Production of and material for Almeva plastic flue exhaust system

In the previous article I introduced to you the newly established Almeva East Europe s.r.o. company. As already mentioned, it is a manufacturing subsidiary of Almeva AG group, which for 22 years has been producing and distributing plastic flue exhaust systems for gas appliances. In this issue I will focus on production technology, I will touch upon physical-mechanical properties of materials often used in production and will mention some advantages and disadvantages of the mentioned materials.

MANUFACTURING PROCESS

The basic input raw material for the production of parts of Almeva flue exhaust system is the high quality PPH granulate, which after drying is mixed with exactly dosed additional substances in magazines for injection moulding machines and extruders.

Injection moulding machines are usually used for production of complex parts and adapting pieces of flue exhaust systems; in these machines molten polypropylene is injected into a mould.

Extruder lines are used especially for production of tubes and hoses. In these lines, PPH granulate is supplied from magazines into a heated pressure chamber where it softens and it is further conveyed by a screw into an extrusion head through which it enters into open space, it cools down and solidifies. The type of the semi-finished product depends on the design of the extrusion head and the shape of the opening.

Through these devices, which constitute the very core of the production process, most of the tubes and adapting pieces (but also semi-finished products which are further welded and assembled together) is produced. The machines are equipped with modern control systems and requisite peripheral devices for reliable and stable process control.

MATERIAL

Solid plastic tubes, flexible hoses and adapting pieces

The raw material for production of solid plastic tubes, flexible hoses, and adapting pieces is polypropylene homopolymer (PPH). It is a thermoplastic high-molecular weight substance, partially crystallized and its density is markedly lower than that of other used plastic materials; it is in the range of 0.90-0.91g.cm^{-3}. The surface is not soluble and does not swell either and therefore gluing is very difficult, on the other hand, it may be welded very well. PPH has good ageing resistance and therefore system parts have a very long service life. It shows excellent chemical resistance to acids (with the exception of oxidizing acids), alkalis and weak solvents. It resists well to climate effects and microorganisms, it is physiologically harmless but it is not resistant to UV radiation. Compared to other common plastic materials it has a good surface hardness and sufficient flexibility at low temperatures. PPH also shows good impact strength, good electrical insulating properties with almost zero absorption of condensate and high thermal resistance (temporarily up to 140°C). It also has a very low heat conductivity (only 0.22 W/mK), therefore in operation the drop of flue temperature in the piping is not that severe as e.g. in stainless steel piping. PPH is a thermoplastic and therefore even after heating and subsequent cooling it keeps its exquisite properties.

Sealing

Lip sealing rings, gaskets and other elements of the system are made of ethylene propylene dien monomer rubber (EPDM) and are placed in all pipes and adapting pieces already in production. It is a high quality elastomer with long-term resistance to effects of the condensate and high temperatures (temporarily up to 150°C), with resistance against ageing, oxidation, ozone and atmosphere effects. This acid-resistant rubber is also very well resistant to chemicals such as carbon oxides) and organic polar chemicals. However, EPDM has a very poor resistance to petroleum products.

External coating and anchoring elements of concentric systems

In the case of concentric systems, indoor (external coat connected by rubber) and outdoor (external coat connected by a cone) versions are available. These designs further offer two variants of surface treatment of external coating:

1) Highly polished structural alloyed stainless steel No. 1.4301 (designation according to EN ISO X5CrNi18-10, according to ČSN 17240). This austenitic chrome-nickel stainless steel has very good weldability, ductility, polishable characteristics, resistance to wear, good recyclability and it withstands

temperatures of up to 300 °C in the long term. The steel is resistant to water, water steam, air humidity, weak organic and inorganic acids.

2) White powder coated low-carbon plain structural steel No. 1.0330 (designation according to EN ISO DC01, according to ČSN 11321) possibly stainless steel No. 1.4301 (designation according to EN ISO X5CrNi18-10, according to ČSN 17240). Steel No. 1.0330 has guaranteed purity, content of phosphorus and sulphur, guaranteed minimum tensile strength, yield strength and ductility. Baked powder coating provides protection against external effects and aesthetic function.

Corporate designation, technical information, physical-mechanical properties and values and possibly other data are all aimed at Almeva trade name. As there are relatively small differences between individual manufacturers, readers may take this as general information about plastic flue exhaust systems. In the following issue we will discuss designation of plastic components, data on the chimney label and characteristics of Almeva plastic system according to ČSN EN 14471.

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