

Butterfly Valve Types — Concentric, High-Performance, Triple-Offset

cBallast · API 609 · Selection guide

The three geometries

Type	Stem offset	Seat	Pressure	Temperature
Concentric	None	Elastomer (EPDM/NBR/FKM)	PN 10/16	-40 to +140 C
High-perf (HPBV double offset)	Two offsets	PTFE / polymer	ANSI 300 / PN 40	-46 to +230 C
Triple-offset (TOBV)	Three offsets	Metal (17-4PH, Stellite, Inconel)	ANSI 600 / PN 100	-196 to +550 C

Concentric — utility valve

Stem centreline through disc centreline. Disc rim scrubs elastomer seat around entire body bore on closure. Wafer + lug ANSI 125/150 or PN 10/16. Workhorse of building services, HVAC, marine cooling, water treatment. 20-30% of HPBV cost. EPDM = hot/cold water, glycol, steam <130 C. NBR = hydrocarbons, oil-in-water. FKM = higher-temp hydrocarbons, aggressive process.

HPBV — process valve

Stem offset from disc centreline + disc face offset from stem. Double offset lifts rim clear of seat in first few degrees of opening — no rubbing wear on frequent-cycling process service. PTFE-lined seat, up to ~230 C, ISO 5208

rate A bubble-tight for hydrocarbons, most acids, steam.

TOBV — safety-critical

Third offset: seat cone axis offset from pipe centreline by 3-5°. Disc contacts seat only in last few degrees of closure — no seat rub. Metal-to-metal, bubble-tight on gas at ANSI 600 / PN 100, -196 C (LNG) to +550 C (superheated steam). Replaces globe/ball valves in critical isolation. Fire-safe (API 607/6FA).

Actuation

Actuator	Use
Manual lever "d DN 200	Small size, infrequent, isolation
Manual gear DN 200+	Where hand torque > 100 Nm
Pneumatic spring-return	Fail-safe (FC or FO on air loss)
Pneumatic double-acting	High-cycle process modulation
Electric 24 VDC / 230 VAC	Slow cycling, HVAC, no air supply
Electro-hydraulic	Large-torque ESD service

Sizing (Cv / Kv)

Cv = flow coefficient imperial; Kv = 0.865 × Cv. Manufacturer Cv-vs-opening = stretched-S. Most flow change between 30-70° open — size valve to run in that window at design flow. Undersized saturates near 100%; oversized throttles noisily in last 10°.

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