Mineral wool process technologies and their link to melt and fibre properties

An invited talk

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Mineral wool process technologies and their link to melt and fibre properties

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Globally there is an increasing need for saving energy, for reducing the consumption of fossil fuels, and for reducing the CO_2 emission, in order to maintain a stable global climate and a clean environment. In addition, there is a need to protect people against the spread off fire and also to reduce the noise in the surroundings, particularly in the fast growing cities. In this context, mineral wool (stone and glass wool) has been playing an important role and has been on the marked for decades, and is a perfect solution for building envelopes to protect against heat and cold, noise as well as spread of fire (stone wool is a particularly good fire barrier). The dominant types of mineral wool on the marked are stone wool (SW) and glass wool (GW). The wool type differs in the composition of the fibres itself, where the R_2O/RO ratio is typically < 1 for SW and > 1 for GW.

The difference in initial chemical compositions between SW and GW is reflected in different technologies for producing them, e.g., different types of melting furnace, fiberizer, wool collection and product forming. Stone wool is typically produced using a cascade spinning process (external centrifugation) whereas glass wool is produced using a rotational fiberizing process (internal centrifugation) (see Figure 1). The difference in the chemical composition of mineral wool determines the type of raw materials to be used, and thus a difference in the melt viscosity, fragility and fibre spinning ability.

The insulating ability of the mineral wool product is described by the thermal conductivity of the product. The thermal conductivity depends on the wool structure of the product and it is directly influenced by parameters, i.e., fibre diameter and length, wool structure, product densities and thickness. In addition, the production technologies have a strong influence on the wool structure that can be achieved.

Besides its high insulating ability, the application of mineral wool as fire barrier is another big advantage of wool products, especially of SW. Since SW fibers crystallize during dynamic heating, preventing a viscous flow, the wool product can keep its shape upon heating. In contrast, the GW fibers do not crystallize under the same heating condition and hence it will not act as a fire barrier in the same way as SW.

In this paper the wool production technologies are discussed and are linked to the melt properties that are determined by chemical compositions.

(a) (b)

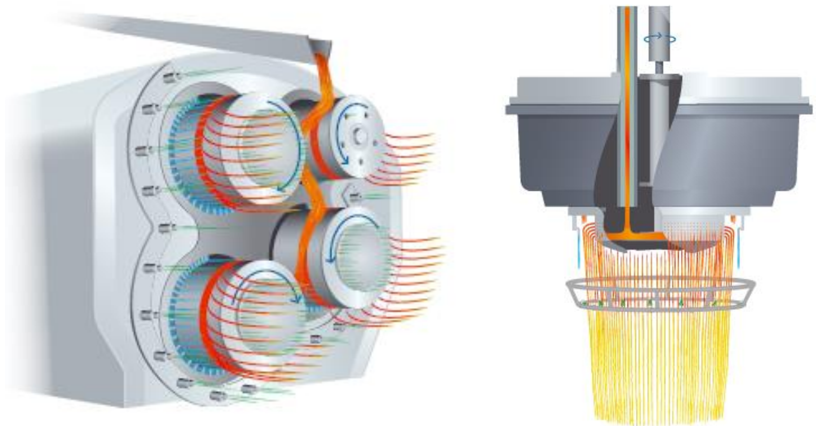

Figure 1: (a) Cascade spinner (external centrifugation), typically used for production of stone wool. (b) Rotational spinner (internal centrifugation) typically used for production of glass wool.