

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Safety Valve**

with type designation(s)

06011, 06012, 06016, 06083, 06413, 06386, 06416, 06387, 06417, 06388, 06418, 06420, 06425, 06421, 06426, 06440, 06441, 06445, 06446, 06472, 06477, 06474, 06478

Issued to

**Herose GmbH Armaturen und Metalle
Bad Oldesloe Schleswig-Holstein, Germany**

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 class programme DNVGL-CP-0186 – Type approval – Valves****Application :****Safety Valve.****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.****K. factor: See product description**Issued at **Høvik** on **2018-01-24**for **DNV GL**This Certificate is valid until **2023-01-23**.DNV GL local station: **Hamburg**Approval Engineer: **Guido Friederich**

**Olaf Drews
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: 262.1-022900-2
Certificate No: TAP00000MJ
Revision No: 1

Product description

Type 06011

Spring loaded 90° angle type, carbon filled PTFE valve seat, closed bonnet.

Working pressure: 5 – 55 bar rating

Working temperature: -196°C to +65°C

Three types of inlet connection: [*See Limitation*]

1. Male thread type R (BSPT) acc. to ISO 7/1
2. Male thread type G (BSPP) acc to ISO 228/1
3. Male thread NPT acc. to ANSI B 1.20.1

Nominal sizes: ¼", 3/8", ½"

K-values type 06011:

¼"	3/8"	½"
0.09	0.09	0.09

Materials:

Body: Mat.no. 1.4408, ASTM A351 CF8M

Disc: PTFE/Carbon filled (25%)

Stem: Mat.no. 1.4305, ASTM A314 Grade 303

Type 06012 and 06016:

Spring loaded 90° angle type, carbon filled PTFE valve seat, closed bonnet. 06016 with manual lifting device.

Working pressure: 1 – 55 bar rating.

Working temperature: -196°C to +150°C.

Three types of inlet connection: [*See Limitation*]

1. Male thread type R (BSPT) acc. to ISO 7/1
2. Male thread type G (BSPP) acc. to ISO 228/1
3. Male thread NPT acc. to ANSI B 1.20.1

Nominal sizes: ¼", 3/8", ½"

K-values type 06012 and 06016:

¼"	3/8"	½"
0.42	0.42	0.42

Materials

Body: Mat.no. 1.4408, ASTM A351 CF8M

Disc: Mat.no. 1.4301, ASTM A479 Grade 304

Stem: Mat.no. 1.4301, ASTM A479 Grade 304

Job Id: **262.1-022900-2**
 Certificate No: **TAP00000MJ**
 Revision No: **1**

Type 06383 and 06413

Spring loaded 90° angle type, carbon filled PTFE valve seat, full lift type, closed bonnet. 06413 with manual lifting device. The inlet is threaded to the outlet body.

Working pressure: 2 – 50 bar rating.

Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [*See Limitation*]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal sizes: ½", ¾", 1", 1 ¼", 1 ½" and 2"

K-values type 06383 and 06413:

½" orifice	½" orifice	¾" orifice	¾" orifice	1"	1 ¼"	1 ½"	2"
7.0	10.5	7.0	10.5	15	23	23	23
0.82	0.58	0.82	0.58	0.5	0.62	0.62	0,62

Materials

Outlet body: Mat.no. 1.4308, ASTM A351-CF8
 Inlet body: Mat.no. 1.4301, ASTM A479-304
 Disc: Mat.no. 1.4301, ASTM A479-304
 Stem: Mat.no. 1.4301, ASTM A479-304

Type 06386 and 06416

Spring loaded 90° angle type, metal to metal valve seat, closed bonnet. 06416 with manual lifting device. The inlet is threaded to the outlet body.

Working pressure: 0,2 – 25/40 bar rating.

Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [*See Limitation*]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal sizes: ½", ¾", 1"

K-values type 06386 and 06416:

½"	¾"	1"
0.67	0.67	0.67

Materials

Outlet body: Bronze DIN EN CC491K or ASTM B62 UNS C83600 [*See Limitation*]
 Inlet body: Mat.no. 1.4301, ASTM A276 Grade 304
 Disc: Mat.no. 1.4541, ASTM A276 Grade 321

Job Id: **262.1-022900-2**
 Certificate No: **TAP00000MJ**
 Revision No: **1**

Type 06387 and 06417

Spring loaded 90° angle type, metal to metal valve seat, closed bonnet. 06417 with manual lifting device. The inlet is threaded to the outlet body.

Working pressure: 0,2 – 25 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [See Limitation]

1. Inlet: Female thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Female thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Female thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Female thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal size: ½"

K-values type 06387 and 06417:

½"
0.67

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [See Limitation]
 Inlet body: Mat.no. 1.4301, ASTM A479 Grade 304
 Disc: Mat.no. 1.4541, ASTM A276 Grade 321

Type 06388 and 06418

Spring loaded 90° angle type, full lift, Carbon filled PTFE valve seat, closed bonnet. 06418 with manual lifting device. The inlet is threaded to the outlet body.

Working pressure: 2 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [See Limitation]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal sizes: ½", ¾", 1", 1 ¼", 1 ½" and 2".

K-values type 06388 and 06418:

½" orifice	½" orifice	¾" orifice	¾" orifice	1"	1 ¼"	1 ½"	2"
7.0	10.5	7.0	10.5	0.5	0.62	0.62	0,61
0.82	0.58	0.82	0.58				

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [See Limitation]
 Inlet body: Mat.no. 1.4301, ASTM A479 Grade 304
 Disc: Bronze DIN EN CC493K, ASTM B505 UNS C93200

Job Id: **262.1-022900-2**
 Certificate No: **TAP00000MJ**
 Revision No: **1**

Type 06420 and 06425

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet. 06425 with manual lifting device.
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [*See Limitation*]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal sizes: ½", ¾", 1", 1 ¼"

K-values type 06420 and 06425:

½" and ¾" orifice	½" and ¾" orifice	¾" orifice	1" orifice 14 and	1 ¼" orifice	1 ½" orifice
7.0	10.5	14	18	18	23
0.78	0.69	0.66	0.66	0.66	0.54

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [*See Limitation*]
 Inlet body: Mat.no. 1.4301, ASTM A479 Grade 304
 Disc: Bronze DIN EN CC493K, ASTM B505 UNS C93200

Type 06421 and 06426

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet. 06426 with manual lifting device.
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [*See Limitation*]

1. Inlet: Female thread type G (BSPP) acc to ISO228/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Female thread type R (BSPT) acc to ISO 7/1, Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Female thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Female thread NPT acc. to ANSI B 1.20.1 Outlet: Female thread type NPT acc to ANSI B 1.20.1

Nominal sizes: ½", ¾", 1", 1 ¼"

K-values type 06421 and 06426:

½" orifice	½" orifice	¾" orifice	1"	1 ¼"
7.0	10.5	14.0		
0.78	0.69	0.66	0.66	0.54

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [*See Limitation*]
 Inlet body: Mat.no. 1.4301, ASTM A479 Grade 304
 Disc: Bronze DIN EN CC493K, ASTM B505 UNS C93200

Job Id: **262.1-022900-2**
 Certificate No: **TAP00000MJ**
 Revision No: **1**

Type 06440

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet.
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [See Limitation]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.3,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.3,
 Outlet: Female thread type NPT acc to ANSI B 1.20.3

Materials:

Outlet body: Mat.no. 1.4308, ASTM, A351 CF8
 Inlet body: Mat.no. 1.4301, ASTM, A479.304
 Disc: Mat.no. 1.4571, ASTM, A479.316Ti

½" orifice 7.0	¾" orifice 7.0	½" orifice 10.5	¾" orifice 10.5	¾" orifice 14.0	1" orifice 14.0	1" orifice 18.0	1 ¼" orifice 18.0	1 ¼" orifice 23.0
0.78	0.78	0,69	0.69	0,66	0.66	0.66	0.66	0.54

Type 06441

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet.
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Inlet/outlet connection: [See Limitation]
 Inlet and outlet: Female thread type G (BSPP) acc to ISO228/1

Materials:

Outlet body: Mat.no. 1.4308, ASTM A351 CF8
 Inlet body: Mat.no. 1.4301, ASTM A479 304
 Disc: Mat.no. 1.4571, ASTM A479 316Ti

½" orifice 7.0	½" orifice 10.5	¾" orifice 14.0	1" orifice 18.0	1 ¼" orifice 23.0
0.78	0,69	0.66	0.66	0.54

Job Id: **262.1-022900-2**
 Certificate No: **TAP00000MJ**
 Revision No: **1**

Type 06445

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet with lifting device
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Four types of inlet/outlet connection: [See Limitation]

1. Inlet: Male thread type G (BSPP) acc to ISO228/1,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
2. Inlet: Male thread type R (BSPT) acc to ISO 7/1,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
3. Inlet: Male thread NPT acc. to ANSI B 1.20.3,
 Outlet: Female thread type G (BSPP) acc to ISO228/1
4. Inlet: Male thread NPT acc. to ANSI B 1.20.3,
 Outlet: Female thread type NPT acc to ANSI B 1.20.3

Materials

Outlet body: Mat.no. 1.4308, ASTM A351 CF8
 Inlet body: Mat.no. 1.4301, ASTM A479.304
 Disc: Mat.no..1.4571, ASTM A479.316Ti

½" orifice 7.0	¾" orifice 7.0	½" orifice 10.5	¾" orifice 10.5	¾" orifice 14.0	1" orifice 14.0	1" orifice 18.0	1 ¼" orifice 18.0	1 ¼" orifice 23.0
0.78	0.78	0,69	0.69	0,66	0.66	0.66	0.66	0.54

Type 06446

Spring loaded 90° angle type, PCTFE valve seat, closed bonnet with lifting device
 The inlet is threaded to the outlet body.
 Working pressure: 0,4 – 50 bar rating.
 Working temperature: -196°C to +185°C.

Inlet/outlet connection: [See Limitation]

Inlet and outlet: Female thread type G (BSPP) acc to ISO228/1,

Materials:

Outlet body: Mat.no. 1.4308, ASTM A351 CF8
 Inlet body: Mat.no. 1.4301, ASTM A479.304
 Disc: Mat.no. 1.4571, ASTM A479.316Ti

½" orifice 7.0	½" orifice 10.5	¾" orifice 14.0	1" orifice 18.0	1 ¼" orifice 23.0
0.78	0,69	0.66	0.66	0.54

Job Id: **262.1-022900-2**
Certificate No: **TAP00000MJ**
Revision No: **1**

Type 06472 and type 06477 :

Spring loaded 90° angle type, metal to metal seating, closed bonnet. 06477 with manual lifting device.
The inlet is threaded to the outlet body.
Working pressure: 0,5 – 6 bar rating.
Working temperature: -196°C to +150°C.

Three types of inlet connection: [See Limitation]

1. Male thread type G (BSPP) acc. to ISO 228/1
2. Male thread NPT acc to ANSI B1.20.1
3. Union type braze fitting for pipe OD 12 mm

Nominal sizes: ¼", 3/8", ½" and ¾"

K-values type 06472 and 06477

¼"	3/8"	1/2"	¾"
0.55 (3 bar)	0.55	0.55	0.55

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [See Limitation]
Inlet body: Mat.no. 1.4301, ASTM A479 Grade 304
Disc: Mat.no. 1.4541, ASTM A276 Grade 321

Type 06474 and type 06478:

Spring loaded 90° angle type, PTFE seating, closed bonnet. 06478 with manual lifting device.
The inlet is threaded to the outlet body.
Working pressure: 4,5 – 45 bar rating.
Working temperature: -196°C to +150°C.

Materials

Outlet body: Bronze DIN EN CC491K, ASTM B62 UNS C83600 [See Limitation]
Inlet body: Mat.no. 1.4301, ASTM A276 Grade 304
Disc: Bronze DIN EN CW452K, ASTM B159 UNS C51900

Three types of inlet connection: [See Limitation]

1. Male thread type G (BSPP) acc. to ISO 228/1
2. Male thread NPT acc to ANSI B1.20.3
3. Union type braze fitting for pipe OD 12 mm

Nominal sizes: ¼", 3/8", ½" and ¾"

Outlet connection

Female thread G 1/2" acc. to ISO 228/1

K-values type 06474 and 06478:

¼"	3/8"	1/2"	¾"
0.66	0.66	0.66	0.66

Job Id: **262.1-022900-2**
Certificate No: **TAP00000MJ**
Revision No: **1**

Requirements for safety valves depending on pipe classes and application

The requirements on the safety relief valve design, material grades and certificates of pressurised parts as well as the scope and requirements of production testing depends on the application and pipe class. For the range of application specified on page 1 of this certificate the following DNVGL Rules are to be observed:

- DNV GL Pt. 2, Ch. 1, Sec. 2 (Approval of material manufacturers)
- Ch.2, Sec. 8 – 5 Castings for boilers, pressure vessels and piping systems
- Sec. 8 – 6 Ferritic steel castings for low temperature service
- Sec. 8 – 7 Stainless steel castings
- DNV GL Pt. 4, Ch. 6, Sec. 1 – Table 1 (pipe classes)
- Sec. 1 – Table 4 (certification requirements)
- Sec. 2 - Table 3 (material certificates acc. to pipe classes)

In addition, for steam and pressure vessels application

- DNV GL Pt.4, Ch. 7, Sec.1 - General Requirements
- Sec.2 - Materials
- Sec.3 - Thermal-oil installations
- Sec.5 – 2 Safety Valves (steam boilers)
- Sec.7 – Manufacture, workmanship and testing

In addition, for cryogenic application

- DNV GL Pt. 5, Ch. 7, Sec. 1, Table 7 - Certification of components
- Ch. 7, Sec. 6 – Materials of Construction, Quality Control and Marking
- DNV GL Pt. 6, Ch. 2, Sec. 5, Table 4 - Certification of material quality and testing

Application/Limitation

Safety relief valves for air, gases, vapours, crogenic liquefied gases.

Limitation

Safety valves with threaded connections are NOT permitted for installation on board of DNV GL classed liquefied gas tankers and in ship's LNG and gas fuel systems.

For valves to be installed on board of ships other than liquefied gas tankers the following limitations apply:

Valves for installation in systems operating with flammable gases are to be classed within Pipe Class I, see DNV GL Rules Pt. 4 Ch. 6 - Piping systems.

Threaded joints may be used for outside diameters as stated below except for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur.

- Threaded joints in CO2 systems shall be allowed only inside protected spaces and in CO2 cylinder rooms
- Threaded joints with tapered thread shall be allowed for pipe class I, outside diameter not more than 33,7 mm.
- Pipe Class II and Class III outside diameter not more than 60,3 mm.
- Threaded joints with parallel thread shall be allowed for Pipe class III, outside diameter not more than 60.3 mm.

The installation of safety valves in pressurized systems has to be observed under consideration of the specific operating conditons, type of flowing media and observation of the applicable DNG GL Rules and Pipe Classes.

Job Id: 262.1-022900-2
Certificate No: TAP00000MJ
Revision No: 1

Type Approval documentation

The approval is based on the following documentation: :

- Manufacturers brochure on each valve.
- Test reports submitted with the manufacturers application
- Design drawings
- Parts lists with material specifications

Tests carried out

Flow test, Seat and leakage test, Cryogenic test

Pressure safety valve production testing and certification

The following tests (to be done on each valve) are to be performed under the supervision by a DNV GL Surveyor:

Type of test	Test standard
Determination of discharge coefficient Verification of discharge capacity Hydarulic pressure test of the valve housing Test pressure = 1,5 times the design presssure Check of set pressure and reset pressure at room temperature	Recognized standard, e.g. ISO 4126

Note

¹ Sufficient valve capacity is to be approved for each application.

² Set pressure is to be sealed by the DNV GL Surveyor

Each safety relief valve is subject to production testing according to the applicable DNVGL Rules as following:

- Part 4, Chapter 6 – Piping systems, Section 9-3 - Valves
- Part 4, Chapter 7 – Pressure equipment, Section 5 and Section 7

Certification and Documentation

The following minimum scope of documents have to accompany each product/delivery:

- Instruction and maintenance manuals.
- Surveyor's Report.
- Documentation of materials used for safety valves for installation on board of DNV GL classed ships in accordance with DNV GL Rules Part2 Materials and Welding, Chapter 1, Ch.2 and Ch.4.
- Material certificates in accordance with DNV GL Rules Pt. 4 Ch. 6 - Piping Systems,
- Table 3 - Material Certificates.

Job Id: **262.1-022900-2**
Certificate No: **TAP00000MJ**
Revision No: **1**

Marking of product

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

- Manufacturer's name or trade mark
- Valve type designation
- Size
- Maximum design pressure and temperature
- Set pressure

Periodical assessment

A condition for retention of the Type Approval Certificate in its validity period is that periodical assessments are successfully carried out.

The objective of the periodical assessment is to verify that the conditions for the type approval have not been altered. The main scope of the periodical assessment will normally include:

- 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 and at other companies that are given the responsibility for manufacturing of the products.
- Review of the TA documentation and that this is still used as a basis for the production
- Review of possible changes to the design, the material and the performance of the product
- Verification of the product marking

END OF CERTIFICATE