

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Safety Valve**

with type designation(s)
3500

Issued to

Broady Flow Control Ltd
Hull, United Kingdom

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems

DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment

DNV GL rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers

DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018

DNV GL class programme DNVGL-CP-0186 – Type approval – Valves

Application :

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

K. factor: Sonic flow: 0.956 (for gas) and 0.635 (for liquid)

Issued at **Høvik** on **2020-06-02**

This Certificate is valid until **2021-12-31**.

for **DNV GL**

DNV GL local station: **MANCHESTER**

Approval Engineer: **Maheshraja Venkatesan**

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Zeinab Sharifi
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

Spring operated safety relief valves with flanged type end connections according to ASME B16.5 with:

Inlet rating : Class 150 to class 2500
Outlet rating : Class 150 and 300

Sizes:

Series 3500: 1" x 2", 1 1/2" x 2", 1 1/2" x 3", 2" x 3", 3" x 4", 3" x 6", 4" x 6", 6" x 8", 6" x 10", 8" x 10"

Design standard: ASME Sec VIII div.1

Material of construction:

Body, Cap, Nozzle and Bonnet	Stainless steel, ASME SA351 Grade CF8M Carbon steel, ASME SA-216 WCB
Disc	Stainless steel, ASTM A564 Grade 630 disc
Non-metallic sealing (joint-guide, cap, clampscrew & plug)	Flexicarb RGS 4 (Graphite) Flexitallic 1065 (Graphite filled PTFE yarn) PTFE G400 Virgin PTFE

Application/Limitation

Safety valves covered by this certificate may be used with gas or liquid with following design conditions:-

Pressure-temperature rating : As per the flanged ends used according to ASME B16.5, dependant on the body material

Design temperature range depending on the non-metallic material used:-

Flexicarb RGS 4 : -196°C to 370°C
Flexitallic 1065 : -100°C to 260°C
PTFE G400 : -196°C to 260°C
Virgin PTFE : -196°C to 260°C

Only the following valves are approved for service lower than -55°C (cryogenic applications):

No.	Size	Orifice area (Sq. in.)	Material	T _{min}
1	4"x6"	3.927	A351 CF8M	-180°C
2	4"x6"	3.115	A351 CF8M	-188°C
3	3"x6"	2.003	A351 CF8M	-185°C
4	3"x4"	1.405	A351 CF8M	-184°C
5	1 1/2"x3"	0.121	A351 CF8M	-185°C
6	8"x10"	28.40	A351 CF8M	-182°C
7	1 1/2"x3"	0.215	A351 CF8M	-187°C
8	2"x3"	0.547	A351 CF8M	-183°C
9	2"x3"	0.855	A351 CF8M	-191°C
10	6"x8"	12.060	A351 CF8M	-193°C
11	6"x10"	17.420	A351 CF8M	-191°C
12	4"x6"	12.060	A351 CF8M	-187°C
13	1"x2"	0.215	A351 CF8M	-187°C
14	1"x2"	0.121	A351 CF8M	-187°C
15	1 1/2"x2"	0.335	A351 CF8M	-193°C
16	4"x6"	4.730	A351 CF8M	-185°C
17	1 1/2"x3"	0.335	A351 CF8M	-182°C

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Valves of austenitic stainless steel shall not be used in direct contact with seawater.

On boilers or steam-heated steam generators the following limitations applies:

- Safety-valves of ordinary type with seats of less than 38 mm inside diameter shall not be used. (Reference is made to DNV GL ship rules Pt.4 Ch.7 Sec.5 [2.1.8])
- For full lift safety valves the inside seat diameter shall not be less than 20 mm. (Reference is made to DNV GL ship rules Pt.4 Ch.7 Sec.5 [2.1.8])
- The discharge from safety valves shall be to a point where hazard is not created. (Reference is made to DNV GL ship rules Pt.4 Ch.6 Sec.5 [7.4.1])

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.

Production test

- All valve bodies shall be subject by the manufacturer to a hydrostatic test at a pressure equal to 1.5 times the set pressure (maximum working pressure at room temperature).
- Each valve shall be subject to leakage test (at 90% of set pressure) after reset and have set pressure sealed and verified.

Certification

Standard service towards ordinary machinery piping systems (DNVGL-RU-SHIP Pt.4 Ch.6)

Valve bodies shall be delivered with material certificates in accordance with DNV GL Ship Pt.4 Ch.6 Sec.2 Table 3. Materials with VL and W certificates shall be manufactured in a foundry approved by the Society.

DNV GL product certificate is required for valves with DN > 100 and design pressure > 16 bar, and for ship side valves where DN>100 regardless of pressure. For other valves a manufacturer's product certificate may be accepted.

Safety valves on boilers and pressure vessels (DNVGL-RU-SHIP Pt.4 Ch.7)

Valve bodies shall be delivered with material certificates in accordance with DNV GL Ship Pt.4 Ch.6 Sec.2 Table 3. Materials with VL and W certificates shall be manufactured in a foundry approved by the Society.

DNV GL product certificate is required when the valve falls under any of the following criteria:

- condition under pressure/temperature rating according to a recognized standard where DN >100 mm and PN >16 bar;
- design temperature >120°C and designed for a specific pressure/ temperature combination where DN >100 mm and PN >16 bar;
- when installed as Boiler safety valves

Liquefied gas service (DNVGL-RU-SHIP Pt. 5 Ch. 7)

DNV GL product certificate is required for valves intended to be used at working temperature below -55 °C or having DN ≥ 100.

Material certificates are required in line with DNVGL-RU-SHIP Pt. 5 Ch. 7 Sec. 1 Table 8.

Type Approval documentation

Tests carried out

Flow test, Cryogenic seat leakage test (for 17 valves as listed above)

Marking of product

For traceability to this Type Approval the products are at least to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Pressure rating
- Size

Periodical assessment

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