

SANDVIK

TORO™ LH515i UNDERGROUND LOADER



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 AutoMine® loading readiness for fully automated use.

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

| | |
|-----------------------|--------------------|
| Tramming capacity | 15 000 kg |
| Break out force, lift | 28 110 kg |
| Break out force, tilt | 24 520 kg |
| Standard bucket | 6.3 m ³ |

SPEEDS FORWARD & REVERSE (LEVEL/LOADED) WITH VOLVO TAD1350VE ENGINE

| | |
|----------|-----------|
| 1st gear | 5.9 km/h |
| 2nd gear | 10.5 km/h |
| 3rd gear | 18.3 km/h |
| 4th gear | 32.7 km/h |

BUCKET MOTION TIMES

| | |
|---------------|---------|
| Raising time | 7.3 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 |



OPERATIONAL CONDITIONS AND LIMITS

| | |
|---------------------------|---------------------|
| Environmental temperature | From -20°C to +50°C |
|---------------------------|---------------------|

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
Filled weight: 1.5 kg
GWP: 1430

Information based on the F Gas Regulation (EU) No 517/2016

POWER TRAIN

ENGINE

| | |
|---------------------------|--|
| Diesel engine | Volvo TAD1350VE |
| Output | 256 kW @ 2100 rpm |
| Torque | 1 770 Nm @ 1260 rpm |
| Engine brake | No |
| Number of cylinders | In-line 6 |
| Displacement | 12.78 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 | Tier 3, Euro Stage III |
| Exhaust system | Catalytic purifier and muffler, double wall exhaust pipe |
| Fuel tank refill capacity | 548 l |

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.

AXLES

| | |
|--|--|
| Front axle, spring applied hydraulic operated brakes. Fixed. | Kessler D106, limited slip differential. |
|--|--|

| | |
|--|---|
| Rear axle, spring applied hydraulic operated brakes. Oscillating $\pm 8^\circ$. | Kessler D10 6, 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 405 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

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|---|--|
| 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. |
|---|--|

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|-------------|--------|
| 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

OPERATOR'S COMPARTMENT

Toro™ LH515i is available with a robust ROPS and FOPS certified cabin protecting the operator in case of roll over or falling objects.

The cabin is air-conditioned and uses dust and noise resistant upholstery materials, has 3-layer laminated safety glass windows, emergency exits, illuminated cabin entrance with three-point contact handles and anti-slip steps.

CABIN

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|---|
| 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 |

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 isolation |
| 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/s ²] | 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 μ Pa] | 75 dB |
| Sound power level L_{WA} [dB re 1 p W] | 117 dB |

FRAME

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

MAIN COMPONENTS

| | |
|---|---|
| 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 modudels inbuilt system diagnostics | |
| Dual horn configuration with separate alarms for start and reverse | |
| Flashing beacon | |

GRADE PERFORMANCE

Volvo TAD1181VE 265 kW/2000 rpm (optional engine)

Empty

| | | | | | | | | | |
|-----------------|------|------|------|------|------|------|------|------|------|
| Percent grade | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | 12.5 | 14.3 | 17.0 |
| Ratio | | | | | 1:12 | 1:10 | 1:8 | 1:7 | |
| 1st gear (km/h) | 5.4 | 5.4 | 5.4 | 5.3 | 5.3 | 5.3 | 5.3 | 5.3 | 5.2 |
| 2nd gear (km/h) | 9.9 | 9.8 | 9.7 | 9.7 | 9.6 | 9.5 | 9.5 | 9.0 | 8.2 |
| 3rd gear (km/h) | 16.5 | 16.3 | 16.1 | 15.9 | 14.4 | 12.8 | | | |
| 4th gear (km/h) | 29.9 | 29.2 | 23.7 | | | | | | |

Loaded

| | | | | | | | | | |
|-----------------|------|------|------|------|------|------|------|------|------|
| Percent grade | 0.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 | 12.5 | 14.3 | 17.0 |
| Ratio | | | | | 1:12 | 1:10 | 1:8 | 1:7 | |
| 1st gear (km/h) | 5.4 | 5.4 | 5.3 | 5.3 | 5.3 | 5.3 | 5.2 | 5.2 | 5.2 |
| 2nd gear (km/h) | 9.8 | 9.7 | 9.6 | 9.6 | 9.5 | 8.8 | 7.8 | 7.2 | |
| 3rd gear (km/h) | 16.4 | 16.1 | 15.6 | 13.3 | 11.4 | | | | |
| 4th gear (km/h) | 29.5 | 24.0 | | | | | | | |

INCLUDED SAFETY FEATURES

FIRE SAFETY

Portable fire extinguisher, 12 kg (CE)

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 of the loader

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

STANDARD MANUALS

| | |
|---------------------------|--|
| Operator's Manual | English and other EU languages |
| Maintenance Manual | English and other EU languages |
| Parts Manual | English |
| Service and Repair Manual | English |
| ToolMan | 2 x USB stick in pdf format, includes all the manuals |

OPTIONS

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|---|
| High back rest seat with four point seatbelt |
| Disabled 4th gear (mandatory in EU) |
| Seatbelt monitoring system |
| Cover grills for lamps |
| Spare rim 22.00-25/3.0 (for tyres 26.5-R25) |
| Boom suspension (ride control) |
| Line of sight radio remote control system |
| Retrieval hook (hydraulic brake release by pulling the hook) |
| Proximity Detection System (PDS) Interface |
| Driving direction lights (red / green) |
| Jump start interface |
| Wiggins quick filling set for fuel, coolant and oils (hydraulic, engine and transmission) |
| Integrated weighing system |
| CE Declaration of conformity (CE requirement) |
| Eclipse™ Fire suppression system with auto shutdown, Sustain or Extreme agent delivered separately (CE requirement) |
| Safety rails |
| Monitoring camera system |
| Emergency steering (CE requirement) |
| Neutral brake |
| Tyre pressure monitoring system |
| Traction control |
| Wheel chocks |
| Artic Packages |
| ANSUL Twin fire suppression system (CE requirement) |

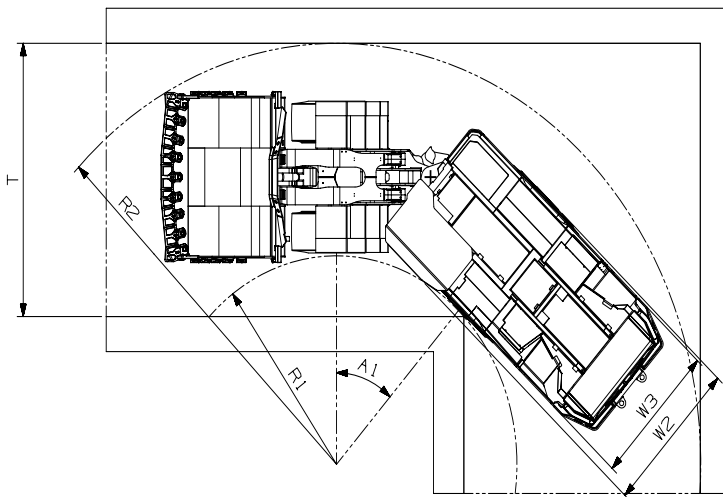
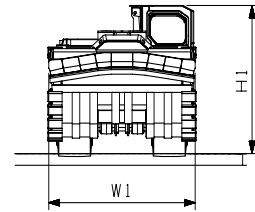
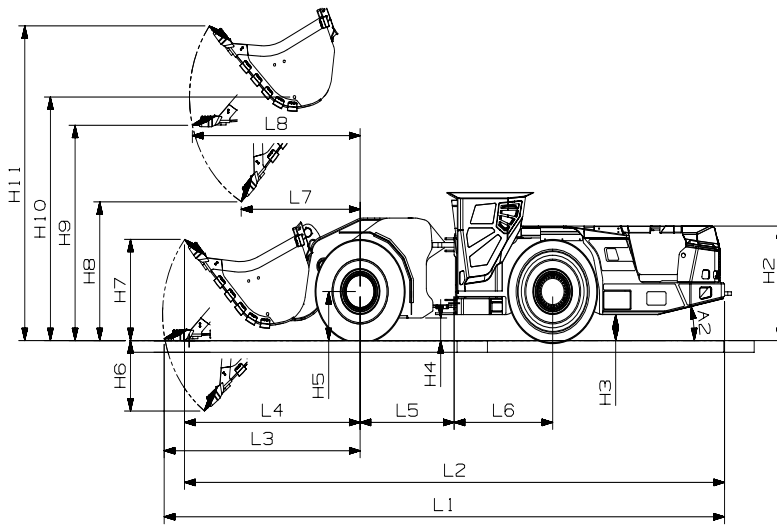
OPTIONAL ENGINE

| | |
|---------------|--------------------|
| Diesel engine | Volvo TAD1181VE |
| Output | 265 kW @ 2 100 rpm |
| Engine brake | Yes |
| Emissions | Stage V |

AVAILABLE BUCKETS

| TYPE | VOLUME | WIDTH | MAX. MATERIAL DENSITY |
|--------|--------------------|---------|------------------------|
| G.E.T. | 7.5 m ³ | 3066 mm | 2000 kg/m ³ |

DIMENSIONS



| Dimension | 6.3m3 |
|----------------|-------|
| | STD |
| L1 | 11220 |
| L2 | 10817 |
| L3 | 3876 |
| L4 | 3474 |
| L5 | 1860 |
| L6 | 1950 |
| L7 | 2352 |
| L8 | 3318 |
| H1 | 2535 |
| H2 | 1960 |
| H3 | 445 |
| H4 | 387 |
| H5 | 840 |
| H6 | 1206 |
| H7 | 1732 |
| H8 | 2375 |
| H9 | 3685 |
| H10 | 4169 |
| H11 | 5387 |
| W1 | 2896 |
| W2 | 2719 |
| W3 | 2500 |
| R1, left turn | 3569 |
| R2, left turn | 7206 |
| R1, right turn | 3582 |
| R2, right turn | 7206 |
| A1, left turn | 42.5° |
| A1, right turn | 42.5° |
| A2 | 12° |
| T | 4677 |

