

# TYPE APPROVAL CERTIFICATE

## This is to certify:

**That the Safety Relief Valve for LNG/LPG Service**

with type designation(s)  
**HSF-FCA**

Issued to

**Mt. H Control Valves Co., Ltd.**  
**Busan, Republic of Korea**

is found to comply with

**DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers**  
**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:** See certificate  
**Temperature range:** -196°C to 50°C  
**Max. working press.:** 10 bar

This Certificate is valid until **2021-08-31**.

Issued at **Høvik** on **2016-09-01**

for **DNV GL**

DNV GL local station: **Pusan**

Approval Engineer: **Sinisa Sedlan**

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**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.

Job Id: **262.1-003119-4**  
Certificate No: **TAP00000J2**

## Product description

Type designation: HSF-FCA  
Conventional type Safety Relief Valve for LPG/LNG/LEG service

Stainless steel body ASTM A351-CF8M

Sizes:

| VALVE SIZE (inlet x outlet, inches) | Discharge coefficient Kd |
|-------------------------------------|--------------------------|
| 3/4 x 1                             | 0,887                    |
| 1 x 2                               | 0,865                    |
| 1 1/2 x 2                           | 0,873                    |
| 1 1/2 x 2 1/2                       | 0,871                    |
| 1 1/2 x 3                           | 0,857                    |
| 2 x 3                               | 0,866                    |
| 3 x 4                               | 0,853                    |
| 4 x 6                               | 0,701                    |

Capacity calculation acc. to API RP 520

## Application/Limitation

Valves covered by this certificate may be used in LNG/LPG applications under the following design conditions:

Service : Liquefied Gas - Cryogenic Service  
Temperature range : -196 °C to +50 °C  
Max. working pressure : 10 bar  
Sizes and types : As given in Product Description

## Type Approval documentation

### Tests carried out

Flow capacity, ambient and cryogenic test

### 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.
- Auxiliary set and reset pressure.
- Leak test after reset at 90% of each set pressure at room temperature.

## Certification

Valves with sizes 3×4" and 4×6" shall be delivered with product certificate. Other sizes shall be certified by DNV GL 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).

The material used in bodies of valves with sizes 3×4" and 4×6" shall be delivered with VL certificate when the minimum design temperature is less than -55°C; otherwise work certificate is accepted. In any case, material of bodies shall be made at foundries approved by the Society.

## Marking of product

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

- Manufacturers name or trade mark
- Type designation
- Pressure rating

## 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.