

CCSC

API 6A Hydraulic Actuator
Operation Instruction

CCSC Petroleum Equipment Co., Ltd.

Scope

As valve actuator, hydraulic actuator made by CCSC Petroleum Equipment Co., Ltd. is widely used in petroleum (natural gas) well. This manual describes necessary requirements for its installation, operation, maintenance and troubleshooting etc.

General

The hydraulic actuator designed by CCSC Petroleum Equipment Co., Ltd. is one-function and spring-reset valve actuator. When a slab valve is assembled with the hydraulic actuator, it is usually used as normal-open safety valve. Refer to Fig 1.

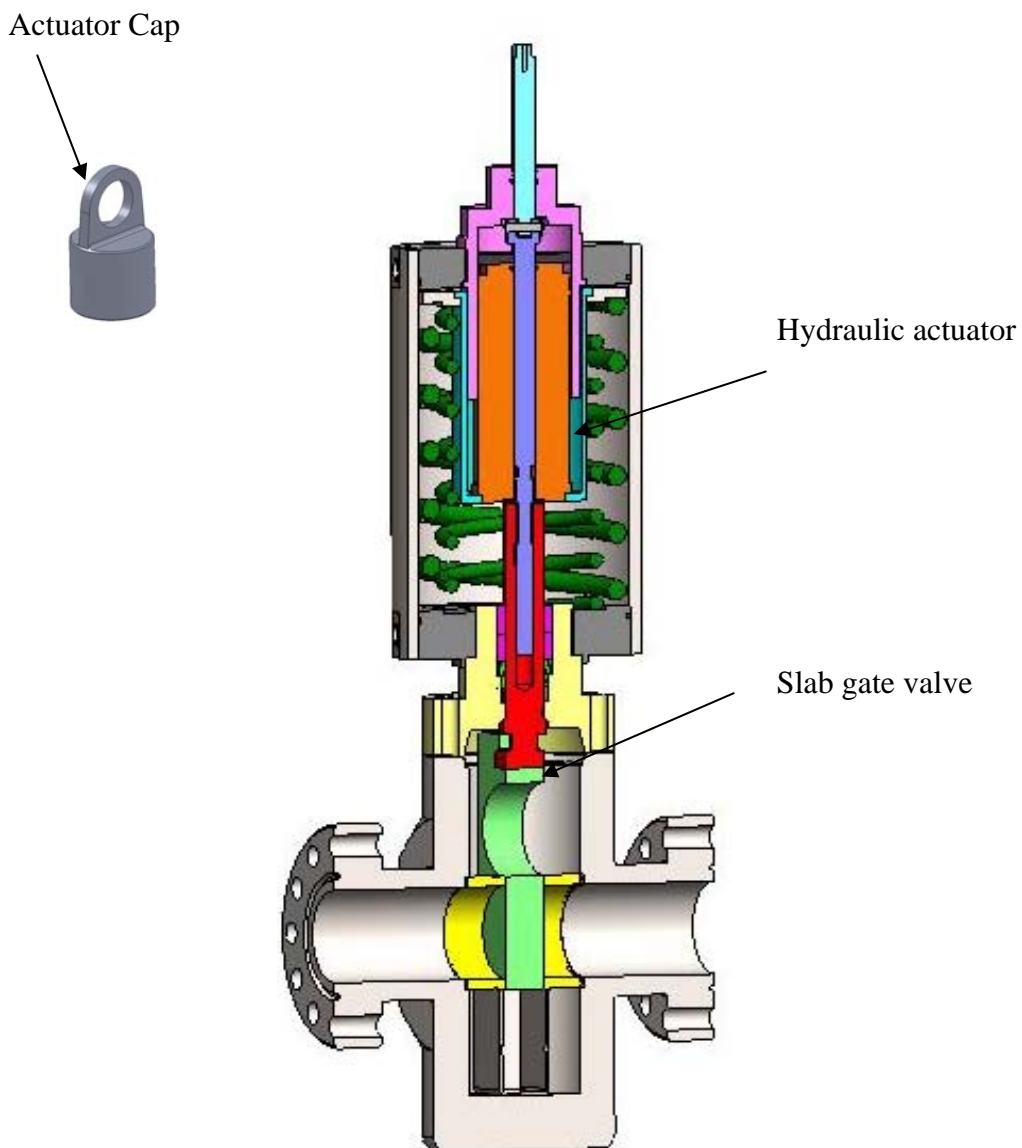


Fig 1 Hydraulic Actuated Gate valve (Safety Valve)

Operation

The hydraulic actuator opens when hydraulic oil enters cylinder, the piston, bottom stem, spring and gate are pushed upwards; When the hydraulic pressure is released, the reset spring will push the piston downward until the valve is fully closed. Where necessary, in valve close condition (i.e. zero hydraulic pressure), valve can be manual open/closed by rotating top stem.

Warning: after manual operation, hydraulic operation will be effective only when the valve is at full close condition!

No-load valve requires small hydraulic pressure to open. Open speed increases as the hydraulic pressure increases.

Full loaded valve requires rated hydraulic pressure to open.

When valve is opened and required to maintain its normal-open condition, the hydraulic pressure shall be always retained, or affix actuator cap (Please see Fig. 1 for actuator cap) and then release the pressure.

Warning: it is not allowed to permanently affix actuator cap (Please see Fig. 1) on the safety valve!

Installation

Hydraulic gate valve can be used as level 1 and level 2 safety valve for well Christmas tree. Its function is to automatically close valve where necessary. Refer to Fig 2 for installation.

Maintenance

Maintenance requirements	Interval
Open/close one time	One time every month
Change sealing and guidance tape	Every 5 years or when leak happens
Check piston and cylinder sealing surfaces	When change sealing and guidance tape
Change safety valve	Every 5 years or when leak happens
Clean hydraulic cylinder inlet and outlet, or change hydraulic system where necessary	Where necessary

For the purpose of traceability, all maintenance activities and replaced parts shall be recorded. This documented record shall be able to trace each safety valve serial number.

Selection of safety valve

CCSC Petroleum Equipment Co., Ltd. designs and manufactures hydraulic actuator and slab gate valve assembled safety valve with consideration of optimal safety and economic. The available safety valve sizes from 1-13/16" through to 7-1/16", of pressure rating from 2000psi to 15000psi. The common used one sizes from 1-13/16" to 4-1/16", of pressure rating from 3000psi to 10000psi. Refer to Table 1.

Where customer requires small size actuator, please contact CCSC engineering department for special design. However, smaller actuator requires higher hydraulic pressure.

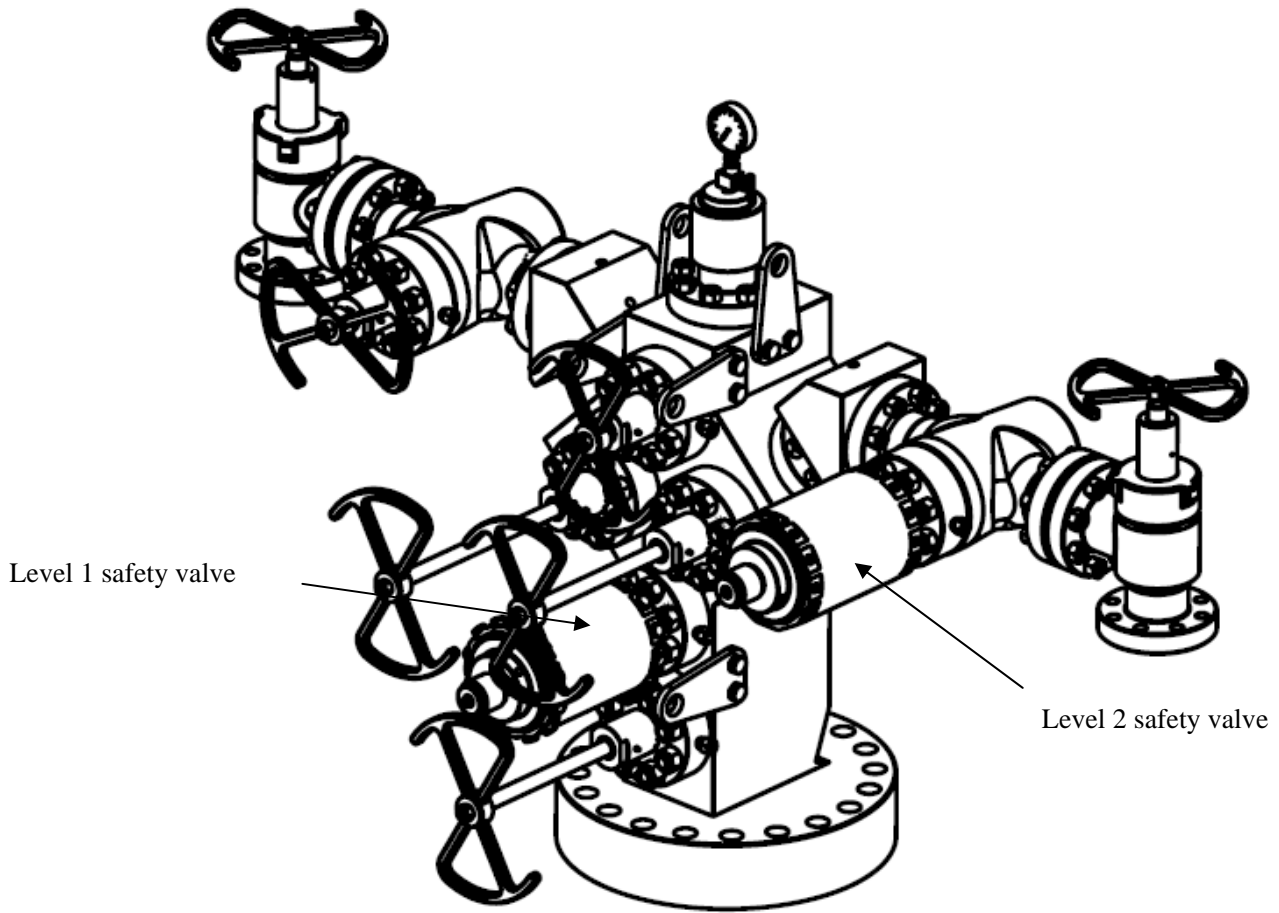


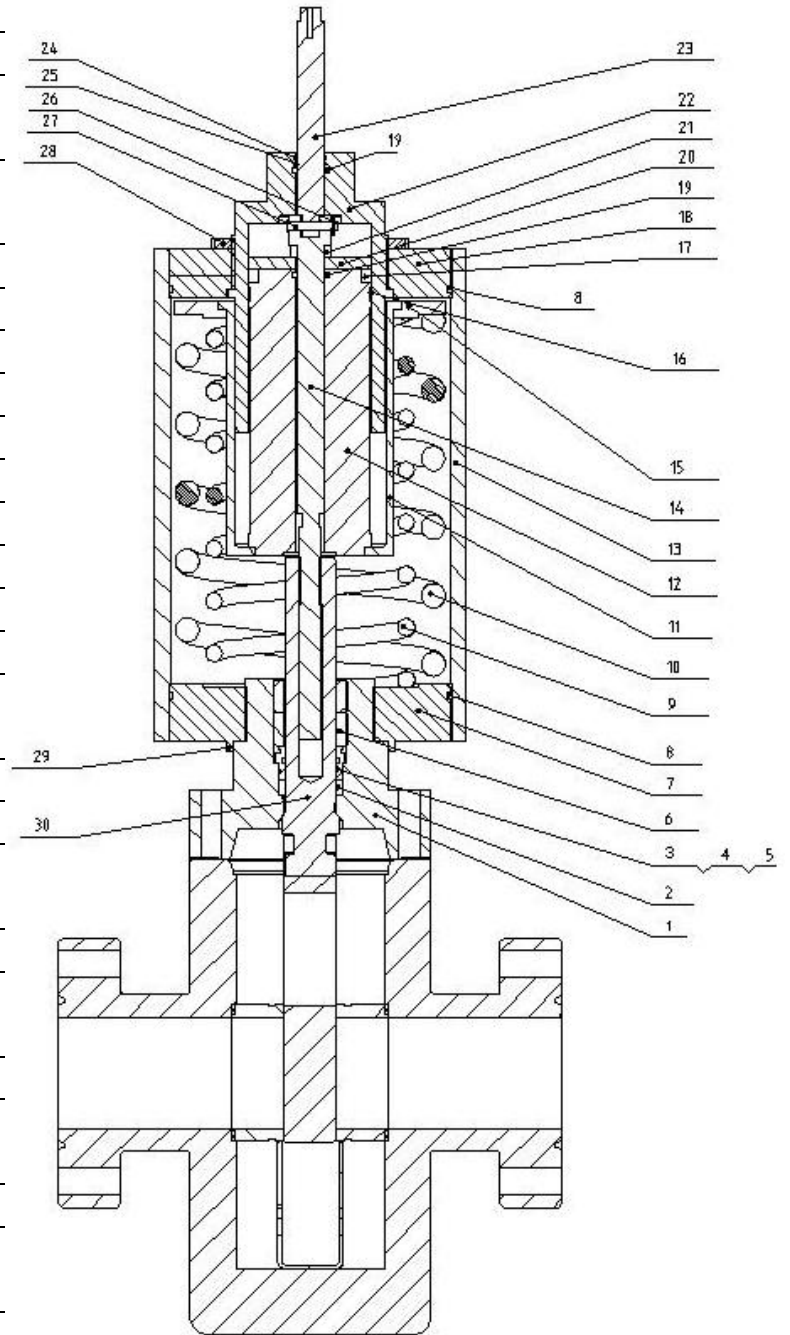
Fig 2 Safety valve used in Christmas tree

Table 1 Safety valve datasheet

DN (in)	PN (psi)	Rate pressure (Mpa)	Reset time (s)	Installation height (mm)
1-13/16	3000/5000	25MPa	5~7	930
	10000	25MPa	5~7	1000
2-1/16	3000/5000	25MPa	5~7	930
	10000	25MPa	5~7	1000
2-9/16	3000/5000	25MPa	5~7	1050
	10000	25MPa	5~7	1140
3-1/16	3000/5000	25MPa	5~7	1090
	10000	25MPa	5~7	1180
3-1/8	3000/5000	25MPa	5~7	1090
	10000	25MPa	5~7	1180
4-1/16	3000/5000	25MPa	5~7	1200
	10000	25MPa	5~7	1300

Bill of material

No	Name	Qty	Material
1	Closure	1	AISI 4130
2	Sealing assembly	1	PTFE+HNBR+PEEK+INCONE L625
3	Packing lantern	1	AISI 410SS
4	O ring 1	1	NBR
5	O ring 2	1	NBR
6	Holding nut	2	AISI 4130+QPQ
7	Bottom flange	1	AISI 4130
8	O ring 3	2	NBR
9	In. spring	1	AISI 6150
10	Ex. spring	1	AISI 6150
11	Sleeve	1	ASTM 4130+QPQ
12	Piston	1	AISI 410SS+QPQ
13	Cylinder	1	AISI 4130
14	Mid stem	1	AISI 17-4PH + QPQ + XYLAN
15	Spring holder	1	AISI 4130
16	Guidance tape	1	Polon052
17	Piston sealing assembly	1	P5008
18	Top flange	1	AISI 4130
19	Assembled sealing	2	Polon052 + N0674
20	Gland	1	AISI 4130 + QPQ
21	Cylindrical roller bearing	1	S.S.+C.S
22	Cylinder	1	AISI 410SS+QPQ
23	Top stem	1	AISI 17-4PH+QPQ
24	Two lips dust proof ring	1	P5008
25	Guidance tape	1	Polon052
26	Split pin	1	AISI 410SS
27	Stop pin, type B	1	AISI 410SS
28	Nut	1	AISI 4130+QPQ
29	Screw	3	B7
30	Bottom stem	1	AISI 17-4PH +QPQ+XYLAN



Safety valve assembly

Safety valve assembly includes assembly of hydraulic actuator and general assembly.

- ※ The assembly location shall be clean and free of dust.
- ※ Be sure that all relevant assembly tools are ready and clean.
- ※ Be sure that grease is in good package condition and free of dust.
- ※ All sealing packages shall be in good condition and shall be opened in assembly location.
- ※ Before assembly, clear all parts and components.
- ※ Before assembly, all elastic and plastic materials shall be placed in bag or box.
- ※ Before assembly, check each component for defects and markings.

1. Assembly of hydraulic actuator

- a. Connect the top stem (23) and the mid stem (14) by stop pin (27) and split pin, to form stem component.
- b. Bolt the external cylinder (13) and the bottom flange (7).
- c. Put the spring (9/10) into the cylinder, and then put the spring holder (15) and the sleeve (11) inside.
- d. Connect the piston (12), the piston sealing assembly (17), the assembled sealing (19), the gland (20), the cylindrical roller bearing (21) and the stem assembly.
- e. Put the assembled sealing (19), the two lips dust proof ring (24) and the guidance tape (25) into the cylinder (22).
- f. Place the guidance tape (16) onto the slot of the piston (12), and then put the piston (12) and stem component into the cylinder (22).
- g. Screw the top flange (18) inside the cylinder (22), and then fixed by nut (28).
- h. Put the cylinder component into the sleeve (11), use tool to place the top flange (18) into the cylinder component. Now the hydraulic actuator assembly is finished.

2. Assemble the slab valve (omit)

3. Connect the hydraulic actuator and the slab valve.

Gate position adjustment

To ensure complete open and close the safety valve, following adjustment shall be done:

1. Reset the spring, check if the gate is at full close position. Checked from valve body bore, if the gate is not fully closed, just rotate the top stem until the gate is fully closed.
2. When the valve is at no-load condition, pressurize the actuator, open the valve and rotate the top stem, use go-gauge to ensure the valve is fully opened.

Warning: after manual operation, the above step 1 and 2 shall be repeated to adjust gate position!

Troubleshooting

Problem	Cause	Troubleshooting
Unable to obtain the required pressure	Control circuit malfunction	Check pressure inlet system for valve open and leakage
	Actuator leak	Change sealing components as per assembly method
	Pressure gauge damage	Check pressure gauge for calibration
Unable to open the valve	Pressure not enough	Check pressure supply
	Internal block	Reassemble the actuator
	Valve assembly no good	Check valve assembly
Unable to fully open or close the valve	Gate is not adjusted to the required position	Adjust the gate position in accordance with this operation instruction.
Spring fails to reset/reset time too long	Incorrect installation of the gate and the seat causes big friction	Disassemble and clean the gate and the seat, check for worn. Rework or replace where necessary
	Internal lubrication not enough	Pressurize and release the actuator several times. If problem can not be solved, disassemble the actuator, check sealing component and inject lubricant.