IMPORTANCE OF PYROPLASTIC DEFORMATION CONTROL TOWARDS OBTAINING THIN-WALLED CERAMIC SANITARYWARE PRODUCTS

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Ceramic sanitaryware production requires high amount of raw materials and energy due to large sized and complicated shaped products and complex production processes. In addition, production of such products limits the use of automatic systems and leads to high cost of labor. According to the relevant standards, water absorption of sanitaryware products should be less than 0.5 % due to their use in water interactive areas. Fired sanitaryware bodies include high level of glassy phase in which crystalline phases of mullite and residual quartz are dispersed as a result of viscous flow sintering. High firing temperatures up to 1240°C and long firing times for 10 to 12 hours are necessary in order to achieve required technological properties such as low water absorption from such complex pieces. Under such firing conditions, products are also expected to be resistant to pyroplastic deformation to satisfy the required dimensional tolerances and thus cast thickness is kept at above certain value. This study aims to understand the factors affecting pyroplastic deformation of sanitaryware bodies in detail, while attaining a thin-walled product. In order to achieve this aim, several formulations were prepared by employing different fluxing agents. Type and amount of crystalline and glassy phases were also varied within a certain range. The firing conditions were almost kept the same to the industrial conditions. The results showed that it was possible to reduce wall thickness from 11-12 mm down to 5-6 mm while doubling the fired strength without deteriorating the other relevant technological properties.

Keywords: sanitaryware, thin-walled, pyroplasticity, strength