

FILLING BULK BAGS BY WEIGHT OR BY VOLUME

by Steve Taylor, Head of Mechanical Engineering at Spiroflow Ltd

Weigh better?

Bulk bags are ubiquitous!

They are spotted at the roadside containing sand and aggregates for use by DIY enthusiasts, on building sites, on trucks, stacked outside of factories and found throughout factories where they will be holding raw materials, intermediate materials generated during the production process or finished products.

Spiroflow Ltd
Clitheroe
Lancs.

Can be contacted on
Tel: 01200 422525
Fax: 01200 429165

E-mail: info@spiroflow.com
Web: www.spiroflow.com

Most bulk bags are filled using proprietary equipment designed to ensure that these containers, which typically hold between 500 and 1,500 kg, are filled quickly, safely and in a dust-free manner. When buying such a machine, the biggest single factor in determining the design and cost is whether the bags are to be filled by volume or by weight.

Sometimes the decision is easy! For example, if the end product is to be sold by weight then the Bulk Bag Filler will need NTEP approval in the USA, 'Weights and Measures' approval in the UK or the equivalent national standard for other countries where consumers are protected by legislation. However, there are some products that are sold by volume such as soil improvers and packaging materials.

Other times, it may be necessary for production control to know what is in bulk bags within the factory. Bulk bags are often used to store and/or move intermediate materials in/around the factory between production processes. If such material is to be measured subsequently by way of some other means (such as a receiving hopper on load cells, a metering feeder or a container on a weigh scale) then knowing the weight of the contents in bulk bags used for this purpose may not be relevant. That is, unless it is important for the accountants to know for their monthly reports/annual (or more frequent) stock-takes. In which case knowing their contents by weight could be critical.

However, knowing the weight for production or inventory purposes usually means that NTEP approval, 'Weights and Measures' approval or other national standard approval is not required.

Filling by Volume

Filling by volume is the lower cost compared to filling by weight given that Bulk Bag Fillers can, in their most basic form, be operated visually such that the operator stops



Erect and stable bags



Filling by volume

the filling operation as soon as the product reaches a certain level or completely fills the bag. It is normal to compact the bag as it is filled using some form of vibration to de-aerate the product when appropriate. Materials such as coarse sand or plastic granules need no such compaction because there is adequate space between the particles through which air can escape. Whereas, materials such as flour and carbon black, need plenty of compaction given that they behave like water when highly fluidised. Compacted products ensure that the bulk bag containing them is the more stable for handling, storage and transportation and that more product can be contained in less space.

Filling by volume is readily automated by either first filling a vessel fitted with a level switch above the bulk bag and then dropping the entire contents directly into the bag below. The level switch is positioned at the point in the collection vessel which gives the correct volume. It can also be used to both stop the filling of material into it and to discharge its contents into the bag below. Alternatively, the filling head of the Bulk Bag Filler can be fitted with a level probe to terminate filling at the desired level. Most Bulk Bag Fillers are designed to fill bags that are inflated to ensure that they are correctly formed ready to accept their contents. Incorrectly formed bags may affect their capacity and may create discharge problems in due course. Filling heads for dusty materials should be designed to duct the air displaced from the bag (by the incoming product) safely to atmosphere through some form of dust collection system - given that some product will be carried away in the escaping air stream.

Filling by Weight

Filling by weight can be achieved in a variety of ways: the simplest, but not necessarily the lowest cost option, is to install a proprietary weigh platform within the base of the Bulk Bag Filler and to link it in the filler's control system. However, the more usual way is for the filler manufacturer to



Filling by weight - platform mounted load cells

support the base of the bag on a load cell mounted structure which can be certified as being correctly calibrated by a National Standards officer when required.

Whatever the system, it must be capable of being 'tarred off' to ensure that only the contents of the bulk bag are weighed. In most instances, the bag will be filled whilst it stands on a pallet. This makes it easy to remove by forklift truck. Because the structure that supports the bag (and its pallet) might be a section of heavy, powered roller conveyor, a heavy flat plate or truncated, pyramid shaped plate, it might be better to consider a bag filler that uses the 'hang-weighing' principal for greatest accuracy. With hang weighing there is less metal (which also has to be tarred off) relative to the weight of the contents of the filled bag with which the weighing system has to contend.

One other advantage with hang weighing is that the weighing mechanism is mounted high up in the structure of the bag filler making it less prone to damage by the forklift truck. Having said that, platform weighing systems can be suitably protected.



Filling by weight - hang weighing