

Introduction

This series of bending testing machine is designed with 3-cylinder structure, allowing fast and freely adjusting the span and fulfilling 180 degree bend test. It is widely used for bending test of metallic materials. It provides with constant loading rate and constant displacement rate control, able to switch from one to the other. This equipment is widely used in steel industries, quality lab, research institutes, universities and etc.

Working principal

One upper-positioned cylinder applies the force to bend specimen to preset angle, then two opposite horizontal-placed cylinders bend the specimen to required angle. It can satisfy precise 180 degree bending test with high efficiency and easy-to-operate.



Standards:

GB/T 14452-93, GB/T 232-1999, ISO 7438, ISO 5173, GOST 6996, ASTM A370

Features:

- One-body cast steel structure with high stiffness
- 3-cylinder design to perform any angle bending test
- Compact structure with ergonomic design
- Two horizontal-positioned cylinders are controlled by highly precise synchronous valve with error less

than 2%

- Easily switch between automatic and manual bending test
- Force measurement is guaranteed by high accuracy load cell, with high reliability and repeatability
- Displacement is measured by photoelectric encoder with high accuracy and stability
- Self-calibration: force and displacement can be calibrated automatically according to test standards
- Silent HPU features environmental-friendly and humanized design. Unique pressure differential follow-up system allows low energy consumption and low heat generation
- High speed DSP control electronics provides high integrity, strong control and data processing ability, and high reliability
- Closed loop control and measurement of stress, strain and displacement. Control loops can switch automatically and smoothly. Control algorithm adopts advanced neural element self-adapting PID.
- New developed controller provides 1/500000 resolution with non-step in full range.
- Built-in overload protection both in hardware and software

Piston:

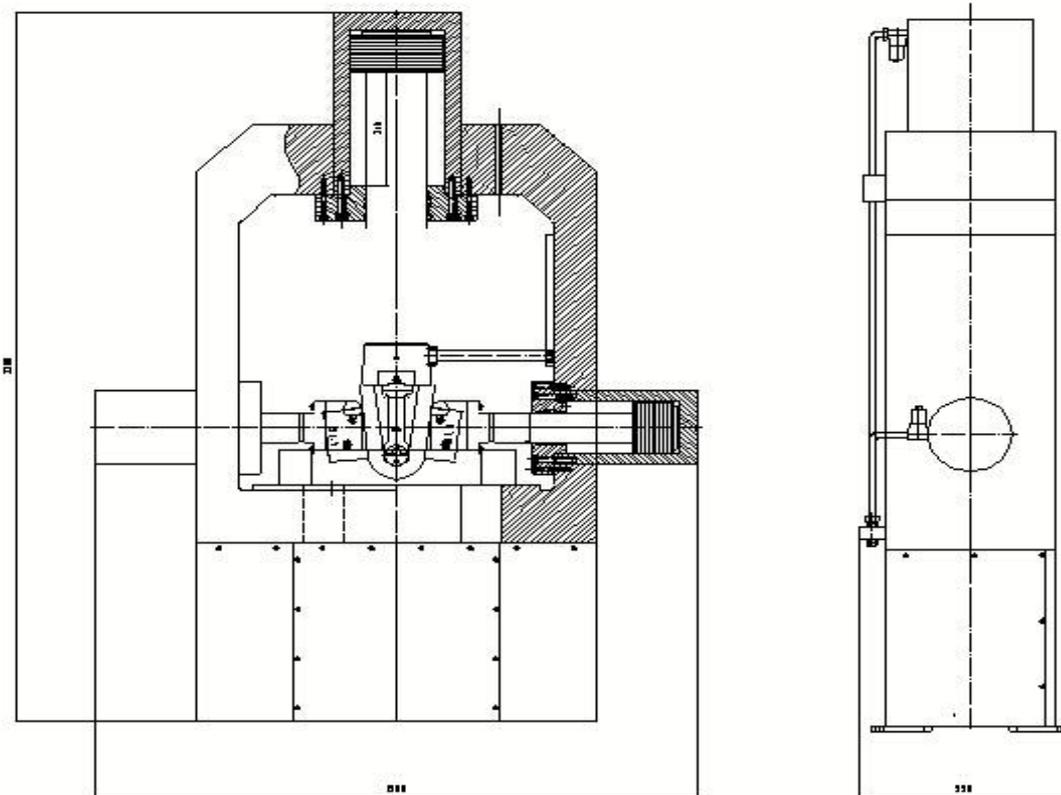
- The bending cylinder is specially designed for the characteristics of the bending testing machine. The head of the cylinder is flanged and connected with the upper plate.
- The piston rod adopts nickel and chromium double coating technology, which has good corrosion resistance and wear resistance. Piston rod bold design, with higher lateral load resistance.
- Piston rod and piston adopt integral forging structure, stronger impact resistance.
- The cylinder seals are made of waterproof polyurethane U-seal patented by Hallite and two-way combined sealing ring, which can ensure zero leakage and better load retention performance. At the same time, Hallite guide wear ring with high lateral pressure resistance and low friction rate is adopted. Main cylinder with hydraulic unit differential loop, piston return time is shorter. The main cylinder piston rod and the upper fixture are connected by prestressed control method, firm and reliable.

Hydraulic power unit

- The vertical cylinder and horizontal cylinder of the machine share one HPU, which is equipped with a cartridge logic valve provided by SUN Company in the United States, which can adjust the pressure of the system intelligently. Pressure follow up technology can ensure that the system pressure is always only 2MPa higher than the pressure required by the cylinder. When the test force is low, the pressure output by the oil pump is also low. When the test force increases, the output pressure of the oil pump increases proportionally. The pressure differential is adjustable, ensuring that the system does not vibrate when completing different tests, saving energy and reducing heat.
- Adopting screw pump provided by German Demus company, combined with the unique design, the noise of the whole machine is greatly reduced, and the working environment of the test personnel is improved.
- MOOG servo valve is used to ensure the control accuracy. MOOG servo valve has the following advantages:
 - Direct drive by high driving force permanent magnet linear motor.
 - Dynamic performance is not affected by pressure, stable control.



- Low hysteresis and high resolution: fast response and high control accuracy.
- Low power consumption at and near hydraulic zero.
- The standardized spool position detection signal can be used to obtain the operation of the system, and is very beneficial to the maintenance of the valve.
- The hydraulic unit is equipped with air cooling device. When the temperature reaches the set temperature of the oil thermometer, the motor of the air cooler starts automatically, so that the system can continue to work normally in a high temperature environment for a long time. The differential pressure follow-up control technology makes the system heat less.
- High filtration precision: the high pressure oil filter precision is 10 μ m, filter element is made of glass fiber filter material, with strong oil ability, small original pressure loss, large amount of pollution and other advantages, effectively ensure the service life and control precision of the servo valve, and reduce maintenance.
- Oil pressure overload protection function: when the oil pressure exceeds the system rating, the overflow valve begins to overflow to ensure the safety of the whole system.
- Pipeline and seal: the hydraulic pipeline from tubing to joint is made by Eaton in the United States, and the pipeline is made by high-pressure hose clamp type conical sealing joint, which can be sealed reliably.



Model	Dimension (mm) A×B×C	Maximum span (mm)	Vertical piston travel (mm)
HBT505A	1200×600×2200	150	200
HBT605A	1990×650×243	550	490
HBT106A	1580×600×2200	370	345
HBT206A	1650×800×2450	350	350
HBT306A	2470×900×2800	400	500

Parameters:

Model	HBT505A	HBT605A	HBT106A	HBT206A	HBT306A
Max vertical force (kN)	500	600	1000	2000	3000
Maximum horizontal force (kN)	300	400	400	1000	2000
Accuracy	Class 1				
Force resolution	1/500000				
Accuracy in synchronism	<2%				
Displacement resolution (mm)	0.004				
Displacement accuracy	±1% of reading				
Force loading speed (kN/s)	0.2~20	0.4~40			0.6~60
Vertical piston speed (mm/min)	290	300	200	180	150
Vertical piston travel(mm)	200	490	345	350	500
Horizontal speed (mm/min)	480	480	480	360	250
Horizontal piston travel(mm)	75	275	185	175	205
Support roller diameter (mm)	Φ30 x 130	Φ 50x200m	Φ50 x 200	Φ80 x 210	Φ100 x 240
Mandrel diameter (mm)	Φ5~ Φ20	Φ5~ Φ20	Φ2~ Φ250	Φ2~ Φ250	Φ50~ Φ100
Maximum span (mm)	150	550	370	350	400
Machine dimension (mm) (Length x width x height)	1200x600x 2200	1990x650x 2430	1580x600x 2200	1650x800x 2450	2470x900x2800
Machine weight(kg)	1200	3500	3000	5000	9000
Power supply	3-phase, 380V, 50Hz				
Power consumption (kW)	4	7	9	9	17
HPU dimension (mm) (Length x width x height)	Built-in machine	1150x600x1100			1350x680x1100
HPU weight (kg)		500			700
Hydraulic oil (L)	46#, 80L		46#, 100L		46#, 100L



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