



## WELL DRILLING BLOWOUT PREVENTER(BOP)

GMP manufactures ram BOP and annular BOP. The plant got BOP Producing Certificate in February 2004 (Certificate Number: XK09-209-000030), and the product was authorized to use API Spec 16A monogram (Certificate No.0172).

BOP is manufactured as per relevant technical standard and drawings strictly. The plant control all procedures from design to ex-works according to ISO9001 standard strictly.

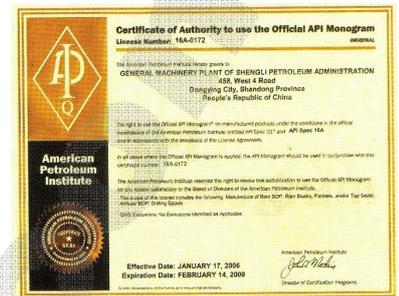
The plant performs overall procedure quality tracing and control to the major parts of BOP.

The plant rechecks the sample of raw material such as shape steel and round steel before manufacturing. All the raw material of pressure-bearing parts endures chemical component analysis and mechanical property testing. Only qualified raw material can enter into next procedure.

After rough manufacturing, perform ultrasonic flaw detection to the major parts, and only qualified parts enter into next procedure.

The plant performs hydraulic pressure test under 1.5 ~2 times of working pressure to all the pressure-bearing parts according to relative standard and design requirements after manufacture finished. And after assembling, the complete BOPs will endure seal capability test both under low pressure (1.4MPa) and high pressure. The plant also perform oil pressure test to all the hydraulic-control routes and cylinders of ram BOP under 31.5MPa. For the ring BOP, the same test is performed under the pressure of 21 MPa.

BOP manufactured in the plant has passed strict inspection performed by Well Control Quality Inspection Center of CNPC. The plant assure that all the technical data of BOP are in accordance with the requirements of SY/T5053.1-2000 *BOP AND CONTROL EQUIPMENT* and *API16A SPECIFICATION FOR DESIGN OF DRILLING BOP*.



## Annular BOP

In case of blowout and well-sealing is needed, high pressure oil coming from control system enters the bottom closing chamber from bottom inlet to push piston moving upward. The movement of piston forces rubber core to move upward along the sphere surface, then supporting ribs get closer to push the internal rubber moving towards the wellhead center to fulfill the function of sealing drill equipment or the wellhead. When unlocking the seal is needed, hydraulic oil pushes the piston moving downward and the rubber core will reset to its original position under its elastic force.

### Structure Characteristics

1- The connection between top cap and housing, top and bottom ends adopt flanges  
2- Hemisphere rubber core has many advantages, such as not easy folding back, big volume of rubber storage. Under the well pressure, the piston pushes the rubber core upward to form a funnel shape. The funnel effect of rubber core increases its sealing performance and life span.

3- Characteristics of the sealing structure include:

(1) The BOP has three important sealing positions: piston external surface seal, piston internal surface seal and mud blocking ring seal.

(2) Radial direction cross section of the piston comes of the shape "Z", which makes the piston have short stroke length, low height and big diameter.

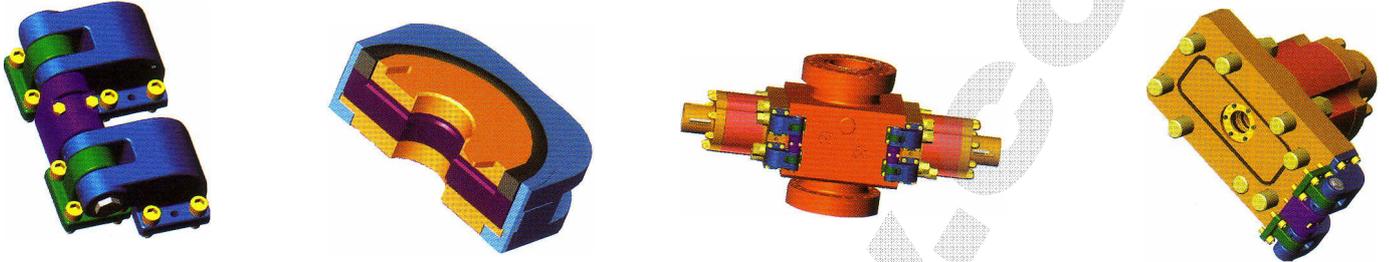
(3) There are two wear-rings stick to the external surface of the piston and a wear-ring stick to the internal surface of the housing. The structure prevents metal to metal contact and protects piston and housing.

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## Ram BOP

Ram BOP is mainly composed of housing, side gate, hydro-cylinder, cylinder cap, piston, piston rod, lock shaft, sealing parts, ram, etc. Oil well's sealing or opening is achieved by moving ram, which is driven by piston rod and piston with hydraulic force.



Compared with products of other structures, the product has the following characteristics:

- 1- The combined type hinge seat makes it's convenient to maintain and disassemble the product.
- 2- In order to guarantee the reliable sealing, the shaft sealing parts are locked by stainless plates and screws.
- 3- Seal ring of the side gate adopts reinforced rubber material to guarantee side gate's lifespan and its reliable seal.
- 4- The ram structure makes it's easy to change the rubber core and fore rubber core on the ram. The floating top rubber core can increase the seal reliability. A leading block, which mounted on the foreside of ram assembly, makes the drilling tools have automatic centering function.
- 5- The horizontal secondary seal equipment of side gate piston rod and sealing leakage hole not only guarantee the exchange ability of the side gate, but make leakage checking and secondary sealing operation be convenient.
- 6- Guide rib in the ram chamber of the housing can limit the moving direction of the ram.
- 7- The two-way seal of piston rod can prevent the inter-leakage between well fluid and hydraulic oil. And installation and dismantling of packing set is convenient.

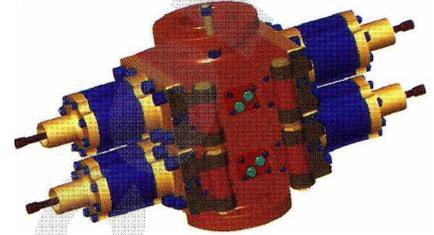
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## Operation BOP

### Hydraulic Ram BOP

Hydraulic ram BOP adopts hydraulic pressure to close and open the ram. When there's no electric power, the ram can be closed manually. When the well needs to be closed for a long period, the ram must be locked manually. Hydraulic ram BOP can be used independently, and it also can be used with other BOP.



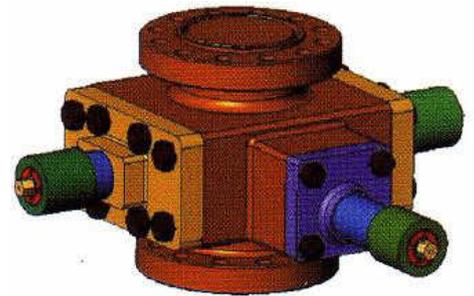
#### Application

The hydraulic ram BOP is equipped with various types of pipe rams, which can seal the annular space between casing and drilling tools, and even the hollow well without pipe string.

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### Manual Half / Full Seal Ram BOP

Manual half/full seal ram BOP is mainly composed of housing, a full seal pipe core, a pair of half seal rams assembly, bearing, valve seat, pressing cap and screwed rod, etc. It has the advantages as high rated working pressure, light weight, small volume, reliable sealing performance and convenient operation, etc. Closing and opening ram manually meets the demand of long time sealing well when there's no electric power. The BOP can be used independently, and it also can be used with other BOP.



#### Application

The ram BOP is equipped with rams which can seal pipes of sizes from 2 3/8" to 3 1/2". When there's pipe string in the well, the BOP can seal the annular space between casing and drilling tools. When there's no pipe string in the well, it can seal the hollow well.

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## Series Emergency BOP

The emergency BOP is mainly composed of valve body assembly, connection coupling, wrench, etc. When there's possibility of well blowout, the BOP can prevent the blowout effectively and reduce the blowout loss in an uttermost way.



### **Operational Principle**

If there's well blowout when running tubing string or there's symbol of blowout, connect the BOP to the tubing string. Then close the valve on the BOP to seal the tubing and prevent accident of well blowout.

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