



TYPE APPROVAL CERTIFICATE

Certificate No:
TAP00000VN
Revision No:
1

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 rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
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.

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

Issued at **Høvik** on **2022-01-17**

for **DNV**

This Certificate is valid until **2026-12-31**.

DNV local station: **Manchester**

Approval Engineer: **Jane Lozanov**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



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 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 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 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 testing and certification

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

Type Approval documentation

<u>Document No.</u>	<u>Rev.</u>	<u>Title</u>
35-GA1, 35-GA-3, 35-GA4, 35-PL1, 35-PL3, 35-PL4, 35-OL1, 35-OL3, 35-OL4	01	3500 valve GA drawings
NCB 610 122, NCB 610 124, NCB 610 125, NCB 610 186, NCB 610 262, NCB 610 264, NCB 610 340, NCB 610 362, NCB 610 380, NCB 610 381	02	Type 3500 Bonnet drawings
NCB 650 122, NCB 650 125, NCB 650 264, NCB 650 362	02	3500 valve PL cap drawings
35 590 200	01	3500 valve nozzle drawings
35 590 161, 35 590 165, 35 590 181, 35 590 185, 35 590 201, 35 590 203, 35 590 223, 35 590 225, 35 590 242, 35 590 243, 35 590 261, 35 590 263, 35 590 280, 35 590 283, 35 590 300, 35 590 320, 35 590 340, 35 590 360, 35 590 380	02	3500 valve nozzle drawings
35 590 124, 35 590 125, 35 590 145, 35 590 220	03	3500 valve nozzle drawings
35 590 144, 35 590 260, 35 590 322	04	3500 valve nozzle drawings
35 590 141, 35 590 240	05	3500 valve nozzle drawings
35 590 121	07	3500 valve nozzle drawings
NCB 640 264	01	3500 valve cap drawing
NCB 640 125, NCB 640 362	02	3500 valve cap drawing
NCB 640 122	04	3500 valve cap drawing
NCB 501 141 MC, NCB 501 123 MC, NCB 501 125 MC, NCB 501 161 MC, NCB 501 162 MC, NCB 501 182 MC, NCB 501 184 MC, NCB 501 186 MC, NCB 501 201 MC, NCB 501 202 MC, NCB 501 221 MC, NCB 501 204 MC, NCB 501 222 MC, NCB 501 223 MC, NCB 501 226 MC, NCB 501 241 MC, NCB 501 242 MC, NCB 501 244 MC, NCB 501 261 MC, NCB 501 264 MC, NCB 501 281 MC, NCB 501 282 MC, NCB 501 283 MC, NCB 501 301 MC, NCB 501 303 MC, NCB 501 321 MC,	01	3500 valve body drawing

NCB 501 323 MC, NCB 501 341 MC, NCB 501 342 MC, NCB 501 362 MC, NCB 501 381 MC

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- Valve catalogue for the type 3500 SRV
- Air Test Report, Sonic flow method, witnessed date: 24.05.2005
- 3500 valve 1 PSCs wall thickness calculations dated: 24.01.2002
- 3500 valve 2 PSCs wall thickness calculations dated: 24.01.2002
- 3500 valve 3 PSCs wall thickness calculations dated: 25.01.2002
- 3500 valve nozzle wall thickness calculations dated: 24.05.1999
- 'Cryogenic Test Results' witnessed by DNV GL Surveyor dated 2019
- Valve types: 3551M-SN-000, 3561L-SN-000, 3572K-SN-000, 3572J-SN-000, 3582D-SN-000, 3531T-SN-000, 3582E-SN-000, 3582G-SN-000, 3572H-SN-000, 3551Q-SN-000, 3551R-SN-000, 3551Q-SN-000, 3531E-SN-000, 3531D-SN-000, 3531F-SN-000, 3551N-SN-000, 3582F-SN-000
- NB Cap Cert. ID NO.: BVL-M93013
- Capacity certification for type 3500 (liquid) dated February, 2011 containing Water Test – Flow meter method test reports dated 2.24-11 from National Board Testing Laboratory
- Gasket - Technical data sheets
- BROADY Flow Control Data sheet
- FLEXICARB RGS4, FLEXITALLIC 1065, REF C003 SEPT 2012, PTFE G400
TYPE 3500 ASRV

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 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 DNV-CP-0338.