



Multiple offset Metal seated Butterfly Valve

- Model No. **GVK-3000**Series
- Usable of bi-directional flow with tight shut-off at full rating pressure.
- Metal to Metal seated Butterfly Valve

GVKOREA CO., LTD.

GVK-3000 SERIES

UNIQUE, NEW & WORLD'S FIRST

Linear Lifting STEM/DISC combined with Multiple Offset Design

GENERAL

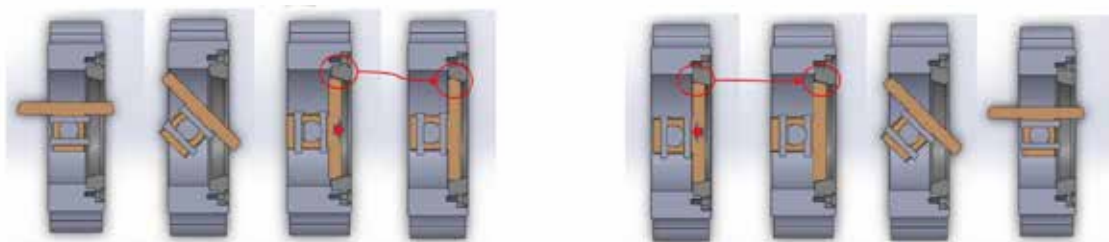
A new Concept of Innovative Design Valve has been successfully developed and it provides extreme high performance when compared to other type of Metal Seated Butterfly Valves including Triple or Quadruple Offset Butterfly Valve or even Metal Seated Ball Valves.



DESIGN CONCEPT

Linear Lifting Stem/Disc combined with Multiple Offset Design is Unique and the First in the world. Unique design allows disc to move linearly perpendicular to body seat against flow direction. It provides **ZERO friction on overall surface of seats** when both open & close of the disc during operation which leads to **less torque** than ever. Also, **Perfect seat sealing** with no seat leakage is well achieved by **flexible adjusting way to push the disc** against body seat when close the disc.

Graphic view to exhibit innovative Linear Lifting Stem/Disc



Disc Open to Close

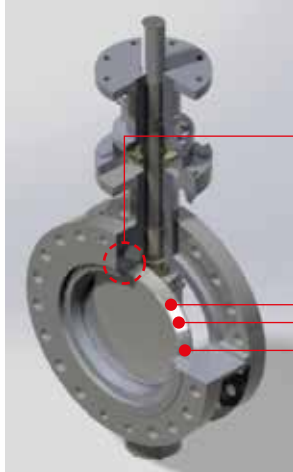
Disc Close to Open

KEY FEATURES

- Unique and Innovative Functional Design
- World's First and New Development
- Multiple Offset Design
- Linear Lifting Stem/Disc Design inducing Zero Friction of Disc & Seat surfaces
- Solid Metal to Metal Seat with hard facing as a basic trim design, Metal to Soft Seat as an option
- Super Fine Seat Face roughness by state-of-the-art machining
- Cutting Edge Seal Technology across the entire seat face
- Replaceable Metal Seat with Retainer
- Origin in South Korea exclusive



KEY FEATURES



- ◆ Retainer Ring features(see below details "A") SEGMNET RING TYPE
Prevents deformation of retainer ring caused by internal pressure of the valve.

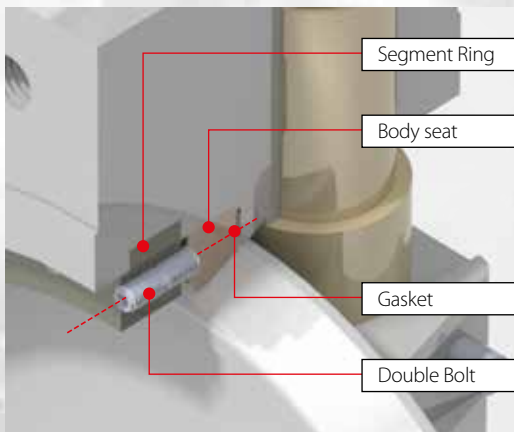
- ◆ Disc & Sealing surface roughness TCC coating or Stelite over ray
After coating, polishing and lapping treatment surface roughness Ra 0.03~0.08 (see below details "B")

- ◆ Disc & Seat surfaces zero friction
Solid Metal to Metal Sealing Available.
Can be used at high pressure by realizing sealing strength according to the working pressure (see below details "C")



- ◆ The valve Disc Position is controlled by upper & lower Bushes
Inserted Into the body
No disc down by valve operation
Can be maintained in initial conditions without change due to valve installation (see below details "D")

◆ Detail "A"



Segment Ring type

- ▶ Centerlines of bolts and gaskets are the same
- ▶ No leakage occurs through gasket because the sealing of gasket does not deteriorate even though any forces are exerted on the retainer ring with the disc due to internal pressure
- ▶ Any bolt loosening is prevented caused by fluid-flow as assembled with double bolt type.

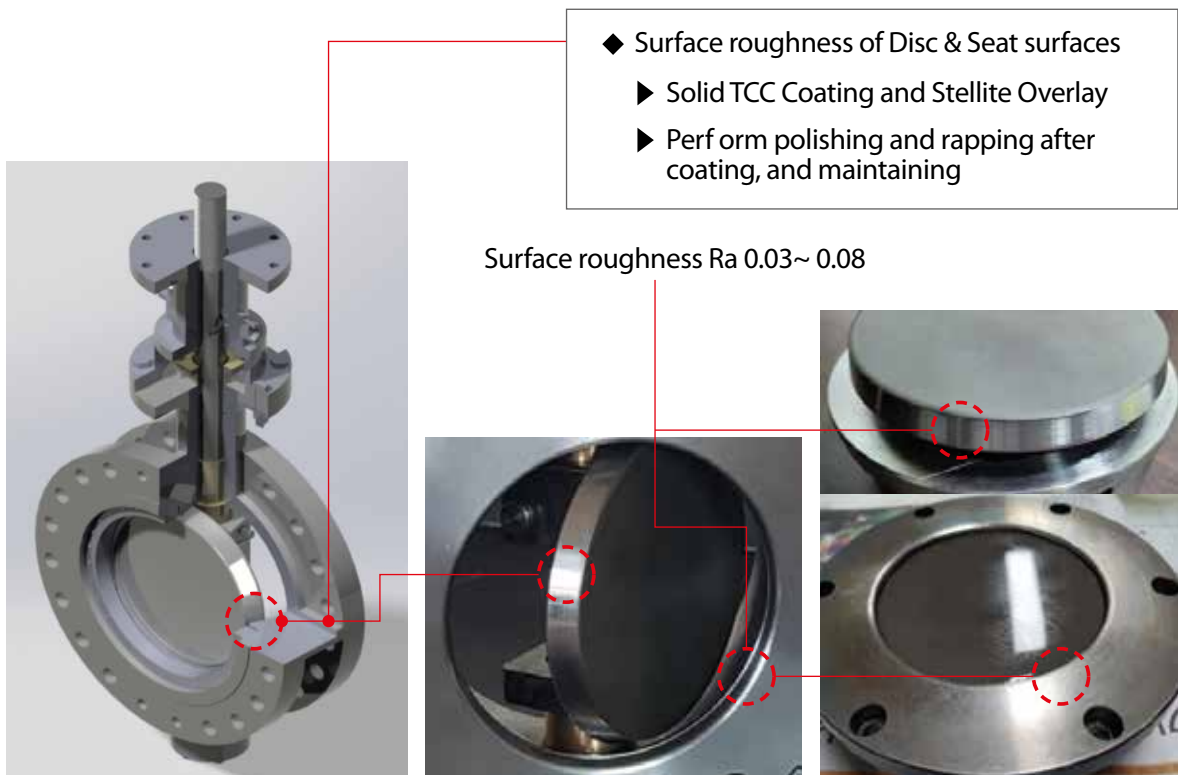
◆ Detail "B"

Multiple offset valve is designed Metal to Metal seat Basically

- ▶ Both Disc & Seat are coated [TCC or Stellite overlay]
 - Increasing wear resistance and durability.Laminated or PTFE seat is available depend on client's requirement.
- ▶ After coating, each Disc & Seat is Polished.
- ▶ One-to-one lapping of Disc & Seat after polishing
 - Seats surface roughness Ra 0.03 ~ 0.08

Triple offset butterfly valve is designed Metal to Laminated seat basically.

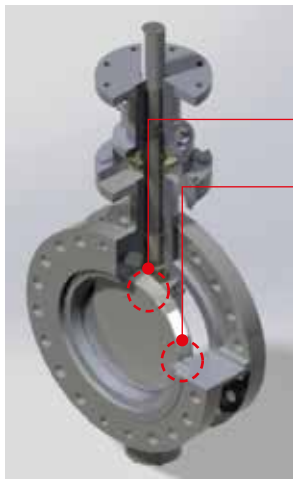
- ▶ Stellite overlayed on only one side of disc or seat.
- ▶ Only machining process after stellite overlay.
 - Seats surface roughness Ra 0.3 ~ 0.5



◆ Detail "C"

Disc & Seat surfaces zero friction

- ▶ Friction free of seating surfaces from before disc rotating
 - Interference is eliminated because valve disc moves in a linear before the Open/Close rotation and then performs with rotation acts.



- ◆ Disc & Seat surfaces zero friction
 - ▶ Solid Metal to Metal Sealing Basically.
 - ▶ Can be used at high pressure by realizing sealing strength according to the working pressure.

Disc rotated angle 0° / offset 4 mm move : Zero Interference.



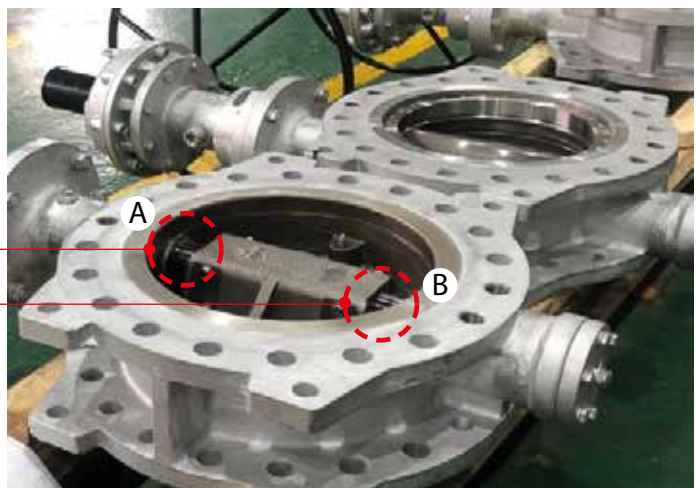
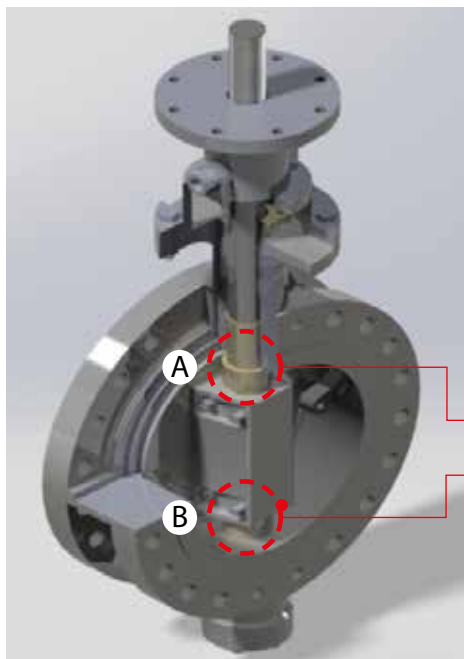
- ▶ Full closed disc
- ▶ Upper side
- ▶ Left side
- ▶ Lower side
- ▶ Right side

- The Triple offset problem is that "zero interference" cannot be implemented by design because it is "impossible to zero cumulative tolerances"
- The multiple offset design is designed to allow the valve to implement the "Zero Interference" of the disc and sealing parts while at the same time absorbing the tolerances generated by the "machining and assembly", thus 100% solving the problems that arise with the existing Triple offset.

◆ Detail "D" [Disc position controlling by Upper & Lower Bush]

- ▶ Both When the valve is operated, thrust is generated according to the direction of rotation. At this time, It is affected by the valve installation direction [Horizontal/Vertical] especially when it is installed Vertically, it is subjected to thrust caused by the disc weight + rotation, the center position of the disc is Changed, and the Sealing point is changed, which often causes leakage.
In a typical valve, the disc weight + rotational thrust generated by the operation is designed to be Controlled by the end cover at the bottom of the valve, and when all of these loads are concentrated On the end cover, it is difficult to design with sufficient strength because of the narrow space in the Structure of butterfly valve.
Therefore, when the valve is operated after installation, a leakage occurs in the sealing part due to a Change in the disc position, or sometimes a leakage occurs in the end cover position.
- ▶ The upper and lower bushes are inserted into the positions of A and B indicated in the below pictures To control the movement of disc caused by load + rotational thrust when the valve is operated, Thereby maintaining perfect sealing ability.

- ▶ The valve disc position is controlled by the Upper and Lower Bush inserted into the Valve body.
- ▶ No disc move by valve operation.
- ▶ Can be maintained in initial conditions without change due to valve installation.



KEY RESULTS

- **Zero Friction** for Seating when disc is either being closed or opened
- **Eliminating enforced seat contact** by linearly lifting stem/disc against body seat
- **Intact Seat Face** against Severe Service
- **Bidirectional Tight shutoff** by way of a Unique Flexible Disc Closing Mechanism
- **No worry of seat damage** compare to laminated seat of triple offset butterfly valve

KEY RESULTS

- Longer Service Life
- Lower costs for Actuation by Zero Friction & Lower Operating Torque
- Cost Saving by Less Trouble
- Cost Saving by Reduced Downtime
- Reliable with long-term operation
- Easy opening even after dormant periods

KEY RESULTS

- Corrosive / Erosive media service including sludge, slurry, oil sand, coal ash, waste water etc
- Severe Service including PP (Propylene Polymer in Vapor/Solid) line, Naptha Cracking line etc
- Cryogenic Service for LNG industry
- Frequent Open / Close of the line
- High temperature Service
- High Pressure Service
- Replaceable with equivalent Ball Valve at lower budget
- Replaceable with current Triple Offset Butterfly Valve
- Replaceable with Soft Seated Valve where abrasive media flows

COMPARISON TABLE 1 (E: Excellent G: Good X: Not Good)

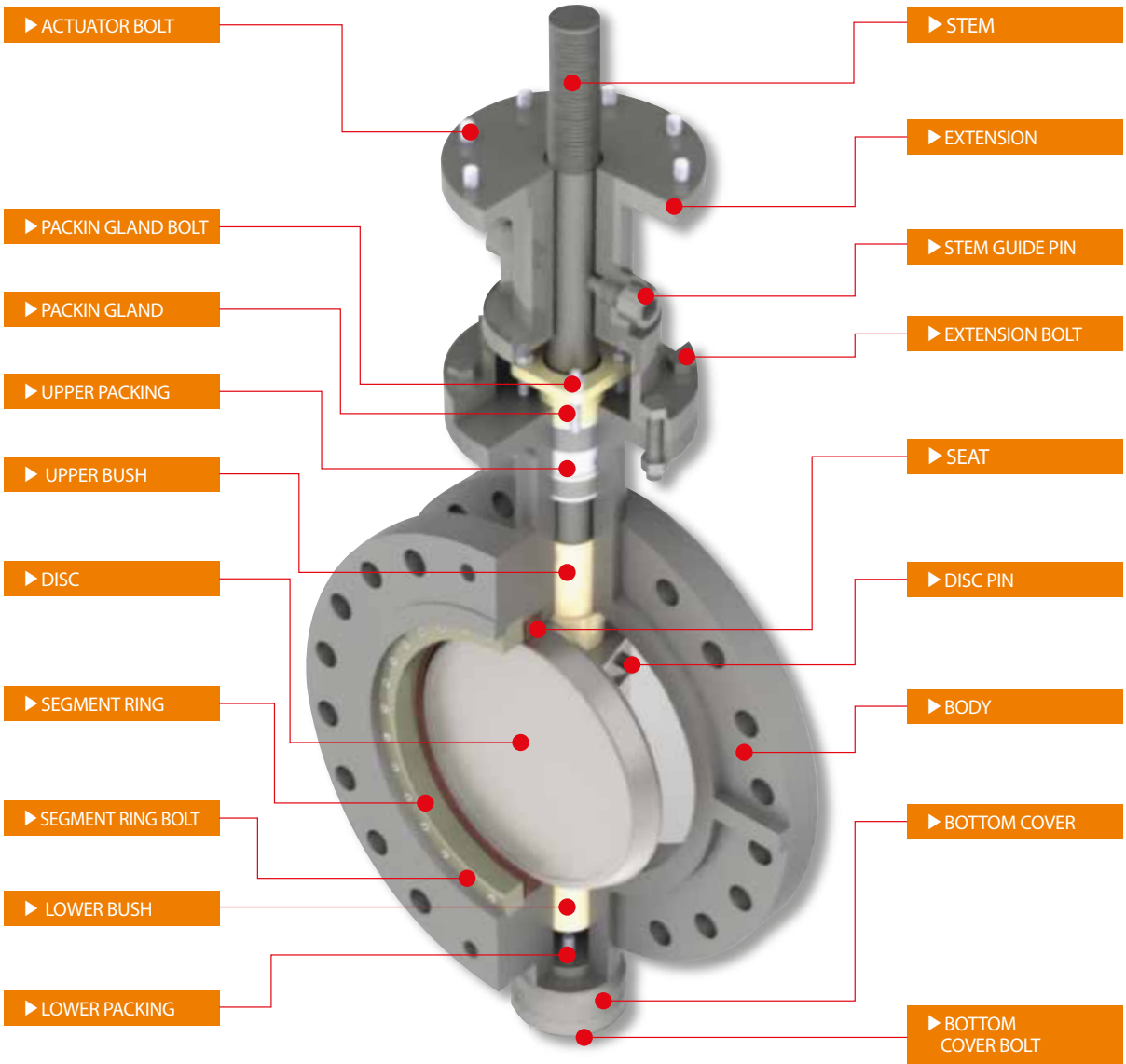
COMPARISON TABLE		GALAXY BUTTERFLY VALVE™						
		TRIPLE OFFSET BUTTERFLY VALVE					CONCENTRIC BUTTERFLY VALVE	
		BALL VALVE			GLOBE VALVE		GATE VALVE	
1	HIGH PRESSURE	E	X	X	E	E	E	900LB & ABOVEE
2	HIGH TEMPERATURE	E	G	X	E	E	E	200~560°C
3	CRYOGENIC SERVICE	E	G	-	E	E	E	-196°C
4	LARGE BORE	E	E	E	X	X	G	ABOVE 2000A
5	FLOW CONTROL	G	G	X	G	E	G	
6	EMERGENCY SHUTOFF	E	E	E	E	E	-	QUICK OPEN/CLOSE
7	SPACE	E	E	E	G	X	X	SMALLER VOLUME
8	WEIGHT	E	E	E	X	X	X	LESS WEIGHT
9	PRICE	E	E	E	X	X	X	COMPETITIVE

COMPARISON TABLE 2

Description	Galaxy [MOBV]	Typical TOBV
Offsets	Multiple [6 axis]	Triple
Stem / Disc Operating	Linear lifting / Rotating	Rotating
Seating	Rotating & Linear	Rotating
Seat material	Solid metal to metal Metal to soft seat also available	Metal to laminated seat (Typical) Metal to Metal seat(Special)
Impacts(seat damage) the on seat against Flow	NO impacts	Yes, impacts on laminated seat
Friction when seating on & off	Zero friction - by linearly lifting stem /disc against body seat	None zero Friction
Seat Shut off at full pressure rate for preferred direction	No seat Leakage under metal to metal seat	Within allowable seat Leakage rate (Laminated seat) Hard to reach(metal to metal seat)
Seat Shut off at full pressure rate for non-preferred direction	No seat Leakage under metal to metal seat	Hard to reach(metal to Laminated seat) Hard to reach(metal to metal seat)
Bi-directional tight shut off	Available by way of a Unique flexible disc closing Mechanism	Hard to achieve
Seat Surface Hard facing Treatment available	Overlay welding [Body seat & Disc seat] TCC, CCC by HVOF	Overlay welding [Body seat or disc seat]
Parts Repair Disc & seat replacement"	Easy & Simple to replace it on site	Hard to replace the disc & Seat on site
Seating Torque[BTO]	Least Torque than ever without Rubbing on the seat	Higher Torque than Galaxy due to unavoidable seat rubbing
Actuator applicable	Pneumatic, Electric & Hydraulic with Quarter turn and Linear *	Pneumatic, Electric & Hydraulic with Quarter turn only
Severe Service application (wear & Tear, erosion)	Suitable with intact metal seat face, linear disc open, seat hard facing	Difficult due to laminated seat, rubbing on the seats
Cryogenic application	Bi-directional tight shut off is achievable	Tight shut off is difficult, especially for non-preferred direction.
Severe Service application (corrosion)	Suitable with TCC, CCC on the seats	TCC, CCC is not applicable
Alternatively replaceable with Ball, Gate, Globe valve	Yes for metal seat	Few
Fire safe	Yes with metal to metal seat design	Yes but difficult with laminated seat
Fluid control Function for control valve	Yes, Similar to Globe valve	Yes but not much preferred in the industry
Budget for the valves in the plant	Lower budget	costly

Note. * Linear lifting Stem/Disc can adopt linear actuator which is smaller in size and volume than rotating actuators.

GVK-3000 SERIES STRUCTURE



DESCRIPTION

- **International Standard:** API609, JIS F7480, ISO5752, JISB2032, BS5155
- **Applicable SIZE Range [Other sizes on request]**
 - Wafer DN 100 ~ DN 500
 - Lug DN 100 ~ DN 800
 - Flange DN 100 ~ DN 2000
- **Applicable Pressure Range Class 125, 150, 300, 600, 900, 1500, 2500LB**
- **Applicable Temperature Range:** -196°C ~ 550°C
- **Applicable Flange standard:**
 - KS/JIS 10K, 16K, 20K, 30K
 - ASME B16.5, ASME B16.1 Class 125, 150, 300, 600, 900, 1500, 2500LB
 - ISO 7005/EN 1092 / DIN 2501 PN6, PN10, PN16, PN25, PN40
- **Operations**
 - Worm & Bevel Gear operation
 - Actuation operation (Pneumatic, Electric and Hydraulic)



PRODUCTION

GVK-3000 SERIES LINEAR LIFTING STEM/DISC

#300-900A, 400A

#150-500A, 400A, 200A, 100A



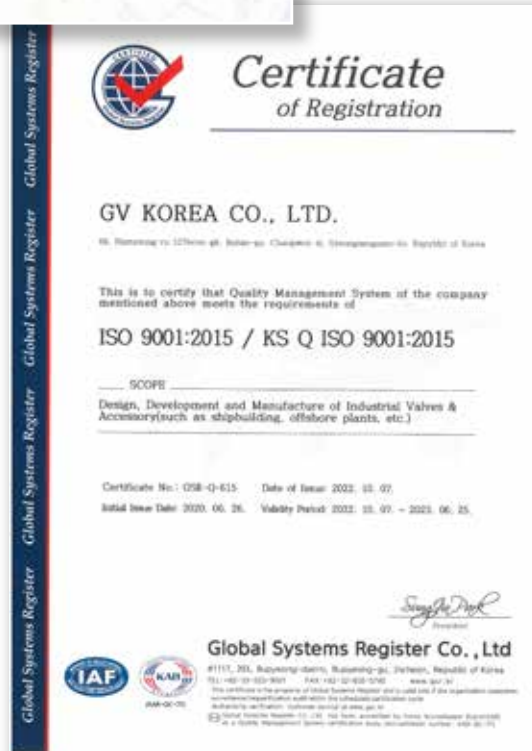
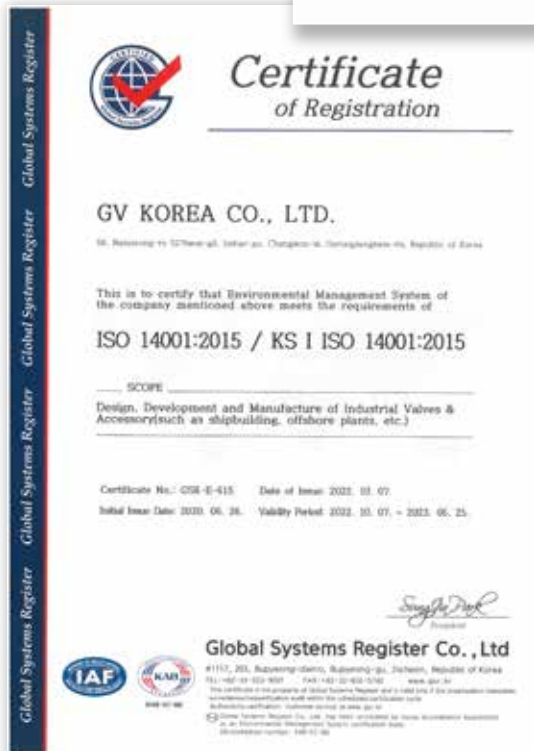
Test Result: Successful Bi-directional zero leakage in conformity with the requirement of API 598

#150-400A Metal Seated CRYOGENIC VALVE



Test Result: Successful Bi-directional zero leakage under Cryogenic test condition in conformity with the requirement of API 598 & BS 6364

CERTIFICATE





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