

Cryogenic Valve for Low Temperature Service



CONTROL
BALL
GLOBE
CHECK
SAFETY
BUTTERFLY
BUNKERING

HISTORY

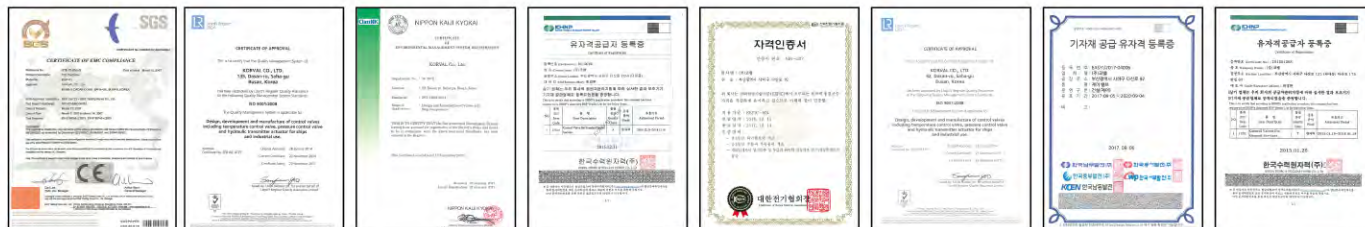


- 1993.04 > KORVAL (KORea VALve) Establishment
- 1994.02 > Supplying Control Valve for ships & engines
- 2009.09 > ERP system construction
- 2015.04 > KEPIC certified
- 2015.11 > The first supplying Cryogenic Cargo & Pipe Line Safety Relief Valve
- 2016.12 > Switch to Cryogenic Valve Item
Supplying Nuclear Control Valve . Shinhanul 1.2 Excavation and 3 other projects. Two thermal
- 2018.02 > power plant projects
- 2008.01 > Supplying GAS Valve with M/E & G/E and 6 other items
- 2018.06 > Supplying all items 100% localized other than the LNG Cryogenic Control Valve.
- 2019.03 > Supplying 4 ships High Pressure Large Size of Cryogenic Control & Safety Relief Valve
to LNG-FSRU Project
- 2020.06 > First supplying in Korea 32 inches of Cryogenic Butterfly valve to the Korea Gas Corporation's
Samcheok base.
- 2020.06 > Supplying all gas & Cryogenic valve for ships & engines

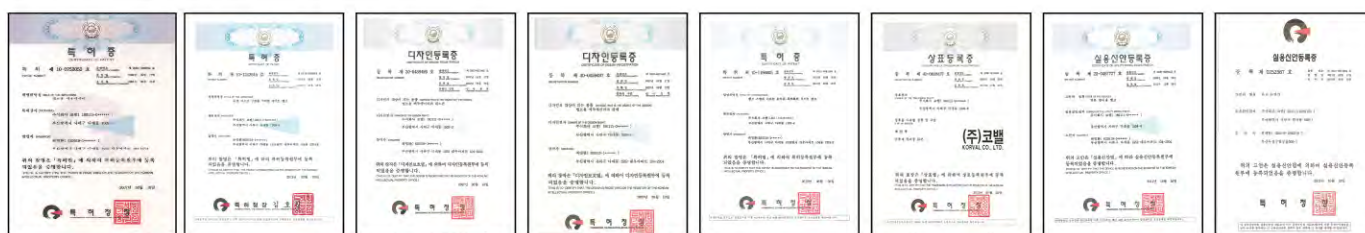


Certificate

QUALITY SYSTEM CERTIFICATES



PATENT CERTIFICATES



CLASSIFICATION CERTIFICATES



ACCREDITATIONS



CRYOGENIC VALVES

VALVES & CONTROLS

PROFESSIONAL VALVE PROVIDER

LEADING 21st CENTURY GLOBAL VALVE INDUSTRY

KORVAL is a control & safety valve manufacture company established in April 1993, aiming for a international valve provider. It is based on innovative valve technologies, know-hows, and valve specialist with skills and experience originated from its over 20 years worldwide valve supply.

With the increasing demand for environment friendly and alternative sources of clean energy, KORVAL supplies low temperature and cryogenic valves such as globe, check, ball, butterfly, safety and control valves for storage, pipeline and transportation of LNG, LPG and cryogenic fluid.



- ◎ Onshore – Steel plant, LNG power plant
- ◎ Marine & Offshore – LNGC, FLNG, FSRU, RV
- ◎ Equipment – Dual Fuel Engine, MEGE Engine, FGS system, PRS System
- ◎ Transportation –LNG terminal, Cargo tank, Bunkering station



LNG RV PJT– Cryogenic ball valve / Butterfly valve

CRYOGENIC VALVE

Korval valves have been developed to meet the most advanced and demanding technological standards, Korval offers a series of cryogenic valves of proven high quality, as demonstrated by technical evidence.

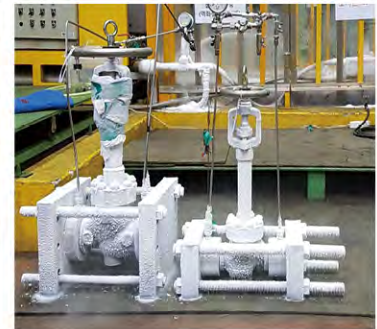
FEATURE

- Expertise in manufacturing and assembling to low temperature specifications.
- In-house specialized testing facilities for seat area and atmospheric leakage.
- Capability to test at specified temperatures down to -196°C
- Extensive familiarity with major end user specification requirements.



RANGE OF PRODUCTION

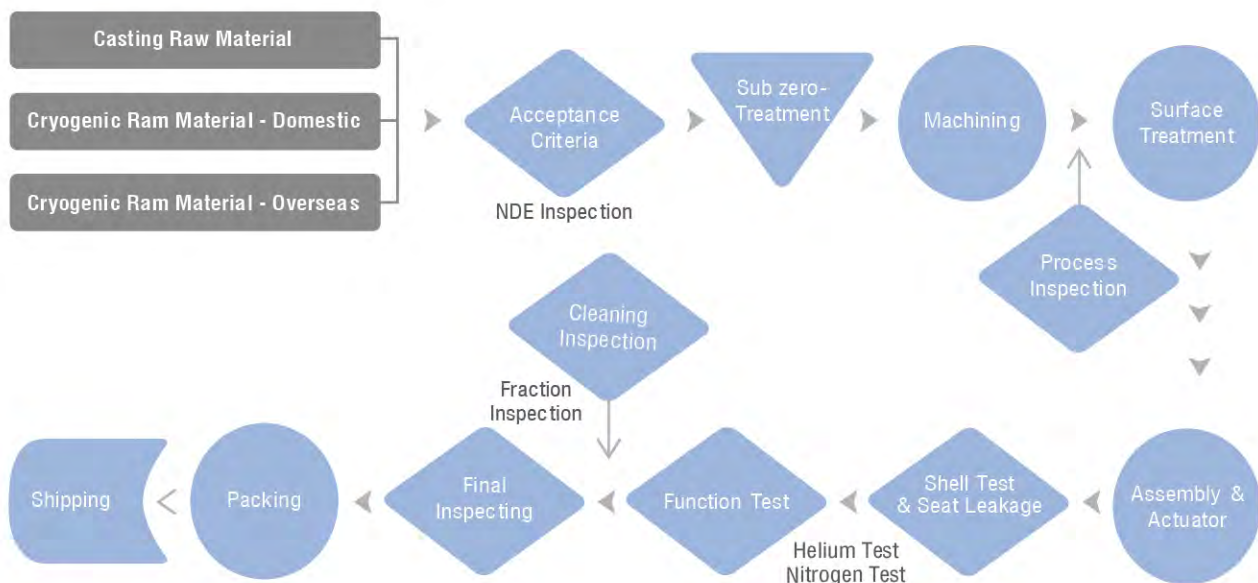
- Pressure Rating : ASME 150~2500
- Size : 1/2" ~ 20"
- Temperature range : -196°C ~ 125°C
- End connection : As specified



MATERIAL

- Austenitic Stainless Steels

Production procedure



CRYOGENIC CONTROL VALVE

Technical standard

- * Valve Design : ASME B16.34, BS6364
- * Face to Face : ASME B16.34, ISA S75.03/15/16
- * End Connection : ASME B16.11, B16.5, B16.25
- * Test : BS6364, ANSI FCI 70.2



Application

MODEL	KCT-CGLD Series	KCT-CBFD Series	KCT-CGLP Series	KCT-CTBN Series
Valve	Globe, Angle, Ball, Butterfly			
Actuator	Pneumatic Cylinder, Pneumatic Diaphragm, Hydraulic			
Rating & Size	Class 150~300, 1/2" ~ 20"		Class 150 ~1500, 1/2" ~ 10"	
	Class 600~2500, 1/2" ~ 12"			
Material	A351 CF8M / CF8 / CF3M / CF3			
Design standard	ASME B16.34, B16.11, B16.25, B16.5			
End connection	Flanged, B/W, S/W			
Service	LNG, LN2, LPG, Helium, Oxygen			
	-196°C ~ 80°C			
Accessories	Positioner, sol valve, I/s, air set, PTM, lock up valve, booster, etc			
Industry Application	Marine(LNG, LPG), LNG storage and pipeline, Steel plant oxgen			



Flange
Cylinder Act.



Welded
Cylinder Act



Flanged
Pneumatic Act.



Welded
Hydraulic Act.



Welded
Pneumatic Act.

CRYOGENIC CONTROL VALVE

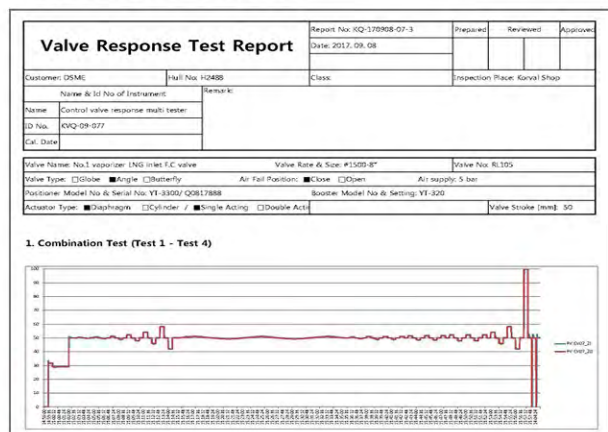
Inspection & Test

Test/Inspection Item	Evaluation
Chemical composition analysis	Relevant ASTM Standards
Mechanical property test	Relevant ASTM Standards
Pressure tests	BS 6364 / ANSI FCI 70.2
Radiographic inspection	ASME B16.34
Wet magnetic particle inspection	
Liquid penetrant inspection	
Low temperature impact test	ASTM A370
Dimension inspection	Relevant Valve Standards.
Visual inspection	MSS SP-55
Emission test	Korval Standard
Cryogenic test	BS 6364

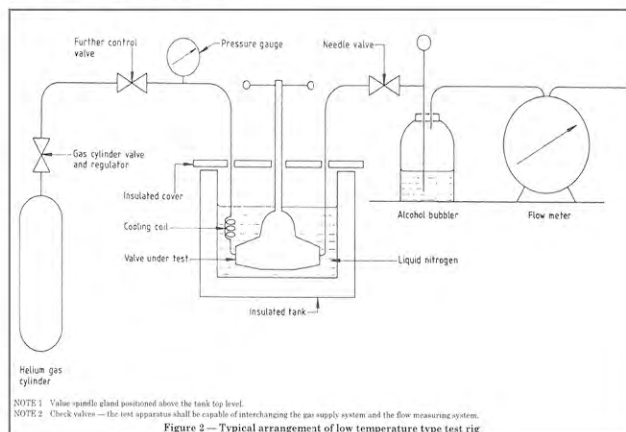


* The test requirements, such as test items, methods and criteria is accordance with agreement bet

* Response Report



* Cryogenic Test



* Flow Rate Test



* FAT Presentation



CRYOGENIC SAFETY RELIEF VALVE

Technical standard

- * Valve Design : New IGC Code, API 520, API 526
- * Face to Face : API 526
- * End Connection: ASME B16.11, B16.5, B16.25
- * Test : BS 6364, API 527

Application



MODEL	KSR-CAGL Series		KSR-CAGO Series		
Type	Conventional		Pilot Operated		
Operation	Spring loaded		Pilot		
Rating & Size	Class150~300, 1/2x1" ~4x6"	Class 600~2500, 1/2x1" ~2x3	Class150, 2x3" ~14X18"	Class150, 2x3" ~8x8"	Class 150, 2x3" ~6x8"
Setting Pressure	1~33 bar	~414bar	0.03~1bar	0.01~0.2bar	1~10 bar
Material	A351 CF8M / CF8 / CF3M / CF3				
Design standard	ASME B16.11, B16.5, B16.25				
End connection	Flanged, Thread				
Service	LNG, LN2, LPG, Oxygen				
	-196°C ~ 80°C				
Industry Application	Marine(LNG, LPG), LNG storage and pipeline, Steel Production Oxygen				



Flanged
Conventional



Flanged
Conventional



Flanged
Pilot operated



Flanged
Pilot operated

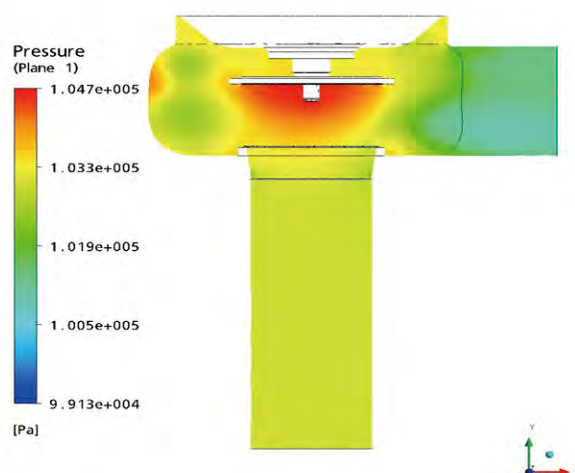
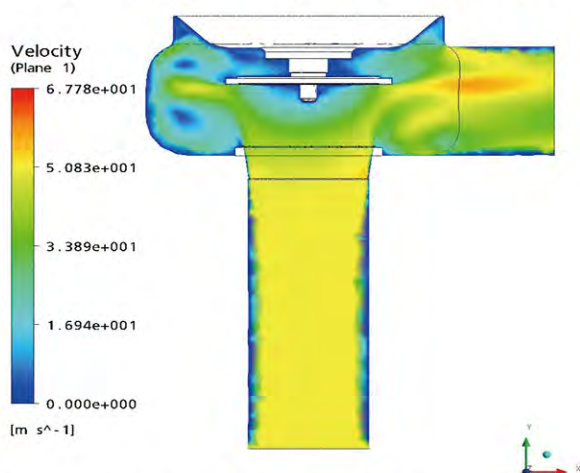
CRYOGENIC SAFETY RELIEF VALVE

Inspection & Test

Test/Inspection Item	Evaluation
International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk	New IGC Code
Pipe Flanges and Flanged Fittings	ASME B16.5
For Sizing, Selection and Installation of Pressure Devices	API 520
Flanged Steel Safety-Relief Valves	API 526
Seat Tightness of Pressure Relief Valves	API 527
Visual inspection	API 598
Standard Marking System for Valves, Fittings, Flanges and Unions	MSS SP-25
Quality Standard for Steel Casting for Valves, Flanges, Fitting and Other Piping Component	MSS SP-55



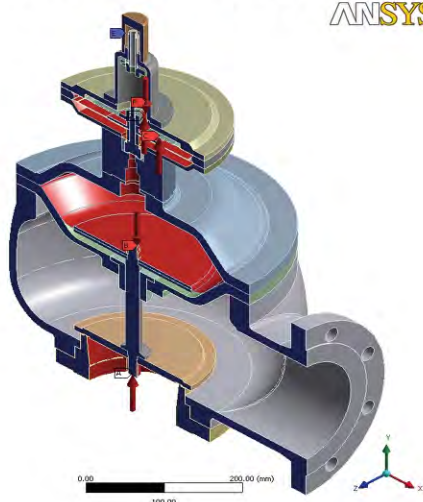
* Flow analysis (6 x 6inch / 0.03bar)



* Heat transmission analysis

Static Structural
Time: 1 s
2011-04-26 空重 1:43

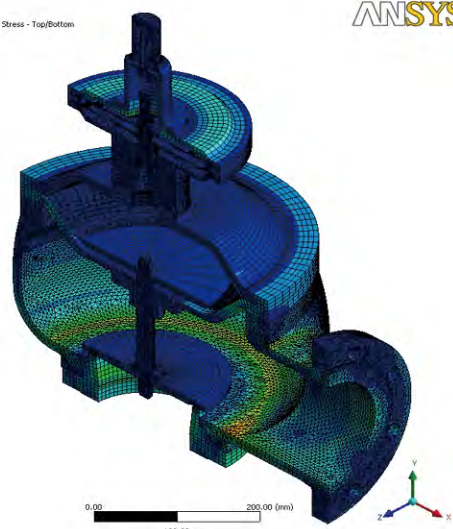
- Pressure: 0. MPa
- Pressure 2: 0. MPa
- Pressure 4: 0. MPa
- Frictionless Support
- Pressure 5: 0. MPa



Equivalent Stress
Type: Equivalent (von-Mises) Stress - Top/Bottom
Unit: MPa

Time: 1
2011-04-26 空重 1:44

182.51 Max
162.23
141.95
121.66
101.4
81.117
60.838
40.559
20.275
6.9265e-5 Min



TANK SAFETY ISOLATION VALVE

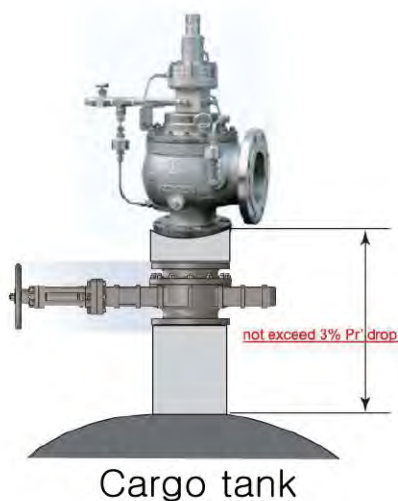
Technical standard

- * Valve Design : ASME B16.34
- * Face to Face : ASME B16.10
- * End Connection : ASME B16.5
- * Test : BS 6364

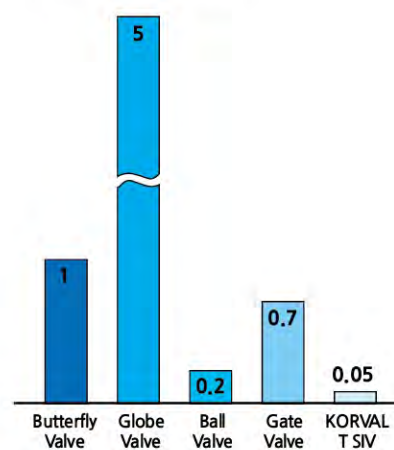


Application

MODEL	KFR-CCKG Series
Operation	Hand wheel
Type	Knief Gate
Rating & Size	Class 150, 4"~14" (TSIV)
Differential Pressure	0.001 Bar
Material	A351 CF8M / CF8 / CF3M / CF3
Design standard	ASME B16.10, B16.34, B 16.5
End connection	Flanged
Service	LNG, LN2, LPG, Liquefied gas, LEG etc.
Industry Application	Cargo tank isolation valve based on New IGC code



Comparison of pressure loss
Butterfly valve=1



CRYOGENIC 3WAY CHANGE OVER VALVE

Technical standard

As of installed for TANK Top, the 3way change over valve allows safety valve to be disassembled and serviced, during running operation. The pressure system continues to be protected against impermissible pressure, and shutdown periods of the plant can be planned independent of the maintenance cycles of the safety valves.

Application

MODEL	KMN-CBFB Series	KMN-CSBM Series	KMN-CBFB Series
Operating	Handle Wheel		
Type	Globe	Ball	Manifold
Rating & Size	Class 150#~300#, 1/2"~12"		
Material	A351 CF8M / CF8 / CF3M / CF3		
End Connection	Flanged		
Service	LNG, LN2, LPG, Liquefied Gas, LEG etc.		
Industry Application	Cargo Tank, LNG Storage (Tank Top) Isolation Valve		



Globe Type



Ball Type



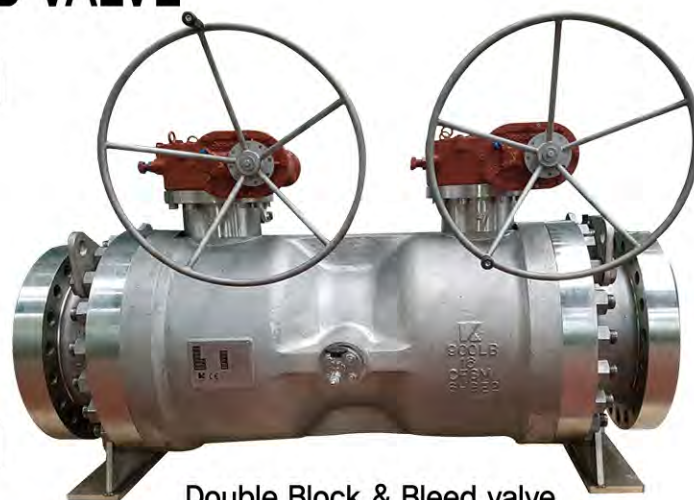
Manifold Type

CRYOGENIC BALL VALVE / DBB VALVE

Technical standard

- * Valve Design : API 6D, BS6364, ASME B16.34
- * Face to Face : ASME B16.10
- * End Connection : ASME B16.11,
B16.5, B16.25
- * Test : BS 6364

Application



Double Block & Bleed valve

MODEL	KMN-CTBM Series		KMN-CTBM Series	
	Lever	Gear Box	Pneumatic Piston	Hydraulic Actuator
Operation	Lever	Gear Box	Pneumatic Piston	Hydraulic Actuator
Type	Top Entry / Side Entry, Full Bore / Reduced Bore / Double Block & Bleed valve			
Rating & Size	Class 150~900, 1/2" ~ 16"			
	Class 1500~2500, 1/2" ~ 4"			
Material	A351 CF8M / CF8 / CF3M / CF3			
Design standard	ASME B16.11, B16.5, B16.25			
End connection	Flanged, B/W, S/W, Screwed			
Service	LNG, LN2, LPG, Oxygen			
	-196°C ~ 80°C			
Industry Application	Marine(LNG, LPG), LNG storage and pipeline, Steel Plant Oxygen			



Flanged
Lever



Welded
Gear box operated



Flanged
Pneumatic Act.



Welded
Hydraulic Act.

CRYOGENIC GLOBE VALVE

Technical standard

- * Valve Design : ASME B16.34, BS6364
- * Face to Face : ASME B16.10
- * End Connection : ASME B16.11, B16.5 B16.25
- * Test : BS 6364

Application



MODEL	KMN-CGLM Series	KMN-CGCM Series
Type	Regular	SDNR
Rating & Size	Class 150~300, 1/2" ~ 20"	
	Class 600, 1/2" ~ 12"	
	Class 900~2500, 1/2" ~ 4"	
Material	A351 CF8M / CF8 / CF3M / CF3	
Design standard	ASME B16.11, B16.5 B16.25	
End connection	Flanged, B/W, S/W, Thread	
Service	LNG, LN2, LPG, Oxygen	
	-196°C ~ 80°C	
Industry Application	Marine(LNG, LPG), LNG storage and pipeline	
Operation	Manual Handle	



Flanged
Manual



Welded
Manual



Welded
Manual



Welded - Flanged
Manual



Welded
SDNR, Manual

CRYOGENIC BUTTERFLY VALVE

Technical standard

- * Valve Design : API609, BS6364
- * Face to Face : API609, ASME B16.10
- * End Connection : ASME B16.11, B16.5, B16.25
- * Test : BS 6364



Application

Model	KMN-CBFB Series	KMN-CBFD Series
Operation	Gear Box	Pneumatic Diaphragm
Type	Double Offset, Triple Offset	
Rating & Size	Class 150~300, 3" ~ 20 "	
Material	A351 CF8M / CF8 / CF3M / CF3	
Design standard	ASME B16.11, B16.5, B16.25	
End connection	Flanged, B/W	
Service	LNG, LN2, LPG, Oxygen	
	-196°C ~ 80°C	
Industry application	Marine(LNG, LPG), LNG storage and pipeline	



Flanged
Gear Operated



Welded
Manual



Flanged
Pneumatic Act



Flanged
Pneumatic Act

CRYOGENIC CHECK VALVE

Technical standard

- * Valve Design : ASME B16.34, API 6D
- * Face to Face : ASME B16.10
- * End Connection : ASME B16.11, B16.5, B16.25
- * Test : BS 6364



Application

MODEL	KFR-CCKG Series	KEG-CKX Series	KFR-CCKLG Series
Type	Swing Check	Pan check	Lift Check
Rating & Size	Class 150~600, 1/2" ~ 12"		
Material	A351 CF8M / CF8 / CF3M / CF3		
Design standard	ASME B16.11, B16.5, B16.25		
End connection	Flanged, B/W		
Service	LNG, LN2, LPG, Helium, Oxygen		
	-196°C ~ 80°C		
Industry Application	Marine(LNG, LPG), LNG storage and pipeline		



Welded
SWING Check



5K 200A
Pan Check



LIFT Check
welded

BREAKAWAY FOR EMERGENCY BUNKERING

Technical standard

Cryogenic break away couplings are safety couplings. It is been used to prevent disconnecting accident in bunkering station for LPG, Butane, Propane and Blends, Co2, DME, LNG.



QC/DC

Application

MODEL	KBC- CCP Series	KBC- CAD Series	KBC- CCP Series
Name	Coupler	Breakaway Coupling	Adapter
Rating & Size	Class 300, 1~6"		
Material	A351 CF8M / CF8 / CF3M / CF3		
End connection	NPT Thead, EN 1092, ANSI Flange		
Service	LNG, LN2, LPG, Liquefied gas, LEG etc.		
Industry application	Fuel bunkering, Vapor recovery lines Container discharge, bunkering and tank vessels		



Adapter



Breakaway Coupling (ERC)



GAS VALVE TRAIN (GVT)

Technical standard

- * GVT is placed Fuel Gas Supply System(FGSS) and ME-GI engine.
- * It is connected to a nitrogen source which is used to purge the exhaust system in case of shut down.
- * The main functionality of GVT is to direct the natural gas evenly to the ME-GI engine or the exhaust.

Application

MODEL	KGVT-25	KGVT-26
Model type	Single type	Double type
Design Pressure Methane block	400 Bar	
Design Pressure Nitrogen block	200 Bar	
Nominal Working Pressure	320 Bar	
Media Temperature	-40°C ~ 60°C	
Fluid	Methane and Nitrogen	
Design Flow	5300kg/h, Methane	
Vibration	Considered	
Main Connection	150# 2" x 150# 2"	
Protection Degree(IEC 60529)	IP65	
Pressure Transmitter	Methane	4~20mA, 10~30VDC, 0~400 Bar
	Nitrogen	4~20mA, 10~30VDC, 0~16 Bar
	Air	4~20mA, 10~30VDC, 0~16 Bar
Temperature Transmitter	4~20mA, 10~30VDC, -50°C ~ 10 0°C	

BUREAU VERITAS		Marine & Offshore Division	
		Certificate number: 10338PSN15	
		www.veristar.com	
CERTIFICATE FOR GAS VALVE UNIT			
Manufacturer	: KORVAL CO., LTD. (BUSAN - KOR)		
Work's ref N°	: STOCK		
Requirements	: Bureau Veritas Rules for the Classification of Steel Ships (Jan. 2015)		
Product description	: GAS VALVE TRAIN		
Design review	: Reference(s) : N.A.		
Quantity	: 1 set		
Module no.	: KGVT-25		
Module Type	: GAS VALVE TRAIN (GVT) / KGVT-25		
Design pressure	: 400 bar		
Control pressure	: 8 bar		
Hydrotest pressure	: 600 bar		
Material grade of block	: ASTM A351 CF8M		
Intended for	: MAN Engine, L70ME-GI type		
Consists of	: Main Block 1pc : On-off valve, 2500LB 1" - 9 off, Manual valve, 2500LB 1" - 1 off : Check valve, 2500LB 1" - 5 off, High pres. filter, 2500LB 1" - 2 off : Safety valve, 2500LB P1347, x 1" - 1 off : Transducer - 4 off (press - 4 off / temp - 1 off)		
Enclosures / Remarks :	This certificate is issued by Bureau Veritas as per the above Classification Rules and in compliance with the applicable technical requirements therein.		
Marking	: 10338PSN15		
Last survey	: 16 Oct 2015		Issuance date : 16 Oct 2015
Surveyor	: Hwan Geuk Choi		Office : BV PUSAN
 			
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<small>The Electronic Version is available at: http://www.veristar.com/veristarweb/ep/certificate/pp/10338PSN15 BV Mod. AC E 677a February 2009 This certificate consists of 1 page(s)</small>			

Gas Valve Train for Main Engine



GAS VALVE UNIT (GVU)

Technical standard

- * GVU is also important for safety related functions.
- * It is a module located between LNG storage system and engine.
- * Each GVU is required for each engine for operation.
- * It is pressure regulating unit of valve to engine based on engine load.
- * It regulates gas pressure with charge air pressure.
- * Gas admission valve can only be operated with a moderate pressure gap between gas pressure and charge air pressure.

Application

MODEL	KGVU-50
Rating & Size(in/out/vent)	Class 150, 2" /2" /1"
Design Pressure	16 Bar
Fluid	Methane and Nitrogen
Service Temperature	-20°C ~ 55°C
Design Flow	300kg/h (methane)
Pressure Control	0.5 ~ 10 Bar
Leakage	No Leakage
Main Connection	150# 2" x 150# 2"
Protection Degree(IEC 60529)	IP65
Pressure Transmitter Signal	4~20mA, 10~30VDC, 0~16Bar
Temperature Sensor	RTC, 3 wire, PT100
Flow Meter	24VDC
Solenoid Valve	24VDC, 8.1Watt

Certificate number: 10054PSN15

BUREAU VERITAS
Marine & Offshore
Division

www.veristar.com

**CERTIFICATE
FOR
GAS VALVE UNIT**

Manufacturer: KORVAL CO., LTD. (BUSAN- KOR)
Work's nr of N°: STOCK
Requirements: Bureau Veritas Rules for the Classification of Steel Ships (Jan. 2015)

Product description: GAS VALVE UNIT
Design review: N/A
Quantity: 1 set

Module no.: KGVU-50
Module Type: GAS VALVE UNIT (GVU) / KGVU-50
Working pressure: 16 bar
Control pressure: 8 bar
Intended for: MAN, L28/32DF type engine
Material grade: ASTM A351 CF8M
Hyd test pressure: 24 bar
Consists of: Stock valve, 150LB2 *-2 off
Pressure regulating valve, 150LB 2" *-1 off
Venting valve, 150LB 1" *-3 off

Enclosures / Remarks: _____

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Last survey: 16 Oct 2015
Surveyor: HwanG eukC hoi

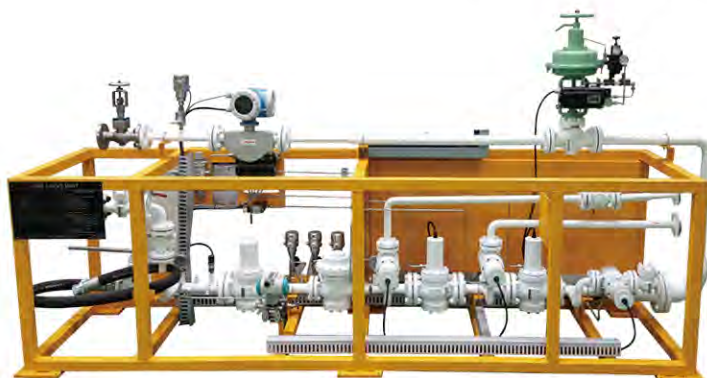
Issuance date: 16 Oct 2015
Office: BV PUSAN




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The electronic version is available at: <http://www.veristar.com/veristar/ps/certificate/10054PSN15.pdf>
BV Mod. A4/E 07/16 February 2009

Gas Valve Unit for Generator Engine



Open Type



Enclosed Type

Factory Layout

Machining Center



Assembly line



Stock



Material warehouse



Material warehouse



Wooden Pattern



Painting shop



Inspection standby



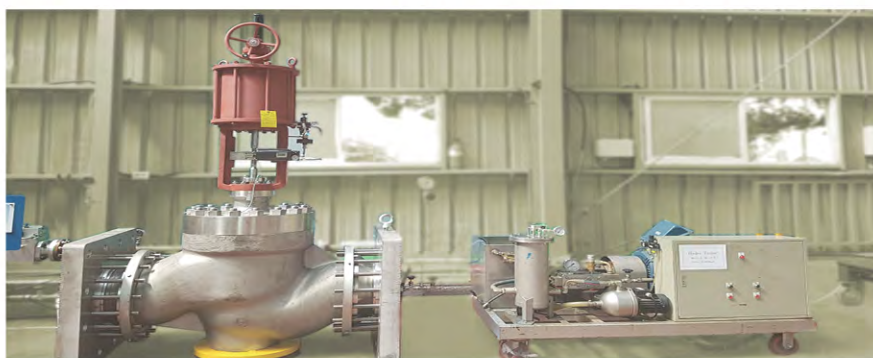
Standby for Inspection



Test Room



Hydro test machine



Measuring



Hardness measuring



Helium detector



PMI



Helium detector



Oscilloscope test



Pressure record



3D Print



Abrasion test



Cryogenic Test Room



LN2 high press test machine

Cryogenic Temperature & Pressure PNL



Laboratory



High temperature Test

Flow rate test

Development



GLOBAL NETWORK

HEADQUARTER

Korea - Busan
T. (82) 51.790.9700
F. (82) 51.790.9799

GLOBAL NETWORK

CONTINENT	COUNTRY	CITY	COMPANY NAME
EUROPE	Germany	Hamburg	Arknoah Ship Management Gmbh
	Greece	Athens	Franman Ltd.
	Netherlands	Rotterdam	Euro-Kytex Engineering BV
	Belgium	Antwerp	Zenta Automation BVBA
	U.K.	Sutton Coldfield	Wolff Oil & Gas Limited
	Turkey	Istanbul	NK-GUNERI Marine System Ltd Sti
ASIA	China	Shanghai	Global Maritime Supply Pty Ltd
	China	Hong Kong	K-TECH
	India	Mumbai	Petrotech Group of Companies
	Indonesia	Jakarta	Jamelca Indo Kaja
	Japan	Osaka	JC Corporation
	Vietnam	Ho Chi Minh	Metallic Engineering (F.E.) Pte Ltd.
	Malaysia	Kuala Lumpur	Prestige Petroleum Sdn Bhd
	Singapore	Singapore	Asia Star Marine Marine Pte LTD
	Australia	Perth	JWJ International Australia Pty.Ltd
	MIDDLE EAST	U.A.E	Dubai
Saudi Arabia		Zeda	Saudi Arabian Engineering Co.,Ltd
Oman		Muskat	Al Ardhi Energy Service LLC
AFRICA	Nigeria	Lagos	Asset Matrix Energy Services Ltd
SOUTH AMERICA	Brazil	Santos, SP	METALOCK
NORTH AMERICA	USA	New York	Goltens New York Corp.
	USA	Houston	STX Service North/Central America

CLIENTS

DOMESTIC MARKET

- DAEWOO SHIPBUILDING & MARINE ENGINEERING(DSME)
- HYUNDAE HEAVY INDUSTRY
- HYUNDAE SAMHO HEAVY INDUSTRY
- HYUNDAE ENGINE
- HYUNDAE MIPO SHIPBUILDING
- SAMSUNG HEAVY INDUSTRY
- DOOSAN HEAVY INDUSTRY
- DOOSAN ENGINE
- STX MARINE & SHIPBUILDING
- STX ENGINE
- HANJIN HEAVY INDUSTRY
- S-OIL
- GS E&C
- Hanhwa Powersystems
- Korea Hydro & Nuclear Power Co., Ltd.

OVERSEAS MARKET

- Excelerate Energy
- Wartsila
- Kobe steel
- KNPC
- Burckhardt Compression
- MITSUBISHI HEAVY INDUSTRY
- NIGC(NATIONAL IRANIAN GAS COMPANY)
- NIOC(NATIONAL IRANIAN OIL COMPANY)
- PETRONAS
- UNIMECH ENGINEERING GROUP (THAILAND) CO.,LTD.
- PT PAL SHIPYARD
- BOHAI SHIPBUILDING HEAVY INDUSTRY
- WHENCHEONG SHIPYARD
- ZHENJIANG CME
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