Reasons for Leakage of Pressure Control Valve of Pressure Regulator in Nuclear Power Station

When the valve with internal leakage failure disintegrates, it is found that the sealing surface of

the valve core seat is damaged, which is characterized by dense medium scouring grooves. In the closed state, the valve medium can still leak along the flushing groove. According to the groove depth of the sealing surface of the valve core seat, the damage defect of the sealing surface can be eliminated by grinding the valve core seat or replacing spare parts. After loading and putting the valve back into operation, the test is qualified. However, after several months of operation, the valve has an internal leakage fault. Therefore, it can be judged that too fast damage to the sealing surface of the valve core seat causes frequent internal leakage failure of the valve. It is necessary to analyze the causes of the damage defects of the sealing surface of the valve core seat too fast. During the operation of the unit, when the valve is opened, especially when the valve is just opened, there will be a large noise inside the valve body accompanied by pipeline vibration. It is judged that the noise is the throttling sound of the internal components of the valve to the high-speed medium steam. At the same time, the valve switch operates frequently during the replacement period of the unit. According to the working conditions of the above valves, the following reasons are analyzed for the failure of the sealing surface of the valve core seat too quickly:

1. The medium pressure at the inlet of the valve is regulator pressure, about 9.93 MPa, and the medium pressure at the outlet is degassing condenser pressure, about 1.05 MPa, and the pressure difference between the inlet and outlet is nearly 9 MPa. When the valve is in a small opening state and the pressure difference between the inlet and outlet is large, the pressure drop of the high temperature medium steam impact valve almost all concentrates on the sealing surface. Especially when the valve is just opened, the maximum pressure difference is 8.88 MPa, and the velocity of the sealing surface of the valve seat is up to 200 m/s. High-speed medium steam scouring results in damage to the sealing surface, and the field performance is that there is a large noise inside the valve body. At the same time, once there is a small leakage point, the medium will continue to wash the leakage point, leading to the expansion of the leakage point, and ultimately make the valve core seat sealing surface groove damage.

2. Frequent valve switching during the refueling period causes the valve sealing surface to be damaged too quickly. When the unit is refueling, the loading and unloading opportunity injects medium into the fuel passage, which increases the loading capacity of the whole system, which shows that the level of the regulator rises. When the liquid level rises, the pressure of the regulator rises by compressing the air space of the regulator. When the pressure reaches 9.93 MPa, that is, the header pressure at the outlet of the reactor exceeds the normal value of 41 kPa, and the valve opens and lowers the pressure. During refueling, steady Pressure control valves of pressure regulators are continuously switched on and off to maintain constant pressure. Only the replacement of the unit results in 600 valve switching actions per month. The valve opens frequently and the opening time increases, which creates conditions for the high-speed medium steam to wash out the sealing surface of the valve seat.