

VANTEC

ENGINEERING TECHNICAL REFERENCE GUIDE

Valves • Flow Control • FCU Kits • Expansion Joints

A consolidated catalogue reference covering materials, international standards, selection, installation, commissioning, maintenance and engineering terminology.

1. MATERIALS & INTERNATIONAL STANDARDS

Use the term Comparable Grade where standards are not direct one-to-one equivalents.

Material Family	BS / EN Reference	Common Grade / Designation	Comparable ASTM / AISI / UNS
Ductile Iron	BS EN 1563	EN-GJS-400-18 / 400-15 / 450-10 / 500-7 / 600-3 / 700-2 / 800-2 / 900-2	ASTM A536 comparable grades subject to mechanical requirements
Grey Cast Iron	BS EN 1561	EN-GJL-150 / 200 / 250 / 300 / 350	ASTM A48; ASTM A126 where applicable
Cast Carbon Steel	BS EN 10213	GP240GH / 1.0619	ASTM A216 WCB - comparable
Stainless Steel	BS EN 10088	304 / 304L / 316 / 316L / 410 / 420 / 431	AISI corresponding grades
Cast Stainless Steel	Applicable casting specification	304/304L/316/316L families	ASTM A351 CF8 / CF3 / CF8M / CF3M
Bronze / Gunmetal	BS EN 1982	CC491K / CuSn5Zn5Pb5	UNS C83600 / ASTM B62 - comparable
Brass	BS EN 12164 / 12165	CW617N / CW614N / CW611N	UNS comparable grade according to composition
DZR Brass	BS EN 12164 / 12165; legacy BS designation	CW602N / CZ132 / CZ132A	No universal direct ASTM equivalent
Lead-Free Brass	Applicable alloy standard	C46500	UNS C46500
Fasteners	BS EN ISO 898-1 / ISO 3506	8.8 / A2-70 / A4-70	Application-dependent ASTM reference

Elastomers & Sealing Materials

Material	Typical Characteristics	Typical Applications
EPDM	Excellent water, weather and ozone resistance; compound-specific temperature limits	Water/HVAC valve seats, liners, O-rings, wedge encapsulation, expansion joints
NBR	Good oil resistance; water-service compounds available	O-rings, seats, stem seals, gaskets
Neoprene / CR	Good weather, ozone and general-purpose resistance	Rubber expansion joints, gaskets, flexible connections
FKM / FPM	High-temperature and chemical-resistant fluoroelastomer	Special seals and O-rings
PTFE / RPTFE	Low friction and broad chemical resistance	Ball-valve seats, packing, gaskets
Graphite	High-temperature sealing	Packing and body/bonnet gaskets

Material suitability shall always be verified against the actual medium, temperature, pressure, concentration, approvals and product construction.

2. VALVE & CONNECTION STANDARDS

Requirement	British / European	American / International
Gate Valves	BS EN 1171; BS EN 1074-2 / BS 5163 for waterworks as applicable	API 600 / API 602; AWWA C509 / C515 as applicable
Butterfly Valves	BS EN 593	API 609; AWWA C504 where applicable
Check Valves	BS EN 1074-3 / applicable product standard	Applicable API / AWWA standard
Ball Valves	BS EN ISO 17292	API 608
Globe Valves	BS EN 13709	API 623 as applicable
Face-to-Face	BS EN 558	ASME B16.10
Steel Flanges	BS EN 1092-1	ASME B16.5 / B16.47
Cast / Ductile Iron Flanges	BS EN 1092-2	ASME B16.1 / B16.42 as applicable
Valve Testing	BS EN 12266-1	API 598
Actuator Interface	ISO 5211	ISO 5211
BSPP	BS EN ISO 228-1	-
BSPT	BS EN 10226-1 / ISO 7-1	-
NPT	-	ASME B1.20.1

Grooved Connections	-	AWWA C606 where applicable
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3. VALVE SELECTION GUIDE

Function / Application	Recommended Valve Type	Engineering Note
On/Off isolation - water networks	Gate Valve / Butterfly Valve	Select according to size, pressure, space and operating frequency
Frequent compact isolation	Butterfly Valve	Low weight and compact face-to-face
Flow regulation / throttling	Globe / Control Valve	Do not use a standard gate valve as a throttling valve
Non-return protection	Check Valve	Select swing, dual-plate or other design according to system dynamics
Hydronic balancing	DRV / Balancing Valve	Commission using design flow and differential pressure
Pressure-independent flow control	PICV / BICV	Verify design flow and available differential pressure
Debris protection	Y-Strainer / Suction Diffuser	Maintain screen access and clean after flushing
Air removal	Automatic Air Vent	Install at appropriate high points / air collection locations
Water-hammer mitigation	Water Hammer Arrestor	Select and locate according to system dynamics
Vibration / movement isolation	Rubber Expansion Joint	Requires correct anchors, guides and pipe supports

Final selection must consider medium, DN, PN/Class, temperature, flow, differential pressure, materials, connection type, approvals and project specification.

4. FLOW, Kv / Cv & PRESSURE REFERENCE

- Kv is the metric flow coefficient: water flow in m³/h at approximately 1 bar pressure drop under defined reference conditions.
- Cv is the US customary flow coefficient: water flow in US gpm at 1 psi pressure drop under defined reference conditions.
- For water-like fluids, flow varies approximately with the square root of differential pressure. Use the product's certified Kv/Cv data for sizing.
- Do not size balancing, PICV/BICV or control valves solely by pipe diameter; verify design flow, pressure drop and controllability.
- PN and ASME Class are different rating systems and shall not be treated as direct numerical equivalents.
- Pressure-temperature capability may be limited by the body material, seat, elastomer, packing, connection or product design.

Useful Unit	Reference
1 bar	100 kPa = 0.1 MPa ≈ 14.504 psi
1 MPa	10 bar
1 m ³ /h	≈ 4.403 US gpm
1 US gpm	≈ 0.2271 m ³ /h
Temperature	°F = (°C × 9/5) + 32

5. GENERAL INSTALLATION & TIGHTENING GUIDE

Flanged Valves

- Ensure mating flanges are clean, parallel, concentric and correctly aligned.
- Support the pipeline independently; do not transfer pipe weight or misalignment loads to the valve.
- Centre the gasket and install all bolts finger-tight before final tightening.
- Tighten progressively in a cross/star pattern using multiple passes, typically about 30% → 60% → 100% of the specified final torque, followed by a verification pass.
- Final torque is product/project specific and depends on flange, gasket, bolt size/grade, lubrication and service conditions.
- Never use flange bolts to pull misaligned pipework into position.

Bronze, Brass & DZR Threaded Valves

- Verify BSPP, BSPT or NPT thread compatibility before assembly.
- Clean threads and apply compatible thread sealant to the male thread where applicable.
- Engage carefully by hand; never use a wrench to overcome cross-threading.
- Apply the wrench to the valve end immediately adjacent to the joint being tightened; counter-hold the mating pipe/fitting where required.
- Do not transmit installation torque through the entire valve body.
- Do not use an arbitrary fixed number of turns. Final engagement depends on size, thread form, tolerance, sealing method and materials.
- Never continue tightening solely to obtain a preferred valve orientation.
- Excessive tightening can cause thread damage, deformation, leakage or body cracking.

6. COMMISSIONING GUIDE

General

- Flush the system and remove construction debris before final commissioning.
- Vent trapped air and clean strainers after initial flushing.
- Pressurise gradually and inspect all joints for leakage.
- Verify flow direction, valve travel and accessibility.

Balancing Valves / DRV

- Confirm design flow and valve size.
- Measure differential pressure using the test points.
- Adjust to the required flow, lock the setting where provided, and record the final commissioning value.
- Use product-specific straight-pipe requirements where stated; do not apply generic distances to every valve.

BICV / PICV

- Verify design flow and the required operating differential-pressure range.
- Protect the regulating mechanism from debris during flushing.
- Clean upstream strainers, preset the required flow, commission the actuator and verify control signal/stroke.
- Measure and record final operating conditions.

FCU Hook-Up Kits

- Verify coil inlet/outlet, hose routing, valve orientation and actuator specification.
- Flexible hoses must not be twisted, kinked, sharply bent or used to correct major pipe misalignment.
- Flush, vent, clean the strainer, preset the flow-control valve and leak-test all joints.

7. MAINTENANCE & TROUBLESHOOTING

Symptom	Possible Cause	Recommended Check
Cracked bronze/brass body	Excessive torque / incorrect wrench position / misalignment	Inspect thread engagement, wrench marks and pipe alignment
Thread leakage	Wrong thread type, damaged thread or sealing issue	Verify BSPP/BSPT/NPT compatibility and sealing method
Flanged joint leakage	Misalignment, gasket issue or uneven bolt loading	Check alignment, gasket condition and tightening procedure
Valve difficult to operate	Debris, external pipe load or internal damage	Flush and inspect alignment/valve internals
Low PICV/BICV flow	Blocked strainer, wrong preset or insufficient ΔP	Clean, verify preset and measure differential pressure
Balancing flow incorrect	Dirty system or incorrect setting	Flush, measure and recommission
High strainer ΔP	Blocked screen	Remove and clean screen
Expansion-joint deformation	Poor anchors/guides, torsion or excessive movement	Inspect system restraint and installation geometry
Flexible hose damage	Twist, kink or excessive tension	Correct routing and bend radius

Maintenance frequency shall be determined by service conditions, water quality, operating cycle, system criticality and product-specific instructions.

8. RUBBER EXPANSION JOINT INSTALLATION

- Verify size, PN, temperature, elastomer and allowable axial/lateral/angular movement.
- Ensure adjacent pipework is independently supported, guided and anchored.
- Do not use the joint to correct pipe misalignment.
- Install without uncontrolled torsion, excessive pre-compression or stretching.
- Tighten flange bolts progressively and uniformly.
- Use control units/tie rods where required by the system design.
- Inspect periodically for cracking, bulging, abnormal deformation, leakage and chemical/thermal deterioration.

9. STORAGE & HANDLING

- Store products clean, dry and protected from mechanical damage.
- Keep protective caps on threaded/flanged openings until installation where supplied.
- Protect FBE-coated surfaces from impact and abrasion.
- Protect elastomers from prolonged sunlight, ozone sources, incompatible oils and chemicals.
- Do not lift heavy valves by handwheels, gearboxes or actuators unless specifically designed as lifting points.
- Store actuators and electrical accessories in accordance with their ingress-protection and environmental requirements.

10. WATER HAMMER & AIR MANAGEMENT

- Trapped air can reduce hydraulic performance, cause noise and contribute to unstable operation; air-release devices should be located according to system design.
- Water hammer is a transient pressure phenomenon caused by rapid velocity changes, such as fast valve closure or pump events.
- Water hammer arrestors must be selected and located according to the system's pipe size, flow, pressure and transient characteristics.
- Air vents and water hammer arrestors address different hydraulic problems and are not substitutes for each other.
- System design may also require controlled valve closing times, surge vessels, pressure control, check-valve selection or other surge-mitigation measures.

11. QUALITY, TESTING & CERTIFICATION

- Pressure-containing valves should be tested according to the applicable product and testing standard, such as BS EN 12266-1 or the specified project requirement.
- Typical verification may include shell strength, seat leakage, backseat and pneumatic tests where applicable.
- WRAS or other potable-water approvals apply only to the certified product/material configuration and scope.
- UL/FM, where applicable, should be stated only for the exact listed/approved product.
- Material certificates, coating approvals and test reports should be retained according to project and quality requirements.

12. SYMBOLS & ABBREVIATIONS

Abbreviation	Meaning
DN	Nominal Diameter
PN	Nominal Pressure designation
Kv	Metric flow coefficient
Cv	US customary flow coefficient
ΔP	Differential Pressure
FBE	Fusion Bonded Epoxy
DZR	Dezincification Resistant
EPDM	Ethylene Propylene Diene Monomer

NBR	Nitrile Butadiene Rubber
CR	Chloroprene Rubber / Neoprene
PTFE	Polytetrafluoroethylene
PICV	Pressure Independent Control Valve
BICV	Balanced / pressure-independent control valve designation as defined for the VANTEC product range
DRV	Double Regulating / Balancing Valve
FCU	Fan Coil Unit
BSPP	British Standard Pipe Parallel
BSPT	British Standard Pipe Taper
NPT	National Pipe Taper
WRAS	Water Regulations Approval Scheme

GENERAL ENGINEERING NOTICE

This guide is a general engineering reference. Product-specific VANTEC datasheets, approved drawings, certified material documentation, project specifications and product-specific installation/commissioning instructions take precedence where they provide more specific requirements. Numerical torque, straight-pipe, pressure-temperature, movement and actuator-setting values shall only be published when validated for the particular product model and size.