Application Note: The RIECO EMOD (Dome) Valve

This document provides a detailed technical overview of the RIECO EMOD Valve, a high-performance, severe-service valve engineered for bulk solids handling. The EMOD Valve is a **full-bore, inflatable-seal dome valve** designed to overcome the common failures of traditional valves (like butterfly, knife-gate, and ball valves) in abrasive, high-pressure applications. Its unique operating principle provides a **bubble-tight seal** and **long service life** in the most challenging industrial environments. Understanding this technology is critical to positioning the EMOD valve as the solution for process-critical applications.

1.0 What is a Dome Valve?

Dome Valve are not common means of isolating high-pressure equipment. They are pressure tight, Power – operated valve for application in the material inlet, vessel discharge, line change over, discharge from pressure chambers. The valve provides an inflatable sealing arrangements which is designed to open and close by actuating a pneumatic actuator by an external 5/2 solenoid valve and sealing is done by another 3/2 solenoid valve.

This design achieves two things that most other valves cannot:

1. **Closes on a Static Column:** The dome has a powerful "wiping" or "cutting" action. As it rotates to close, its curved profile can push material aside and close securely through a moving *or* a static column of material. This means the process does not need to be stopped to actuate the valve, preventing jamming and ensuring reliable operation as a true process isolation valve.
2. **Full, Unobstructed Bore:** When open, the dome component rotates completely out of the material flow path, offering 100% full-bore flow with zero obstruction. This prevents pressure drop and material buildup.
3. **Protected Inflatable Seal:** The valve's sealing mechanism is not friction-based. A pneumatic, inflatable elastomeric seal provides the sealing action *after* the dome is already in the closed position. This soft seal is completely shielded from the abrasive material flow when the valve is open, dramatically reducing wear.

2.0 Operating Principle & Mechanism

The dome closes below the seal when the inflatable seal is relaxed, allowing a clearance between the seal and dome flap. In the closed position, high pressure gas enters the space between the back of the seal face and the insert ring to cause the seal to expand onto the periphery of dome flap. Material is entrapped by the seal against the dome surface, irrespective of particle or shape. Before opening the valve, the seat is relaxed, and the gap is reestablished before the dome component moves to its open condition. The seal can be accessed by loosening the top plate fasteners detaching the insert ring and spigot plate.

Inflatable flexible seats entrap particles that are normally the cause of seat erosion. Particles are induced to move across valve seats under the influence of pressure differentials on either side of the closing member. Entrapping particles within a flexible face during the period of valve closure prevents particle movement and considerably reduces valve seat wear. Inflatable seats allow automatic wear compensation.

- When the seal is relaxed, the dome component can open resulting in a full bore opening hence allowing material to pass through and fall from the dome valve into the bottom process.
- In the closed position, high-pressure air / gas enters the space between the backside of the seal face and the insert ring. This causes the face of the seal to expand towards the dome surface, irrespective of the particle size and shape. This ensures pressure tight sealing of the dome.
- The above control sequence is made to repeat for the next cycle of operation

3.0 Key Components

1. **Valve Body:** A robust, heavy-duty casting (e.g., Cast Iron, Carbon Steel, Stainless Steel) that houses all components and provides flange connections.
2. **Dome (Hemisphere):** The rotating closing component. This is the primary part in contact with the material during actuation.
    - **Material:** Typically, Stainless Steel or Cast Steel.
    - **Coatings:** This is a key area for customization.
        - **Chrome Plating:** For sticky and abrasive materials.
3. **Inflatable Seal:** The "heart" of the valve. This is an elastomeric ring that inflates to create the seal.
    - **Silicone:** Food-grade and high-temperature applications.
4. **Actuator:**
    - The valve comes with Actuator direct coupled on shaft or via a flexible coupling. Compact rack and pinion actuators units are used to achieve required flap torque. Generally, 2.5-5 kg/cm2(g) pressure compressed air pressure is required for actuator operation.
5. **Control System:** A local control box with solenoid valves and proximity switches that ensures the correct "close-then-inflate" and "deflate-then-open" sequence.

4.0 Core Features & Benefits

Use this table to address customer pain points.

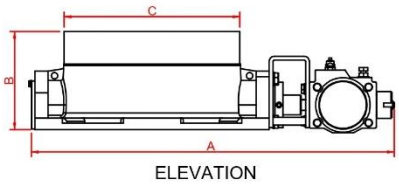
Customer Pain Point	RIECO EMOD Valve Feature	Benefit (Your Sales Pitch)
Our current valves (butterfly/ball) wear out and leak	Inflatable, Protected Seal	"The EMOD's seal is completely shielded from the material flow. It only inflates to seal *after* the valve is closed, so it never gets worn down by the abrasive product. This gives it a service life many times longer than a butterfly valve, where the seat is always exposed."
We get material blockages and pressure drop	Full, Unobstructed Bore	"When open, the EMOD is 100% full-bore. It's like having an open pipe. This means zero pressure drop, no product degradation, and no ledges or cavities for material to build up and clog the line."
We must stop our process to close our valves	Closes Through a Column of Material	"The EMOD is a true process valve. Its dome has a 'wiping' action that can cut through a static or moving column of material. You don't have to stop your feed, which means no loss in production time. It's designed to be used as an inlet/outlet valve on pressure vessels."
Our fine powder is leaking and causing a mess/safety hazard	Bubble-Tight, Wear-Compensating Seal	"The inflatable seal provides a perfect, pressure-tight seal every single time, even with fine powders like cement or fly ash. Because it inflates, it automatically compensates for any minor wear, ensuring it seals tightly for thousands of cycles."
Our process is high-pressure	Robust, Severe-Service Design	"The EMOD is built for this. Its all-metal dome and body, combined with specialized seals (like Silicon) and coatings (like Hard Chrome), can handle mildly abrasive materials at high pressures where other valves would fail in days."

5.0 Target Applications

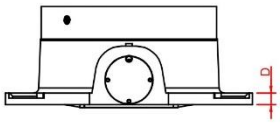
Focus your efforts on these high-potential areas:

- Branch Isolation, Diverter Valve, Silo Isolation in pneumatic conveying lines
- Material Inlet, Material Outlet & Vent / Equalising of pneumatic conveying dense pump
- Handling sticky, gummy, pelletized or granulated substances.
- Highly abrasive flow.
- Sanitary, Food and Pharmaceutical.
- Hopper discharge cut-off.
- Ball, Knife and Butterfly valve replacement.
- Vessel Sealing.
- Inline Flow Isolation.

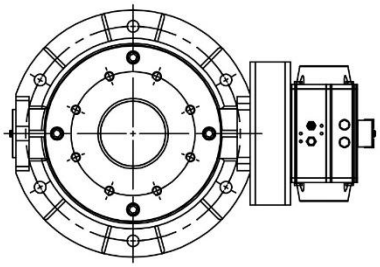
6.0 Dimensional Chart

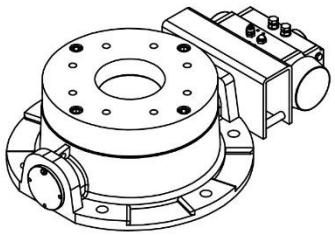


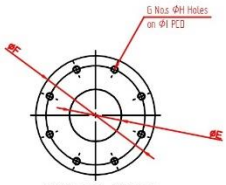
ELEVATION



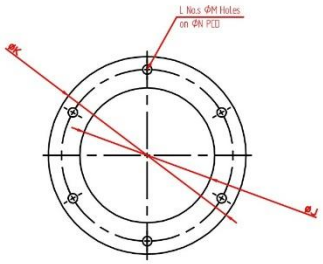
SIDE VIEW


PLAN


ISOMETRIC VIEW



TOP FLANGE



BOTTOM FLANGE

SIZE	A	B	ΦC	D	ΦE	ΦF	G	ΦH	ΦI	ΦJ	ΦK	L	ΦM	ΦN
EMOD 100	558	151	270	18	100	229	8	M14	190.5	259	380	6	18	330
EMOD 150	644	183 ± 3	323	20	150	323	6	M12	260	305	450	8	22	390
EMOD 200	749	217	410	22	200	325	6	M12	280	395	520	8	22	470
EMOD 250	870	247	490	22	250	374	6	M12	349	495	620	8	25	563

Technical Highlights:

1. Air cooled design for temperature range up to 150 °C
2. Hard chrome surface plating for abrasive material applications
3. Rotary Pneumatic actuator
4. FG Silicon inflatable seal

7.0 FAQs

1. What makes the EMOD Dome Valve different from butterfly, knife-gate, or ball valves?
   Ans: The EMOD valve uses a rotating dome combined with an inflatable seal, unlike conventional valves where the sealing surface stays exposed to the material. This protected sealing mechanism provides significantly longer service life and superior sealing performance.
2. Can the EMOD valve close through a moving or static column of material?

Ans: Yes. The dome's wiping/cutting motion allows it to close even when material is flowing or static. This makes it suitable as a true process isolation valve that does not require stopping the feed.

3. How does the inflatable seal work?
   Ans: Once the dome closes mechanically, compressed air inflates the elastomeric seal against the dome surface to create a bubble-tight seal. Before opening, the seal deflates to provide clearance, reducing wear and preventing friction-based erosion.
4. What materials are available for the valve body and dome?
   Ans: Valve bodies are available in Cast Iron, Carbon Steel, or Stainless Steel. The dome is generally Stainless Steel or Cast Steel and can be chrome plated for applications involving sticky or abrasive materials.
5. What industries or applications benefit most from the EMOD valve?
   Key applications include pneumatic conveying (inlet/outlet isolation), silo discharge, dense-phase pump sealing, abrasive or sticky powder handling, hopper isolation, and replacement of ball, knife-gate, and butterfly valves.
6. What type of actuator is used, and what air pressure is required?
   Ans: The valve uses a rack-and-pinion pneumatic actuator, either directly coupled or connected via flexible coupling. Typical operating air pressure is 2.5–5 $kg/cm^2(g)$.
7. How is the sealing sequence controlled?
   Ans: A local control box with 5/2 and 3/2 solenoid valves manages the close-then-inflate and deflate-then-open cycle. Proximity switches provide open/close feedback to ensure correct operation.
8. Is maintenance difficult? How is the seal replaced?
   Ans: Maintenance is simple. The inflatable seal can be accessed by loosening the top-plate fasteners and removing the insert ring and spigot plate. The seal can be replaced without dismantling the entire valve.
9. Can the EMOD valve handle abrasive or high-temperature materials?
   Ans: Yes. Hard chrome plating on the dome is available for abrasive materials. FG silicone seals and an air-cooled valve design support use in high-temperature environments up to approximately 150°C
10. Does the full-bore opening truly eliminate pressure drop?
    Ans: Yes. When open, the dome moves completely out of the flow path, offering a 100% unobstructed bore. This eliminates pressure drop, reduces product degradation, and prevents material buildup.