

Technical characteristics

Sinking equipment. Roadheader П110

Roadheader application

Roadheader П110 is designed for mechanized breakage and loading of mined rock when developing of arched, trapezoidal and rectangular-shaped workings with cross sections from 7 to 25 m² while roadheading with $\pm 12^\circ$ inclination angle in coal and combined face with maximum ultimate uniaxial compression strength $\bar{\sigma}_{\text{conpr}}=100$ MPa and abrasivity up to 15mg in mines which are hazardous by gas and dust.

- High capacity.
- Compact design of roadheader for minimal face sections.
- Service life is up to the first overhaul – up to 120 ths. m³ of broken rock.
- The lowest maintenance costs per 1 m of sinking.

Distinctive features of the roadheader П110

Roadheader П110 is the unique, high-production boom-type equipment of new technical level, suitable for high adaptability to different mining and geological conditions, with wide range of workings cross-sections according to their area and shape, with free access to face space, adapted to support of workings near to the face, with high maneuverability, relatively simple structure, with reduced construction height and weight.

Roadheader П110 has the following distinctive features:

1. The transverse arrangement of the cutting heads eliminates the overturning effect during the rock cutting, which increases the stability of the roadheader against turning.
2. The direction of cutting heads rotation "underneath themselves" ensures that the destroyed rock is poured into the feeder area, and when processing the soil to the horizon using telescoping, the loading of the rock onto the feeder improves.

Loading can be combined with cutting when the operating member is fed both left and right, idling is excluded compared to the roadheader with the axial cutting head.

3. The roadheader is equipped with 900 mm cutting heads.

1000 mm cutting heads can be supplied for coal mining.

4. The two-speed gearbox of the operating member allows to change the cutting heads rotational frequency and to choose the most productive cutting modes depending on the strength of the breaking rocks. The transition to low speed during hard rock breakage reduces dynamic loads, dust emission and cutters expenditure.

5. Serial powering on with a time delay of two operating member drive motors facilitates the roadheader activation, reduces in-rush current, provides the possibility of operation in the working with a length of up to 1400 m without reinstallation of the transformer substation.

6. The use of hydraulic clamps in the operating member compensates for the wear of the guides during telescoping, enables to reduce vibration level and to enhance reliability by increasing the stiffness of the structure.

7. The low center of gravity as well as the power supporting feeder and rear outriggers increases the roadheader stability during the destruction of the rock massif.

8. Removable feeder reamers allow to reduce overall dimensions and to increase maneuverability when the roadheader driving and passing orthogonal workings. A set of interchangeable reamers allows the loading front increase in relation to working conditions from 2100 up to 3800 mm. The roadheader outfit with interchangeable feeders - with arms or spinners (sprockets) - allows to optimize the choice of the feeder type by the customer depending on the mining-and-geological conditions of sinking.

The version of the feeder and chain-and-flight conveyor using wear-resistant flat rolled stock of the HARDOX type allows the roadheader using for sinking (or mining) of highly abrasive rocks.

9. Small dimensions in the transport position improve visibility, allow to transfer the roadheader without disassembling at workings of small section with the height up to two meters. Low height allows to place additional equipment above the roadheader (monorail, ventilation pipe, etc.).

10. The use of a gearless oil-pumping station with the three-section gear-type pump reduces noise level and operating costs.
11. The hydraulic drives of the crawler track and the feeder gathering elements are unified and allow the operation in the watered workings.
12. The modernized hydraulic equipment scheme provides the following:
 - separate hydraulic drive of end trucks;
 - hydraulic drive of two rock-drilling machines for anchoring or other hydroficated tools;
 - reduction of pressure losses in the hydraulic system of the roadheader due to the use of distribution equipment with increased consumption;
 - improvement of the dynamic characteristics of the undercarriage (increased speed, tractive effort), feeder (increased rotation frequency and effort of the gathering elements), operating member (increased feeding speed).
13. Two crawler track movement rates:
working – 2,2 m/min and travelling – 6,4 m/min can reduce the technological (non-production) work cycle.
14. The conveyor is equipped with the lifting and turning section, which allows the broken rock mass loading onto mine transportation devices (chain-and-flight or belt conveyors, trucks).
15. The roadheader can be connected to the electrical mains of both 660 V and 1140 V.
16. The roadheader can be controlled from the local control panel, remotely - from the cable control panel by means of two-wire cable or from the radio control panel.
17. The roadheader control system is built on the basis of a programmable controller that performs the functions of control, protection and signaling. This allowed to reduce the number of relay-contactor and protective equipment. The use of the RS 485 interface for communication between devices in the control system allowed to significantly reduce the number of cable routes on the roadheader. All of this together increased the reliability of the control system.
18. The instrumentation provides diagnostics of the roadheader electrical equipment with the output of information on the control panel liquid-crystal display.
19. The electrical equipment diagram allows powering the belt reloader, the irrigation pumping unit, the dust-collector from the roadheader.
20. Electric drives of the operating member and oil-pumping station are unified.

Operating member	the choice of optimal cutting head revolutions is provided by the two-speed gearbox; sequential start of two motors of 55 kW each reduces in-rush current;
Feeder	increased stability due to the use of the feeder as a power front support during cutting is provided by the feeder lowering below the soil level;
Removable feeder reamers	when removed - maneuverability is increased, when additional ones are installed - the loading front is increased;
Crawler track	reduction of non-production time losses during the driving is provided by the second increased speed of movement; high maneuverability during movement in the face (especially for orthogonal workings) is provided by the autonomous drive to each truck;
Connectivity	connection of the belt reloader, irrigation plant, dust collector, rock-drilling machines for anchoring, other electric and hydraulic tools;
Control	stationary and portable panels: cable and radio control panel

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Table 1

Parameter name	Value
Roadheader	
Cutting technical performance, m ³ /min	0,3...2,5
Operating member electrical motors power, kW	2x55
Installed electrical motors total power, kW	195
Rated values of supply mains:	
- voltage, V	1140/660
- current frequency, Hz	50

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Table 1 continuation

Parameter name	Value
Boom span, not less, mm:	
- over the width	6700
- over the height	5000
Overall dimensions in transport position, not more:	
length, mm:	
- with conveyor turning section	12650
- without conveyor turning section	10530
width, mm	2300
height, mm	
- over the operating member	1800
Minimum height of the working made by the roadheader, mm	2250
Weight, t	43
Operating member	
Type - boom-shaped telescopic with two axial cutting heads	
Type of the cutters - RG501D-16S, PT-3212, PIII32-85/16, PKC-2	
Maximum cutting heads diameter over the cutters, mm	900; 1000
Cutting head penetration beneath the crawlers supporting surface, mm	100; 155
Operating member extension, mm	555
Feeder	
Type - non-rotating, supporting with gathering arms (spinners)	
Width, mm	
- without reamers	2100
- with reamers 4000	3800
- with spinners	3310
Arms (spinners) oscillation frequency, rpm	24
Feeder penetration beneath the crawlers supporting surface, mm	225
Feeder hoisting above the level of the crawlers supporting surface, mm	470
Undercarriage	
Type - crawler track, self-propelled with individual hydraulic drive of left and right trucks	
Width of track chain, mm	550
Specific ground pressure, MPa	0,13
Travel speed, m/min.:	
- working	2,2
- travelling	6,4
Conveyor	
Type - chain-and-flight, single-strand	
Channel width, mm	535
Flight chain travel speed, m/s	1,0
Hydraulic system	
Working fluid - oil ИГП-49	
Working pressure, MPa	14...18
Capacity of hydraulic system, l	700