

Selected installation faults and shortcomings when implementing plastic flue exhaust systems

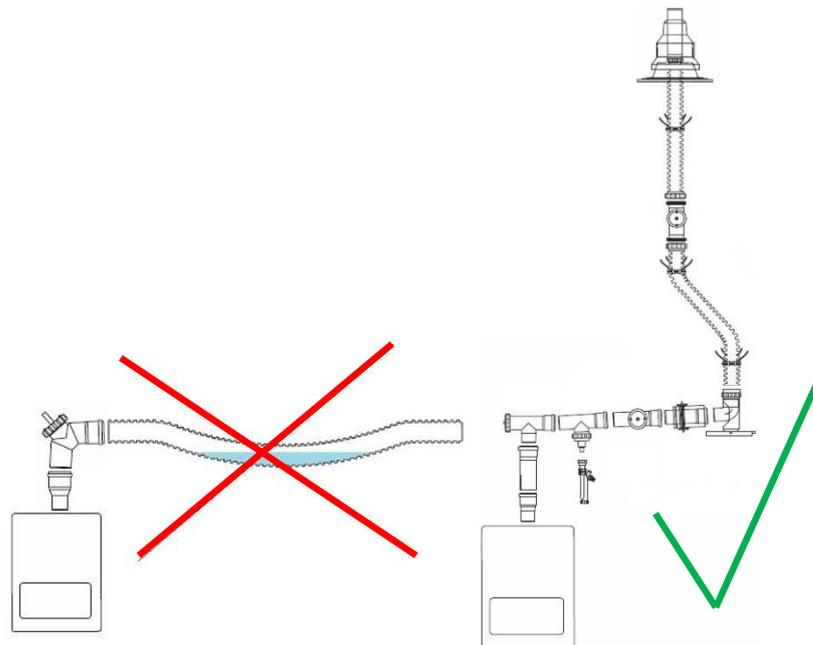


Recently, the use of plastic flue exhaust systems for condensing appliances has expanded. The systems are of high quality and technically mature. Any doubts whether to use a stainless pressure-tight tube or a plastic tube for a condensing appliance may seem nowadays pointless. The ever-increasing number of plastic flues that are being realized clearly shows us where the future of modern exhaust gas systems is headed and which choice is the right one.

Plastic systems made from PPH (homopolymer polypropylene) are very resistant to aging, have excellent chemical resistance to acids, are physiologically harmless and can resist to short term temperature of up to 150°C. Compared to stainless steel, plastic offers countless advantages and is a very popular material due to its low price. The plastic exhaust system can serve us for a very long time if the necessary principles are followed. Regarding manufacturers there are usually no problems, the production technology is strictly controlled, the individual pipes and fittings are precise, the sockets are perfectly tight and generally without the slightest defects. Problems usually occur directly during the installation of the exhaust system. Due to lack of knowledge, installation errors are made, assembly procedures are not followed, manufacturer's instructions and relevant standards are not respected. Listed below are some of the installation errors and deficiencies that are commonplace. It is necessary to avoid such mistakes:

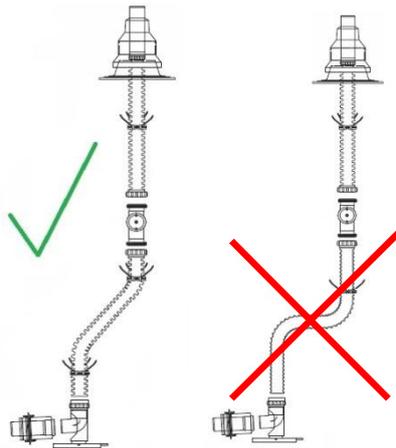
1) Flexible exhaust pipes may only be used vertically.

Reason: Horizontal mounting of flexible hoses is strictly forbidden. Hoses are essentially soft and undulated, the waves may hold condensate and its weight may cause deflection of a hose between ceiling anchors. In some cases a horizontally mounted hose under a ceiling was flooded with condensate and eventually the whole flue gas path was blocked.



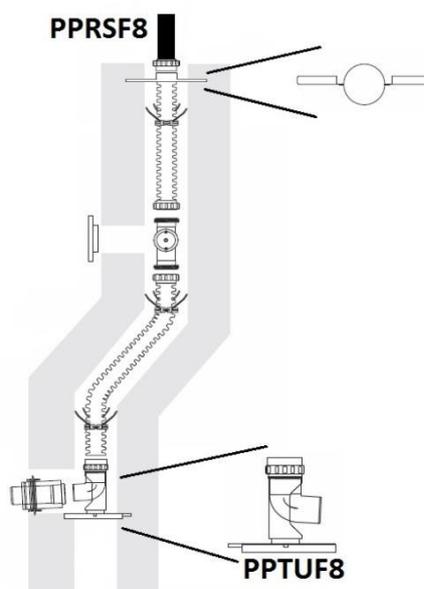
- 2) Flexible hoses may be bent maximally up to 45° from the axis of a chimney with a liner.

Reason: If hoses are bent further, it creates excessive tension during operation at the external edge of the bend and the hose may easily crack there. This happens most frequently at the transition from the chimney to the flue gas ducting. Therefore, it is always necessary to use an anchored elbow or inspection T piece with condensate drain at the transition from the vertical to the horizontal part, wherein the following horizontal ducting is further implemented of fixed pipes. Deviations of up to 45° from the vertical axis in overpressure chimneys are also limited by EN 73 4201 (paragraph 6.4.3).



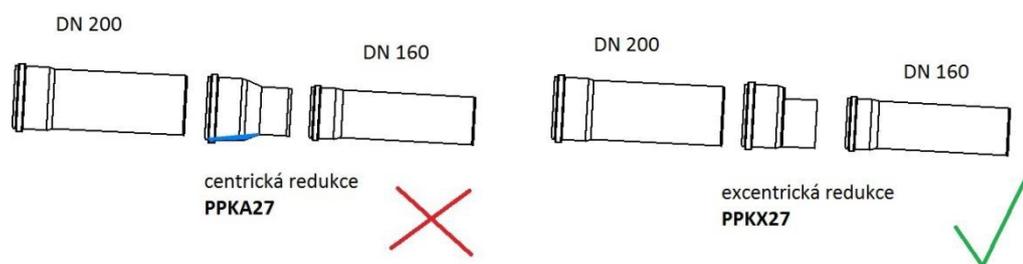
- 3) Flexible hoses must be anchored at the foot of the chimney and at the outlet as well.

Reason: Due to the changing temperature, the flexible hose expands and it is necessary that the hose is provided with fixed anchoring at the foot of the chimney and its outlet. If the hose is not anchored at the chimney outlet as well, it may slide and even crack.



- 4) If a diameter change is required, eccentric reductions must be used to maintain condensate flow in the piping.

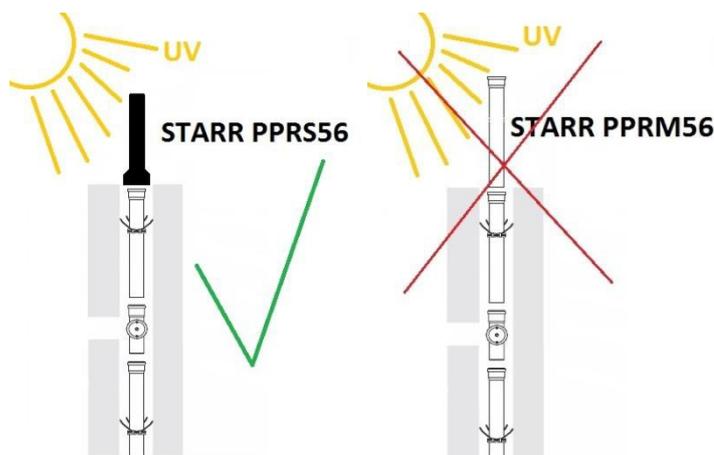
Reason: If the installer uses a common centric reducing piece at the anchored elbow at the place of a chimney flue (e.g. cascade $\varnothing 160$ and chimney $\varnothing 200$, i.e. we need to use a reducing piece) we have a problem. A blind trough is formed in the elbow where condensate is collected, which may eventually result in loss of tightness (depending on the seal quality). This also applies to cascades with variable diameters where the use of a common centric reducing piece means that condensate does not drain properly. However, these cascades are only seldom used with overpressure systems.



- 5) Plastic flue exhaust systems of PPH are not UV stable. Despite the fact that manufacturers in their technical manuals state advantages and disadvantages of PPH, the installer often disregard this information. Then in practice we may come across unprotected plastic pipes mounted on facades of buildings, which is a serious error.

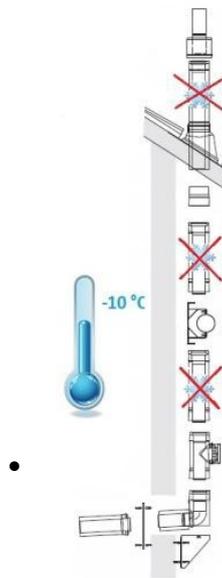
Reason: PPH is not UV stable, should not be exposed to sunlight. Plastic pipes are often protected by the following materials:

- a) Stainless steel pipe (made of 1.4301 material), also used for supply of external air to type-C appliances (i.e. appliances which do not need air from the room where they are placed for combustion process).
- b) Special UV stable exterior self-adhesive films applied to pipes and creating sufficient protection against UV radiation. A nonstandard solution but in principle it is correct. An unprotected PPH pipe exposed to UV radiation gradually deteriorates - the material acquires a yellowish shade, it becomes scaly, peels and eventually disintegrates. This does not happen immediately but gradually, depending on the quality of the used granulate. With some manufacturers it may be as early as after 6 months with others these changes do not occur until after 5 years.



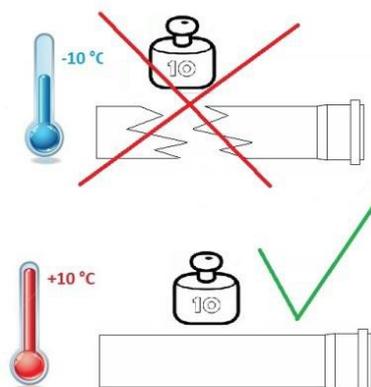
- 6) Plastic exhaust systems made of PPH do not freeze. Despite the fact that litres of condensate flow through the ducting, plastic chimney liners have the exquisite characteristic of not freezing up when the temperature outside drops below zero.

Reason: When the flue gas temperature falls below the dew point temperature of a plastic liner, the water steam contained in flue gas is condensed on the surface. This is manifested by formation of condensate drops on the piping inner surface. A drop may freeze but does not hold on the surface, it drops down where it melts again. This phenomenon is provided by the material structure. Therefore, it is not necessary to insulate these flues additionally - they only need to be protected against UV radiation as mentioned in article 4. Almeva® facade flues do not need insulation, which has been verified in long-term practice. An example of that may be a number of Almeva® flues systems installed in the extreme conditions of the Swiss Alps at altitudes of ca 2,500m which have never frozen up.



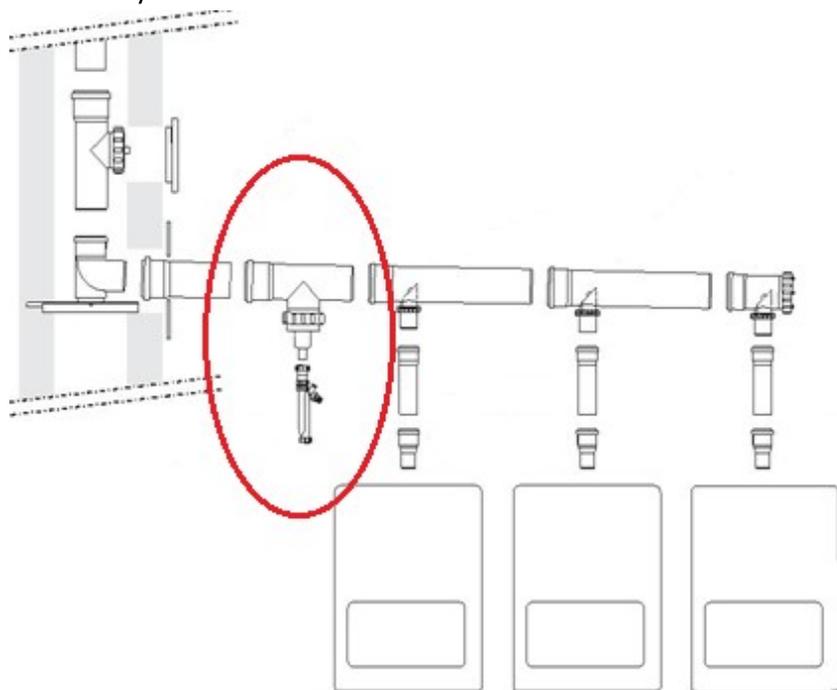
- 7) PPH has good surface hardness and impact resistance. However, this does not apply at low temperatures, when the plastic becomes brittle and there is a risk of cracking.

Reason: For example, if the temperature is above zero you may load the pipe excessively, but you cannot do the same if the temperature drops below zero. The plastic pipe cannot withstand the strain and it would crack. This characteristic needs to be taken into account particularly during installation when the temperature drops below zero. Even dropping of a part on a hard ground in winter may result in the loss of a costly component.



- 8) Place condensate drains before boiler cascades of AXIAL type. The manufacturer of the Almeva® flue gas exhaust system recommends an inspection-T-piece with a condensate drain be placed before cascades of the AXIAL type. AXIAL type cascade means a common collector situated directly above boilers on the axis of the flue gas vent orifice, where the condensate flows directly into the boiler.

Reason: If you fail to place a T-piece with a condensate drain before the cascade, the condensate produced by all boilers will drain into the first boiler in the cascade only. Thus the first boiler will have, e.g. 4 times the condensate flow for which it is designed and it may get damaged. We recommend that any unclear issues during installation be always consulted with the manufacturer or manufacturer's representative. In this way you may prevent unnecessary problems of the flue gas exhaust system in the future.



- 9) Measuring of overpressure flue gas paths must be done using system parts designed for the given purpose.

Reason: In the case of underpressure flue gas paths it is possible to drill a measuring opening in the flue gas ducting subsequently covered with an aluminium tape. This is not allowed in the case of overpressure flue gas paths, as an overpressure gas path needs to be perfectly tight and measuring is implemented by system elements.

