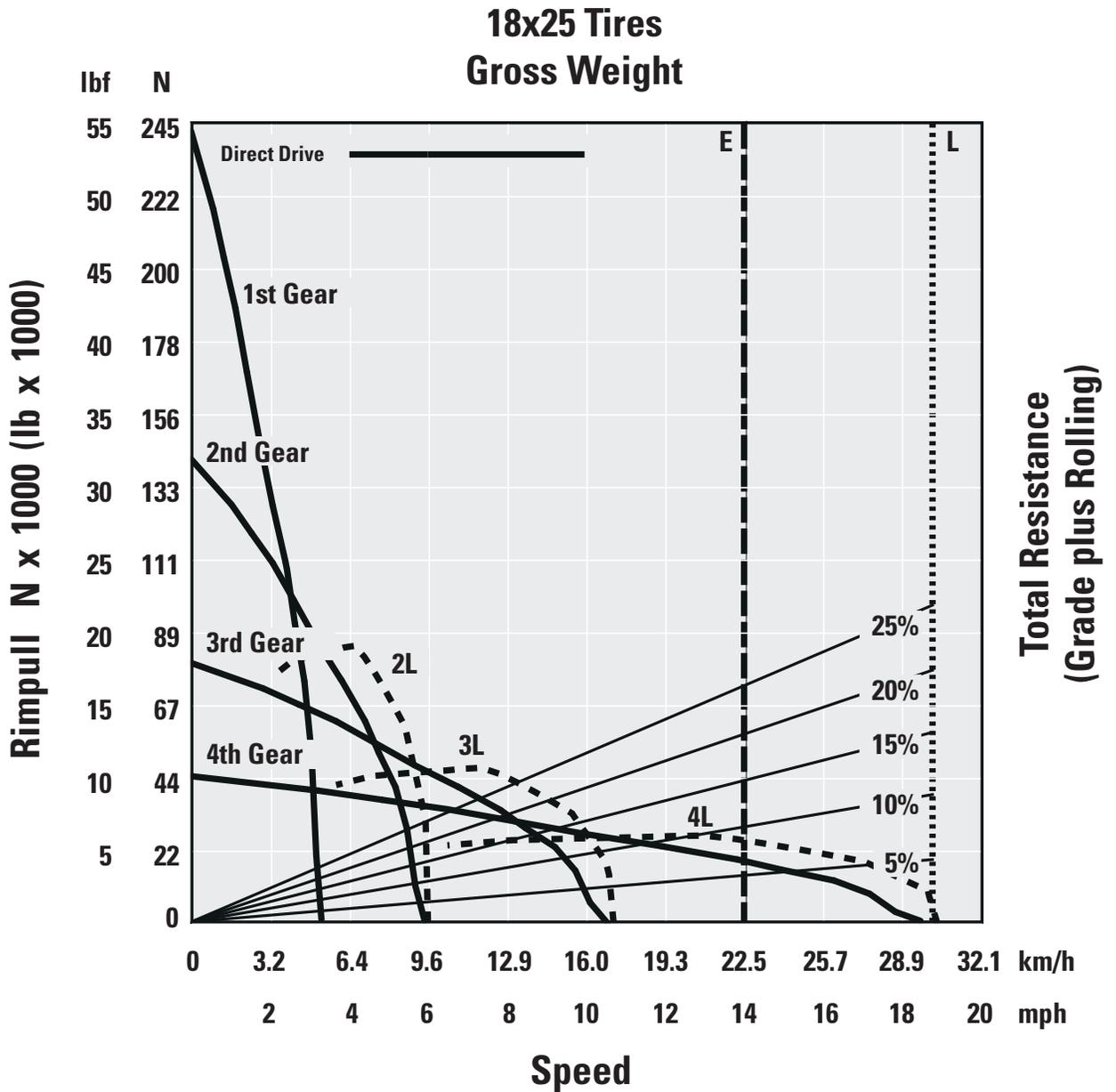
	227-4702		203-1792		227-4704		227-4703		229-1676	
	Dump Bucket		Dump Bucket		Dump Bucket		Dump Bucket		Ejector Bucket	
Bucket Capacity	4.2 m ³	5.5 yd ³	4.8 m ³	6.3 yd ³	5.6 m ³	7.3 yd ³	5.9 m ³	7.7 yd ³	4.8 m ³	6.3 yd ³
	mm	in								
Bucket Width over Cutting Edge	2600	102.4	2600	102.4	2600	102.4	2900	114.2	2600	102.4
1 Height – Bucket Raised	5114	201.3	5204	204.9	5282	208.0	5242	206.4	5385	212.0
2 Height – Max Dump	4497	177.0	4497	177.0	4497	177.0	4497	177.0	4565	179.7
3 Height – Max Lift Bucket Pin	3752	147.7	3752	147.7	3752	147.7	3752	147.7	3752	147.7
4 Height – Dump Clearance at Max Lift	2311	91.0	2207	86.9	2042	80.4	2114	83.2	2120	83.5
5 Height – Digging Depth	28	1.1	39	1.5	54	2.1	45	1.8	47	1.9
6 Height – Ground Clearance	344	13.5	344	13.5	344	13.5	344	13.5	344	13.5
7 Height – Top of Hood	1895	74.6	1895	74.6	1895	74.6	1895	74.6	1895	74.6
8 Height – Top of ROPS	2400	94.5	2400	94.5	2400	94.5	2400	94.5	2400	94.5
9 Length – Overall (Digging)	9955	391.9	10 107	397.9	10 347	407.4	10 243	403.3	10 233	402.9
10 Length – Overall (Tramming)	9619	378.7	9711	382.3	9853	387.9	9790	385.4	9948	391.7
11 Length – Wheelbase	3536	139.2	3536	139.2	3536	139.2	3536	139.2	3536	139.2
12 Length – Front Axle to Hitch	1768	69.6	1768	69.6	1768	69.6	1768	69.6	1768	69.6
13 Length – Rear Axle to Bumper	3055	120.3	3055	120.3	3055	120.3	3055	120.3	3055	120.3
14 Length – Reach	1304	51.3	1408	55.4	1573	61.9	1504	59.2	1495	58.9
15 Width – Overall Tire	2400	94.5	2400	94.5	2400	94.5	2400	94.5	2400	94.5
16 Width – Machine with Bucket	2723	107.2	2723	107.2	2723	107.2	3018	118.8	2723	107.2
17 Width – Machine without Bucket	2564	100.9	2564	100.9	2564	100.9	2564	100.9	2564	100.9
18 Recommended Clearance Width	3500	137.8	3500	137.8	3500	137.8	3500	137.8	3500	137.8
19 Recommended Clearance Height	3000	118.1	3000	118.1	3000	118.1	3000	118.1	3000	118.1

R1600G Underground Mining Loader Specifications

Gradeability/Speed/Rimpull

To determine gradeability performance: Read from gross weight down to the percent of total resistance. Total resistance equals actual percent grade plus rolling resistance. As a general guide use 2% for rolling resistance in underground application or refer to the Caterpillar Performance Handbook. From the total resistance point, read horizontally to the curve with the highest obtainable gear, then down to maximum speed. Usable rimpull will depend upon traction available and weight on drive wheels.

- - - - - Typical Field Empty Weight
 Loaded Weight



E – Empty 29 800 kg (65,698 lb)
 L – Loaded 40 000 kg (88,185 lb)

R1600G Standard Equipment

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

ELECTRICAL

Alternator, 95-amp
Battery Disconnect Switch, Ground Level
Circuit Breaker, 80-amp
Corrosive Protection Spray
Diagnostic Connector
Electric Starting, 24-volt
Engine Shutdown Switch
External Lighting System, Front, Rear
Low Maintenance Batteries
Reversing Alarm
Starting and Charging System

OPERATOR ENVIRONMENT

Cat Electronic Monitoring System (Cat EMS)
Electric Horns
Gauges
 Engine Coolant Temperature
 Fuel Level
 Hydraulic Oil
 Speedometer
 Tachometer
Pilot Hydraulic Implement Controls,
Single Joystick
ROPS/FOPS Structure
Suspension Seat with Retractable Seat Belt
STIC™ Steering

POWER TRAIN

Cat 3176C EUI ATAAC Diesel Engine
Engine Air Intake Precleaner
Technology, 6-Cylinder
Long Life Coolant
SAFR™ Full Hydraulic Enclosed Wet
Multiple-Disc Brakes
Heat Shields
Planetary Powershift Transmission
with Automatic Shift Control,
4 Speed Forward/4 Speed Reverse
Torque Converter with Automatic
Lockup Clutch
Transmission Neutralizer

OTHER STANDARD EQUIPMENT

Brake Axle Cooling
Bucket Positioner, Return To Dig
Catalytic Exhaust Purifier/Muffler Group
Engine and Transmission Belly Guards
Fenders, Front, Rear
Firewall
Hydraulic Oil Cooler – Swing Out
Rear Frame Protection Wear Bars
100 × 50 mm (4 × 2 in)
Swing Out Radiator Grill
Tires, 18.00 × 25 – 28 PLY STMS L5S

R1600G Optional Equipment

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

Alternative Tire Arrangements
Automatic Lube System
Auxiliary Start Receptacle
Brake Light
Brake Pressure Gauges
Brake Release Arrangements
Bucket Heel Shrouds
Bucket Sacrificial Wear Strip Package
Centralized Lube System, Manual
Draw Bar Attachment, Bolt-on
Dual Fuel Tanks
Ejector Bucket Ready
Electronic Access Module

Fast Fill System
 Coolant
 Engine
 Fuel
 Hydraulic
 Transmission
Fire Extinguishers
Fire Suppression System
Front Light Protectors
Heater, Air Conditioning
Idle Timer
Oil Sample Adapters
Operators Station
 Air Conditioning
 Pressurizer
 Dome Light
 Radio Ready

Payload Control System (PCS)
Remote Control Interface Kit
Residual Brake Pressure Light,
Dash Mounted
Reversible Steering, Wheel Steer
Ride Control System
Seat Covers
Secondary Steering System
Service Tools
Starting Receptacle
Tee Seat

R1600G Underground Mining Loader

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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