

# DET NORSKE VERITAS

## TYPE APPROVAL CERTIFICATE

**CERTIFICATE NO. P-13223**

This Certificate consists of 4 pages

*This is to certify that the*  
**Safety Relief Valve for LNG/LPG Service**  
*with type designation(s)*  
**Pilot-Operated Safety Relief Valve Type F7040, F7050, F8040  
and F8050**

*Manufactured by*  
**Flow Safe Inc.**  
ORCHARD PARK, United States

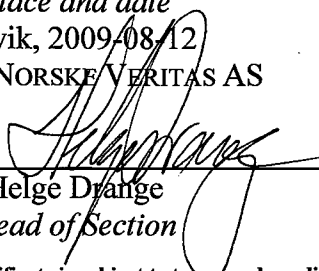
*is found to comply with*  
Det Norske Veritas' Rules for Classification of Ships  
Det Norske Veritas' Standards for Certification 2.9 No. 5-794.40

### *Application*

The safety relief valves are approved for use on cargo tanks and in piping systems for ships  
having class notation "Tanker for Liquefied Gas"

|                      |                                       |
|----------------------|---------------------------------------|
| K. factor:           | F7000: 0.824 and F8000: 0.878         |
| Temperature range:   | Depending on seat material, see cert. |
| Max. working press.: | Depending on type, see cert.          |

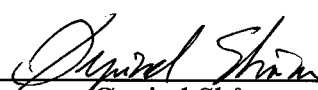
*Place and date*  
Høvik, 2009/08/12  
for DET NORSKE VERITAS AS

  
Helge Drange  
Head of Section



*Local Office*  
DNV New York 

*This Certificate is valid until*  
2010-12-31

  
Øyvind Skåra  
Surveyor

**Notice: 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.**

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



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 File No.: 783.40  
 Job No.: 262.1-005726-2

## Product description

Pilot operated safety relief valve for LPG and LNG

F7040: Full-bore with plastic seat

F7050: Full-bore with elastomer seat

F8040: Restricted (API) bore with plastic seat

F8050: Restricted (API) bore with elastomer seat

Sizes: 1"x2", 1.5"x3", 2"x3", 3"x4", 4"x6", 6"x8", 8"x10"

### Materials:

| Part          | Material   |
|---------------|--|
| Body          | Carbon steel SA-216 WCB/ SA-352 LCB<br>Stainless steel SA-351 CF8M or CF3M |
| Liner         | Stainless steel A743 CF8M  |
| Piston        | Stainless steel 351 CF8M   |
| Seat retainer | Stainless steel 316 SS   |

### Working temperature range depending on seat material:

| Material           | Temperature                         |
|--------------------|-------------------------------------|
| Buna-N             | -30 °F to 275 °F (-34 °C to 135 °C) |
| Viton              | -30 °F to 400 °F (-34 °C to 204 °C) |
| Ethylene Propylene | -65 °F to 325 °F (-54 °C to 162 °C) |
| Polyurethane       | -60 °F to 225 °F (-51 °C to 107 °C) |
| PTFE/Teflon        | -67 °F to 400 °F (-55 °C to 204 °C) |
| PCTFE/Kel-F        | -67 °F to 400 °F (-55 °C to 204 °C) |
| Vespel             | -67 °F to 500 °F (-55 °C to 260 °C) |
| PEEK               | 0 °F to 525 °F (-18 °C to 274 °C)   |
| Perlast G60A       | -60 °F to 500 °F (-51 °C to 260 °C) |

## Application/Limitation

| VALVE SIZE (NPS)<br>(Inlet x Outlet) | MAWP and Set pressures<br>(psig) |
|--------------------------------------|----------------------------------|
| 1 X 2                                | 6000                             |
| 1½ X 3                               | 6000                             |
| 2 X 3                                | 6000                             |
| 3 X 4                                | 3705                             |
| 4 X 6                                | 3705                             |
| 6 X 8                                | 1480                             |
| 8 X 10                               | 1480                             |



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|         |     |
|---------|-----|
| 12 X 16 | 285 |
|---------|-----|

Each valve is to be certified by Det Norske Veritas' Surveyor

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

- Instruction and maintenance manuals
- Surveyors report

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

- Hydraulic pressure test of each valve body to 1.5 times the design pressure
- Verification of the set pressure (popping pressure) and reset pressure at room temperature
- Auxiliary set and reset pressure
- Leakage test after reset at 90% of each set pressure at room temperature.

Sufficient valve capacity is to be approved for each application.

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.

Each valve is to be equipped with a back flow preventer.

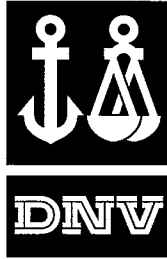
Materials of the valve body is to be delivered with material certificates in accordance with DNV Rules Part 5, Chapter 5 Section 2.

### **Type Approval documentation**

Manufacturer's product catalogue "Bulletin: F78K1105"  
Manufacturer's design analysis dated 2006-07-15 and 2007-08-17  
Manufacturer's design drawings:

- Body casting 07-1229 dated 1995-11-20
- Body machining 07-4240F dated 2005-09-22
- Body machining 07-4241F dated 2006-03-09
- F7100 dated 2005-05-31
- F7200 dated 2005-06-01
- F7300 dated 2005-06-01
- F7500 dated 2008-06-05
- F8500 dated 2008-06-05

Manufacturer's test reports No: 8752 dated 2006-11-07, witnessed by DNV



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### Tests carried out

Hydraulic pressure and leakage test.

### Marking of product

For traceability to this Type Approval each valve is to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Size
- Maximum allowable relief valve setting

### Certificate retention survey

For retention of the Type Approval, a DNV Surveyor shall perform a survey - every second year and before the expiry date of this certificate - to verify that the conditions for the type approval are complied with.

END OF CERTIFICATE