

COMPACTION BY HORIZONTALLY VIBRATED 3D GRANULAR MATERIALS. APPLICATION TO SAND FILLING AND COMPACTION IN ELECTRICAL FUSES

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Abstract: Horizontal shaking of silica sand has been studied for the purpose of improving the efficiency and reliability of high breaking capacity fuses. An horizontal vibration device has been designed, which provides sinusoidal vibrations up to 300 Hz and enables the external observation of sand motion in 3D sand piles up to 4×8×5 cm³ in transparent boxes. At 50 Hz, with increasing relative acceleration Γ , the sand behaviour shows the onset and development of convective rolls in the upper part of the sand pile with 2-rolls organization, then the development of strong downwards motions at the four vertical corners of the box. An overall densification is observed in

dynamic conditions. When vibrations are stopped, the sand structure relaxes and further densification is observed. The relaxed density first increases with increasing acceleration, then tends to decrease to a plateau after having reached a maximum value.

Keywords: fuses, granular media, 3D horizontal vibrations, packing density, homogeneity.

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