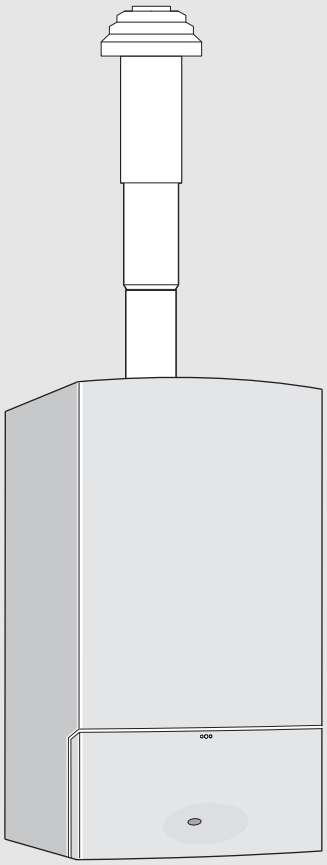
BOSCH

Information regarding routing flue gas

# Wall mounted gas fired condensing boilers

# **Condens 5000 W**

ZSB 30-2 A ... | ZWB 37-2 A ...



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6 720 644 146 (2019/03) NZ/AU

## Contents



# 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 minimising danger are not taken.

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

- **DANGER** indicates that severe or life-threatening personal injury will occur.
- **WARNING** indicates that severe to life-threatening personal injury may occur.
- **CAUTION** indicates that minor to medium personal injury may occur.
- **NOTICE** indicates that material damage may occur.

**Important information**

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

**Additional symbols**

| Symbol | Explanation |
|---|---|
| ▶ | Step in an action sequence |
| → | Cross-reference to another part of the document |
| • | List entry |
| – | List entry (second level) |

*Table 1*

## 1.2 General safety instructions

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

If you are in any doubt contact the Robert Bosch technical hotline on:
1300 30 70 37 AU or 0800 54 33 52 NZ

### Determined use

The product may only be used in a domestic situation for the heating of central heating water and for DHW heating in closed-loop DHW and heating systems.

Any other use is considered inappropriate. Any damage that may result from misuse is excluded from liability.

This appliance is not suitable to be used as a pool heater.

### If you smell gas

A gas leak could potentially cause an explosion. If you smell gas, observe the following rules.

- ▶ Prevent flames or sparks:
  - – Do not smoke, do not use a lighter or strike matches.
  - – Do not operate any electrical switches or unplug any equipment.
  - – Do not use the telephone or ring doorbells.

- ▶ Turn off the gas supply at the main shut-off valve or at the gas meter.
- ▶ Open windows and doors.
- ▶ Warn your neighbours and leave the building.
- ▶ Prevent anyone from entering the building.
- ▶ Move well away from the building: call the emergency services and the gas supplier.

**Danger to life from poisoning by flue gas**

There is a danger to life from escaping flue gas.

- ▶ Ensure that flues and gaskets are not damaged.

**Danger of death from poisoning by flue gas due to inadequate combustion**

Danger of death due to flue gas leak. If flues are damaged or leaking, or if you smell flue gas, observe the following rules.

- ▶ Close the fuel infeed.
- ▶ Open doors and windows.
- ▶ If necessary, warn all residents and leave the building.
- ▶ Prevent third parties from entering the building.
- ▶ Rectify any damage to the flue gas pipe immediately.
- ▶ Check the combustion air supply.
- ▶ Do not cover or reduce the size of ventilation openings in doors, windows and walls.
- ▶ Ensure that there is adequate combustion air supply, including for any appliances installed at a later date, e.g. extractor fans, kitchen fans or air conditioning units that discharge air to the outside.
- ▶ Never operate the device if there is insufficient combustion air supply.

**Open flued Appliance**

- ▶ Do not use an unlined Masonry chimney as the flue for this appliance.

**Installation, commissioning and maintenance**

Installation, commissioning and maintenance must only be carried out by an approved contractor.

- ▶ Carry out a gas tightness test after completing work on gas-carrying components.
- ▶ In the case of open flue operation: Ensure that the installation location meets the ventilation requirements.
- ▶ Only use original spares.

**Electrical work**

Electrical work must only be carried out by electrical installation contractors.

Before starting electrical work:

- ▶ Isolate all poles of the mains voltage and secure against reconnection.
- ▶ Make sure the mains voltage is disconnected.
- ▶ Observe the wiring diagrams of other system components as well.

**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
- ▶ Explain that conversions and repairs must only be carried out by a competent person.
- ▶ Point out the need for inspections and maintenance for safe and environmentally-compatible operation.
- ▶ Leave the installation instructions and the operating instructions with the user for safekeeping.
- ▶ Do not spray aerosols in the vicinity of this appliance while in operation.
- ▶ Do not use or store flammable materials in or near this appliance.
- ▶ Do not place articles on or against this appliance.
- ▶ Do not modify this appliance.

# 2 Usage

## 2.1 General information

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

The flue duct kit is a component of the CE-approved system. Therefore, only genuine flue duct kits may be used.

The permissible maximum balanced flue line depends on the appliance and the number of deflections in the balanced flue. For calculation, see chapter 5 from page 11.

## 2.2 Wall mounted gas fired condensing boiler

| Wall mounted gas fired condensing boiler |
|---|
| **ZSB 30-2 A** |
| **ZWB 37-2 A** |

*Table 2*

## 2.3 Combination with flue duct kits

The following flue accessories can be used in flue gas systems for these condensing boilers:

- Flue accessories, coaxial pipe Ø 60/100 mm
- Flue accessories, coaxial pipe Ø 80/125 mm
- Flue accessories, single pipe Ø 80 mm

For flue gas/flue gas accessory designations and the part numbers of the original flue gas accessories, see the current pricelist.

# 3 Installation

## 3.1 General information

- ▶ Follow the instructions for the flue duct kit.
- ▶ Route horizontal flues with 3 ° gradient (= 5.2 %, 5.2 cm per metre) in the flow direction of the flue gas.
- ▶ Insulate the combustion air line in humid rooms.
- ▶ Install cleaning apertures where they will be easily accessible.
- ▶ When installing cylinders, take their dimensions into consideration when installing flue accessories.
- ▶ Before fitting the flue kits:
  Apply a thin coating of solvent-free grease (e.g. Vaseline) to the joint seals.
- ▶ When fitting the balanced flue, always push the pipe fully home into the sockets.

## 3.2 Flue terminal positions

Use as a guide only. Refer to AS/NZ 5601 or gas fitting rules for specific location.

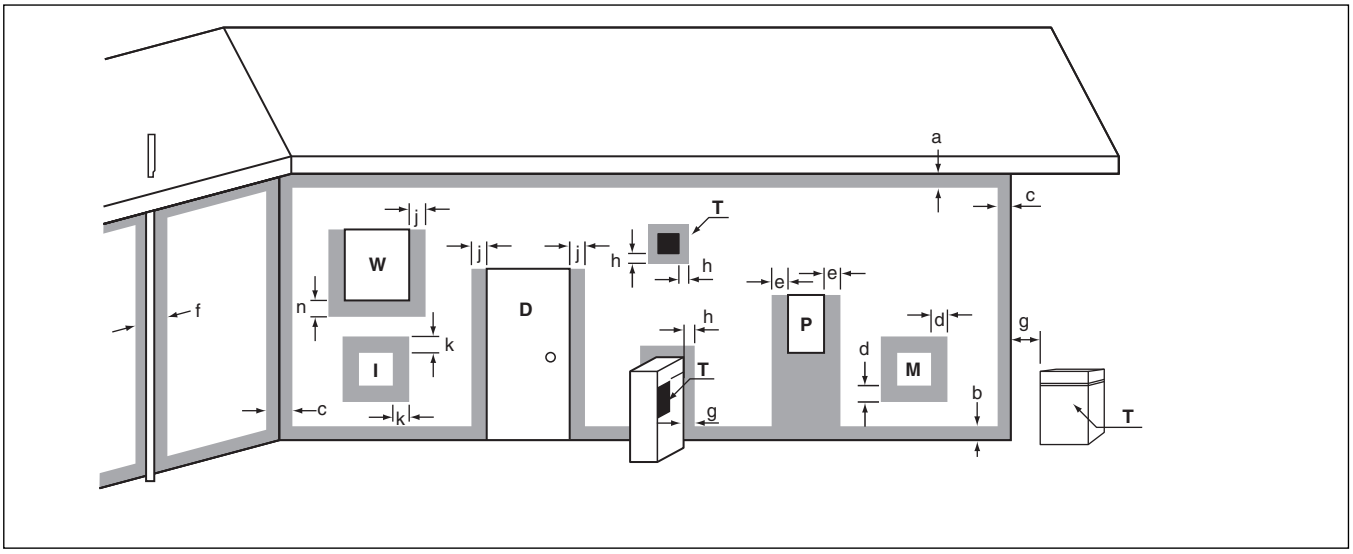


*Fig. 1 Flue terminal positions: Shaded area indicates prohibited area*

D Door
I Mechanical air inlet
M Gas meter
T Flue terminal
W Window

| Ref. | Item | Min. Clearance mm |
|---|---|---|
| a | Below eaves, balconies and other projections (Appliances over 50MJ/h) | 300 |
| b | From the ground, above a balcony or other surface | 300 |
| c | From a return wall or external corner | 300 |
| d | From a gas meter | 1000 |
| e | From an electricity meter or fusebox/breaker panel | 500 |
| f | From a drain pipe or soil pipe | 75 |
| g | Horizontally from any building structure or obstruction facing a flue terminal | 500 |
| h | From any other flue terminal, cowl or combustion air intake | 300 |
| j | Horizontally from any opening window, door, non-mechanical air inlet or other opening into a building with the exception of sub-floor ventilation | 300 |
| k | From a mechanical air inlet including a spa blower. | 1000 |
| n | Vertically below an opening window, non-mechanical air inlet or any other opening into a building with the exception of sub-floor ventilation | 500 |

*Table 3*

- The location of the flue terminal must comply with the clearances shown on this page.
  If you are unsure about clearances not indicated here, in general refer to AS/NZ 5601 or your local authority.
- All measurements are the minimum clearances required.
- Terminals must be positioned so to avoid combustion products entering the building.

## 3.3 Routing the flue vertically

### 3.3.1 Extension with flue accessories

The flue accessory “vertical balanced flue” can be extended between the boiler and the roof outlet at any point using the flue accessories “coaxial extension”, “coaxial elbow” (15° - 90°) or “test aperture”.

### 3.3.2 Routing the flue gas over the roof

A clearance of 400 mm between the outlet of flue accessories and the roof surface is adequate, as the rated output of the listed Buderus wall mounted gas fired condensing boilers is below 50 kW.

### 3.3.3 Installation location and balanced flue

The following regulations apply:

- Installation of the wall mounted gas fired condensing boiler in a room where only the roof structure lies above the ceiling:
  - If a fire rating is required for the ceiling, then the balanced flue must have the same fire rating between the top edge of the ceiling and the roof skin, and must be made from non-flammable materials.
  - If no fire rating is demanded for the ceiling, then the balanced flue must be routed through a duct made from non-flammable, solid 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 room must be routed through a duct with a fire rating of at least 90 minutes and, in buildings of low height, of at least 30 minutes.

### 3.3.4 Layout of cleaning apertures:

- One cleaning aperture is sufficient for gas combustion equipment tested together with a flue up to 4 m length.
- The lower cleaning aperture in the vertical flue section may be arranged as follows:
  - In the vertical flue section immediately above the introduction of the joint
    **or**
  - In the side of the joint no more than 0.3 m away from the deviation in the vertical flue section
    **or**
  - In the face of the straight joint, no more than 1 m away from the deviation in the vertical flue section.
- Flues that cannot be cleaned directly from the terminal must be equipped with a further upper cleaning aperture up to 5 m below the terminal. Vertical flue sections with a sloping run greater than 30° between the axis and the vertical require a clearance of no more than 0.3 m to the kinking points of the cleaning apertures.
- The upper cleaning apertures can be omitted in vertical sections, provided that:
  - The vertical flue section will only be run at a slope once up to 30°
    **and**
  - The lower cleaning aperture is not more than 15 m away from the terminal.
- Install cleaning apertures where they will be easily accessible.

## 3.4 Routing horizontal flues

### 3.4.1 Extension with flue accessories

The flue accessory “horizontal flue” can be extended between the boiler and the wall outlet at any point using the flue accessories “coaxial extension”, “coaxial elbow” (15° - 90°) or “test aperture”.

### 3.4.2 Routing a balanced flue type $C_{13}$ over the external wall

- Observe the relevant national regulations regarding the max. permissible output.
- Observe the minimum clearances towards windows, doors, wall protrusions and between terminals themselves.
- The terminal of a coaxial pipe must not be fitted in a sub-surface duct.

### 3.4.3 Routing a balanced flue type $C_{33}$ via the roof

- With covering on site, maintain the minimum clearances to AS/NZ 5601. A clearance of 400 mm between the accessory terminal and the roof surface is adequate, as the rated output of the listed Bosch gas fired condensing boilers is below 50 kW. The Bosch dormers meet the requirements regarding minimum dimensions.
- The flue accessory terminal must protrude above structures on the roof, room openings and unprotected components made from flammable materials, excluding roof cover, by at least 1000 m or must be at least 1500 mm away from them.
- Local regulations specify no output limit in heating operation for the routing a balanced flue horizontally above a roof with dormer.

### 3.4.4 Layout of cleaning apertures

- One cleaning aperture is sufficient for gas combustion equipment tested together with a flue up to 4 m length.
- Provide at least one cleaning aperture in horizontal flue/joint sections. The maximum clearance between cleaning apertures is 4 m. Size cleaning apertures at deviations 45° larger.
- One cleaning aperture in horizontal flue/joint sections is adequate, if
  - the horizontal section ahead of the cleaning aperture is no longer than 2 m
    **and**
  - the cleaning aperture in the horizontal section is no more than 0.3 m away from the vertical section,
    **and**
  - no more than two deviations are in the horizontal section upstream of the cleaning aperture.
- An additional cleaning aperture may be required near the combustion equipment, if brushing residues must be prevented from entering the combustion equipment.

# 4 Fitted dimensions (in mm)

## 4.1 Balanced flue as concentric pipe

As condensate drain:

▶ Route horizontal flues with 3 ° gradient (= 5.2 %, 5.2 cm per metre) in the flow direction of the flue gas.

The horizontal flue connection is used for:

- Routing the flue inside a duct compliant with $C_{33}$, $C_{53}$, $C_{93}$
- Routing the flue horizontally compliant with $C_{13}$, $C_{33}$

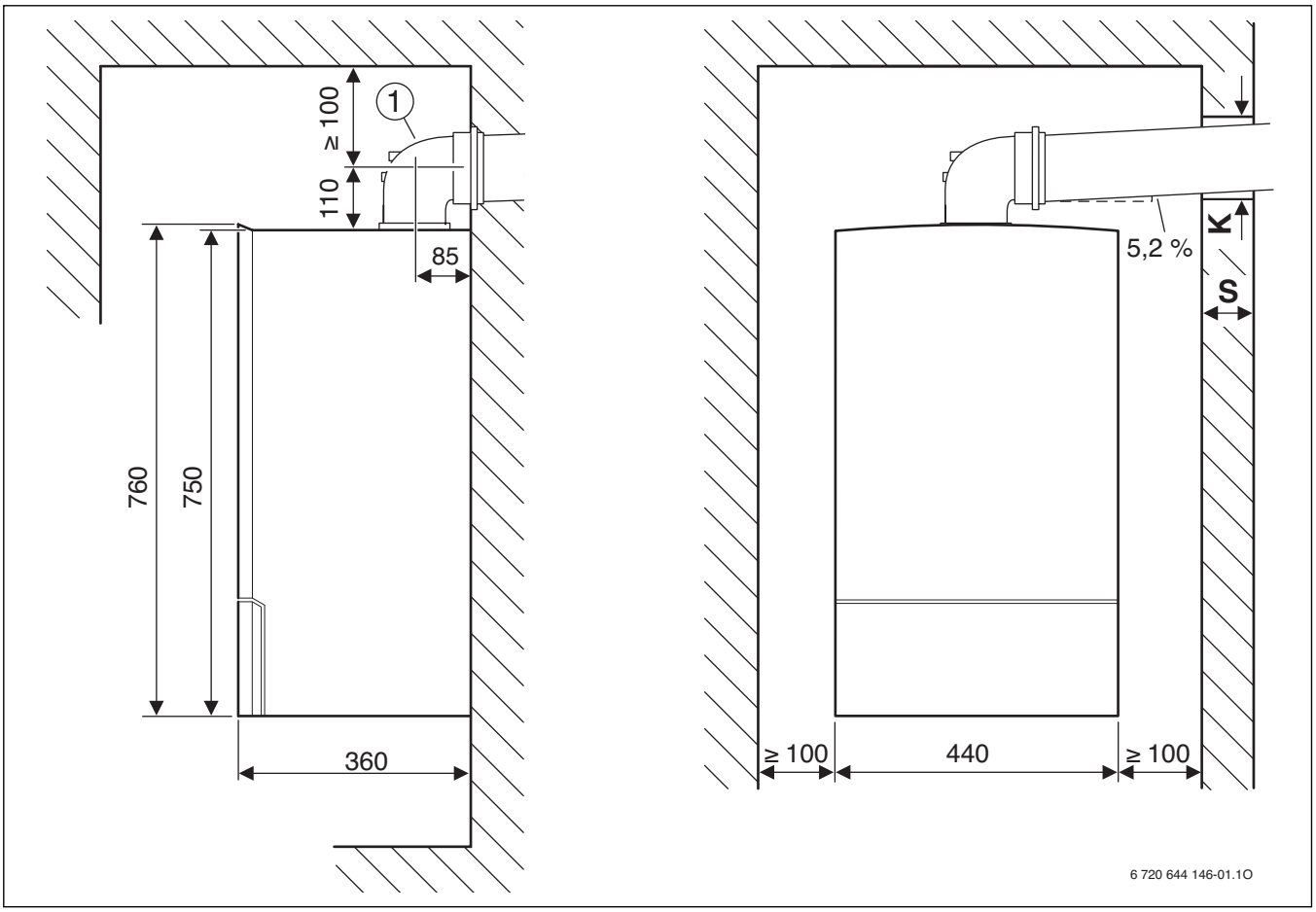


*Fig. 2 Ø 80/125 mm*

[1] Connection elbow 90° (Ø 80/125 mm) with measuring holes

| S | K<br>AZB Ø 80/125 mm |
|---|---|
| **15 - 24 cm** | 155 mm |
| **24 - 33 cm** | 160 mm |
| **33 - 42 cm** | 165 mm |
| **42 - 50 cm** | 170 mm |

*Table 4*

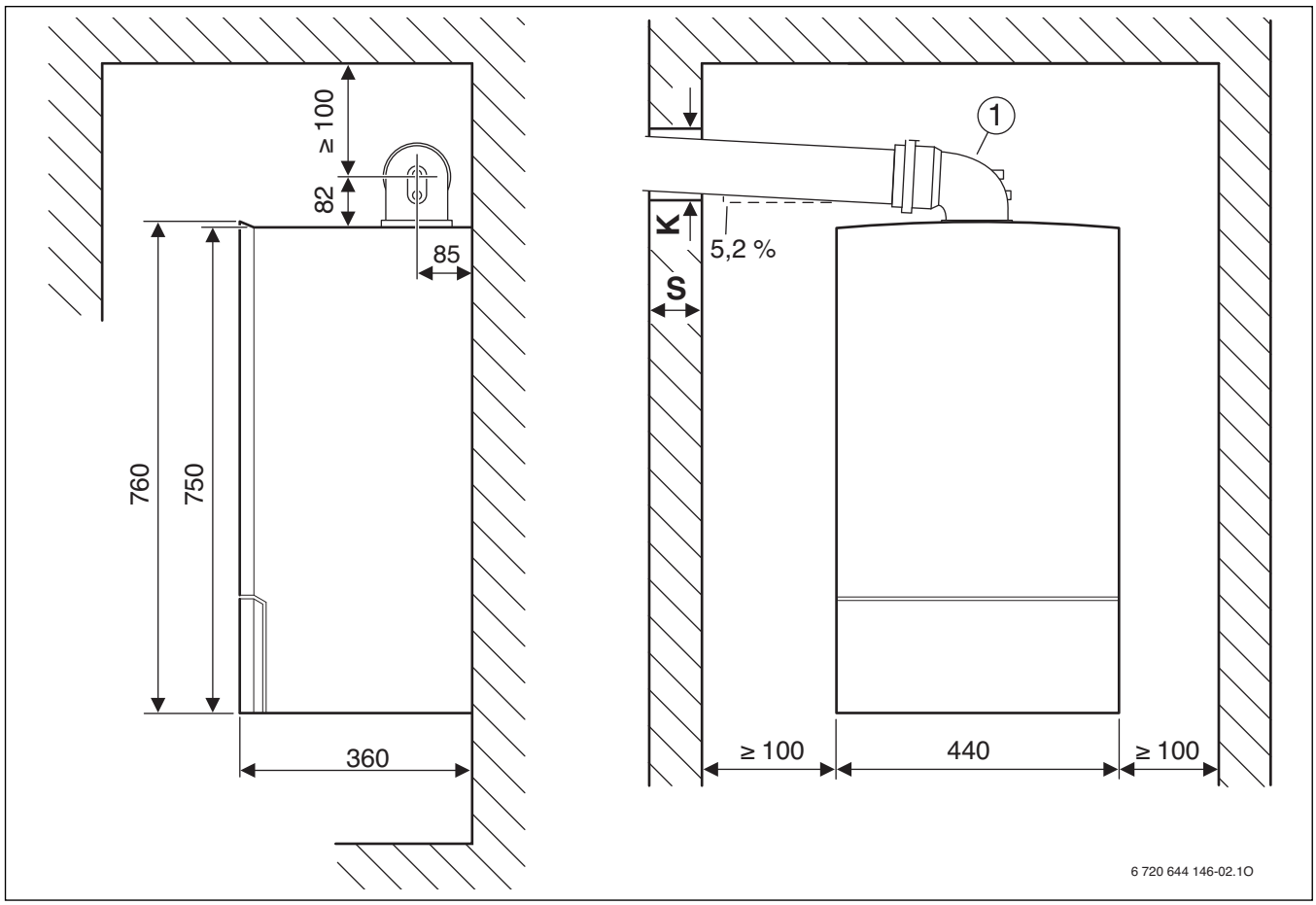


*Fig. 3 Ø 60/100 mm*

[1] Connection elbow 90° (Ø 60/100 mm) with measuring holes

| S | K<br>AZB Ø 60/100 mm |
|---|---|
| **15 - 24 cm** | 130 mm |
| **24 - 33 cm** | 135 mm |
| **33 - 42 cm** | 140 mm |
| **42 - 50 cm** | 145 mm |

*Table 5*

## 4.2 Vertical flue connection

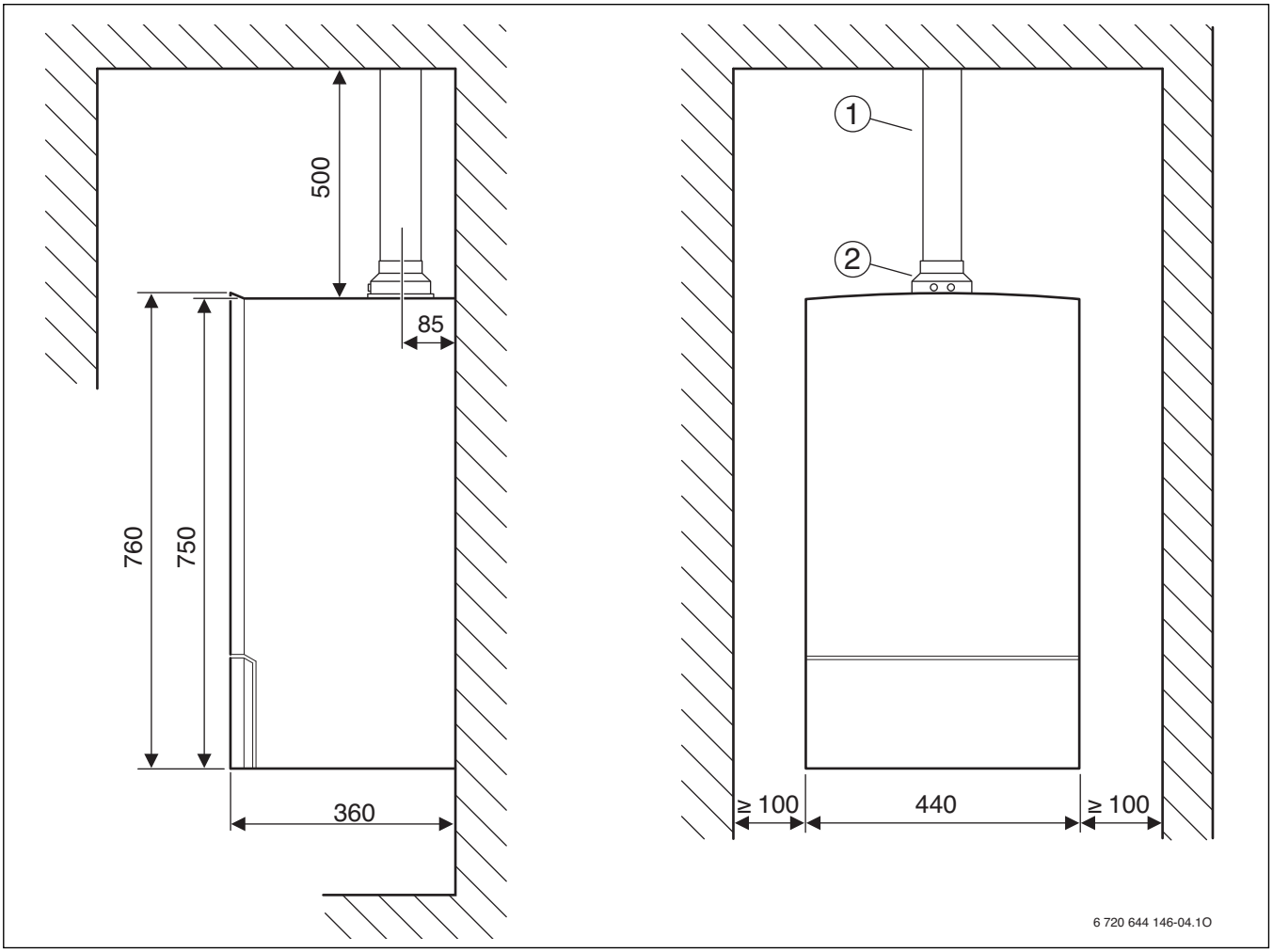


*Fig. 4 flat roof*

[1] Balanced flue - vertical/extension pipe (Ø 60/100 mm or Ø 80/125 mm)
[2] Connection adaptor vertical (Ø 60/100 mm or Ø 80/125 mm) with measuring holes

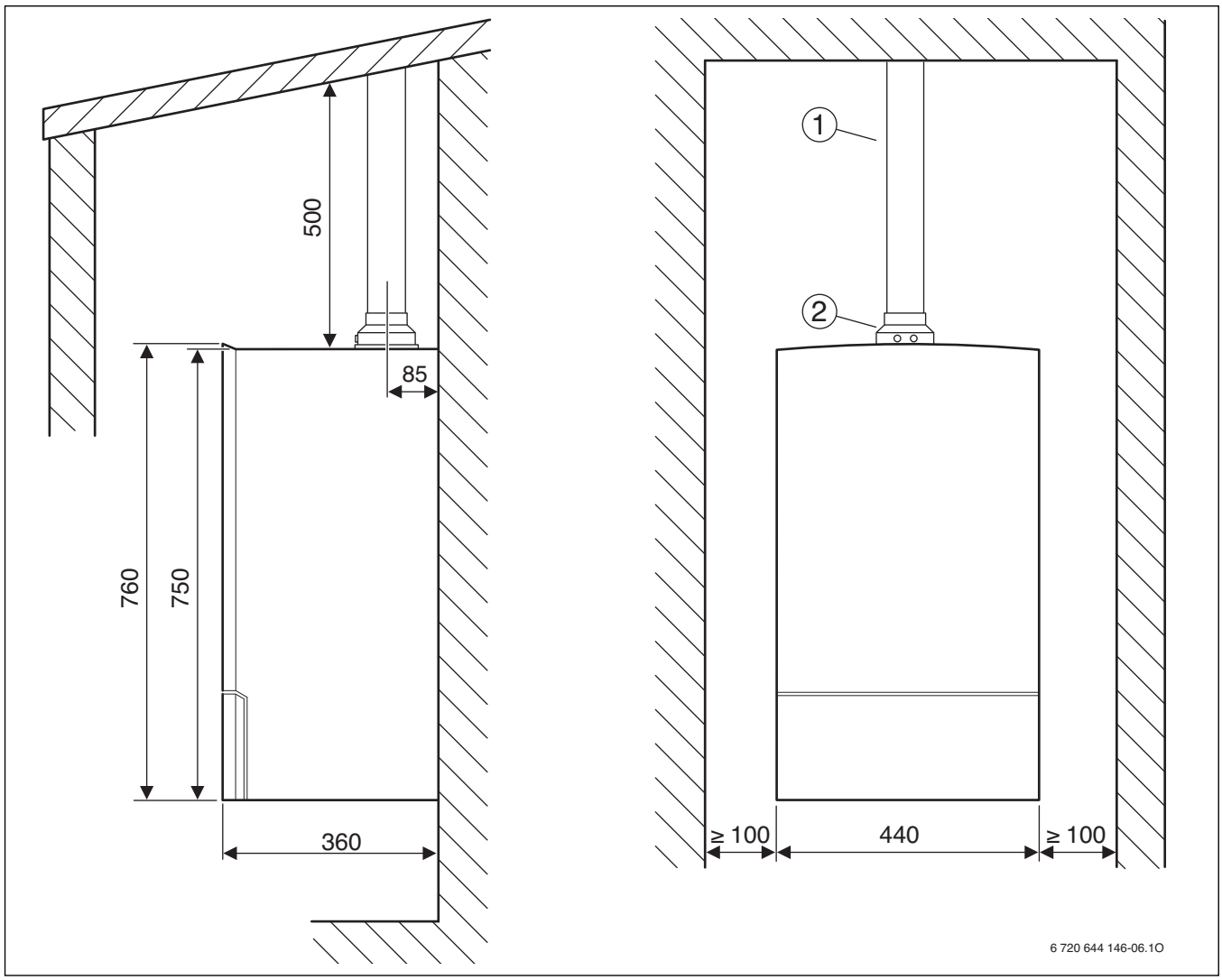


*Fig. 5 pitched roof*

[1] Balanced flue - vertical/extension pipe (Ø 60/100 mm or Ø 80/125 mm)
[2] Connection adaptor vertical (Ø 60/100 mm or Ø 80/125 mm) with measuring holes

# 5 Flue lengths

## 5.1 General information

The condensing boilers are fitted with a fan that transports the flue gases into the flue. Flow losses inside the flue decelerate the flue gases. Consequently, flues must not exceed a specific length to ensure the flue gases are securely propelled to the outside. This length is the maximum equivalent pipe length $L_{equiv,max}$. It is subject to the boiler, the flue and its routing. Flow losses are greater in ebows than in straight pipes. An equivalent pipe length is therefore assigned to elbows that is greater than their physical length. The sum of horizontal and vertical pipe lengths as well as the equivalent pipe lengths for the elbows used, results in the equivalent flue length $L_{equiv}$. This total length must be shorter than the maximum equivalent pipe length $L_{equiv,max}$. In addition, in some flue gas systems the length of horizontal flue $L_w$ must not exceed a certain value $L_{w,max}$.

## 5.2 Determining the flue length

### 5.2.1 Installation analysis

▶ Determine the following from the given installation situation:
- Route of the flue
- Routing the flue gas to AS/NZ 5601
- Condensing boiler
- length of horizontal flue, $L_w$
- length of vertical flue, $L_s$
- Number of additional 90° deviations in the flue
- Number of 15 °, 30 ° and 45 ° elbowsin the flue

### 5.2.2 Determining the parameters

The flue may be routed as follows:
- Vertical flue (→ Tab. 6 on page 12 and Tab. 7 on page 13)
- Horizontal flue (→ Tab. 6 on page 12 and Tab. 7 on page 13)

▶ Determine the following from the respective table, subject to the method of routing the flue to AS/NZ 5601, condensing boiler and flue diameter:
- Maximum equivalent pipe length $L_{equiv,max}$
- Equivalent pipe length of elbows
- Poss. maximum horizontal pipe length $L_{w,max}$

### 5.2.3 Calculation of the equivalent pipe length $L_{equiv}$

The equivalent pipe length $L_{equiv}$ is calculated from the sum of the horizontal and vertical flue lengths ($L_w$, $L_s$) and the equivalent lengths of elbows. The required 90° elbows are included in the maximum lengths. Take every additional elbow with its equivalent length into consideration.

The equivalent total pipe length must be shorter than the maximum equivalent pipe length: $L_{equiv} \leq L_{equiv,max}$

For an example of calculating the flue length, see page 14.

## 5.3 Flue gas routing options

| Routing the flue gas horizontally/vertically Ø 80/125 mm[1] compliant with $C_{13}$, $C_{33}$ | | | equivalent lengths of additional elbows [2] | |
|---|---|---|---|---|
| Appliance | vertical ($L_S$) $L_{equiv,max}$ [m] | horizontal ($L_W$) $L_{equiv,max}$ [m] | 90° [m] | 15-45° [m] |
| **ZSB 30-2 A** | 16 | 16 | 2 | 1 |
| **ZWB 37-2 A** | 18.4 | 17.2 | | |

*Table 6 Pipe lengths for $C_{13}$, $C_{33}$*

1) The values given apply to Bosch accessories. For any other accessories, please refer to standard AS/NZ 5601.

2) 90° elbow on the appliance with horizontal flue has already been taken into consideration in the maximum lengths

$L_{equiv,max}$ maximum equivalent length
$L_S$ vertical pipe length
$L_W$ horizontal pipe length

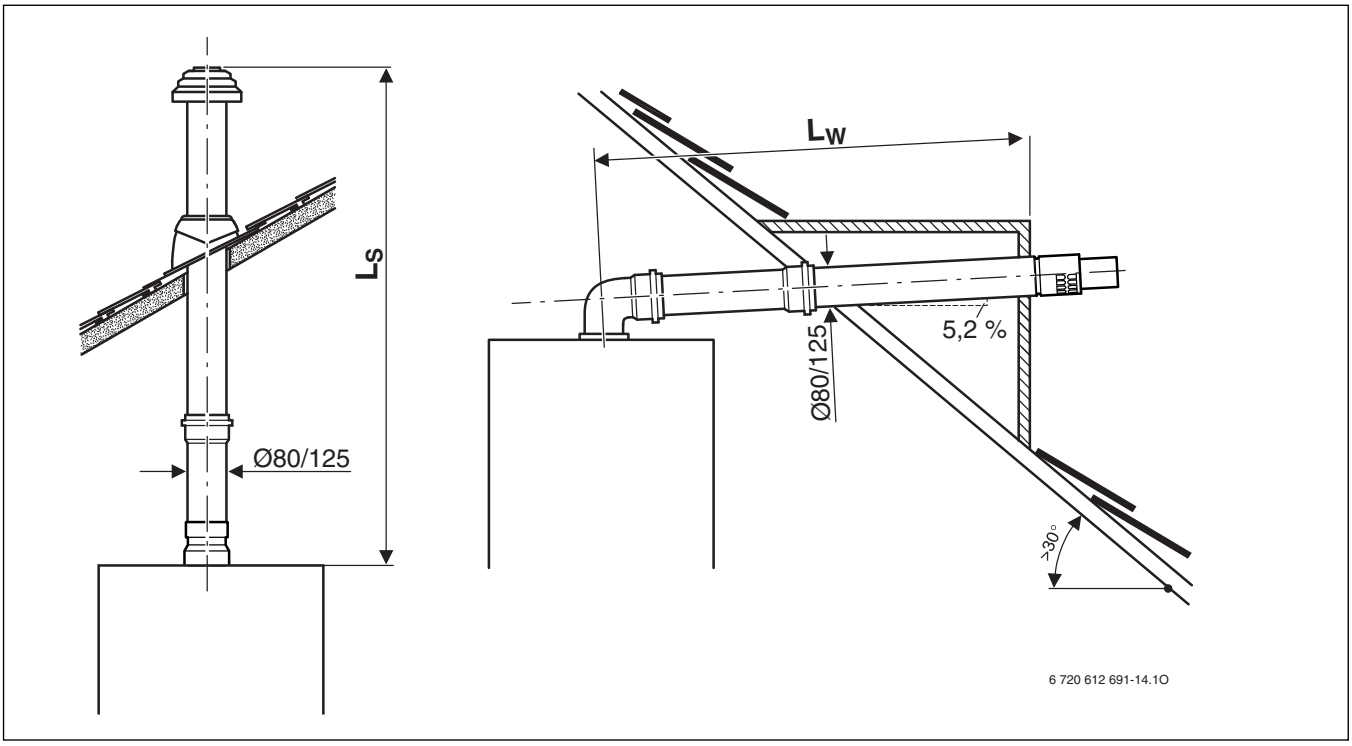


*Fig. 6 $C_{33}$*

| Routing the flue gas horizontally/vertically Ø 60/100 mm[1] compliant with $C_{13}$, $C_{33}$ | | | equivalent lengths of additional elbows [2] | |
|---|---|---|---|---|
| Appliance | vertical ($L_S$) $L_{equiv,max}$ [m] | horizontal ($L_W$) $L_{equiv,max}$ [m] | 90° [m] | 15-45° [m] |
| **ZSB 30-2 A** | 8 | 7 | 2 | 1 |
| **ZWB 37-2 A** | 8.6 | 5.7 | | |

*Table 7 Pipe lengths for $C_{13}$, $C_{33}$*

1) The values given apply to Bosch accessories. For any other accessories, please refer to standard AS/NZ 5601.

2) 90° elbow on the appliance with horizontal flue has already been taken into consideration in the maximum lengths

$L_{equiv,max}$ maximum equivalent length
$L_s$ vertical pipe length
$L_w$ horizontal pipe length

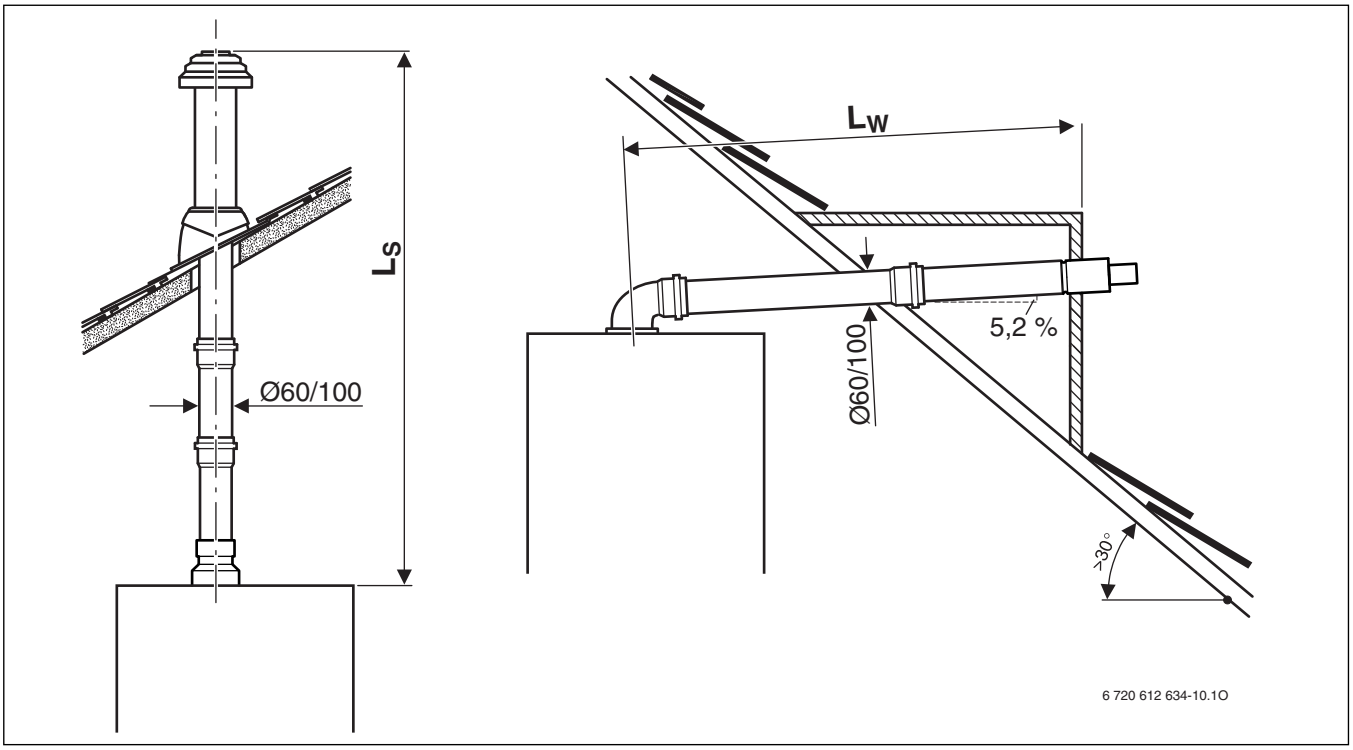


*Fig. 7 $C_{33}$*

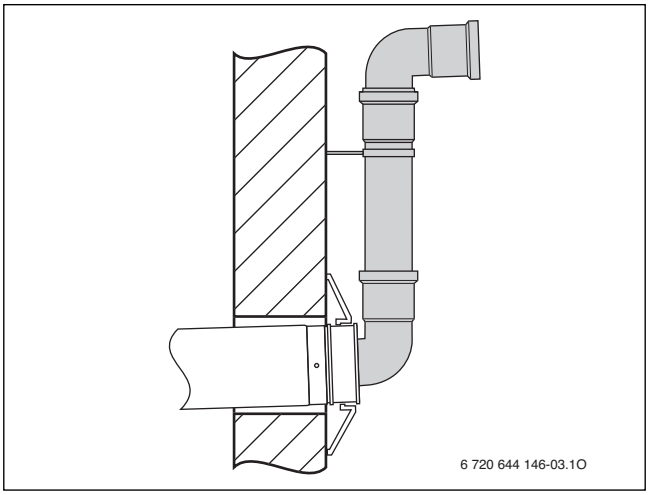


*Fig. 8 $C_{13}$, Plume Management*

Plume management kits are available for the 100 mm horizontal flue options.

Plume management reduces the effective length of the flue, refer to the manual supplied with the kits for complete installation instructions.

## 5.4 Example for calculating the flue lengths (Fig. 9)

**Installation analysis**

Determine the following from the given installation situation:

- Method of routing the flue: vertical, Ø 80/125 mm
- Flue compliant with AS/NZ 5601: $C_{33}$
- Condensing boiler: ZSB 30-2 A
- length of horizontal flue: $L_w$ = 1 m
- length of vertical flue: $L_s$ = 6 m
- Number of 90° deviations in the flue: 2
- Number of 15 °, 30° and 45° deviations in the flue: 0

**Determining the parameters**

Determine the parameters from table 6 as the flue is routed through a duct compliant with $C_{33}$. The following values result from ZSB 30-2 A:

- $L_{equiv,max}$ = 15 m
- equivalent length for 90° deviations: 2 m
- equivalent length for 15°, 30 °and 45°deviations: 1 m

**Calculation of the equivalent pipe length $L_{equiv}$**

The equivalent pipe length $L_{equiv}$ is calculated from the sum of the horizontal and vertical flue lengths ($L_w$, $L_s$) and the equivalent lengths of elbows. The required 90° elbows are included in the maximum lengths. Take every additional deviation with its equivalent length into consideration.

The equivalent total pipe length must be shorter than the maximum equivalent pipe length: $L_{equiv} \leq L_{equiv,max}$

| | Length/Number | | equivalent partial length | | Total length |
|---|---|---|---|---|---|
| **straight length $L_S$** | 6 m | × | 1 | = | 6 m |
| **straight length $L_W$** | 1 m | × | 1 | = | 1 m |
| **90° elbow** | 2 | × | 2 m | = | 4 m |
| **45° elbow** | 0 | × | 1 m | = | 0 m |
| | | | | equivalent pipe length $L_{equiv}$ | 11 m |
| | | | | Maximum equivalent pipe length $L_{equiv,max}$ | 15 m |
| | | | | $L_{equiv} \leq L_{equiv,max}$ | o.k. |

*Table 8*

The equivalent total pipe length with 11 m is less than the maximum equivalent total length of 15 m. As a result, the flue is OK.

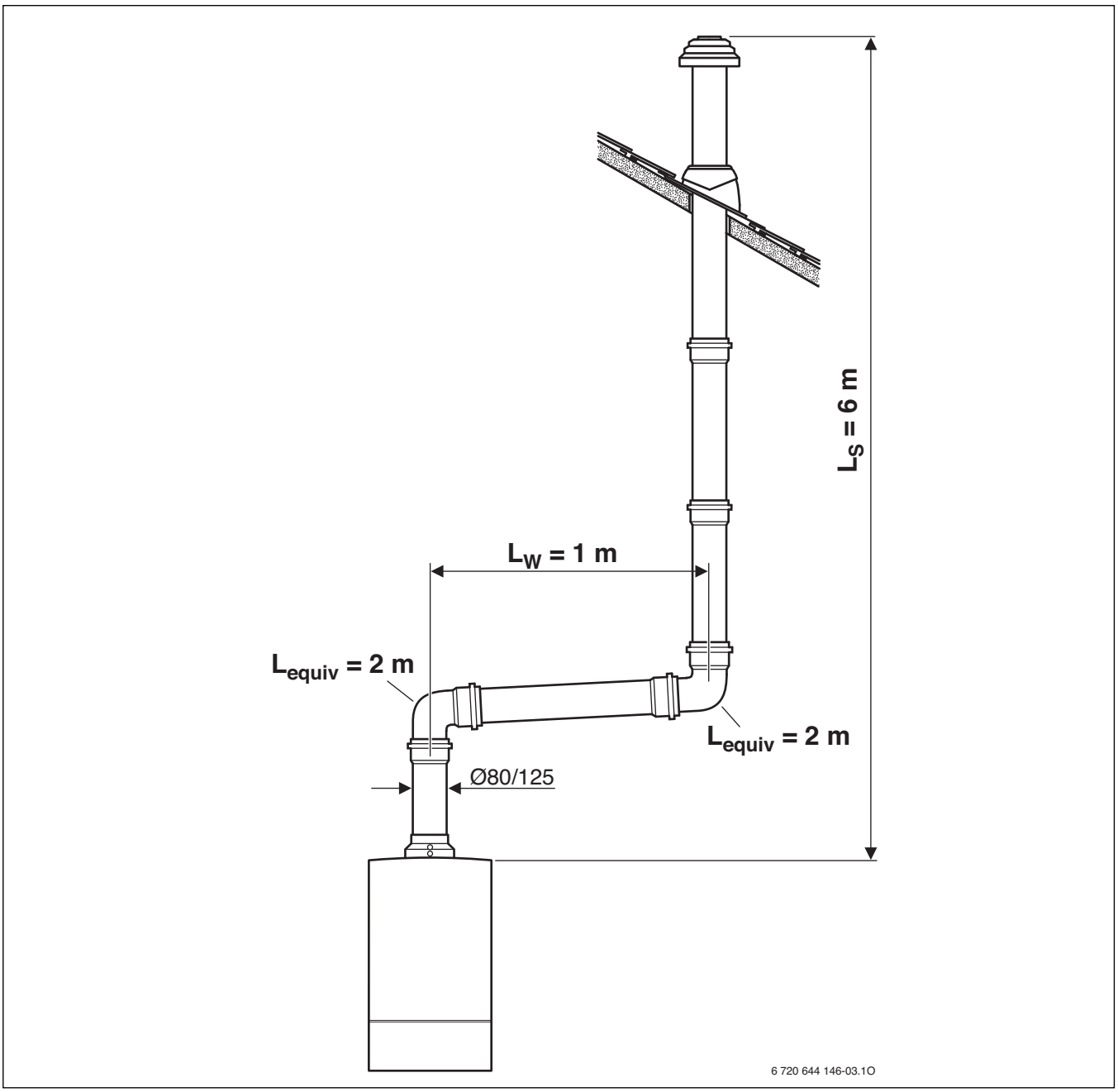


*Fig. 9*

## 5.5 Template for calculating the flue length

| | Length/Number | | equivalent partial length | | Total length |
|---|---|---|---|---|---|
| **straight length $L_S$** | | × | | = | |
| **straight length $L_W$** | | × | | = | |
| **90° elbow** | | × | | = | |
| **45° elbow** | | × | | = | |
| | | | | equivalent pipe length $L_{equiv}$ | |
| | | | | Maximum equivalent pipe length $L_{equiv,max}$ | |
| | | | | $L_{equiv} \leq L_{equiv,max}$ | |

*Table 9*

Robert Bosch (Australia) Pty Ltd
Thermotechnology Division
1555 Centre Road
Clayton Victoria 3168

Australia
Phone: 1300 30 70 37
Fax: 1300 30 70 38
www.bosch-climate.com.au

New Zealand
Phone: 0800 54 33 52
Fax: 0800 54 33 55
www.bosch-climate.co.nz