INFORMATION. SOLUTIONS. PRODUCTS. TECHNICAL DATA.






PROPERLY FILLING HEATING INSTALLATIONS

The comprehensive SYR Guide: Filling modern heating installations and quality of filling water.

SYR®

Innovative solutions for smart people

This did not use to be the case! Why do you prescribe a certain quality of water for heating installations?

Aims and objectives of the new standards and instructions

The main aim of Guideline VDI 2035 is to prevent scale formation (part 1) and water-side corrosion damage (part 2).

Modern heating systems are sensitive to hard and corrosive filling water. Increased heat loads and more compact heat exchangers result in higher surface temperatures and thus in the formation of limescale build-up, which then prevents a better heat transfer and could limit the efficiency or endanger the functioning of the system. In addition, materials such as aluminium or stainless steel are also very sensitive when it comes to an improper composition of the water.

For these reasons, heating system manufacturers require the use of conditioned filling water. Guideline VDI 2035 part 1 and part 2 contain the corresponding instructions.

The main aim of Guideline VDI 2035 is to prevent scale formation (part 1) and water-side corrosion damage (part 2).

To reach these goals, the Guideline foresees different procedures (softening, demineralisation, hardness stabilisation, stabilisation of the pH) applicable to the process of heating water conditioning for water heating installations in accordance with DIN EN 12828 within buildings when the flow temperature does not exceed 100°C.

From December 2005 onwards (introduction of the revised version of Guideline VDI 2035 part 1), planners and installers have to check on-site whether the total hardness of the filling water present for the filling of the heating installation is suitable.

The result of this check is to be submitted to the developer/ operator in writing. The heat output and the specific volumes of the installation are the decisive factors here.

These limit values gain importance when considering that many buildings are supplied with "hard" drinking water (> 14 °dH) and in smaller buildings, the use of underfloor heating or buffer storage tanks means an increase of the specific system volume. In addition, the use of renewable energies in new buildings (including the resulting higher volumes of water) has already been prescribed in the EnEV of 2007 (German Energy Savings Ordinance), meaning that the vast majority of installations are subject to water conditioning procedures in accordance with Guideline VDI 2035.

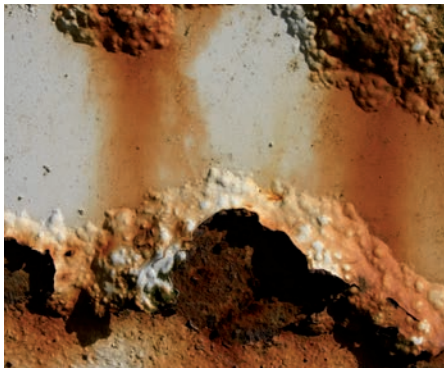
Planners, installers and specialised firms for sanitation, heating and air conditioning must check an installation on-site to see whether the quality of the filling water present is suitable for the filling of the heating installation.

Total heat output	**Total hardness in °dH depending on the specific system volume when considering the lowest individual heat output**		
	< 20 l/kW	**≧ 20 l/kW und < 50 l/kW**	**≧ 50 l/kW**
< 50 kW	≦ 16,8 °dH	≦ 11,2 °dH	< 0,11 °dH
50 kW – 200 kW	≦ 11,2 °dH	≦ 8,4 °dH	< 0,11 °dH
> 200 kW – 600 kW	≦ 8,4 °dH	≦ 0,11 °dH	< 0,11 °dH
> 600 kW	< 0,11 °dH	< 0,11 °dH	< 0,11 °dH

1 °dH = 1,78 °fH = 0,1783 mmol/l

Can I be held liable for damages to the heating installation caused by inappropriate filling water?

Liability consequences for specialised firms



Guideline VDI 2035 part 2 calls for a documentation obligation, starting with counselling and advice, via planning and acceptance of the installation all the way to its maintenance.

Indeed, the liability risk for specialised firms in the field of sanitation, heating and air-conditioning has increased. Although it is the operator of such installation who is responsible for the orderly state of its heating water and who has to have it checked on a regular basis (at least once a year), Guideline VDI 2035 assumes at the same time that the operator, as a layman, is unable to shoulder this responsibility on his own. This is why it includes the obligation for the planner and the installer of the heating installation to enable the operator to do so through appropriate counselling and advice.

This requirement has existed for quite some time on paper (VOB/C EN 12828) – however, in the past, planners or installers only rarely met this obligation. This is why Guideline VDI 2035 part 2 now includes a documentation obligation for these tasks (cf. page 22, "keeping a system logbook").

When building new installations, every step has to be documented, from the advice and counselling stage to planning and acceptance of the installation all the way to its maintenance. Any modification of existing installations (replacement of components, change of water, extension) has to be assessed and documented additionally in respect of the compatibility of the water present within the installation and the newly fitted parts (cf. VOB/C EN 12828, Guideline VDI 2035 part 2 section 8.3.3).

In the meantime, insurance companies, too, refer to this standard as an opportunity to save costs in the millions. Thus, the operator's insurance company and the manufacturer of any damaged parts may possibly have the right to withhold performance if no complete documentation can be submitted. This right to withhold performance is based upon the assumption mentioned in Guideline VDI 2035, namely that due to non-observance of the Guideline's requirements, considerable damage is almost inevitable.

For this reason, the operator of an installation will have to address the planner or installer when it comes to claims for damages, and the latter will subsequently have to prove that the respective job had been done properly and professionally. Should this prove to be impossible, they will have to provide evidence that the damage was not caused by their own work.

The operator's insurance company and the manufacturer of any damaged parts may possibly have the right to withhold performance if no complete documentation can be submitted.

Degree of hardness, pH-value, conductivity – can anybody please explain?

Water, chemistry and heating installations

One German degree of water hardness (1 °dH) corresponds to 10 mg of calcium oxide (lime), or 7.19 mg of magnesium oxide per litre of water.

Heating water pH-values must be within the alkaline range (>8.2 to approx. 10.5).

For a proper functioning and a long service life of modern heating installations, the quality of the filling water is important.

Yet, what properties of the filling water have any effect on the heating installations? How does it work? What is the link between pH-values and the degree of hardness, conductivity and corrosion?

Degree of water hardness

High concentrations of calcium and magnesium make for hard water. This is why calcium and magnesium are also referred to as hardeners. Their presence determines the total hardness of the water, measured in °dH. One German degree of water hardness (1 °dH) corresponds to 10 mg of calcium oxide or 7.19 mg of magnesium oxide per litre of water.

The degree of hardness (°dH) of the heating water should correspond to the indications given in Guideline VDI 2035. Accordingly, the recommended total water hardness is to be seen in the context of total heat output and the specific system volume. The installations should be filled with conditioned water (partly softened or fully desalted or demineralised water under consideration of the manufacturer's specifications.

pH-value

The pH-value is a measure of the acidity or basicity of an aqueous solution. The pH in heating water is an important factor and must be within the alkaline range (>8.2 up to approx. 10.5). It affects surface layers developing on the metals in the heating installation

which serve as a natural protection against corrosion. Aluminium plays a special role here. The surface layers on aluminium parts (heat exchangers, radiators) can be damaged as from a pH of 8.5.

Electrical conductivity

Electrical conductivity (µs/cm) refers to the water's total salinity and should be as low as possible with regard to corrosion. High electrical conductivity of heating water speed up or promote corrosion processes. In accordance with Guideline VDI 2035, a conductivity level of >100 µs/cm can only be tolerated if there is a very low oxygen concentration (<0.02 mg/l). Low conductivity can be reached by using fully demineralised water (hardness grade of ~0 °dH, conductivity <100 µs/cm). In case of using completely demineralised water, after approx. 8 to 12 weeks and after having checked the pH in the heating water, a corresponding full protection liquid may have to be filled in. This ensures the installation's permanent protection against corrosion.

Corrosion can occur via a reaction with oxygen. This is why the installation should not be filled with water unnecessarily and/or should not have any leaking parts in order to prevent oxygen injection!

The oxygen content of the heating water should be around or below 0.1 mg/l. In case of low electrical conductivity of the water, slightly higher oxygen concentrations are acceptable.

Electrical conductivity (µs/cm) refers to the water's total salinity and should be as low as possible.

Avoid oxygen injection caused by unnecessary filling procedures – danger of corrosion.

When is the time for demineralisation, when for softening?

Comparison of two conditioning procedures

It used to be so simple: just connecting the filling hose to the drinking water installation, opening the draw-off valve and closing it again once the system pressure had been reached. Today, the installer will need some knowledge of chemistry: softening, demineralisation, pH-value, conductivity of the water etc.

Basically, there are different procedures to prevent scaling (lime deposits) and to effectively protect the heat generator, regulating valves, heating circuit pumps and other components.

According to Guideline VDI 2035 part 1, filling water has to be softened or demineralised to guarantee the prescribed water quality. Both procedures have advantages and disadvantages.

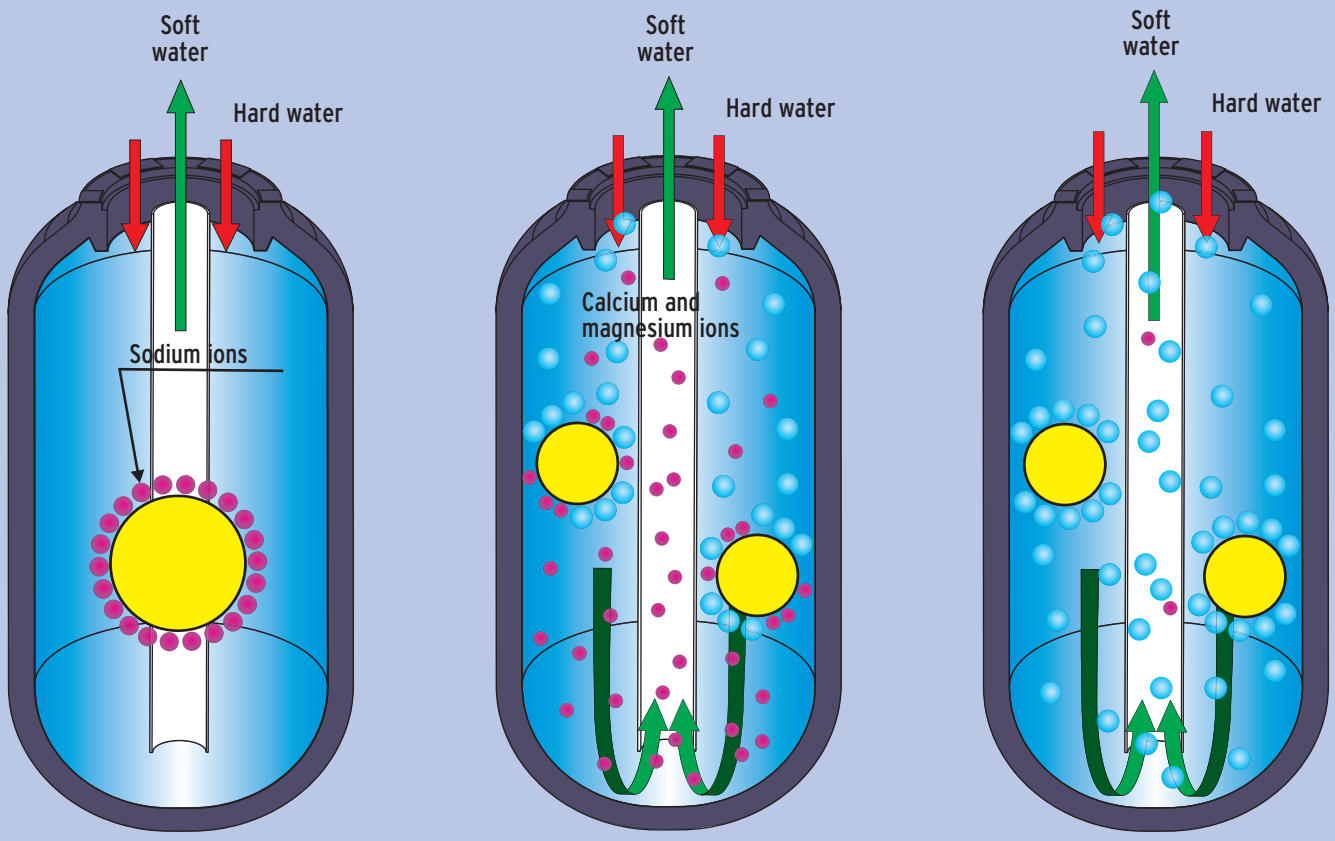
Please respect the latest manufacturer's specifications regarding the hardness level of the heating water.

This is why it is imperative to respect the manufacturer's specifications.

The decision in favour of the one or the other technique depends on the desired conductivity of the water, which defines the total salinity (= total amount of minerals in the water) and can easily be determined by conductivity meters (cf. page 20 "metering devices for the purposes of analytics").

SYR offers special softening and (complete) demineralisation systems for both heating water conditioning methods.

Operating principle of softening heating water



Which variant to choose?

The water softening procedure consists in replacing calcium and magnesium (hardeners) by sodium. During the procedure, the water flows through a cartridge with ion-exchange resin. The resin traps the minerals calcium and magnesium and replaces them by sodium ions. The conductivity of the water remains unchanged with this principle so that the remaining ingredients stay in the water. Once the absorption capacity of the resin is exhausted, the replacement resin has to be renewed.

This is referred to as a "salt-based operation" in heating installations. It comes at a rather reasonable price. The salts present in the water maintain a largely neutral pH-value.

The water softening procedure consists in replacing calcium and magnesium (=hardeners) by sodium. The conductivity of the water remains unchanged, the remaining ingredients stay in the water.

Comparison of two conditioning procedures

In case of complete demineralisation, the conductivity of the water diminishes and the water is particularly soft – however, the pH-value should be regularly monitored.

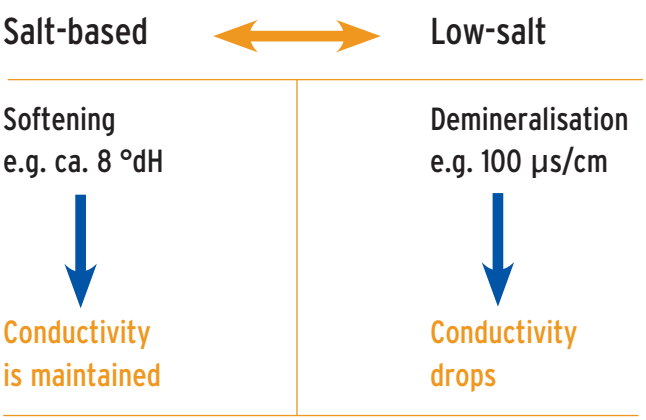
Other than in softening procedures with their replacement of ions in the water, complete demineralisation procedures use mixed bed resins to effectively remove all salts from the filling water.

The difference between demineralisation and softening lies in the water's conductivity, as mentioned above. If one removes all the salts from the heating water, conductance drops, too. This then results in demineralised, particularly soft water. This procedure is referred to as a "low-salt operation" of heating installations.

Given the low level of conductivity, galvanic corrosion between metals of different electrochemical series is reduced. However, the pH needs monitoring because it may drop below a particular value or see an extreme increase, which would then endanger materials such as aluminium, for example.

(The pH-value should not be checked until 8 to 12 weeks after filling!)

Different "modes of operation"



The perfect solution: Connection Center 3200

Working with Connection Center 3200 makes the work of the installer much easier: the system module serves as a universal basis for cartridges, for both, the softening of heating water (HWE) and its complete demineralisation (HVE). Both methods are feasible – and require following a few steps only. Simply connect the cartridge to be used with the Connection Center and install it within the heating installation – that's it! Once the cartridge is exhausted, simply fill it with replacement granulates.

Cartridges are available in sizes of 4, 7, 14 or 30 litres. Here, too, SYR follows its principle of system integration which offers flexibility and makes life easier (again) for the installer: thanks to the digital capacity control function of the fitted cartridge, it is easy to determine the correct draw-off quantity.

SYR's Connection Center 3200 makes for a simple and uncomplicated combination of both methods.

Connection Center 3200

- digital capacity control
- 2 stop valves
- titration test
- wall bracket
- blending possibility

Softening (HWE) or demineralisation (HVE) cartridge

- available in 4, 7, 14 and 30 litres
- already filled
- reusable with replacement granulates

HVE-Plus to stabilize the pH

- available in 4, 7, 14 and 30 litres
- already filled
- reusable with replacement granulates

Please find the technical data on page 21

What solutions does SYR offer for filling the heating installation and for the conditioning of heating water?

Stationary or mobile filling of the heating installations

The stationary version is preferable because it is the only one to guarantee a permanent filling of the installation with conditioned water.

There are two possibilities to fill heating installations: the stationary and the mobile variant. SYR offers a suitable solution for both variants. In general, the stationary variant is preferable because it is the only one to guarantee a permanent filling of the installation with conditioned water.

Stationary filling of the heating installation

The SYR Connection Center 3200 is a connection module that can be used in both cases, to soften heating water as well as to completely demineralise it. The cartridge used depends on the intended use.

The Connection Center includes a stop valve on the inlet and outlet side for an easy replacement of the cartridge, an integrated blending device that can be switched to full demineralisation, a digital capacity control indicating the remaining value of the cartridge as well as a wall bracket.

If it proves impossible to install the stationary variant, choose the mobile solution.

Please find the technical data on page 21

Mobile filling devices for heating installations

SYR offers two mobile solutions for filling the heating water conditioning unit: the Mobile Filling Device (in a Trolley Case) and the Fill-Caddy. Wherever fixed installations are impossible for lack of space, these products see to the correct quality of the heating water: the Mobile Filling Device (in a Trolley Case) is used for one and two-family dwellings. For larger installations in multi-family buildings or in case of large buffer storage tanks the Fill-Caddy with its 30 litre resin tank is the appropriate solution.

Both, the Mobile Filling Device (in a Trolley Case) as well as the Fill-Caddy, are fully integrated units containing everything you need for variable and safe use for on-site fillings: a type BA backflow preventer, a pressure reducing valve, connecting hoses, as well as a cartridge and a digital capacity control.

SYR's Fill-Caddy has its 30 litre resin tank fitted on a hand truck to make transport easy. The big pneumatic tyres make for easy and safe pulling of the device.

Please find the technical data on page 22

How do I calculate the volume of the installation?

Determining the volume of the installation

The filling water volume can easily be determined by considering the total boiler output and the different heating surfaces.

The decision as to whether or how the filling water is to be treated depends on the one hand on the hardness of the regional water (to determine total hardness of the water, please cf. page 24 "metering devices for the purposes of analytics"), on the other hand on total heat output and the volume of the installation according to Guideline VDI 2035.

The filling water volume can easily be determined by considering the total boiler output and the different heating surfaces.

Design of the system	Filling volume in litres/kW ca.
Column and steel radiators	35
Cast iron radiators	25
Underfloor heating ca. 60 W/m²	20
Plate radiators	15
Convectors	10
Buffer storage systems	> 20

A tip from the professional: SYR's carefully designed module-based system (cf. page 12 "stationary or mobile filling of heating installations") can be used both, for softening the heating water or for complete demineralisation. Depending on the procedure, different sizes of cartridges of 4, 7, 14 or 30 litres are available.

Design of the system

Which cartridge size should be chosen for which installation?

The size depends on the capacity of the cartridge divided by the total hardness (in case of complete demineralisation) or on the difference between the raw water hardness minus the initial hardness of the respective regional water (in case of softening).

Used-up cartridges can be refilled with the appropriate refill granulates (for heating water softening or complete demineralisation).

Capacity calculation

Example: 4 litre cartridge

HWE (softening)
14.560 l capacity / °dH
Raw water: 20 °dH
Demineralisation to: 8 °dH
Hardness difference: 20–8=12
14.560 litres / 12 =
1.213 litre capacity

HVE (demineralisation)
5.000 l capacity / °dH
Raw water: 20 °dH
Demineralisation to: 0 °dH
Hardness difference: 20
5.000 litres / 20 =
250 litre capacity

HVE-Plus
3.500 l capacity / °dH
Raw water: 20 °dH
Demineralisation to: 0 °dH
Hardness difference: 20
3.500 litres / 20 =
175 litre capacity

The Connection Center 3200 features a digital capacity control, a stop valve on the inlet and outlet side, a wall bracket as well as a blending device.

Calculation formula for 4-litre softening cartridge

$$\frac{\text{Capacity}}{\text{Hardness difference (20 °dH – initial hardness level)}}$$

$$\frac{14.560 \text{ litres}}{(20 \text{ °dH} - 8 \text{ °dH} = 12 \text{ °dH})}$$

= 1.213 litres

Calculation formula for 4-litre complete demineralisation cartridge

$$\frac{\text{Capacity}}{\text{Total hardness (20 °dH)}}$$

$$\frac{5.000 \text{ litres}}{(20 \text{ °dH})}$$

= 250 litres

What needs to be considered in respect of pH?

Corrosion protection and pH

FillSafe plus

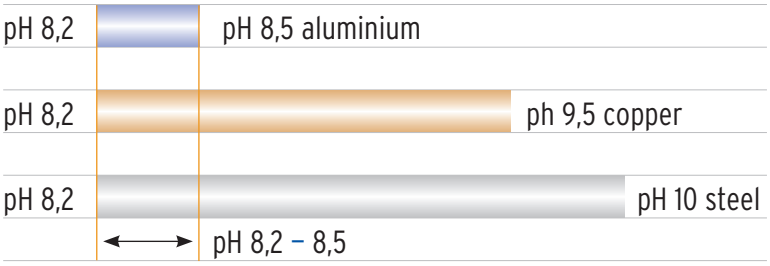
- **Corrosion inhibition** due to development of a protective layer on steel and aluminium surfaces through molybdate components, on materials containing copper through organic, sulphur-free copper inhibitor
- **Avoiding coverings on metal surfaces that would favour corrosion**
- **Avoiding calcium carbonate deposits by stabilising hardeners**

Please find the technical data on page 23

Next to scaling, corrosion is the worst enemy of your heating installation on the water side. A low pH and high temperatures favour corrosion of metallic materials. Under such conditions, even low oxygen concentrations can lead to corrosion and to erosion of metallic boiler and pipe materials, manifested in an increasing discoloration of the boiler water and/or in the accumulation of sludge within the system.

To avoid such damage in heating water installations, Guideline VDI 2035, part 2, section 8 includes several possibilities of corrosion protection via water conditioning.

"Protected" pH-range of different materials

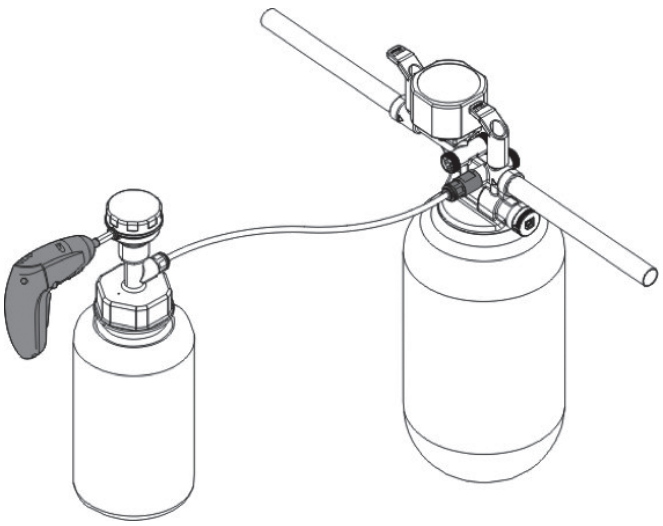


If, for example, the installation is fitted with the three materials aluminium, copper and steel, the pH of the heating water should be between 8.2 and 8.5 – this is where the protected range of the three materials overlaps, so that corrosion cannot occur.

Apart from the pH, the oxygen content in the heating water plays a major role when it comes to corrosion. Air or oxygen is added during the feed-in of fresh water; however it can also get into the system through leaks, areas of negative pressure or pipe materials that are not diffusion-resistant.

Adding inhibitors (e.g. SYR FillSafe plus) to the heating water prevents potential corrosion when there is oxygen in the system.

A tip from the professional: the special, active component of SYR FillSafe plus prevents deposits on the pipes and thus offers the basis for the formation of a protective layer against corrosion. This inhibitor is also suitable for conditioning heating waters for underfloor heating systems with plastic pipes and oxygen diffusion.



FillDOS

- fills the installation with the inhibitor
- simple to fill in by means of a cordless screwdriver
- includes dosing head connecting hose, connecting piece 1/4" for connection to the SYR Connection Center 3200
- adapter for a fill-and-drain valve and empty 2-litre container

Please find the technical data on page 23

Easy to fill in inhibitor FillSafe plus by means of FillDOS and cordless screwdriver.

Practical Guide – case studies

Step by step – two examples

Calculation formula for 7-litre complete demineralisation cartridge

$$\frac{\text{Capacity}}{\text{Total hardness (20 °dH)}}$$

$$\frac{\text{8.750 litres}}{\text{(20 °dH)}}$$

= 437,50 litres

The insertion of a filling combination in accordance with EN 1717 for filling heating installations is required.

Please find the technical data on page 23

Specification: condensing boiler, 20 kW, underfloor heating
Manufacturer's instruction: complete demineralisation

Step 1 Determining the initial hardness by means of the SYR titration test, Example: 20 °dH

Step 2 Determining the system volumes:
20 kW x 20 litres/kW = 400 litres

Step 3 Selection of the cartridge:
Capacity of a 7-litre cartridge HVE:
8,750 litres / 20 °dH = 437.50 litres

Step 4 Installation of SYR Connection Center, Filling-Combi BA and 7-litre HVE cartridge

Step 5 Control of conductivity with a conductivity meter

Step 6 Document filling procedure

Step 7 After 8 to 12 weeks, check hardness, conductivity and pH parameters
Note: in case of an incorrect pH corrosion protection can be reached with SYR FillSafe plus.

Step 8 Annual documentation of pressure maintenance, the pH, conductivity and volumes of refilled water

Specification: condensing boiler, 20 kW, radiators
Manufacturer's instruction: partial softening to 8 °dH

Step 1 Determining the initial hardness by means of the SYR titration test, Example: 20 °dH

Step 2 Determining the system volumes:
20 kW x 25 litres/kW = 500 litres

Step 3 Selection of the cartridge:
Capacity of a 4-litre cartridge HWE:
14,560 litres / °dH = 14,560 litres / 12 °dH = 1,213 litres

Step 4 Installation of SYR Connection Center, Filling-Combi BA and 4-litre HWE cartridge

Step 5 Control of mixed water hardness with a titration test

Step 6 Document filling procedure

Step 7 After 8 to 12 weeks, check hardness and pH parameters
Note: in case of an incorrect pH, corrosion protection can be reached with SYR FillSafe plus.

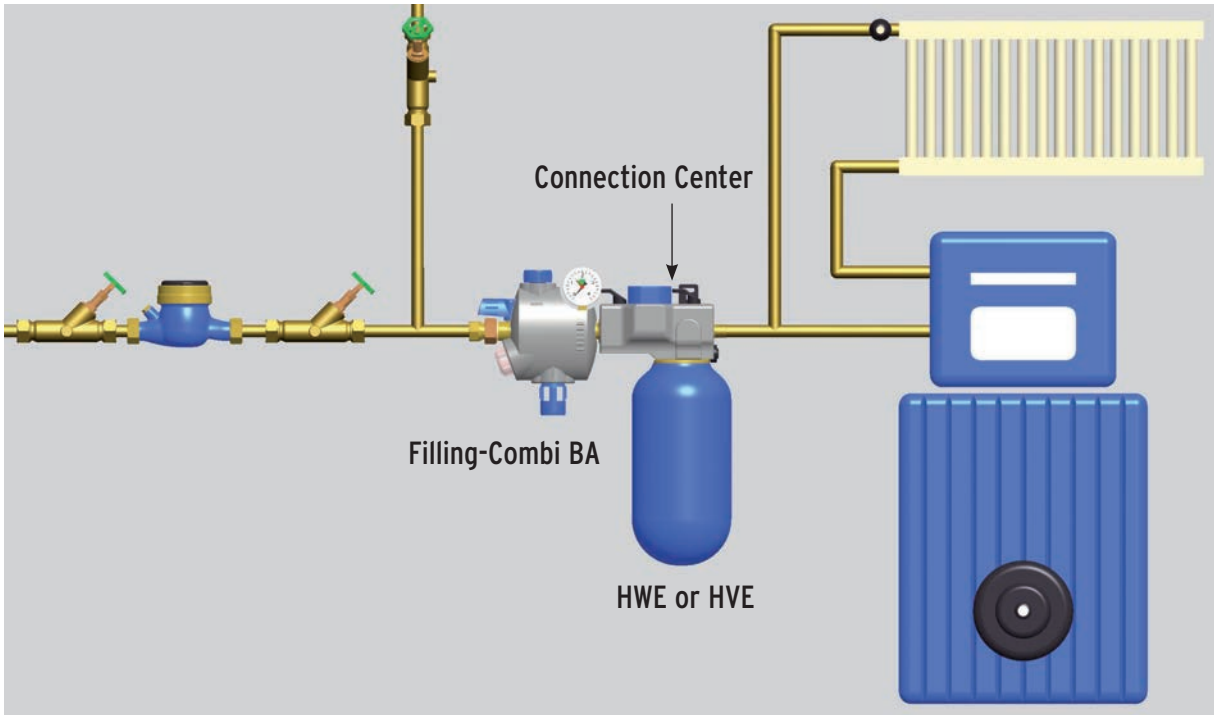
Step 8 Annual documentation of pressure maintenance, the pH, hardness and volumes of refilled water

Calculation formula in case of 4-litre softening cartridge

$$\frac{\text{Capacity}}{\text{Hardness difference (20 °dH – mixed water hardness)}}$$

$$\frac{14.560 \text{ litres}}{(20 \text{ °dH} - 8 \text{ °dH} = 12 \text{ °dH})}$$

= 1.213 litres



How do I determine water quality myself?

Metering devices for the purposes of analytics

The pH of the filling water and conductivity are the relevant values for the determination of the correct heating water quality.

The pH of the filling water and conductivity are the relevant values for the correct heating water quality. To measure the hardness of the filling water, SYR offers two direct, on-site measurement methods.
The titration test (measuring device to determine hardness) counts the drops until there is a change in colour, indicating the hardness of the water. In addition, SYR has a pocket-size pH measuring device on offer.

1	Titration test (hardness measuring device), complete	serial no. 3000.00.913
2	pH-measuring device to determine pH-values	serial no. 3200.00.918
3	Calibration solution for pH measuring device (5 pcs.)	serial no. 3200.00.911

The conductivity meter is intended for a simple and quick measurement of the electrical conductivity of the heating water. It is a simple aid for the filling of heating installations with demineralised water or for the monitoring of the current operation. This is an easy-to-use device that produces its measuring results directly in micro-Siemens. Danger due to corrosion caused by electrical conductivity can thus be assessed.

4	Conductivity meter for complete demineralisation of heating system	serial no. 3200.15.905
3	Calibration solution for conductivity meter (25 pcs.)	serial no. 3200.00.909

Finally, molybdenum tests determine molybdenum concentrations, the substance being used as corrosion protection in the filling water.

5	Molybdenum test as accessory to FillDOS 3220	serial no. 3220.00.900

Technical data at a glance

Softening and demineralisation of heating water

Connection Center 3200

Max. operating pressure	6 bar
Max. operating temperature	30 °C
Medium	Potable water
Flow rate	0.5 m³/h
Mounting position	main axis horizontal
Connection size	DN 15
Serial no.	3200.15.010

The installation of a filling combination in accordance with EN 1717 for filling a heating installation is required.

Perfect to be combined with Connection Center – SYR Filling-Combi BA (serial no. 6628.20.000).

	HWE cartridge (softening)		HVE cartridge (complete demineralisation)		HVE-Plus cartridge (to stabilize the pH)	
Content	4, 7, 14 or 30 litres		4, 7, 14 or 30 litres		4, 7, 14 or 30 litres	
Capacity	4-l-cartridge 7-l-cartridge 14-l-cartridge 30-l-cartridge	14.560 l / °dH 25.480 l / °dH 50.960 l / °dH 109.200 l / °dH	4-l-cartridge 7-l-cartridge 14-l-cartridge 30-l-cartridge	5.000 l / °dH 8.750 l / °dH 17.500 l / °dH 37.500 l / °dH	4-l-cartridge 7-l-cartridge 14-l-cartridge 30-l-cartridge	3.500 l / °dH 6.500 l / °dH 13.000 l / °dH 27.850 l / °dH
Serial no.	3200.00.001 3200.00.003 3200.00.004 3200.00.018	4 litres 7 litres 14 litres 30 litres	3200.00.011 3200.00.013 3200.00.014 3200.00.017	4 litres 7 litres 14 litres 30 litres	3200.00.015 3200.00.005 3200.00.006 3200.00.016	4 litres 7 litres 14 litres 30 litres

Accessories/spare parts for softening (HWE) and complete demineralisation (HVE)

Replacement granulates HWE

serial no.	3200.00.904	4 litres
	3200.00.906	7 litres
14-l-cartridge:	2 x 3200.00.906	
30-l-cartridge:	4 x 3200.00.906	

Replacement granulates HVE

serial no.	3200.00.914	4 litres
	3200.00.916	7 litres
14-l-cartridge:	2 x 3200.00.916	
30-l-cartridge:	4 x 3200.00.916	

Replacement granulates HVE Plus

serial no.	3200.00.927	4 litres
	3200.00.926	7 litres
14-l-cartridge:	2 x 3200.00.926	
30-l-cartridge:	4 x 3200.00.926	

Stationary or mobile filling of the heating installation

Mobile Filling Device (in a Trolley Case)

Max. operating pressure	Filling-Combi BA: 10 bar Connection Center: 6 bar	
Max. operating temperature	Filling-Combi BA: 30 °C (inlet), 65 °C (outlet) Connection Center: 30 °C	
Medium	Potable water	
Capacities		
HWE	4 litres(14.560 l / °dH)	
HVE	4 litres (5.000 l / °dH)	
HVE Plus	4 litres (3.500 l / °dH)	
serial no.	HWE	3200.15.022
	HVE	3200.15.023
	HVE Plus	3200.15.024

FillCaddy

Max. operating pressure	Potable water-prefilter: 16 bar Filling-Combi BA: 10 bar Connection Center 6 bar	
Max. operating temperature	Potable water-prefilter: 30 °C Filling-Combi BA: 30 °C (inlet), 65 °C (outlet) Connection Center: 30 °C	
Medium	Potable water	
Capacities		
HWE	30 litres (109.200 l / °dH)	
HVE	30 litres (37.500 l / °dH)	
HVE Plus	30 litres (27.850 l / °dH)	
serial no.	HWE	3200.15.030
	HVE	3200.15.031
	HVE Plus	3200.15.027

Corrosion protection and increase of pH-value

FillDOS 3220 filling pump including adapter on ¾" fill-and-drain valve

Max. operating pressure	10 bar
Medium	Inhibitors, non-adhesive liquids Note: not suitable for sealants!
Speed	max. 500 r/min
Connection size shaft	¼" bit fixture
serial no.	3220.00.000

Access.

FillSafe plus 3200 pH increase

serial no.	3220.00.001 (2 litres)

FillSafe plus 3220 Corrosion protection

serial no.	3220.00.010 (2 litres)

Filling combinations – required under DIN EN 1717 during filling

Filling-Combi BA 6628

Can be combined with Connection Center 3200 without accessories!

Max. operating pressure	10 bar
Max. operating temperature	30 °C (inlet), 65 °C (outlet)
Medium	Potable water
Fluid category	up to and including 4
Initial pressure	0.5 – 4 bar (factory-set at: 1.5 bar)
Flow rate	1.3 m³/h at Δp 1.5 bar
Mounting position	horizontal, tundish connection pointing downwards
Connection size	DN 20
serial no.	6628.20.000

Filling-Combi BA plus with second stop valve 6628

Max. operating pressure	10 bar
Max. operating temperature	30 °C (inlet), 65 °C (outlet)
Medium	Potable water
Fluid category	up to and including 4
Initial pressure	1 – 5 bar (factory-set at: 1.5 bar)
Flow rate	0.9 m³/h at Δp 1.5 bar
Mounting position	horizontal, tundish connection pointing downwards
Connection size	DN 20
serial no.	6628.20.005

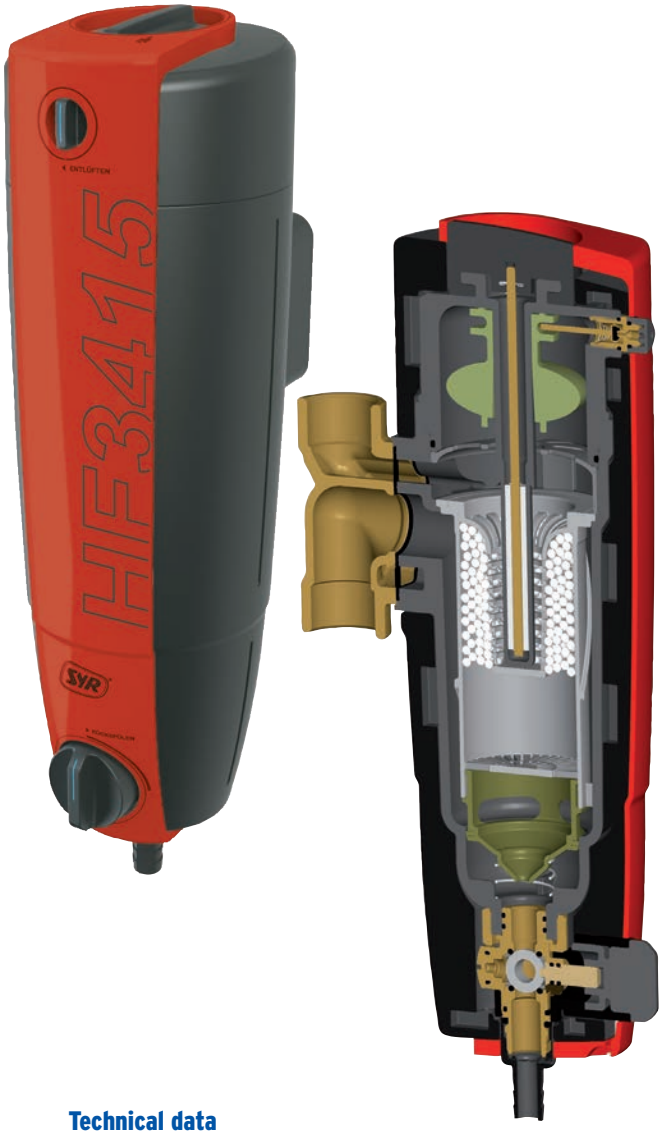
Access. BA plus: Screw joints to connect the Filling-Combi BA plus with the Connection Center

serial no.	0805.20.902

Filling-Combi BA plus with water meter 6628

Max. operating pressure	10 bar
Max. operating temperature	30 °C (inlet), 65 °C (outlet)
Medium	Potable water
Fluid category	up to and including 4
Initial pressure	1 – 5 bar (factory-set at: 1.5 bar)
Flow rate	0.8 m³/h at Δp 1.5 bar
Mounting position	horizontal, tundish connection pointing downwards
Connection size	DN 20
serial no.	6628.20.015

SYR COMFORT-PLUS for your heating installation: backwashable heating filter HF 3415.



1. Pearl Technology – puts an end to dirt

The secret to the efficiency of the SYR heating system filter 3415 against sediment and haematite lies in its pearl technology: synthetic balls within the HF 3415 are statically charged in the circulating volume flow of the heating installation. Thus, the pearls bind the sludge developing in the heating installation (haematite) as well as free flowing sediments.

2. Automatic vent

The air entering the heating installation is collected in the upper area of the filter and is then automatically released via the vent valve.

3. Magnetic bar against magnetite

The core of the heating system filter HF 3415 is the magnetic bar, fitted in a synthetic thermowell – dry, so that there is no contact with the medium. The SYR-advantage: haematite cannot form a layer on the magnetic bar because it had been filtered and bound by the pearls beforehand. The magnetic bar so efficiently binds the magnetite within the heating system that it cannot return into the circulation via the volume flow.

4. Clean backwash

The backwashing heating system filter HF 3415 is ideally combined with the Filling-Combi BA, which can be fitted directly to the cross-type flange. As soon as the ball valve of the HF 3415 is open, a mechanism interrupts the hydraulic volume flow. The backwash water reverses the static load of the pearls and the water rinses off the haematite through the filter. The magnetic bar is manually removed at the same time. The bound magnetite is now "floating freely" and is removed without residue during backwashing.

Easy-to-mount with the cross-type flange

A horizontal or vertical installation of the HF 3415 is possible thanks to the cross-type flange of DN 20, 25 and 32. If it is mounted together with the SYR Filling-Combi, the HF 3415 with the SYR automatic backwash system RSA can even be upgraded to a fully automatic system.

Technical data

Max. operating pressure	10 bar
Max. operating temperature	110 °C
Medium	heating water
Min. pressure for backwashing	1.5 bar
Mounting position	Main axis vertical
Flow rate DN 20 – DN 32	2.0 m^3/h at Δp 0.1 bar
Kvs-value DN 20 – DN 32	8.5
serial no.	3415.00.000

Accessories

serial no. connecting flange	
DN 20	3415.20.000
DN 25	3415.25.000
DN 32	3415.32.000

- **vents, desludges and removes magnetite**
- **ensures efficient operation and longer service-life of heating installations**
- **reduces maintenance efforts**
- **easy-to-clean via backwashing**

1508 Subject to technical modifications

Hans Sasserath GmbH & Co. KG • Mühlenstr. 62 • D-41352 Korschenbroich • Phone +49 2161 6105-0 • Fax +49 2161 6105-20 • info@SYR.de • www.syr.de