

Slider upgrading in combination with pipe network cleaning

The aim of preventive, condition-based maintenance of pipe networks is to reduce the frequency of incidents in order to be able to supply consumers with flawless drinking water at all times. The focus is on safety and hygiene. Valve inspection in accordance with DVGW W 392 is given an important safety component through condition-based valve maintenance. The Complex cleaning presented in this article restores existing pipes to a perfect hygienic condition. In addition, valve refurbishment results in an interesting savings potential. Refurbished valves do not need to be removed and can continue to do their job

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Dhe purpose of pipe network cleaning is to maintain the quality of drinking water during transportation. The Complex pulse flushing process has been proving its effectiveness for over ten years.

years. During Complex cleaning, the valves in the pipe network are actuated more than once and the cleaning sections are taken out of service. So why not check the function right away and repair defective valves? This reduces the number of valves that need to be replaced - an interesting savings potential for the operator. Finally, detailed documentation, if possible with a valve inspection in accordance with DVGW W 392, provides an up-to-date overview of the condition of the pipe network.

SLIDE INSPECTION ACCORDING TO DVGW W 392

The valve inspection is described in DVGW Code of Practice W 392 [1]. Table 2 contained therein provides information on the inspection and maintenance of operating equipment and system components. For shut-off valves

Valves such as gate valves and butterfly valves must be randomly inspected every eight years by closing/opening according to the local situation. The following must be checked:

- Movement by briefly closing and opening (at least five turns; caution with closed or throttled valves)
- Easy movement of the valve actuator and shut-off section
- Tightness of the spindle seal
- Operating position (check stop)
- External tightness (visual inspection and listening)
- Condition of the extension spindle
- Corrosion on visible parts (corrosion protection)
- Closing and opening position according to the defined operating state
- Condition of the indicator device for recognizing the position of the shut-off device

Zone separating slides must be checked annually:

- Operating position "CLOSED"
- Tightness at the end (pay attention to flow noise)

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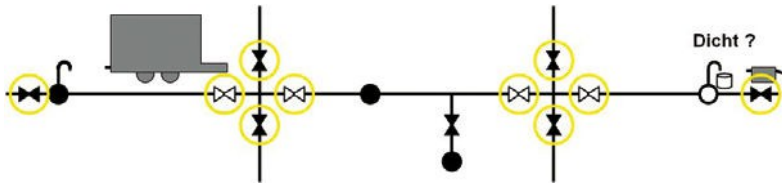


Figure 1: Checking the sliders before Complex cleaning

VALVE CHECK WHEN THE DRINKING WATER DISTRIBUTION SYSTEM IS SHUT DOWN

As part of the valve inspection in accordance with DVGW worksheet W 392, the actual function of the shut-off valves, i.e. the tightness at the end, cannot be tested directly. This is only possible when the pipeline is out of operation, for example during pipe network cleaning [2].

Various preparatory work is required to decommission a pipeline or pipe network section. Good preliminary planning is the basis for efficient implementation of the subsequent measures. Furthermore, residents must be informed in good time by means of flyers. In certain areas, only low-consumption times such as the night hours between 10 p.m. and 5 a.m. are suitable for decommissioning. This means that maintenance work can only be carried out with a low noise level. Appropriate vehicles and equipment must be planned.

CONDITION-ORIENTED SLIDER MAINTENANCE

Valve upgrading in combination with pipe network cleaning (Complex netcare) is a condition-oriented measure. In the first step, the gate valves and butterfly valves are checked (Figure 1). To do this, the gate valves that limit the pipe section to be cleaned must be closed. The water outlet on the standpipe of the feed hydrant indicates whether all actuated gate valves are closed (Figure 2).

Non-closing or poorly closing gate valves, i.e. gate valves in poor condition (Figure 3), must be marked. It has proven to be advantageous to attach a temporary marking to the road caps of the tested shut-off valves. Figure 4 shows such a marking using a chalk line. Yellow means "tested", red indicates "gate valve in poor condition".

Slides that no longer work are replaced. Repeated operation of the spindle reduces the stiffness in many cases. The tightness in the



Fig. 2: Water quantity at the feed hydrant shows the slider function: Increased water leakage (top) - poorly closing; low water leakage (bottom) - sufficiently closing

Closure can be achieved through controlled cavitation. In the case of metal-sealed gate valves, for example, lowering the gate wedge is often sufficient to remove deposits from the gate valve bag using the water flow. In the case of stubborn deposits, the Complex process supports cleaning. Here, too, a condition-oriented approach proves to be advantageous: in the first step, generate short-term cavitation by closing the gate valve and slightly raising the gate valve wedge, if necessary, increase the cleaning effect using the Complex process.

Experience has shown that around 50 % to 70 % of poorly closing or non-closing gate valves can be restored to full functionality (Figure 5). Refurbished gate valves are given another green mark on their road cap.

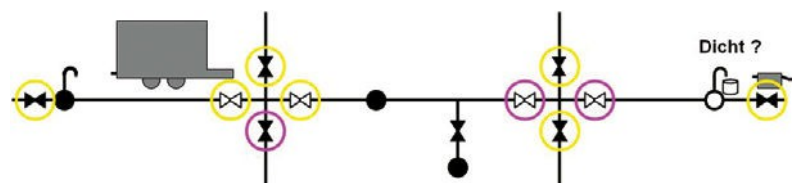


Figure 3: Gate valve in poor condition after inspection



Figure 4: Marking on penalty cap after inspection

temporary marking (**Fig. 6**). Defective sliders must be replaced. Their road caps are given a permanent red marking (see Fig. 6).

COMPREX CLEANING

Comprex cleaning of the pipe network follows the condition-oriented valve maintenance. It is based on a controlled, pulsed supply of compressed, quadruple-filtered air from a Comprex unit into a defined pipe network area (**Fig. 7**).

The air blocks that form at the feed point move alternately with water blocks through the flushing section. The air pulses accelerate the water blocks, whereby turbulence with flow velocities of 10 m/s to 15 m/s form in the water/air/pipe wall boundary areas. The intermittent flow velocities induce an extremely intensive drag stress. The turbulence at the phase boundaries between the water and air blocks also causes controlled cavitation. Water distribution networks can be cleaned efficiently.

The Comprex process not only removes biofilms and impurities, but also deposits that have built up in the network over the years. **Figure 8 shows** the principle of Comprex cleaning on an existing pipeline.

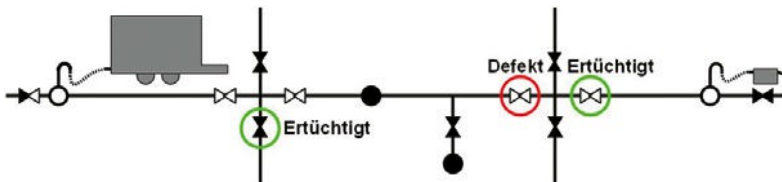


Figure 5: Result of condition-based valve maintenance during pipe network cleaning

The Comprex process can help to clean gate valves. It is also effective in removing impurities or deposits from hard-to-reach areas in shut-off valves, for example from metal-seated gate valves. As Comprex cleaning follows the gate valve repair, it is ensured that all substances removed and mobilized from the gate valves are reliably removed from the pipe network.

Comprehensive pipe network cleaning makes it possible to check not only valves but also other fittings installed in the pipe network area. Aeration and ventilation valves can be serviced. For Comprex cleaning, most hydrants are operated and used as feed-in or feed-out points.

SYNERGY IN THE COMBINATION OF PIPE NETWORK CLEANING AND VALVE CLEANING

The combination of condition-based valve maintenance and pipe network cleaning restores pipe networks to a proper condition and extends the service life of shut-off valves. The complete valve inspection in accordance with DVGW W

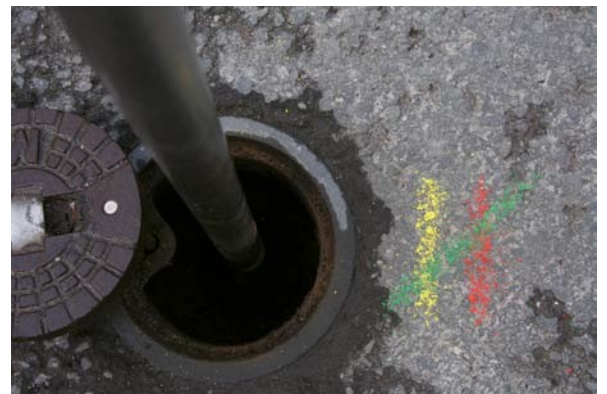


Fig. 6: Marking on the steel cap after upgrading: green (upgraded), red (defective)

392 is recommended. This provides the operator with comprehensive documentation on the condition of the pipe network. Necessary follow-up measures can be planned and carried out according to their importance and urgency. It is essential that in critical situations, such as fires or burst pipes, shut-off valves close, hydrants function and the drinking water quality in the pipe network is maintained in accordance with the Drinking Water Ordinance.

The combination of pipe network cleaning and maintenance-oriented valve maintenance reveals new synergy effects. For example, the costs for pipe network cleaning can be offset by extending the service life of the refurbished valves. Further potential savings can be achieved by cleverly distributing the work between the service provider and the pipe network operator. A computer program can calculate the possible variants. After entering the pipe network data and operator-specific data, it calculates the costs for the measures and shows potential savings.

In summary, condition-based valve maintenance in combination with pipe network cleaning has the following advantages:

- Hygienically and hydraulically perfect condition of the pipe network
- Checking the function of all valves in the pipe network
- Upgrading of poorly closing or non-closing gate valves by 50 % to 70 %
- Increased safety in the event of incidents by cordoning off affected areas
- Documentation of the defective gate valves and identification on site
- Reduction in the number of sliders to be replaced
- Reduction in civil engineering measures as a result of valve replacement
- Further valve inspection in accordance with DVGW W 392 possible
- Small repair measures possible during cleaning and valve inspection
- Cost optimization by extending the service life of the pipe network, including valves in particular

CONCLUSION

Supplying consumers with clean drinking water requires clean pipe networks. Fire-fighting and measures in the event of incidents require functioning valves. The combination of pipe network cleaning using the Complex process and valve refurbishment, if necessary also with armatures and valves, ensures that the pipes are clean.

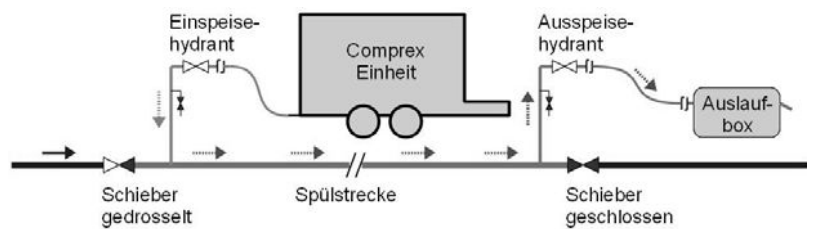


Figure 7: Principle of Comrex cleaning on a pipe section

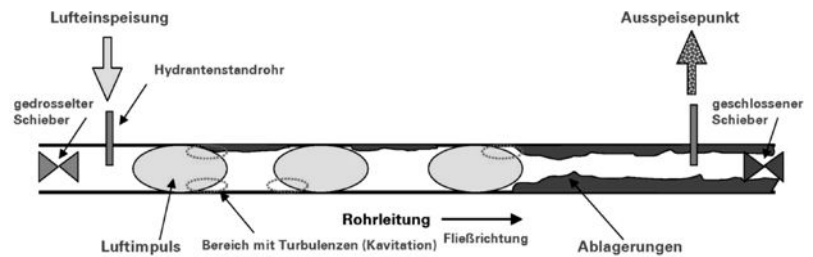


Figure 8: Schematic representation of Comrex cleaning

ture inspection in accordance with DVGW W 392 opens up new synergies. The partnership-based cooperation between pipe network operators and service providers not only leads to increased safety, but also offers potential savings.

LITERATURE

- [1] DVGW W 392 (A) Pipe network inspection and water losses - Measures, procedures and assessments
- [2] Klein N., Hammann H.-G.: Pipe network cleaning with valve upgrading, 3R (2010), Issue 12/2010, S. 712-715

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