Although continuous update of technologies, the technical specification is subject to changes without further notice. The machine shown in the diagram probably contains additional equipment. The copyright is reserved by Sany Heavy Equipment Co., Ltd. Without the written consent of Sany Heavy Equipment Co., Ltd., it's prohibited to copy or duplicate any part of this brochure for any purpose.

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This brochure is for reference only and is subject to changes without further notice and the contract or real product shall prevail for all configurations.
Sany Heavy Equipment Co., Ltd. always undertakes the R&D and manufacture of coal machinery and its supporting products as own mission and its industry senior R&D and service teams offer complete solutions, including mine mining design, equipment selection and customization, supporting product R&D, production installation, and after-sales maintenances, to the customers. While continuously improving the technologies of traditional coal machinery, Sany pays more attention to the product R&D and put forward 5 manufacturing requirements for the support products, namely light weight, less failures, long reliable life, high adaptability, and one-time zero-defect design, to bring about real benefits to the coal mine users (Low failure and operation and maintenance costs and guaranteed high-efficiency coal mining). Sany Heavy Equipment Co., Ltd. is already competent to become reality the automated and intelligent green mines.
Inspection and testing

Quality control of structural parts: The supersonic flaw detection was taken for main structural parts to verify the welding quality.

Support bench test (30,000kN comprehensive test bench) was completed as per national standard (European standard) to verify the overall performance.

Manufacturing processes

High-strength steel plate welded parts: The manufacturing quality of structural parts is guaranteed by removing the oxide skin from groove surfaces, reasonably controlling the welding parameters (such as current and welding speed) and equal-strength welding wires, and using multi-layer and multi-bead welding process, residual stress relief, and shot blasting.

Machining: The 100% interchangeability of the structural parts is guaranteed by main reamed holes and integral boring process.

Targeted design optimization

Based on the working conditions (approximately horizontal face, large inclination, face-up/face-down mining, fault structure, tight roof, three-soft problem, and highly corrosive working face) of the working face, the targeted design was fulfilled to guarantee the excellent working condition adaptability of the supports. The mechanical structure of the machine was optimized by finite element analysis to eliminate common design defects (concentrated stress, insufficient rigidity, and unreasonable partial structure) and guarantee no-defect structure design.

Scientific model selection

1. "Working resistance" model selection

Based on the histogram data and in combination with the actual local operation experiences, the scientific model selection utilized the "transmission rock beam" mechanics theory of the academician Song Zhenqi and reasonably determined the working resistance of supports to guarantee the appropriate working resistance and prevent the adverse events such as waste of investment and occurrence of roof accident or damage of mass supports.

2. "Anti-corrosion and anti-contamination" model selection

The water of working face was collected for water quality analysis. Based on the water quality report, the anti-corrosion and anti-contamination model selection was fulfilled to determine the plating anti-corrosion technology of hydraulic cylinder, ensure that the "anti-corrosion and anti-contamination" performance of supports meets the requirements, and reduce the failure rate and operation and maintenance costs of hydraulic system parts.

Quality control of structural parts: The supersonic flaw detection was taken for main structural parts to verify the welding quality.

Support bench test (30,000kN comprehensive test bench) was completed as per national standard (European standard) to verify the overall performance.
Sany adopts innovative anti-corrosion laser cladding technology. The salt fog test for the electroplating performance is up to 1,800h, longer by 400~500h than that specified by national standard.

The laser cladded stainless steel eliminates the formation of porosity cracking to thus isolate the contact between water and base material and achieve permanent anti-corrosion performance for the piston rod. (After 1,000h salt fog test, the one with Sany anti-corrosion technology almost has no change and the double chrome plating is already corroded).

The valve internal flow field and dynamic characteristics of the supports are analyzed by CFD computational fluid mechanics to realize the optimized matching between valve internal channel structure and flow speed and differential pressure.

**Working medium management**

For fully mechanized mining equipment, the traditional emulsified liquid supply system is actively managed to guarantee the concentration and cleanliness of emulsified liquid to reduce the failure rate of hydraulic system.

The ultra-pure water is used as medium in place of emulsified liquid. Compared with traditional emulsified liquid system, this system is simplified more to realize lower failure rate and high economy and environmental-friendliness.
Technical Features

The high cost-performance electrohydraulic control system developed independently by Sany Heavy Industry Co., Ltd. innovated the wireless remote control device and video monitoring system to drive the intelligent development of supports and lay a foundation for the realization of automated underground fully mechanized mining working face with less manpower in the industry.

Experience of remotely operated supports by experts of China National Coal Association in 2012

Industry’s pioneering remotely operated supports

With IP67 protection grade, the control system parts can be immersed in the water for long-time energized working to adapt to the severe mine environments.

Intrinsically safe micro-camera

Real-time upload of underground video to monitoring center

Working face field video on gate road centralized control system

Full mining height support

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Two-pillar shield type</th>
<th>Four-pillar shield type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working resistance (kN)</td>
<td>2400 ~ 20000</td>
<td>3500 ~ 18000</td>
</tr>
<tr>
<td>Maximum height (m)</td>
<td>1.4 ~ 7</td>
<td>1.3 ~ 4.5</td>
</tr>
<tr>
<td>Minimum height (m)</td>
<td>0.7 ~ 3.2</td>
<td>0.65 ~ 2.5</td>
</tr>
<tr>
<td>Conventional center distance (m)</td>
<td>1.5 (≤8000kN working resistance)</td>
<td>1.5 (≤14400kN working resistance)</td>
</tr>
<tr>
<td>Thin seam</td>
<td>07 ~ 14; 07 ~ 17; 08 ~ 18</td>
<td>07 ~ 14; 08 ~ 16; 09 ~ 18</td>
</tr>
<tr>
<td>Medium-thickness seam</td>
<td>09 ~ 20; 10 ~ 23; 12 ~ 26; 13 ~ 28; 14 ~ 30; 16 ~ 32; 17 ~ 35</td>
<td>12 ~ 24; 14 ~ 26; 16 ~ 30; 17 ~ 32; 18 ~ 35</td>
</tr>
<tr>
<td>Thick seam</td>
<td>18 ~ 38; 20 ~ 40; 22 ~ 45; 23 ~ 48; 24 ~ 50; 26 ~ 55; 28 ~ 63; 32 ~ 70; 35 ~ 80</td>
<td>19 ~ 38; 20 ~ 40; 23 ~ 42; 25 ~ 45</td>
</tr>
</tbody>
</table>

Technical Specification

Operation cases

Model: ZY3000/07/17
Working location: Beilukou Coal Mine, Shandong Fengyuan Yuanhang Coal Co., Ltd.

Model: ZY3200/07/17
Shanshi Tongzhou Ameihe Coal Mine

Model: ZY3540/6/6/13
The Donbas coal mine, east of Poltavograd, Ukraine

Model: ZY3600/08/18D
Tucheng mine, Guangzhou Panyujiang Clean Coal Co., Ltd.

Model: ZY4000/08/18D
Shandong Coal Group Zuyun Coal Co., Ltd.

Model: ZY4800/13/28
Guangzhou Pan-County Dezhou Town Xianhekou Coal Mine

Model: ZY6000/17/34
Shanxi Xinyi Xiaohuangnong Co., Ltd.

Model: ZY6800/17/35
Inner Mongolia Wutai Coal Mine

Model: ZY8000/18/35
Datong Queqie Clean Coal Co., Ltd.

Model: ZY9000/25/50
Shanxi Longyang Coal Mine

Model: ZY9000/26/55
Xingyang Shihe Coal Co., Ltd.
Sublevel carving support

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Two-pillar shield type</th>
<th>Four-pillar shield type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working resistance (kN)</td>
<td>5000 – 12000</td>
<td>4000 – 18000</td>
</tr>
<tr>
<td>Maximum height (m)</td>
<td>3 – 4.5</td>
<td>2.6 – 4.5</td>
</tr>
<tr>
<td>Minimum height (m)</td>
<td>1.6 – 2.3</td>
<td>1.6 – 2.3</td>
</tr>
<tr>
<td>Conventional center distance (m)</td>
<td>1.75(≤12000kN working resistance)</td>
<td>1.75(≤18000kN working resistance)</td>
</tr>
</tbody>
</table>

Face-end supports

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Two-support set middle type</th>
<th>Walking type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working resistance (kN)</td>
<td>10000 – 30000</td>
<td></td>
</tr>
<tr>
<td>Maximum height (m)</td>
<td>3.5 – 4.5</td>
<td></td>
</tr>
<tr>
<td>Minimum height (m)</td>
<td>1.8 – 2.6</td>
<td></td>
</tr>
<tr>
<td>Conventional center distance (m)</td>
<td>Adjust depending on the gate road width and supporting equipment</td>
<td></td>
</tr>
<tr>
<td>Height adjustment combinations</td>
<td>18–35; 22–35; 24–38; 26–38; 22–40; 23–42; 25–45</td>
<td></td>
</tr>
</tbody>
</table>

Operation cases

- **Model**: ZF4800/17/28
  - **Working location**: Shanxi Xingguang Coal Co., Ltd.
- **Model**: ZF6400/16/30
  - **Working location**: Gansu Huating County Chezhe Xixiang United Coal Mine
- **Model**: ZF8800/18/35
  - **Working location**: Xinjiang Dabai mine
- **Model**: ZF7500/18/35
  - **Working location**: Shanxi Coal Group Zuoyun Hanjiaxi Coal Co., Ltd.
- **Model**: ZF8000/18/35
  - **Working location**: Datong Queshan Gasjiaxi Coal Mine
- **Model**: ZF8000/20/32
  - **Working location**: Shanxi Baoshanyaozai Coal Co., Ltd.
- **Model**: ZF9000/18/35
  - **Working location**: Datong Zengdian
- **Model**: ZF10000/18/35
  - **Working location**: Datong Coal Group Shuzhouchi Xianyue Coal Mine
- **Model**: ZF15000/24/43
  - **Working location**: Inner Mongolia Liliang Coal Co., Ltd.
SANYI Support Series Product

Gate road support

Walking forepoling support

Parameter | Walking forepoling
---|---
Working resistance (kN) | 10000 – 30000
Maximum height (m) | 3.5 – 4.5
Minimum height (m) | 1.8 – 2.6
Conventional center distance (m) | Adjust depending on the gate road width and supporting equipment
Height adjustment combinations | 18–35; 22–35; 24–38; 26–38; 22–40; 23–42; 25–45

Operation cases

Model | Working location
---|---
ZC224000/22/40 | Haishewan Coal Mine, Yaojie Coal and Electricity Group Co., Ltd.

Walking face retracement support

Parameter | Special application support
---|---
Working resistance (kN) | Customized
Maximum height (m) | Customized
Minimum height (m) | Customized
Conventional center distance (m) | Customized
Height adjustment combinations | Customized

Operation cases

Model | Working location
---|---
ZL13000/22/46 | Inner Mongolia Daitai Coal Co., Ltd.

Special application support

Technical Specification

Parameter | Special application support
---|---
Working resistance (kN) | Customized
Maximum height (m) | Customized
Minimum height (m) | Customized
Conventional center distance (m) | Customized
Height adjustment combinations | Customized

Operation cases

Model | Working location
---|---
ZC224000/22/40 | Inner Mongolia Daitai Coal Co., Ltd.

Product configuration

Selection of items

<table>
<thead>
<tr>
<th>Item</th>
<th>Conventional configuration</th>
<th>Optional Equipment</th>
<th>Enhanced configuration</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control mode</td>
<td>Manual control</td>
<td>Electrohydraulic control system (Patented technologies: Remote control and video monitoring)</td>
<td>High efficiency and less manpower</td>
<td></td>
</tr>
<tr>
<td>Cylinder anti-corrosion protection</td>
<td>Milky white chrome + chrome</td>
<td>Sany anti-corrosion technology</td>
<td>Severe working conditions</td>
<td></td>
</tr>
<tr>
<td>Valve</td>
<td>Carbon steel</td>
<td>Stainless steel</td>
<td>Severe working conditions</td>
<td></td>
</tr>
</tbody>
</table>

Features

- Electrohydraulic control system (Patented technologies: Remote control and video monitoring)
- Sany anti-corrosion technology
- High efficiency and less manpower
- Severe working conditions

Operation cases

Model | Working location
---|---
ZC224000/22/40 | Haishewan Coal Mine, Yaojie Coal and Electricity Group Co., Ltd.

Technical Specification

Parameter | Walking face retracement support
---|---
Working resistance (kN) | 10000 – 30000
Maximum height (m) | 3.5 – 4.5
Minimum height (m) | 1.8 – 2.6
Conventional center distance (m) | Adjust depending on the gate road width and supporting equipment
Height adjustment combinations | 18–35; 22–35; 24–38; 26–38; 22–40; 23–42; 25–45

Operation cases

Model | Working location
---|---
ZC224000/22/40 | Inner Mongolia Daitai Coal Co., Ltd.

Support Series Product

Quality Changes The World