DNV·GL

Certificate No:
TAP00000MK

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Safety Relief Valve for LNG/LPG Service

with type designation(s)
RP Series

Issued to
Fukui Seisakusho Co., Ltd.
Hirakata-city 27, Japan

is found to comply with
DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV GL class programme DNVGL-CP-0186 – Type approval – Valves

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

K. factor:	**0.877 (RPS type) and 0.743 (RPSL type)**
Temperature range:	**-175ºC to 232ºC (see cert.)**
Max. working press.:	**41.3 MPa and 60 MPa**

This Certificate is valid until **2021-11-09**.

Issued at **Høvik** on **2016-11-10**

for **DNV GL**

DNV GL local station: **Kobe**

Approval Engineer: **Zeinab Sharifi**

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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Job Id:
Certificate No: **TAP00000MK**

Product description

Pilot Operated Safety Relief Valves for LNG/LPG Services. The valve assembly consist of two parts, main valve and pilot vlave. The main valve is designed in different combination of type, size and materials as listed below:

Variations of different types, end connections and sizes for the main valve:

Main valve type	Inlet type	Orifice type	Outlet type	Size (Inlet x Outlet)
RPS (gas use) RPSL (gas or liquid use)	ASME Flange 2500LB Techlok	D (10.1) E (13.4) F (16.8)	ASME Flange 300LB	1" x 2" (casting) 2" x 2" (casting) 2" x 2" (Forging)

Discharge coefficient:

- RPS type: 0.877
- RPSL type: 0.743

Materials for main pressurized parts (valve body, flange, end cover, hub and clamp)

- Austenitic Stainless Steel: A182/SUS- F316/316L
- Stainless steel: A351 – CF3M/CF8M, SCS14, SCS16.

Application/Limitation

Pressure and temperature limits:

Valve size (Inlet x Outlet)	MAWP/Set pressure	Size (Inlet x orifice x outlet)	Min. Working temperature*
1" x 2" (casting)	41.3 MPa	1"xDx2" 1"xEx2" 1"xFx2"	-175ºC
2" x 2" (casting)	60 MPa	2"xDx2" 2"xEx2" 2"xFx2"	-175 ºC
2" x 2" (Forging)			

**Only valves made of austenitic stainless steel with metallic sealing (PTFE+Inconel) are approved for use in low temperature below -55ºC. Above listed min. working temperatures are limited based on the results from submitted cryogenic test reports.*

Derating of maximum allowable working pressure for temperature above ambient shall be according to the design standards, ASME B16.5/ASME B16.34. However, maximum working temperature shall not exceed the limitations given in below table for non-metallic materials:

Working temperature range depending on seat/sealing material:

Material	Temperature range
PTFE + Inconel	-196 to 232 ºC
HNBR	-29 to 160 ºC
EPDM	-45 to 100ºC
FKM	-15 to 232 ºC
Kalrez	-20 to 232 ºC
NBR	-30 to 100ºC
Perfluor	-20 to 120 ºC
VMQ	-50 to 200 ºC

The pilot valve is to be protected by arrangements on board or by stiffeners placed between the pilot and main valve

The pilot valve exhaust is to be guided into the vent system.

Job Id:
Certificate No: **TAP00000MK**

Type Approval documentation

Tests carried out

Hydraulic pressure, leakage test and cryogenic testing.

Production testing

Valves covered by this certificate shall be subject to product tests in presence of a DNV GL surveyor as below (Reference is made to DNV GL ship rules Pt.5 Ch.7 Sec.8 [2.2.2]):

1. Hydrostatic test of the valve body at a pressure equal to 1.5 times the design pressure for all valves.
2. Test of set pressure at ambient temperature.
3. Leak test after reset at 90% of each set pressure at room temperature.
4. Sufficient valve capacity is to be approved for each application.

Documents, signboards etc. which are to accompany each product/delivery:

- Instruction and maintenance manuals
- Surveyors report

PRVs shall be set and sealed by the Society , and recorded by a sealing certificate, including the valves' set pressure, shall be retained on board the ship. The set pressure shall be sealed by the use of a robust non-corrosive wire. (Pt.5 ch.7 Sec.8 [2.2.3])

Certification

All valves covered by this certificate shall be delivered with a DNV product certificate, if the minimum design temperature is below -55°C. Otherwise manufacturer certificate is accepted.

Materials of the valve body are to be delivered with material certificates in accordance with DNV Rules Part 5, Chapter 5 Section 2 Table E1. All of materials with NV or Work certificate have to be supplied from an approved manufacturer of DNV GL for the type and grade of steel being supplied and for the relevant steelmaking and processing route.

Marking of product

For traceability to this type approval each device has to be permanently marked with:

- Manufacturer’s name or trade mark
- Type designation
- Size of inlet and outlet
- Pressure and vacuum setting

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. The scope of the periodical assessment survey, is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the certificate retention survey are:

- Review of Type Approval documentation
- Review of possible changes in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.