



Installation and operation manual for fireplace insert



TYPE: KFD ECO

MODELS: 5161 L/R | 5172 L/R | 5183 LH/RH

The fireplace insert is a heating and decorative device, allowing construction of a complete heating system based on distribution of hot air. It is not an autonomous heating device but a component of the heating system. Due to the above reasons, its operation and safety largely depends on the method of installation and materials used. Considering that, it is recommended that installation of the insert is commissioned to an Authorised KFD Fitter, guaranteeing an appropriate standard of service. Installation of the fireplace must be performed in compliance with applicable regulations (table 5). All domestic and local regulations ought to be observed.

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1 Construction of the fireplace

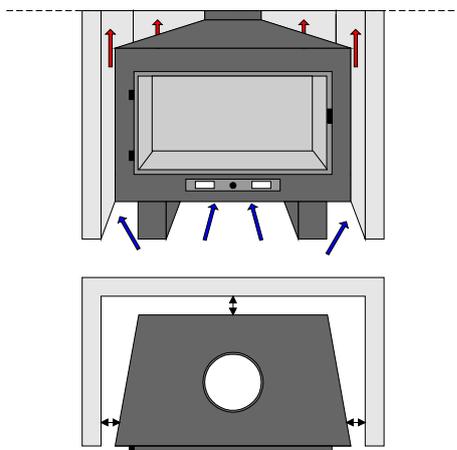
1.1 Placement of the fireplace

The installation of fireplace insert starts with preparing a correct place for the fireplace construction . It ought to be characterised with:

- strength of the base (floor) appropriate to the type of insert and weight of enclosure (on average, from 450 to 850 kg); the floor must be reinforced and/or the weight ought to be distributed over a larger area, if this condition is not fulfilled,
- the chimney with parameters (diameter and height) suitable for the type and power of the insert (chapter 3) and it must be resistant to humidity produced during the combustion process, and temperatures occurring during combustion of solid fuels,
- adjustable supply of fresh air from outside the building (min. 200 cm²), conducted to the room in which the fireplace insert is installed,
- the place of installation should not contain any combustible materials or non-heat resistant materials, electrical or hydraulic installations,
- the fireplace must not be installed in a room with mechanical exhausts (ventilation) „If the fireplace can be installed in a room with mechanical ventilation, please observe local regulations.
- floor under the fireplace and 60 cm in front of the fireplace must be made from incombustible materials (e.g. terracotta or natural stone).

Once the place of installation is prepared as above, construction of the fireplace pedestal constituting the fireplace foundation may proceed. The pedestal structure must guarantee unobstructed flow of air from underneath, along external walls of the insert and upwards, ensuring the minimum air flow section required for the given type of insert (table 4). If the insert does not have its own supporting structure, the pedestal constructed as above may become its foundation. While placing the insert, make sure that the insert base does not limit the required air flow area (figure 1).

a)



b)

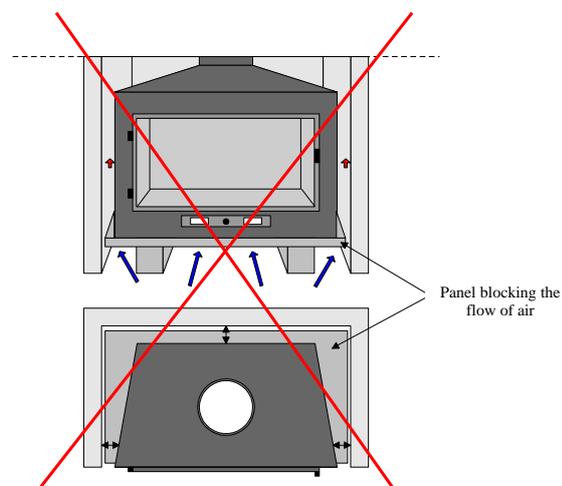


Figure 1. Flow of convection air: a) correct, b) incorrect.

- situation of the fireplace in timber frame houses (“Canadian houses”)

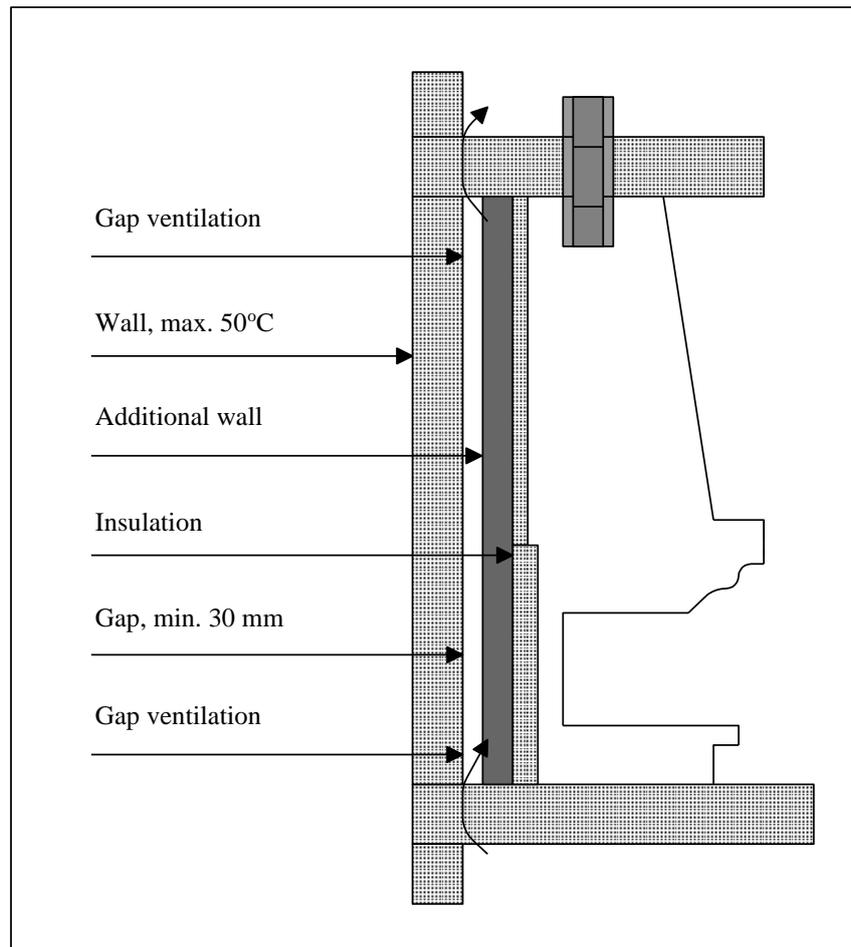


Figure 2. Example installation of a fireplace with a ventilated thermal screen.

1.2 Chimney

Once the insert is placed correctly, the outlet stub pipe of the insert ought to be connected to the chimney by means a respective duct with the required certification, allowing application in solid fuel furnaces. The angle of connection to the chimney ought to be **app. 45°** (figure 3 – do not use a 90° elbow), and the connecting duct ought to have a diameter corresponding to diameter of the stub pipe of the combustion gas outlet. If the diameter needs to be reduced, use appropriate reducer couplings selected in compliance with the diagram (figure 21).

Use of a flexible connecting pipe eliminates the “insert movement” phenomenon due to tensions caused by thermal expansion if immovable connection elements are used. Moreover, if immovable connections are installed, thermal compensation of the expanding pipe needs to be insured and ducts must have inspection holes allowing access through openings in the fireplace enclosure (e.g. grids in the hood).

KFD ECO inserts require installation of an additional reduction on the stub pipe of the fireplace insert, depending on the kind of connecting pipe used for connecting the fireplace insert. The reducing element is to be fitted with the smaller dimension inside the stub pipe of the fireplace insert. Next, the flexible connecting pipe is to be placed inside the upper part of the reducing element. The reducing element must not be based on the axle of the chimney

damper, as this may cause problems in using the chimney damper or a damage. It is recommended that fragment of the reducing element placed inside the fireplace insert stub pipe should have the maximum height of 50 mm. Connection of the reducing element with the insert and with the connecting pipe must be sealed. The process ends with connection of the connecting pipe with the chimney. In case of flexible connecting ducts, a transition element appropriate to dimensions and kind of the chimney must be purchased. Please remember during connection that the connecting pipe must be mounted on the external side of the transition element.

Materials which can be used for installation are specified in chapter 4.

After removing all labels from the surface of the glass pane and thorough cleaning of glue residues, perform test lighting up of the initially connected insert. Fire ought to be increased gradually to avoid occurrence of excessive internal tensions in the insert body.

During test lighting up of the insert, check tightness of connections with the chimney, tightness of door gaskets and operation of adjusting elements (combustion rate adjustment levers). During the first lighting up and annealing of the insert, heat resistant paint covering the insert surface smells while hardening, which is a normal phenomenon you should not be concerned with.

Please observe appropriate EN norms and local regulation which concern the chimney. Figure 4 presents regulatory requirements related to height of the chimney with respect to the roof ridge.

Basic requirements for chimneys to be used for connection of fireplace inserts stipulate that the chimney:

- should have a circular section or another appropriate section as required by applicable regulations,
- should be thermally insulated and waterproof, made from materials resistant to very high temperatures, products of combustion and possible condensate,
- should not have any narrowings or vertical deflections over 30°,
- in case of a rectangular section, the maximum proportion of the sides may not exceed $\frac{1}{2}$,
- minimum chimney height is recommended as 4m measured from the connection of the connecting pipe to the chimney,
- must have a cleaning hole for collecting and emptying of combustion process residues,
- an excessive section of the chimney may cause problems in using the fireplace; to avoid that, “cladding” of the chimney may be made throughout its length,
- an insufficient section of the chimney may cause significant draught reduction and, in consequence, smoking of the fireplace insert.

Negative pressure in the chimney ought to be 12 Pa (1.2 mm column of water). Negative pressure measurement ought to be performed during operation of the fireplace (at nominal combustion rate). If the negative pressure exceeds 17 Pa (1.7 mm column of water), a draught terminator may need to be installed. Similarly, in case of insufficient negative pressure, a draught enhancing attachment ought to be fitted.

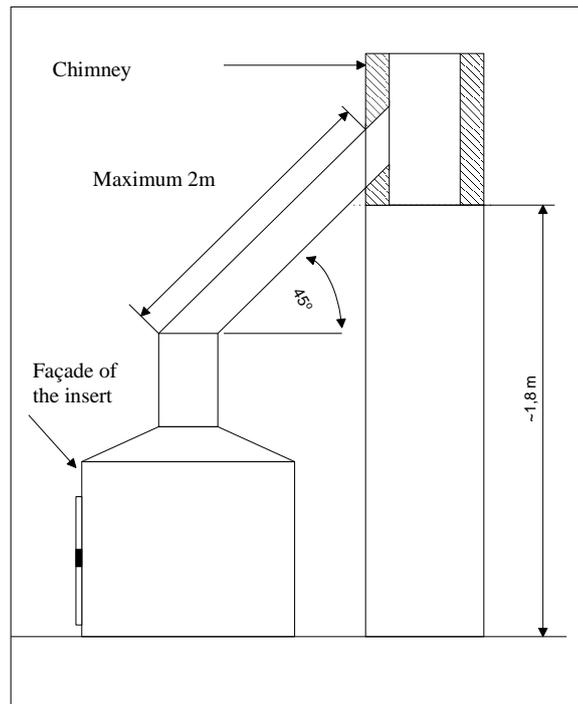


Figure 3. Correct connection of the insert to the chimney.

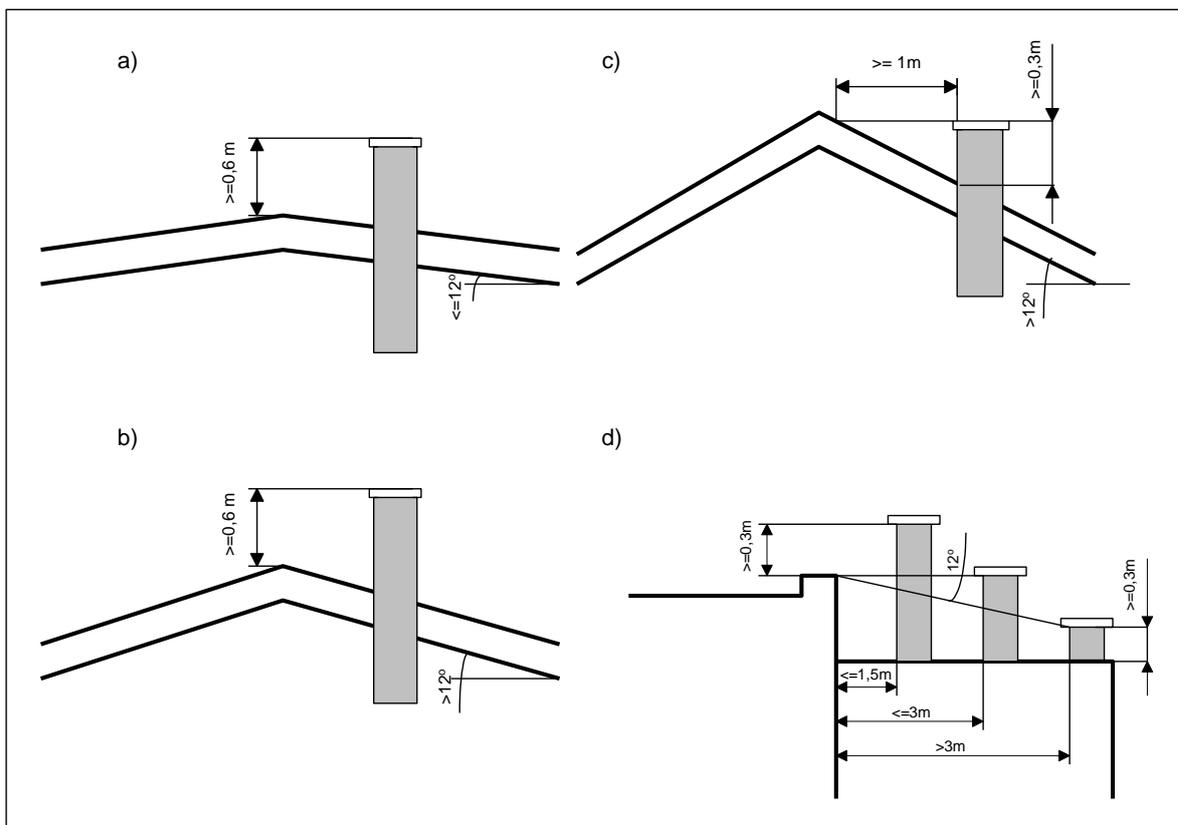


Figure 4. Required chimney heights according to the norm PN-89/B-10425: a) flat roof covered with any material, b) steep roof with easily ignitable covering, c) steep roof with non-ignitable, incombustible and flash resistant covering, d) situation of the chimney nearby another building.

Note

- Safe distance between the internal side of the chimney and combustible elements is at least 16 cm in case of a brick chimney. In case of steel chimneys, the information is specified by the manufacturer (X).

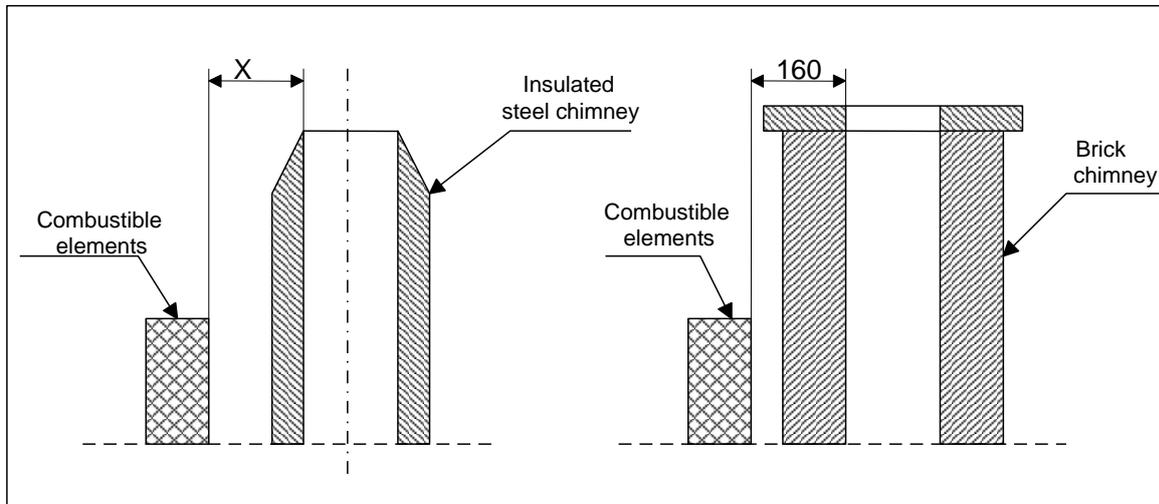


Figure 5. Safe distance of the chimney from combustible elements (dimensions in mm).

- Safe distance for conducting the connecting pipe (combustion gas pipe) through a combustible wall is at least 20 cm.

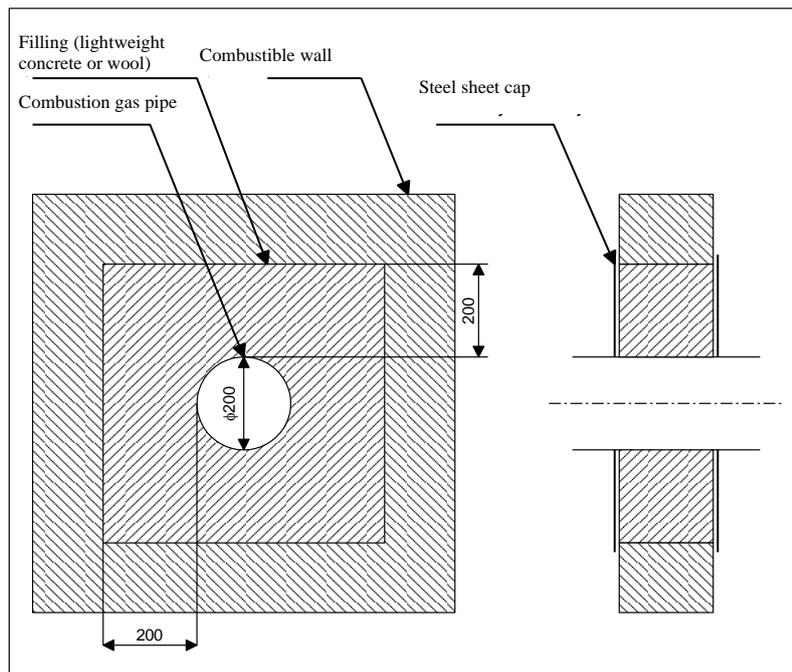


Figure 6. Method of conducting the combustion gas pipe through a combustible wall (dimensions in mm).

1.3 Tip of the chimney

The strength and stability of draught in the chimney depend as well on the kind of chimney tip. It ought to reach above the roof ridge and protect the outlet against rain and adverse impact of wind (figure 7).

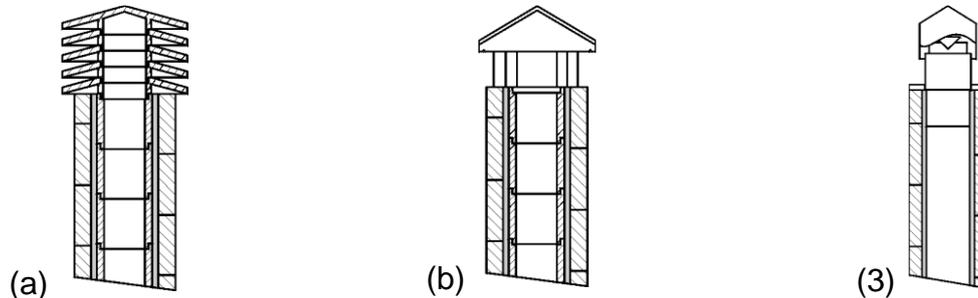


Figure. 7 Example chimney tips: a) prefabricated tip, b) brick version, c) steel tip – so called chimney cowl.

The chimney tip ought to meet the following requirements:

- its internal diameter should be equal to the diameter of the chimney,
- usable diameter of the combustion gas outlet is to be twice the size of the chimney diameter,
- it ought to protect the chimney against adverse weather (rain, snow) and foreign bodies,
- it ought to be easily accessible for maintenance and cleaning of the chimney,
- in case of two adjacent chimneys, tip of one chimney ought to be located at least 50 cm above the other one, in order to avoid mutual interference of produced negative pressure (figure 8),
- chimney tip ought to be situated 6 m away from any obstructions, such as walls, rocks or trees according to the local in regulations. Otherwise, the chimney ought to be extended to protrude approximately 1 m above the existing obstruction. The chimney tip ought to be situated approximately 1 m above the roof surface (figure 9).

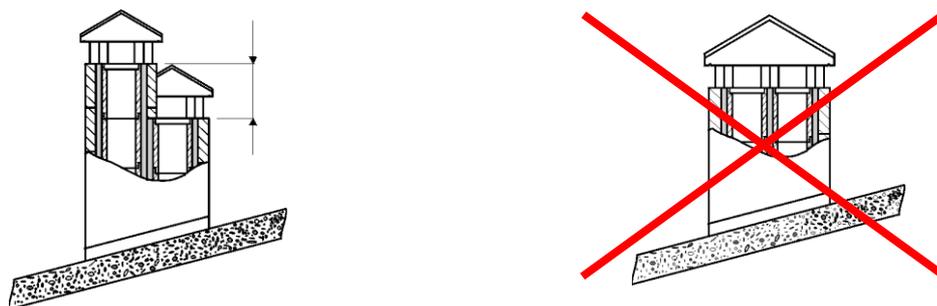


Figure 8. Construction of adjacent chimneys.

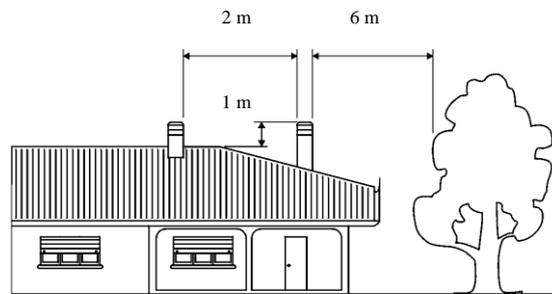


Figure 9. Situation of the chimney.

1.4 Ventilation conditions for KFD ECO fireplace insert installation

Rooms in which KFD ECO fireplace inserts are installed ought to meet the technical conditions specified in the local regulations. (Polish: REGULATION OF THE MINISTER OF INFRASTRUCTURE dated 12 April 2002 on technical conditions to be met by buildings and their situation – Polish Journal of Laws of 15 June 2002, № 75, item 690 – in particular, in paragraph 150 of the above mentioned act – regarding ventilation and air conditioning).

1.5 Supply of outdoor air

Additional outdoor air needs to be supplied to fireplace inserts. Pursuant to data specified in table 4, section area of the air inlet ought to be 200 cm². The following conditions must be observed while constructing the installation:

- air is to be supplied from the direction of prevailing winds,
- air is not to be supplied from the direction of the street,
- a damper is to be installed to allow cutting off air supply while the fireplace is not in use,
- air from other rooms of the house or flat must never be supplied,
- outdoor air may be supplied by installing window- or wall-mounted intake ventilators with mechanical adjustment.

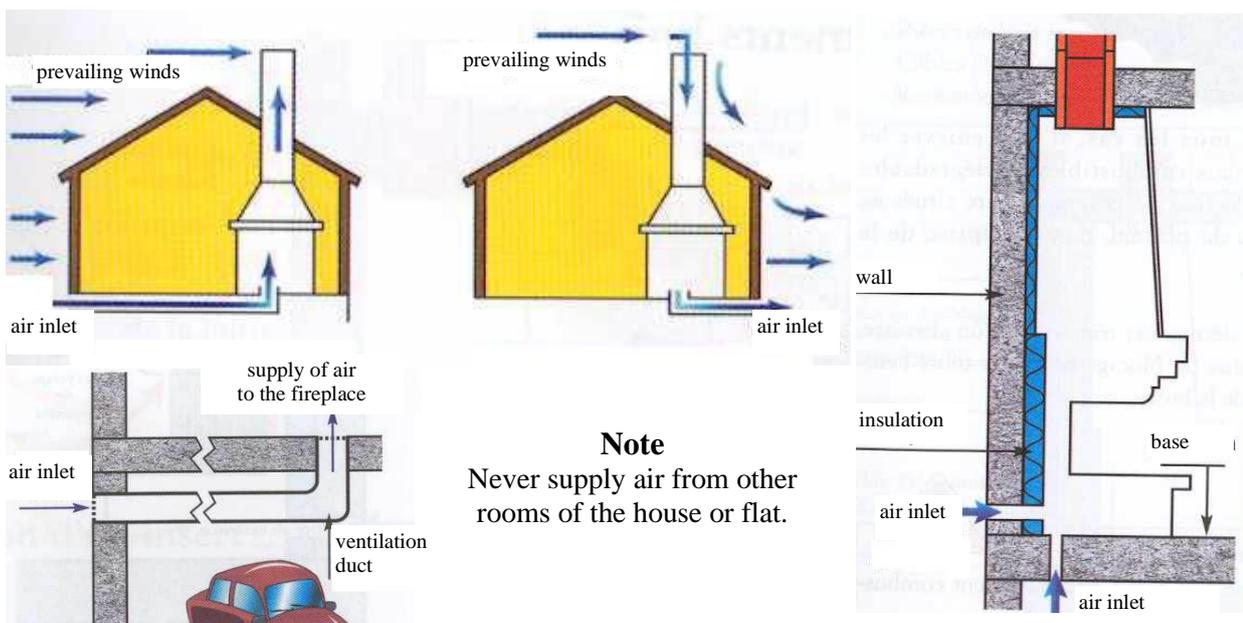


Figure 10. Method of supplying outdoor air underneath the insert.

Installation of outdoor air supply is mandatory. Regulations stipulate that at least 10 m³/h of outdoor air must be supplied per 1 kW of furnace power. In case of the KFD ECO inserts, a certain quantity of air can be supplied directly to the furnace. This requires installation of a pipe with the diameter of 125 mm to the stub pipe situated in the bottom part of the fireplace insert. The remaining quantity of air is to be supplied directly to the room in which the fireplace insert is located.

NOTE: Exhaust ventilation devices working in the same room as the fireplace or in a room with common ventilation may cause interference to proper operation of the fireplace.

Consequently, the ventilation installation design must allow independent operation of all devices which consume air.

In case of another furnace in the same room, working simultaneously with the KFD ECO insert, a sufficient quantity of air for combustion must be supplied, as required by each of the installed furnaces.

All air inlets (grates) of intake ventilation leading into the room must be passable.

1.6 Installation of the fireplace enclosure

After trials confirming proper operation of the insert, further stages of fireplace construction may proceed, involving construction of the enclosure at the sides, installation of the beam and hood chamber. During installation, appropriate distance (5 cm) must always be maintained between the insert walls and the surface of enclosure interior thermal insulation (figure 14). The heat conductivity coefficient of mineral wool below 0,09 W/mK (measured at the temperature of 200°C) is required.

This is crucial as unrestricted air flow of a sufficient quantity in compliance with local regulations is needed, ensuring required cooling the insert and important to further efficiency of the whole air heating system (5 cm is to be measured between external ends of radiators and insulation of the enclosure). Enclosure of the hood above the beam must also be insulated properly up to the separating shelf (at least 30 cm below the ceiling – also insulated). A sufficient number of hot air outlet grates must be located immediately under the shelf; outlet grate section must be appropriate to the given insert type (chapter 5). While selecting the grates remember that many decorative motives, grills or lamellas reduce the effective grate section area by up to 50%. During fireplace construction, consider temperatures produced during combustion of wood. Parts of the fireplace insert body heat up to 550°C. Temperature at the convection air outlet grates must not exceed 90-100°C. In case of failure or inappropriate use of the fireplace, the above temperatures may rise even higher. Therefore, only appropriate materials with respective certifications may be used for construction of the fireplace. The distance of combustible elements from the fireplace insert must be 2 m, whereas the distance from outlet grates must be at least 0.6 m.

While installing the fireplace insert, remember to keep a gap of approximately 2 mm between sides of the fire insert façade and parts of the enclosure (figure 16), required due to thermal expansion of the material used for construction of the fireplace insert. A gap of approximately 5 mm between the top part of the fireplace insert façade and enclosure elements is also to be kept.

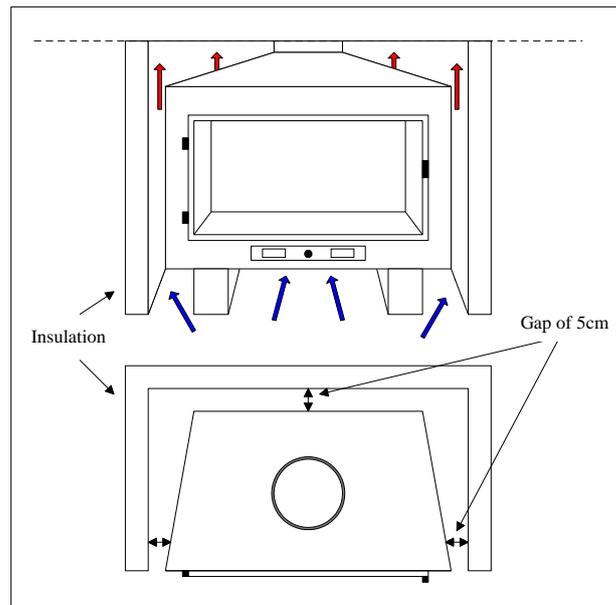


Figure 14. Expansion gap between the insert and the insulation.

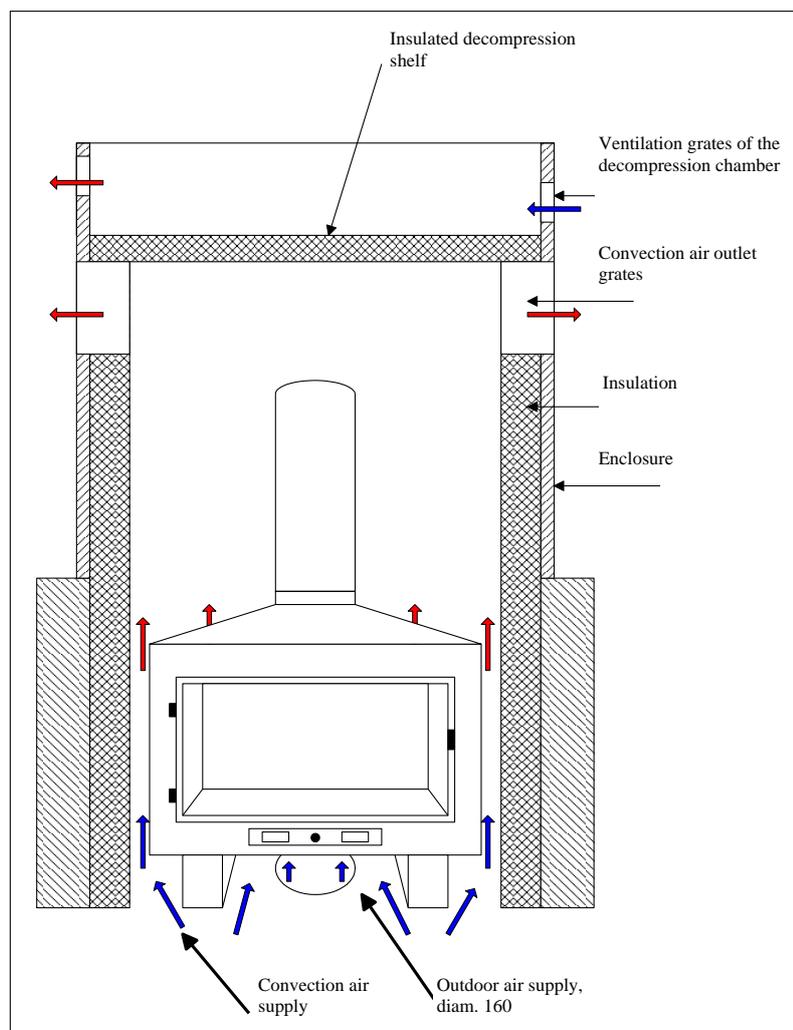


Figure 15. Ventilation of the fireplace insert (dimensions in mm).

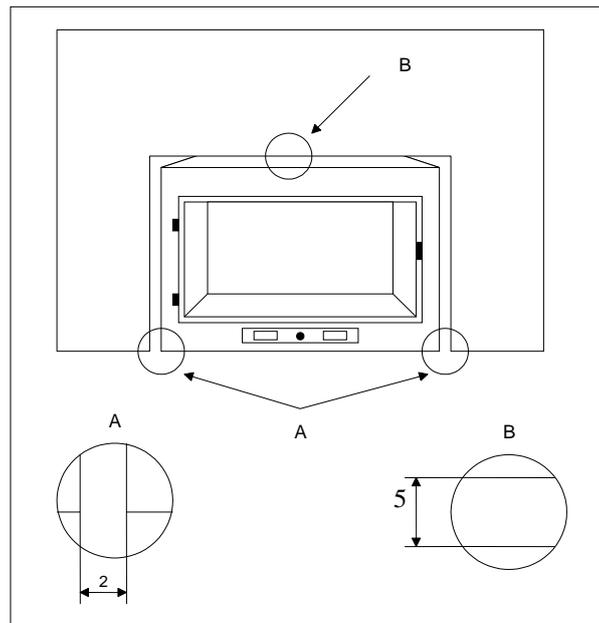


Figure 16. Expansion gaps between the fireplace insert and the enclosure (dimensions in mm).

1.7 Connection of hot air distribution pipes in the hood

If distribution of hot air from the fireplace to other rooms through natural gravitational draught is designed (maximum 3 m horizontally), connect distribution pipes directly to openings previously cut out in the separating shelf. Ensure thorough sealing of connections (figure 17). However, if air is to be distributed by a turbine because of significant distances (forced circulation), termination of the pipe sucking hot air from the hood ought to be located app. 15 cm below the bottom edge of outlet grates in the hood, to prevent possible suction of cold air through outlet grates (figure 18). The installation constructed as above should be safe and the temperature of air coming out from grates in the hood, during fireplace operation at rated power, should not exceed 90°C.

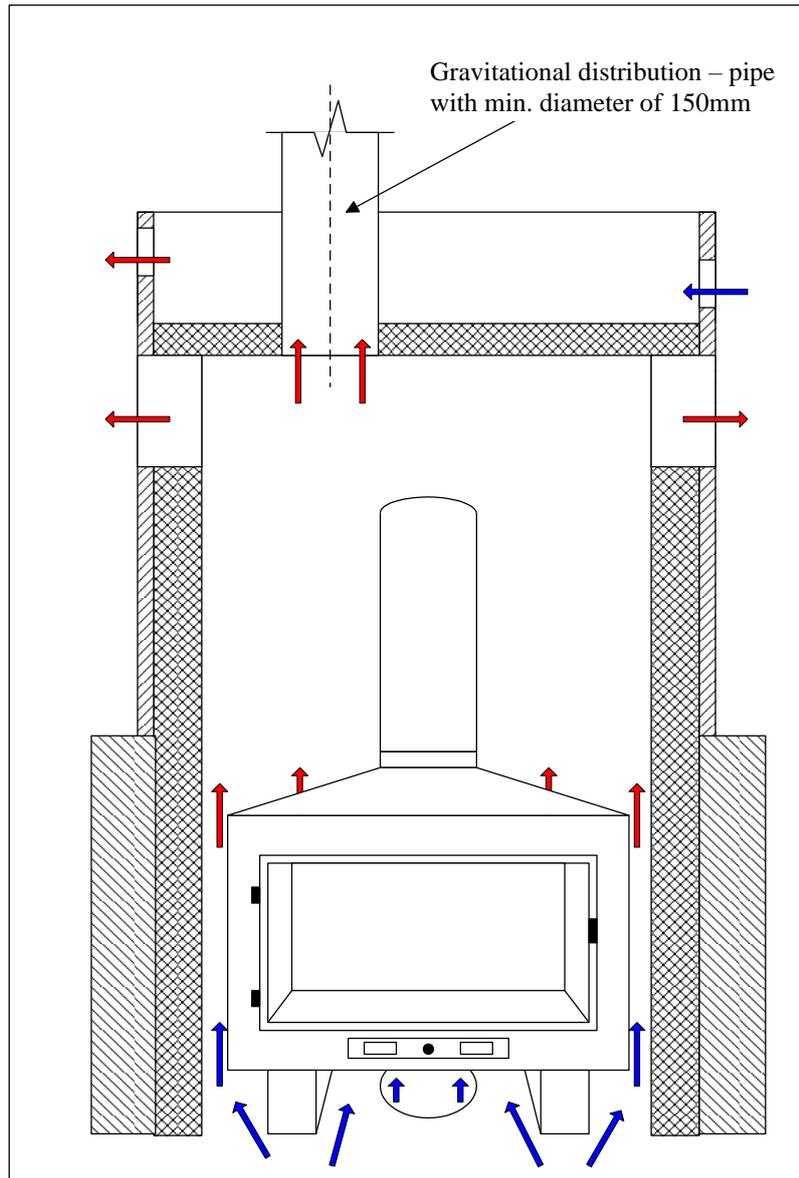


Figure 17. Connection of gravitational distribution to the hood.

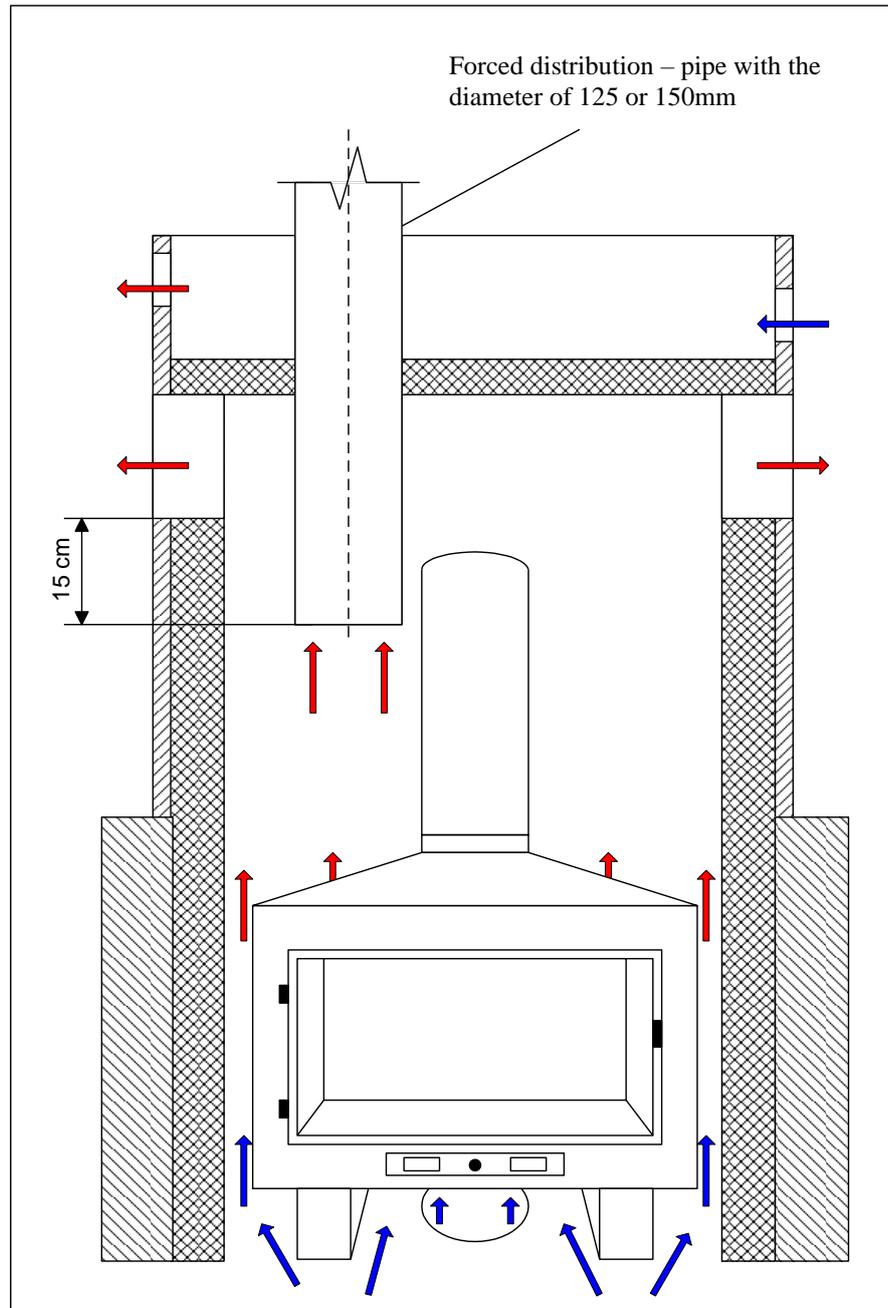


Figure 18. Connection of forced distribution to the hood.

1.8 Protection of the beam in the fireplace enclosure

Considering radiation of the fireplace insert, particular attention is to be paid to protection of the wooden beam during designing of the fireplace construction. On the one hand, consider proximity of the beam to external walls of the fireplace insert and, on the other hand, radiation of the furnace glazed door which is usually located very close to the fireplace beam. Remember that both the internal surfaces and the bottom surface of the beam are made from combustible materials and may not be in contact with a temperature above 65°C.

Figure 19 presents several examples of resolving this problem.

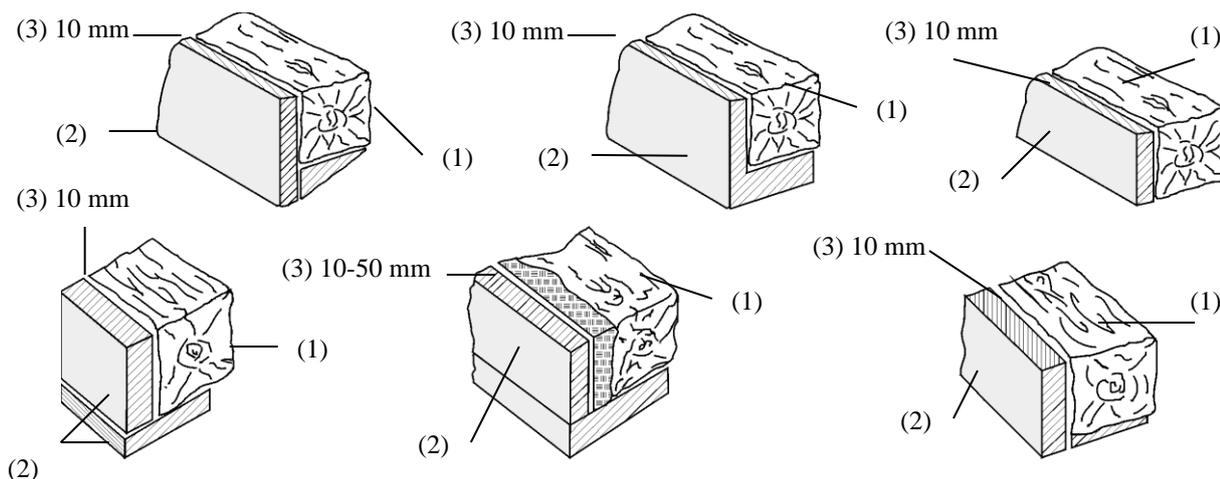


Figure 19. (1) Beam; (2) Insulation made from fire resistant material; (3) Air void; (4) Metal protection.

1.9 Determination of heating power of the device

There is no one ideal formula for calculating area of rooms which may be heated by a fireplace insert. It is influenced by many factors, the most important one being insulation of the house or flat to be heated with the fireplace. Because of this, presented below is a simple relationship for determining heating capability of the KFD ECO insert (table 1).

However, please remember that heating capabilities of the fireplace insert are also influenced by other factors, including:

- quality of wood used: humidity and calorific value,
- climate conditions – ambient temperature,
- chimney draught,
- properly constructed installation of the fireplace insert,
- properly constructed installation of hot air distribution,
- time of heating the rooms by means of the fireplace insert,
- proper operation of the device.

Table.1 Cubic capacity to be heated by means of a selected fireplace insert

House 100 m ² /250m ³	Required power [kW]
Cold zone / poorly insulated house	ca. 14
Cold zone / well insulated house	ca. 10
Moderate zone / poorly insulated house	ca. 12
Moderate zone / well insulated house	ca. 8

2 Using the fireplace insert

Note!

State of the art technical solutions applied in construction of fireplace-based heating systems guarantee high safety and minimise activities related to operation. Nevertheless, fire requires particularly cautious handling and fire safety principles must be observed. The superior requirement guaranteeing safe operation of the fireplace is regular cleaning of the chimney.

2.1 Basic information

Pursuant to the EN 13229 standard, KFD ECO fireplace inserts are classified as solid fuel fireplaces.

KFD ECO fireplace inserts have:

- steel body with ceramic panels fitted inside,
- chimney dampers demountable from inside the furnace (not apply 5183 LH/RH model)
- combustion air inlet stub pipe with the diameter of 125 mm,
- steel deflector,
- combustion gas afterburning system in the side (models 5183 LH/RH) part of the furnace, –
- door equipped with a ceramic glass pane (with thermal resistance up to 750°C). The pane allows perfect visibility of the fire while protecting against falling out of embers and retraction of smoke into the room,
- integrated combustion air adjustment mechanism, ensuring correct process of primary and secondary combustion of wood.

Heating of the room takes place by way of:

- a) convection: while air flows around the fireplace insert jacket, through the fireplace hood and grate, heat is released to the surroundings,
- b) radiation: heat is given off through the glass pane and steel body of the device.

2.2 Lighting up

NOTE! If the KFD ECO fireplace insert is not used for a prolonged time, before lighting up check if the chimney is passable.

The fireplace heating system you have purchased is an ecological, economical and efficient system which – apart from obvious economic advantages – can give you a lot of pleasure by creating a very pleasant and cosy atmosphere at home, with the fireplace burning with real fire. However, to be able to fully enjoy the atmosphere, you should first acquire certain skills required to be able to effectively and comfortably make the best of all advantages of the fireplace.

The fundamental skill you need to acquire at the beginning is how to light up fire in the fireplace. Although it may seem banal, it does require some skill. You need to realise that a cold furnace and chimney may result in penetration of a considerable quantity of smoke into the room. To prevent that, start with lighting up a few scrunched up sheet of paper in the furnace. Please remember that both the chimney damper (adjuster at the top of the furnace) and the air supply (at the bottom of the furnace) need to be set in the open position (maximum to the right). After initial heating up of the furnace, proceed to placing scrunched up newspapers first, fine slivers of wood (preferably – placed vertically), followed by slightly thicker pieces of wood. The load of fuel prepared as above can now be lit up at the bottom. Then, push the door ajar, leaving a small gap (of a few centimetres). This stage of lighting up requires constant control of fire by the user, allowing determination of the right moment to add thick chunks of wood and to close the door. From now on, the process of lighting up

proceeds with the air inlet (bottom lever) open to the maximum and with open chimney damper (top lever). The fireplace may burn at these settings for a few up to over ten minutes, until fire spreads over all fuel in the furnace. By then, the turbine pushing hot air into particular rooms should be activated automatically, if the hot air distribution system is equipped with a turbine. Now, add a full load of fuel (5 kg of wood – several finer chunks with the length of 33 cm) and close the chimney damper. From now on, control the combustion rate exclusively by the supply of air (handle at the bottom of the furnace). The position of the adjustment handle and, consequently, the combustion rate are to be set so as not to exceed the combustion rate of 4 kg of wood per hour (in most cases, this corresponds to the central position of the bottom handle). Greater combustion rate involves emission of power exceeding rated power of the insert, and involves the risk of thermal overloading. From now on, the fireplace does not require the user's intervention except for adding wood. The Chimney damper must be opened whenever the door of the furnace is to be opened, otherwise, smoke from the furnace will come out to the room. The frequency of adding fuel depends on several factors: position of adjustment elements, quality of used wood and chimney draught which also depends on the weather.

An excessive quantity of wood and an excessive quantity of combustion air may cause overheating and, consequently, damage to the fireplace insert.

When the door of the fireplace insert is being opened (for lighting up and adding of fuel), the chimney damper of the fireplace insert must be opened. Otherwise, smoke will come out to the room where the fireplace is installed. During normal operation of the fireplace, the chimney damper ought to be closed. To avoid smoking of the room, fuel should only be supplemented during the final stage of combustion, i.e. when only a layer of embers remains in the furnace. The furnace door is to be opened slowly to equalise the pressures and avoid smoking, and it is to be closed immediately after adding fuel.

If fuel is added at longer intervals, when there is only a layer of embers in the furnace, the lighting up process ought to be divided into two stages. During the first stage, add only 1 or 2 small chunks of wood into the furnace when the chimney damper and air inlet are open. Once fire spreads over the chunks, in stage two add the right quantity of fuel and set the adjustment levers appropriately.

If a large quantity of wood is placed over a layer of embers (in particularly, fine pieces of wood with thick bark), this may result in sudden production of considerable quantities of gas in the furnace and its ignition. To eliminate that hazard, fuel ought to be added in a manner preventing “stifling” of the flame and accumulation of gases. Combustion of gases ought to take place on an ongoing basis, i.e. the user should aim at keeping at least a small flame visible inside the furnace.

Apart from adjustment of combustion air inlet (bottom lever), intensity of the combustion process and, as a consequence, thermal efficiency of the fireplace insert depend as well on chimney parameters. In case of insufficient negative pressure (draught), the chimney damper (top lever) may be opened when the fireplace is lit up; in that case, position of air supply adjustment lever (bottom lever) is to be adjusted accordingly. However, this is not recommended as it involves reduction of fireplace thermal efficiency.

In order to light up the fireplace insert properly for the first time (the product is processed using lacquers resistant to high temperatures), please remember that:

- construction materials used for building the fireplace are not homogeneous: steel and chamotte elements are used,
- the temperature which particular parts of the body are exposed to is not homogeneous, either: for different elements of the fireplace insert, the temperature changes and may even reach 500°C,

- during operation, the fireplace insert is subjected interchangeably to cycles of heating and cooling, related to lighting up and extinguishing during one day, as well as cycles of intensive usage and complete rest during warm months of the year,
- before beginning proper usage, a brand new device ought to undergo the process of removing internal tensions and hardening of lacquer. This involves several cycles of heating up to nominal operating temperature followed by cooling down to ambient temperature,
- during the initial phase of using the fireplace insert, a smell typical for heating up metal and annealing of fresh lacquer will be sensible. During the stabilisation stage, the lacquer should be subjected to the influence of the temperature of 250°C, it should – several times and for a prolonged time – exceed the temperature of 350°C; only this will let it achieve the appropriate durability and it will be bound with the metal surface. This may take from 1 to 2 weeks, depending on intensity of using the fireplace.

The following precautions are to be considered during the lighting up stage:

- 1) make sure that the room where the fireplace insert is installed has sufficient ventilation,
- 2) during initial lighting up cycles, do not overload the combustion chamber (approximately half of the level indicated in the operating manual), maintain the fire for at least 3-8 hours at wood combustion rate below the one specified in the operating manual,
- 3) repeat the procedure at least 4-5 times, if possible,
- 4) gradually increase the quantity of fuel (in compliance with guidelines contained in the operating manual) and maintain the device in operation for as long as possible – avoid short cycles of lighting up and extinguishing the fireplace insert, at least during the initial stage,
- 5) during the first cycles of lighting up, do not place any objects on the device, in particular on its lacquered surfaces. Moreover, do not touch lacquered surfaces during operation of the device,
- 6) after the device is “annealed”, it may be used like a vehicle engine, avoiding sudden heating up of the insert which occurs as a result of excessive loading with fuel.

2.3 Adjustment of combustion air supply

Apart from a safe view of fire, a modern fireplace insert ensures clean and effective combustion of wood. The supply of combustion air in the bottom part of the furnace only does not guarantee complete combustion of wood. Gases produced as a result of incomplete combustion are taken off into the chimney, making the chimney dirty and causing heat losses. To enable complete combustion in the fireplace furnace, the deficiency of air in the upper part of the furnace, above the surface of fuel must be supplemented, while the supply from the bottom of the furnace is reduced. Thanks to this modern solution applied in your fireplace insert, combustion of not only the solid parts of fuel (wood), but also of gases produced during the primary stage of combustion can be achieved. This solution is referred to as “secondary combustion” and it is applied in your fireplace insert, guaranteeing higher efficiency of the device (more heat from the same quantity of wood) and reduced quantity of contaminations emitted into the atmospheric air we breathe. The structure of your furnace is designed to cause alteration of air circulation as a result of changing the position of one adjustment element (lever at the bottom of the furnace), whereas the afterburning system is constantly supplied with air, irrespective of the lever position.

2.3.1 Adjustment of primary air supply

Primary air is supplied from the bottom, along the furnace board, at a quantity depending on position of the bottom lever, from the outermost right position (maximum) to the outermost left position (minimum of primary air). The quantity of primary air ought to be reduced once flames spread and the temperature increases.

2.3.2 Afterburning of gases – impact of primary air supply adjustment

Once the process of lighting up ends and the temperature inside the furnace grows enough to clean the chamotte panels from soot (pyrolysis), primary air supply ought to be reduced, whereas air supply in the upper zone of the furnace is to be increased. This takes place automatically once the bottom lever is moved into the central position. If the lever is moved further to the left, this causes reduction of primary air quantity and slowing down of combustion along with greater efficiency of gas afterburning. Operation within the range from the central position of the lever (rated power) to the outermost left position (minimum power) is the optimum operating range for the KFD ECO insert. Basically, after lighting up and heating up of the furnace, it is not advisable to use of the insert with considerable primary air supply, i.e. with the adjustment lever from the centre towards the right. Apart from greater quantity of contaminations produced as a result of too fast and incomplete combustion, using the fireplace at such settings may cause excessive growth of power and, as a result, damage to the fireplace.

In case of insufficiently effective adjustment of combustion rate (usually caused by excessive negative pressure in the chimney), the flow of smoke should be reduced by means of the damper.

2.4 Maintenance

The way of using the fireplace and the quality of wood used for combustion are crucial to the phenomena occurring inside the furnace. This requires periodic inspections and maintenance of the fireplace and cooperating elements. Only original parts supplied by the fireplace insert manufacturer may be used as spare parts. Moreover, the duct supplying fresh outdoor air for combustion must be kept in a passable condition.

NOTE! Access from outside of the fireplace insert enclosure must be ensured for cleaning the fireplace insert and connecting pipe, i.e. the connecting element between the insert and the chimney.

2.4.1 Chimney

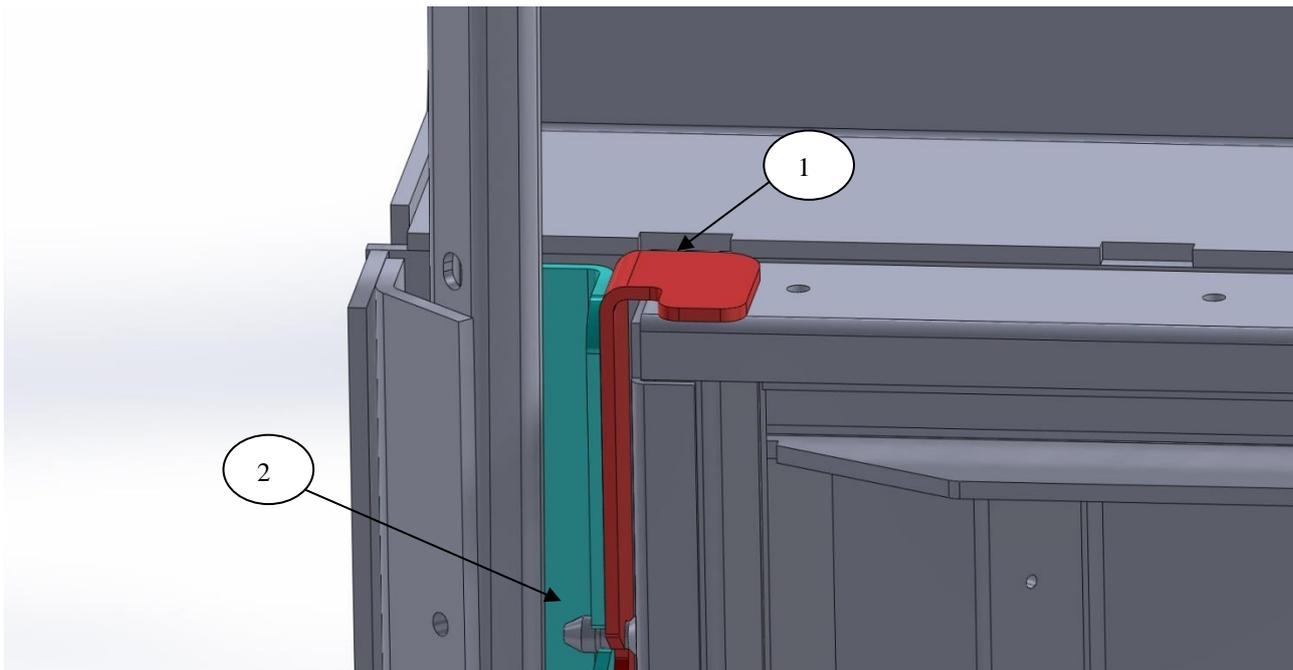
The foundation of proper and safe fireplace operation is properly cleaned and maintained chimney. Polish regulations require cleaning and inspection of the chimney at least four times a year. However, experience shows that the frequency may increase in case of a chimney without sufficient thermal insulation or if non-seasoned wood with the humidity over 20% is used as fuel, or wood of coniferous trees. In that case, the risk of soot ignition in the chimney increases considerably as a result of build-up of a thick layer of inflammable creosote deposit, which needs to be removed on a regular basis. A similar phenomenon occurs inside the fireplace insert, especially if it is operated for a long time at a considerably reduced power. Although depositing of creosote inside the fireplace insert is not dangerous, it ought to be avoided because of the risk of corrosion and premature wear of gaskets which – while absorbing creosote – become glued and lose their properties fast.

Cleaning of the chimney ought to be performed by a qualified chimneysweep. Along with maintenance of the chimney, fixed pipes connecting the fireplace insert with the chimney ought to be cleaned. The connecting pipes ought to have cleaning holes, accessible through grates or doors in the fireplace enclosure.

2.4.2 Fireplace insert glass pane

Both because of esthetical and operational reasons, particular attention ought to be paid to the ceramic heat-resistant glass pane equipped with an air supply system to protect it against contamination (so-called vitroc ceramic glass pane with an air curtain). The vitroc ceramic glass pane with an air curtain requires periodic cleaning (every couple of days), depending on the quality of fuel and usage of the insert. Special products may be used for cleaning the glass pane, but it can also be cleaned with ash using a damp newspaper or a cloth.

In models 5183 LH/RH doors fireplace insert to maintenance and servicing works opening on aside. Should be released lever lock service by raise the lever(1). The pins (2) must be relaxed from lock.



After service we close the doors in the reverse sequence. The pins (2) must enter to the lock and we close the lock by pushing the lever (1) down.

CRACKING OF THE GLASS PANE: vitroc ceramic glass panes are resistant to the temperature of 750°C and they are resistant to thermal shocks. Cracking may only be caused by a mechanical shock (impact, violent closing of the door, etc.).

2.4.3 Fireplace insert

Inspection and cleaning of the whole fireplace is required before each heating season. The inspection ought to include disassembly of internal insert elements (ceramic panels, deflector, etc.), cleaning from soot and ash – especially the insert body surface under the chamotte panels (accumulated creosote hinders the flow of heat which, in turn, reduces heating efficiency of the insert). The condition of gaskets should also be checked; in case of damage, replace gaskets with new ones remembering not to tension the cord excessively as it will lose its flexibility and the gasket will not play its role. After thorough cleaning and visual inspection of the insert interior, all checked elements may be fitted again, with particular attention to correct fitting, i.e. keeping proper expansion distances. At the end of inspection, grease movable elements of the insert, including the damper levers, closures of the door and door lifting mechanism, if installed. To do that, a heat resistant lubricant should preferably be used (recommended by the fireplace insert manufacturer); do not allow excess lubricant flow out of the insert. Afterwards, the insert is ready for further use, but the whole system requires some more work.

During the heating system, a system based on circulation of hot air handles very high quantities of air carrying dust particles (which, unfortunately, cannot be avoided in today's environment), which in time deposit inside the fireplace enclosure and on grates of convection air as well as on blades of the air turbine. To keep the system operational, maintain silent operation of the turbine and keep hygiene at home, thoroughly dust all the above elements of the system using a brush and an ordinary vacuum cleaner.

2.4.4 Removal of ash

KFD ECO fireplace inserts are not equipped with an ash grate or ash box. Ash from combustion of wood accumulates on the furnace board. The combustion chamber ought to be emptied regularly, leaving only a thin layer of ash required for improved conditions of wood combustion. Removed ash should be placed in a container with a lid, made from non-combustible material. The container ought to be placed on a base made from fire resistant materials, at an appropriate distance from any combustible materials, and allowed to cool down completely. Due to safety reasons, at least once a year check cleanliness of the duct supplying outdoor air (with particular focus on the air intake located outside the building). The chimney ought to be cleaned regularly by a chimneysweep who should also check whether the fireplace installation is constructed properly, inspect connection of the insert to the chimney as well as ventilation.

2.4.5 Summer break in using the fireplace

In case of high humidity of the room where the fireplace insert is installed, place a humidity absorbent (“silica gel”) in the insert..

2.5 Fireplace fuel

Irrespective of the class, type or make of the fireplace insert, the quality of fuel used is crucial to proper operation, efficiency and durability of the device. The only fuel allowed in closed fireplaces is the wood of deciduous trees. To enable economical usage guaranteeing your satisfaction with the fireplace, wood ought to be seasoned for at least 18 months in the open air, e.g. under an umbrella roof, sawn and split. This allows appropriate wood humidity (20%), required for proper operation of the fireplace. It ought to be emphasised that 1 m³ of wood with the humidity of 20% contains app. 60 l of water, whereas the same quantity of wood two months after cutting down contains as much as 350 litres of water. If the latter is used in the fireplace, it will result in quick soiling of the glass pane, corrosion of the insert, erosion of the chimney and, obviously, the house will not be heated. Recent research (including ecological research) indicates high importance of wood as ecological renewable fuel. First of all, combustion of wood does not increase the greenhouse effect or the so-called ozone hole, because wood – whether burned in the fireplace or decomposed naturally – emits into the atmosphere the same quantity of carbon dioxide (CO₂). Combustion residues do not contain sulphur, chlorine or other harmful chemical substances. Exhaust gases contain only water and carbon dioxide, whereas ash is an excellent natural fertiliser because it contains all mineral salts needed by plants.

The furnace should contain no more than 2-3 chunks with the length of app. 33-50 cm (and diameter of 10-15 cm. Prohibited fuels include coal, briquettes, waste, remainders of bark or laminated panels, humid wood, processed wood (e.g. lacquered wood) and plastics. If such materials are used for combustion, the guarantee expires. Paper or cardboard may only be used for lighting up.

Burning of waste is prohibited as this is hazardous to the device and to human health.

2.6 Instructions for users

- ! **Prohibited kinds of fuel: coal and coal derivatives, briquettes, straw, woodwork chippings and wood under 10% humidity, plastic objects and rubbish. Moreover, it is prohibited to use chemical products and all kinds of inflammable liquids for combustion and facilitating the lighting up.**
- ! **Never use water to extinguish fire in the fireplace.**
- ! **Do not touch the device during operation because of the risk of burning.**
- ! **Wear the protective gloves attached to the fireplace insert.**
- ! **Clean the furnace regularly to avoid excessive accumulation of ash.**
- ! **Do not leave the insert with door open or ajar unattended while the fuel is burning inside.**
- ! **Parts such as the grate, deflector and gaskets are not covered by the guarantee and ought to be replaced during technical inspections, depending on wear.**
- ! **Technical inspections ought to be performed once a year by Authorised KFD Fitters.**
- ! **Lack of the deflector may cause excessive negative pressure which causes too violent combustion, excessive consumption of wood and, respectively, overheating of the device.**
- ! **To avoid the hazard of explosion in the fireplace insert, cleaning of the glass pane may only be performed while the device is cold.**
- ! **Use of any liquid substances such as alcohol, petrol, petroleum, etc. is prohibited.**
- ! **Combustion residues (ash) ought to be picked up to a hermetic container resistant to the heat of embers.**
- ! **The device may not be used at a place where emission of any kind of vapours takes place (e.g. petroleum, glue for linoleum, etc.). Do not leave combustible materials nearby the device. Warn children not to touch the device while in operation or immediately after extinguishing.**
- ! **In case of occurrence of a fire in the fireplace or in the chimney:**
 - i. **close the fireplace insert door**
 - ii. **close the supply of combustion air**
 - iii. **extinguish the fire using carbon dioxide extinguishers (CO₂, dry power extinguishers)**
 - iv. **immediately call the fire brigade.**
- ! **Never light up the fireplace insert if vapours of gases or combustible dusts are present in the room (e.g. after lacquering or scraping of wooden floors).**
- ! **Do not allow overheating of the device, evidenced by metal incandescence. If this occurs, reduce the supply of air and, consequently, the rate of combustion. If this fails, let the fire extinguish. Incandescence of metal elements (red colour) may cause damage to the device. This type of damage is excluded from guarantee of the fireplace insert.**
- ! **Unauthorised alterations of the fireplace insert and the fireplace are prohibited.**

3 Selection of chimney parameters – chart

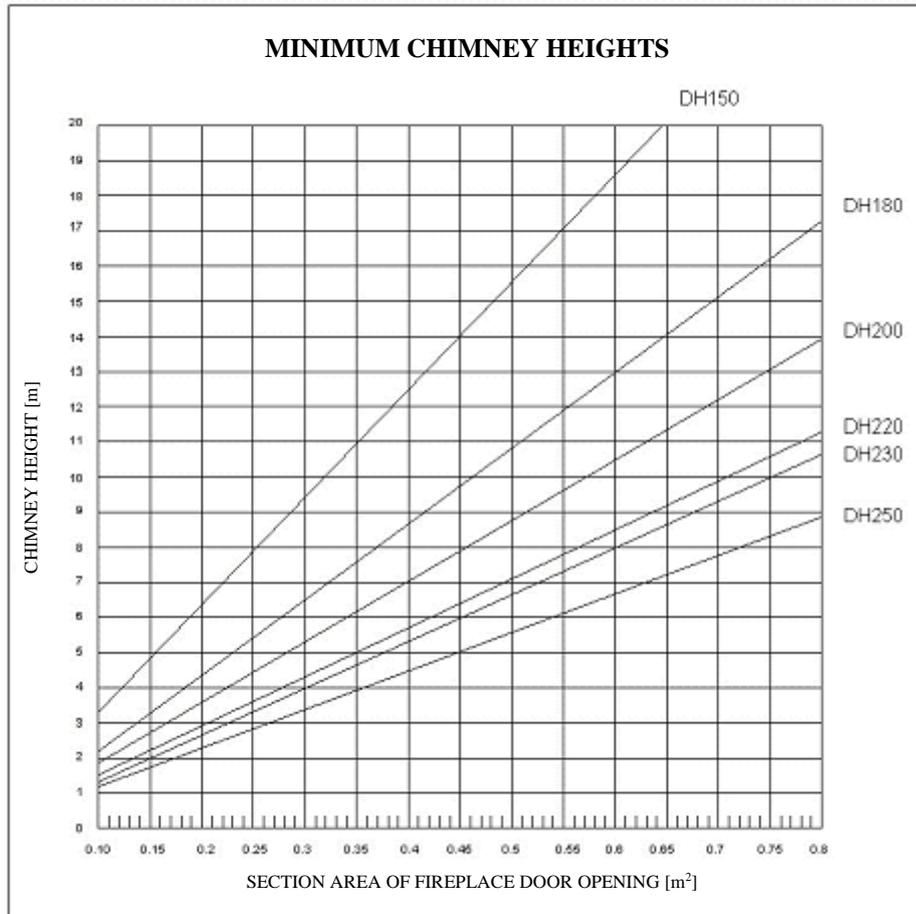
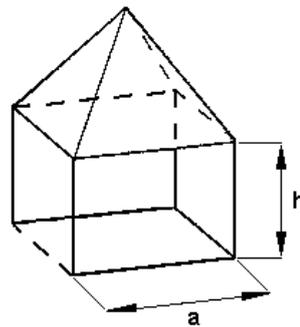


Figure 18. Height and diameter of the chimney depending on the area of the fireplace door. Height of the chimney is to be measured from the point of connection of the furnace (Dh hydraulic diameter = $4 \cdot \text{area} / \text{circumference}$).

Furnace open on one side

$$\text{Area} = a \cdot h \text{ [m}^2\text{]}$$



Minimum reduced hydraulic diameter for the fireplace insert may not be smaller than 150 mm, if chimney height is observed in compliance with figure 18.

4 List of materials recommended for construction of the fireplace.

- Floor under and in front of the fireplace:
 - concrete,
 - terracotta,
 - stoneware,
 - natural stone.
- Foundation under the insert:
 - brick,
 - concrete blocks,
 - aerated concrete + brick,
 - steel profiles.
- Bottom part of insert enclosure:
 - natural stone,
 - conglomerate,
 - brick,
 - ceramic tiles,
 - aerated concrete,
 - structural plasterwork,
 - gypsum board,
 - gypsum finishing coat,
 - fire resistant mineral wool with Alu foil (FIREROCK).
- Upper part of the enclosure (hood)
 - natural stone, brick (stone beam),
 - wood – e.g. oak (wooden beam),
 - sheet brass (wooden beam shield),
 - steel profiles – 30 x 28,
 - fire resistant gypsum board,
 - fire resistant mineral wool with Alu foil,
 - self-adhesive Alu tape,
 - Alu-flex Ø 100, 125 or Ø 160 pipes – degreased,
 - structural plasterwork,
 - gypsum finishing coat,
 - outlet grates (without closable blinds).
- Connection of the insert to the chimney:
 - “Spiro” Inox chimney pipe (technical approval),
 - steel chimney pipe (wall thickness 2 mm – technical approval),
 - Inox band clips,
 - chamotte clay,
 - heat resistant cement,
 - heat resistant silicon (1200° C).
 - high temperature sealing cord.

5 Tables

NOTE: ONLY GRAVITATIONAL HOT AIR DISTRIBUTION IS TO BE ADDED IN CALCULATIONS FOR CONVECTION AIR OUTLETS.

CONSIDER THE SECTION AREA OF PIPES COMING OUT FROM THE CHIMNEY DUCT – NOT THE AREA OF HOT DISTRIBUTION AIR OUTLET AREAS

Table 4. Convection air inlet and outlet areas.

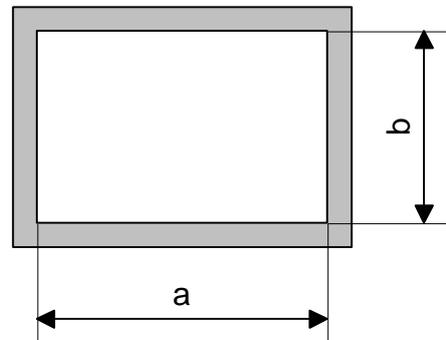
Draught [Pa]	Minimum inlet of outdoor air	Min. section area of convection air inlet		Min. section area of total convection air outlet	
		Opening without grate	Opening with grate	Opening without grate	Opening with grate
12-20	200 cm ² or 10 m ³ /h/1kW	500 cm ²	1000 cm ²	600 cm ²	1200 cm ²

Section areas of convection air inlets and outlets:

Opening without mesh

The effective section area is equal to the area of grate opening:

$$F=a*b$$

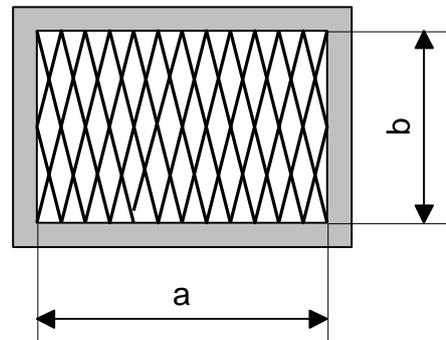


Opening with grid

The effective section area is equal to half of the area of the grate opening:

$$F=(a*b)/2$$

The section area of the grate opening is reduced by the section area of the grate itself, constituting 50% of the opening.



NOTE:

- In the hood, it is prohibited to install grates with adjustable blinds; moreover, if gravitational distribution is considered in calculations of the effective outlet area of convection air, grates with blinds in gravitational distribution are not recommended!
- Regularly clean inlet and outlet grates in order to ensure unrestricted flow of convection air.

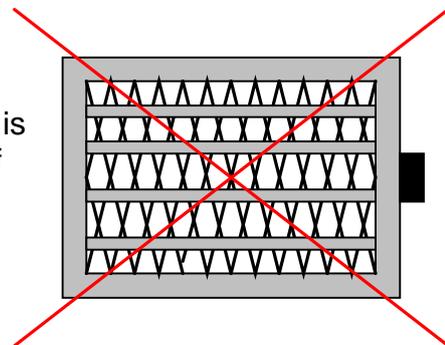


Table 5. Norms and regulations.

Regulation of the Minister of Infrastructure of 12 April 2002 on technical conditions to be met by buildings and their situation (Journal of Laws № 75, item 690)
Regulation of the Minister of Infrastructure of 7 April 2004 amending the regulation on technical conditions to be met by buildings and their situation
Regulation of the Minister of Infrastructure of 6 November 2008 amending the regulation on technical conditions to be met by buildings and their situation
Regulation of the Minister of Infrastructure of 12 March 2009 amending the regulation on technical conditions to be met by buildings and their situation
PN-89/B-10425 Flues, exhaust gas ducts and brick ventilation ducts – Technical requirements and inspection upon acceptance
PN-EN 13229 Fireplace inserts with open solid fuel fireplaces. Requirements and tests, December 2002
AMENDMENT TO THE POLISH NORM PN-EN 13229:2002/A1 March 2005
AMENDMENT TO THE POLISH NORM PN-EN 13229:2002/A2 June 2006
PN-EN 1443: 2001 Chimneys. General requirements.
PN-EN 1443: 2005 Chimneys. General requirements.
PN-87/B-02411 Integrated solid fuel boiler rooms.
PN-91/B-02413 Heating and heat engineering. Protection of water heating installations of the open system.

All the operations recommendations and tips contained in this manual ought to be checked against local regulations respectively!!!

Table 6. Parameters of KFD ECO

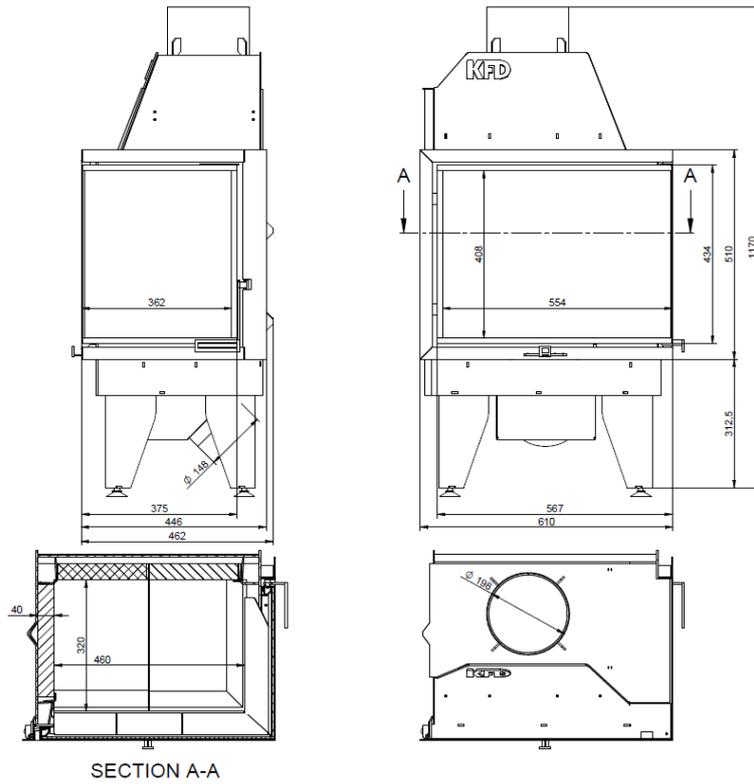
	ECO 5161L/R	ECO 5172L/R	ECO 5183L/R H
energy efficiency class	A	A	A+
direct heat output (nominal power) [kW]	12	14	16
heating power range [kW]	6 - 15	7 - 17	8 - 19
energy efficiency index [EEI]	104	106	107
energy efficiency at nominal heat output [%]	78,1	79,05	80
seasonal space heating energy efficiency [%]	69,1	70,05	71
CO emission at 13% O ₂ [%]	0,087	0,0915	0,096
[mg/Nm ³]	1082	1140	1198
dust emission at 13% O ₂ [mg/Nm ³]	31,5	30,5	30
OGC at 13% O ₂ [mg/Nm ³]	68	110	<120
NOX emission at 13% O ₂ [mg/Nm ³]	152	139,5	127
flue gas mass flow [g/s]	10,3	11,55	12,8
average smoke temperature at smoke outlet [°C]	270	263	256
minimum chimney draft [Pa]	12	12	12
weight [kg]	151	164	220

6 Troubleshooting

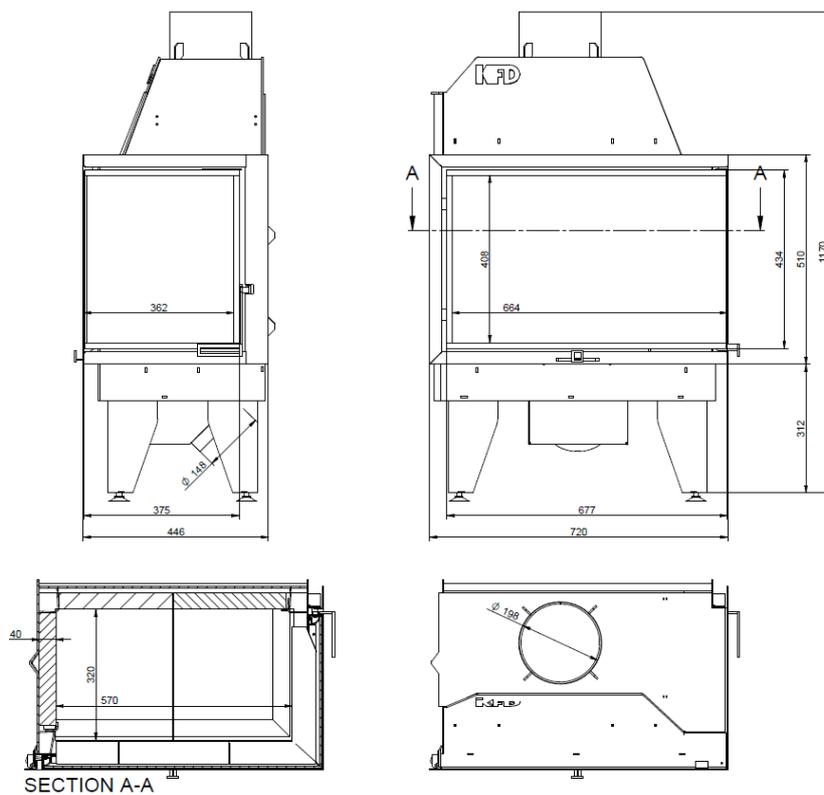
PROBLEM	REASON	SOLUTION
I. Poor control of fire in the furnace.	<ol style="list-style-type: none"> 1. Excessive quantity of combustion air. 2. Open chimney damper. 3. Excessive quantity of inserted fuel. 4. Worn gaskets. 5. Excessive negative pressure in the chimney. 	<ol style="list-style-type: none"> 1. Reduce the quantity of combustion air using the adjustment lever in the fireplace insert. 2. Close the chimney damper. 3. Do not put more fuel and reduce the quantity of combustion air, close the chimney damper. 4. Fit new gaskets. 5. Install a cap type chimney attachment and/or install a draught moderator.
II. Fire cannot be lit up in the furnace	<ol style="list-style-type: none"> 1. Closed levers of combustion air inlet. 2. Clogged openings of air blow-in in the furnace. 	<ol style="list-style-type: none"> 1. Increase the quantity of combustion air. 2. Clean furnace interior from ash.
	<ol style="list-style-type: none"> 3. Insufficient negative pressure in the chimney. 4. Too humid wood. 5. Too large slivers used for lighting up. 6. Bad weather conditions. 	<ol style="list-style-type: none"> 3. Check if the inspection door is closed; clean the chimney and connecting duct; recommended installation of a mechanical combustion gas exhaust. 4. Replace the wood with dry wood (humidity under 20%) 5. Use smaller slivers. 6. Check if burning improves once the weather is better. In case of recurring problems resulting from weather conditions, installation of a mechanical combustion gas exhaust is recommended.
III. Smoke comes out from the fireplace insert	<ol style="list-style-type: none"> 1. The chimney and/or connecting pipe is not passable. 2. The chimney and/or connecting pipe is not tight. 3. Excessive negative pressure in the room in which the fireplace is installed. 	<ol style="list-style-type: none"> 1. Cleaning of the chimney and connecting pipe is necessary. 2. Check tightness of closing the inspection door in the chimney and connection of the connecting pipe. 3. Supply fresh air to the room in which the fireplace is installed (e.g. open the window).

	<p>4. Fresh air inlet is not passable.</p> <p>5. Air inlet is installed at the leeward side.</p> <p>6. Incorrectly constructed ventilation of the fireplace insert.</p>	<p>4. Check if the duct supplying fresh air to the fireplace is passable.</p> <p>5. Change location of the air intake.</p> <p>6. Check if convection air inlets under the insert are constructed correctly.</p>
<p>IV. Smoke comes out from the fireplace enclosure when the door is closed</p>	<p>1. Connecting pipe is not tight.</p> <p>2. The tee pipe in the chimney is not tight.</p>	<p>1. Check if connection of the connecting pipe is tight.</p> <p>2. Check if the connecting tee pipe in the chimney is tight.</p>
<p>V. Significant bloom of tarry substances (creosote) appears on the glass pane</p>	<p>1. Too humid wood.</p> <p>2. Insufficient negative pressure in the chimney.</p> <p>3. Clogged air blow-in openings in the furnace.</p>	<p>1. Replace the wood with dry wood (humidity under 20%).</p> <p>2. Check the reasons described in points III 1-4.</p> <p>3. Clean interior of the furnace from ash.</p>
<p>VI. Fire in the chimney or flue</p>	<p>1. To be evaluated by the fire brigade.</p>	<p>1. Close the door of the fireplace insert.</p>
		<p>2. Close combustion air inlets.</p>
		<p>3. Extinguish the fire using carbon dioxide extinguishers (CO₂, dry powder extinguishers) – Never extinguish fire inside the chimney using water!</p>
		<p>4. Call the fire brigade immediately.</p>
<p>VII. No power supply (water module option)</p>	<p>No power supply</p>	<p>1. Do not add more fuel, open the chimney damper and door of the fireplace insert.</p>

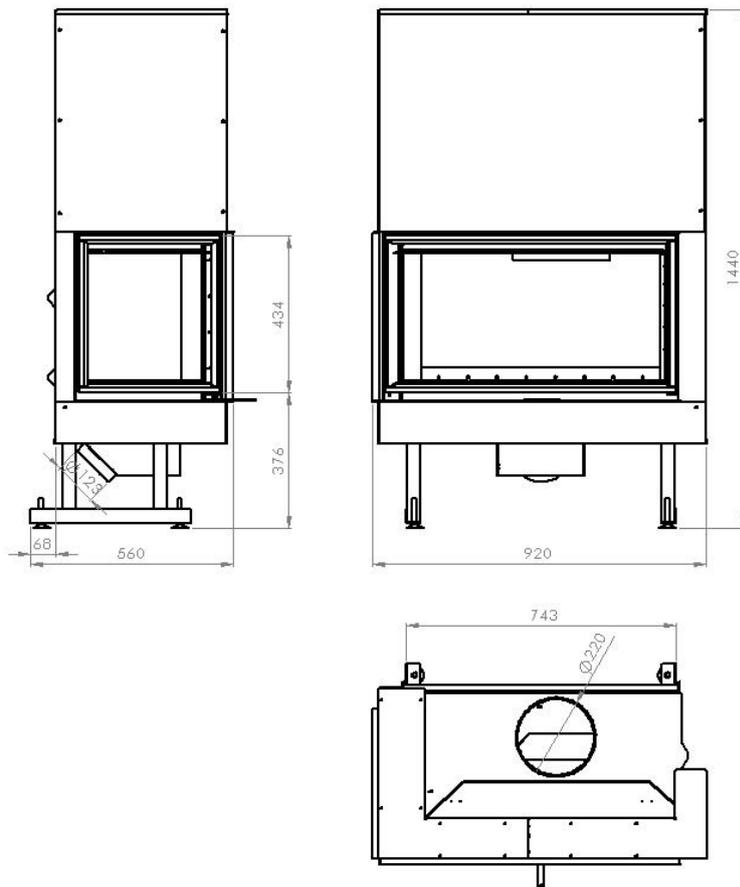
7 Drawings of the KFD ECO inserts



KFD ECO 5161 L/P



KFD ECO 5172 L/P



KFD ECO 5183 L/R H

Inspection log

The inspection ought to be performed once a year by an Authorised KFD Fitter.

Date	Performed work	Company/Signature

Date	Performed work	Company/Signature

Date	Performed work	Company/Signature



ver. KFDECOENG1.20181123

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