Typical phenomena when bulk solid is flowing out of a hopper or silo are:

- **Mass flow**
The entire vessel contents are in motion during discharge of the bulk solid. If the area above the hopper is high enough, a uniform sinkage across the cross-section occurs (piston flow).

- **Funnel flow**
Only a limited zone above the discharge opening, which can widen out upwards in a funnel shape, is in motion during discharge of the bulk solid. At the sides of the flowing bulk so-called dead zones are formed, in which the material is at rest. The material rests in those zones for a long time, and is only discharged towards the end of the emptying process. Moreover, a bulk solid which is not very free-flowing may become compacted in the dead zones to such an extent that it will not flow out by gravity alone.

- **Arching**
In the case of poor flowing, cohesive bulk solids, a stable arch may form in the discharge hopper causing the material flow to come to a stop.

- **Segregation**
When filling storage containers, segregation may occur if the particles are of differing size, shape or density. Segregation by its nature reduces product quality.

Whether mass or funnel flow is occurring depends on the flow properties of the bulk solid and on the wall material and angle of inclination of the hopper walls. The required angle of the hopper walls can be calculated if the flow properties are known. The flow properties are measured using shear testers. With these measured values, the minimum size of the discharge opening to avoid arching can also be calculated.