



# Denseveyor<sup>®</sup>

**Low velocity, dense phase solids pump conveys difficult-to-handle materials in one smooth operation.**

**The ultimate conveying system for handling your difficult-to-convey materials: abrasive, hot and/or wet.**

**Gentle handling of friable products prevent degradation and separation of blended materials.**

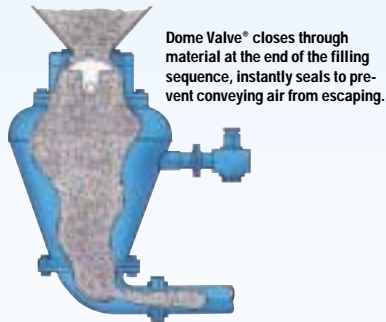
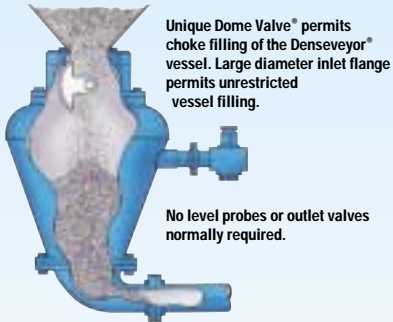


# Denseveyor® – Advanced Dense-phase Pneumatic Conveying

Simplicity is the most recognizable feature of the Denseveyor® design. With most applications, level probes and outlet valves are not required to be mounted within the pressure vessel since the vessel closing device, Macawber's patented Dome Valve®, is purpose-designed to close and seal through a static or dynamic column of material. The special relationship between vessel capacity and pipeline insures the movement of material without dependence on material fluidization, pipeline boosters or high velocity.

## The Four Basic Pneumatic Conveying Regimes.

### Typical Sequences



**A Solid Dense Phase** Very low material velocity – pipeline full of material – an excellent regime for fragile materials.

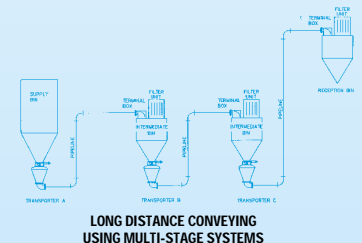
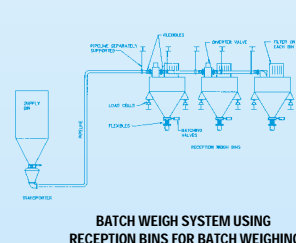
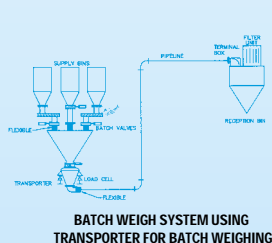
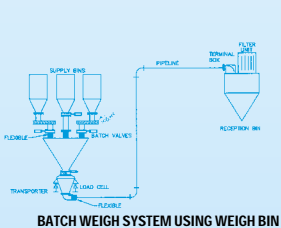
**B Discontinuous Dense Phase** Low material velocity – pipeline almost full of material which moves in plug flow fashion – best regime for most applications in which power economy, pipe erosion and material degradation issues are important;

**C Continuous Dense Phase** Highest velocity below the saltation velocity of the material conveyed – suitable for powder and narrow particle size distribution – may not be optimum design for abrasive materials;

**D Dilute Phase** Material velocity above the saltation velocity – no upper limit to the velocity – least attractive regime for operating economy – unsuitable for abrasive materials or materials with wide particle size distribution.

Selecting the correct pneumatic conveying regime for your requirements is a vital decision for a successfully designed system. Almost all applications will benefit from a regime providing the heaviest line loading and the lowest material velocity. These attributes also provide the greatest conveying gas economies for efficient power consumption.

Our Scientific Approach to studying your conveying requirements assures you that the lowest material velocities are achieved consistent with any limitations of the material characterization.



# Macawber's Denseveyor®

Smooth, low-velocity dense-phase pneumatic conveying of powders, granules and irregularly shaped materials without degradation or segregation.

Hot, wet, fine or coarse, blended or batched... Denseveyor® handles them all.

## Phase Density

Two important features of the Denseveyor® design combine to provide a non-fluidizing conveying technique which in turn reduces air requirements, and therefore, establishes a high phase density normally between 30 and 150, depending on material and application objectives.

## Patented Dome Valve®

The vessel valve is purpose-designed to provide a high degree of reliability – up to 500,000 cycles between inspections in approved applications – even when operating with abrasive materials such as sands and ash or coke fines. More than 5,000 Dome Valves are operating throughout the world on heavy-duty pressure sealing and flow control, as well as shut-off applications. The reliability of the Dome Valve® sets the Denseveyor® apart from systems of inferior design.

## Pipework Wear

The unique low-velocity, nonfluidizing principle of the Denseveyor® insures low velocity control of the bulk material. Since internal pipewear increases by the square of material velocity, a considerable reduction in pipewear is possible with the Denseveyor® system even with the most abrasive materials.

## Material Velocity Control

Low-velocity control is important in maintaining a nonfluidizing conveying regime. This is achieved by when a proper relationship is established between total material resistance to flow for each cycle and the minimum air energy required.

## Low Air Consumption

Each of the foregoing principles ultimately equate the economy. High material velocity is unnecessary to achieve almost all our customers' objectives. The Dense-veyor® provides the best combination of reliability, durability, economy and performance than any other so-called dense-phase pneumatic conveying process.

*Denseveyor® testing in Macawber's test facility for peanut transfer at the H. B. Reese Company in Hershey, Pennsylvania.*



### Coal/Coke/Fly Ash

Wet, lump coal, fines, coke breeze, dust and fly ash, siftings, wood ash



### Raw and Prepared Foods

Raw and roasted peanuts, almonds, unpuffed loops, non-dairy creamer, granular yeast, loose tea, corn, sugars, raisins, fructose, salts



### Foundry Sands

Resin-coated, green, blended new and reclaimed, premix bond

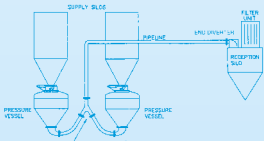


### Chemicals/Powders Plastics/Minerals

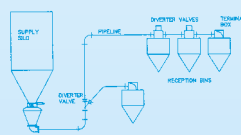
Titanium dioxide, aluminum trihydrate, PVC and CPVC resin pellets and chips, phenolic resin dust/ powder, pebble lime and limestone

### Alternate Fuels

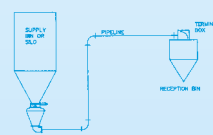
Wastewater treatment sludges, paper and pulp wastes, incineration



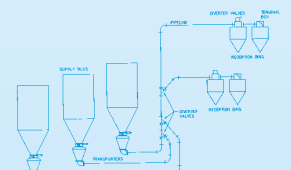
MULTI-FEED TO SINGLE RECEPTION



SINGLE-FEED TO MULTI-RECEPTION



SINGLE-FEED TO SINGLE RECEPTION



MULTI-FEED TO MULTI-RECEPTION



## Research, Testing and Demonstration Facilities

The company possesses a purpose-built, stand-alone facility dedicated to research, testing and demonstration. Within the facility, systems utilizing the company's technology are connected to full-size pipelines running within the building. A computer based data acquisition system permits instantaneous collation of information for review of significant performance parameters.

Our materials characterization laboratory performs analysis of bulk materials to achieve a full understanding of bulk materials samples before they are presented to the test circuits. Applied research and application testing is only a part of the development program. We are continuously engaged in data acquisition through fundamental research of new system development aimed at the needs of new processes in many industries.

## Design and Innovation Keeps Us Ahead

Every Macawber Advanced Pneumatic Conveying System is fitted with the Dome Valve® to insure operating reliability and system efficiency. The first successful, inflatable seat valve, Macawber developed and patented this technological breakthrough to provide efficient closing and sealing of the pressure vessel.

Macawber's Dome Valve® is unique in its ability to close in one action through a static or moving column of material entering the vessel. This feature insures complete filling of the vessel, and a simple control philosophy that does not rely on level probes fitted in the vessel.

Available in standard sizes from 4" to 20" and duty temperatures from -160°F to 900°F with pressure ratings from full vacuum to 600 psig, the Dome Valve® can be constructed to your material specifications for any bulk solids handling application.

## Equipment, Engineering and Turnkey Services

As well as developing advanced pneumatic conveying techniques and manufacturing quality equipment, Macawber undertakes extensive engineering contracts to support the most complex system requirements. This includes controls, instrumentation and data acquisition systems. Additionally, Macawber offer complete turnkey services comprising of structures, storage systems, pressure vessels, control equipment, mechanical and electrical system installations and startups.

Continuous, on-site supervision throughout the contract gets the job done the way you want. We're not satisfied until the customer is, and every installation goes on record as a job well done and an achievement to be proud of.

## Our Manufacturing Facilities for Cost and Quality Control

Since our establishment, we have operated our own extensive manufacturing facilities. We possess our own ASME pressure vessel shop, general fabrication shop, machine shop, control panel/electrical facility and final assembly facility. At every step of the manufacturing process, our people strive to produce equipment at quality standards that have set us apart.

Macawber operates under a policy of continuous product and systems development. Specifications and equipment descriptions presented herein may change without notice.



Custom fabrication of 304 and 316 stainless steel Denseveyors are used in food markets for sterile transfer of ingredients and finished products.

Material characteristics are thoroughly studied before engineering or manufacturing has begun. Macawber systems are guaranteed to satisfy customer specifications and requirements.



Macawber's patented Dome Valve®, the Denseveyor's only moving part, provides complete vessel filling without level probes. Rated at 500,000 cycles between scheduled inspections, maintenance is almost eliminated!

Turnkey capability ensures system performance and total customer satisfaction ... time after time.



Extensive manufacturing facilities provide quality and cost controls from engineering design to machine shop through final mechanical and electrical fabrication. Macawber technology is behind every step of the way in supplying our customers with Advanced Pneumatic Conveying Systems.



Nestled in the foothills of the Great Smoky Mountains, Macawber Engineering have been worldwide pneumatic conveying specialists since 1977.



**Macawber Engineering, Inc.**

1829 Clydesdale Street • Maryville, TN 37801  
1 800 433-2213 toll free • 615 977-4131 fax