DISCHARGING BULK BAGS

(250 - 2000kg FIBCs)

A Practical Guide to Dust Containment and Static Control

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A series of Spiroflow brochures and data sheets is available to cover topics discussed in this guide.

SPIROFLOW

POWDER HANDLING SYSTEMS

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SELECTION CRITERIA FOR BULK BAG DISCHARGERS

Before purchasing a Bulk Bag Discharger, always ask these key questions:

1. Will the machine accept varying bag sizes?
2. Will it handle poor flowing products?
3. Is there a fork lift truck available or is an integral hoist needed?
4. Does the machine provide a controlled flow when spout is opened?
5. Does the discharger have a device to keep the bag under tension during discharge to ensure all product is discharged?
6. Is discharge of bag contents required by weight or by volume?
7. Is there provision for restraint and/or removal of inner liner?
8. Is an integral take-off conveyor required?
9. Is there a height restriction?
10. Is there provision for emptying small sacks in case the bulk bag supply is interrupted?
11. Does the plant require an hygienic discharger or a USDA/FDA Approved machine?
12. What dust control features are incorporated into the discharger?
    a. when untying the bag spout
    b. whilst the product is being discharged
    c. when the inner liner is being removed
    d. when the bag is removed and folded for disposal
13. Is the product or environment hazardous, therefore needing provision for containment with static grounding and monitoring?

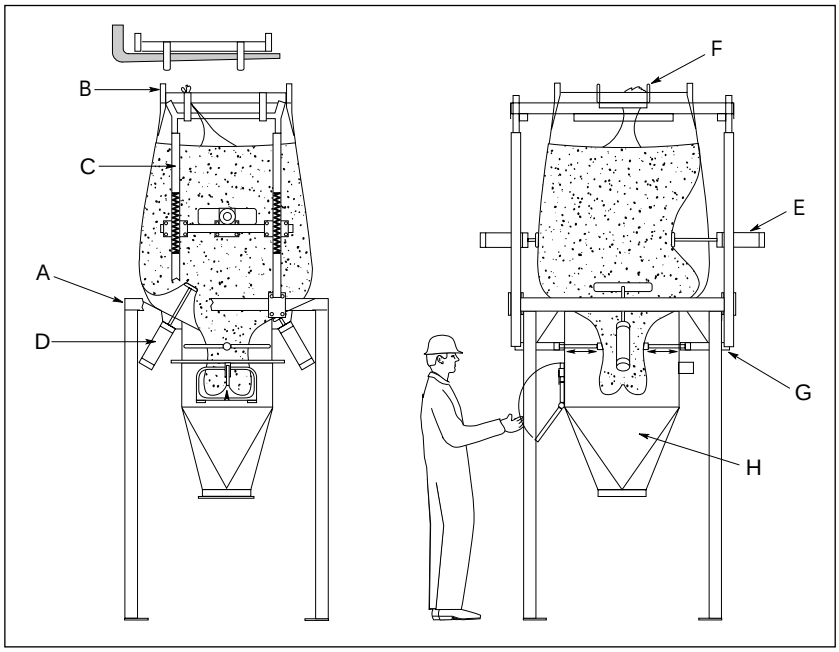
INTRODUCTION

Largely as a result of legislation to reduce the incidence of back strain and other injuries to personnel, an increasing variety of materials is today being handled in Bulk Bags (FIBCs) in place of 25kg sacks, and this has confronted manufacturers of discharge equipment with problems which chiefly focus upon achieving dust-free operation and good product flow from bulk bags.

The favourable economics of Bulk Bags are a further factor contributing towards their growing use for the distribution of materials for which small sacks were previously almost exclusively employed. In contrast with the situation of some 15 years ago, when Bulk Bags were mainly used for high tonnages of relatively low value product such as sand or cement, they are employed today for small amounts of valuable materials such as organic food ingredients or speciality industrial chemicals and pharmaceutical products, many of which have difficult flow characteristics and are inherently dusty. Bulk Bags are also increasingly used for in-plant intermediate storage of processed or premixed product.

At the same time as problems associated with poor flow have been tackled, makers of discharge equipment have improved their designs and optional items of equipment to meet specific installation requirements and interface efficiently with other kinds of plant. The result of this effort is that modern Bulk Bag discharge equipment should be almost universally applicable and flexible to operate. An almost painless conversion to this modern method of semi-bulk handling from the traditional use of small sacks has been achieved, and older methods are retained only in certain instances where Bulk Bags are not practical, or large silos can still be economically justified.

STANDARD BULK BAG DISCHARGER



A	FIBC mild steel support dish and frame with membrane seal located in support dish.
B	FIBC lifting frame - fully welded design - SWL 1 tonne.
C	Tensioning bag support arms - spring loaded to stretch bag during discharge.
D	Bag base massage system - twin cylinders mounted under support dish.
E	Bag side massage system - twin cylinders mounted on side frame.
F	FIBC liner retention clamp - prevents liner collapsing during discharge.
G	Pneumatic closure bars for FIBC spout control.
H	Mild or stainless steel discharge chute with interlocked door for spout access and dust port.
K	Sack tip door - large door fitted in chute for manual sack emptying.

SEQUENCE OF OPERATION

Before discussing dust control features, a brief overview of the sequence of operations is shown in this section for those unfamiliar with the use of bulk bags. Further information on safe handling can be obtained from FIBCA (see Appendix).

1. The loops of the bulk bag are hooked over the lifting frame and, if applicable, the liner clamped.

2. The bulk bag is lifted by fork lift truck or hoist on to the discharger bag support arms. These spring loaded support arms gradually raise and tension the bag as its weight decreases during discharge. This ensures total emptying of the bag and prevents the bag spout or liner sagging or fouling the take-off conveyor below.

3. Access to the bag spout is provided via an interlocked door. Spout closure bars allow untying of the spout tie string without releasing the product until the operator re-closes the access door.

4. Pneumatically operated massagers push against the sides and base of the bag to provide consistent flow into the discharge chute and integral conveyor. See Page 6.

On certain enhanced models, the support arms are pneumatically operated and operate in tandem with corner massagers to elongate the bag and ensure minimal residue of discharged product.

1. Loops of bag are hooked over lifting frame.

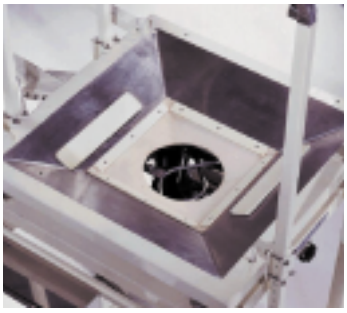
2. Bag is lifted by FLT on to discharger and kept under tension with spring loaded side support arms.

Optional powered side support arms.

DUST CONTROL AT BASE OF BAG

MEMBRANE SEAL

The Bulk Bag is lifted by fork lift or hoist into the discharge dish and the bag base is encased by a dust suppression membrane seal which has an opening to suit the size of the bag spout.



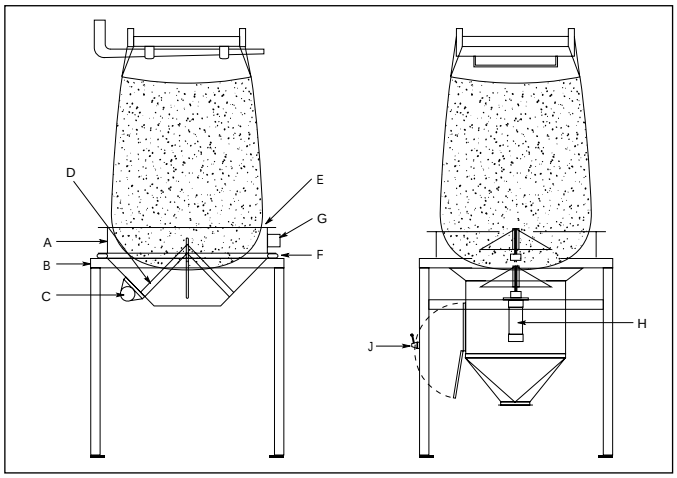
View of discharge dish and membrane seal.

DOUBLE MEMBRANE SEAL

A secondary dust chamber and membrane seal is particularly effective when handling single trip bags with no base spout which require a knife device within the discharger.
The Bulk Bag is lifted by fork lift or hoist and lowered down to sit deep within the discharger support dish so that any dust emitted when the knife ruptures the base of the bag is contained within the double dust chamber.
The knife can either be static or a pneumatically powered telescopic device, which also serves as a flow aid for difficult powders being discharged from single trip bags.

Note: Single trip bags are not recommended for food products since the tearing action of the knife on the polypropylene bag causes strands to fall away and contaminate the product.

Secondary dust chamber for single trip bags.



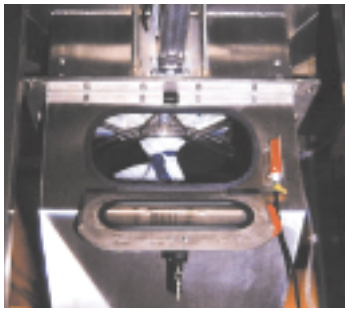
A	Secondary dust chamber	E	Upper membrane seal
B	Support dish	F	Lower membrane seal
C	Vibratory discharge aid	G	Dust port
D	Static knife	H	Powered knife

CONTROLLING DUST WHEN UNTYING A BULK BAG

SPOUT CLOSURE BARS

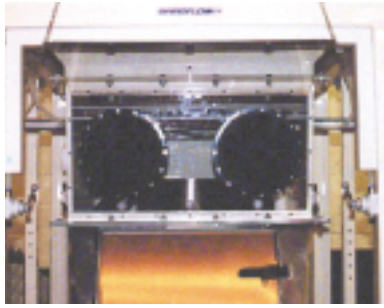
An interlocked access door enables the operator to pull the Bulk Bag spout through the opening of the discharge dish in which the bag sits. The door is then closed and the pneumatically operated spout closure bars close off the bag above the tie string.
The bag can then be untied without releasing the contents of the bag. The access door is closed, allowing the closure bars to be opened to release product into the integral conveyor chute. (See Data Sheet 30). These patented circular, or 'yoke' type of closure bars are useful if only part of a bulk bag needs to be discharged and then retied, often the case with an ingredients batching process.
Some plants with clean-rooms and hazardous environments require a glove-box arrangement so that access to the bag spout is carried indirectly and contact with bag contents by the operator or environment is completely avoided.

Containment levels of 0.025 microgrammes per cubic metre are possible with this type of equipment.



Yoke type spout closure bars (patented).

Access door allows untying of bag tie string.

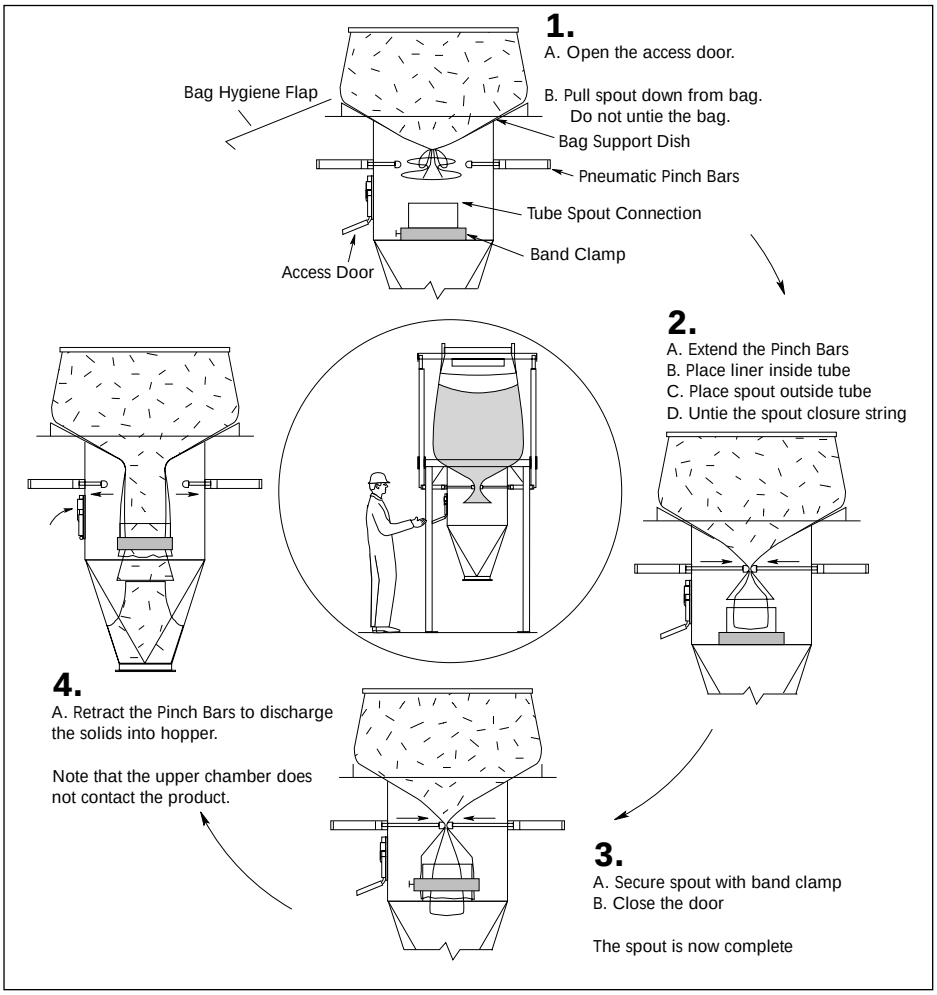


Glove box arrangement for spout untying.

HYGIENIC BAG SPOUT CONNECTION

The hygienic bag spout is designed for applications where foreign matter from the bag underside must be minimised.
A fixed tube and clamp assembly provides a secure and reliable method for making a dust-free connection between the bulk bag spout and hopper.

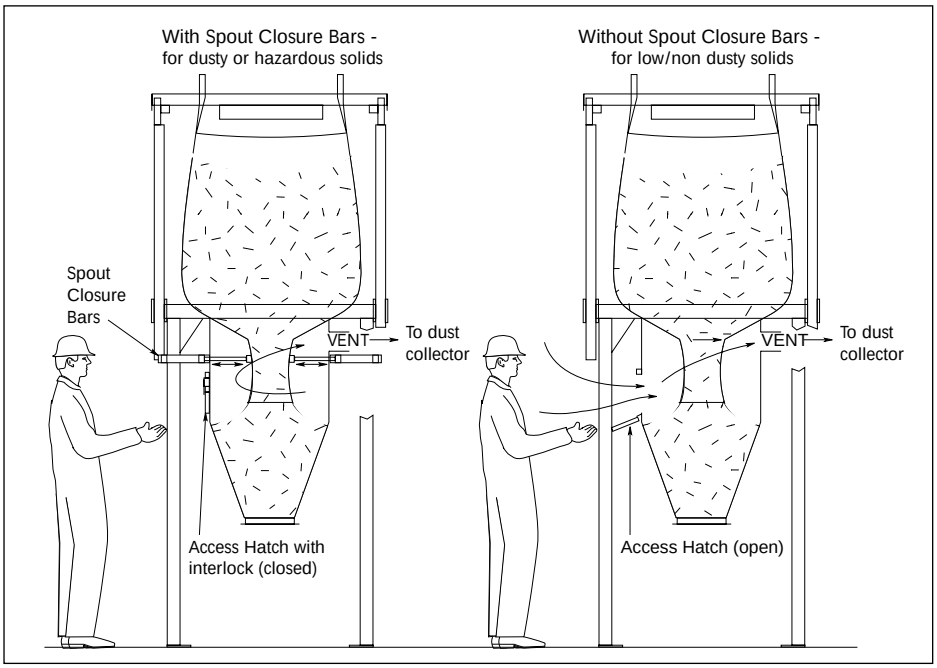
For the discharge of dusty, poor flowing products from lined bulk bags, Spiroflow offers a pneumatic or manually operated liner clamping device.
For further details, contact our sales office.



DUST EXTRACTION DURING DISCHARGE

A quantity of air will be displaced and must be vented equal to the volume of solids discharged. Two methods of controlling vented air and dust are available on Spiroflow discharging systems.

The pneumatic bag spout closure bars offer the operator the best protection from nuisance or hazardous dust. Because the bag spout is remotely controlled by the closure bars, solids will not flow until the interlocked access hatch has been closed.
For low dust solids (e.g. sugar, plastic chip) manually opening the spout may be acceptable.
In this case, the vent opposite the access hatch may be connected to a dust collector to prevent dust from venting through the access hatch in the direction of the operator.



DUST CONTAINMENT OF HAZARDOUS AND NOXIOUS POWDERS

A number of products handled in Bulk Bags are of a fine, powdery and invasive nature and total containment during unloading is necessary to prevent contamination of the local atmosphere and health and safety hazards. The problem is exacerbated where the product is volatile, toxic or presents an explosion risk.
Spiroflow has developed the Model T9 discharger for use where total dust containment is essential.

Features include:

* Sealing device for bag base spout.
* Automatic spout stretching.
* Assurance of complete discharge.
* Variable height adjustment for different sizes of bulk bag.
* Static grounding and monitoring.
  (See STATIC section on Pages 10-11)

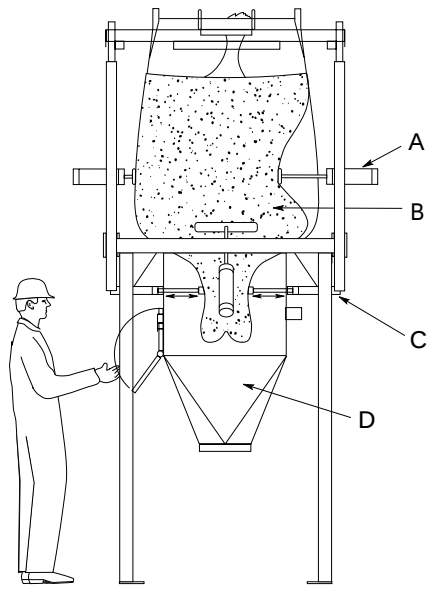
The sealing device inflates inside the bottom spout and seals it during discharge to eliminate risk of dust emission. It also operates in conjunction with the automatic spout stretching device, to promote a smooth and cylindrical path for flow of product directly into a process vessel or integral conveyor. This feature is of special value with poor flowing or light aerated products.
It is important to ensure total discharge of product from the bag when invasive powder is being discharged, to prevent escape of residual product when the empty bag is removed. The Model T9 also has bag massagers at the corners as well as the base, with special angled plates to clear any residual product from the corners of the bag. A pneumatic bag tensioner and an inner liner clamp prevent any creases from forming during discharge which can trap residual product.
Height adjustment for bags of different sizes is provided as well as a lifting frame locator. Cleaning in Place features can also be provided.
For full sequence of operation, refer to Data Sheet 35.

Spout closure bars close off bag whilst operator places spout over seal and unties the bag.

Inflatable spout sealing and stretching device (Patented)

DUST-FREE ‘MASSAGERS’ TO AID FLOW OF PRODUCT FROM BAG

‘Massagers’ are used to assist the flow of product from bulk bags, and are particularly effective when powdered product has been compacted during the filling process, or during transport and storage. They offer an effectice and dust-free alternative to the noisy vibration method. Two pneumatically operated massagers push against the base of the bag and two against the sides, to break the ‘bridge’ of product, as shown above.
The position of the side massagers is adjusted during the installation of the discharger, to suit the type of product being handled.



A. Side Massagers
B. Base Massagers
C. Spout closure bars
D. Discharge chute

Pneumatic side massagers are adjustable in height depending on the product flow properties and bulk density.

Bag base massagers.

Alternative four-corner massagers are available with Type 9 dischargers.

CONTROL OF DUST: INNER LINERS AND EMPTY BULK BAGS

LINER CLAMP

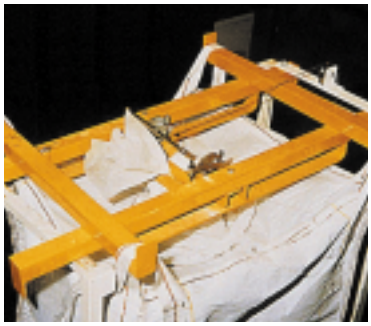
Bulk Bags are often supplied with long inner liners which require clamping at the top to prevent fouling downstream conveyors. This clamping device is incorporated into the Bulk Bag lifting frame.

LINER REMOVER AND TENSIONER (Patented)

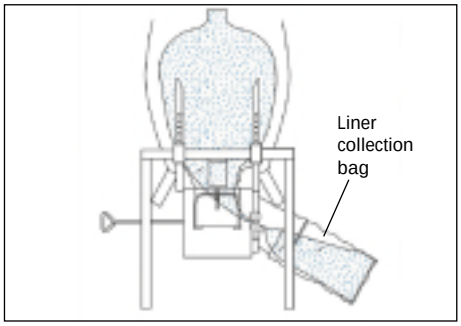
Liners can be removed from the emptied Bulk Bag and contained without emission of dust by use of this powered retraction device and compaction facility. Empty liners are compressed into a removable plastic sock and tied off ready for disposal or compaction.

BULK BAG FOLDING TABLE

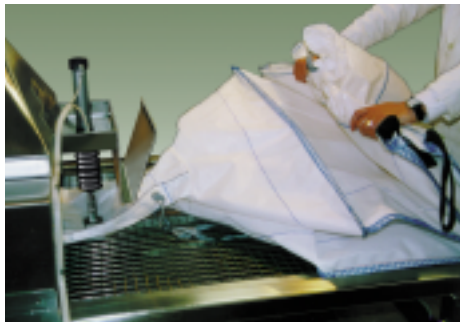
A Bulk Bag folding table is a practical final step to reducing dust emissions. The spout of the emptied bag is pneumatically clamped under the integral dust extraction vent. Whilst the operator folds the bag, displaced dust flows into the dust extractor. The clamp is then released, the bag is removed and the table can be hosed down if necessary.



Clamping device for inner liner on lifting frame.



Liner removal and tensioning mechanism.

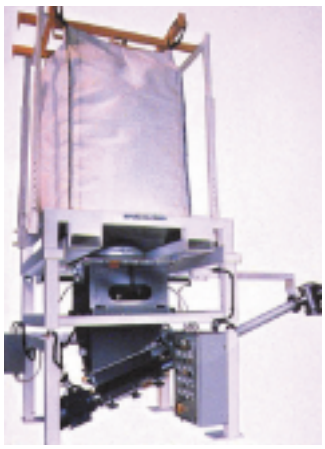


Bulk Bag folding table.

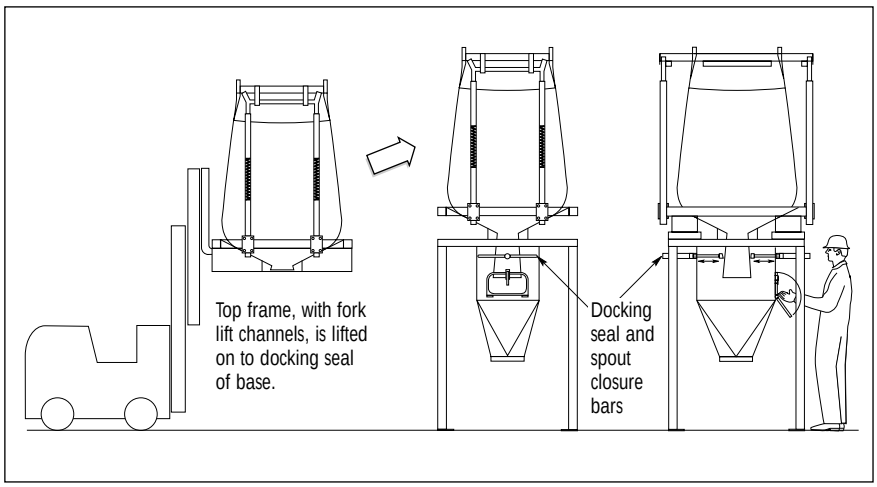
SPLIT FRAME WITH DUST TIGHT DOCKING SEAL

Restricted headroom can cause problems in handling Bulk Bags, often because the fork lift truck backframe cannot be accommodated and the bag raised sufficiently to lift it on a standard height discharger (approx. 4.5 metres depending on the bag size).
A low loading discharger has been designed by Spiroflow to overcome this difficulty. The top section of the discharger is a removable frame on to which the bag is loaded at ground level.

The frame has fork channels at its base and needs only to be lifted approximately 1.5 metres on to the main discharger frame. The discharger base itself has a dust-tight docking seal on to which the top frame and bag are placed.
As with standard dischargers, this low loading version has spout closure bars to allow dust-free untying of the bag via an access door, together with spring loaded side arms to keep the bag in tension during discharge.



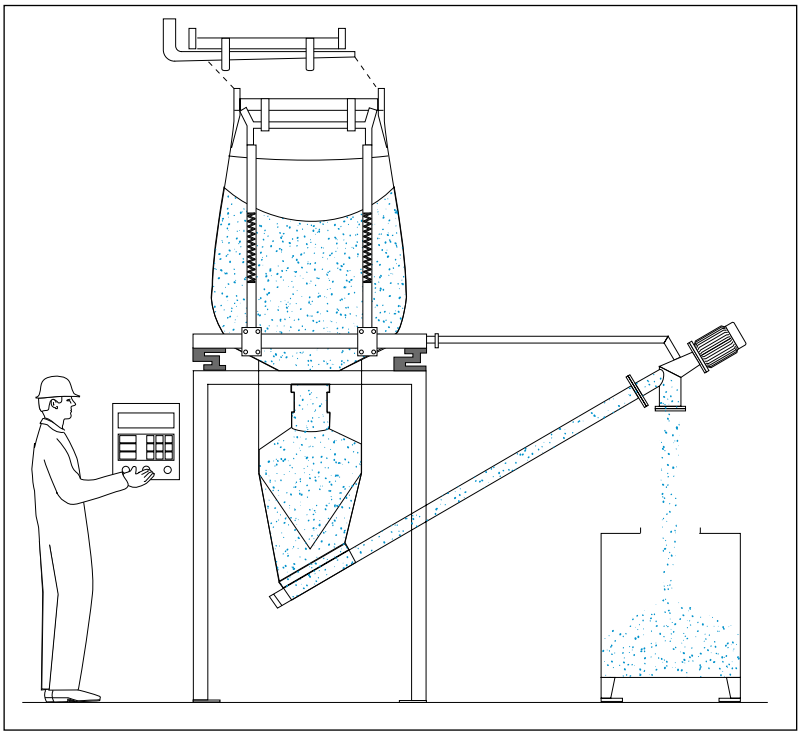
Low loading discharger with split top and base sections.

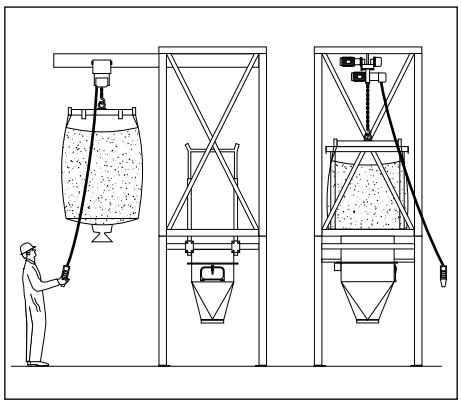


GENERAL SECTION: USEFUL OPTIONS TO CONSIDER

DISCHARGING BY WEIGHT

Accurate dispensing of bulk bag contents can be achieved using a loss-in-weight discharger. This can be varied for individually selected batch amounts or fully interfaced with plant process control for continuous batch production requirements. On this model, the load cells are located between the top and middle sections of the discharger, a safer and maintenance free option than locating them at the base of the machine.





Discharging with integral hoist.

INTEGRAL HOIST OPTION

Bulk bags can be brought to the discharger by pallet truck and stored ready for lifting without the need for fork lift truck assistance. The unit has an integral runway beam and pendant controlled hoist for loading bags into the frame where the normal operating procedure can then be followed.

MOBILE BULK BAG DISCHARGER

A robust mobile frame, with towing facility if required, provides a versatile arrangement for processors who require discharge of bags at several locations. Note: This option cannot be supplied with integral hoist.

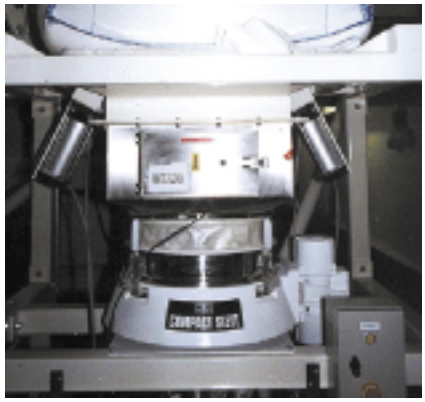
INTEGRAL SIEVE

An integral vibratory or rotary sieve provides assurance that product from a bulk bag is suitably screened for lumps and other impurities before entering the discharge chute and other process equipment.

SACK TIP FACILITY

A large or small sack tip door is always a useful option so that if the supply of bulk bags is interrupted for any reason, delivery of raw materials can be accepted in small sacks and handled by the same discharger.

Bulk Bag discharger on mobile frame.



Integral sieve fitted to discharge chute.

Sack tip door in discharger base.

DUST-FREE INTEGRAL CONVEYORS

DUST-FREE CONVEYORS

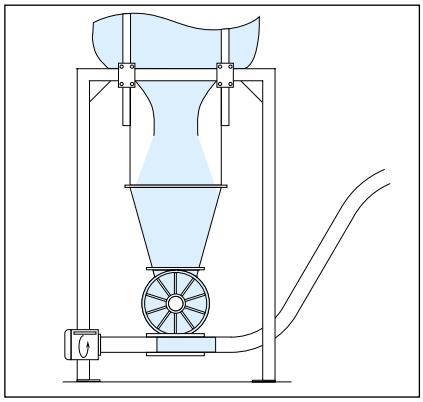
Choosing the right conveyor system to integrate with a bulk bag discharger is determined by several factors:

* Nature of product
* Flow characteristics
* Length of conveyor required
* Angle of lift
* Flow rate required
* Degradation or separation considerations

TESTING

Testing of the product being handled is essential to assess flow rates and anticipate, and thereby avoid, any problems which may arise during full production. Bulk bag discharge trials are also recommended, if sufficient product is available to reassure the customer of dust-free operation and demonstrate the operating procedure.

Spiroflow has over 25 years of experience in conveying dry solids and ingredients and can offer advice on the right selection of conveyor to suit a particular product and process application. Extensive test facilities are available to customers, backed up by a large database of products successfully conveyed.

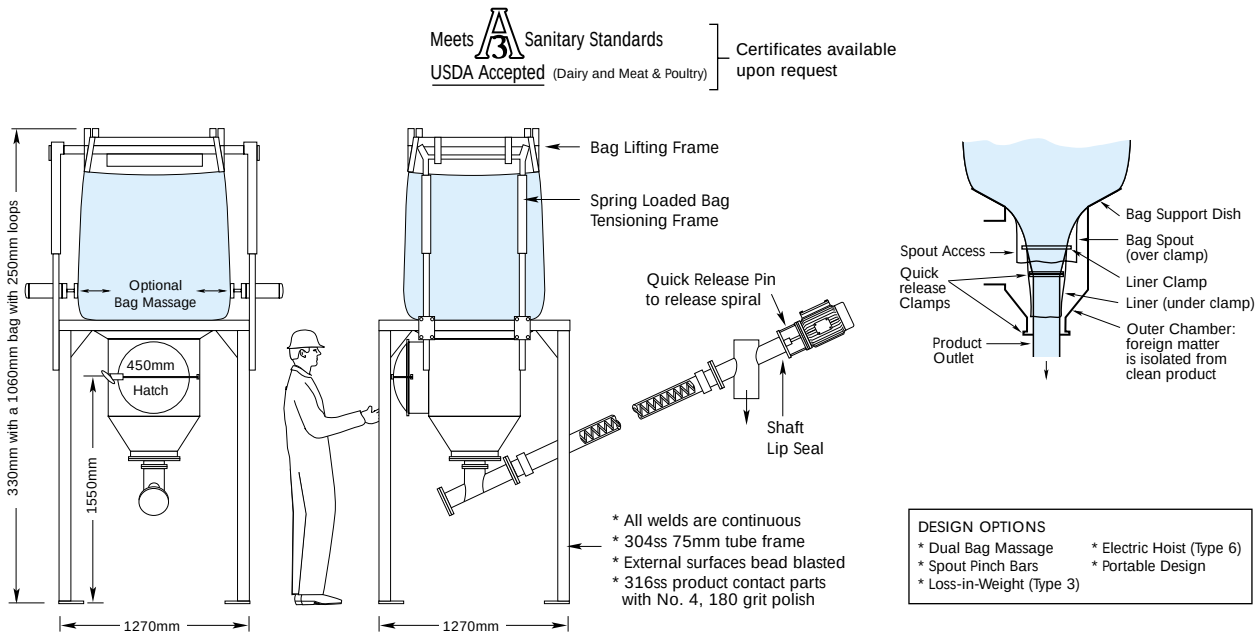


Pneumatic conveyor

Flexible screw conveyor

Aero mechanical conveyor

USDA ACCEPTED DISCHARGER WITH FLEXIBLE SCREW CONVEY0R



Dirt, loose threads and other foreign matter are trapped in the outer chamber while clean product passes through the inner tube. Quick release clamps allow routine cleaning of the system. All surfaces are self-draining for wash down.

PRODUCT CONTAINMENT AND STATIC SAFETY WHEN HANDLING VOLATILE PRODUCTS IN FIBCs

Bulk Bags (FIBCs) can move and store from 200 to 2000kg of bulk materials. This section discusses some serious safety issues when handling FIBCs containing volatile products in hazardous atmospheres.

From the first use of Flexible Intermediate Bulk Containers (FIBCs) or Big Bags in the early 40's in the USA, the worldwide use of them has been steadily increasing in line with the requirement from industry to transport and store powdered, flaked and granular products more efficiently and economically. Originally used for comparatively low value products such as fertiliser, they are now widely employed in the food, chemical, pharmaceutical and plastics industries.

This has meant that the users of FIBCs have enjoyed significant increases in productivity, having been able to dispense with 25kg sacks with the associated manual handling and empty bag disposal.

However, the FIBC has brought with it some serious safety issues of vital importance to all processing plant managers. Some of the products handled in FIBCs are inherently volatile and even the most innocuous of products such as flour are liable to explode quite violently if exposed to a sufficiently high ignition source. This problem is compounded by the fact that FIBCs are capable of attracting and holding static electricity from the bulked product. Where the processing has an atmosphere containing flammable gases, solvent vapours or high dust-in-air mixtures the need for safe FIBC discharge becomes crucial.

As an FIBC is filled or discharged there is a steady accumulation of charge within the product which is transferred to the walls of the bag. If left unchecked, this static build-up may result in spark discharges from the surface of the FIBC or the charging of adjacent isolated conductors, such as people or unearthed metal, by induction. Couple this with the risk of powder being thrown into the atmosphere during the emptying process, and a spark discharge could cause the product or atmosphere to ignite resulting in a fire or an explosion. Needless to say, such an occurrence would most likely lead to injury and major damage to the plant and environment. In addition, any such damage would create business interruption costs resulting from lost production, the possibility of legal action and the attendant bad publicity for the organisation concerned.

The speed and scale of modern manufacturing processes coupled with changes to the nature and properties of many raw materials has increased the range of applications where electrostatic charge can accumulate. Indeed, any organisation which stores, handles or processes flammable liquids, powders, gases or solvents is exposed to the risk of static related ignitions.

In addition, there are a number of products handled in FIBCs which are extremely fine and as such, possess a highly invasive nature. This makes it necessary to ensure as close to total containment of the product during discharge to prevent contamination of the local atmosphere and to maintain health and safety standards. Obviously this problem is exacerbated when the product is volatile, toxic or presents an explosion risk.

BULK BAG TYPES AND CLASSIFICATIONS

FIBC manufacturers have long been aware of these static risks and of the four basic types of bulk bag produced, two of these are specifically designed to dissipate static. There are four types of FIBCs available, known as Type A, B, C and D.

The following classification seems to have been generally adopted:

Type A. These are the standard FIBC used by companies who are filling and discharging products with no static problems.

Type B. These are manufactured from a two-ply, woven polypropylene 'sandwich' with interwoven conductive PP monofilaments to enable them to withstand a breakdown voltage of 4kv or less. As such, these are the least effective of bags made to deal with static.

Type C. These are woven with conductive yarns which interconnect to provide a network covering the entire structure of the bag, (known as the Faraday cage effect). Earthing tabs, (a small loop) are then attached to facilitate earthing before filling and discharge. Provided they are adequately earthed before use and the FIBC discharge equipment fully earth bonded, such FIBCs prevent the occurrence and propagation of brush discharges and will also stop any spark discharges.

Type D. This FIBC is made from Chromiq Blue fabric which has been designed to dissipate surface charge by a combination of conductive and corona discharge, dispensing with the need to earth the bag. It employs interwoven conductive threads which are not connected together and it is believed that the low capacitance of the individual threads prevent the occurrence of static discharges for all except the most flammable atmospheres.

Summary. Current controversy surrounds the effectiveness of the Type D bag in comparison to the Type C. One thing, however, is certain and that is the fact that static protective FIBCs are only one element of an electrostatically safe materials handling system. There are other important precautions which can be taken when discharging potentially hazardous materials.

For example,

a) has the operator correctly fitted the necessary earthing clamp for the Type C FIBC?

b) has the bag lost some of its static conductive properties through previous use?

STATIC GROUNDING AND MONITORING

In order to eliminate the risk of dust emission during operation, specially designed and patented features are required to ensure safe discharge of the FIBC. The outlet spout of the FIBC should be connected to an inflatable seal which will prevent dust escape during the FIBC discharge process. A tensioning device should be utilised to pneumatically stretch the outlet spout, to promote a smooth and cylindrical path for the material to flow directly into the clients downstream process.

Depending on the level of product containment required, the FIBC outlet spout connection can be placed in a containment enclosure that may be connected to a centralised dust extraction system or have an integral HEPA filter fitted to it. Subject to the correct operation of these units, containment levels of up to 0.025 microgrammes per cubic metre. Material could still escape when the empty bag has to be removed, so total discharge of product from the bag is crucial. FIBC massagers are positioned at every corner and two in the base.

The FIBC also requires attachment to a pneumatic FIBC/Liner tensioning and an inner liner clamp which stretches the bag during discharge to eliminate the possibility of creases being formed and holding residual material.

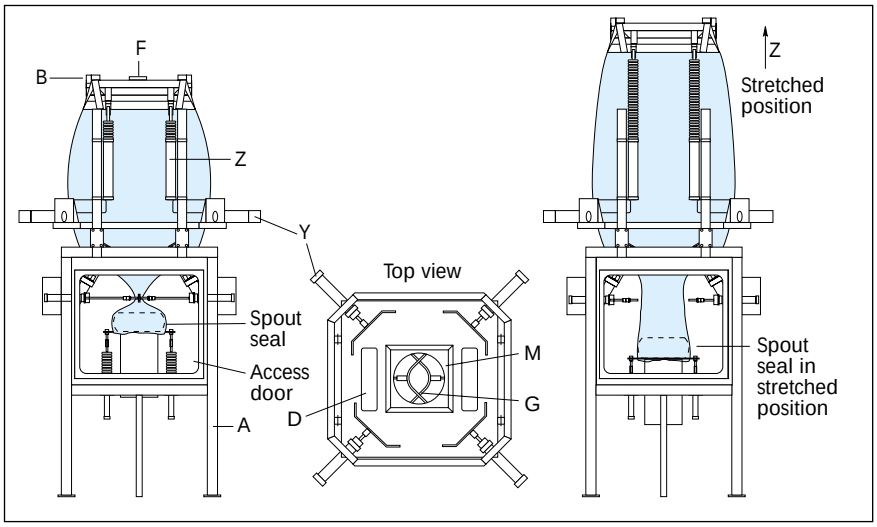
Where high levels of containment are required, special tying of FIBC spouts and liners are required when removing empty FIBCs to ensure minute amounts of dust are not allowed to be released into the working environment. These procedures must be carried out before removal of the FIBC from the discharging unit.

A height adjustment facility can also be incorporated to accommodate FIBCs of different sizes, as well as an FIBC lifting frame locator to facilitate easy and correct alignment of the FIBC into the discharge unit.

Other special design features can be included for 'Cleaning In Place' (CIP).

FIBC Filling

The same containment precautions are required during the filling of FIBCs as for when discharging. Correct connection of the FIBC filling spout and where fitted, liner to ensure no product emissions. In addition, liner inflation should be considered to ensure satisfactory inflation of loose internal liners together with satisfactory displaced air venting during the process. As with discharging, where high levels of containment are required, the filling head may be enclosed in a containment enclosure with venting to a centralised dust extraction system or an integral HEPA filter.



The above issues were major concerns for a large international chemical and food manufacturer to overcome the above static problems and design a new FIBC discharger for use with a very invasive material that presented a major static risk. As close to total dust containment was a priority for this company to prevent any material escaping into the atmosphere and creating an explosion risk.

A specially designed FIBC discharge unit had to be developed to be used in conjunction with any Type C conductive bag and utilised a static grounding system. The static grounding system was used to constantly monitor the surface resistance of the FIBC to ensure that the bag functioned within European Safety Standards, and remained correctly connected to earth at all times during the discharging process.

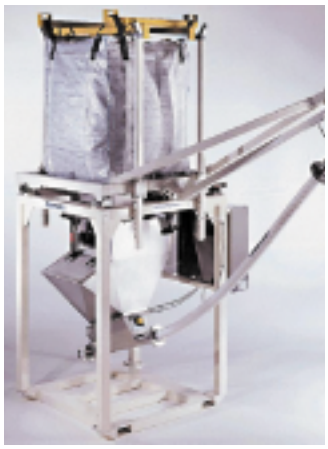
A specially insulated monitoring clamp is attached to the FIBC and the system then ensures that the process of discharging the product from the FIBC is initiated only when the resistance through the FIBC is within the range of 500 to 10^8 ohms. Customers using specific FIBCs, or who have different safety standards may use alternative resistance ranges available to special order. Once the parameters have been selected, the system will not operate until these conditions are achieved. Also, the system will immediately shut down should the parameters be exceeded at any time.

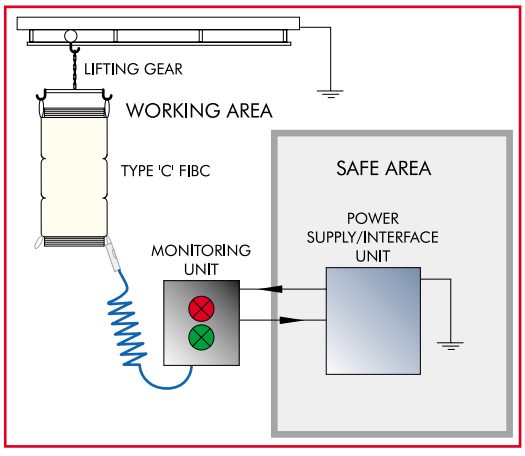
This will prevent the operator from being able to fool the device by clamping the monitoring lead directly to earth.

Visual indicators show the FIBC status and its earth connection are used for ease of operation.

This Static Grounding System is certified intrinsically safe which makes it suitable for use in hazardous atmospheres, the most common of which are those which contain toluene vapours and methane gas.

Earthing clamp is fixed to loop of Type C bag.





SAFETY - FLEXIBLE INTERMEDIATE BULK CONTAINERS

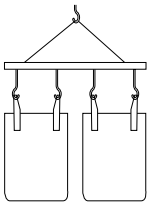
Safety guidelines for the use of FIBCs from Gerry Ashkam, Chief Executive Officer at the International Cargo Handling Coordination Association (ICHCA).

Flexible Intermediate Bulk Containers (FIBCs) are being used throughout the world for transporting, storing and handling a wide range of materials. The handling and use of FIBCs has shown an unsurpassed safety record and the International Cargo Handling Co-ordination Association (ICHCA) has pleasure in highlighting some general issues to continue this safety record.

Lifting

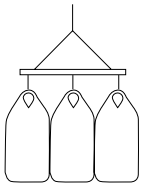
Before any FIBC is lifted certain safety measures should be followed. Users should be aware that although FIBCs may have been despatched in a safe condition, it could be that some units have sustained damage in transit.

FIBCs should be lifted according to the manufacturers instructions as shown on the label. The use of safety hooks with integrated latch to avoid accidental slipping of the loop from the hook, particularly when several FIBCs are lifted together, is essential. It is important that where there is more than one loop the load should be shared evenly by all loops.
Other lifting methods should only be used if the manufacturer's instructions, as shown on the label, indicate that it is safe to do so. This could be, for instance, four lifting loops attached to a single hook or two lifting loops attached to a single loop, two by two.



Correct

Wrong



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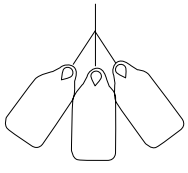
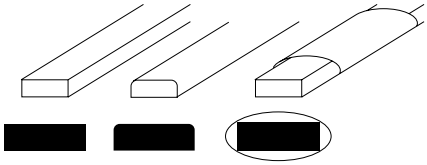


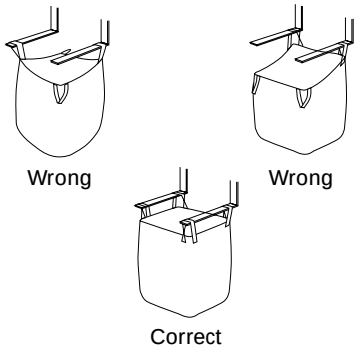
Wrong

Lifting devices should be free from any sharp edges or burrs that may cause damage to the lifting loop(s). FIBCs should not be lifted by putting steel wires, fibre ropes, belt slings or similar materials through one or more lifting loops. Hoisting in that way could produce friction, even frictional heating and could damage the loops. Any pendular motion or sideways pulling of the FIBC during lifting should be avoided. To avoid any cause of shock damage assure that the FIBC is raised and lowered smoothly avoiding sudden jerks.



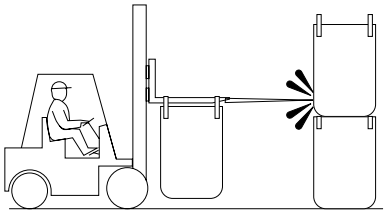
Wrong Correct Correct

When you use a fork lift truck to lift an FIBC care should be taken to ensure that the forks are spaced correctly. FIBCs should be suspended from forks in such a manner that no lateral forces can be created in the FIBC as a result. Also ensure that the lifting loops are not twisted.



Wrong Wrong Correct

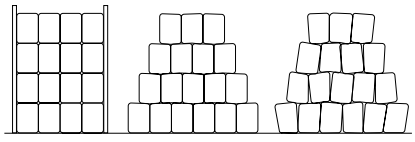
It is recommended that the projection of fork lift tines beyond the FIBC being handled be kept to a minimum. This will reduce the possibility of accidental damage to other stacked FIBCs. Puncturing of the main body of the bag either by the forks or by obstacles can be avoided by ensuring personnel are aware of the vulnerability of FIBCs. To avoid severing or damaging the loops, rounded forks or forks that have been wrapped in a suitable material should be used.



Transport

Before handling FIBCs mounted on pallets, check that the pallets are in good condition and that the load is stable.
Apart from the use of pallets and the lifting arrangements provided no other method should be attempted.

When FIBCs are carried on trucks and trailers or in freight containers, particular attention should be paid to the stability of the load, which should be securely lashed and sheeted. For freight containers the use of air bags or other suitable means is advisable. Labelling on units nearest to the doors should be visible.



Correct Correct Wrong

If FIBCs are to be placed on the dockside to await transport it should be ensured that the area is clear of obstacles such as stones, pieces of wood, scrap metal, etc. to avoid damage to the base of the containers. When stacking FIBCs, every effort should be made to ensure that the stack is stable. Where possible the stack should be formed against at least 2 retaining walls, preferably 3, to achieve maximum stability; generally the higher the stack the greater the number of retaining walls required.