Application Example

Indirect and Direct Loading of Pharmaceutical Blenders via Vacuum Conveying

Background

Pneumatic conveying by vacuum is a popular method of transfer for the loading of blenders in the pharmaceutical and nutraceutical industries. One of the distinct advantages of vacuum systems is the inward suction created by the vacuum source and resulting reduction of any outward leakage of dust which may occur in pressure conveying systems. Vacuum loading of blenders typically falls into two categories: indirect loading via pneumatic sequencing systems or direct loading, where the blender becomes the primary vacuum receiver.

Indirect Vacuum Loading of Blenders

In the case of indirect loading, the vacuum receiver is mounted directly above the blender. Blender types which can be loaded in this manner include ribbon blenders and cone blenders (as shown in Figure 1).

Material is conveyed directly from pick-up hoppers, bag dump stations or – in the case of drum unloading – via a specialized pick-up wand to a vacuum receiver mounted above the blender. It should be noted that in this configuration the receiver can be mounted on load cells, allowing for the confirmation of the exact weight of material being delivered to the batch mixing process. The receiver acts as a holding vessel, utilizing a fill/dump principle. The batching sequence of the receiver is totalized for each filling session, thus confirming the total amount of powder delivered to the blender.

The advantage lies in the fact that this design allows for verification of the exact weight of the batch. However, there is an added height requirement above the blender for the vacuum receiver. In addition, when using specialized rotating blender designs, provision must be made to disconnect and swing the blender out of the way during the blending cycle.

Direct Vacuum Loading of Blenders

In the case of direct loading, the blender is actually used as a receiving vessel. It is important to note that this method is applicable to any mixer, reactor or vessel capable of withstanding a vacuum. As shown in Figure 2, this method is possible with both V blenders and cone blenders, as long as they are outfitted with the specialty cover adapters for both the vacuum inlet and vent exhaust. They must also be vacuum rated, which can easily be confirmed by the blender manufacturer.

In direct loading, material is conveyed directly to the blender and allowed to fall out of the airstream into the blender vessel. A smaller filter receiver is connected to the exhaust or vent port of the blender, in order to eliminate carryover/dust from the blender and ensure batch integrity. This filter receiver is equipped with a small compact filter which is periodically pulsed so that any residual dust on the filters is sent back to the blender.

P-Series Vacuum Receivers

The direct loading design ensures that all material is conveyed directly to the blender with minimal spills or waste. In addition, it requires substantially less headroom due to the remote mount of the filter receiver.

As shown in Figure 2, this method can also be used for both loading and unloading of blenders directly to another vessel which is also capable of withstanding vacuum.

Inline Sieving:

In both of the processes shown, the use of an inline sieve or screener is also integrated into the process line. The purpose of the inline sieve can be twofold, to act as a check sieve for foreign material entrapment, and also to act as a delumper/conditioner of the powder prior to entrance into the blender.

For further information on inline sieving or co-milling, please see Coperion K-Tron application sheet "Air Swept Sieving and Check Screening", document no. A-800406.

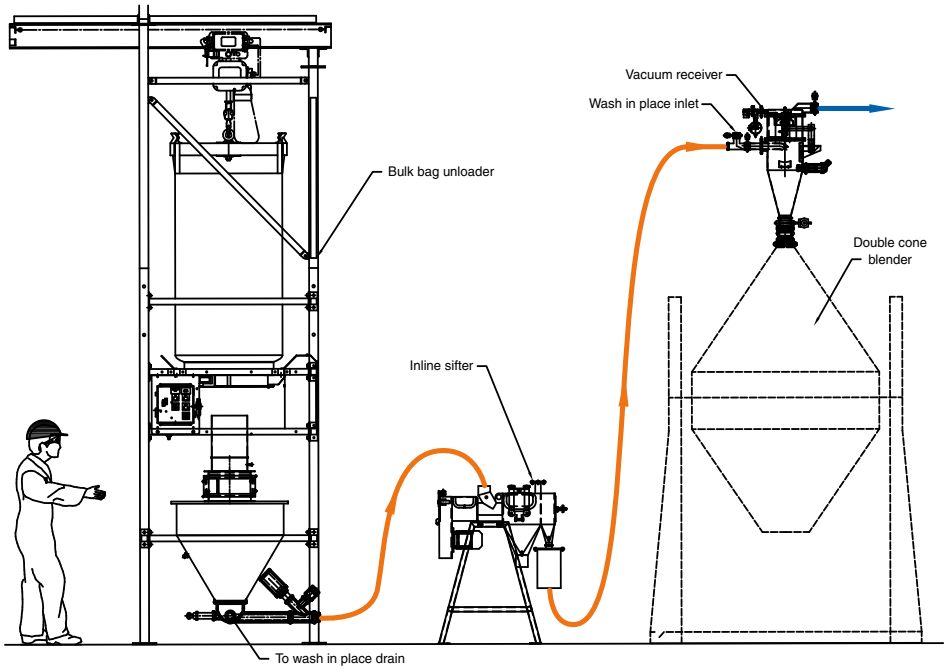

Figure 1: Indirect Loading of Blenders and Inline Sieving

Indirect and Direct Loading of Pharmaceutical Blenders via Vacuum Conveying

Coperion K-Tron Advantage

- The Coperion K-Tron line of vacuum receivers and components are all designed with ease of cleaning and maintenance in mind.
- All components feature a quick clean, easy disassembly design complete with fully welded and polished housings and triclover clamps/ferrules.
- All product contact parts are constructed to conform with strict cGMP standards.
- The Coperion K-Tron Systems Group can supply integrated systems of Coperion K-Tron and ancillary products including in line sieves, with one source management and control.
- Coperion K-Tron can provide all controls and engineering including CFR 21 Part 11 based control platforms.
- All conveying systems can be provided with a full range of validation documentation, including FDS, FAT and SAT-IQ, SAT-OQ protocols.
- Each pneumatic solution is custom developed according to the process application, based upon Coperion K-Tron's extensive knowledge in material handling of a variety pharmaceutical active ingredients and excipients.

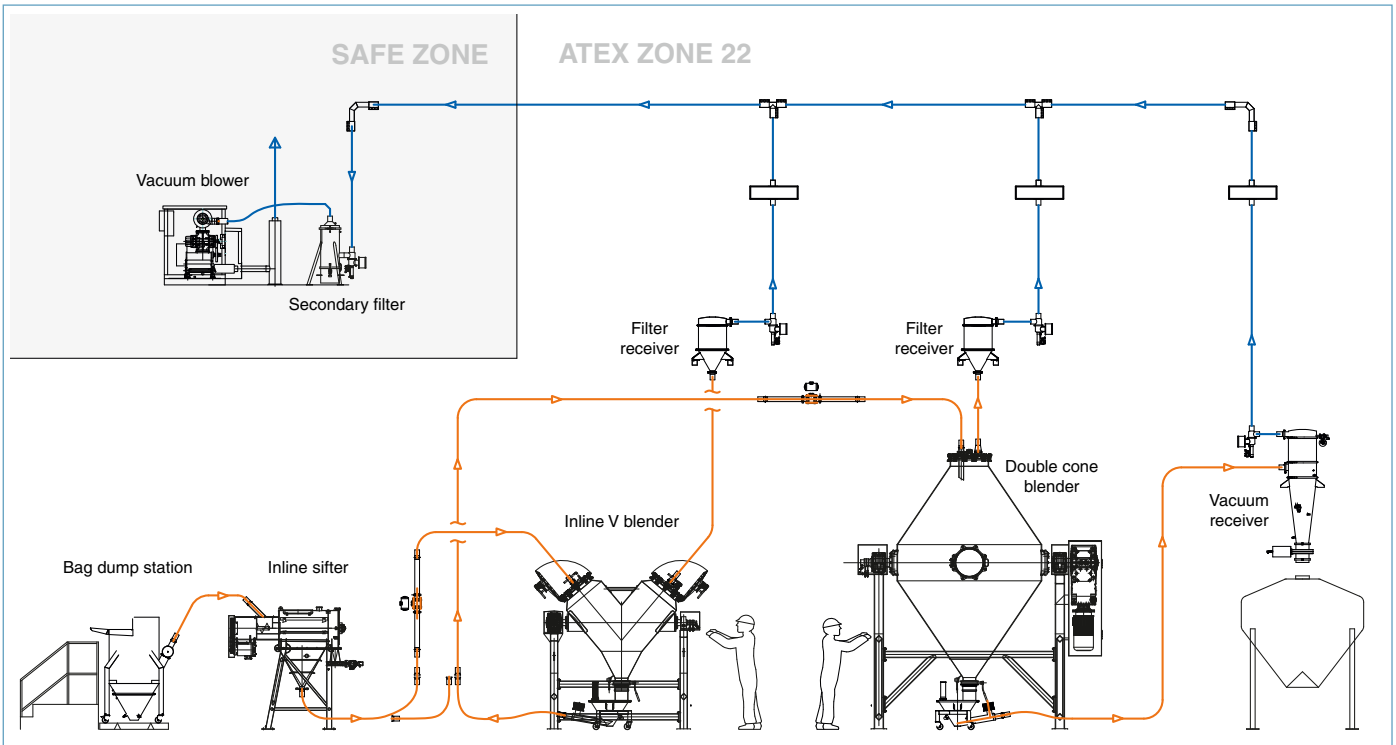

Figure 2: Direct Loading of Blenders and Inline Sieving

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