Flow controller

PRACTICAL TEST IN A HOTEL

A hotel is having problems with fluctuations in shower water temperature. When a person is showering, the water temperature is constantly fluctuating. Guests are complaining about an uncomfortable and even hazardous situation – a situation which must be improved. But what approach will work best?

Various parties have already made changes to the hotel's system. For example, mixer taps have been replaced, the pressure level and pump control altered and the settings for the hot tap water circulation system changed. However, nothing has yielded the desired result.

System

This is a system in a large hotel which has a few hundred hotel rooms spread across over five floors. A pressure-increasing system is installed in the basement which supplies the draw-off points with a minimum pressure of 3 bar. There is a hot water circulation system which supplies around 61 °C at the draw-off points, at which moment the drinking water temperature is 19 °C. The system has sufficient capacity to supply the draw-off points.

Splitting

The drinking water pipe and the hot water pipe enter a hotel room. The hot water pipe splits into separate pipes to the bath/shower and washbasin mixer tap (Rake model).

The pressure independent flow controller HL2024 Inline 1P 1/2" f-m (5.0 l/min)

The drinking water pipe also splits into separate pipes to the bath/shower and washbasin mixer tap, as well as to the toilet. The system consists of plastic pipes. The bath/shower mixer tap is a single-lever mixer tap that has been built into the wall. The problematic temperature fluctuations are noticeable in all hotel rooms.

Analysis

In (large) collective systems, draw-off points and appliances are being switched on and off all the time. This causes pressure fluctuations in the system, in both the cold and the hot water systems. These pressure fluctuations are not equivalent in every respect. For example, the cold water pressure at a draw-off point might increase, whilst the hot water pressure at that point decreases. These pressure fluctuations cause a change in volume flows (cold and hot) entering the mixer tap.

Pressure differences

The changes in flow result in temperature fluctuations in the water coming out of the draw-off point. As a result, the water temperature will fluctuate when a person is showering. In addition to greater pressure differences, short, small pressure differences (pressure ripples) also cause temperature problems. The occurrence of pressure differences in the cold and hot water system is a physical phenomenon that can never be prevented.

'Authority'

Increasing the hydraulic resistance just before the mixer tap gives the mixer tap 'authority' in the system and prevents temperature fluctuations. For further information about authority, see the supplement in ISSO publication no. 55 'Leidingwaterinstallatie in woon- en utiliteitsgebouwen'. (Pipeline water system in residential and non-residential buildings). This additional information can be downloaded free of charge.

Solution

By installing a pressure independent flow controller HL2024 before the mixer tap, this creates a hydraulic resistance. The mechanical controller also responds very quickly and accurately to pressure changes, allowing HL2024 to supply a constant, non-fluctuating flow at all times. This means that pressure fluctuations in the system are no longer passed into the mixer tap. Because HL2024 supplies the mixer tap with the same flow at all times, this will prevent any further temperature fluctuations from occurring.

Test protocol

To investigate whether the pressure independent flow controller HL2024 is able to solve the problems with temperature fluctuations in the hotel, tests are being carried out using accurate measuring devices and in accordance with a protocol. In the test protocol, the situation will be looked at when only the shower mixer tap (or other mixer tap) is turned on in the hotel room, all whilst other draw-off points in the hotel can be turned on or off. Then the effect will be looked at when a different mixer tap is turned on in the hotel room. This will be done in the case of a decrease in hot water or a decrease in cold water, and for both short (1 second) and longer (10 seconds) pressure differences.

Measurement

The measurement is taken in the existing situation (without HL2024) and in the situation in which HL2024 is fitted to the draw-off point in the hot and cold water supply. In this situation, the HL2024 Inline 1P 1/2" (5.0 l/min) was chosen, which will be fitted in the cold and hot water pipes to the bath/shower mixer tap. The available dynamic pressure for this type of HL2024 to function optimally is way above the minimum required 1.5 bar.

Results

The results of the measurements can be seen in graph 1 (without HL2024) and graph 2 (with HL2024). Without HL2024, the water temperature from the shower head varies between 35.3 and 47.6 °C (total 12.3 °C) during the 5-minute test time. When HL2024 has been fitted in the cold and hot water pipes to the bath/shower mixer tap, the temperature varies just 0.4 °C. That is barely to not at all noticeable to a guest taking a shower.
The hotel staff couldn't believe these results and began to turn taps on and off in other hotel rooms to cause pressure fluctuations in the system. However, the temperature variation measured with HL2024 (0.4 °C) remained unchanged.

Variations

In a different location with the same system, the temperature variation was reduced from over 7 °C to just 1 °C. Excellent results were also achieved in practical situations with thermostatic mixer taps. In addition to the pressure independent flow controller HL2024 Inline 1P, in certain situations the HL2024 Connect or the HL2024 Connect-S can also be used at the connection to the mixer tap. Different connection ends and flows are available. HL2024 has also proven that it can work in other (collective) systems.

Availability

In addition to a more constant outflow temperature, HL2024 offers more advantages, including a more constant flow, water and energy saving, system stabilisation and restriction of the pump capacity. HL2024 has been awarded the Kiwa Water Mark on the basis of BRL-K635. In the Netherlands, HL2024 products are being sold by independent consultancy firm KDWS Nederland.

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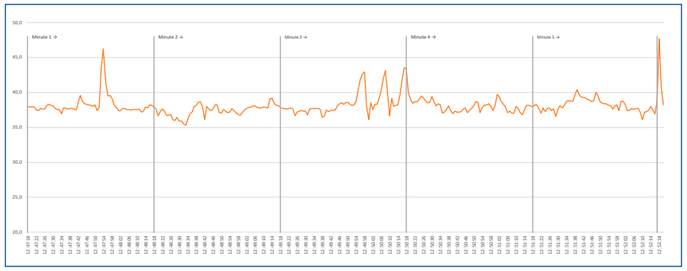
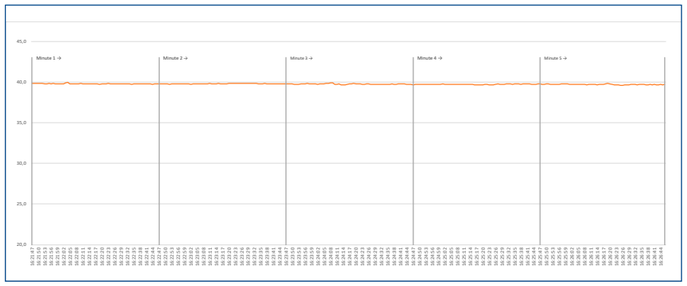


Graph 1: Temperature fluctuations during test without HL2024



Graph 2: Temperature fluctuations during test with HL2024

TEST PROTOCOL

Determine the required shower water temperature (38 - 40 °C) and make the necessary adjustments. Allow the water to flow for a while. Begin the measurement, with each step taking 60 seconds.

- Step 1: Allow the shower mixer tap to run at the required temperature;
- Step 2: Turn on the hot water tap for 10 seconds before turning off the washbasin mixer tap and waiting to the end of the 60 seconds;
- Step 3: Turn on the hot water tap for 1 second before turning off the washbasin mixer tap and waiting to the end of the 60 seconds;
- Step 4: Turn on the cold water tap for 10 seconds before turning off the washbasin mixer tap and waiting to the end of the 60 seconds;
- Step 5: Turn on the cold water tap for 1 second before turning off the washbasin mixer tap and waiting to the end of the 60 seconds;

Stop the measurement.