**PRECAUTIONS FOR VALVE INSTALLATION**

**INSPECTION BEFORE INSTALLATION**
 There are many different types, models, specifications of general valves. Choose appropriate valve according to application of the valve, medium characteristics, maximum working pressure, maximum temperature, and the flow rate of the medium or the nominal diameter of the pipeline.
 Before installation, carefully check whether the model, specification of all valves meet design requirements. According to the valve model and factory instructions, check whether valves can be used under the required conditions, make a water pressure or air pressure test if necessary. In addition, check gasket, bolts, stems, wedges conditions. Like cover bolts should leave enough adjust margin, stem and wedge can’t stuck or skew. The sealing of the wedge surface must be closed tightly. Check screw thread quality for all screw threaded valve. Unqualified valves cannot be installed and should be stacked or marked separately.

**PRECAUTIONS OF VALVE INSTALLING**
Rising stem valve cannot be directly layed underground. Rising stem valve only can be installed in a covered trench, in case of valve stem rusted. The valve should be installed in a location that is convenient for operation, inspection, disassembly, maintenance and operation. Not allowed to throw valve casually when handling, to avoid damage and deformation. Carbon steel valves, stainless steel valves, non-ferrous metal valves should be separated stacking. Wire rope should be tied to the connecting flange between the valve body and the bonnet when lifting. Not allowed tied wire rope to the hand wheel or valve stem, to prevent damage the valve stem and hand wheel.

The valve installation position should not hinder the disassembly, maintenance and operation of equipment, pipelines and the valve. The installation height should be convenient for operation and maintenance. Generally, the valve operating handle should be 1-1.2m from the ground. Frequently used valves, if installed more than 1.8m from the operating surface, should install a fixed operating platform. If valve must be installed above or below the operating surface, an extension rod should be installed or the valve stem should be installed horizontally, also install a handwheel with transmission or a remote operation device. The angle between the axis of the valve transmission device should not be greater than 30°. The joint should be flexible, operate easily, indicate accurately. For valves with thermal displacement, the transmission should have compensation measures.

For horizontal pipelines, it is best to install the valve vertically upwards or install the valve stem within the upper semicircle, but do not install the valve stem downwards. The valve stem and handwheel on the vertical pipeline must be installed along the direction of the operating circuit. The valve should be installed as centralized as possible to facilitate operation. The valves on the tower area pipelines 4m above the ground should not be installed outside the platform to facilitate installation and operation.

For directional valves, the installation direction should be determined according to the flow direction of the pipeline during installation. When install check valve, pay more attention to flow direction of the medium to ensure that the valve wedge can automatically open. In important situations, mark arrow outside the valve body, to indicate the flow direction of the medium. For swing check valves, ensure that the rotation pivot of the insert plate is installed in a horizontal position. For lift check valves, ensure that the center line of the valve wedge is perpendicular to the horizontal plane. For example, when install globe valve, the medium should flow from the bottom of the wedge to the above, it is called low inlet and high outlet. When install plug valve and gate valve, allow the medium to flow out from either end.

Be familiar with the installation requirements for valves with special requirements. For example, when installing a lever type pressure reducing valve or a safety valve, the center line of the valve wedge must be perpendicular to the horizontal plane. Correct it if found any skew.
 When installing threaded valves on the pipeline, be sure to install liver connectors near the valve for easy disassemble and assembly.
A shut-off valve should be set when the auxiliary system pipeline enters the workshop. When the workshop is stopped for maintenance, it can be cut off from the main pipeline. The installation height of these valves is generally high and should be arranged together as much as possible to set up a fixed operating platform.

Install flange connection valves, make sure that the end faces of the two flanges connected to the valves are parallel to the valve flange and on the same axis. Especially when installing cast iron or other brittle material valve, it is necessary to avoid damage to the valve due to incorrect installation position and uneven force. When tightening the flange bolts, adopt a symmetrical or crisscross method, and the flange bolts should be tightened gradually in several times.

Before installing the high-pressure valve, the product certificate and test records must be reviewed. The high pressure valves are mostly angle valves, mostly are two in series when used. Starting force is large when open. Valve brackets must be set to support the valve and reduce starting stress. The installation height preferably should be 0.6-1.2m.

The pipe connections on pumps, heat exchangers, towers and containers should not bear the weight of valves and pipes. Valves with DN>80mm should be equipped with brackets.
 The lining, coating and non-metallic material valves are of high quality and low strength. In addition to considering the process requirements, should be as far as possible to achieve centralized layout, convenient for valve frame design. A single valve also should be fixed on the valve frame. When installing heavy valves on horizontal pipes, consider installing brackets on both sides of the valve.
 Install the screw threaded valves should ensure that the thread is intact, and the gasket should be selected according to the working conditions, and the position of the valve stem should meet the installation requirements when tightened the stem. When tightening, use wrench to bite and twist the valve into the hexagon face at on end of the pipe, to ensure that the valve body will not be deformed or damaged. Flanged or screw threaded valves should be installed in the closed state.

The valve and pipeline juction should use arc welding, to ensure that the interior is smooth and clean. The valve should not be closed during welding, to prevent overheating and deformation of the sealing surface. If the sealing material is not resistant to high temperatures, dismantle the sealing material before welding, to prevent the high temperature from damaging the sealing material.

The flow direction of the shut-off valve during installation should be the same as the arrow marked on the valve body (cannot be installed backwards), so that the pressure is added to the cone of the valve top when the valve is closed, and the gasket is not loaded. However, for valves that are not frequently opened and closed but need to be strictly ensured that they do not leak in the closed state (such as heating valves), they can be consciously reversed according to requirements to make them tightly closed with the help of medium pressure. Big size gate valves (DN200-500MM) and pneumatic control valves should be installed vertically, to prevent the valve core from being biased to one side due to the large weight of the valve core, which increases the mechanical wear between the valve core and the bushing and causes leakage. When tightening the compression screw, the valve should be slightly open to avoid crushing the sealing surface of the valve top. After all valves are in place, open and close them again, qualified if valves are flexible and free of jams. After the large air separation tower is barely cooled, pretighten the connecting valve in the cold state, to prevent the valve from leaking at room temperature and leaking at low temperature. Do not press too tightly to the gasket then use new valve, no leak is enough, so as to avoid too much pressure on the valve stem, accelerated wear, and strenuous opening and closing.

For valves on side-by-side pipelines, the net distance between the handwheels shall not be less than 100mm. In order to reduce the distance between the pipelines, it is best to stagger the side-by-side valves.
 The cryogenic valve should be opened and closed as far as possible in the cold state before positioning, requiring flexibility and no jamming.
 There should be an elbow (or fittings such as tee) at the connection of the safety valve to prevent the fluid from directly impacting the valve. In addition, it is necessary to ensure that the safety valve does not form frost during operation, to avoid failure during operation. Strictly forbidden to use the valve stem as a scaffold when installing the valve.

For high temperature valves above 200°C, as the valve is installed at normal temperature, and after normal use, the temperature rises, the valve bolts are heated to expand, and the gap increases, so they must be tightened again, which is called "thermal tightening". The operator should pay attention to this, or it is easy to cause valve leakage incidents. When the water valve is closed for a long time in cold winter, the accumulated water behind the valve should be removed. After the steam valve stops steam, the condensed water should also be removed. The bottom of the valve is like a drain switch, which can be opened to drain. Non-metal valves, some are hard and brittle, and some are low in strength. Opening and closing force should not be too large when operating, especially can’t use too hard force. Also pay attention to avoid object bumps.