

Name : Mr.Pankam Sri-U-Thai
Thesis Title : A Study of Flow Behaviour of Gypsum in Silos
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Thesis Advisors : Asst.Prof.Dr.Bundit Fungtammasan,
Asst.Prof.Dr.Yuthachai Bunterngchit
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Abstract

The purpose of this thesis is to obtain an experimental data-base on the parameters which govern the design of silos for handling gypsum powder. Relevant physical properties of gypsum powder were measured , and the effects of hopper geometry on flow behaviour, flow rate and wall pressure distribution were investigated.

The results show the following characteristics for gypsum powder: bulk density of 826.7 kg/m^3 , moisture content of 5.6 % , angle of effective yield locus of 38.7 degree, wall yield locus of 36.8 degree.

Twelve different hopper geometries were used; these being combination of three outlet diameters (80, 110 and 165 mm) and four hopper angles (15, 20, 25 and 30 degrees), with a fixed cylinder of 360 mm in diameter and 1,700 mm in length. The results show that the measured static pressure distribution exhibits a profile close to that calculated by Jenike's equation. The measured dynamic pressure profiles agreed with Janssen's equation. For the average flow rate of the gypsum, measured data agree with theoretical calculation only for the case of hopper with a 165 mm diameter outlet; that is, at a hopper angle of 15° ; the profile is closed to Brown & Richard's prediction, While at 20° , 25° and 30° , the profiles are closed to Davidson & Nedderman's.