Vibrating Bin Dischargers

Eliminate Bridging, Ratholing and Segregation

Bulletin #365

carman® Industries, Inc.

Bin Flow Problems

Bin flow problems, including bridging, ratholing, and segregation, are usually related to one or more of the following conditions:

- **Hopper outlet is too small**
- **Hopper depth is too great**
- **Hopper slope is too flat**

Bridging

Bridging is a no-flow condition in which the pressure of the stored material on itself results in a “bridge” or “arch” formation in the bin or the hopper section of the bin.

Ratholing

Ratholing is a condition in which the stored material does not slough into the central flow stream for discharge and instead forms a core. Problems associated with ratholing are flooding, substantial variation of density in product, and eventually no-flow.

Segregation

Materials with varying particle sizes have a natural tendency to segregate during freefall into a bin. Larger particles concentrate in the periphery, fines migrate to the center. When withdrawn through a static hopper, fines tend to discharge first and coarse materials last.

Carman Bin Discharging Solutions

A properly sized Carman Vibrating Bin Discharger can economically eliminate bridging, ratholing and segregation.

Eliminate Bridging and Ratholing

The Carman Vibrating Bin Discharger eliminates bridging and ratholing by increasing the effective hopper outlet size and reducing the hopper depth which reduces pressure against the hopper walls.

Installed on a bin, a Carman Vibrating Bin Discharger increases the size of the hopper outlet and reduces the effective depth of the hopper.

Eliminate Segregation

By increasing the hopper outlet size and reducing the depth of the hopper, the Carman Vibrating Bin Discharger creates uniform flow throughout the bin, remixing stored material as it discharges.

Increasing hopper slope requires expensive bin modifications that will sacrifice storage capacity or increase overall system elevation.

Maximize Hopper Volume

With identical elevations and bin diameters, a 60° bin with a 5’ Carman Vibrating Bin Discharger provides 130% more hopper volume than a 70° mass flow bin design.

Design Factors and Material Classifications

There is no average material. But, through thousands of tests, Carman has grouped materials into five classifications. These classifications give Carman engineers the basic parameters from which to design and select the proper vibrating bin discharger system.

In addition to understanding the material to be stored, several factors relating to bin construction are important to consider when specifying a Carman Vibrating Bin Discharger.

Bin Design and Material Characteristic Factors

- Bin Diameter
- Bin Height
- Hopper Angle
- Materials of Construction
- Required Flow Rate
- Downstream Equipment
- Material
- Particle Distribution
- Moisture Content
- Bulk Density
- Temperature
- Pressure

Testing/Pilot Plant

The flow properties of your product or raw material can be carefully analyzed in our laboratory or with rental equipment in your facility. Performance is guaranteed.

Class I

Limestone, plastic pellets, coal, pearlite, sand, pebble lime, furnace slag, lithium ore, coke and clinkers.

Class II

Hydrated lime, flour, starch, calcium carbonate, iron oxide, diatomaceous earth, whey, return foundry sand, blood meal, kaolin clay, soy flour, magnesium oxide, marl, crushed phosphate, manganese dioxide, carbon black, alumina, soda ash, sinter mix and titanium dioxide.

Class III

Micronized titanium dioxide, prepared foundry sand, talc, precipitator dust, zinc oxide, boric acid, cement, flue dust, lactose, cocoa powder, atrazine, acetylene black, carapol and land plaster.

Class IV

Wood chips, fibrous products, sawdust, filter cakes and wood waste (mixture of sawdust, shavings, etc.).

Class V

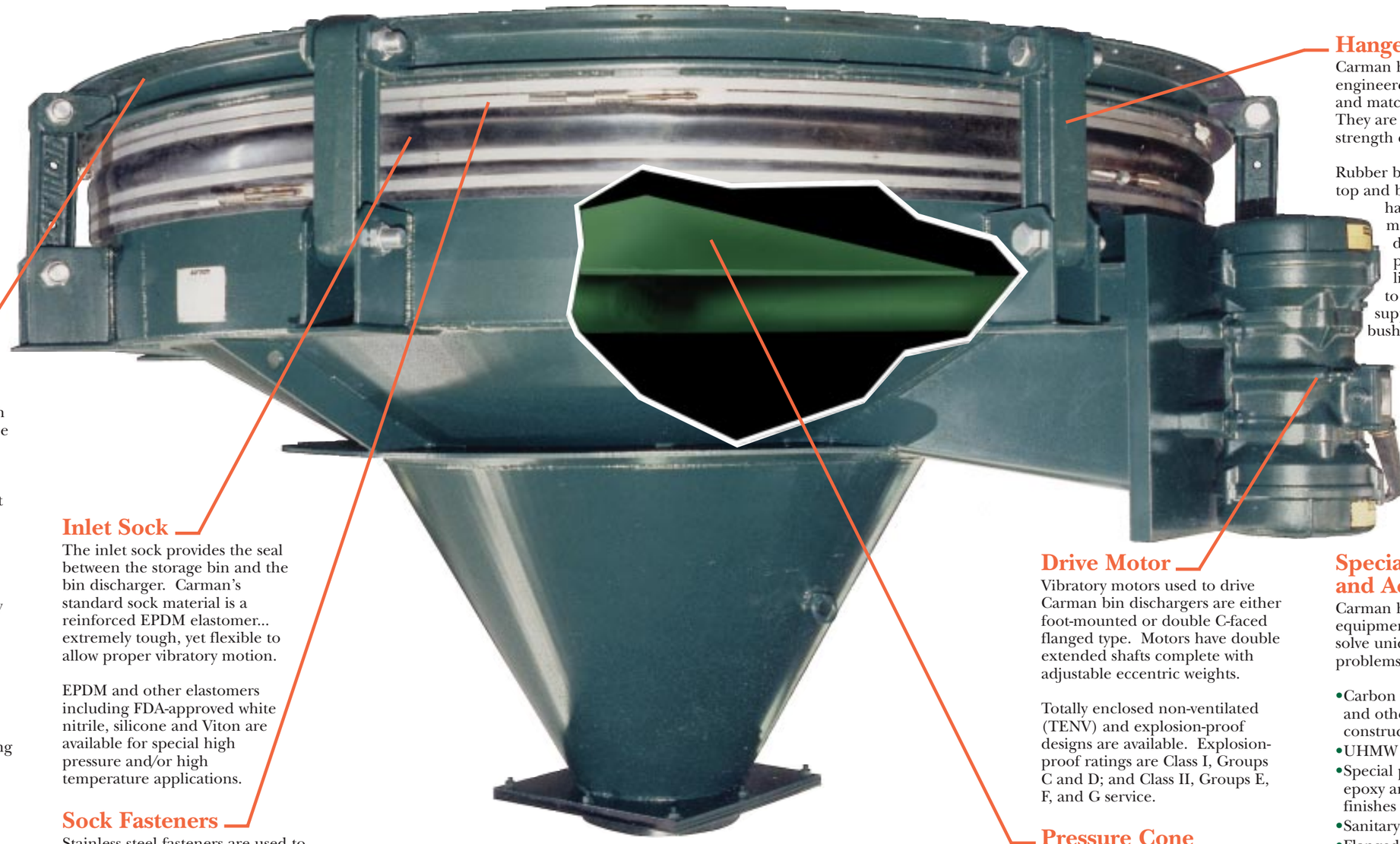
Sludges, soft wood bark, film scraps, fiberglass scrap and wood shavings. The materials in this classification would generally require a whirlpool-type vibrating bin discharger.

The Carman 30°/60° Vibrating Bin Discharger

A unique design with all the hardware to install quickly...and the ruggedness to stay on-line.

Carman's 30°/60° cone design offers proven performance advantages, including two significant benefits when compared to competitive single slope or dished-head designs:

1. **Increased Discharge Capacity**
2. **Improved Performance When Cycling Is Required**



Adapter Ring

The adapter ring is used to attach the vibrating bin discharger to the bin or hopper section of the bin. It provides an attachment point for the inlet sock and properly positions the hanger arm support points.

Adapter rings are available for either weld-on or bolt-on installation. The typical weld-on adapter ring simply welds directly to the bin. When a bolt-on adapter ring is supplied, there must be a mating flange on the outlet of the storage bin. Normally, pre-assembly of the hanger arms and inlet flexible sock to the bin discharger is included when bolted adapter ring designs are furnished.

Inlet Sock

The inlet sock provides the seal between the storage bin and the bin discharger. Carman's standard sock material is a reinforced EPDM elastomer... extremely tough, yet flexible to allow proper vibratory motion.

EPDM and other elastomers including FDA-approved white nitrile, silicone and Viton are available for special high pressure and/or high temperature applications.

Sock Fasteners

Stainless steel fasteners are used to secure inlet socks.

Standard double drawbands are used for low pressure applications (up to 5 PSI).

Hanger Arms

Carman hanger arms are custom engineered for vibratory service and matched to your application. They are constructed of high strength ductile iron.

Rubber bushings, located in the top and bottom eyelets of the hanger arm, allow maximum horizontal bin discharger movement to promote material flow, yet limited vertical movement to minimize stress on the support flange above. The bushings have 3/16 inch thick metal sleeves to give the hanger bolts a close tolerance fit and protection. Special bushings are available for high temperature use.

Drive Motor

Vibratory motors used to drive Carman bin dischargers are either foot-mounted or double C-faced flanged type. Motors have double extended shafts complete with adjustable eccentric weights.

Totally enclosed non-ventilated (TENV) and explosion-proof designs are available. Explosion-proof ratings are Class I, Groups C and D; and Class II, Groups E, F, and G service.

Pressure Cone

Individually engineered for each application, the Carman pressure cone promotes uniform product flow and provides relief of headload pressure at the outlet.

Special Equipment and Accessories

Carman has developed special equipment and accessories to solve unique storage flow problems including:

- Carbon steel, stainless steel and other special materials of construction
- UHMW and urethane linings
- Special paint finishes including epoxy and high temperature finishes
- Sanitary designs
- Flanged outlets
- Flanged inlet and outlet connectors
- Maintenance gates
- Cycle timers

Carman Vibrating Bin Dischargers On-The-Job In These Industries

Power and Water Treatment Industries

This model 8GBD dual outlet Bin Discharger promotes flow from a single tank into two independent feeders. Typically, with one leg on standby as back-up, flyash is discharged to a conditioner prior to disposal or lime to a slurry system. Reinforced EPDM inlet connector with double drawbands prevents leakage of fine products. Rugged TENV motors include adjustable eccentric weights for field tuning.

Food Industry

Cut carrots, lettuce and cabbage are stored and positively discharged at a controlled rate to a salad packaging system by a vibrating feeder. Total washdown is accomplished by easily cleanable 304 stainless steel construction including exclusive connectorless overlap design, CIP spray head under pressure cone, access doors, and waterproof drive motor.

Prepared cake mix products are stored in activated surge hopper prior to packaging. Full diameter Bin Discharger creates uniform flow throughout the bin, remixing stored materials as it discharges. 304 stainless steel construction, white EPDM flexible connectors and white epoxy paint system meet FDA standards for bakery operations.

Land Remediation Industry

Incinerated hazardous waste is stabilized and neutralized by mixing with hydrated lime before disposal. This 5’ diameter Model 5GBD Bin Discharger discharges -300 mesh hydrated lime at a constant density to volumetric feeding equipment.

Glass and Plastic Industries

Finely ground, difficult-to-handle minor ingredients and additives are stored and discharged at high rates to downstream “loss in weight” feeding equipment using a self-contained Model 3GBD storage bin. Large diameter outlet assures high discharge rates while in volumetric mode. Pneumatically operated gate assures positive shut-off for accurate feeding in the gravimetric mode.

Chemical Industry

12' diameter electrically heated and insulated Bin Discharger eliminates problems which occur during start-up and shutdown when handling hot products in a wet atmosphere. 300˚F skin temperature eliminates condensation and the sticking and flow problems which result when product build-up occurs.

Munitions plant uses portable 4' diameter storage bin with Bin Discharger for movement of volatile products from one process to another. System can be transported using integral lifting lugs or forklift brackets. Safe operation is assured by use of explosion-proof motor, vented support legs and non-vibrated stationary discharge valve.

Grain and Wood Industries

Fibrous materials interlock when stored. This Model 6GBD Bin Discharger includes a special steep-angle pressure cone that penetrates deeply into stored product. This eliminates bridging by permitting direct transmission of vibration.

Other Carman Vibratory Equipment

Carman manufactures the most complete line of vibratory material processing equipment in the industry. For more information, call and ask for the bulletin listed under the product youÕre interested in.

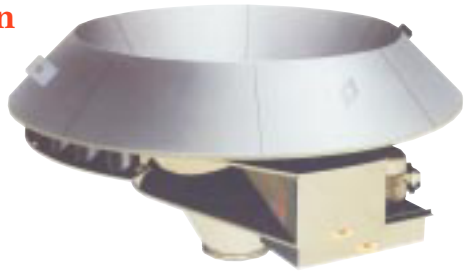
Vibrating Spiral Elevator

Heat, Cool, Dry, Cure, Dewater, or Quench While Elevating.

- ¥ Long retention with minimal floorspace requirements.
- ¥ Direct or indirect processing capability.
- ¥ Integral isolation system minimizes force transmission.
- ¥ Non-resonant drive with long-life vibrating service motors.
- ¥ Process Guarantee.

Ask for Bulletin No. 910

Drawdown Hopper



Reclaim Coal, Potash, Salt, Aggregate and Other Materials

- ¥ Projection ring transmits vibrations to encourage Òslough-inÓ.
- ¥ Increase active reclaim.
- ¥ Cycled operation eliminates compaction.
- ¥ Rugged design for dependable operation.

Ask for Bulletin No. 1100

Adjust-A-Flow V ibrating Feeder

Feed, Meter, Scalp, Charge or Distribute.

- ¥ Rugged design well suited for impact loading and handling sticky materials.
- ¥ Non-resonant drive.
- ¥ Designed and constructed to suit application.
- ¥ Isolation system reduces force transmissions.
- ¥ Variable capacity control.

Ask for Bulletin No. 610

Vibrating Conveyor

Convey, Inspect, Orient, Pick, Screen, Clean, Cool, Dry, Feed, Fluidize, Freeze, Heat, Mix, Quench, Size or Sort.

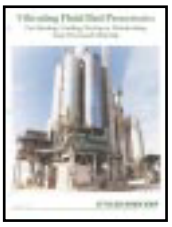
- ¥ "Natural frequency" spring system.
- ¥ "Positive arm" drive.
- ¥ Standard-duty, fiberglass leaf spring or heavy-duty coil spring designs available.

Ask for Bulletin No. 700

Vibrating Fluid Bed Processor

Heat, Cool, Dry, Classify, Moisturize, Toast De-Dust, Ctystallize or Freeze.

- ¥ Controlled process air and vibration combine for efficient fluidization.
- ¥ Intensive intermixing for direct heat and/or moisture transfer.
- ¥ Process flexibility.
- ¥ High thermal efficiencies.
- ¥ Process Guarantee.



Ask for Bulletin No. 1200

carman® Industries, Inc.

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