What to consider when choosing a bulk bag discharger

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Planning to switch to receiving your dry bulk materials in bulk bags? This article explains what you need to consider when selecting a bulk bag discharger to unload those bulk bags.

If you’ll be receiving material in bulk bags for the first time, you’ll need to invest in a bulk bag discharger, as shown in Figure 1, to handle the bags safely, efficiently, and cleanly. To avoid one common mistake that first-time buyers often make, don’t just choose a discharger that meets some of your material handling needs. Make sure the discharger provides the right bag-lifting method, works with your plant layout and downstream equipment, handles a range of bulk bags and material characteristics, and enhances your operator and plant safety. [Editor’s note: For more details on bulk bag dischargers and how they operate see the later section “For further reading.”]

Before you choose a bulk bag discharger to unload your bulk bags, consider the following questions to determine what features your discharger needs.

Are you going to use a forklift, dedicated hoist, or column lift to lift and maneuver the bulk bag into the discharger?

Make sure to tell the discharger supplier which bag-lifting method you plan to use so that the discharger can be manufactured to accommodate this method.

Does your plant have any height restrictions?

If your discharger will be installed in an area with limited headroom, it may be difficult to raise and lower the bulk bag using a standard forklift, dedicated hoist, or column lift. Many discharger suppliers manufacture a low-profile discharger for such low-headroom applications. One type of low-profile discharger has a low-loading bag-lift frame that allows a forklift’s tines to slide under the bag and lift it from below. Another has a low-loading dedicated hoist or column lift that allows the bag to be maneuvered into and out of the discharger without a forklift.

Will your discharger need to accept various bulk bag sizes?

If the discharger isn’t able to compensate for slight variances in bulk bag dimensions, problems can occur during the unloading process because a different-sized bag may not seat properly in the bag-support base (Figure 1a). An improperly seated bag won’t form a dust seal with the bag-support base, so dust could escape into the plant during discharge. An improperly seated bag also hinders the use of flow aids, such as bag massagers. To accommodate various bulk bag sizes, some dischargers have tool-adjustable support arms, while others have spring-loaded support arms (Figure 1a) that automatically adjust for small differences in bag dimensions, allowing the bag to be properly seated.

Will you need to discharge 50-pound bags to the downstream process?

If your application requires adding minor ingredients from 50-pound bags or other small containers, make sure that the discharger has an integral bag-dump station such as a bag-dump door located on the discharge chute. This will allow you to safely add minor ingredients to the downstream process at the discharger without having to remove the bulk bag from the discharger.

How will the discharger handle poorly flowing materials?

If your material doesn’t readily flow from the bulk bag, the discharger will need to include a flow aid, such as pneumatic bag massagers or a vibratory base. Pneumatic bag massagers can be mounted on the discharger frame near the bag-support base (Figure 1a) or on the bag-support frame near the bag’s middle (Figure 1b), and they massage the bag with a kneading motion to facilitate flow and precondition the material before it discharges to the downstream process. A vibratory base, typically a square or dished pan that’s mounted on the bag-support base, vibrates the bag’s bottom to induce flow.

Can the discharger control the material flow from the bulk bag?

If you’re going to use the same discharger to handle multiple materials, sometimes you may need to remove a partially used bulk bag from the discharger. To do so, you’ll need to be able to start and stop flow from the bag and easily tie off the bag’s discharge outlet to avoid cross-contamination,
dusting, and spillage. To control flow from the bag, make sure the discharger has a flow-control device (Figure 1b) mounted below the bag-support base. A flow-control device can be a mechanical choker (with round pinch bars that form a circular yoke around the discharge outlet) or flat pinch bars that sandwich the discharge outlet between them), an iris valve, a cable system, or another device.

**Will you discharge the material from the bag by loss-in-weight or volume?**

To provide loss-in-weight discharge, you can select a loss-in-weight discharger that has load cells mounted under the bag-support base or under the frame’s legs. The load cells constantly weigh the bag and send a signal to a controller. The controller will keep track of how much material discharges from the bag over a set time and adjust the discharge rate to meet a predetermined setpoint. The discharger typically uses a rotary airlock or screw conveyor to control the discharge rate from the bag. To provide volumetric discharge, you can choose a volumetric discharger that discharges material from the bag at a constant rate into a hopper or batch vessel or onto a variable-speed weighbelt conveyor that feeds a downstream process. The weighbelt conveyor’s scale will weigh the material on the belt and send a signal to a controller. The controller will either speed or slow the belt to maintain the material’s predetermined discharge rate to the process. This discharger will need a flow-control device to stop flow from the bag when the downstream process is shut down.

**How will the discharger maintain bag tension during discharge?**

As material discharges from the bulk bag, the bag will naturally sag and collapse on itself and material will become trapped in creases and allowing complete discharge. The bag-tensioning device also prevents the bag liner, if your bag is so equipped, from sagging and blocking flow through the discharge outlet. The bag-tensioning device that pulls the discharge outlet taut to aid material flow typically has a flow-control device. After seating the bag in the discharger, you activate the flow-control device to prevent discharge from the bag. You then untie the discharge outlet, place it over the fill head, and inflate the fill head to create a dust-tight seal. Some dischargers also use a pneumatic stretching device that pulls the discharge outlet taut to aid material flow from the bag. After you open the flow-control device, the material will discharge from the bag through the fill head to the downstream process. When equipped with an inflatable seal system, the discharger doesn’t need a dust collection system.

**How will the discharger retain the bag liner during discharge?**

If your bulk bag has an internal liner to protect the material during shipping and storage, choose a discharger with a liner-retention device (Figure 1b), such as a clamp system mounted on the bag-lift frame or a spring-loaded tension system mounted on the discharger frame. The liner-retention device attaches to the liner’s top and prevents the liner from collapsing to the bag’s bottom and trapping material or blocking flow. This ensures complete discharge without requiring the operator to shake out the liner, saving labor and reducing material waste and dust.

**Do you need a discharger that meets sanitary requirements?**

If you’ll use the discharger in a sanitary application, such as food or pharmaceutical processing, make sure that the discharger has material-contact surfaces manufactured to comply with USDA, 3A dairy, and FDA standards. Sanitary construction materials, such as Type 316 and 316L stainless steel, allow for easy and thorough cleaning and repeated use without cross-contamination. Other sanitary features include a sealed bag-support base that prevents contaminants on a bag’s bottom from passing into the downstream process, quick-release clamps, and self-draining surfaces that simplify equipment washdown.

**How will the discharger control and dissipate static charges that accumulate on the bulk bag during discharge?**

As material discharges from the bulk bag, static charges tend to accumulate on the bag’s outer surface. If left unchecked, the static charges can build up and generate a brush discharge if the bag comes in close proximity to a grounded conductive object, such as the operator or discharger frame. The static brush discharge can cause an explosion or fire if the discharger is located in a volatile atmosphere containing flammable...
Typical bulk bag dischargers

- Spring-loaded support arms
- Liner-retention device
- Bag-support frame
- Pneumatic bag massager
- Flow-control device
- Bag-support base
- Tie box

a. With spring-loaded support arms, tie box, and other options

b. With liner-retention device, flow-control device, and other options

gases, solvent vapors, or high dust-to-air ratios. A grounding device mounted on the discharger and connected to a monitoring device and the bag can prevent static brush discharges by safely dissipating static charges from the bag directly into the ground. You can also place rubber floor mats around the discharger where the operator walks; the floor mats form an insulative barrier that prevents the operator from being grounded. Additionally, the operator can wear specially designed grounding devices that dissipate static charges from the bag directly into the ground. You can also select a bulk bag constructed of static-dissipative fabric (a Type D bag), which dissipates the static charges without a grounding device, or a conductive fabric (a Type C bag), which dissipates static charges through a grounding device connected to the bag.

Reference

1. Patented mechanical choker by Spiroflow, Monroe, N.C.

For further reading

Find more details on bulk bag dischargers and bulk bags in articles listed under “Bagging and packaging” and “Bags” in Powder and Bulk Engineering’s comprehensive article index at www.powderbulk.com and in the December 2003 issue.

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