SANDVIK

Toro® TH663i | Gen2

Safer.
Stronger.
Smarter.

Technical specification

Toro® TH663i | Gen2

Toro® TH663i is a high productivity 63 tonne articulated underground dump truck for use in 6 x 6 meter haulage ways. This next generation intelligent truck is a safer, efficient, high capacity and easy to maintain underground truck for optimized fleet management.

Toro® TH663i truck features a wide range of intelligence integrated technology, such as Sandvik Intelligent Control system, My Sandvik Digital Services and Automation Readiness as standard, supplemented with Onboard Weighing System option for tracking the payload. With the latest addition of the AutoMine® Trucking Onboard option, the truck enables autonomous haulage for both transfer level and decline ramp application.

Toro® TH663i offers a reliable and safer solution that can significantly increase the efficiency and productivity of operations while decreasing the cost per tonne, providing smart productivity. Operator safety, health and comfort are enhanced by the mining focused, sound suppressed, ROPS and FOPS certified cabin.

Capacities *SAE heaped 2:1	
Maximum payload capacity	63 000 kg
Standard dump box	36.0 m³
Dump box range	24 - 40 m³

Speeds (level/loaded)	
Tier 2 engine	34.3 km/h
Stage V engine	32.4 km/h

Dump box motion times & movements	
Discharging time	16 sec
Dumping angle	62°

Operating weights*	
Total operating weight	48 440 kg
Front axle	33 400 kg
Rear axle	15 040 kg

Loaded weights*	
Total loaded weight	111 440 kg
Front axle	48 520 kg
Rear axle	62 920 kg

* Unit weight is dependent on the selected options

Operational conditions and limits	
Environmental temperature	From -20°C to +50°C
Standard operating altitude	With engine Volvo TAD1643VE-B from -1500 m to +1000 m at 25 °C without rated power derate

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 ISO 19296. 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 38 bar/550 PSI: Filled weight: 1,5 kg CO2e: 2,145 tons GWP: 1430 Information based on the F Gas Regulation (EU) No 517/2016

Engine	
Diesel engine	Volvo TAD1643VE-B (Tier 2)
Engine brake	Yes
Output	565 kw (760 hp) @ 1900 rpm
Torque	3260 Nm @ 1200 rpm
Number of cylinders	In-line 6
Displacement	16.1 l
Cooling system	Liquid cooled
Combustion principle	4-stroke, direct injection, turbo, after cooler
Air filtration	Dry type
Electric system	24 V
Emissions	Tier 2, Euro Stage II
Ventilation rate (Ultra low sulphur diesel)	CANMET 54,000 CFM m3/s, MSHA 46,000 Ventilation Rate
Particulate index (Ultra low sulphur diesel)	MSHA Particulate Ventilation Index 12,000 CFM
Exhaust system	Catalytic converter with muffler
Average fuel consumption at 50% load	70 l/h
Fuel tank refill capacity	850 l
Compatible with paraffinic diesel fuel (EN 15940)	Yes

Up box	
Katsa	Ratio 1:1

Transmission
Fully automatic Dana transmission with electric shifting system and retarder includes converter with lock-up and drop box. Standard Operator Speed Assist helps operators maintain speed control when traveling downhill. Eight gears forward and two reverse. Dana self-diagnostics fully integrated into Sandvik Intelligent Control System.

Axles	
Front axle	Kessler D111 series, spring applied hydraulic operated brakes, hydraulic suspension
Rear axle	Kessler D111 series, spring applied hydraulic operated brakes, fixed

Tires	
Tire size	35/65 R33 -E4

Tires are application approved. Brand and type subject to availability.

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 and heating unit as a standard
Cyclone pre-filter for A/C device
Adjustable steering wheel
No high pressure hoses in the operator's compartment
Inclinometers to indicate operating angle
Emergency exit
Illuminated steps to the cabin
Three-point contact access system with replaceable and colour coded handles and steps
12 V output
Remote circuit breaker switch
Mirrors defrost
Trainer's seat (behind operator)

Control system, dashboard and displays

- Sandvik Intelligent Control System
- Critical warnings and alarms displayed as text and with light, warning and alarm recorded to the control system log
- 5.7” display with adjustable contrast and brighteness
- Instrument panel with illuminated switches
- My Sandvik Digital Services Knowledge Box™ on-board hardware
- AutoMine® Trucking readiness
- Supports 3G, 4G, LTE and WLAN data transfer

Operator’s seat

- Low frequency suspension
- Height adjustment
- Adjustment according to the operator’s weight
- Fore & aft isolator to minimise vibrations in driving direction
- Padded and adjustable arm rests
- Adjustable lumbar support
- Selectable damping
- Seatbelt monitoring system
- Four-point seat belt on operator’s seat
- Three-point seat belt on trainer’s seat

Measured vibration level

Whole body vibration was determined while operating the truck 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]	0.64 (driving with load)
VDV_W over 15 min period [$m/s^{1.75}$]	5.9 (driving with load)

Measured sound level

The sound pressure level and sound power level at the operator’s compartment have been determined in stationary conditions on high idle and at full load, with engine Volvo TAD1643VE-B (Tier 2).

Sound pressure level L_{pA} [dB re 20 µPa]	76 dB
Sound power level L_{WA} [dB ew 1 p W]	118 dB

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 lower bearing
- Tanks stand alone structures, bolted onto main frame
- Automatic central lubrication
- Removable belly guards

Hydraulics

- Filling pump for hydraulic oil
- Filtration
- Door interlock for brake hydraulics and steering
- Oil cooler for hydraulic and transmission oil, capability up to 55°C ambient temperature
- ORFS Fittings
- Hydraulic oil tank capacity 280 l
- Sight glass for oil level, 2 pcs

Steering hydraulics

Fully hydraulic, center articulad, power steering with two double acting cylinders. Closed-center system with a load sensing piston type pump and pilot operated orbital wheel steering.

Steering main valve	Solenoid operated
Steering hydraulic cylinders	140 mm, 2 pcs
Steering pump	Variable displacement piston pump

Dump box hydraulics

Fully hydraulic system, equipped with variable displacement piston pump. Oil flows to box hydraulic system from the steering hydraulics. Oil flow from the brake circuit pump is divided to the brake system and oil cooler motor.

Hydraulic pump	Variable displacement piston pump
Control valve	Solenoid operated
Main valve	Solenoid operated
Cylinders	180 mm, 2 pcs

Brakes

Service brakes are spring applied; hydraulically operated multi disc 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, brake activates after 3sec in neutral gear
- Automatic brake activation system, ABA
- Electrically driven emergency brake release pump
- Foot operated brake pedal, fully modulated
- Brake oil tank capacity 100 l

Electrical equipment

Alternator	28 V, 150 A
Batteries	2 X 12V, 180 Ah
Starter	24 V, 7 kW
Driving lights	LED lights: 4 pcs in front 4 pcs in rear
Working lights	LED lights: 4 pcs in front 4 pcs in rear
Parking, brake and indicator (blinkers) lights	LED lights: 2 pcs in front 2 pcs in rear
Control system	5,7” Color display, 5 modules, inbuilt system diagnostics
Reverse alarm (CE)	
Flashing beacon	
Reverse camera	

Illumination

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

Head lights, low beam E_{av}	12 lx

Illuminance E_{av} with 2 pieces of 50 W led lights at a distance of 20 m behind the truck:

Reversing lights, low beam E_{av}	13 lx

Toro® TH663i is compliant with the South African Mine health and safety act 29 of 1996, as the average light intensity in the direction of travel is more than 10 lux at a distance of 20 m.

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 the manuals
Decals	English and other EU languages

Fire safety features

- 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 features

- Lockable main switch, ground level access
- Starter isolator
- Emergency stop push buttons according to EN ISO 13850:
1 pc in cabin, 1 pc in front frame and 2 pcs in rear frame
- Pressure release in the radiator cap
- Automatic discharge for pressure accumulators (brake system and pilot circuit)
- Frame articulation locking device
- Mechanical dump box locking device
- Wheel chocks and brackets

Available boxes

			Standard			Ejector	Ejector
Box capacity (m^3)	32	34	36	38	40	25	28
Material broken density with 90% fill factor (t/m^3)	2.2	2.1	2.0	1.8	1.7	2.2	1.95
Total height (mm)	3254	3361	3492	3582	3591	3167	3402

Note that more boxes can be available, please contact your local Sandvik representative for more information.

Options
ANSUL Twin fire suppression system (CE)
Arctic package 120V or 230V (preheater for hydr. oil, brake oil transmission, up-box, drop box, and engine)
AutoMine® Trucking: Onboard Package
Box-up support device (N/A with Ejector box)
Carryback reduction system
CE Declaration of conformity
Cover grills for lamps
CRN pressure accumulators
Direct feed for beacon
DPF exhaust system, HJS
Ducktail for 38 and 40m³ boxes for improved productivity
Dump box 40.0 m3 (SAE heap. 2:1) made with SSAB Zero™ steel
Eclipse™ fire suppression system with auto shutdown
Emergency steering (CE)
Harsh Conditions package
Integrated weighing system (IWS)
Integrated weighing system (IWS) with external screens
Integrated jacking system
Jump start interface
Live oil sampling kit
Partial flow DPF exhaust system for > 50 ppm Sulphur content fuel (not available with Stage V)
Pre- and post-lubrification for turbo
Proximity Detection System (PDS) Interface

Options
Safety rails
Service stand
Spare rim 33-28.00/3.5 (for tyres 35/65R33)
Spill guard
Tyre Pressure Monitoring System
Water cooled alternator
Wiggins fuel fill system
Wiggins quick filling set for fuel and oils (hydraulic, engine and transmission)

Optional engine	
Diesel engine	Volvo TWD1683VE
Output	585kW (784 hp) @ 1900 rpm
Engine brake	Yes
Emissions	Euro Stage V (CE)
Ventilation rate (Ultra low sulphur diesel)	CANMET 27 000 CFM MSHA 25 000 CFM
Particulate index (Ultra low sulphur diesel)	MSHA Particulate Ventilation Index CFM 3000
Average fuel consumption at 50% load	70 l/h
Compatible with paraffinic diesel fuel (EN 15940)	Yes

Grade performance

Volvo TAD1643VE-B (Tier 2), 3 % rolling resistance, with 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)	6.2	6.2	6.2	6.2	6.1	6.1	6.1	6.1	6.1	6.0
2nd gear (km(h)	8.1	8.0	8.0	8.0	7.9	7.9	7.9	7.8	7.8	7.8
3rd gear (km/h)	10.5	10.5	10.4	10.4	10.3	10.3	10.2	10.1	10.1	10.0
4th gear (km/h)	13.5	13.4	13.3	13.2	13.1	13.1	12.9	12.9	12.7	12.6
5th gear (km/h)	16.5	16.4	16.2	16.1	16.0	15.8	15.7	15.5	15.3	14.8
6th gear (km/h)	21.4	21.2	20.9	20.7	20.5	20.2	19.8	19.3	17.6	
7th gear (km/h)	27.8	27.4	27.0	26.6	26.2	25.2				
8th gear (km/h)	35.5	34.9	34.2	33.4	31.4					

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)	6.2	6.1	6.1	6.1	6.0	6.0	5.9	5.9	5.8	5.7
2nd gear (km(h)	8.0	7.9	7.9	7.8	7.7	7.6	7.5	7.5	7.2	6.7
3rd gear (km/h)	10.4	10.3	10.2	10.0	9.9	9.8	9.4	8.8		
4th gear (km/h)	13.3	13.1	12.9	12.7	12.3	11.6				
5th gear (km/h)	16.2	15.9	15.6	15.1	13.7					
6th gear (km/h)	20.9	20.4	19.6							
7th gear (km/h)	27.0	26.0								
8th gear (km/h)	34.3	30.1								

Grade performance

Volvo TWD1683VE (Stage V), 3 % rolling resistance, with 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)	5.7	5.7	5.7	5.7	5.6	5.6	5.6	5.6	5.6	5.6
2nd gear (km(h)	7.5	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.3	7.3
3rd gear (km/h)	9.8	9.7	9.7	9.6	9.6	9.6	9.5	9.5	9.4	9.4
4th gear (km/h)	12.5	12.4	12.4	12.3	12.2	12.2	12.1	12.0	12.0	11.9
5th gear (km/h)	15.3	15.2	15.1	15.0	14.9	14.8	14.7	14.6	14.5	14.2
6th gear (km/h)	20.2	20.0	19.9	19.7	19.5	19.3	19.1	18.7	17.7	15.9
7th gear (km/h)	26.1	25.8	25.5	25.2	24.9	24.4	22.8	20.9		
8th gear (km/h)	33.4	32.9	32.4	31.9	30.7	27.5				

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)	5.7	5.6	5.6	5.6	5.6	5.5	5.5	5.5	5.4	5.4
2nd gear (km(h)	7.5	7.4	7.4	7.3	7.3	7.2	7.2	7.1	7.0	6.7
3rd gear (km/h)	9.7	9.6	9.5	9.4	9.3	9.2	9.0	8.8	7.8	
4th gear (km/h)	12.4	12.2	12.1	11.9	11.8	11.3	10.1			
5th gear (km/h)	15.1	14.9	14.7	14.4	13.8	12.0				
6th gear (km/h)	19.9	19.5	19.0	17.1						
7th gear (km/h)	25.5	24.8	22.0							
8th gear (km/h)	32.4	30.2								

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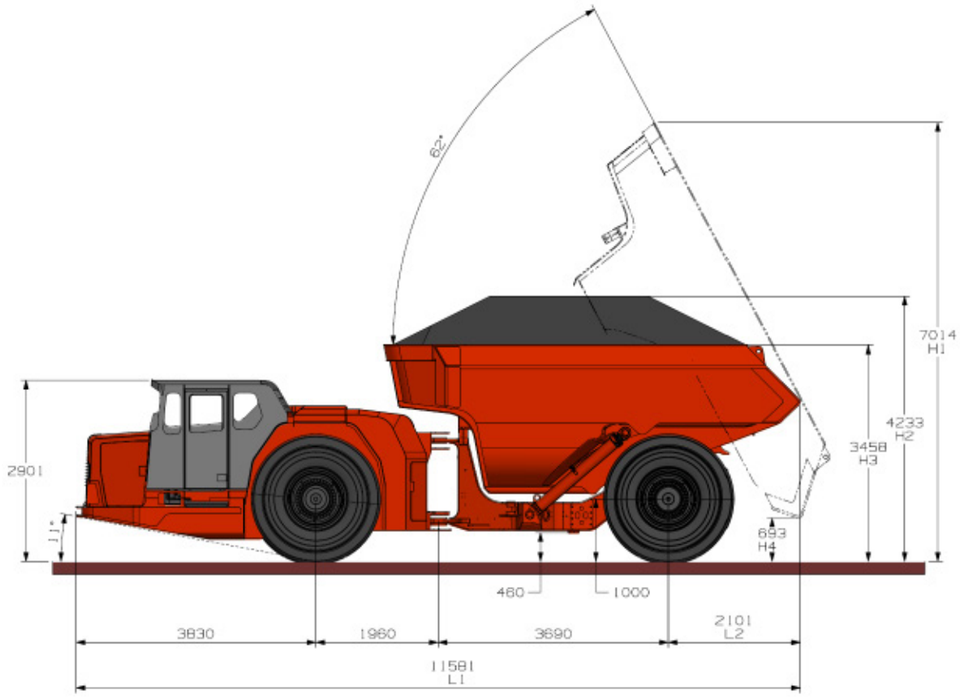
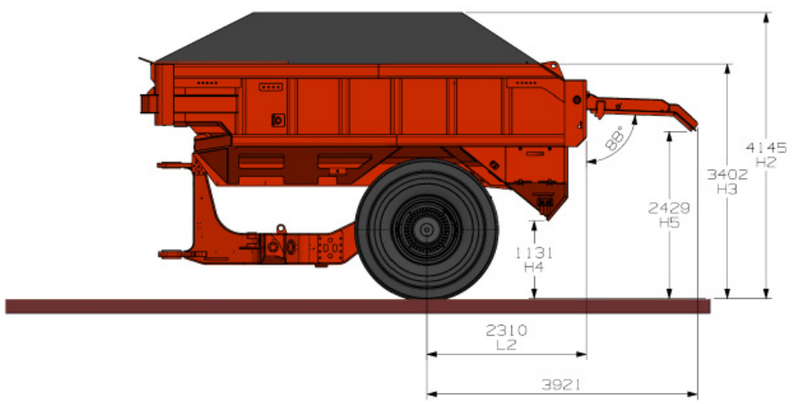
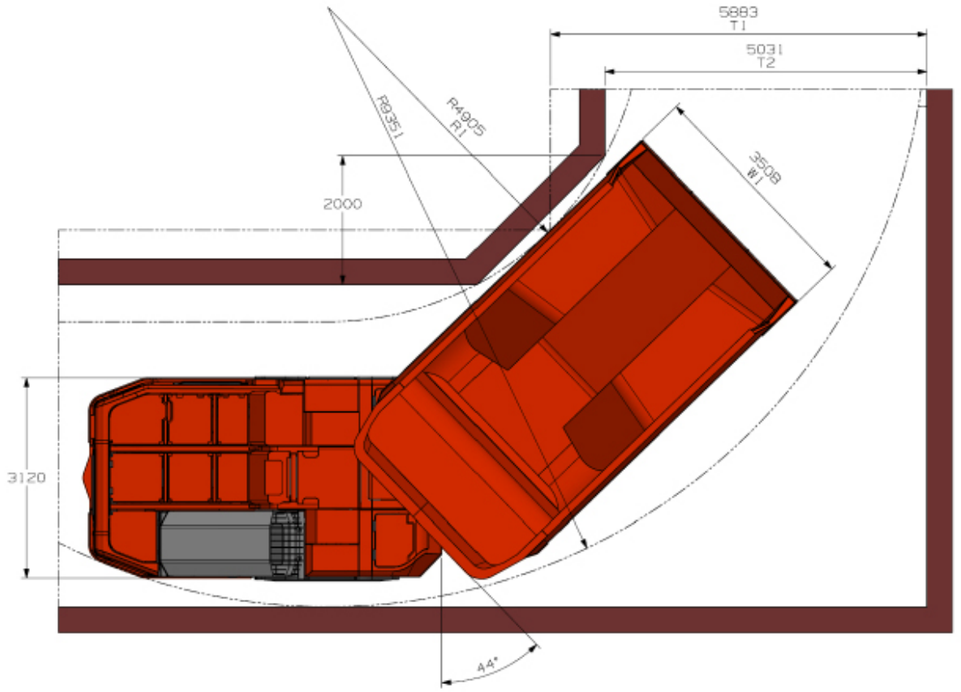
Dimensions with 36 m³ box (standard)

The dimensions are indicative only







Dimensions								
Dump boxes				Standard			Ejector	Ejector
Volume SAE heaped 2:1*	(m^3)	32	34	36	38	40	25	28
Maximum material density with fill factor of 90%	(t/m^3)	2.1	2.0	1.9	1.8	1.7	2.1	1.9
Overall machine length	L1 (mm)	11581	11581	11581	11581	11581	11790	11790
Rear axle to rear of machine	L2 (mm)	2101	2101	2101	2101	2101	2310	2310
Dump position height max	H1 (mm)	6884	6952	7014	7094	7094		
SAE heap height	H2 (mm)	4030	4137	4233	4358	4395	3945	4145
Dumpbox spillguard	H3 (mm)	3255	3362	3458	3583	3583	3167	3402
Discharge height	H4 (mm)	693	693	693	693	693	1131	1131
Ejector bucket tailgate height	H5 (mm)						2429	2429
Dumpbox width	W1 (mm)	3508	3508	3508	3513	3658	3200	3200
Dumpbox inner turn radius	R1 (mm)	4905	4905	4905	4905	4830	4916	4916
Minimum tunnel width	T1 (mm)	5883	5883	5883	5883	5936	5875	5875
Tunnel width	T2 (mm)	5031	5031	5031	5031	5086	5022	5022

* According to SAE 1363/ISO 6483