

Drum Transfer System

OVERVIEW

Flexible Containment for offloading drummed materials in a safe and efficient manner is provided by the Drum Transfer System (DTS) platform at fixed and varying heights.



Figure 1a – Fixed Height Lifter

1. Flexible Enclosure
2. Outer Drum Sleeve
3. DTS Enclosure Frame
4. DTS Base Frame
5. Outlet Canister
6. Lifter



Figure 1b – Variable Height Lifter

The DTS consists of an enclosure attachment frame, a support stand, a drum lifter, an enclosure, an outer drum sleeve, and discharge softgoods that are dependent upon your process equipment.

The basic process steps include:

- Attach the enclosure to the frame.
- Stretch the bottom opening of the Drum Sleeve over the drum and attach the sleeve to the ring on the back of the frame.
- Pull the drum slightly into the enclosure and open the inner drum liner using the integral gloves on the enclosure.
- Scoop/pour powder into the process equipment to be utilized.
- Put trash in the empty drum and move the drum back out of the ring with the translating arm of the lifter.
- Twist and crimp the Drum Transfer Sleeve for disposal of the drum.
- Attach a new sleeve to a new drum and attach the sleeve over the stub remaining from the previous drum. Pull the stub into the enclosure to allow a clear pass through for the drum and repeat the process steps above.

HOW DOES THE SYSTEM WORK?

The Enclosure Frame sits on a series of bases offering a modular approach to processing drums in a contained fashion. This provides the benefit of processing into various mills, DoverPacs® and other vessels.

The entire assembly is mobile and can be wheeled over the piece of process equipment to be charged. The castors used here are conductive. Two wheels are locking while the other two pivot for steering.

The enclosure functions as a flexible isolator. It is attached to the frame at the drum inlet ring and the outlet canister. Bungee cords are used to attach the enclosure to the frame and allow the enclosure to move with the operator to take advantage of the system's built in flexibility.

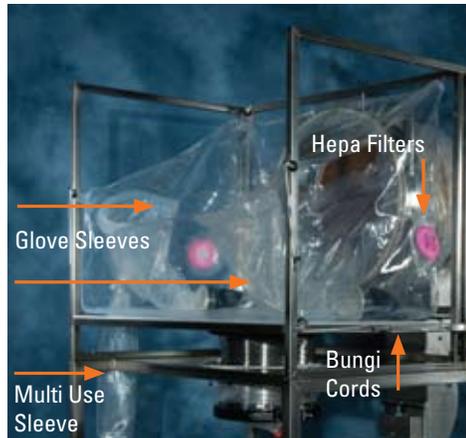


Figure 2

The drum lifting unit is provided as part of the system. The lifter is pneumatic powered to lift and tilt the drum into position. The unit is a stainless steel construction and meets cGMP requirements. The maximum lift capacity of the standard unit is 100 Kg though larger lifts can be provided.

The drum's inner liner can then be accessed from the enclosure after the outer drum liner is removed as depicted here.

The outlet canister supplied with the frame is typically our 5 liner, multiple o-ring groove system. For transfer direct to a process vessel a Transfer Sleeve is used.

If filling with a DoverPac® is required, the canister supports interface to this containment technology.

WHAT CONTAINMENT LEVEL PROVIDED?

OEB 5 with results in the nanogram range. This is based on proven applications, third party testing to the "SMEPAC" protocols, and the 100% inflation tests performed on the deliverable enclosures.

WHY USE THIS OVER OTHER TECHNOLOGIES?

The cost of ownership, ergonomic advantages, and speed of delivery benefits of this flexible solution far outweigh those of rigid isolation systems.

APPLICATIONS

Given the modularity features designed into the Drum Transfer System, contained transfer of drummed powders for the following applications is possible:

MILLING

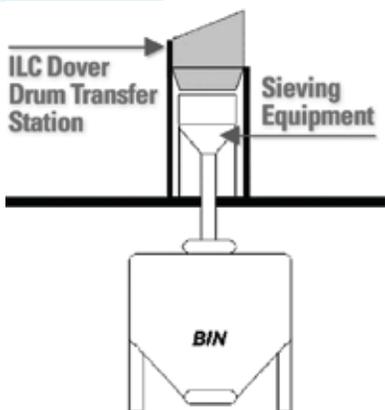


Figure 3

In the application pictured in Figure 3, powder is processed from a drum, through a mill (a Quadro Sifter in this example), into a stainless steel Intermediate Bulk Container (IBC).

An interface to the mill is provided at the outlet of the Enclosure frame using a transfer sleeve. A similar sleeve is used to go from the outlet of the mill to the inlet of the IBC.



Figure 4

In Figure 4, the milled powder is processed into a DoverPac® for future charging into a vessel. The example pictured uses a Quadro overdrive mill. This same approach has been accomplished with the Quadro under drive mill as well as other mills.

In this application, a transfer sleeve would be attached to the discharge canister of the DTS frame and to the inlet canister on the mill.

SUBDIVIDING

Using the DTS, a scale can be placed either inside the enclosure or just underneath it between the support tray and the enclosure. In this approach, the discharge canister was moved to the side to allow room for the scale.

On a larger size system, like the BNL repackaging effort discussed in the next paragraph, the DTS was placed around a floor scale so that a tare weight was measured. In this instance a Sartorius scale was used but others can be accommodated. In this type of application it is important to confirm the interface sizes.



Figure 5

REPACKAGING

We have worked recently with a repackaging company, BNL Labs, for an application with one of our customers in Ireland. In this application, drums and bags of intermediate materials were transferred directly into DoverPacs®. These were for 185L, 400L and 700L sizes.

The customer would have rejected any lot of repackaged materials if any powder were seen on the outside of the restraint. In order to be successful, BNL adopted our Drum Transfer Station.

CHARGING TO VESSELS

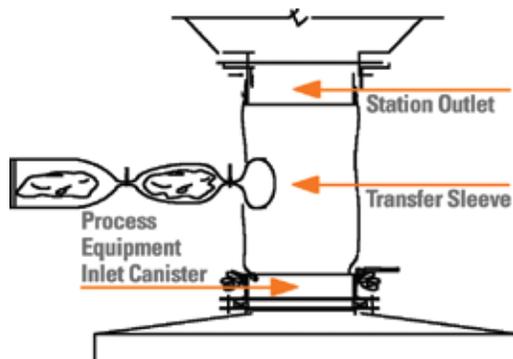


Figure 6

The Transfer Sleeve between the bottom of the DTS and the inlet of the next piece of equipment is depicted in Figure 6. This uses our standard technology of multiple groove o-rings and bag out techniques.

The Transfer Sleeve between the enclosure outlet and the process equipment inlet will be sized using our standard 12" hardware. In this case, we will be able to use our unique crimp system for contained separation.

After processing, the Transfer Sleeve will be twisted and crimped closed using the red, 14" crimps. The hand tool applies two crimps at once. The cutter is then used to cut between the two crimps and the cap is slid onto the closed crimp body.

In addition, the DoverLoc™, a molded clamp that secures the liner at the bottom interface point of the canister, supports the twisting/crimp operation and minimizes cleaning.

Feature	Benefit
Flexible enclosure follows operator's movements	Ergonomic performance is better than rigid system Fits a wider range of operator sizes without ergonomic issues of rigid designs
Lightweight, portable design	Can move to process area when needed, freeing room in process suite when not in use unlike a rigid, fixed system Better utilization of facilities
Disposable	Significant operational cost savings in cleaning time and validation
Third Party proven containment	Engineered process control Protection of operator No product loss of expensive APIs
Reduced capital cost over rigid systems	Significant savings of capital budget leaving money for other priorities
Maximized use of contained processing commonality	Operator training minimized across multiple processes
Time to manufacturing readiness is shorter than capital intensive systems	Improved speed to market
cGMP system	No cross contamination
Modular frame design	Allows attachment to a process specific frame Improved interface to multiple pieces of process equipment and DoverPac® sizes
Proven in customer applications	This is a validated system

