Pipe network inspection

In the interests of sustained use of the resource water and to ensure the greatest possible security of supply, pipelines must undergo regular inspection. Inspecting the supply network for leaks reduces water loss and, with it, the amount of energy expended. Checking valves increases security of supply and guarantees short remedial times in the event of damage.

Water loss analysis

Every water pipeline system is subject to water loss to some extent, where how much depends on its size and structure. However, these losses must be kept as low as possible for supply, safety, economic, ecological and legal reasons.

In these interests, the operator must make constant efforts to analyze and limit these losses and locate leaks.

A systematic water loss analysis is performed in several stages. First, entire supply zones are measured and their minimum night feed values compared with limits based on supplied residents or pipeline lengths. Working from these initial values, priority lists can be created or individual zones declared as loss-free.

Even when fixed measuring points are set up, it makes sense to subject these to a comparative analysis from time to time.

In those supply zones subject to losses, the search is narrowed down further and the zones divided and scaled down using the installed shutoff valves.

In a next step, measurement zones can be defined and supplied via a flowmeter and hoselines. In this way, losses can already be pinned down very precisely to individual pipeline sections. The principle adopted wherever possible is

> water loss analysis means measuring and not estimating losses

Another way to locate leaks is to use noise level loggers. These are installed onto valves in the network. They record any existing leak noises during the night hours. The results are analyzed and checked and refined using suitable methods. Typically, noise loggers are used by preference for permanent or continuous network monitoring. Location by noise level loggers does not allow quantification of losses.

These pre-located, quantified leak points are then pinned down to a more precise location. This is done using various methods adapted to the specific requirements of the individual situation.

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Correlation analysis

Correlation analysis for targeted location of leak points can be applied in any pipe network without interrupting operation.

Correlation analysis is an acoustic leak location method based on the following principle:

When water escapes from a pipe under pressure, it makes a characteristic sound that propagates along the pipeline in both directions. Sensors record the incident noises at the valves (hydrants or slide rods). After automatic filtering and amplification, the leak noises are radioed to the correlator and analyzed. The exact position is calculated based on the difference in time the sound takes to travel from the leak point to the two recorders.

Employing correlation analysis ensures that all acoustically measurable leak points will be detected and located with pinpoint accuracy, provided the exactly pipeline lengths and pipe materials are known.

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Listening method

The structure-borne sound made by water escaping under pressure is listened to by stethoscope and various in-ground microphones in conjunction with suitable amplifiers.

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Tracer gas location

Use of tracer gas can locate even tiny losses (slow leaks and drip losses). When using this method, an eye must be kept on the economic viability of the measure. The time expenditure and monetary costs for this method are disproportionately higher.

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Valve inspection

The Austrian and German Gas and Water Associations (ÖVGW and DVGW) prescribe an annual inspection of the main pipeline valves, and this is therefore considered state of the art. An independent inspection without any interest in repairs presents the most economical and most certain option.

Hydrant inspection:

- Corrosion on visible parts
- Easy mobility of shutoff valves
- Condition of claw
- Correct drainage
- Condition of downpipe closure
- Functional testing by brief withdrawal, hydrant flushing
- Testing the fire protection withdrawal capacity, specifying water volume in l/sec, l/min or m^3/h
- Test cap for correct functional position and for traffic and accident safety (subsidence, pollution, easy removal, proper seat, damage)
- Check signage for completeness and correctness
- Put up an inspection poster with the month and year of the inspection
- Documentation in the network plans

Checking shutoff valves:

- Test sliders for tightness by briefly shutting off a section. The slider is closed maximum twice and its state of tightness noted in the result log. State of tightness is recorded as tight, almost tight or leaky. To determine the state of tightness, the slider is tested acoustically.
- Test terrain surface around the slider (subsidence)
- Corrosion on visible parts
- Closed and open positions according to specified operating state
- Easy mobility of valves actuators
- Mobility is tested by briefly opening and closing; zone sliders are checked only upon agreement with the waterworks
- Acoustic testing of tightness of closed position; zone sliders are checked only upon agreement with the waterworks
- Tightness of gland
- Check specified dimension by comparing number of spindle rotations
- Check extension spindles for locatability and operation (e.g. covered, tarred caps)

- Test street cap for correct functional position and for traffic and accident safety (subsidence, pollution, easy removal, proper seat, damage)
- Check signage for completeness and correctness of size +-30 cm and condition
- Documentation in the network plans

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