

## SANDVIK MH621 HARDROCK ROADHEADER

PRODUCT SPECIFICATION / MH621Ex\_2021.305\_REV2

The Sandvik MH621Ex hard-rock miner is a smart, strong and powerful mechanical rock excavation machine. It is an electrically powered and crawler-mounted roadheader that is engineered to excavate tunnels, roadways and galleries as well as caverns, basically any underground and subsurface structures, in strong and abrasive rock formations under flame-proof mining conditions.

This heavy-duty mining machine has a powerful transverse cutter head mounted on an extremely robust telescopic cutter boom. It is designed to excavate rocks with high compressive strengths. The MH621Ex is a PLC (programmable logical controller) controlled machine and country-specific FLP (flame-proof) certifications by various international approval authorities are considered to satisfy special customer needs and requirements.

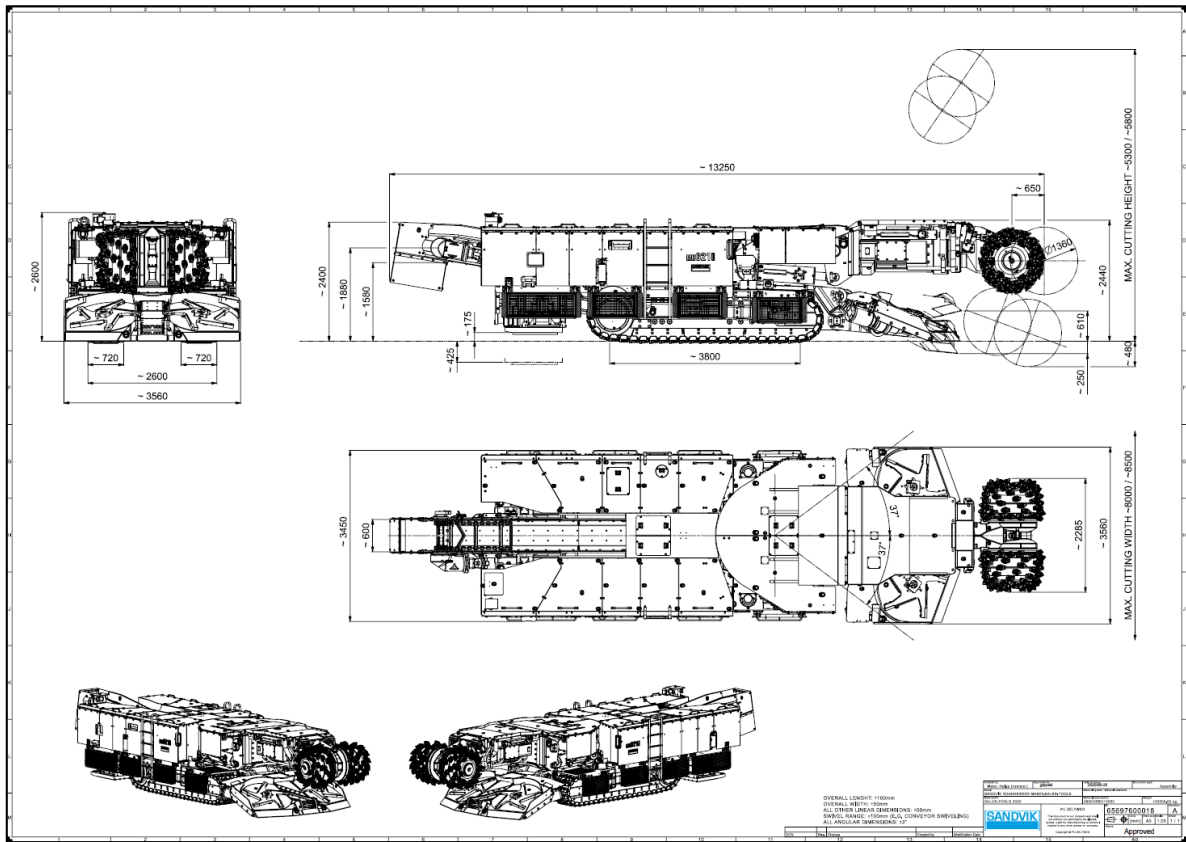
The range of application of Sandvik MH621Ex hard-rock miner goes beyond 100 MPa uniaxial compressive strength of rock, an operational range where other roadheaders start to fail. The MH621Ex offers superior productivity without damaging the rock mass surrounding the tunnel excavation. That enables this machine to achieve high advance rates even in challenging geological conditions referring to high rock strength and high rock abrasiveness.

### KEY FEATURES AND BENEFITS

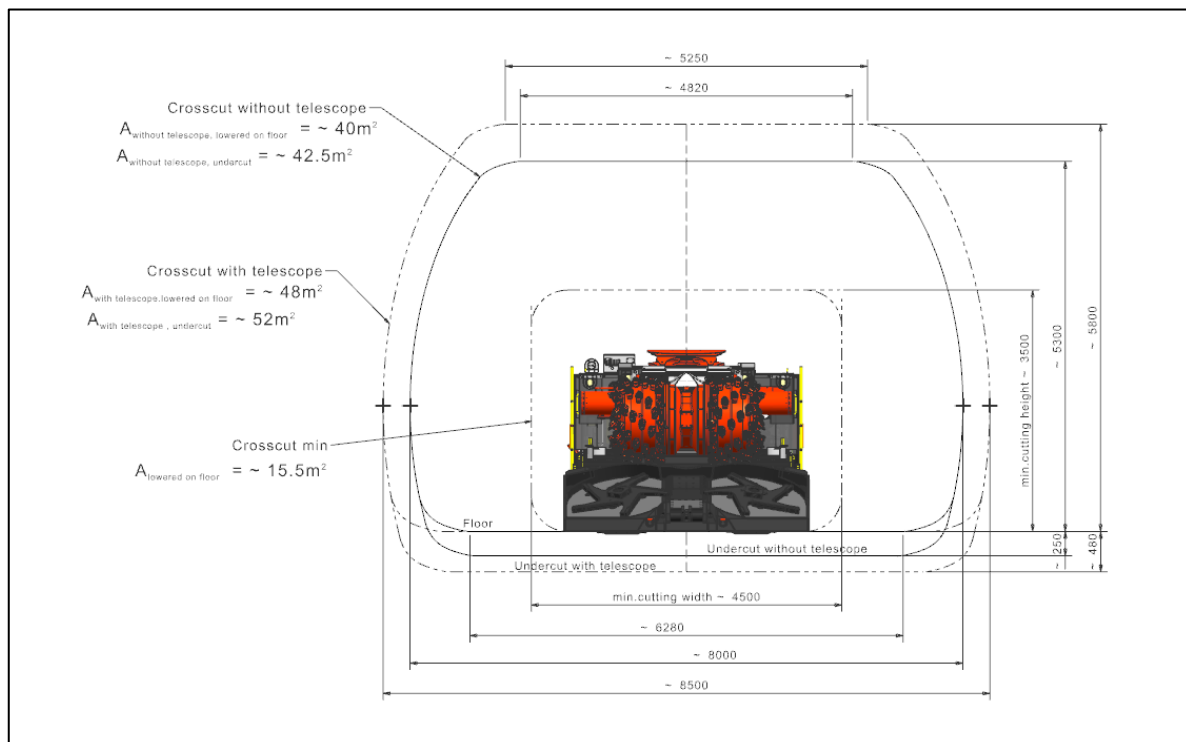
- Improved safety features ensure safe underground working conditions and less operational hazards.
- Heavy duty, robust machine design and ICUTROC® cutting technology for hard rock application increase machine availability and reduce machine service costs.
- Different cutter heads for a wide range of rock conditions and applications serve for high versatility in machine operation.
- Optional machine guidance system significantly improves profile accuracy and decreases tunneling costs.
- Various digitalization options like Cutronic® (semi-automated cutting cycle), which enables semi-autonomous machine operation, optimize customer value.



## Overall machine dimensions

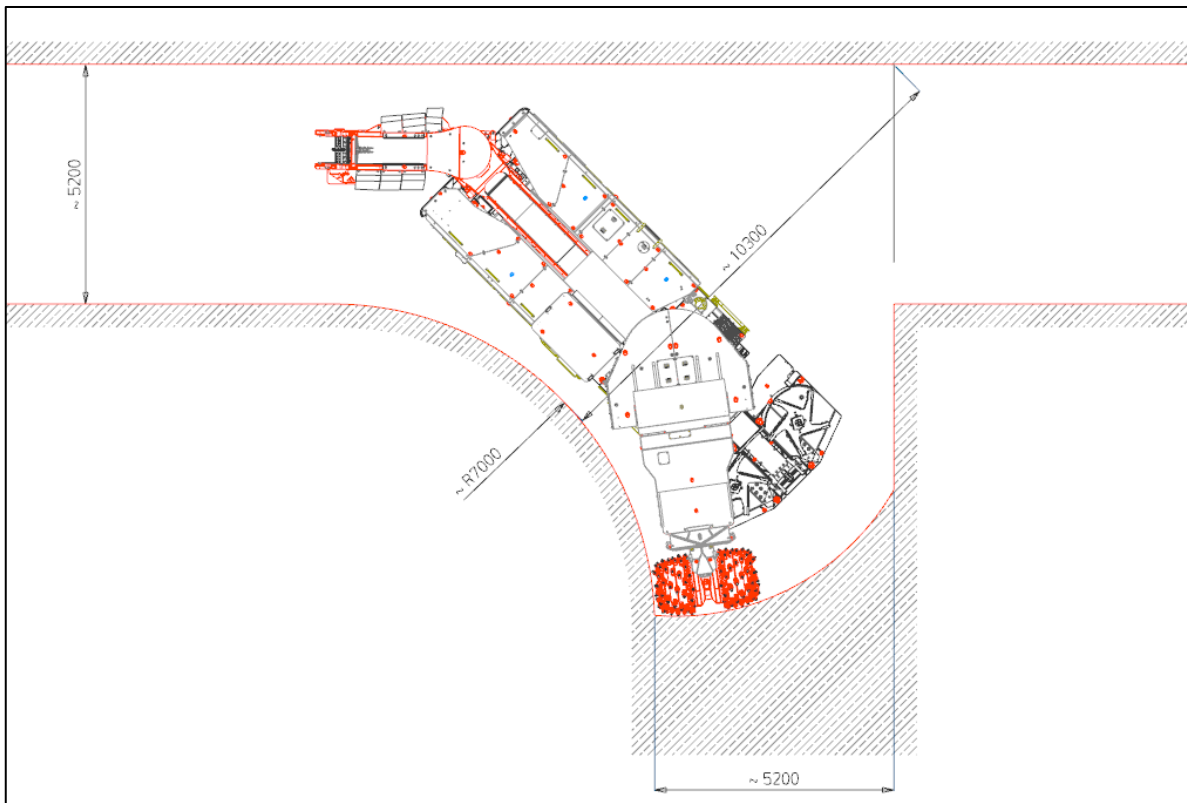


## Cutting profile dimensions



Machine shown in optional configuration (with arch lifting device)!

## Machine 90° Turn-Out-Radius referring to specified Tunnel Width

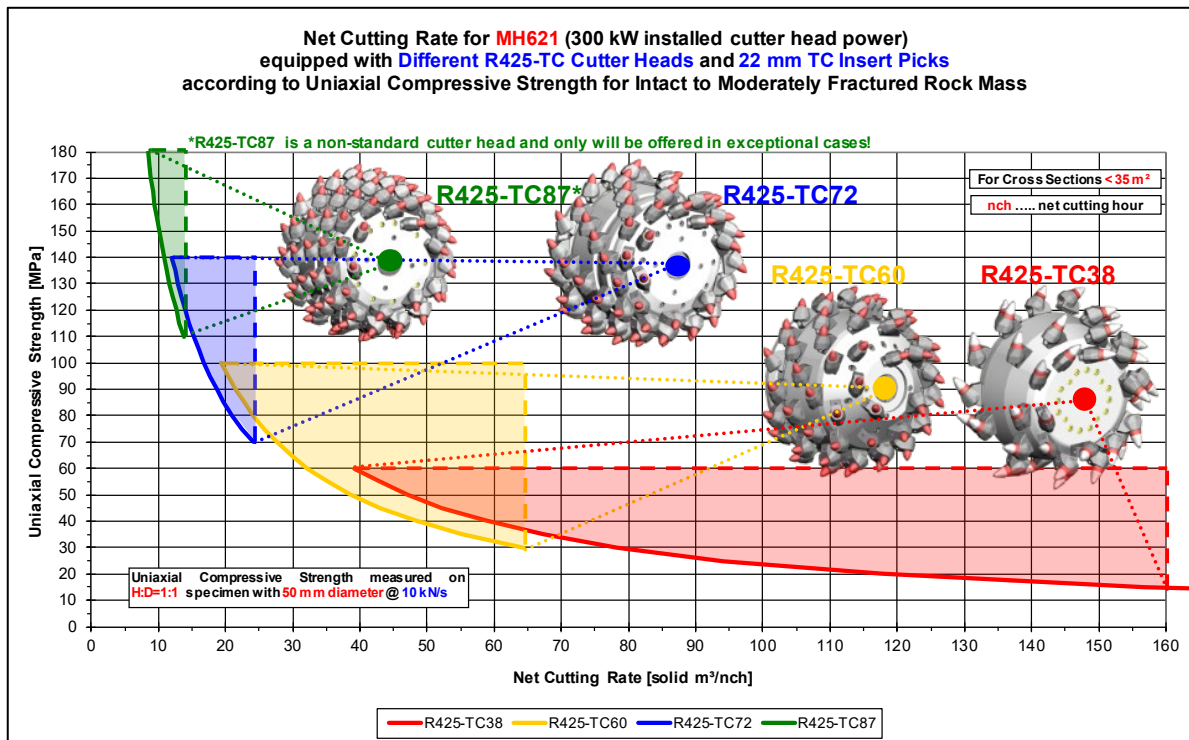


Turn-out dimensions for machine in optional configuration (with slewing single chain conveyor)!

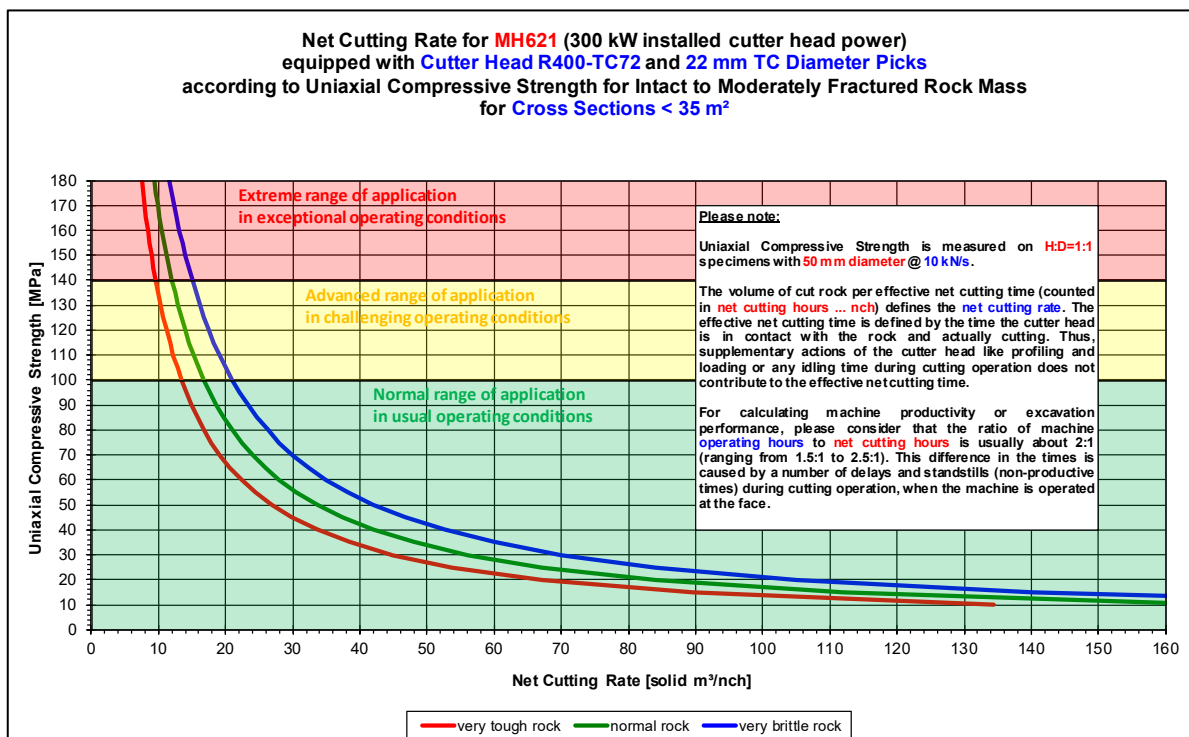
## Machine Basics

Item	Figure	Unit
Weight	~ 120	[t]
Ground pressure	~ 0.19 - 0.23	[N/mm <sup>2</sup> ]
Total installed power	504	[kW]
Maximum longitudinal gradient navigable angle /	+/- 18	[°]
Maximum transversal gradient navigable angle /	+/- 5	[°]
Cone radius	~ 25	[m]
Basin radius	~ 25	[m]

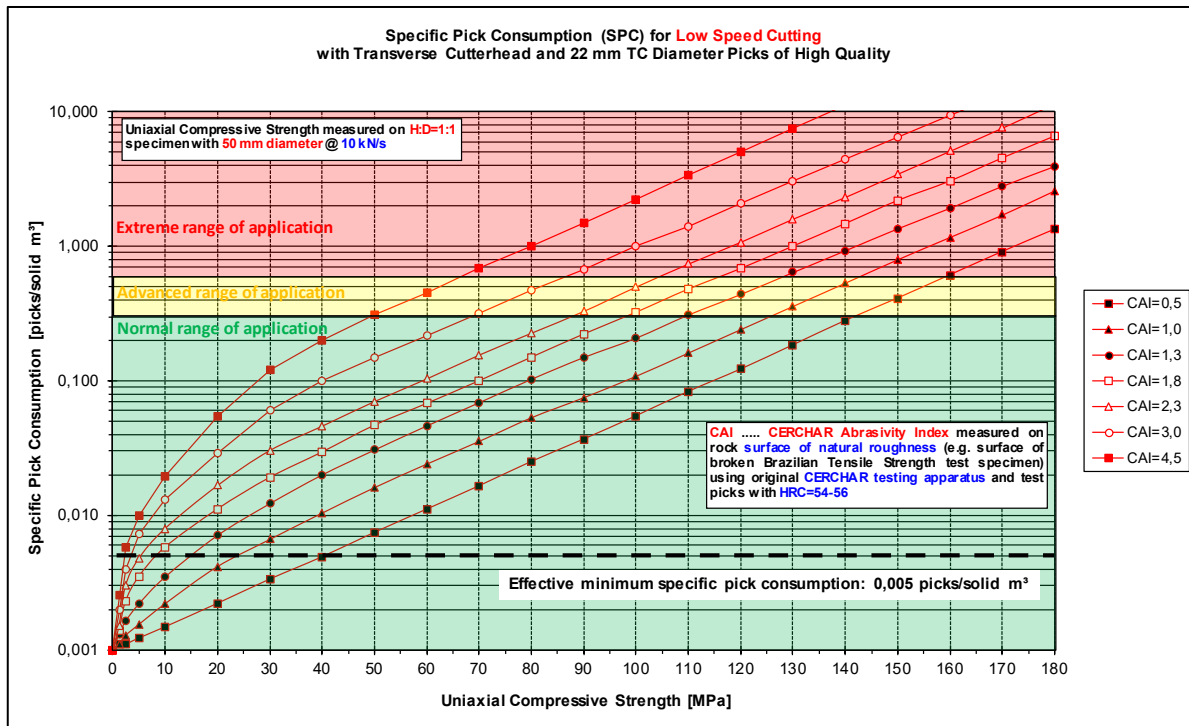
## Selection of Cutter Heads referring to Geological Conditions



## Net Cutting Rate referring to Selection and Configuration of Cutting Unit and to Geological Conditions and Cross Section Size



# Specific Pick Consumption referring to Selection and Configuration of Cutting Unit and to Geological Conditions



## Machine Details

### Conditions for Use and Dimensions

#### Standard items

Machine length with short, straight double chain conveyer	~ 13.25	[m]
Maximum navigable longitudinal angle / gradient	+/- 18	[°]
Maximum navigable transversal angle / gradient	+/- 5	[°]
Cone radius	~ 25	[m]
Basin radius	~ 25	[m]
Machine width over loading table	~ 3.56	[m]
Machine width over crawler tracks	~ 2.6	[m]
Machine width over frame rear end excluding auxiliary steel structures	~ 3.3	[m]
Machine width over frame rear end including auxiliary steel structures	~ 3.45	[m]
Machine height in basic configuration @ top of lowered conveyer	~ 2.4	[m]
Machine weight in basic configuration	~ 120	[t]
Ground clearance @ rear support	~ 175	[mm]
Machine ground pressure in basic configuration (min. - max.)	~ 0.19 - 0.23	[N/mm <sup>2</sup> ]
Total installed power	504	[kW]
Maximum cuttable uniaxial compressive strength	up to 140	[MPa]

## Assembly Group #01 – Cutter Head

Standard cutter head for hard / strong rock / rock mass conditions

Cutter head type	R425-TC72	
Typical range of operation / application	70 - 140	[MPa]
Pick block type	EF58T/BRD	
Cutting speed @50Hz / @60Hz	1.36 / 1.48	[m/sec]
Pick type	P7JU-3870-1962	
Pick tip type	Insert	
Pick tip diameter	22	[mm]
Pick head length	70	[mm]

Optional cutter head for soft / weak rock / rock mass conditions

Cutter head type	R425-TC38	
Typical range of operation / application	10 - 60	[MPa]
Pick block type	EF58T/AUS	
Cutting speed @50Hz / @60Hz	1.48 / 1.60	[m/sec]
Pick type	P7JU-3870-1962	
Pick tip type	Insert	
Pick tip diameter	22	[mm]
Pick head length	70	[mm]

Optional cutter head for medium hard / strong rock / rock mass conditions

Cutter head type	R425-TC38	
Typical range of operation / application	30 - 100	[MPa]
Pick block type	EF58T/AUS	
Cutting speed @50Hz / @60Hz	1.48 / 1.60	[m/sec]
Pick type	P7JU-3870-1962	
Pick tip type	Insert	
Pick tip diameter	22	[mm]
Pick head length	70	[mm]

Optional items

High wear resistant layout of cutter head
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## Assembly Group #03 – Cutter Gear

Standard items

Cutter gear CG425 for transversal cutter head including coupling		
Weight of cutter gear CG425	~ 5.2	[t]
Cutter gear CG425 in L configuration @ 50Hz		
Output rotation speed of cutter gear CG425 in L configuration @ 50Hz	~ 20.4	[rpm]
Gear oil capacity of cutter gear CG425	~ 140	[l]
Gear oil type for ambient temperature >10°C	Sandvik oil with viscosity 320	

Gear oil pump flow system		
Gear oil filtering and cooling system (OMFCS II)		
Gear oil temperature monitoring	analog	
Gear oil pressure monitoring	analog	
Gear oil filter electric clogging indicator	digital	

#### Optional items

Cutter gear CG425 in LL configuration @ 60Hz		
Output rotation speed of cutter gear CG425 in LL configuration @ 60Hz	~ 20.2	[rpm]
Gear oil type for ambient temperature <10°C	Sandvik oil with viscosity 220	

## Assembly Group #04 – Cutter Boom

#### Standard items

Telescopic cutter boom with linear transducers in FLP version (2x)		
Cutter boom telescope extraction distance	~ 650	[mm]
Minimum cutting height in basic configuration	~ 3500	[mm]
Maximum cutting height @ telescope retracted	~ 5300	[mm]
Maximum cutting height @ telescope extracted	~ 5800	[mm]
Minimum cutting width in basic configuration	~ 4500	[mm]
Maximum cutting width @ telescope retracted	~ 8000	[mm]
Maximum cutting width @ telescope extracted	~ 8500	[mm]
Minimum profile area in basic configuration	~ 15.5	[m <sup>2</sup> ]
Maximum profile area @ telescope retracted	~ 40	[m <sup>2</sup> ]
Maximum profile area @ telescope extracted	~ 48	[m <sup>2</sup> ]
Maximum undercut below floor level @ telescope retracted	~ 250	[mm]
Maximum undercut below floor level @ telescope extracted	~ 480	[mm]
Cutter boom horizontal slewing time in fast speed for complete swing	~ 18	[sec]
Cutter boom vertical lifting time in fast speed	~ 40 - 45	[sec]
Cutter boom vertical lowering time in fast speed	~ 32	[sec]
Cutter boom horizontal slewing time (setup @ site)	~ 28 - 36	[sec]
Cutter boom vertical slewing time (setup @ site)	~ 100 - 130	[sec]
Telescope cylinder extraction time	~ 32 (min. 16)	[sec]
Telescope cylinder retraction time	~ 23 (min. 11)	[sec]

## Assembly Group #05 – Turret Assembly

#### Standard items

Turret with linear transducer in FLP version (1x)		
Turret slewing angle	2 x 37	[°]
Vertical lifting cylinders with linear transducers in FLP version (2x)		

## Assembly Group #06 – Loading System

### Standard items

Loading device width linear transducers in FLP version (2x)		
Loading device in wear resistant layout (5mm thick wear plates as top layer and heat-treated steel on chain guides)		
Loading device with fixed loading width	~ 3560	[mm]
Loading device vertical lifting distance above floor	~ 610	[mm]
Loading device vertical lowering distance below floor	~ 250	[mm]
Maximum cut material bunkering capacity	~ 4	[m <sup>3</sup> ]
Loaders / spinners on left and right side of loading device driven by two electric motors (one motor for each loader / spinner)	2 x 36	[kW]
Loader gear ratio	49.78	
Loader gear output speed @ 50Hz	~ 29	[rpm]

### Optional items

Loaders / spinners on left and right side of loading device driven by two hydraulic motors (one motor for each loader / spinner, theoretical power)	2 x 65	[kW]
Loader gear output speed @ 60Hz	~ 35	[rpm]
Loading device with fixed loading width	~ 3500	[mm]
Loading device with fixed loading width @ 2x split	~ 4500	[mm]
Loading device with fixed loading width @ 4x split	~ 4500	[mm]
Loading device with variable loading width @ 2x split	~ 4600 - 5300	[mm]
Loading device with variable loading width @ 4x split	~ 4600 - 5300	[mm]

## Assembly Group #07 – Conveying System

### Standard items

Straight, wear resistant double chain conveyor (5mm thick wear plates as top layer and heat-treated steel on chain guides)		
Double chain conveyor discharge height	~ 1580	[mm]
Double chain conveyor chain type DIN 22252-2	19 x 64.5	[mm]
Double chain conveyor running speed adjustable with variable hydraulic pump	~ 0.5 - 0.9	[m/s]
Double chain conveyor hydraulic drive motor theoretical power @ 0.9m/s	1 x 65	[kW]
Double chain conveyor hydraulic drive motor variable adjustment	0.160 - 0.070	[cm <sup>3</sup> /rev]
Double chain conveyor width	~ 600	[mm]
Maximum conveyor capacity of double chain conveyor	~ 300	[m <sup>3</sup> /h]
Double chain conveyor running monitoring		
Double chain conveyor pressure monitoring		

### Optional items

Slewing single chain conveyor hydraulically driven (theoretical power)	1 x 65	[kW]
Slewing single chain conveyor electrically driven	2 x 36	[kW]
Single chain conveyor slewing angle	2 x 45	[°]
Machine length with slewing single chain conveyor	~ 15.2	[m]



Maximum discharge height of slewing single chain conveyor	~ 2670	[mm]
Minimum machine height with slewing single chain conveyor @ upper edge of conveyor in down position	~ 2700	[mm]
Width of slewing single chain conveyor	~ 600	[mm]
Running speed of slewing single chain conveyor adjustable with variable hydraulic pump	~ 0.5 - 0.9	[m/sec]
Mounting basis for intermediate conveyor		

## Assembly Group #08 – Crawler Track System

### Standard items

High crawler track system		
Crawler track frame left and right side connected by bolts to machine main frame		
Tramming theoretical power (hydraulic drive)	2 x 50	[kW]
Tramming speed forward (variable)	~ 0 - 15	[m/min]
Slow tramming speed	~ 0 - 4.5	[m/min]
Medium tramming speed	~ 0 - 7.8	[m/min]
Fast tramming speed	~ 9 - 15	[m/min]
Reverse tramming speed	~ 0 - 15	[m/min]
Crawler track gear (2x)		
Crawler track chain width	~ 720	[mm]
Crawler track length on ground	~ 3800	[mm]
Crawler track overall width – crawler track exterior	~ 2600	[mm]
Crawler track brake release (2x)		
Crawler track tensioning device (2x)		
Crawler track left and right side gearbox (2x - 1 side each)		
Gear oil type for ambient temperature >10°C	Sandvik oil with viscosity 320	

### Optional items

Gear oil type for ambient temperature <10°C	Sandvik oil with viscosity 220	
Low crawler track system		

## Assembly Group #09 – Frame

### Standard items

Solid frame construction		
Rear bottom stabilizers linked via pins to machine main frame		
Rear bottom stabilizer vertical distance above floor @ retracted	~ 240	[mm]
Rear bottom stabilizer vertical distance below floor @ extracted	~ 365	[mm]
Rear bottom stabilizers - synchronized movement (1 solenoid)		
Rear bottom stabilizers - auto function DOWN for machine stabilization		
Rear bottom stabilizers - auto function UP for machine tramming		

## Optional items

Split frame construction		
Rear bottom stabilizers - separate movement (2 solenoids)		
Cross shifting device for easier machine positioning (lateral shifting distance on back of machine)	~ 270	[mm]
Split frame construction for cross shifting device		
Cross shifting device - rear bottom stabilizer vertical distance above floor @ retracted	~ 175	[mm]
Cross shifting device - rear bottom stabilizer vertical distance below floor @ extracted	~ 425	[mm]

## Assembly Group #10 – Electric Motors

### Standard items

Cutter motor power (water cooled @ S6 mode)	1 x 300	[kW]
Hydraulic drive motor power (water cooled @ S1 mode)	1 x 132	[kW]
Loader motor power (water cooled @ S1 mode)	2 x 36	[kW]

### Optional items

Conveyor motor power (water cooled @ S1 mode) and loaders / spinners hydraulically driven	2 x 36	[kW]
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## Assembly Group #11 – Electrics, Electronics & Control System

### Standard items

Main electrical panel SANDVIK SMV Ex-11 1000V / 50Hz / IP55		
Control system PLC B&R X90		
Data logging (SCU, data via OPC-UA available, FDM ready)		
Display integrated in electric main panel		
Type of solenoid valves	24 V Ex	
SIL 2 emergency stop on electric main panel	1	[pcs.]
SIL 2 emergency stops on machine (2 on left side of machine and 2 on right side of machine)	4	[pcs.]
Supply voltage monitoring		
Monitoring of current consumption / supply of all electric motors		
Monitoring of all electric motor functions shown on display		
Monitoring of all hydraulic functions shown on display		
Monitoring of all sensors		
Fault monitoring of analog sensors		
Hydraulic motor hour meter (counting of motor running hours)		
Cutter motor hour meter (counting of motor running hours)		
Cutter motor net cutting hour meter (counting of net cutting hours – motor running hours @ motor load >50%)		
Loader motor left and right side hour meters (counting of motor running hours)		
Conveyor motor hour meter (counting of motor running hours)		
LED 24VDC front headlight in FLP version on cutter boom	2	[pcs.]

LED 24VDC front headlight in FLP version on turret	2	[pcs.]
LED 24VDC rear / back headlight in FLP version below top platform	2	[pcs.]
LED 24VDC area floodlight in FLP version below top platform	2	[pcs.]
Signal horn in FLP version (for pre-start warning)	1	[pcs.]
Flash light white with sounder in FLP version (for tramming reverse warning)	2	[pcs.]
Optional signal light green in FLP version (for radio remote control active warning)	1	[pcs.]
Optional signal light orange in FLP version (for automatic cutting cycle active warning)	1	[pcs.]
Optional signal light blue in FLP version (for tele-remote operation active warning)	1	[pcs.]
Trailing cable pulling force protection		
Radio remote control (RRC) system (1x receiver, 1x transmitter, 1x charger, 3x batteries)		
Radio remote control cable connection		
SMS 3 control system for ITP spraying system		
On-board basic WiFi communication		

#### Optional items

Spare radio remote control (1x transmitter, 1x charger, 3x batteries)		
Portable emergency stops for working platforms (2x - 1x left & 1x right)		
Trailing cable segment 3x95mm <sup>2</sup>	100	[m]
Connection for externally supplied electric drive motors	2 x 30 (max.)	[kW]
Methane (CH <sub>4</sub> ) monitoring system TROLEX with flash light red and sounder including data transfer unit		
Interface for local methane monitoring system		
Interface for proximity detection system (PDS)		

## Assembly Group #12 – Brackets & Covers

#### Standard items

Anti-slip coating on platforms		
Weight limitation of covers - as per country regulations		
Railing - as per country regulations		

## Assembly Group #13 – Hydraulic System

#### Standard items

Hydraulic cylinders with CrNi standard coating		
Mineral based hydraulic fluid		
Variable axial piston pump combination for machine primary functions		
Vane pump combination for machine secondary functions		
Hose type	Semperit	
Fitting type (standard)	ORFS (flat seal)	
Maximum hydraulic pump pressure	330	[bar]
Solenoids type Ex	24	[V]

Total hydraulic oil volume	~ 700	[l]
Hydraulic tank volume	~ 400	[l]
Bypass filter visual clogging indicator		
Return filter visual clogging indicator		
Brake release system		
Oil re-filling device hydraulically driven		
Oil level / temperature sensor (combined)	analog	
Bypass filter electric clogging indicator		
Return filter electric clogging indicator		
Pressure sensors for main hydraulic pumps		
Hydraulic oil type for standard ambient temperature (>15°C and <30°C)	Sandvik oil with viscosity 46	

#### Optional items

Hydraulic oil type for high ambient temperature (>30°C)	Sandvik oil with viscosity 68	
Hydraulic oil type for low ambient temperature (<15°C)	Sandvik oil with viscosity 32	
Hydraulic cylinders with special acidic water resistant coating		
Fitting type (on special request)	DKO	
Fitting type (on special request)	JIC	
Connection for additional tooling system (2x - 1x left & 1x right)		
Fire resistant hydraulic fluid		

## Assembly Group #14 – Operator Stand / Cabin

#### Standard items

No operator stand / cabin @ machine control via radio remote control		
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#### Optional items

Open, FOPS certified operator stand with low and removable roof		
Machine height with operator stand / cabin	~ 3.15	[m]
Operator stand / cabin width	~ 1160	[mm]
Operator stand / cabin length	~ 1450	[mm]
Operator stand / cabin height	~ 1925	[mm]
Operator seat adjustable with shock absorbers, ergonomic positioned		
LCD operator screen for machine control system visualization (external display in combination with operator stand replaces internal display in electric main panel SANDVIK SMV Ex-11), machine operation via radio remote control located in operator stand (cable connection for RRC available)		
Switch for operator presence monitoring		

## Assembly Group #15 – Lubrication System

### Standard items

Automatic, consumption optimized lubrication / greasing system (hydraulically driven) with controlled activation and grease filling control		
Individual grease nipples and grease ledges for manual lubrication		
Grease type	DIN 51825, K2K-25	
Hand lever press with grease nipple tube 0.5kg	1	[pcs.]

## Assembly Group #16 – Cooling & Spraying System

### Standard items

Open cooling system continuously supplied with fresh water for machine cooling and for water spraying for dust suppression		
Water supply volume	~ 50	[l/min]
Water supply temperature range	~ 10 - 35	[°C]
Water supply pressure range	~ 10 - 50	[bar]
Water booster pump station for spraying system hydraulically driven		
Hose type	Semperit	
Fitting type (standard)	ORFS (flat seal)	
Incoming water pressure sensor		
Spraying system with ITP nozzles		
ITP pressure sensor		
ITP flow sensor		
Water supply monitoring directly on high pressure water pump (pump stop when supply pressure <3bar)		
Back flushing filter		
Pressure relief valve - 20bar		

### Optional items

Pressure reduction valve ~15bar for water supply in high pressure range	~ 10 - 50	[bar]
Closed circuit cooling system for maximum 35°C ambient temperature		
Closed circuit cooling system for maximum 40°C ambient temperature		
Fitting type (on special request)	DKO	
Fitting type (on special request)	JIC	
Water spraying device on conveyor rear end for dust suppression including manual switch valve		

## Assembly Group #17 – Accessories & Tools

### Standard items

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Standard tool set for roadheader machine assembly

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### Optional items

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Special hand tools for roadheader machine assembly

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Special tool set for cutter head maintenance

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## Assembly Group #19 – Additional Equipment

### Standard items

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Mechanical boom stop for cutting arm (safety device)

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Hand fire extinguisher 6 kg class ABC 2 [pcs.]

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Several lifting devices for basic machine

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### Optional items

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Auto fire suppression system ANSUL

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Auto fire suppression system AUG-12

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Basic surface COM @ fiber optics (F/O)

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Basic surface COM @ power line modem (PLM)

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Daylight IP camera system in FLP version integrated

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Cutronic® (cutting automation - semi-automated cutting cycle)

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Extendable working platform excluding arch lifting device

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Extendable working platform including arch lifting device

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Machine weight with working platforms / arch lifting device ~ 132 [t]

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Machine height with arch lifting device and lowered conveyor ~ 3200 [mm]

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Minimum cutting height with arch lifting device ~ 4500 [mm]

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Integrated dust intake channels (requires low crawler track system)

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Special brackets and covers for container transport

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Slurry pump hydraulically driven

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## Assembly Group #60 – Operating & Safety Labels

### Standard items

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Operating / maintenance manual - country language - digital version 3 [pcs.]

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Parts manual - country language - digital version 3 [pcs.]

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Safety labels complete - country language 1 [pcs.]

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Operating labels complete - country language 1 [pcs.]

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Machine approval label - country specific 1 [pcs.]

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## Assembly Group #99 – Special Customer Requirements & Tests

### Standard items

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Disassembly, painting, design hours and software validation		
Factory 4 hour operation test run		
Machine tear-down for shipment		

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### Optional items

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Technical documentation - Operating / maintenance manual - hard copies in English and in customer language	3	[pcs.]
Technical documentation - Parts manual - hard copies in English and in customer language	3	[pcs.]

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#### **SANDVIK MINING AND ROCK TECHNOLOGY**

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