지인철 주식회사
ZI IN CHEOL Co., Ltd.

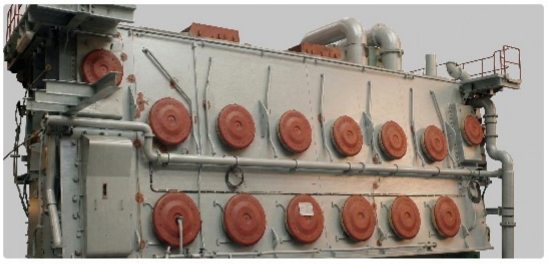
Marine Engine Safety & Flow Control Solutions

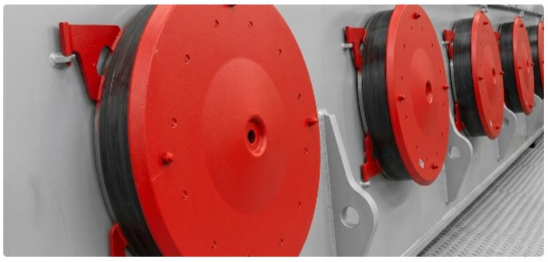
- Explosion Relief Valve for Crankcase **(HWG)**
- Explosion Relief Valve for Intake Manifold of DF Engine **(ZRI)**
- Explosion Relief Valve for Exhaust Pipe of DF Engine **(ZRE)**
- Gas Venting Valve for DF Engine **(ZGV)**
- Flow Control Valve for Industrial

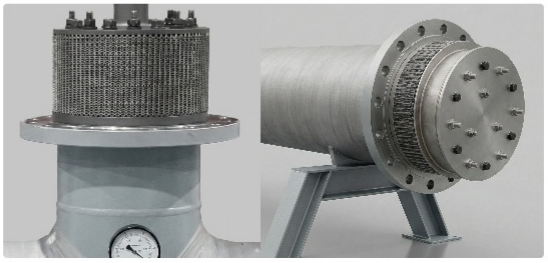
GLOBAL CERTIFICATIONS

DNV · ABS · LR · BUREAU VERITAS · KR KOREAN REGISTER · RINA · ClassNK CHARTING THE FUTURE · CCS CHINA CLASSIFICATION SOCIETY 中国船级社 · RUSSIAN MARITIME REGISTER OF SHIPPING

COMPANY PROFILE







Introduction: Leading the Future of Marine & Industrial Safety

Greetings to our Valued Customers,

Since its establishment in 2004, ZiInCheol Co., Ltd. has dedicated itself exclusively to the specialized manufacturing of valves, ranging from absorption chiller and heater valves to marine engine relief valves. Through unwavering R&D, we have achieved consistent growth, positioning ourselves as a trusted partner in the global industrial sector.

A significant milestone was reached in 2020 with the development of the Relief Valve for Dual Fuel (DF) Engines, a next-generation eco-friendly engine. This innovation has allowed us to play a pivotal role in both industrial advancement and environmental preservation. Our technological excellence is further validated by Type Approvals from major international classification societies.

To ensure the highest standards, we have obtained ISO 9001, ISO 14001, and ISO 45001 certifications. These guarantee that every ZiInCheol product is manufactured through reliable, sustainable, and safe processes, reflecting our commitment to quality, environmental responsibility, and workplace safety.

At ZiInCheol, our first priority is always the customer. We strive to create value that consistently exceeds expectations. By securing world-class product quality and technical expertise, we are leaping forward to become the world's best manufacturing company in our industry. We invite you to join us on this journey toward innovation and excellence.

Thank you.
Lee Chung-yeol
CEO, ZiInCheol Co., Ltd.

HISTORY TIMELINE

2004–2008
FOUNDATION & DEVELOPMENT

2004. 06	●	**HyunWoo Sanki Co., Ltd. Established**
2008. 03	●	**Crankcase Explosion Relief Valve for Marine Engines Developed**
2008. 04	●	**Flame Arrester Unit for Internal Combustion Engines Patented (6 Patents)**
2008. 06	·	Marine Engine Designer Approval (MAN, WCH)
2009. 02/09	·	CRV Classification (MAN, GL, LR, RINA, NK, ABS, DNV)
2009. 09	·	First CRV Delivery to Hyundai Heavy Industries
2009. 11	·	CRV Classification (BV, KR, CCS)

2009–2015
CLASS & GROWTH

2010. 03	·	A.P. Moller-Maersk Approved
2011. 12	·	Self-Inspection Level Company Registered for HHI
2014. 01	·	Partner Registration and Delivery for Doosan Engine
2014. 03	·	Hyundai Heavy Industries APQP Quality Rating 'B'
2015. 04	●	**Renamed to Zi In Cheol Co., Ltd.**
2016. 05	●	**ISO 9001, 14001 Renewal; ISO 45001 Certified**
2019. 02	·	Cryogenic Pipe System & Gasket for Semiconductor Developed
2020. 01	·	Establishment of Corporate Research Institute
2020. 01	·	Technology Innovation SME (INNO-BIZ) Certified
2020. 03	·	Management Innovation SME (MAIN-BIZ) Certified

2016–2020
CERTIFICATION & R&D

2021. 05	●	**High-Temp/Pressure Relief Valve for Gas Engine Localized; DNV Certified**
2022. 01	·	HHI Quality Excellence Partner Award (HiQ)
2022. 02	·	Materials/Parts/Equipment Specialist Certification
2022. 04	·	First High-Temp ERV Delivery to HD Hyundai Heavy Industries
2022. 05	·	Selected as Centennial Small Artisan Enterprise
2022. 06	·	A.P. Moller-Maersk Audit Approved
2022. 10	·	Industry-Academia Partnership (Seoul Technical High School)
2023. 03	·	Hyundai Heavy Industries APQP Quality Rating 'A'
2023. 04	●	**Selected as Innovative Growth Venture Company**
2024. 02/08	·	First High-Temp ERV Delivery to HD Hyundai Mipo, HD Hyundai Samho, Samsung Heavy Industries

2021–2024
INNOVATION & EXPANSION

Explosion Relief Valve For Crankcase (HWG)

A critical safety component installed in the crankcase to ensure vessel integrity. It rapidly relieves internal pressure caused by oil mist or fuel blow-by explosions while preventing external flame release, safeguarding both your crew and the vessel from catastrophic damage.

External View

Internal Structure

Key Benefits

- **Maximum Safety:** Ensures reliable engine operation in extreme conditions.
- **Continuous Operation:** Maintains engine performance even after an explosion.
- **Instant Response:** Rapid pressure relief and immediate closing to prevent secondary explosions.
- **Advanced Flame Control:** Specialized cooling system for superior flame suppression.
- **Superior Durability:** High-grade carbon steel built to withstand explosive pressure.

Efficiency & Maintenance

- **Virtually Maintenance-Free:** Designed for long-term operational cost savings.
- **Plug-and-Play Installation:** Simplified design for quick and easy setup.
- **Quick Restoration:** Fast and easy replacement of flame arresters.
- **Optimized Ventilation:** High-efficiency airflow via precision-engineered devices.

REFERENCES

➢ **IACS**

IACS UR M9 : Crankcase explosion relief valves for crankcases of internal combustion engines.
IACS UR M10 : Protection of internal combustion engines against crankcase
IACS UR M66 : Type Testing Procedure for Crankcase Explosion Relief Valves

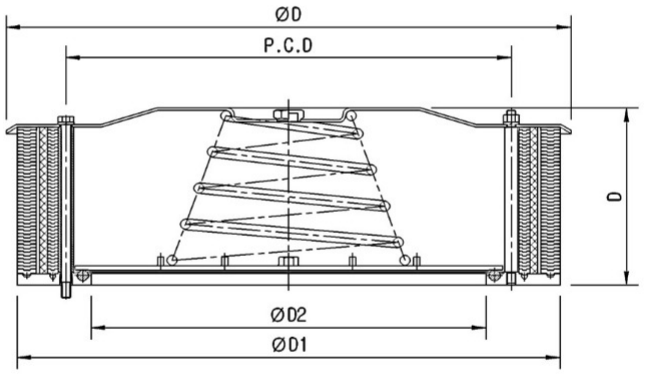
➢ **MAN B&W Quality Controls;**

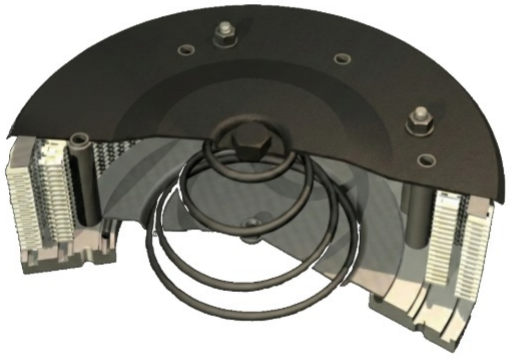
No 0742838-0; Crankcase Relief Valve.
No 0742839-2; Type Approval Test of Crankcase Relief Valve.

➢ **Approved by**

Type tested relief valves regarding 6 models with witnesses attending MAN, GL, LR, HHI in FTZU
Type approval-MAN, Wartsila, GL, LR, BV, DNV, ABS, NK, KR, RINA, CCS

Explosion Relief Valve For Crankcase (HWG)





Model	Outflow Area (cm^2)	ØD1 (mm)	ØD2 (mm)	H (mm)	D (mm)	Mounting Bolt	P.C.D (mm)	Weight (kg)
HWG-735	3904	969	705	318	425	12-M16	795	245
HWG-645	2990	871	617	280	378	12-M16	700	190
HWG-565	2299	784	541	252.5	335	12-M16	615	153
HWG-480	1662	699	460	215	287	8-M16	530	117
HWG-420	1257	36(605)	400	191	251	8-M16	465	93
HWG-345	830	556	325	164	214	6-M16	390	72
HWG-320	731	510	305	152	197.5	6-M12	355	59
HWG-266	499	418	252	108	170	6-M12	302	26
HWG-224	346	371	210	96.6	142	6-M12	255	22
HWG-204	284	351	190	86.6	132.5	6-M12	235	20
HWG-173	201	319	160	78.2	–	6-M10	203	14
HWG-162	177	306	150	71.3	–	6-M10	190.5	13
HWG-122	95	262	110	62.6	–	6-M8	150	9
HWG-098	59	237	87	51.6	–	4-M8	122	7

- Eye bolts from HWG-345
- (H) Means Hinged type explosion relief valve

Explosion Relief Valve For Intake Manifold (ZRI)

ZRI Series

Protects engine integrity by mitigating damage from abnormal intake manifold explosions in DF engines and ensures crew safety by providing absolute containment of flame leakage.

ZRI DESIGN

Feature Highlights

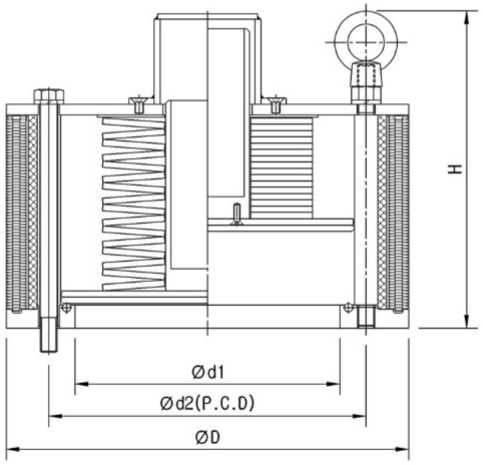
- **Optimized Design**
  High efficiency via CFD and structural analysis.
- **Uninterrupted Operation**
  No shutdown required after multiple explosions.
- **Zero Flame Risk**
  Instant relief with 100% flame suppression.
- **Low Maintenance**
  User-friendly, durable, and virtually maintenance-free.

Technical Specifications

Feature	Specification
Model Name	ZRI-98, ZRI-122, ZRI-173, ZRI-224, ZRI-266
Opening Pressure	3.5 ~ 6.3 bar
Operating Temp.	40 ~ 60℃

** The opening pressure can be adjusted to meet the customer's specific engine requirements.*

Model Dimensions



ZRI Specifications (Unit: mm, kg)

Model	Area (cm²)	Ød1	Ød2	ØD	H	Bolt	Weight
ZRI-98	75	98	138	210	230	4-M12	18
ZRI-122	117	122	165	240	260	6-M12	25
ZRI-173	235	173	225	305	320	6-M16	42
ZRI-224	394	224	280	365	390	8-M16	68
ZRI-266	555	266	335	420	450	8-M16	95

Explosion Relief Valve For Exhaust Pipe (ZRE)

ZRE Series

Specialized safety solution engineered to mitigate explosion risks caused by methane slip in DF engines, featuring an advanced design optimized for high-temperature operating environments.

ZRE DESIGN

Feature Highlights

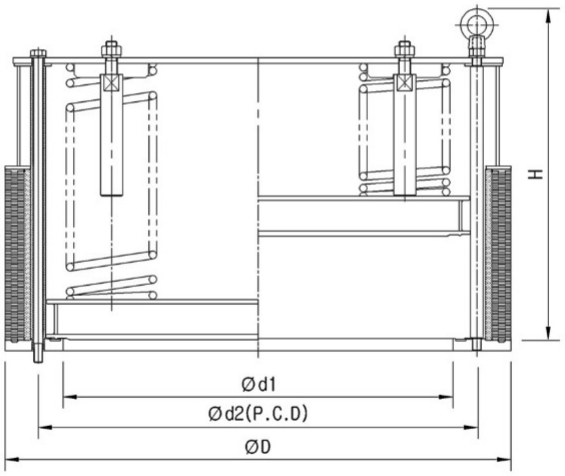
- **Optimized Design**
  High efficiency via CFD and structural analysis.
- **Uninterrupted Operation**
  No shutdown required after multiple explosions.
- **Zero Flame Risk**
  Instant relief with 100% flame suppression.
- **Low Maintenance**
  User-friendly, durable, and virtually maintenance-free.
- **High Heat Resistance**
  Utilizes premium heat-resistant materials and specialized surface treatments for extreme temperature environments.

Technical Specifications

Feature	Specification
Model Name & Size	ZRE-320, ZRE-420, ZRE-565, ZRE-735
Opening Pressure	0.15 ~ 0.22 bar
Opening Temp.	Max. 700°C

** The opening pressure can be adjusted to meet the customer's specific engine requirements.*

Model Dimensions



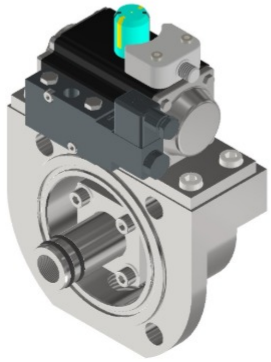
ZRE Specifications (Unit: mm, kg)

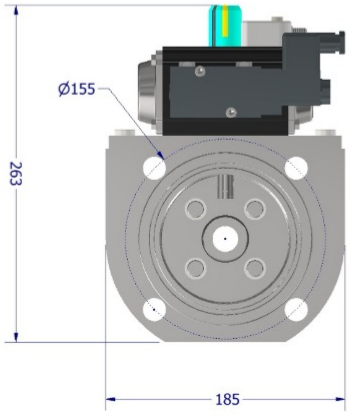
Model	Area (cm^2)	Ød1	Ød2	ØD	H	Bolt	Weight
ZRE-320	731	305	355	470	312	6-M12	63
ZRE-420	1257	400	465	585	388	8-M16	116
ZRE-565	2299	541	615	735	476	12-M16	210
ZRE-735	3904	705	795	915	619	12-M16	355

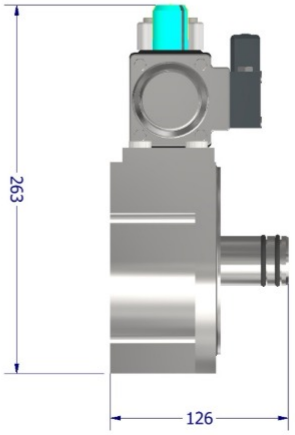
Gas Venting Valve For DF Engine (ZGV)

The Gas Venting Valve applied to DF (Dual Fuel) engines is a critical safety component used when natural gas is utilized as fuel in ships or power plants.

This valve is primarily located within a gas control block, commonly referred to as a GVU (Gas Valve Unit) or FVT (Fuel Valve Train). Its key role is to safely discharge residual gas from the piping system in the event of a system abnormality or during a planned shutdown.







Feature

- **Optimized Configurations**
  Available in both Single and Double Type to meet diverse system requirements and space constraints.
- **Rapid Response & Robustness**
  Combines heavy-duty durability with ultra-fast response speeds to mitigate sudden pressure spikes.
- **Fail-Safe Operation**
  Engineered to trigger the actuator automatically upon power failure, ensuring immediate opening for maximum safety.
- **Superior Sealing Integrity**
  Precision-machined for perfect airtightness and gastightness, eliminating any risk of leakage.

Specification

MEDIUM	NATURAL GAS
DESIGN PRES.	10 bar
DESIGN TEMP	-55 ~ 80℃
TEST PRES.	15 bar
NORMAL POS.	OPEN

Materials List

NO.	PART NAME	MATERIAL
1	VALVE HOUSING	SUS316L
2	VALVE BODY	SUS316L
3	VALVE ROD	SUS316L
4	VALVE COVER	SUS304
5	MOUNTING PLATE	SUS304
6	BALL	SUS316L

Industrial Flow Control Valve

Precision Flow Control Valves for Diverse Industries. Our valves are engineered to provide precise fluid control across a wide range of applications, including industrial boilers, chillers, heaters, and home heating systems like hot water mats. We ensure optimal performance and reliability for every fluid system.

Control Valve for Absorption Refrigerating (Water Heater)


Angle Valve


Damper Valve


Diaphragm Valve


Check Valve


Service Valve


Stem Trap


Flow Setting Valve


Sampling Valve


Purge Tank


Purge Unit


Safety Valve


Float Valve


Check Valve Ass'y

3-Piece Ball Valve

Specification

Temperature	-20 ℃ ~ 200 ℃
Max. Pressure	25Kg/㎠
Max. Vacuum	1 x 10^{-9} atm cc/sec

Other Valve

Oil Control Valve for Oil Boiler Burners

Gas Control Valve for Gas Boiler Burners

Butterfly Valve for Gas Boiler

Dual Quick Coupler for
Water-Circulating Heating Pad

3-Way Valve for
Water-Circulating Heating Pad

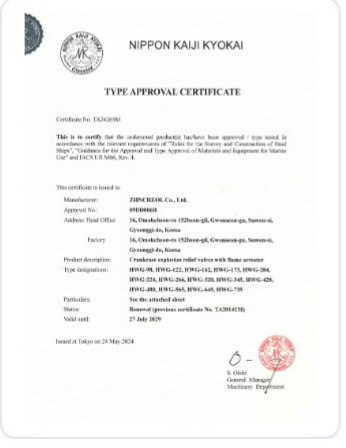
Ass'y Link for Centrifugal Chiller

Sight Glass for Centrifugal Chiller

Supplier

LG Electronics Kiturami Century

Patents & Certifications



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