Introduction

There have been several incidents where multiple jet controls have failed to operate as intended due to internal or external corrosion or contamination. The failure of a multiple jet control to release water to open spray nozzles could allow a fire to develop into a severe event causing significant property damage and business interruption. Examples of hazard protected by multiple jet controls include cable trays or hydraulic packs (pumping combustible fluids).

Discussion

Multiple jet controls are similar to traditional automatic sprinklers in that they incorporate either a fusible link or a glass bulb which is thermo-sensitive. Excess temperature (from a fire) causes the thermo-sensitive element to operate which opens the mechanical valve within the multiple jet control. When the valve opens, water is allowed to flow to groups of water spray nozzles.

Multiple jet controls are installed in numerous installations throughout a range of production sites. They are particularly used in applications where a small number of nozzles need to activate simultaneously and form a concentrated spray pattern over a defined area. To be effective, this must occur during the early stages of a developing fire.
Figure 1 shows an example of a multiple jet control, the bronze color unit, installed with the water supply entering the multiple jet control from the top. Pipes supplying spray nozzles exit the multiple jet control from either side.

Figure 2 shows an example of a multiple jet control unit including the cage provided to protect the thermo-sensitive glass bulb used to actuate the unit. This unit has been removed from service. Note the contamination on the protective cage.

Figure 3 shows the multiple jet control unit (same unit as in Figure 2) with the protective cage removed. The red thermo-sensitive bulb is visible, and it is apparent the contamination has affected the release mechanism.
Multiple jet control failure

The unit shown in Figure 2 and Figure 3 protected a paint application process. It is a more extreme example of contamination. The extent of contamination experienced by multiple jet controls will vary depending upon the process protected or the environment in which it is located. This type of external contamination is just one cause of multiple jet controls failure. Contamination and corrosion both internal and external to the multiple jet controls can lead to failure.

Maintenance

There is a need for an ongoing maintenance plan for multiple jet controls. This is of particular important because:

1. Many multiple jet controls may be installed at a location.
2. Multiple jet controls may protect essential production equipment.
3. Multiple jet controls may be installed in aggressive, corrosive environments such as painting and coating plants or oil cellars.
4. Multiple jet controls rely upon the movement of internal parts making them susceptible to the effects of mechanical corrosion or degradation.
5. Multiple jet controls in use for 10 to 20 years or more have frequently been found with no record or visual indication of formal maintenance or inspection.
6. Fire Protection Association Technical Bulletin TB213 notes that continued leakage or wetting over a period of time can result in the build-up of salt deposits that may render a multiple jet control unserviceable or slow to operate.

Guidance

Implement a multiple jet control inspection and maintenance program. Identify and replace multiple jet controls before they become unreliable and a potential point of failure.

Sources of information on the inspection, testing, and maintenance of multiple jet controls are available in manufacturer’s literature and standards such as the Fire Protection Association Technical Bulletin TB213. The following is a summary of guidance based upon these sources.

Identification of multiple jet controls

Develop a log of all multiple jet controls including System ID, location, make, model, year of manufacture or last, and size. Identify the process or feature protected and if it is essential to production. Also, identify environmental exposures such as dampness, corrosiveness, or contaminants. An example of a log format is shown below. The information in this log will allow further inspection and maintenance actions to be prioritized.
Inspections

- Inspections are visual activities intended to identify a need for testing or replacement of multiple jet controls.
  - Inspect each multiple jet control monthly for:
    - Signs of leakage
    - Deposits or buildup of salts
    - Corrosion
    - Contaminates
    - Paint (*) especially on the bulb or parts required to move
    - Mechanical damage
    - Other conditions likely to impact operation
  
  (*) Any paint applied to a multiple jet control could adversely affect performance. As with sprinklers, only paint applied by a manufacturer should be permitted.

  - Include the following elements in each inspection:
    - Heat sensitive element
    - Linkage
    - Valve stem

- Conduct inspections using qualified persons. This may include the installing contractor or a contractor licensed, certified, or approved by local authorities.

Testing

Testing is an active operation of the multiple jet control requiring replacement or following the test. The test is intended as help for you to verify the ongoing ability of multiple jet controls to perform as intended.

- Test a sample of multiple jet controls every five years or the interval specified by the manufacturer.

- Select the test sample to include the multiple jet controls that have been in service the longest since manufacture.

- Select test samples for each make and model of multiple jet control installed at the location.
• Select a test sample size of 6% with the minimum sample being three.

  **Note:** Where there are three or less multiple jet controls of a particular make and model, it may be more cost effective to replace the multiple jet controls rather than test.

• Select an approved third party to conduct testing. This may include the manufacturer or a test laboratory recognized by Zurich.

• Submit copies of all multiple jet control test reports to Zurich for review and comment.

For sites with a large number of multiple jet controls where a test program is being implemented for the first time, consult with Zurich to develop a plan to implement testing over a reasonable time frame such a 3 to 5 year period. The 3 to 5 year plan should prioritize testing considering factors such as:

• Protection of key production equipment or processes

• Hazard

• Concentration of multiple jet controls

• Environment (contamination and corrosion)

**Replacement**

• Replace multiple jet controls that show signs of leakage.

• Replace multiple jet controls exposed to contaminans or corrosives unless they can be cleaned by light brushing with a soft bristle brush.

• Replace all multiple jet controls exposed to similar conditions (*) as the multiple jet control that fails testing. Consult with Zurich regarding an option to submit an additional sample of multiple jet controls for testing.

  (*) Similar conditions refer to those conditions associated with the failure of the tested multiple jet control and may include the multiple jet control make, model, age, type of fusible element, contamination, or corrosion.

**Replacing multiple jet controls with deluge valve sets**

Conduct a cost benefit analysis that considers the replacement of multiple jet controls with water spray systems controlled by deluge valves. The main considerations are the less onerous maintenance and inspection regimes and the increased reliability.
Conclusion

Considering the wide number of installations, applications and exposures where multiple jet controls are applied, it is not possible to offer blanket advice covering every system installed at the every site. The guidance in this Risktopic is considered a best practice and is based on the requirements of standards, test data, and loss history where available.

In summary, apply the inspection, testing, and replacement guidance outlined in this document as well as the referenced documents. This process is intended to allow fire protection systems using multiple jet controls to perform at a suitable level of reliability for Property insurance purposes.

References


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