TYPE APPROVAL CERTIFICATE

Certificate no.:
TAP00001ZZ
Revision No:
1

This is to certify:

that the Safety Relief Valve for LNG/LPG Service

with type designation(s)
Spring Loaded Safety Valves Series 3000 & 4000, Low Pressure Pilot Operated Safety Valves Series 9010, Pilot Operated Safety Valves Series 9000

issued to
TAI MILANO S.p.A.
Milano, MI, Italy

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

Application:

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

Type:	K. factor:	Temperature range:	Max. working press.:
Spring Loaded Safety Valves Series 3000 & 4000	**See Page 2**	**See Page 3**	**See Page 2 & 3**
Low Pressure Pilot Operated Safety Valves Series 9010	**See Page 2**	**See Page 3**	**See Page 2 & 3**
Pilot Operated Safety Valves Series 9000	**See Page 2**	**See Page 3**	**See Page 2 & 3**

Issued at **Høvik** on

This Certificate is valid until **2030-01-15**.
DNV local unit: **Italy/Malta CMC**

Approval Engineer: **Maheshraja Venkatesan**

for **DNV**

Digitally Signed By:
Bosman van der Merwe
Location: DNV Høvik, Norway

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

Series		3000A/B/W		4000/4000W		9010/60		9000/60/70/90	
Description		Spring loaded safety valves, angle type, ASME B16.5 flanged connections		Spring loaded safety valves, angle type, ASME B16.5 flanged or threaded connections		Low pressure pilot operated safety valves, angle type, ASME B16.5 flanged connections		Pilot operated safety valves, angle type, ASME B16.5 flanged connections	
ASME/NPT class		Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Sizes	1/2"x1"	-	-	600-1500	300	-	-	-	-
	3/4"x1"	-	-	150-2500	150-300	-	-	-	-
	1"x1"	-	-	150-2500	150-300	-	-	-	-
	3/4"x1 1/2"	-	-	1500-2500	300	-	-	-	-
	1"x1 1/2"	-	-	1500-2500	300	-	-	-	-
	1"x2"	150-600	150	-	-	-	-	150-2500	150-300
	1 1/2"x2"	150-1500	150-300	-	-	-	-	150-2500	150-300
	1 1/2"x3"	150-2500	150-300	-	-	-	-	150-2500	150-300
	2"x3"	150-2500	150-900	-	-	150	150	150-2500	150-300
	3"x4"	150-1500	150-300	-	-	150	150	150-2500	150-300
	3"x6"	900-1500	150-300	-	-	-	-		
	4"x6"	150-2500	150-900	-	-	150-300	150	150-2500	150-600
	6"x8"	150-600	150	-	-	150	150	150-1500	150-900
	6"x10"	300-600	150	-	-	-	-	150-600	150-300
	8"x10"	150-300	150	-	-	150	150	-	-
	10"x14"	-	-	-	-	150	150	150-600	150-300
	12"x16"	-	-	-	-	-	-	150-300	150
	12"x18"	-	-	-	-	150-300	150	-	-
Body/Bonnet materials		A216 WCB A352 LCB/LCC A217 WC6/ WC9/C5/C12/C12A A351 CF8/CF8M/ CF3M/CK-3MCuN A995 4A/5A/6A A494 M35-1/ CW6MC/CU5MCuC/ CW12MW/CX2MW B367 C2		A216 WCB A352 LCC A351 CF8/CF8M/ CF3M/CK-3MCuN A995 4A/5A/6A A494 M35-1/ CW6MC/CU5MCuC /CW12MW/CX2MW /C2 A182 F304/F316/ F316L/F44/ F51/F53/F55 B564 UNS N04400/ N06625/N08825/ N10276 B381 F2		A216 WCB A352 LCB/LCC A351 CF8/CF8M/ CF3M/CK-3MCuN A995 4A/6A A494 CW12MW/ CW2M/CX2MW /CW6MC A105 A350 LF2 A182 F304/F316/ F316L/F44/ FXM19/F51/ F53/F55 B564 UNS N06625		A216 WCB A352 LCB/LCC A351 CF8/CF8M/ CF3M/CK-3MCuN A995 4A/6A A494 CW12MW/ CW2M/CX2MW /CW6MC A105 A350 LF2 A182 F304/F316/ F316L/F44/ FXM19/F51/ F53/F55 B564 UNS N06625	
Discharge coefficient	Liquid	0.87		0.68		0.74		0.75	
	Steam & gas	0.95-0.975		0.93-0.95		0.74		0.95	

Manufacturing location:

Tai Milano S.p.a
Via Delle industrie, 6-8, 26862 Guardamiglio LO, Italia

Application/Limitation

Valves covered by this certificate may be used with gas, steam or liquid with following design conditions:

Design pressure: As per pressure-temperature ratings (refer to ASME B16.34 / ASME B16.5), temperature dependent on the body material.

Design temperatures depending on non-metallic materials:

EPDM/Fluoroelastomer: -30°C to +150°C;
Neoprene: -20°C to +90°C;
FKM/Viton: -30°C to +200°C;
MFQ/Fluorosilicone elastomer: -60°C to 200°C;
FFPM/FFKM/Perfluoroelastomer: -46°C to 320°C;
PTFE/Teflon: -196°C to 260°C;
PFA/perfluoroalkoxy copolymer: -196°C to 150°C;
FEP/fluoroethylene-propylene copolymer: -196°C to 100°C;
Graphite: -196°C to 600°C.

Only the following valves are approved for service at temperatures equal or lower than -55°C:

No.	Series	Size	Class		Material	T_{min}
			Inlet	Outlet		
1	3000A	1"x2"	300	150	A351 CF8M	-55°C
2	3000B	1"x2"	300	150	A351 CF8M	-55°C
3	3000W	1"x2"	300	150	A351 CF8M	-196°C
4	4000	3/4"x1" NPT	1500	300	A351 CF8M	-55°C
5	4000W	3/4"x1" RF	300	150	A351 CF8M	-196°C
6	9010	8"x10"	150	150	A351 CF8M	-110°C

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. The use of valves of austenitic stainless steel with seawater shall be limited according to DNV Rules for Ships Pt.4 Ch.6 Sec.2 [1.1].

EPDM may not be used for hydrocarbon services.

Threaded joints shall only be used according to DNV Rules for Ships Pt.4 Ch.6 Sec.9 [5.2.6].

The valves covered by this certificate are not to be considered fire safe and therefore shall not be installed wherever fire safe application is required; e.g. as pressure relief valves on cargo tanks in liquefied gas tankers.

Type Approval documentation

- Product catalogues for valves series 3000 & 4000, 9010 and 9000
- General description for valves series 3000, 4000, 9010 and 9000
- Stress analysis reports for valves series 3000, 4000, 9010 and 9000
- Test procedure for valves for service at cryogenic temperature
- Pressure test/cryogenic test reports witnessed by DNV GL (for 6 valves only)
- Dimensional outline drawings with material list and valve data for valves series 3000, 4000, 4000W, 9010 and 9000
- Dimensioned sectional drawings of pressure parts for valves series 3000, 4000, 9010 and 9000
- Datasheets for non-metallic materials

Tests carried out

Hydrostatic pressure test, Cryogenic testing (only for 6 valves listed above)

Production Testing and Certification

Production Testing and Certification for the actual intended application shall follow the latest applicable edition of the Rules (as mentioned on the front page of this certificate).

Marking of product

Minimum marking requirements shall be as outlined in the standard ISO 4126-1 [10] in addition to minimum design temperature details for cryogenic valves.

Periodical assessment

This certificate is only valid if required periodical assessments are carried out with satisfactory results.

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment after two years (+/- 90 days) after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNV-CP-0338.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com.