

Title (en)

METHOD FOR PRODUCING ULTRA-FINE SYNTHETIC YARNS

Title (de)

VERFAHREN ZUR HERSTELLUNG VON ULTRAFEINEN SYNTHETISCHEN GARNEN

Title (fr)

PROCEDE DE PRODUCTION DE FILS SYNTHETIQUES ULTRAFINS

Publication

EP 1185728 B1 20031210 (DE)

Application

EP 00927131 A 20000502

Priority

- DE 19922240 A 19990514
- EP 0003975 W 20000502

Abstract (en)

[origin: DE19922240A1] Manufacture of synthetic continuous polyester or polyamide yarn, by melt spinning at high drawing speeds, achieves ultra-fine dimensions and low breakage rate, in light of mathematical understanding of process and materials variables. Filtration medium of the spinning assembly comprises a succession of differing fabric layers with finest mesh 5-15 μm , with or without finest steel particles of grading 88-250 μm . For melt shearing, either steel particles or corresponding internal components with finest pore openings 50-1000 μm are employed in the spinning assembly, to achieve a total pressure across the assembly of 150 bar minimum. Filter surface loadings of 0.25-0.80 to 80 g/min/ cm^2 are reached. Hole density of the nozzle plates employed is 1.5-6.0 holes/ cm^2 . The diameter d of the capillary bores in the nozzle plate is obtained from a relationship presented in the disclosure. It is so selected that the apparent wall shear rate of melt within the capillaries lies between 5,000 and 25,000 per second. Length of the capillaries is obtained from a further relationship presented in the disclosure. It is selected such that melt pressure ahead of the nozzle plate lies between 50 and 100 bar, preferably 60-100 bar. Over the cross section of the filament bundle, before reaching the drawing zone, a uniform temperature profile is produced at spacing (h) from the nozzle plate. This is less than the spacing of the setting point (h0.98%) from the nozzle plate. The setting point is selected in direct association with the protected recovery. A relationship provided defines h0.98%. Further relationships on which this value is dependent are provided. To achieve uniform temperature profile in the filament bundle, an excess temperature value is adjusted. This is measured as the surface temperature difference between center and edge of the nozzle plate in the stressed titer region. Further relationships provided, link this with spinning beam heating, polymer melt temperature, heating temperature, filament mass throughput, drawing speed and filter area. Precisely defined heating is applied to the outer stream in the spinning assembly, defined by further relationships in terms of contact time t and contact length along the internal wall, being determining factors in thermal transfer; l/t is kept within set limits. Still-molten fibers are not directly exposed to air blast. They are first cooled to a recovery temperature below the drawing point. The air blast has a set symmetrical profile over the transverse axis, with controlled suction effect on the opposite side, a function of resistance to airflow. Individual fiber bundles are separated by sheets. All functional components contacting the yarn, e.g. oilers, guides and treatment components, are ceramic with friction-optimized surfaces. Having passed through each functional component, the maximum tension reduction in the yarn is 60-110%. Optionally the fiber bundle is subjected to untangling. A relationship is specified for the winding tension at which the freshly-spun yarn is wound up. Further claims in the disclosure detail and quantify process conditions and product variables. An Independent claim is included for the yarn so produced.

IPC 1-7

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CPC (source: EP US)

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