

Description

The invention relates to a process for the continuous production of plates and/or shaped bodies of fibre reinforced hydraulically setting compositions in which the hydraulically setting composition made up with water is applied in a predetermined thickness to a substrate which lies on a continuously moving belt and is moved on with the belt, fibre cuttings coming from a cutting mechanism are strewn in metered quantity on the surface of the continuously moved on pre-fixed composition and the composition is then compressed.

Such a process is known from US-A-4 187 275. This publication describes the production of shaped plates of glass fibre reinforced plaster. Plaster paste having a small excess of water for making up is applied to a water-impermeable pre-shaped track. Glass fibres coming from a cutting mechanism are strewn on and a further layer of plaster paste is applied on top. This is followed by compression and shaping with rollers. The final shape of the plate does not have to correspond to that of the pre-shaped track. It is claimed that similar shaped plates can also be produced from glass fibre reinforced concrete.

It is the object of the invention to provide a process of the above-mentioned kind with which in a continuous manner faultless fibre reinforced uniformly thick plates having a controlled quantity of fibres, fibre distribution and/or fibre orientation as well as shaped bodies formed therefrom with uniformly smooth and, if desired, improved surfaces can be produced.

This object is achieved by a process of the above-mentioned kind in that the strewn fibres are pressed into the composition by means of a tool acting over the entire working width.

Advantageous further developments of the process are characterized in the sub-claims.

The advantages of such a process are many. Apart from the fact that operation can be continuous, the hydraulically setting composition can be applied in a uniform thickness over the working width and the fibre reinforcement can be incorporated in controlled manner. Furthermore, it is possible to work with a composition which contains no excess water and consequently does not have to be subjected to water removal in a separate process step.

The controlled fibre distribution and fibre orientation can easily be regulated and can be very simply monitored so that it can be ensured that the plate produced is largely uniform. By using a substrate, a clean, smooth and if desired also coloured and/or structured or profiled plate surface is formed. A particular advantage of the process consists in the fact that by folding the edge portions of the substrate around the raw plate edges of the not yet hardened composition as early as during the production process a rectilinear lateral margin of the plate can be produced, with rounding off of its edges. In this manner a further trimming procedure, whether in the fresh or hardened condition of the plate, can be avoided. The width of the plate is adjustable from the outset within close tolerances and a subsequent straightening of the plate, which always involves loss of material, is not necessary. The adjustment of the width is

effected by adjustable guide elements which are, however, stationary relative to the moving belt, and which are arranged above the belt at the desired spacing from each other.

The substrate lying on the belt and moved on with it serves as a separating layer and also for shaping the side edges of the plate. It may comprise various materials, for example a plastics foil, a glass fleece or plastics-coated paper. Thus, simply by means of the substrate, many possibilities are provided for giving the surface of the plate a coloured or structured form. The substrate may be provided as a formwork and as such faultlessly removed from the plate surface without residue and without damage. In this manner the plate surface is completely uniform and smooth and does not have any rough places or cracks. On the other hand it is possible to incorporate the employed substrate itself, and/or its coating of surface-improving material, into the plate surface. Accordingly, the surfaces of flat plates and the surfaces of corrugated or trapezoidal plates shaped from the raw plate in the green condition or of other shaped bodies, for example tubes, can be given desired structures.

Moreover, the substrate also forms a protection for the finished plate, both when stacked and also during transport. Finally, by use of such a substrate an expensive aftertreatment which is required with customary processes can be dispensed with, since a substrate remaining on the plate represents an excellent aftertreatment.

The process will be further explained with reference to an example embodiment.

A substrate receiving the composition is applied to a belt which is arranged for continuous movement and with which guide elements are associated corresponding to the desired width of a plate to be produced. This substrate is preferably wider than the width of the plate to be produced, which is predetermined and established by the spacing of the guide elements, so that the edge strips on the longitudinal sides of the substrate stand up sufficiently far or can be placed over the upper sides of the guide elements. While the substrate is moved forwards with the belt, a hydraulically setting composition is continuously applied to the substrate in a uniform thickness and in the width determined by the spacing of the guide elements. This can for example be effected by extruding the composition through a mouthpiece whereof the opening corresponds to the width of the plate to be produced. Behind the extruder and above the transport path of the composition is arranged a cutting mechanism which continuously ejects fibre cuttings of the desired length into a chute from which the fibre cuttings are then strewn on the surface of the composition, loosened and oriented. Since the composition is moved on continuously below the shower of cuttings, the fibre cuttings coming from the chute are distributed uniformly on the surface of the composition in a manner which may be controlled.

In a further production station, the fibre cuttings are then pressed into or incorporated in the surface of the composition with the aid of a tool which acts over the entire width of the surface of the moved on composition. Here, by adjusting the tool, the depth of incorporation can be regulated and thus the

selected to accord with requirements. At the same time, the fibre cuttings are wetted and the composition compressed. Advantageously, a tool which gives resiliently is used.

The step of fibre incorporation may be repeated a plurality of times in the same layer of the composition or in layers successively applied to the substrate.

In addition to the reinforcing by means of fibre cuttings, endless fibres may also be laid onto and/or incorporated into the composition of the plate to be produced. The endless fibres may be impregnated in a manner known per se.

Since, as explained, the substrate is wider than the plate to be shaped and the parts of the substrate projecting on both sides beyond the plate are drawn upwards and so cover the plate edges, the outer sides of these parts of the substrates slide on the guide elements. This prevents rubbing and lateral adhesion of the composition on the guide elements. By folding the projecting portions of the substrate around the side edges of the raw plate, the latter are rounded off cleanly.

Cement may be strewn on the free upper side of the finished raw plate, and/or a covering, for example a fleece remaining connected to the plate or a removable foil, may be applied thereto.

The process according to the invention allows the outer surface of the finished plate to be already treated during the production process, for example to be coloured, profiled and/or improved in another manner. This may be effected by applying to the free side of the substrate a layer of colour separable therefrom, a profiled strip or another material suitable for surface improvement. The layer of colour or other material is received by the moist, hydraulically setting composition extruded onto the substrate, or the profiling of a profiled strip is pressed into the composition so that the finished plate has a coloured or profiled surface and/or one which has been improved in another manner. This makes a later post-treatment of the plate surface superfluous.

Using the process according to the invention, it is surprisingly possible to work with a fibre reinforced hydraulically setting composition without excess water.

The raw plate is either left for its final hardening as a flat plate or is brought into an appropriate shaping apparatus for shaping.

In order where appropriate to facilitate the incorporation of the fibres and the shaping process, additives may be added to optimize the consistency and cohesiveness. The composition may additionally be modified by vibration for the incorporation of the fibres and for the shaping process.

The loosening of the fibres may be effected by suitable shaping of the chute and/or by fittings in the chute, it being possible for the latter to be stationary or moved in driven manner. The desired orientation of the fibres is in particular achieved by the chute opening being dimensioned in a manner matched to the fibre length.

The resiliently giving tool serving for the gentle incorporation of the fibres into the composition may engage in the composition by means of a plurality of parallel cutters and the desired resilient force may be applied by the intrinsic

Claims

1. Process for the continuous production of plates and/or shaped bodies of fibre reinforced hydraulically setting compositions in which the hydraulically setting composition made up with water is applied in a predetermined thickness to a substrate which lies on a continuously moving belt and is moved on with the belt, fibre cuttings coming from a cutting mechanism are strewn in metered quantity on the surface of the continuously moved on pre-fixed composition and the composition is then compressed, characterized in that the strewn fibres are pressed into the composition by means of a tool acting over the entire working width.
2. Process according to Claim 1, characterized in that the tool engages in the composition by means of a plurality of parallel cutters.
3. Process according to Claim 1, characterized in that the tool gives resiliently.
4. Process according to Claim 3, characterized in that the resilient force is applied by the intrinsic elasticity of a material used for manufacturing the tool.
5. Process according to Claim 1, characterized in that the fibre cuttings are guided through a chute.
6. Process according to Claim 5, characterized in that the chute opening is dimensioned in a manner matched to the fibre length in order to orient the fibres.
7. Process according to Claim 5, characterized in that the chute contains fittings which are stationary or moved in driven manner for loosening the fibres.
8. Process according to Claim 1, characterized in that bundles of endless fibres are additionally laid onto and/or incorporated into the composition reinforced by fibre cuttings.
9. Process according to Claim 1, characterized in that the composition is used with a water content which is substantially just sufficient for hydration.
10. Process according to Claim 1, characterized in that the hydraulically setting composition is extruded onto the substrate in a predeterminable thickness.
11. Process according to Claim 1, characterized in that the step of strewing the fibre cuttings onto and pressing the fibre cuttings into the continuously moved on composition is repeated two or more times.
12. Process according to Claim 1, characterized in that the step of strewing and pressing in the fibre cuttings is performed in successive and superimposed layers of the continuously moved on composition.
13. Process according to Claim 1, characterized in that the substrate is wider than the width of the plate to be produced and the portions of the substrate projecting at the longitudinal sides beyond the edge of the raw plate are folded around the raw plate edge.
14. Process according to Claim 1, characterized in that cement is strewn and/or a covering is applied on the free side of the fibre reinforced, not yet set composition.
15. Process according to Claim 1, characterized in that the side of the substrate onto which the composition is applied is coated



with a layer, separable from this substrate, of a corresponding surface-improving material integrable in the surface lying on the substrate of the hydraulically setting composition, for improving the plate surface.

16. Process according to Claim 1, characterized in that, for shaping, the non-hardened raw plate is given a final shape in an appropriate apparatus.