| INTERPLANT STANDARD - STEEL INDUSTRY | | |
|---|---|---|
| IPSS | **STANDARD MAINTENANCE PRACTICE FOR PNEUMATIC OPERATED SHUT OFF VALVES** | **IPSS: 2-07-105-15** |
| | *No Corresponding IS Exists* | *Formerly-: (New Standard)* |

0. Foreword

0.1. Interplant standardization activity in steel industry is being pursued under the aegis of Steel Authority of India Limited (SAIL). This Interplant Standard has been prepared by the Standards Committee on Instrumentation and Automation IPSS 2:7, with the active participation of representatives from the steel plants, other concerned organizations and established manufacturer in the field, and was adopted on May, 2015.

0.2. Shut off valves are used to isolate the process conditions such as flow, pressure, temperature and liquid level by fully opening or closing the process parameter like steam, coal tar, oxygen, N2, COG, BFG, LDG and others as per the signal received from the PLC/DCS. The valve can be Ball Valve. Globe valve or Butterfly Valve.

0.3. The opening or closing of control valves is usually done automatically by electrical / pneumatic actuators. Pneumatic solenoid valves are used to control the opening or closing of the actuator based on electric signals. These control signals, traditionally are 220v ac, 110v ac, 24 dc. Depending upon the condition of the valve condition, feedback is taken the DCS with help of proximity switches, micro switches, limit switches, magnetic switches and few others as per process requirement.

0.4. A shut off valve consists of four main parts namely:

i) Valve's actuator
ii) Valve's DC solenoid valve
iii) Valve's body
iv) Valve feedback system

1. Scope

The scope consists of inspection of all the pneumatic operated shut off valves.

i) Inspection guidelines
ii) Running inspection (monthly)
iii) Periodical inspection / maintenance (shutdown basis)
iv) Inspection format

2. Inspection Guidelines : Running Inspection

| Sl. No. | Check Point Details | Fre-quency | How to Check | Criteria | Action (if out of criteria) |
|---|---|---|---|---|---|
| 1 | Instrument Air Line and its Quality | Monthly | Visually check for presence of moisture and required pressure | No moisture to be present | • Draining the drain value in instrument manifold of the supply air line<br>• Check the source of pneumatic air<br>• Check for the functioning of drier |
| 2 | Air Filter Regulator and Gauges | Monthly | Visually check for the proper pressure required | Indication of the pressure gauge | • In the gauge by increase/ decrease the presence as per requirements |
| 3 | Leakage of Actuator | Monthly | Physically check for leakages | There should not be any leakage | • Arrest the leakage by sending the same to MED Instrumentation Lab |
| 4 | Leakage from Valve Flanges | Monthly | There should not be any leakages | Physically check for leakages | • Make action plan for arresting the same by isolating the process with SOP |
| 5 | Leakage from the valve gland | Monthly | Visually check for leakage from the gland | No leakage should be there | • If yes check for any increase in temperature of the actuator. Make plan to arrest the same on shutdown day. |
| 6 | Condition of the linkages/ couplings | Monthly | There should not be any misfit of the linkage | No looseness to be observed | • The link / coupling has to be properly tightened with proper tools and tackles |

3. Maintenance Guidelines: During shutdown

| Sl. No. | Check Point Details | Frequenc y | How to Check | Criteria | Action (if out of criteria) |
|---|---|---|---|---|---|
| 1 | Quality of Air | During planned shutdown | Visually check for presence of moisture | No moisture to be present | • Instrument manifold of the supply air by draining the drain valve<br>• Check the source of pneumatic air<br>• Check for the functioning of drier |
| 2 | Line leakage of instrument air line | During planned shutdown | Visually check for any pneumatic leakage | Visually check for any leakage | • From the instrument manifold to the valve positioner I/P |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Condition of AFR and its gauges | During planned shutdown | Visually check for presence of moisture and dust | No dust or moisture to be present | • Whether the filter is clean by isolating the same on a shutdown day and cleaning of the filter<br>• Check for the condition of the increase/decrease knob and drain plug |
| 4 | Protection for feedback enclosure box | During planned shutdown | Visually check for feedback switches condition and its fittings | The feedback switches shall be properly sealed and properly tightened | • Check for any leakage of the instrument air in the DC valve fittings and its gauges<br>• Check whether the cable glanding is proper to avoid any water ingress. Check the condition of the fittings. |
| 5 | Condition of Mounting Bolts of actuator/ power cylinder | During planned shutdown | Visually check whether it is loose or not | The nuts and bolts to be firm without any looseness | • Make action plan for tightening the same by isolating the process with SOP |
| 6 | Leakage in the actuator | During planned shutdown | Physically check for leakages | There should not be any leakage | • Arrest the leakage by sending the same to the MED instrumentation lab for checking the |
| 7 | Protection from water ingress on actuator | During planned shutdown | Visually check for water protection is there or not | If installed outside there should be canopy | • Install proper protection for the shut off valve actuator |
| 8 | Condition of nuts and bolts of valve body | During planned shutdown | Visually check for looseness of nuts and bolts | No looseness should be there | • Make action plan for tightening the same by isolating the process with SOP. |
| 9 | Leakage from the flanges of valve body | During planned shutdown | There should not be any leakage | Physically check for leakages | • Make action plan for arresting the same by isolating the process with SOP. |
| 10 | Condition of the valve movement | During planned shutdown | Visually check for movement of the valve stem | No jerk should be there | • Check the gland packing and lubrication if required as per OEM recommendation. |
| 11 | Leakage from the gland | During planned shutdown | Visually check for leakage from the gland | No leakage should be there | • If yes check for any increase in temperature of the actuator Make plan to arrest the same on shutdown day |

| | | | | | |
|---|---|---|---|---|---|
| 12 | Condition of link rods and its linkages | During planned shutdown | Visually check that there should not be any looseness | No looseness should be there | • The link has to be properly tightened with suitable tools and tackles |
| 13 | Condition of key way of actuator and valve shaft | During planned shutdown | Check for any slip between the actuator and the valve shaft | No slip should be there | • Set right without any slip as it shall lead to hysteresis |
| 14 | Checking of the end limit switches | During planned shutdown | Check for the contact wrt to the valve travel | Both the open and close limit switches should be enabled during operation | • Adjust the limit switches as per requirement with proper SOP in proper for line isolation<br>• Check for the air pressure in the solenoid valve |
| 15 | Checking of the volume tank | During planned shutdown | Close the pneumatic supply to the volume tank | Manually close and see that there is one cycle of operation of the valve travel. | • The pressure of the volume tanks should hold when pneumatic supply is put off.<br>• Check for the NRV for its healthiness |
| 16 | Checking of the solenoid valve | During planned shutdown | Give command from PLC | Manually check whether the valve is opening/closing as per command | • Make sure the process line is isolated during shutdown<br>• Check for voltage in the coil during shutdown |
| 17 | Checking of the complete valve | During planned shutdown | Check for the movement of the valve by giving command from the PLC/DCS | Complete movement of the valve | • Check for the open close condition of the valve as per requirement and adjust the feedback switches |

4. Inspection checklist format : Fortnight basis

| Sl.No. | Area | Checkpoints | Emarks if any |
|---|---|---|---|
| 1 | Air pressure for solenoid valve | g/cm2 | |
| 2 | Leakage of instrument air line | Y/N | |
| 3 | Looseness of linkages | Y/N | |
| 4 | Leakage of gland | Y/N | |
| 5 | Leakage of valve flanges | Y/N | |
| 6 | Movement of the control valve smooth | Y/N | |
| 7 | Condition of the limit switches | Y/N | |
| 8 | Contact of the limit switches with striker | Y/N | |

| Check List for shut off valve on shutdown |
|---|

5. Inspection checklist format: Shutdown basis

| Sl.No. | Item to be inspected | Ok / Not ok | Comments |
|---|---|---|---|
| 1 | Pneumatic / hydraulic tubing leak tested | | |
| 2 | Instrument housing / actuator covered | | |
| 3 | Wiring condition for solenoid and feedback switches | | |
| 4 | Open/close command proper | | |
| 5 | Open/close feedback proper | | |
| 6 | Air pressure for actuator | | |
| 7 | Leakage of the valve in the process line are closing also | | |

| State Check List | | | | | | |
|---|---|---|---|---|---|---|
| | State Description | PLC input | Local MI | DCS | Alarm | Ok/Not Ok |
| 0 | | | | | | |
| 1 | | | | | | |

| Checking | | | |
|---|---|---|---|
| Transition | Set point time delay in secs | Actual time delay in secs | Ok/Not Ok |
| 0-1 | | | |
| 1-0 | | | |
| Comments if any: | | | |