Manual Isolation Valve (MIV)

Pressure Controlled Isolation (WIP)

Electrically Controlled Isolation (WIE)

Figure 1—MIV with hand-wheel

Figure 2—Isolation valve with pressure WIS type) control and hand-wheel (WIP type)

GENERAL DESCRIPTION

The Y-body and poppet-in-cage design result in a robust valve with a well-supported poppet, which permits throttling at 25 MPa. This allows the valve to be used for pipe filling and flushing. It also provides for slow and gentle opening and closing and thereby eliminates pressure surges (water hammer).

The valve is also available in an angle pattern format.

PURPOSE

The purpose of the Isolation Valve is to isolate flow in the forward flow direction at pressures up to 25 MPa. It can be used as a manual isolation valve with a simple hand-wheel. Alternatively, it may be controlled with high-pressure water or an electric actuator and used as a control valve. For example, because the valve is capable of throttling, it can be used as a pump control valve or pressure sustaining valve. Many other applications and control configurations are possible.

Valves over 50NB are fitted with reverse flow protection and therefore will also isolate in the reverse direction.

Manual, Pressure or Electrically Controlled Isolation Valves

Figure 3--Angle pattern type

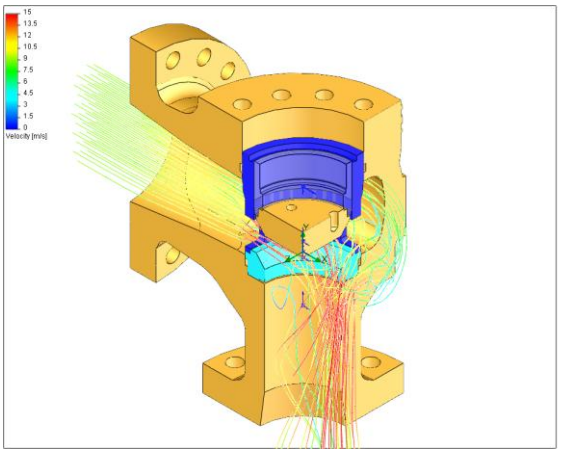

Figure 4—CFD modeling of the flow

FEATURES

- The main valve poppet and seat is our labyrinth grooved type that has proven to be best in "wire drawing" erosion, cavitation and dirt resistance.
- The poppet and seat elements are stainless steel.
- The valves have only one small full pressure working seal.
- Closing of the valve is by a small hand-wheel that can be turned with one hand to shut off at pressures of 25 MPa.
- Control can be manual, rotary electric actuator or by servo cylinder.
- Servo cylinder controlled valves can be manually overridden to close for added safety.

- The internal parts are all of corrosion resistant materials.
- The seals are proven to be the best design that stands up to dynamic water cylinder sealing.
- Maintenance can be done in line requiring access from the hand wheel side only.
- The valves must always be primed before full performance can be achieved.

OPERATION OF THE VALVE

Open the valve by turning the handwheel anticlockwise. Close the valve by turning the handwheel clockwise. Back the handwheel off one-quarter turn at end of stroke.

These valves servo operated valves. The handwheel is connected to a spindle, which raises or lowers a pilot poppet, which allows water into or out of a control chamber above the poppet.

This design means that very low handwheel forces are required to operate the valve, and that the massive seating forces are generated by water pressure. These seating forces ensure effective sealing.

The pilot controlled valves incorporate a control tower which has pistons that move the pilot poppet spindle up to open or down to close. The opening may be done in two stages with two opening piston one of which has limited stroke and pre-opens the valve.

SAFETY

All high-pressure valves must be operated correctly in accordance with the manufacturer's instructions by persons trained and authorized to operate the valves.

When opening valves manually, always just 'crack open' the valve by turning the handwheel a small amount to allow slow filling of the downstream pipeline and for air in the system to be dissolved or displaced. As a rule of thumb, do not raise the pressure faster than 1 MPa per second. When filling long pipelines which are empty or partially full, provision should be made to vent the air at the end of the line.

Always open and close valves slowly to avoid pressure surges (water hammer).

Never open any valve, hose or clamp under pressure. Always assume that a valve may leak and thus cause re-pressurization downstream even if the hand wheel is down. When removing valves or pipe work always ensure that the pressure is bled to atmosphere and keep the system open to atmosphere while undoing the connection bolts. When loosening a flange or clamp it is recommended that that the bolts be slackened, but left on the bolts until the joint is opened. Only then should they be removed completely.

MAINTENANCE

The valve is maintenance free if installed correctly (i.e. within 45° of the upright) in a non-corrosive atmosphere and if the water is non-corrosive and free from solids.

Although the cage design acts as a course strainer, sometimes the valve may weep due to a solid particle (e.g. a glove or a piece of corrosion debris) being trapped between the seat and poppet. This is usually rectified by opening the valve slightly and flushing under throttling conditions to expel the foreign particle out of the valve

TECHNICAL SPECIFICATIONS

The valve is designed to ANSI B16.34.

The valve body is rated to 25 MPa (ANSI Class 1500), but the valve pressure rating is limited by the flanges fitted.

For fatigue life up to 10 million cycles, the valve body pressure rating is reduced to 14 MPa.

Valve size (NB in mm)	**50**	**80**	**100**	**150**	**200**	**250**	**300**
Minimum Pressure (MPa)	2,5	2,5	2,5	2,5	2,5	3	5
Working flow (l/s)--Note 1	15	22	40	64	113	177	255
Handle torque at 20 MPa (Nm)	25	30	30	30	45	45	45
Face-to-face hubs (mm)	245	365	430	510	690	880	1100

Note 1—This flow is the recommended design flow rate for general hydropower reticulation. Higher flow rates higher than those above are possible, but pressure drops will be higher as shown in the table below. Valves can be throttled up to the full differential pressure.

Valve size (NB in mm)	50	80	100	150	200	250	300
Cv (l/s per MPa^0.5)	26	59	100	197	586	977	1152
Cv (USgpm per psi^0,5)	34	78	132	259	772	1286	1516
Flow (l/s)	**Approximate pressure drop (m head)**						
5	3.8	0.7					
10	15.1	2.9	1.0				
15	34.1	6.5	2.3	0.6			
20	61	11.6	4.1	1.1			
22	73	14.0	4.9	1.3			
25	95	18	6.4	1.6			
30	136	26	9.2	2.4			
40	242	46	16.3	4.2	0.5		
50	378	72	25	6.6	0.7		
60	545	104	37	9.5	1.1	0.4	
64	620	118	42	10.8	1.2	0.4	0.3
70	742	142	50	13	1.5	0.5	0.4
80	969	185	65	17	1.9	0.7	0.5
90	1226	234	83	21	2.4	0.9	0.6
100	1514	289	102	26	3.0	1.1	0.8
113	1933	369	130	34	3.8	1.4	1.0
120		416	147	38	4.3	1.5	1.1
140		567	200	52	5.8	2.1	1.5
160		740	261	67	8	2.7	2.0
177		906	319	83	9	3.3	2.4
180		937	330	85	10	3.5	2.5
200		1156	408	105	12	4.3	3.1
220		1399	493	127	14	5.2	3.7
240		1665	587	152	17	6.2	4.4
255		1880	663	171	19	6.9	5.0
260		1954	689	178	20	7.2	5.2
280		2266	799	206	23	8.4	6.0
300		2602	917	237	27	9.6	6.9
320			1043	270	30	10.9	7.9
340			1178	304	34	12.4	8.9
360			1321	341	38	13.8	10.0
380			1471	380	43	15.4	11.1
400			1630	421	47	17.1	12.3

Materials of construction

Valve body	Cast steel--ASTM A216 grade WCC (equiv BS 3100 grade A4)
Flanges	Wrought carbon steel--AISI A105 or as specified
Hubs	As per body
Seals	Ultra-high molecular weight polyethylene polymer
O-rings	Nitrile—70 Shore hardness
Spindle guides	Bronze--ASTM B505C83600 (equiv to SABS 200D or BS 1400 LG2)
Guide pin etc	AISI 304
Seats & poppets	AISI 431 hardened & ground

Corrosion protection & finishes

Externally painted	Standard
Hot dip galvanized	As requested by customer
H/dip galvanized and externally painted	As requested by customer

Hydro Power Equipment is manufactured in South Africa and is represented by Upwey Valve & Engineering Pty Ltd.

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