

A guide to silo cleaning in the food production sector

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Silos are widely used in the food and beverage sector for storing bulk powdered and granulated ingredients in and around production facilities before they are required for use. This article examines best practice in the cleaning and maintenance of these key aids to production.

Silos and other bulk storage vessels are widely established in almost all facilities involved in large scale food and beverage production. They are seen at almost every major bakery and biscuit factory in the UK, where they store bulk powders such as flour, salt or sugar.

Typically measuring up to 50ft in height, and holding up to 80 tonnes of product, their presence enables facility owners to benefit from economies of scale when purchasing raw materials while ensuring production can continue uninterrupted over extended periods.

Generally made of metal, silos can be found both inside and outside production facilities depending on their intended contents.

Correct management

The size of silos – and the fact that they can be holding several thousand pounds' worth of product at any one time – means that cleaning and maintenance must be correctly managed. They should be treated as any other piece of food production equipment.

Any contamination of silo contents is not only costly in terms of waste, downtime and lost production, but also brand image, if contaminated product finds its way into the main production line, and cleaning costs too – for both silos and production equipment.

While there is no specific legislation governing silo cleaning intervals, best practice as applied by most major retailers typically requires that silos are emptied and thoroughly cleaned at least once and usually twice per year.

Wherever they are located and whatever their contents, silos present a variety of issues for production managers.

The first relates to the contents themselves, with some powdered products, such



The cleaning and maintenance of silos at food production facilities must be properly managed.

as flour, chocolate powder and sugar dust, potentially being explosive if stored or handled incorrectly. This means they must not be subjected to excess dust creation, sparks or naked lights – so all equipment and PPE used within the silo must be of non-ferrous construction and shielded from electrical spark risk, complying with ATEX regulations.

Meanwhile, the hygiene issues which can affect silos are significant. Silos containing sugar or other 'coarse flow' items are almost effectively self-cleaning in the short and medium term, with those silos needing only an occasional deep clean.

However, most powdered product is potentially susceptible to infestations from stored product insects such as flour beetles, moths and biscuit beetles. These can enter the silo when the product is delivered – live or as eggs – or afterwards, through any gaps, for example around the silo lid.

The underside of the lid is in fact one of the most likely sites for an infestation, as this is the area within the silo where the product is not regularly agitated. Infestations also commonly occur in the 'dead space' at the ends of the screw conveyors fitted to many silos which transport the stored product to the main production line.

Mould can also be a problem, as heat is

generated by the movement of product within the silo, either as it is blown into the silo or taken from it to the production line. The effect of mould can be worsened if the silo is situated externally in a windy area.

The other issue from a production planning point of view is that silos can only be cleaned when they are empty, to avoid wasted or contaminated product, meaning significant cleaning must be scheduled around raw material deliveries and key order deadlines.

Prevent 'bridging'

Left over contents in the silo can create other problems for the cleaning process. The granules of hygroscopic or water-absorbing products such as sugar can clump together over time and create 'bridging' which not only blocks ready access to the area of the silo beneath the 'bridge', but if undetected and left unremoved, can physically stop the powder flow.

The only generally effective way to remove the 'bridge' is to chip it away from above – itself a potentially dangerous process as the bridge can give way suddenly, causing damage to conveyors and screw feed systems at

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the base of the silo. A full risk assessment must be undertaken before silo cleaning commences. A safe system of work should be devised, with an escape plan in case any safety issues arise.

Good practice in this area also requires the preparation of a report on the condition of the silo, including 'before' and 'after' images, details of any infestations, and general comments on its state of repair.

Separation of the interior lining, for example, from the exterior shell, is not uncommon and should be reported.

Most silos have a hatch in the top of the lid which allows human access for the purposes of cleaning. Before cleaning can even commence, however, a meter must be introduced into the silo to measure the 'breathability' of the air within.

Work must not begin if the air is not fit to breathe. Even if the air is found to be of an acceptable standard, the silo cleaners – who must work in teams of at least three – must always wear a dust mask throughout the cleaning process. Some sites, such as breweries, insist in any case that full breathing apparatus with air tanks be worn.

Access to the silo is typically gained via a tripod and winch, although older, or less well designed silos may require specialist rope access methods. All operatives involved must have received accredited training in working in confined spaces.

The first stage is usually to vacuum down the interior surfaces of the silo. Brushing is not an option as this increases the risk of explosion as a cloud of dust can be created. Indeed all tools and equipment used for cleaning the silo must be spark-proof, from plastic scrapers through to vacuum cleaners which can be air powered and which must also be fitted with anti-static hoses.

Any metal product must be phosphor bronze or copper, while all lights must be sealed and cleaning operatives must wear disposable paper suits.

All equipment is subject to the requirements of ATEX, the name commonly given to two European Directives for controlling explosive atmospheres.

Check for mould and pests

Silos are normally cleaned dry, although pressure washing can be undertaken if mould is present. If the latter, blow drying will be required immediately afterwards. Virtually all silos have filters (either of DCE or reverse jet design) on top, which will need to be cleaned and examined for soundness and filter elements replaced if required. If there are any signs of infestation present, a specialist pest control supplier should be immediately called in.

Smaller, liquid ingredient tanks, holding up to about 20 tonnes, are widely used for edi-

ble oils, yeast and liquid chocolate. These tanks are usually fitted with an external water jacket and have an agitator to keep the contents moving.

Problems can occur if the heat supply to the product fails, causing it to solidify. Under normal circumstances, cleaning personnel do not enter these vessels, the cleaning being carried out from the top access. In specific cases where product needs to be physically removed, access is gained using the tripod and winch method and a corresponding safe system of work.

Upon completion of the cleaning task, the vessels are normally sanitised and then environmental swabs taken to validate micro-integrity. Because of the safety issues surrounding silo cleaning and the specialist nature of the work, many companies choose not to use their own cleaning staff for this task, instead outsourcing it to a food facilities cleaning specialist.

This can not only prove more cost effective, but the risk to the company is reduced and the job can be undertaken at a time most convenient to the manufacturer. Indeed many contractors have dedicated silo cleaning teams and will more than likely have come across any common issues before, enabling them to recommend the most efficient and cost effective solution and to guarantee legal compliance and safe, clean production. ■

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