

Toro[®] LH515i

Safer.
Stronger.
Smarter.



Technical specification

Toro® LH515i

Toro® LH515i is a high capacity underground loader for hard rock applications.

Toro® LH515i combines smart geometry with powerful thrust, high breakout forces, responsive controls and high tramming speeds. The advanced but still robust loader provides fast bucket filling, high fill factors, fast cycle times and proven reliability for underground mining use.

Toro® LH515i is equipped with Sandvik Intelligent Control System, the backbone of the loader. The control system monitors the equipment productivity and health, and enables multiple smart solutions, such as the optionally available Integrated Weighing System and full AutoMine® loading capability.

SHARK™ Ground Engaging Tools (G.E.T.) are available on a wide range of bucket sizes, optimized for loader productivity and extended bucket service life.



Capacities	
Maximum tramming capacity	15 000 kg
Break out force, lift	28 100 kg
Break out force, tilt	24 500 kg
Standard bucket	6.3 m ³

Speeds forward & reverse (Level/loaded, with lock-up) with Volvo TAD1350VE engine

1st gear	5.2 km/h
2nd gear	9.4 km/h
3rd gear	15.7 km/h
4th gear	28.2 km/h

Bucket motion times	
Raising time	6.9 sec
Lowering time	4.3 sec
Dumping time	3.0 sec

Operating weights *

Total operating weight	39 600 kg
Front axle	16 900 kg
Rear axle	22 700 kg

Loaded weights *

Total loaded weight	54 600 kg
Front axle	40 000 kg
Rear axle	14 600 kg

* Unit weight is dependent on the selected options

Operational conditions and limits	
Environmental temperature	From -20°C to +55°C
Standard operating altitude (at sea level)	± 1700m (variable of 5%)
Requirements and compliance	
Compliance with 2006/95/EC Low voltage directive	
Compliance with 2004/108/EC Electromagnetic compatibility directive	
Compliance with 2006/42/EC Machinery directive (Equipment for EU area, achieved with relevant options)	
Design based on EN 1889-1. Machines for underground mines. Mobile machines working underground. Safety. Part 1: Rubber tyred vehicles.	
Design based on MDG 15. Guideline for mobile and transportable equipment for use in mines. (Equipment for Australia, achieved with relevant options)	
Electrical system based on IEC 60204-1. Safety of machinery – Electrical equipment of machines – Part 1: General requirements	
CONTAINS FLUORINATED GREENHOUSE GASES Refrigerant R134a under pressure max 391 PSI Filled weight: 1.5 kg CO2e: 2145 kg GWP: 1430 Information based on the F Gas Regulation (EU) No 517/2016	
Engine	
Diesel engine	Volvo TAD1181VE
Output	265 kW @ 2100 rpm
Torque	1795 Nm @ 1400 rpm
Engine brake	Yes (modulating 0-100%)
Number of cylinders	In-line 6
Displacement	10.84 l
Cooling system	Liquid cooled and piston pump driven cooler fan
Combustion principle	4-stroke, direct injection, turbo with intercooler
Air filtration	Two stage filtration, dry type
Electric system	24 V
Emissions	EU NRMM Stage V
Ventilation rate (Ultra low sulphur fuel, AdBlue)	MSHA 12 000 cfm, Canmet 12 500 cfm
MSHA Particulate index (Ultra low sulphur fuel, AdBlue)	500 cfm
Exhaust system	DPF+SCR
Average fuel consumption at 40% load	28 l/h
Fuel tank refill capacity	550 l
Compatible with paraffinic diesel fuel (EN 15940)	Yes

Transmission	
Fully automatic Dana transmission with electric shifting system. Includes converter with lock-up. Four gears forward and reverse with de-clutch function. Dana self-diagnostics fully integrated into Sandvik Intelligent Control System. Upbox: Kessler, ratio 1:1	
Axles	
Front axle, spring applied hydraulic operated brakes. Fixed.	Kessler D106, limited slip differential.
Rear axle, spring applied hydraulic operated brakes. Oscillating ± 8°.	Kessler D106, limited slip differential.
Tires	
Tire size (Tires are application approved. Brand and type subject to availability.)	26.5-R25
Hydraulics	
Electric filling pump for hydraulic oil	
Door interlock for brakes and boom, bucket, and steering hydraulics	
Oil cooler for hydraulic and transmission oil capability up to 50°C ambient temperature	
ORFS fittings	
MSHA approved hoses	
Hydraulic oil tank capacity 249 l	
Sight glass for oil level, 1 pc	
Steering hydraulics	
Full hydraulic, centre-point articulation, power steering with two double acting cylinders. Steering lock.	Steering controlled by electric joystick.
Steering main valve	Open circuit type, LS controlled
Steering hydraulic cylinders	100 mm, 2 pcs
Steering pump	Piston type
Steering and servo hydraulic pumps	Piston type
Bucket hydraulics	
The oil flow from steering hydraulic pump is directed to bucket hydraulics when steering is not used.	Joystick bucket and boom control (electric), equipped with piston pump that delivers oil to the bucket hydraulic main valve.
Boom system	Z-link
Lift cylinders	160 mm, 2 pcs
Dump cylinder	220 mm, 1 pc
Main valve	Open circuit type
Pump for bucket hydraulics	Piston type

Brakes
Service brakes are spring applied; hydraulically operated multidisc wet brakes on all wheels. Two independent circuits: one for the front and one for the rear axle. Service brakes also function as an emergency and parking brake. Brake system performance complies with requirements of EN ISO 3450, AS2958.1 and SABS 1589.
Neutral brake
Automatic brake activation system, ABA
Electrically driven emergency brake release pump
One tank system
Brake-by-wire

Cabin
ROPS certification according to EN ISO 3471
FOPS certification according to EN ISO 3449
Sealed, air conditioned, over pressurized, noise suppressed closed cabin
Sound absorbent material to reduce noise
Laminated glass windows
Cabin mounted on rubber mounts to the frame to reduce vibrations
Air conditioning unit located outside the cabin to reduce noise inside the cabin
Powered pre-filter for A/C device
Adjustable joysticks
No high pressure hoses in the operator's compartment
Inclinometers to indicate operating angle
Emergency exit
Floor washable with water to reduce dust
Three-point contact access system with replaceable and colour coded handles and steps
12 V output
Remote circuit breaker switch

Control system, dashboard and displays
A 12” color display with advanced touch screen functionality has all the needed information and alarms on one large display giving the operator more time to keep eyes on the road. New dark background graphics with clear symbols are designed for the underground mining environment to reduce eye fatigue, while red interior cabin lighting is also designed to not affect night vision during driving.
Sandvik Intelligent Control System
Critical warnings and alarms displayed as text and with light
12” color display with touch screen function and adjustable contrast and brightness, illuminated switches
My Sandvik Digital Services Knowledge Box™ on-board hardware
Supports 3G, 4G, LTE and WLAN data transfer

Operator's seat
Toro® LH515i cabin is fitted with an adjustable low frequency suspension seat with two-point seat belt or optional high back seat with four-point seat belt. New softer padded arm rests and adjustable joysticks can be configured either on the cabin wall or fixed to the seat.
Low frequency suspension
Height adjustment
Adjustment according to the operator's weight
Padded and adjustable arm rests
Two-point seat belt
Fore & aft isolator to minimise vibrations in driving direction
Adjustable lumbar support
Selectable damping

Measured vibration level	
Whole body vibration was determined while operating the loader in a simulated working cycle consisting of loading, unloading and driving with and without load. The value is determined applying standards EN 1032 and ISO 2631-1.	
Maximum r.m.s. value a _w [m/s²]	0,84
VDV _w over 15 min period [m/s ^{1.75}]	7,49

Measured sound level	
The sound pressure level and sound power level at the operator's compartment, in a closed cabin, have been determined in stationary conditions on high idle and at full load, with engine Volvo TAD1181VE Stage V.	
Sound pressure level L _{pA} [dB re 20 µPa]	75 dB
Sound power level L _{WA} [dB re 1 p W]	117 dB

Rear and front frame
A heavy duty rear frame with added weight in the rear of the loader balances the machine perfectly when lifting and pushing into the muck pile. Heavy duty rear frame and mask with integrated reaction bars minimize damages from wall impacts. High strength structure with optimized material thicknesses and reduced own weight contribute to higher overall hauling capacity and long structural lifetime. Welded steel box structures used in the frame and boom provide strong resistance to shock loads and are optimized to reduce stresses and extend frame lifetime.
Adjustable upper bearing in central hinge
Tanks welded to the frame
Automatic central lubrication

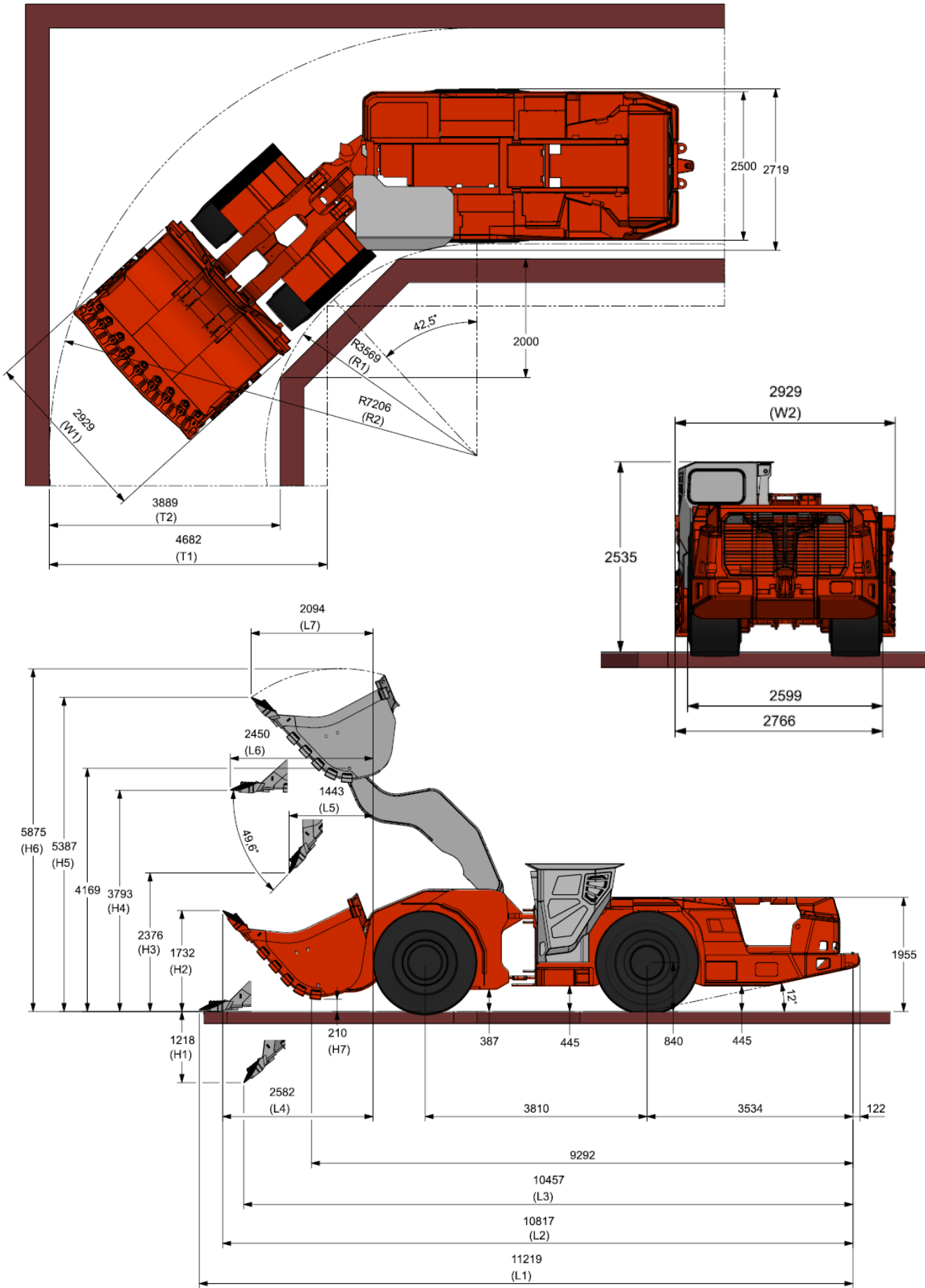
Electrical equipment	
Alternator	24 V, 150 A
Batteries	2 x 12 V, 180 Ah
Starter	9 kW, 24 V
Driving lights	LED lights: 4 pcs in front, rear and cabin
Working lights	LED lights: 1 pc under boom 2 pcs corner lights
Parking, brake and indicator (blinkers) lights	LED lights: 2 pcs in front 2 pcs in rear
Control system with 12" Color display 1 CPU module, 8 modules, 2 pcs safety modules Inbuilt system diagnostics	
Dual horn configuration with separate alarms for start and reverse	
Flashing beacon	
Illumination	
Illuminance E _{av} in front of the loader with 3 pieces of 50 W led lights and 2 pieces of 28W led lights at a distance of 20 m in front of the loader	
E _{av} low beam	125 lx
E _{av} high beam	133 lx
Illuminance E _{av} behind the loader with 4 pieces of 28 W led lights and 1 piece of 50 W led lights and at a distance of 20 m behind the loader::	
E _{av} low beam	20 lx
E _{av} high beam	52 lx
Toro® LH515i is compliant with South African Mine health and safety act 29 of 1996, because average light intensity in the direction of travel is more than 10 lux at a distance of 20 m.	
Fire safety	
Portable fire extinguisher, 12 kg (CE requirement)	
Hot side - cold side design	
Isolation of combustibles and ignition sources	
Heat insulation on exhaust manifold, turbo, and isolated exhaust pipe	
Energy isolation	
Lockable main switch, ground level access	
Starter isolator	
Emergency stop push buttons according to EN ISO 13850: 1 pc in cabin, 2 pcs in rear	
Pressure release in the expansion tank cap	
Automatic discharge for pressure accumulators (brake system and pilot circuit)	
Frame articulation locking device	
Mechanical boom locking device	
Wheel chocks and brackets	

Documentation	
Operator's Manual	English and other EU languages
Maintenance Manual	English and other EU languages
Parts Manual	English
Service and Repair Manual	English
E-manuals	2 x USB stick in pdf format, includes all manuals
Decals	English, Finnish, German and other languages as needed.
Options	
ANSUL Twin fire suppression system (CE requirement)	
Arctic packages	
AutoMine® Loading: Onboard Package	
Boom suspension (ride control)	
CE Declaration of conformity (CE requirement)	
Collision Prevention System interface	
Cover grills for lamps	
Cover grills for windows	
Disabled 4th gear	
Driving direction lights (red / green)	
Eclipse™ Fire suppression system with auto shutdown, Sustain or Extreme agent delivered separately (CE requirement)	
Emergency steering (CE requirement)	
High back rest seat with four point seatbelt	
Integrated weighing system (IWS)	
Jump start interface	
Line of sight radio remote control system	
Monitoring camera system	
Neutral brake	
Operator speed assist	
Pre- and post-lubrication for turbo	
Retrieval hook (hydraulic brake release by pulling the hook)	
Safety rails	
Spare rim 22.00-25/3.0 (for tyres 26.5R25)	
Traction control	
Tyre pressure monitoring system	
Wiggins quick filling set for fuel, coolant and oils (hydraulic, engine and transmission)	

Available buckets***			
Type	Volume SAE heaped (2:1) *	Width	Material broken density with fill factor 100%
G.E.T. (standard)	6.3 m³	2740 mm	2400 kg/m³
Bare Lip	6.8 m³	2740 mm	2200 kg/m³
G.E.T.	7.5 m³	3066 mm	2000 kg/m³
Bare Lip Ejector	6.3 m³	2830 mm	2200 kg/m³
Note: Depending on the bucket size and type, the actual payload may deviate from the nominal payload. ***Other bucket sizes will become available later			

Grade performance										
Volvo TAD1181VE 265 kW/2000 rpm (Stage V), with 3% rolling resistance and lock-up										
Empty										
Percent grade	0.0	2. 0	4.0	6.0	8.0	10.0	12.5	14.3	17.0	20.0
Ratio					1:12	1:10	1:8	1:7	1:6	1:5
1st gear (km/h)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
2nd gear (km(h)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.1	8.3	7.5
3rd gear (km/h)	15.9	15.9	15.9	15.9	14.6	13.0	9.1			
4th gear (km/h)	29.2	29.2	24.0							
Loaded										
Percent grade	0.0	2.0	4.0	6.0	8.0	10.0	12.5	14.3	17.0	20.0
Ratio					1:12	1:10	1:8	1:7	1:6	1:5
1st gear (km/h)	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
2nd gear (km(h)	9.4	9.4	9.4	9.4	9.4	8.9	7.9	7.3		
3rd gear (km/h)	15.9	15.9	15.9	13.4	11.5					
4th gear (km/h)	29.2	24.3								

Standard dimensions (with standard bucket)
in the drawing, necessary changing dimensions in a table.



Dimensions			
Volume SAE heaped 2:1 (m³)	6.3 (standard)	6.8	7.5
Maximum material broken density with fill factor 100% (kg/m³)	2400	2200	2000
Lip plate type	G.E.T.	Bare Lip	G.E.T.
L1(mm)	11219	11412	11418
L2(mm)	10817	10926	10946
L3(mm)	10457	10658	10605
L4(mm)	2582	2961	2711
L5(mm)	1443	1632	1577
L6(mm)	2450	2671	2645
L7(mm)	2094	2110	2228
H1(mm)	1218	1324	1345
H2(mm)	1732	1931	1878
H3(mm)	2376	2240	2228
H4(mm)	3793	3843	3793
H5(mm)	5387	5582	5528
H6(mm)	5875	5878	5879
H7(mm)	210	260	208
W1(mm)	2929	2830	3098
W2(mm)	2929	2835	3098
R1(mm)	3569	3569	3569
R2(mm)	7206	7203	7337
T1(mm)	4682	4682	4813
T2(mm)	3889	3886	4020

