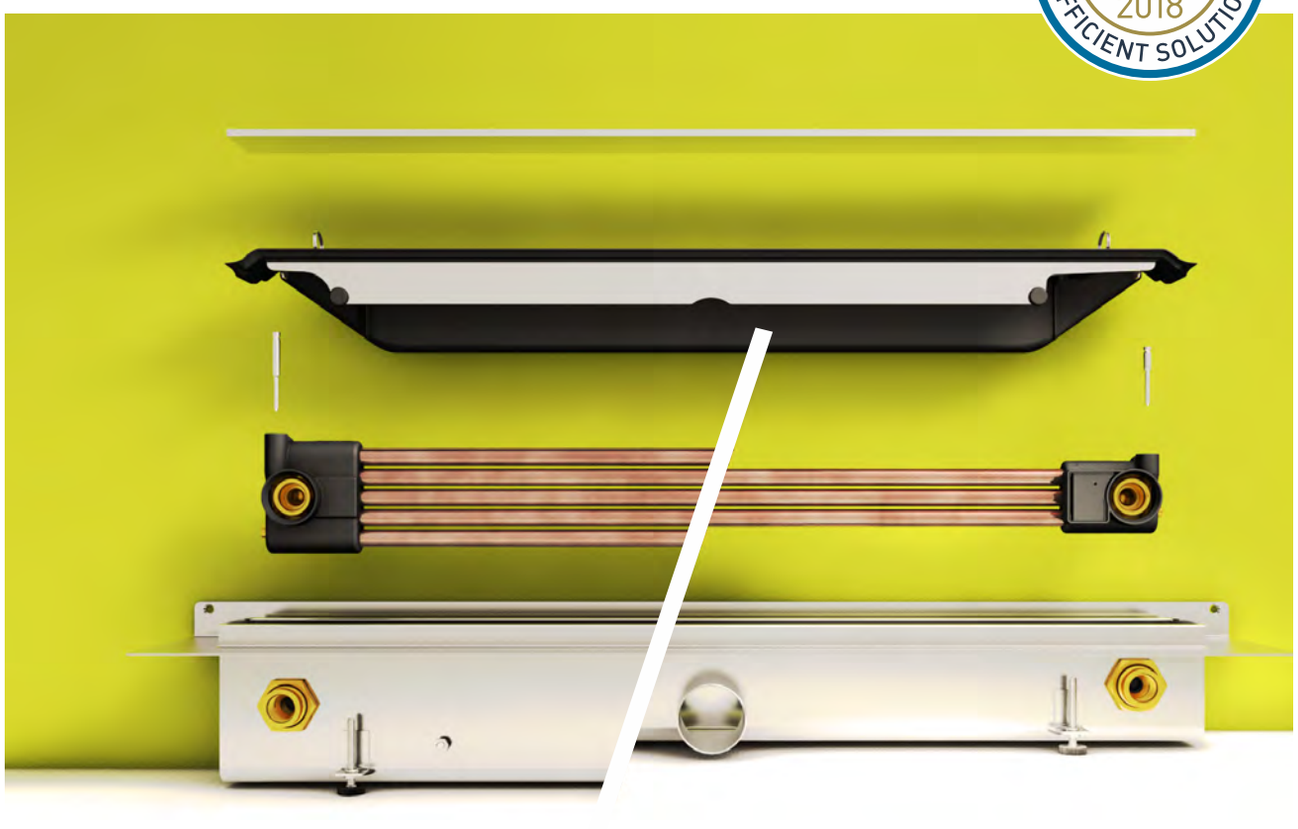
Shower
with
heat
recovery.

joulia®
SWITZERLAND

SOLARIMPULSE
OCTOBER
2018
EFFICIENT SOLUTION



Technical documentation Joulia-Inline

The most refreshing way - to save energy.

Certified by:

kiwa

SVGW

WRAS
APPROVED PRODUCT

DVGW

joulia® inline
SWITZERLAND

Inline with your cold water supply.
Inline with an energy-efficient future.
Inline with your personal needs.

Joulia ltd. - Nov. 2025



A conscientious approach to
energy savings:
as satisfying as your daily shower.

We’d love to hear from you!
+41 32 366 64 22
hello@joulia.com

Why heat recovery?

According to EnergieSchweiz, hot water production requires almost as much energy as all other heating.

If we look at the evolution of residential energy demands since 1975, we see that the energy required for heating has fallen dramatically, and as a result the energy needed to produce hot water represents an ever-larger share of the total household energy use.

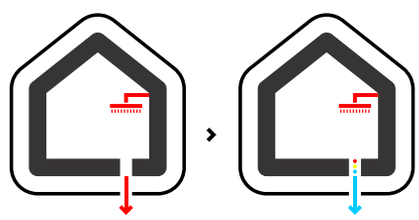
Furthermore, the values shown in red represent the theoretical maximal value for the hot water. However, it is very doubtful whether these can be achieved in practice.

Hot water and showers are seen as a daily luxury, and are given up only with great reluctance.

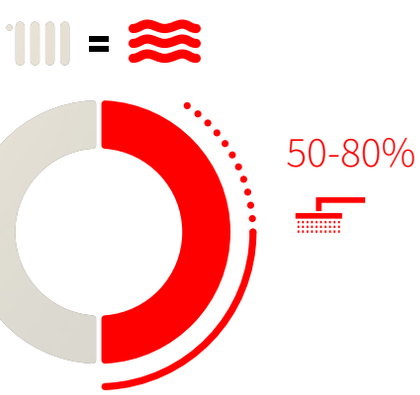
It's time, then, to think about household wastewater as an energy source, and fix this last chink in the insulating armor.

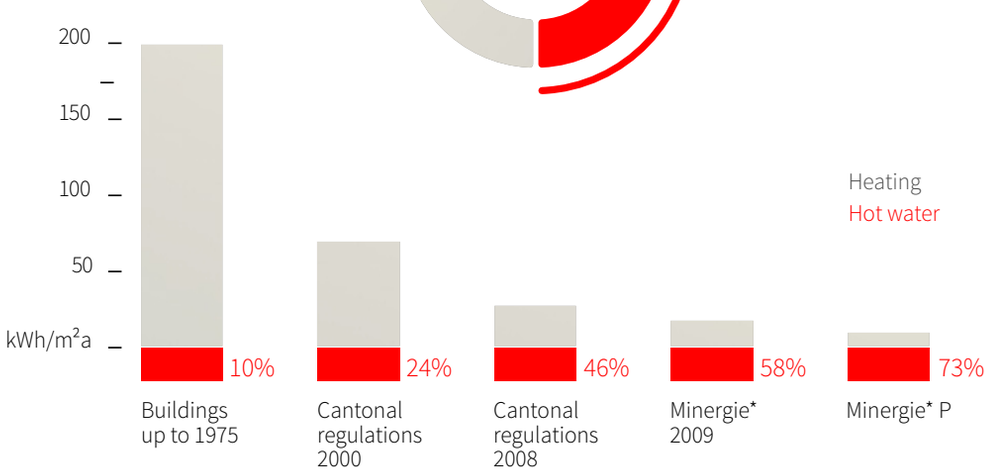


Formerly
Optimise heating by insulating the building.



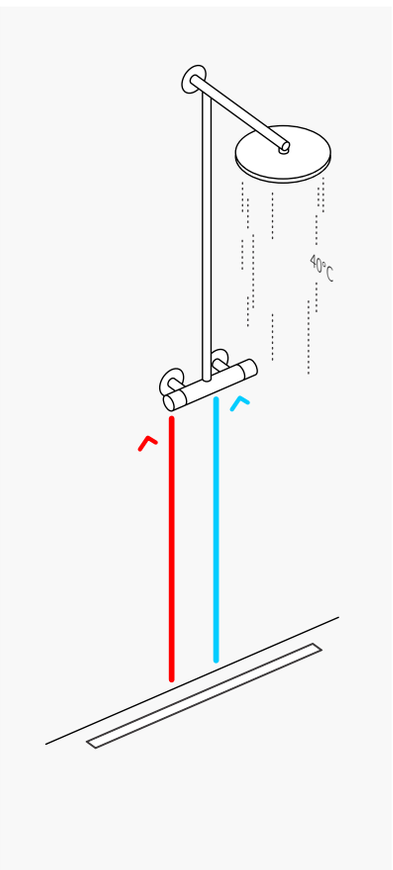
Today
Optimising the hot water supply through heat recovery.





Source: Jean-Marc Suter, Special event: drinking water from the perspective of health, energy efficiency and economics, Nov. 2015, Bern
* The proportion of renewable energy is not included in the Minergie figures.

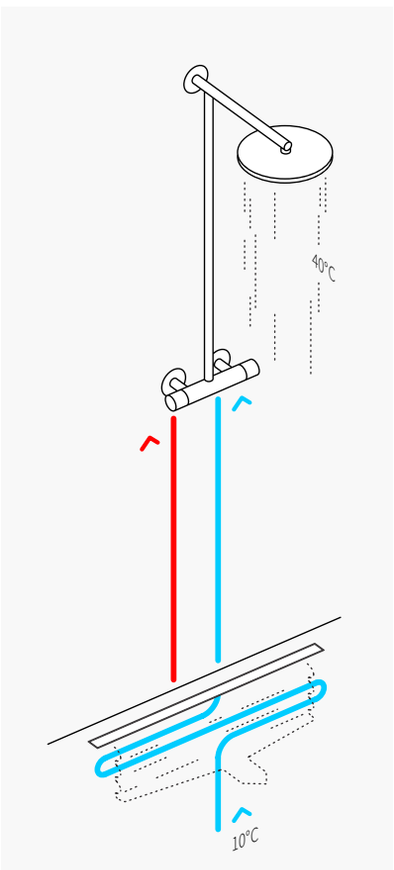
Operational principle



So far: 100% loss

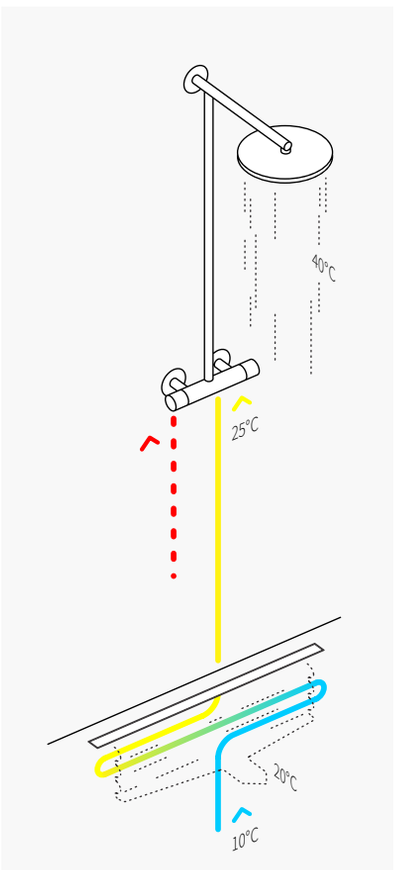
Cold and hot water is connected directly to the mixer tap and the used and still warm shower water flows unused into the sewage system.

This is despite the fact that the shower is the ideal place for a DWHR, because there is always a constant flow of hot waste water and a constant need for cold fresh water.



Thanks to cold water detour...

Joulias shower drain is connected directly to the cold water pipe. Thanks to the integrated heat recovery system, the outflowing heat ...



... the heat comes back now!

... is used to preheat the fresh cold water.. This means that less hot water is needed at the shower mixer, which saves a lot of energy, CO2 and money.

The intrinsic values



From the outside, the Joulia-Inline looks like a completely normal shower drain. But its true worth lies under the cover:

Efficient
in a year, it recovers as much energy as an 8m2 solar array produces

Simple
fast installation and thorough cleaning

Siphon
integrated directly into the heat recovery module (Siphon hood)

Superb design
winner of the Design Prize Switzerland

Design
slim construction, invisibly integrated into the drain channel

Amortization
cost is quickly recouped thanks to energy savings

Compact
same installation height as drains without heat recovery

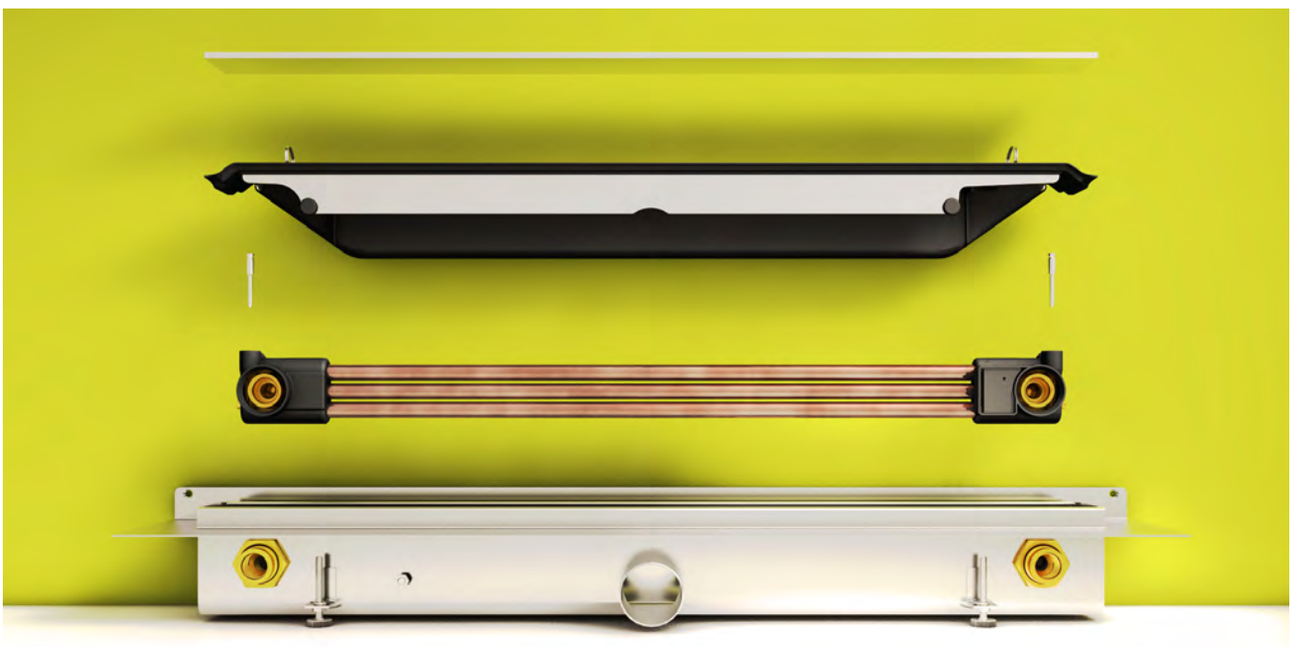
Drinking water
construction meets the strict KIWA, SVGW, WRAS & DVGW regulations

Safety
double partition between fresh water and wastewater

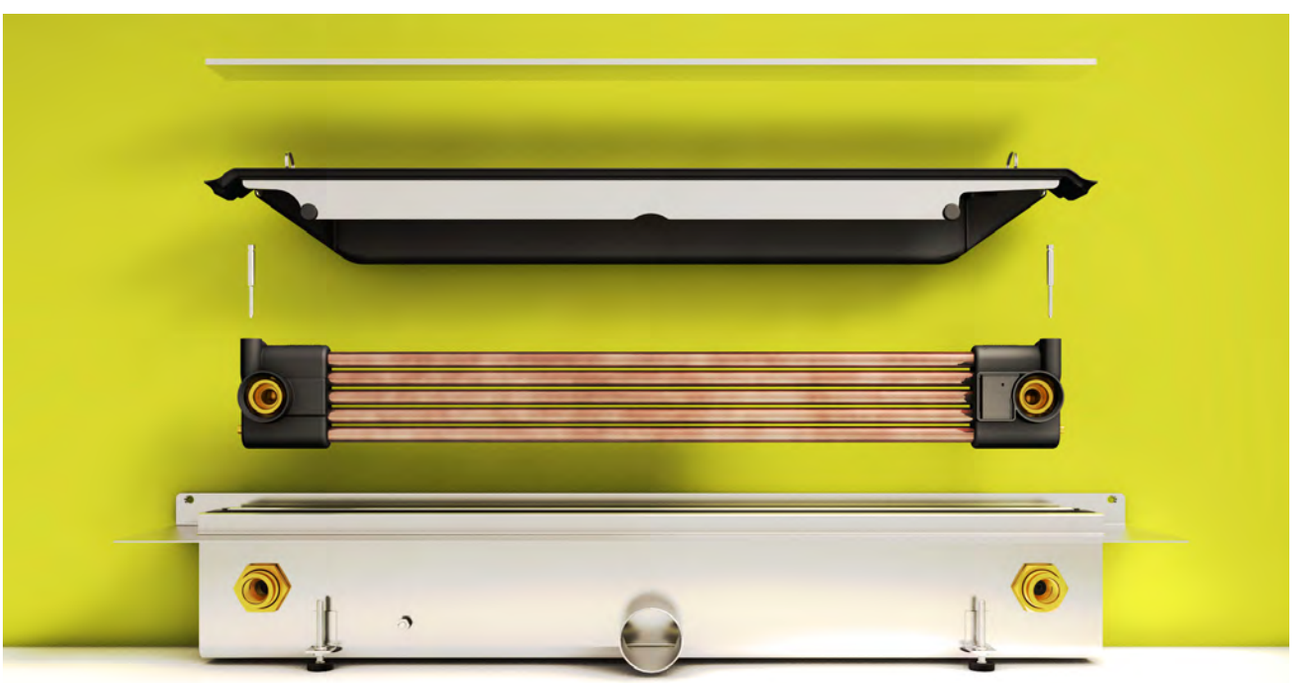
High flow capacity
ideal drainage, even with rainfall showerheads

Durable
functions reliably without moving parts

3P or 5P model?

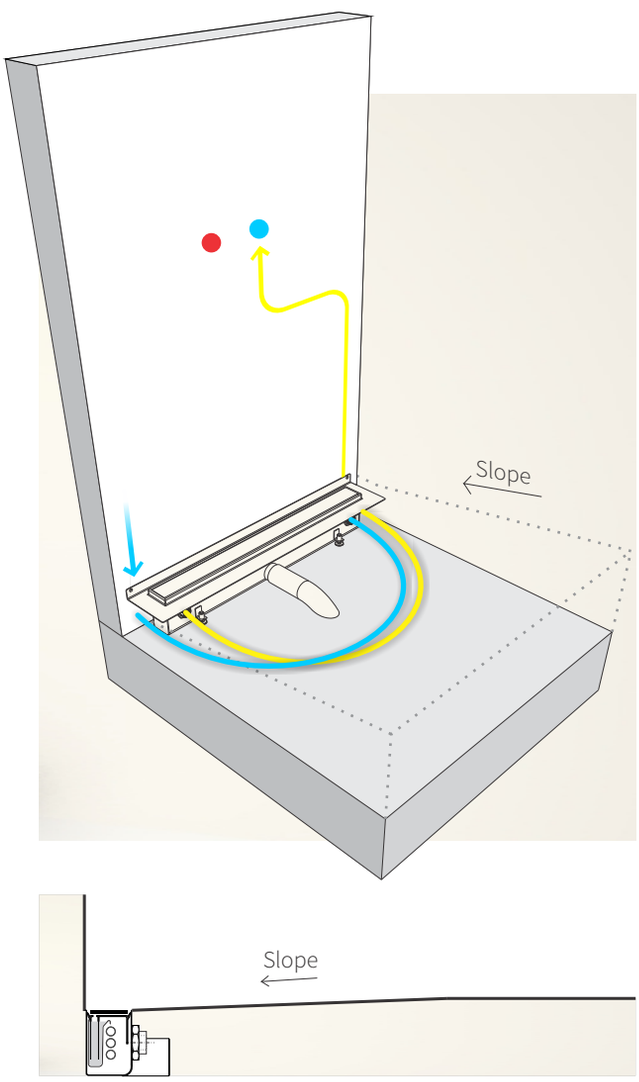


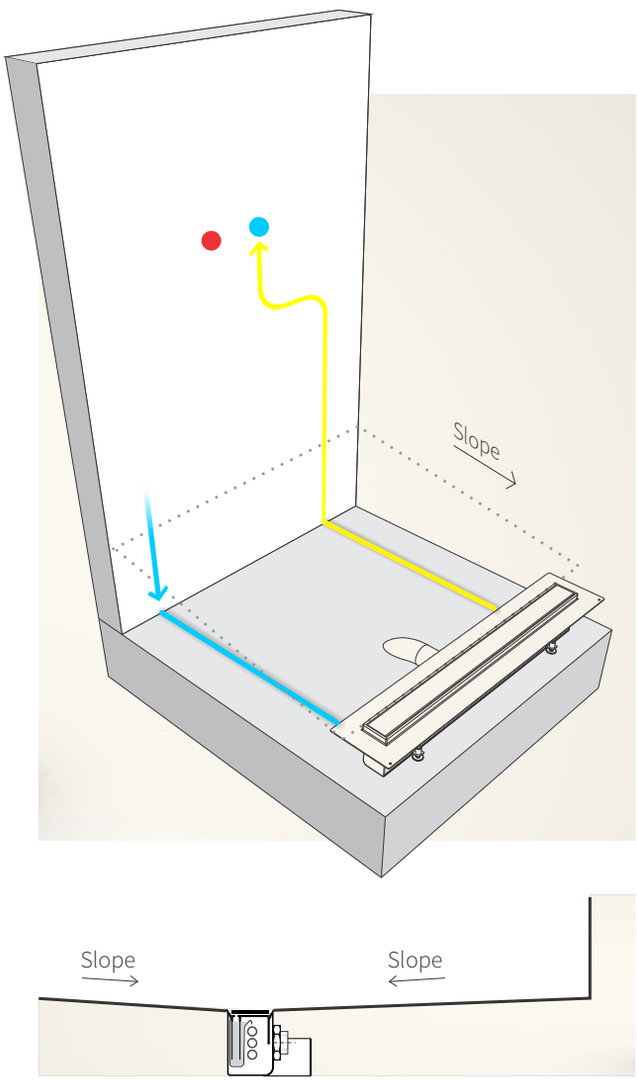
3P: Heat exchanger with 3 copper tubes, 89 mm installation height > ideal for renovations.



5P: Heat exchanger with 5 copper tubes, 120 mm installation height > offers maximum efficiency.

Wall or room-side?





Wall-side assembly

The shower drain is mounted on the rear wall, using a wall flange. The cold water lines (supply and return) are connected to the shower drain in large loops. This type of assembly limits the pressure losses that can arise with tight 90-degree bends.

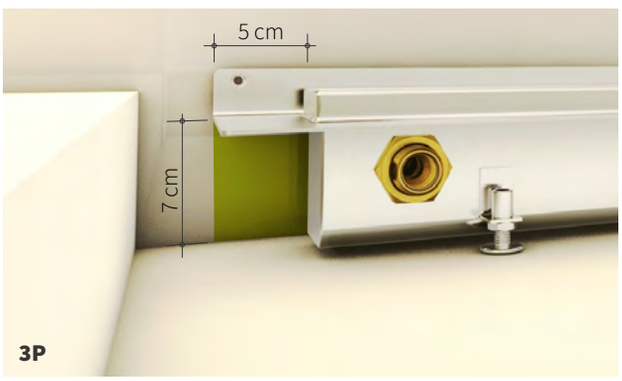
The shower floor slopes toward the wall. The remainder of the bathroom floor is therefore higher than the Joulia-Inline shower drain cover.

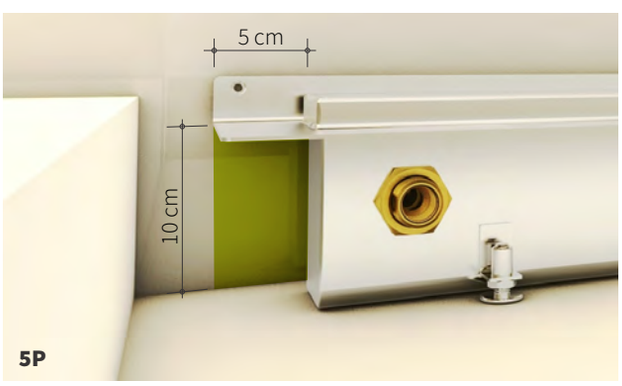
Room-side assembly

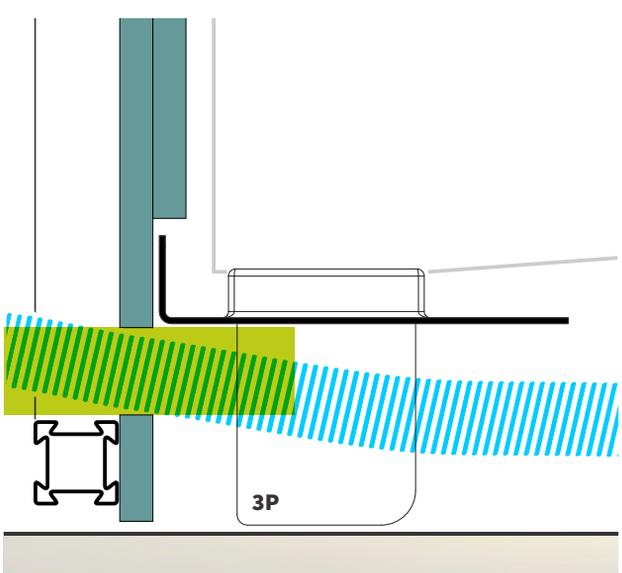
The shower drain is situated adjacent to the floor at the end of the shower zone and attached to the leveling feet by means of additional brackets. The cold water lines (supply and return) are connected to the shower drain via straight stubs.

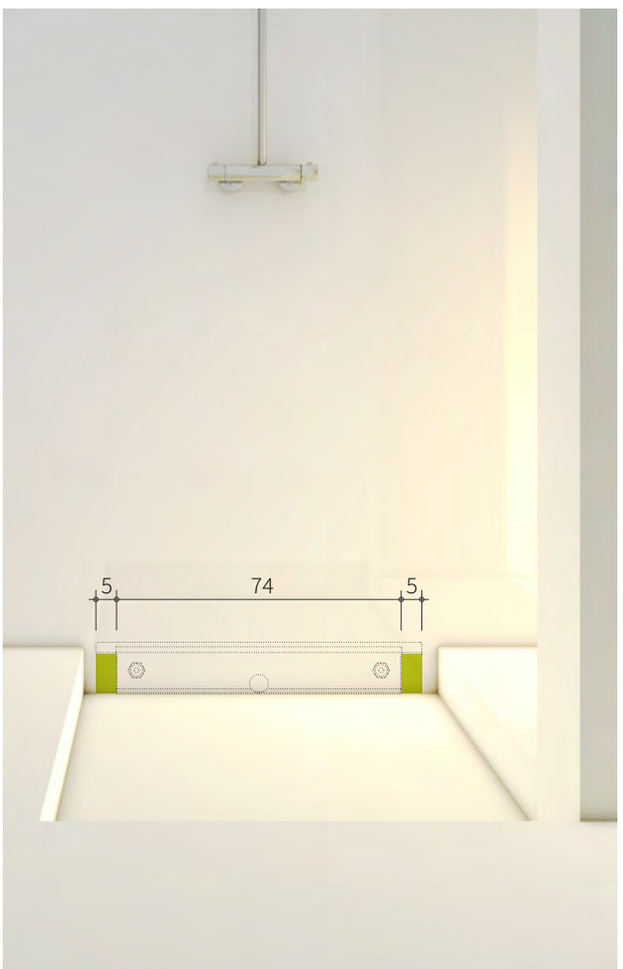
The shower floor slopes away from the wall, toward the shower drain.

Preparing for cold water installation







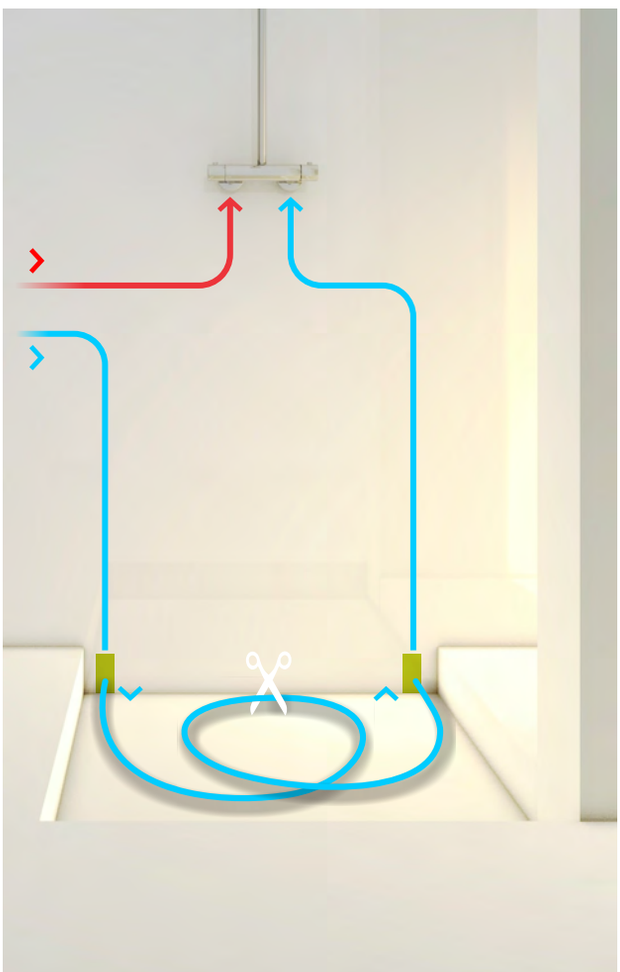


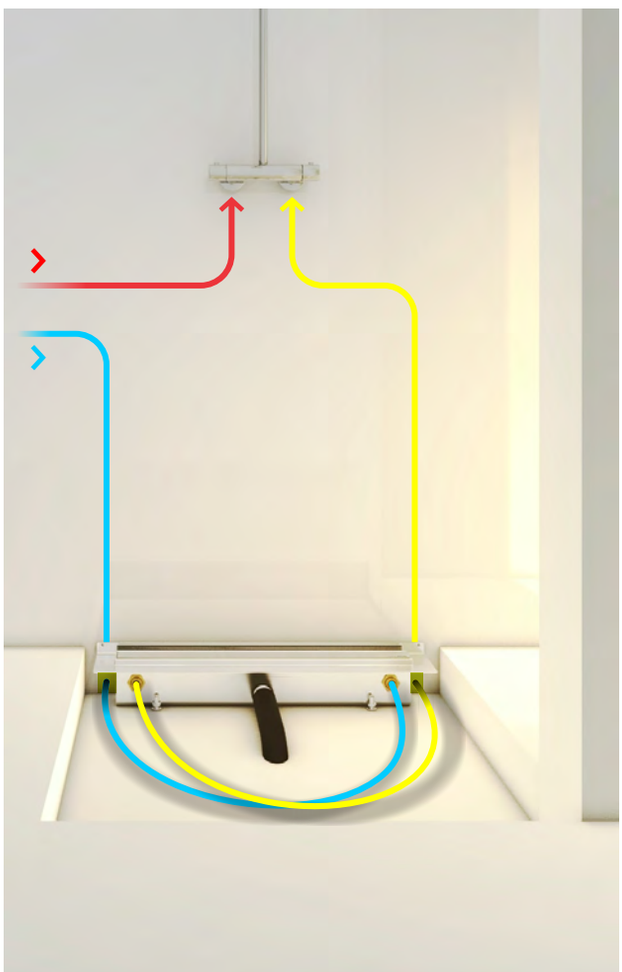
1. Define zones

The holes for the cold water supply and return must be planned so that they lie below the sealing flanges (5 cm width). No holes should be made along the length of the shower drain (74 cm).

Use great caution around horizontal substructures in the front wall! The cold water line must be routed either over or under such structures.

Shower drain assembly





2. Form the loop

The cold water line runs in a large loop over the unfinished floor. The line emerges from the wall in the left corner (supply), and returns to the wall in the right corner.

Therefore, the initial installation and pressure testing can be completed, even if the shower tray with heat recovery will not be installed until a later time.

3. Install the shower drain with heat recovery

The shower drain with heat recovery is leveled and connected to the sewer pipe. The existing cold water line is connected in two large curves to the two ½" female fittings provided.

This layout minimizes sharp corners and their associated pressure drops.

Made in Switzerland



We are proud to offer you a high-quality product that has been invented, developed and produced in Switzerland.

All our suppliers are highly specialized experts in their respective trades, and the components necessary for Joulia-Inline have been developed through extensive collaboration.

Many custom-made items or entirely new designs were necessary to reach our ambitious goals.

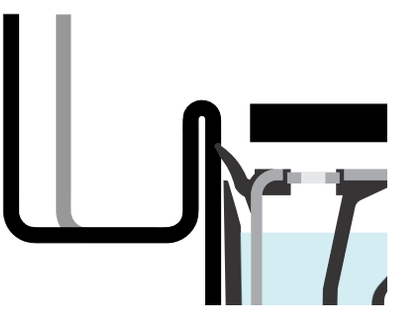
In order to ensure that all components meet our highest expectations, the final assembly and quality control take place in-house at the company headquarters in Biel Switzerland.

By request

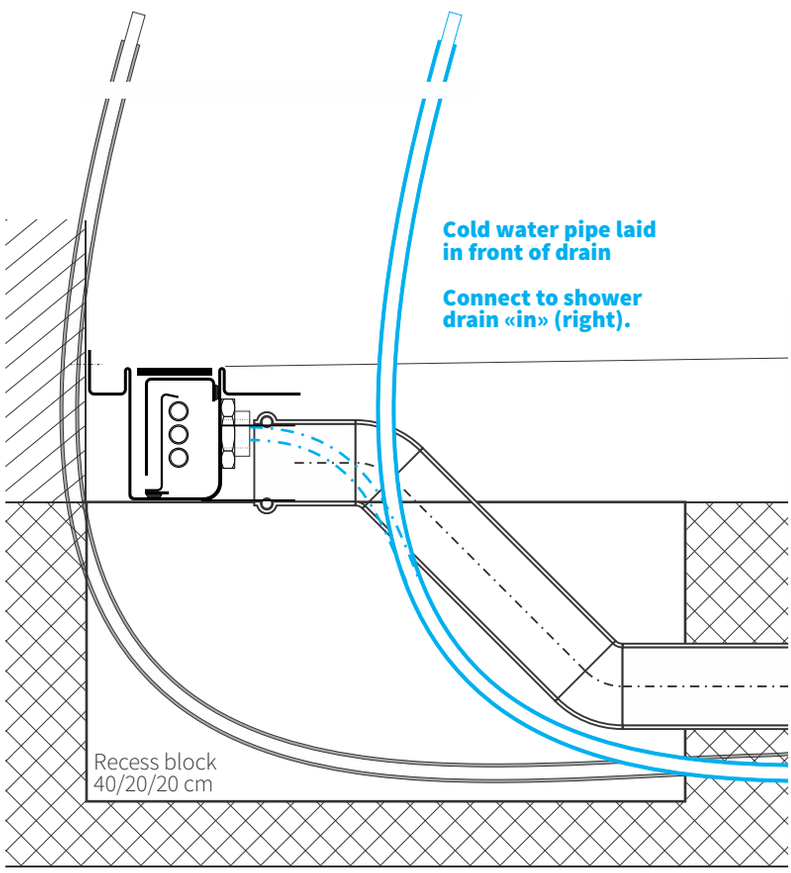


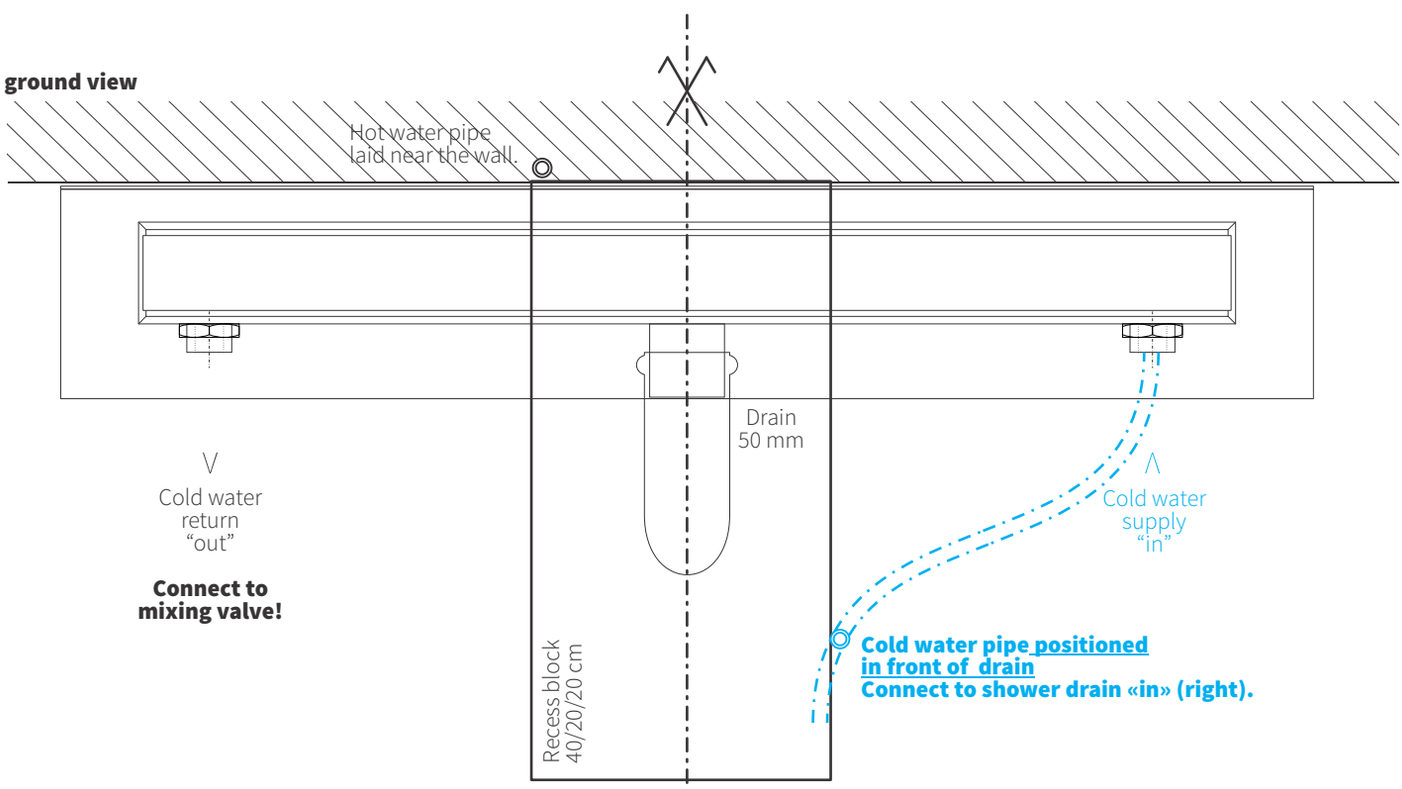
If your specific installation situation requires a customised flange solution, we can offer the following modifications:

- Additional side upstands
- Corner design on one or both sides
- Customised dimensions of the upstands
- Secure drain channel covers

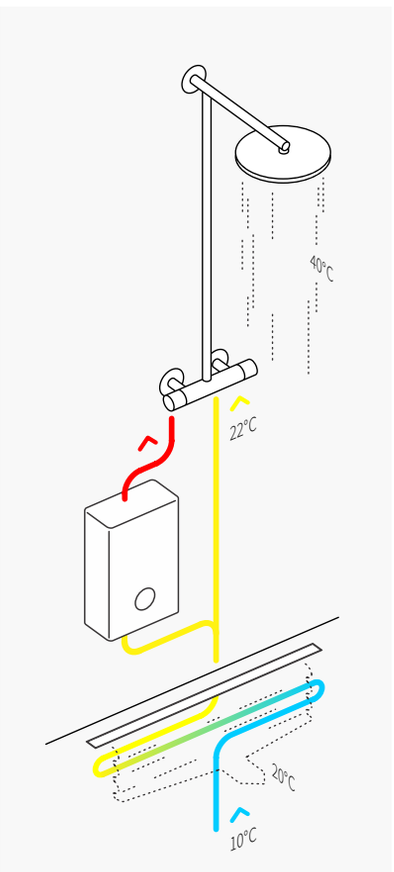


Recesses in concrete slabs





Modes of operation & diagrams

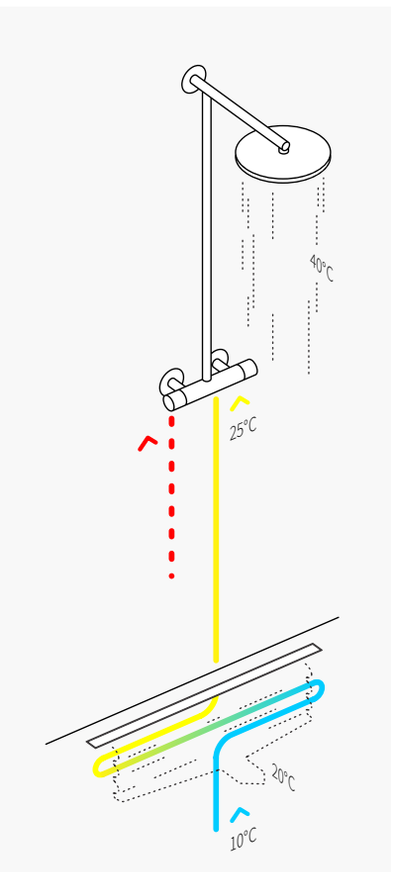


Layout A
Preheating of all shower water.

The entire volume flow of shower water passes through the heat exchanger.

Pre-heated, it flows partly to the shower mixer (cold) and partly to the local boiler, where it is heated and then goes to the mixer (hot).

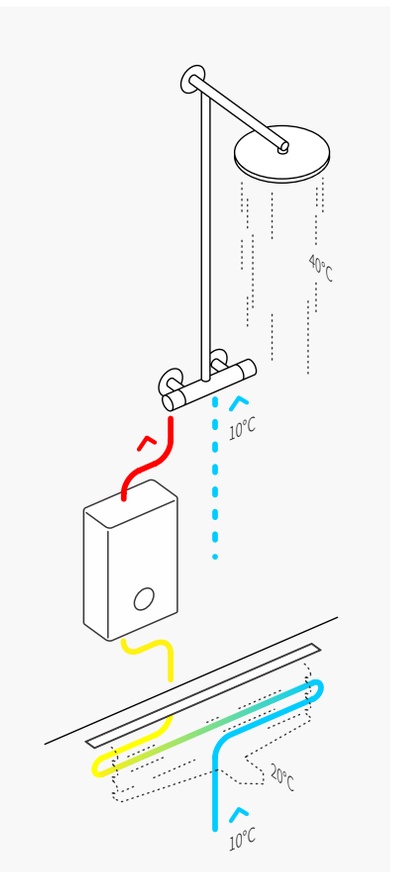
The efficiency is slightly better because the volume flow through the heat exchanger is higher than in layout B.



Layout B
Preheating of cold water.

Incoming cold water flows through the heat exchanger as hot water is used from the tank.

Therefore, how much cold water flows and the efficiency level of the heat exchanger are dependent on the hot water temperature.



Layout C
Preheating of warm water.

The hot water portion of the total volume flow first flows through the heat exchanger before it is heated in a nearby water heater or heat interface unit (HIU) (locally, near the shower, hot water ~45°C) and then directed to the shower mixer (hot). The cold water is directly connected to the shower mier.

The efficiency is slightly better because the volume flow through the heat exchanger is higher than in layout B.

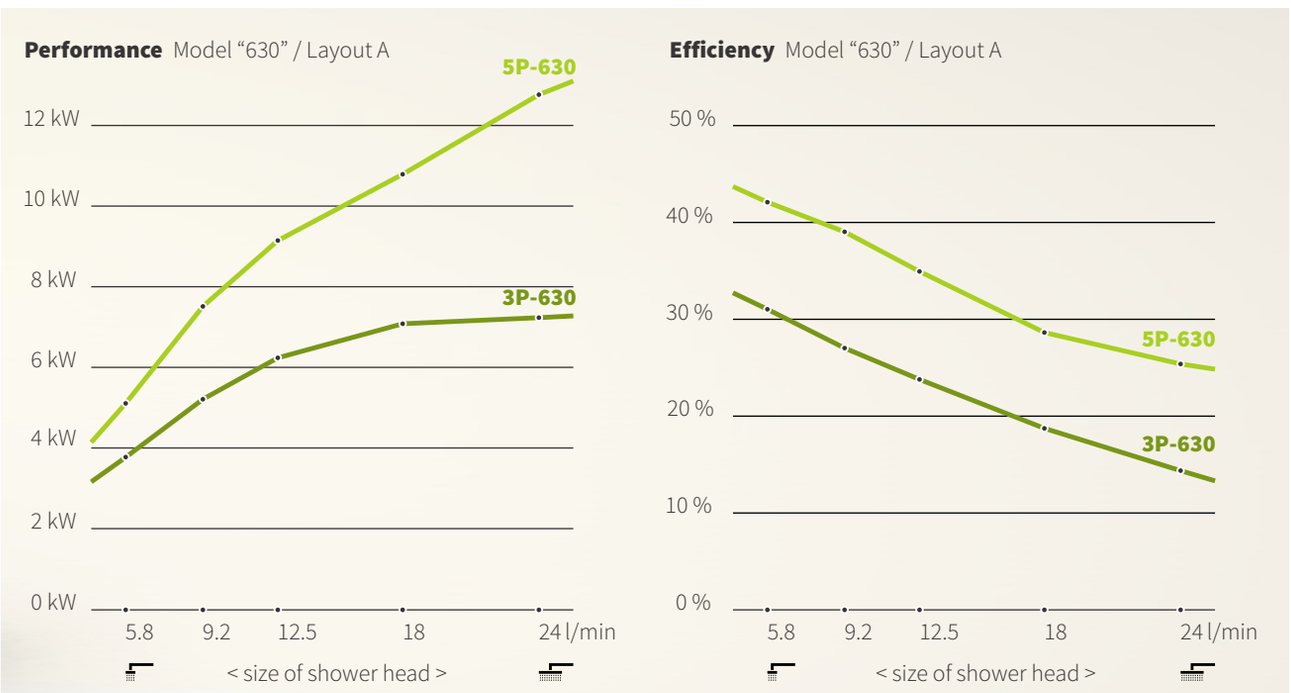
Performance & Efficiency

The bigger the showerhead, the better the performance.

With the higher flow of a bigger showerhead, the demand for cold water also rises, and thus there is greater flow through the heat exchanger. Because of this turbulent flow, the heat transfer increases and more heat energy can be extracted from the warm used shower water. Therefore the heat recovery performance rises, and the most energy is saved, which in turn has a positive effect on energy bill.

The smaller the showerhead, the higher the efficiency.

Because the outgoing warm used shower water flows directly around the solid pipes that carry the incoming cold water, a larger proportion of the outgoing heat can be recovered when a thinner layer of outgoing shower water is produced - i.e. when a smaller showerhead is used. Showerheads with a flow of approximately 6 l/min therefore result in higher efficiency than larger “rainfall” type showerheads that generate more outgoing flow.



Temperature rise of cold water

Size of shower head			Heat exchanger 5P		Temperature rise		
Flow	cold	hot	Efficiency	Performance	in	out	Delta T
6 l/min	2.92 l/min	3.08 l/min	26.6 %	2.9 kW	10 °C	24.2 °C	14.2 °C
9 l/min	4.45 l/min	4.55 l/min	27.8 %	4.5 kW	10 °C	24.6 °C	14.6 °C
12 l/min	5.84 l/min	6.16 l/min	26.6 %	5.8 kW	10 °C	24.2 °C	14.2 °C
18 l/min	8.32 l/min	9.68 l/min	22.3 %	7.3 kW	10 °C	22.6 °C	12.6 °C
24 l/min	10.55 l/min	13.45 l/min	18.4 %	8.0 kW	10 °C	20.9 °C	10.9 °C

Assumptions: layout B, cold water temperature 10 °C, shower water 40 °C (in heat exchanger 36 °C), hot water at the mixing valve 55 °C

Certification

All components of the Joulia-Inline shower channel have been developed for direct connection to the potable water supply.

The construction is completely double-walled and even has an acoustic leak detector (buzzer.joulia.com).

The product is certified by the international KIWA certification agency, the Swiss SVGW, the English WRAS as well as the German DVGW.

The integrated trap conforms to EN1253 regulations and comprises a water trap height of 50mm.

Certified by:

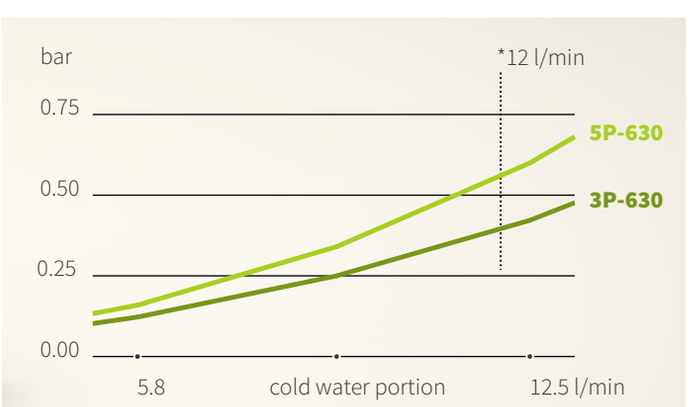
Note on the mixing valve

Because the waste heat from the used shower water pre-warms the incoming cold water, the mixing ratio of cold and hot water must be changed. Joulia recommends that a thermal mixing valve be used in combination with the heat recovery technology, so that this adjustment (reduction in the flow of hot water) is done automatically and the user is not exposed to increased water temperatures. This thermal mixing valve is also appropriate for public installations or rental units.

However, if the user would like to have visual feedback, a mechanical mixing valve can be used to great effect. As the heat recovery begins to function and the incoming cold water temperature rises, the lever must be moved dramatically toward the “cold” setting. The system is then stable, and the energy-savings effect is very obvious in the mixing valve setting, when the user enjoys a warm shower with the mixing valve set to the blue, “cold” position!



Pressure loss



*According to the W3d directive of the SVGW, the pressure loss in the heat exchanger is determined at 12 l/min flow.

KIWA has made the following measurements at 12.5 l/min:
5P-630 @ 12.5 l/min = **0.60 bar**
3P-630 @ 12.5 l/min = **0.42 bar**

This flow figure only represents the cold water portion in the heat exchanger; i.e. at 12 l/min of cold water the total shower flow in layout B is over 25 l/min!

Information on the subject of legionella.

Legionella bacteria multiply and reach potentially dangerous concentrations at temperatures between 25 and 50°C, if a biofilm is present and the water remains undisturbed for a long time. In practice, this situation occurs not only in warm water pipes but also cold water pipes (for example, when run in parallel with heating ducts or hot water pipes, or in the summer when room temperatures exceed 25°C); it cannot be completely avoided even with great effort.

If the drinking water is chemically treated at the household connection (or earlier), e.g. by chlorine electrolysis, then there is no danger from legionella even in the stated temperature range. The process is economically feasible in larger buildings, but is not widespread. Furthermore, the chemical treatment of clean drinking water is sometimes viewed critically.

Conventional wisdom holds that a temporary heating to 70°C reliably kills legionella, but this has recently been called into question. (due to so-called viable-but-not-culturable "VBNC" state).

Depending on the efficiency of the heat exchanger, the DWHR process can also heat the cold water to temperatures above 25°C. However, the water is only in this state for a short time and while flowing; the process basically corresponds to heating in a dedicated water heater (e.g. tankless water heater or freshwater station). When the shower flow stops, the water in the pipes quickly drops back to room temperature, particularly if the lines are uninsulated.

In **Switzerland** the SIA 385/1 regulation ("Systems for heated potable water in buildings") is applicable; it stipulates that thermal disinfection is necessary if the hot water maintains a temperature of more than 25 °C over a 24-hour period.

In the **Netherlands**, where household energy recovery is widespread, reference is made to a TNO report from 2002. It recommends:

• Maximum heated water volume of 1 liter (with small dead spaces) or 4 liters (without dead spaces).
*Note: the Joulia-Inline heat exchanger with 3 tubes (**3P**) comprises **1.8 dl**; the model with 5 tubes (**5P**) only **2.9 dl**.*

• No external thermal insulation of the heat recovery mechanism (fast cooling)
Note: the Joulia-Inline heat exchanger is exposed to the air and thus quickly cools back down to the ambient temperature.

• Temperature at the installation site is not higher than in the rest of the building; do not install in warm ducts.

Note: The Joulia-Inline heat exchanger is mounted directly in the shower channel and far away from installation ducts in which hot pipes may also be routed.

Accordingly, when the **French** CSTB tested installed shower water heat recovery systems, no legionella could be detected, either in the pre-warmed water or in the biofilm of the corresponding piping, even though temperatures over 30°C were intermittently reached. The studied systems were on the drinking-water side of copper, which has certain germicidal properties and reduces the formation of biofilm.

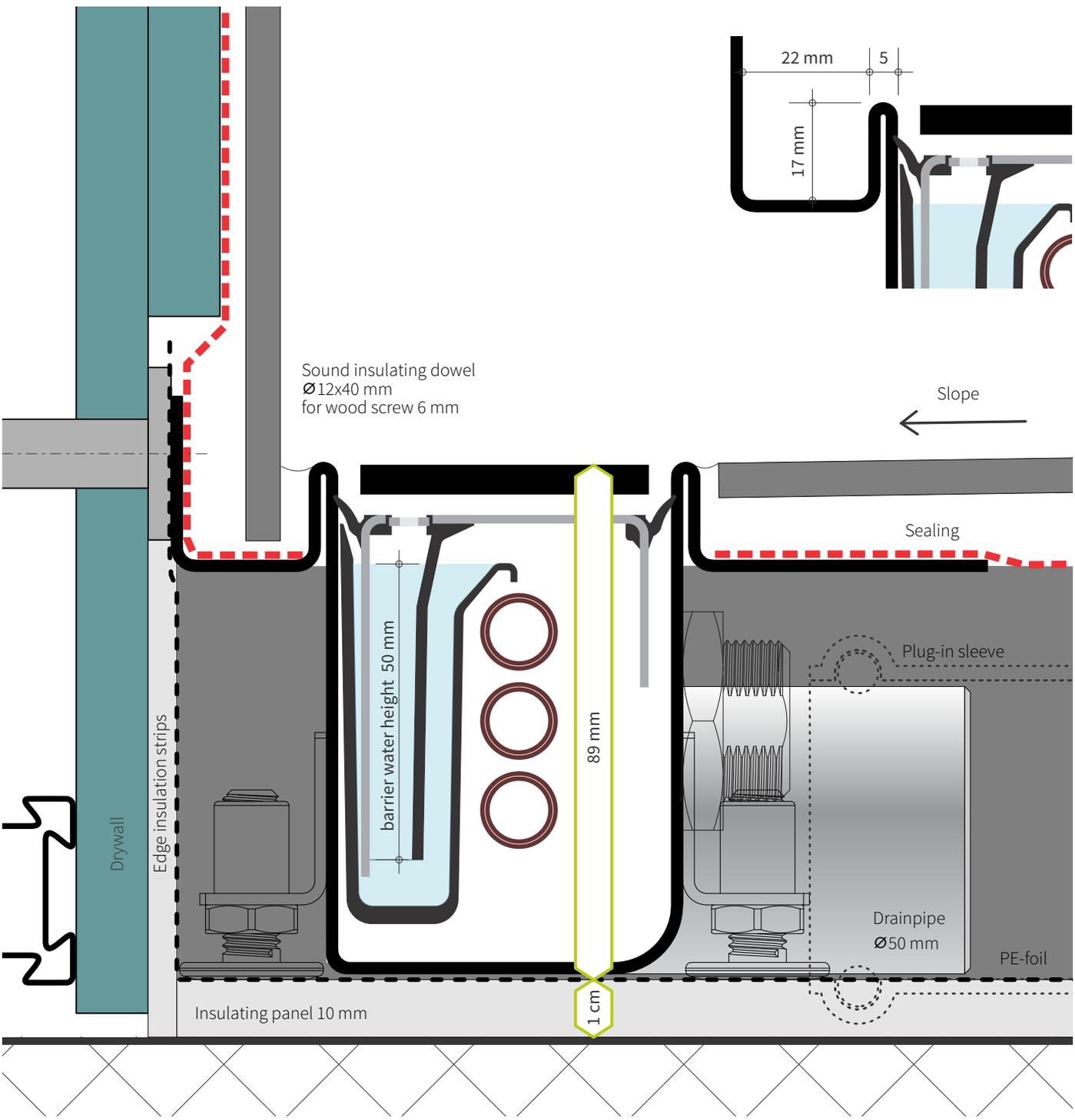
Note: The Joulia-Inline heat exchanger also consists of copper pipes.

One can see that in this context the process in the heat recovery module itself and the subsequent pipes is substantially the same as what occurs in the shower hose or overhead showerhead. The volumes involved are also similar.

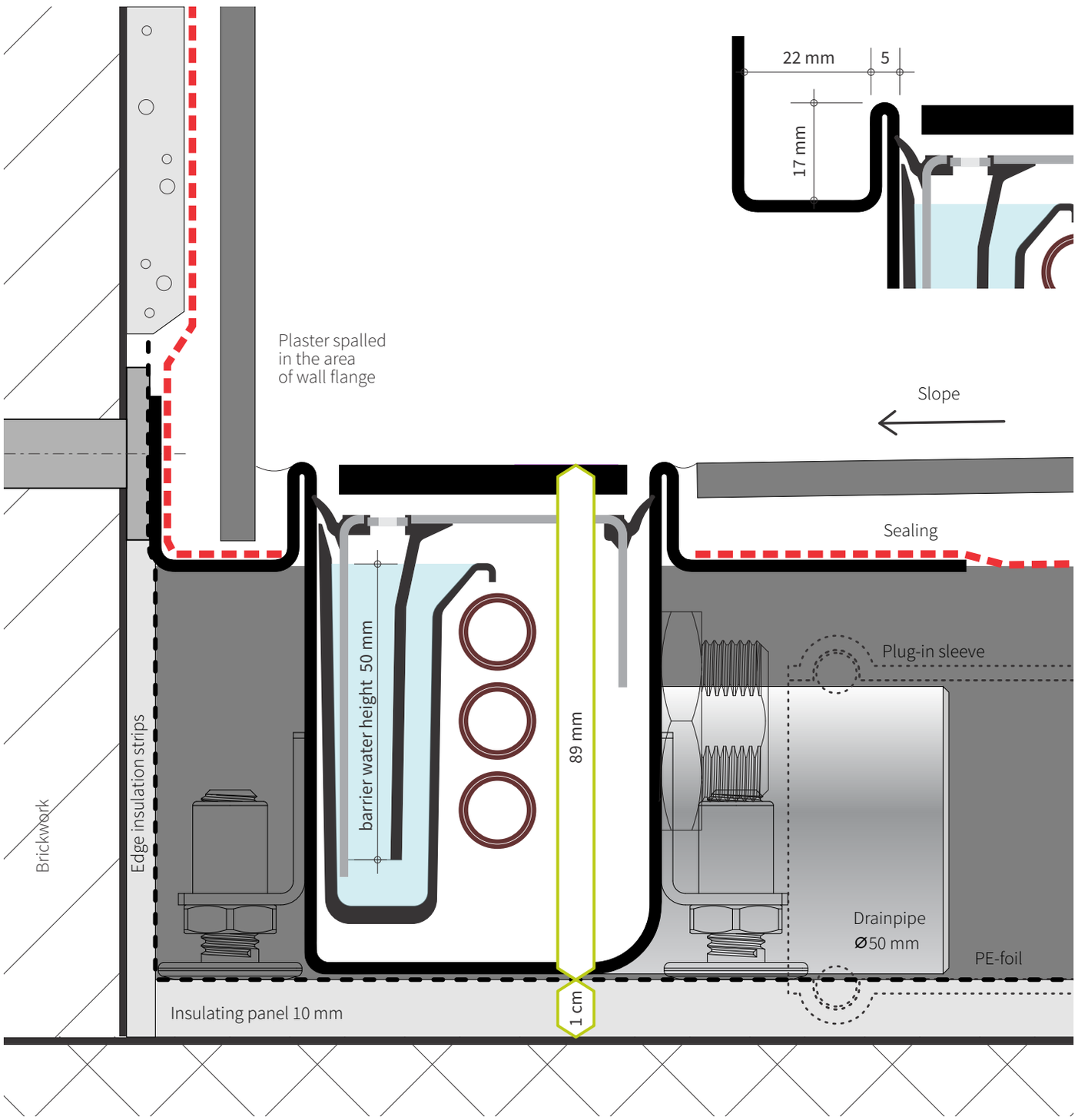
So in fact the risk of legionella with a DWHR is barely higher than with a normal cold water pipe.

Note:
Flush the heat exchanger via the toilet tank. Because toilets are usually used more often than showers, the time in which water remains undisturbed in the Joulia heat exchanger can be further shortened by including the toilet tank on the same loop with the incoming cold water.

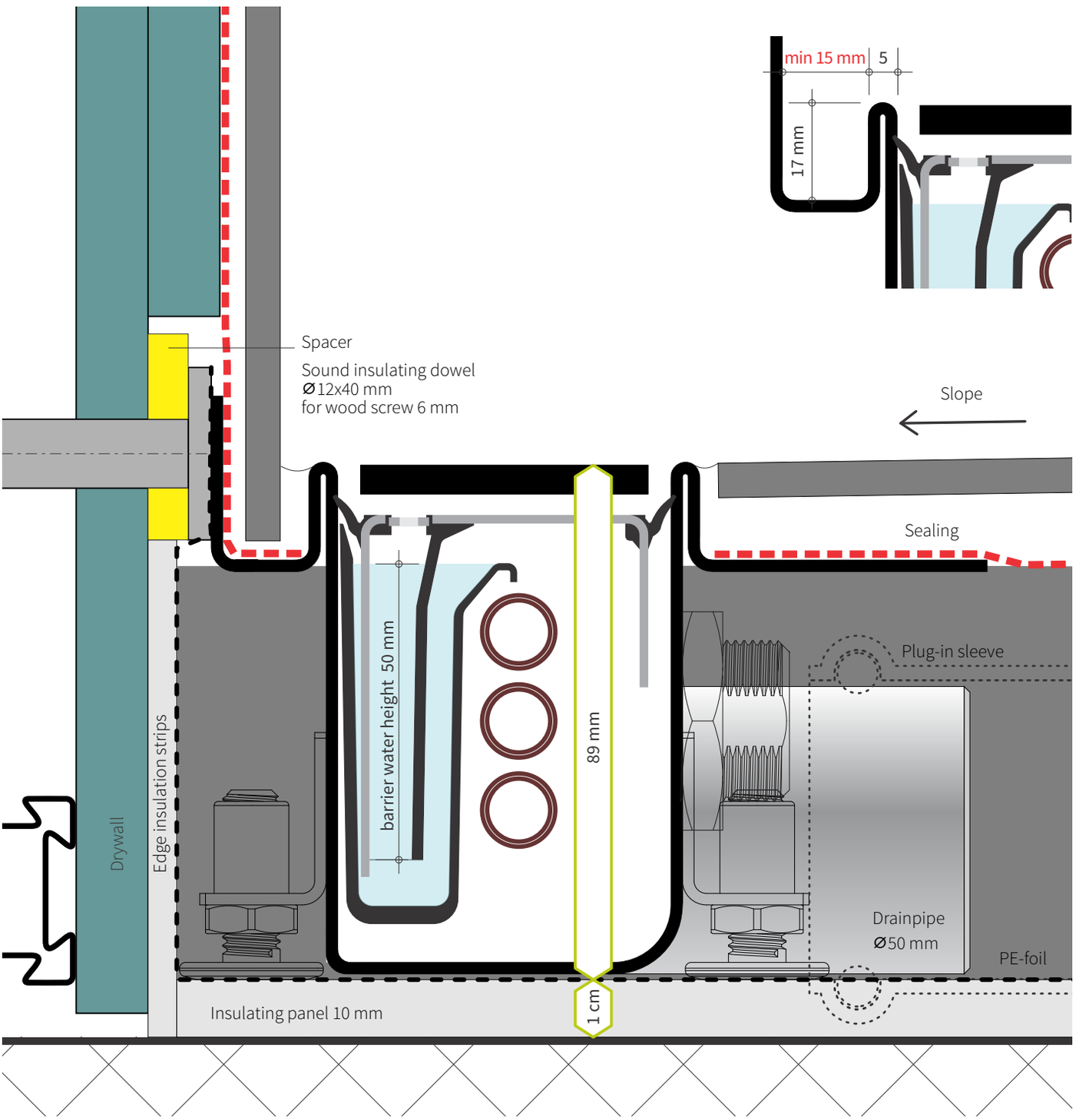
Detail 1:1
Drywall incl. sound insulation



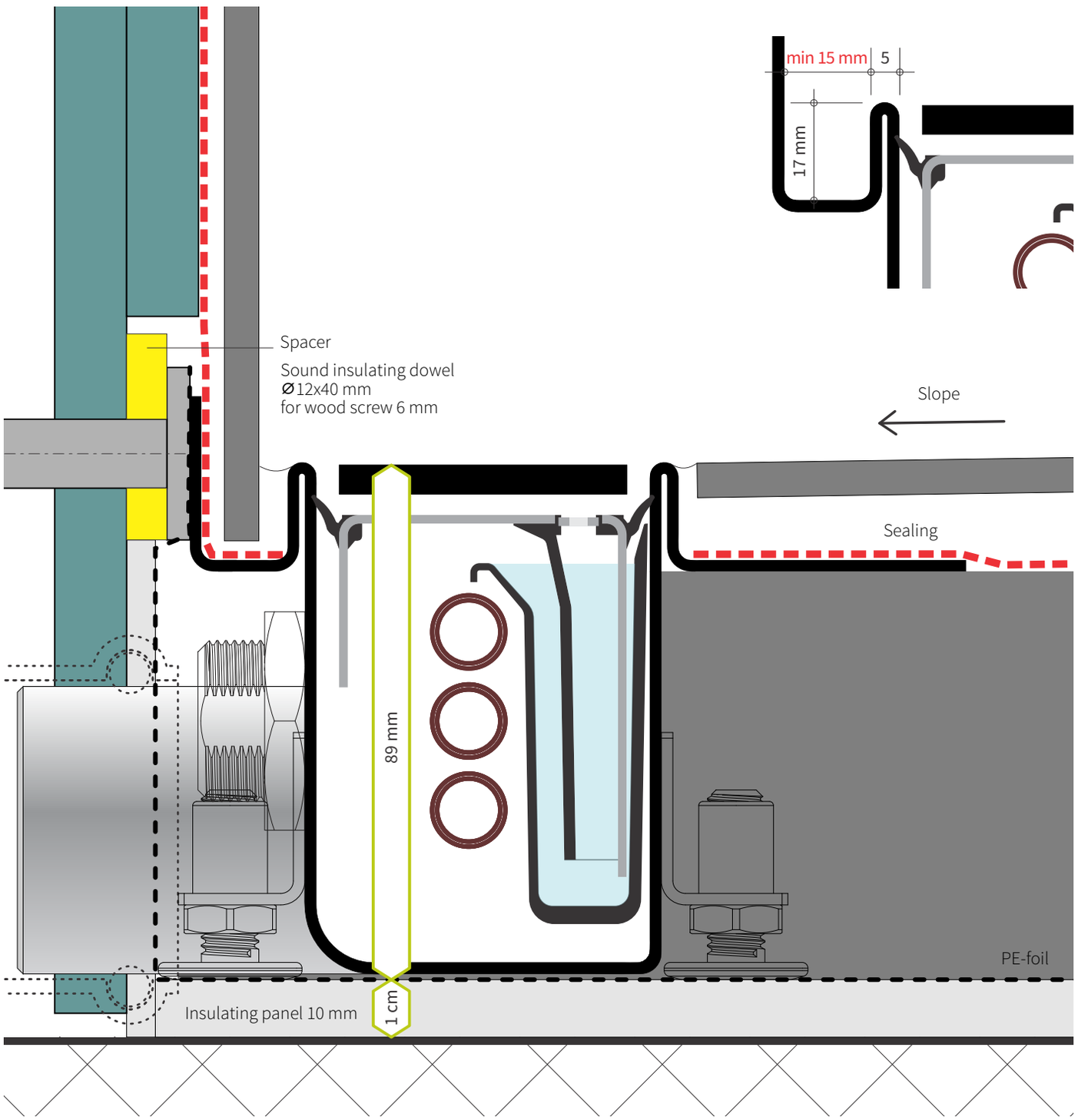
Detail 1:1
Brickwork incl. sound insulation

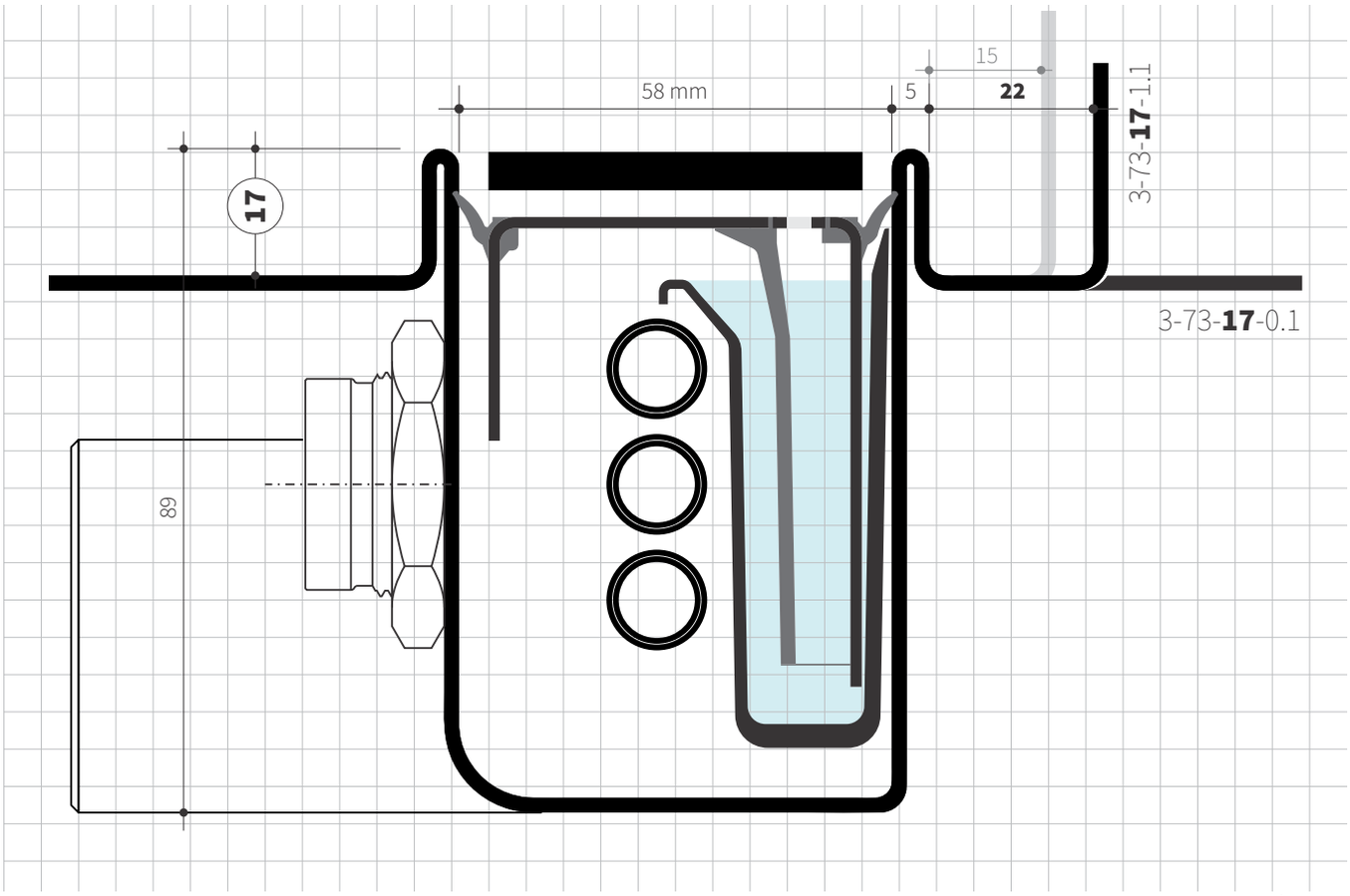


Detail 1:1
Drywall with special flange

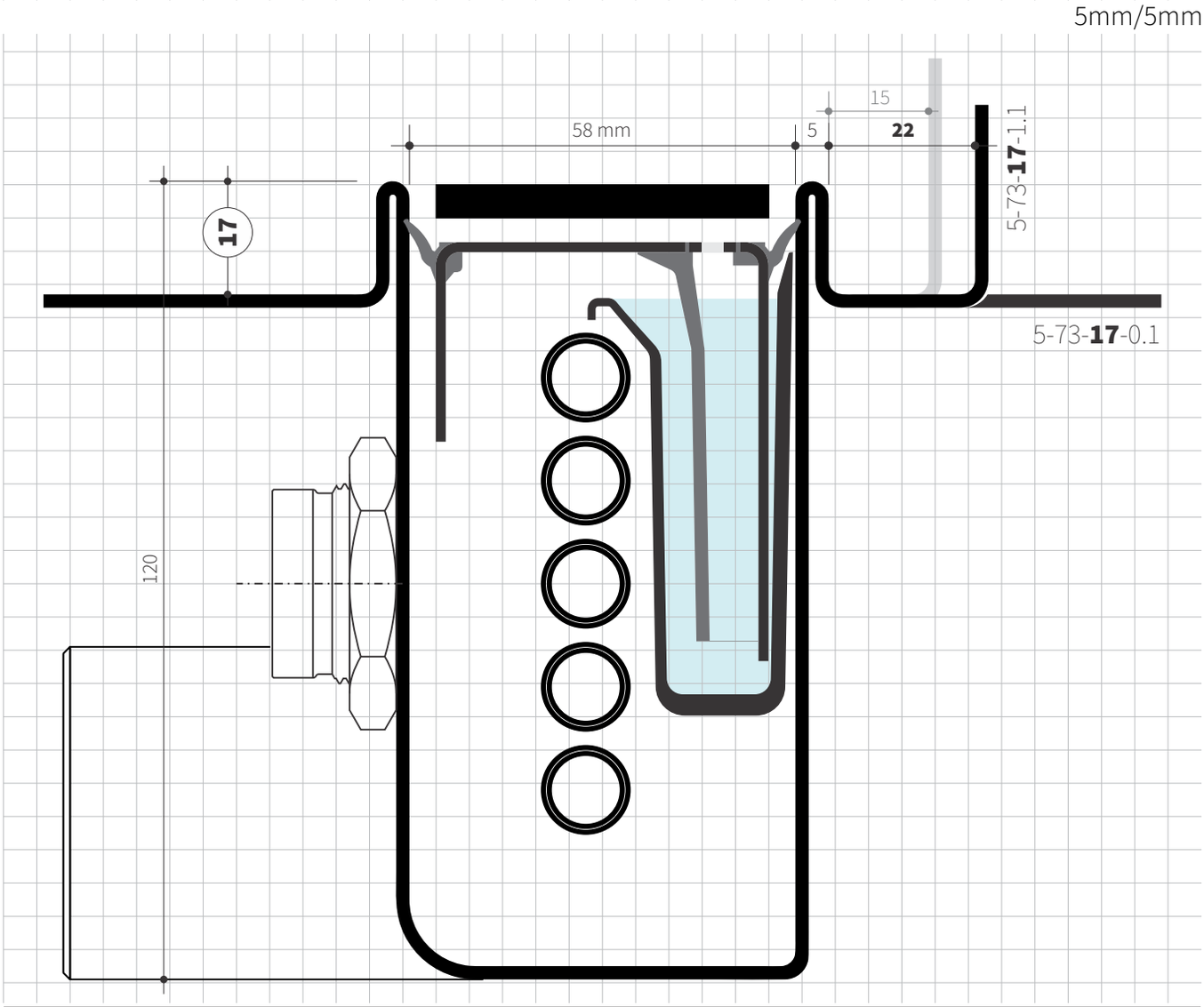


Detail 1:1 - rotated 180°
Drywall with special flange




58 mm
5
15
22
17
3-73-17-1.1
3-73-17-0.1
89

5mm/5mm


58 mm
5
15
22
17
5-73-17-1.1
5-73-17-0.1
120