

INDUSTRY GUIDELINES

Dust-free paper sacks



Performance powered by nature.

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INTRODUCTION

Purpose

These Industry Guidelines contain established technical methods on how to obtain a dust-free paper sack after filling with cement or similar building materials. For other types of powdered products, please contact your sack producer for solutions.

The instructions are directed at paper sack converters when meeting customers who:

- » use paper sacks of inferior quality, leading to dusty sacks and a bad reputation for the paper sack industry.
- » intend to switch from paper sacks to plastic sacks, using dust and cleanliness as arguments.

Although we try to be as precise and exhaustive as possible in these guidelines, there may be other reasons for dusty paper sacks, and different solutions to the ones described here, not to mention differing opinions.

We would be grateful for your comments and feedback.

Produced by

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INTRODUCTION

On behalf of

The boards of **CEPI Eurokraft** and **EUROSAC**.

About the organisations

CEPI Eurokraft is the European Association for Producers of Sack Kraft Paper for the Paper Sack Industry and Kraft Paper for the Packaging Industry. It has ten member companies representing a volume of 2.5 million tonnes of paper produced in ten countries. www.cepi-eurokraft.org

EUROSAC is the European Federation of Multiwall Paper Sack Manufacturers. The federation represents over 75% of the European paper sack manufacturers operating in 20 countries. They produce more than 5 billion paper sacks every year, representing 650,000 tonnes of paper converted in 60 plants. www.eurosac.org

THE IMPORTANCE OF HAVING A DUST-FREE PAPER SACK

A. Better health and safety along the value chain

- » More convenient for customers to handle paper sacks with cement or other building materials (no slippery sacks).
- » More stable pallets, leading to better load security.
- » Better health and safety for employees, since for example cement is a hazardous material and cement dust can be harmful to human health.

B. Less environmental impact

- » Reduced carbon footprint for filled goods because less material is lost in the supply chain.

C. Cost savings for fillers

- » Less complaints from customers.
- » More resource- and cost-effective production since no product loss.
- » More effective production process since less maintenance and cleaning are needed.
- » Longer lifetime of machinery in the production process.
- » More accurate weighing of every filled paper sack which fulfils customer requirements.
- » Reduced energy cost since cleaning processes on filled paper sacks can be minimised.

D. Branding

- » A clean sack is more attractive. The colours of the prints appear brighter.
- » Dust-free sacks convey an image of quality along the distribution channel which benefits the customer, the converter as well as the paper sack industry.

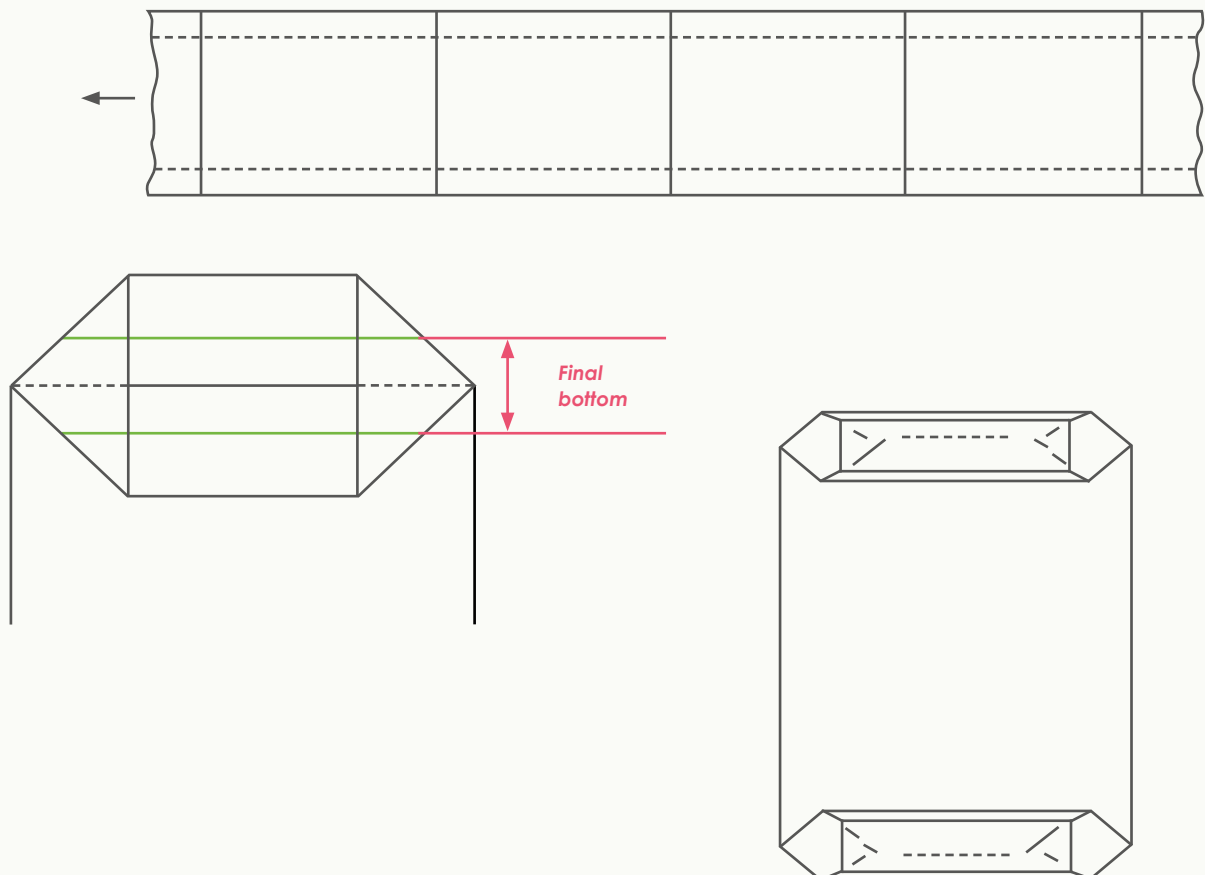
HOW TO PREVENT DUST

The most suitable type of paper sack for cement or other building materials is a pasted valve sack in accordance with ISO 6590-1. This may be of one or more plies and may include barrier plies for specific applications.

A. Leakage from corners

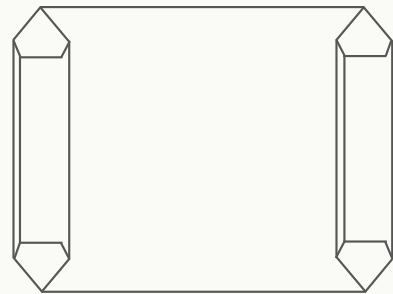
Bottom construction

1. Flush-cut tubes are the most common construction for cement sacks. They can be quickly set up in the sack machine. The tubes have a bottom/top cap to increase their strength, stability and sift-proof properties.



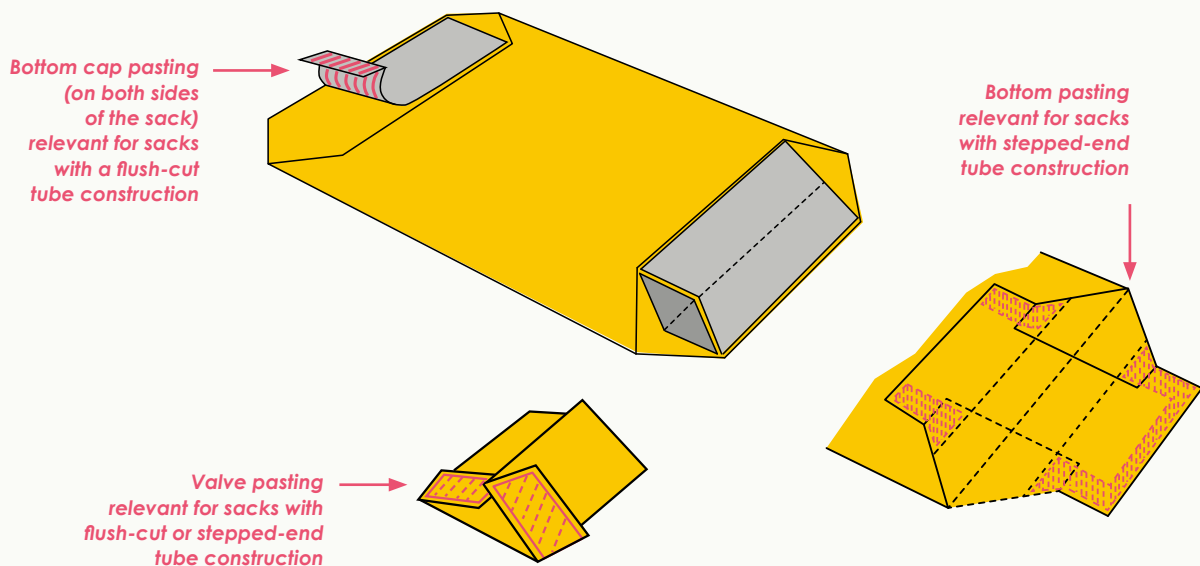
HOW TO PREVENT DUST

2. Stepped-end tubes have a more complex construction, but are more efficient with respect to material savings, flat-bottomed surface and reinforced bottom. Due to the stepped material edges, it is possible to glue each ply together in the overlapping area of the bottom flap. The bottom corners become tighter as the restoring force of the bottom fold decreases.



Folded corners on bottom flaps

Leakage from the folded corners on bottom flaps is avoided by setting the right amount of glue in the right position: it is best to set the glue as close as possible to the bottom folding lines to seal the bottom corners. The amount of glue must be enough to cover the channels that could be created from the restoring force of the bottom fold.



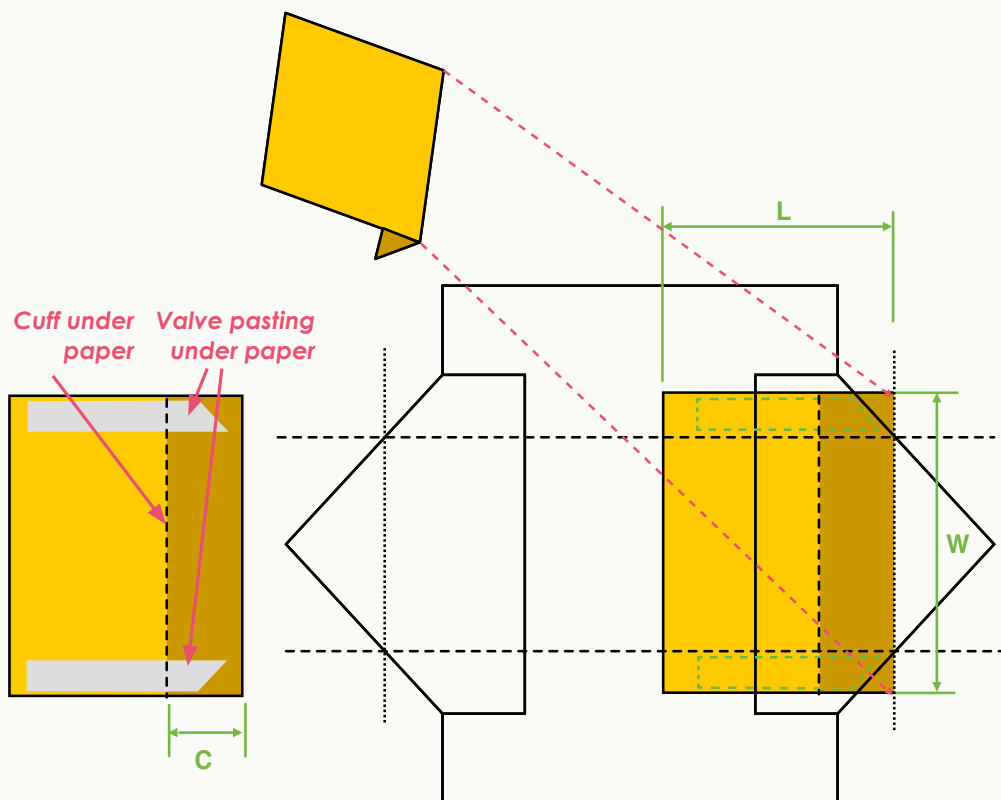
HOW TO PREVENT DUST

B. Leakage from valve opening

Valve construction

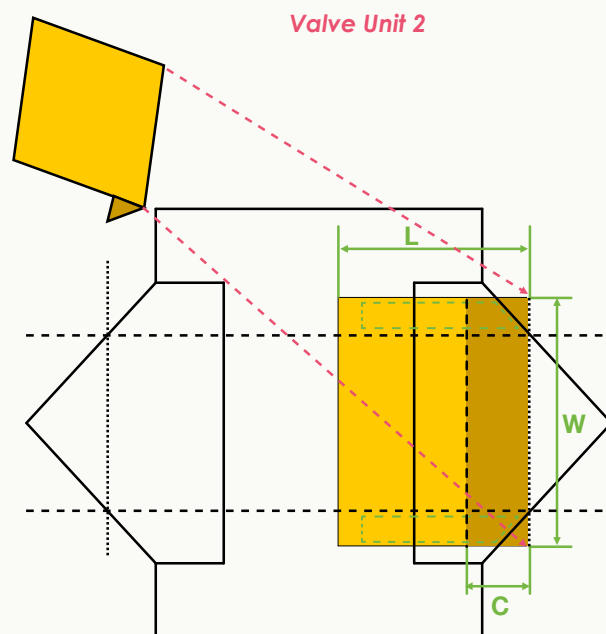
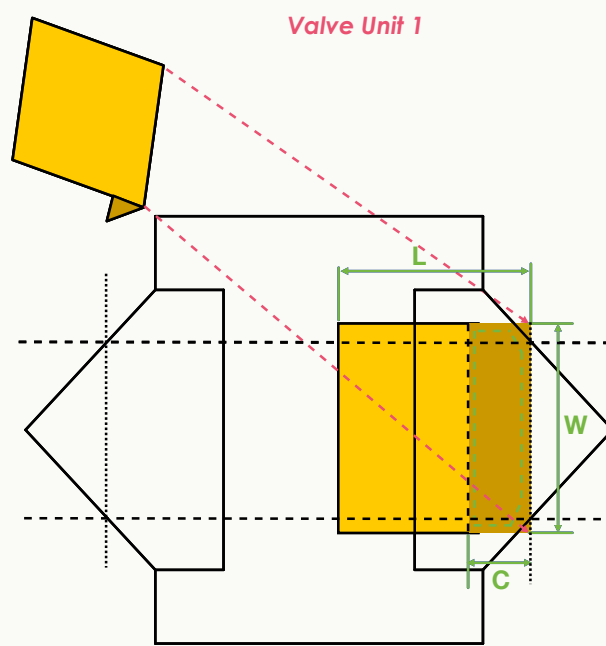
Use a pasted valve sack with an internal self-closing valve or external fully sealed valve. There are three types of internal self-closing valves:

1. Reinforcing patch with cuff. One single sheet of paper is used. This is glued close to the bottom sidelines, at least when reinforcing the bottom flaps on top.



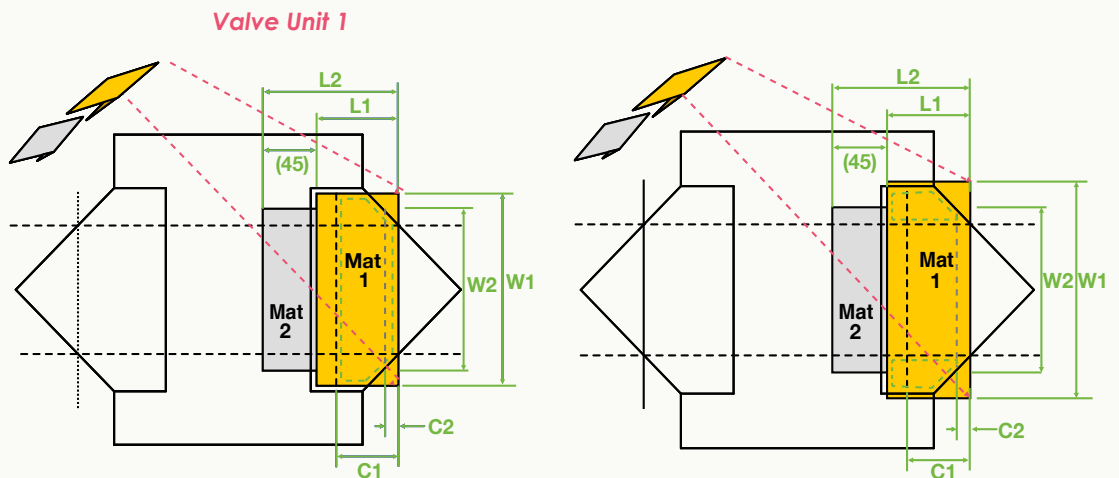
HOW TO PREVENT DUST

2. Double-sheet valve. The first sheet is glued on the pocket and the second sheet is glued on top. This increases the tightness, as the paper sheet overlaps the pocket depth.



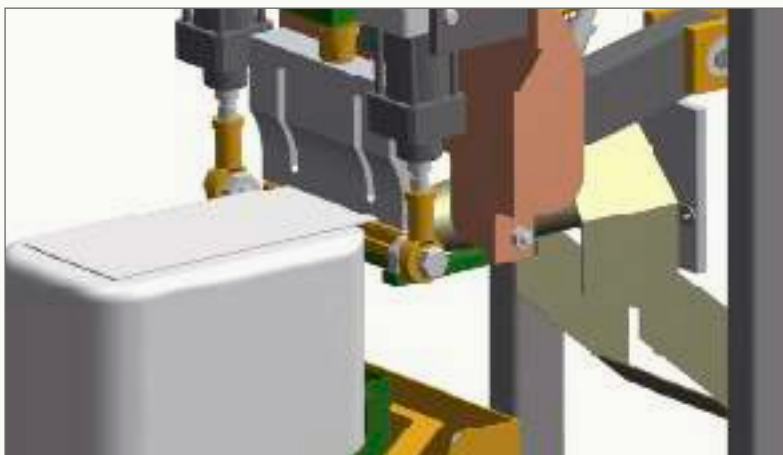
HOW TO PREVENT DUST

3. Internal two-part sleeve (four components). Two sheets of varying length are glued on the pocket and two sheets of varying length are glued on top.



The more plies used in the valve construction, the more dust-free the construction will be.

There are two options available for external valve closure: sealing at the spout, see picture below, or after sack discharging.



HOW TO PREVENT DUST

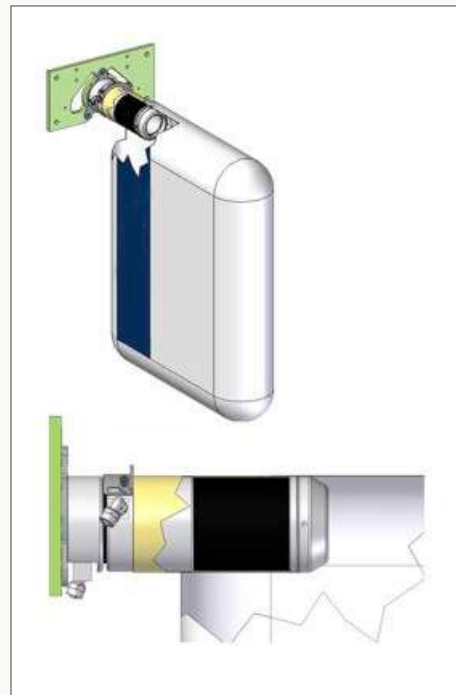
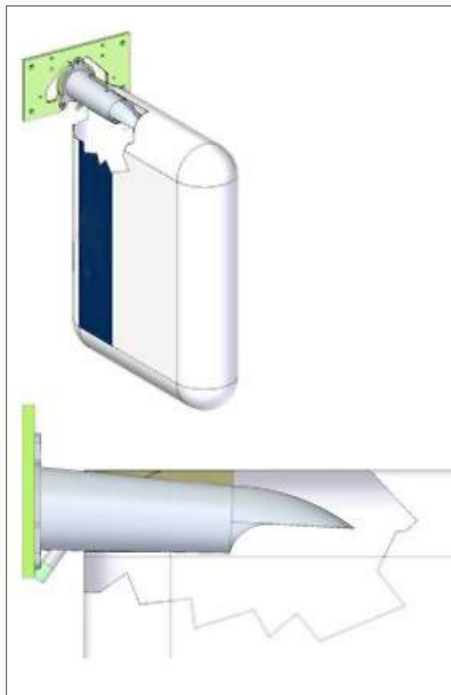
C. Leakage during filling

Filling spout

The filling spout can be in the shape of a **cone**, see left picture below.

Following application, the valves must fit on the spout without any gaps. Otherwise air (with dust) will escape from under the spout.

The filling spout can also be an **inflatable sleeve**, see right picture below. It fills out the entire valve during the filling procedure and is therefore better for dust-free filling.

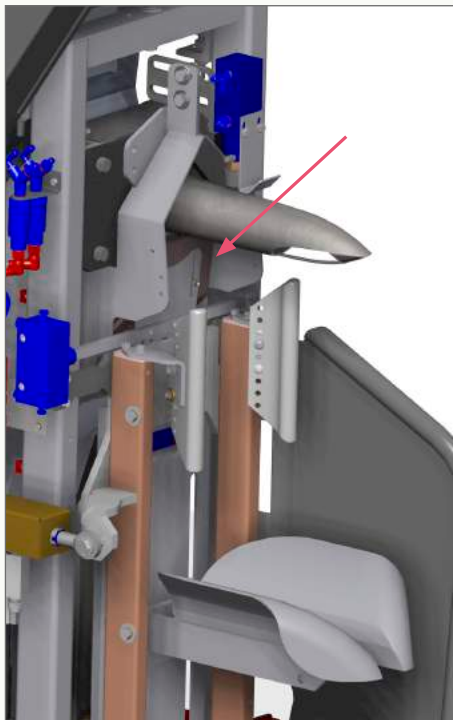


HOW TO PREVENT DUST

Spillage return flap

A spillage return flap (see picture and arrow) is used to prevent any products that fall out of the spout or valve during sack discharge from dropping onto the conveyor belt (or on the filled sack).

When the flap switches to the start position, the overhead product drops into the spillage channel below.



Sack discharge

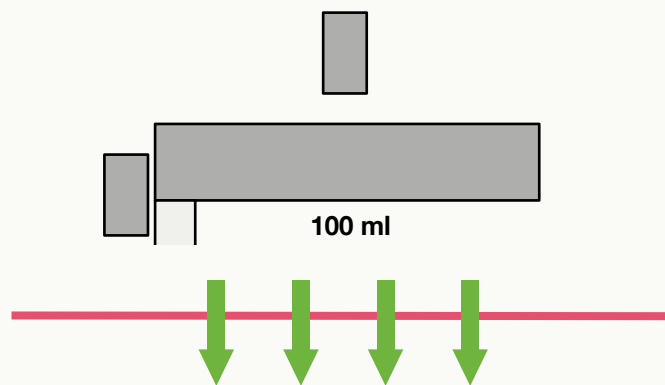
As material (dust) can escape when the sack drops down, it is important that the drop is as short as possible, otherwise air and dust will escape from the valve before it has closed properly.

HOW TO PREVENT DUST

D. Leakage from perforations

Use a high-porous paper, without any perforations, for a cement sack. Perforations will limit the strength of the sack and lead to dusty sacks.

The porosity of a paper is measured by its air resistance, i.e. the time taken for 100 ml of air to pass (with a specific pressure of 1.23 kPa) through a specified area (6.42 cm²) of a sheet of paper. The air resistance is reported in Gurley seconds. A short time means that the paper is more porous.



Use a paper with a porosity between 5 and 7 Gurley seconds for a standard cement sack.

If a very long shelf life is required (hence a closed film), then use high-porous paper on the inner ply and a top or side deaeration system on the sack.

HOW TO PREVENT DUST

E. Avoiding broken sacks

Strength

Use a paper with high-strength properties. TEA* indicates the strength, which is a calculation of the tested parameters of stretch and tensile strength for a paper. Stretch and tensile strength together indicate how well the paper will absorb the energy from a drop test (TEA = tensile energy absorption). See the table below to find the right solution for each paper sack:

Geometric average TEA for 25 kg sacks:

Normal handling	330–390 J/m ²
Tough handling	400–450 J/m ²

Geometric average TEA for 35 kg sacks:

Normal handling	370–430 J/m ²
Tough handling	440–490 J/m ²

Geometric average TEA for 50 kg sacks:

Normal handling	430–490 J/m ²
Tough handling	500–550 J/m ²

* The geometric average TEA takes into account both machine direction (MD) and cross direction (CD) values; the geometric average TEA = $\sqrt{\text{TEA MD} \times \text{TEA CD}}$

HOW TO PREVENT DUST

Correct size/volume

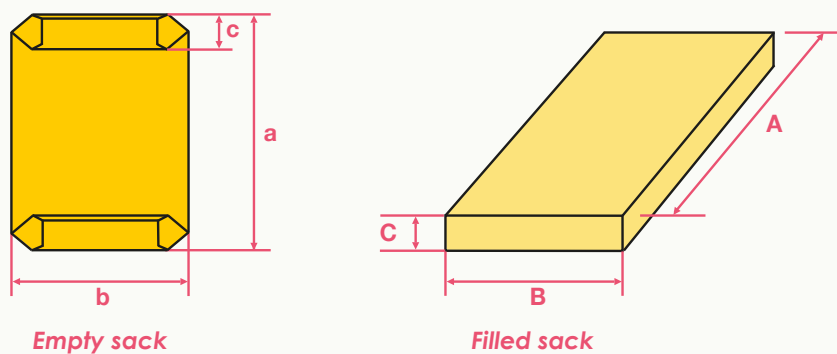
The correct size/volume of the sack is important for achieving a good filling result. If a sack is too large for the goods in it, the sack will be loose. This leads to:

- » Poor palletising
- » Leaking valves if an internal self-closing valve

If a sack is too small for the goods in it, the sack will be tight. This leads to:

- » Slow filling
- » A difficult-to-seal external valve if the goods are in the valve area during sealing
- » An internal valve potentially failing to close properly because the goods are left in the valve after filling
- » Potentially small tears during filling, which release dust

EUROSAC has created a calculation method to determine the size/volume for a valve sack. By using this method, the total volume of a filled sack can be calculated.



Volume out of flat dimension

$$V = b^2 (0.2668 a + 0.4047 c - 0.1399 b) * 10^{-6}$$

V is given in litres for a, b, c in millimeters

Filled dimensions from the flat dimensions

$$A = 1.025 a + 1.02 c - 0.0028 c^2 - 80$$

$$B = 0.920 b - 0.0015 c^2 - 35$$

$$C = 0.095 b + 0.0025 c^2 + 58$$

A,B,C are given in millimetres for a,b,c in millimetres

HOW TO PREVENT DUST

Correct palletising

When sacks are palletised, make sure no sacks are hanging over the edge of the pallet. Overhanging sacks can result in breakages due to the high pressure involved when several sacks are stacked on top of each other.



The picture shows an example of perfectly palletised paper sacks.

CONCLUSION

To avoid dusty cement paper sacks, the following should be taken into consideration:

- » Use a pasted valve sack from flush-cut or stepped-end tubes.
- » Make sure the glue is set in the right position around the folded corners of the bottom flaps.
- » Use an internal self-closing valve or an external fully sealed valve. The more plies used in the internal self-closing valve, the more dust-free the construction will be.
- » Apply an inflatable-sleeve filling spout, which fills out the entire valve during the filling procedure.
- » Make sure a spillage return flap is installed in the filling machine. This prevents overhead products from dropping on the sack.
- » Keep the drop height to the conveyor as short as possible for the filled sack; otherwise air and dust will escape before the valve has closed properly.
- » Use a high-porous paper, without any perforations, and use a paper with high-strength properties.
- » Make sure the size of the sack is correct in relation to the desired filling volume. Use the EUROSAC calculation method to avoid sacks that are loose or too tight.
- » Ensure the filled sacks are palletised correctly.



MORE INFORMATION

For more information on paper sacks,
contact your sack producer or either of the
two organisations below.



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