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1. Tunnel boring machine general

	<p>Marking: The rating plate of the system is attached in the TBM control cabin.</p>
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1.1 Tunnel boring machine

Machine type	Mixshield
Installed power	1 600 kVA
Length TBM + back-up	approx. 68 m
Weight TBM + gantry	approx. 450 t
Correction curve radius (min.)	400 m
Working pressure	3.0 bars

Table II - 1: Tunnel boring machine

1.2 Tunnel

Total tunnel length	1 300 mm
Downward gradient (max.)	3 %
Overburden (max.)	32 m
Oberburden (min.)	6 m

Table II - 2: Tunnel

1.3 Segments

Outer ring diameter	5 100 mm
Inner ring diameter	4 500 mm
Segment length	1 200 mm
Segment thickness	300 mm
Ring arrangement	5 + 1
Segment weight (max.)	2.6 t
Weight of a complete ring	13.4 t

Table II - 3: Segments

2. Shield general

2.1 Steel construction shield

Diameter front shield (without hardfacing)	5350 mm
Length front shield	2020 mm
Diameter centre shield	5340 mm
Length centre shield	3500 mm
Diameter tailskin	5330 mm
Length tailskin	3030 mm
Tailskin sealing	3 rows of brushes

Table II - 4: Steel construction shield

2.2 Tailskin articulation cylinders

Number	14
Stroke	100 mm
Cylinder force	5595 kN at 265 bars

Table II - 5: Tailskin articulation cylinders

2.3 Advance

Number of main thrust cylinders	16
Stroke	1700 mm
Thrust force main thrust cylinders	25334 kN at 350 bar

Table II - 6: Advance

2.4 Man lock

Number	1
Type	parallel lock
Volume pre-chamber	2300 l
Number of persons pre-chamber	2
Volume main chamber	2700 l
Number of persons main chamber	3
Working pressure	3.0 bars

Table II - 7: Man lock

2.5 Material lock

Number	1
Length	1790 mm
Nominal width	DN716

Table II - 8: Material lock

2.6 Stone crusher

Type	jaw breaker
Grain size (max.)	400 mm

Table II - 9: Stone crusher

3. Cutting wheel general

3.1 Steel construction cutting wheel

Bore diameter	5390 mm
Weight (with tools)	40 t
Disc cutters (1 ring)	25
Disc cutters (centre)	4 x 2 ring disc cutters
Diameter disc cutters	14"
Track pitch	90 mm / 95 mm
Cutting knives	54
Centre knife	1 (optional instead of centre disc cutters)
Buckets	4 + 4

Table II - 10: Steel construction cutting wheel

4. Drive general

4.1 Main drive

Type	hydraulic
Motors	6
Power	630 kW
Speed	0 - 3.5 ¹ / _{min}
Torque (nominal)	2331 kNm
Breakaway torque	2928 kNm
Main drive diameter	2200 mm
Seal system (inner / outer)	double / fourfold

Table II - 11: Main drive

5. Erector general

5.1 Erector

Drive	hydraulic
Weight (erector with main beam)	approx. 19 t
Grabbing system	mechanical
Driveway	1400 mm
Rotational speed (with / without segment)	1 / 2 ¹ / _{min}
Rotary angle	+/- 200°
Control	radio control

Table II - 12: Erector

6. Process technology

6.1 Hydraulic system

Total power	825 kW
Tank volume	2 160 l + 930 l

Table II - 13: Hydraulic system

6.2 Water circuit

Flow rate (min.)	30 m ³ /h
Inflow temperature (max.)	25 °C

Table II - 14: Water circuit

6.3 Ring gap filling

Medium	lime mortar
Pumps	2 x KSP12
Power	30 kW
Tank	4 m ³

Table II - 15: Ring gap filling

6.4 Slurry circuit

Diameter slurry line	DN300
Diameter feed line	DN300
Diameter telescopic pipe	DN300
Feed pump	P1.1: 450 kW (separation) P1.2: 200 kW (TBM)
Conveyance rate	1000 m ³ /h
Slurry pump	P2.1: 400 kW (TBM) P2.2: 400 kW (tunnel)
Conveyance rate	1000 m ³ /h

Table II - 16: Slurry circuit

6.5 Dewatering

Dewatering pumps	P10: pneumatic
Wastewater pump	Wastewater pump 1: 54 kW Wastewater pump 2: pneumatic

Table II - 17: Entwässerung

6.6 Compressed air regulating system

Type	double air intake / outgoing air
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Table II - 18: Compressed air regulating system

6.7 Secondary ventilation

Power ventilator	15 kW
Ventilation duct diameter	300 / 600 mm

Table II - 19: Secondary ventilation

6.8 Safety installations

Measured gases	3 x CH ₄
Fire extinguisher	ABC / CO ₂
Smoke and heat detectors	5
Water curtain	at the end of the last gantry

Table II - 20: Safety installations

6.9 Electric systems

Primary voltage	10000 V
Secondary voltage	400 / 415 V
Control voltage	24 / 230 V
Valve voltage	24 V
Line frequency	50 Hz
Transformers	1 x 1600 kVA

Table II - 21: Electric systems

7. Back-up general

7.1 Steel construction back-up

Number of gantries	4
Total length	approx. 60 m
Weight back-up	approx. 200 t

Table II - 22: Steel construction back-up

7.2 Segment feeder

Capacity	1 ring (6 segments)
Control	control panel

Table II - 23: Segment feeder

7.3 Segment crane

Drive	hydraulic
Drawing No.	2959-006-030-01
Grabbing system	mechanical
Rated load	2.6 t
Driveway	approx. 9 m
Stroke height	2.3 m
Travel speed	0 - 40.0 m _{min}
Stroke speed	5.0 m _{min}

Table II - 24: Segment crane

7.4 Grease barrel crane

Position	gantry 1
Drawing No.	168-06-038-10
Drive	manual
Rated load	0.5 t
Driveway	2.2 m
Stroke height	3.0 m

Table II - 25: Grease barrel crane

7.5 Ventilation cassette lifting device

Position	gantry 4
Drawing No.	2959-006-034-00
Drive	manual
Rated load	0.82 t

Table II - 26: Ventilation cassette lifting device

7.6 Rail laying crane

Position	gantry 4
Drawing No.	2959-006-031-00
Drive	lifging: electrical driving: manual
Rated load	1.0 t
Driveway	1.8 m
Stroke height	3.0 m
Stroke speed	1.0 / 4.0 ^m / _{min}

Table II - 27: Rail laying crane

7.7 Pipe laying crane

Position	gantry 4
Drawing No.	2959-006-035-01
Drive	hydraulic
Rated load	0.4 t
Driveway	1.5 m
Stroke height	0.8 m

Table II - 28: Pipe laying crane