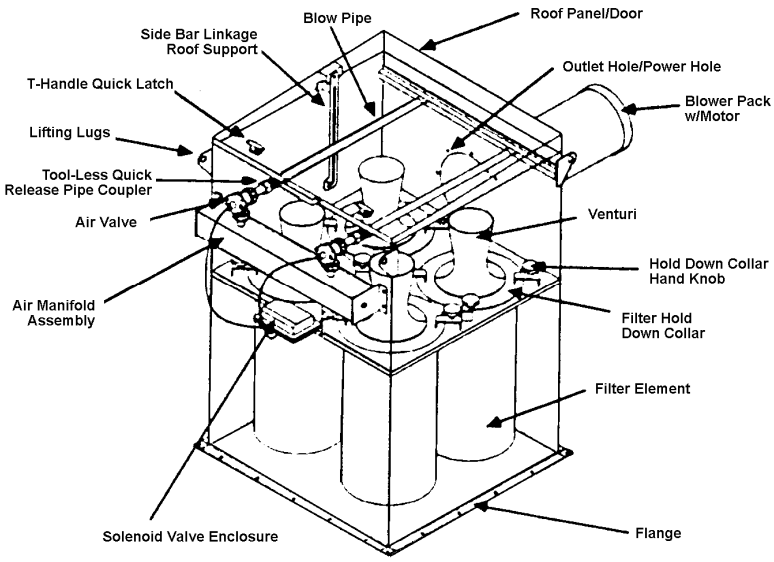
Torit® Bin Vent Filters

Product Overview



Torit Bin Vents (TBVs) apply cartridge technology for significant advantages on continuous-duty, bin venting applications. They were introduced in 1995 specifically for silo, storage bin, and conveyor transfer applications. Standard models include the insertable-mounted cabinet and the plenum-mounted cabinet, with both available in three sizes: a two-filter unit (TBV-2), a four-filter unit (TBV-4), and a six-filter unit (TBV-6). The TBV includes Torit Ultra-Web II® filters as standard, with continuous air, pulse-jet cleaning. This provides a highly efficient, self-cleaning filtration system ensuring long filter life and reduced maintenance. The TBV provides simple filter service and maintenance with a "tool-less" design. The unit incorporates clean-side (clean air plenum) filter cartridge removal and replacement, making it unnecessary to enter the silo or storage container. No tools are needed for the quick release couplings when replacing filters. This reduces the risk of contamination to the customer product stored in the silo/storage container.

Operation Explanation

Normal Operation: During normal operation, dust-laden air enters the TBV through the cabinet opening at the bottom of the unit, which is fastened to the silo or storage container. The incoming dust-laden air is collected on the outside surface of the filter elements. The clean, filtered air flows up through the center of the filter elements and passes through the venturi into the clean air plenum, where it finally exits through the clean air outlet. The clean air outlet can be configured with a blower fan or a weather hood side-mounted to the rear of the unit. The air is vented to the atmosphere or can be recirculated into the workspace, depending on the application.

Filter Cleaning: The filter elements are automatically cleaned during operation, with a portion of filters off-line during pulse-jet cleaning. As the dust cake collects on the outside filter surface, gravity and air pulse-jet cleaning force the dust to drop back into the storage bin. A solid-state timer controls the cycle of pulse-jet cleaning. Solenoid-operated diaphragm valves open in sequence, introducing jets of high pressure air - 90 - 100 psig (621 - 690 kPa) into venturis located above the filter element cartridges. The resulting reverse airflow initiates the cleaning cycle, which dislodges the dust accumulated on the outside of the filter media, while the remaining filter elements in the unit continue the filtration process.

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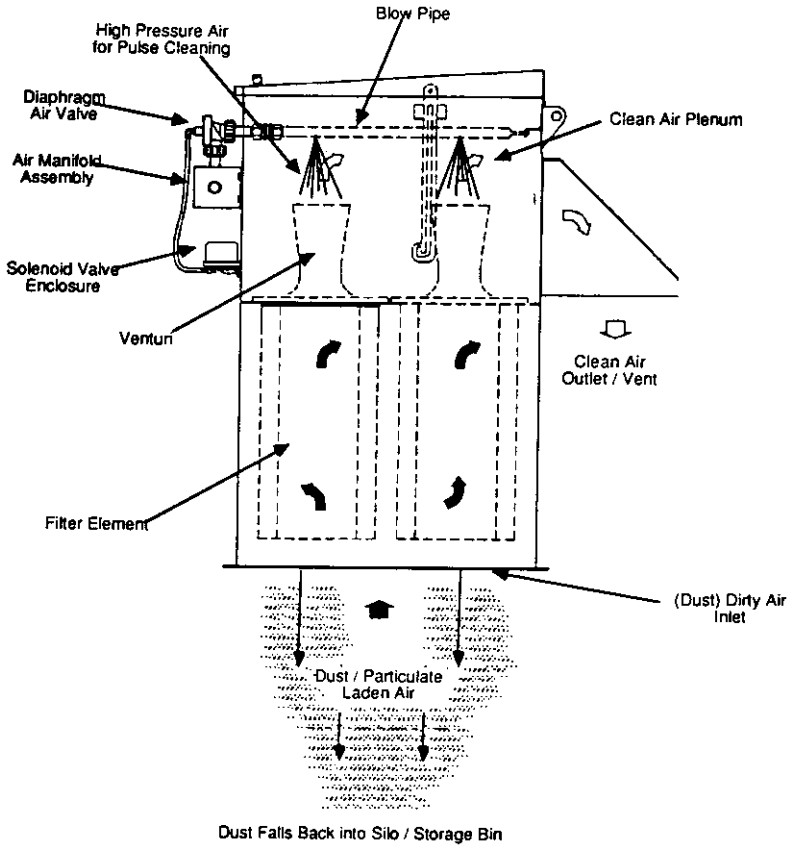
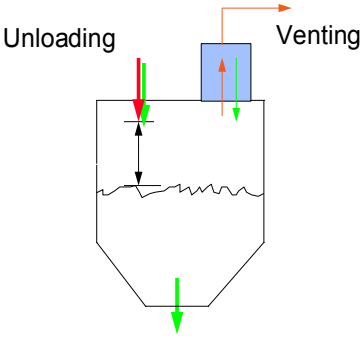


Application Summary



The Torit Bin Vent is used to vent displaced air and contain valuable and/or harmful products in bins or silos. As materials are conveyed to a bin by various means (mechanical, gravity, and pneumatic), air inside the enclosed bin is displaced. The process by which excess air is removed is called bin venting. The most common industries for the TBV are food/agriculture such as grain and process/manufacturing such as chemical/pharmaceutical, cement, wood, foundries (clay, sand, additives), and waste treatment. The most common dusts are lime, cement, carbon, plastics, and wood.

Inlet: The inlet should be arranged to minimize re-entrainment of the dust or product. This is best accomplished by providing an inlet box to slow the velocity of the product and conveying gas (if applicable) into the bin.

Mounting Location: The TBV should be located so that it is as far away from the inlet as possible. In addition, an adequate **freeboard** distance should be provided (freeboard is the distance from the highest fill location in the bin to the bottom of the bin vent). The greater the freeboard, the lower the loading to the TBV.

Dust Characteristics: Dust that "floats" is more difficult to handle than dust that "sinks." Light dust; i.e., paper and lint, with high-surface area, is more likely to "float". Heavy dust; i.e., lead

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and steel shot, with a low surface area, is the easiest dust to handle. This “sinking” dust is least likely to reach the TBV and will expose the TBV to lower loading conditions.

Dust Loading: Dust loading can vary considerably on bin venting applications. Four variables must be considered to estimate the loading to the bin vent. They are:

- Inlet Configuration,
- TBV Mounting Location,
- Freeboard Distance,
- Dust Shape and Density.

Sizing and Selecting Criteria

The two issues that must be addressed when applying the TBV are the actual vented airflow and the dust loading. The vented airflow is often much higher than the inlet or measured airflow, because the air expands when it enters the silo/container. First, the standard airflow must be determined and is usually stated in scfm. Then, the material conveying into the bin must be added to the standard airflow to determine the total vented airflow. Second, the loading of the dust to the TBV must be estimated.

Airflow: The standard airflow is calculated using the following equation.

$$\frac{\textit{Inlet cfm} \times [\textit{Inlet Pressure (psig)} + 14.8]}{14.8} = \textit{scfm}$$

For example: Given: Inlet Airflow = 100 acfm @ 8 psig

$$\frac{100 \text{ cfm} \times [8 \text{ psig} + 14.8]}{14.8} = \textit{154 scfm}$$

Assuming that 25 cubic feet of dust are fed to the bin with the above 154 scfm:

154 *scfm* + 25 ft^3 = 179 *cfm* (Total Vented Air)

The table below can be used to estimate the standard airflow when the conveying velocity and inlet pressure are unavailable.

Pipe Diameter	cfm / m^3/h	Note
3" (76 mm)	378 (642)	These values assume: 5000 fpm transport velocity, 8 psig inlet pressure, 70°F, and sea level. The values should be used for estimates only. The actual airflow will vary. (These metric values assume: 25.4 m/s transport velocity, 0.55 kg/cm^2 inlet pressure, 21°C, and sea level. These values should be used for estimates only. The actual airflow will vary.)
4" (102 mm)	672 (1,142)	
5" (127 mm)	1,050 (1,784)	
6" (152 mm)	1,512 (2,569)	
7" (178 mm)	2,058 (3,497)	
8" (203 mm)	2,688 (4,567)	

Be sure to add the conveyed material volume to the standard airflow from the table above to estimate the total vented airflow.

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Each bin venting application is different, and most of the applications will have poor inlets, freeboard, and available mounting locations. Because of these conditions, most TBVs should be sized at one-half of the recommended air-to-media ratio from the Recommended Air-To-Media Ratio Guide. Once the dust category has been found, look under the "TD" heading and divide the ratio by two. Make the unit is sized by actual airflow. Use Ultra-Web II® for fine dusts, Ultra-Tek® for fibrous dusts, and Fibra-Web™ for fine and fibrous or agglomerative dusts. Ultra-Tek and Fibra-Web are applied at twice the recommended ratio for Ultra-Web II.

Features/Advantages/Benefits

Features	Advantages	Benefits
Top, clean side cartridge changeout	• Exposure to dust is minimized • Filter changeout time is reduced • Tool-free filter changeout	• A cleaner and safer working environment • Reduced maintenance costs
Plenum and insertable configurations	• Low profile • Shorter than conventional baghouse bin vents	• Easy installation • Easy compliance with zoning restrictions • Faster and safer maintenance
Torit-Built® cartridge filtration: • **Ultra-Web II Filter** • **Ultra-Tek Filter** • **Fibra-Web Filter**	• Application flexibility • Long filter life • High filtration efficiency • Low pressure drop • Easier maintenance than conventional baghouse or bottom removal cartridges	• Reduced filter replacement costs • Cleaner working environment • Reduced energy costs • Reduced maintenance costs