

3M Advanced Materials Division

3M™ Glass Bubbles Bag Unloading Suggestions

Introduction

This guide provides suggestions for the efficient removal of 3M™ Glass Bubbles from bulk bags (FIBC—Flexible Intermediate Bulk Containers). These are not intended for use as a design specification or operational manual. The user is responsible for determining the method and equipment appropriate for the user's operation.

Note: Refer to the Product Label and Safety Data Sheet (SDS) for Product Health and Safety Information on glass bubbles. Refer to the glass bubbles Product Data Sheet for additional storage and handling information. See the appendix for equipment and component considerations.

Bulk Bag

3M glass bubbles are available in approximately 50 cubic foot (1.41 cubic meter) bulk bags with a polyethylene liner and ten-inch bag lifting loops. The liner has a 22 in (0.56m) diameter by 30 in (.762m) long discharge spout in the base. The filled bag size is approximately 45 in W × 45 in L × 46 in H (1.14m × 1.14m × 1.17m). Bags are stacked two per pallet then wrapped with a stretch film. The maximum shipped height is 104 in (2.64m). The pallet is a two-way entry type. Typical shipping is in a “high cube” trailer or a 40 foot “high cube” seagoing shipping container. Bags are not returnable.



Note: The purpose of this guide is to provide basic information to product users for use in evaluating, processing, and troubleshooting their use of certain 3M products. The information provided is general or summary in nature and is offered to assist the user. The information is not intended to replace the user's careful consideration of the unique circumstances and conditions involved in its use and processing of 3M products. The user is responsible for determining whether this information is suitable and appropriate for the user's particular use and intended application. The user is solely responsible for evaluating third party intellectual property rights and for ensuring that user's use and intended application of 3M product does not violate any third party intellectual property rights.

Bag Unloading Suggestions

Bulk Bag Discharging

Typically, bulk bags are suspended in an unloading station. Material is usually transferred by vacuum suction from a vacuum receiver or a double-diaphragm pneumatic pump. Material is pulled through the conveying line, either for a predetermined time or until a desired weight is reached in the stand or the receiving vessel. Using valves the system can supply material to one or more processes. Filters separate air from the material in the receiving vessel. The filter is cleaned with pulsed, high-pressure, conditioned, dry air. Dust collection trunks or hoods are usually placed near the system.

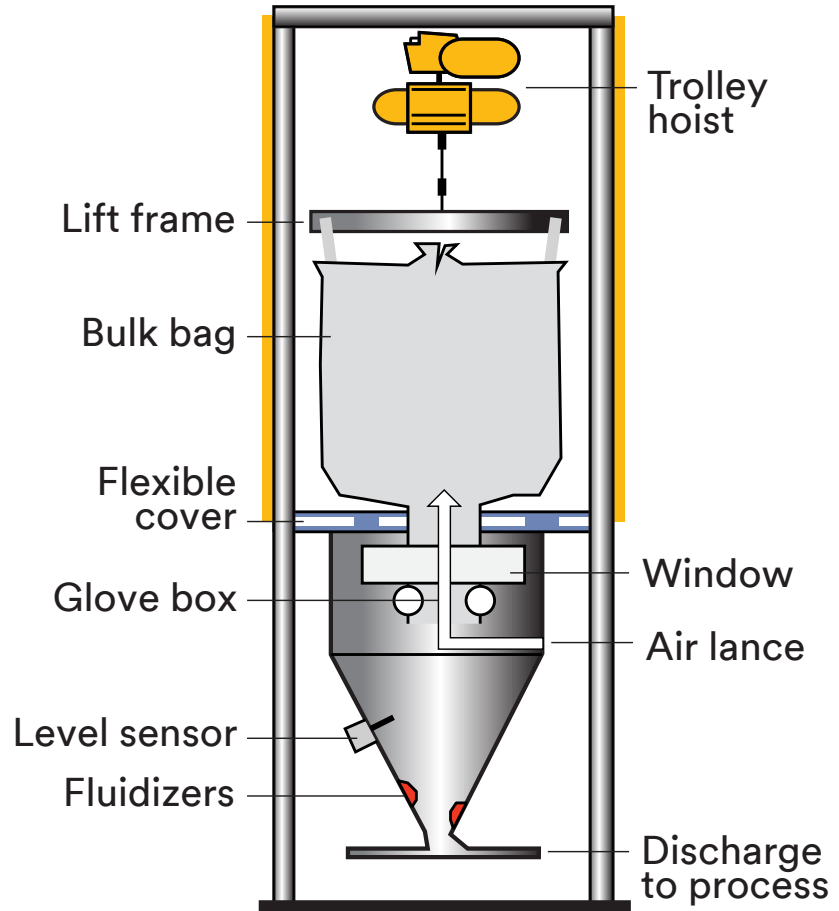
Bulk Bag Station

Bulk bags require a lifting frame for handling the bags safely. The lifting frame can be attached to an overhead trolley or placed on a forklift truck.

Do not use clamp forklifts for moving glass bubble-filled bulk bags as they may cause bubble breakage or release bubbles into the air.

The most dust-free method of discharging bulk bags is to place the bag into a bag unloading station. The station includes a glove box hopper with a window, light and flexible dust containment cover. The flexible hopper top is slightly stretched by the bag weight in order to minimize dust when the bag discharge spout is opened. The station can be enclosed on three sides. Usually, dust collection vents are placed above the top of the hopper. Dry air is used to fluidize material in the hopper. If desired the station can include a weigh cell system for metering material to the process by weight. Capacitance sensors are used to detect material level.

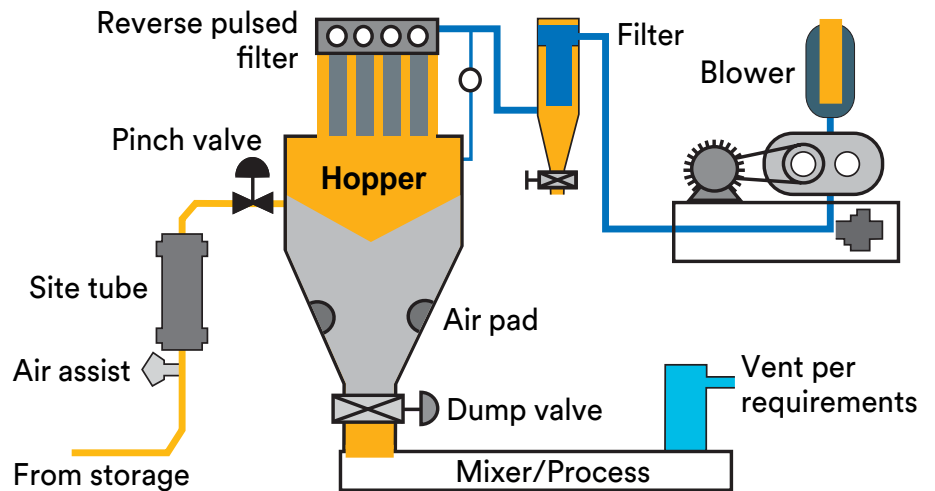
Often for mix tanks the bulk bag is discharged directly into the entry way of the vessel. This requires an auxiliary filter port in order to collect the dust created during bag discharging.



Bag Unloading Suggestions

Vacuum Conveying

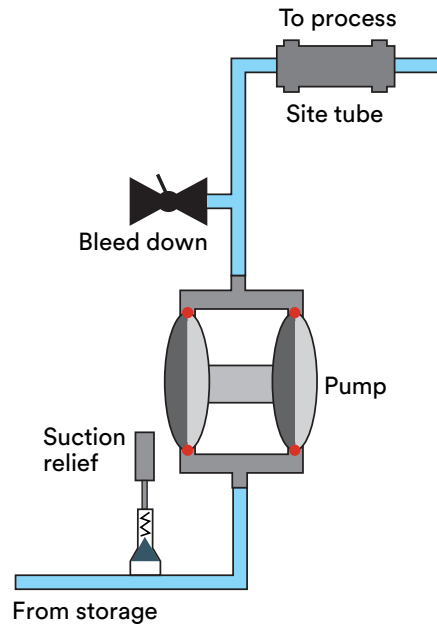
The vacuum transport system is a pull-only conveying system. The pull system operates at a negative pressure, below atmospheric. It may use a venturi, two-stage fan or a positive displacement blower (illustrated) to move the air that carries the material. The vacuum system will move material at higher line velocities than the pump system. The advantage is that it does not leak particles into the work area. This system is not prone to line plugging problems. The primary filter is usually cleaned with pulsed, high-pressure, clean, dry air. A secondary filter is placed after the receiver filter in order to protect the fan or blower. An adjustable vacuum relief valve regulates vacuum in the receiver. Typical suction is 50 to 100 inches of water column. A hopper sight panel and cone aeration is suggested.



Double Diaphragm Pump

Typically, a three-inch pneumatic double-diaphragm pump is used to move lightweight powders. It is a lower cost method that effectively transfers aerateable low bulk density powders. The air-driven pump is a combination pull/push, vacuum-pressure conveying system. The pump pulls material by vacuum into its inlet, then pushes the material along the conveying line with pressure. In the pressure conveying system poor line connections will leak dust into the workplace. The pump should be placed closer to the process rather than near the box in order to pull material a longer distance. This will reduce line plugging.

Purge air added into a pump chamber when it is pushing material into the line helps to decrease pump plugging and stalling. Often a vacuum relief valve is mounted close to the pump suction port. A bleed down valve at the pump outlet is suggested for relieving pressure from a plugged line or pump. Purging of the pump and the conveying system with air or other compatible gas is suggested before and after glass bubble transfer.



Conveying Lines and Hoses

Conveying lines connect the various system components for glass bubble handling. Typically, a transfer system uses 3-in (76mm) components. Glass bubbles should be transferred with a line velocity of less than 1200 ft/min (300 m/min). Lines with long radius bends or sweeps are suggested instead of ninety degree elbows.

Lines can be combinations of rigid and flexible materials. All conveying lines and all components should be electrically grounded. Hoses with a smooth inner bore and a conductive drain wire are suggested. The drain wire must be connected to metal connectors. Flexible lines may range from braided chemical hose, semitransparent PVC, clear polyurethane to interlocking metal hose. Be careful, however, as some hoses are limited to use above 20°F.

Flow Aids

Air assists in the conveying line are used to keep conveying lines trouble-free. They are typically mounted at the bottom of vertical line legs and about every fifty feet in horizontal line runs. Air pads mounted near the discharge port in hoppers are suggested to help fluidize material for easy transfer.

Sight Windows and Sight Tubes

Sight windows and sight tubes are a big aid to observe material flow in order to locate a problem in the transfer system. Suggested mounting locations are at the pump outlet or the bottom of vertical legs, or optionally at the receiving vessel entrance. Sight tubes use Pyrex glass or transparent PVC schedule 80 tubing. Grounding with a wire across the length of the sight tube is suggested. Polycarbonate material is suggested for windows.

Appendix: Equipment Manufacturers

The following equipment manufacturers are identified for your convenience. 3M makes no representations about the manufacturer or their equipment. The user is responsible for determining what method and equipment are fit for a particular purpose and suitable for the user's application.

Systems

Nol-Tec Systems, Inc.
425 Apollo Drive
Lino Lakes, MN 55014
Phone: 651-780-8600
Web: www.nol-tec.com

Bulk Bag Unloading

Custom Equipment Design
1057 Highway 80 East
Monroe, LA 71203
Phone: 318-345-2222

Control & Metering
6500 Kestrel Road
Mississauga, ONT L5T 1Z6
Phone: 800-736-5739
Website:
www.controlandmetering.com

Components

McMaster-Carr Supply Company
600 County Line Road
Elmhurst, IL 60126-2081
Phone: 800-990-7867
Website:
www.mcmastercarr.com

Morris Coupling Company
2240 West 15th Street
Erie, PA 16505
Phone: 800-426-1579
Website:
www.morriscoupling.com

Sight Tube

Harvel Plastics, Inc.
P.O. Box 757
Easton, PA 18044-0757
Phone: 610-252-7355
Website: www.harvel.com

Flow Aids

Solimar Pneumatics
7256 Commerce Circle
Minneapolis, MN 55432
Phone: 800-233-7109
Website:
www.solimarpneumatics.com

Porex Industries
500 Bohannon Road
Fairburn, GA 30213
Phone: 770-964-1421
Website: www.porex.com

Double Diaphragm Pumps

Ingersol Rand Fluid Products
P.O. Box 151
Bryan, OH 43506
Phone: 419-636-4242
Website: www.arozone.com

Yamada America
1200 Nuclear Drive
West Chicago, IL 60185
Phone: 800-990-7867
Website:
www.yamadapump.com

Wilden Pump & Engineering Co.
22069 Van Buren Street
Grand Terrace, CA 92313-5607
Phone: 909-422-1730
Website: www.wilden.com

Resources

For further information or sales assistance, please contact:

3M Advanced Materials
Phone: 800 367 8905 Fax: 800 81 8514

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98-0212-2477-3 rev B