

**SANDVIK**

# DL411 TOP HAMMER LONGHOLE DRILL

## TECHNICAL SPECIFICATION

Sandvik DL411 is a fully-mechanized and compact electro-hydraulic top hammer longhole drill designed for underground mass mining in 3.6 x 3.6 m or larger production drifts. It is capable of drilling vertical and inclined fans and single or parallel  $\varnothing 64 \dots 115$  mm longholes up to 54 meters in depth, using T38, T45 and T51 MF-rods or  $\varnothing 65$  mm/T45, ST58 and ST68 tube rods. The DL411 is mounted on a 4-wheel drive frame-steered and diesel-powered carrier. Sandvik DL411 is equipped with the HL1560ST hydraulic rock drill, LFRC1600 drilling module, ZR30 telescopic boom, TAS drilling control system, remote control panel and FOPS operator's (tramming) canopy for high drilling capacity and maximum uptime. The 360° drilling module rotation and wide boom swing and tilt angles make the unit suitable for most mining methods and various service support applications. The CANbus based TAS drilling control system with the user-friendly operating interface and various instrumentation and automation levels allow maximum productivity and good drilling accuracy. The layout of the NC7N carrier is designed for good visibility, mobility and stability, ensuring fast and safe tramming in narrow mine drifts. The operating and maintenance interface are designed for easy access, safe operation and all service points are accessible from the ground level.

### KEY FEATURES

Hydraulic rock drill	HL1560ST (33 kW)
Drilling module	LFRC1600 (29 + 1 rods)
Rod length	4' - 6' (1 220 - 1 830 mm)
Boom	ZR30 (on front stabilizer)
Minimum drift size (H and W)	3 560 to 4 170 mm
Drift width in T-section	3.4 m (minimum)
Pivot point height	1 565 - 2 100 mm
Boom coverage (vertical holes)	3 000 mm
Transport height	3 200 mm
Transport width	2 240 mm
Transport length	8 800 to 9 400 mm
Transport weight	21 000 kg

### ROCK TOOLS AND HOLE LENGTH

Rod and hole diameter			*Hole length (m)	Rock drill
Thread	Rod $\varnothing$ (mm)	Hole $\varnothing$ (mm)		
T38	39	64	37 ... 54	HL820ST
T45	46	76		HL820ST
T45	65 (tube)	76 ... 89		HL820ST
T51	52	89		HL820ST, RD927L
ST58	76 (tube)	89 ... 102		HL1560ST, RD927L
ST68	87 (tube)	102 ... 115		HL1560ST

*\*) Feed in contact with rock, front stinger retracted*



1. DL411 TOP HAMMER - LONGHOLE DRILL

## HYDRAULIC ROCK DRILL

Type of rock drill	HL1560ST (TS2-319)
Percussion power	33 kW
Percussion pressure	Up to 200 bar
Percussion rate	30 - 40 Hz
Stabilizer	Sleeve type
Rotation speed	0 - 100 rpm (OMT500)
Rotation torque	2 330 Nm (OMT500)
Weight	490 kg
Length with shank adapter	1 505 mm

## DRILLING MODULE

Type of drilling module	LFRC1600 (TS2-342)
Rod length	1 220 - 1 830 mm (4' - 6')
Storing capacity	29 + 1 rods (all threads)
Retaining centralizer	Pito 16
Cuttings diverter	CC1016
Set-off from stope face	1 000 mm
Feed force	31 kN
Feed and return speed	0.3 m/s

## DRILLING MODULE DIMENSIONS

Type	LFRC1606 (standard)	LFRC1605 (option)	LFRC1604 (option)
Rod length	6' (1 830 mm)	5' (1 525 mm)	4' (1 220 mm)
Total length	3 970 mm	3 665 mm	3 360 mm

## LONGHOLE BOOM

Telescopic boom	ZR30 (TS2-288)
Boom swing	Left 44° / Right 44°
Boom (fan) tilt	Back 30° / Forward 45°
Drilling module roll-over	360°
Boom extension	565 mm
	1 000 mm (4' rods)
Drilling module travel	1 100 mm (5' rods)
	1 400 mm (6' rods)
Vertical hole drilling coverage	3 000 mm
Pivot point height (boom vertical)	2 110 - 2 665 mm
Front and rear stinger	Mounted on feed cradle
Rear stinger extension	1 500 mm (4')
	1 700 mm (5' and 6')
Front stinger extension	1 700 mm (4')
	2 000 mm (5' and 6')

## HYDRAULIC SYSTEM

Type of hydraulic system	TPC LH
Operating principle	Electric pilot control
Powerpack	HPP1590 (90 kW)
Filtration size (pressure / return)	20 µ / 10 µ
Oil tank volume	270 liters
Cooler for hydraulic oil	OW45 oil-to-water (1 x 45 kW)
Low oil level indication	Low oil level switch

## DRILLING CONTROL SYSTEM

Type of control system	TAS
Operating principle	CANbus
Control panel	Portable remote panel Cable length 20 m
Adjustable parameters	Full percussion Collaring Rotation / Threading Feed / Anti-jamming Flushing
Rotation pressure controlled feed	With One-hole / Fan automation
Diagnostics system	Interactive
OptiMine®	With configuration readiness

## ELECTRIC SYSTEM

Standard voltages	380 - 690 V, 50 or 60 Hz
Total installed power	119 kW
Main switch gear	MSE 10
IP-classification	Specification TS2-132
Allowed voltage fluctuation	± 10%
Starting method	Star delta 380 V - 690 V Soft starter 575 V
Automatic cable reel	TCR3E
Cable reel remote control	At operator station and cable reel
Front and rear lights (combined working and driving)	10 x 50 W (24 V) LED
Portable working lights	2 x 50 W (24 V) LED
Carrier positioning lights	2 x Laser type
Rear parking / brake lights	2 x Red LED (24V)
Stair case service lights	LED (24V)
Sealed AGM batteries	2 x 12 V (145 Ah)

## AIR AND WATER SYSTEM

Flushing of holes	By water
Water booster pump type	WBP3
Water pump capacity	215 l/min
Water pump inlet pressure	2 -7 bar
Flushing water pressure	10 - 20 bar
Shank lubrication device	SLU1 (air / oil mist)
Air compressor	CTN10 (1.0 m³/min at 7 bar)
Rock drill oil consumption	200 - 500 g/h
Rock drill air consumption	300 - 400 l/min
Air cleaner for external air supply	IP5

## OPERATOR'S SAFETY CANOPY

Canopy certification	FOPS (ISO3449)
Unit height in tramming	3 200 mm
Sound pressure level EN 791	Canopy < 102 dB(A) Emitted 127 dB(A)
Operator's seat	Ergonomic T-back seat

## CARRIER

Type of carrier	NC7N (frame-steered)
Carrier articulation	± 40°
Rear axle oscillation	± 10°
Ground clearance	320 mm
Diesel engine	M-B OM904LA (110 kW, Stage IIIA)
Exhaust catalyzer	Standard
Transmission	Hydrodynamic, Spicer T20 000
Axles	Spicer
Tires	12.00 - 20/20 RL
Service brakes	SAHR type, fail safe wet disc brakes
Parking / emergency brakes	SAHR type, fail safe wet disc brakes
Tramming speed	Horizontal (0%): 15 km/h 8°=1:7=14%: 5 km/h
Gradeability / sideways tilt	15° / 5°
Carrier stabilization	Front stabilizer 2 x TJ60 jacks (rear)
Fuel tank	140 liters
Hand throttle	Standard
Filling pump for hydraulic oil	Electric
Hand held fire extinguisher	1 x 7.7 or 9 kg (type ABC)
Carrier centralized greasing points	Specification TS2-463
Tramming alarm	Standard
Tramming cameras	Front, rear and side
Knowledge Box™	Connectivity solution (TS2-535)
Colour scheme	Sandvik standard
Documentation	1 x Operator's manual 1 x Maintenance manual 1 x Technical manual (in English only) 1 x Parts manual (in English only) 2 x Toolman USB key

## OPTIONAL ITEMS

### Drilling system

*HL710S rock drill	With 55 kW or 90 kW powerpack
*HL820ST rock drill	With 90 kW powerpack
*RD927L rock drill	With 90 kW powerpack
Power extractor	For HL1560ST, HL820ST, HL710S, RD927L
Drilling module wear parts kit	For alternative tools
Bit changer	For LFRC1600 drilling module
Rear stinger extension	820 mm
Conversion kit	From one rod/tube size to another
Spare remote control panel	For offboard use

### Hydraulic system

*Oil cooler (Air actuated)	OA30 (30 kW)
Vacuum pump	For hydraulic oil

### Instrumentation

Access detector, or protector	Mandatory in Europe (TS2-211)
Drilling instrument	TMS for DL400 series (TS2-122)
Spirit level angle indicators	3 pcs (on boom and feed)

### Automation

One-hole automation (incl. TMS)	Specification TS2-198
Tele-remote drilling	Including data transfer (USB/WLAN)
Fan automation (including TMS)	Specification TS2-199
Data transfer USB/WLAN (incl. DrillConnect mobile app)	Connectivity through Knowledge box™ for easy data transfer to and from the rig

## OPTIONAL ITEMS

### Cleaning system

Low pressure system with reel	Up to 15 bar (TS2-343)
High pressure system with reel	Up to 220 bar (TS2-343)

### Greasing systems

Automatic system	Lincoln (for carrier, boom and rod handler)
Manual system	Specification TS2-463

### Electric system

*Voltage option	1 000 V (50 or 60 Hz) and DOL starter
Dewatering pump outlet readiness	Site voltage 380 - 690 V (8 kW), excluding USA/CAN
Flygt pump starter with plug	Site voltage 1 000 V (8 kW), Specification TS2-121
Electric cables	VYK
Ground fault and overcurrent unit	110 or 230 V (16 A), site voltage 380 - 690 V
Power outlet on carrier	LED (24 V)
Amber flashing light	CAT
Battery jump start	

### Air and water system

*Air compressor	CT28 (2.8 m³/min, 18.5 kW) or 2 x CT28 (5.6 m³/min, 37 kW)
Air mist flushing kit	For external air and water supply
Compressed air outlet	Quick coupling for pneumatic hand tools
1 x 60 liters air receiver	For end-of-hole flushing (requires CT28)
*Harsh water resistant water circuit	For basic and advanced packages
Water hose reel and hose	THR and Ø38 mm hose (lg. 65 m)

### Fire suppression system

Spare hand held extinguisher	7.7 or 9 kg (type ABC)
Automatic system	Sandvik Eclipse™ (TS2-461)
Manual or automatic system	6 nozzles, Ansul (TS2-460)

### Carrier

*Diesel engine	Cummins B4.5 (119 kW, Stage IIIB) Cummins B4.5 (129 kW, Stage V)
Reduced tramming speed	3rd gear lockout
*Foam filled tires	4 pcs
Fast filling and evacuation system	Wiggins (complete)
Wheel chocks and holders	2 Sets

### Extra items

Spare rock drill	HL1560ST, HL820ST, HL710S, RD927L
Spare wheel assembly	Standard or foam filled tires
Special tools for rock drill	Field kit or complete set
Documentation	Extra manuals
Warranty extension	One year (excl. Kazakhstan)
Package: Country specific options	USC, AUS and EUR
Package: Harsh water	Basic or Advanced (TS2-049)
Package: Onboard air supply	For air mist flushing
Package: Onboard air and water supply	For air mist flushing

\*) Replaces standard feature

**MINIMUM PRODUCTION DRIFT SIZE\***

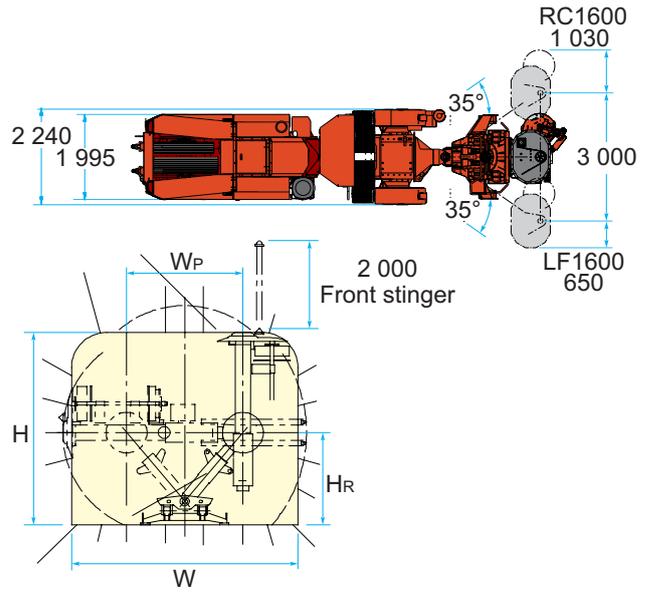
	H	W	WP	HR
LFRC1604	mm 3 560	3 560	1 750	2 100
LFRC1605	mm 3 865	3 865	2 050	2 100
LFRC1606	mm 4 170	4 170	2 350	2 100

*\*)100 mm clearance*

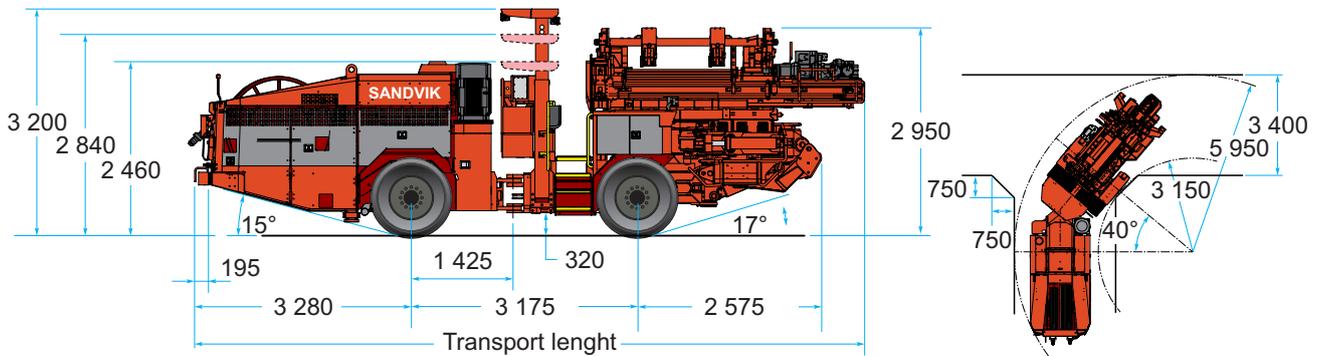
**MAXIMUM PRODUCTION DRIFT SIZE\*\***

	H	W	WP	HR
LFRC1604	mm 4 150	4 800	3 000	2 100
LFRC1605	mm 4 250	5 100	3 000	2 100
LFRC1606	mm 4 370	5 400	3 000	2 100

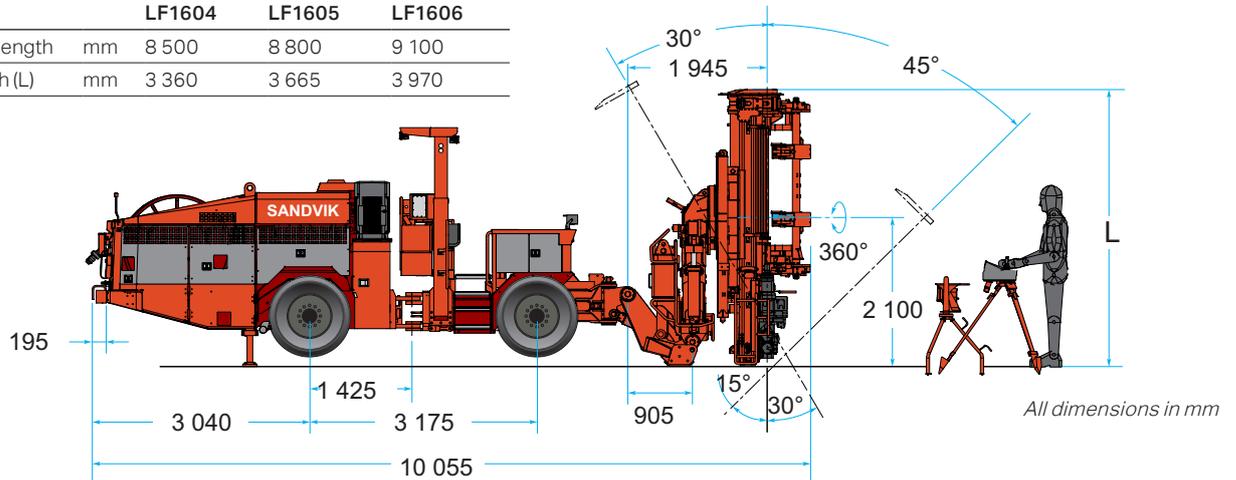
*\*\*)) Rear stinger extended, front stinger retracted*



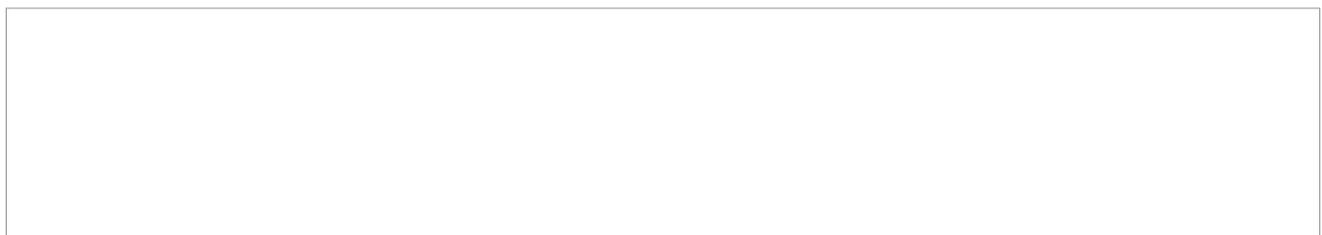
All dimensions in mm



	LF1604	LF1605	LF1606
Transport length	mm 8 500	8 800	9 100
Total length (L)	mm 3 360	3 665	3 970



All dimensions in mm



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