



## ROBBINS 4.305 M HARD ROCK DOUBLE SHIELD TBM

( MODEL DS1415-370 )



**ROBBINS 4.305 M HARD ROCK DOUBLE SHIELD TBM ( MODEL DS1415-370 )**

**GENERAL SPECIFICATIONS**

**Year of Manufacture** 2012  
**Machine Diameter** 4,305 mm (14.1 ft)

**Cutters**

Face/Gauge/Center Series 17 ( 483 mm)  
Number of Disc Cutters 28  
Loading Back  
Maximum Recommended Individual cutter Load 267 kN (60,000 lb.)

**Cutterhead**

Maximum Operating Cutterhead Thrust 9,806 kN (2,204,623 lbf)  
Cutterhead Drive VFD Elektric motors safe sets,gear reducers  
Cutterhead Power 1,320 kW (4x330 kW) 1,770 HP  
Cutterhead Speed (Constant torque range) 0-7.5 rpm  
(Constant power range) 7.5-13.5 rpm  
Cutterhead Torque ( At 7.5 rpm) 1,674 kNm (1,234,528 lbf.ft)  
( At 13.5 rpm) 1,197 kNm ( 882,860 lbf.ft)

**Thrust Cylinder Stroke (Effective)** 1,450 mm ( 57.09’')

**Hydraulic System**

System Maximum Operating Pressure ( Nominal ) 345 bar ( 5,003 psi )  
Emergency Auxiliary Thrust Pressure ( Excaptional ) 450 bar ( 6,527 psi )

**Electrical System**

Cutterhead Drive VFD System  
Primary Voltage 11,000 V, 50 Hz  
Secondary Voltage 690v, 3 phase, 50 Hz  
Transformer Size 1X1,850 Kva ( 690 V )  
Transformer Size 1X1,000 Kva ( 400 V )

## TECHNICAL SPECIFICATIONS OF ROBBINS 4.305 M HARD ROCK DOUBLE SHIELD TBM

### Main Characteristics

#### TBM

Type	Double Shield
Maximum penetration rate	130 mm/min
Horizontal minimum curve Radius while boring	350 m
Horizontal minimum Radius through drill and blast portion	100 m
Maximum slope	+2/-1 %%

#### Cutterhead

Excavation diameter	4,305 mm
Type	rock/Mixed Face type bi-direction with muck pick-up/boring only in one direction
Numberof cutters	28
Cutter size	Robbins 17'' Wedgelock
Cutter load	27 metric ton
Boring diameter	4.305 m with new discs
Overboring capacity on diameter	50/80 mm by cutter shimming
Overboring modality and features	Cutter shimming&oversize discs
Overboring with large discs	18.25 discs on 17'' cutter-6 required
Cutterhead maximum thrust	756 metric ton ( based on cutter load and count )

#### Cutterhead Drive

Type	Electric VFD
Speed	0 to 13.5 rpm
Torque	Max 1,497 kNm

Breakout Torque	Max 2,247 kNm
Driving power installed	4x315=1260 kW (330 kW motors may be supplied )
Main Bearing gear	High capacity, 3 axis
Lubrication of bearing	Re-circulating, filtered, monitored
Front sealing	Multi-lip Merke type
Lubrication of sealing	Oil/grease flushing
Main Bearing type and O.D.	2,650 mm
<b>TBM Belt Conveyor</b>	
Belt width	610 mm
Total length	11 m
Quantity	1
Belt speed ( adjustable )	Approximately 2.8m/s
Total installed power	30 kW
Driving system	Hydraulic
<b>Back-up Belt Conveyor</b>	
Capacity	368 m <sup>3</sup> /hr
Belt Width	610 mm
Belt speed	2.8 m/s VFD Electrical (IP65 motor)
<b>Main Thrust</b>	
Nominal propel thrust ( nominal )	1,000 metric ton
Maximum propel thrust	1,425 metric ton
Number of cylinders	8
Cylinders	178 metric ton/each (nominal)
Stroke	1,400 mm
Advance speed/retract speed	160 ext/2,000 mm/min ret

### **Shield Articulation**

Number of cylinders with thrust system power 8

### **Auxiliary Thrust**

Number of cylinders 11

Stroke 2,100 mm Nominal Thrust 1,281 metric tons Auxiliary thrust system will be supplied with small volume emergency thrust system 400 bar system

Emergency Thrust 2,267 metric tons

### **Segment Erector**

Type Rotary

Pick-up Steel ball inserted in segment

Clutching force/power 37.5 kW

Torque 90 kNm

Degree of freedom 6°

Shift travel able to disassemble last erected ring

Angle of rotation 220°

Control mode Radio control with pendant

Pick-up Center pin

### **Segment Information**

Inside Diameter 3,500 mm

Outside Diameter 4,000 mm

Number 5+1

Length 1,350 mm

Configuration Attached Geodata drawing

## **Back-up**

Type of gantries	Open gantry riding on Auxiliary rail
Muck transport	Muck car
Optional	Conveyor haulage
Method	One (1) stroke advance
Optional	Double Stroke or Conveyor haulage
Window for train ( width x height )	1.5 m x 1.75 m ( to be Confirmed at final design)

## **Ventilation**

Primary ventilation	Blowing fan at tunnel portal, out of supply
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## **Electricity**

Cutterhead drive	1,260 kW ( or 1,320 kW )
Belt conveyor	50 kW
Propel/auxiliary	75 kW
Miscellaneous functions	100 kW
Total installed power	Surge protection required
Transformer for Cutterhead Drive	1x1700 kVA- to be confirmed
Auxiliary Transformer	1x350 kVA
Primary voltage	11 kV, 50Hz
Secondary voltage	380 V
Degree of protection	IP55/IP65
HV cable-Figure 8 storage system	250 m
Normal lighting	220V,50Hz
Emergency lighting	