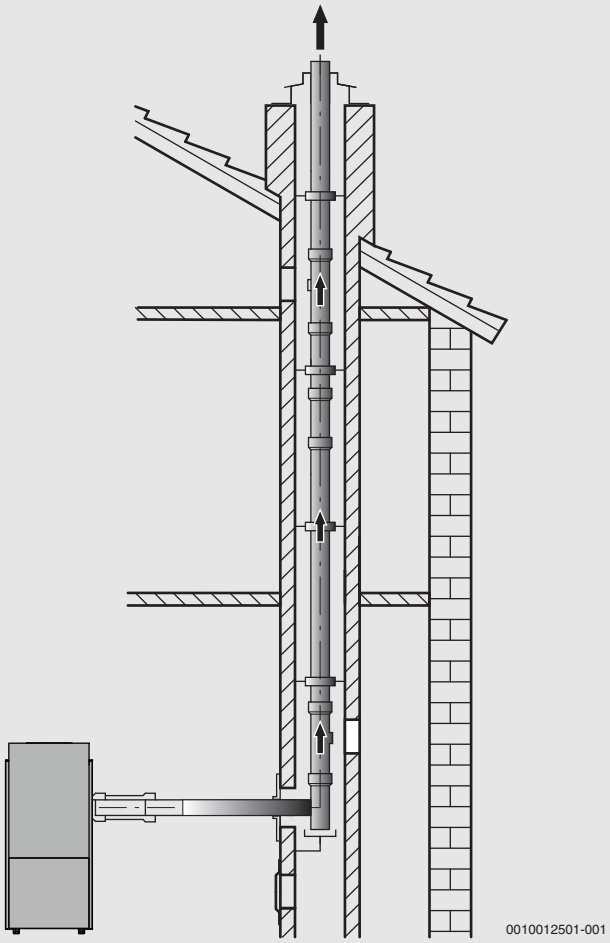
BOSCH

Notes on flue gas routing

Floor standing gas condensing boiler

Condens 7000 FP

GC7000FP 350...620



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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe to life-threatening personal injury will occur.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in serious personal injury or danger to life.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate personal injury.

NOTICE

ATTENTION indicates that material damage may occur.

Important information

The info symbol indicates important information where there is no risk to people or property.

Additional symbols

Symbol	Meaning
▶	a step in an action sequence
→	a reference to a related part in the document
•	a list entry
–	a list entry (second level)

Table 1

1.2 Safety precautions

⚠ Notices for the target group

These installation instructions are intended for gas, plumbing, heating and electrical contractors. All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life.

- ▶ Read the installation, service and commissioning instructions (heat source, heating controller, pumps, etc.) before installation.
- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.
- ▶ Record all work carried out.

⚠ Handover to the user

When handing over, instruct the user how to operate the heating system and inform the user about its operating conditions.

- ▶ Explain how to operate the heating system and draw the user's attention to any safety relevant action.
- ▶ In particular, point out the following:
  - – Alterations and repairs must only be carried out by an approved contractor.
  - – Safe and environmentally compatible operation requires inspection at least once a year and responsive cleaning and maintenance.
  - – The heat generator may only be operated with the casing fitted and closed.
- ▶ Point out the possible consequences (personal injury, including danger to life or material damage) of non-existent or improper inspection, cleaning and maintenance.
- ▶ Point out the dangers of carbon monoxide (CO) and recommend the use of CO detectors.
- ▶ Leave the installation instructions and the operating instructions with the user for safekeeping.

⚠ Danger if you smell flue gas

- ▶ Switch off the boiler.
- ▶ Open windows and doors.
- ▶ Notify an approved contractor.

2 About these instructions

The floor standing boiler can be equipped with different control units. The boiler is therefore shown symbolically without a control unit in the graphics in these instructions.

3 Usage

3.1 General description

Before installing the boiler and flue gas routing, consult the responsible building authorities and district flue gas inspector to establish whether there are any a wall.

The maximum surface temperature at the combustion air pipe is below 85 °C. Observe national regulations and the minimum distances to combustible construction materials.

The permissible maximum balanced flue length depends on the boiler and the number of deflections in the balanced flue. Refer to the calculation for the balanced flue length in Chapter 7 from page 12.

3.2 Regulations

In order to ensure installation and operation of the product in accordance with the regulations, please observe all the applicable national and regional regulations as well as all technical rules and guidelines.

The document 6720807972 contains information about the applicable regulations. You can use the document search on our website to display this. You will find the address of the website on the back of these instructions.

3.3 Approved flue accessories

We recommend the use of original accessories offered by Bosch for the flue systems described in these instructions.

You can find designations and part numbers in the main catalogue.

For the sake of simplicity, the following standard flue gas routings have been calculated with Centrotherm system flue PP rigid for the single boiler and additionally for the 2 boiler cascade flue gas routing with Raab system flues made of stainless steel EW01/DW01 for system temperatures of 80/60 °C. If the system used and flue gas routing matches the setup described and the specifications, the calculation can be omitted.

When carrying out your own calculations, consider the residual head of the fan of 200 Pa for single boilers and 120 Pa for cascades.

The following points must be observed for the Raab flue gas system:

- The EW 0.6 mm system in DN300 must be fitted with an intermediate support after approx. 24 m of installation height (H1a). A further 36 m can be mounted from the bracket.
- For the twin wall systems DW in DN300, depending on the installation situation, install an intermediate support every 15 m, for installation on the lower wall mounting bracket or 31 m height installation on the foundation.
  Thereafter, another bracket with a further 15 m can be mounted.

In case of cascading, we recommend the use of the original accessory "Cascade". Cascading provided by the customer must be equipped with the same components. Each boiler requires a tight-closing, motorised flue gas damper that meets the tightness requirement according to EN 15502-2. Moreover, a CO detector must be installed in the installation room of the cascade.

3.4 Flue gas routing according to $B_{23(P)}$

System description	
Combustion air supply	With open flue
Certification	The balanced flue system is not tested together with the device.

Table 2 Flue gas routing according to B_{23P}

CE marking (EN 14471 for plastics, EN 1856 for metal) is required.

The installer must ensure and demonstrate that the flue system is functioning perfectly according to B_{23p}. Flue systems according to B_{23p} are not tested by the manufacturer of the heat source.

The flue accessories used must satisfy the following requirements:

- Temperature class: at least T120
- Pressure and tightness class: H1 (Centrotherm)/P1 (with attachment strap, Raab) cascade
- Condensate resistance: W
- Corrosion class for metal: V1 or VM
- Corrosion class for plastic: 1

You can find this data in the product specifications and in the manufacturer's documentation.

- ▶ Observe country-specific regulations and standards, especially in relation to designing the flue outlet and combustion air supply apertures.
- ▶ Observe requirements of the flue system manufacturer.
- ▶ Observe requirements of the corresponding general approval for the system!

4 Installation instructions

4.1 General description

WARNING

Danger to life from poisoning!

An inadequate combustion air supply may cause a hazardous discharge of flue gas outlet gas.

- ▶ Ensure that there is an adequate combustion air supply.
- ▶ Do not cover or reduce the size of ventilation apertures in doors, windows and walls.
- ▶ Ensure an adequate supply of combustion air, also when installed at a later date (such as extract air fans, extractor hoods or climate, conditioning units with extract air systems leading to the open air).
- ▶ In event of insufficient combustion air supply: Do not put the heat generator into operation.

- ▶ Observe the installation instructions of the flue accessories.
- ▶ Route horizontally installed flue with 3°slope (= 5.2 % or 5.2 cm per metre) in direction of flue gas flow.
- ▶ Insulate the combustion air line in humid rooms.
- ▶ Whenever possible, install the inspection apertures so they are easily accessible.
- ▶ When using cylinders, consider their dimensions in relation to the installation of flue accessories.
- ▶ Before installing the flue accessories:
  lightly grease gaskets on the female connections with solvent-free grease (e.g. Centrocerin).
- ▶ When installing the balanced flue, always push the flue accessories as far as possible into the female connections.

To avoid unintentional uncoupling of the flue system (loosening of female socket connections):

- ▶ Support and secure the flue system appropriately at a distance of 1 metre at the most before and after each elbow.

DANGER

Risk to life from escaping flue gas inside at the installation location!

- ▶ Ensure that the seal in the flue gas connection on the condensation catch pan is fitted, undamaged and correctly inserted.

DANGER

Risk to life through toxic exhaust gases escaping.

- ▶ Check all joints in the flue system to ensure they are correctly made, secured and sealed.

4.2 Fire protection requirements at the installation location and flue system

Follow national and regional regulations, ordinances and guidelines.

- Installation of the floor standing gas condensing boiler in a room where only the roof structure is located above the ceiling:
  - If a fire rating is required for the ceiling, then the balanced flue between the top edge of the ceiling and the roof skin must have a casing which has the same fire rating and is made from non-flammable materials.
  - If no fire rating is required for the ceiling, then the balanced flue must be routed through a duct made from non-flammable, dimensionally-stable materials or a metal protective pipe (mechanical protection) running from the top edge of the ceiling to the roof skin.
- If the balanced flue bridges floors in a multi-storey building, then the balanced flue outside the installation location must be routed through a duct with a fire rating of at least 90 minutes and, in residential buildings of low height, of at least 30 minutes.

Only applies in Germany:

- A fire-resistance rating is not required for the duct in buildings of class 1 and 2 that contain only one living unit.

When arranging the fire-resistance rating, the relevant national and regional regulations, ordinances and guidelines in each case must be observed.

4.3 Notes on operation and dimensioning requirements for the flue system

Depending on the dimensioning according to EN13384 or the specifications in this document, excessive pressure may arise in the flue system. In the Condens GC7000FP product line, overpressure may arise in the flue.
If the flue system is routed through occupied rooms, the entire length of the flue must be installed in a duct as rear-ventilated system. The duct must be compliant with the relevant national and regional conditions of the FeuVO [Germany] or the country-specific technical regulations.

4.3.1 Requirements on the installation room with rated heat output >100 kW with open flue operation

A special installation room is required for gas combustion equipment with a total rated heat output of more than 100 kW (see also local regulations for Germany, TRGI 2018). Observe the firing regulations for the respective country. In the installation room, two combustion air openings leading to the outside must be present that have a cross-section of 150 cm^2 plus 2 cm^2 for each kilowatt exceeding 50 kW total rated heat output.
For open flue operation, the installation room must fulfil the following requirements:

- The installation room must not be used for other purposes, except the following:
  - for the introduction of building connections, including the shut-off, control and measuring devices,
  - for the installation of combustion equipment for liquid fuels, heat pumps, combined heat and power units or fixed internal combustion engines.
  - for the storage of fuels.
- The installation room must not have any openings to other rooms, except for doorways.
- The doors to the installation room must be tight and self-closing.
- It must be possible to ventilate the installation room.
  Above 100 kW, the ventilation requirements of TRGI 2018 (see also local regulations for Germany) must be observed additionally for flue gas systems in positive pressure (e.g.: B_{23P}, B_{53P}). In this case an upper and lower ventilation aperture is required on the same wall of the installation room.
  With outputs higher than 100 kW, the size of each aperture increases by 1 cm^2 per kW. For a 300 kW system, 2 ventilation apertures each of 350 cm^2 are necessary. The requirements for ventilation of the installation room are therefore more extensive than the requirements for the combustion air supply.
  The vertical distance between the upper and lower ventilation aperture should be as large as possible. These apertures can be added to the combustion air supply.

An emergency stop switch must be installed outside the installation room (see also local regulations for Germany, TRGI 2018). The burner of heat generator must be able to be shutdown with this emergency stop switch at all times.

Combustion air vents		
Boiler size [kW]	Area per opening [cm^2]	Number of openings [n]
350	400	2
400	450	2
500	550	2
620	670	2
2 x 350	750	2
2 x 400	850	2
2 x 500	1050	2
2 x 620	1290	2

Table 3 Combustion air openings during open flue operation

4.3.2 Requirements on the installation room with rated heat output >100 kW with balanced flue operation

A special installation room is required for gas combustion equipment with a total rated heat output of more than 100 kW (see also local regulations for Germany, TRGI 2018). Observe the firing regulations for the respective country.
For balanced flue operation, the installation room must fulfil the following requirements:

- The installation room must not be used for other purposes, except the following:
  - for the introduction of building connections, including the shut-off, control and measuring devices,
  - for the installation of combustion equipment for liquid fuels, heat pumps, combined heat and power units or fixed internal combustion engines.
  - for the storage of fuels.
- The installation room must not have any openings to other rooms, except for doorways.
- The doors to the installation room must be tight and self-closing.
- It must be possible to ventilate the installation room. This requires that, e.g. a window or door can be opened to the outside.
- In order to provide ventilation, the installation room must have a ventilation aperture leading to the outside of at least 150 cm^2, or ventilation apertures of at least 2 × 75 cm^2, or pipes to the open air with equivalent flow cross-sections. With outputs higher than 100 kW, the ventilation requirements of DVGW TRGI 2018, point 8.3.2.5 must also be observed for flue systems operating with positive pressure. In this case an upper and lower ventilation aperture is required on the same wall of the installation room.
  With outputs higher than 100 kW, the size of each aperture increases by 1 cm^2 per kW. For a 300 kW system, 2 ventilation apertures with a size of 350 cm^2 are necessary. The requirements for ventilation of the installation room are therefore extensively the same as the requirements for the combustion air supply.
  The vertical distance between the upper and lower ventilation aperture should be as large as possible. These apertures can be added to the combustion air supply.

An emergency stop switch must be installed outside the installation room (see also local regulations for Germany, TRGI 2018). The burner of heat generator must be able to be shutdown with this emergency stop switch at all times.

Combustion air vents		
Boiler size [kW]	Area per opening [cm²]	Number of openings [n]
350	400	2
400	450	2
500	550	2
620	670	2
2 x 350	750	2
2 x 400	850	2
2 x 500	1050	2
2 x 620	1290	2

Table 4 Combustion air openings during balanced flue operation

4.4 Testing and cleaning apertures

It must be possible to easily and safely inspect flue systems to ensure an unobstructed cross-section and also to clean them if necessary. For this, allow for inspection apertures.

When determining the arrangement of inspection/cleaning apertures, the relevant national and regional regulations, ordinances and guidelines in each case must be observed.
We recommend you consult your local chimney sweep.

▶ Follow applicable national and regional regulations, technical regulations and guidelines.

4.4.1 Arrangement of inspection apertures

- One inspection aperture is sufficient for flue gas routings up to 4 m in length tested together with the gas combustion equipment.
- The lower inspection aperture in the vertical flue section may be arranged as follows:
  - In the vertical flue section of the flue system immediately above the introduction of the connection piece **or**
  - In the side of the connection piece no more than 0.3 m away from the deflection in the vertical section of the flue system **or**
  - In the face of the straight joint, no more than 1 m away from the deflection in the vertical flue section.
- Flue systems that cannot be cleaned from the terminal must provide an additional top inspection aperture up to 5 m below the terminal. Vertical flue sections with a slope greater than 30° between the axis and the vertical must have an inspection aperture no more than 0.3 m from where they change direction.
- The upper inspection aperture can be omitted in vertical sections, provided that:
  - The vertical section of the flue system runs no more than once at a slope of up to 30° **and**
  - the lower inspection aperture is located no further than 15 m from the terminal.

4.5 Assembly of flue accessories

Trimming pipes

CAUTION

Risk of injury from sharp edges and burrs!

▶ Wear protective gloves.

▶ With concentric pipes, pull the inner pipe out of the outer pipe.

▶ Trim pipes at a right angle to the required length x. With concentric pipes, trim flue gas and air intake pipe to the same length.

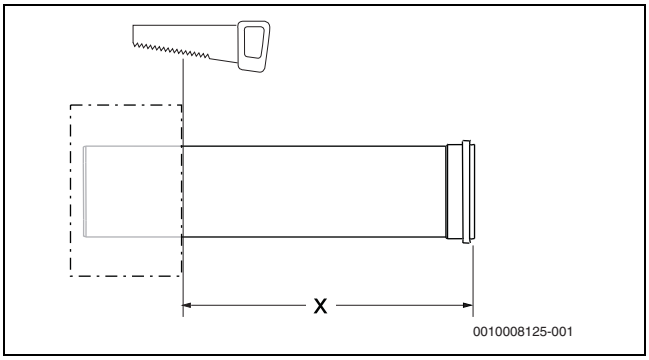

Fig. 1 Trimming pipes

▶ Carefully remove the burrs from cut edges.
For stainless steel pipes, we recommend that you paint the cut edges with a commercially-available touch-up paint stick.

▶ Put the flue gas and air intake pipes back together.

Installing the pipe connection

Assemble the pipes so that the female connection points in the direction of the flue gas stream.

▶ Only use original flue gas pipe gaskets from the manufacturer.

▶ Use the lubricating paste specified by the manufacturer of the flue accessories for the gaskets [1] at the female connections.

▶ Apply a thin coating of CENTROCERIN® lubricating paste (included in scope of delivery of connectors/elbows) to the gaskets at the flue gas connection of the floor standing boiler.

▶ Push the flue pipes [2] into one another as far as they will go, turning them slightly.
With concentric pipes, continue pushing the supply air pipe [3] in.
Verify that the gaskets did not shift.

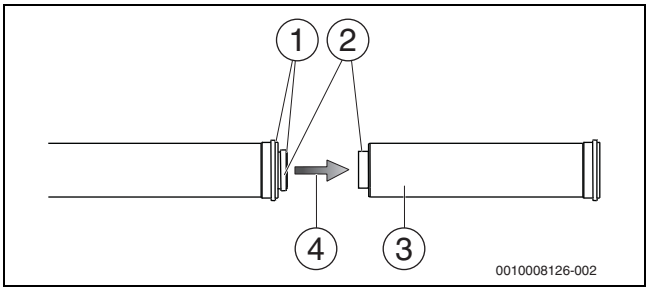

Fig. 2 Installing the pipe connection

[1] Gaskets
[2] Flue pipes (internal pipes)
[3] Supply air pipes (outer pipes)
[4] Direction of flue gas flow

▶ Make sure the flue system is adequately secured when installing horizontally/vertically and in the duct using the appropriate fixings. Observe manufacturer's instructions.

Loosening the pipe connection

▶ Pull the pipes apart, turning them slightly as you do so.

4.6 Roof clearances

4.6.1 Routing the flue gas through the roof

A clearance of 1 m between the termination of the flue accessories and the roof surface is sufficient.

- ▶ Comply with relevant national and regional regulations, ordinances and guidelines.

To maintain the minimum clearances above the roof, the external pipe of the roof outlet can be extended up to 500 mm with flue accessory “extension pipe”.

Flat roof

For distance X refer to IGE/UP/10 edition 4 figure 10A and 10B.

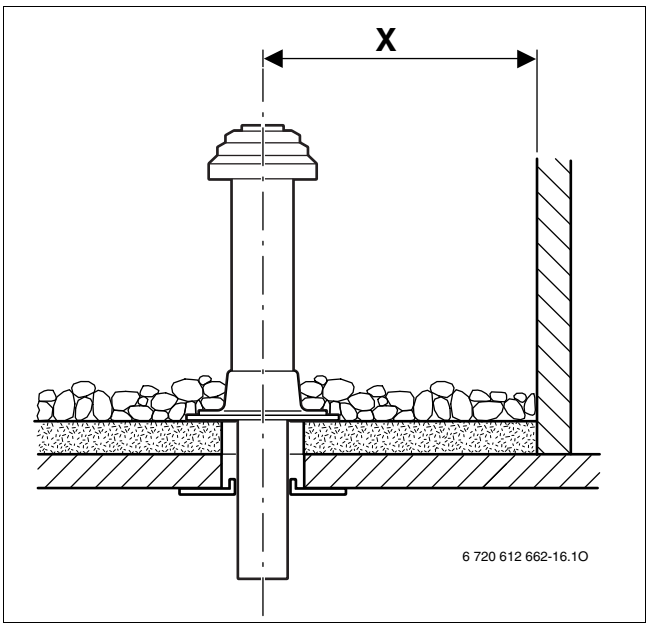

Fig. 3 Flat roof outlet

Pitched roof

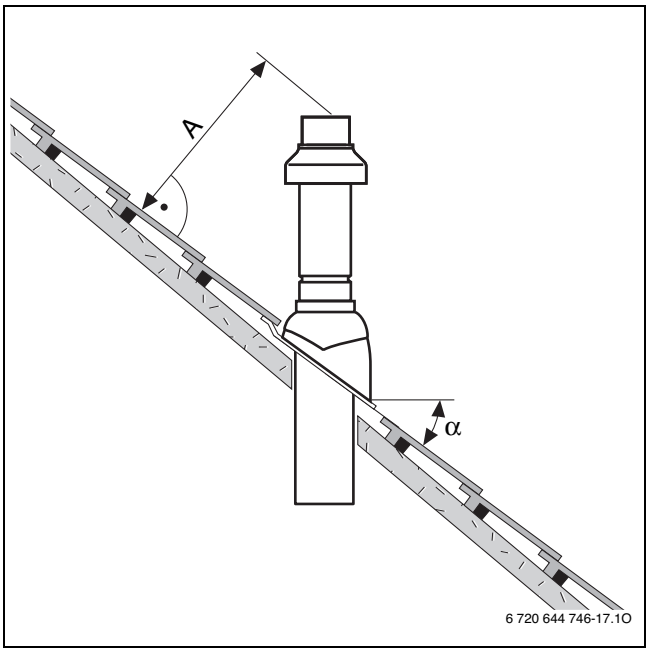

Fig. 4 Sloped roof outlet

The pitched roof tiles are only suitable for roof slopes between 25° and 45°.

4.7 Balanced flue on the external wall with basic accessories

The flue accessories can be extended at any point using flue accessories. The **inspection aperture** flue accessory can also be used.

A sample installation is shown in Fig. 17 on page 15.

4.8 Flue in a duct

4.8.1 Requirements for existing ducts

Observe country-specific requirements when installing flues in existing ducts.

Shafts made of non-combustible rigid materials with a fire rating of at least 90 minutes are generally suitable for the installation of flues.

Shafts for flues must not be used for any other purpose.

4.8.2 Requirements for routing flue pipes

- Only one item of combustion equipment may be connected to the flue accessories in the duct.
- If the flue accessory is installed inside an existing duct, any existing connection apertures may need to be tightly sealed using appropriate materials.
- The duct must be made from non-flammable, dimensionally-stable materials and offer a fire rating of at least 90 minutes. In buildings of low height, a fire resistance of 30 minutes is adequate.

4.8.3 Checking the permissible duct dimensions

Operation with rear-ventilated duct

During operation with rear ventilated duct and **Bosch / Centrotherm system flue system PP rigid** and with cascade operation with flue system manufactured by **Raab** observe the following prior to installation:

- ▶ Check whether the duct complies with the dimensions approved for the intended application. If the dimensions a_{min} or D_{min} are **undercut**, the installation is **impermissible** (→Fig. 5 and Tab. 5).

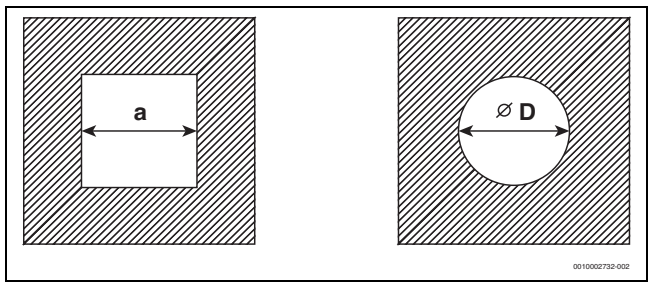

Fig. 5 Rectangular and round cross-section

Internal diameter	Female connection [mm]	Round duct D_{min} [mm]	Rectangular duct a_{min} [mm]
Ø 160	184	245	225 x 225
Ø 200	225	285	265 x 265
Ø 250	273	333	313 x 313

*Table 5 Duct dimensions for secondary ventilation with open flue operation (**manufactured by Centrotherm**)*

Internal diameter	Pipe Ø [mm]	Round duct D_{min} [mm]	Rectangular duct a_{min} [mm]
Ø 160	182	242	222 x 222

*Table 6 Duct dimensions for secondary ventilation of flexible pipes with open flue operation (**manufactured by Centrotherm**)*

Single-wall pipes in duct without clamp fitting (**manufactured Raab**)

Internal diameter	External female connection Ø [mm]	Round duct D_{min} [mm]	Rectangular duct a_{min} [mm]
Ø 200	208	268	248 x 248
Ø 250	258	318	298 x 298
Ø 300	308	368	348 x 348
Ø 350	358	418	398 x 398

*Table 7 Duct dimensions for secondary ventilation with open flue operation (**manufactured by Raab**)*

Double-wall pipes in duct with thermal insulation and clamp fitting (**manufactured by Raab**)

Internal diameter	External clamp fitting Ø [mm]	Round duct D_{min} [mm]	Rectangular duct a_{min} [mm]
Ø 200	271	331	311 x 311
Ø 250	321	381	361 x 361
Ø 300	371	431	411 x 411
Ø 350	421	481	461 x 461

*Table 8 Duct dimensions for secondary ventilation with open flue operation (**manufactured by Raab**)*

Operation with countercurrent flue system

Undercutting of the dimensions a_{min} (→Tab. 5) or D_{min} (→Tab. 5) is permitted with balanced flue operation (countercurrent), providing the function can be verified by means of calculations.

▶ In addition to the calculation, observe the minimum installation dimensions (→Tab. 9).

Minimum fitted dimensions for assembly (**manufactured by Centrotherm**)

Internal diameter	Square cross-section a	Circular cross-section D
Ø 160	200	200
Ø 200	240	240
Ø 250	293	293

*Table 9 Minimum fitted dimensions for assembly [mm] (**manufactured by Centrotherm**)*

Minimum fitted dimensions for assembly (including quick-release fastener of the clamp fitting; **manufactured by Raab**)

Internal diameter	External clamp fitting Ø [mm]	Round duct D_{min} [mm]	Rectangular duct a_{min} [mm]
Ø 200	302	362	342 x 342
Ø 250	352	412	392 x 392
Ø 300	402	462	442 x 442
Ø 350	452	512	492 x 492

*Table 10 Minimum fitted dimensions for assembly [mm] (**manufactured by Raab**)*

4.8.4 Cleaning existing ducts and chimneys

Flue gas routing in rear-ventilated duct

Cleaning is not required if the flue gas is routed inside a rear-ventilated duct (→ Fig. 14 and 15).

Countercurrent flue system

If the combustion air is routed in countercurrent through the duct (→ Fig. 19), the duct must be cleaned as follows:

Previous usage	Required cleaning
Ventilation duct	Thorough mechanical cleaning
Flue gas routing for gas combustion	Thorough mechanical cleaning
Flue gas routing for oil or solid fuel	Thorough mechanical cleaning, if necessary; sealing of surface to prevent vapour from residues (e.g. sulphur) in the brickwork permeating the combustion air

Table 11 Cleaning the duct

To avoid having to seal the surface:

▶ Opt for open flue operation.

-or-

▶ Draw in combustion air via a separate pipe from the outside.

4.8.5 Structural characteristics of the duct

Flue to the duct as single pipe (B_{23P})

- The flue must be rear-ventilated throughout the length of the duct.
- The entry aperture for the secondary ventilation (minimum 75 cm^2) must be provided at the installation location of the combustion equipment and be covered with an air grille.

5 Flue gas cascade

CO detector for emergency shutdown of the cascade

For cascades, a CO detector with volt free contact is required that alerts in event of CO escaping, and switches off the heating system.

- ▶ Observe the installation instructions of the CO detector used.
- ▶ Connect CO detector to cascade module (→ installation instructions of cascade module).
- ▶ When using products of other manufacturers for controlling the cascade: observe the details of manufacturer for connecting a CO detector.

5.1 Notice regarding cascade operation

Flue gas damper

The tight-closing motorised flue gas damper supplied with the cascade kit must be connected to the control unit (→ chapter 8.1).

In case of cascading, we recommend the use of the original accessory "Cascade". Cascading provided by the customer must be equipped with the same components. Each boiler requires a tight-closing, motorised flue gas damper that meets the tightness requirement according to EN 15502-2. Moreover, a CO detector must be installed in the installation room of the cascade.

5.2 Notes on operation and dimensioning requirements for the flue system

Depending on the dimensioning according to EN13384 or the specifications in this document, excessive pressure may arise in the flue system. The Condens GC7000FP product line, overpressure may arise in the flue both in single boilers and also cascades in two-boiler mode. If the flue system is routed through occupied rooms, the entire length of the flue must be installed in a duct as rear-ventilated system. The duct must be compliant with the relevant national and regional conditions of the FeuVO [Germany] or the country-specific technical regulations.

- Cascade (with flue gas damper)
  - The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

DANGER

Risk to life from escaping flue gas inside at the installation location!

- ▶ Ensure that the seal in the flue gas connection on the condensation catch pan is fitted, undamaged and correctly inserted.

DANGER

Risk to life through toxic exhaust gases escaping.

- ▶ Check all joints in the flue system to ensure they are correctly made, secured and sealed.

6 Fitted dimensions (in mm)

6.1 Single boiler (GC7000-350...620)

When determining the installation location, take the clearances for the flue gas routing and the connection pipe assembly into consideration (→ Fig. 6).

Where applicable, allow extra wall clearances for additional components, for example DHW cylinder, pipe connections or other components on the flue gas side.

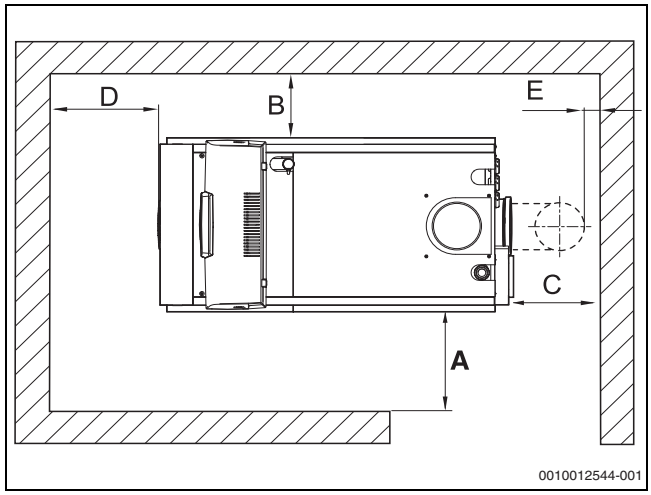

Fig. 6 Wall clearances at the installation location (right-hand version)

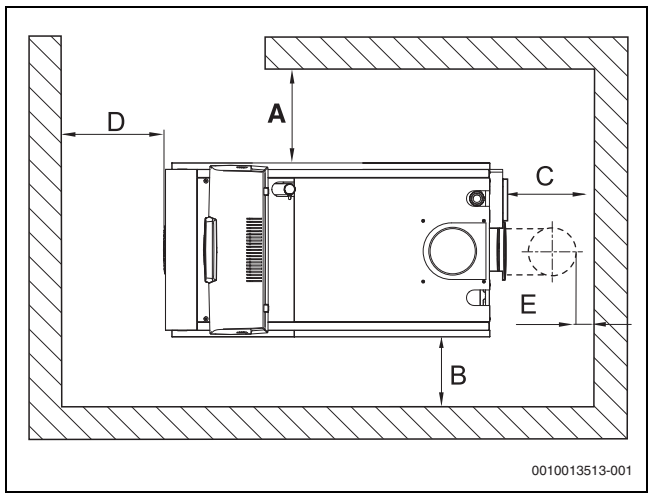

Fig. 7 Wall clearances at the installation location (left-hand version)

Dimension	Wall clearance [mm]	
	Minimum	recommended
A	600	1000
B	100	400
C[1)]	–	–
D; 350 / 400 kW	900	1100
D; 500 / 620 kW	1100	1300
E[1)]	150	400

1) This clearance depends on the installed flue system.

Table 12 Recommended and minimum wall clearances

6.2 2-boiler cascade (GC7000-700...1240)

6.2.1 Wall clearances when mounted behind the boiler

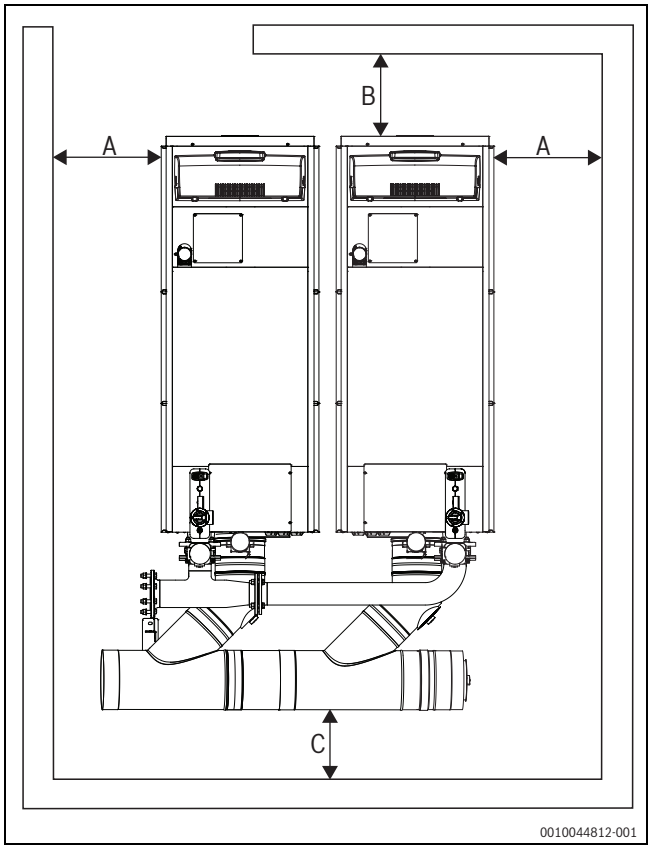

Fig. 8 Wall clearances GC7000-700...1240 – 2-boiler cascade (behind the boiler)

Dimension	minimum [mm]	recommended [mm]
A	600	1000
B; 2 x 350 / 2 x 400	900	1100
B; 2 x 500 / 2 x 620	1100	1300
C	100	200

Table 13 Wall clearances GC7000-700...1240 – 2-boiler cascade (behind the boiler)

6.2.2 Wall clearances when mounted above the boiler

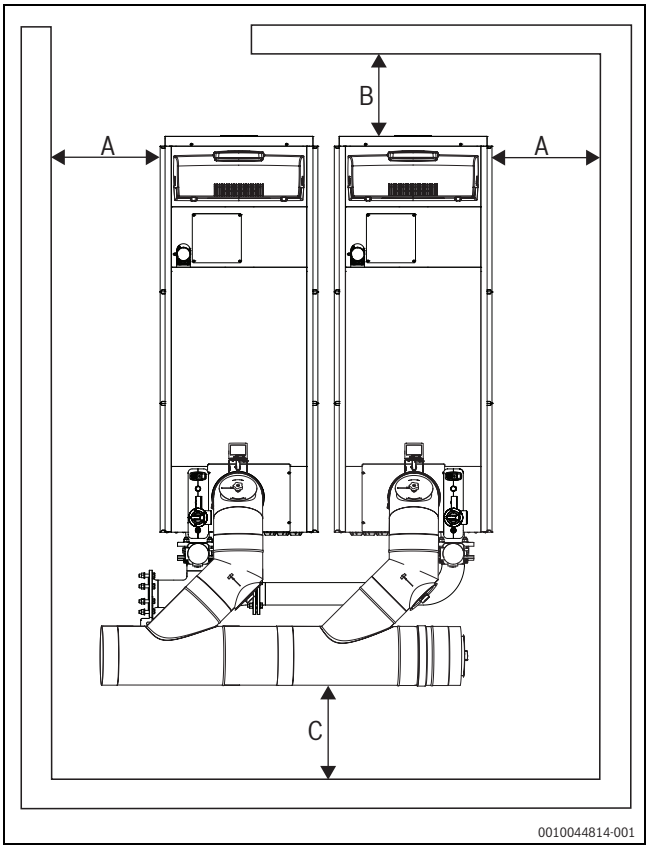

Fig. 9 Wall clearances GC7000-700...1240 – 2-boiler cascade (above the boiler)

Dimension	minimum [mm]	recommended [mm]
A	600	1000
B; 2 x 350 / 2 x 400	900	1100
B; 2 x 500 / 2 x 620	1100	1300
C	100	200

Table 14 Wall clearances GC7000-700...1240 – 2-boiler cascade (above the boiler)

6.2.3 Installation dimensions of different cascade variants (Example based on the ratings 700...1240 kW)

Cascade behind the boiler

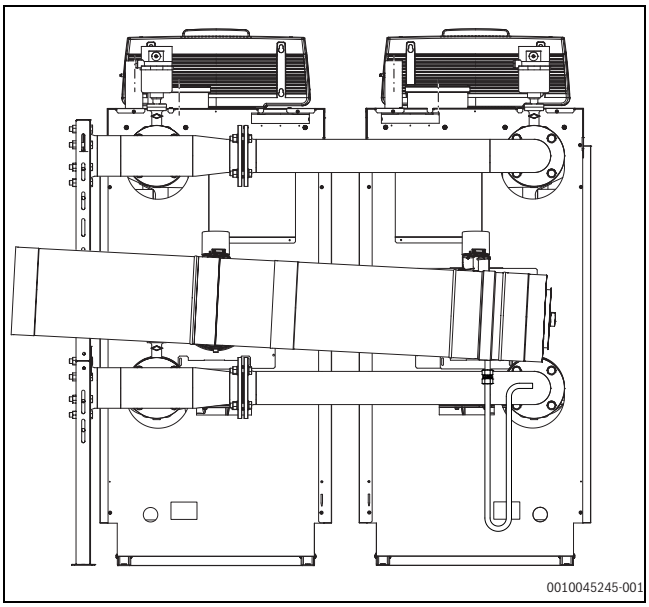

Fig. 10 2-boiler cascade behind the boiler (rear view)

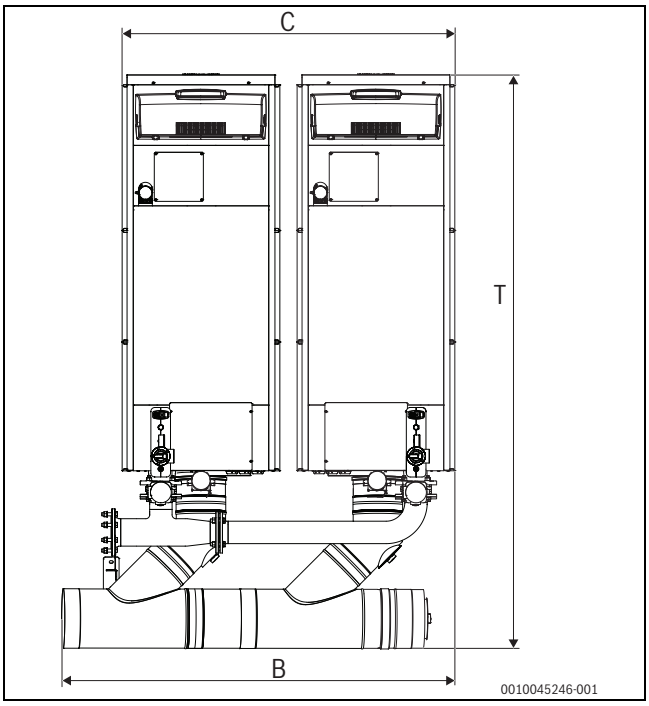

Fig. 11 2-boiler cascade behind the boiler (top view)

	Boiler rating, 2-boiler cascade [kW]			
	2 x 350	2 x 400	2 x 500	2 x 620
Dimension [mm]				
H (without foot screws)	1822			
C	1695			
B	2003			
T	2763			

Table 15 2-boiler cascade behind the boiler

Cascade above the boiler

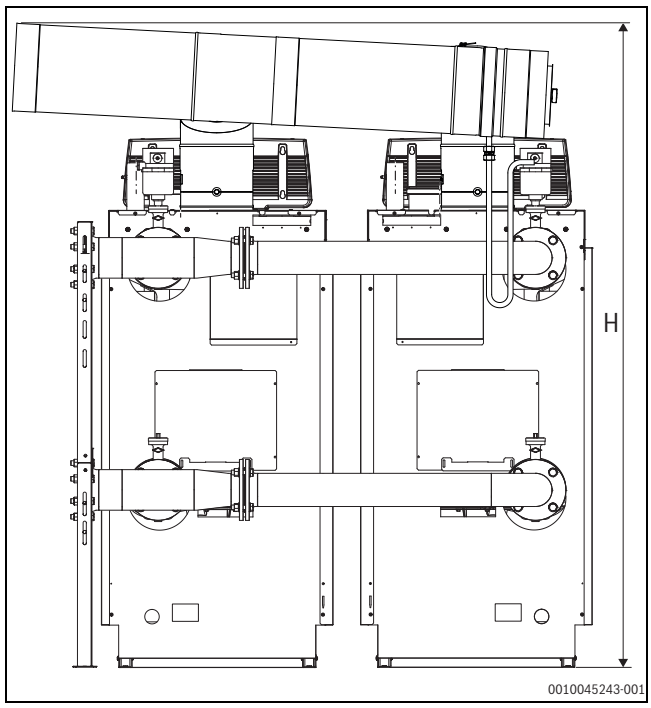

Fig. 12 2-boiler cascade above the boiler (rear view)

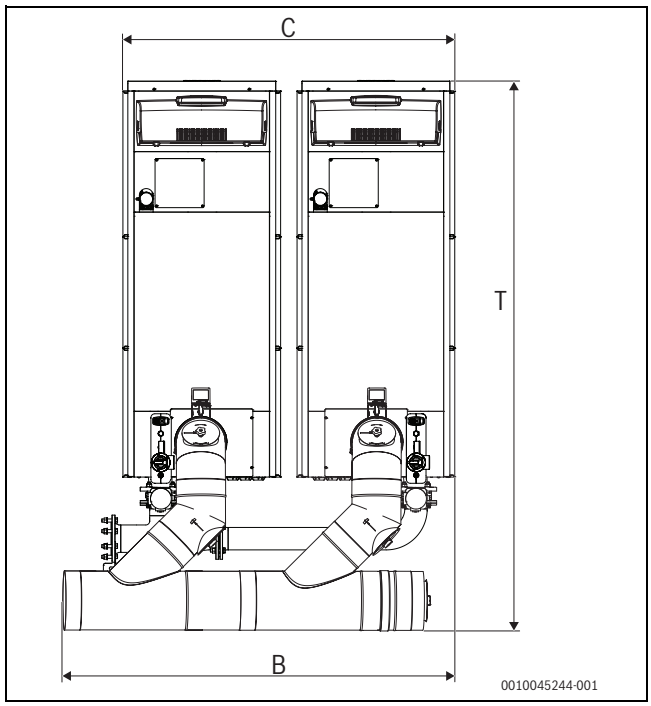

Fig. 13 2-boiler cascade above the boiler (top view)

	Boiler rating, 2-boiler cascade [kW]			
	2 x 350	2 x 400	2 x 500	2 x 620
Dimension [mm]				
H (including foot screws)	2293			
C	1695			
B	2003			
T	2618			

Table 16 2-boiler cascade above the boiler

7 Flue length

7.1 General description

Floor standing condensing boilers are fitted with a fan that transports the flue gases into the flue. The pressure drop inside the flue decelerates the flue gases.

The flues must not exceed a specific length to ensure the flue gases are reliably discharged into the open air. For this purpose, a calculation according to EN 13384 shall be carried out using the data for the single boiler from the technical documentation.
Please observe national, regional, and local guidelines and regulations.

We recommend the use of original accessories offered by Bosch for the flue systems described in these instructions.

For the sake of simplicity, the following standard flue gas routings have been calculated for operating temperatures 80/60 °C.
If the system used and flue gas routing matches the setup described and the specifications, the calculation can be omitted.

When carrying out your own calculations for single boilers, consider the residual head of the fan of 200 Pa for cascade 120 Pa for.

7.2 Flue systems for open flue operation

7.2.1 Routing of open flue through a duct according to B23p

Variant 1

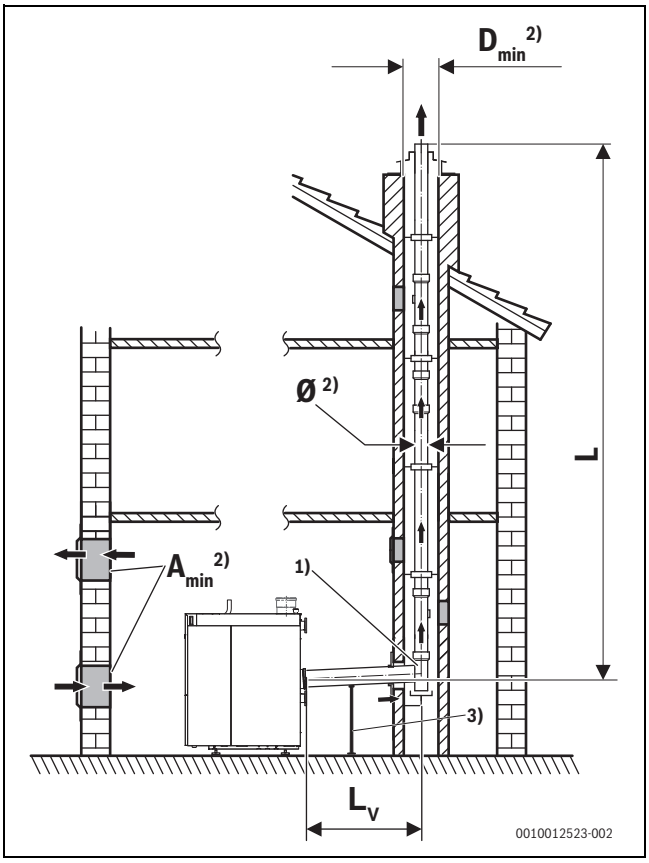

Fig. 14 Routing the flue through a duct, variant 1

[1)] Support bend in the duct
[2)] → Chapter 4
[3)] Support/fastening

L_V Length of connection piece
L Vertical pipe length

Routing of open flue through a duct according to B_{23P} (operating temperature 80/60 °C), Variant 1[1)]								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2)]**	**DN200[2)]**	**DN250[2)]**	**DN300[2)]**	**DN350[2)]**
Single boiler	350	DN250	–	20	50	50	–	–
	400	DN250	–	12	50	50	–	–
	500	DN250	–	–	43	50	–	–
	620	DN250	–	–	22	50	–	–
2-boiler cascade [3)4)]	2 x 350	DN250	DN300	–	5	50	50	–
	2 x 400	DN250	DN300	–	–	34	50	–
	2 x 500	DN250	DN300	–	–	11	50	–
	2 x 620	DN250	DN300	–	–	–	31	50

1) Basis for calculation: overall length of the connection piece $L_V \leq 1.5$ m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 17 Pipe lengths L [m] with open flue routed through a duct (single boiler and cascade, variant 1)

Variant 2

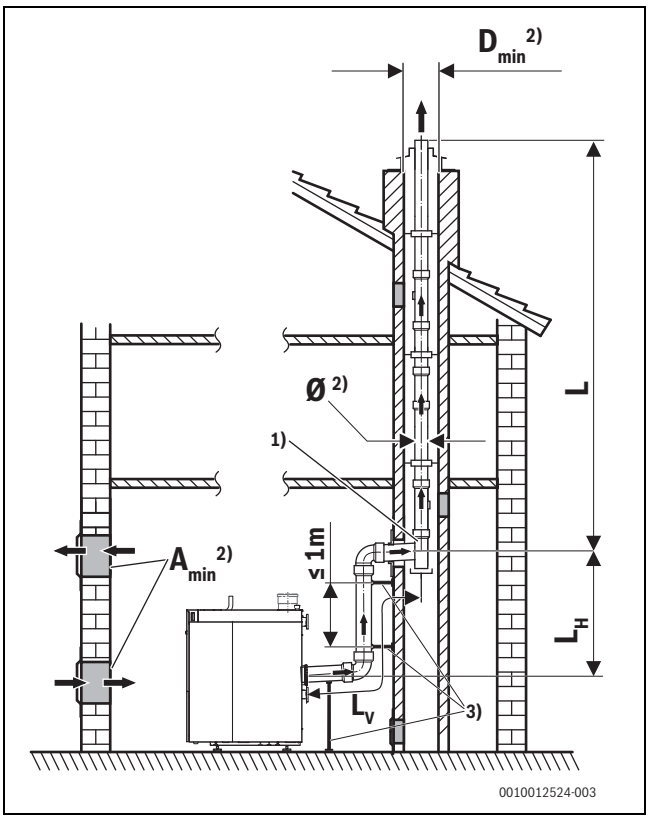

Fig. 15 Routing the flue through a duct, variant 2

[1)] Support bend in the duct
[2)] → Chapter 4
[3)] Support/fastening

L_V Length of connection piece
L Vertical pipe length
L_H Effective height of connection piece

Routing of open flue through a duct according to B_{23P} (operating temperature 80/60 °C) – Variant 2[1)]								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2)]**	**DN200[2)]**	**DN250[2)]**	**DN300[2)]**	**DN350[2)]**
Single boiler	350	DN250	–	15	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	37	50	–	–
	620	DN250	–	–	16	50	–	–
2-boiler cascade [3)4)]	2 x 350	DN250	DN300	–	4	50	50	–
	2 x 400	DN250	DN300	–	–	30	50	–
	2 x 500	DN250	DN300	–	–	7	50	–
	2 x 620	DN250	DN300	–	–	–	18	50

1) Basis for calculation: overall length of the connection piece $L_V \leq$ 2.5 m; effective height of the connection piece $L_H \leq$ 1.5 m; 2 x 87° elbow; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 18 Pipe lengths L [m] with open flue routed through a duct (variant 2)

7.2.2 Open flue routed without duct according to B23p

Variant 3

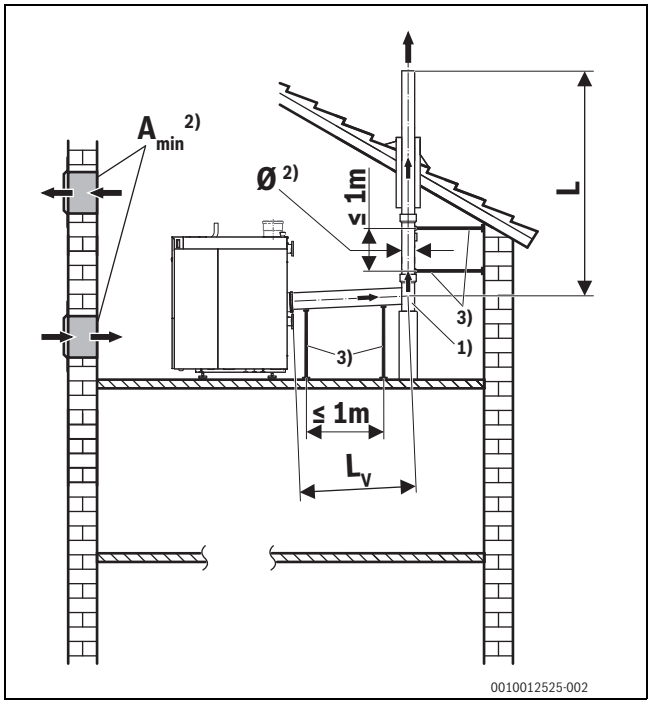

Fig. 16 Flue gas routing without duct, central roof system, variant 3

[1)] Support bend
[2)] → Chapter 4
[3)] Support/fastening

L_V Length of connection piece
L Vertical pipe length

Routing of open flue through a duct according to B_{23P} (operating temperature 80/60 °C) – Variant 3[1)]								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2)]**	**DN200[2)]**	**DN250[2)]**	**DN300[2)]**	**DN350[2)]**
Single boiler	350	DN250	–	20	50	50	–	–
	400	DN250	–	12	50	50	–	–
	500	DN250	–	–	43	50	–	–
	620	DN250	–	–	22	50	–	–
2-boiler cascade [3)4)]	2 x 350	DN250	DN300	–	8	50	50	–
	2 x 400	DN250	DN300	–	–	37	50	–
	2 x 500	DN250	DN300	–	–	14	50	–
	2 x 620	DN250	DN300	–	–	–	36	50

1) Basis for calculation: overall length of the connection piece $L_V \leq 1.5$ m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 19 Pipe lengths L [m] with open flue routed without a duct (variant 3)

Variant 4

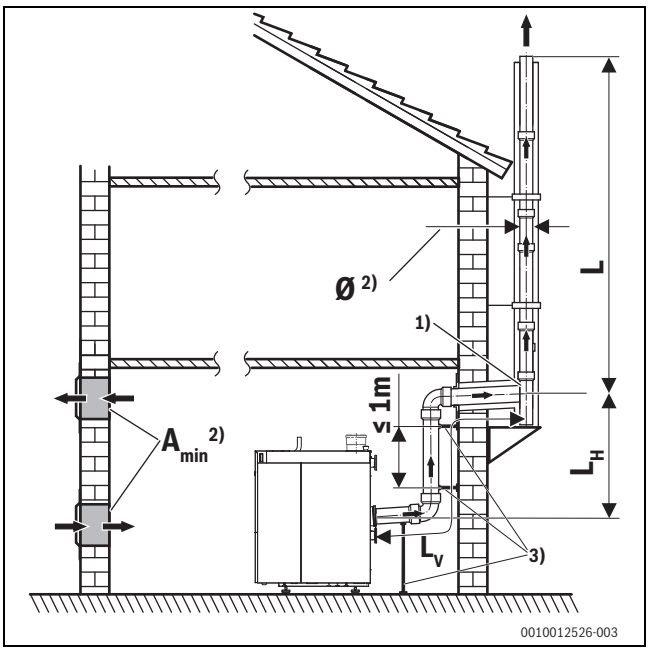

Fig. 17 Flue gas routing without duct, variant 4

[1)] Support bend
[2)] → Chapter 4
[3)] Support/fastening

L_V Length of connection piece
L Vertical pipe length
L_H Effective height of connection piece

Routing of open flue through a duct according to B_{23P} (operating temperature 80/60 °C) – Variant 4[1)]								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2)]**	**DN200[2)]**	**DN250[2)]**	**DN300[2)]**	**DN350[2)]**
Single boiler	350	DN250	–	15	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	35	50	–	–
	620	DN250	–	–	15	50	–	–
2-boiler cascade [3)4)]	2 x 350	DN250	DN300	–	4	50	47	–
	2 x 400	DN250	DN300	–	–	31	47	–
	2 x 500	DN250	DN300	–	–	7	50	–
	2 x 620	DN250	DN300	–	–	–	18	50

1) Basis for calculation: overall length of the connection piece $L_V \leq$ 2.5 m; effective height of the connection piece $L_H \leq$ 1.5 m; 2 x 87° elbow; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 20 Pipe lengths L [m] with open flue routed without a duct (variant 4)

7.2.3 Routing of open flue with offset according to B23p

Integrating an offset into the vertical part of the flue system as shown in the illustration below changes the useful lengths of the variants with the same boundary conditions for operating temperature 80/60 as follows.

Maximum of 1 offset permitted.

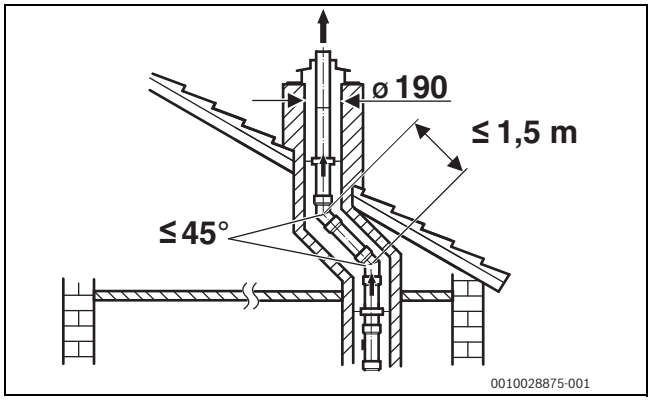

Fig. 18 Offset dimensions for variants 5 – 8

Variant 5

Routing of open flue according to B_{23P} (operating temperature 80/60 °C) – Variant 5[1] (same as variant 1, with offset →Fig. 18)								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2]**	**DN200[2]**	**DN250[2]**	**DN300[2]**	**DN350[2]**
Single boiler	350	DN250	–	15	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	36	50	–	–
	620	DN250	–	–	15	50	–	–
2-boiler cascade [3][4]	2 x 350	DN250	DN300	–	–	50	50	–
	2 x 400	DN250	DN300	–	–	24	50	–
	2 x 500	DN250	DN300	–	–	–	50	–
	2 x 620	DN250	DN300	–	–	–	15	50

1) Basis for calculation: overall length of the connection piece $L_V \leq 1.5$ m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) With conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 21 Pipe lengths L [m] with open flue routed through a duct (variant 5)

Variant 6

Routing of open flue according to B_{23P} (operating temperature 80/60 °C) – Variant 6[1] (same as variant 2, with offset →Fig. 18)								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2]**	**DN200[2]**	**DN250[2]**	**DN300[2]**	**DN350[2]**
Single boiler	350	DN250	–	10	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	30	50	–	–
	620	DN250	–	–	9	50	–	–
2-boiler cascade [3][4]	2 x 350	DN250	DN300	–	–	48	50	–
	2 x 400	DN250	DN300	–	–	19	50	–
	2 x 500	DN250	DN300	–	–	–	50	–
	2 x 620	DN250	DN300	–	–	–	–	50

1) Basis for calculation: overall length of the connection piece $L_V \leq 2.5$ m; effective height of the connection piece $L_H \leq 1.5$ m; 2 x 87° elbow; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.

2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.

3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.

4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 22 Pipe lengths L [m] with open flue routed through a duct (variant 6)

Variant 7

Routing of open flue according to B_{23P} (operating temperature 80/60 °C) – Variant 7[1] (same as variant 3, central roof system, with offset →Fig. 18)								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN160[2]**	**DN200[2]**	**DN250[2]**	**DN300[2]**	**DN350[2]**
Single boiler	350	DN250	–	15	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	36	50	–	–
	620	DN250	–	–	15	50	–	–
2-boiler cascade [3][4]	2 x 350	DN250	DN300	–	–	50	50	–
	2 x 400	DN250	DN300	–	–	27	50	–
	2 x 500	DN250	DN300	–	–	–	50	–
	2 x 620	DN250	DN300	–	–	–	21	50

1) Basis for calculation: overall length of the connection piece $L_V \leq$ 1.5 m; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.
2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.
3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.
4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 23 Pipe lengths L [m] with open flue routed without a duct (variant 7)

Variant 8

Routing of open flue according to B_{23P} (operating temperature 80/60 °C) – Variant 8[1] (same as variant 4, façade system, with offset →Fig. 18)								
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Flue gas connection, collector**	**DN110[2]**	**DN200[2]**	**DN250[2]**	**D300[2]**	**D350[2]**
Single boiler	350	DN250	–	10	50	50	–	–
	400	DN250	–	–	50	50	–	–
	500	DN250	–	–	28	50	–	–
	620	DN250	–	–	8	50	–	–
2-boiler cascade [3][4]	2 x 350	DN250	DN300	–	–	50	47	–
	2 x 400	DN250	DN300	–	–	20	47	–
	2 x 500	DN250	DN300	–	–	–	50	–
	2 x 620	DN250	DN300	–	–	–	–	50

1) Basis for calculation: overall length of the connection piece $L_V \leq$ 2.5 m; effective height of the connection piece $L_H \leq$ 1.5 m; 2 x 87° elbow; with cascades, this is the length of the connection piece starting from the collector. The connection pieces from the boiler to the collector are taken into account in the scope of delivery. The specified length takes the support bend into account.
2) Single boiler: with conical adapter directly at flue gas connection of boiler if required.
Cascade: with adapter directly before support bend if required.
3) The accessories set "Cascade" contains two motor-driven tight-closing flue gas dampers as reverse flow safeguard.
4) To reach the maximum installation height, depending on the combination of shaped parts and the system (single wall or double wall) intermediate connectors may need to be installed (→chapter 3.3).

Table 24 Pipe lengths L [m] with open flue routed without a duct (variant 8)

7.3 Flue gas systems for open-flue mode

7.3.1 Balanced flue routed in duct

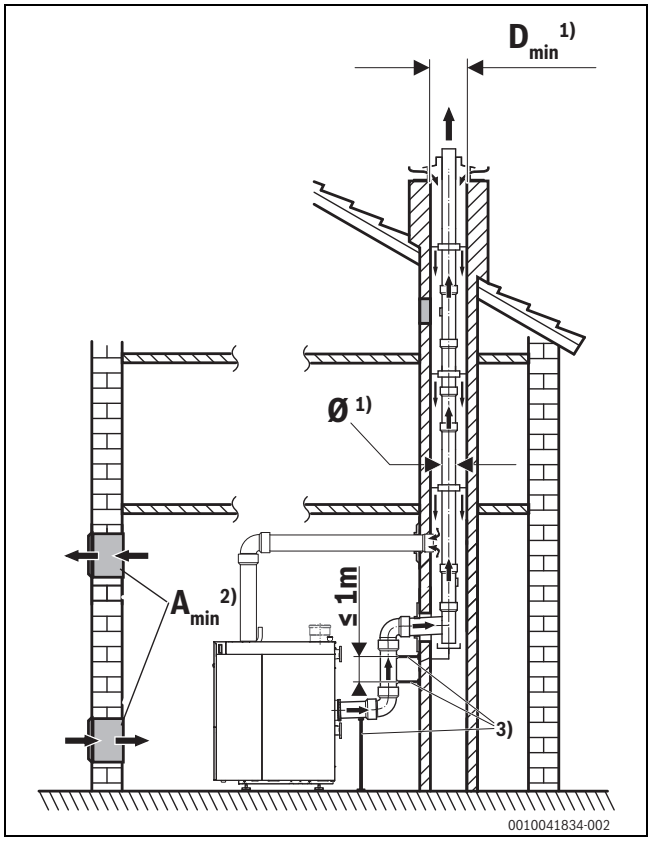

Fig. 19 Countercurrent in duct

[1)] → Chapter 4
[2)] →Chapter 4.8.5
[3)] Support/fastening

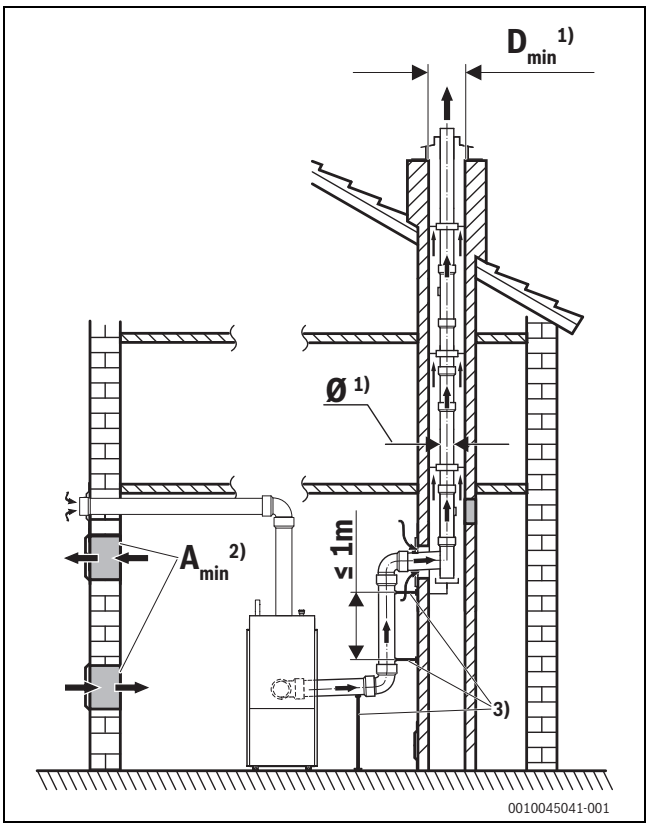

Fig. 20 Separate pipe routing

[1)] → Chapter 4
[2)] → Chapter 4.8.5
[3)] Support/fastening

A calculation according to EN 13384 is required. Observe country-specific regulations and guidelines.

7.3.2 Routing of balanced flue according to C53

Variant 1

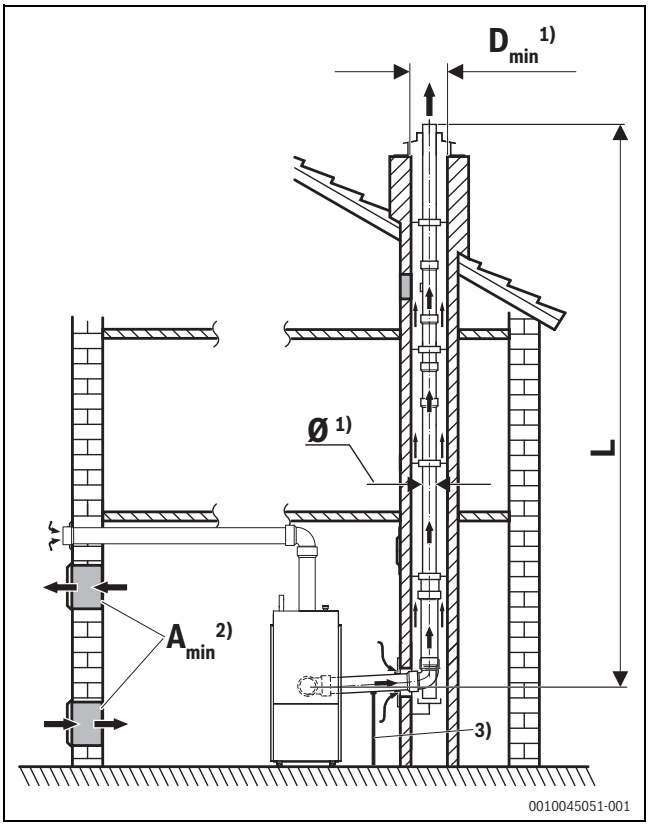

Fig. 21 Effective height of flue, in duct, variant 1

[1)] → Chapter 4
[2)] → Chapter 4.8.5
[3)] Support/fastening

Balanced flue routed through a duct according to C_{53} (operating temperature 80/60 °C) – Variant 1[1)]						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2)]**	**DN160[3)]**	**DN200[3)]**	**DN250[3)]**
Single boiler	350	DN250	DN200	18	50	50
	400	DN250	DN200	10	50	50
	500	DN250	DN200	–	34	50
	620	DN250	DN200	–	14	50

1) Basis for calculation: overall length of connection piece ≤ 1.5 m.
The specified length takes the support bend into account: with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.

3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 25 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 2

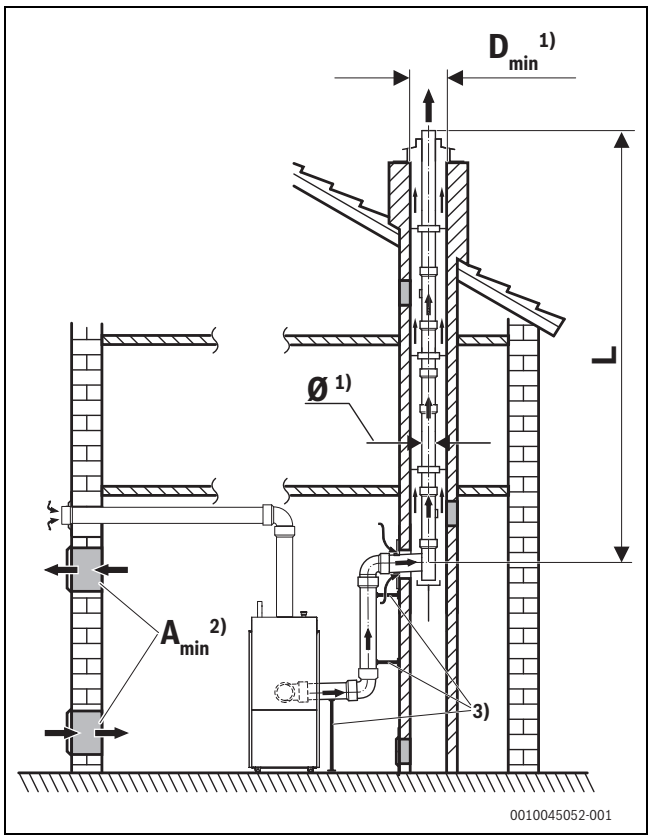

Fig. 22 Effective height of flue, in duct, variant 2

[1)] → Chapter 4
[2)] → Chapter 4.8.5 "Structural characteristics of the duct"
[3)] Support/fastening

Balanced flue routed through a duct according to C_{53} (operating temperature 80/60 °C) – Variant 2[1)]						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2)]**	**DN160[3)]**	**DN200[3)]**	**DN250[3)]**
Single boiler	350	DN250	DN200	13	50	50
	400	DN250	DN200	–	43 or 50?	50
	500	DN250	DN200	–	28	50
	620	DN250	DN200	–	7	50

1) Basis for calculation: overall length of connection piece ≤ 2.5 m; effective height of connecting ≤ 1.5 m 2 x 87° elbow.The specified length takes the support bend into account: with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.

3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 26 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 3

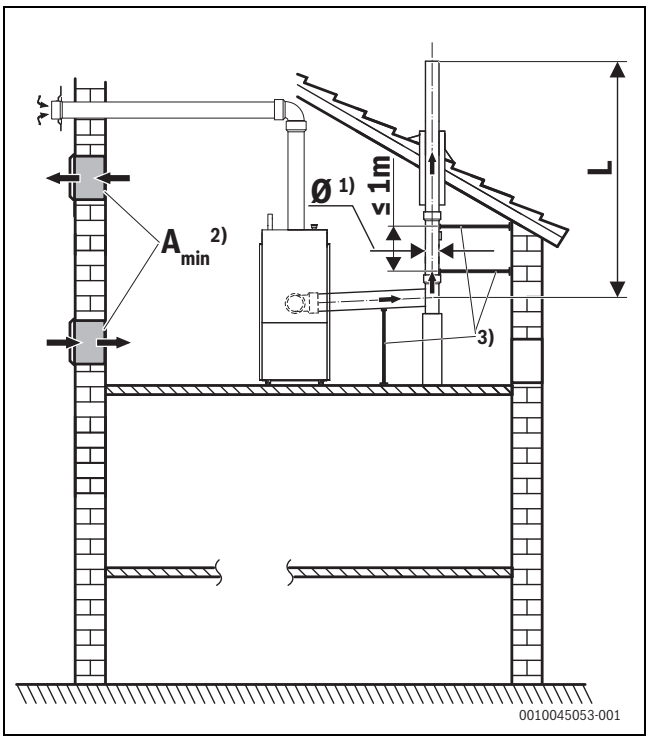

Fig. 23 Effective height of flue, without duct, central roof system, variant 3

[1)] → Chapter 4
[2)] → Chapter 4.8.5
[3)] Support/fastening

Routing of balanced flue according to C_{53}, central roof system (operating temperature 80/60 °C – Variant 3[1)]						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2)]**	**DN160[3)]**	**DN200[3)]**	**DN250[3)]**
Single boiler	350	DN250	DN200	18	50	50
	400	DN250	DN200	10	50	50
	500	DN250	DN200	–	35	50
	620	DN250	DN200	–	14	50

1) Basis for calculation: overall length of connection piece ≤ 1.5 m.The specified length takes the support bend into account: with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.

3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 27 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 4

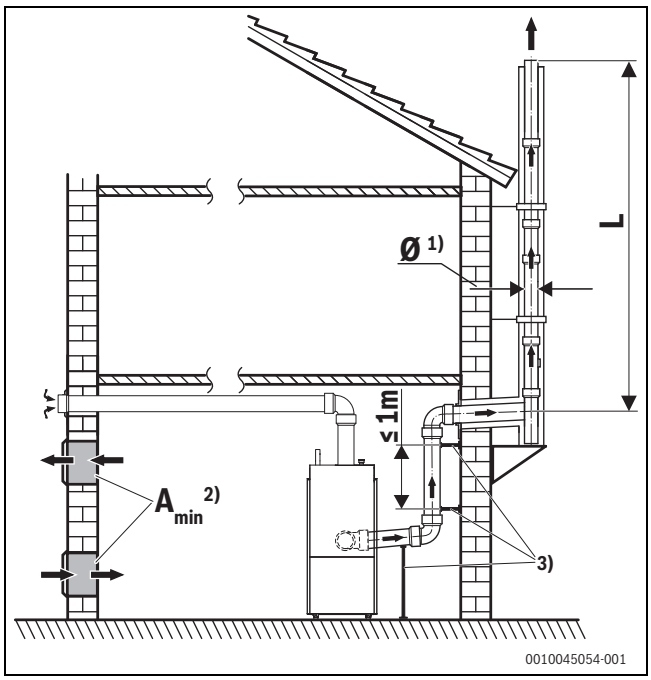

Fig. 24 Effective height of flue, without duct, facade system, variant 4

[1)] → Chapter 4
[2)] → Chapter 4.8.5
[3)] Support/fastening

Routing of balanced flue according to C_{53}, façade system (operating temperature 80/60 °C) – Variant 4[1)]						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2)]**	**DN160[3)]**	**DN200[3)]**	**DN250[3)]**
Single boiler	350	DN250	DN200	13	50	50
	400	DN250	DN200	–	50	50
	500	DN250	DN200	–	27	50
	620	DN250	DN200	–	7	50

1) Basis for calculation: total length of the connection piece ≤ 2.5 m; effective height of the connection line ≤ 1.5 m; 2 x 87° elbow. The length stated takes the support bend into account; with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.

3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 28 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 5 (same as variant 1, but with offset)

Balanced flue routed through a duct according to C_{53} (operating temperature 80/60 °C) – Variant 5[1] (same as variant 1, with offset →Fig. 18)						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2]**	**DN160[3]**	**DN200[3]**	**DN250[3]**
Single boiler	350	DN250	DN200	13	50	50
	400	DN250	DN200	–	50	50
	500	DN250	DN200	–	27	50
	620	DN250	DN200	–	6	50

1) Basis for calculation: overall length of connection piece ≤ 1.5 m.The specified length takes the support bend into account: with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.
2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.
3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 29 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 6 (same as variant 2, but with offset)

Balanced flue routed through a duct according to C_{53} (operating temperature 80/60 °C) – Variant 6[1] (same as variant 2, with offset →Fig. 18)						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2]**	**DN160[3]**	**DN200[3]**	**DN250[3]**
Single boiler	350	DN250	DN200	8	50	50
	400	DN250	DN200	–	50	50
	500	DN250	DN200	–	21	50
	620	DN250	DN200	–	–	50

1) Basis for calculation: total length of the connection piece ≤ 2.5 m; effective height of the connection line ≤ 1.5 m; 2 x 87° elbow. The length stated takes the support bend into account; with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.
2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.
3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 30 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 7 (same as variant 3, but with offset)

Routing of open flue according to C_{53}, central roof system (operating temperature 80/60 °C) – Variant 7[1] (same as variant 3, with offset →Fig. 18)						
Boiler variant	**Boiler size [kW]**	**Ø Flue gas connection, boiler**	**Ø Boiler supply air connection[2]**	**DN160[3]**	**DN200[3]**	**DN250[3]**
Single boiler	350	DN250	DN200	13	50	50
	400	DN250	DN200	–	50	50
	500	DN250	DN200	–	27	50
	620	DN250	DN200	–	6	50

1) Basis for calculation: overall length of connection piece ≤ 1.5 m.The specified length takes the support bend into account: with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.
2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.
3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 31 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

Variant 8 (same as variant 4, but with offset)

Routing of open flue according to C_{53}, façade system (operating temperature 80/60 °C) – Variant 8[1] (same as variant 4, with offset →Fig. 18)						
Boiler variant	Boiler size [kW]	Ø Flue gas connection, boiler	Ø Boiler supply air connection[2]	DN160[3]	DN200[3]	DN250[3]
Single boiler	350	DN250	DN200	8	50	50
	400	DN250	DN200	–	50	50
	500	DN250	DN200	–	19	50
	620	DN250	DN200	–	–	50

1) Basis for calculation: total length of the connection piece ≤ 2.5 m; effective height of the connection line ≤ 1.5 m; 2 x 87° elbow. The length stated takes the support bend into account; with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 1.5 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: 2 × 90° elbows and 2 m length, executed with plain-ended PP pipes with the diameter of the supply air connection The permissible flue length of long supply air pipes reduces by 1.5 m per 1 m additional length of supply air connection. The maximum extended length of the supply air connection is 6 m.

3) Single boiler: with conical adapter directly at flue gas connection of boiler if required.

Table 32 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{53}):
45°: 1.5 m
87°: 2.5 m

7.3.3 Routing of balanced flue according to C93

Variant 1

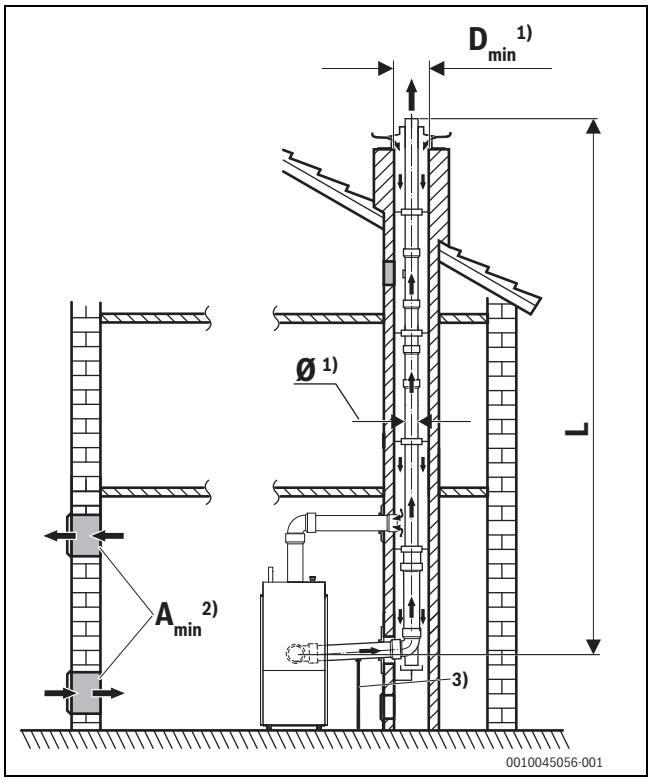

Fig. 25 Effective height of flue, in duct, variant 1

[1)] → Chapter 4
[2)] $A_{min} \geq 150\ cm^2$ (or 2 × 75 cm^2)
[3)] Support/fastening

Balanced flue routed through a duct according to C_{93} (operating temperature 80/60 °C) – Variant 1[1]							
Boiler variant	Boiler size [kW]	Ø Flue gas connection, boiler	Ø Boiler supply air connection[2]	Duct cross-section [mm]	DN160[3]	DN200	DN250
Single boiler	350	DN250	DN200	225 × 225	6	–	–
				250 × 250	11	11	–
				300 × 300	16	45	28
				350 × 350	17	50	50
				400 × 400	18	50	50
	400	DN250	DN200	250 × 250	6	7	–
				300 × 300	9	31	19
				350 × 350	10	45	50
				400 × 400	11	50	50
	500	DN250	DN200	250 × 250	–	–	–
				300 × 300	–	14	9
				350 × 350	–	22	46
				400 × 400	–	25	50
	620	DN250	DN200	250 × 250	–	–	–
				300 × 300	–	4	4
				350 × 350	–	7	27
				400 × 400	–	8	50

1) Basis for calculation: overall length of connection piece ≤ 1.5 m. The length stated takes the support bend into account; with longer connection pieces up to 5 m the length of the permissible flue pipe reduces by 2 m for each additional 1 m connection piece.

2) Basis for calculation of the supply air connection: length corresponds to connection line, executed with plain-ended PP pipes with the diameter of the supply air connection.

3) For single boilers, if required, with conical adapter directly on the flue gas connection of the boiler. Flue gas lengths are specified with reference to the specified duct cross-section.

Table 33 Internal diameter and maximum permissible effective height L of flues according to the requirements of DIN EN 13381-1

Length deduction for additional elbows in the flue system
(flue lengths C_{93}):
45°: 1 m
87°: 2 m

7.4 Cascades (with motor-operated flue gas dampers)

The following table applies for boiler installation variant in combination with the cascade set.

Individual connection pieces per boiler										
Boiler variant	Setup variant	Boiler size [kW]	Internal diameter of boiler connection line DN_V [mm]	Internal diameter of shared boiler connection line DN_G [mm]	Long shared horizontal boiler connection line L_{HG} [mm]	Effective height of boiler connection line L_{HV} [mm]	Extended length of boiler connection line L_V [mm]	Individual resistance 87 ° elbow	Individual resistance 45 ° elbow	Tee junction 45 °
Cascade	above the boiler	2x 350	250	300	1250	460	1460	1	1	1
		2x 400	250	300	1250	460	1460	1	1	1
		2x 500	250	300	1250	460	1460	1	1	1
		2x 620	250	300	1250	460	1460	1	1	1
	behind the boiler	2x 350	250	300	1250	–	1005	–	1	1
		2x 400	250	300	1250	–	1005	–	1	1
		2x 500	250	300	1250	–	1005	–	1	1
		2x 620	250	300	1250	–	1005	–	1	1

Table 34 Dimensions of individual connection pieces (for the following figures 26, and 27)

7.4.1 Setup accessories set "Cascades"

Cascade for individual boiler sizes 350 – 620 kW (flue gas collector behind the boiler; DN 300)

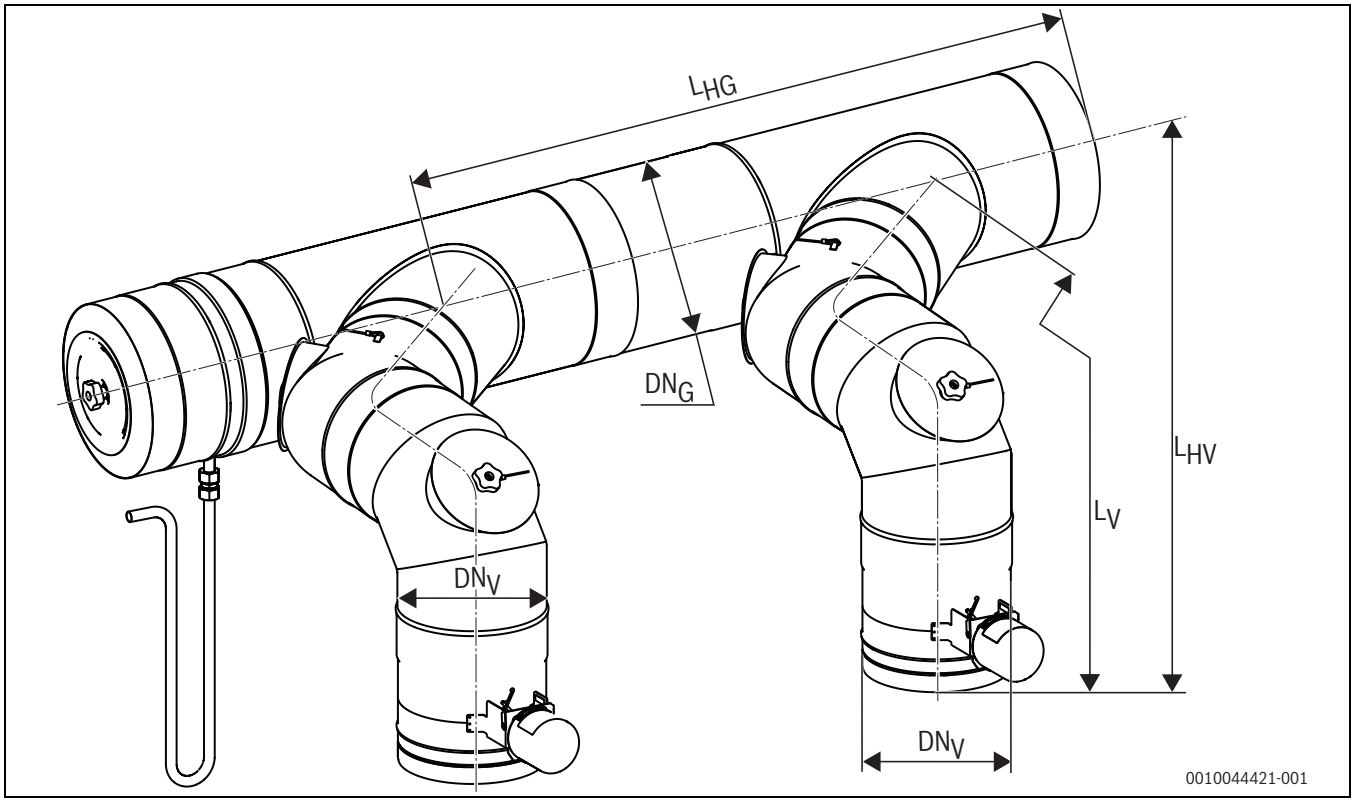

Fig. 26 Cascade setup above the boiler (example; individual boiler size 350 – 620 kW)

DN_V Internal diameter of boiler connection line
DN_G Internal diameter of shared boiler connection line
L_{HG} Length of shared horizontal boiler connection line
L_{HV} Effective height of boiler connection line
L_V Extended length of boiler connection line

Cascade for individual boiler sizes 350 – 620 kW (flue gas collector behind the boiler; DN 300)

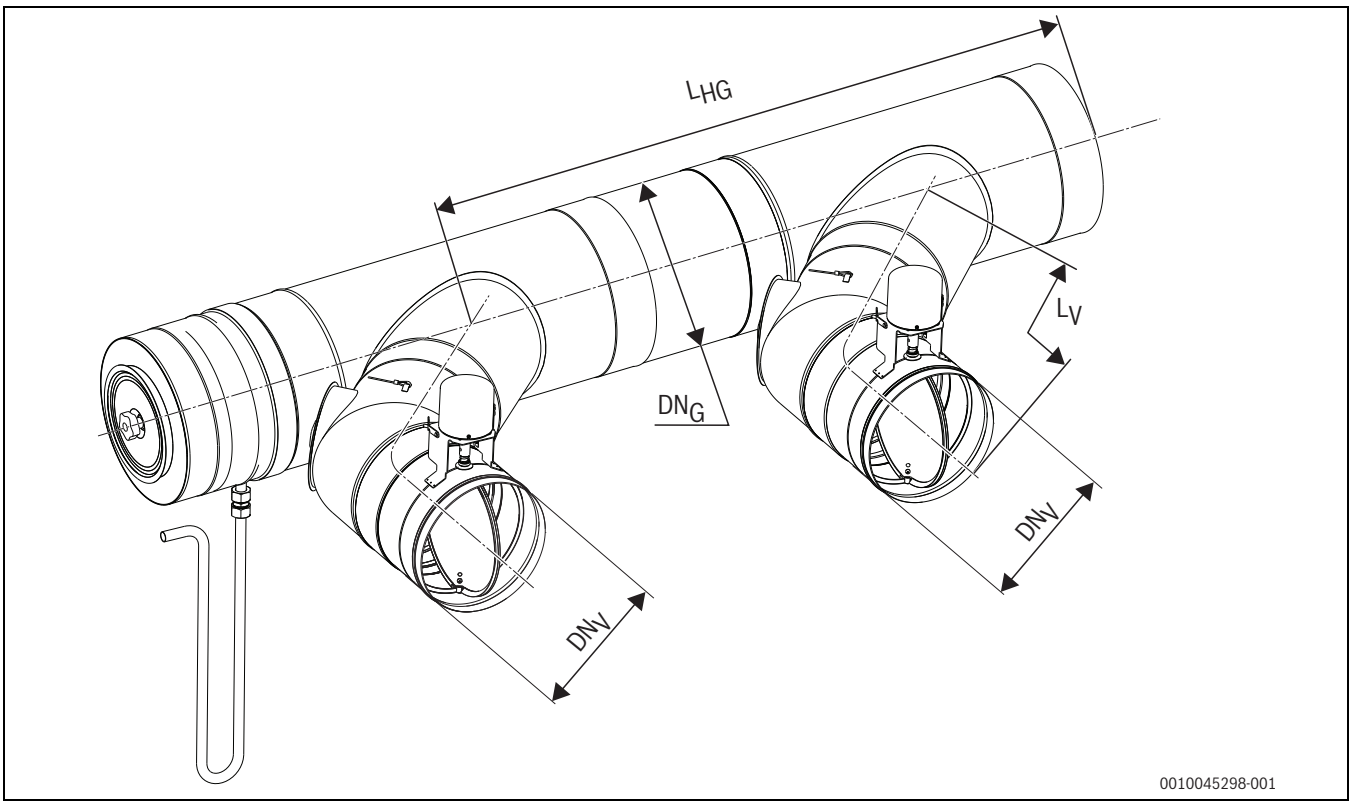

Fig. 27 Cascade setup behind the boiler (example; individual boiler size 350 – 620 kW)

DN_V Internal diameter of boiler connection line
DN_G Internal diameter of shared boiler connection line
L_{HG} Length of shared horizontal boiler connection line
L_V Extended length of boiler connection line

8 Electrical connection

WARNING

Risk to life from electric shock!

Touching live electrical parts can cause an electric shock.

- Before working on electrical parts, disconnect all phases of the power supply (fuse/circuit breaker) and lock the isolator switch to prevent unintentional reconnection.

WARNING

Danger to life from electric current!

Incorrectly connected electrical cables can result in faulty operation with potentially dangerous consequences.

- When making the electrical connections, refer to the connection diagrams for the individual devices and components.
- When performing maintenance, label all power cables before disconnecting them.

NOTICE

Material damage if the maximum current consumption is exceeded!

Short-term high (start-up) currents can can damage electrical components.

- When connecting external components to the control unit, make sure that the sum of the individual power consumption (consider the power consumption of the boiler) does not exceed the maximum current consumption (→control unit data plate).

Note the following when making electrical connections:

- Electrical work on heating systems must only be carried out by qualified electricians. If you are not suitably qualified, ask a licensed heating contractor/electrician to establish the electrical connection.
- Make sure that all boiler components are earthed via the control unit and burner control unit (earthing is a constituent part of the control unit used).
- Observe all local regulations!

8.1 Flue gas damper

A motor-actuated flue gas damper can be connected to the control unit (CC83xx control system) or or function module (CC8000 control system) at the corresponding terminal.

NOTICE

Manually-controlled flaps that shut off the flue gas path or impede the combustion air supply are not permitted.

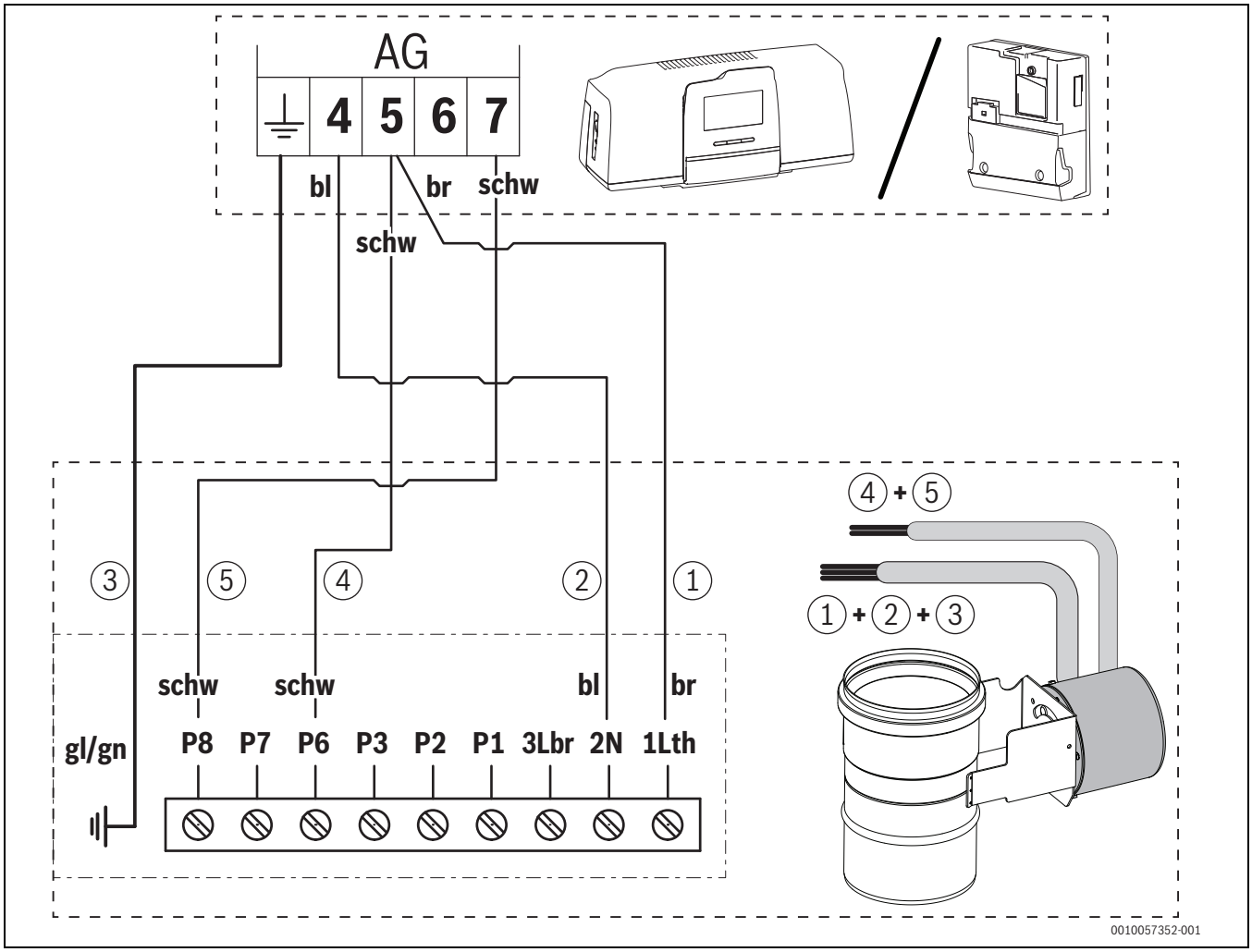

Fig. 28 Flue gas damper connection diagram

gl/gn yellow/green
bl blue
br brown
schw black

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