Application Note: RIECO Dual Tunnel Diverter Valve

Technical Version for Engineering Consultants, OEM Designers & EPC Integrators

The **RIECO Dual Tunnel Diverter Valve** is a high-precision rotary diverter engineered for **dilute and dense-phase pneumatic conveying** of powders and granules. Unlike flap or butterfly-style diverters—which introduce high wear, leakage paths, and material degradation—the valve uses a **dual parallel tunnel plug** that rotates to align the conveying path with the selected outlet, ensuring a fully unobstructed bore and minimal pressure drop.

The pressure-tight housing, stainless steel product-contact surfaces, and rapid rotary actuation make this valve suitable for **continuous-duty conveying**, high switching frequencies, abrasive materials, and industries with stringent hygiene or contamination control requirements.

1.0 Design and Operating Principle

The valve operates on a **rotary plug mechanism** fitted with two independent, full-bore tunnels. The design eliminates constrictions in the conveying path, ensuring uniform air-solids flow velocity.

Operating Sequence:

1. **Position A (Outlet–1 Aligned)**
    - Tunnel-1 is aligned with the inlet and Outlet A.
    - Tunnel-2 remains isolated and sealed via static/dynamic elastomeric seals.
2. **Transition**
    - A pneumatic actuator rotates the plug by approx. **35°**.
    - Rotation is completed in <1 second under standard pressure.
3. **Position B (Outlet–2 Aligned)**
    - Tunnel-2 aligns with the inlet and Outlet B.
    - Tunnel-1 is fully sealed off.

2.0 Major Components & Engineering Construction

Component	Engineering Description	Material	Design Advantage
Valve Housing	Machined internal bore with precision SS insert for wear protection.	Aluminium casting with SS liner	High strength-to-weight ratio; pressure-tight up to 3.5 bar(g).
Pipe Assembly (Rotor)	Dual-path plug with two independent conveying channels; precision-ground sealing surfaces.	Stainless Steel 304	Ideal for abrasive, hygienic, and high frequency switching applications.
Pneumatic Actuator	Direct coupled to plug shaft; high torque for rapid switching.	Pneumatic cylinder with linkage	Ensures positive positioning and repeatable switching accuracy.
Sealing System	Static and dynamic seals optimized for pressure containment and minimal leakage.	Silicone / VITON	Suitable for food, pharma, chemicals; low wear under cyclic duty.
Control & Feedback Package	Solenoid valves, position sensors (proximity switch), junction box.	Industrial-grade sensors	PLC-ready, reduces control panel integration time.

3.0 Technical Model Matrix

Model	Pipe Size (NB)	Switching Angle	Max. Op Pressure	Construction
DTDV 80NB	80 mm	36.6°	3.5 bar(g)	SS 304
DTDV 100NB	100 mm	35°	3.5 bar(g)	SS 304
DTDV 125NB	125 mm	35.5°	3.5 bar(g)	SS 304
DTDV 150NB	150 mm	35°	3.5 bar(g)	SS 304
DTDV 200NB	200 mm	34.8°	3.5 bar(g)	SS 304

4.0 Performance Features

Engineering Constraint	DTD-P Feature	Resulting Technical Benefit
Avoiding shear & attrition in fragile products	Full-bore straight tunnels	No turbulence zones: velocity profile remains uniform.
Preventing leakage under pressure	Precision plug + elastomeric sealing	Airtight sealing of non-active outlet; prevents reverse flow.
Reducing field maintenance	Enclosed mechanism	Minimal exposure of moving parts; extended MTBF.
Ensuring mechanical integrity under cyclic loads	SS plug + reinforced housing	Stable geometry and long operational life.

5.0 Application Engineering

Food & Beverage

- **Material:** Sugar, coffee beans, spices, flour blends
- **Use Case:** Line selection from silo to multiple packing stations
- **Engineering Requirement:** Hygienic surface finish, low shear
- **Compatibility:** Meets cGMP design expectations

Pharmaceutical

- **Material:** APIs, excipients, granules
- **Use Case:** Post-blending routing to compression or coating lines
- **Key Requirement:** No cross-contamination between batches
- **Compatibility:** SS contact parts; seal options for cleanroom use

Plastics & Polymers

- **Material:** PVC/PE/PP granules
- **Use Case:** Routing to multiple extruders or day bins
- **Engineering Requirement:** No pellet chipping; withstands cyclic switching

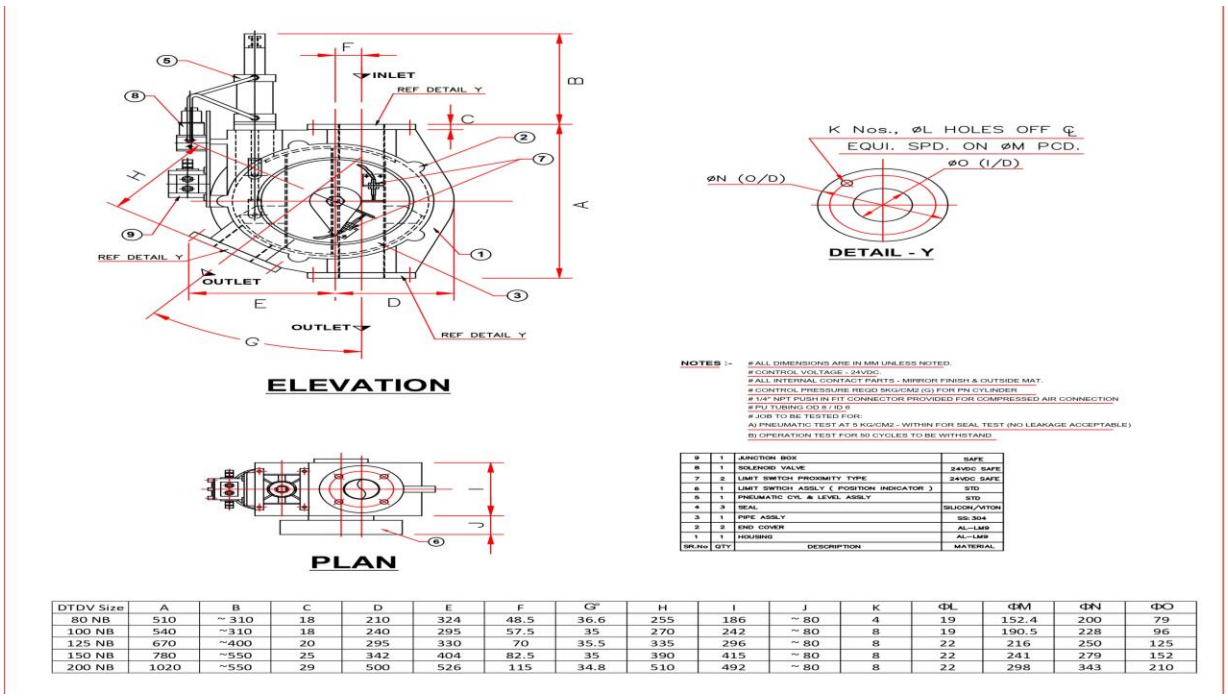
Chemical & Mineral Processing

- **Material:** Cement, ash, alumina, pigments
- **Use Case:** Diverting to alternate reactors or storage bins
- **Key Requirement:** Abrasion resistance; pressure integrity

6.0 Technical Performance Data

Parameter	Specification
Conveying Modes	Dilute & Dense Phase
Maximum Pressure	3.5 bar(g) Op. (6 bar Design.)
Operating Temperature	(-)20 to (+) 80°C
Product Contact Material	SS304
Housing Material	Aluminium Casting + SS Insert
Leakage Class	Air-tight
Area Rating	Safe area Std
Switching Cycle Time	2-3 second
Max Hardness of Powder	2 MHO

7.0 Dimensional Data



DTDV Size	A	B	C	D	E	F	G°	H	I	J	K	ΦL	ΦM	ΦN	ΦO
80 NB	510	~ 310	18	210	324	48.5	36.6	255	186	~ 80	4	19	152.4	200	79
100 NB	540	~310	18	240	295	57.5	35	270	242	~ 80	8	19	190.5	228	96
125 NB	670	~400	20	295	330	70	35.5	335	296	~ 80	8	22	216	250	125
150 NB	780	~550	25	342	404	82.5	35	390	415	~ 80	8	22	241	279	152
200 NB	1020	~550	29	500	526	115	34.8	510	492	~ 80	8	22	298	343	210