Annex A : Technical Description, Scope of Supply_Rev00

Main Equipment

Pos.No	Description	Qty	
1	AVN1500TB/OD 1810mm Microtunnelling Machine with upskin to 1600/OD 1960mm Herrenknecht AVN 1500TB M-591M	1	

Rock Cutting Wheel

The cutting wheel 1970 is specially designed for AVN1500TB in rock.
Not Equipped with disc cutters and scraper buckets, only used tools are integrated.
Cutting wheel 1810 mm is not scope of supply.

Maximum Unconfined Compressive Strength (UCS)		200 MPa
	Cutting diameter	1 970 mm
Tools	Cutting discs	10 No
	Cutting discs diameter	305 mm
	Bolted scraper buckets	4 No
Features	Tool exchange system: Closed face type	backloading
Dimensions	Overall length	740 mm
	Diameter	1 940 mm
	Weight	4 500 kg

Machine AVN1500TB M591-M

Articulated shield with face support / excavated material transportation by slurry. Slurry feed by 3 nozzles into crusher / excavation chamber and 2 nozzles to area around slurry discharge pipe.

Nozzle sets may be used individually or in combination to suit varying soil conditions. Integral conical stone crusher behind cutting wheel. Face access for cutter inspection / change.

Main drive assembly providing peripheral hyrd. drive motors and heavy duty main bearing for reliable torque transmission to cutting wheel, special capabilities in hard rock.
Machine-can with power pack.
Standard design for groundwater pressure up to 3 bar.

Connection to remote control container via electrical cables 950 V and control cable.

Technical name	AVN1500TB		
Drive	Hydraulic drive motors		4 No
	Rated power		160 kW
	Variable speed	Stage 1	0 - 4.6 rpm
		Stage 2	0 - 7.7 rpm
	Maximum torque		
	continuous	Stage 1	316 kNm
		Stage 2	187 kNm
	Maximum torque		
	intermittent	Stage 1	474 kNm
		Stage 2	281 kNm
Face access door	Diameter		570 mm
Slurry valves	Hydraulically remote controlled Feed lines		
	Annulus / Cutterhead		125 mm
	Discharge line		125 mm
	By-pass		125 mm
	Emergency valve for slurry discharge		
	line, automatic closure with power		
	supply failure		125 mm
Articulation joint	With adjustable seal		
Steer cylinders	With inductive electronic stroke measurement		4 No
	Stroke		60 mm
	Maximum single thrust at 450 bar		900 kN
Oil filtration	To protect steer cylinder and by-pass solenoid valves 3		micron
Dimensions	Base Diameter		1 810 mm
	Upskin Diameter		1 950 mm
	Length		3 356 mm
	Weight		18 500 kg

Machine-Can	Reduces tendency of machine roll.		
With Power Pack	Includes hydraulic power pack for main drive.		
	Powerpack	Installed el. power cutting wheel drive	160 kW
		Installed el. power telescope station	15 kW
		Supply voltage	960 V / 50 Hz
		Outlets for interjack stations	3 No
		Outlets for telescope station	1 No
		Oil tank Main Pumpe	500 ltr
		Oil tank IJS	290 ltr
	Dimensions	Base Diameter	1 810 mm
		Upskin Diameter	1 940 mm
		Length	2 682 mm
		Weight	7 600 kg

Pos.No	Description	Qty	
2	Control Container Herrenknecht M592-C	1	

Control Container C03 M592-C

Adaptable for operation of a certain range of microtunnelling machines.
Containerized with separate compartments and interconnecting door for powerpack and operator.
Window in operator compartment for site and shaft observation.
Single connection port for all electric power cables and hydraulic lines for cutting head and jacking rig.
Ergonomic layout of controls with industrial PC and color monitor for full on-line visualization of all operating parameters; PLC-system Siemens S5.
Data logger records all drive parameters for output to printer in either tabular or graphical form (time- or distance based record interval).

Dimensions	Length	5 500	mm
	Width	2 450	mm
	Height	2 800	mm
	Weight	11 000	kg
Operator control panel	Cutting wheel	Speed of rotation	rpm
		Direction of rotation	
	Cutting wheel drive	Operating pressure	bar
	Slurry pressure	At cutting head	bar
	Steering cylinder	Pressure	bar
		Stroke	mm
	Bypass valves system	Position	
		Operating pressure	bar
	Slurry lines	Flow	m^3/h
	Pumps	Speed of rotation	rpm
	Jacking rig	Pressure	bar
		Advance speed	mm/min
		Fast retract	mm/min
	Interjack station	Pressure	bar
		Stroke	mm
	All equipment	Start and stop controls	
	Hydraulic oil	Temperature	°C
Safety features	Emergency	Stop control	
	Auto shut down	Oil temp too high	
		Oil level too low	
		Oil cooler trip	

	Telephone	To cutting head telephone	
	Operating hours		
Drive record system	Date and time		
	Total drive length (via length encoder)		m
	Stroke steering cylinders		mm
	Vertical deviation		mm
	Horizontal deviation		mm
	Roll		degrees
	Angle of cutting head assy / vertical		mm/m
	Angle of cutting head assy / horizontal		mm/m
	Jacking rig thrust		t
	Cutting wheel torque (pressure)		bar
Air compressor	Installed in power pack compartment.		
	Displacement (at 6bar pressure)		230 l/min
	Maximum pressure		10 bar
Remote control jacking rig	Pendant on wander lead to operate jacking rig remote from control container during set up and pipe installation.		
Main jacking aggregate	Installed electrical power		30 kW
	Supply voltage		400 V / 50 Hz
	Pump-Valve block combination		0 – 38 l/min
	Outlets for interjack stations		4 No
Hydraulic tank	Capacity		1 500 l
Transformer	Main drive power pack and interjack power pack	400 / 950 V	270 kVA
Transformer	Slurry discharge pump P2.1 (machine) 400 / 950 V		165 kVA
Transformer	Slurry discharge pump P2.2 (Tunnel) 400 / 950 V		165 kVA
Frequency converter	Slurry feed pump		75 kW
	Supply voltage		400 V / 50 Hz
Frequency converter	Slurry discharge pump (Machine)		132 kW
	Supply voltage		950 V / 50 Hz

Frequency converter	Slurry discharge pump (Tunnel)	132 kW
	Supply voltage	950 V / 50 Hz
Frequency converter	Slurry discharge pump (Shaft)	90 kW
	Supply voltage	400 V / 50 Hz

Power supply	Lubrication pump, Target, PLC & auxiliaries
Machine survey	Monitor installed in container to provide view into machine via b/w camera