SANDVIK

TORO™ LH514BE BATTERY ASSISTED ELECTRIC LOADER

UNIQUE POWERTRAIN TECHNOLOGY

The Toro™ LH514BE loader from Sandvik is a unique combination of technology: a conventional electric loader, boosted with a battery. This one-of-a-kind equipment combines the best of two worlds, as it utilizes Sandvik's decades of experience in designing and building electric loaders and the new innovative battery technology of Sandvik's BEV equipment.

Less heat, less $CO^{2, no}$, no diesel exhaust

The Toro™ LH514BE loader utilizes today's cutting edge battery technology, based on Lithium-Iron Phosphate chemistry (LiFePO4 or LFP). LFP is the fit-for-purpose choice for underground mining environments. The loader produces no exhaust emissions and significantly less heat than traditional diesel engines, supporting the mines in reaching sustainability targets for example by means of reduced CO2 emissions. On a practical level, electric equipment helps to reduce ventilation requirements deep underground, having a positive impact on the bottom line.

Muck with cable, tram with battery

Toro™ LH514BE operates as a traditional cable electric loader. When mucking, it is powered by a trailing cable, connected the mine electric network. When the battery assisted Toro™ LH514BE needs to be moved to another area or to the maintenance bay, the power cable is disconnected from the electric grid and reeled in by the loader, as for the transfer drive, Toro™ LH514BE gets its power from its battery. Compared to the conventional electric loaders, this battery-assist to tramming makes an enormous difference, allowing easy relocation of the loader without a diesel vehicle needed to tow it to the new location.

Virtual gears

Due to the electric drive line, there are no conventional gears in Toro™ LH514BE. However, its virtual gears can be used to limit the loader speed. For example, if a virtual gear is set to a speed range of 0-5 km/h, it allows the operator to use the speed control pedal within that range. On that pre-set range, the operator can use the full movement of the throttle pedal, making it easy to accurately control the tramming speed. Naturally, the virtual gear function can be used to limit the equipment top speed. When the operators take their foot off the pedal, the equipment stops.

Energy efficient permanent magnet motor

The Toro™ LH514BE loader is equipped with a liquid-cooled permanent magnet motor for tramming, specifically well-suited for underground use. The benefits of the permanent magnet motor include compact size, light weight, high torque and high energy efficiency due to smaller energy losses. Additionally, the loader has its own motor for the work hydraulics, and a separate motor for cable reeling and brake flushing.

Extra boost for ramp drive

Compared to traditional cable electric loaders, which are mainly intended for level haulage, the battery pack of the Toro™ LH514BE gives an extra boost to the loader in uphill tramming. The battery assisted loader performs well in ramp drive.

SUPERIOR HYDRAULIC POWER

FAST BUCKET FILLING
Just as with Sandvik's LH514 loader, Toro™ LH514BE smart boom geometry is optimized to provide the highest in class breakout forces for fast bucket filling and handling of oversized rocks. Compared to a standard cable electric loader, Toro™ LH514BE has more weight in the rear frame, nicely balancing the equipment. The powerful boom and bucket hydraulics combined with smart geometry enable the use of both lift and tilt functions simultaneous when penetrating the muck pile, making one-pass bucket filling easy and contributing to high fill factors.

EFFICIENT LOAD SENSE HYDRAULICS
The proven load sense hydraulic system with variable displacement piston pumps provides on demand pressure and flow for greater efficiency, enabling increased tractive effort during loading.

DE-CLUTCH AND AUTOMATIC BUCKET SHAKING
The electrohydraulic controls include an easy button operated de-clutch function for truck loading. The automatic bucket shaking function, available as an option, shakes the filled bucket to drop loose rocks before moving on.
Steering and boom soft stops reduce shock loads and vibration and extend cylinder lifetime.

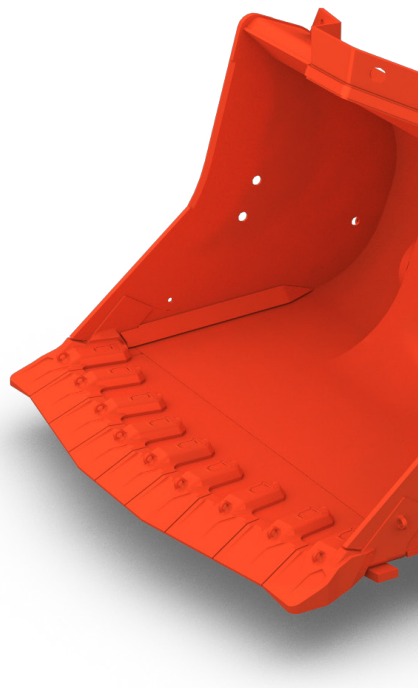
PRODUCTION MONITORING
Payload monitoring can assist in maximizing productivity, identifying training needs and reducing overloading. The optionally available Sandvik Integrated Weighing System (IWS) accurately measures payload when lifting the boom as well as the number of buckets filled during a shift and records the results to My Sandvik Digital Services Knowledge Box™. The Knowledge Box™ can transfer this production monitoring data through Wi-Fi connection for access via My Sandvik internet portal. Alternatively, data can be downloaded manually onto a USB stick.

LOW COST OF OWNERSHIP

TRAMMING POWER FROM BATTERY, LESS CABLE DAMAGE
Toro™ LH514BE has been designed for extended cable lifetime. The trailing cable is not exposed to damages during transfers, as it is nicely reeled on the loader's cable reel. This is possible because during transfer drive, the loader takes its power solely from its tramming battery. The tramming battery is charged during normal operation.

LONG BRAKE LIFE
Toro™ LH514BE uses the traction motors to decelerate and control machine speed while recharging the batteries. The brakes are rarely used due to the regenerative braking capability. Regenerative braking converts kinetic and gravitational potential energy back into usable battery energy rather than burning it off as heat and wear in the braking system. The result is less heat, better battery runtime and extremely long brake life.

FEWER TYRE CHANGES WITH TRACTION CONTROL
In the battery assisted loader, the optionally available traction control system performs extremely well. The system reduces wheel spin and slipping when penetrating to the muck pile, extending tyre lifetime. A reduced number of tyre changes results in lower costs and contributes to sustainability and resource efficiency.



REDUCED VENTILATION NEEDS
Benefits of electric loaders include that they produce less heat and no emissions, contributing to lower mine ventilation needs and potential for cost savings.

STRONG RESISTANCE TO SHOCK LOADS
Toro™ LH514BE welded steel box structures used in the frame and boom provide strong resistance to shock loads and are optimized to reduce stress as well as extend frame lifetime. Computer designed frames, using Finite Element Analysis (FEA) are made of high strength structural steel for superior strength to weight ratio.

EXTENSIVE STEEL PIPING
Extensive use of hydraulic steel piping throughout Toro™ LH514BE delivers a longer lifetime and easier maintenance access than traditional hydraulic hoses. Additionally, steel piping improves safety by reducing the risks of hydraulic hose failures.

EFFICIENT COOLING
Separate brake and hydraulic cooling provides increased performance and results in lower oil temperatures and reduced stress on the system. Separate cooling circuits for the battery and for the high voltage electrics ensure that the operating temperatures stay on the level required for the battery and electrics reliable operation.

LOWER BUCKET MAINTENANCE COSTS AND REDUCED DOWN TIME
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. Available as either mechanical or weld on systems, G.E.T. solutions provide lower overall bucket maintenance costs and reduced downtime.

READY FOR AUTOMATION

AutoMine®

Sandvik AutoMine® is the industry leader in automation for underground loaders and trucks. This high-performing, robust and comprehensive solution is operating around the world, backed by global network of Sandvik experts. The Toro™ LH514BE loader can either be ordered with AutoMine® Onboard Package, or it can be retrofitted later during the loader's lifetime.

With AutoMine®, a fleet of Toro™ LH514BE is converted into a high performing autonomous production system, providing significant safety and productivity improvements for mine operations.

OptiMine®

OptiMine® takes optimization further. It is the most comprehensive solution for analyzing and optimizing underground hard rock mining production and processes. It integrates all assets and people including non-Sandvik equipment delivering descriptive and predictive insights to improve operations.

Knowledge Box™

The Knowledge Box™ onboard Toro™ LH514BE transfers monitoring data through a Wi-Fi connection to the My Sandvik internet portal for visualization of fleet health, productivity and utilization. Transferred data can also be used by the OptiMine® solution for improving mining process efficiency.

Line of sight radio remote control

Our Toro™ LH514BE can be equipped with a line of sight radio remote control, available with a direct CAN bus connection to the Sandvik Intelligent Control System.

EASE OF MAINTENANCE & SERVICEABILITY

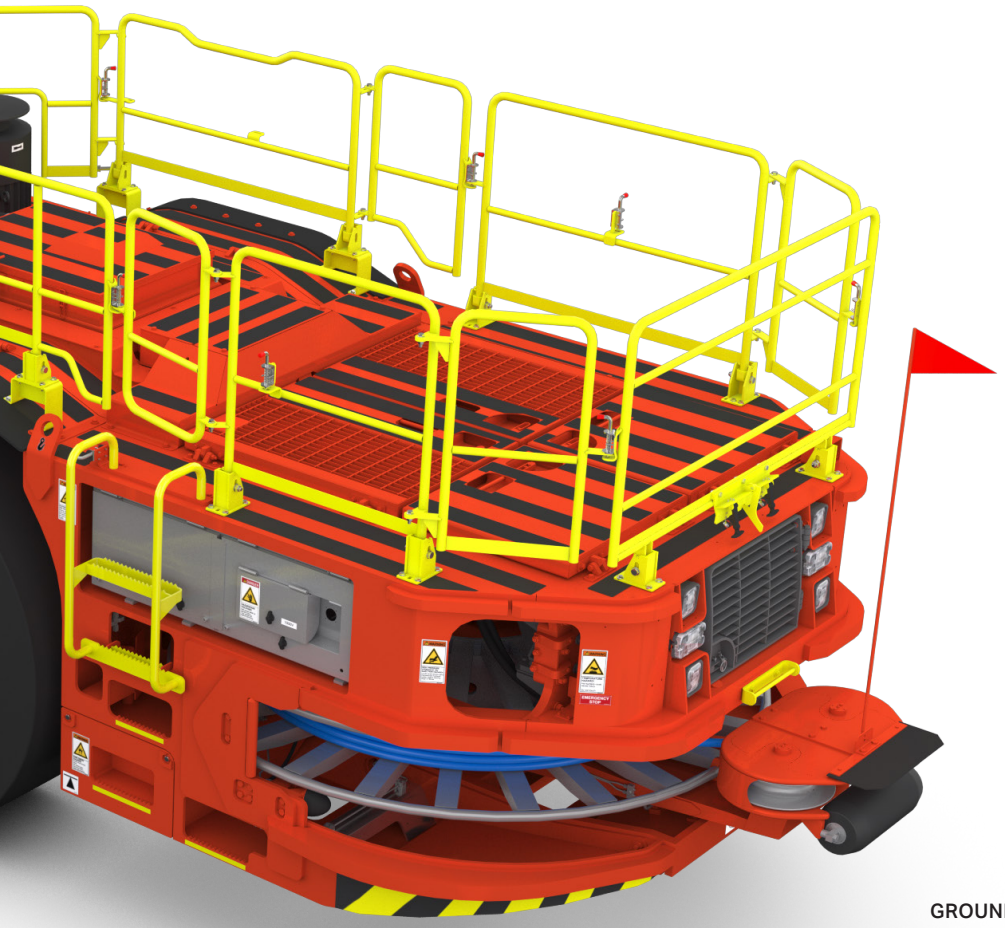
AUTOMATIC CENTRAL LUBRICATION SYSTEM
The standard automatic central lubrication system optimizes grease consumption and extends the life of the bushes and bearings. Activated by Sandvik Intelligent Control System when the parking brake is released, hard to reach areas are well lubricated and service time is reduced.

BATTERY HEALTH MONITORING
For general battery health and status monitoring, the battery temperature, voltage and current information is available from the control system diagnostics. The battery maintenance indicator light turns on when the battery needs to be taken to cell balancing and when state of charge (SOC) calibration is needed.

NO PIT STOPS FOR REFUELING
One of the differences of the Toro™ LH514BE loader compared to either diesel or battery electric equipment, is in refueling – or recharging. There is no diesel engine that would require fueling stops, and the battery does not need to be swapped because the battery is recharged during normal loader operation.

SANDVIK INTELLIGENT CONTROL SYSTEM
To minimize the need to move around the machine or use special tools, the 7" touch screen color display in the operator's compartment provides service information, easy system diagnostics and alarm log files. An automatic brake test with diagnostics and logging can also be performed from the display.

SAFETY ON TOP
Maintenance access to the top of the machine includes three-point high contrast handles and anti-slip steps on both front and rear frames. Optionally available, easy to assemble safety rails on the rear of the machine reduce risks of falling.



GROUND LEVEL DAILY SERVICE
Naturally, Toro™ LH514BE has been designed with smart placement of key service areas and safer service access, and all daily checks can be done on ground level. Standard onboard wheel chocks can be used to ensure the machine remains stationary. An electric filling pump for hydraulic oil quickly fills the hydraulic tank through a filter to ensure clean oil to protect the hydraulic system components.

SAFETY AND OPERATOR COMFORT

SMOOTH AND EFFORTLESS IN ROUGH CONDITIONS

The most notable benefit of the battery-assisted loader is the smoothness of the control. It is fast, nice, and easy to accurately operate. The motor revolutions increase and decrease smoothly. Further, the optional ride control system on the Toro™ LH514BE dampens the boom and bucket movement, providing a convenient ride over rough ground and less spillage when carrying loads at high tramming speed. Steering and boom soft stops reduce shock loads and vibration, and also extends cylinder lifetime. Durable axles use limited slip differentials to maintain traction and spring applied hydraulic release brakes for safer braking.

ROPS AND FOPS CERTIFIED

The sealed and pressurized cabin of Toro™ LH514BE is air-conditioned and uses dust and noise resistant upholstery materials, has three-layer laminated safety glass windows, emergency exits, illuminated cabin entrance with three-point contact handles and anti-slip steps. In addition, the cabin is mounted on oil dampened bushings to reduce whole body vibration. The cabin door includes a door lock and latch mechanism and a magnetic interlock switch which automatically applies brakes and deactivates boom, bucket and steering when the door is opened.

7" TOUCH SCREEN COLOR DISPLAY

The 7" 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. Dark background graphics with clear symbols are designed for the underground environment to reduce eye fatigue. The Sandvik Intelligent Control system monitors and warns the operator before failures occur, preventing severe damage and potential loss of production.

EFFORTLESS BATTERY CHARGE MONITORING

During operation, the battery charge level is always visible for the operator as a percentage value on the display. Following the charge level and considering the cycle part ahead, the operator can estimate and monitor approaching charging or discharging needs. Uphill tramming will need full battery whereas downhill tramming is faster when the battery is not full.

IMPROVED VISIBILITY

Adjustable high-power LED lights are standard configuration in every Toro™ LH514BE. All-around operator visibility can be further improved by selecting optional right-hand side and rear facing monitoring cameras. The air conditioning system is equipped with a heater as a standard, helping to keep windows free of mist and ice in cold conditions.

SANDVIK 365 PARTS & SERVICES

MAKING A DIFFERENCE THROUGH SERVICE AND DIGITAL EXPERTISE

You may wonder what you get when choosing Sandvik Parts & Service solutions?

PERSONALIZED, PROACTIVE SERVICE AND HIGH QUALITY

We strive to serving our customers in a personalized manner and we give high emphasis to quality, which is not only about using genuine parts & components, you can also expect consistent service quality from us.
The backbone of our service is a unique mix of skilled people, our system, tools & global infrastructure, our long experience from the field and the great collaboration with our customers.

Instead of just waiting for issues to pop up and reacting only after they have happened, we are able to offer solutions that take the whole lifecycle of the machine into account, which allows us to be supportive in a proactive way.

SCALABLE OFFERINGS

It starts with the basic support at site including operator training, parts availability and of course technical and advisory support to ensure a trouble-free and economical operation.
All major components of your loader can be replaced or repaired. With our solutions, you can expect superior reliability and longer life than with non-OEM alternatives.
We offer different type of service agreements and advisory services which can be adapted to the specific level of support you require – helping you to proactively manage your fleet and to find the optimal maintenance strategy.

A UNIQUE COMBINATION: SANDVIK DIGITAL SERVICES + APPLIED OEM KNOWLEDGE

As an in-house digital services developer, we know the machines and their features through and through. This means that we can tailor our services to offer exactly the information and features the machines, their owners and their operators need. Besides our standard telemetry reporting we also offer assisted & advanced digitalization-based services.
Through analyzing the data and referencing it against our big pool of data, then, combined with our product expertise, we can offer insights into how to get the most out of your equipment. From a sustainability point of view, digital services provide clear insights into fuel consumption and excessive idle time, which can drastically reduce emissions underground. Equipment alerts on speeding, brake violations and freewheeling in neutral are just some examples which improve safety for operators and other staff in the mine.

TECHNICAL SPECIFICATION TORO™ LH514BE

Toro™ LH514BE is a battery-assisted electric loader for underground hard rock mining applications with a tramming capacity of 14 tonnes.

Toro™ LH514BE operates as a traditional cable electric loader. When mucking, it is powered by a trailing cable, connected to the mine electric network. When the battery assisted Toro™ LH514BE needs to be moved to another area or to the maintenance bay, the power cable is disconnected from the electric grid and reeled in by the loader. For the transfer drive, Toro™ LH514BE gets its power from its battery.

Toro™ LH514BE smart boom geometry is optimized to provide the highest in class breakout forces for fast bucket filling and handling of oversized rocks. Compared to a standard cable electric loader, Toro™ LH514BE has more weight in the rear frame, nicely balancing the equipment. The powerful boom and bucket hydraulics combined with smart geometry enable the use of both lift and tilt functions when penetrating the muck pile, making one-pass bucket filling easy and contributing to high fill factors.

The loader has integrated intelligence in the form of Sandvik Intelligent Control system, My Sandvik Digital Services Knowledge Box™ on-board hardware and automation readiness. Additional examples of available options are integrated weighing system and AutoMine® Loading Onboard Package.

CAPACITIES	
Tramming capacity	14 000 kg
Break out force, lift	25 700 kg
Break out force, tilt	25 200 kg
Standard bucket	5.4 m³

BUCKET MOTION TIMES	
Raising time	8.4 sec
Lowering time	4.0 sec
Dumping time	1.8 sec

OPERATING WEIGHTS (CALCULATED)	
Total operating weight	40 000 kg
Front axle	16 300 kg
Rear axle	23 700 kg

LOADED WEIGHTS (CALCULATED)	
Total loaded weight	54 000 kg
Front axle	38 300 kg
Rear axle	15 700 kg

SPEED FORWARD & REVERSE (LEVEL/LOADED, 3% ROLLING RESISTANCE)	
Level, loaded	21 km/h

OPERATIONAL CONDITIONS AND LIMITS	
Environmental temperature	From 0 °C to +25 °C
Standard operating altitude	With standard unit from -1500 m to + 2000 m at 25 °C

REQUIREMENTS AND COMPLIANCE
On request compliant with applicable European and North American requirements

POWER TRAIN

ELECTRIC MOTORS	
Permanent magnet motor	Siemens
Drive motor output	320 kW
Drive motor voltage	750 V
Drive motor speed	3 500 rpm
Drive motor insulation class	F
Drive motor degree of protection	IP 65
Three phase squirrel-cage pump motor	Siemens
Pump motor output	45 kW
Pump motor voltage	900 V
Pump motor speed	1500 rpm
Pump motor insulation class	F
Pump motor degree of protection	IP 55
Permanent magnet motor	Parker
Motor output	47.5 kW
Motor voltage	450 V
Motor speed	3 470 rpm
Fan motor insulation class	H
Fan motor degree of protection	IP 67
Total electric power	412.5 kW

DROP BOX
Kessler W4081

TIRES	
Tire size (Tires are application approved. Brand and type subject to availability.)	26,5x25 L5S 36 ply

AXLES	
Front axle, spring applied hydraulic operated brakes. Fixed.	Kessler D106, limited slip differentials.
Rear axle, spring applied hydraulic operated brakes. Oscillating ± 8°.	Kessler D106, limited slip differentials.

HYDRAULICS

Electrical filling pump for hydraulic oil
Door interlock for brakes and boom, bucket, and steering hydraulics
Oil cooler for hydraulic and brake oil
ORFS fittings
MSHA approved hoses
Hydraulic oil tank capacity 320 l
Sight glass for oil level, 2 pcs

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 center 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	200 mm, 1 pc
Main valve	Open center type
Pump for bucket hydraulics	Piston type, LS controlled

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
Brake oil tank capacity 70 l

OPERATOR'S COMPARTMENT

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
Cyclone 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

Sandvik Intelligent Control system
Critical warnings and alarms displayed as text and with light
Instrument panel with 7" display, adjustable contrast and brightness. Illuminated switches.
My Sandvik Digital Services Knowledge Box™ on-board hardware

OPERATOR'S SEAT

Low frequency suspension
Height adjustment
Adjustment according to the operator's weight
Padded and adjustable arm rests
Two-point seat belt
Adjustable lumbar support
Selectable damping
Fore-aft isolation

ILLUMINATION

Illuminance E_{av} with 2 pieces of high beam 50 W led lights at a distance of 20 m in front of the loader:

E_{av} high beam	110 lx

Illuminance E_{av} with 3 pieces of high beam 50 W led lights at a distance of 20 m behind the loader:

E_{av} high beam	184 lx

Toro™ LH514BE 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.

FRAME

REAR AND FRONT FRAME

High strength structure with optimized material thicknesses. Reduced own weight for higher overall hauling capacity and long structural lifetime. Welded steel construction.
Central hinge with adjustable upper bearing
Rear tanks are bolted to frame, hydraulic tank and cabin base are both bolted and welded to frame
Automatic central lubrication

ELECTRICAL EQUIPMENT

COMPONENTS

Low voltage batteries	2 x 12 V, 75 Ah, Gelled-electrolyte type
Driving lights	LED lights: 4 pcs in front 4 pcs in rear 4 pcs in cabin
Working lights	LED light, 1 pc under boom
Parking, brake and indicator (blinkers) lights	LED lights: 2 pcs in front, LED lights 2 pcs in rear, LED lights
Control system	7" color display, inbuilt system diagnostics
Reverse alarm	
Flashing beacon	
Electronically controlled cable reeling	
Cable anchoring unit	
Cable shock absorber	

MAIN BATTERY

Cell chemistry	$LiFePO_4$
Cell monitoring system	Artisan BMS
Power rating	256 kW
Energy capacity - total	74 kWh
Ah rating	144 Ah
Nominal voltage	512 V
Cooling method	Liquid
Weight	910 kg
Charging current	144 A

INCLUDED SAFETY FEATURES

FIRE SAFETY	
Portable fire extinguisher	12 kg

ENERGY ISOLATION
Lockable main switch, ground level access
Emergency stop push buttons according to EN ISO 13850: 1 pc in cabin, 2 pcs in rear
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
Maintenance Manual	English
Parts Manual	English
Service and Repair Manual	English
ToolMan	2 x USB stick in pdf format, includes all the manuals
Decals	English

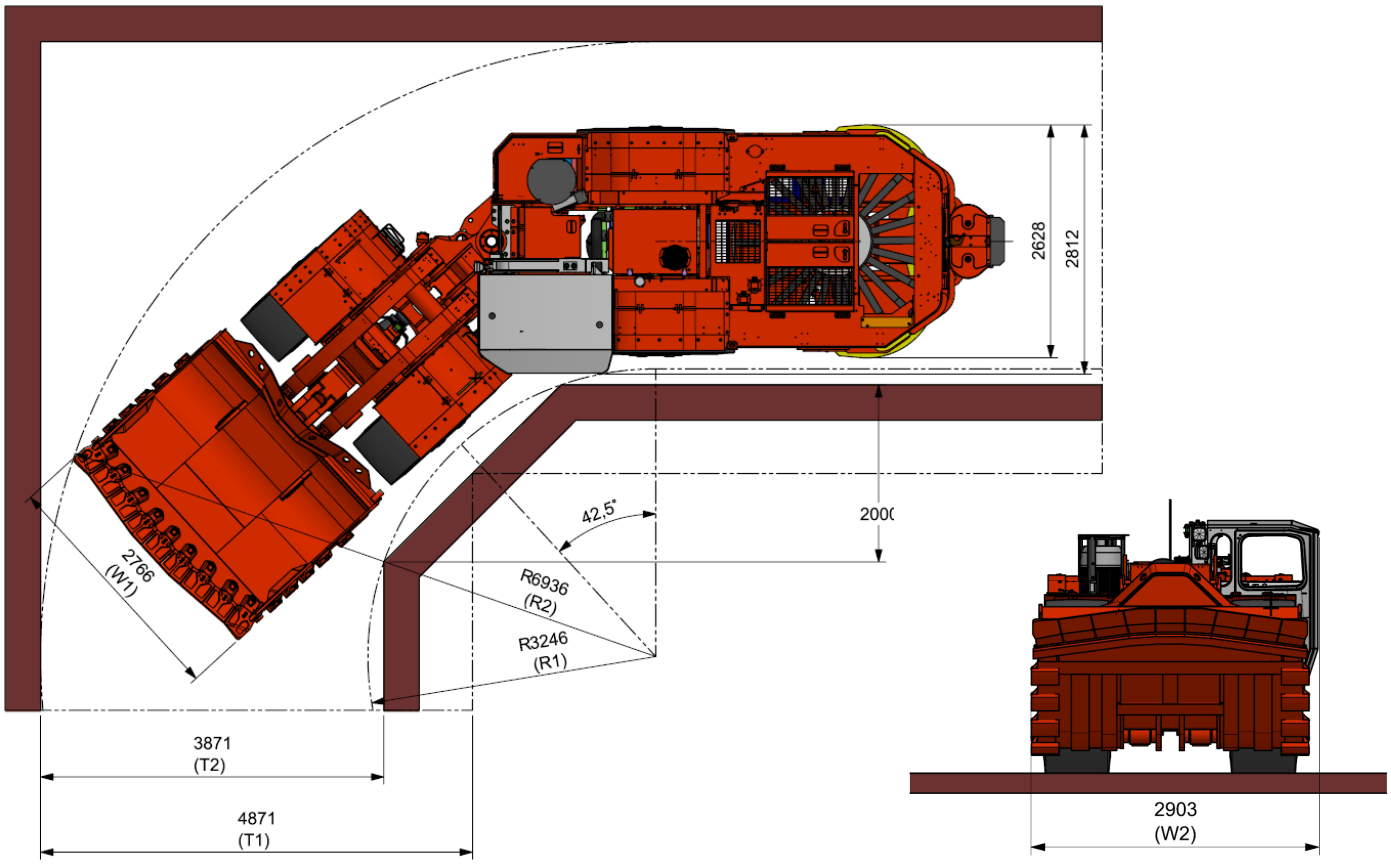
OPTIONS

Boom suspension (ride control)
Cover grills for lamps
Emergency steering
Fire suppression system ANSUL, 2 tanks, 8 nozzles, Checkfire, including auto shutdown
Fire suppression system ANSUL, 2 tanks, 8 nozzles, including auto shutdown (not for automation)
Integrated weighing system
Line of sight radio remote control (HBC, CAN)
Monitoring camera system
Safety rails
Spare rim 22.00-25/3.0 (for tires 26.5-25)
Supply box
Wiggins quick filling set for oils

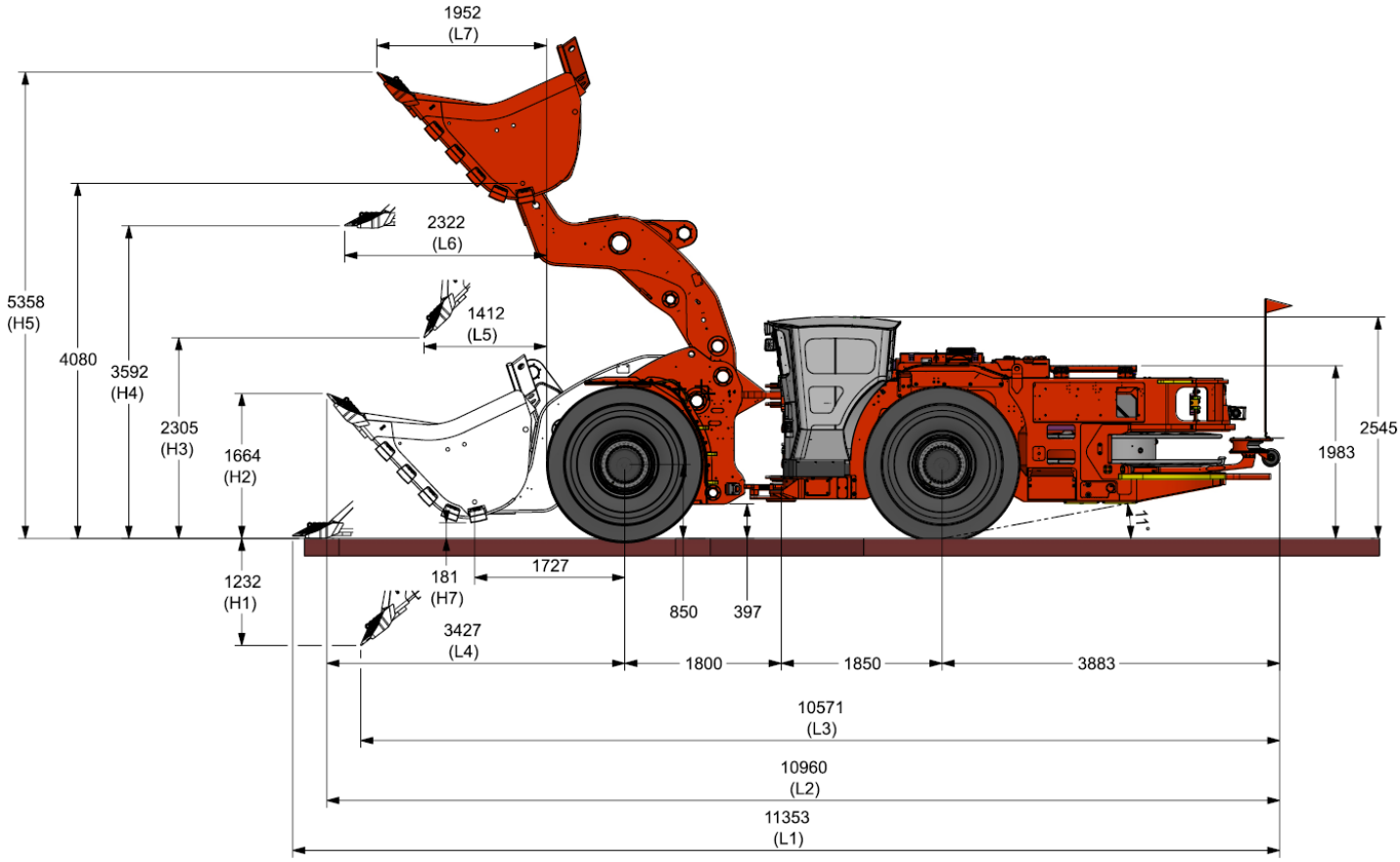
GRADE PERFORMANCE										
3% rolling resistance										
Empty										
Percent grade	0.0	2.0	4.0	6.0	8.0	10.0	12.5	14.3	17.0	20.0
Ratio					1:12	1:10	1:8	1:7	1:6	1:5
km/h	21,1	21,1	21,1	21,1	20,1	17,1	14,4	12,9	11,2	9,9
Loaded										
Percent grade	0.0	2.0	4.0	6.0	8.0	10.0	12.5	14.3	17.0	20.0
Ratio					1:12	1:10	1:8	1:7	1:6	1:5
km/h	21,1	21,1	21,1	18,1	14,8	12,6	10,6	9,6	8,4	7,2

DIMENSIONS WITH 5.4m³ GET BUCKET (STANDARD)

The dimensions are indicative only



Buckets		Bare lips					
Volume SAE heaped	m3	4.6	5.0	5.4	6.2	7.0	7.5
Maximum material density	t/m3						
Overall machine lenght	L1 (mm)	11190	11309	11428	11602	11627	11729
Bucket, default pos. to rear of machine	L2 (mm)	10806	10886	10965	11082	11098	11167
Lowered bucket pos. to rear of machine	L3 (mm)	10526	10565	10701	10829	10848	10924
Front axle to bucket, default pos.	L4 (mm)	3273	3353	3432	3549	3565	3634
Front tyre to raised bucket, tipped	L5 (mm)	1336	1415	1494	1610	1628	1696
Front tyre to raised bucket, straight	L6 (mm)	2151	2267	2383	2552	2577	2677
Front tyre to raised bucket, up	L7 (mm)	1800	1878	1956	2071	2087	2154
Bucket lowered pos.	H1 (mm)	1081	1158	1234	1346	1362	1428
Bucket, default pos.	H2 (mm)	1577	1661	1746	1869	1889	1961
Bucket, tipped	H3 (mm)	2465	2380	2995	2171	2153	2080
Bucket, straight	H4 (mm)	3649	3643	3637	3628	3628	3622
Bucket raised, up	H5 (mm)	5268	5354	5440	5565	5585	5658
SAE heap height	H6 (mm)						
Bucket ground clearness	H7 (mm)	229	229	229	229	229	229
Bucket width	W1 (mm)	2700	2700	2700	2700	3000	3000
Machine width	W2 (mm)	2873	2873	2873	2873	3043	3043
Inner turn radius	R1 (mm)	3246	3246	3246	3246	3246	3246
Outer turn radius	R2 (mm)	6815	6852	6890	6947	7078	7112
Minimum tunnel width	T1 (mm)	4749	4787	4825	4882	5013	5046
Tunnel width	T2 (mm)	3749	3787	3825	3882	4013	4046



Buckets		Blue Shark Pointer				
				STD		
Volume SAE heaped	m3	4.6	5.0	5.4	6.2	7.0
Maximum material density	t/m3					
Overall machine lenght	L1 (mm)	11114	11234	11353	11527	11542
Bucket, default pos. to rear of machine	L2 (mm)	10800	10881	10960	11077	11087
Lowered bucket pos. to rear of machine	L3 (mm)	10395	10484	10571	10699	10711
Front axle to bucket, default pos.	L4 (mm)	3267	3348	3427	3544	3554
Front tyre to raised bucket, tipped	L5 (mm)	1253	1333	1412	1528	1539
Front tyre to raised bucket, straight	L6 (mm)	2088	2206	2322	2492	2507
Front tyre to raised bucket, up	L7 (mm)	1795	1875	1952	2067	2077
Bucket lowered pos.	H1 (mm)	1078	1156	1232	1344	1354
Bucket, default pos.	H2 (mm)	1494	1580	1664	1788	1799
Bucket, tipped	H3 (mm)	2476	2390	2305	2181	2170
Bucket, straight	H4 (mm)	3603	3597	3592	3583	3583
Bucket raised, up	H5 (mm)	5185	5272	5358	5484	5495
SAE heap height	H6 (mm)					
Bucket ground clearness	H7 (mm)	181	181	181	181	185
Bucket width	W1 (mm)	2766	2766	2766	2766	3066
Machine width	W2 (mm)	2903	2903	2903	2903	3104
Inner turn radius	R1 (mm)	3246	3246	3246	3246	3246
Outer turn radius	R2 (mm)	6861	6898	6936	6993	7124
Minimum tunnel width	T1 (mm)	4795	4833	4871	4927	5058
Tunnel width	T2 (mm)	3795	3833	3871	3927	4058

Buckets		Shark Half Arrow		
Volume SAE heaped	m3	5.4	6.2	7.0
Maximum material density	t/m3			
Overall machine lenght	L1 (mm)	11400	11574	11617
Bucket, default pos. to rear of machine	L2 (mm)	10995	11112	11139
Lowered bucket pos. to rear of machine	L3 (mm)	10595	10723	10759
Front axle to bucket, default pos.	L4 (mm)	3462	3579	3606
Front tyre to raised bucket, tipped	L5 (mm)	1432	1548	1581
Front tyre to raised bucket, straight	L6 (mm)	2364	2534	2578
Front tyre to raised bucket, up	L7 (mm)	1987	2102	2128
Bucket lowered pos.	H1 (mm)	1266	1378	1403
Bucket, default pos.	H2 (mm)	1686	1810	1845
Bucket, tipped	H3 (mm)	2269	2144	2115
Bucket, straight	H4 (mm)	3582	3573	3575
Bucket raised, up	H5 (mm)	5381	5507	5542
SAE heap height	H6 (mm)			
Bucket ground clearness	H7 (mm)	181	181	178
Bucket width	W1 (mm)	2860	2860	3158
Machine width	W2 (mm)	2931	2931	3158
Inner turn radius	R1 (mm)	3246	3246	3246
Outer turn radius	R2 (mm)	6990	7047	7182
Minimum tunnel width	T1 (mm)	4924	4982	5116
Tunnel width	T2 (mm)	3924	3982	4116