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Planning documents



for pellet boiler



ETA Heiztechnik
Gewerbepark 1
A-4716 Hofkirchen an der Trattnach
Tel: +43 (0) 7734 / 22 88 -0
Fax: +43 (0) 7734 / 22 88 -22
info@eta.co.at
www.eta.co.at

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1 General information

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1.1 Fuel pellets

Pellets, a fuel which regrows and is clean

Wood pellets consist of 100% natural wood, sawdust or wood shavings. Starchy residual materials (such as maize starch, for example) from food production are used as pressing aids; chemical-synthetic binding agents are not permitted. The raw material is compressed and made into pellets at high pressure.



Wood pellets are standardised (according to ISO 17225-2-A1, ENplus-A1, for example) and offered as quality-tested brand products. They are suitable for fully automated heating operation, easy to transport and store. Even the pollutant content is limited with very strict values. This means it is safe to use the ash as fertiliser in the garden.

Pellets are a safe and environmentally-friendly alternative to fossil fuels such as oil or gas.

Keep an eye on the quality

The composition and characteristics of pellets are standardised, but not legally regulated. To heat with minimum possible maintenance, demand certified quality in accordance with the applicable current standards from your pellet dealer.

Delivery quality also includes the last link in the transport chain, blowing the pellets into the storeroom. The pellets should not fly too fast or too slowly; they should strike the impact protection mat gently and not be pulverised.

A reference value for an acceptable injection time is 4 to 5 minutes per ton. In no case should the pellets be injected more quickly.

The most important pellet data

Since the heating value of different types of woods differ fractionally on a weight basis, the following formula applies as a rule of thumb:
1 litre heating oil = 2 kg pellets

Typical values for pellets	
Heating value	4.9 kWh/kg
Bulk weight	650 kg/m³
Diameter	6 - 8 mm
Length	5 - 48 mm
Water content	< 10%
Specific weight	1.1 - 1.2 kg/dm³
Fine content	max. 1%
Ash content	< 0.7%
Raw material	Natural wood shavings and sawdust
Energy required for manufacture	approx. 2 - 3% of the energy content
Additives	no chemical additives but just natural pressing aids (thickness < 2%)

Energy content of different fuels	
Extra-light heating oil	10.00 kWh/lt
Natural gas	9.52 kWh/m³
LPG	12.8 kWh/kg or 6.78 kWh/lt
Coke	8.06 kWh/kg
Pellets	4.90 kWh/kg
Split spruce logs	1250 kWh/rm
Split logs beech/oak	1800 kWh/rm
Spruce wood chips w=15% G30	850 kWh/srm

Energy content of different fuels	
Wood chips beech/oak w=15% G30	1220 kWh/srm

1.2 Remote control

Remote control of the boiler via the internet

All boilers with the ETAtouch control system can be controlled remotely via smartphone, tablet or PC. The boiler's touch screen is connected to the Internet via a network cable.



A LAN socket near the boiler is required for the internet connection. If none are available, an internet connection can be established using a dLAN adapter via the in-house power grid. This dLAN adapter is also available from ETA.

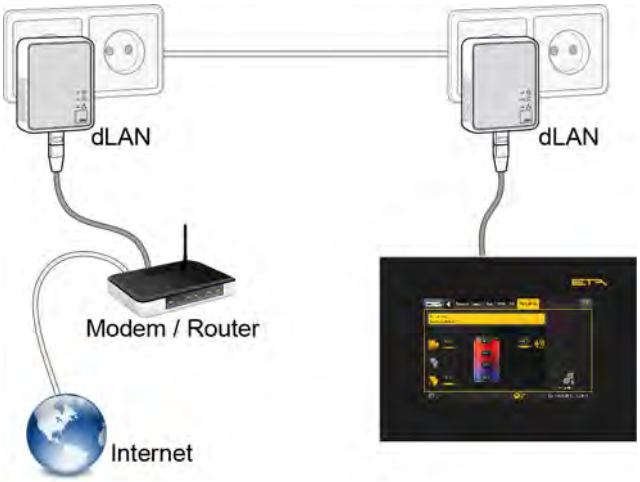


Fig. 1-1: dLAN network

Worldwide access via www.meinETA.at

Remote control via the free internet platform ***www.meinETA.at***.
After registering on this platform, the boiler can be controlled remotely. It can be accessed by smartphone, tablet or PC and is, of course, protected by username and password. You can also access the boiler's control system via your home network with a free VNC Viewer. To see how remote operation of your boiler works, please visit *www.meinETA.at*.

meinETA: the free internet platform

If your heating boiler is connected to the internet, you can see and change all heating settings on your mobile, tablet or PC. So you always have a handle on your heating, wherever you are! When you login to www.meinETA.at, you see the touchscreen as if you were standing right in front of the boiler!

The ash bin must be emptied, it's time for the next heating service... no need to remember all of these tasks, as meinETA will remind you free of charge by e-mail.

Quick help

Give your installer or the ETA customer service representative temporary access to your meinETA account. So they can prepare for their visit to you. And maybe the technician doesn't even have to come visit, because thanks to meinETA they can tell you over the phone what you need to do to make your heater work again. You can see who can access your boiler via the status display. Only you decide who's in your partner network!

2 ETA boilers

2.1 Condensing boiler ePE-BW

Pellet boiler with modern condensing technology

The ETA ePE-BW is the ideal pellet boiler for the modern single-family home, and it is also suited to the renovation of buildings with a low-temperature heating system. An entire heating system is packed into a compact boiler. Thanks to the integrated condensing heat exchanger, the efficiency of the system is increased even more. High efficiency pump, safety devices and more are already integrated. This reduces the space required and assembly costs. A mixer for the buffer operation, or a heating circuit, is integrated into the boiler. Optionally, a second heating circuit can be installed in the boiler.

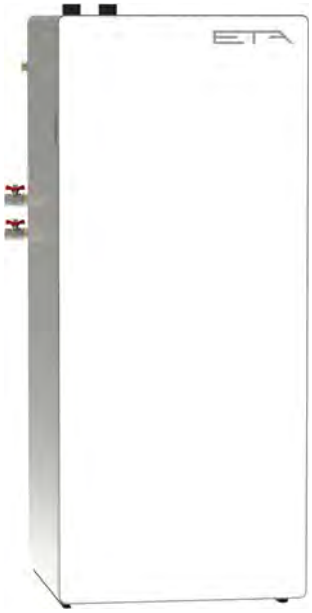


Fig. 2-1: Condensing boiler ePE-BW

While the boiler can be operated without a buffer storage tank, we still recommend using a buffer. Especially when heating in autumn or in spring and for hot water preparation in the summer, less energy is often required than the boiler produces. The buffer stores this excess heat and releases it on demand. This saves fuel and protects the boiler, because fewer boiler start-ups are needed.

The boiler can be operated with external air supply. The required combustion air is supplied to the boiler from outside through a temperature-resistant pipeline. This ensures that the boiler can also be located in heated buildings or in rooms with comfort ventilation. For more information, see chapter 4.7 "Operation with external air supply".

Overview of benefits

- A stainless steel condensing heat exchanger is integrated into the boiler.
- A precipitator can be optionally integrated.
- A mixer for the buffer operation, or a heating circuit, is integrated into the boiler. Optionally, a second heating circuit can be installed in the boiler.
- All fittings required for safe operation, such as a safety valve, electronic pressure sensor and an automatic bleed valve, are integrated in the boiler.
- When operated with external air, a separate boiler room is not required.
- Flexible connection options:
  - –Flue gas connection: left or rear
  - –Supply air for external air operation: left or rear
  - –Flow and return: left or right
  - –Outlet for condensate: left, right or rear
- Moving rotating grate with self-cleaning feature ensures optimum fuel utilization.
- The hot combustion chamber guarantees optimal combustion.
- The rotary valve ensures maximum burn-back safety.
- The Lambda probe ensures maximum efficiency with lowest emissions.
- Convenient and automatic heat exchanger cleaning and de-ashing via the ash box.
- No thermal safety valve required.
- Barely audible draught fan.
- The ETAtouch control system can be remotely controlled via the internet. This includes complete control of the heating system, as well as any connected solar heating systems.
- Permanent monitoring of all states of the boiler (such as, for example, draught fan speed, residual oxygen content, exhaust temperature, current draw of the drives...) ensures safe operation.

Checklist for boilers with condensing technology

The following points must be observed in the planning and implementation phase for safe operation of boilers with condensing technology.

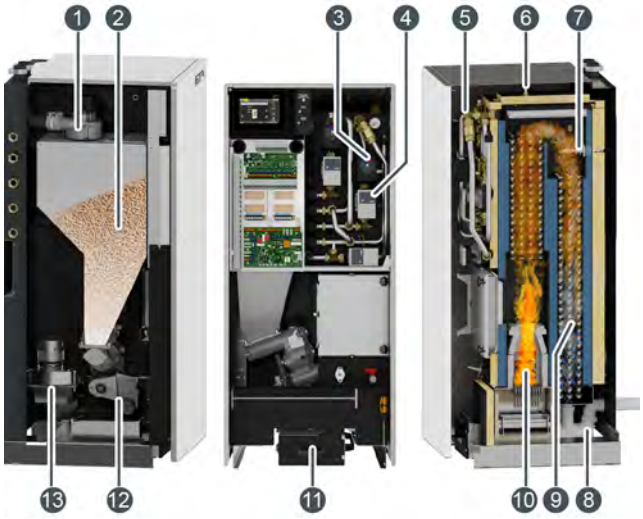
- The chimney must be condensate-resistant and thus insensitive to moisture.
- Draught limiters and deflagration dampers are prohibited. If these are present, they must be removed.

- The required chimney diameter must be adhered to. For more information, see chapter 6.1 "Dimensioning".
- A separate chimney must be available for the boiler. No additional boilers may be connected to this chimney.
- The flue pipe to the chimney must be made of stainless steel, sealed and rising (at 2%).

  A suitable stainless steel flue pipe system is optionally available from ETA.
- A cold water and sewer connection must be available near the boiler. A water filter or dirt filter needs to be installed in the cold water line. The minimum pressure in the cold water pipe must be 2 bar.

  Rainwater or drinking water can be used to flush the condensing heat exchanger. If rainwater is used, it should be filtered to prevent the spray nozzle from clogging.
  If drinking water is used, country-specific regulations must be observed. From water hardnesses of 14°dH, we recommend installing a water softener.
- The return temperature from the heating system should be as low as possible (e.g. 35 °C) in order to facilitate efficient use of the condensing technology. If the return temperatures at the buffer storage differ, the return line to the boiler must be created as a separate line.
- A stratified buffer is the preferred form of buffer storage.

2.1.1 Boiler functionality



1 Vacuum turbine for pellet transport
2 Pellet hopper
3 Flow mixing valve
4 Heating pump
5 Safety devices
6 Lambda probe
7 Precipitator
8 Condensate drain
9 Condensing heat exchanger
10 Hot combustion chamber
11 Ash box
12 Rotary valve
13 Draught fan

A vacuum turbine draws the pellets from the storeroom, which may be up to 20 m away, into the pellet hopper on the boiler. The dosing screw doses the pellets as they are conveyed from the pellet hopper, to avoid overfilling the rotary valve. This way, pellets do not need to be cut. This protects the sealing edges and enables quiet operation. The rotary valve separates the pellet hopper from the combustion chamber to prevent back burning in the pellet hopper. The stoker screw pushes the pellets into the combustion chamber.

The pellets are burned on the movable rotating grate. Automatic cleaning takes place during breaks in combustion. The grate is rotated against a comb to clean the air gaps. For a restart, the pellets are ignited with a ceramic igniter. A newly developed de-ashing push floor conveys the ash from the grate and the heat exchanger into a removable ash box.

In an uncooled primary combustion chamber, hot and complete burnout occurs before the combustion gases in the heat exchanger transfer the heat to the heating water. Movement of the turbulators cleans the heat exchangers automatically once a day.

The optionally integrated precipitator charges the particles and thus ensures the lowest possible emissions.

The boiler pump, the safety valve, a pressure gauge with monitoring and a bleed valve in the boiler flow are installed in the boiler as standard.

The Lambda probe, in combination with the variable-speed draught fan, ensures high efficiency. The boiler can be operated with an external air supply by means of a temperature-resistant air supply duct.

Functionality of the condensing technology

The flue gas passes from the combustion chamber through the first heat exchanger, where it gives off most of its heat to the heating water. It is then diverted to the second heat exchanger, the condensing heat exchanger. Here the flue gas is cooled so that condensate is produced, approx. 0.3 litres per kg of pellets. This condensate is fed via the siphon into the sewage system (e.g. duct).

For optimum operation, low return temperatures from the heating system are required (e.g.: 30°C). This can save up to 10% in fuel.

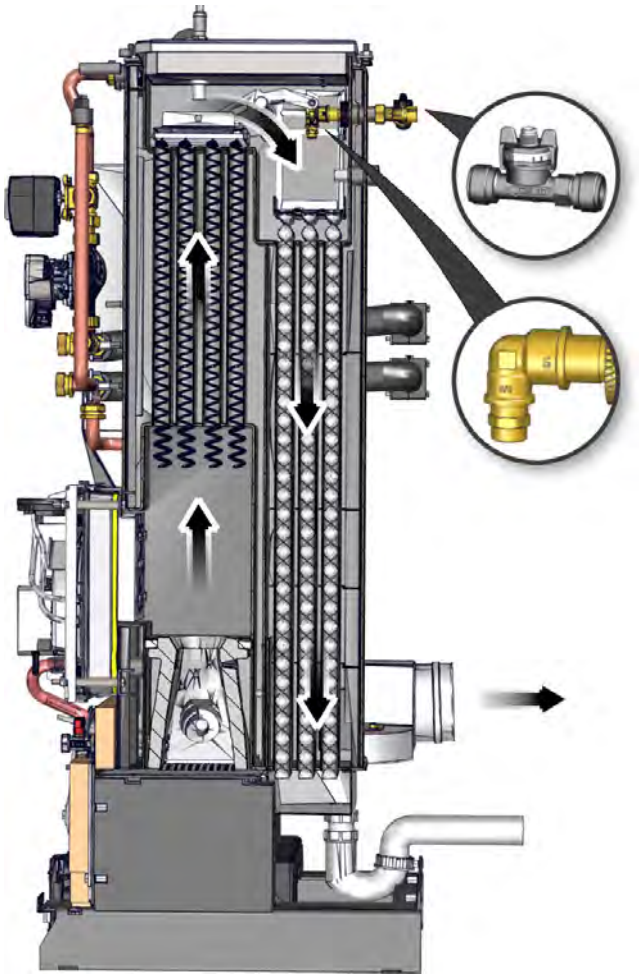


Fig. 2-2: Path of the flue gas

The condensing heat exchanger is cleaned at regular intervals with water injected through the spray nozzle. A water connection is therefore required for the boiler. To ensure that the spray nozzle does not get dirty inside, we recommend a dirt filter in the cold water supply line if no water filter is installed. An additional shut-off valve upstream of the strainer is appropriate for maintenance work.

Rainwater or drinking water can be used to flush the condensing heat exchanger. If rainwater is used, it should be filtered to prevent the spray nozzle from clogging.
If drinking water is used, country-specific regulations must be observed. From water hardnesses of 14°dH, we recommend installing a water softener.

The water supply and water quantity is controlled by the flow sensor and the solenoid valve. This ensures that there is always water in the siphon and that no flue gas can get into the sewage system (duct). If the water supply is interrupted, a message is output at the boiler. Emergency operation is still possible.

The water consumption of the condensing heat exchanger is dependent on the return temperature of the heating system. If this is low, more condensate, i.e. water, is produced in the heat exchanger. This reduces the additional water required for cleaning the condensing heat exchanger.

approximate water consumption per year (in litres)

Return temperature	ePE-BW 8	ePE-BW 10	ePE-BW 12	ePE-BW 14
< 30 °C	500	550	620	700
~50 °C	1300	1400	1550	1800

Return temperature	ePE-BW 16	ePE-BW 18	ePE-BW 20	ePE-BW 22
< 30 °C	700	750	820	900
~50 °C	1800	1900	2050	2250

Flue pipe to the chimney

The flue pipe to the chimney must be made of stainless steel, sealed and rising (at 2%). This ensures that the condensate from the chimney and flue pipe reaches the condensing heat exchanger and from there via the siphon into the waste water system.

A suitable stainless steel flue pipe system is optionally available from ETA. This has internal seals and suitable openings for the required cleaning. It is preferable for this system to be used.

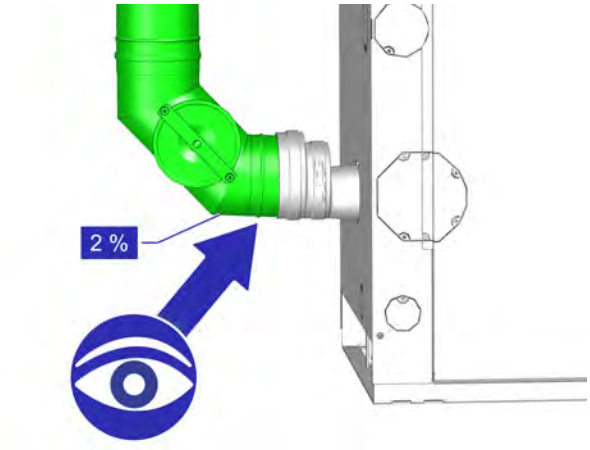


Fig. 2-3: Flue pipe

Lay the flue pipe path in the shortest path between the boiler and chimney.

Easily accessible cleaning openings must be available for cleaning the flue pipe. In the lower arch, the cleaning opening must be on the side and not on the underside, because condensation can escape there.

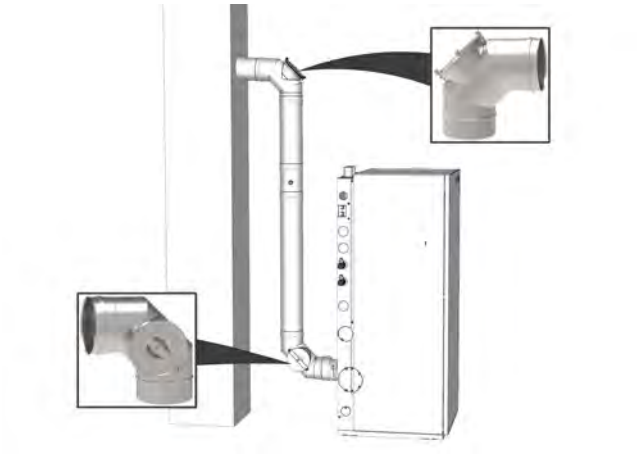


Fig. 2-4: Cleaning opening

Condensate-resistant chimney

The chimney must be condensate-resistant and thus insensitive to moisture. Therefore, only chimneys made of ceramic or stainless steel are permitted. The suitability of the chimney should always be clarified with a chimney sweep.

2.2 PelletsUnit PU

Small and compact

The ETA PelletsUnit is the ideal pellet boiler for renovations or new builds of single-family and multi-family homes. An entire heating system is packed into a compact boiler. Highly efficient pump, safety valves and more are already integrated. This reduces the space needed and assembly costs. Even a second heating circuit can be installed directly in the boiler.



Fig. 2-5: PelletsUnit 7-15 kW

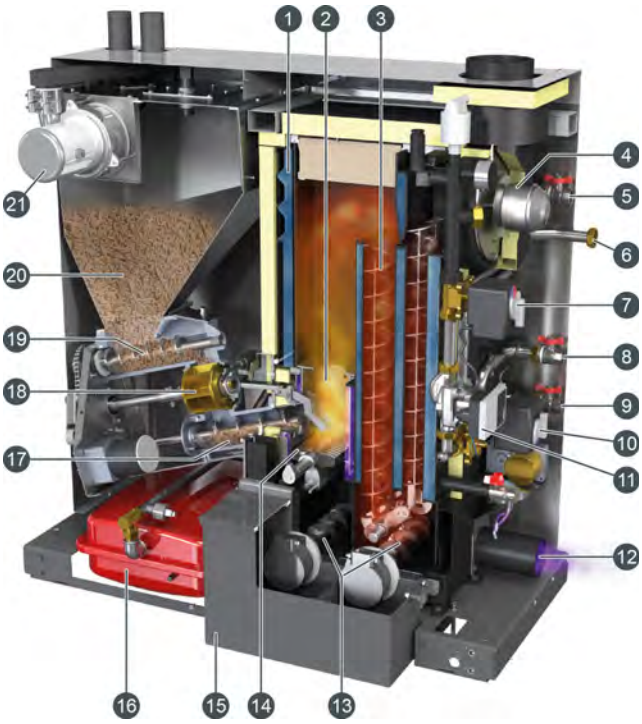
The boiler with 7-15 kW can be operated without a buffer storage tank, but a buffer is still recommended. Above all, when heating in autumn or in spring and for hot water preparation in the summer, often less energy is needed than what the heating boiler produces. The buffer stores this excess heat and releases it on demand. This saves fuel and protects the boiler, because fewer boiler starts are needed.

The boiler can be operated with external air supply. The required combustion air is supplied to the boiler from outside through a temperature-resistant pipeline. This means that the boiler can also be situated in heated buildings or in rooms with comfort ventilation. See chapter 4.7 "Operation with external air supply".

Overview of benefits

- The pump, mixer and changeover valve for a heating circuit and the hot water supply are integrated into the boiler. The return riser for buffer operation is also integrated. Optionally, a second heating circuit can be installed in the boiler.
- Connection of the underfloor heating without external hydraulic bypass directly to the internal heating circuit groups (up to optimum 80 m, maximum 100 m pipe length per distributor outlet).
- All fittings required for safe operation, such as expansion tank (18 litre), safety valve, bleed valve and water shortage switch-off (minimum pressure) are integrated into the boiler.
- When operated with external air, a separate boiler room is not required. See chapter 4.7 "Operation with external air supply".
- Moving rotating grate with self-cleaning feature ensures optimum fuel utilization.
- The hot stainless steel chamber guarantees optimum combustion.
- The rotary valve ensures maximum burn-back safety.
- The Lambda probe ensures maximum efficiency with lowest emissions.
- Comfortable and automatic heat exchanger cleaning and de-ashing in the external ash box.
- No thermal safety valve required.
- Barely audible draught fan.
- The ETAtouch control system can be controlled remotely via the internet. This includes complete control of the heating system, as well as any connected solar heating systems.
- Permanent monitoring of all states of the boiler (such as, for example, draught fan speed, residual oxygen content, exhaust temperature, current draw of the drives...) ensures safe operation.

2.2.1 Boiler functionality



1 Heat exchanger
2 Hot stainless steel combustion chamber
3 Turbulators
4 Draught fan
5 Return
6 Outlet for safety valve
7 Flow mixing valve
8 Flow to hot water tank
9 Flow for heating circuit or buffer
10 Changeover valve between heating circuit (or buffer) and hot water tank
11 Heating pump
12 Air connection for external air supply operation
13 Ash screws
14 movable, self-cleaning rotating grate
15 detachable ash box
16 Expansion tank
17 Stoker screw
18 Rotary valve
19 Dosing screw
20 Pellet hopper
21 Vacuum turbine for pellet transport

A vacuum turbine draws the pellets from the storeroom, which may be up to 20 m away, into the pellet hopper on the boiler. This pellet hopper has a capacity of 30 kg.

The dosing screw doses the pellets as they are conveyed from the pellet hopper, to avoid overfilling the rotary valve. This way, pellets do not need to be cut. This protects the sealing edges and enables quiet operation. The rotary valve separates the pellet hopper from the combustion chamber to prevent back burning in the pellet hopper. The stoker screw pushes the pellets into the combustion chamber.

The pellets are burned on the movable rotating grate. Automatic cleaning takes place during breaks in combustion. The grate is rotated against a comb to clean the air gaps. For a restart, the pellets are ignited with a ceramic igniter. Beneath the grate and the heat exchanger, two ash screws convey the ash to a detachable ash box.

In an uncooled, hot combustion chamber made of stainless steel, hot and complete burnout occurs before the combustion gases in the heat exchanger transfer the heat to the heating water. Movement of the turbulators cleans the heat exchangers automatically once a day.

The return riser is already integrated for operation of the boiler with a buffer storage tank. A mixed heating circuit can be integrated additionally for buffer operation. For heating systems without a buffer storage tank, all the devices needed for safe operation, such as the pump, flow mixing valve, changeover valve for the hot water charging, expansion tank, boiler air vent and safety valve, are already installed in the boiler.

The Lambda probe, in combination with the variable-speed draught fan, ensures high efficiency. The boiler can be operated with an external air supply by means of a temperature-resistant air supply duct.

2.3 PelletsCompact PC

The pellet boiler for renovations

The ETA PelletsCompact is the ideal pellet boiler for renovations or new builds of larger residential buildings and office spaces. Depending on demand, the boiler is available with outputs from 20 to 150 kW.



Fig. 2-6: PelletsCompact 20-32 kW

Boilers with 20-32 kW can be operated without a buffer storage tank, but a buffer is still recommended. Above all, when heating in autumn or in spring and for hot water preparation in the summer, often less energy is needed than what the heating boiler produces. The buffer stores this excess heat and releases it on demand. This saves fuel and protects the boiler, because fewer boiler starts are needed.

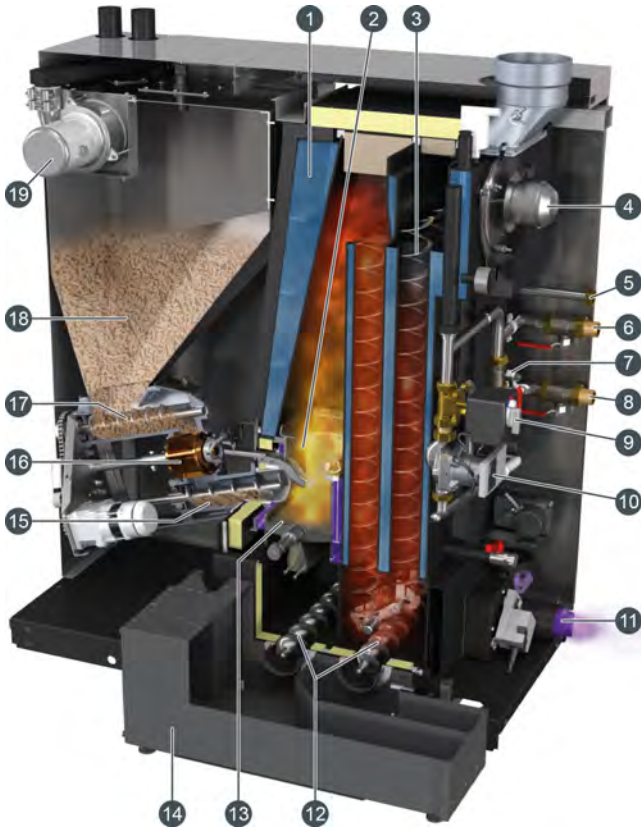
For boilers of 33 kW and larger, an adequately dimensioned buffer is required for smooth function of the boiler. Information on the dimensions of the buffer can be found in chapter 8.3 "Dimensioning".

Boilers with 20-32 kW can also be operated with an external air supply. The required combustion air is supplied to the boiler from outside through a temperature-resistant pipeline. This means that the boiler can also be situated in heated buildings or in rooms with comfort ventilation. See chapter 4.7 "Operation with external air supply".

Overview of benefits

- Safety devices such as safety valve, bleed valve and water shortage alert (minimum pressure) are integrated into the boiler.
- When operated with external air, a boiler room is not even needed. See chapter 4.7 "Operation with external air supply".
- With its connectable hydraulic bypass, the boiler is suitable for all systems, from the smallest to the largest water circulation. The return riser for buffer operation is also integrated.
- Moving rotating grate with self-cleaning feature ensures optimum fuel utilization.
- The hot stainless steel chamber guarantees optimum combustion.
- The rotary valve ensures maximum burn-back safety.
- The Lambda probe ensures maximum efficiency with lowest emissions.
- Comfortable and automatic heat exchanger cleaning and de-ashing in the external ash box.
- No thermal safety valve required.
- Barely audible draught fan.
- The ETAtouch control system can be controlled remotely via the internet. This includes complete control of the heating system, as well as any connected solar heating systems.
- Permanent monitoring of all states of the boiler (such as, for example, draught fan speed, residual oxygen content, exhaust temperature, current draw of the drives...) ensures safe operation.

2.3.1 Boiler functionality



1 Heat exchanger
2 Hot stainless steel combustion chamber
3 Turbulators
4 Draught fan
5 Outlet for safety valve
6 Flow
7 Bypass
8 Return
9 Return riser mixing valve
10 Boiler pump
11 Air connection for external air supply operation
12 Ash screws
13 movable, self-cleaning rotating grate
14 detachable ash box
15 Stoker screw
16 Rotary valve
17 Dosing screw
18 Pellet hopper
19 Vacuum turbine for pellet transport

A vacuum turbine draws the pellets from the storeroom, which may be up to 20 m away, into the pellet hopper on the boiler. The dosing screw doses the pellets as they are conveyed from the pellet hopper, to avoid overfilling the rotary valve. This way, pellets do not need to be cut. This protects the sealing edges and enables quiet operation. The rotary valve separates the pellet hopper from the combustion chamber to prevent back burning in the pellet hopper. The stoker screw pushes the pellets into the combustion chamber.

The pellets are burned on the movable rotating grate. Automatic cleaning takes place during breaks in combustion. The grate is rotated against a comb to clean the air gaps. For a restart, the pellets are ignited with a ceramic igniter. Beneath the grate and the heat exchanger, two ash screws convey the ash to a detachable ash box.

In an uncooled, hot combustion chamber made of stainless steel, hot and complete burnout occurs before the combustion gases in the heat exchanger transfer the heat to the heating water. Movement of the turbulators cleans the heat exchangers automatically once a day.

The return riser is already integrated for operation of the boiler with a buffer storage tank. A boiler pump, a safety valve, a pressure gauge with monitor and a bleed valve are also integrated in the boiler flow.

The Lambda probe, in combination with the variable-speed draught fan, ensures high efficiency. The boiler can be operated with an external air supply by means of a temperature-resistant air supply duct.

2.4 ePE-K Pellet boiler

The pellet boiler for high outputs

The "ePE-K" boiler uses the tried and tested technology of the wood chip boiler and was optimised for the pellet fuel - with a specially matched flue gas recirculation from the boiler outlet back into the combustion chamber. This prevents slag and the grate remains clean for flawless operation. It is the ideal boiler for renovations or new builds of larger residential buildings and office spaces. Depending on demand, the boiler is available with outputs from 100 to 240 kW.



Fig. 2-7: ePE-K 100 - 130 kW

An optional and integrated precipitator is available for the boiler. This can be retrofitted in the boiler at a later time, and therefore does not require any space in the boiler room. The precipitator is automatically completely cleaned during de-ashing. The dust then lands in the ash box along with the remaining ash from the boiler. With a separating ratio of 80-85%, the precipitator ensures low dust emission at minimum power consumption even with poorer quality fuels.

The boiler can be expanded with external de-ashing instead of the ash box. The larger ash bin with a capacity of 320 litres or 240 litres allows for longer boiler runtimes. See chapter 2.4.2 "External ash removal" for details on the external de-ashing.

Overview of benefits

- With integrated flue gas recirculation, optimum combustion of the pellets takes places in a narrow, slag-free temperature range.
- With the optionally retrofittable precipitator in the boiler, the flue gas is additionally cleaned. This results in even lower dust emissions.
- A return riser with pump and mixer is already integrated into the boiler.
- The hot and fully refractory-lined combustion chamber guarantees optimum combustion.
- The rotary valve ensures maximum burn-back safety.
- The Lambda probe ensures maximum efficiency with lowest emissions.
- Comfortable and automatic heat exchanger cleaning and de-ashing in the external ash box.
- Barely audible draught fan.
- The ETAtouch control system can be controlled remotely via the internet. This includes complete control of the heating system, as well as any connected solar heating systems.
- Permanent monitoring of all states of the boiler (such as, for example, draught fan speed, residual oxygen content, exhaust temperature, current draw of the drives...) ensures safe operation.

Flue gas control by the precipitator

Additional cleaning of the flue gas takes place with the optional precipitator. Inside the precipitator is the centrally positioned and vertically oriented "discharge electrode", which is connected to the high voltage unit. The draught fan draws the flue gas from the boiler through the precipitator. It is redirected to the bottom of

the precipitator and sucked between the inner wall and the electrode to the flue gas connection by the electrical field.

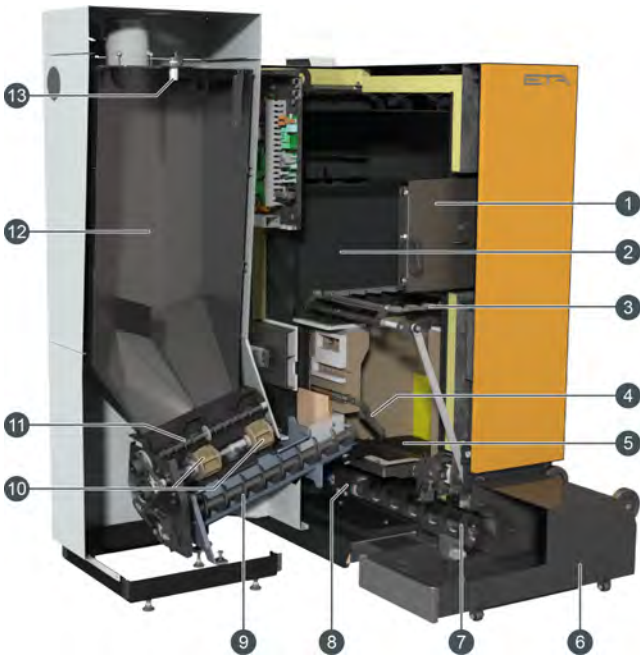


Fig. 2-8: Precipitator

The flue gas is cleaned as it flows through the electrical field. In the electrical field (up to 30 kV voltage), the electrode "pushes" the dust particles from the flue gas to the inner wall of the precipitator. The dust particles settle there and can no longer escape with the flue gas via the chimney. Small quantities of dust will remain adhered to the electrode. Therefore, it is cleaned at regular intervals.

Deposits on the inner walls are removed by a cleaning cage, which moves up and down. The sliding rake operates at the same time as the de-ashing of the boiler. The ash is conveyed into the ash box at the bottom by the ash screw.

2.4.1 Boiler functionality



1 Combustion chamber door
2 Combustion chamber
3 Ash rake
4 Firebed lever in the combustion chamber
5 Tilting grate
6 Ash box
7 Ash screw
8 Rotary screw seal
9 Stoker screw
10 two rotary valves
11 Dosing screw
12 Pellet hopper
13 Fill level sensor

A vacuum turbine draws the pellets from the storeroom, which may be up to 20 m away, into the pellet hopper on the boiler. The dosing screw doses the pellets as they are conveyed from the pellet hopper to avoid overfilling the rotary valve. This way, pellets do not need to be cut. This protects the sealing edges and enables quiet operation. The rotary valves separate the pellet hopper from the combustion chamber to prevent back burning in the pellet hopper. The stoker screw pushes the pellets into the combustion chamber.

The pellets are burnt on the grate and the ash is tipped at regular intervals from the grate onto the ash screw which lies below it. Beneath the grate and the heat exchanger, two ash screws convey the ash to a detachable ash bin.

In the refractory-lined combustion chamber, a hot and complete burnout occurs before the combustion gases in the heat exchanger transfer the heat to the heating water. The movement of the turbulators cleans the heat exchangers automatically once a day.

The flue gas recirculation mounted on the boiler keeps the temperatures on the grate low in order to prevent the formation of slag and preserve the grate.

After short breaks in combustion, the refractory-lined combustion chamber remains hot enough that any new material which is fed in can be ignited by the remaining embers. The ceramic lighters only need to be activated after long breaks.

The Lambda probe, in combination with the variable-speed draught fan, ensures high efficiency.

2.4.2 External ash removal

Description

The external de-ashing can be optionally aligned to the left or right side of the boiler. We recommend installing it so that the ash bin is on the opposite side of the fuel discharge (stoker or pellet hopper). This ensures that the boiler maintenance areas and the ETAtouch screen remain accessible.

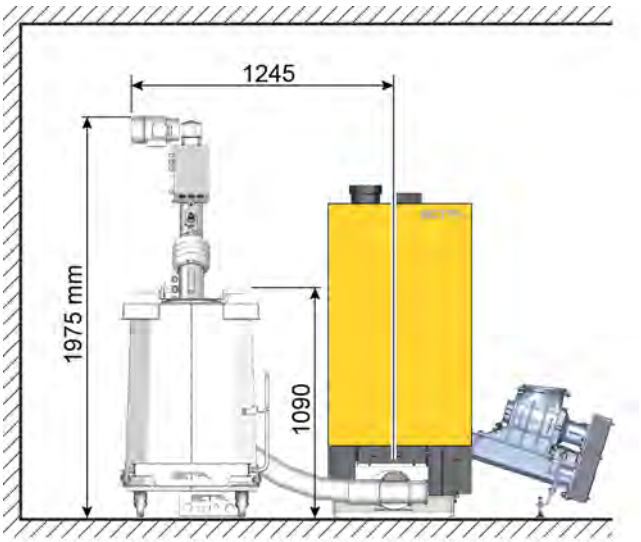
A 240 litre or 320 litre ash bin is available for storing the ashes. The connections for the two ash bins are identical, so they can be exchanged later.

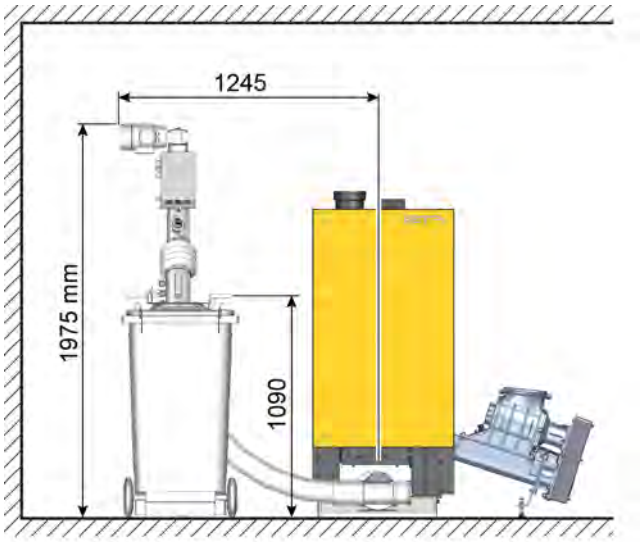
The external de-ashing and the ash bins must be protected from weather by the customer.

Check the fill level either by opening the ash bin on the upper side or by tapping on the vertical container wall. A full ash bin makes a short, dull thump. When empty, it makes a more hollow sound like a drum.

If the ash bin is full, a message is issued at the boiler. Final de-ashing can be carried out before emptying the ash bin.

The graphics below show the external de-ashing for the "eHACK" boiler; it is essentially the same for the "ePE-K" pellet boiler.





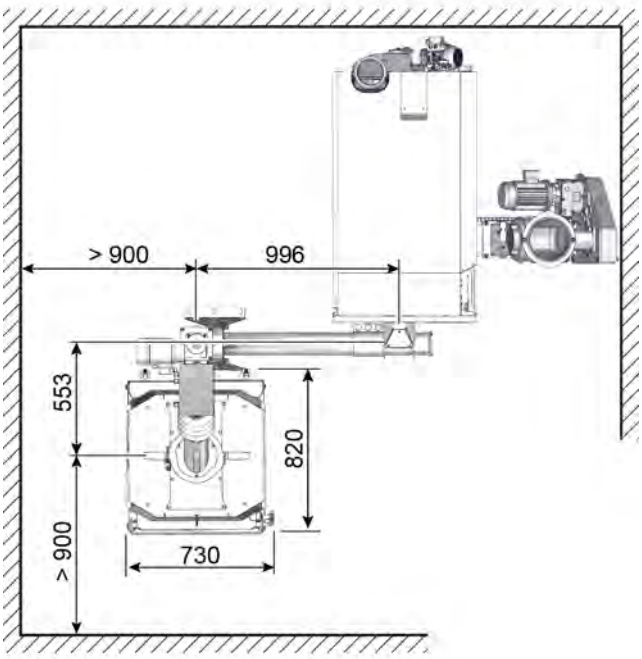


Fig. 2-9: Dimensions (320 litre ash bin)

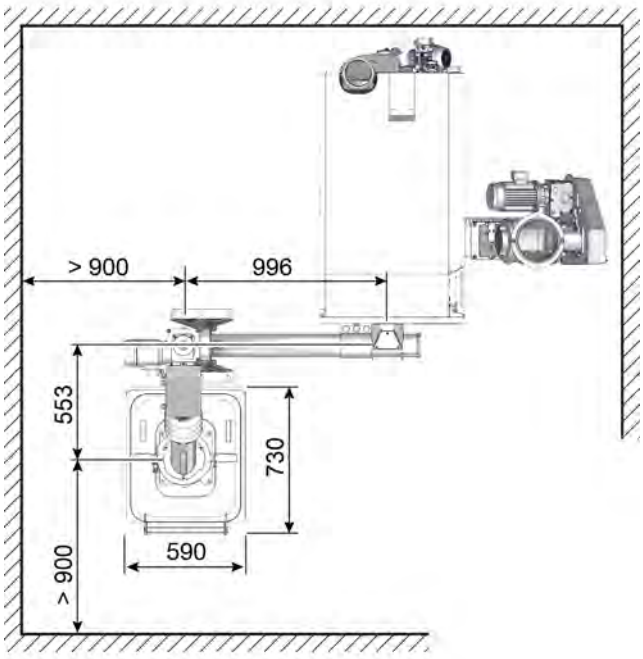


Fig. 2-10: Dimensions (240 litre ash bin)

2.5 TWIN Pellet Burner

Boiler for logs and pellets

If you only want to use split logs for now and plan to introduce pellets at a later stage, your best choice of log boiler is the ETA SH-P model with pellet flanges, To which an ETA TWIN pellet burner can be added later on.



Fig. 2-11: SH-P boiler with TWIN pellet burner

The log boiler is fully-fledged with the large fuel chamber, which only has to be refilled once a day, or maximum twice a day on cold winter days.

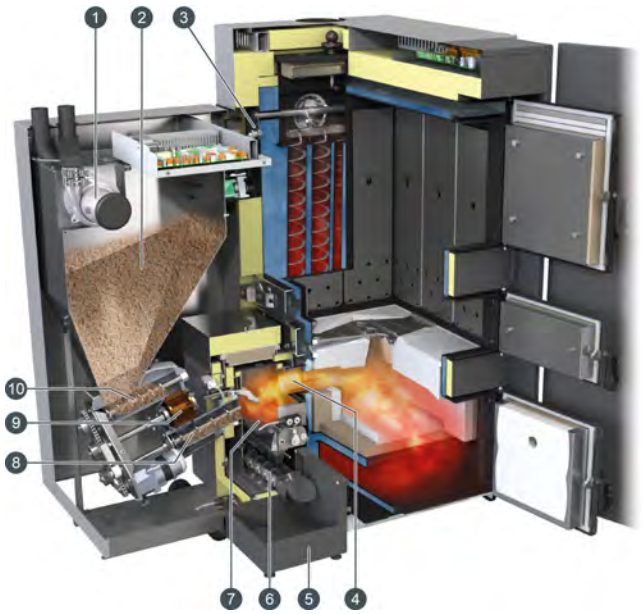
The pellet combustion chamber is separated from the split log furnace, thus enabling flexible switching between split logs and pellets. Once the split logs have been burnt up and the buffer is empty, a red signal on the room sensor in your house alerts you to add more fuel. If you do not refill within a set interval, the boiler automatically heats with pellets. Until you add some more split logs.

Overview of benefits

- Fully-fledged combination of two high-quality boilers: log boiler SH with glow zone combustion chamber and TWIN pellet burner with self-cleaning rotating grate.

  The TWIN pellet burner can also be retrofitted later. However, first the log boiler with pellet flange must be selected.
- Thanks to the pellet combustion chamber that is separate from the log boiler itself , automatic continuation of operation from logs to pellets is possible without the need for conversion or grate replacement.
- Just one chimney connection for two operating systems.
- The Lambda probe ensures maximum efficiency with lowest emissions.
- The log boiler also contains a patented, insulated glow zone combustion chamber made from high temperature-resistant ceramic for optimum partial load operation and high burnout with low ash levels.
- Comfortable de-ashing of the TWIN pellet burner with the external ash box.
- Barely audible draught fan.
- The ETAtouch control system can be controlled remotely via the internet. This includes complete control of the heating system, as well as any connected solar heating systems.
- Permanent monitoring of all states of the boiler (such as, for example, draught fan speed, residual oxygen content, exhaust temperature, current draw of the drives...) ensures safe operation.

2.5.1 Boiler functionality



1 Vacuum turbine for pellet transport
2 Pellet bin
3 Automatic turbulator cleaning
4 Burn-through opening between the pellet burner and the log boiler's combustion chamber
5 detachable ash box
6 Ash screw
7 Movable, self-cleaning rotating grate
8 Stoker screw
9 Rotary valve
10 Dosing screw

An aspirator sucks the pellets from the storage room, which may be up to 20 m away, into the pellet bin on the boiler. This pellet bin has a capacity of up to 60 kg.

The metering screw doses the pellets as they are conveyed from the pellet bin, to avoid overfilling the rotary valve. This way, pellets do not need to be cut. This protects the sealing edges and enables quiet operation. The rotary valve separates the pellet bin from the combustion chamber to prevent back burning in the pellet bin. The stoker screw pushes the pellets into the pellet burner's combustion chamber.

The pellets are burned on the movable rotating grate. Automated cleaning takes place during breaks in combustion. The grate is rotated against a comb to clean the air gaps. For a restart, the pellets are ignited with a ceramic igniter. Beneath the grate and the heat exchanger, the ash screws convey the ash to a detachable ash box.

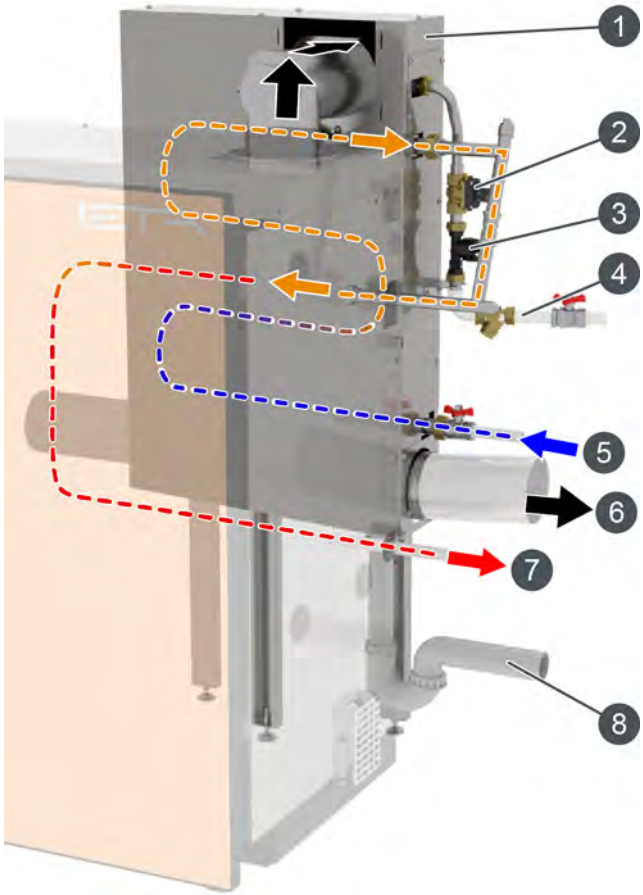
After the stainless steel combustion chamber, the wood gas flame can burn out unhindered through the burn-through opening in the log boiler's combustion chamber. The heat is transferred from the cleanly burned combustion gases to the boiler water in the heat exchanger.

Automatic actuation of the turbulators also cleans the log boiler's heat exchangers.

3 Condensing heat exchanger (for PelletsUnit and PelletsCompact)

Functionality

The condensing heat exchanger uses the residual heat of the flue gas to heat the return of the heating system. It is installed between the boiler and the consumer (e.g.: buffer, heating circuit).



1 Condensing heat exchanger
2 Solenoid valve
3 Flow sensor
4 Water supply with water filter and strainer
5 Return from the heating system
6 Flue connection for the flue tube connection to the chimney
7 Flow to the heating system
8 Siphon for connection to the sewage system

The warm flue gas flows from the boiler through the heat exchanger and heats the cold return that flows through the pipes in the heat exchanger. The heated return reaches the boiler and thus reduces fuel consumption. For optimum operation, low return temperatures from the heating system are required (e.g.: 30°C). This leads to potential savings of up to 10%.

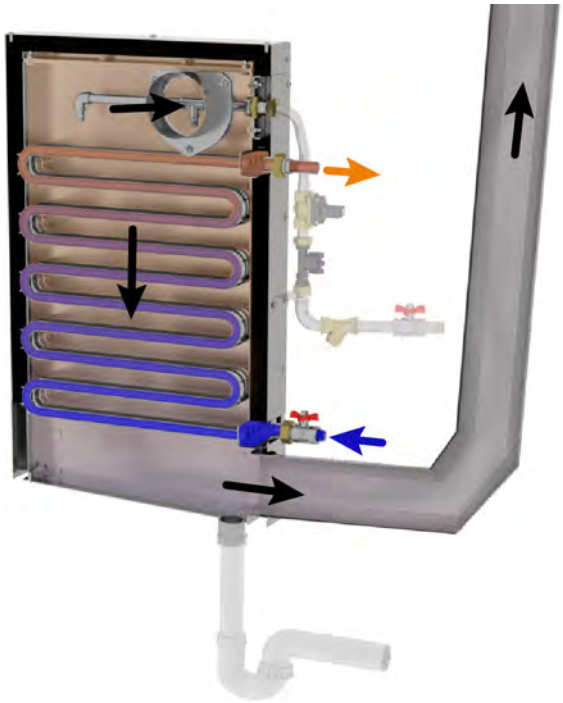


Fig. 3-1: Function

In the condensing heat exchanger, the flue gas is cooled and condensate is produced, approx. 0.3 litres per kg of pellets. This condensate is fed via the siphon into the sewage system (e.g. duct). The condensing heat exchanger must be cleaned with water at regular intervals. A water connection is therefore required. To ensure that the spray nozzles do not get dirty inside, we recommend a dirt filter in the cold water supply line if no water filter is installed. An additional shut-off valve upstream of the strainer is appropriate for

maintenance work. Filtered rainwater (from a cistern) can also be used for cleaning. If the water contains a lot of lime, we recommend a decalcification system.

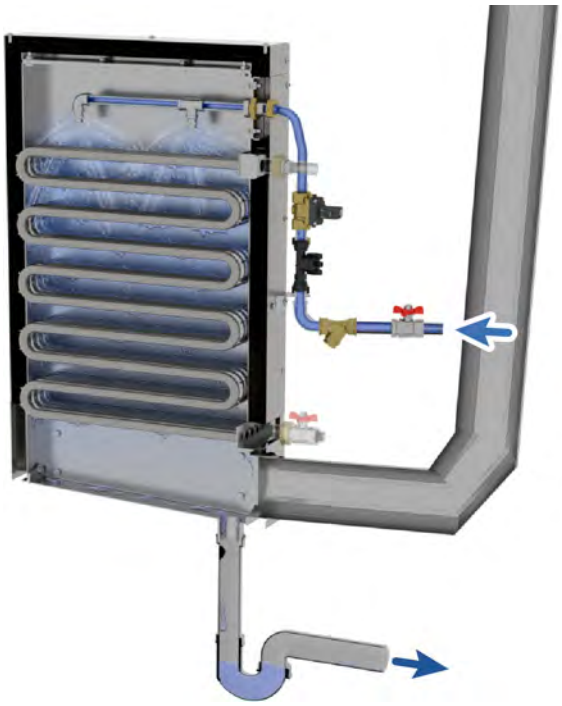


Fig. 3-2: Cleaning with spray nozzles

The water supply is monitored by the flow sensor, and the amount of water is regulated by the solenoid valve. This ensures that there is always water in the siphon and that no flue gas can get into the sewage system (duct). If the water supply is interrupted, a message is output at the boiler. Emergency operation is still possible.

Water consumption of the condensing heat exchanger

The water consumption of the condensing heat exchanger is dependent on the return temperature of the heating system. If this is low, more condensate, i.e. water, is produced in the heat exchanger. This reduces the additional water required for cleaning the condensing heat exchanger.

approximate water consumption per year (in litres)

Return temperature	PU 7 - 15 kW	PC 20-32 kW	PC 33-50 kW	PC 60-105 kW
< 30 °C	800	1200	2000	4000
~ 50 °C	2000	3000	5300	10600

Flue tube connection to the chimney

The flue tube connection to the chimney can be optionally connected to the left or right of the condensing heat exchanger.

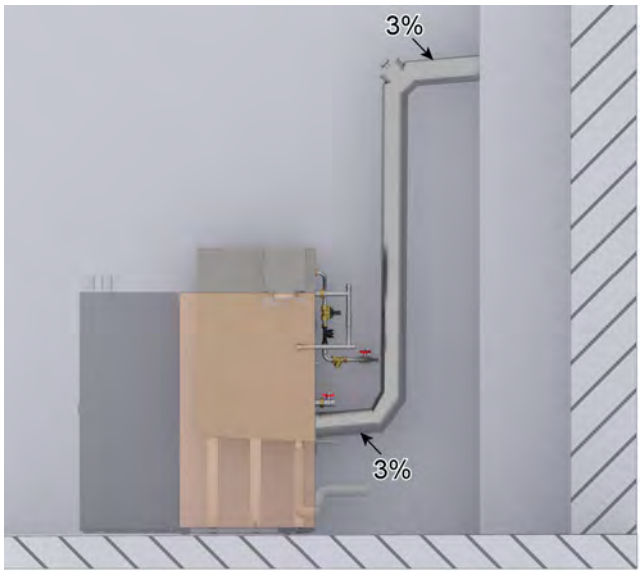


Fig. 3-3: Flue tube connection

The flue tube connection to the chimney must be made of stainless steel, sealed and rising (at 3%), so that the condensate from the chimney and the flue tube connection reaches the condensing heat exchanger and from there via the siphon into the sewage system.

Lay the flue tube connection in the shortest path between the condensing heat exchanger and the chimney with a maximum of three bends. We recommend a maximum length of 20x the diameter of the flue tube connection. A cleaning opening must be available. However, do not place it in the lower bend of the flue tube connection (after the condensing heat exchanger), because condensate can escape there.

Merge the return from the heating system

All returns of the heating system must be connected to the condensing heat exchanger, irrespective of the return temperature. Even if this can reduce the efficiency of the condensing heat exchanger.

The options "second internal heating circuit (article 12210)" and "mixer circuit for buffer operation (article 12211)" can therefore no longer be retrofitted to the PelletsUnit boiler.

Permit to discharge condensate into the sewage system

The resulting condensate from the exhaust gas has an almost neutral pH value. Discharge into the sewage system is often allowed without a special permit. Nevertheless, find out whether you need a permit for this.

3.1 Technical data

3.1.1 Condensing heat exchanger 7-15 kW

Technical data

The connection for the flue tube connection to the chimney can optionally be mounted on the left or right of the condensing heat exchanger. This is factory mounted on the right side, see the following diagram.

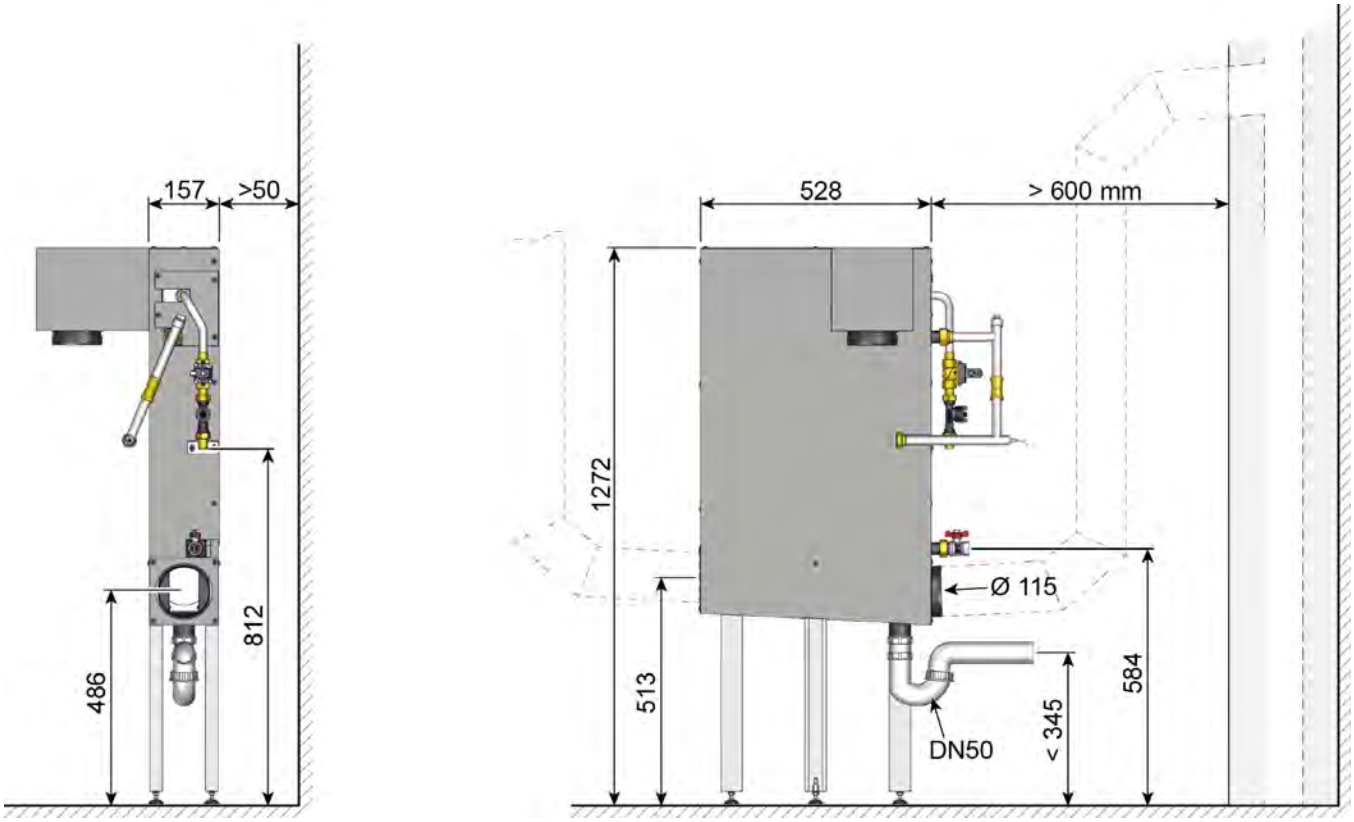


Fig. 3-4: Dimensions

The distance to the wall (> 50 mm) is only required for mounting. After installation, the boiler can be pushed to the wall with the condensing heat exchanger.

3.1.2 Condensing heat exchanger 20-32 kW

Technical data

The connection for the flue tube connection to the chimney can optionally be mounted on the left or right of the condensing heat exchanger. This is factory mounted on the right side, see the following diagram.

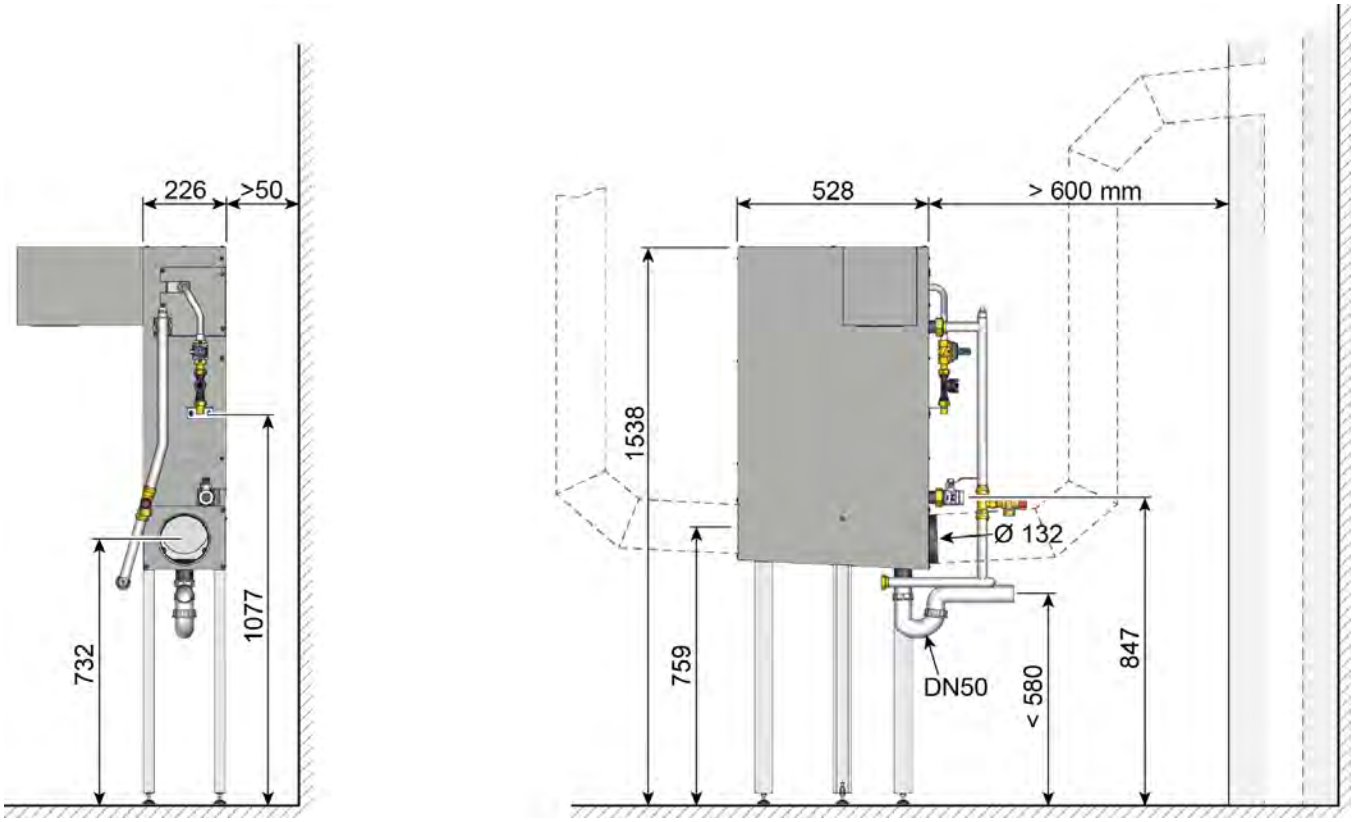


Fig. 3-5: Dimensions

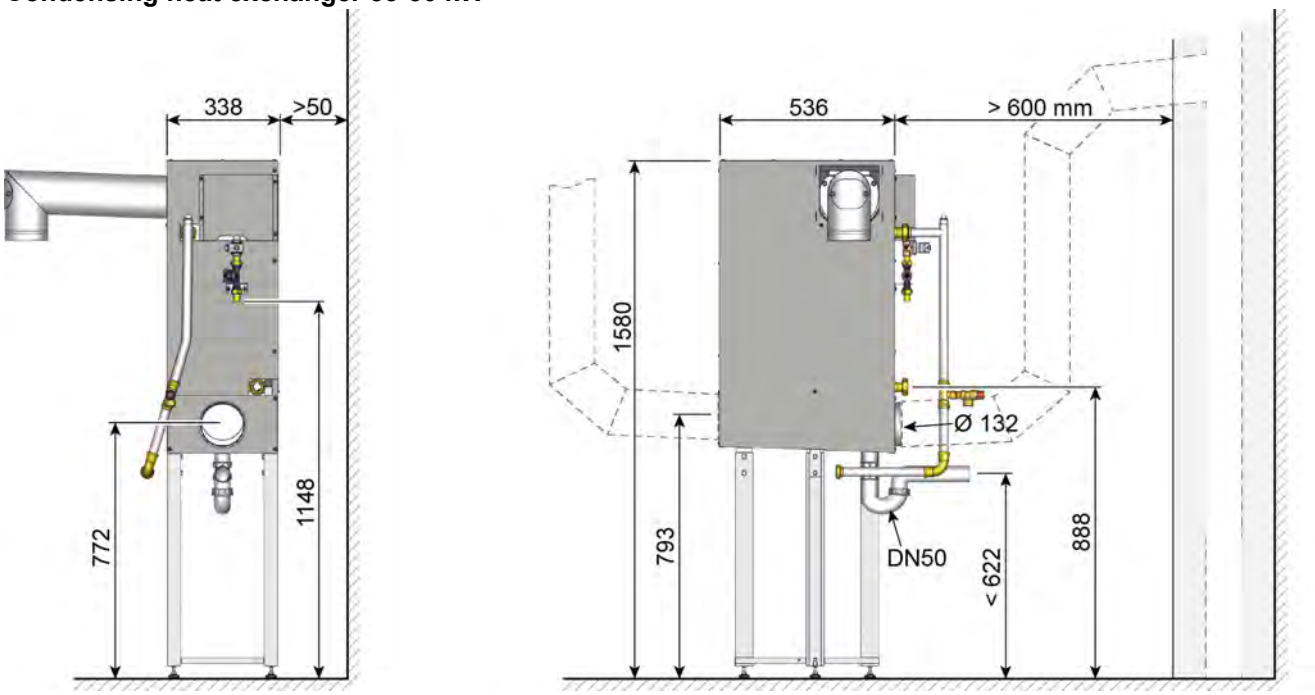
The distance to the wall (> 50 mm) is only required for mounting. After installation, the boiler can be pushed to the wall with the condensing heat exchanger.

3.1.3 Condensing heat exchanger 33-105 kW

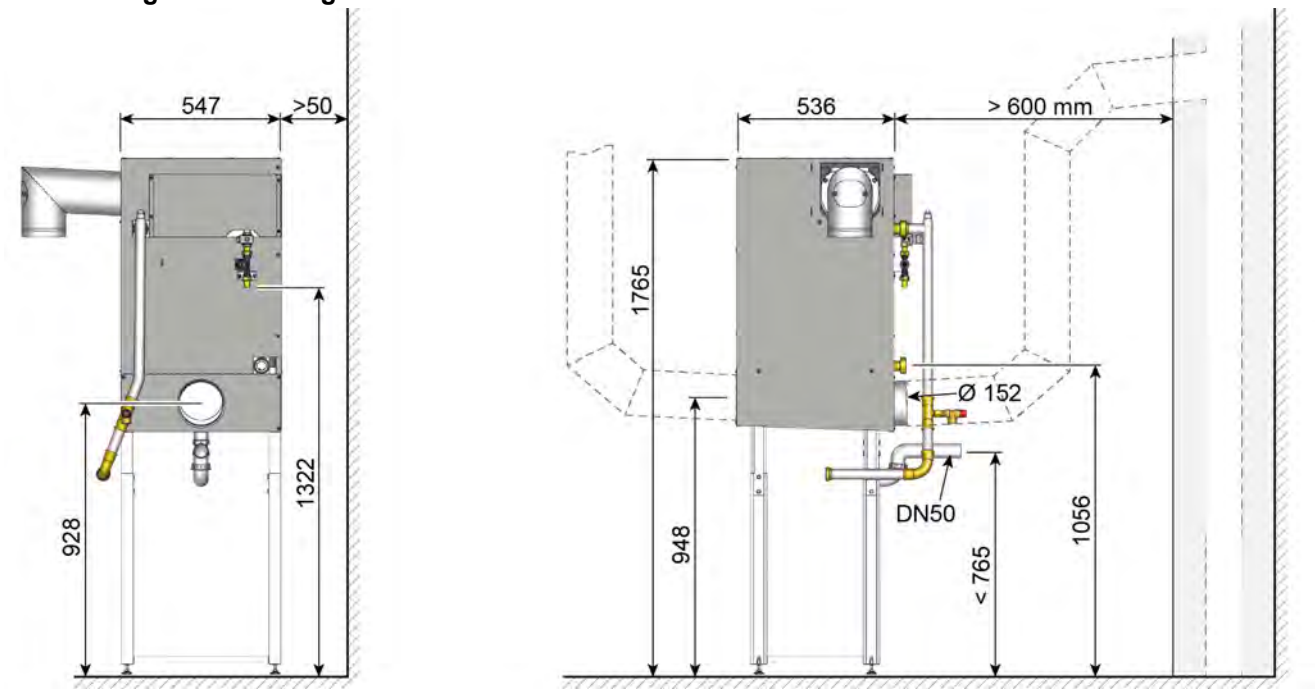
Technical data

The connection for the flue tube connection to the chimney can optionally be mounted on the left or right of the condensing heat exchanger. This is factory mounted on the right side, see the following diagram.

Condensing heat exchanger 33-50 kW



Condensing heat exchanger 60-105 kW



The distance to the wall (> 50 mm) is only required for mounting. After installation, the boiler can be pushed to the wall with the condensing heat exchanger.

4 Information for planning

4.1 Regulations, standards and guidelines

Regulations for the implementation of the heating system

To implement and operate the system, the rules of technology and legal provisions are to be observed:

- Technical building laws and regulations, which can vary from state to state in Germany. Therefore, in case of doubt, contact the local construction authorities.
- Fire protection and the chimney are the responsibility of the district chimney sweep. He/she must be informed before starting installation and the suitability of the chimney must be clarified.
- As regards the safety of the heating system, EN 12828 "Heating systems in buildings" applies in the European Union. The specialist company carrying out the installation is especially liable for compliance.
- As regards electrical safety, national regulations and laws are to be complied with in addition to the EN standards. The electrical specialist company is especially liable for this.
- Wood and pellet heating is often sponsored by public authorities. Before ordering the system, please find out about the currently valid guidelines that must be met in order to be eligible.

Inspecting the boilers

The ETA boiler fulfils the requirements of EN 303-5 as regards the design, safety and emissions. This has been confirmed by testing carried out by BLT Wieselburg and TÜV Süddeutschland.

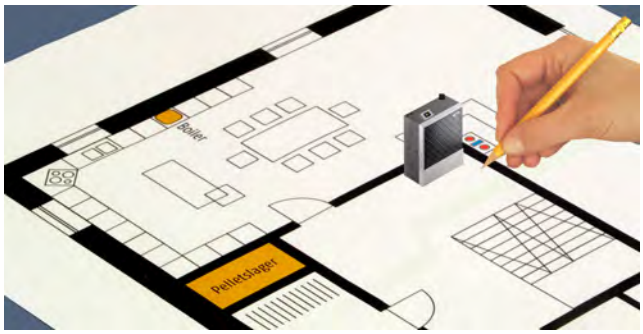
CE compliance

Compliance with EU guidelines and EN standards is the responsibility of the manufacturer and is confirmed with the CE mark on the type plate. In a CE declaration of conformity, which can be requested from the manufacturer (www.eta.co.at), the underlying guidelines and standards for series production are provided.

CE conformity is equivalent to national test marks, such as the "Ü mark" in Germany.

4.2 Setting up the heating system

Placement of the boiler



For optimum placement of the boiler, the following points are to be observed:

- Place the boiler close to the chimney.
- The pellet store can be up to 20 m away from the boiler. To fill the pellet store, plan an outside wall on the side of the road.
- Place the hot water tank (or the buffer with the fresh water module) as close to the kitchen as possible.
- For apartments and residential buildings, instructions about noise emissions must be observed for the placement of the boiler and the pellet store due to possible noise. For more information, see chapter 4.3 "Noise emission".

Hot water tank near the kitchen

Energy-saving installation of the heating system also requires hot water to be given a second thought. A space for the tank is to be sought within the living area, close to the kitchen and bathroom. During the day, often hot water needs to be on tap in the kitchen. With a tank close to the kitchen sink, hot water circulation is not required.

4.3 Noise emission

Airborne noise emission

In normal operation, the airborne noise emissions from a pellet or wood chip boiler is between 40 and 50 dB(a) with individual peaks of up to 75 dB(a) (ignition fan and pellets vacuum motor).

To limit airborne noise emissions, the usual measures that are required for all boiler rooms are sufficient:

- Heavy doors such as the legally prescribed fire doors

- Restriction of the air intake openings to the required minimum
- Sound absorption insulation in the floors of the rooms above

Structure-borne noise

Noise problems with pellet discharge screws are primarily caused by structure-borne noise emissions, that is from the noise energy that is introduced into the building.

Measures to reduce structure-borne noise

- Squeaking and creaking of the conveyor screw:

  Squeaking and creaking of the conveyor screw cannot be fully prevented. Even if these noise sources are negligible in 90% of systems, without measures to counteract structure-borne noise transmission, the limit value of 30 dB(a) (for domestic technical systems) can be exceeded in the adjacent living rooms for 10% of systems. For this reason, cover the screw in the wall opening with mineral wool to prevent noise being introduced into the wall.
- Place the storeroom on floating screed:

  The storeroom should be set up on a floating screed to acoustically decouple the conveyor from the building. In addition, a rubber underlay can be inserted under the adjustable feet.
- Do not support slanted floors on walls:

  The slanted floor as well as the support frame itself may not lean against the walls as often statically inadequately dimensioned walls do not have the strength to withstand the forces involved. Seal the connection of the tilting floor to the wall with silicon so that no pellets can fall under the tilting floor.

Correct placement of the pellet store

Placement of the storeroom is crucial for satisfactory operation. For this reason, do not place the pellet store underneath or in the immediate vicinity of bedrooms. Because the noises that occur during operation could be transferred into these rooms.

4.4 Boiler room

Installation of the boiler

The boiler may only be installed in dry surroundings. The permitted ambient temperatures are between 5 and 30 °C.

The boiler may only be installed on a flat, non-combustible surface. The distance of flammable materials in the immediate vicinity of the boiler must be heeded in accordance with national regulations.

Installation room for smaller boilers

For small boilers, a room with a sufficient air supply is adequate. The area immediately surrounding the boiler must be non-flammable.

In Germany, for up to 35 kW rated output, either at least one door to the outside or one window that can be opened (rooms with connection to outside), and a room volume of at least 4 m³ per kW of boiler output, is required. The room volume may also include other rooms connected via air inlets in the doors.

Requirements for the boiler room

Boiler rooms must be built with fire-resistant F90 (EI90) walls and ceilings; in Switzerland EI30 up to 70 kW and EI60 over 70 kW.

An escape door to a corridor or to the outside is required. The door F30 (EI30) must open in the direction of escape and be self-closing with a tight seal. Boiler room doors that open onto escape routes must be EI90 (F90).

The boiler room must feature air inlet and outlet vents with minimum diameters for the boiler.

To prevent flue gases from escaping, it must be ensured that no negative pressure occurs in the boiler room. Building installations, such as suction for the ventilation system or installed compressors, for example, are thus not permissible.

Floor characteristics

The boiler may only be installed on a flat, non-combustible floor. The floor must be capable of supporting the boiler's weight. For more information see the chapter 10 "Technical data".

Sufficient lighting in boiler room

The boiler room must have lighting sufficient for the installation and commissioning of the boiler.

There must be no heating appliances in the vicinity of escape routes

Boilers may not be installed in stairwells, corridors or rooms through which escape routes lead to the outside.

Free minimum cross sections for the air intake openings

The boiler requires air for combustion. That is why free minimum cross sections are required in the boiler room for the air intake openings. In Austria, these are defined in ÖNORM H 5170, see the following table.

Boiler output [kW]	Free minimum cross sections in cm²		
	Austria (specification from ETA)	Germany	Switzerland
20	400	150	206
30	400	150	309
40	400	150	412
50	400	150	515
60	400	170	618
70	400	190	721
90	400	230	927
110	440	270	1133
130	520	310	1339
180	720	410	1854
200	800	450	2060
350	1400	750	3605
500	2000	1050	5150

Tab. 4-1: free minimum cross sections

A protection grille at the air intake opening also reduces the free cross section. Therefore, the air inlet opening must be larger depending on the protection grill. In air ducts through channels a calculation by a specialist is required.

The values listed may vary from country-specific and national regulations. Enquire about it at your authorities. If no rules exist, we recommend the Austrian minimum cross sections to use as a guide.

Too small-sized air inlet openings may result to low pressure in the boiler room. This can lead to a reduction of the boiler output, as well as to an exit of flue gas in the boiler room.

Boilers that are operated with an external air supply require no further supply air and outlet openings in the boiler room.

Fuel storage

In Germany, up to 10,000 litres (6.5 tons) of pellets or 15,000 kg (20 steres) of split logs can be stored in the room where the boiler is installed. For larger quantities, a separate fire-resistant EI90 (F90) storeroom is required.

In Austria, no more than a week's supply of wood may be stored next to the boiler. For pellets, a separate storeroom EI90 (F90) with a EI30 (T30) door is required. As a result of amendments to building laws, up to 10 tonnes of pellets may be stored in the boiler room in some states.

In Switzerland, up to 10 m³ of wood can be stored in separate boiler rooms (EI60); the clearance from the boiler must be 1 m. For larger quantities, a separate storeroom (EI60 separated from the building) is required; here wood may be stored together with straw or hay.

4.5 Water hardness

Determine the permissible water hardness for the heating water according to ÖNORM H 5195-1

Specific water content (litres/kW)		Table 1 Heat producer with large (> 0.3 l/kW) water content			Table 2 Heat producer with small (≤ 0.3 l/kW) water content		
		< 20 l/kW	≥ 20 /kW < 50 l/kW	≥ 50 l/kW	< 20 l/kW	≥ 20 l/kW < 50 l/kW	≥ 50 l/kW
Total output of the heat producer	≤ 50 kW	16.8 °dH	11.2 °dH	5.6 °dH	11.2 °dH	5.6 °dH	0.6 °dH
	> 50 kW ≤ 200 kW	11.2 °dH	5.6 °dH	2.8 °dH	5.6 °dH	2.8 °dH	0.6 °dH
	> 200 kW ≤ 600 kW	5.6 °dH	2.8 °dH	0.6 °dH	2.8 °dH	0.6 °dH	0.6 °dH
	> 600 kW	2.8 °dH	0.6 °dH	0.6 °dH	0.6 °dH	0.6 °dH	0.6 °dH

Instructions for determination:

1. Determine the water content of the heat producer (in litres) and divide it by its output (in kW). If the result is larger than 0.3 l/kW, Table 1 applies. If the value is smaller or equal to 0.3 l/kW, Table 2 applies.
2. Divide the total heating water volume (in litres) by the output (in kW) of the smallest heat producer. The result is the specific water content and this determines the column within the previously calculated table.
3. Read the data for the permissible water hardness from the respective line using the total output of the heat producer.

Example: a heating system with a 45 kW boiler and 1500 litre total water volume

1. The ratio of water content to output is more than 0.3 l/kW (117:45=2.6) => table 1.
2. The specific water content is 33,3 l/kW (1500÷45 = 33.3) => middle column in table 1.
3. The total output of the boiler is 45 kW; therefore, only the data from the first line (≤ 50 kW) are relevant.

The permissible water hardness in this example is 11.2 °dH.

Softening with a salt-regeneration ion exchanger

We recommend softening water with salt-regeneration ion exchangers, just as drinking water is softened. This method does not remove salt from the water. It replaces the calcium in the lime with sodium from the salt, and has considerable advantages. It is cheap and chemically stable against contamination. In addition, it produces a natural alkalinity that generally results in a sufficiently non-corroding pH value of around 8.

pH value between 8 and 9 may require dosing with trisodium phosphate

If the heating water's pH value has not itself changed to more than 8 after a week of operation, increase it by adding 10 g/m³ of trisodium phosphate (Na_3PO_4) or 25 g/m³ of trisodium phosphate dodecahydrate ($Na_3PO_4.12H_2O$). Wait another 2-4 weeks before making further corrections. The pH value must not exceed 9.

No hybrid installations

A disadvantage of salt-regeneration ion exchange is the salt content with its high electrical conductivity, which can lead to electrolytic corrosion, especially of aluminium or galvanized steel. If only steel, brass, gunmetal and copper are used in the heating system and the use of stainless steel is limited to small areas, then no corrosion problems should be expected, even with salty water.

Galvanized and aluminium parts in a heating system are always in danger of corrosion, especially in combination with copper tubing. In practice, this means no hot-galvanized fittings and no mixing of galvanized tubing with copper tubing. There is an illogical exception: galvanized steel tubing combined with boilers or buffer storage tanks made of steel. Presumably, the uniform zinc layer dissolves uniformly and is dispersed evenly throughout the system without localised corrosion.

Complete desalination not required

If there is no aluminium (heat exchanger in the gas boiler or aluminium radiator) in the system, then costly complete desalination with ion exchange cartridges or osmosis is not required.

Lime stabilisation can be dangerous

The addition of lime stabilising agents prevents limescale. However, we advise against doing this. These agents increase the salt content and result in an undefined pH value. If the system is filled with large amounts of water, exactly the same agent must be used again. Mixing with other water additives or with antifreeze can result in corrosion.

4.6 Bleeding

Protection against atmospheric corrosion

To reliably protect the entire heating system against corrosion, air intrusion should be kept to a minimum and any air that does gain entry must be released as soon as possible.

Bleeding at highest point in flow

No system is completely airtight. Air that gets into the system is transported to the boiler with the return flow since water can take up more air as it gets colder and as the pressure increases. The air is released again at the point in the system with the highest temperature and the lowest pressure. The two typical points for releasing gas are the hot boiler and the highest point in the heating system flow.

Install a bleed valve at the upper end of the pipe from the boiler outlet (already installed in PelletsUnit and PelletsCompact boilers) and also at the highest point in the flow of the entire system.

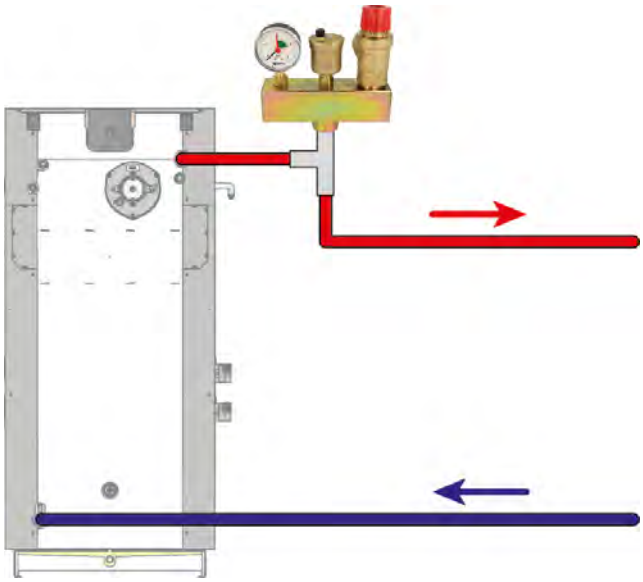


Fig. 4-1: correct positioning of the bleed valve

The T-piece of the bleed valve must be the same size as the boiler's flow connection, so that no air pocket may form. Likewise, the boiler body must be oriented horizontally, or ascending slightly toward the flow connection, so that air can escape.

For large, unseparated underfloor heating systems, an absorption filter for the entire water flow should be installed in the flow after the boiler (Spirovent, Flamco and Pneumatex are typical manufacturers).

Impermeable plastic tubing or system separation

Plastic tubing which is used must have DIN 4726 certification. As a rule, this is documented with a DIN test mark and a register number in the pipe label. Underfloor heating systems from older construction years often do not meet the requirements of the DIN standard from 1988. A considerable input of oxygen is to be expected here. The oxygen introduced can have a corrosion-promoting effect on various components in the heating system. A separation of the existing underfloor heating from the new boiler is required here. Although the limit values are not reached, the sum of the oxygen input via surface heating system, distribution, leakages, replenishment, etc. can also cause corrosion damage, especially in large systems (pipe lengths over 5000 running metres). A separation of the surface heating system from the heating boiler is

recommended here. If damage to the boiler caused by the introduction of oxygen is proven, all claims under warranty and guarantee are void.

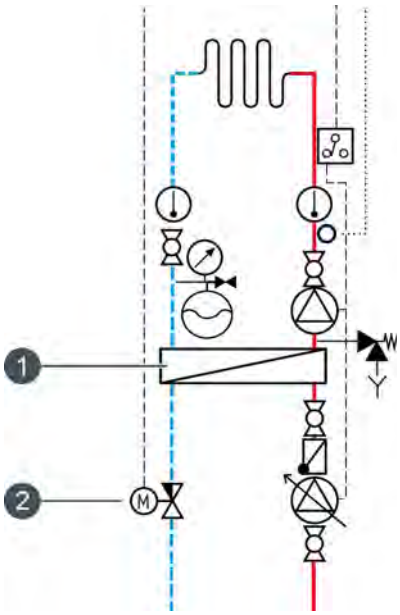


Fig. 4-2: System separation

1 Heat exchanger

2 Control valve

The hydraulically correct incorporation of the heat transfer station (regardless of whether for system separation or as a transfer station) must be adjusted on the primary side. In order to achieve optimal flow based on the flow temperature, the use of a two-way control valve (see graphic above) is recommended. Additionally, the primary pump should be designed with differential pressure control. A system separation module with these specifications is available from ETA.



Fig. 4-3: ETA system separation module

No open expansion tanks

Open expansion tanks improperly allow air into the system. Existing systems with open expansion tanks must be redesigned or physically separated from the boiler.

Pressureless buffer storage may not be attached directly to the boiler. If it is not possible to replace this buffer, there must be a physical separation between the boiler and the pressureless buffer.

4.7 Operation with external air supply

Operation with external air supply is possible

Only the boilers of the PelletsUnit 7-15 kW as well as PelletsCompact 20-32 kW and ePE-BW 8-22 kW series can be operated with external air supply.

In modern energy-saving houses, the aim should be to install the boiler within the insulated shell, that is in the heated living area. Compared with installation in a boiler room in the cold cellar, this results in fuel savings of 5 to 15%. However, since conventional air inlets and outlets cause high heat loss in the living area, this boiler can be operated with direct external air supply.

For operation with an external air supply, the required combustion air is supplied to the boiler through a temperature-resistant (up to 120°C) pipe with 80 mm diameter.

External air operation is also recommended if the boiler is installed in a room where cleaning agents are also stored. This is because chlorine from strong cleaning agents that are stored next to the boiler and evaporate turns into hydrochloric acid during combustion, causing corrosion in the boiler.

Settling section required for supply air

For operation with an external air supply, a straight section at least 25 cm long is required at the boiler's air connection. This ensures that the incoming air can settle and increases the measurement accuracy of the vacuum actuator. After the settling section, bends can be added to the air supply ducts.

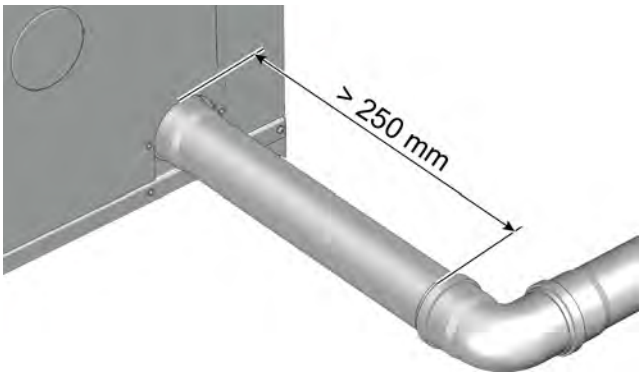
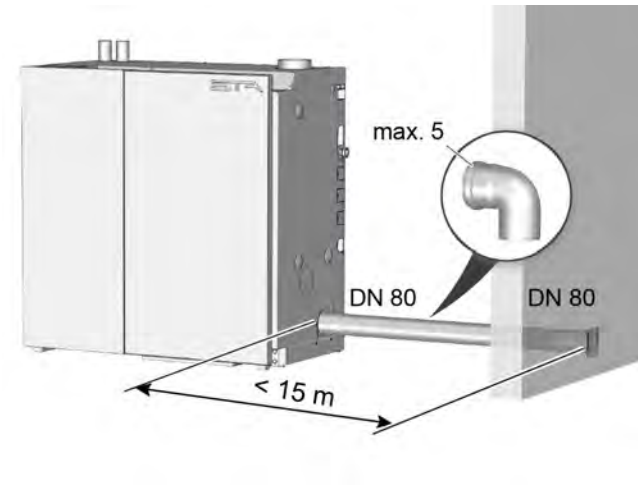


Fig. 4-4: Settling section

Maximum length of the supply air pipe

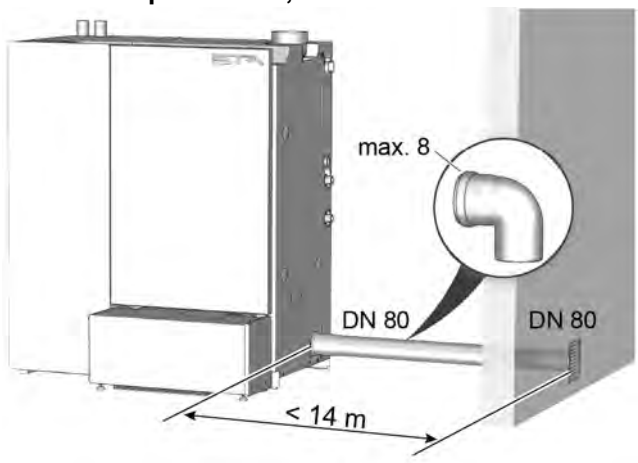
PelletsUnit



- 15 m pipe DN 80 and a maximum of 5 bends
- each additional bend reduces the total length by 2 m

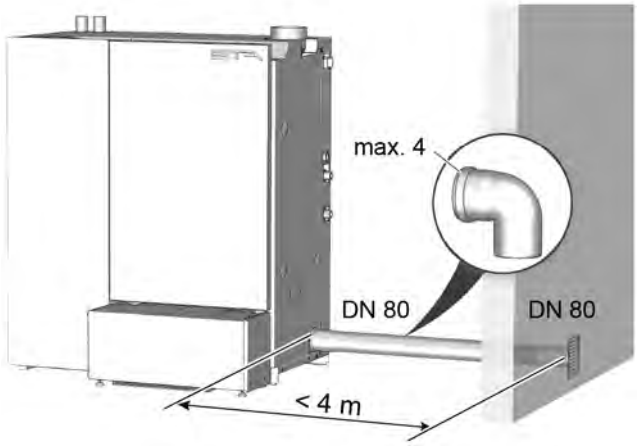
Maximum length of the supply air duct

PelletsCompact 20 kW, 25 kW



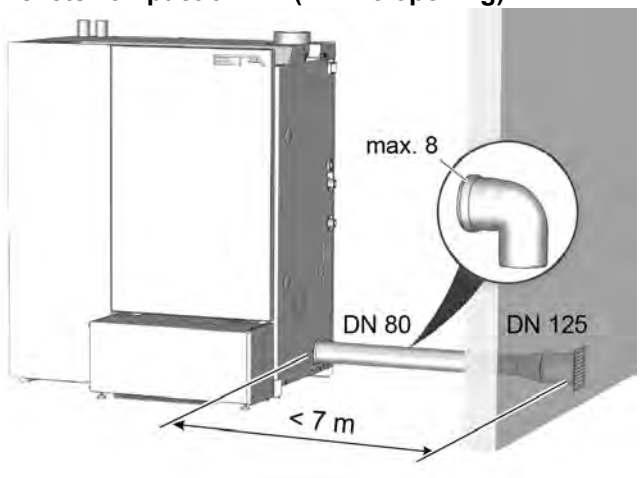
- 14 m pipe DN 80 with a maximum of 8 bends
- each additional bend reduces the total length by 2 m

PelletsCompact 32 kW (DN80 opening)



- DN 80 opening with opening screen
- 4 m total length pipe DN 80 with a maximum of 4 bends
- each additional bend reduces the total length by 2 m

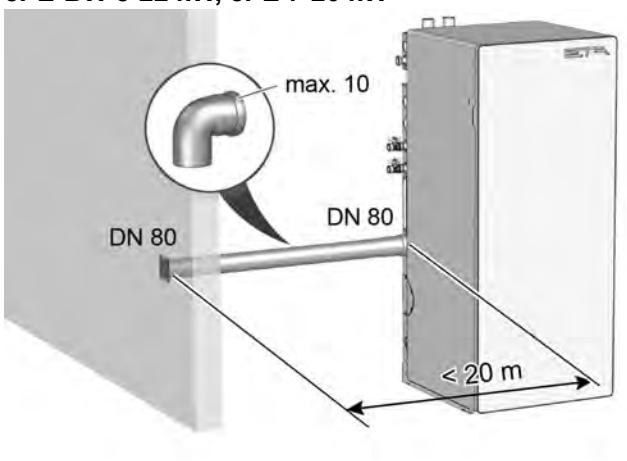
PelletsCompact 32 kW (DN125 opening)



- DN 125 opening with opening screen
- 7m total length pipe DN 80 with a maximum of 8 bends
- each additional bend reduces the total length by 2 m

Maximum length of the supply air duct

ePE-BW 8-22 kW, ePE 7-20 kW



- 20 m pipe DN 80 with a maximum of 10 bends

Insulation against cold and fire protection for the air supply duct

To avoid condensation on the pipe surface that can result in structural damage, air supply ducts separated from the chimney and leading through walls, floors or ceilings must be insulated against cold. If the air supply is directed through other rooms, additional fire insulation with mineral wool is required.

No draught limiter and no deflagration damper for room-air-independent operation

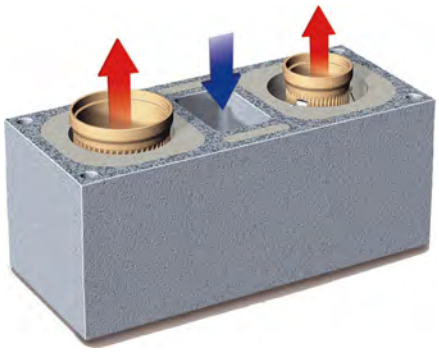
For operation with external air supply, the chimney must be absolutely airtight from the room. No draught limiters or deflagration dampers (often also called blowback flaps) may be installed in the flue pipe.

Chimney with air supply is the better choice

If air is supplied from the side of the building facing away from the wind, extremely windy conditions (negative-pressure in storms) with simultaneous power failure can cause hot combustion gases to be sucked from the boiler into the air supply duct.

To prevent this, we recommend a ventilation shaft in the chimney. The boiler is connected to the air supply from the chimney with an 80 mm pipe (resistant to 120°C).

Systems with an annular air supply (LAS systems) can also be used, as long as they have an insulated inner pipe and a corresponding certification.



Heating appliances, cooker hoods and central vacuum cleaners need air supply

To keep ventilation heat losses under control, airtightness (blower door test) is a crucial issue in today's new buildings. In an airtight house, the boiler receives air from the outside via a dedicated pipe. This is described as "operation with external air supply".

A cooker hood or a central vacuum cleaner also need air in order to generate suction. Without an air supply, their effectiveness tends towards zero. Worse yet, negative-pressure results inside the house, which can cause combustion gases to be sucked into the living quarters if a pellet boiler with external air supply is installed there.

There are several different ways to ensure the air supply for cooker hoods and central vacuum cleaners:

1) **Air supply from the ventilation system**
   If an open air supply path is guaranteed for all of the ventilation system's operating conditions, then the ventilation system can be used to supply air to the cooker hood and the central vacuum cleaner. This is a simple and proven solution. If a heat exchanger installed in the air supply path is protected against frost by a shut-off damper, a bypass damper for the heat exchanger is needed.
2) **Recirculation cooker hood a proven solution for passive houses**
   A recirculation cooker hood needs no air supply. In passive houses with controlled ventilation in the living quarters, this is the preferred solution to keep the ventilation heat loss to a minimum.
3) **Supply air position switch on window**
   The power supply for the cooker hood and the central vacuum cleaner is only activated when the window is open or tilted.
4) **Air supply via blinds**
   The slats in the blinds open due to the pressure difference and admit air into the room. This solution is safe and simple but can be an unpleasant source of leaks in rooms with mechanical ventilation (controlled ventilation of living quarters).
5) **Air supply via motorised flap**
   An air inlet damper (diameter approx. 300 mm) is opened when the cooker hood or the central vacuum cleaner is switched on. Only when the open position is reached is the fan for the cooker hood or the central vacuum cleaner activated via a position switch in the flap actuator.

5 Safety

5.1 General information

Operation only by trained personnel

The product may be operated by trained adults only. Training may be provided by the heating technician or our customer service. Please read the associated documentation carefully in order to avoid errors during operation and maintenance.

Persons who lack experience and knowledge as well as children may not operate, clean, or maintain the product.

Keep children away from the pellet store

Children must be kept away from the pellet store. It is a good idea to lock the door to the pellet store. The door handle on the inside of the pellet store must not be removed. It must be possible to open the door from the inside in an emergency.

Keep fire extinguishers in a clearly visible location

In Austria, the minimum requirement is an ABC powder extinguisher with 6 kg. An AB foam extinguisher with 9 litres, which produces less damage when used, is preferable. The fire extinguisher should be kept outside the boiler room, visible and easily accessible. Even if country-specific regulations do not prescribe a fire extinguisher, we still recommend that you keep one in-house.



Fig. 5-1: Fire extinguisher

Storage of ash

The ash must be kept in non-flammable containers with covers for cooling. Never put hot ash into the waste bin!



Emergency stop switch for the boiler

In Austria, heating systems installed in boiler rooms must be equipped with an emergency stop switch. The switch must be situated immediately outside the access door and clearly marked. For boiler rooms that are only accessible from outdoors, these switches may also be within the boiler rooms, immediately next to the access doors.



Fig. 5-2: Emergency stop switch

A single-pole emergency stop switch is integrated into the boiler's safety chain. When actuated, it interrupts the supply of combustion air and fuel. The pumps continue running to cool the boiler.

Return riser

Wood contains water. If the temperature in the boiler is too low, steam condenses from the flue gas onto the heat exchanger surfaces. Corrosion and a leaky heat exchanger are the results. To prevent this, the water temperature at the boiler inlet must be at least 55°C. Since the return temperatures are usually lower, a return riser is needed to provide controlled, heated flow to the boiler return.

The mixing valve also makes it possible to use the boiler's residual heat in the buffer. If the bottom of the accumulator tank is colder than the boiler when the fire is extinguished, the boiler control system opens the mixing valve again and switches on the boiler pump to make use of the residual heat.

The boilers of the SH, SH-P, TWIN and PE-K series require an external return riser. The PelletsUnit and PelletsCompact boilers have integrated return risers.

A return riser with a "Termovar" valve is not permitted. An electrical mixer with a 230 V supply must be installed to enable output regulation of the boiler.

5.2 Safety devices

Pump safety run, automatic heat dissipation at overtemperature

If the boiler temperature exceeds 90°C (factory setting) for any reason, the pump safety run will start. All heating pumps and boiler pumps that are connected to the boiler control system are switched on to dissipate heat from the boiler.

This action prevents the boiler temperature from rising further and triggering further safety devices such as the safety temperature limiter and the thermal relief valve.

The heat dissipation is limited by the maximum flow temperature set in the heating circuits and the target hot water temperature.

Install thermal emergency cooling valve against overheating

The boilers of the SH, SH-P, PE-K and HACK series are designed with a safety heat exchanger according to the requirements of EN 303-5. The PelletsUnit and PelletsCompact boilers (up to 50 kW) as specified in EN 303-5 are quick to shutdown and, therefore, require no thermal emergency cooling valve.

The safety heat exchanger built into the boiler must be connected by the heating technician to the house's cold water supply via a thermal relief valve to protect the boiler against overheating if the pump fails. The minimum pressure in the cold water pipe must be 2 bar and the temperature must not exceed 15 °C.



Fig. 5-3: Thermal emergency cooling valve

Only thermal emergency cooling valves that correspond to the standard DIN EN 14597 (or comparable standards) may be installed. They must activate at 100 °C and have a flow rate of at least 2.0 m³/h. The clear width of the cold water supply and outlet may not fall below the nominal diameter of the safety heat exchanger.

The cold water supply must be connected to the upper connector of the safety heat exchanger; the lower connector serves as an outlet to the sewer. To prevent the supply line from being shut off accidentally, remove the levers from ball valves or the hand wheels from valves and hang them there with a piece of wire.

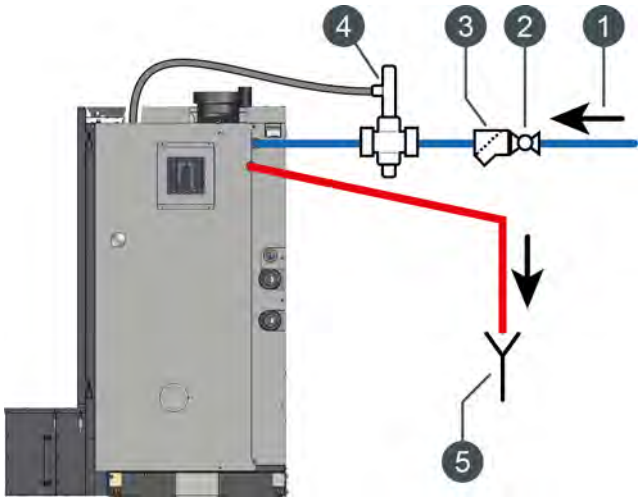


Fig. 5-4: Installation on the boiler

1 Cold water connection
2 Isolating valve; remove hand wheel
3 Strainer
4 Thermal emergency cooling valve
5 Visible outlet to sewer

The outlet must have an easily visible flow path so malfunctions can be recognised. Direct the discharged water to the sewer via a siphon funnel or at least with a pipe into the ground so that nobody can be scalded if the valve is activated.

Even for cold water coming from a domestic well with its own pump, a thermal emergency cooling valve must be installed on the boiler. With a generously dimensioned air vessel, enough water for cooling will come even if there is a power failure. If the power supply is very uncertain, a dedicated air vessel for the thermal emergency cooling valve is required.

Safety shutdown by safety temperature limiter

For additional safety against boiler overheating, a safety temperature limiter is built into the boiler. When a boiler temperature of 100 °C (tolerance +0/-6 °C) is reached, the power supply is interrupted to the draught fan and the fuel feed. When the boiler temperature falls back below 70 °C, the safety temperature limiter can be manually released for a restart of the boiler.

Installing a safety valve against overpressure

A safety valve with 3 bar opening pressure must be installed on the boiler. Every heat producer in a heating system must be protected by at least one safety valve against pressure exceeding the maximum permissible operating pressure (see EN 12828). These valves must be designed such as to ensure the maximum permissible operating pressure that can arise in the heating system or parts thereof. The safety valve must be situated in the boiler room and be easily accessible.



Fig. 5-5: Safety valve

DANGER!

Do not install any shut-off valves, strainers or such like between the boiler and the safety valve.

The connection size of the safety valve is determined on the basis of the heating system's maximum heating capacity, as shown in the table.

Valve size[a] Nominal diameter (DN)	Maximum heating capacity (kW)
15 (G ½)	50
20 (G ¾)	100
25 (G 1)	200
32 (G 1 ¼)	300
40 (G 1 ½)	600
50 (G 2)	900

a. The valve size is determined by the size of the inlet connection.

Install the safety valve at the highest point of the heat producer or in the flow pipe close to the heat producer. Only in this way can it discharge heat by blowing out hot water and steam.

The safety valve may be installed in any position, but the upper part of the valve must not face downward. The flow pipe may be 1 m long maximum and must be routed in a straight line in the nominal diameter of the valve inlet.

DANGER!

Safety valve outlet

The safety valve outlet must be directed to the ground in a pipe so nobody is endangered by hot water or steam.

- The safety valve outlet (vent pipe) must have at least the same nominal diameter as the valve outlet, be installed with a consistent gradient and be routed to a sewage system (e.g. duct). The vent pipe may contain a maximum of 2 bends and be 2 m long. If a length of more than 2 m is required, the next size of pipe must be selected. More than 3 bends and 4 m of length are not permitted. The mouth of the vent pipe must allow easy inspection and be routed such as to exclude any danger to persons. If the vent pipe ends above a funnel, its discharge pipe must have a cross section at least double that of the valve inlet.

6 Chimney

6.1 Dimensioning

6.1.1 Condensing boiler ePE-BW 8-14 kW

Required chimney diameter

The flue pipe from the boiler to the chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation.

Example: ePE-BW 12 with a 9 m chimney height and DN130 flue pipe => a chimney with 13 cm diameter is required.

No cross-sectional taper is permitted, such as a DN130 flue pipe in a chimney with a 12 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		ePE-BW 8	ePE-BW 10	ePE-BW 12	ePE-BW 14
DN 113 DN 130	6 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	7 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	8 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	9 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	10 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	11 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	12 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	13 m	11.3 13	11.3 13	11.3 13	11.3 13
DN 113 DN 130	14 m	11.3 13	11.3 13	11.3 13	11.3 13

6.1.2 Condensing boiler ePE-BW 16-22 kW

Required chimney diameter

The flue pipe from the boiler to the chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation.

Example: ePE-BW 20 with a 9 m chimney height and DN130 flue pipe => a chimney with 13 cm diameter is required.

No cross-sectional taper is permitted, such as a DN130 flue pipe in a chimney with a 12 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		ePE-BW 16	ePE-BW 18	ePE-BW 20	ePE-BW 22
DN 130	6 m	13	13	14	14
DN 130	7 m	13	13	14	14
DN 130	8 m	13	13	13	13
DN 130	9 m	13	13	13	13
DN 130	10 m	13	13	13	13
DN 130	11 m	13	13	13	13
DN 130	12 m	13	13	13	13
DN 130	13 m	13	13	13	13
DN 130	14 m	13	13	13	13

6.1.3 PelletsUnit PU 7-15 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue has connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. For some boilers a smaller chimney dimension (corresponding to the minimum diameter) can also be used. These values are listed in brackets.

Example: PU 7 with a 9 m chimney height and DN100 flue pipe => a chimney with 12 cm diameter is required. Alternatively, a chimney with 10 cm diameter can be used.

No cross-sectional taper is permitted, such as a DN113 flue pipe in a chimney with a 10 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm	
		PU 7	PU 11
DN 100 DN 113	6 m	12 (10) 12	12 (10) 12
DN 100 DN 113	7 m	12 (10) 12	12 (10) 12
DN 100 DN 113	8 m	12 (10) 12	12 (10) 12
DN 100 DN 113	9 m	12 (10) 12	12 (10) 12
DN 100 DN 113	10 m	12 (10) 12	12 (10) 12
DN 100 DN 113	11 m	12 (10) 12	12 (10) 12
DN 100 DN 113	12 m	11 (10) 11	11 (10) 11
DN 100 DN 113	13 m	11 (10) 11	11 (10) 11
DN 100 DN 113	14 m	11 (10) 11	11 (10) 11

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm
		PU 15
DN 110 DN 113	6 m	13 (11) 13 (11)
DN 110 DN 113	7 m	13 (11) 13 (11)
DN 110 DN 113	8 m	12 (11) 12 (11)
DN 110 DN 113	9 m	12 (11) 12 (11)
DN 110 DN 113	10 m	12 (11) 12 (11)
DN 110 DN 113	11 m	12 (11) 12 (11)

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm PU 15
DN 110 DN 113	12 m	12 (11) 12 (11)
DN 110 DN 113	13 m	12 (11) 12 (11)
DN 110 DN 113	14 m	12 (11) 12 (11)

6.1.4 PelletsCompact PC 20-32 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue has connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. For some boilers a smaller chimney dimension (corresponding to the minimum diameter) can also be used. These values are listed in brackets.

Example: PC 25 with a 10 m chimney height and DN120 flue pipe => a chimney with 13 cm diameter is required. Alternatively, a chimney with 12 cm diameter can be used.

No cross-sectional taper is permitted, such as a DN130 flue pipe in a chimney with a 12 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm		
		PC 20	PC 25	PC 32
DN 120 DN 130	6 m	13 (12) 13	13 (12) 13	14 (13) 14 (13)
DN 120 DN 130	7 m	13 (12) 13	13 (12) 13	14 (13) 14 (13)
DN 120 DN 130	8 m	13 (12) 13	13 (12) 13	13 (12) 13
DN 120 DN 130	9 m	13 (12) 13	13 (12) 13	13 (12) 13
DN 120 DN 130	10 m	12 13	13 (12) 13	13 (12) 13
DN 120 DN 130	11 m	12 13	13 (12) 13	13 (12) 13
DN 120 DN 130	12 m	12 13	12 13	13 (12) 13
DN 120 DN 130	13 m	12 13	12 13	13 (12) 13
DN 120 DN 130	14 m	12 13	12 13	13 (12) 13

6.1.5 PelletsCompact PC 33-50 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue has connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. For some boilers a smaller chimney dimension (corresponding to the minimum diameter) can also be used. These values are listed in brackets. The "X" marks any diameters which may not be used.

Example: PC 50 with a 7 m chimney height and DN150 flue pipe => a chimney with 16 cm diameter is required. Alternatively, a chimney with 15 cm diameter can be used.

No cross-sectional taper is permitted, such as a DN150 flue pipe in a chimney with a 13 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm	
		PC 33 PC 40	PC 45 PC 50
DN 130 DN 150	6 m	X 16 (15)	X 18 [a]
DN 130 DN 150	7 m	X 16 (15)	X 16 (15)
DN 130 DN 150	8 m	16 (15) 15	X 15
DN 130 DN 150	9 m	15 15	16 15
DN 130 DN 150	10 m	15 (14) 15	16 (15) 15
DN 130 DN 150	11 m	14 (13) 15	15 (14) 15
DN 130 DN 150	12 m	13 15	15 (14) 15
DN 130 DN 150	13 m	13 15	14 15
DN 130 DN 150	14 m	13 15	14 15

a. For boiler outputs over 30 kW and low chimney heights, a chimney joint tilted 45° can help achieve the required draught of 5 Pa at full load with acceptable cross-sections (a size smaller than indicated in the table).

6.1.6 PelletsCompact PC 60-105 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue has connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. For some boilers a smaller chimney dimension (corresponding to the minimum diameter) can also be used. These values are listed in brackets. The "X" marks any diameters which may not be used.

Example: PC 70 with a 13 m chimney height and DN150 flue pipe => a chimney with 18 cm diameter is required. Alternatively, a chimney with 16 cm diameter can be used.

No cross-sectional taper is permitted, such as a DN180 flue pipe in a chimney with a 16 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		PC 60	PC 70	PC 80	PC 100 PC 105
DN 150 DN 180	6 m	X 18 [a]	X 20 [a]	X 20 [a]	X 25 [a]
DN 150 DN 180	7 m	18 [a] 18	X 18 [a]	X 18 [a]	X 20 [a]
DN 150 DN 180	8 m	18 [a] 18	22 [a] 18	X 18 [a]	X 20 [a]
DN 150 DN 180	9 m	18 18	20 18	X 18	X 20
DN 150 DN 180	10 m	16 18	18 18	X 18	X 20
DN 150 DN 180	11 m	16 18	18 18	18 [a] 18	X 20
DN 150 DN 180	12 m	16 (15) 18	18 18	18 18	X 18
DN 150 DN 180	13 m	16 (15) 18	18 (16) 18	18 18	X 18
DN 150 DN 180	14 m	16 (15) 18	18 (16) 18	18 18	X 18

a. For boiler outputs over 30 kW and low chimney heights, a chimney joint tilted 45° can help achieve the required draught of 5 Pa at full load with acceptable cross-sections (a size smaller than indicated in the table).

6.1.7 Pellet boiler ePE-K 100 - 130 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue gas connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. The "X" marks any diameters which may not be used.

Example: eHACK 110 with 8 m chimney height and DN200 flue pipe => a chimney with 20 cm diameter is required.

No cross-sectional taper is permitted, such as a DN200 flue pipe in a chimney with a 18 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		eHACK, ePE-K 100	eHACK, ePE-K 110	eHACK, ePE-K 120	eHACK, ePE-K 130
DN 180 DN 200	6 m	X 25 [a]	X 25 [a]	X 25 [a]	X 25 [a]
DN 180 DN 200	7 m	X 20 [a]	X 20 [a]	X 25 [a]	X 25 [a]
DN 180 DN 200	8 m	20 [a] 20 [a]	X 20 [a]	X 20 [a]	X 25 [a]
DN 180 DN 200	9 m	20 [a] 20 [a]	20 [a] 20 [a]	X 20 [a]	X 20 [a]
DN 180 DN 200	10 m	20 20	20 [a] 20 [a]	20 [a] 20 [a]	X 20 [a]
DN 180 DN 200	11 m	20 20	20 20	20 20	20 20
DN 180 DN 200	12 m	18 20	20 20	20 20	20 20
DN 180 DN 200	13 m	18 20	20 20	20 20	20 20
DN 180 DN 200	14 m	18 20	20 20	20 20	20 20

a. For boiler outputs over 30 kW and low chimney heights, a chimney joint tilted 45° can help achieve the required draught of 5 Pa at full load with acceptable cross-sections (a size smaller than indicated in the table).

6.1.8 Pellet boiler ePE-K 140-170 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue gas connection on the boiler has two different diameters (see table). The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. The "X" marks any diameters which may not be used.

Example: eHACK 150 with 8 m chimney height and DN250 flue pipe => a chimney with 25 cm diameter is required.

No cross-sectional taper is permitted, such as a DN250 flue pipe in a chimney with a 20 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		eHACK, ePE-K 140	eHACK, ePE-K 150	eHACK, ePE-K 160	eHACK, ePE-K 170
DN 200 DN 250	6 m	X 25 [a]	X 25 [a]	X 25 [a]	X 30 [a]
DN 200 DN 250	7 m	X 25 [a]	X 25 [a]	X 25 [a]	X 25 [a]
DN 200 DN 250	8 m	25 [a] 25	X 25	X 25	X 25
DN 200 DN 250	9 m	25 25	25 [a] 25	25 [a] 25	25 [a] 25
DN 200 DN 250	10 m	25 25	25 25	25 [a] 25	25 [a] 25
DN 200 DN 250	11 m	25 25	25 25	25 25	25 25
DN 200 DN 250	12 m	20 25	25 25	25 25	25 25
DN 200 DN 250	13 m	20 25	20 25	25 25	25 25
DN 200 DN 250	14 m	20 25	20 25	25 25	25 25

a. For boiler outputs over 30 kW and low chimney heights, a chimney joint tilted 45° can help achieve the required draught of 5 Pa at full load with acceptable cross-sections (a size smaller than indicated in the table).

6.1.9 Pellet boiler ePE-K 180-240 kW

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue gas connection on the boiler has two different diameters (see table). The flue gas connection with DN200 must not be used with this boiler. The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with a length of 2 m and with two 90° bends was assumed for the calculation. The "X" marks any diameters which may not be used.

Example: eHACK 200 with 8 m chimney height and DN250 flue pipe => a chimney with 30 cm diameter is required.

No cross-sectional taper is permitted, such as a DN250 flue pipe in a chimney with a 20 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		eHACK, ePE-K 180	eHACK, ePE-K 200	eHACK, ePE-K 220	eHACK, ePE-K 240
DN 200 DN 250	6 m	X 30 [a]	X 30 [a]	X 30 [a]	X 35 [a]
DN 200 DN 250	7 m	X 30	X 30 [a]	X 30 [a]	X 30 [a]
DN 200 DN 250	8 m	X 30	X 30	X 30	X 30 [a]
DN 200 DN 250	9 m	X 30	X 30	X 30	X 30
DN 200 DN 250	10 m	X 25	X 30	X 30	X 30
DN 200 DN 250	11 m	X 25	X 25	X 30	X 30
DN 200 DN 250	12 m	X 25	X 25	X 25	X 30
DN 200 DN 250	13 m	X 25	X 25	X 25	X 30
DN 200 DN 250	14 m	X 25	X 25	X 25	X 25

a. For boiler outputs over 30 kW and low chimney heights, a chimney joint tilted 45° can help achieve the required draught of 5 Pa at full load with acceptable cross-sections (a size smaller than indicated in the table).

6.1.10 SH log boiler

Required chimney diameter

Please note that in partial-load operation the exhaust temperature is lower and the large chimney diameters, normally used for solid fuel, are no longer ideal. If the cross section is too large, the flue gas no longer safely rises from the chimney opening and may flow along the roof and sink to the windows of the living quarters.

The flue pipe from boiler to chimney must be executed as per the requirements in the table. A flue pipe with 2 m length and two 90° bends was assumed for the calculation.

Example: SH20 with a 9 m chimney height and DN150 flue pipe => a chimney with 15 cm diameter is required. As an alternative, a flue pipe with DN130 can be used for a 14 cm diameter chimney.

No cross-sectional taper is permitted, such as a DN150 flue pipe in a chimney with a 13 cm diameter.

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm	
		SH 20	SH 30
DN 130 DN 150	6 m	14 15	14 15
DN 130 DN 150	7 m	14 15	14 15
DN 130 DN 150	8 m	14 15	14 15
DN 130 DN 150	9 m	14 15	14 15
DN 130 DN 150	10 m	13 15	13 15
DN 130 DN 150	11 m	13 15	13 15
DN 130 DN 150	12 m	13 15	13 15
DN 130 DN 150	13 m	13 15	13 15
DN 130 DN 150	14 m	13 15	13 15

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		SH 32	SH 40	SH 50	SH 60
DN 150 DN 180	6 m	18 18	18 18	20 20	20 20
DN 150 DN 180	7 m	16 18	16 18	18 18	20 20
DN 150 DN 180	8 m	16 18	16 18	18 18	18 18
DN 150 DN 180	9 m	15 18	15 18	16 18	18 18
DN 150 DN 180	10 m	15 18	15 18	15 18	16 18
DN 150 DN 180	11 m	15 18	15 18	15 18	16 18
DN 150 DN 180	12 m	15 18	15 18	15 18	15 18

Diameter of the flue pipe from boiler to chimney	Chimney height above the boiler room floor	Required chimney diameter in cm			
		SH 32	SH 40	SH 50	SH 60
DN 150 DN 180	13 m	15 18	15 18	15 18	15 18
DN 150 DN 180	14 m	15 18	15 18	15 18	15 18

6.2 Planning and layout

Overview of the requirements for the flue pipe and chimney

The table below lists the most important requirements for the flue pipe and the chimney, depending on the boiler in question. You will find a detailed description of this in the respective boiler's installation instructions.

Request	PU	PC	ePE-K	ePE-BW
A separate chimney is required for each boiler	x	x	x	x
Moisture-resistant chimney required	x	x	x	x
Connection to the sewage system required for the chimney	x	x	x	x
Lay the flue pipe (preferably made of stainless steel) to the chimney in a short, compact and rising manner	x	x	x	x
Insulate flue pipe to chimney	x	x	x	
Cleaning opening in the flue pipe to the chimney	x	x	x	
Flue pipe to the chimney made of stainless steel with internal seals and side cleaning openings required				x
Draught limiter required for boilers with flue gas recirculation			x	
No draught limiter and no deflagration damper for external air operation	x	x		
No draught limiter and no deflagration damper permitted				x
Measurement opening required for emissions measurement	x	x	x	x
Fit the chimney connection just under the ceiling	x	x	x	

Clarify with the chimney sweep

A specialist or a chimney sweep must inspect the dimensions and suitability of existing chimneys especially before boiler installation.

DANGER!

Every boiler must have its own chimney

Although it is not expressly prohibited, each boiler needs its own chimney or chimney pipe.
Only then can it be ensured that, under every boiler operating condition, the flue gas is safely conveyed outside and cannot enter the living space, for example, via the flue pipe of another boiler.

▶ Connect the boiler to a suitable and separate chimney.

DANGER!

Do not connect fan-assisted boilers and gas boilers to the same chimney

Most gas-fired boilers do not have a sealed air flap, and if the fan-assisted boiler is started when the chimney is cold, the flue gas is pushed through the gas boiler into the boiler room. This is not greatly helped by a flue gas damper in the flue pipe of the gas boiler, as these dampers are not certain to seal well on closing.

In the case of atmospheric gas boilers, old fireclay chimneys only stay dry due to the gas boiler's overflow opening. The water from the flue gas condenses in the chimney. During heating pauses, air flows through the overflow opening and dries the chimney. If this air flow is blocked by a flue gas damper, the moisture can destroy an old fireclay chimney.

DANGER!

Do not connect fan-assisted boilers and wood-burning stoves to the same chimney

Although not expressly prohibited, connecting a fan-assisted boiler and a wood-burning stove to the same chimney is a dangerous combination. For every wood-burning stove has an air intake. When the chimney is cold, any fan-assisted boiler, whether it burns oil or wood, will blow flue gas through this opening into the living area. If the wood-burning stove's combustion

chamber door is not closed and the boiler is defective at the same time, acute carbon monoxide poisoning is even possible.

Wood-burning stoves require a considerably larger chimney diameter, which cannot be heated by the fan-assisted boiler. Moreover, it may be possible to hear the boiler's fan in the living quarters through the wood-burning stove.

Obsolete regulations stipulate the wrong chimney

Laws and regulations demand a moisture-resistant flue system for oil and gas and one that is resistant to soot fires for solid fuels.

Wood is a solid fuel. However, in the lower output range, the temperature of the flue gas can be below 100?, and condensates can be deposited in the chimney. The chimney must therefore be moisture-resistant, "contrary to regulations". Builders making a chimney resistant to soot fires in compliance with the law must then look on helplessly as the condensate destroys the chimney wall.

Soot fires are possible in natural-draught boilers or wood-burning stoves regulated by throttling the air supply. When the wood fire is at full intensity and the boiler temperature has been reached, a thermostat closes the air flap. This stops combustion. However, as the combustion chamber temperature doesn't fall, the wood continues to gasify. Unburned wood gas condenses to tar in the chimney, which can be ignited by sparks from the fire.

With modern, lambda-controlled wood boilers, soot fires of this kind are virtually impossible, as the control system restricts wood gasification, not the air. In modern,lambda-controlled wood boilers, the control system shuts down the fire by stopping the fuel supply, without closing off the supply of air to the fire. This way, there is no lack of air and no flammable tar in the chimney. In addition, the low flue gas temperatures of modern wood boilers also provide no ignition source for a soot fire. Modern and properly maintained wood boilers therefore pose no danger to chimneys from soot fires.

Moisture-resistant W3G flue systems

Since 2005, W3G chimneys (classified according to the German DIN 18160) exist that are resistant to both moisture and soot fires. These chimneys are approved for all fuels. Most of these W3G chimneys have ceramic inner pipes, which have a significantly longer service life than metal chimneys due to their acid resistance.

Connection to the sewage system for the chimney

For the condensate in the chimney, a connection to the sewage system (e.g. duct) with at least DN25 via a siphon is required. The sewer pipe to which the condensation drain pipe is connected should be flushed once a year.



Fig. 6-1: Condensate drain

For chimneys on the outer walls (made of stainless steel, for example), frost-proof run-off must be provided for the condensate water.

Lay the flue pipe to the chimney in a short, tight and rising manner

The flue pipe from the boiler to the chimney must be short, tight and rising. The optimum to strive for is the shortest pipe with a minimum of directional changes.

Measurement opening for the emissions measurement

Create a self-locking and sealing measurement opening in the flue pipe for the emissions measurement. The measurement opening must be implemented in accordance with national directives.

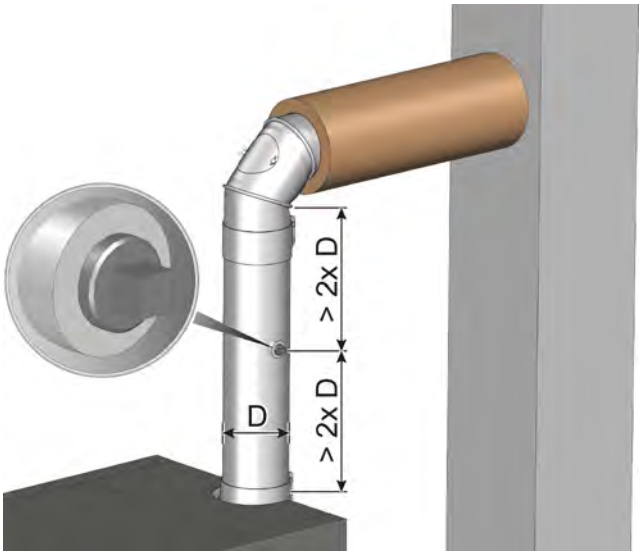


Fig. 6-2: Measurement opening

The measurement opening must be created in the vertical portion of the flue pipe. A straight section of a suitable length must be present before and after the measurement opening because, otherwise, turbulence at the measurement points will prevent meaningful measurements. The clearance from the boiler's flue duct connection or from a pipe bend must be at least twice the diameter of the flue duct.

A stainless steel flue gas pipe system for the ePE-BW condensing boiler is optionally available from ETA. It comes pre-fitted with a piece of pipe with the required measurement opening.

Prevention of structure-borne noise

There should not be a fixed connection between the flue pipe and the chimney to prevent structure-borne noise as much as possible! Good flue gas systems are acoustically insulated. If steel pipes are connected to a fireclay chimney, ceramic fibre bandages have proven effective at preventing structure-borne noise as well as damage to the fireclay sleeve.

6.3 Renovation

Chimney renovation before it's too late

Compared to older boilers, modern ones are more efficient and have lower amounts of flue gas and considerably lower temperatures.

Chimneys with a "too large diameter", in particular, can no longer be heated adequately. The moisture contained in the flue gas condenses in the chimney, resulting in the very slow but inexorable destruction of old masonry chimneys.

Furthermore, the exit velocity and temperature are too low if the diameter of the chimney is too large. The flue gas then lacks the energy to rise and, in extreme cases, the smoke can sink down along the roof.

If your chimney does not have a moisture-resistant liner or its diameter is too large, it will require renovation in the form of a new, moisture-resistant liner. Narrow chimneys can also be renovated by the addition of stainless steel pipes.

Also keep in mind that chimneys have a limited service life. Timely renovation before destruction of the chimney wall can be achieved quickly and easily by inserting a tube. But if the flue gas condensates have penetrated the mortar joints, the entire chimney must be dismantled and rebuilt.

Chimney renovation with a stainless steel pipe

Maybe the chimney has already been renovated for oil or gas with a stainless steel pipe, and now a conversion to wood or pellets is planned. Or the chimney is too narrow to install a ceramic pipe with a reliable seal. If a moisture-resistant inner pipe is installed in a sufficiently fire-resistant casing, the German Association of Chimney Sweeps has found the following solution to the standards and regulations dilemma: "in the certification of suitability and safe use for heating systems, it should be noted that after a soot fire the long-term durability cannot be ensured and penetration of the chimney by moisture cannot be ruled out so that it may be necessary to replace the inner pipe (Criteria for Determination of Suitability and Safe Use of Heating Systems - October 29th 2008, page 12).

Replacing the inner pipe and seals after a soot fire

The boiler is equipped with safety routines to prevent soot burning. Nevertheless, in very rare cases, it is possible that a soot fire may occur in the chimney. After that, it is very likely that the inner pipe of the chimney and the flue pipe from the boiler to the chimney will no longer be tight.

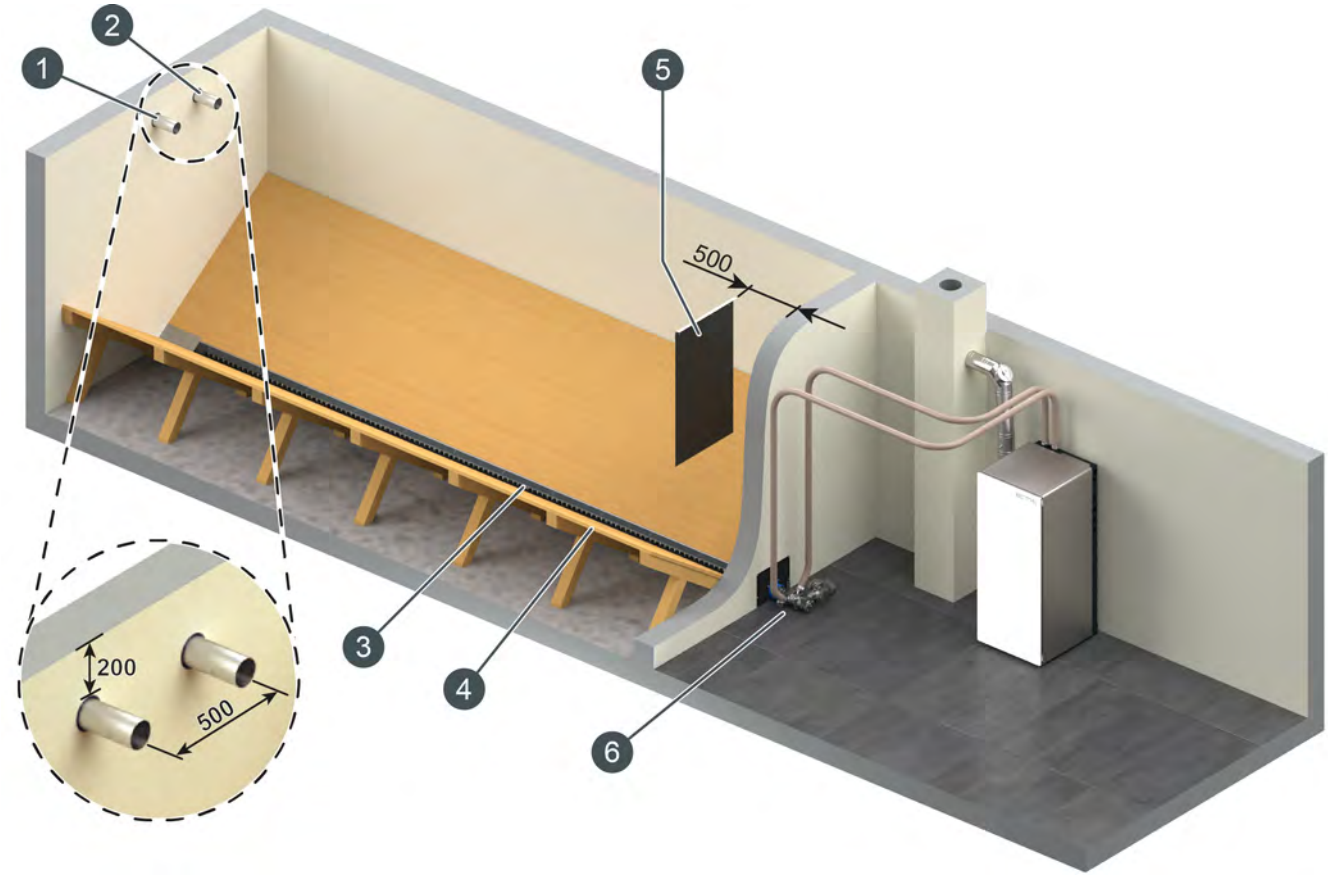
For safety's sake, have the chimney checked by a specialist or chimney sweep. The inner pipe should also be replaced and the seals in the flue pipe from the boiler to the chimney should be replaced.

7 Conveying system variants

7.1 Conveyor screw

Pellet store with screw conveyor

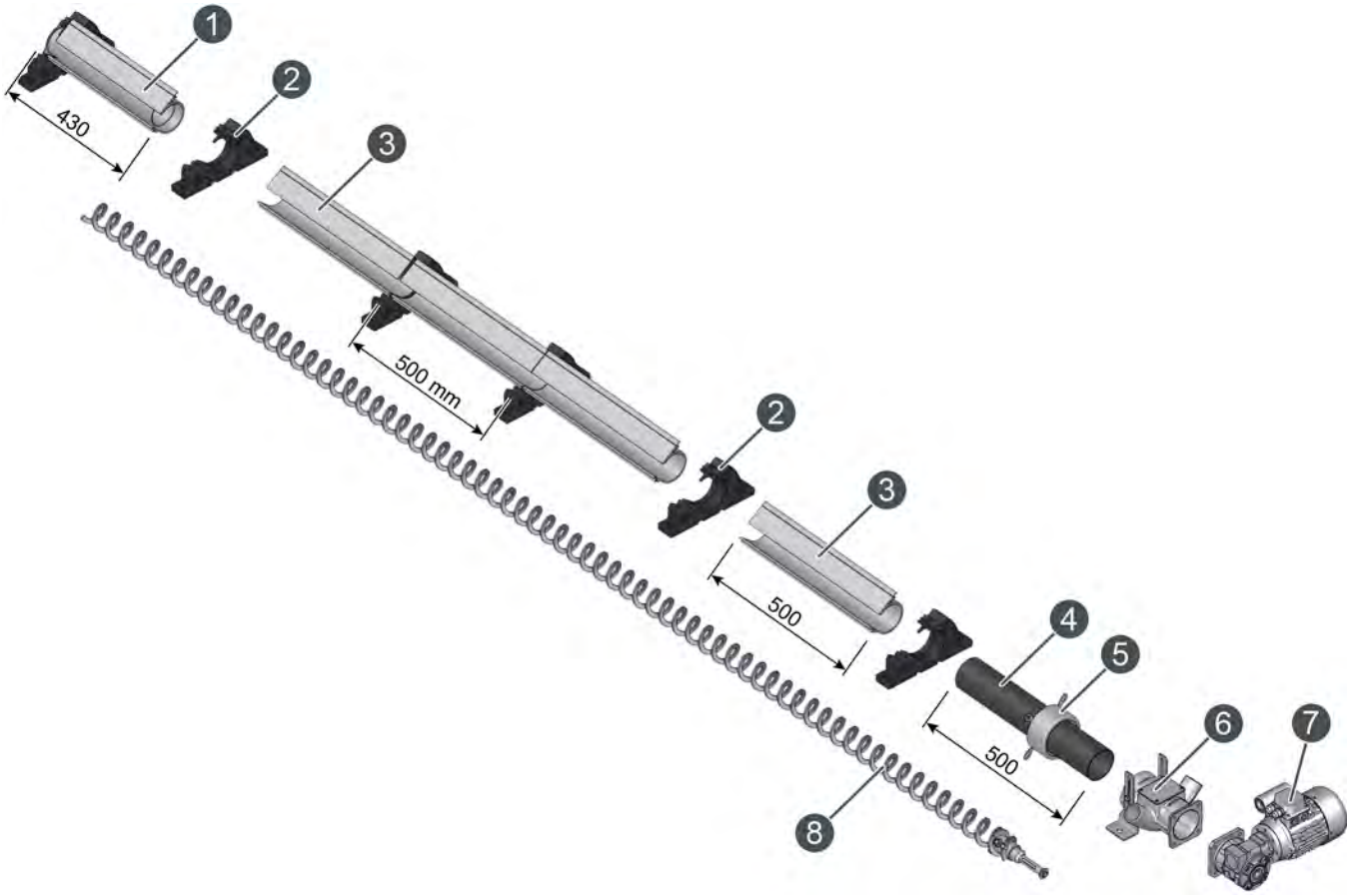
Conveying systems with screw conveyors are preferable as then the storeroom can be completely emptied. The pellets slide over the slanted floor to the screw conveyor and are sucked into the boiler through the discharge trough. The pellet hoses in these conveying systems can be emptied completely. Therefore, the pellet store may also be located on a higher floor than the boiler, but also below the level of the boiler. The largest storage volume is achieved with narrow, long rooms. Because in this case the non-usable volume below the sloping sides is relatively small. The wider the room the greater the non-usable volume.



1 Filling nozzle
2 Back air nozzle
3 Screw conveyor
4 Slanted floor
5 Impact protection mat
6 Discharge trough and drive

Layout of the pellet conveying system

This pellet conveying system is modular and can be used for storerooms with a maximum length of 6 m. In the plastic channel there is a shaftless screw conveyor for low-noise operation. To avoid damage, it is not permitted to turn the screw conveyor against the conveying direction.



1 End piece of the channel (with internal pipe)
2 Supporting part (between all channels)
3 open channel (can be shortened on site)
4 Wall duct for maximum 300 mm thick walls (can be shortened on site)
5 Fire protection sleeve (for the wall duct from the pellet store to the installation room)
6 Transfer coupling
7 Conveying system drive
8 Shaftless screw conveyor (can be shortened on site)

The pipe for the wall duct must protrude a little on each side for the installation of the fire protection sleeve, supporting part and the transfer coupling. This results in storeroom lengths (uncut) in 0.5 m increments. The troughs can be shortened on site, so any storeroom length up to 6 m is possible. The following illustration shows a conveying system with a length of 3 m. With an additional trough, the conveying system would be 0.5 m longer.

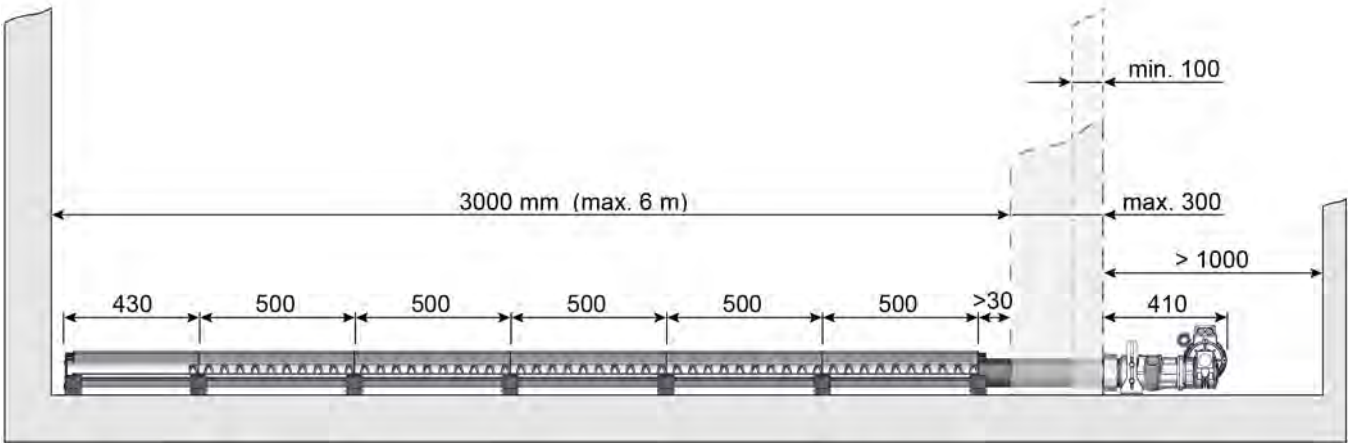


Fig. 7-1: Example: conveying system with 3 m length

The open troughs and the pipe of the wall duct can be shortened on site. This allows the length of the conveying system to be easily and precisely adapted to an existing room. After shortening the troughs, the screw conveyor must also be shortened accordingly.

The conveying system is placed centrally (in width) in the storeroom. A round or rectangular section is required for the wall duct. See the following illustration.

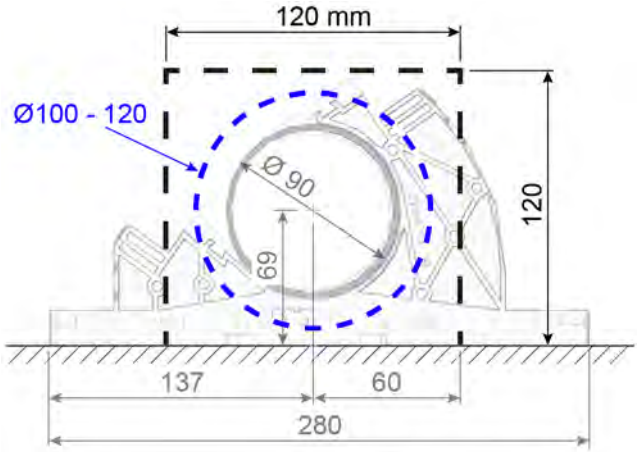
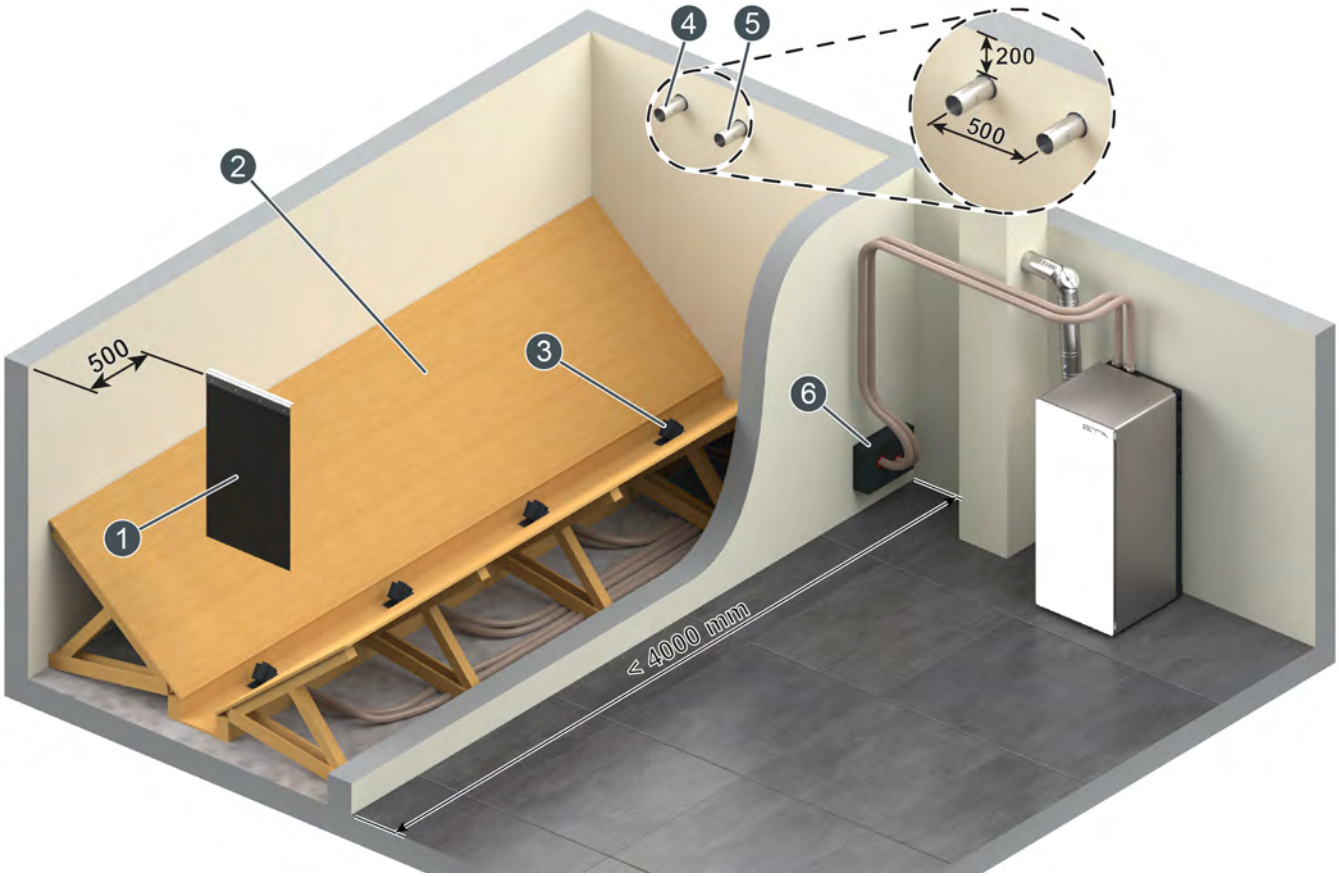


Fig. 7-2: Required opening for the wall duct

7.2 Switching unit for 4 suction probes

Pellet store with suction probes and switching unit

The pellets slide across the slanted floor to the suction probes mounted on the floor. From there the pellets are sucked alternately into the boiler via the switching unit. The advantage of this conveying system is that angular rooms can serve as pellet stores too, as the arrangement of the suction probes is freely selectable. Unlike conveyor screws, the suction probes do not fully empty the storeroom. When the storage room capacity is tight, this can be a disadvantage. The maximum length of the pellet store is 4 m. With a greater length, the unusable space between the suction probes would be too large.



1 Impact protection mat
2 Slanted floor
3 Suction probe
4 Back air nozzle
5 Filling nozzle
6 Switching unit with integrated fire protection sleeves

When conveying with suction probes, the pellet hoses cannot be emptied completely. To prevent blockages in the pellet hoses, the storeroom for such conveying systems must be on the same storey as the boiler or on a higher storey, but it should not be at a lower level than the boiler.

Do not attach pellet hoses to the tilted floor structure

In the store room, do not attach pellet hoses to the tilted floor structure or guide them to it. In this way, noise transmission is prevented from the pellet hoses to the tilted floor structure and noise lelvels are reduced.

Making a wall opening for the pellet hoses

To feed the pellet hoses through the wall, an opening with a diameter of 260 mm is needed.

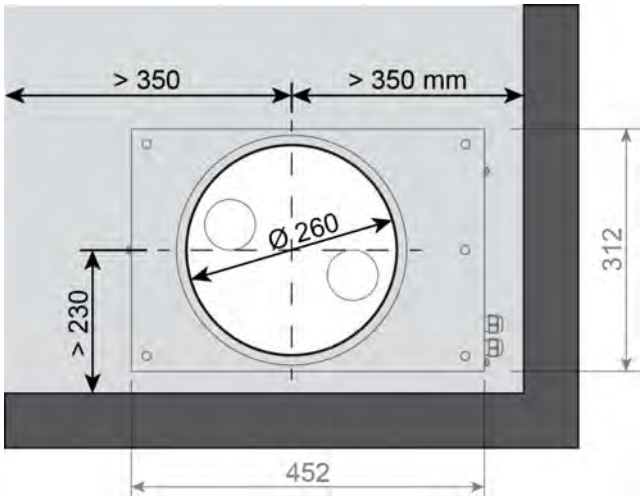
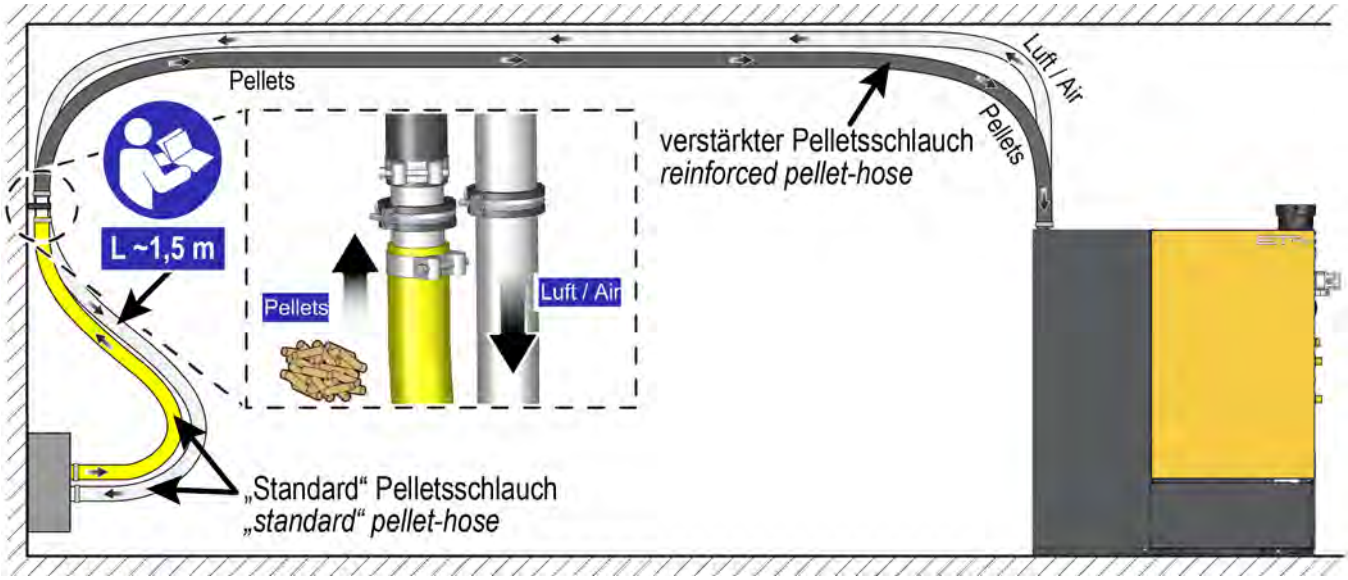


Fig. 7-3: Minimum clearances

Ensure that the minimum clearance to the nearest walls is kept.

Information about reinforced pellet hoses

A "reinforced" pellet hose can be used for the suction hose from the switching unit to the boiler. However, only after the first fastening, because the reinforced hoses are stiffer and thus cause torsion in the switching unit.

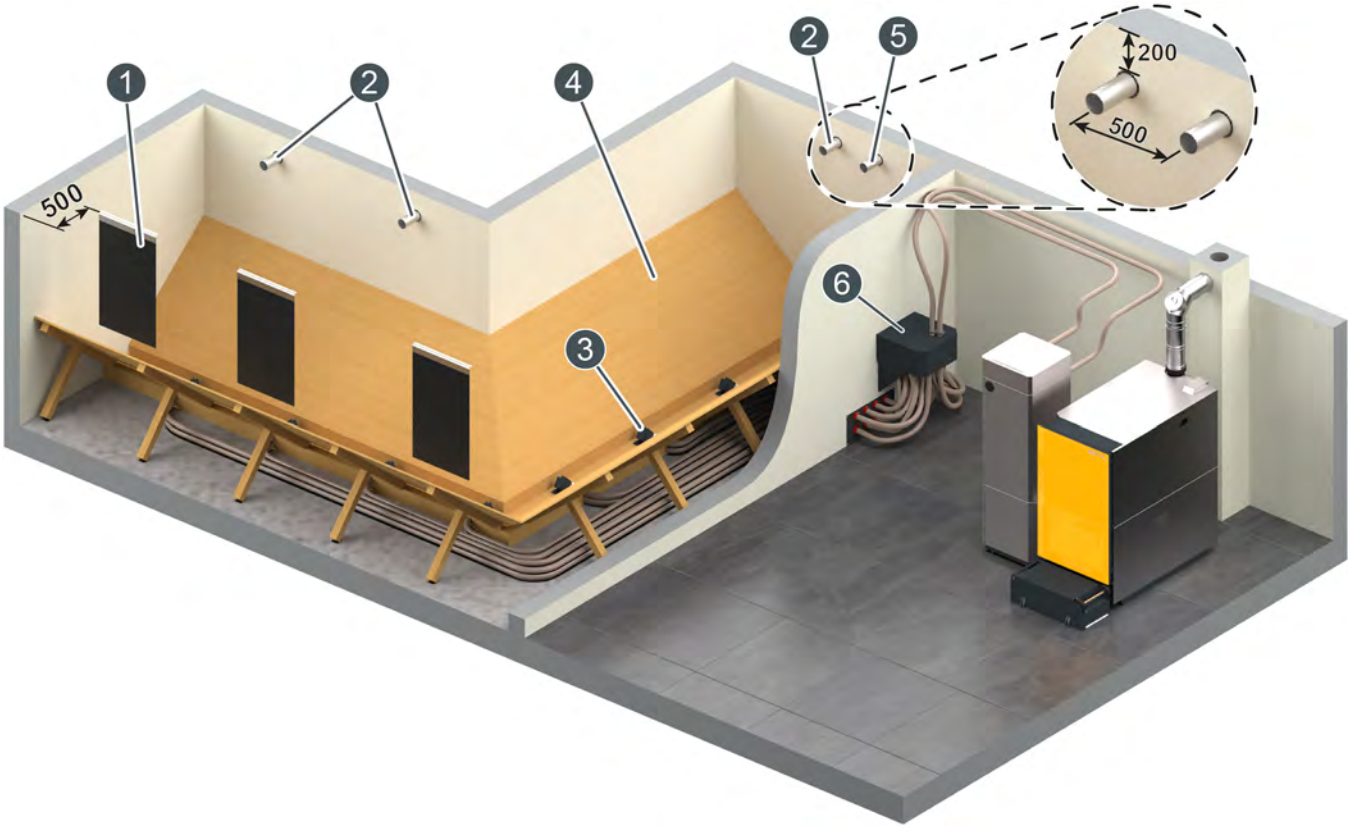


Only use a "standard" pellet hose for the return air from the boiler to the switching unit, as well as in the store room. These are more flexible than the "reinforced" variant and thus can be more easily connected to the switching unit.

7.3 Switching unit for 8 suction probes

Pellet store with suction probes and switching unit

The pellets slide across the slanted floor to the suction probes mounted on the floor. From there the pellets are sucked alternately into the boiler via the switching unit. The advantage of this conveying system is that angular rooms can serve as pellet stores too, as the arrangement of the suction probes is freely selectable. Unlike conveyor screws, the suction probes do not fully empty the storeroom. When the storage room capacity is tight, this can be a disadvantage. With a greater length, the unusable space between the suction probes would be too large.



1 Impact protection mat
2 Filling nozzle
3 Suction probe
4 Slanted floor
5 Back air nozzle
6 Switching unit with integrated fire protection sleeves

When conveying with suction probes, the pellet hoses cannot be emptied completely. To prevent blockages in the pellet hoses, the storeroom for such conveying systems must be on the same storey as the boiler or on a higher storey, but it should not be at a lower level than the boiler.

Function of the switching unit

All 8 suction probes are connected to the pellets store at the switching unit. The switching unit is controlled by the ETA boiler.

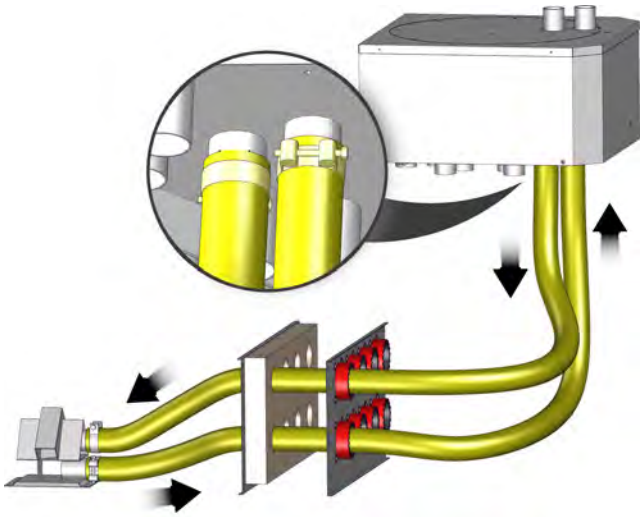


Fig. 7-4: Connection between suction probe and switching unit

The pellets are extracted alternately and at regular intervals by the suction probes. This ensures a uniform pellet extraction rate.

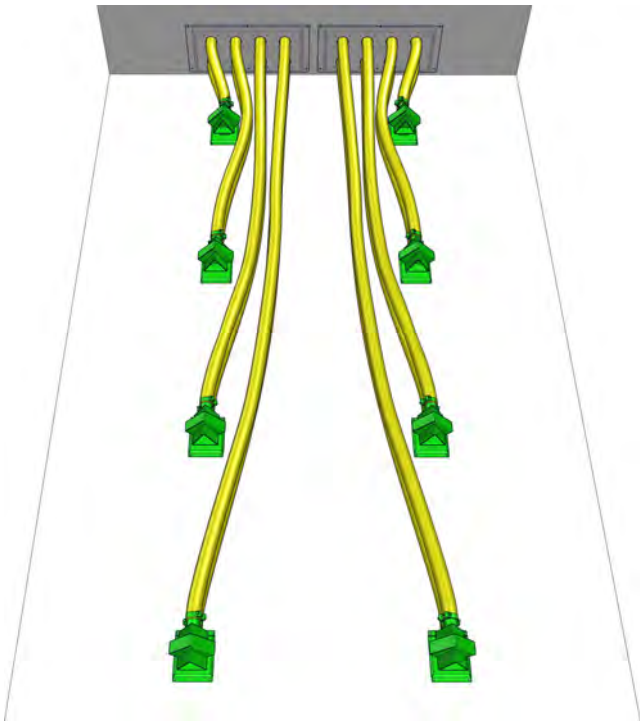


Fig. 7-5: Suction probes in pellet store

On the suction probe, the lower connection is for the pellet extraction and the upper connection is for the return air from the boiler's vacuum motor.

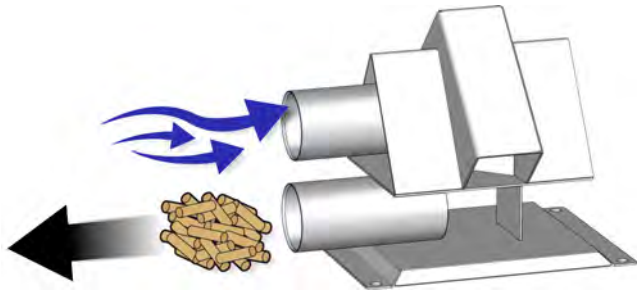


Fig. 7-6: Suction probe

In purge mode, the switching unit switches the connections from suction air and return air. Clearing mode is needed in order to break up any blockages that may occur in a suction probe. These are detected by the ETAtouch control system, which then switches to purge mode automatically.

The switching unit uses its reference point switch and position switch to recognise its position and the selected suction probe.

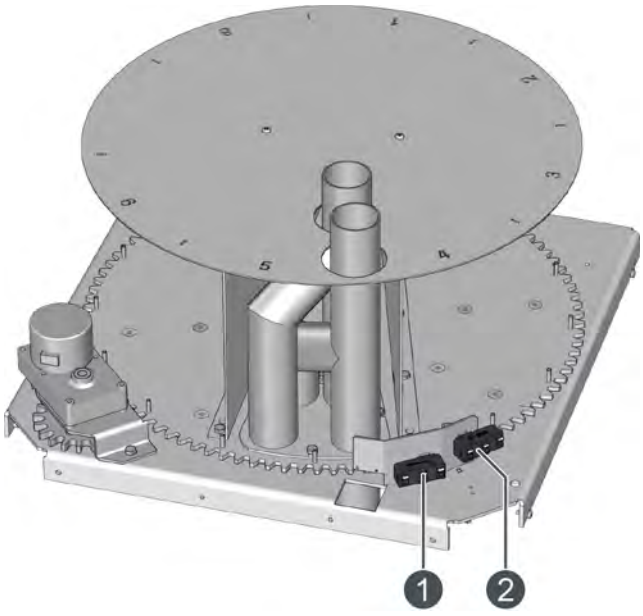


Fig. 7-7: Switch designations

1 Position switch

2 Reference point switch

Dimensions

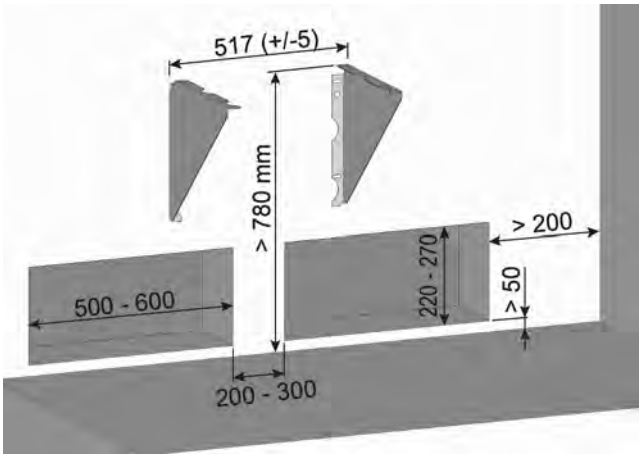


Fig. 7-8: Openings for pellet hoses

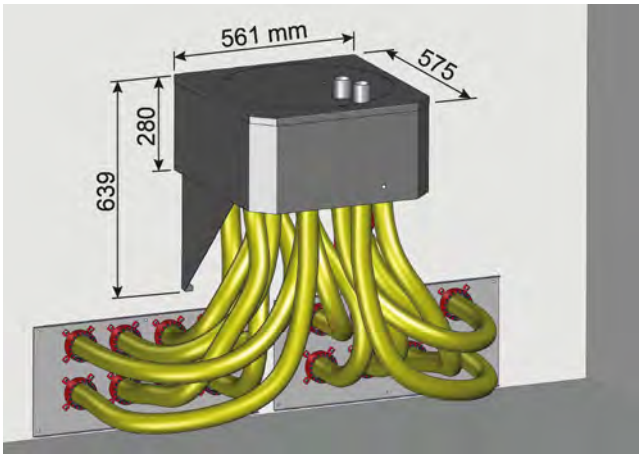


Fig. 7-9: Dimensions

A "reinforced" pellet hose can be used for the suction hose from the switching unit to the boiler. However, only after the first fastening, because the reinforced hoses are stiffer and thus cause torsion in the switching unit. A short standard pellet hose for the suction line from the switching unit to the first attachment is therefore included in the scope of delivery.

Only use a "standard" pellet hose for the return air from the boiler to the switching unit, as well as in the store room. These are more flexible than the "reinforced" variant and thus can be more easily connected to the switching unit.

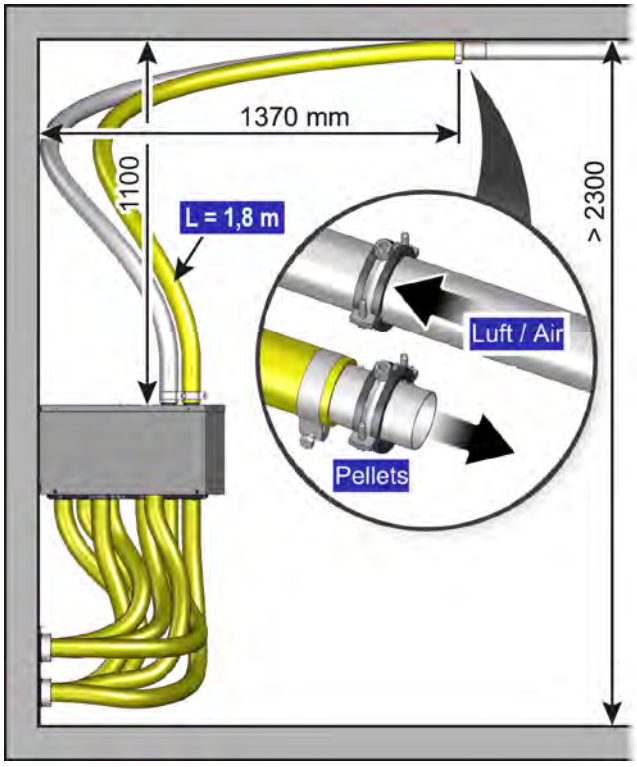


Fig. 7-10: Fastening the pellet hoses (side view)

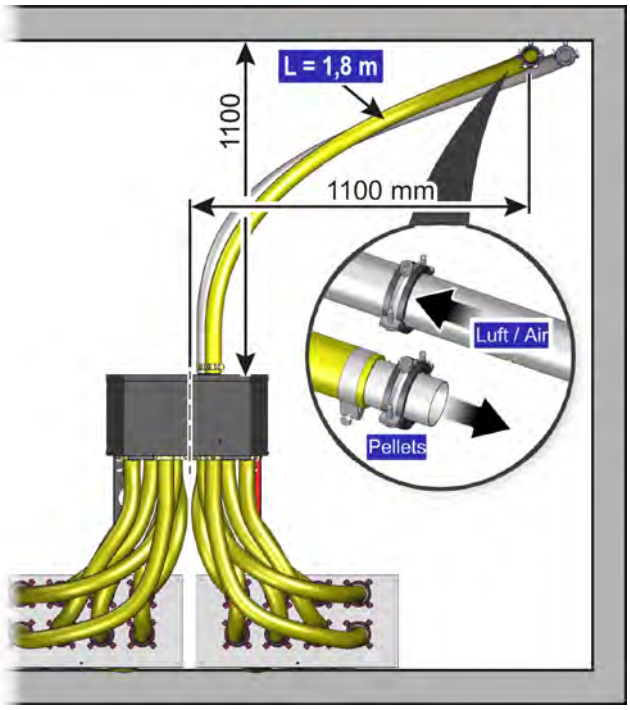


Fig. 7-11: Fastening the pellet hoses (front view)

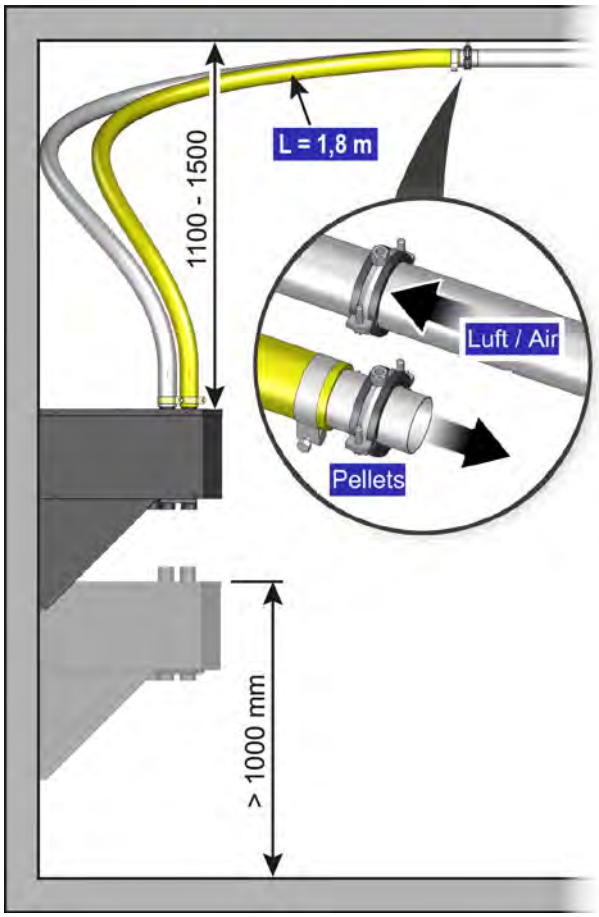
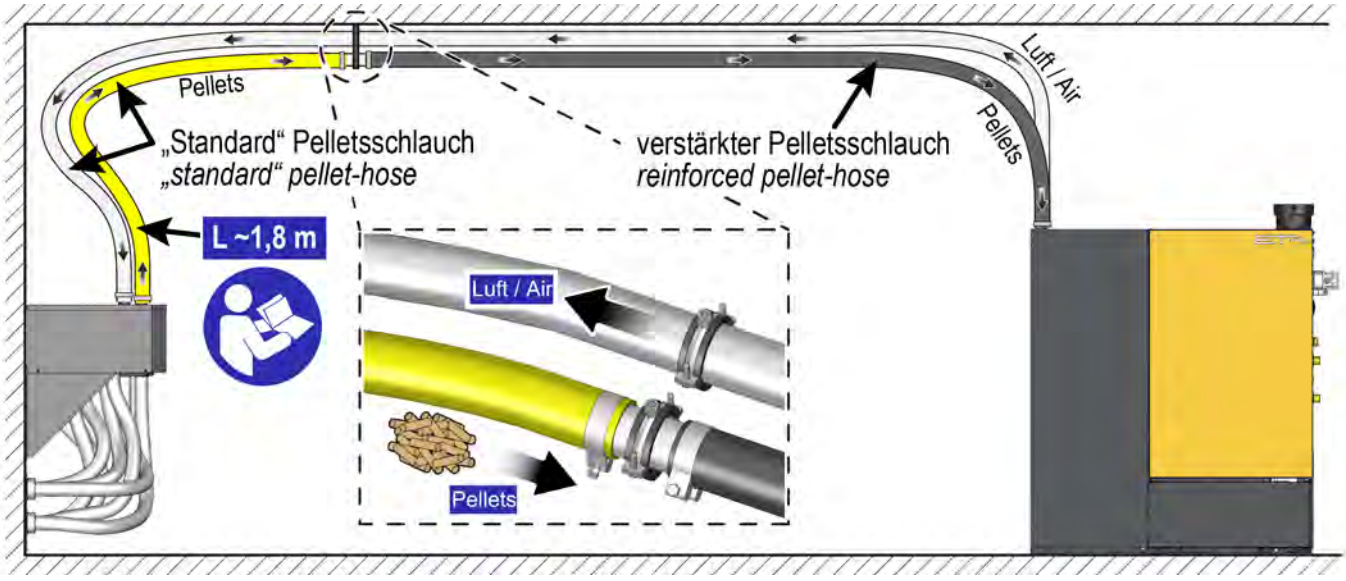


Fig. 7-12: Fastening for large room height (side view)

Information about reinforced pellet hoses

A "reinforced" pellet hose can be used for the suction hose from the switching unit to the boiler. However, only after the first fastening, because the reinforced hoses are stiffer and thus cause torsion in the switching unit. A short standard pellet hose for the suction line from the switching unit to the first attachment is therefore included in the scope of delivery.



Only use a "standard" pellet hose for the return air from the boiler to the switching unit, as well as in the store room. These are more flexible than the "reinforced" variant and thus can be more easily connected to the switching unit.

7.4 Mole E3

Functional description

In this pellet discharge system, the "pellet mole" moves to the pellets in the storeroom. The star-shaped drive rollers allow the mole in the pellet store to move in all directions. The pellet hose is connected at the suction connection of the mole and leads to the vacuum turbine of the boiler. The orientation is achieved by means of the integrated control system, which is equipped with a tilt sensor and wall recognition. The mole is programmed to initially level the material cone in the pellet store by targeting it. It then removes the pellets evenly from above, thereby almost completely emptying the pellet store. Usually, only a residual amount of about 5-10% (of the original volume) remains in the storeroom.

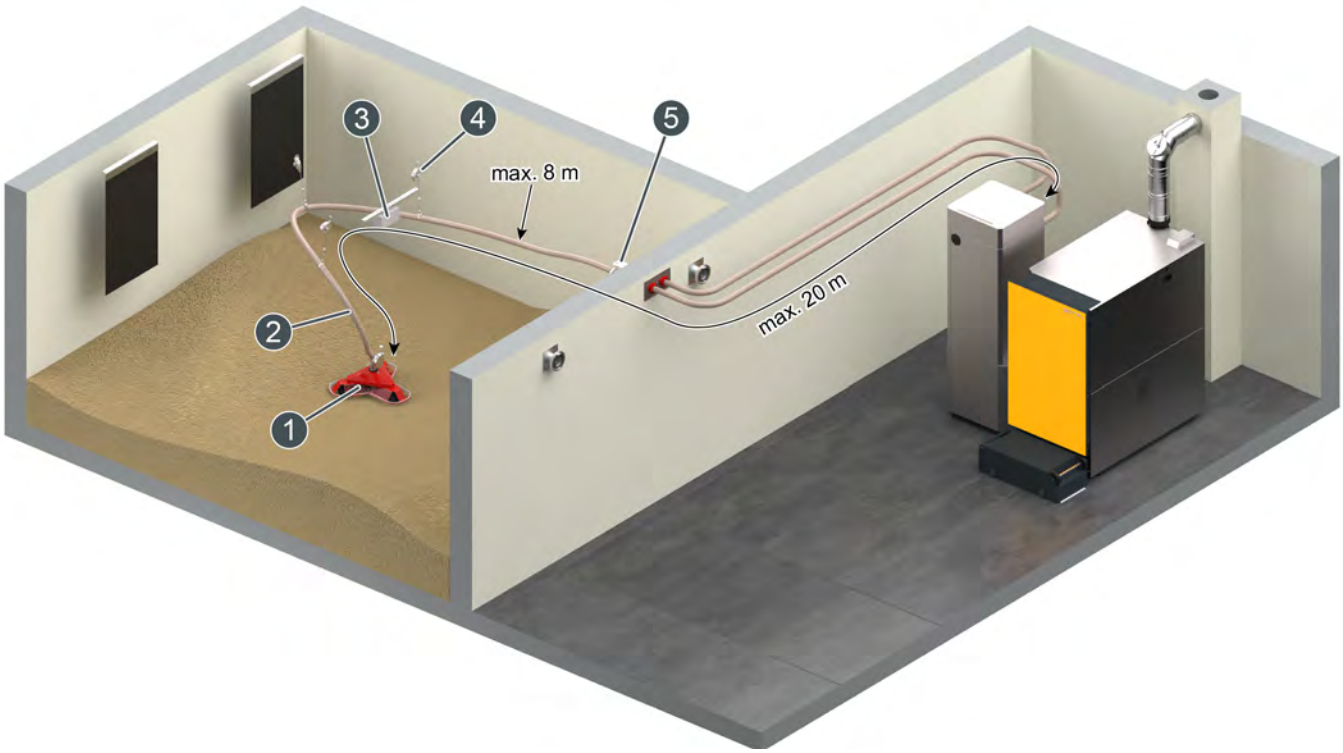


Fig. 7-13: Overview

1 Mole
2 Flexible pellet hose with attached electrical wire for the mole
3 Lifting module for the mole
4 Spring balancers for guiding the pellet hose
5 Wall mount for threading of the pellet hoses

The mole receives the start and stop signal from the boiler. The electrical connection of the mole is made via the connection box. The boiler signals are connected to this box and forwarded to the mole.

When filling the pellet store, the mole must be raised to the ceiling so it is not spilled or damaged by the pellets. The lifting and lowering is done comfortably with the electric lifting module. By pressing the switch on the connection box, the mole is raised or lowered again for operation.

The spring balancers guide the suction hose for the mole in the pellet store. For smooth and trouble-free operation, a few points must be noted when positioning them. See the planning notes in chapter 7.4.1 "Information for planning".

The following graphic shows the clearance/gaps for fastening the spring balancers using cable ties.

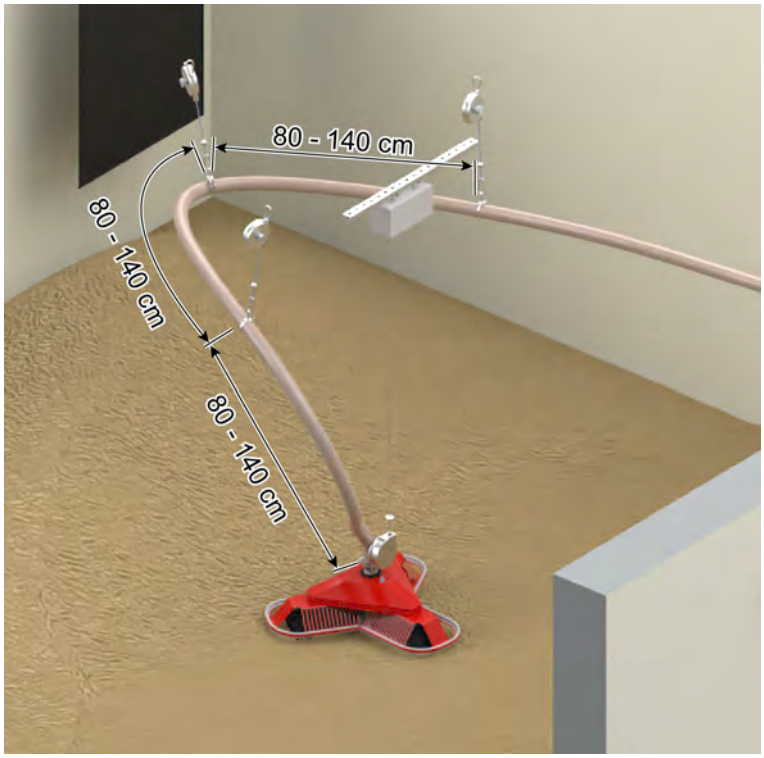


Fig. 7-14: Clearance/gaps for fastening the spring balancers

Technical data



Mole	E3
Weight	14 kg
Voltage	24 V DC
Current draw	2.5 A
Output	60 W (max)
Dimensions (W x D x H)	725 x 660 x 340 mm
Pellet hose	DN 50
Feed rate	9 - 12 kg/min
Electrical connection (made via the connection box)	230 V AC 50 Hz

Detailed planning is recommended

We recommend custom planning for this discharge system, which we offer as a service. For this, we need the dimensions of your pellet store as well as information on any protrusions, roof pitches and so on. If you have all the information, you will receive a detailed plan with all positions for the spring balancers, lifting module and wall duct. These positions must be observed during installation for a smooth operation of the mole.

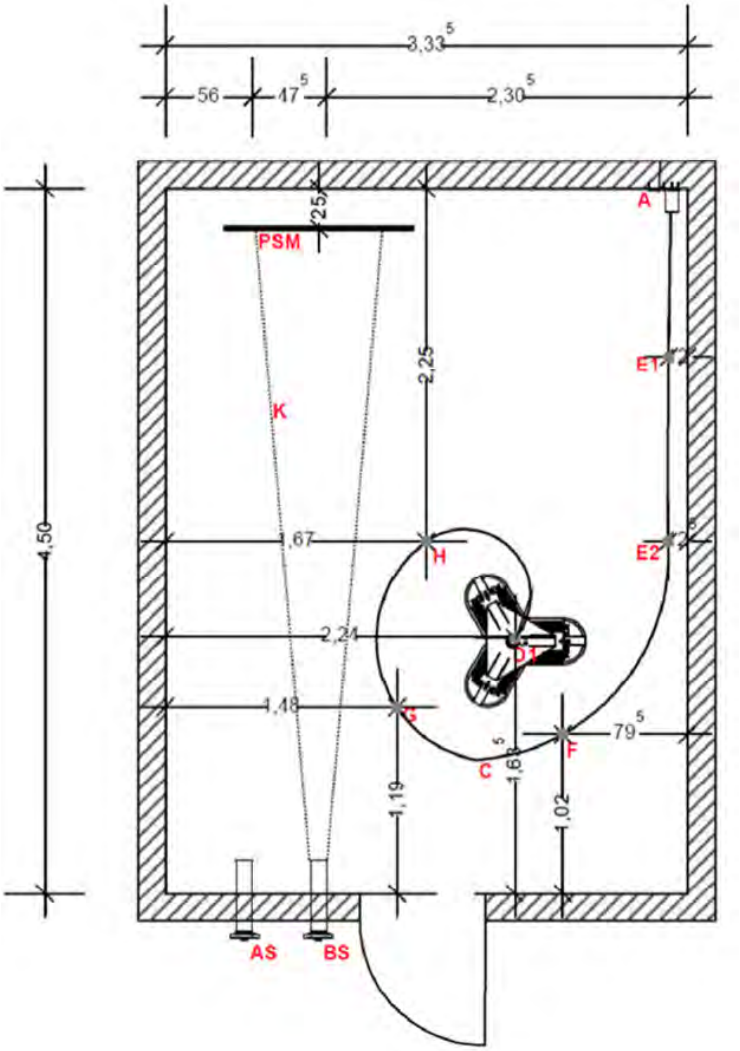


Fig. 7-15: Planning example

A: wall duct

C: hose path on the ceiling

D1: suspension point for the lifting module of the mole. This is also the filling position of the mole when filling the pellet store.

E1, E2: hose clamps for the fixed guidance of the pellet hose

F, G, H: spring balancers for the flexible guidance of the pellet hose
(H = first spring balancer, G = second spring balancer, F = third spring balancer)

IPM: impact protection mat

SS: pellet suction nozzle for the return air during filling

FN: pellet filler neck for filling the storeroom

7.4.1 Information for planning

Planning information

The following points must be considered for smooth operation.

- The maximum working area is 36 m² with a room height of 2.5 m. Room heights of up to 3.5 m are possible; the working area is reduced to 16 m² in this case. The maximum suction height is 4 m.
- The maximum hose length for the flexible suction hose in the pellet store is 8 m. Shortening the suction hose is possible; it may not be lengthened.
- The filling pipes for the pellet store should be mounted so that a clearance width of 1.5 m is present for the filling position (= mole on ceiling) of the mole and hose.
- In the filling position, the mole hangs down approximately 50 cm from the ceiling. Therefore, the filling position should be in the vicinity of the filling pipes, because the material cone is lower there and thus more free space between it and the ceiling is available.
- If the mole filling position is located between two filling pipes, then a minimum distance of 2 m must be present between the filling pipes.
- Neither the mole nor the suction hose may be struck by pellets in the filling position when the pellet store is being filled.
- A minimum distance of 50 cm must be present between the filling pipe and the hose suspensions so they are not struck by pellets during filling.
- In the filling position, the suction hose must be at least 20 cm from the walls or beams.
- The suspension points for the spring balancers on the ceiling must be circular or oval in a diameter of 100 - 200 cm. This creates a hose circuit in the middle of which the lifting module for the mole is mounted.
- Three spring balancers in the pellet store hold the suction hose. The clearance/gaps between the individual spring balancers can be seen in the graphic Fig. 7-14: "Clearance/gaps for fastening the spring balancers".
- Mount the first spring balancer (closest to the mole) approximately midway in the room on the ceiling, so that all corners in the room can be reached. At this point, the maximum reach of the mole is approximately 4.5 m (3.5 m cable length in the spring balancer and a 100 - 140 cm hose).
- Filling the pellet store is only allowed via the filling pipe. Replugging, i.e. blowing in the pellets at the suction hose, is not allowed. This is because the filling position of the mole may be located there. For this reason, the filling pipes must be clearly marked for the pellet supplier

Requirements for the pellet store

- The pellet store must stay dry throughout the year. The normal humidity encountered in normal residential construction throughout the year is not harmful to the pellets.
- The shape of the storeroom is arbitrary. Narrow and oblong spaces are just as suitable as square or asymmetrical ones.

  The pellet store must be at least 2.5 m wide and may be no more than 8 m long due to the maximum hose length of 8 m.

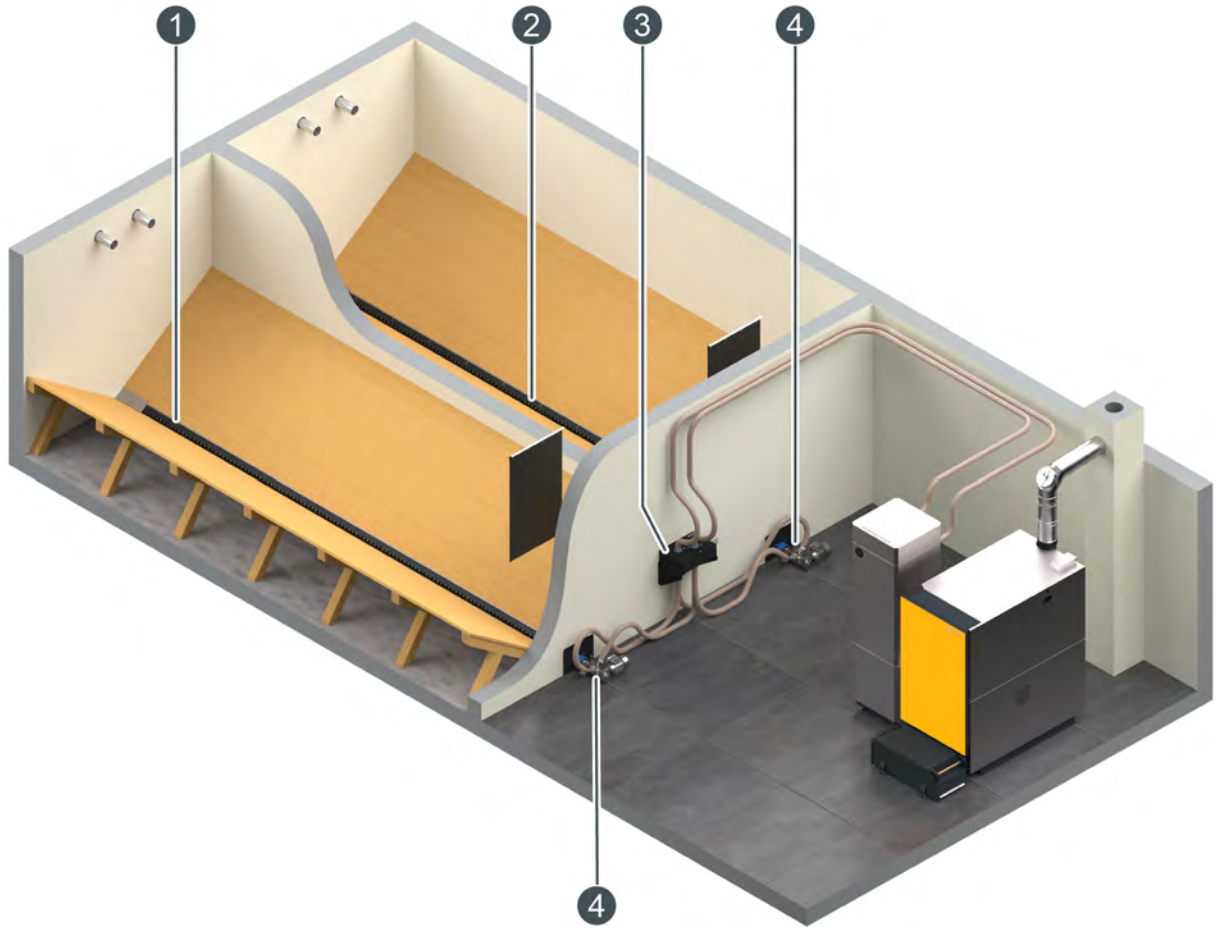
  For special variations of the storeroom, it is best to consult with ETA.
- The storeroom floor must be resistant to abrasions because the mole's bristles brush against the bottom of the empty pellet store. Ledges or protrusions in the pellet store must be clad (e.g., with wood). Protruding parts, such as nails, must be removed to prevent damage to the mole or suction hose.
- The walls in the pellet store should be vertical or at least have an inclination of 70°. Slants in the pellet store must be dismantled. Wall niches must have a minimum height and width of 1 m to allow the mole to enter the niche.
- A width of at least 1.5 m must be planned for the hose path on the ceiling (suspended on the spring balancers).
- The access door to the pellet store must be positioned so that the pellet store is always accessible.

7.5 Switching unit between conveyor screws

Design of the switching unit

For larger storage quantities, up to 4 conveyor screws or 4 ETAboxes can be connected to one boiler via the switching unit (only conveyors of same design). The switching unit is controlled by the ETA boiler. Removal takes place alternately so that the pellet store empties evenly.

Fire protection sleeves may be required depending on the type of pellet store, the storage quantity as well as the positioning of the switching unit and the boiler. Country-specific regulations must be observed while doing this.



1 First warehouse with "Flex" pellet conveying system
2 Second warehouse with "Flex" pellet conveying system
3 Switching unit (with fire protection sleeves) between the pellet stores
4 Transfer coupling (with fire protection sleeve)

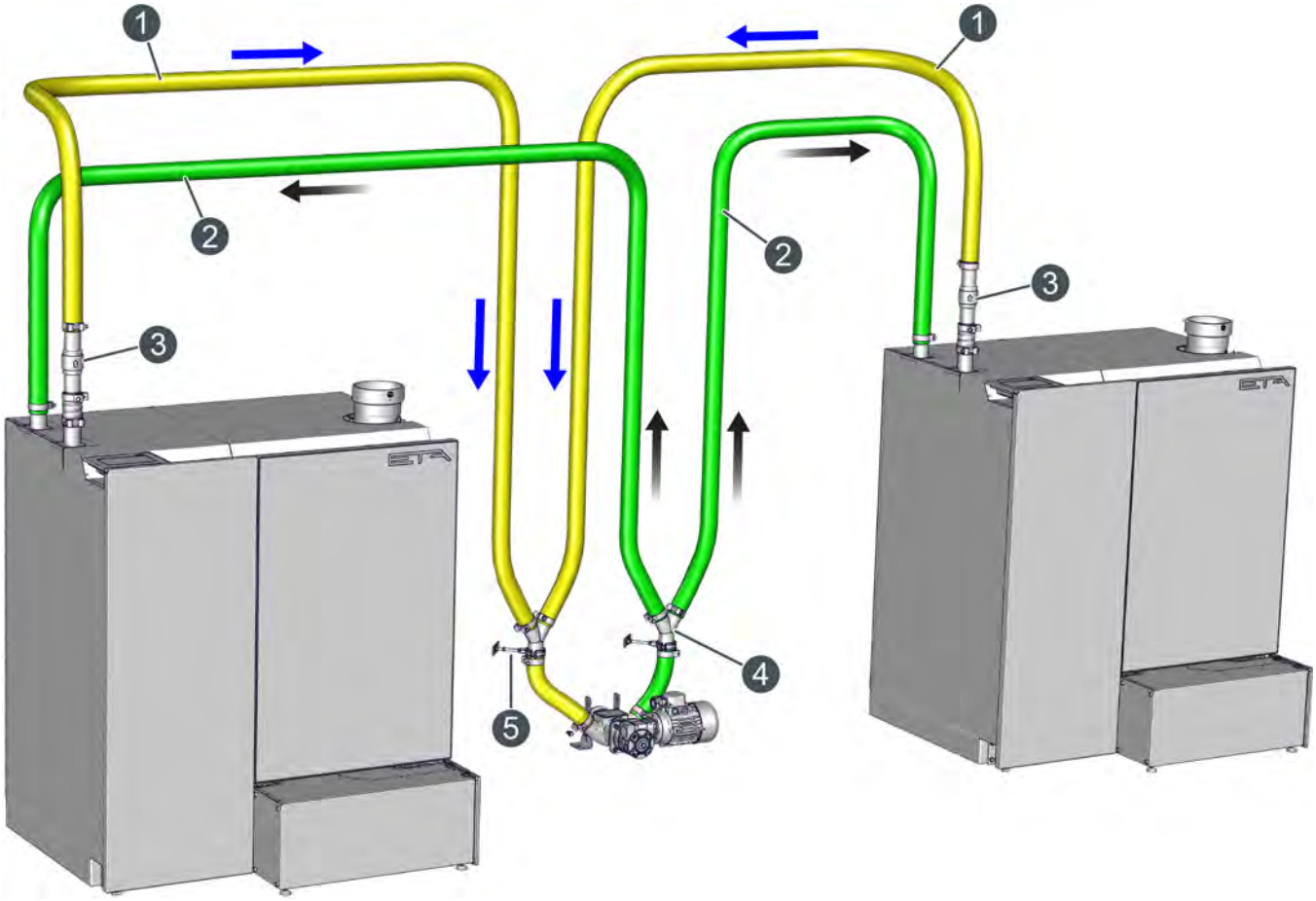
7.6 Cascade module for PelletsUnit, PelletsCompact

Description

The cascade module provides two boilers of a fuel store with a screw discharge. The check valves in the pellet return air line ensure that the return air reaches the conveying system and not the second boiler. The maximum suction length may be reduced due to leaks in the cascade module.

The cascade module is only suitable for conveyors with screws and not for suction probes, switching unit with suction probes or mole discharges. The hoses can only be sucked empty, and thus a blockage prevented, in combination with screws. The cascade module is not suitable for the ePE-K boiler because the pellet connections on this boiler are arranged horizontally.

Y-pieces must be located below the level of the connecting pieces on the boiler. If they were located higher, the pellets would also fall into the suction hose of the boiler that is not currently drawing.



1 Return air hose DN50
2 Pellet drop chute DN50
3 Check valve
4 Y-piece
5 Mounting for Y-piece

For boilers with more than 60 kW output and hose lengths of more than 12.5 m, piping made of carbon steel (54x2 mm) with appropriate bends and couplings can be used instead of the pellet drop chute. The carbon steel piping is more resistant to wear and tear than the pellet hoses.

7.7 Cascade module for the ePE-K boiler

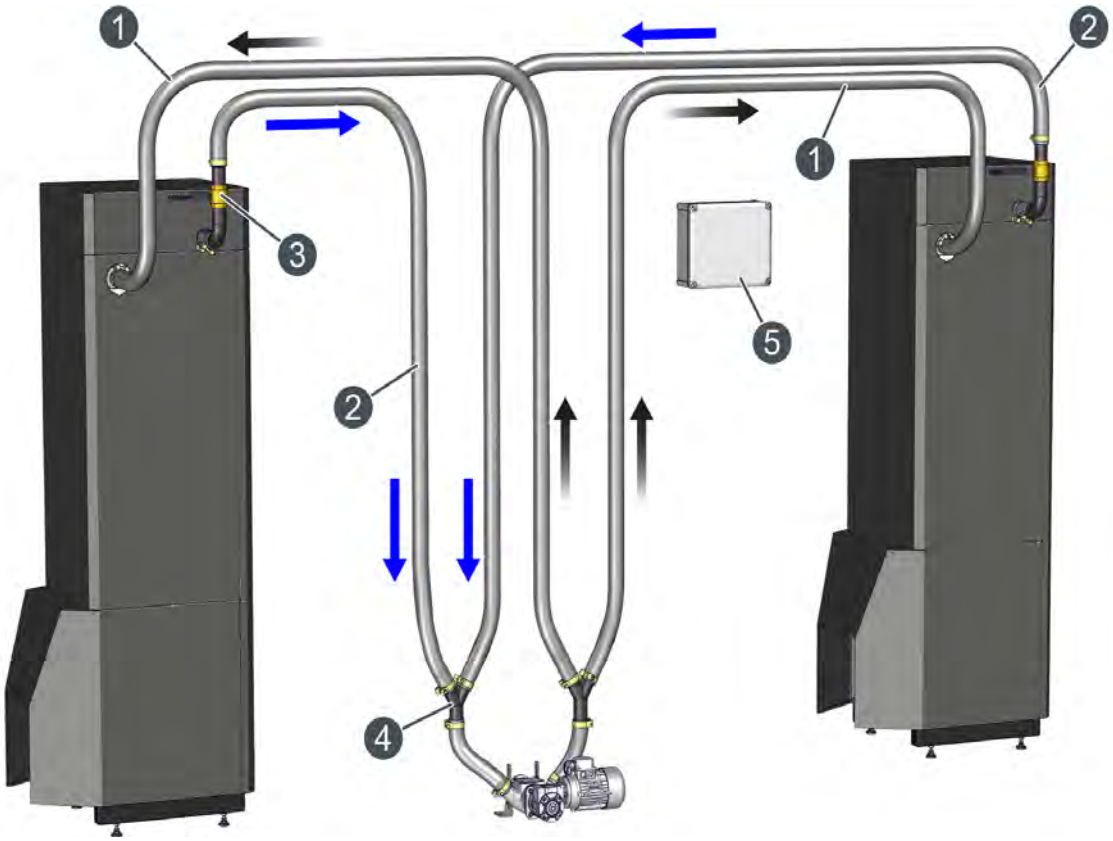
Description

The cascade module provides two boilers of a fuel store with a discharge screw. The check valves in the pellet return air line ensure that the return air reaches the conveying system and not the second boiler. The maximum suction length can be reduced due to leaks in the cascading module.

The cascade module is only suitable for conveyors with screws and not for suction probes, switching unit with suction probes or mole discharges. Only discharge screws allow the pellet hoses to be sucked empty, thus preventing clogging.

The conveying system is connected to the wall-mounted switch box, which has a separate power supply. The conveying system can be switched off separately with the on/off switch in the wall-mounted switch box. Communication between the ETAtouch control system and the pellet conveying system is established with the CAN-Bus connection between the wall-mounted switch box and the boilers. A separate emergency stop switch is required on site for the conveying system, which must be integrated into the safety chain of the boiler.

Y-pieces must be located below the level of the connecting pieces on the boiler. If they are higher, the pellets would also fall into the suction hose of the boiler that is not currently drawing.



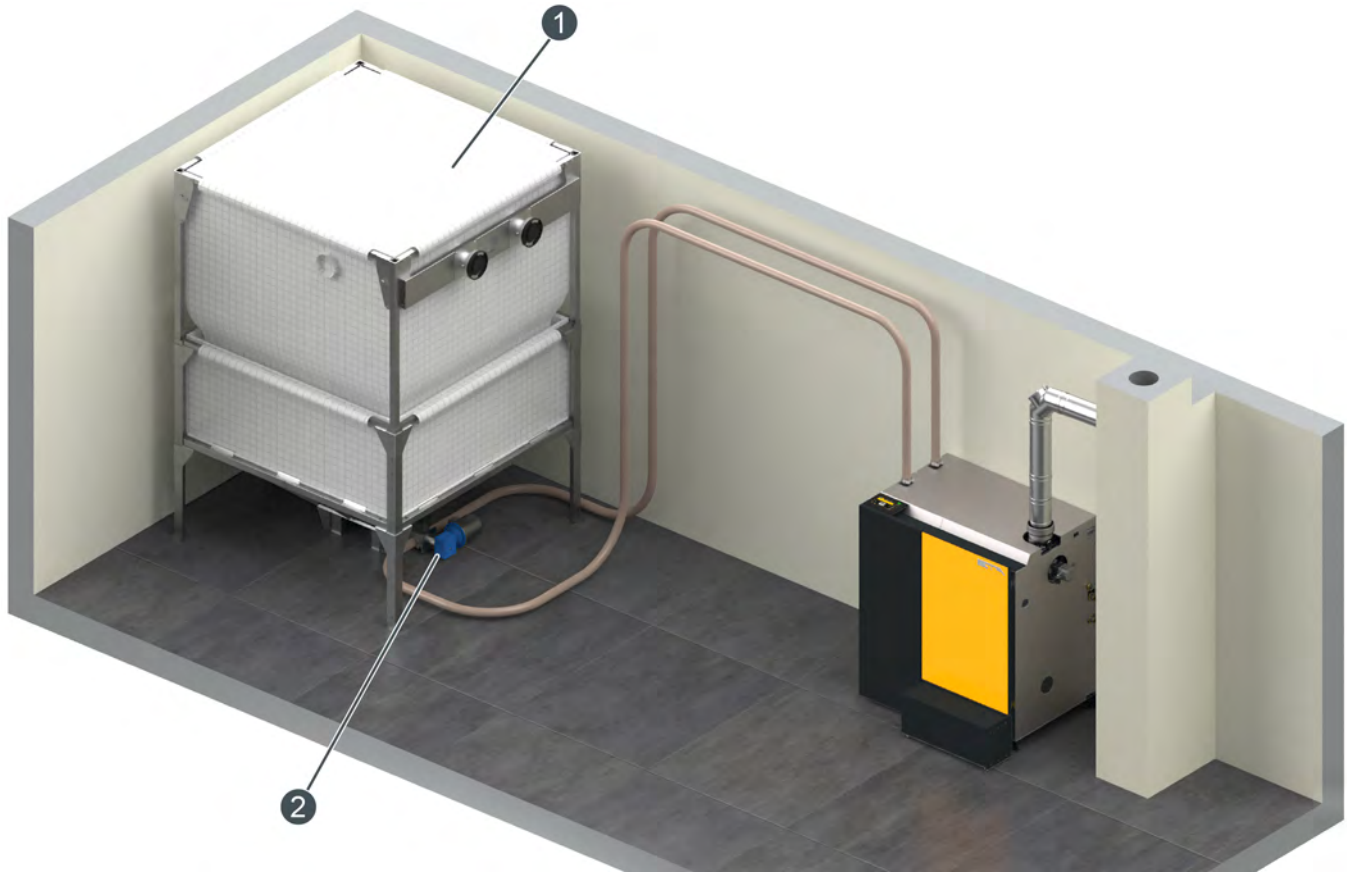
1 Pellet drop chute DN50
2 Return air hose DN50
3 Check valve
4 Y-piece
5 Wall-mounted switch box

For boilers with more than 60 kW output and hose lengths of more than 12.5 m, piping made of carbon steel (54x2 mm) with appropriate bends and couplings can be used instead of the pellet drop chute. The carbon steel piping is more resistant to wear and tear than the pellet hoses.

7.8 ETAbox

Pellet store and conveying system with ETAbox

The ETAbox contains the pellet store and the conveying system by means of an integrated screw conveyor. It can be set up directly in the boiler room, in the attic, in a barn or, if roofed and covered accordingly, even outside. The ETAbox can be up to 20 m away from the boiler. However, it may not be positioned right next to a wall, so that the fabric sack is not damaged during filling or due to damp walls. Due to the required clearance to the wall, the space requirement of the ETAbox is a bit larger than for a comparable pellet store made from masonry. The filling nozzles can be extended to a maximum of 10 m in length.



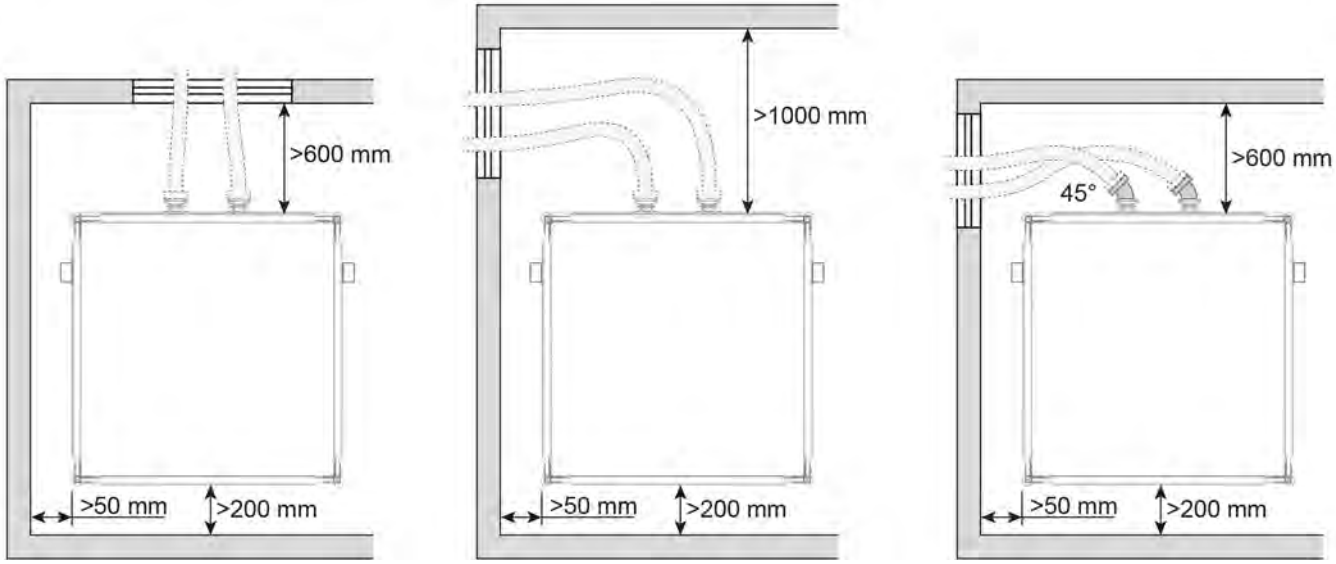
1 ETAbox with fabric sack
2 Conveying system with screw conveyor

Permanent ventilation and exhausting of the boiler room must be available, for example, through a window. For the placement of the ETAbox, the respective country-specific regulations must also be observed.

Maximum of one filling per year

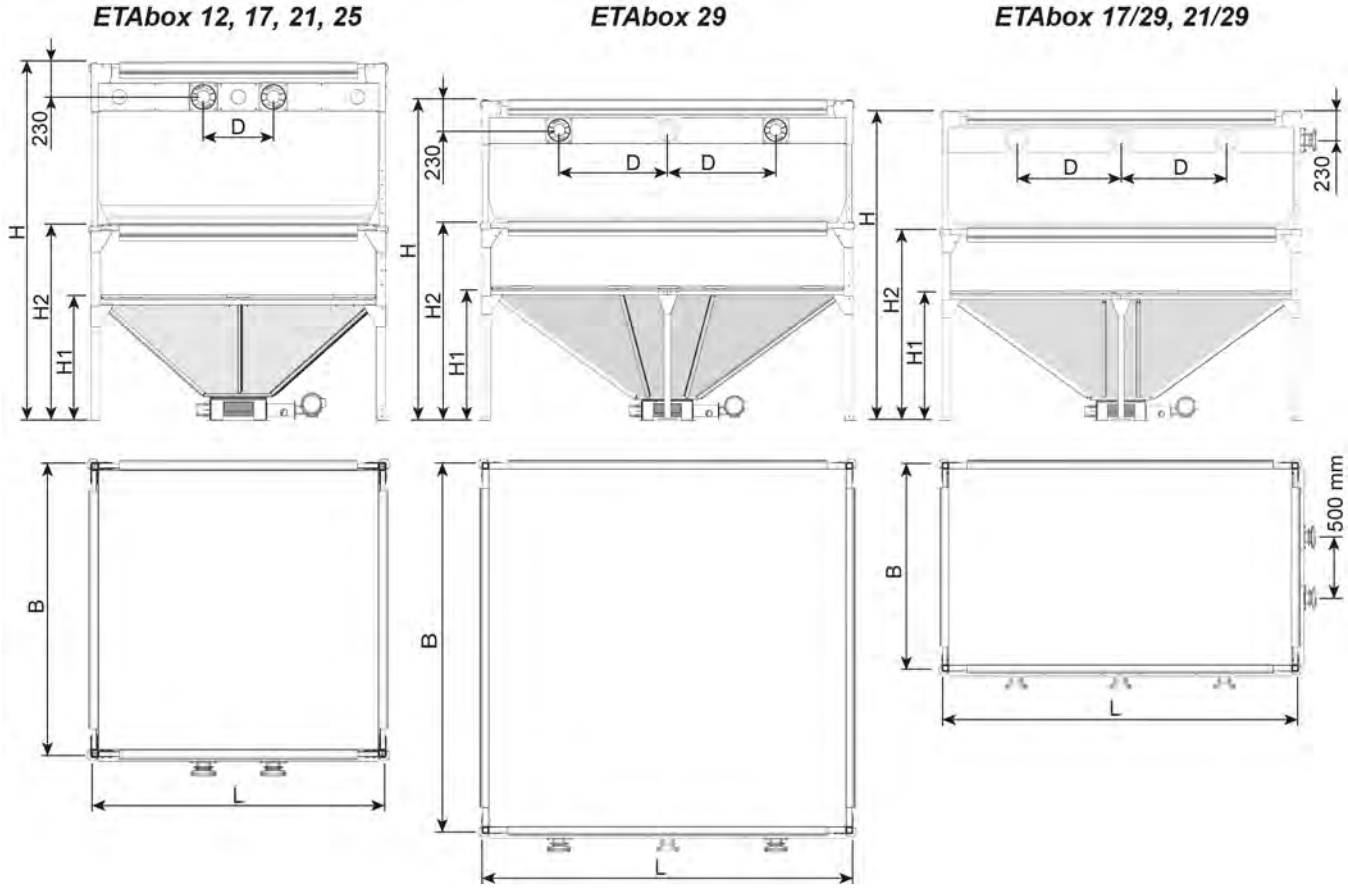
The fabric of the ETAbox is dimensioned for a maximum of one filling per year over a period of approx. 20 years.

Required clearances for filling



Technical data

ETAbox 12, 17, 21, 25, 29, 17/29 and 21/29



Dimensions and data (in mm)	ETAbox 12	ETAbox 17	ETAbox 21	ETAbox 25	ETAbox 29	ETAbox 17/29	ETAbox 21/29
Length (L) x width (W):	1200 x 1200	1700 x 1700	2100 x 2100	2500 x 2500	2900 x 2900	2900 x 1700	2900 x 2100

Dimensions and data (in mm)	ETAbox 12		ETAbox 17		ETAbox 21		ETAbox 25		ETAbox 29		ETAbox 17/29		ETAbox 21/29	
Height (H) adjustable in increments of 100 mm	1800 - 2500		1800 - 2500		1800 - 2500		1800 - 2500		1900 - 2500		1900 - 2500		1900 - 2500	
Height (H1)	470		700		860		860		1030		1030		1030	
Height (H2)	1360		1360		1360		1360		1550		1550		1550	
Gap between the filling nozzles (D)	500		500		500		900		850		850		850	
Storage volume, quantity at	m³	T	m³	T	m³	T	m³	T	m³	T	m³	T	m³	T
H = 1800 mm	1.7	1.1	3.1	2.0	4.3	2.8	6.1	3.9	-	-	-	-	-	-
H = 1900 mm	1.8	1.2	3.4	2.2	4.7	3.1	6.7	4.4	8.5	5.5	5.1	3.3	6.2	4.0
H = 2100 mm	2.1	1.4	3.9	2.5	5.6	3.6	7.9	5.1	10.0	6.5	5.9	3.9	7.3	4.8
H = 2500 mm	2.6	1.7	5.0	3.2	7.3	4.7	10.3	6.7	13.5	8.8	8.0	5.2	9.9	6.4

ETAbox M6

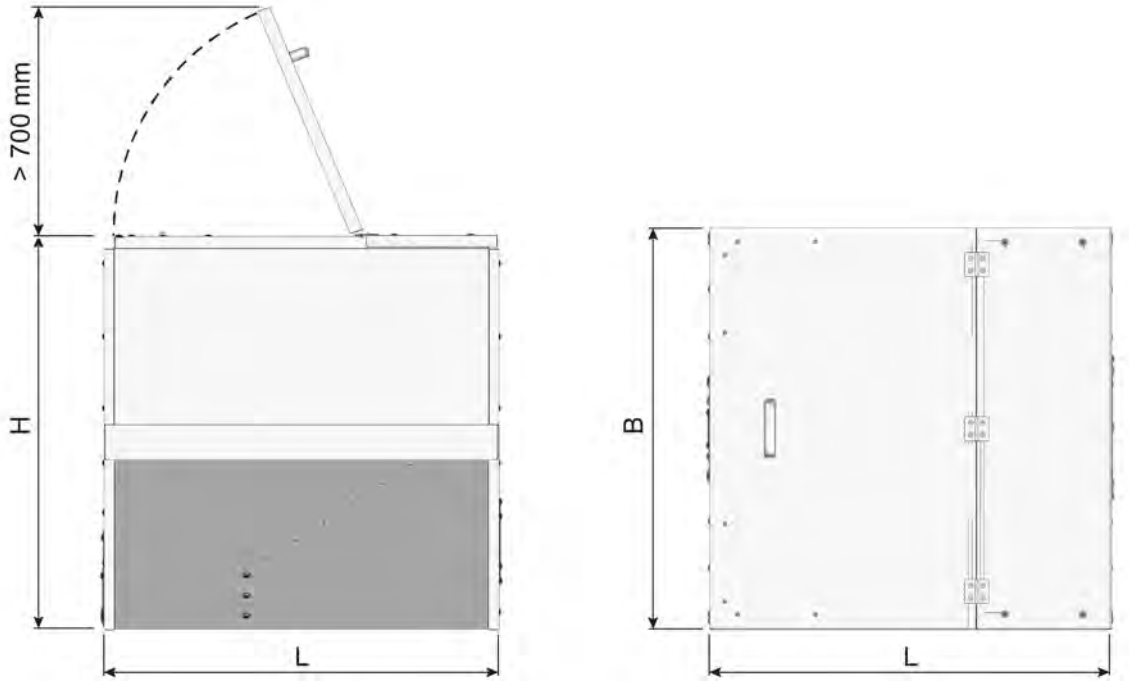


Fig. 7-16: Technical data

Dimensions and data	ETAbox M6	
Length (L) x width (W):	1000 x 1000 mm	
Height (H)	1100 mm	
min. Height of store room	1800 mm	
Storage volume / storage quantity	0.78 m³	500 kg

8 Buffer storage tank

8.1 General information

Why a buffer storage tank?

Many old log boilers that do not have buffer storage tanks are still in use, so why do we need them with today's wood-burning systems? The answer to this frequently asked question: Earlier, in the days before heating control systems, the boiler used the thermal mass of the entire house as a buffer.

Now if the boiler is replaced and the radiators are fitted with new thermostat valves and/or a weather-dependent mixing system, the log boiler is forced to operate at too low an output level in autumn and spring when the heating requirements are minimal.

At low output levels, the temperature in the combustion chamber drops, but production of wood gas doesn't. Hard-to-burn components of the wood gas such as tar or acetic acid no longer combust; instead, they condense (create tar deposits) either in the boiler's heat exchanger or in the chimney. The materials that are not deposited pollute the environment. To master this low-load operation, which inevitably occurs in a modern, energy-saving heating system, the boiler has to operate with small outputs. But the lowest output of the boiler can still be higher than the heat consumer can take. That is why a buffer storage tank is recommended to store excess heat in it and to supply it back into the heating system when required.

When is a buffer storage tank necessary?

A buffer has to be installed for the boiler under the following conditions:

- if individual room temperature control is installed.
- for more than two heating circuits.
- especially in apartment buildings where the flats are individually controlled.
- in low-energy houses, when a substantial portion of the boiler's operating time is spent below its output range.
- during the transitional period in autumn/spring when there is very low heating demand, such as only for the bathroom.
- for wooden houses with low heat capacity and radiator heating.
- if above-average hot water demand or high spikes in hot water use are expected, e.g. in hotels, blocks of flats, showers in sports facilities. A pellet boiler needs up to 20 minutes (wood chip boiler up to 45 minutes) to reach its maximum output from standby.
- if an air heating system is to be started without warm-up time for the boiler.
- if a solar heating system is being integrated with a low-temperature heating system (underfloor heating).

Pellet boiler without buffer storage tank

A modern pellet boiler can maintain a clean fire down to 30% partial load. If the heating circuits are controlled with the ETA boiler control system, for partial loads below 30% the boiler runs according to the minimum running time and heat is supplied into the heating circuits. As long as there is gas-emitting wood in the combustion chamber, combustion air continues to be fed in and the resulting residual heat is supplied to the heating circuits.

Individual room temperature control is only possible with one buffer

A buffer storage tank reduces the number of on/off cycles to an energy-saving and gentle minimum.

Through the separation of production and consumption, the room control does not have to take the boiler into consideration. Only the currently required heat is removed from the buffer.

This makes needs-based heating of individual rooms possible, for example in the morning only bathroom and kitchen, or only the rooms in the north of the house if the rooms in the south are directly heated by the sun.

At low heating loads, either install a buffer or set short heating time slots

For very well-insulated brick walls (not for wooden construction), the house itself is an excellent thermal store. If the boiler output is too high, it can be adjusted to the house's heating requirements by limiting the heating time to three short time slots spread over the day.

If there is very low heat consumption during the transitional period in autumn/spring (e.g. heating only in the bathroom), then a buffer storage tank is needed for this low heating load.

Wooden houses need a buffer storage tank

For a wooden house with radiator heating, where there is not even the screed of an underfloor heating system to act as a thermal store, the installation of a buffer should be considered.

With a design output less than 70% of the boiler's rated output, an underfloor heating system operating only with time slots will cause large temperature variations

in the rooms and a buffer storage tank is required. Heat produced by the boiler and not currently needed in the house can be stored in a buffer storage tank and returned to the heating system when needed.

For large hot water demand

A large demand for hot water often occurs for showers in sports clubs, large apartment blocks or hotels.

A pellets or wood chip boiler requires 20 minutes from standby to full output. To bridge this start time for large and instant hot water demand, either large hot water tanks or larger buffers are required.

To really maintain the hot water peak load, the upper temperature sensor (to start buffer charging) both in the hot water tank as well as the buffer are to be set very low. It may be necessary to reweld a sensor sleeve.

A sufficiently large hot water tank

To operate the boiler without a buffer storage tank, a hot water tank of sufficient size (see table) to take up the heat from an entire firing cycle is needed. A sufficiently large hot water tank should also be chosen for increased convenience.

Boiler output	Supply volume (litres)	Charging volume (litres)	Total hot water volume (litres)	Exchanger surface
< 11 kW	100	100	200	0.8 m²
< 32 kW	100	200	300	1.5 m²

Air heaters and heating fans

For air heaters that are not operated continuously (air heat exchangers), and which are started without a boiler warm-up time, a buffer storage tank is required to prevent the heater from blowing cold air at start up. In practice, this may pertain to ventilation in gastronomy or air heat exchangers of a partially heated production hall.

For smaller air heating ratios, the buffer storage tank is to be set for 30 minutes minimum runtime (of the boiler) and for larger proportions to 40 minutes (see chapter 8.3 "Dimensioning"). The boiler start can take place with the temperature sensor in the center of the buffer, so that the upper buffer half always maintains sufficient energy for the air heating and the lower buffer half allows a minimum of 15 minutes runtime for the boiler.

Buffer storage tank to cover peak loads

The buffer storage tank serves to cover peak loads, such as, for example, for a spray booth which is only in operation a few hours a day (for example in a car workshop or a carpentry). Here, a buffer storage tank can drastically reduce the required boiler output. To really maintain peak load, the charging status of the buffer is to be set high enough.

To cover smaller heating water quantities and thus also with a smaller buffer, lower return temperatures are required from the heating. That is why the air heat exchanger should be used at a design temperature of 80/40 °C, even better 60/40 °C instead of today's still unfortunate 80/60 °C (see the calculation in chapter 8.3 "Dimensioning").

Output peaks in the morning

For pure air heat exchangers in production halls, a buffer storage tank is to be considered for the morning start (between 30 and 60 minutes minimum runtime of the boiler, see calculation 8.3 "Dimensioning"). The buffer is not absolutely necessary if heating is started one or two hours before starting work.

In a well-insulated new build, a substantial drop at night is hardly possible any more and also makes no sense. Even for old builds, in particular for underfloor heating, the room temperature overnight should not drop by more than 3 °C below the daytime room temperature in order to prevent cooling of the walls. Regardless of the type of heating system, walls that have cooled overnight need a higher air temperature in the morning.

Comfort in a room is provided by the average of the air temperature and the surface temperature of the walls. This average should be between 19 and 21 °C. In winter, when heating is stopped, the surface temperature of poorly insulated outer walls can drop below 12 °C overnight. With 33% outer wall ratio, an air temperature above 24 °C is required in the morning for a "comfortable" room climate.

For comfortable heating, no buffer storage tank is needed in the morning if a minimum temperature is maintained overnight and the heating start is set one hour before getting up.

Integration of a solar heating system

Solar excesses which the hot water tank can no longer accommodate can be stored in a buffer for rainy days. If underfloor heating is present, with larger solar heating systems it makes sense to switch the collectors from hot water tank to underfloor heating in winter. At 50 °C effective temperature, the yield from solar collectors falters to "zero" in winter. At 30 °C for underfloor heating, simple flat plate collectors still achieve 30 to 40% efficiency in the transition period, and on clear, sunny spring days 50% collector efficiency is not uncommon at low temperature levels.

Solar coupling can be realised most elegantly with a buffer storage tank. To do this, a heating boiler, radiator and a hot water tank are connected to the upper half of the buffer, the solar heating system below the middle of the buffer and underfloor heating in the lower area of the buffer. The temperature sensor for the lower buffer area (for ending the charge by the boiler) is to be set above the solar heating system connection.

Tight radiator valves improve buffer utilisation

For radiators, low return temperatures and thus better buffer utilisation are also possible if they are fitted with tight radiator valves (kv < 0.35). Tight radiator valves are common for heating systems supplied with district heat, they get condensing boilers to really condense, and they control the room temperature more precisely with a higher valve authority.

Unfortunately, radiator valves are still delivered only with valve cores between kv=0.6 and kv=1.1 in order to ensure high return temperatures for oil boilers. Tighter kv values are currently only available via special order. It is frequently stated that valve cores can be throttled. However, this ignores the fact that if throttling from kv=1 to kv=0.35, the control area of the valve is also drastically cut. Instead of controlling the room temperature, an "on/off" operation occurs with large temperature fluctuations.

If you fit radiators designed for 70/55 °C with tight valves, 80/45 °C operation is possible, whereby the flow temperature high point of 80 °C is only necessary on a few winter days.

If you want to keep the "maximum 60 °C flow temperature" guideline, select radiators from the 55/45 °C lists, then theoretically 65/35 °C is possible with tight valves. With the uncertainty factors, often minor over-dimensioning, 60/30 °C is then reached in actual operation. Temperatures below 30 °C are hardly reachable with a radiator, as below this temperature the convection (=heat transfer) breaks down significantly.

Even for existing radiator heating, equipping with tight radiator valves makes sense especially if the building envelope were subsequently insulated and therefore the radiators are large enough in current state. If a valve has to be exchanged, all valves must be exchanged. Because remaining old valves continue to keep the return temperature high.

With tight valves, not only will better buffer utilisation be achieved as a result of lower return temperatures, but the sharper control characteristic also provides better room control and thus energy-savings with simultaneous higher usage comfort.

Buffers for multi-boiler systems

For systems with several boilers and also for those with several very different heating circuits (especially different times of operation or air and underfloor heating in the same heating system), a bypass is needed between heat producers and consumers to ensure stable hydraulic conditions for the individual circuits. A hydraulic bypass is nothing more than a pipe connection between the flow and the return with the same diameter as both. The differential water quantities from heating and boiler circuits flow through this bypass, This results in a neutral pressure point that ensures that the heating circulation cannot influence the boiler water circulation and vice versa.

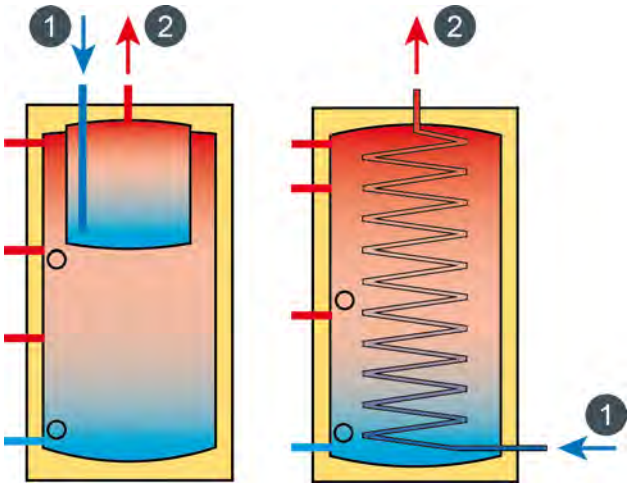
A bypass that can do more than just stabilise pressure conditions is the buffer. If a wood boiler for the base-load range and an oil/gas boiler for peak load or as emergency reserve are operated together in a heating system, a buffer storage tank reduces the operating time of the peak-load boiler by compensating for brief differences between production and consumption. The number of boiler starts/stops when consumption fluctuates around the rated output of a boiler is reduced, saving energy and easing stress on the boiler.

To work as an output compensator and bypass for several boilers, the buffer's storage capacity should be chosen to match 20 to 30 minutes of full-load operation for the largest automatic wood boiler in the system. In special cases, peak loads and non-continuously operated air heating systems must also be taken into account, or the morning peak if the start of an oil/gas boiler is to be avoided. Whereby "first", the morning peaks themselves should be minimised with staggered starting times for the heating circuits as well as reasonable set-back temperatures.

8.2 Hot water production

Hot water production in buffer

Here, two different systems are offered. Either a hot water tank suspended in the buffer or an internal water heat exchanger from bottom to top through the buffer.



1 Cold water

2 Hot water

The benefit of a hot water tank suspended above is the large amount of hot water for several parallel tapping points. A disadvantage is the cooling of the buffer from above, and thus a substantial reduction of the producible hot water quantity from a buffer charge.

For the internal water heat exchanger, the arguments are the exact opposite. Only a limited hot water quantity is produced, but with better buffer utilisation.

The advantage of both systems is the space saved by being able to forego the hot water tank. The disadvantage is calcification in case of hard drinking water. Above 15 °dH, these systems should only be deployed if the buffer temperature can be limited to 65 °C.

Hot water production with a fresh water module

Instead of a hot water tank, a drinking water heat exchanger (=fresh water module) is also possible, which heats fresh water at the time it's needed with the heating water of the buffer.



Fig. 8-1: Buffer storage tank with fresh water module

The fresh water module has significant advantages:

- The fresh water module can be installed on or next to the buffer. The space needed by the fresh water module is much less compared to a hot water tank.
- The temperature of the heating water in the fresh water module is limited to 60 °C with the integrated admixing pump. As a result of this, the critical calcification temperature of 60 °C is not reached and lime buildup is minimised.
- The buffer storage capacity is used to its maximum. Hot water is removed from the top and returned to the buffer below at 10 to 15 °C above the cold water flow temperature. The entire buffer volume is used with a maximum spread of 85/30 °C.

8.3 Dimensioning

Calculating the required buffer volume

First, the heat quantity to be stored "Q" is determined and, in a second step, the buffer volume required for this heat quantity.

Determine the heat quantity to be stored

Heat quantities are determined by the minimum runtime of the boiler. The formula for this is as follows:

$$Q_{min} = P_k \cdot t_{min}$$

$Q_{min.}$	...	Heat quantities from the minimum runtime of the boiler in [kWh]
P_K	...	Boiler output in [kW]
$T_{min.}$	...	Min. runtime in [h]

Example:
For a 90 kW boiler with 0.5 h minimum runtime, this results in:

$$Q_{min} = 90 \cdot 0{,}5 = 45\ kWh$$

Heat volume due to the peak heat load

The amount of thermal energy for the peak load is similarly calculated. The formula for this is as follows:

$$Q_{SHL} = (P_{SHL} - P_K) \cdot t_{SHL}$$

Q_{SHL}	...	Heat volume due to the peak heat load in [kWh]
P_{SHL}	...	Peak heat load in [kW]
P_K	...	Boiler output in [kW]
t_{SHL}	...	Duration of peak heat load in [h]

For a peak heat load of 210 kW over 1.5 h for a boiler output of 90 kW, this results in:

$$Q_{SHL} = (210 - 90) \cdot 1{,}5 = 180\ kWh$$

The heat volumes to be stored (minimum runtime and peak heat load) are now determined for the boiler.

Determine required buffer volume

The formula for this is as follows:

$$V_P = (Q_{SHL} + Q_{min}) \cdot \frac{c}{(T_{VL} - T_{RL})}$$

V_P	...	Required buffer tank volume in litres [l]
c	...	specific heat capacity of water (1 kWh heating 860 l water by 1 °C)
t_{VL}	...	Boiler flow temperature in [°C]
t_{VL}	...	Boiler return temperature in [°C]

Example:
The required buffer volume for the heat quantity from the minimum runtime of the boiler (45 kWh, see previous calculation) at 85 °C flow and 55 °C return temperature results in a value of:

$$V_P = (0 + 45) \cdot \frac{860}{(85 - 55)} = 1290\ l$$

Example:
For the peak heat load of 180 kWh (see previous calculation) at 85 °C flow and 60 °C return temperature from a conventional air heat exchanger (80/60 °C), and 45 kWh heat volume (from the minimum runtime), this results in a required buffer volume of:

$$V_P = (180 + 45) \cdot \frac{860}{(85 - 60)} = 7740\ l$$

The same peak heat load but with 40 °C return temperature from the air heat exchanger (80/40°C) results in:

$$V_P = (180 + 45) \cdot \frac{860}{(85 - 40)} = 4300\ l$$

Heat quantity for hot water

The formula for this is as follows:

$$Q_{ww} = n \cdot N \cdot \frac{(T_{ww} - T_{KW})}{c}$$

Q_{HW}	...	Heat quantity for hot water demand in [kWh]
n	...	Number of people
n	...	Standard consumption of hot water: • simple demand: 30 l/day with 45 °C • medium demand: 50 l/day with 45 °C • high demand: 80 l/day with 45 °C • a bathtub: 200 l with 40 °C • a shower: 50 l with 40 °C; flow rate 10 l/min with 40 °C
t_{HW}	...	Hot water temperature in [°C]
t_{kW}	...	Cold water temperature in [°C]

Examples:
For a family of four with medium demand, a heat volume for hot water is calculated as:

$$Q_{ww} = 4 \cdot 50 \cdot \frac{(45 - 10)}{860} = 8{,}1\ kWh$$

For a gymnasium with six showers (10 l/min) and 20 minutes shower duration, this results in:

$$Q_{ww} = 6 \cdot 10 \cdot 20 \cdot \frac{(40 - 10)}{860} = 41{,}8\ kWh$$

For the arrival of a bus at a hotel, it can be assumed that 60 people all take a shower (50 l/person) at the same time. This results in:

$$Q_{ww} = 60 \cdot 50 \cdot \frac{(40 - 10)}{860} = 104{,}6\ kWh$$

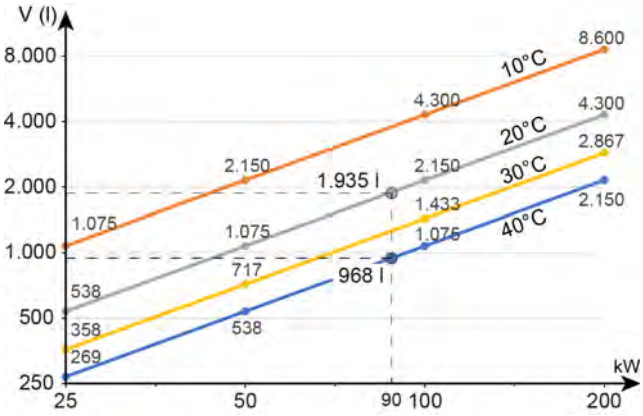
For the previous example with 104.6 kWh (heat volume for hot water) and 45 kWh (heat volume from the minimum runtime), this results in a required buffer volume of:

$$V_P = (104{,}6 + 45) \cdot \frac{860}{(85 - 40)} = 2859\ l$$

Choosing buffer size for systems with automatic fuel supply

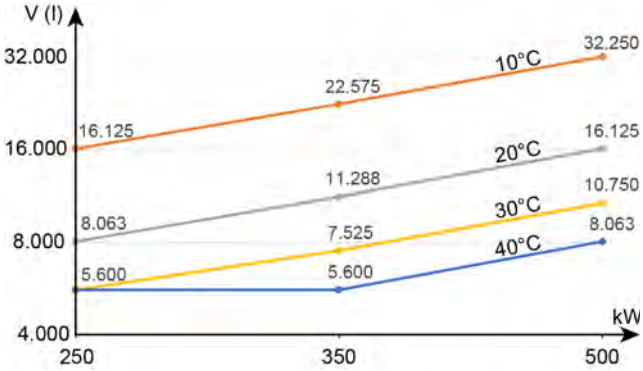
Even if some subsidy guidelines demand "litres per kilowatt" and thereby specify a minimum buffer size, one should arrange for a technically correct size. The storage capacity of a buffer essentially depends on the spread between the heating system's boiler flow temperature and return temperature.

Example: For a 90 kW boiler with 70°C flow temperature, 30 minutes of full-load operation with underfloor heating and 30°C return temperature (= 40°C spread) requires a buffer volume of 968 litres, but with radiator heating and 50°C return temperature (= 20°C spread), it requires 1,935 litres.



The minimum volume for the buffer can also be calculated with the following formula:

$$\text{Volume} = \frac{\text{operating time (h) x output (kW) x 860}}{\text{spread (°C)}}$$



8.4 Hydraulic integration

Different options

The hydraulic integration of the buffer tank into the heating system depends on the boiler. With a condensing boiler (e.g. the ePE-BW), the flow and return are connected to the buffer in a different way than with a conventional boiler, e.g. the PelletsCompact. These options are listed in the following chapters.

8.4.1 for the ePE-BW condensing boiler

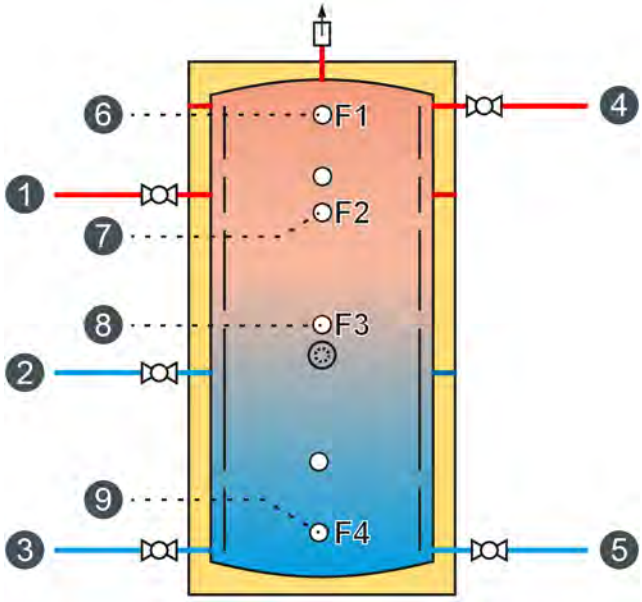
Hydraulic integration of a buffer

For the largest possible buffer storage capacity and for maximum solar yield even in winter, low return temperatures from the consumers are the goal. Even the best stratified buffer can't unmix what has been mixed by heat distributors. Particularly in houses where radiators and underfloor circuits are present, no mixing heat distributors should be installed; the returns should be connected directly to the buffer. An underfloor heating system can still be operated with the return from the radiators. In all cases, an oil or gas boiler should be connected to the top part of the buffer only. Siphon loops downwards at all connections reduce heat losses in summer. In the case of condensing boilers, no hydraulic switch may be installed between the boiler and the buffer.

For condensing boilers, the flow connection must be made at the second coupling (seen from above at the buffer) and not at the highest coupling. Thus, no mixing of the buffer can take place when the hot water demand is complete. This is because the ePE-BW condensing boiler regulates the feed temperature according to the current highest demand of the heat consumers.
In the control system, the temperature sensor at the level of the flow connection of the condensing boiler must therefore be assigned in the function block of the PufferFlex at [Boiler/buffer producer] at [Buffer top]. In the following example, this is the temperature sensor [Sensor 2].

For optimal and economical use of the condensing technology, we recommend the lowest possible return temperature from the heating system (approx. 35 °C).

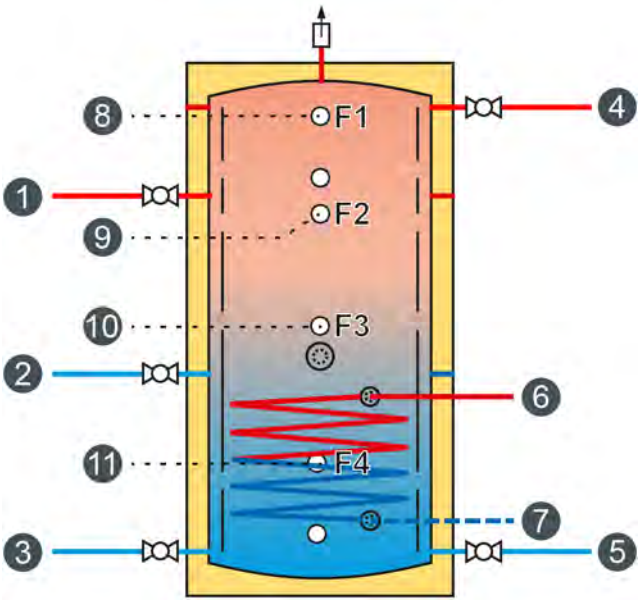
Hot water tank or fresh water module



1 Condensing boiler, heating circuits, oil/gas boiler flow
2 Oil/gas boiler return, high-temperature circuit return, hot water tank return
3 Condensing boiler, low temperature circuits return
4 Fresh water module, hot water tank flow
5 Fresh water module return
6 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module and hot water tank
7 Temperature sensor [Sensor 2] for requesting and releasing the heating circuit
8 Temperature sensor [Sensor 3]
9 Temperature sensor [Sensor 4] for the differential temperature control between the boiler and the buffer

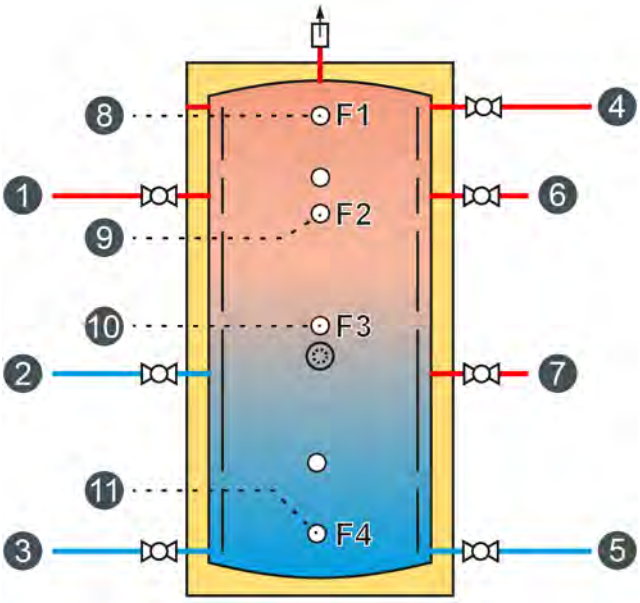
The temperature sensor [Sensor 4] must always be positioned just above the lowest return connection.
This is also important for buffers from third parties, so that they are not positioned beneath the lowest return connection.

Solar exchanger and fresh water module



1 Condensing boiler, heating circuits, oil/gas boiler flow
2 Oil/gas boiler, high-temperature circuits return
3 Condensing boiler, low temperature circuits return
4 Fresh water module flow
5 Fresh water module return
6 Solar flow
7 Solar return
8 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module
9 Temperature sensor [Sensor 2] for requesting and releasing the heating circuit
10 Temperature sensor [Sensor 3]
11 Temperature sensor [Sensor 4] for differential temperature control between the solar heating system and the buffer, and for differential temperature control between the boiler and the buffer

Stratified charging module and fresh water module



1 Condensing boiler, heating circuits, oil/gas boiler flow
2 Oil/gas boiler, high-temperature circuits return
3 Condensing boiler, low temperature circuits return
4 Fresh water module flow
5 Fresh water module return, solar
6 Upper solar flow (stratified charging module)
7 Lower solar flow (stratified charging module)
8 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module
9 Temperature sensor [Sensor 2] for requesting and releasing the heating circuit and upper solar heating system
10 Temperature sensor [Sensor 3]
11 Temperature sensor [Sensor 4] for differential temperature control between the solar heating system and the buffer, and for differential temperature control between the boiler and the buffer

8.4.2 for PelletsUnit, PelletsCompact and ePE-K

Hydraulic integration of a buffer

For the largest possible buffer storage capacity and for maximum solar yield even in winter, low return temperatures from the consumers are the goal.

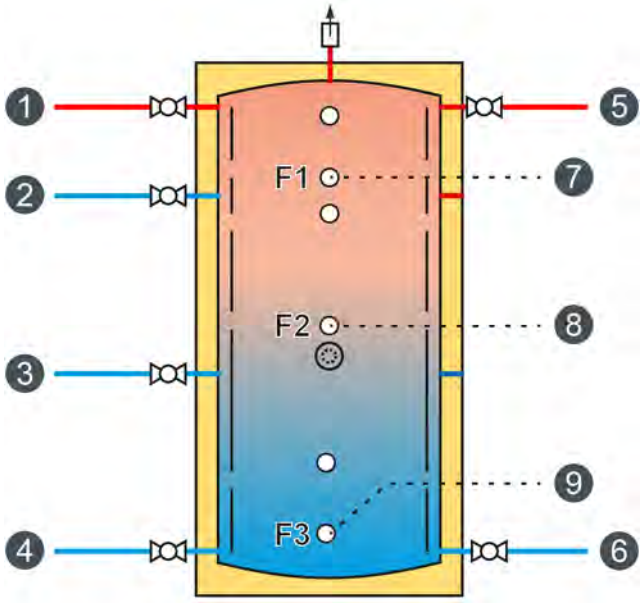
Even the best stratified buffer can't unmix what has been mixed by heat distributors. Particularly in houses where radiators and underfloor circuits are present, no mixing heat distributors should be installed; the returns should be connected directly to the buffer. An underfloor heating system can still be operated with the return from the radiators.

If a solar heating system is connected, only the cold returns from an underfloor heating system or from a fresh water module may be fed into the solar-heated lower third of the buffer. This results in lower solar panel working temperatures with significantly higher efficiencies and also significantly higher solar yield.

In all cases, an oil or gas boiler should be connected to the top part of the buffer only.

Siphon loops downwards at all connections reduce heat losses in summer.

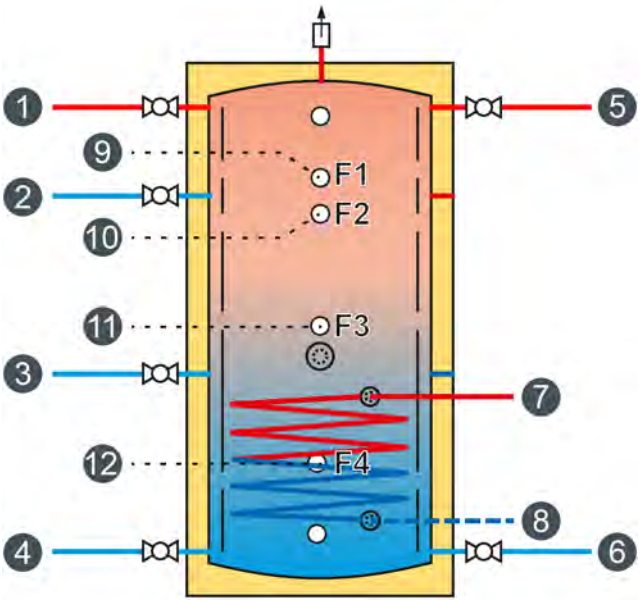
Hot water tank or fresh water module



1 Boiler flow, heating circuits, hot water tank, oil/gas boiler
2 Oil/gas boiler return
3 Hot water tank return, high-temperature circuit return
4 Boiler, low-temperature circuit return
5 Fresh water module flow
6 Fresh water module return
7 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module, hot water tank and heating circuit
8 Temperature sensor [Sensor 2]
9 Temperature sensor [Sensor 3] for the differential temperature control between the boiler and the buffer

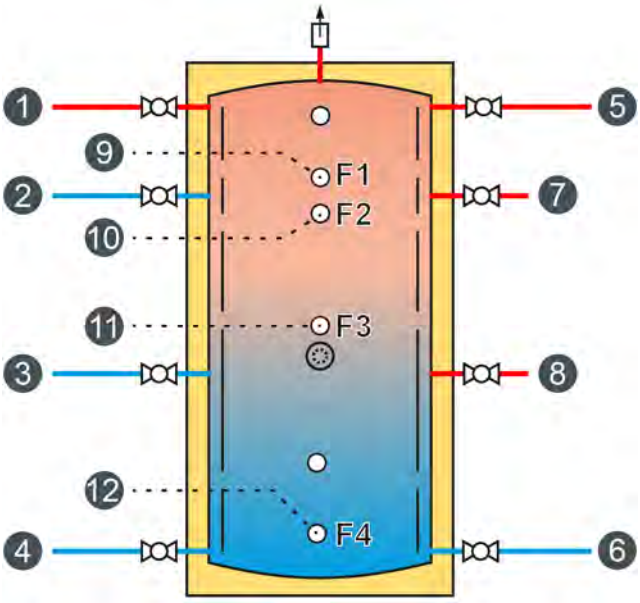
The temperature sensor [Sensor 3] must always be positioned just above the lowest return connection.
This is also important for buffers from third parties, so that they are not positioned beneath the lowest return connection.

Solar exchanger and fresh water module



1 Boiler, heating circuits, oil/gas boiler flow
2 Oil/gas boiler return
3 Boiler, high-temperature circuits return
4 Low-temperature circuits return
5 Fresh water module flow
6 Fresh water module return
7 Solar flow (register)
8 Solar return (register)
9 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module and heating circuit
10 Temperature sensor [Sensor 2]
11 Temperature sensor [Sensor 3] for the differential temperature control between the boiler and the buffer
12 Temperature sensor [Sensor 4] for the differential temperature control between the solar heating system and the buffer

Stratified charging module and fresh water module



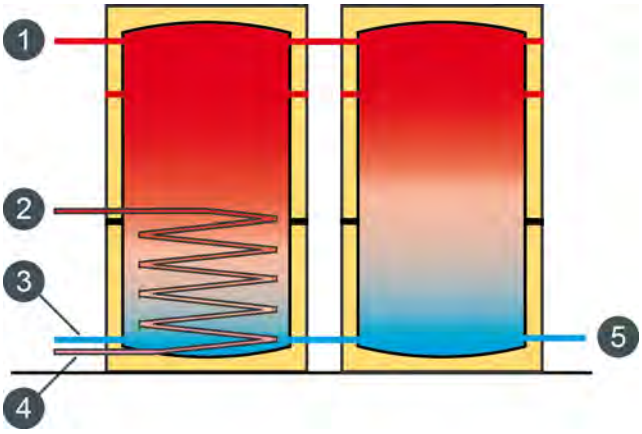
1 Boiler, heating circuits, oil/gas boiler flow
2 Oil/gas boiler return
3 Boiler, high-temperature circuits return
4 Low-temperature circuits return
5 Fresh water module flow
6 Fresh water module return, solar
7 Upper solar flow (stratified charging module)
8 Lower solar flow (stratified charging module)
9 Temperature sensor [Sensor 1 (top)] for requesting and releasing the fresh water module and heating circuit
10 Temperature sensor [Sensor 2] for the solar heating system, top
11 Temperature sensor [Sensor 3] for the differential temperature control between the boiler and the buffer
12 Temperature sensor [Sensor 4] for the differential temperature control between the solar heating system and the buffer

8.5 Connection between multiple buffer storage tanks

Parallel connection

When there are several buffers, parallel connection (top with top and bottom with bottom) is usually the better solution. With a parallel connection, the entire buffer volume is available to installed heat exchangers such as solar heat exchangers or internal water heat exchangers and suspended hot water tanks.

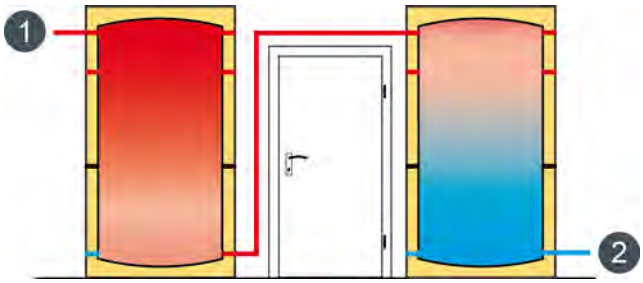
If two buffer storage tanks of different dimensions are connected in parallel, then the flow must be connected to the higher buffer or the lower buffer must be raised so that the upper connection can be horizontal.



1 Flow
2 Solar heating system flow
3 Return
4 Solar heating system return
5 Return

Serial connection

A serial connection between two buffers has no advantages over a parallel connection; but it does disadvantages. For example, a suspended hot water tank can get no heat from the second buffer or an internal heat exchanger cannot heat to both buffers. For this reason, with serial buffers one should connect the solar heating system using either heat exchangers in both buffers or (preferred) with an external heat exchanger.



1 Flow
2 Return

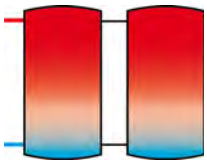
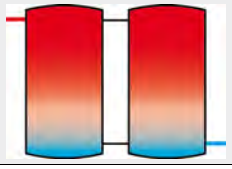
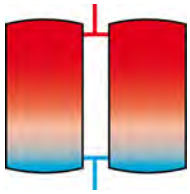
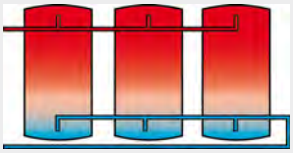
With rare exceptions, the use of the serial connection (buffer 2 top and buffer 1 bottom connected) is limited to overcoming spatial constraints of a particular installation. If passage to a door must be kept free or if there is a long distances between buffers, only a serial connection will be possible

Tichelmann connection for higher outputs

For parallel connection with one-sided connection, the volume of the second buffer is integrated using the thermosiphon principle. The exchange between the two tanks is driven only by gravity and limited by the hydraulic resistance of the junctions. Therefore, a Tichelmann connection is required for medium outputs.

With a 6/4" connection, a maximum of 5500 l/h at 0.25 mws pressure loss is possible (for flow and return connections together). This corresponds to 130 kW at a spread of 20 °C. Therefore, external piping (either symmetric or with Tichelmann connection), is needed for higher outputs.

With more than two tanks, external piping with Tichelmann connection is also needed to fill and drain all tanks uniformly.

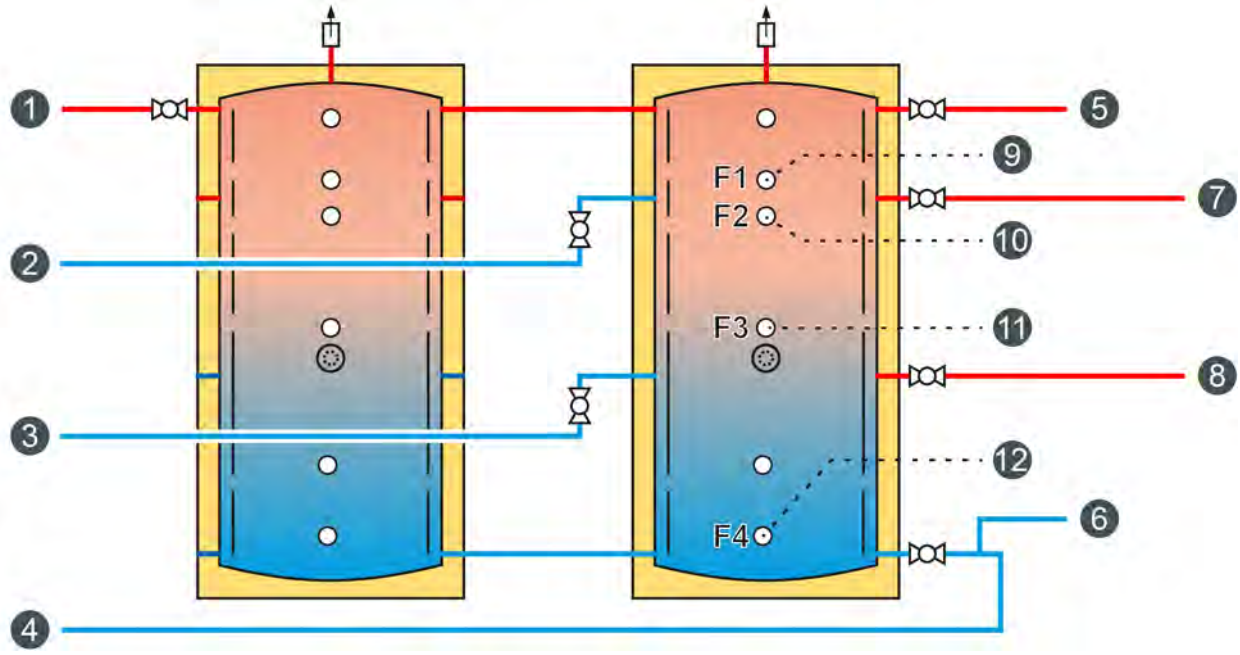
Parallel connection between buffer storage tanks	**Buffer connections 5/4" DN 32**	**Buffer connections 6/4" DN 40**
one-sided connection 	< 25 kW boiler output maximum 2 buffers	< 40 kW boiler output maximum 2 buffers
Internal Tichelmann connection 	< 80 kW boiler output maximum 2 buffers	< 130 kW boiler output maximum 2 buffers
Symmetrical connection 	> 80 kW boiler output maximum 2 buffers	> 130 kW boiler output maximum 2 buffers
external piping with Tichelmann connection 	> 80 kW boiler output, and/or more than 2 buffers	> 130 kW boiler output, and/or more than 2 buffers

8.6 Parallel buffer connection

Parallel buffer connection with internal Tichelmann

The basic principle of the internal Tichelmann is diagonal flow. Two buffers are connected together at the top and bottom (= parallel connection). For output up to 90 kW, a connection with DN 32 (ETA buffer connection set) is sufficient, for 30 kW use at least R1" or 28 mm copper. On one tank, the boiler outlet is connected at the top; on the other the boiler return is connected at the bottom. Return lines with greatly differing temperatures should be fed into the buffer storage tank separately. To minimize pipe circulation losses, it is beneficial to make the connections with downward siphon loops.

With hot water tank, fresh water module and stratified charging module



1 Boiler flow, heating circuits, oil/gas boiler, hot water tank
2 Oil/gas boiler return
3 Boiler return, high-temperature circuit return, hot water tank return
4 Low-temperature circuits return
5 Fresh water module flow
6 Fresh water module return, solar
7 Upper solar flow (stratified charging module)
8 Lower solar flow (stratified charging module)
9 Temperature sensor [Sensor 1 (top)]
10 Temperature sensor [Sensor 2]
11 Temperature sensor [Sensor 3]
12 Temperature sensor [Sensor 4]

For a sufficient hot water reserve, the release temperatures of the heating circuits must be over 45 °C.

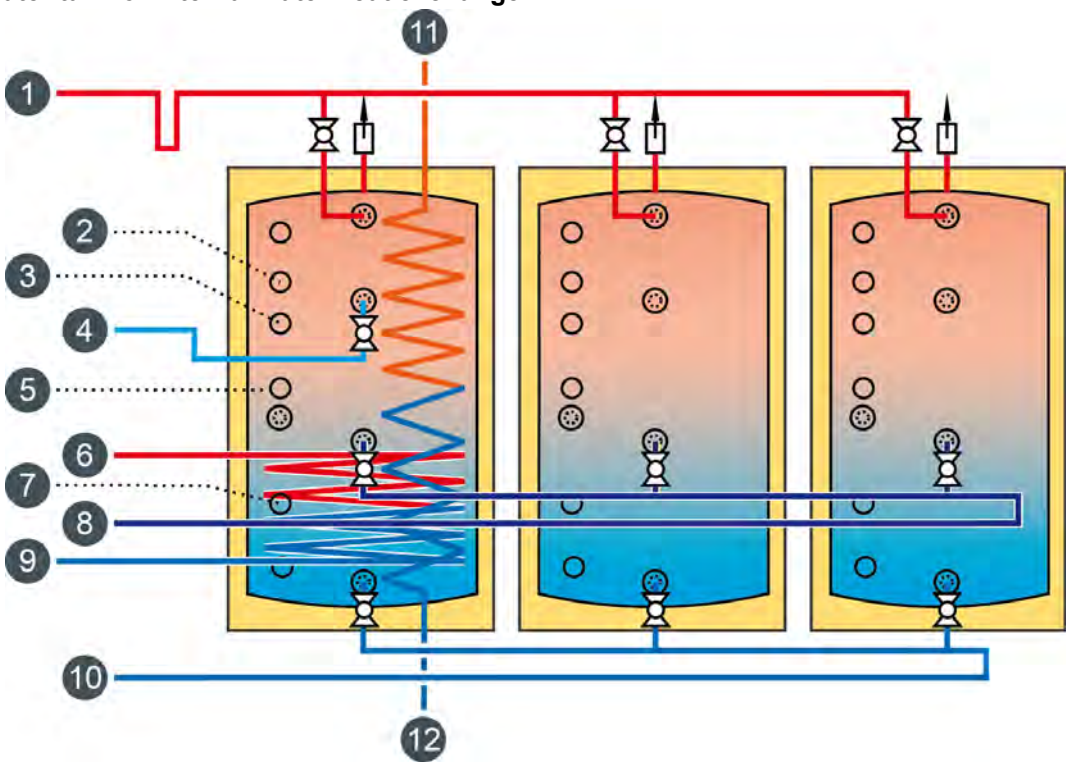
8.7 External Tichelmann

Parallel buffer connection with external Tichelmann

The basic principle of the external Tichelmann is parallel flow through several buffer storage tanks, which is achieved with diagonally opposed connection of the collectors. The last buffer on the flow collector is the first on the return collector. To achieve uniform charging and discharging, the connection pipes should be at least one or two sizes smaller than the collector. There is no output limit for this circuit. To minimize pipe circulation losses, it is helpful to make the connections with downward siphon loops.

For a small solar heating system, the total volume can be reduced in the summer by locking individual buffers.

With hot water tank or internal water heat exchanger

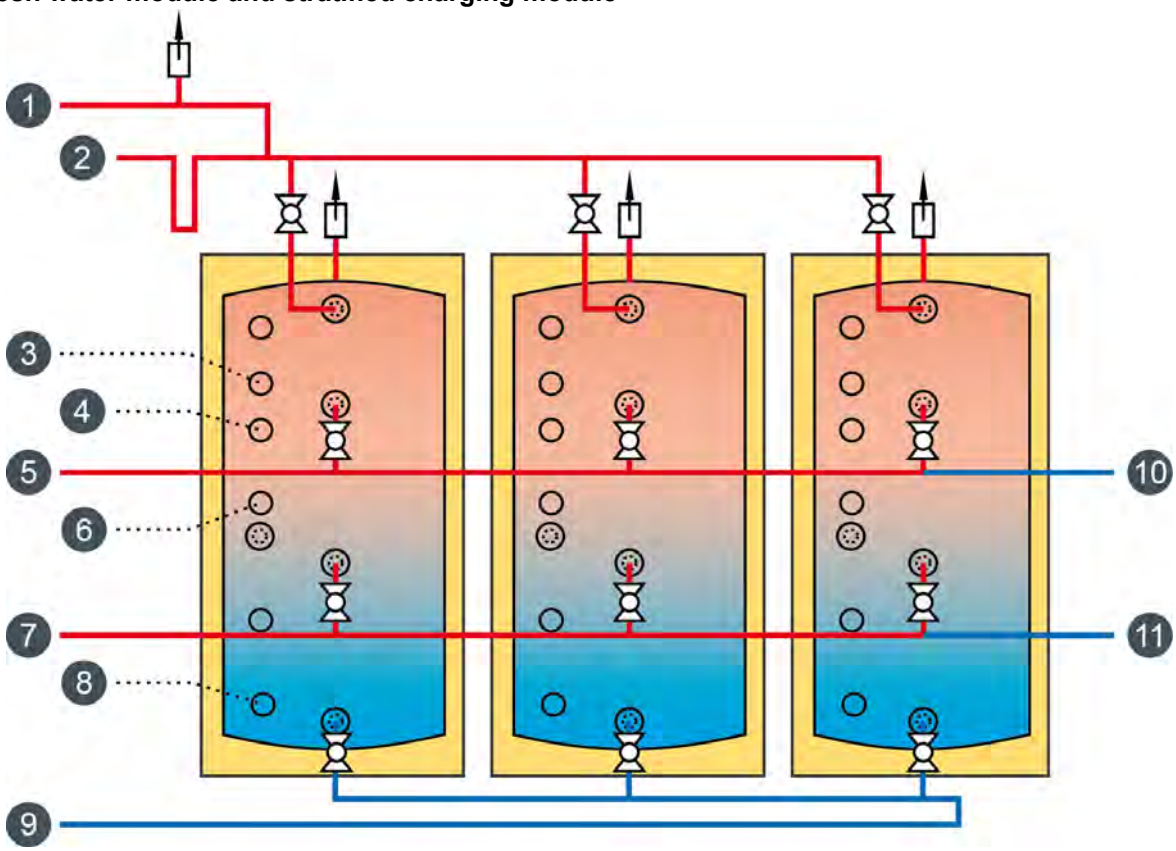


1 Boiler, heating circuits, oil/gas boiler flow
2 Temperature sensor [Sensor 1 (top)]
3 Temperature sensor [Sensor 2]
4 Oil/gas boiler return
5 Temperature sensor [Sensor 3]
6 Solar flow
7 Temperature sensor [Sensor 4]
8 Boiler, high-temperature circuit return
9 Solar return
10 Low-temperature circuits return
11 Hot water
12 Cold water

maximum total output	Connecting ball valves on buffer	Collector line at least		
30 kW	DN 20	DN 25	R 1"	28 x 1.5
60 kW	DN 25	DN32	R 1¼"	35 x 1.5

maximum total output	Connecting ball valves on buffer	Collector line at least		
90 kW	DN 32	DN 40	R 1½"	42 x 1.5
160 kW	DN 32	DN 50	R 2"	54 x 1.5
300 kW	DN 40	DN 65	R 2½"	76 x 2
450 kW	DN 40	DN 80	R 3"	89 x 2

With fresh water module and stratified charging module



1 Fresh water module flow
2 Boiler, heating circuits, oil/gas boiler flow
3 Temperature sensor [Sensor 1 (top)]
4 Temperature sensor [Sensor 2]
5 Solar flow, top
6 Temperature sensor [Sensor 3]
7 Solar flow, lower
8 Temperature sensor [Sensor 4]
9 Fresh water module return, solar and low temperature circuits
10 Oil/gas boiler return
11 Boiler, high-temperature circuit return

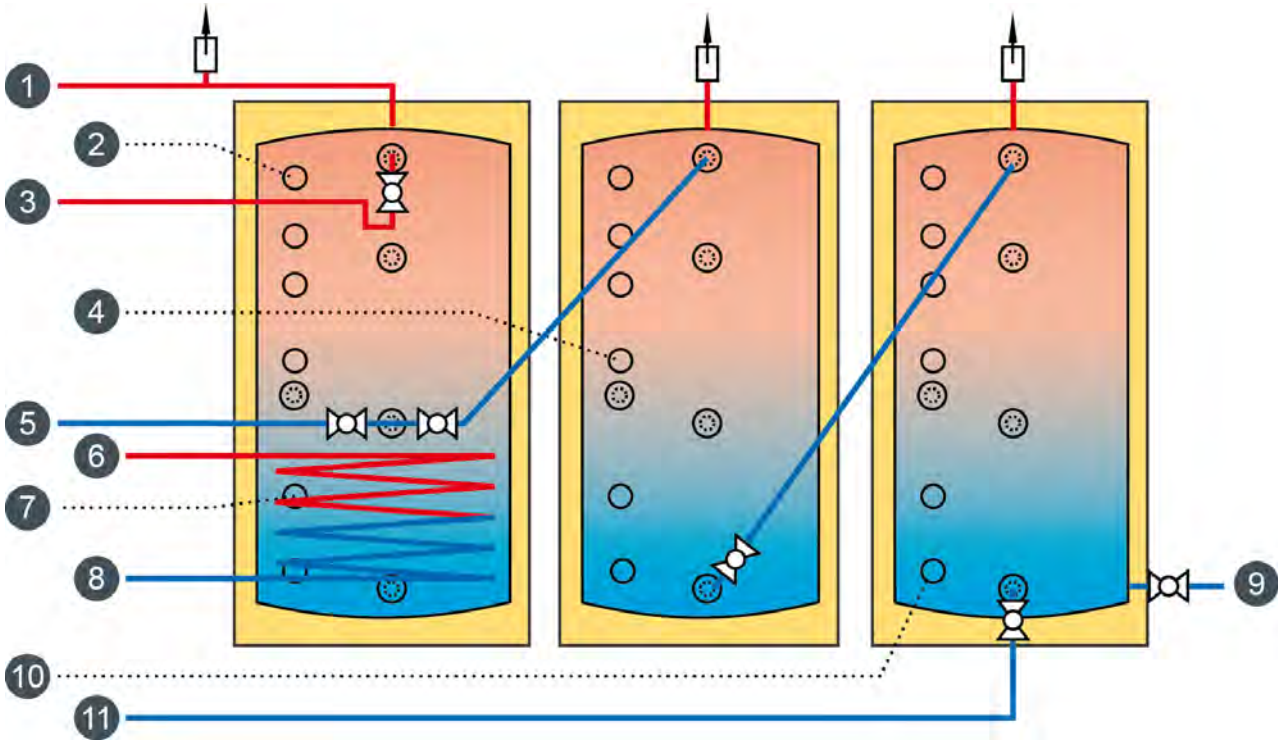
8.8 Serial buffer connection

Serial buffer connection

If there are different buffer types, or if not all buffers can be set up in one group, serial connection of the buffers will be necessary. Note that for serial buffer connection, integration of a solar heating system will work adequately only when a fresh water module is used for the hot water supply.

Solar tanks with internal solar exchangers are only of limited effectiveness. Combination tanks with immersed hot water tanks or internal water heat exchangers are unsuitable for a serial buffer connection. To minimize pipe circulation losses, it is helpful to make the connections with downward siphon loops.

With fresh water module

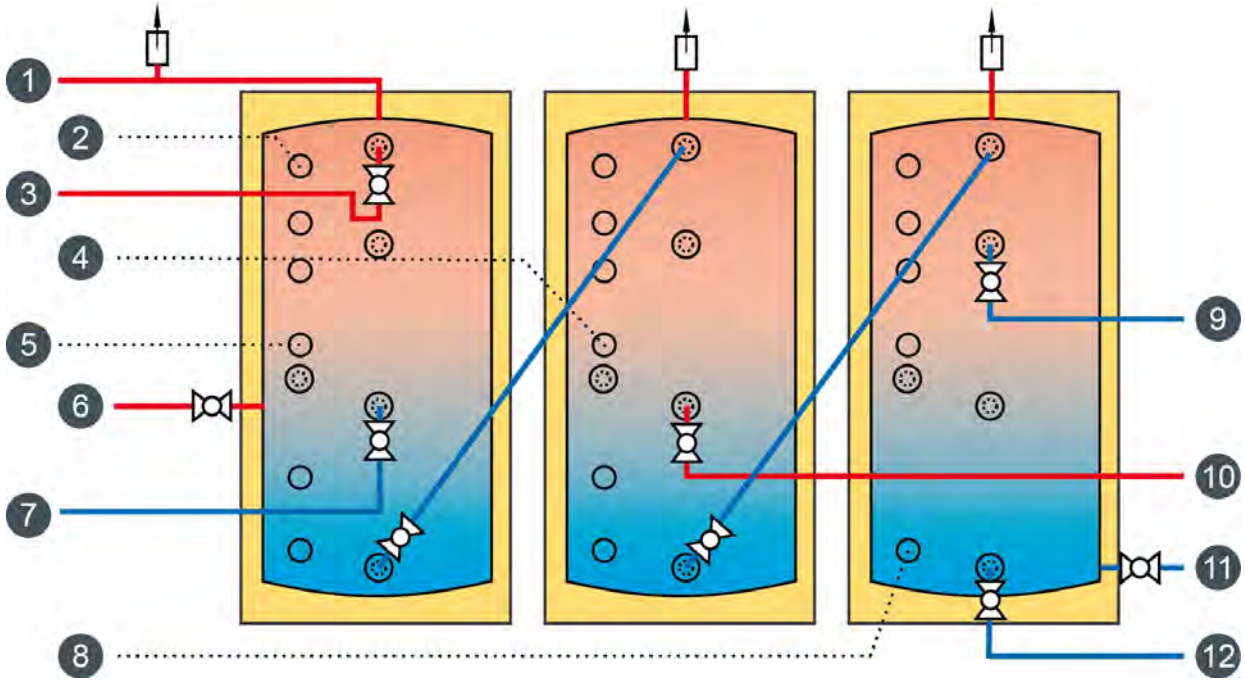


1 Fresh water module flow
2 Temperature sensor [Sensor 1 (top)]
3 Boiler, heating circuits, oil/gas boiler flow
4 Temperature sensor [Sensor 2]
5 Oil/gas boiler return
6 Solar flow
7 Temperature sensor [Sensor 3]
8 Solar return
9 Fresh water module return
10 Temperature sensor [Sensor 4]
11 Boiler and heating circuits return

maximum total output	Number of buffers	Connecting line, minimum		
30 kW	4	DN 25	R 1"	28 x 1.5
50 kW	4	DN32	R 1¼"	35 x 1.5
65 kW	2	DN32	R1¼"	35 x 1.5
80 kW	4	DN 40	R1½"	42 x 1.5

maximum total output	Number of buffers	Connecting line, minimum		
100 kW	2	DN 40	R1½"	42 x 1.5
140 kW	4	DN 50	R2"	54 x 1.5
170 kW	2	DN 50	R2"	54 x 1.5

With fresh water module and stratified charging module

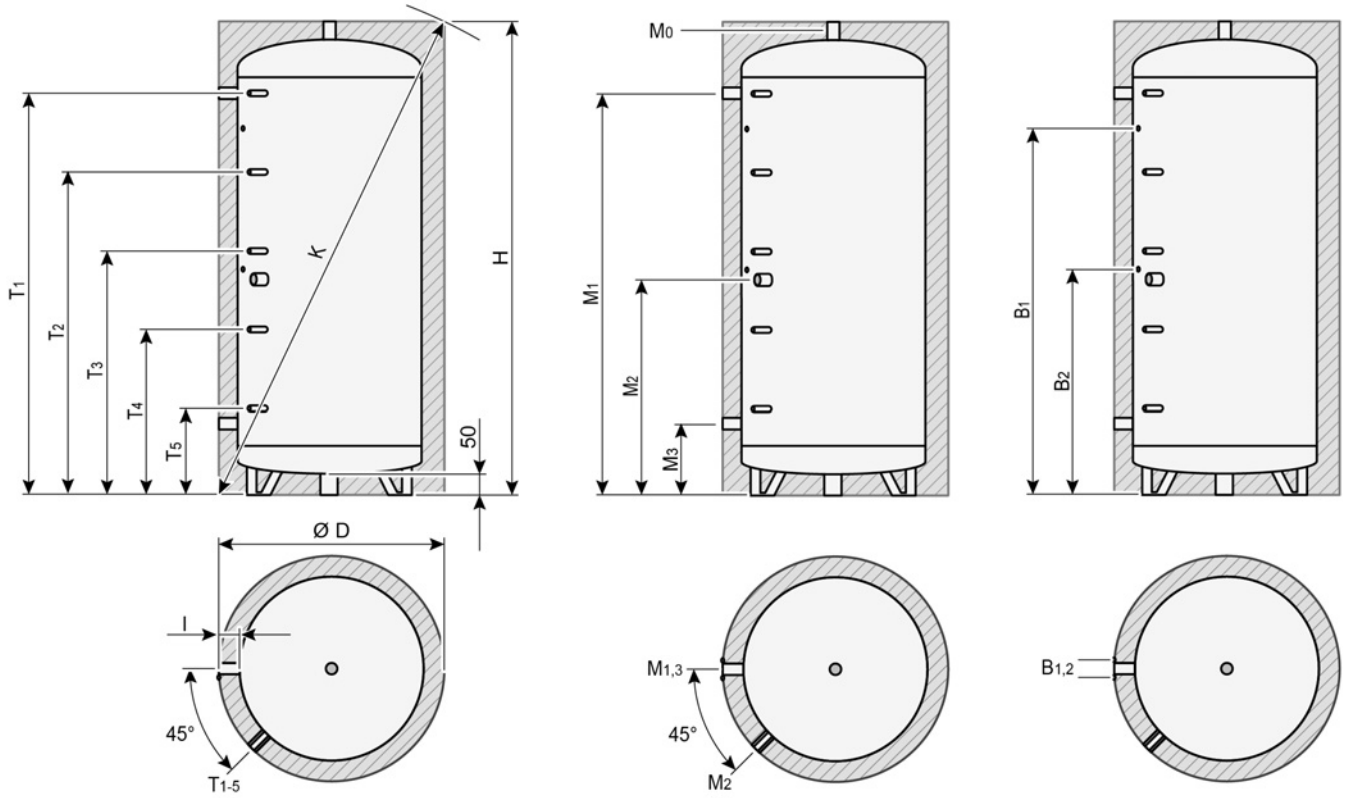


1 Fresh water module flow
2 Temperature sensor [Sensor 1 (top)]
3 Boiler, heating circuits, oil/gas boiler flow
4 Temperature sensor [Sensor 3]
5 Temperature sensor [Sensor 2]
6 Solar flow, top
7 Oil/gas boiler return
8 Temperature sensor [Sensor 4]
9 High-temperature circuits return
10 Solar flow, lower
11 Fresh water module and solar return
12 Boiler and low-temperature circuit return

8.9 Technical data

8.9.1 ECO-Buffer 500

The number and positions of the connections are optimized for the ETA hydraulics and control system.



Technical data

Technical data		Unit	ECO 500
Volume		l	501
Maximum permissible operating pressure		bar	3
Maximum permissible operating temperature		°C	95
Energy efficiency index [a]			B
Energy efficiency calculation factor [a]			0.83
Heat retention loss [S]		W	73.7
Total weight		kg	62
I	Insulation thickness	mm	60
Di-am-eter d	Diameter (with insulation)	mm	750
H	Height (with insulation)	mm	1720
K	Tilted height (with insulation)	mm	1880

a. Product information required in accordance with EU Regulation 814/2013

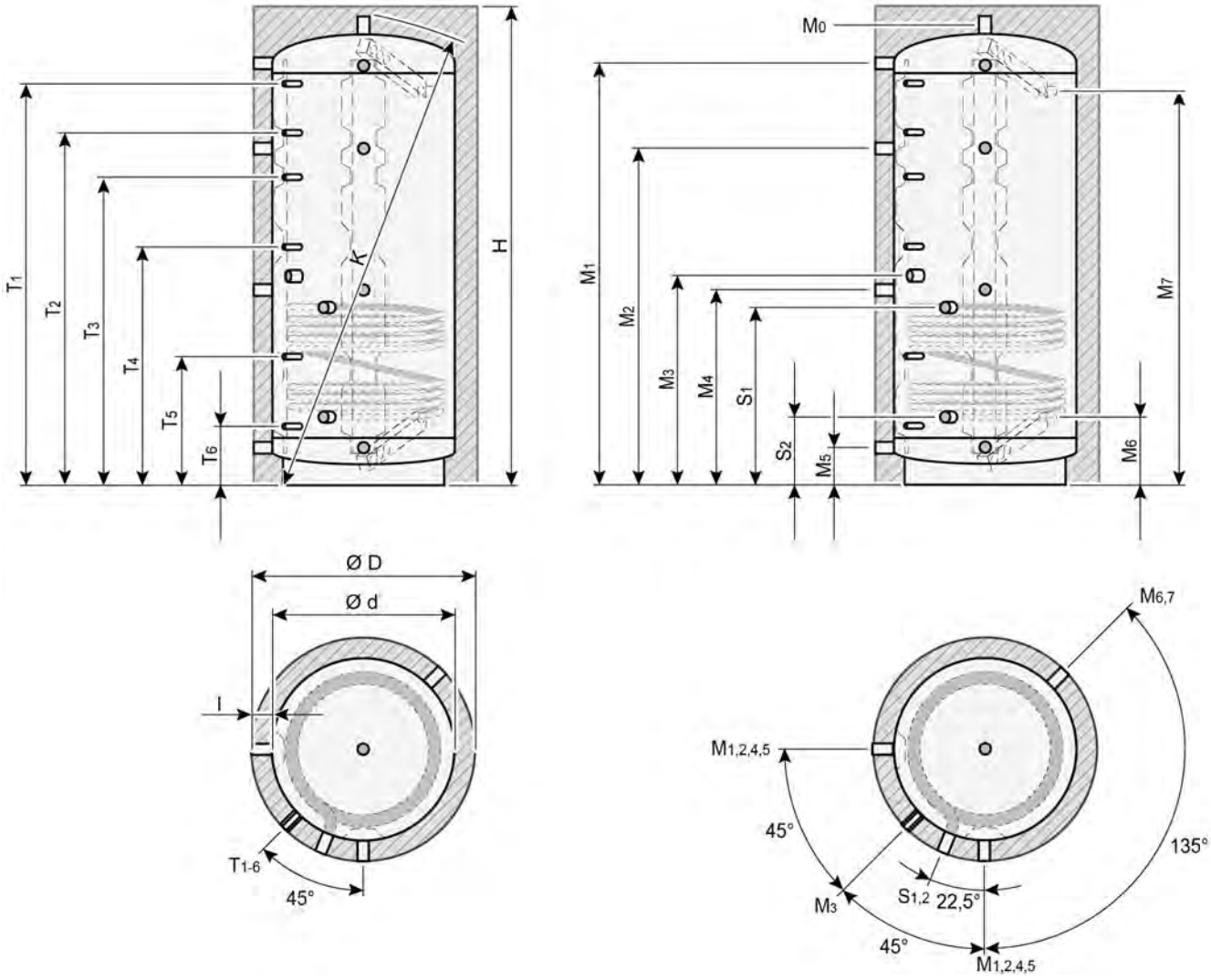
Position height of the couplings and immersion sleeves

Position height		Unit	ECO 500
B_1	Attachment (fresh water module)	mm	1275
B_2		mm	790
M_0	1" coupling	top	
M_1		mm	1470
M_2	6/4" coupling	mm	750
M_3	1" coupling	mm	250
T_1	Immersion sleeve ø 9 mm (for temperature sensor)	mm	1470
T_2		mm	1125
T_3		mm	850
T_4		mm	575
T_5		mm	300

8.9.2 Stratified buffer SP and SPS 600-2200

The M_3 connection without thermosiphonic separator is intended for the return connection of boilers that are to heat only the upper half of the buffer, or for the attachment of an electric heating element with a 6/4" outside thread.
The M_4 connection is designed specifically for the return from hot water tanks. By means of the separator plate, a warm return flows to the middle of the buffer and a cold return to the lower third.
The M_6 and M_7 connections are only installed on stratified buffers SP and SPS 2200. These connections are equipped with an inflow lance for high outputs with a flow rate of up to 20 m³/h.

The following figures show a solar SPS stratified buffer with a supplemental solar heat exchanger (connections S_1 and S_2).



Technical data

Technical data	Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100	SP/SPS 1650	SP/SPS 2200
Volume	l	600	825	1000	1100	1650	2200
Maximum permissible operating pressure	bar	3					
Maximum permissible operating temperature	°C	95					
Total weight (without solar heat exchanger)	kg	117	141	160	166	274	328

Technical data

Technical data		Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100	SP/SPS 1650	SP/SPS 2200
Diameter d	Diameter (without insulation)	mm	700	790	790	850	1000	1150
K	Tilted height (without insulation)	mm	1810	1970	2240	2200	2420	2430

For some storage tanks, the insulation is available with different energy efficiency indices. See the tables below.

Insulation with energy efficiency index "B"

Technical data		Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100
Energy efficiency index [a]			B			
Energy efficiency calculation factor [a]			0.83			
Heat retention loss [S]		W	85.4	96.7	104.6	108.3
Thermal conductivity of the insulation (lambda value)		W/mK	0.032			
I	Insulation thickness	mm	120			
Diameter d	Diameter (with insulation)	mm	940	1030	1030	1090
H	Height (with insulation)	mm	1830	1970	2250	2180

a. The values only apply for the combination of ETA SP/SPS stratified buffer storage and insulation ETA SP/SPS NeodulPlus (product information required according to EU Regulation 814/2013)

Insulation with energy efficiency index "C"

Technical data		Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100	SP/SPS 1650	SP/SPS 2200
Energy efficiency index [a]			C					-
Energy efficiency calculation factor [a]			0.83					-
Heat retention loss [S]		W	112.5	120.8	125	133.3	162.5	-
Thermal conductivity of the insulation (lambda value)		W/mK	0.032					
I	Insulation thickness	mm	100					
Diameter d	Diameter (with insulation)	mm	900	990	990	1050	1200	1350
H	Height (with insulation)	mm	1800	1940	2220	2150	2370	2380

a. The values only apply for the combination of ETA SP/SPS stratified buffer storage and insulation ETA SP/SPS NeodulPlus (product information required according to EU Regulation 814/2013)

Position height of the couplings and immersion sleeves

Position height		Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100	SP/SPS 1650	SP/SPS 2200
M_0	6/4" coupling	top						
M_1		mm	1595	1718	1998	1910	2095	2080
M_2		mm	1240	1393	1513	1535	1710	1735

Position height of the couplings and immersion sleeves

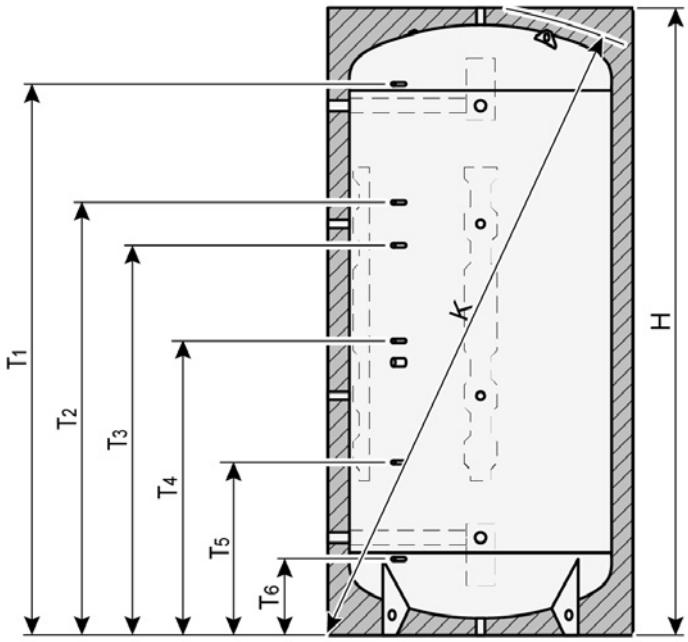
Position height		Unit	SP/SPS 600	SP/SPS 825	SP/SPS 1000	SP/SPS 1100	SP/SPS 1650	SP/SPS 2200
M_3	6/4" coupling (without separator plate)	mm	865	833	943	940	1020	1100
M_4	6/4" coupling	mm	800	773	883	875	940	965
M_5		mm	125	148	148	170	205	230
M_6	2" coupling	mm	-	-	-	-	-	360
M_7		mm	-	-	-	-	-	1970
T_1	Immersion sleeve ø 9 mm (for temperature sensor)	mm	1510	1628	1908	1820	2005	1985
T_2		mm	1340	1493	1613	1635	1810	1835
T_3		mm	1140	1293	1413	1435	1610	1635
T_4		mm	965	933	1043	1040	1120	1200
T_5		mm	525	503	547	565	625	690
T_6		mm	230	253	253	275	310	325

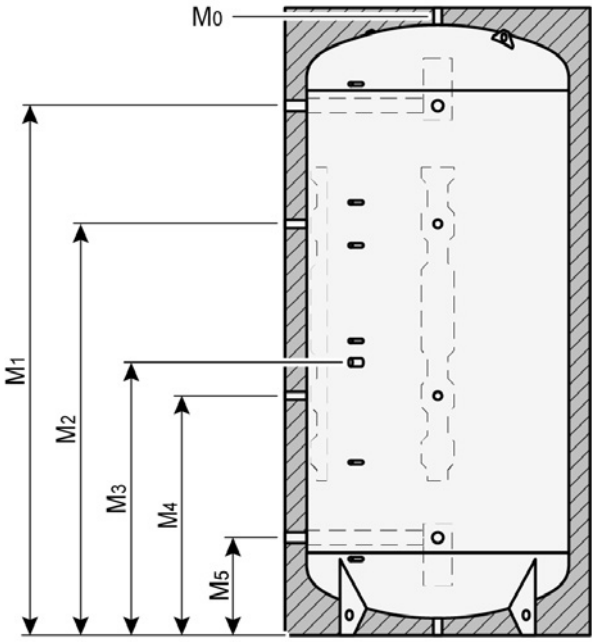
Supplementary data for Solar SPS stratified buffer

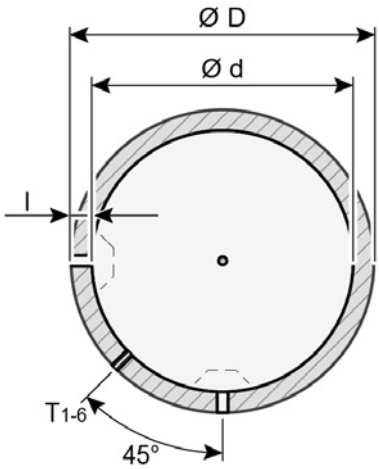
Technical data	Unit	SPS 600	SPS 825	SPS 1000	SPS 1100	SPS 1650	SPS 2200
Optimum solar collector area (in relation to tank volume)	m²	3-7	4-9	5-11	6-12	8-18	11-25
Maximum solar collector area (as regards solar exchanger)	m²	15	15	18	20	25	30
Maximum permissible operating pressure (solar exchanger)	bar	16					
Maximum permissible operating temperature (solar exchanger)	°C	110					
Total weight (with solar heat exchanger)	kg	157	182	206	213	338	409
Solar exchanger surface	m²	2.5	2.5	2.9	3.2	4.0	5.1
Volume of solar heat exchanger	l	15.5	15.5	18.0	20.0	25.0	33.9
Pressure loss at 1000 l/h	mws	0.31	0.31	0.36	0.39	0.49	0.61

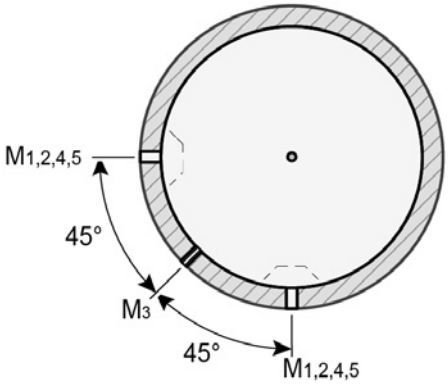
Position height		Unit	SPS 600	SPS 825	SPS 1000	SPS 1100	SPS 1650	SPS 2200
S_1	R1" coupling (solar exchanger connection)	mm	818	757	841	863	940	1032
S_2		mm	230	253	253	275	310	360

8.9.3 Buffer storage SP 3000 - 5000









Technical data		Unit	SP 3000	SP 4000	SP 5000
Volume		l	3,000	4,000	5,000
Maximum permissible operating pressure		bar	3	3	3
Maximum permissible operating temperature		°C	95	95	95
Total weight		kg	397	477	582
Colour of the insulation			Melon yellow		
I	Insulation	mm	100	100	100
Di-am-eter D	Diameter (without insulation)	mm	1,250	1,400	1,600
Di-am-eter D	Diameter (with insulation)	mm	1,450	1,600	1,800
H	Height (with insulation)	mm	2,712	2,920	2,850
K	Tilted height	mm	2,740	2,950	2,890

Position height		Unit	SP 3000	SP 4000	SP 5000
M_0	6/4" coupling	top			
M_1	2" coupling	mm	2,286	2,465	2,355
M_2	6/4" coupling	mm	1,811	1,915	1,880
M_3	6/4" coupling (without separator plate)	mm	1,176	1,300	1,245
M_4	6/4" coupling	mm	1,041	1,145	1,110
M_5	2" coupling	mm	426	455	495
T_1	Immersion sleeve ø 9 mm (for temperature sensor)	mm	2,386	2,565	2,455
T_2		mm	1,911	2,015	1,980
T_3		mm	1,711	1,815	1,780
T_4		mm	1,276	1,400	1,345
T_5		mm	766	835	835
T_6		mm	326	355	395

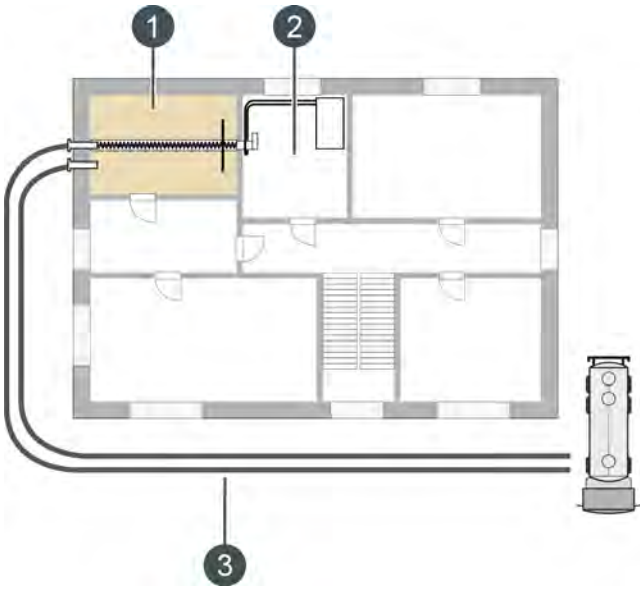
9 Pellet store

9.1 General information

Delivery of pellets

The pellets are delivered in a tank truck and blown into the storage room. The tank trucks usually have a pump hose with a length of up to 30 m. If you think you need a longer pump hose, contact your pellet supplier to enquire about this technical capabilities.

Vehicle access should be at least 3 m wide and 4 m high. The truck can only back up if the street and gate are wide enough.



1 Pellet store
2 Boiler room
3 Filling hoses from tank truck

Correct placement of the pellet store

Placement of the storeroom is crucial for satisfactory operation. For this reason, do not place the pellet store underneath or in the immediate vicinity of bedrooms. Because the noises that occur during operation could be transferred into these rooms.

Position of pellet store and boiler room

If possible, the pellet store should adjoin an outer wall since the filling nozzle should be accessible from outside. For an interior pellet store, the blower and back air pipes should be extended to the outer wall. The boiler room should adjoin an outer wall to ensure direct supply of combustion air to the pellet boiler. For an interior boiler room, an air supply duct must lead from the boiler room to the outer wall.

If the pellet store is located above the boiler (e.g., heating boilers in the basement and the pellet store on the ground floor or attic) condensation can occur in the pellet hoses.
To prevent this, a check valve can be installed in the pellet hose of the return air line (from the boiler to the pellet store). This prevents air circulation from the lower boiler to the pellet store.

Testing before initial fill-up

Before filling the pellet store, test the functionality of the entire heating system and the pellet conveying system. For this purpose, deposit some pellets (bagged product) in the storage room near the discharge conveyor.

Only fill up the pellet store after this test has been completed successfully.

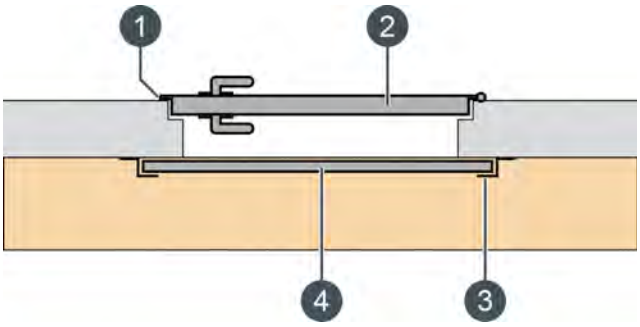
Burn-back protection also when filling

The authorities or the chimney sweep often require that a notice saying "CAUTION! A sticker with the text "Switch off boiler before filling" must be affixed, easily visible, to the filling nozzle covers. Since we at ETA don't want to leave the burn-back safety of our boilers to chance, we equip all ETA pellet boilers with a rotary valve, so that even during operation there is no open connection between the combustion chamber and the pellet store. Though it is not required that an ETA pellet boiler be switched off while filling the pellet store, you should do so anyway if the refuelling truck driver requests it.

Dust-tight doors to pellet store

Doors and other openings must open outward and be furnished with a circumferential dust-tight seal. For doors or other openings to the pellet store, wooden

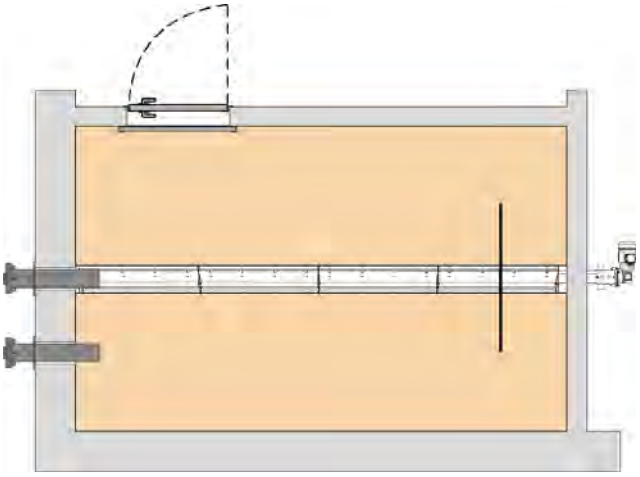
boards must be mounted on the inner wall (30 mm thick with tongue and groove) so the pellets cannot push against the door, or so that it can be opened.



1 Seal between door and frame
2 Fire-resistant door
3 Z profile for boards
4 Boards

The door's lock must be sealed against dust on the inner side. In spite of a widely circulated construction document, the door handle on the inner side may not be removed. It must be possible to open the door from the inside in an emergency.

For screw conveyors, the store room door should be positioned on the opposite side to the screw drive. Because this area of the store empties first and, if required, facilitates quick access to the store.



Electrical socket for pellet supplier's blower

A grounded AC outlet (CEE 7/7; 230V, 16A) must be accessible in close proximity to the filling couplers if extraction fans are required.

Instructions for attachment for filling

Visibly affix the sticker supplied with the instructions for correct filling of the store to the storeroom door.



Fig. 9-1: Labels

9.2 Requirements for pellet store

Structural requirements

Implement the pellet store in accordance with EN ISO 20023. The pellet store's walls must be able to withstand the load caused by the weight of the pellets (bulk weight 650 kg/m³). The plasterwork should also be durable enough that it cannot rub or flake off and contaminate the pellets.

If the forces from the tilted floor construction are directed into the floor and not the wall, then the following wall thicknesses have proven effective in practice given proper anchoring in the enclosing masonry:

- Concrete 100 mm thick.
- Common brick 170 mm thick and plastered on both sides.
- Post-and-beam walls with 120 mm beams, clearance 625 mm, with wooden panelling 15-20 mm thick on both sides.

Dry storage for pellets

Pellets are very hygroscopic; they absorb moisture from the environment. On contact with water or moist walls, they swell up and break apart, becoming unusable.

The pellet store must stay dry throughout the year. The normal humidity encountered in normal residential construction throughout the year is not harmful to the pellets.

If there is a danger of moist walls from time to time, such as in older buildings, we recommend installing rear-ventilated wood facing on the walls or storing the pellets in a fabric silo.

Regularly remove the dust from the pellet store

The pellet store must be regularly "emptied", so that the dust can be removed from the pellet store. Because the pellets "crumble" after a few years and produce dust. In combination with increased air humidity, this dust can lead to blockages of the suction probes or prevent the pellets from sliding on the slanted floor in the storeroom.

An increased amount of dust often occurs in oversized storerooms that are only filled every 2 - 3 years, because the high bulk weight of the pellets slowly crushes the pellets below. Even in storerooms with suction probes without inclined floor, "old" pellets often remain between the suction probes and then crumble slowly.

Therefore, the pellet store must be "emptied" at the latest every three years, so that the dust can be removed before refilling. Shovel "old" pellets either to the discharge screw or the suction probe, so that they are quickly used up.

9.3 Calculating pellet supply and store size

Heating value and bulk weight of pellets

Heating value	4.9 kWh/kg
Bulk weight	650 kg/m³

The energy density of 2 kg of pellets corresponds to that of 1 litre of extra-light heating oil.

Calculating the pellet supply

Rule of thumb for determining the pellet supply in tons: divide the heating load of the building by 3.
For the pellet supply in cubic metres (m³), divide the heating load by 2.

Example for the pellet supply for a single-family house with average insulation and 12 kW heating load:

- 12 kW / 3 -> 4 tons of pellets per year
- 12 kW / 2 -> 6 m³ of pellets per year

The pellet supply can also be calculated from the current fuel consumption using the appropriate conversion factors:

Fuel consumption	Factor	Pellet supply
1960 l heating oil	x 2.04	4000 kg
2060 m³ natural gas	x 1.94	4000 kg
2960 l LPG	x 1.35	4000 kg
1560 kg LPG	x 2.56	4000 kg
2660 kg coke	x 1.50	4000 kg
5700 kWh electricity from a geothermal energy heat pump with COP 3.4	x 0.70	4000 kg
9500 kWh electricity from a ground source heat pump with COP 2.1	x 0.42	4000 kg

9.3.1 Flex pellet conveying system

Required storeroom size

The required storeroom size is based on the heating load. Use the rule of thumb "heat load divided by 2" to find the minimum required storage volume in m³.
Example for the pellet supply for a single-family house with average insulation and 12 kW heating load:
12 kW / 2 -> 6 m³ of pellets per year

To be prepared for colder winters, the store should hold around 20% more than a year's supply. For this example, that means a storage volume of 7.2 m³ is needed. Using this volume, we can determine the necessary room dimensions and the length of the conveying system.

The length of the conveying system needed for the storage volume can be determined using table Tab. 9-1: "Useful cross section". That length also determines the minimum length of the storeroom.

Example: Room width 2 m and height 2.4 m:

- The table shows a usable cross section of 3 m². The volume of pellets to be stored in the example above is 7.2 m³:

  => 7.2 m³ / 3 m² = 2.4 m minimum room length

  A conveying system with a length of 2.5 m is required.

Example: room width 2.8 m and height 2.4 m:

- The table yields a usable cross section of 3.73 m². The volume of pellets to be stored in the example above is 7.2 m³:

  => 7.2 m³ / 3.73 m² = 1.93 m minimum room length

  A conveying system with 2 m length is required.

The screw conveyor should preferably be oriented along the room's long axis. This is because the narrower the storeroom, the less space is lost under the slanted floor.
The conveying system can also be shorter than the storeroom. To use the entire room length for the conveying system, select the next larger length of the conveying system (see examples above) and shorten the troughs on site.

Determining the usable storage volume

Due to the required slope, storeroom widths over 3 m with normal room height yield little to no usable additional volume. This also applies to conveying systems with suction probes.

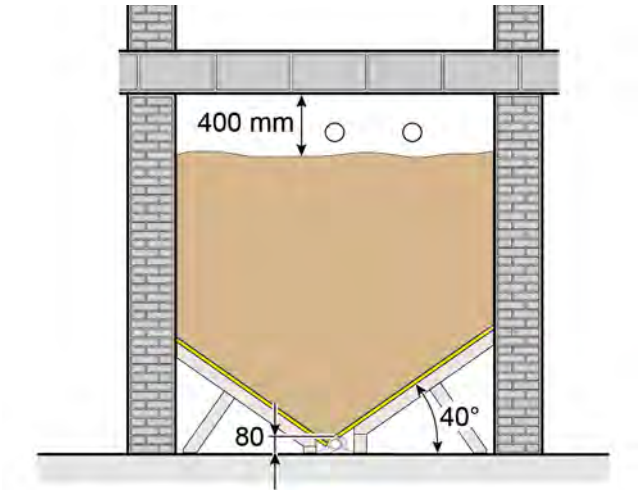


Fig. 9-2: Cross section

The following table is used to determine the usable cross-section of a storeroom in m² with the conditions in the illustration above:

- 40° inclined form
- Free space above 400 mm
- Free space for the conveying system 80 mm

Usable cross section in m²

	Total height of the storeroom (m)							
Width (m)	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**	**3.0**	**3.2**	**3.4**
2.0	2.20	2.60	3.00	3.40	3.80	4.20	4.60	5.00
2.2	2.33	2.77	3.21	3.65	4.09	4.53	4.97	5.41
2.4	2.44	2.92	3.40	3.88	4.36	4.84	5.32	5.80
2.6	2.53	3.05	3.57	4.09	4.61	5.13	5.65	6.17
2.8	2.61	3.17	3.73	4.29	4.85	5.41	5.97	6.53
3.0	2.67	3.27	3.87	4.47	5.07	5.67	6.27	6.87
3.2	2.72	3.36	4.00	4.64	5.28	5.92	6.56	7.20
3.4	2.75	3.43	4.11	4.79	5.47	6.15	6.83	7.51
3.6	2.76	3.48	4.20	4.92	5.64	6.36	7.08	7.80
3.8	2.76	3.51	4.27	5.03	5.79	6.55	7.31	8.07
4.0	2.76	3.53	4.33	5.13	5.93	6.73	7.53	8.33

Tab. 9-1: Useful cross section

With the useful cross section of the storeroom, the storage volume and the storage contents can be calculated:

- Storage volume (in m³) = useful cross section (m²) x room length
- Amount (in tonnes) = storage volume (m³) x 0.650

9.3.2 Suction probe

Required pellet store size

The required store size is based on the heating load. Use the rule of thumb "heat load divided by 2" to find the minimum required store volume in m³.

Example for the pellet supply for a single-family house with average insulation and 12 kW heating load:

- 12 kW / 2 -> 6 m³ of pellets per year

To be prepared for colder winters, the store should hold around 20% more than a year's supply. For this example, that means a store volume of 7.2 m³ is needed.
This volume is used to determine the required dimensions for the room.

9.4 Filling nozzles

Installing the filling nozzles on the narrow side of the pellet store

Two nozzles are preferably installed in the narrower outer wall of the pellet store. One for blowing in the pellets (filling nozzle) in the middle and the other for back air (back air nozzle) to the side.

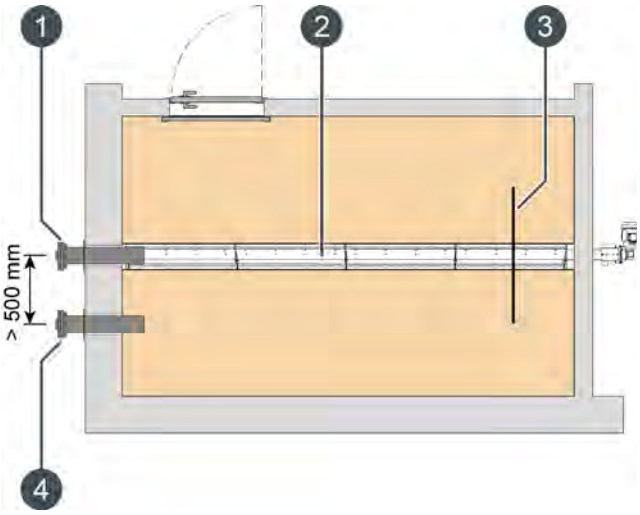


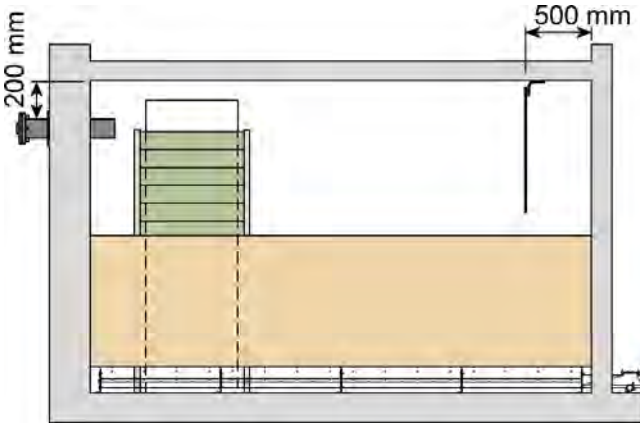
Fig. 9-3: Filling nozzles on the short side

1 Filling nozzle
2 Conveyor screw
3 Impact protection mat
4 Return air nozzle

Label the filling nozzle and the return air nozzle so that the pellet supplier recognises which nozzle the pellets are blown into.

Opposite the middle filling nozzle, an impact protection mat is installed 500 mm from the wall to prevent damage to both pellets and the plasterwork on the wall.

The filling nozzles must be installed 200 mm below the ceiling to keep the pellets from scraping on the ceiling during injection.



Only in exceptional cases - when no narrow side of the pellet store is accessible from the outside - can the filling nozzles be positioned on the longitudinal wall.

A separate nozzle with an impact protection mat on the opposite side is required for each half of the space. The hoses must be reconnected halfway through the filling process. A clearance of at least 500 mm must be maintained between two impact protection mats.

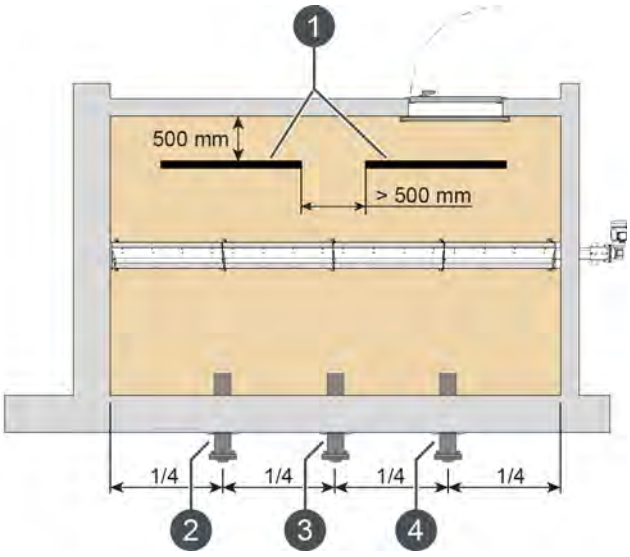


Fig. 9-4: Filling nozzles on the longer side

1 Impact protection mats
2 Filling nozzle
3 Return air nozzle
4 Filling nozzle

To protect the impact protection mats, they can be installed slightly curved using two squared wooden blocks at the lower edge.

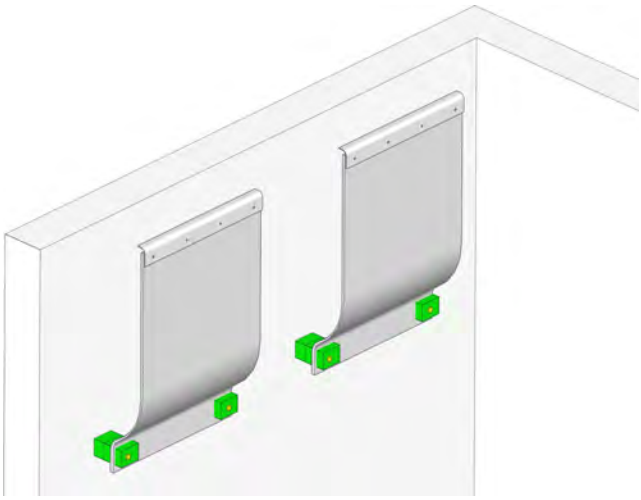


Fig. 9-5: Squared wooden blocks

Fill storage rooms fitted with multiple impact protection mats slowly, so that they are not damaged as a result of floating on the pellet cone.

Anchoring the filling nozzles

The filling nozzles must be firmly anchored in the wall, so that they can withstand the movements of the hoses from the tanker and cannot rotate when the hose is attached. Mount the filling nozzles horizontally 200 mm under the ceiling of the pellet store so that the pellets are not blown against the ceiling.

ETA filling nozzles with 100 mm diameter fit into recesses with a smooth bore of at least 110 mm or into recesses made with a sewer pipe with a 125 mm outer diameter due to the earthing lug.

The gap between the filling nozzle and sewer pipe is filled with foam. To install the filling nozzles in smooth holes or sewer pipe cut-outs so they cannot twist, the ETA filling nozzles are equipped with a flange that transfers the forces directly into the wall via screws.

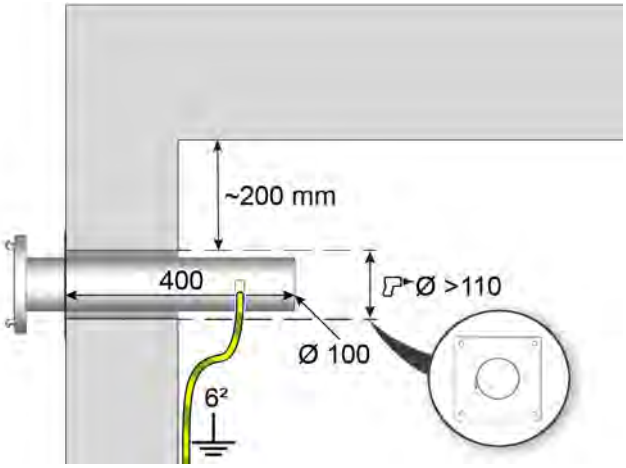


Fig. 9-6: Dimensions for straight filling nozzles

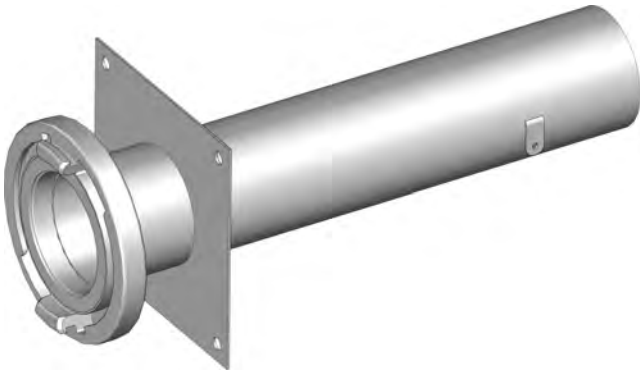


Fig. 9-7: Straight filling nozzle with earthing lug

If the filling nozzles are installed below ground in a light shaft, ensure that the hose can be led out of the shaft in a straight line. Angled filling nozzles are available for this situation.

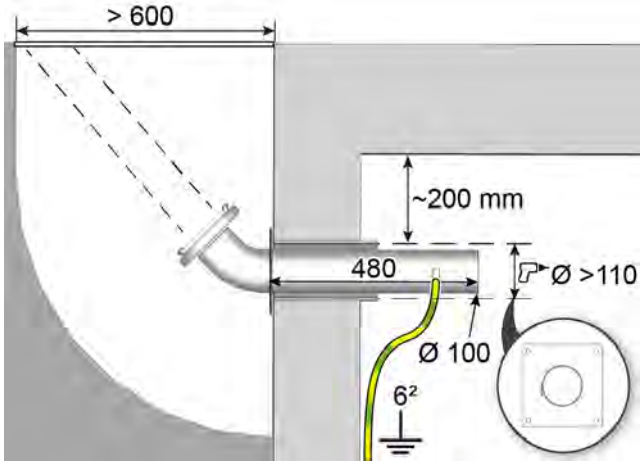


Fig. 9-8: Dimensions for angled filling nozzles

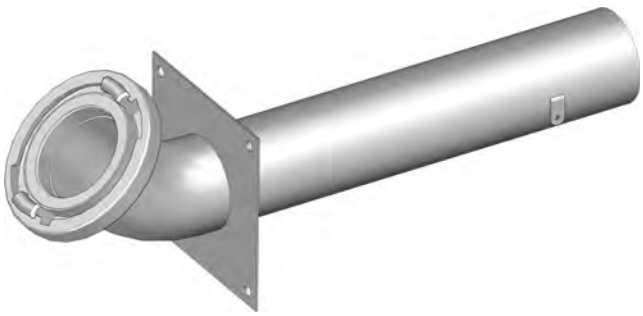


Fig. 9-9: Angled filling nozzle with earthing lug

If an extension of the fill line is required, keep it as short as possible to prevent friction losses while filling.

The lever for tightening the coupling, around 300 mm long, needs a working range of 120°.

Conversion to ventilated sealing cover

For filling nozzles and sealing caps available from ETA, the interior of the sealing caps contain a cover for sealing. If this cover is removed, air enters the pellet store via the sealing cover. The cover is thus ventilated with a cross section of 30 cm² per cover.

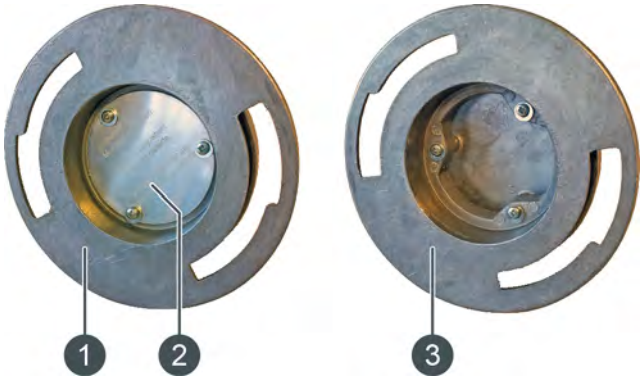


Fig. 9-10: Sealing cover

1 unventilated sealing cover (with cover mounted)
2 dismantled cover
3 ventilated sealing cover

If the filling nozzles are mounted inside the building, they must be tightly sealed. The cover in the cap must not be removed (see EN ISO 20023). This prevents the potential escape of gases into the interior of the building.

If the filling nozzles are not properly positioned (for example, when installed on the weather side of the building), water can also penetrate into the pellet store via the ventilated sealing cover. This is to be avoided to prevent swelling of the pellets.

Earthing the filling nozzles

Connect the filling nozzles to the earthing of the house's electrical system with a 6 mm² earthing cable.

Extension of the filling pipes

The ETA filling nozzles are made of 100 x 2 mm aluminium piping and can be extended if needed. If the tank truck can approach close to the filling nozzle so that its filling distance (30 m) is not already exceeded outside the building, then filling lines up to 20 m in length pose no problem. Height differences of one floor, or even two for short lines, can also be overcome without problems.

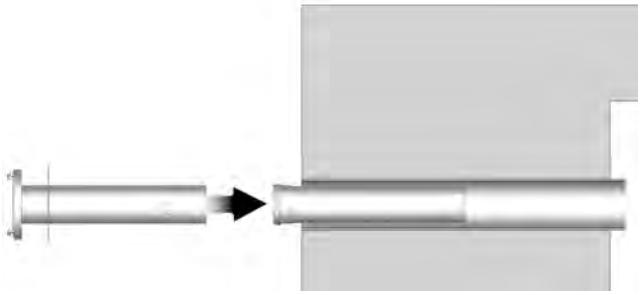


Fig. 9-11: Extending the filling nozzles

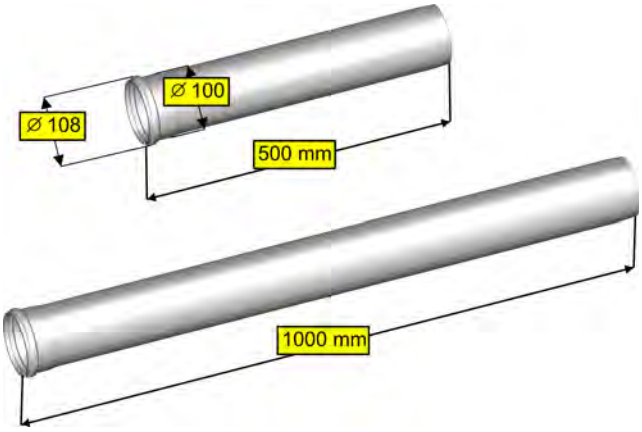


Fig. 9-12: Extensions

Extension with aluminium piping only

- Only aluminium piping may be used for the filling system. Do not use plastic piping (danger due to electrostatic charge build-up).
- The filling lines must be earthed against electrostatic charges.
- The filling lines must be smooth on the inside throughout its length; do not use spiral ventilation ducting.
- If bends are used, their radius of curvature should be at least five times the pipe's radius. As an alternative, you can make 90° bends by using two 45° bends with a straight piece between them.
- The filling lines should not end with a bend. To ensure that the pellets are blown out straight, a straight length of pipe at least 50 cm long must come after a bend.

9.5 No cables/pipes in the pellet store

No water pipes or electrical cables in the pellet store

There should be no water pipes or electrical cables in the pellet store. Water from a burst pipe causes the pellets to swell and uninsulated parts of an electrical installation can ignite a dust explosion. Existing cold

water pipes that can only be removed with unreasonable effort must be insulated against condensation to ensure that the pellet store is protected against dripping condensation. Pipes and cables in the path of pellets being injected, especially those on the ceiling, must be shielded. Ensure that the pellets are gently deflected by a deflection plate.

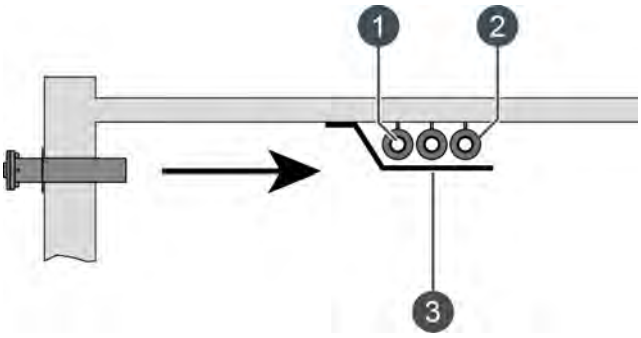
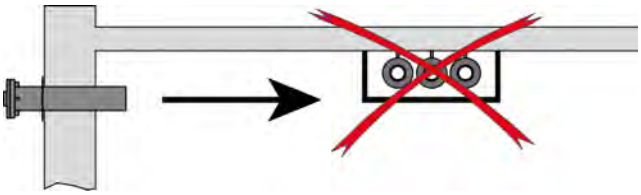


Fig. 9-13: Deflection plate for pipes/cables that cannot be removed

1 Pipes
2 Insulation for pipes
3 Deflection plate



DANGER!

Fire hazard due to electrostatic charge

- ▶ All metallic parts (e.g. covers, sheets) in the pellet store must be earthed. This prevents potential ignition of the pellets due to electrostatic charging of the metal parts.

Only explosion-proof electrical installations

DANGER!

No electrical equipment such as switches, lights, junction boxes, etc. may be present in the pellet store.

- ▶ Unavoidable installations must be airtight and moisture-proof to protect against explosions, and in the flight path of pellets they must be protected against damage. Existing junction boxes that cannot be installed elsewhere should at least be filled in with foam to seal all exposed live parts.

9.6 Tilted floor

A tilted floor is needed

The pellet store must have a floor with 40° tilt to ensure that all pellets in the store can be extracted. This applies for systems with conveyor screws as well as for suction heads.

Construction of tilted floor for storeroom

For the slanted floor, three-ply concrete formwork panels 27 mm thick have proven effective. Unplaned wooden boards 25 mm thick with a smooth plastic-laminated surface can also be used.

The slanted floor should be flush with the enclosing walls so that no pellets can fall into the empty space beneath it. However, the support frame itself may not lean against the walls since the often statically inadequately dimensioned walls do not have the strength to withstand the forces involved.

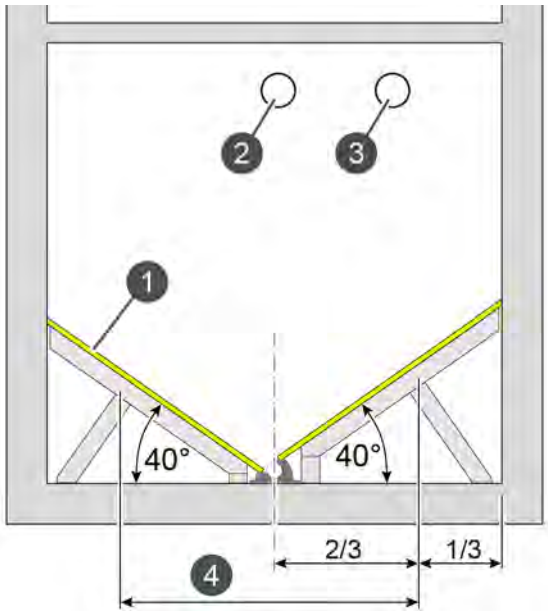


Fig. 9-14: Slanted floor design for conveying system screw

1 Formwork panel
2 Filling nozzle
3 Back air nozzle
4 Support span

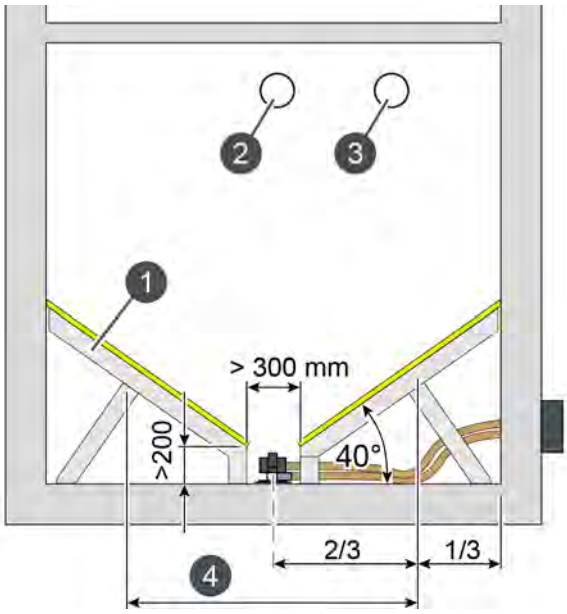


Fig. 9-15: Tilted floor design for suction probes

1 Formwork panel
2 Filling nozzle
3 Back air nozzle
4 Support span

The slanted floor must withstand the weight of the pellets (bulk weight 650 kg/m³). Assuming the usual commercially available formwork panels with a width of 100 cm, members of the support frame should have a separation of 50 or 100 cm. For these separations, the following tables show the required beam thicknesses depending on the room width.

Beams for support frame separation 100 cm, room height 2.5 m		
Wood cross section (cm)	**Support span (m)**	**Room width (m)**
10 x 5	1.50	2.25
12 x 6	2.00	3.00
10 x 10	2.20	3.30
15 x 5	2.35	3.50

Beams for support frame separation 50 cm, room height 2.5 m		
Wood cross section (cm)	**Support span (m)**	**Room width (m)**
8 x 4	1.50	2.25
10 x 5	2.20	3.30
12 x 6	3.00	4.50
10 x 10	3.40	5.10

Tilted floors may not touch the wall

The tilted floor may not touch the wall, otherwise noise emissions will be transferred. For this reason, a small gap is to be left between the tilted floor and wall, and sealed with silicon.

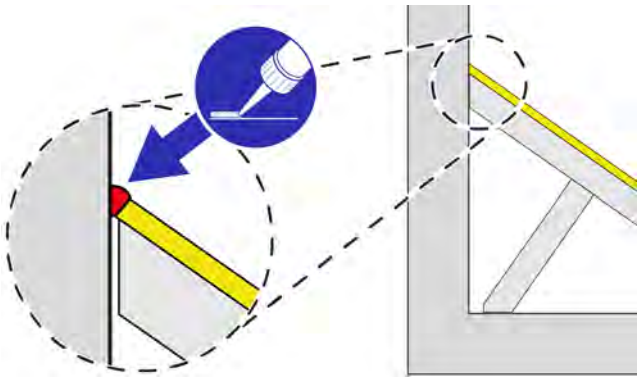


Fig. 9-16: Seal gap with silicon

Mounting the suction probes on a wooden board

If the suction probes sit directly on a cold concrete floor, water from the circulating air can condense on them. The condensation can cause pellets and, in particular, pellet dust to form clumps that can clog the pneumatic conveyor. To avoid this, always mount the suction probes on a wooden board (25 or 27 mm thick) and fasten it to the floor.

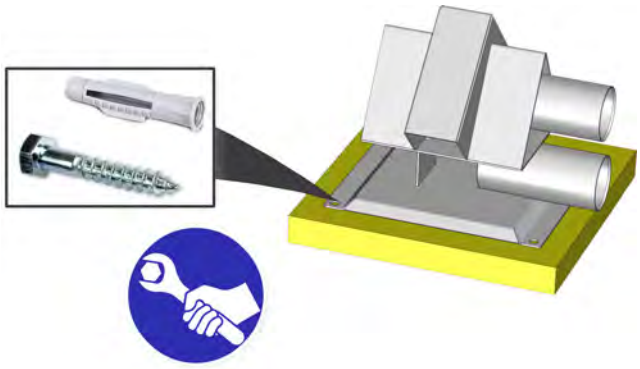


Fig. 9-17: Suction probe on a wooden board

Pad wall opening for conveyor screw trough

Sound from the screw can be transmitted through the pellet store walls into the house. To avoid that, pad the wall opening for the troughs with soft material (mineral wool).

Under no circumstances should the conveyor screw trough be cemented into a concrete wall without acoustic insulation.

Small store rooms with reserve

For small pellet stores, the tilted floor can be truncated. A reserve of pellets will remain on the resulting flat surfaces; when the main store is empty, the reserve pellets can be manually swept into the main store.

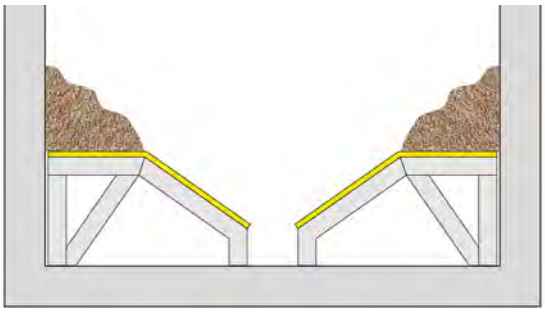


Fig. 9-18: Reserve

The disadvantage of this method is that the reserve space must be cleared at least every three years to prevent an accumulation of dust and broken or moist pellets.

9.7 Information about pellet hoses

Suitable pellet hose

DN50 pellet hoses with copper wires (earthing) are required for the suction and return air. Reinforced pellet hoses must also be used for the suction hose. For the return air line from the boiler to the conveying system as well as in the storage room, "standard" pellet hoses can be used. These are more flexible than the reinforced version and can therefore be connected more easily.

The maximum length of the pellet hose is 20 m. For a conveying system with a switching unit, the distance is measured from the boiler through the switching unit to the suction probe that is the farthest away.

For boilers from 60 kW, we recommend that reinforced pellet hoses (NW50 x 5.5 mm) are used for the pellet suction hose to the boiler. The relevant information is provided in the corresponding instructions.

For boilers from 60 kW and a hose length of more than 12.5 m, the pellet suction hose to the boiler should also be made of carbon steel (pipes and bends), but only after the initial attachment. Before that, please mount the reinforced hoses included in the basic set. The relevant information is provided in the corresponding instructions.

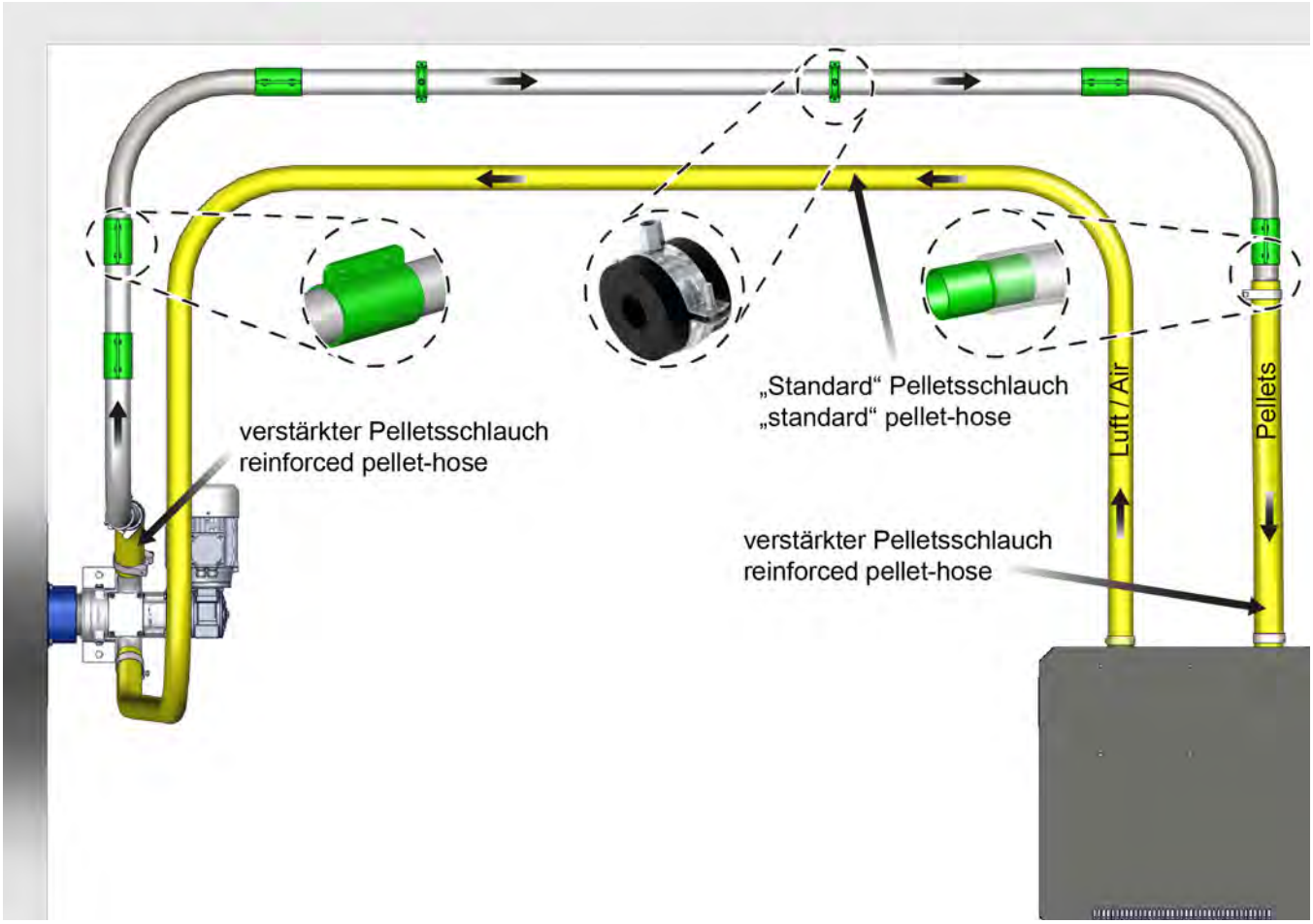


Fig. 9-19: Pellet steel pipework

Notes for switching units with reinforced pellet hoses:
A "reinforced" pellet hose can be used for the suction hose from the switching unit to the boiler. But only after the initial attachment, because the reinforced hoses are stiffer and thus cause torsion in the switching unit. A short standard pellet hose for the suction hose from the switching unit to the first attachment is therefore included in the scope of delivery. See the following graphics.

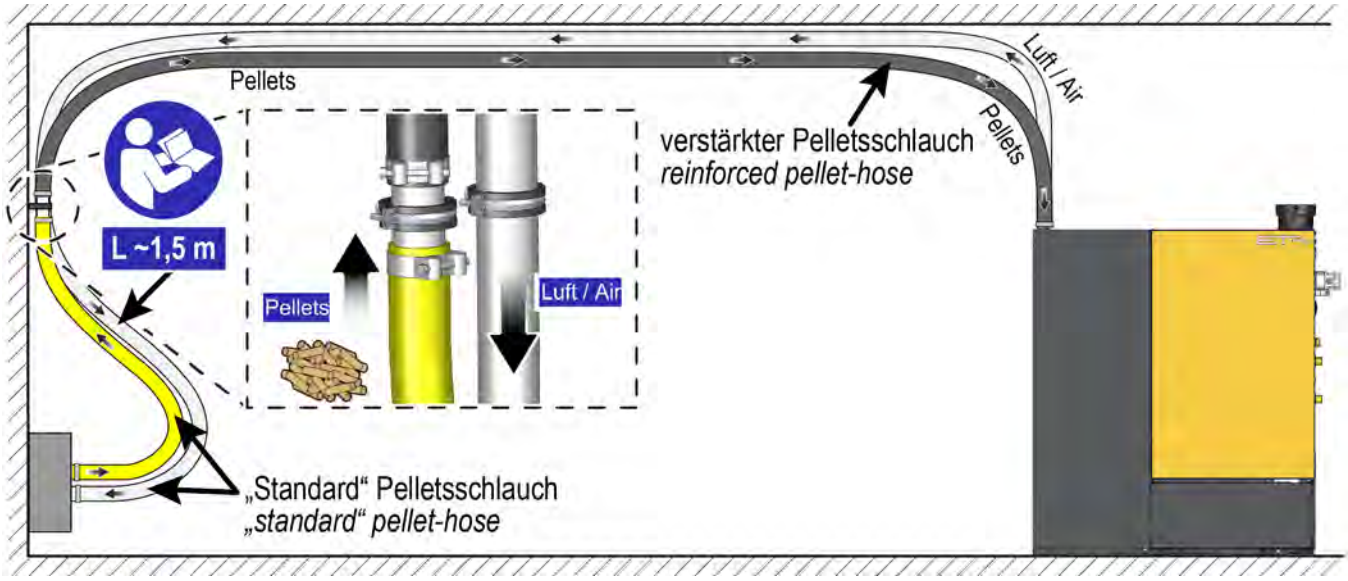


Fig. 9-20: Switching unit with 4 suction probes

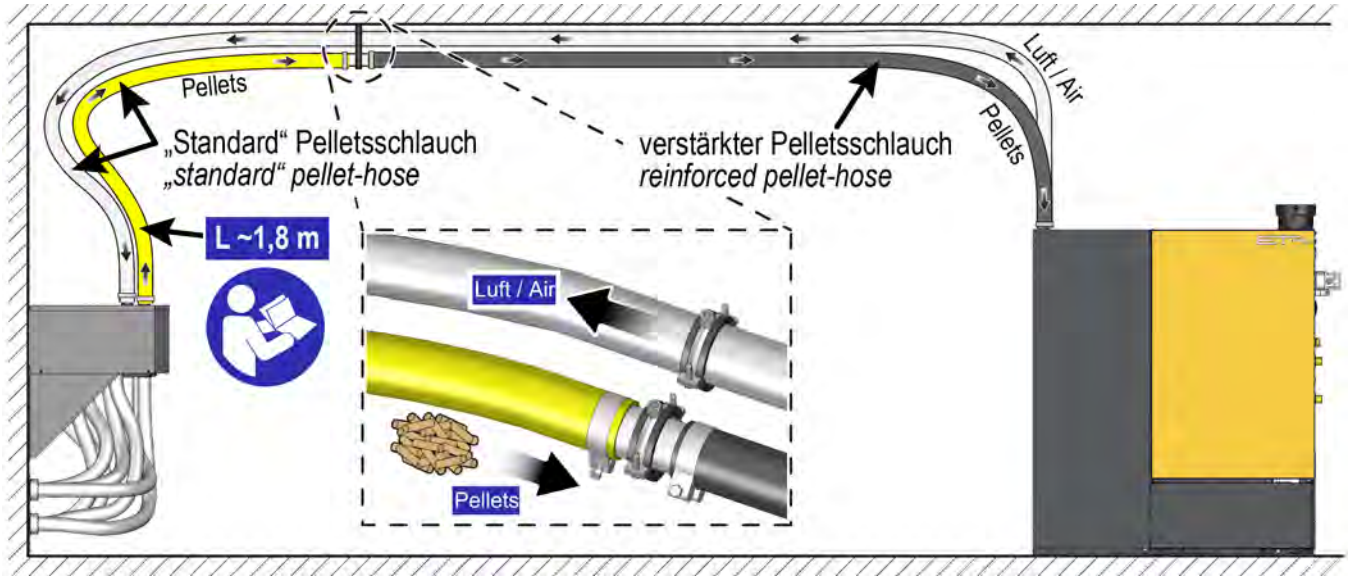


Fig. 9-21: Switching unit with 8 suction probes

Minimum bending radius: 250 mm

The minimum bending radius for pellet hoses is 250 mm. If the radius is below this value, the cross section of the pellet hose is reduced and the friction on the inner walls increases. As a result, the pellets are damaged, blockages can occur, and the service life of the pellet hose is reduced.

Installation tips for pellet hoses

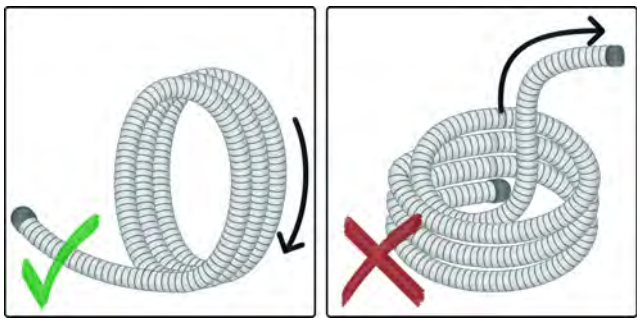


Fig. 9-22: Unroll pellet hoses instead of pulling them out

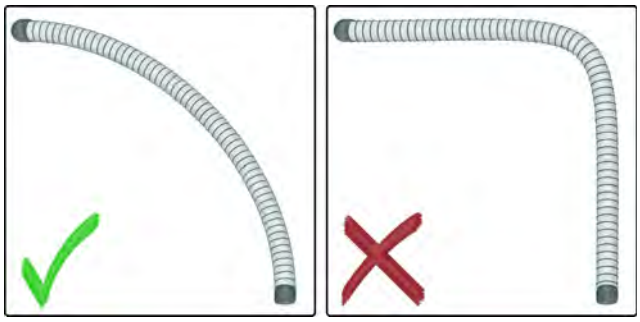


Fig. 9-23: Note bending radius

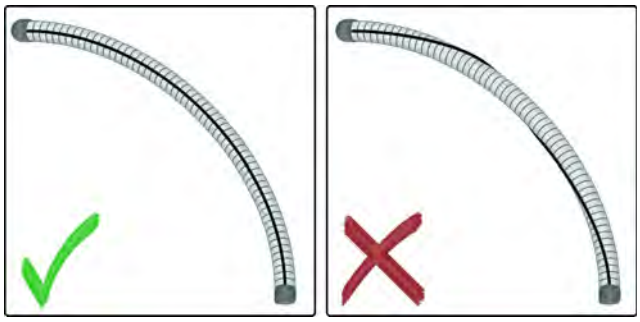


Fig. 9-24: Avoid twisting pellet hoses

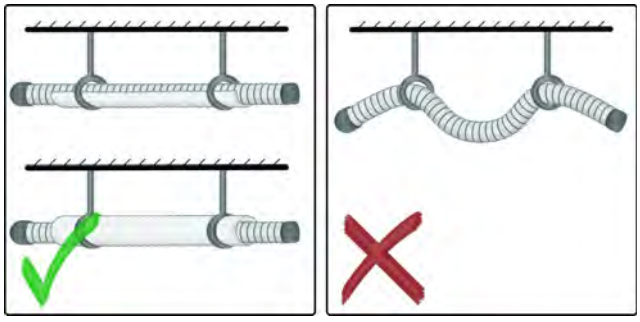


Fig. 9-25: Use pipe guides or pipe supports

Single-piece suction hose

The suction hose for the pellets must always consist of a single piece. Suction hoses made from several parts have higher friction on the inner walls of the pellet hoses, which can result in damage to the pellets.

Only the pellet hose for the return air may be made of multiple pieces.

Straight installation

Lay out the pellet hoses as straight as possible. Suction hoses laid out in loops have higher friction on the inner walls, which can result in damage to the pellets.

Do not attach pellet hoses to the tilted floor structure

In the store room, do not attach pellet hoses to the tilted floor structure or guide them to it. In this way, noise transmission is prevented from the pellet hoses to the tilted floor structure and noise lelvels are reduced.

Earthing

The pellet hoses must be earthed, as they acquire an electrostatic charge during pellet transport. A copper wire is moulded into the pellet hoses for earthing. At the ends of the pellet hoses, free around 5 cm of copper wire from the hose and bend it inwards into the hose.



This establishes a contact between the conveying system and the boiler. On the boiler, the copper wires are clamped to the earthing cable at the pellet connections.

No contact with uninsulated heating pipes

The pellet hoses are designed for a temperature range of -15°C to +60°C, so they may not come into contact with uninsulated heating pipes.

UV protection outdoors

When pellet hoses are installed outdoors, they must be enclosed in a protective conduit to protect them from ultraviolet radiation. If the pellet hoses are not protected, they can become brittle, leading to a reduced service life.

Mounting fire protection sleeves (if required)

If the pellet hoses from the storeroom are routed over a fire section (for example a room in-between) to the boiler room, fire protection sleeves

must be fitted over both pellet hoses. In wall ducts, a fire protection sleeve must be mounted on each side, with ceiling ducts only positioned on the ceiling side.



Fig. 9-26: Fire protection sleeve

Use the concrete screws supplied to fasten the fire protection sleeve. These screws are screwed directly into the wall by pre-drilling, but without dowels.

In the event of a fire, the internal material of the fire protection sleeve expands, and thus closes the pellet hoses. So burn-back is prevented in rooms through which the pellet hoses are fed.

9.8 Fire safety regulations

Fire safety regulations in Austria

Legally, fire safety is regulated in the various building codes of the states, though all state legislation is based on the TRVB H 118 "Technische Richtlinien vorbeugender Brandschutz - automatische Holzfeuerungsanlagen" (technical directives for preventive fire safety for automated wood combustion systems).

For questions about details, consult an expert or the building inspectorate or the regional fire prevention agency.

Wood and fuel storage rooms within a building:

- All walls and ceilings REI90 (F90).
- Doors between boiler room and fuel store, and doors and windows to the outside EI30 (T30) or E30 (G30).
- Self-closing doors to rooms with increased fire danger (tank rooms, garages), to escape routes and to rooms above them (staircase), either 2x EI30 (T30) or EI90 (T90).
- Windows that cannot be opened
- Ventilation openings in the outer wall barred, with mesh less than 5 mm
- Air inlet and outlet pipes and pellet store filling lines that are routed through other fire compartments are to be implemented as EI90 (K90 or L90).
- For pellet-conveying hoses through rooms outside the boiler room (fire compartment), fire-resistant collars must be installed in the wall openings facing the boiler room.

Free-standing wood and fuel storage rooms:

- All walls, ceilings and doors to the outside fireproof
- Doors between boiler room and fuel store must be EI30 (T30)
- Maintain clearances from buildings and property boundaries according to state building legislation.
- Otherwise no special requirements

Pellet storage container in boiler room or outdoors directly next to building:

- Currently only allowed in Austria if the boiler output is less than 50 kW and the container is smaller than 15 m³ (9.5 tons) (Bulletin MVB 29/2005 from Upper Austrian fire prevention agency).

Minimum clearances for outdoor fuel stores:

- When setting up a pellet storage container in open air, maintain clearances from buildings and property boundaries according to state building legislation.

Temperature monitoring system in fuel store/pellet bin:

- In accordance with TRVB H 118, an alarm thermostat must be installed above the conveying hose where it exits the fuel store, or the pellet bin.

  This alarm thermostat is not required for an ETA pellet system since the ETA rotary valve with pressure equalisation ensures that no gas can flow in either direction between the combustion chamber and the fuel store. This has been confirmed by tests at the Institut für Brandschutztechnik und Sicherheitsforschung (institute for fire protection engineering and safety research) in Linz.

Fire safety regulations in Germany

In Germany, the specimen ordinance on combustion equipment (Muster-Feuerungsverordnung MFeuVO, version dated September 2005) is the basis for fire safety regulations. Below are the most important rules from these regulations. Since there are minor variations among the states, get information from specialists such as the local master chimney sweep.

Pellet stores up to 10,000 litres / 6.5 tons:

- Here there are no requirements for walls, ceilings and doors and no usage restrictions are stipulated.

Pellet stores over 10,000 litres / 6.5 tons:

- Walls and ceilings REI90 (F90).
- no lines through walls,
- No other use.
- Doors self-closing and fire-resistant EI30 (T30).

- Pellet filling lines through other rooms EI90 (F90).

Rated heat output of boiler less than 50 kW (boiler room):

- No requirements for the room.
- Not permitted: installation in required stairwells, in rooms between required stairwells and exits to the outside, and in required hallways (escape routes).
- Boilers with external air supply (PelletsUnit and PelletsCompact 20-32 kW) may be installed in garages (does not apply for Baden-Württemberg, Saarland and Rhineland-Palatinate).
- Up to 10,000 litres of pellets may be stored in boiler room; clearance between heating appliance and fuel store 1 m or sheet metal heat deflector

Rated heat output of boiler over 50 kW (boiler room)

- Headroom at least 2 m and room volume at least 8 m³.
- Walls and ceilings REI90 (F90).
- Self-closing, fire-resistant doors EI30 (T30) that open in direction of escape.
- Up to 10,000 litres of pellets may be stored in boiler room; clearance between heating appliance and fuel store 1 m or sheet metal heat deflector.
- No other use.
- For pellet-conveying hoses through rooms outside the boiler room (fire compartment), fire-resistant collars must be installed in the wall openings facing the boiler room.
- Ventilation lines through other rooms EI90 (F90).
- Fire extinguishers as initial firefighting aids are only legally regulated for commercial and public buildings.

9.9 Ventilation

9.9.1 Ventilation for airtight pellet stores

Requirements for the ventilation of an (airtight) pellet store

Pellet stores must have ventilation to prevent dangerous CO concentrations. In Europe, EN ISO 20023 applies for a storage capacity of ≤ 100 tons.

For large storage capacities (> 100 tonnes), the specifications can be found in EN ISO 20024. For questions about details, consult an expert or the building inspectorate or regional fire prevention agency.

The requirements of the most frequently occurring storage arrangements can be found in the table (Tab. 9-2: "Requirements of EN ISO 20023").

Ventilation requirements for storerooms and prefabricated stores made of airtight material:

Ventilation distance	Requirements for ventilation
0 m	• Ventilation opening with a free opening ≥ 150 cm² and ≥ 10 cm²/t capacity
≤ 2 m	• Ventilating lid on at least two outlets with a free cross-sectional area ≥ 4 cm²/t capacity • External opening at the same level or up to a maximum of 50 cm higher than the inner opening Note: Stores with a capacity of ≤ 15 t can also be ventilated into another room if this is not used as a living or working space and has a ventilation opening of ≥ 15 cm²/t of the capacity of the pellet store
≤ 5 m	• At least one pipe or duct for the outflowing air with a cross section ≥ 100 cm² and ≥ 5 cm²/t capacity as well as an external unobstructed opening ≥ 4 cm²/t at the same height or at most 50 cm higher than the inner opening. • At least one pipe or duct for the inflowing air with a cross-section ≥ 75 cm² and ≥ 5 cm²/t capacity as well as an external unobstructed opening ≥ 4 cm²/t capacity at the same height or lower than the inner opening Note: Filling nozzles with vented covers contribute to the total cross section of the incoming air
All	Individual calculation of the required ventilation cross-sections depending on the height difference between the higher-positioned of the outer exhaust air outlet and the ventilation air inlet in the storage space. Note: Calculation according to DIN EN ISO 20023 required
All	• Mechanical ventilation to the outside via a duct fan at the outlet of an exhaust air duct or pipe • Air exchange rate ≥ 3 x storage volume/hour when the fan function is linked to the opening of the storage door • Air exchange rate ≥ 3 x storage volume/day with continuous or intermittent operation of the fan and additional supply air line with a free cross-section ≥ 75 cm²
Note:	• Ventilation for storage areas > 15 t capacity always to outdoors • The living and working areas of the building must be sealed from this • Not applicable for underground storage

Tab. 9-2: Requirements of EN ISO 20023

Examples for ventilating the pellet store

Because the outer mouth of the filling line can be no more than 50 cm higher than the inner opening, ventilation of the cover is sufficient.

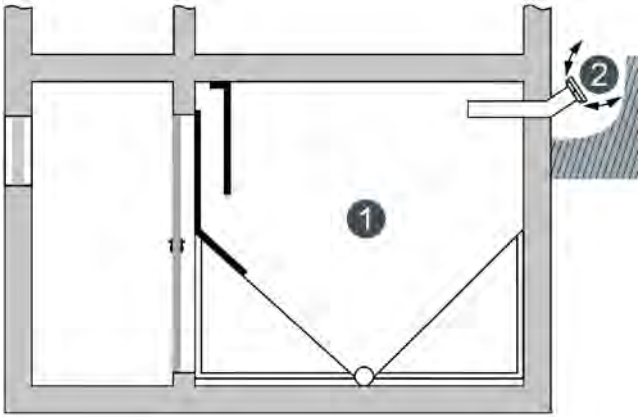


Fig. 9-27: Filling nozzle in open air

1 Pellet store
2 Coupling with vented covers

Ventilation of the cover is sufficient for filling lines up to a maximum length of 2 m.

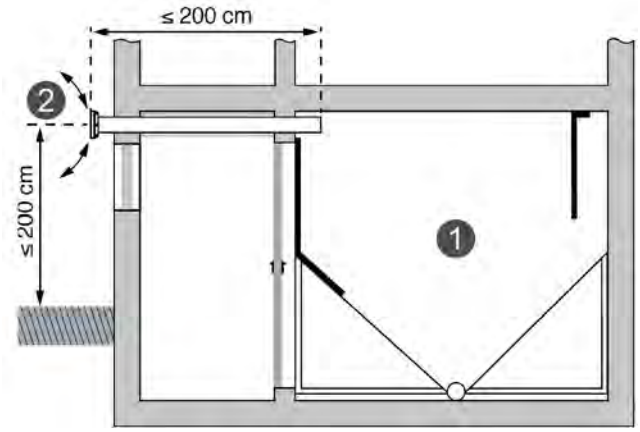


Fig. 9-28: Filling nozzle in open air

1 Pellet store
2 Coupling with vented covers

Ventilation into the boiler room is only permitted for stores with a capacity of up to 15 t.

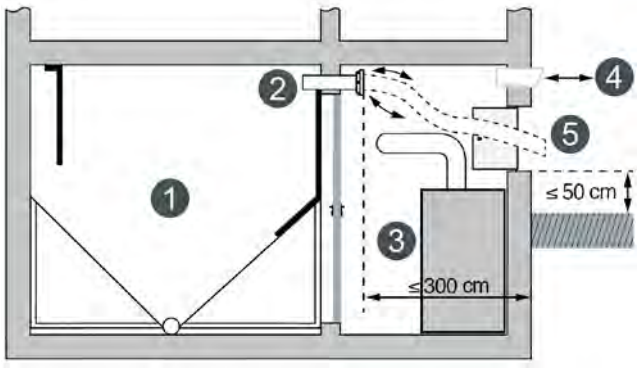


Fig. 9-29: Filling nozzles in the boiler room

1 Pellet store
2 Coupling with vented covers
3 Boiler room
4 Ventilation opening of the boiler room
5 Window or door for laying the drop chute for the filling process

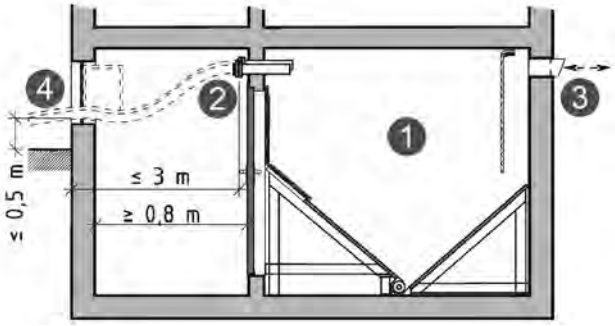


Fig. 9-30: Filling nozzle inside building

1 Pellet store
2 Coupling with airtight covers
3 Ventilation opening of the boiler room
4 Window or door for laying the drop chute for the filling process

9.9.2 Ventilation for air-permeable fabric silos

Requirements for ventilation of the installation room of a fabric silo (ETAbox)

Pellet stores must have ventilation to prevent dangerous CO concentrations. In Europe, EN ISO 20023 applies for a storage capacity of ≤ 100 tons.

Ventilation requirements for the installation room of an air-permeable fabric silo:

Ventilation distance	Requirements for ventilation
≤ 15 t	Ventilation opening to the outside with an unobstructed opening of ≥ 15 cm²/t
> 15-100 t	Ventilation opening to the outside with an unobstructed opening of ≥ 150 cm² and ≥ 8 cm²/t pellets Note: No additional use is permitted for the installation room.
Note for both:	A fabric silo without an extraction nozzle requires a temporary opening of at least 400 cm² to allow the conveying air to escape when the pellets are blown in.

Tab. 9-3: Requirements of EN ISO 20023

Examples of ventilation for the installation room of a fabric silo (ETAbox)

If the pellet store is a bag silo that is located in the same room as the boiler, this room must be ventilated.

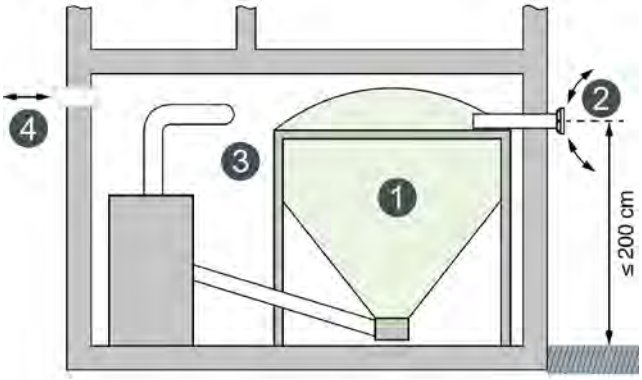


Fig. 9-31: Bag in boiler room

1 Bag silo
2 Filling nozzle
3 Boiler room
4 Ventilating the room

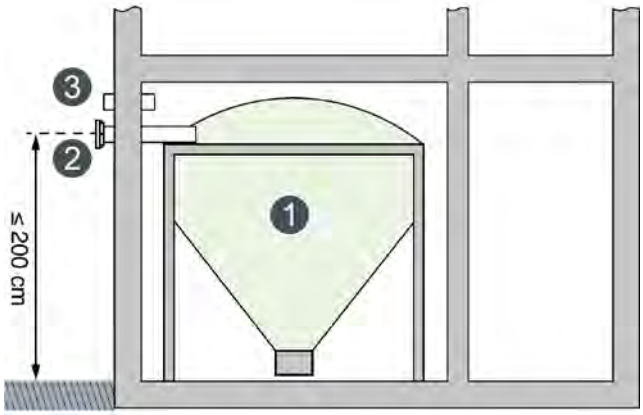


Fig. 9-32: Filling nozzle in open air

1 Bag silo
2 Filling nozzle
3 Ventilating the room

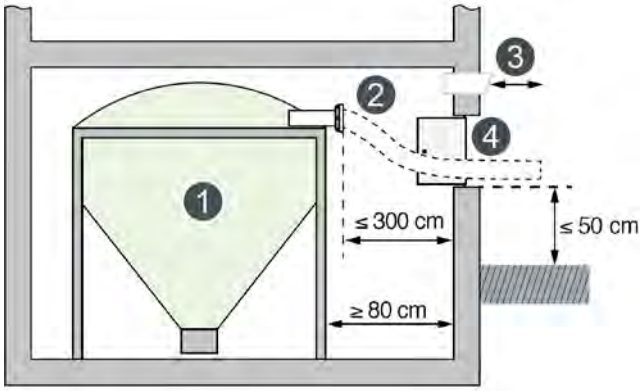


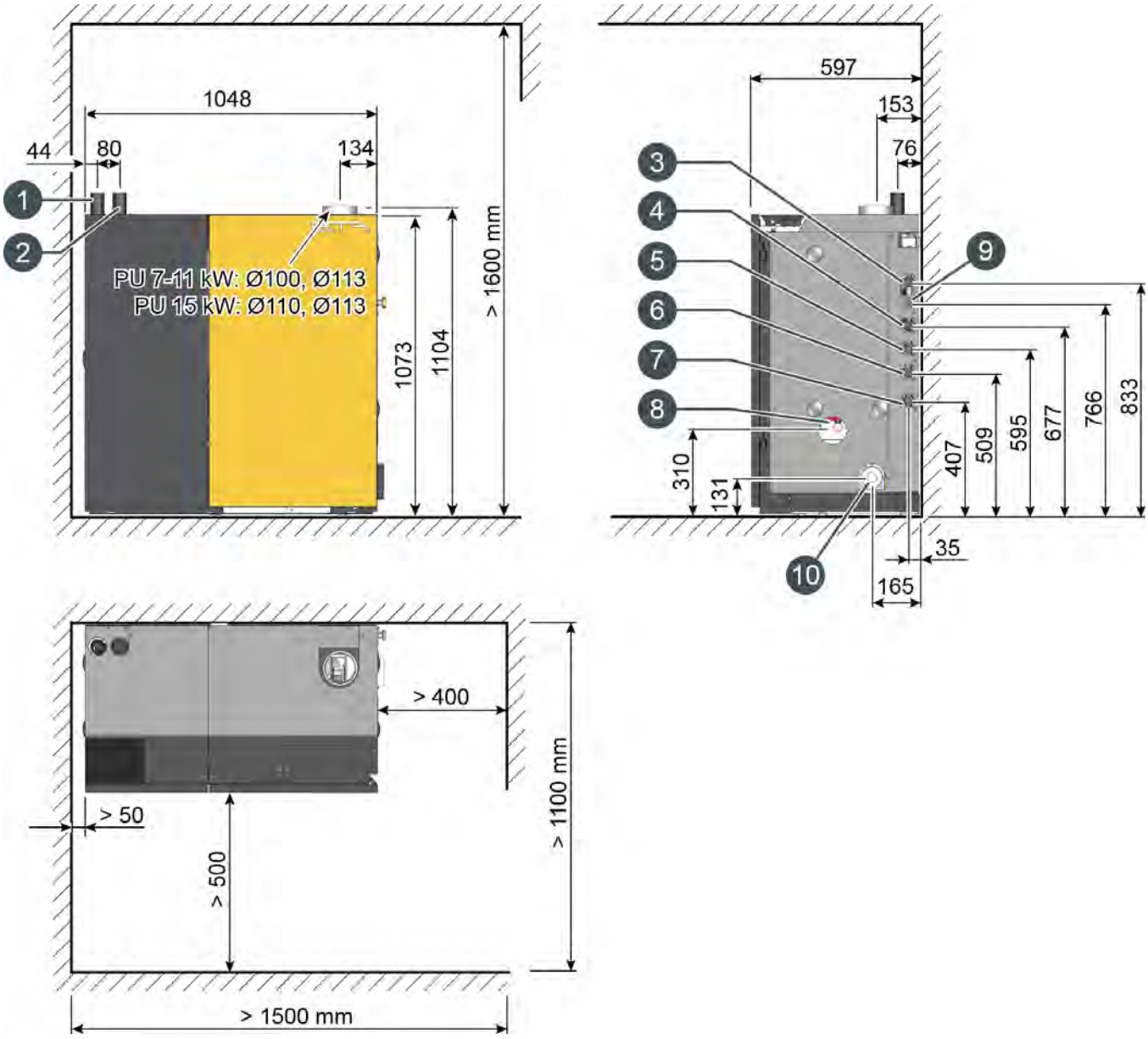
Fig. 9-33: Filling nozzle inside building

1 Bag silo
2 Filling nozzle
3 Ventilating the room
4 Window or door for laying the filling hose during delivery

10 Technical data

10.1 PelletsUnit PU 7-15 kW

Data sheet for PelletsUnit 7 - 15 kW



1 Pellet suction hose DN50
2 Pellet return air DN50
3 Return for heating circuit 1 and hot water tank, R3/4" coupling
4 Optional heating circuit 2 return, R3/4" coupling
5 Optional heating circuit 2 flow, R3/4" coupling
6 Flow for hot water tank, R3/4" coupling
7 Heating circuit 1 flow, R3/4" coupling
8 Drainage fitted with 1/2“ filling and drainage valve
9 Outlet for the safety valve, flat sealing union nut R1"
10 Air connection for external air operation, DN80

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

PelletsUnit	**Unit**	**7**	**11**	**15**
Rated capacity	kW	2.3 - 7.7	2.3 - 11.2	4.4 - 14.9
Efficiency at partial / full load (installation outside living area)	%	89.3 / 93.4	89.3 / 92.5	91.4 / 94.2
Transport dimensions, W x D x H	mm	1072 x 600 x 1150		
Weight	kg	267		
Water content	Litres	27		
Available residual pump head at ΔT = 7 °C Maximum floor heating pipe length per branch 100 m (better 80 m), for radiators variable-speed depending on flow temperature	mWs / m³/h	3.8 / 0.9	3.5 / 1.3	2.4 / 1.8
Pellet bin on boiler (net)	kg	30 kg (147 kWh)		
Maximum distance to pellet store	m	20		
Ash box volume	Litres	12		
Flue gas mass flow rate at partial / full load	g / s	1.9 / 4.4	1.9 / 6.4	2.8 / 8.4
CO_2 content in dry flue gas at partial / full load	%	10 / 14	10 / 14.5	12 / 14
Exhaust temperature at partial / full load	°C	~80 / ~150		
Required flue draught	Pa	> 3 Pa a draught limiter is required above 15 Pa		
Carbon monoxide (CO) emissions at partial / full load	mg/MJ	88 / 8	88 / 6	18 / 4
	mg/m³	134 / 13	134 / 10	28 / 6
Dust emissions at partial / full load	mg/MJ	6 / 6	6 / 8	9 / 4
	mg/m³	9 / 9	9 / 12	14 / 5
Unburned hydrocarbon emissions (CxHy) at partial / full load	mg/MJ	1 / 1	1 / 1	0 / 0
	mg/m³	1 / 1	1 / 1	0 / 0
Electrical power consumption at partial / full load	W	46 / 61	46 / 63	66 / 95
Electrical power consumption in ready mode	W	12		
Maximum permissible operating pressure	bar	3		
Temperature adjustment range	°C	30 – 85		
Maximum permissible operating temperature	°C	95		
Boiler class	5 acc. to EN 303-5:2012			
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1			
Electrical connection	1 x 230 V / 50 Hz / 13 A			
Mode of operation	non-condensing			

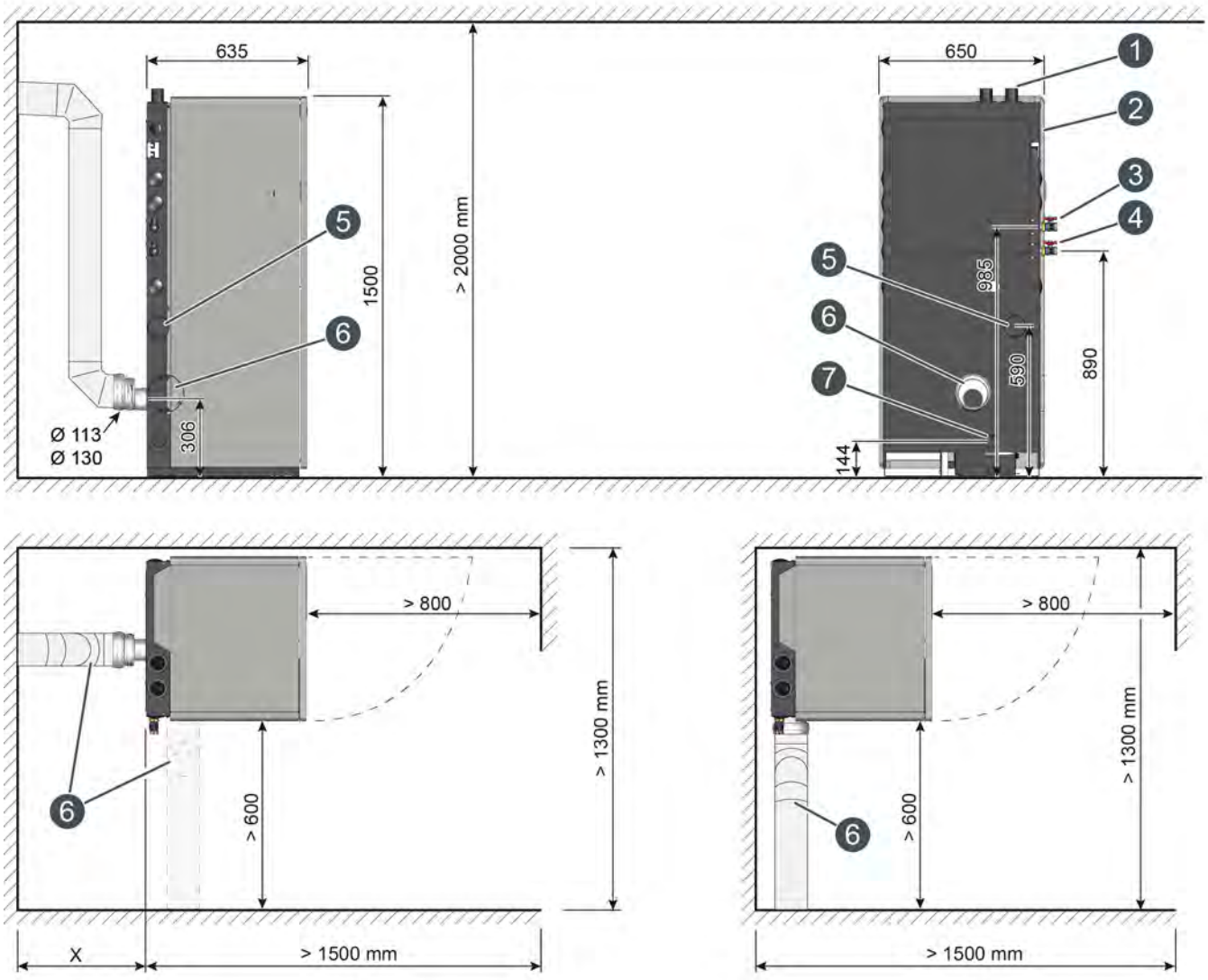
Subject to technical changes and errors

10.2 Condensing boiler ePE-BW 8-14 kW

Data Sheet for Pellet Condensing Boiler ePE-BW 8-14 kW

The hydraulic connections are led out on the left-hand side of the boiler from factory (seen from the front to the rear). However, they can also be bent on site and led out on the right side of the boiler. The flue gas connection and the supply air for operation with external air supply can be installed on the left or on the rear side of the boiler. The outlet for the condensate can be brought out on the left, right or rear side. The clearance "x" in the following diagram depends on how the flue pipe is installed from the boiler to the chimney.

For optimal and economical use of the condensing technology, we recommend the lowest possible return temperature from the heating system (approx. 35 °C).



1 Pellet suction hose, pellet return air DN50
2 Outlet for safety valve
3 Flow, R3/4" ball valve
4 Return, R3/4" ball valve
5 Air connection for operation with external air supply, NW80
6 Flue gas connection
7 Outlet for condensate, DN 50

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

Pellet condensing boiler ePE-BW	**Unit**	**8**	**10**	**12**	**14**
Rated capacity (for condensing operation)	kW	2.4-8	3-10	3.6-12	4.2-14
Rated capacity (non-condensing operation)	kW	2.3-7.6	2.9-9.5	3.4-11.4	4-13.3
Efficiency (for condensing operation) at partial/full load	%	104.8 / 104.7	104.7 / 104.5	104.6 / 104.3	104.6 / 104.3
Efficiency (non-condensing operation) at partial/full load	%	97.5 / 98	97.8 / 98.2	98 / 98.3	97.9 / 98.3
Transport dimensions, W x D x H	mm	700 x 635 x 1550			
Weight	kg	270			
Water content	litres	41			
Water-side pressure drop of the boiler body (ΔT = 20 K)	mbar	10	12	14	17
Water-side pressure drop of the boiler body (ΔT = 10 K)	mbar	38	46	55	67
Free residual pump head (at ΔT = 20 K) for operation with a buffer or radiators	mWS	7.5	7.1	6.7	6
	m³/h	0.34	0.43	0.52	0.60
Free residual pump head (at ΔT = 7 K) for operation of underfloor heating	mWS	5.7	4.6	3.4	2.3
For direct operation of an underfloor heating circuit, the maximum output is 14 kW.	m³/h	0.98	1.23	1.48	1.72
Pellet bin on boiler (net)	kg	30 kg (147 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	litres	13.5			
Flue gas mass flow rate at partial/full load (condensing operation)	g/s	1.4 / 4.5	1.7 / 5.6	2.1 / 6.8	2.4 / 7.9
Flue gas mass flow rate at partial/full load (non-condensing operation)	g/s	1.4 / 4.7	1.8 / 5.9	2.1 / 7	2.5 / 8.2
CO_2 content in dry flue gas at partial/full load	%	11.1 / 12.3	11.6 / 12.3	12 / 12.2	12.3 / 12.5
Exhaust temperature in condensing operation (depending on return flow and operating temperature)	°C	25-70			
Exhaust temperature in non-condensing operation (depending on return flow and operating temperature)	°C	50-100			
Required flue draught	Pa	0 Pa Up to 3 Pa overpressure in the flue pipe is permissible			
Carbon monoxide (CO) emissions at partial/full load	mg/MJ	27 / 0	23 / 2	18 / 4	15 / 4
	mg/m³	42 / 0	35 / 4	28 / 7	23 / 7
Dust emissions at partial/full load	mg/MJ	3 / 4	3 / 4	3 / 4	3 / 4
	mg/m³	4 / 6	4 / 6	4 / 6	4 / 6
Unburned hydrocarbon emissions (CxHy) at partial/full load	mg/MJ	0 / 0	0 / 0	0 / 0	0 / 0
	mg/m³	0 / 0	0 / 0	0 / 0	0 / 0
Electrical power consumption at partial/full load (=values with integrated precipitator)	W	28 / 43 (48 / 64)			
Electrical power consumption in standby	W	7			
Maximum permissible operating pressure	bar	3			
Minimum and maximum pressure for the rinse water	bar	2-6			

Pellet condensing boiler ePE-BW	Unit	8	10	12	14
Temperature adjustment range	°C	30-90			
Maximum permissible operating temperature	°C	90			
Boiler class	5 acc. to EN 303-5:2021				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	1 x 230 V / 50 Hz / 13 A				
Operating mode	Condensing				

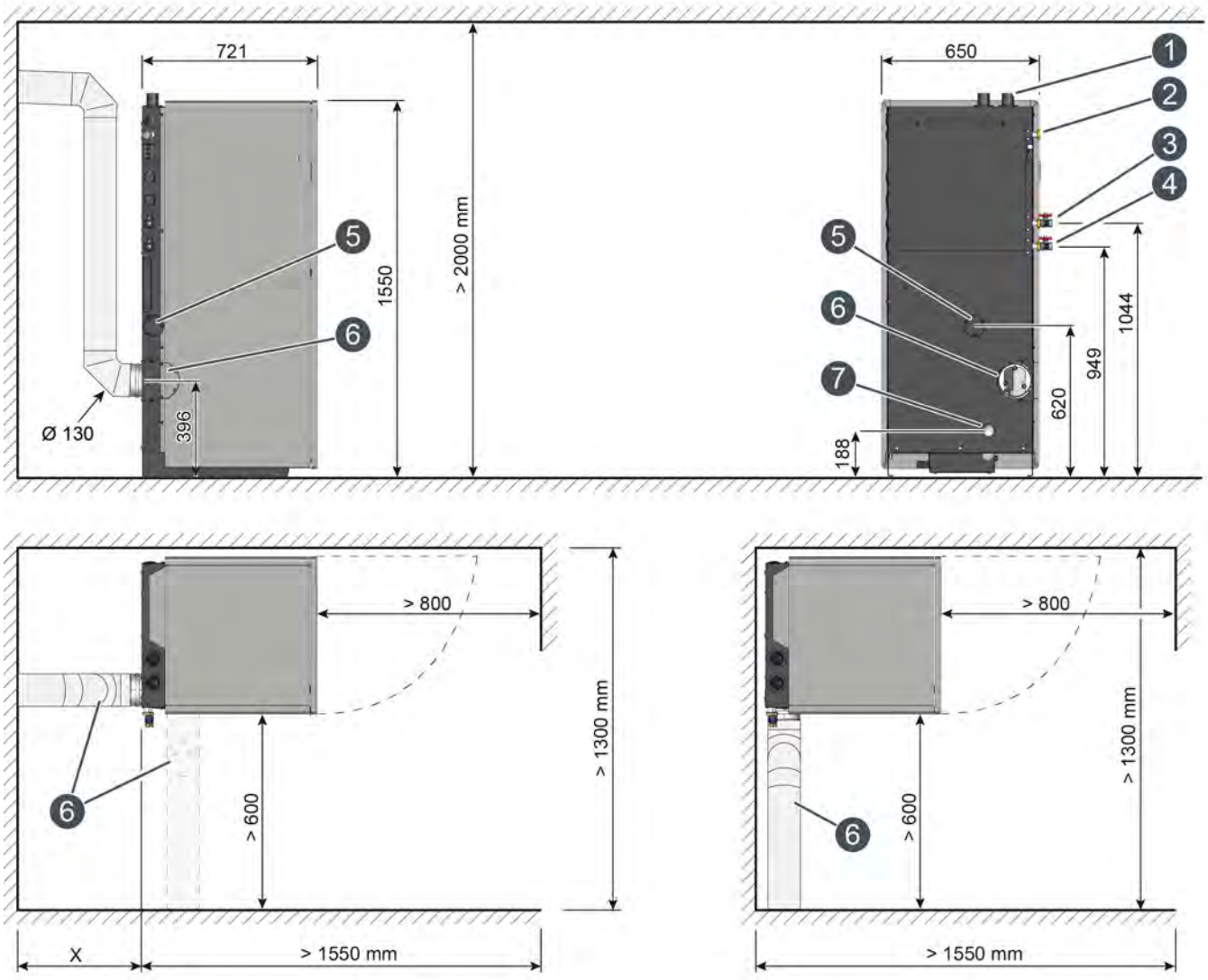
Subject to technical changes and errors

10.3 Condensing boiler ePE-BW 16-22 kW

Data sheet for pellet condensing boiler ePE-BW 16-22 kW

The hydraulic connections are led out on the left-hand side of the boiler from factory (seen from the front to the rear). However, they can also be bent on site and led out on the right side of the boiler. The flue gas connection and the supply air for operation with external air supply can be installed on the left or on the rear side of the boiler. The outlet for the condensate can be brought out on the left, right or rear side. The clearance "x" in the following diagram depends on how the flue pipe is installed from the boiler to the chimney.

For optimal and economical use of the condensing technology, we recommend the lowest possible return temperature from the heating system (approx. 35 °C).



1 Pellet suction hose, pellet return air DN50
2 Outlet for the safety valve, flat sealing union nut R1"
3 Flow, flat sealing union nut R1"
4 Return, union nut flat-sealing R1"
5 Air connection for operation with external air supply, NW80
6 Flue gas connection
7 Outlet for condensate, DN 50

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

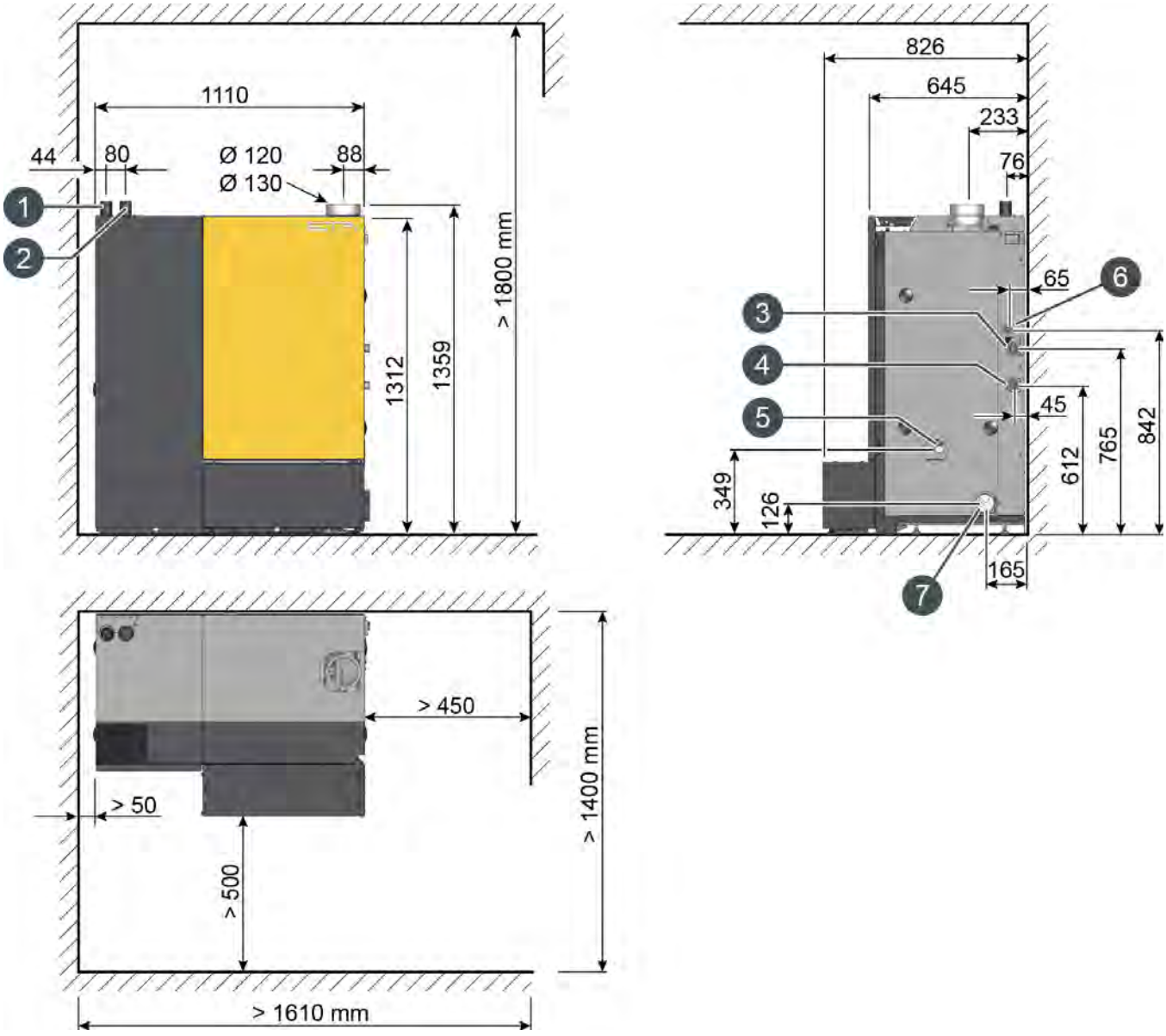
Pellet condensing boiler ePE-BW	**Unit**	**16**	**18**	**20**	**22**
Rated capacity (for condensing operation)	kW	4.8-16	5.4-18	6-20	6.6-22
Rated capacity (non-condensing operation)	kW	4.6-15.2	5.1-17.1	5.7-19	6.3-20.9
Efficiency (for condensing operation) at partial/full load	%	104.6 / 104.3	104.6 / 104.3	104.6 / 104.3	104.6 / 104.3
Efficiency (non-condensing operation) at partial/full load	%	97.7 / 98.3	97.6 / 98.3	97.4 / 98.3	97.3 / 98.3
Transport dimensions, W x D x H	mm	660 x 721 x 1580			
Weight	kg	290			
Water content	litres	49			
Water-side pressure drop of the boiler body (ΔT = 20 K)	mbar	21	26	31	38
Water-side pressure drop of the boiler body (ΔT = 10 K)	mbar	85	102	124	150
Free residual pump head (at ΔT = 20 K) for operation with a buffer or radiators	mWS	6.6	6.1	5.5	5
	m³/h	0.69	0.78	0.86	0.94
Free residual pump head (at ΔT = 7 K) for operation of underfloor heating	mWS	2.3	2.3	2.3	2.3
For direct operation of an underfloor heating circuit, the maximum output is 14 kW.	m³/h	1.72	1.72	1.72	1.72
Pellet bin on boiler (net)	kg	30 kg (147 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	litres	15			
Flue gas mass flow rate at partial/full load (condensing operation)	g/s	2.6 / 8.6	2.9 / 9.7	3.3 / 10.7	3.6 / 11.8
Flue gas mass flow rate at partial/full load (non-condensing operation)	g/s	2.7 / 8.9	3.1 / 10	3.4 / 11.1	3.7 / 12.2
CO_2 content in dry flue gas at partial/full load	%	12.5 / 12.8	12.8 / 13	13 / 13.3	13.3 / 13.6
Exhaust temperature in condensing operation (depending on return flow and operating temperature)	°C	25-70			
Exhaust temperature in non-condensing operation (depending on return flow and operating temperature)	°C	50-100			
Required flue draught	Pa	0 Pa Up to 3 Pa overpressure in the flue pipe is permissible			
Carbon monoxide (CO) emissions at partial/full load	mg/MJ	12 / 4	8 / 4	5 / 4	2 / 4
	mg/m³	18 / 7	13 / 6	8 / 6	3 / 6
Dust emissions at partial/full load	mg/MJ	3 / 4	3 / 3	3 / 3	3 / 3
	mg/m³	4 / 6	4 / 5	4 / 5	4 / 5
Unburned hydrocarbon emissions (CxHy) at partial/full load	mg/MJ	0 / 0	0 / 0	0 / 0	0 / 0
	mg/m³	0 / 0	0 / 0	0 / 0	0 / 0
Electrical power consumption at partial/full load (=values with integrated precipitator)	W	28 / 56 (43 / 64)			
Electrical power consumption in standby	W	7			
Maximum permissible operating pressure	bar	3			
Minimum and maximum pressure for the rinse water	bar	2-6			

Pellet condensing boiler ePE-BW	Unit	16	18	20	22
Temperature adjustment range	°C	30-90			
Maximum permissible operating temperature	°C	90			
Boiler class	5 acc. to EN 303-5:2021				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	1 x 230 V / 50 Hz / 13 A				
Operating mode	Condensing				

Subject to technical changes and errors

10.4 PelletsCompact PC 20-32 kW

Data sheet for PelletsCompact 20 - 32 kW



1 Pellet suction hose DN50
2 Pellet return air DN50
3 Flow with ball valve and screw joint R1" outer thread
4 Return with ball valve and screw joint R1" outer thread
5 Drainage fitted with 1/2“ filling and drainage valve
6 Outlet for the safety valve, flat sealing union nut R1"
7 Air connection for external air operation, DN80

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

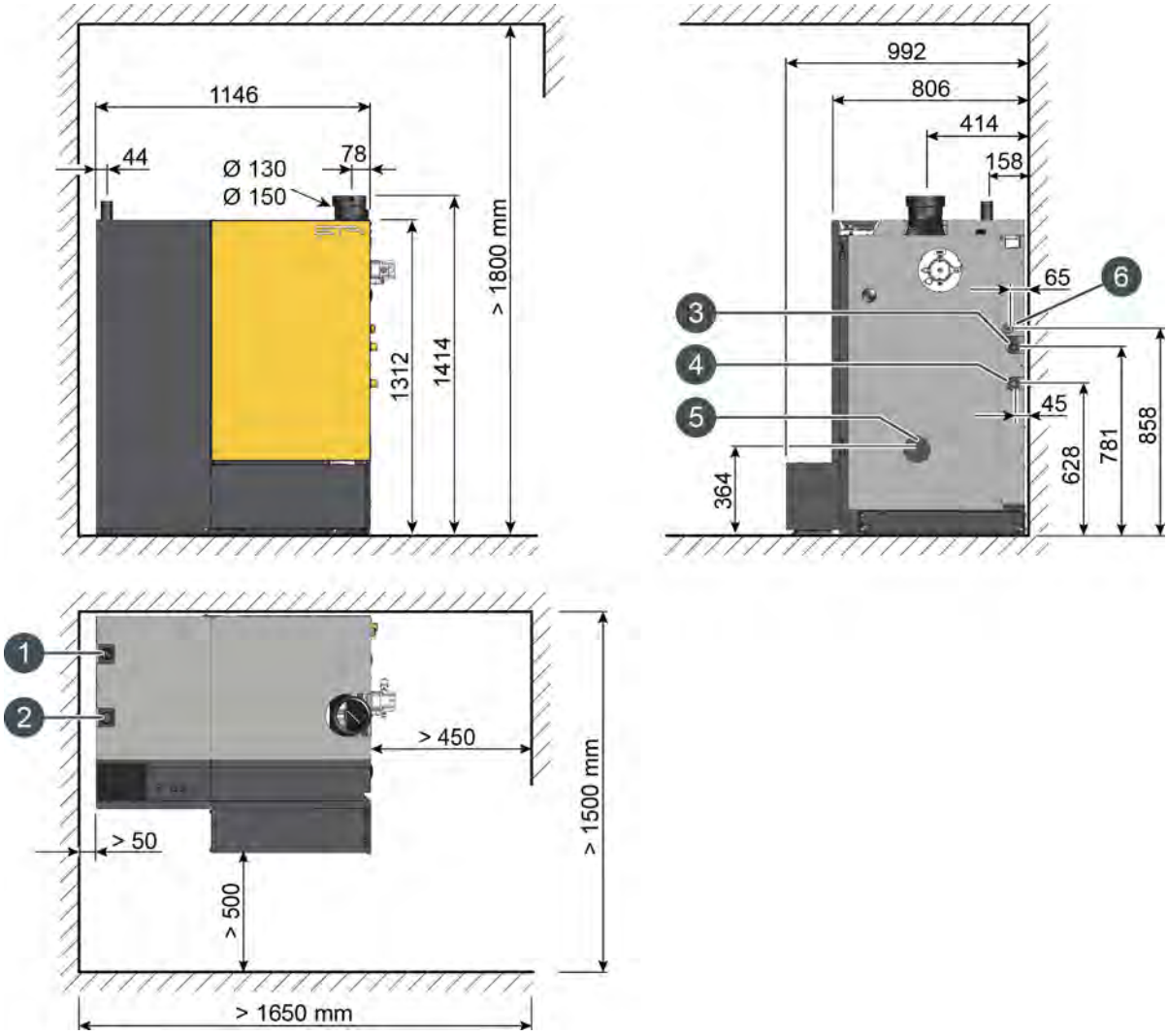
PelletsCompact	Unit	20	25	32
Rated capacity	kW	6.0 - 20.0	7.3 – 25.0	7.3 – 32.0

PelletsCompact	Unit	20	25	32
Efficiency at partial / full load (installation outside living area)	%	91.8 / 94.7	92.2 / 95.2	92.2 / 94.5
Transport dimensions W x D x H	mm	1120 x 644 x 1375		
Weight	kg	380		
Water content	Litres	52		
Available residual pump head at ΔT = 20 °C for buffer operation	mWs / m³/h	5.9 / 0.85	5.6 / 1.06	4.3 / 1.36
Water-side pressure drop (ΔT=20 °C) over internal hydraulic bypass	Pa / mWs	530 / 0.053	840 / 0.084	1340 / 0.134
Pellet bin on boiler (net)	kg	60 kg (294 kWh)		
Maximum distance to pellet store	m	20		
Ash box volume	Litres	44		
Flue gas mass flow rate at partial / full load	g / s	4.7 / 12.1	5.5 / 14.5	5.5 / 18.7
CO_2 content in dry flue gas at partial / full load	%	10 / 13	10.5 / 13.5	10.5 / 13.5
Exhaust temperature at partial / full load	°C	~80 / ~150		
Required flue draught	Pa	> 3 Pa a draught limiter is required above 15 Pa		
Carbon monoxide (CO) emissions at partial / full load	mg/MJ	16 / 5	14 / 5	14 / 5
	mg/m³	24 / 7	21 / 7	21 / 7
Dust emissions at partial / full load	mg/MJ	8 / 3	6 / 3	6 / 5
	mg/m³	12 / 5	10 / 5	10 / 8
Unburned hydrocarbon emissions (CxHy) at partial / full load	mg/MJ	1 / 1	1 / 1	1 / 1
	mg/m³	1 / 1	1 / 1	1 / 1
Electrical power consumption at partial / full load	W	56 / 90	60 / 101	60 / 142
Electrical power consumption in ready mode	W	12.6		
Maximum permissible operating pressure	bar	3		
Temperature adjustment range	°C	70 – 85		
Maximum permissible operating temperature	°C	85		
Boiler class	5 acc. to EN 303-5:2012			
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1			
Electrical connection	1 x 230 V / 50 Hz / 13 A			
Mode of operation	non-condensing			

Subject to technical changes and errors

10.5 PelletsCompact PC 33-50 kW

Data sheet for PelletsCompact 33 - 50 kW



1 Pellet suction hose DN50
2 Pellet return air DN50
3 Flow with ball valve and screw joint R1" outer thread
4 Return with ball valve and screw joint R1" outer thread
5 Drainage fitted with 1/2“ filling and drainage valve
6 Outlet for the safety valve, flat sealing union nut R1"

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

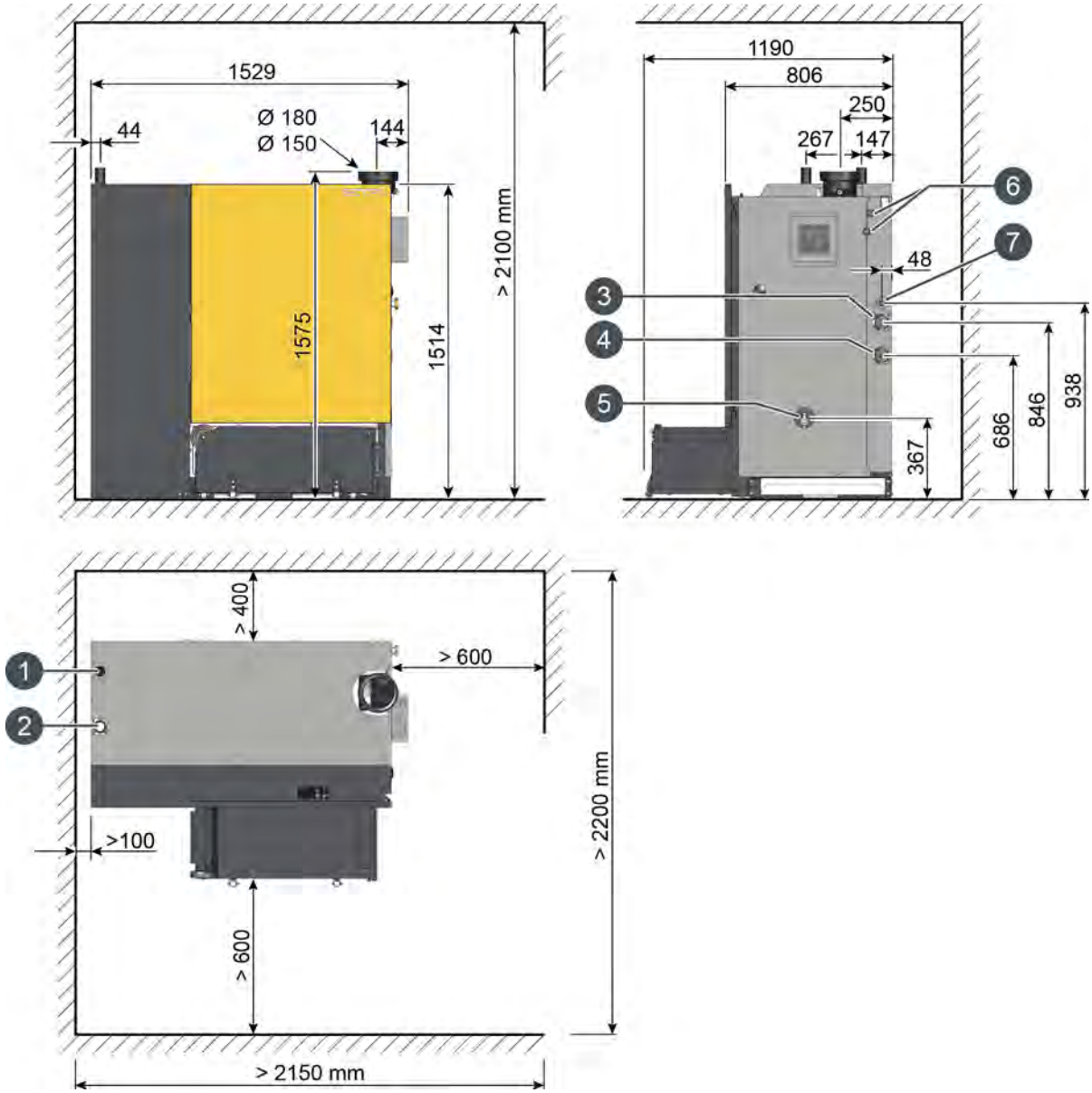
PelletsCompact	Unit	33	40	45	50
Rated capacity	kW	9.9 - 32.9	12.0 - 40.0	12.0 - 45.0	14.6 - 49.9
Efficiency at partial / full load	%	92.2 / 94.5	92.3 / 94.2	92.4 / 94.1	92.5 / 93.9
Transport dimensions W x D x H	mm	1175 x 805 x 1390			
Weight	kg	462			

PelletsCompact	Unit	33	40	45	50
Water content	Litres	76			
Available residual pump head at ΔT = 20 °C for buffer operation	mWs / m³/h	4.7 / 1.40	4.2 / 1.70	3.5 / 1.92	3.3 / 2.13
Water-side pressure drop (ΔT=20 °C) over internal hydraulic bypass	Pa / mWs	3100 / 0.31	4600 / 0.46	5900 / 0.59	7200 / 0.72
Pellet bin on boiler (net)	kg	60 kg (294 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	Litres	44			
Flue gas mass flow rate at partial / full load	g / s	5 / 17	6 / 21	6 / 23	7 / 26
CO_2 content in dry flue gas at partial / full load	%	10.8 / 13.6	10.8 / 13.8	10.9 / 13.9	11 / 14
Exhaust temperature at partial / full load	°C	~80 / ~150			
Required flue draught	Pa	> 3 Pa a draught limiter is required above 15 Pa			
Carbon monoxide (CO) emissions at partial / full load	mg/MJ	14 / 5	16 / 4	17 / 3	18 / 2
	mg/m³	21 / 7	24 / 5	25 / 4	27 / 3
Dust emissions at partial / full load	mg/MJ	6 / 5	6 / 5	6 / 6	6 / 6
	mg/m³	10 / 8	10 / 8	9 / 9	9 / 9
Unburned hydrocarbon emissions (CxHy) at partial / full load	mg/MJ	1 / 1	1 / 1	1 / 0	1 / 0
	mg/m³	1 / 1	1 / 1	1 / 0	1 / 0
Electrical power consumption at partial / full load	W	63 / 121			
Electrical power consumption in ready mode	W	11			
Maximum permissible operating pressure	bar	3			
Temperature adjustment range	°C	70 - 85			
Maximum permissible operating temperature	°C	85			
Boiler class	5 acc. to EN 303-5:2012				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	1 x 230 V / 50 Hz / 13 A				
Mode of operation	non-condensing				

Subject to technical changes and errors

10.6 PelletsCompact PC 60-105 kW

Data sheet for PelletsCompact 60 - 105 kW



1 Pellet suction hose DN50
2 Pellet return air DN50
3 Flow with R6/4" ball valve
4 Return with R6/4“ ball valve
5 Drainage fitted with 3/4“ filling and drainage valve
6 Safety heat exchanger R1/2"
7 Outlet for the safety valve, flat sealing union nut R5/4" (to 100 kW); R6/4" (at 105 kW)

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

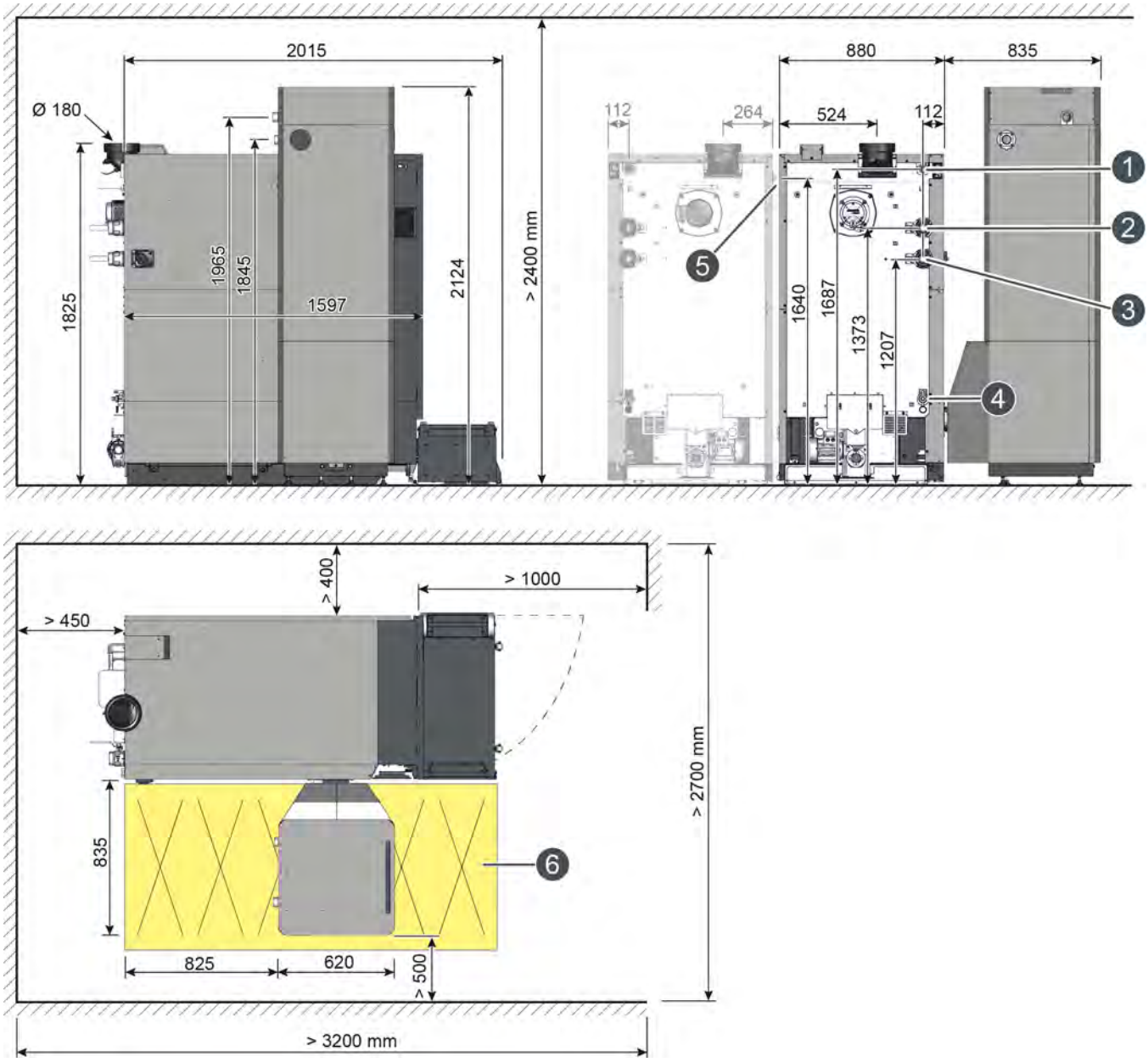
PelletsCompact	**Unit**	**60**	**70**	**80**	**100**	**105**
Rated capacity	kW	17.9 - 59.9	20.9 - 69.9	23.9 - 79.9	29.9 - 99.8	29.9 - 103
Efficiency at partial / full load	%	92.9 / 93.8	93.3 / 93.7	93.6 / 93.6	94.4 / 93.4	94.4 / 93.4
Transport dimensions W x D x H	mm	1528 x 806 x 1593				
Weight	kg	770				
Water content	Litres	147				
Available residual pump head (at ΔT = 20 K) and flow rate	mWs	4.5	3.4	2.4	3.8	3.5
	m³/h	2.6	3	3.4	4.3	4.5
Water-side pressure drop (ΔT = 20 K)	Pa / mWs	1693 / 0.17	2306 / 0.23	3013 / 0.30	4700 / 0.47	5006 / 0.50
Pellet bin on boiler (net)	kg	118 kg (578 kWh)				
Maximum distance to pellet store	m	20				
Ash box volume	Litres	100				
Flue gas mass flow rate at partial / full load	g / s	12.4/ .34.8	14/40.2	15.6/ 45.6	18.8/ 56.1	18.8/ 57.9
CO_2 content in dry flue gas at partial / full load	%	11 / 14	11 / 14	11 / 14	11 / 14	11 / 14
Exhaust temperature at partial / full load	°C	~80 / ~150				
Required flue draught	Pa	> 3 Pa a draught limiter is required above 15 Pa				
Carbon monoxide (CO) emissions at partial / full load	mg/MJ	18 / 2	19 / 2	19 / 2	20 / 2	20 / 2
	mg/m³	27 / 3	28 / 3	28 / 3	29 / 3	29 / 3
Dust emissions at partial / full load	mg/MJ	6 / 6	6 / 6	5 / 7	5 / 7	5 / 7
	mg/m³	9 / 9	8 / 9	8 / 10	7 / 10	7 / 10
Unburned hydrocarbon emissions (CxHy) at partial / full load	mg/MJ	1 / 0	1 / 1	2 / 1	2 / 2	2 / 2
	mg/m³	1 / 0	2 / 1	2 / 1	3 / 2	3 / 2
Electrical power consumption at partial / full load	W	54 / 162				
Electrical power consumption in ready mode	W	10				
Maximum permissible operating pressure	bar	3				
Temperature adjustment range	°C	70 - 90				
Maximum permissible operating temperature	°C	90				
Boiler class	5 acc. to EN 303-5:2012					
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1					
Electrical connection	1 x 230 V / 50 Hz / 13 A					
Mode of operation	non-condensing					

Subject to technical changes and errors

10.7 Pellet boiler ePE-K 100 - 130 kW

Pellet boiler ePE-K 100 - 130 kW

The boiler can optionally be supplied with the pellet module (pellet hopper with stoker) on either the left or the right side. The illustration shows a boiler with the pellet module on the left side.



1 Connection for safety valve, pressure gauge and bleed valve, R1"
2 Flow, R2“
3 Return, R2“
4 Filling and draining valve
5 Safety heat exchanger R1/2"
6 Maintenance area to be kept clear

For maintenance on the boiler, an area which is to be kept clear is required on the side of the boiler on which the pellet module is mounted. No expansion tanks or other devices may be installed within the maintenance area.

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

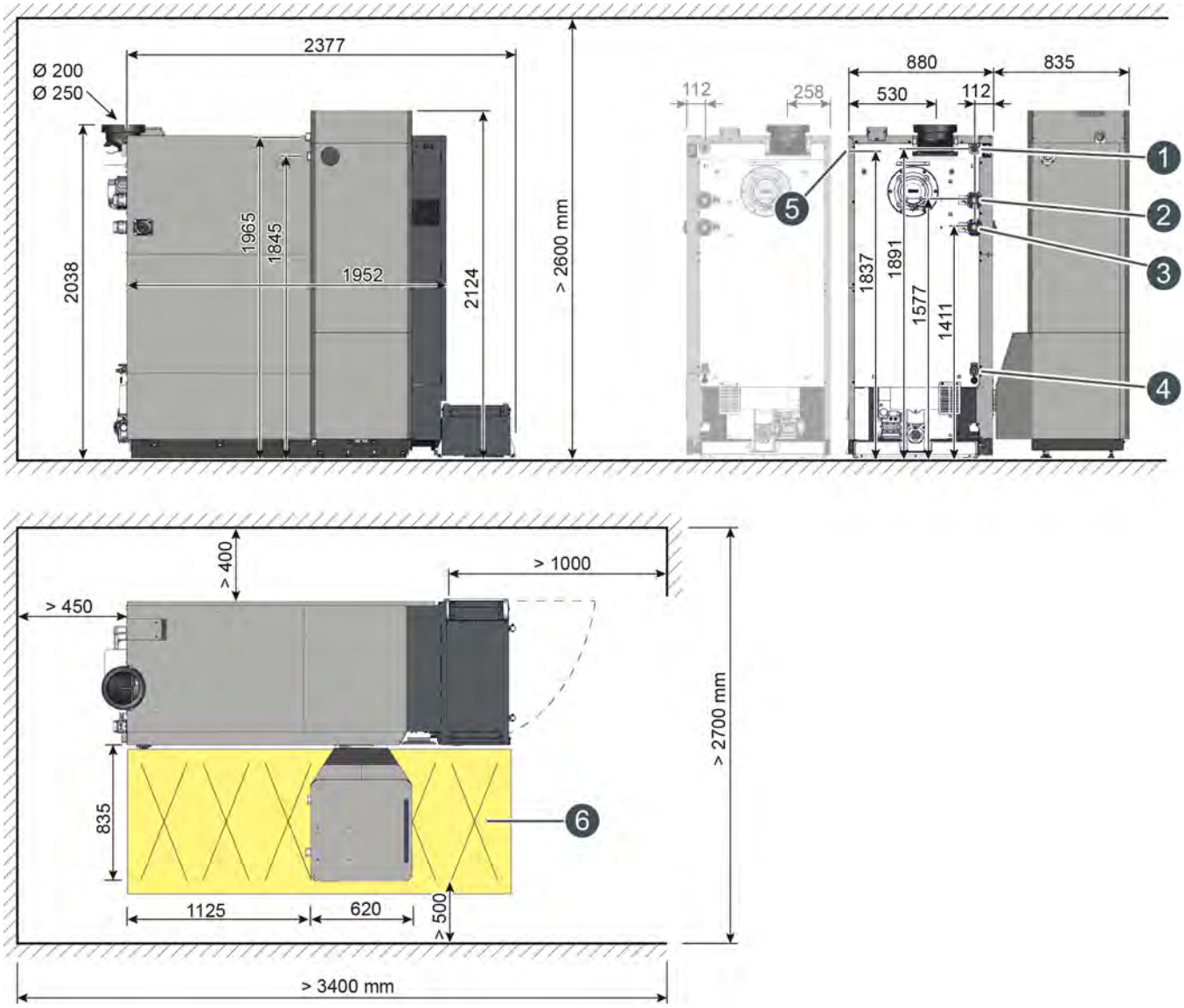
Pellet boiler	**Unit**	**100**	**110**	**120**	**130**
Rated capacity	kW	29.9 - 99.9	32.9 - 109.9	35.9 - 119.9	38.9 - 129.9
Efficiency at partial / full load	%	92.8 / 93	92.4 / 93	92 / 92.9	92 / 92.9
Transport dimensions (boiler) W x D x H	mm	922 x 1764 x 1825			
Transport dimensions (pellet module) W x D x H	mm	1130 x 650 x 2124			
Weight of the boiler	kg	1329			
Weight of the pellet module	kg	200			
Water content	Litres	272			
Water-side pressure drop (ΔT = 20 K)	mWs	0.778	0.941	1.121	1.331
Available residual pump head (at ΔT = 20 K) for buffer operation	mWs	4.5	3.8	3.1	2.5
	m³/h	4.3	4.7	5.1	5.5
Pellet bin on boiler (net)	kg	220 kg (1078 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	Litres	94			
Flue gas mass flow rate, partial / full load	g/s	18.1 / 54.5	20.3 / 61.7	22.4 / 68.9	24.6 / 76.1
CO_2 content in dry exhaust gas partial / full load	%	11.6 / 13.8	11.7 / 13.8	11.8 / 13.7	11.9 / 13.7
Exhaust temperature at partial / full load	°C	~70 / ~130			
Required flue draught	Pa	> 5 Pa A draught limiter is always required (≤15 Pa)			
Carbon monoxide (CO) emissions at partial/full load (=values with integrated precipitator)	mg/MJ	19 / 2 (19 / 3)	20 / 2 (20 / 2)	21 / 2 (21 / 2)	21 / 2 (21 / 2)
	mg/m³	29 / 3 (29 / 3)	30 / 3 (30 / 3)	32 / 2 (32 / 2)	32 / 2 (32 / 2)
Dust emissions at partial/full load (=values with integrated precipitator)	mg/MJ	7 / 5 (0 / 0)	7 / 5 (0 / 0)	8 / 5 (0 / 0)	8 / 5 (0 / 0)
	mg/m³	10 / 8 (0 / 0)	11 / 8 (0 / 0)	12 / 7 (0 / 0)	12 / 7 (0 / 0)
Unburned hydrocarbon emissions (CxHy) at partial/ full load (=values with integrated precipitator)	mg/MJ	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)
	mg/m³	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)	<1 / <1 (1 / 1)
Electrical power consumption at partial/full load (=values with integrated precipitator)	W	49 / 124 (148 / 211)			
Electrical power consumption in ready mode	W	13			
Maximum permissible operating pressure	bar	3			
Temperature adjustment range	°C	70 – 90			
Maximum permissible operating temperature	°C	95			
Boiler class	5 acc. to EN 303-5:2012				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	230 V AC / 50 Hz / 16 A				
Mode of operation	non-condensing				

Subject to technical changes and errors

10.8 Pellet boiler ePE-K 140-170 kW

Pellet boiler ePE-K 140-170 kW

The boiler can optionally be supplied with the pellet module (pellet hopper with stoker) on either the left or the right side. The illustration shows a boiler with the pellet module on the left side.



1 Connection for safety valve, pressure gauge and bleed valve, R1"
2 Flow, R2“
3 Return, R2“
4 Filling and draining valve
5 Safety heat exchanger R1/2"
6 Maintenance area to be kept clear

For maintenance on the boiler, an area which is to be kept clear is required on the side of the boiler on which the pellet module is mounted. No expansion tanks or other devices may be installed within the maintenance area.

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

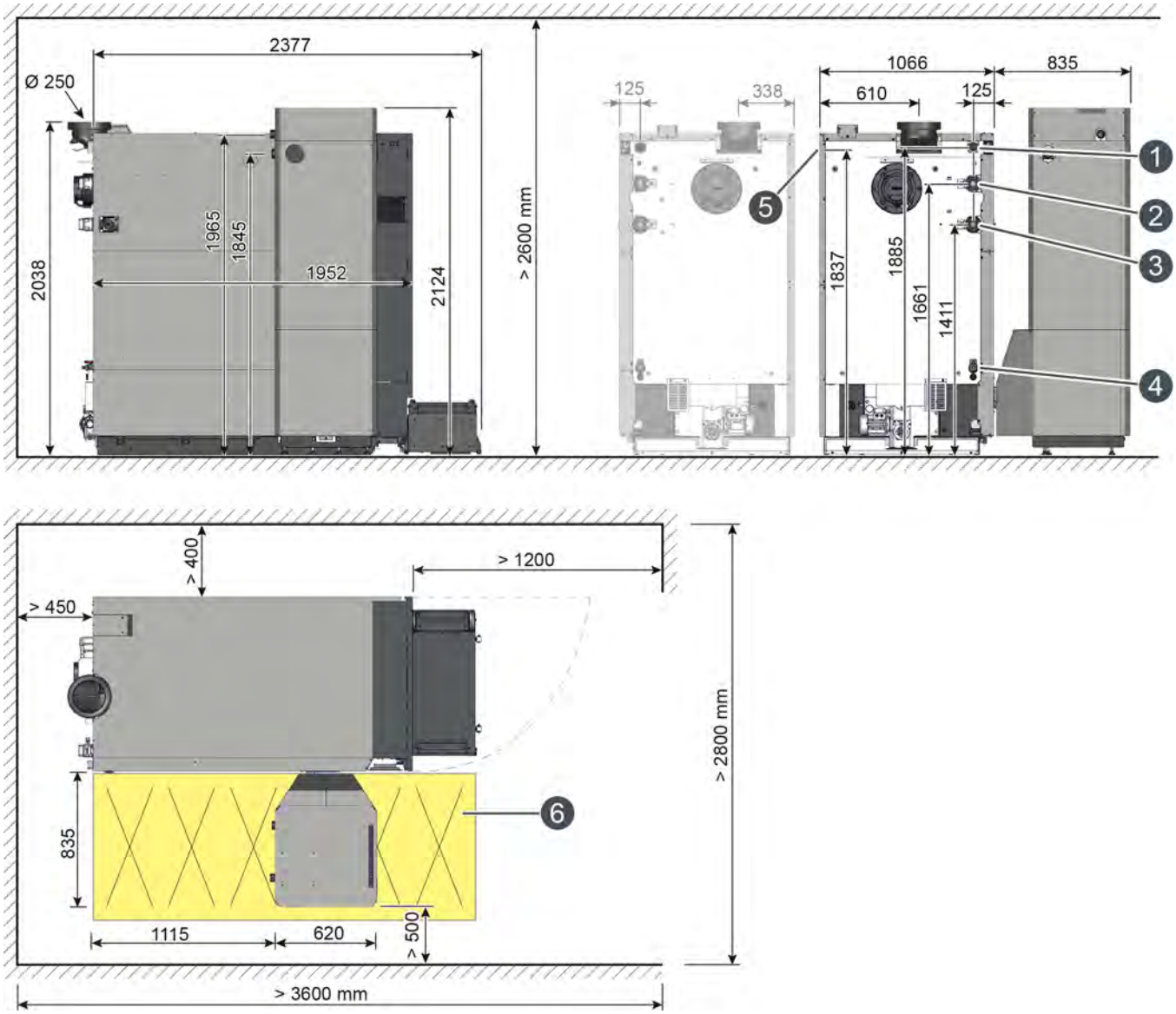
Pellet boiler	**Unit**	**140**	**150**	**160**	**170**
Rated capacity	kW	41.9 - 139.9	44.9 - 149.9	47.9 - 159.9	50.9 - 169.9
Efficiency at partial / full load	%	92.8 / 93.4	93.1 / 93.6	93.5 / 93.9	93.9 / 94.1
Transport dimensions (boiler) W x D x H	mm	905 x 2073 x 1970			
Transport dimensions (pellet module) W x D x H	mm	1130 x 650 x 2124			
Weight of the boiler	kg	1682			
Weight of the pellet module	kg	200			
Water content	Litres	347			
Water-side pressure drop (ΔT = 20 K)	mWs	0.66	0.76	0.87	0.98
Available residual pump head (at ΔT = 20 K) for buffer operation	mWs	8.9	6.6	5.5	5
	m³/h	6	6.4	6.8	7.2
Pellet bin on boiler (net)	kg	220 kg (1078 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	Litres	94			
Flue gas mass flow rate, partial / full load	g/s	31 / 91	33 / 95	35 / 100	36 / 106
CO_2 content in dry exhaust gas partial / full load	%	12.1 / 14	12.2 / 14.2	12.2 / 14.4	12.3 / 14.6
Exhaust temperature at partial / full load	°C	~70 / ~130			
Required flue draught	Pa	> 5 Pa A draught limiter is always required (≤15 Pa)			
Carbon monoxide (CO) emissions at partial/full load (=values with integrated precipitator)	mg/MJ	20 / 2 (21 / 2)	20 / 2 (20 / 2)	20 / 2 (20 / 2)	20 / 2 (19 / 2)
	mg/m³	31 / 3 (31 / 2)	31 / 3 (31 / 2)	30 / 3 (30 / 3)	30 / 3 (29 / 3)
Dust emissions at partial/full load (=values with integrated precipitator)	mg/MJ	8 / 5 (0 / 0)	8 / 5 (0 / 0)	8 / 5 (0 / 0)	8 / 6 (0 / 0)
	mg/m³	12 / 8 (0 / 0)	12 / 8 (0 / 0)	12 / 8 (0 / 0)	12 / 9 (0 / 0)
Unburned hydrocarbon emissions (CxHy) at partial/ full load (=values with integrated precipitator)	mg/MJ	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)
	mg/m³	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)
Electrical power consumption at partial/full load (=values with integrated precipitator)	W	76 / 149 (175 / 236)			
Electrical power consumption in ready mode	W	15			
Maximum permissible operating pressure	bar	3			
Temperature adjustment range	°C	70 – 90			
Maximum permissible operating temperature	°C	95			
Boiler class	5 acc. to EN 303-5:2012				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	230 V AC / 50 Hz / 16 A				
Mode of operation	non-condensing				

Subject to technical changes and errors

10.9 Pellet boiler ePE-K 180-240 kW

Pellet boiler ePE-K 180-240 kW

The boiler can optionally be supplied with the pellet module (pellet hopper with stoker) on either the left or the right side. The illustration shows a boiler with the pellet module on the left side.



1 Connection for safety valve, pressure gauge and bleed valve, R5/4“
2 Flow, R2“
3 Return, R2“
4 Filling and draining valve
5 Safety heat exchanger R1/2"
6 Maintenance area to be kept clear

For maintenance on the boiler, an area which is to be kept clear is required on the side of the boiler on which the pellet module is mounted. No expansion tanks or other devices may be installed within the maintenance area.

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

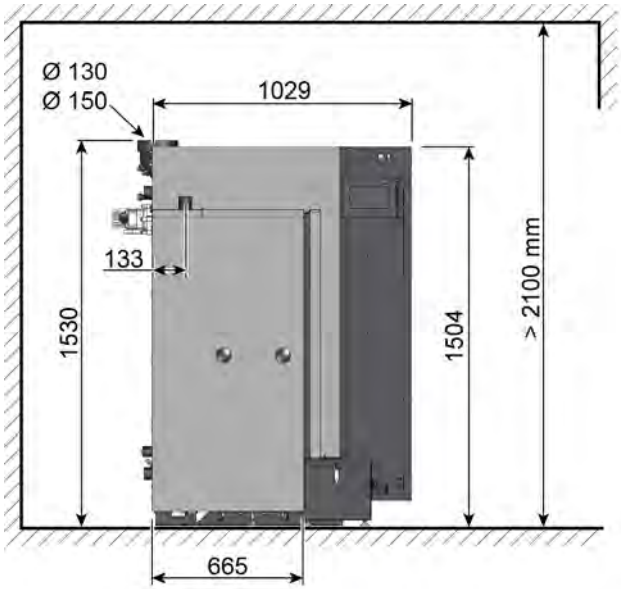
Pellet boiler	**Unit**	**180**	**199**	**220**	**240**
Rated capacity	kW	53.9 - 179.9	59.9 - 199.9	65.9 - 219.9	71.9 - 239.9
Efficiency at partial / full load	%	94.3 / 94.4	95 / 94.9	95.7 / 95.3	96.5 / 95.8
Transport dimensions (boiler) W x D x H	mm	1076 x 2073 x 1970			
Transport dimensions (pellet module) W x D x H	mm	1130 x 650 x 2124			
Weight of the boiler	kg	1982			
Weight of the pellet module	kg	200			
Water content	Litres	434			
Water-side pressure drop (ΔT = 20 K)	mWs	0.83	1.03	1.24	1.46
Available residual pump head (at ΔT = 20 K) for buffer operation	mWs	6.5	5.5	4	2.5
	m³/h	7.7	8.5	9.4	10.2
Pellet bin on boiler (net)	kg	220 kg (1078 kWh)			
Maximum distance to pellet store	m	20			
Ash box volume	Litres	94			
Flue gas mass flow rate, partial / full load	g/s	41 / 120	45 / 130	48 / 139	51 / 148
CO_2 content in dry exhaust gas partial / full load	%	11.1 / 13.2	11.2 / 13.4	11.2 / 13.7	11.3 / 13.9
Exhaust temperature at partial / full load	°C	~70 / ~130			
Required flue draught	Pa	> 5 Pa A draught limiter is always required (≤15 Pa)			
Carbon monoxide (CO) emissions at partial/full load (=values with integrated precipitator)	mg/MJ	19 / 2 (19 / 2)	19 / 2 (18 / 2)	18 / 2 (17 / 2)	18 / 2 (16 / 2)
	mg/m³	29 / 3 (29 / 3)	29 / 3 (28 / 3)	28 / 3 (26 / 4)	27 / 3 (25 / 4)
Dust emissions at partial/full load (=values with integrated precipitator)	mg/MJ	8 / 6 (0 / 0)	7 / 6 (0 / 0)	7 / 6 (0 / 0)	7 / 7 (0 / 0)
	mg/m³	11 / 9 (0 / 0)	11 / 9 (0 / 0)	11 / 10 (0 / 0)	11 / 10 (0 / 0)
Unburned hydrocarbon emissions (CxHy) at partial/ full load (=values with integrated precipitator)	mg/MJ	1 / <1 (1 / 1)	1 / <1 (0 / 0)	1 / <1 (0 / 0)	1 / <1 (0 / 0)
	mg/m³	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)	1 / <1 (1 / 1)
Electrical power consumption at partial/full load (=values with integrated precipitator)	W	78 / 227 (358 / 487)			
Electrical power consumption in ready mode	W	17			
Maximum permissible operating pressure	bar	3			
Temperature adjustment range	°C	70 – 90			
Maximum permissible operating temperature	°C	95			
Boiler class	5 acc. to EN 303-5:2012				
Suitable fuels	Pellets ISO 17225-2-A1, ENplus-A1				
Electrical connection	230 V AC / 50 Hz / 16 A				
Mode of operation	non-condensing				

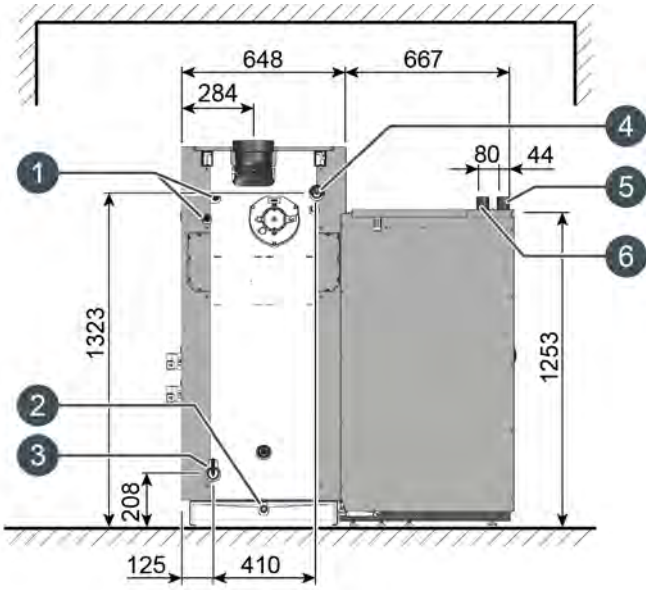
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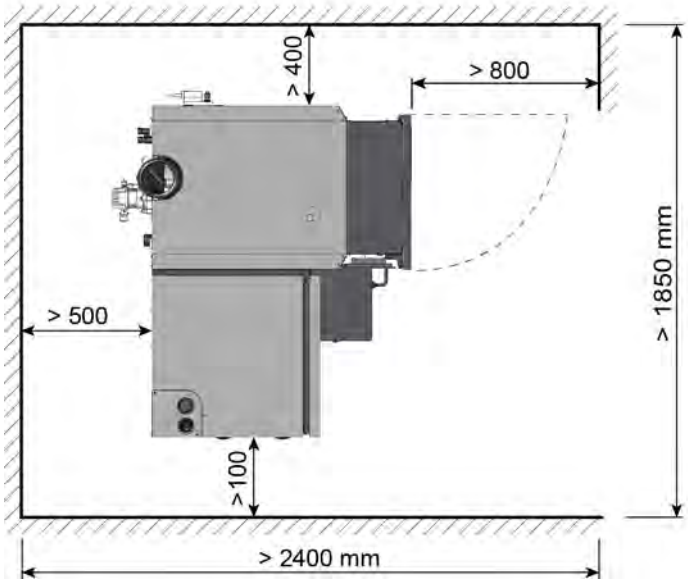
10.10 TWIN 20-26 kW

Data sheet for TWIN 20 - 26 kW

The pellet burner can be delivered for installation on the right or left side. The illustration shows a log boiler (20-30 kW) with the pellet burner on the left side.







1 Safety heat exchanger R1/2" external thread
2 Drainage with R1/2" coupling
3 Return with R5/4" coupling
4 Flow with R5/4" coupling
5 Pellet suction hose DN50
6 Pellet return air DN50

The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

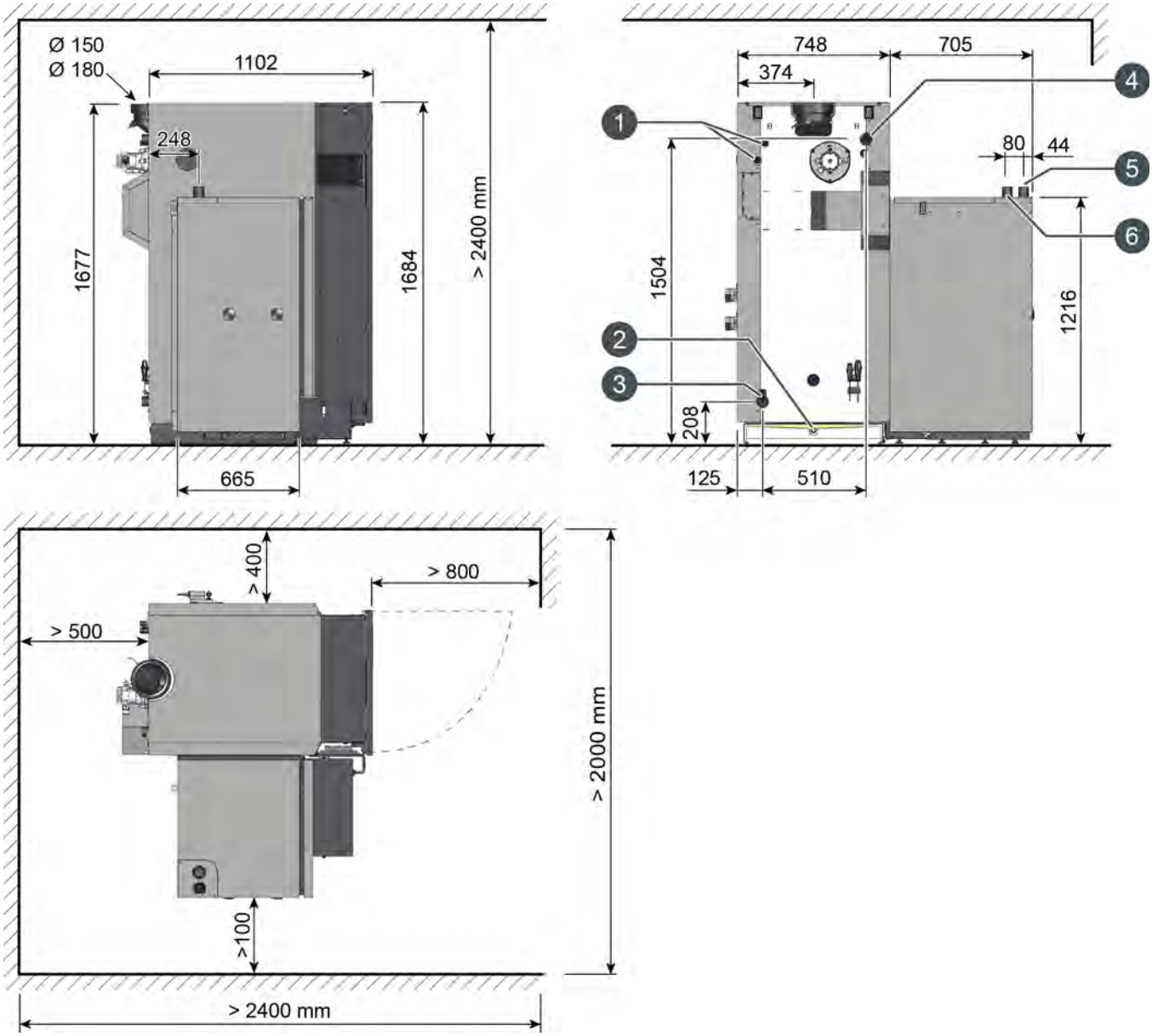
TWIN pellet burner	Unit	20	26
Rated capacity TWIN pellet burner	kW	6 - 20	7.5 - 26
Efficiency of pellet burner at partial / full load	%	87.8 / 92.0	90.1 / 93
Transport dimensions of the pellet burner without panel W x D x H	mm	570 x 790 x 1290	
Weight with/without pellet burner	kg	728 / 580	728 / 583
Pellet bin on boiler (net)	kg	60 kg (294 kWh)	
Maximum distance to pellet store	m	20	
Ash box volume	Litres	16	
Flue gas mass flow rate of pellet burner at partial / full load	g / s	5.8 / 12.8	7.2 / 18.6
CO_2 content in dry flue gas at partial / full load	%	9 / 14	9 / 14
Exhaust temperature of pellet burner at partial / full load	°C	~110 / ~170	
Required flue draught	Pa	> 5 Pa a draught limiter is required above 30 Pa	
Carbon monoxide (CO) emissions of pellet burner at partial / full load	mg/MJ	11 / 3	10 / 2
	mg/m³	17 / 4	15 / 4
Dust emissions of pellet burner at partial / full load	mg/MJ	4 / 7	8 / 7
	mg/m³	6 / 11	12 / 11
Unburned hydrocarbon emissions (CxHy) of pellet burner at partial / full load	mg/MJ	< 1 / < 1	1 / < 1
	mg/m³	< 1 / < 1	1 / 1
Electrical power consumption of pellet burner at partial / full load	W	46 / 61	57 / 102
Electrical power consumption of pellet burner in ready mode	W	13	
Maximum permissible operating pressure	bar	3	
Temperature adjustment range	°C	70 – 85	
Maximum permissible operating temperature	°C	95	
Minimum return temperature	°C	55	
Boiler class	5 acc. to EN 303-5:2012		
Tested fuels	Pellets ISO 17225-2-A1, ENplus-A1		
Electrical connection	1 x 230 V / 50 Hz / 13 A		
Mode of operation	non-condensing		

Subject to technical changes and errors

10.11 TWIN 40-50 kW

Data sheet TWIN 40 - 50 kW

The pellet burner can be delivered for installation on the right or left side. The illustration shows a log boiler (40-60 kW) with the pellet burner on the left side.

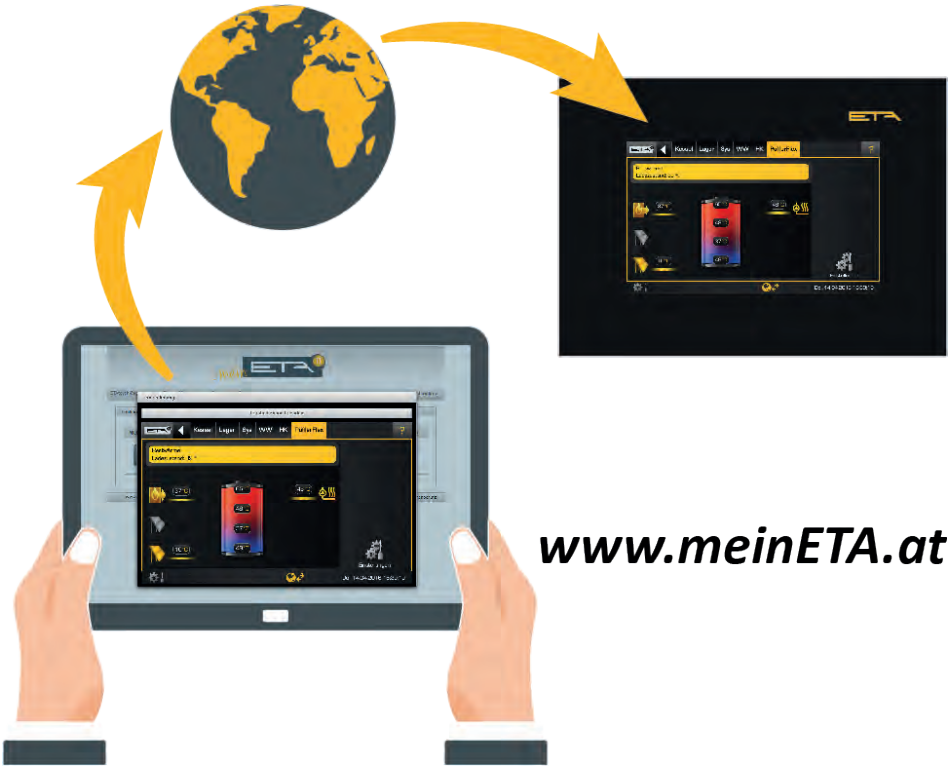


1 Safety heat exchanger R1/2" external thread
2 Drainage with R1/2" coupling
3 Return with R5/4" coupling
4 Flow with R5/4" coupling
5 Pellet suction hose DN50
6 Pellet return air DN50

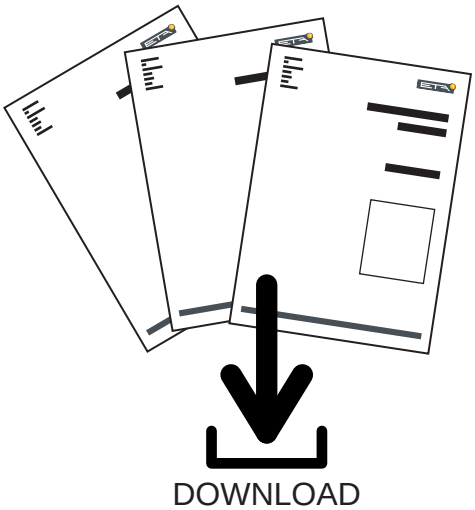
The flue gas connection on the boiler does not yet give any indication of the required chimney diameter. Information on the required chimney diameter can be found in the installation instructions for the boiler in the chimney chapter. The emission values refer to a residual oxygen content of 13% O_2.

TWIN pellet burner	Unit	40	50
Rated capacity TWIN pellet burner	kW	12 - 40	14.3 - 49.9
Efficiency of pellet burner at partial / full load	%	90.4 / 91.7	90.6 / 90.7
Transport dimensions of the pellet burner without panel W x D x H	mm	810 x 591 x 1249	
Weight with/without pellet burner	kg	990 / 800	
Pellet bin on boiler (net)	kg	60 kg (294 kWh)	
Maximum distance to pellet store	m	20	
Ash box volume	Litres	25	
Flue gas mass flow rate of pellet burner at partial / full load	g/s	9 / 26	11 / 32
CO_2 content in dry flue gas at partial / full load	%	10 / 12	10 / 12.8
Exhaust temperature of pellet burner at partial / full load	°C	~110 / ~170	
Required flue draught	Pa	> 5 Pa a draught limiter is required above 30 Pa	
Carbon monoxide (CO) emissions of pellet burner at partial / full load	mg/MJ	12 / 2	13 / 2
	mg/m³	18 / 3	21 / 3
Dust emissions of pellet burner at partial / full load	mg/MJ	8 / 6	9 / 6
	mg/m³	13 / 10	14 / 9
Unburned hydrocarbon emissions (CxHy) of pellet burner at partial / full load	mg/MJ	1 / < 1	1 / < 1
	mg/m³	1 / 1	1 / 1
Electrical power consumption of pellet burner at partial / full load	W	65.8 / 116	67 / 116
Electrical power consumption of pellet burner in ready mode	W	11.6	
Maximum permissible operating pressure	bar	3	
Temperature adjustment range	°C	70 – 85	
Maximum permissible operating temperature	°C	95	
Minimum return temperature	°C	55	
Boiler class	5 acc. to EN 303-5:2012		
Tested fuels	Pellets ISO 17225-2-A1, ENplus-A1		
Electrical connection	1 x 230 V / 50 Hz / 13 A		
Mode of operation	non-condensing		

Subject to technical changes and errors



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