COMFORTABLE SANITARY

For a long time, attention to sanitary fittings focused primarily on the external appearance and comfort. In other words, luxury, warmth and a lot of water – often hot water. Because of the energy transition, plenty of opportunities for energy saving can be expected in this regard, but too little has been done so far. And that is despite the fact that increasing numbers of products for energy-saving and water-saving sanitary fittings are coming onto the market. It is important here that the comfort and safety factors are not forgotten and that sufficient creativity is developed to allow both user requirements and environmental needs to be met.

Text: ing. M. de Wit – Blok, freelance journalist
Photography: Industry

In terms of the technology and installed systems, the energy transition has above all led to solutions that have affected energy consumption for heating the space. On the one hand, housing is much better insulated and on the other, there are solutions such as low-temperature heating and energy efficient boilers. However, the focus on water piping systems and the production of hot tap water has lagged behind.
Eric van der Blom, who works at the Technology & Market Department of Techniek Nederland (formerly UNETO-VNI) believes that this has to change. 'There are plenty of opportunities for achieving savings with existing solutions, but we still have to ensure our high standards in terms of comfort, health and safety. If we're talking about comfort, that means for example as few temperature fluctuations as possible, a constant flow and sufficient warm water when showering. In terms of health and safety, the key risks of energy-saving measures are the elevated risk of legionella caused by lowering the temperatures and/or insufficient thermal disinfection.'
'But this theme also covers the increased risk of falls or burns during showers, resulting from temperature variations and mixer taps that are difficult to adjust. Temperature fluctuations occur more often with water-saving taps and shower heads because pressure fluctuations in the system have a relatively large effect for these lower flows on the mixture between hot and cold water.'

Trias Energetica

One starting point for saving energy and retaining the level of comfort is the Trias Energetica, originally a three-step strategy for producing energy-efficient building designs, but ultimately a general method for handling energy economically. The first step in all cases comprises minimising the intrinsic energy consumption through good insulation or a compact structural shape (room heating) and using the available options for consuming less hot tap water.
The latter is made possible by affecting the behavioural component or by taking technical measures such as using pressure-independent flow controllers, water-saving taps or shower heads, or through smart system design. Behaviour can be affected by providing information or by giving a clearer picture of the options for consumption and savings, for example an LED that lights up green for normal or minimal water consumption and changes to red when unnecessary amounts of water (or specifically hot water) are being used.
In the second step, the energy requirement is met as far as possible using sustainable energy sources, such as solar, wind and hydroelectric power. For private households, solar will offer the best immediate opportunities because private individuals are also able to install and use solar panels and solar heaters. Wind and hydroelectric power are largely a question of selecting the appropriate energy supplier.
The third step focuses on minimising the amount of fossil fuel needed for meeting any residual energy requi-

Cross-section of the pressure-independent HL2024 Flow Controller.

FITTINGS CAN SAVE ENERGY

rements. This can for instance be done using a hybrid heat pump system in which the central heating boiler is switched on when insufficient hot water is available. This step also covers the smart use of energy in the home. Energy can be regained using a shower heat exchanger or recirculation showers.

Hot water

There are plenty of options, therefore, as well as strict definitions of where the solutions have to be realised. Van der Blom says, 'If we focus specifically on the options for water pipes and hot water production, the energy saving opportunities are spread across three processes: the actual production of hot water, the transport and finally the consumption from the tap. Comfort issues can arise in all three, particularly when showering.'

For the production of hot tap water, energy efficiency can be improved by using energy-efficient boilers, heat pumps and sustainable energy sources such as solar heaters. The last of these also offers good opportunities for large institutions, such as care homes, sports complexes, the hospitality sector and campsites. Comfort problems only arise here in situations where it is not possible to top the heating up with fossil fuels, which can lead to a shortage of hot tap water. To avoid this, a sufficient supply will always have to be available.

In terms of savings during transport, sufficient insulation throughout the whole system of hot tap water circulation pipes can prevent unnecessary heat loss. The length of the circulation system and of the hot water supply pipes plays a role in this. For example, an electric close-in boiler in the kitchen is only energetically favourable if there is not an energy-efficient hot water system or solar heater present and/or if small quantities of hot tap water are often needed that are drawn from a long pipe. The user has the freedom here to choose for themselves what hot water source is used, so this affects their level of comfort.

ONE STARTING POINT FOR SAVING ENERGY AND RETAINING THE LEVEL OF COMFORT IS THE TRIAS ENERGETICA

Solutions at the draw-off point itself can be found in the use of taps with flow and/or temperature limiters in the tap itself. A pressure-independent flow controller ensures not only savings of water and energy but also a constant, maximised flow – even when other taps are being opened or closed. This is important because any flow differences can be seen more clearly when there is a lower total flow, and this reduces the level of comfort.

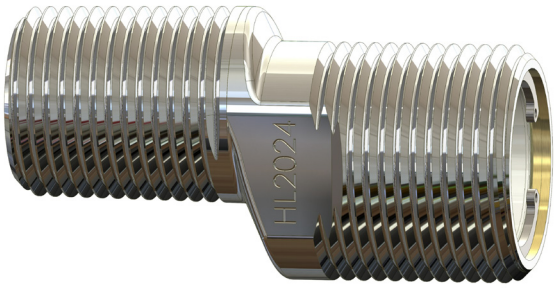
Comfort issues can arise in showers in the form of temperature fluctuations due to pressure variations in the system (see box). In cases of users such as dishwashers

and washing machines, the solutions can mostly be found in the use of energy-efficient equipment that requires less water or where there are options for reusing either the heat or the water. There are also increasing numbers of standard options for reclaiming heat and using it again, for example by applying a heat exchanger in the shower drain.

Behaviour

In addition to technical measures, the behavioural component is also crucial for energy savings. Think of restricting the length of a shower, for instance, or only switching a dishwasher or washing machine on when it is completely full, not leaving the tap running while shaving or brushing your teeth, and so forth. Van der Blom says, 'You could think of these as a reduction in comfort. After all, the user now has to think and take (or not take) certain actions; that may take a little bit of effort at first. On the other hand, it's also about awareness. If users know how much energy – and money – they are saving by altering their own behaviour, it sometimes stops feeling like a loss of comfort and instead like a gain for the environment and for their own wallets. Recording and representing usage data can help achieve this.'

'In other cases, it's largely a question of simply knowing.



Temperature fluctuations can also be avoided by using a pressure-independent flow controller in an S-connection.

Take a mixer tap with a single lever, for instance: people usually open these in the middle position. That's a position where hot and cold water are mixed, even if you only wanted cold water in the first instance. If you always turn the tap off in the cold position, you will avoid unnecessary use of hot water. There are mixer taps on the market that by default still provide cold water in the central position and only start mixing when the tap is moved more towards the hot water side.'

Safety

Energy-saving measures in sanitary facilities can also affect safety, which is also a form of lost comfort. Firstly, there is the risk of legionella if water is produced or stored at a temperature that is too low.

Van der Blom says, 'There's not a lot to say here: the legislation and regulations are quite clear about the requirements for legionella prevention. It means that a temperature of 55°C must be available at draw-off points in houses without circulation systems and in hot tap water storage systems. A temperature of 60°C applies for the draw-off points and the entire piping in houses with a circulation system or for collective installed systems. The contents of the storage vessel must be at least 60°C at all points. If that is not possible, weekly thermal disinfection of the storage vessel is mandatory. Irrespective of whether extra energy is needed to achieve this, it has to be done.'

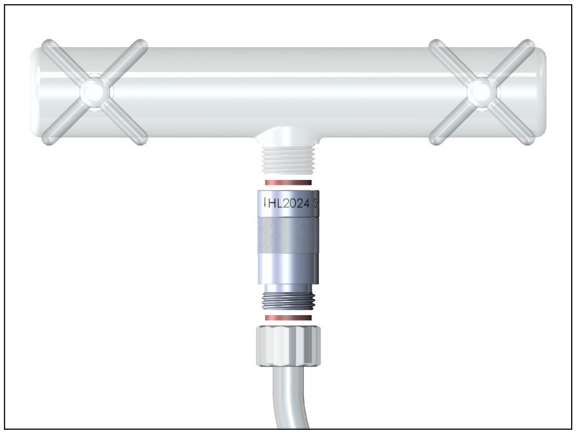
"For draw-off points that are connected to a local boiler – a hot water device that supplies energy for direct heating only while the tap water is flowing – there are specific conditions under which no minimum temperature for the draw-off point is defined1.'

A second safety issue is the risk of falls or burns. This aspect is certainly a source of concern in hospitals or care centres, for example, where people are not always capable of responding quickly to temperature fluctuations. On the

Pressure-independent flow control

The loss of comfort when thermostatic or other mixer taps are used is often noticed in the temperature fluctuations that occur at the draw-off point. These variations are generally the result of pressure variations within the system when multiple taps are being used at the same time. A pressure change in the system – transient, slow, large or small – then leads to a change in the flow on the intake side of the thermostatic tap. This then responds slowly or overreacts, so that a clear temperature difference will be noticed for many thermostatic taps. This variation can be so large that it not only results in less comfort but can even present a risk of burns.

One option for resolving or avoiding this problem is the HL2024 pressure-independent flow controller. It is a relatively small product that achieves a constant flow that is independent of the pressure in the pipe. Pressure fluctuations are then no longer reflected in the mixer tap. The flow controller is placed just in front of the mixer tap intake. The lack of dependence on the pressure (2% flow variation over a pressure range from 200 to 1000 kPa dynamic pressure) applies for both upward and downward pressure changes, assisting the function of the thermostatic tap. The tap then only has to respond to changes in the supply temperature and hardly at all to changes in the incoming flow of hot and cold water. Noticeable and uncomfortable temperature changes are then a thing of the past. The HL2024 is certified for pressure-independence according to BRL K635/03 and it complies with the Kiwa Water Mark requirements.



Water saving on the shower head with the pressure independent HL2024 Flow Controller.

A pressure-independent flow controller prevents temperature fluctuations while showering.

one hand, this can be because they sometimes do not feel it properly and on the other because they may be physically restricted in their ability to operate the tap. The risk of falls due to a startled or shocked reaction to temperature fluctuations (possibly combined with a floor made slippery by soap and shampoo) or of burns is present for both thermostatic and non-thermostatic mixer taps. An initial point of attention is a single-lever mixer tap that is not put back in its central position. A temperature limiter can provide a solution here, with the initial position (neutral) always being taken up when the tap is being closed and when exceeding the threshold temperature is only possible by a deliberate action, i.e. it can't happen by accident.

'IT'S IMPORTANT TO COMMUNICATE CLEARLY TO THE END USER WHAT EFFECT SPECIFIC MEASURES HAVE ON THE LEVEL OF COMFORT'

Open communication

Van der Blom says, 'At the moment, whether people are open to applying energy-saving measures or not depends a bit on what the media are reporting. It's all a bit vague for many of them: 'It may be better in terms of energy, but I'm not giving my nice shower up for it'. In that regard, there is a major role for the plumbing sector here in communicating clearly to the end users what effect specific measures have on the level of comfort. If users understand how they should apply energy-saving techniques, it can be done without any loss of comfort in most cases.'

Once the decision has been taken to implement energy-saving measures, it's then important that what's promised becomes reality. One part of this is making sure that the systems are dimensioned correctly. For a hot water system, for example, there is a principle in the legislation and regulations that a temperature of at least 55°C must be available at the draw-off points in residential accommodation. In addition, the dimensioning of the system depends on a number of variables that all affect the amount of water at a given temperature that has to be made available within a specific time interval.

- Does the end user have a luxury shower set (a rain shower or power shower) or do they have a water-saving shower head?
- How many people use the hot water and what is their pattern of usage? After all, more people obviously do require more hot water, but if everyone wants to shower in the morning between half past six and eight o'clock, a different sustainable source or store of heat is needed than in the case where the showers are spread out over the morning and evening, for instance.
- The effect of the average shower time is directly proportional to the amount of hot water needed, remembering for instance that teenagers use a lot more water than adults.

Van der Blom says, 'Open communication about the wishes and the possibilities makes it possible to advise end users better about the potential consequences of various choices. This is important if disappointments are to be avoided at a later stage. Consultants and designers can draw inspiration for example from ISSO 30 (2018) 'Tap water systems in residential accommodation – Design, realisation and management of safe tap water systems'. This pays a great deal of attention to hot tap water: what systems for which applications and with what options for savings. All sorts of things are possible!' <<

Notes

1 see NEN 1006, 2018, supplementary sheet A1.

This article is a translation of the original Dutch article that first appeared in VV+ (www.vvplus.nl) in February 2019.