

ELECTRO-HYDRAULIC SERVO COMPRESSION SHEAR TESTING MACHINE YAW-20000J

Electro-hydraulic servo compression shear testing machine YAW-20000J is a high-precision material testing equipment that can realize closed-loop control and automatic testing, adopts hydraulic drive, electro-hydraulic servo control, computer data acquisition and processing.

It is mainly composed of mainframe, shear frame, rotation angle measurement frame, main oil source (hydraulic power source), electrical control system, etc. The maximum test force is 20000kN, with a high accuracy.

It is mainly used for the mechanical test of axial and radial compressive, shearing and rotation angle of the plate and pot rubber bearings of various bridges under the complex conditions of compression and shear resistance; it can test the compressive strength, compressive elastic modulus, shear bonding performance, shear aging resistance, friction coefficient, and rotation angle of rubber bearings, as well as the elastic modulus and compressive properties of concrete and other material samples.



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FEATURES

MAINFRAME

- The mainframe is a vertical four-column frame structure, which is mainly composed of base, columns, upper beam, main oil cylinder, upper and lower pressure plate, lower pressure plate lifting device, guide rail, and deformation measuring device.
- Segmented guide rail structure, convenient to install the specimen. The upper and lower pressure plate have high strength and rigidity, which meet the requirements of relevant standards and ensure the accuracy of the test results.
- Bottom-mounted load cell, easy to assemble, disassemble and maintain.

ROTATION ANGLE MEASUREMENT FRAME

- The contact surface of the cylinder piston rod and the rotation angle plate is a ball-head ball-seat structure, and the position of the contact surface is automatically adjusted during the test.

OIL SOURCE CABINET

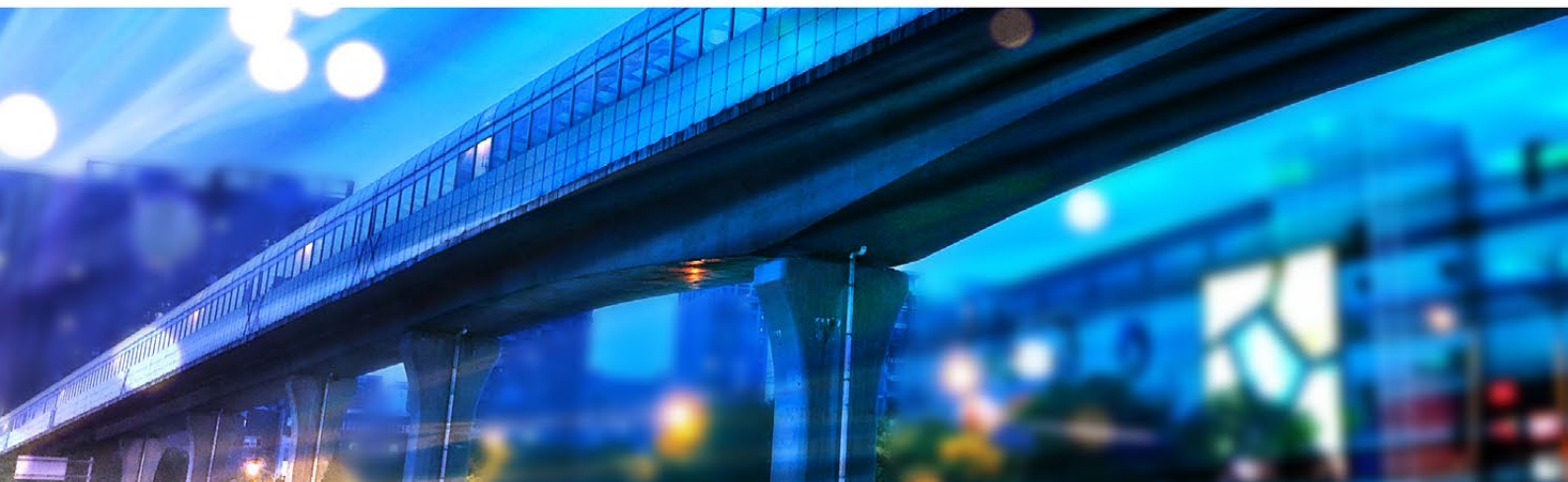
- Integral servo oil source cabinet is composed of oil tank, servo motor, three-phase asynchronous motor, plunger pump, gear pump, filter, valve plate group, etc. The servo oil source system has stable output and low noise. The oil source cabinet is highly integrated, occupies a small area, and is easy to operate and observe.
- There are four independent oil pump groups in the oil source cabinet, and different oil pump groups can be selected to work according to different test items, reducing energy consumption and saving resources.
- Two groups of servo motor oil pump sets can supply oil to the axial loading cylinder of the main cylinder and the horizontal loading cylinder of the shear frame. During the test, the servo motor oil pump group can automatically adjust the output oil volume and the motor speed, which reduces the energy consumption and effectively controls the oil temperature.
- The axial loading of the main oil cylinder adopts the dual-control structure of the fast and slow oil pump group. The no-load fast lifting and the automatic lifting during the test process are supplied by two independent oil supply systems.

SHEAR FRAME

- The shearing part is a floating reaction force frame structure, which is mainly composed of guide rail bracket, horizontal loading oil cylinder, shear frame, floating oil cylinder, and shearing frame dragging device.
- Electric drag system, which can drag the whole set of shears to move along the track. And it is equipped with a plug-in connection device, which is convenient to replace the horizontal pull plate for various purposes.
- The horizontal loading device of the reaction force frame structure is easy to calibrate and verify the horizontal load.

MEASUREMENT AND CONTROL SYSTEM

- The measurement and control system includes computer, load sensors, displacement sensors, deformation sensors, multi-channel servo controller and software, etc., with high control precision and good reliability. The measurement and control system adopts the high-speed Ethernet communication interface to communicate with the computer, and has various control modes such as load and displacement, as well as the screen display of various test curves of test force, displacement and deformation. It can realize smooth switching of control modes and arbitrary reading of multi-channel data.
- The test data is managed by standard database and can be accessed arbitrarily. It can realize re-analysis of test data and curves, local magnification and data re-editing, can automatically calculate various mechanical performance indicators of materials, can print out complete test reports and curves, and provide network data port.
- The measurement and control system has a variety of limit protection, such as: force overload protection, force channel overspeed protection, hydraulic cylinder limit protection, etc. The measurement and control system can be programmed by the user according to the test needs, such as cyclic loading, test force maintenance, etc.



TECHNICAL SPECIFICATIONS

VERTICAL LOADING SYSTEM

Maximum vertical test force: 20000kN;
Resolution: ≤ 0.1 kN
Measurement range: 2%-100%FS(400-20000kN)
Measurement accuracy: ± 1.0 %
No-load maximum displacement speed of oil cylinder: 0-50mm/min(Stepless adjustable)
Beam lifting speed: 150mm/min
Maximum stroke of oil cylinder: 300mm
Displacement measurement accuracy: ± 1.0 %
Deformation measurement resolution (mm): 0.001 (vertical deformation), 0.001 (radial deformation);
Deformation measurement: Four grating digital displacement sensors measure the vertical deformation of the sample; four grating digital displacement sensors measure the radial deformation of the sample;
Deformation measurement range: 0~50mm (vertical deformation); 0~20mm (radial deformation);
Deformation measurement accuracy: ± 0.5 %;
Test adjustment space: 0~1500mm;
Maximum test space: 1500mm;
Upper pressure plate size: 1500mm \times 1500 \times 240mm;
Lower pressure plate size: 1500mm \times 1500 \times 240mm (with scale lines for easy sample installation and alignment);
Isokinetic test force control range: 0.5kN/s ~ 30kN/s (control accuracy 1%);
Isokinetic displacement control range: 0.5mm/min ~ 50mm/min;
Control mode and data processing: computer servo control system and data (force, displacement) graphic acquisition and processing, etc.;
Force measurement method: use high-precision load sensor to measure force;
The low damping combined sealing element keeps the test force stable and reliable;
Control mode: hydraulic loading, electro-hydraulic servo closed-loop control, high-precision oil pressure sensor measurement, screen display.

HORIZONTAL SHEAR TEST PART

Maximum test force: 4000kN;
Test force measurement range: 2%-100%FS (80kN ~ 4000kN);
Resolution: ≤ 0.1 kN;
Accuracy: $\leq \pm 0.5$ %;
Adopts single-rod double-acting piston cylinder, piston stroke is 300mm;
Propulsion speed of piston: 0~100mm/min (stepless adjustable);
Support span for horizontal shear: 40mm ~ 600mm (excluding shear plate thickness);
Deformation measurement range: 0~200mm;
Deformation measurement accuracy: ± 0.5 %FS;
Deformation measurement resolution: 0.001mm;
Displacement measurement range: 0~300mm;
Displacement measurement accuracy: ± 1.0 %FS
Displacement and deformation measurement: two grating digital displacement sensors measure the shear deformation of the sample;
Force measurement method: high-precision load cell;
Advance and retreat of horizontal shearing device: motor driven;
Horizontal shear device vertical floating coordination mechanism: floating hydraulic cylinder adjustment;
The shearing plate is consistent with the movement axis of the horizontal shearing cylinder, and does not swing left and right;
Hydraulic loading: Servo pump valve dual channel control system.
Load holding function: 30s fluctuation can be better than 0.5%, multi-level control of transverse shear force;
Adopts combined sealing elements to prevent hydraulic oil leakage.
Control mode: Servo pump valve dual-channel control system. Hydraulic loading, high-precision load cell measurement, microcomputer screen display test parameters and curves.

ROTATION ANGLE TEST PART

Maximum torque of rotation: 1200kN•m;
Rotating arm: 1000mm;
Maximum rotating ejection force: 1200kN;
Test force measurement range: 2%~100%FS (24kN~1200kN);
Test force accuracy: $\leq \pm 0.5\%$;
Load resolution: 0.1kN;
Force measurement method: high-precision load cell;
Deformation measurement: Four grating digital displacement sensors measure the overturning deformation of the sample;
Deformation measurement range: 0~50mm;
Deformation measurement resolution: 0.001mm;
Deformation measurement accuracy: $\pm 0.5\%$ FS;
Maximum piston stroke: 300mm;
Piston moving speed: 0~100mm (stepless adjustable);
Displacement measurement range: 0~300mm;
Displacement measurement accuracy: better than $\pm 1.0\%$ FS;
Rotation angle board size: 1500*1800*120mm;
Hydraulic loading, microcomputer servo automatic control, high-precision load sensor measurement, screen display;
Load holding function: 30s volatility can be better than 0.5%, multi-level control of rotation angle force;
Adopts combined sealing elements to prevent hydraulic oil leakage.
Control mode: Servo pump valve dual-channel control system. High-precision load cell measurement, screen display.

STANDARD CONFIGURATION

MAINFRAME

YAW-2000J Microcomputer controlled electro-hydraulic servo compression shear testing machine mainframe;
20000kN two-way cylinder;
20000kN high precision load sensor;
Deformation measuring device;
Upper and lower pressure plate;
Lower pressure plate lifting device;

SHEAR FRAME

Horizontal loading device frame;
4000kN two-way oil cylinder;
4000kN high precision load sensor;
Displacement measurement device;
Floating oil cylinder;
Electric drag device;
Shear pull plate, friction pull plate, spherical bearing horizontal bearing capacity test pull plate;

ROTATION ANGLE MEASUREMENT FRAME

1200kN two-way oil cylinder;
1200kN high precision load sensor;
Deformation measuring device;
Guiding device;
Rotation angle board;

MEASUREMENT AND CONTROL SYSTEM

1 measurement and control system control cabinet;
1 commercial computer, 1 brand laser printer;
2 multi-channel full digital servo controllers;
Microcomputer control electro-hydraulic servo compression shear testing machine special test software



SOFTWARE

Adopts the professional software of "TestEPD" developed based on Windows system. It is used together with the test host, vertical detection controller, lateral detection controller and displacement controller. The design is based on the relevant national standards and industry standards of various types of rubber bearings, and meets the mechanical properties testing requirements of rubber bearings of relevant standards.

The "TestEPD" interface is simple and easy to operate. It can automatically collect and store all data related to the test during the test process, automatically draw test curves, and automatically generate test reports. Report formats are customizable for input, and results are permanently stored and easily traceable. A variety of common test types are built in the software, and the test content can be customized according to user requirements. The software can perform different standard test types as follows:

- ◆ Compressive elastic modulus test
- ◆ Shear elastic modulus test
- ◆ Shear aging test
- ◆ Shear bonding test
- ◆ Friction coefficient test
- ◆ Allowable rotation angle test
- ◆ Ultimate compressive strength test
- ◆ Pot bearing vertical bearing capacity test
- ◆ Pot bearing friction test
- ◆ Pot bearing rotation Test
- ◆ Spherical bearing vertical bearing capacity test
- ◆ Spherical bearing horizontal bearing capacity test
- ◆ Spherical bearing friction coefficient test
- ◆ Spherical bearing rotation Experiment
- ◆ General compression test

The software has built-in various standard specimen specifications and test conditions and information, which can be manually selected before the test without separate input. There are humanized prompts before each test is executed, and users can directly follow the prompts.

The test execution interface can display all the parameters and test curves required for the test. The interface is intuitive and clear, and the display windows can be added or deleted according to user needs.

The software has built-in general compression test options, and users can complete the compression test items performed by traditional compression testing machines by customizing test control conditions and specimen size parameters.

