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12/04/22

To whom it may concern

Harleston Hall – Air Quality Statement (Ref: TR-HH-120422-1)

The following Air Quality Statement has been produced to support the Harleston Hall Planning Application (Ref: PP-11033291).

1.0 Introduction

1.1 Proposed Works

A Froling P4 100kW biomass boiler is to be installed at Harleston Hall. Along with the boiler, ancillary components will also be installed, this includes an external flue which will extend ~1.4m above the apex of the building it will be housed in. On the southern wall of the building two pipes will be installed to enable blown pellet deliveries to the fuel store housed within the building. Any external changes to the building are highlighted on the drawings submitted with this application.

1.2 Site Description

Harleston Hall is located off Haugley Road, approximately 3.8km to the North West of Stowmarket town centre. The biomass boiler will be located in a garage to the west of the main property. The closest neighbor is located approximately 75m to the north east of the proposed biomass boiler location. The site boundary and location of the boiler is highlighted in Figure 1.

1.3 Format of Submission

In order to assist consideration of this application, the following supporting information has been provided:

- Froling P4 brochure
- Smoke Control Exempt Appliance Certificate
- RHI Emission Certificate for the Froling P4
- Flue height calculations

Figure 1: - Position of biomass boiler on site



2.0 System

2.1 Biomass boiler

The chosen biomass boiler is the P4 100 from an Austrian company called Froling. They have operated for over 50 years in the biomass industry and are Europe's largest biomass boiler manufacturer. They are a multi award winning company, widely known in the sector for producing highly efficient and industry leading boilers.

The boiler has a PCB to control combustion. This is done by using a number of sensors within the combustion and flue system where combustions temperature, oxygen levels, draught are all monitored and altered accordingly by the balanced introduction of primary and secondary air into the system, changing fuel feed rates and increasing fan speed to create more draught in the system. This automatic process ensures high levels of burn efficiency are kept throughout the process, even with varying fuel qualities, which in itself minimises emissions of particulate matter.

The boiler has a modulation system that when it needs more heat supplied to the water system it will increase the boilers output up to 100%, when the boiler detects the water demand is satisfied the boiler will modulate (reduce its output) and will sit as low as 30% of maximum output, whilst maintaining high efficiencies of combustion.

There are turbulators within the boilers heat exchangers which slow down the exhaust gases and catch fly ash. All ash from and that produced in the combustion chamber are automatically fed into sealed external containers.

A brochure for the boiler is presented in Addendum A.

3.0 Emissions

3.1 Smoke Control Exempt Appliance

The boiler is classified as an exempt appliance, meaning it can be used in Smoke Control Areas. Whilst we do not believe the site is within a smoke control area so there is no requirement for the boiler to be an exempt appliance, it does demonstrate that the system meets the more stringent requirements for use in Smoke Control Areas. The link below takes you to the DEFRA Smoke Control Website where the certificate for this boiler can be viewed, with a screenshot of this page shown in figure 2.

<https://smokecontrol.defra.gov.uk/appliance-details.php?id=382>

Figure 2: Screen shot from Smoke Control Exempt Appliance List

| | |
|-----------------------|--|
| Appliance name | Fröling P4 80 and P4 100 wood pellet boilers |
| Output | n/a |
| Fuel Type | Wood based |
| Appliance Type | Boiler |
| Manufacturer | Fröling Heizkessel und Behälterbau GmbH, A-4710 Grieskirchen, Industriestrasse 12, Austria |

3.3 RHI Emission Certificate

As demonstrated by the certificate in Addendum B, the Froling P4 100 meets the stringent emissions limits that are required for systems to be used on the governments Renewable Heat Incentive scheme.

3.3 Target Emission Rates

In terms of air quality issues, we are able to undertake a screening assessment to identify if this in indeed any issue at this site. The first step in ascertaining this is to use the boiler emissions rates for PM and NO_x that are detailed on the RHI emissions certificate as 13g/GJ and 83g/GJ. These values are then converted to g/s using the following formula $((\text{Boiler Power/kWh in } 1\text{GJ}) \times \text{g/GJ}) / 3600$, this equates to the following:

a) PM – $((100 / 277.778) \times 13) / 3600 = 0.0013\text{g/s}$

b) NO_x - $((100 / 277.778) \times 83) / 3600 = 0.0083\text{g/s}$

We can now decide if the emissions from the boiler would have a significant impact on the existing background emissions. Local emissions data was gathered by using the background emissions published by DEFRA (<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>). The closest recorded annual mean back ground emissions data to site is ~200m to the north (601500, 260500) shows PM₁₀ at 17.17ug/m³ and total NO_x at 10.37 ug/m³.

Using the LAQM biomass emission screening assessment tool on the DEFRA website (<https://laqm.defra.gov.uk/air-quality/air-quality-assessment/biomass-emissions-screening/>), we are able to calculate target emission rates for both PM₁₀ and NO_x. Screen shots of this are presented below in Figures 3 and 4.

Note the flue stack height and diameter used in the screening assessment have been calculated using specialist software to ensure the correct draught is achieved for the boiler. These calculations are included in Addendum C.

Figure 3: Calculation of PM₁₀ target emission rate

| PM ₁₀ Emissions from Biomass Combustion Stacks (Individual Installations) | | |
|--|---|-------------------|
| The target emissions of PM ₁₀ in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedance of the 24-hour objective for PM ₁₀ in England, Wales and Northern Ireland or the annual mean objective in Scotland. | | |
| Enter required information in Yellow Cells Resulting Emission in Red Bold | | |
| Building height | <input type="text" value="5.4"/> | m |
| Stack diameter | <input type="text" value="0.25"/> | m |
| Stack height | <input type="text" value="6.8"/> | m |
| Location | <input type="text" value="Rest of UK"/> | |
| PM ₁₀ Annual mean background concentration (include roadside contribution at relevant receptors) | <input type="text" value="17.17"/> | µg/m ³ |
| Calculated Effective stack height | <input type="text" value="2.3"/> | m |
| Target Emission Rate | <input type="text" value="0.015"/> | g/s |
| If the maximum stack emission rate is less than the target above then it is not likely that the most stringent objective for PM ₁₀ will be exceeded. If your emissions are greater then please refer to LAQM.TG(16) for further advice. | | |

Figure 4: Calculation of NO_x target emission rate

| NO _x Emissions from Biomass Combustion Stacks (Individual Installations) - Annual Mean NO ₂ Objective | | |
|--|---|-------------------|
| The target emissions of NO _x in g/s from biomass combustion source emissions are calculated for your given stack details. Greater emission rates may result in exceedance of the annual mean objective for NO ₂ . | | |
| Enter required information in Yellow Cells Resulting Emission in Red Bold | | |
| Building height | <input type="text" value="5.4"/> | m |
| Stack diameter | <input type="text" value="0.25"/> | m |
| Stack height | <input type="text" value="6.8"/> | m |
| Location | <input type="text" value="Rest of UK"/> | |
| NO ₂ Annual mean background concentration (include roadside contribution at relevant receptors) | <input type="text" value="10.37"/> | µg/m ³ |
| Calculated Effective stack height | <input type="text" value="2.3"/> | m |
| Target Emission Rate | <input type="text" value="0.0892"/> | g/s |
| If the maximum stack emission rate is less than the target above then it is not likely that the annual mean objective for NO ₂ will be exceeded. If your emissions are greater then please refer to LAQM.TG(16) for further advice. | | |

A comparison of the target emission rates and calculated boiler emission rates are detailed in Table 1. It can be seen that in both instances the calculated emission rates are approximately an order of magnitude lower than the target emission rates, as such the most stringent objective for both PM₁₀ and NO_x will not be exceeded.

Table 1: Comparison of emission rates

| Emission | Target emission rate (g/s) | Boiler emission rate (g/s) |
|------------------|----------------------------|----------------------------|
| PM ₁₀ | 0.015 | 0.0013 |
| NO _x | 0.0892 | 0.0083 |

4.0 Conclusion

The conclusion reached is that the proposed development is in accordance with national and local policy, and no adverse impacts arise as a result of the use in terms of air quality. As such, it is respectfully requested that no objections are raised in relation to air quality when it comes to the planning decision.

Best regards,

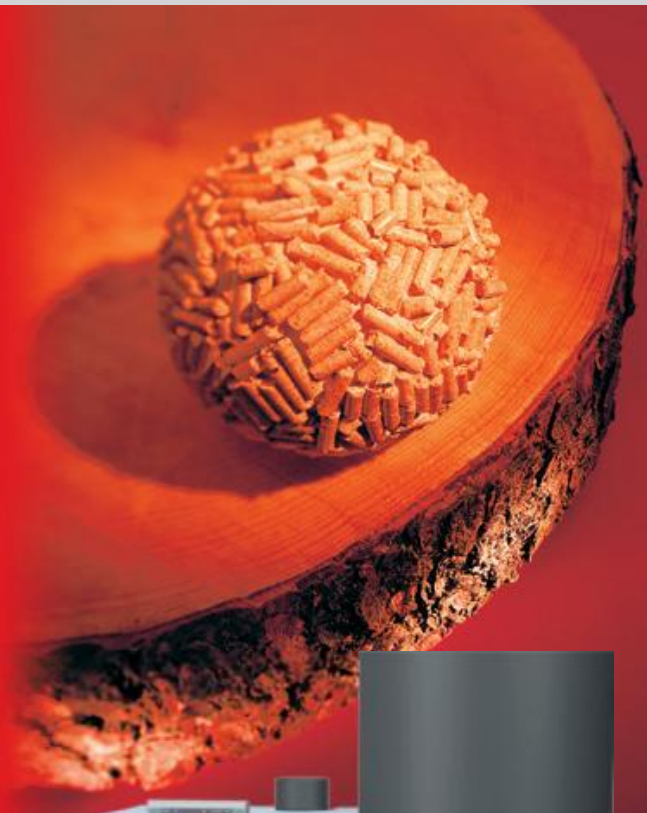
A handwritten signature in blue ink, appearing to read "Ben Bevan", with a long horizontal flourish extending to the right.

Ben Bevan

Director

Addendum A – Froling P4 Brochure

P4 Pellet



Heating with pellets

For more than 50 years Froling has specialised in the efficient use of wood as a source of energy. Today the name Froling stands for modern biomass heating technology. Froling firewood, wood chip and pellet boilers are successfully in operation all over Europe. All of our products are manufactured in our factories in Austria and Germany. Our extensive service network guarantees full coverage and reliability.



Make savings with pellets without compromising on comfort

The price changes for different energy sources in recent years show the benefits of wood pellets: the ecological way of heating is also economically attractive. Wood is a renewable energy source that is also CO₂-neutral. Pellets are made of natural wood. The large volumes of wood shavings and sawdust

generated by the wood-processing industry are compacted and pelleted without being treated beforehand. Pellets have a high energy output and are easy to deliver and store.

These are just some of the advantages that make pellets the perfect fuel for fully automatic heating systems. Pellets are delivered by tanker and unloaded directly into your store.





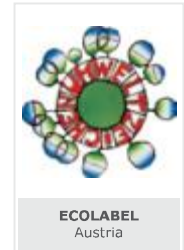
The next generation of pellet boilers

Froling has set new international standards for technology and design with the new P4 Pellet. With its ingenious fully automatic operation, this new product from Froling offers the ultimate in convenience.

Multi-award winning products

AUSTRIAN ECOLABEL - Awards for quality and safety

The Froling P4 Pellet boiler has won many international quality awards in Europe and the USA. Probably the most prestigious of all is the Austrian Ecolabel, describing itself as the world's first environmental award for products and services.



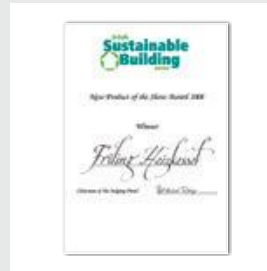
Modern biomass boilers are future-oriented and economical. This is also guaranteed by the many international standards on emissions and efficiency. In Austria the limit values are set by Article 15a of the Federal Constitution (B-VG) and in Germany they are set by the Federal Emissions Control Act passed at the start of 2010 (and implemented in the Federal Emissions Control Ordinance (BImSchV)).



VESTA Award
USA



Innovation Award at "Bois Energie" 2008
France



New Product of the Show Award
Ireland



Plus X Award
International



From low-energy houses to apartment blocks

When it comes to determining heating requirements, the heated living space and the type of construction are the most important factors. The P4 Pellet is available in ten different sizes, and with its wide output range and modulating operation it can be used in both low-energy houses and in buildings with greater heating requirements. It can also be connected to an existing heating system. The Froling Lambdatronic P 3200 smart control management system takes charge of all control functions, including remote control via PC or mobile phone.

P4 Pellet 15/20/25



Easy-access ashcans

P4 Pellet 32/38

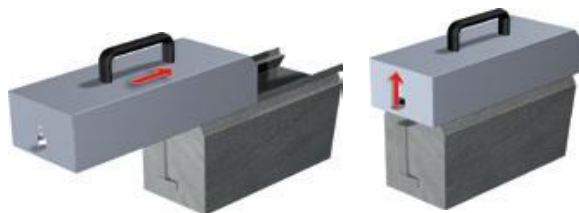


Automatic ash removal

P4 Pellet 45/60/80/100/105



Automatic ash removal



Easy-access ashcan (P4 15-25)

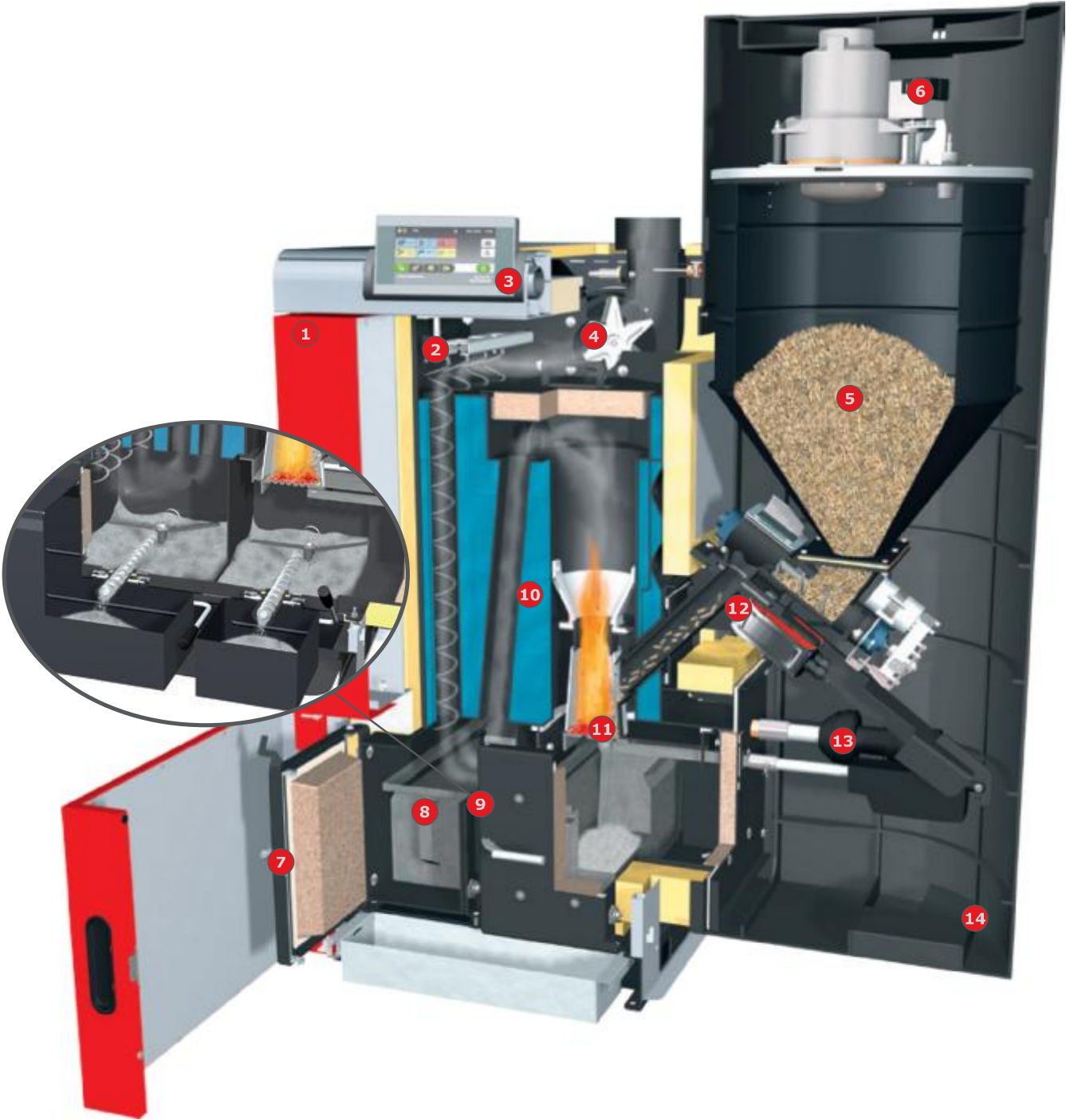
With this user-friendly ash removal system the ash is automatically fed into two ashcans. With the transport cover in place, the ashcan can simply be carried to the emptying point for dust-free disposal.



Automatic ash removal (P4 32 onwards)

With automatic ash removal the ash is fed into two external ash containers. The clever locking mechanism makes it quick and easy to remove the ash container.

The latest technology





The new pellet boiler with special benefits:

- 1 Multi-layer insulation for the highest level of thermal insulation.
- 2 WOS technology (efficiency optimisation system) as standard for maximum efficiency and automatic heat exchanger cleaning.
- 3 Lambdatronic P 3200 control with 7" touch display and innovative bus technology.
- 4 Speed-regulated, low-noise induced draught fan with function monitoring for maximum operational reliability.
- 5 Large pellet container with automatic pellet feed and integrated soundproofing (volume 90 - 280 litres).
- 6 Store gate valve.
- 7 Insulated cleaning port door for excellent heat retention.
- 8 Large easy-access ashcan with P4 Pellet 15 - 25.
- 9 Automatic ash removal in two closed ash containers with P4 Pellet 32 - 105.
- 10 Patented multiple-pass heat exchanger for variable boiler operation, ideal for heating low-energy houses. The 3-pass heat exchanger design guarantees the best possible ash separation. It also avoids the need for an external return temperature control.
- 11 Automatic sliding grate for ash removal, offering maintenance-free operation.
- 12 Proven burner gate valve.
- 13 Automatic ignition with hot-air blower.
- 14 Special suction cyclone with integrated soundproofing for almost silent operation.

Perfection in the details



Smart positioning and installation

Feature: **Plug and play**

- Advantages:
- Unpack, connect, heat
 - Compact design
 - Easy positioning

The P4 Pellet offers important advantages even before it reaches your boiler room. Its compact design makes it child's play to install the P4 Pellet even in confined spaces. All components are already fully wired. But if necessary, individual components can be removed in just a few steps. The parts can then be positioned separately. This means that the P4 Pellet is also an excellent choice for renovated systems.



Feature: Multi-layer heat exchanger with 3-pass design

- Advantages:
- Maximum boiler use
 - Considerable cost savings
 - Long service life

The patented multiple-pass heat exchanger means that operation is perfectly adjusted in every respect with the P4 Pellet. An external return temperature control is not necessary. Together with the variable operation, this results in considerable operating savings. The special boiler construction prevents the temperature from dropping below the dew point and ensures the P4 Pellet has a very long service life. The 3-pass design repeatedly alters the flow of the flue gases in the boiler, ensuring exceptionally efficient ash separation.

Feature: Easy to clean

- Advantages:
- Clean combustion
 - Very low emissions
 - Automatic ash removal

With the P4 Pellet you are choosing a quality product. The automatic sliding grate allows for convenient and maintenance-free operation. Ash is always generated when wood or pellets are burnt. In the P4 Pellet it is transported automatically to two ash containers, which can be emptied simply and easily.

Feature: Energy efficiency

- Advantages:
- Low energy consumption
 - Low operating costs

Particular attention was paid to energy efficiency during the development of the P4 Pellet. This priority was clearly confirmed when the boiler was awarded the Blue Angel and the Austrian Ecolabel. The P4 Pellet consumes little energy during operation, keeping the operating costs down.



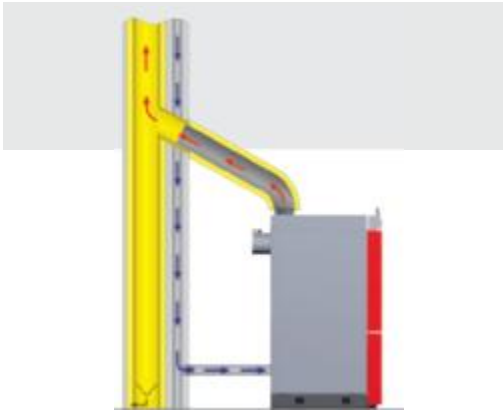
Perfection in the details



Feature: Speed-regulated induced draught fan and lambda control

- Advantages:
- Maximum ease of use
 - Constant optimisation of combustion

The speed-regulated induced draught fan, which comes as standard, ensures the exact air quantity for combustion. In conjunction with the broadband lambda probe it creates optimum combustion conditions.



Feature: Room-air-independent operation

- Advantages:
- Perfectly suited for low-energy houses
 - The highest possible system efficiency

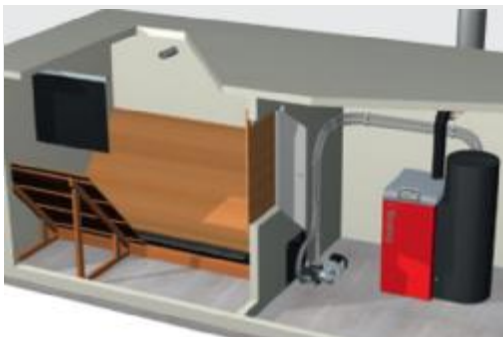
Low-energy houses have a closed building shell. In traditional boiler rooms there can be uncontrolled heat loss from the necessary ventilation openings. This is avoided with room air-independent boilers because of the direct air connection. Also the temperature of the combustion air that is supplied is raised with an integrated pre-heating system, increasing the efficiency of the boiler.



Feature: Comprehensive safety concept

- Advantages:
- The highest possible operating safety
 - Maximum reliability

The downpipe – in conjunction with the safety-tested, gate valve-fitted combustion chamber and the gate valve-fitted store – creates a double door system. The self test before the system starts and the automatic diagnostics system support this unique safety concept.



Feature: Also ideal for container installation

- Advantages:
- Relocation of the boiler room and store
 - All-in-one system
 - Perfectly matched components

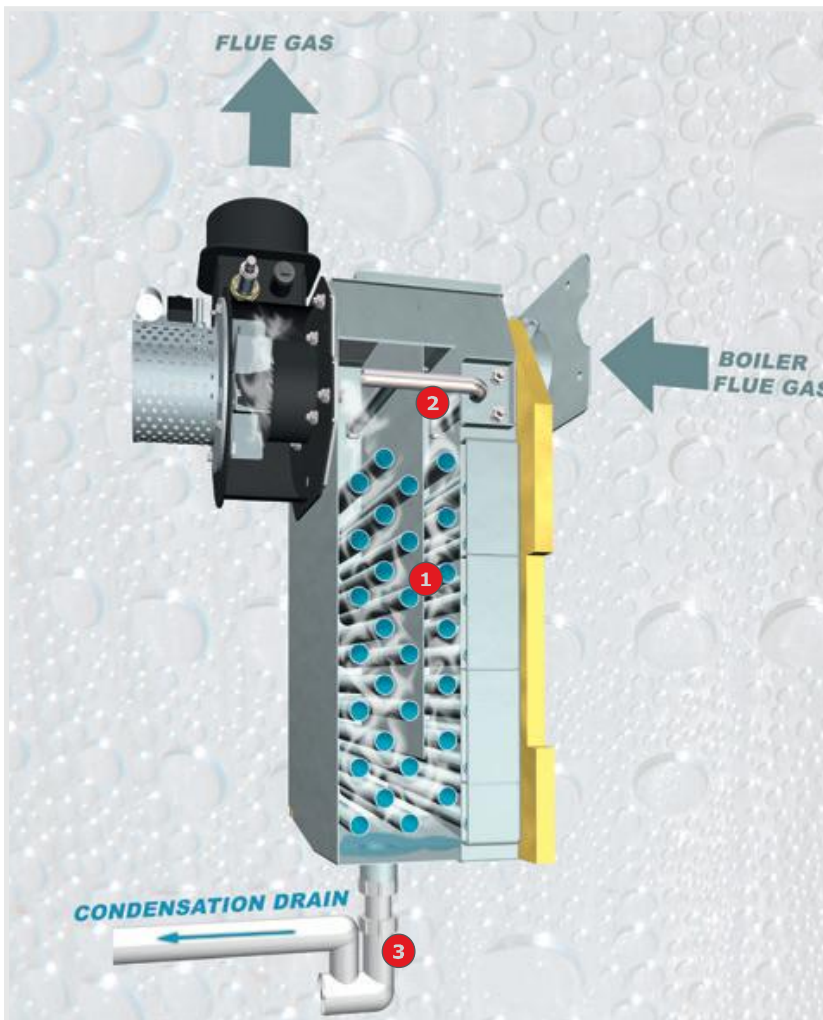
The Froling Energy box is an all-in-one complete solution. All components are perfectly matched to each other.

Option: Condensing boiler technology



For outputs from 15 to 60 kW, the Froling P4 Pellet boiler is also available with innovative condensing boiler technology. The flue gas contains energy, which escapes unused up the chimney with conventional solutions, but an additional heat exchanger positioned on the back of the boiler makes use of it for the heating system. This increases the **boiler efficiency to over 104 percent (HU)**. Froling won the innovation prize at the ExpoEnergy trade fair in Wels for condensing boiler technology in the biomass sector as early as 1996, making it a pioneer in the field.

The heat exchanger is made of high-quality stainless steel. It is cleaned using a water flushing system. The module can also be retrofitted.



Overview of condensing boiler heat exchanger:

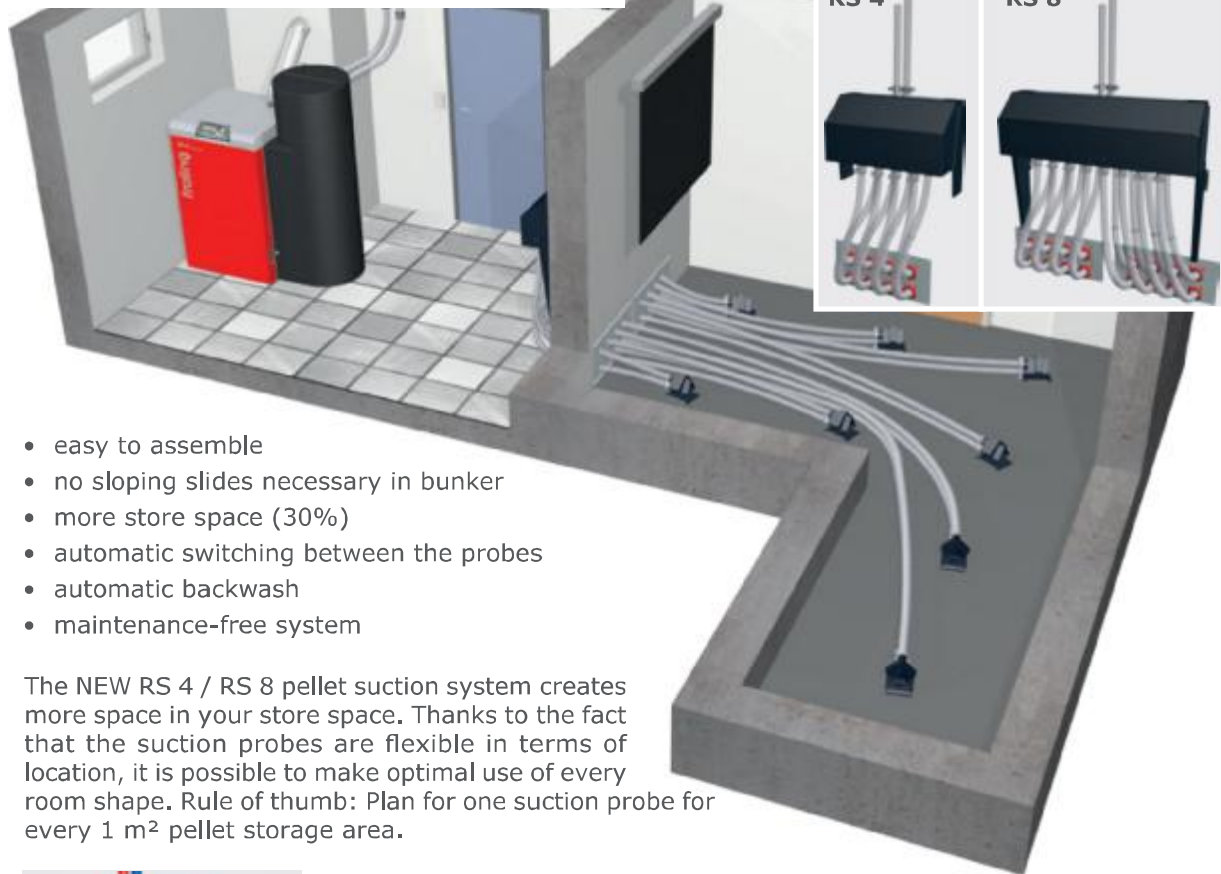
- 1 Stainless steel heat exchanger
- 2 Automatic flushing equipment
- 3 Drain with siphon to remove condensation

Requirements for optimal use of condensing boiler technology:

- The lowest possible return temperature (e.g. floor or wall heating)
- Moisture-resistant and soot fire-resistant flue gas system
- Duct connection for drainage of condensation and flushing water

Feed systems

RS 4 / RS 8 pellet suction system



- easy to assemble
- no sloping slides necessary in bunker
- more store space (30%)
- automatic switching between the probes
- automatic backwash
- maintenance-free system

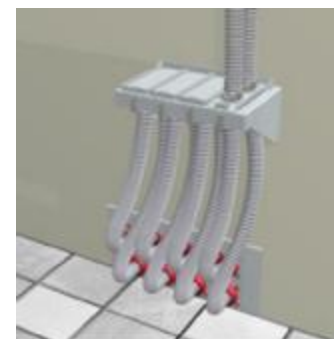
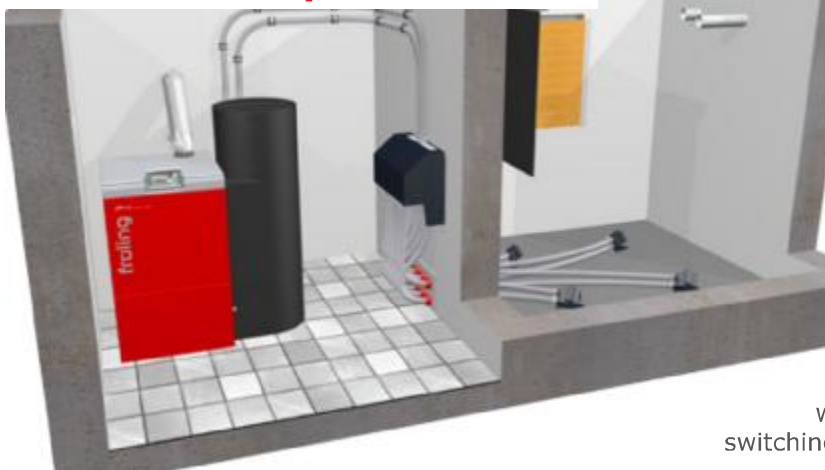
The NEW RS 4 / RS 8 pellet suction system creates more space in your store space. Thanks to the fact that the suction probes are flexible in terms of location, it is possible to make optimal use of every room shape. Rule of thumb: Plan for one suction probe for every 1 m² pellet storage area.



It automatically selects 4 or 8 suction probes in specified cycles, it is controlled by the pellet boiler. If, however, the suction probe fails unexpectedly, it is remedied by a **fully automatic reversal of the air flow (backwash)**.

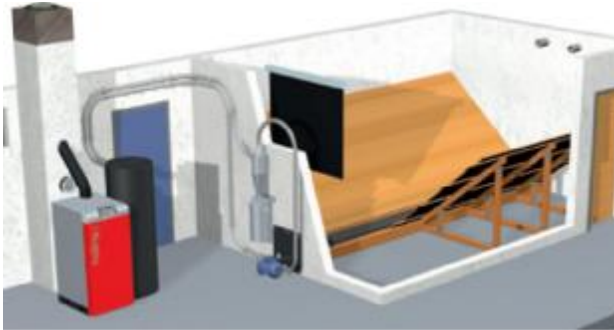
Depiction: fully automatic reversal of flow

4 times suction system manual



Same as above but with the difference of the manual switching between the suction systems.

Suction screw system



The Froling suction screw system is the ideal solution for rectangular rooms with front-end removal.

The deep and horizontal position of the discharge screw means the space in the room is used optimally and complete emptying of the store is guaranteed. Combined with a suction system from Froling it also enables flexible boiler setup.

1-2-3 suction screw system



The 1-2-3 suction screw system from Froling is the ideal solution for large stores.

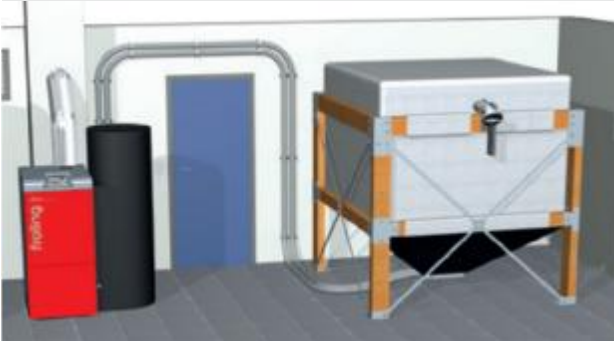
Depending on the size of the store, two or three discharge screws are positioned parallel to each other and integrated into the fuel feed of the suction system. The automatic screw selector automatically switches between the suction screws in a predefined cycle, ensuring that the store is emptied evenly.



Pellet filling pipes

The pellets are delivered by tanker and blown into the store through a filling pipe. The second pipe is used for controlled and dust free removal of the escaping air.

Bag silo discharge system



The bag silo system is a flexible, simple way of storing pellets. Available in 9 different footprints (from 1,5 m x 1,25 m to 2,9 m x 2,9 m) with a capacity of between 1,6 and 7,4 tonnes, depending on the bulk density.

Using a bag silo brings other benefits: it is simple to assemble and, if necessary, it can be installed outside with the necessary protection against rain and UV light.

Pellet Mole®



This pellet discharge system is easy to install and makes full use of the store space.

The Pellet Mole® draws the pellets from above, ensuring an optimum fuel feed to the boiler. The Pellet Mole moves automatically into every corner of the store to empty it as efficiently as possible.

System convenience

Option: Fuel tuning with the PST pellet deduster



Wood pellets are clean and of very high quality. Any remaining wood dust can be filtered from the fuel using the PST pellet deduster. This optimises the efficiency of the combustion zone over the years. The PST pellet deduster can be fitted in any position in the return air line of the pellet suction system.

The suction cyclone design means that the dust particles are separated from the return air and deposited internally. The container is convenient to remove and transport to the emptying point. The system can be retrofitted at any time and it is maintenance-free.



Supply bin

If it is not possible to set up a fuel store, a supply bin is the perfect alternative. Thanks to the modular design an automatic feed system can be retrofitted later at any time.



| Dimensions and data | | P4 Pellet 15 | P4 Pellet 20 | P4 Pellet 25 |
|---------------------|---|--------------|--------------|--------------|
| L | Length of boiler [mm] | 740 | 740 | 740 |
| L1 | Length including induced draught fan [mm] | 940 | 940 | 940 |
| B | Width of boiler [mm] | 600 | 770 | 770 |
| B1 | Width including supply bin [mm] | 1425 | 1595 | 1595 |
| B2 | Width of supply bin [mm] | 825 | 825 | 825 |
| H | Height of boiler [mm] | 1280 | 1280 | 1280 |
| H1 | Height of supply bin [mm] | 1400 | 1400 | 1400 |
| H2 | Height of supply bin when open [mm] | 1890 | 1890 | 1890 |
| | Capacity [l] | 235 | 235 | 235 |
| | Total weight including boiler [kg] | 406 | 470 | 480 |

Lambdatronic P 3200 control

With the new Lambdatronic P 3200 boiler controller, Froling is taking a step into the future. The control unit is optimised to suit any requirement. An individually adjustable viewing angle ensures that all operating statuses are clearly displayed. Exact combustion control thanks to lambda control **with broadband probe** as standard. The menu structure is ideally organised to ensure easy operation. All essential functions can be selected by simply pressing a button.



Lambdatronic P 3200 control

Advantages:

- Exact combustion control with broadband probe lambda control
- Large, clear control unit

NEW! 7" Touch-Display

Advantages:

- Individual installation of your own heating system
- Even more comfortable operation of the boiler thanks to a larger touch screen

Accessories for even greater ease of use



FRA room temperature sensor

By using the Froling FRA room temperature sensor (measuring only 8x8 cm), the main modes of the corresponding heating circuit can be easily selected and adjusted. The FRA room temperature sensor can be connected with or without affecting the room area. The adjusting wheel allows you to change the room temperature by up to $\pm 3^{\circ}\text{C}$.

RBG 3200 room console

The RBG 3200 room console makes the system even easier to use. The heating system is conveniently controlled from your living room. All important system data is clearly displayed on the 19x8 cm console and settings can be changed at the push of a button.



RBG 3200 Touch room console

The RBG 3200 Touch has an impressive touchpad interface. The menu structure means it is intuitive and easy to use. The 17x10 cm console with colour screen shows the most important functions at a glance and automatically adjusts the background lighting to the conditions. The room consoles are connected to the boiler controller using a bus cable.

System convenience

Online controller
froeling-connect.com



Froling's new online control, froeling-connect.com, allows you to check and control your Froling boiler with boiler touchscreen anytime, anywhere. You can read or modify the main status information and settings easily and conveniently online (from your PC, smartphone, tablet PC, etc.). You can also specify which status messages you would like to receive by text message or e-mail. The new froeling-connect.com service allows the owner of the heating system to enable additional users - for example the installer, a neighbour, etc. - to access the boiler and monitor the heating system, during holidays for instance.



Customer
Installer
Customer service

Individual access
rights



Platform-
independent
Operate the heating
system online



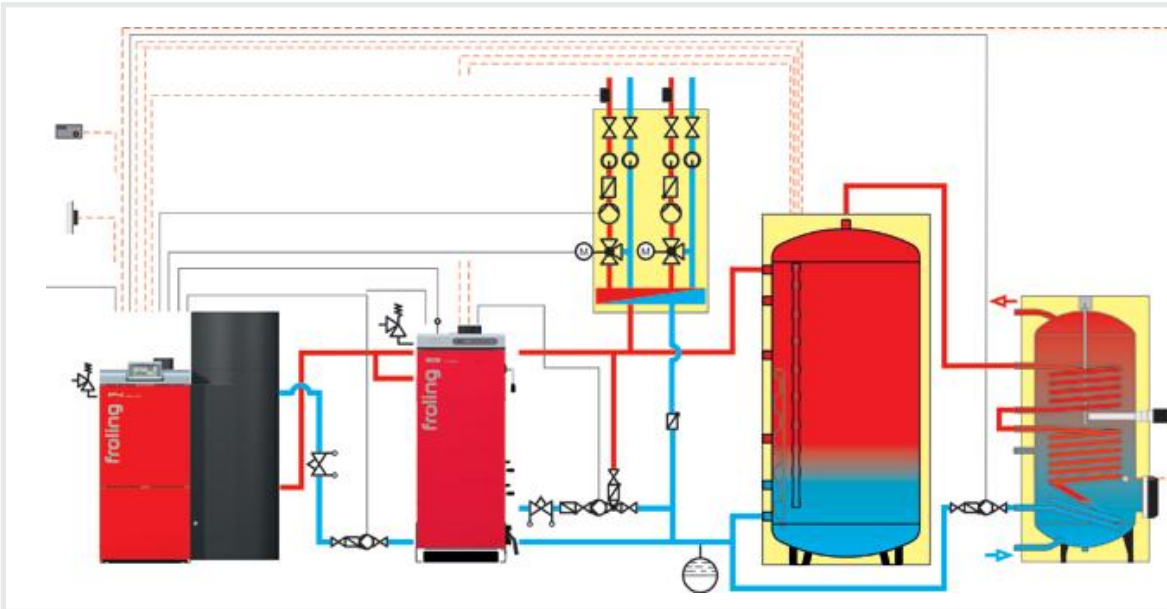
System requirements:

- Froling boiler (core module software version V54.04, B05.09) with boiler touchscreen (software version V60.01, B01.20)
- broadband internet connection
- Froling boiler internet connection via network
- web-enabled terminal device (smartphone/tablet PC/laptop/PC) with web browser

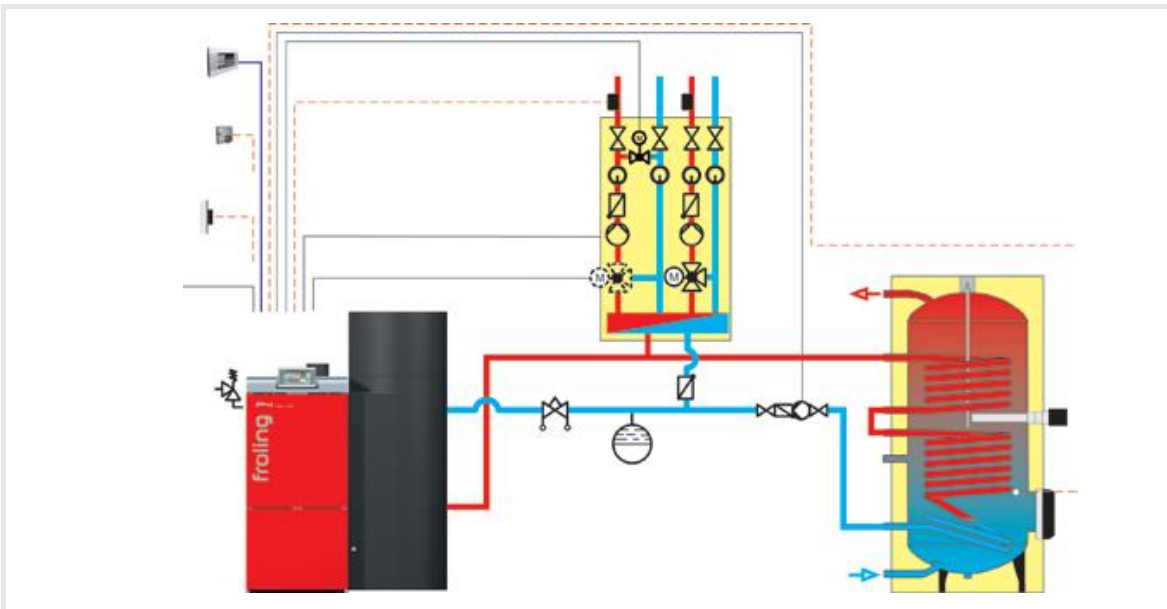
P4 Pellet

Feature: Systems engineering for optimum energy consumption

- Advantages:
- Complete solutions for all requirements
 - The components work perfectly together
 - Integrated solar power



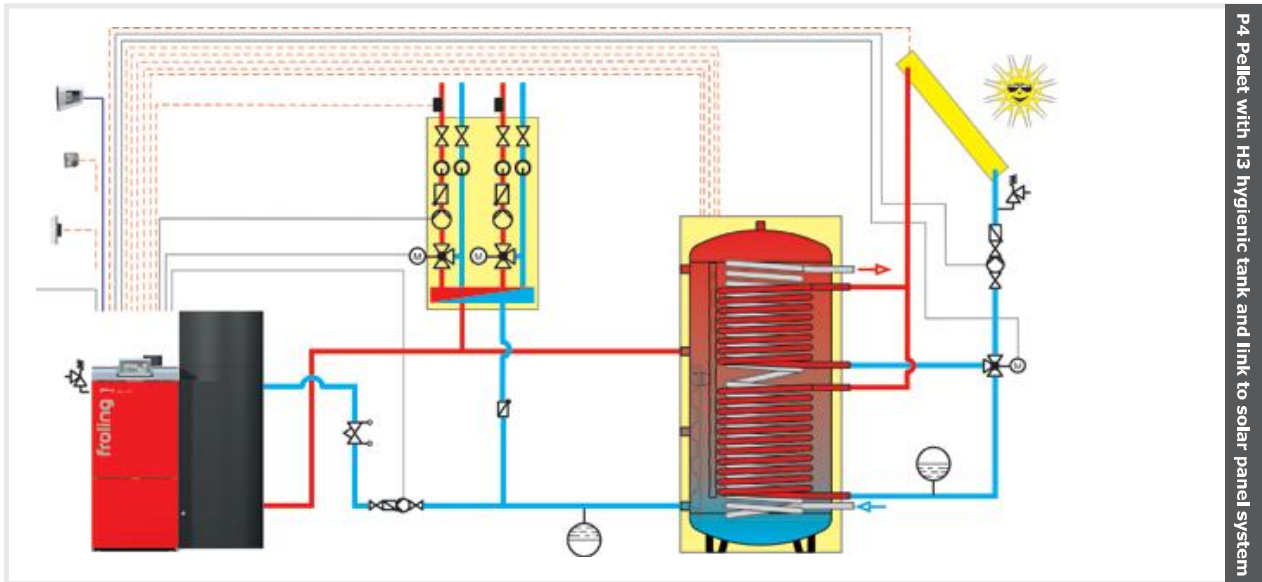
P4 Pellet with S3 Turbo, layered tank and Urnicell NT-S



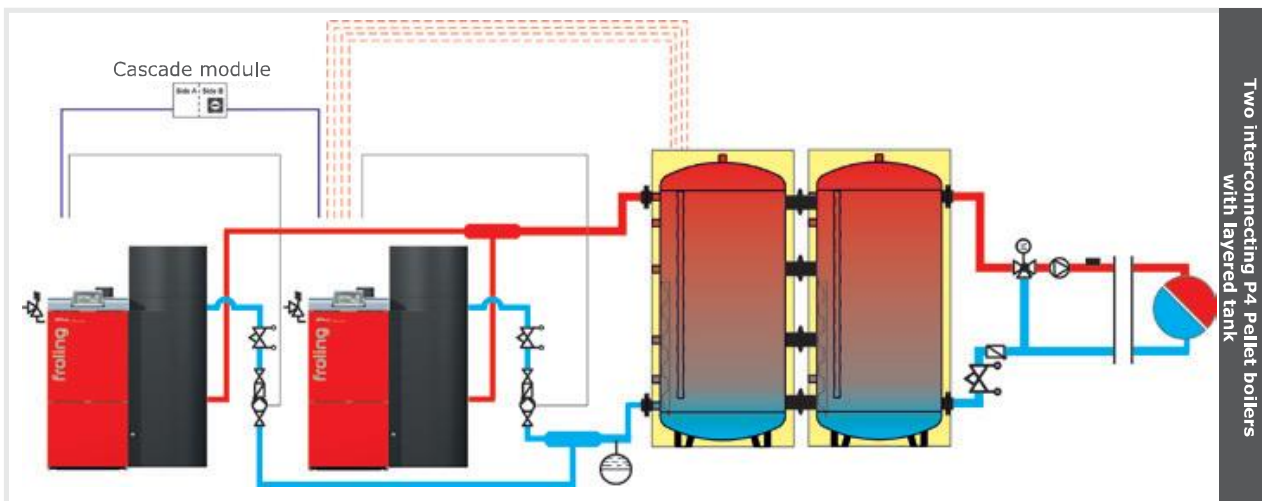
P4 Pellet with Urnicell NT-S

Froiling systems engineering offers efficient energy management. Up to 4 storage tanks, up to 8 hot water tanks and up to 18 heating circuits can be integrated into the heating management system.

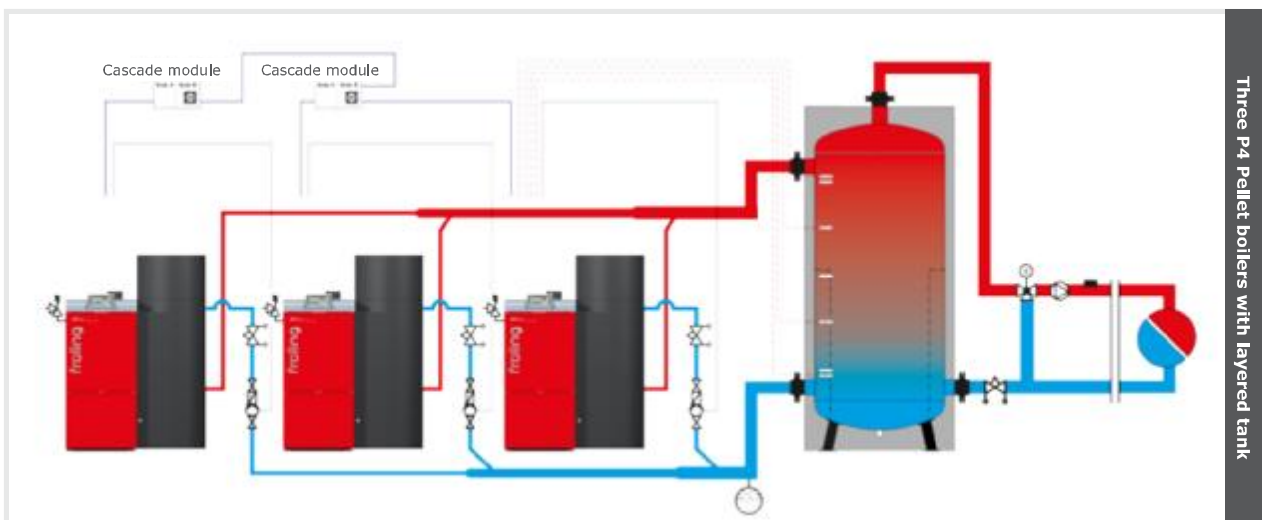
Perfect connections



P4 Pellet with H3 hygienic tank and link to solar panel system



Two interconnecting P4 Pellet boilers with layered tank



Three P4 Pellet boilers with layered tank

WMZ solar package (optional)

The heat quantity measurement package (WMZ) enables you to benchmark the efficiency of your solar panel system. The Lambdatronic P3200 analyses and displays the flow and return temperature, the flow rate and the daily and total output of the solar panel system.

Variable operation

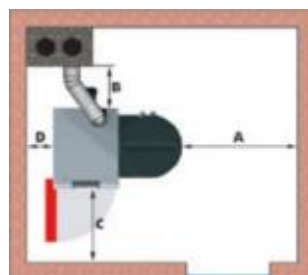
With variable operation the Froling P4 Pellet is only heated to the temperature level required by the heating system (hot water tank, radiator heating circuit). This avoids unnecessary radiant heat loss. This special feature guarantees maximum efficiency and avoids the need for an external return temperature control.

- Advantages:
- Minimal radiant heat loss
 - Maximum efficiency
 - No external return temperature control required

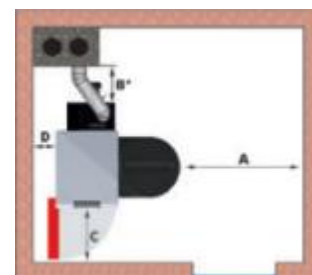
NEW: Froling cascade controller

Heating requirements vary considerably, especially in larger buildings such as hotels or public buildings. Froling offers a flexible answer to this problem in the form of a cascade. This smart solution allows you to combine up to four P4 Pellet boilers to reach a total output of up to 420 kW. You can also see the benefits of a cascade during the summer months. If the heat requirement is low, one boiler is often sufficient for hot water preparation. This provides a particularly efficient and economical heating solution. A further advantage is the increased reliability of operation, as the heat is provided by several boilers.

Recommended clearances in the boiler room



P4 Pellet

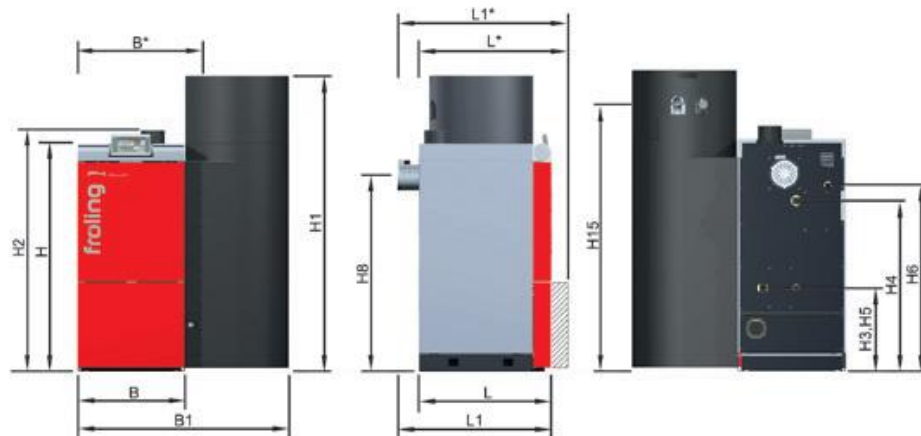


P4 Pellet with calorific value heat exchanger

| Mindestabstände im Heizraum - P4 Pellet | | 8 - 15 | 20 - 25 | 32 - 38 | 45 - 60 | 70 - 105 |
|---|---|--------|---------|---------|---------|----------|
| A | Minimum distance to stoker assembly | 300 | 300 | 300 | 300 | 300 |
| B | Induced draught fan maintenance area | 300 | 300 | 300 | 300 | 300 |
| B* | Space required incl. maintenance area for induced draught fan with calorific value heat exchanger | 300 | 350 | 450 | 450 | - |
| C | Space for insulated door | 550 | 720 | 830 | 490 | 590 |
| | Space requirement with plug-in insulated door | 400 | 400 | 300 | - | - |
| D | Minimum distance to side of boiler | 200 | 200 | 200 | 200 | 200 |

All information in mm.

Technical data



| Dimensions - P4 Pellet [mm] | P4 15 | P4 20 | P4 25 | P4 32 | P4 38 | P4 45 | P4 60 | P4 80 | P4 100 | P4 105 |
|--|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| L Length of boiler ¹⁾ | 740 | 740 | 740 | | | | | | | |
| L* Length of boiler ¹⁾ | | | | 820 | 820 | 900 | 900 | 1000 | 1000 | 1000 |
| L1 Total length including induced draught fan | 860 | 860 | 860 | | | | | | | |
| L1* Total length including induced draught fan | | | | 940 | 940 | 1020 | 1020 | 1070 | 1070 | 1070 |
| B Width of boiler | 600 | 770 | 770 | 860 | 860 | 1030 | 1030 | 1235 | 1235 | 1235 |
| B* Width of boiler including support ²⁾ | 705 | 875 | 875 | 965 | 965 | 1275 | 1275 | 1480 | 1480 | 1480 |
| B1 Total width including suction cyclone | 1185 | 1355 | 1355 | 1445 | 1445 | 1790 | 1790 | 2085 | 2085 | 2085 |
| H Height of boiler ³⁾ | 1280 | 1280 | 1280 | 1430 | 1430 | 1585 | 1585 | 1710 | 1710 | 1710 |
| H1 Total height including suction cyclone | 1660 | 1660 | 1660 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| H2 Height of flue pipe connection | 1350 | 1350 | 1350 | 1530 | 1530 | 1685 | 1685 | 1785 | 1785 | 1785 |
| H3 Height of flow connection (to 38 kW) | 460 | 460 | 460 | 460 | 460 | | | | | |
| H4 Height of return connection (to 38 kW) | 940 | 955 | 955 | 1085 | 1085 | | | | | |
| H3 Height of flow connection (from 45 kW) | | | | | | 515 | 515 | 520 | 520 | 520 |
| H4 Height of return connection (from 45 kW) | | | | | | 1290 | 1290 | 1410 | 1410 | 1410 |
| H5 Height of drainage connection | 460 | 460 | 460 | 460 | 460 | 490 | 490 | 500 | 500 | 500 |
| H6 Height of ventilation connection | 1030 | 1030 | 1030 | 1155 | 1155 | 1310 | 1310 | 1430 | 1430 | 1430 |
| H8 Height of induced draught fan connection | 1090 | 1090 | 1090 | 1215 | 1215 | 1375 | 1375 | 1495 | 1495 | 1495 |
| H15 Height of suction system connection | 1480 | 1480 | 1480 | 1720 | 1720 | 1720 | 1720 | 1720 | 1720 | 1720 |
| Flue pipe diameter | 130 | 130 | 130 | 150 | 150 | 150 | 150 | 200 | 200 | 200 |

1) All boilers can fit through an 88 cm-wide doorway.

2) Width of boiler including support for positioning unit, Corresponds to the minimum positioning width after removing the stoker assembly, suction cyclone and stoker unit.

3) Corresponds to the minimum positioning height after removing the stoker assembly, suction cyclone and stoker unit.

| Technical specifications - P4 Pellet | P4 15 | P4 20 | P4 25 | P4 32 | P4 38 | P4 45 | P4 60 | P4 80 | P4 100 | P4 105 |
|--------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Rated heat output [kW] | 14,9 | 20 | 25 | 32 | 38 | 45 | 58,5 | 80 | 100 | 105 |
| Output range [kW] | 3,1-14,9 | 6,0-20,0 | 7,5-25,0 | 8,9-32,0 | 8,9-38,0 | 13,5-45,0 | 17,3-58,5 | 24-80 | 24-100 | 24-105 |
| Energy (ErP) label* | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ | A ⁺ |
| Power consumption [W] | 55 | 71 | 87 | 110 | 110 | 113 | 120 | 115 | 112 | 112 |
| Water capacity [l] | 70 | 80 | 80 | 125 | 125 | 170 | 170 | 280 | 280 | 280 |
| Boiler weight [kg] | 355 | 425 | 435 | 525 | 535 | 760 | 765 | 1090 | 1100 | 1110 |

* Composite label (boiler + controls)

Your Froling partner:

P0191517 - All illustrations intended as a guide only. We reserve the right to make technical changes without prior notice. Errors and omissions excepted. Sources for external images: www.pelletlets.at, www.aboutpixel.de



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Addendum B – RHI Emission Certificate

Non-Domestic Renewable Heat Incentive

www.ofgem.gov.uk/ndrhi

22 JUN 2018

Emissions Certificate

In order to accredit any biomass boiler or stove applications received for the domestic or non-domestic Renewable Heat Incentive (RHI) schemes, Ofgem must be satisfied that a valid emissions certificate exists for the specific model in the application (or alternatively for the non-domestic RHI, an environmental permit for the site). This template incorporates all information required to demonstrate that the tested plant meets the air quality requirements of the RHI. It must be fully completed and issued by a testing laboratory in order to be a valid certificate.



| 1. TEST HOUSE | |
|---|---|
| a) Name and address of the testing laboratory that has carried out the required tests and issued this certificate * <i>*if different, include details of both</i> | TÜV AUSTRIA SERVICES GMBH Wiener Bundesstraße 8 A-4060 Leonding <i>Former address (June 1993-Sep 2017)</i> Am Thalbach 15 A-4600 Thalheim / Wels |
| b) Name and signature of the person authorised by the testing laboratory to issue the certificate | Name: Gerald Schrögendorfer |
| | Signature: |
| c) Date of issue of this certificate, together with certificate reference number for this certificate <i>*Please see Note A</i> | Date: 16/04/2019 |
| | Certificate reference number: RHI Cert Fröling_TÜV Austria_P4 Pellet 70-100_190416 <i>Optional: reference number of original test report on which this certificate is based: 10-UW-Wels-EX-242/1, 14-U-188/SD, 10-UW-Wels-EX-242/4, 10-UW-Wels-EX-242/5</i> |
| d) If the testing laboratory that has carried out the required tests is accredited to BS EN ISO/IEC 17025:2005, date of accreditation and accreditation number <i>(if testing conducted on or after 24 September 2013, the testing laboratory must be BS EN ISO/IEC 17025:2005 accredited at the time of testing)</i> | Date: 01/07/2007 |
| | Accreditation number: Id-No. (PSID): 274 before 01/07/2007 accredited as TÜV Austria, Id-No. (PSID) 10 |

| 2. PLANT - Please see Note B | |
|---|---|
| a) Name of the plant tested (model family of design) | P4 Pellet |
| b) Model of the plant tested* <i>*Please ensure this is the same as in the manufacturer's documentation and boiler nameplate</i> | P4 Pellet 100 |
| c) Manufacturer of the plant tested | Fröling Heizkessel- und Behälterbau GesmbH, A-4710 Grieskirchen |
| d) Installation capacity* of the tested plant in kilowatts (kW) <i>*The total installed peak heat output capacity</i> | P4 Pellet 100 (99 kW) P4 Pellet 100 (100 kW) |
| e) Is the plant a <u>manually stoked, natural draught</u> plant? (without a fan providing forced or induced draught) | yes/no |

| | |
|---|--|
| <p>f) (i) Date the plant was tested* (ii) Please confirm that NOx and PM have been tested on the same occasion <i>*This is in reference to the emissions testing for PM and NOx, not any wider range of tests. A specific date is required. Please provide the date of test performed at ≥85% of the installation capacity. If more than one model has been tested or testing has been conducted on different dates for different fuels, please list each date with details.</i></p> | <p>Fuel wood pellets: 19/10/2010 yes/☐</p> |
| <p>g) Please list all the plants in the type-testing range* of the tested plants to which the certificate applies, if any.¹ Please include the installation capacity of each model. <i>*This must follow the ratio rules: If the smallest plant in the range is 500kW or less, the largest plant in the range can't be more than double the smallest. If the smallest plant in the range is over 500kW, the largest plant in the range can't be more than 500kW greater than the smallest.</i></p> | <p>- P4 Pellet 100 (99 kW) - P4 Pellet 100 (100 kW) <i>interpolated between P4 Pellet 60 and P4 Pellet 100:</i> - P4 Pellet 70 (69.0 kW) - P4 Pellet 80 (80.0 kW)</p> |

| | |
|--|---|
| <p>3. FUELS</p> | |
| <p>a) Types of fuels used when testing <i>(Where relevant, the fuel should be classified according to EN303-5, referencing the relevant EN14961 standard for specific classification (superseded by EN17225). We don't expect broader categories such as 'beech'.</i></p> | <p>Wood pellets according to - EN 303-5:2012, class C1 - EN ISO 17225-2, class A1</p> |
| <p>b) Based on the testing, list the range of fuels that can be used in compliance with the emission limits of 30 grams per gigajoule (g/GJ) net heat input for particulate matter (PM), and 150 g/GJ net heat input for oxides of nitrogen (NOx) <i>(Where relevant, the fuel should be classified according to EN303-5, referencing the relevant EN14961 standard for specific classification (superseded by EN17225). We don't expect broader categories such as 'beech'.</i></p> | <p>Wood pellets according to - EN 303-5:2012, class C1 - EN ISO 17225-2:2014, class A1</p> |
| <p>c) Moisture content of the fuel used during testing. (If multiple fuel types have been tested state all.)</p> | <p>Wood pellets: w=7.1 %</p> |

¹ The type-testing approach enables testing laboratories to provide assurance that all boilers in a given range meet the air quality requirements, without needing to specifically test each boiler.

| | |
|---|--|
| <p>d) Maximum allowable moisture content* of fuel that can be used with the certified plant(s) that ensures RHI emission limits are not exceeded. <i>*This value may be obtained from ranges specified in relevant EN14961 standard for specific fuel classifications or EN303-5 when not applicable. Different fuel types should state different maximum allowable moisture contents.</i></p> | <p>Wood pellets according to - EN 303-5:2012, class C1; w=10% - EN ISO 17225-2, class A1; w=10%</p> |
|---|--|

| <p>4. TESTS</p> | |
|---|---|
| <p>Confirm which requirements the emissions of NOx and PM have been tested in accordance with. <u>Either 4a or 4b must be confirmed to be a valid RHI certificate.</u></p> | |
| <p>a) Was the testing carried out in accordance* with all of the provisions relevant to emissions of PM and NOx in either BS EN 303-5:1999 or BS EN 303-5:2012?² <i>*It is not a requirement that the tested plant must be within the scope of one of these standards, as long as the test lab can confirm that all of the relevant provisions were followed appropriately</i></p> | <p>EN 303-5:1999 yes/∅ EN 303-5:2012 <i>not applicable at test time</i></p> |
| <p>b) Was the testing carried out in accordance with <u>all</u> of the following requirements? (i) - EN 14792:2005 in respect of NOx emissions - EN 13284-1:2002 or ISO 9096:2003 in respect of PM emissions³ (ii) emissions of PM represent the average of at least three measurements of emissions of PM, each of at least 30 minutes duration (iii) the value for NOx emissions is derived from the average of measurements made throughout the PM emission tests.</p> | <p>- yes/∅ - yes/∅ (in fulfilment of annex A of EN 303-5:2012) Tested according to 4a Tested according to 4a</p> |
| <p>c) Please confirm the plant was tested at ≥85% of the installation capacity of the plant.</p> | <p>yes/∅</p> |
| <p>d) Please confirm the test shows that emissions from the plant were no greater than 30 g/GJ PM and 150 g/GJ NOx.</p> | <p>yes/∅</p> |
| <p>e) Measured* emissions of PM in g/GJ net heat input <i>*This average value should be from the test confirmed in 4c. Results from partial load tests are not required. This value must be in the specified units.</i></p> | <p>Wood pellets: 13 <i>(classification of fuel used during testing see 3.a) and 3.c)</i></p> |

² BS EN303-5:1999 and 2012 explain what should be measured and when.

³ These standards explain how to make the PM and NOx measurements.

| | |
|--|---|
| <p>f) Measured* emissions of NOx in g/GJ net heat input <i>*This average value should be from the test confirmed in 4c. Results from partial load tests are not required. This value must be in the specified units.</i></p> | <p>Wood pellets: 83 (classification of fuel used during testing see 3.a) and 3.c)</p> |
|--|---|

Note A: If details from a previously issued certificate or an original test report are being transferred to this RHI emission certificate template, please note that this document must be **issued by the testing laboratory** as a separate certificate. The issue date and certificate reference number should be in relation to *this* certificate produced using the RHI template, not the issue date and reference number of the original certificate or test report.

Note B: If you are including multiple tested plants on one certificate, please ensure that all sections are completed for each tested plant, and are laid out such that it is clear which details relate to which tested plant. If a type-testing range is included as well, please show clearly which type-testing range relates to which tested plant(s), following the type-testing range ratio rules outlined in 2g.

Addendum C – Flue height calculations

Calculation of Chimneys according to EN 13384-1

Design of Plant - Single Appliance



| | |
|-------------------------|--------------------------|
| Calculated according to | EN 13384-1 |
| Chimney | House Chimney |
| Position/Run | Inside Building |
| Fresh Air Supply | Dependent on Room Air |
| Air Supplied by | From Installaion Room |
| Sections | Connector: 1, Chimney: 1 |
| Outlet | Open Outlet Zeta = 0 |



Environment



| | |
|--------------------------------------|---------------------------------|
| Geodetic Height | 64 m |
| Safety Factor SE | 1.5 |
| Correction Factor SH | 0.5 |
| Ambient Air Temperatures (Standards) | |
| At top Outlet | 0 °C (Temperature Requirement) |
| Outside Area | 0 °C (Temperature Requirement) |
| In Unheated Areas | 0 °C (Temperature Requirement) |
| In Heated Areas | 20 °C (Temperature Requirement) |
| Ambient Air | 15 °C (Pressure Requirement) |

Appliance



| | | |
|----------------------------|---------------------|-----------------|
| Category | Pellets Heating | |
| Manufacturer, Model | Fröling (A) P4 100 | |
| Fuel | Wooden Pellets | |
| | High Fire | Low Fire |
| Nominal Output (Net) | 100 kW | 24 kW |
| Nominal Output (Gross) | 106 kW | 25.5 kW |
| CO2 Level | 12 % | 9 % |
| Mass Flow | 76 g/s | 26 g/s |
| Temperature | 170 °C | 100 °C |
| Required Feed Pressure | 8 Pa | 6 Pa |
| Max. Förderdruck Zuluft | 20 Pa | 20 Pa |
| Appliance Outlet | Round 200 mm | |
| Kind of Connection | Conic Reduction 60° | |
| Required Air (Factor Beta) | 1.1 | |

Installation Room

| | |
|-------------|----------------------|
| Category | Special Boiler Room |
| Fresh Air | Opening from Outside |
| Extract Air | Opening to Outside |

Connector - Construction

| | |
|------------------------|--|
| Category | Twin Wall Connector |
| Manufacturer, Model | SFL Nova SM |
| Cross Section | Round 250 mm |
| Thermal Resistance | 0.5 m ² K/W |
| Thickness | 26 mm |
| Inner Wall Material | Stainless Steel |
| Rugosity | 1 mm |
| Product Classification | EN 1856-1/2 - T450 N1 D V2 L50050 G50 |
| Suitable acc. to | Declaration of conformity CE-0086-CPD-496040 |

Connector - Geometrie

| | |
|---------------------------|-----------------------|
| Resistances | Segment Bend (2) 90 ° |
| Effective Height | 412 mm |
| Drawn Length | 1255 mm |
| Portion in outside areas | 0 % |
| Portion in unheated areas | 0 % |
| Portion in heated areas | 100 % |

Chimney - Construction

| | |
|------------------------|--|
| Category | Twin Wall Chimney |
| Manufacturer, Model | SFL Nova SM |
| Cross Section | Round 250 mm |
| Thermal Resistance | 0.5 m ² K/W |
| Thickness | 26 mm |
| Inner Wall Material | Stainless Steel |
| Rugosity | 1 mm |
| Product Classification | EN 1856-1 - T450 N1 D V2 L50050 G50 |
| Chimney Classification | EN 15287 - T450 N1 D 3 G50 (R0.50) |
| Suitable acc. to | Declaration of conformity CE-0086-CPD-496040 |

Chimney - Geometrie

| | |
|------------------|---------|
| Resistances | None |
| Effective Height | 4625 mm |
| Drawn Length | 4.625 m |

Chimney - Course (Inside Building)

| | |
|---------------------------|-----------|
| Portion in outside areas | 35 % |
| Portion in unheated areas | 0 % |
| Portion in heated areas | 65 % |
| Building Contact | All Sides |

Additional Insulation

| | |
|-------------------|----------|
| Outside Area | No |
| In Unheated Areas | canceled |

Outlet Resistance

| | |
|-------------------|-------------|
| Outlet Resistance | Open Outlet |
| Zeta | 0 |

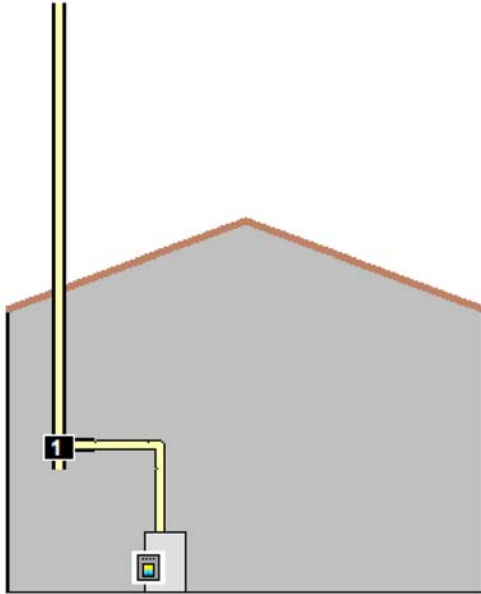
Entry



Resistance

Tee 90 °

Schematic Representation of the Plant



Result of Calculation - Chimney



| | | | | | | |
|-------------------------------|-------------------------------------|-------------|------------------|-----|-----------------|-----|
| Mode | Planned With Negative Pressure, Dry | | | | | |
| Requirement | Form. | Unit | High Fire | | Low Fire | |
| Pressure Requirement | P _Z -P _{Ze} | Pa | 3.9 | +++ | 1.8 | +++ |
| Low Pressure Condition | P _Z -P _{LU} | Pa | 9.9 | ++ | 6.8 | ++ |
| Temperature Requirement | t _{iob} -t _g | °C | 82.7 | +++ | 11.4 | ++ |
| Additional Information | | | | | | |
| Chimney Velocity | W _m | m/s | 1.97 | | 0.57 | |

All of the mentioned conditions for the check of the function of the chimney are fulfilled. The plant fits all conditions of standard EN 13384-1.