DNV·GL

Certificate No:
TAP000003T

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Safety Relief Valve for LNG/LPG Service

with type designation(s)
KSC-SH, KSC-DM, KSC-DL, KSC-PH

Issued to
KORVAL CO., LTD.
Busan, Republic of Korea

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition July 2015
DNV GL class programme DNVGL-CP-0186 – Type approval – Valves

Application :

K. factor:	**See Certificate**
Temperature range:	**See Certificate**
Max. working press.:	**See Certificate**

Issued at **Høvik** on **2017-08-23**
This Certificate is valid until **2020-06-30**.
DNV GL local station: **Pusan**

Approval Engineer: **Mehdi Rowshan**

for **DNV GL**

Marianne Spæren Marveng
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Conventional and pilot operated safety relief valves:

Capacity calculation acc. to API RP 520
Strength calculation: ASME B16.34

Material:
Body, bonnet and piston: A351 CF8M
Nozzle, cover, seat and spring: A351 CF8M (SUS316)
Gasket, diaphragm, seat and disk: Teflon

Sizes:

Conventional type safety relief valve

Size (inch) (in x out)	Flange rating (ANSI) (in x out)	K. factor	Type
½ x 1	150LBS x 150 LBS 300LBS x 150LBS	0.897	KSC-SH
1 x 2			
1 ½ x 2			
1 ½ x 3			
2 x 3			
3 x 4			
4 x 6			

Pilot operated safety relief valves

Size (inch) (in x out)	Flange rating (ANSI) (in x out)	K. factor	Type
10 x 12	150LBS x 150LBS	0.889	KSC-DM (with retainer)
12 x 16			
6 x 6	150LBS x 150LBS	0.783	KSC-DL (without retainer)
6 x 8	150LBS x 150LBS	0.857	KSC-PH (with Piston)

Application/Limitation

Design data:

Type	Temperature range	Max. working press
KSC-SH	-196° C to 100° C	1000 KPa.G (10 bar) [3300 KPa.G (33 bar) for 1'' x 2'']
KSC-DM	-196° C to 100° C	100 KPa.G (1 bar)
KSC-DL	-196° C to 100° C	20 KPa.G (0.2 bar)
KSC-PH	-196° C to 100° C	450 KPa.G (4.5 bar)

Type Approval documentation

Tests carried out

Cryogenic test, Leakage Test (ambient temperature), Hydrotest

Production Testing
The following tests (each valve) are to be performed under the supervision by a surveyor of DNV GL:

- Hydraulic test to 1.5 times the maximum allowable pressure setting.
- Checking of set pressure (popping pressure) and reset pressure at room temperature. Set pressure to be sealed.
- Sufficient valve capacity is to be approved for each application.

Certification
Valves with sizes of DN > 100 mm shall be delivered with product certificate, regardless of minimum design temperature. Valves with DN < 100 mm shall be certified by DNV GL product certificate when minimum design temperature is less than -55°C (reference is made to DNV GL Ship Rules Pt.5 Ch.7 Sec.1 Table 7). Otherwise manufacturer's certificate may be accepted.

VL material certificate is required for the body material for valves with DN > 100 mm and design temperature < -55 ºC
Works material certificate is required for the body material:

- for valves with DN > 100 mm and design temperature > -55 ºC.
- for valves with DN < 100 mm regardless of design temperature.

Marking of product

For traceability to this type approval the valves are to be marked as a minimum with:

- Manufacturers name or trade mark
- Valve type designation
- Size
- Maximum design pressure and temperature
- Arrow to indicate direction of flow

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment every second year and before the expiry date of this certificate, to verify that the conditions for the type approval are complied with.
When possible, this assessment may be harmonised with normal surveys for product certification and / or other surveys and audits carried out.

The main elements of the certificate retention survey are:

- Verification of the TA applicant’s production and quality system w.r.t. ensuring continued
- consistent production of the type approved products at the TA applicant’s own premises
- Review of Type Approval documentation and assurance that it is still used as basis for production
- Review of possible changes in design, materials and performance
- Assurance of traceability between manufacturer’s product type marking and Type Approval Certificate.

Renewal should be applied for in writing before the certificate expires.