

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Safety Valve for Boiler and Pressure Vessel**with type designation(s)
441/442, 431/433

Issued to

Leser GmbH & Co. KG
Hamburg, 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 rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers****DNV GL class programme DNVGL-CP-0186 – Type approval – Valves****Application :****Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.****K. factor: Refer to certificate**Issued at **Hamburg** on **2017-07-06**This Certificate is valid until **2022-07-05**.for **DNV GL**DNV GL local station: **Hamburg**Approval Engineer: **Hagen Markus**

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.



Product description

Spring loaded safety relief valve, angle type with flange connections for steam, gases and liquids.
Opening characteristic series 441, 442 - Full Lift or Standard and 431, 433 - Standard.
Optional with conventional or balanced stainless steel bellow and soft sealed disc.

Valve types and details		Type
Lifting devices		
H2	Gastight cap	433, 441
H3	Open bonnet lifting device	431, 442
H4	Gastight with lifting device	433, 441
Opening characteristics	Full lift (steam, gases)	441, 442
	Standard (liquids)	431, 433, 441, 442
Connection type inlet/outlet	Flanges	431, 433, 441, 442
Body	Angle type	
Pressure ratings		
Inlet flange ¹ / Outlet flange	PN 16/16, PN40/40	431, 433
	PN16/16, PN25/10, PN25/16, PN40/16	441, 442
Set pressure range	Refer to LESER product catalogue ¹	

Notes

¹ Refer to LESER product catalogue, Doc.No.0777.5465.

Pressure rating may be reduced on higher temperature or lower temperature according to ASME B16.34.

Material specifications and Temperature range²

Valve part	4411/4421 4311/4331	4415/4425 4315/4335	4412/4422 4312/4332	4414 4334	4412 XXL 4422 XXL
Body	GG-25 ^{3, 5} (0.6025)	EN-GJS-400-18U-LT ⁴ (0.7043) A536 (60-40-18)	GP240GH (1.0619) WCB	GX5CrNiMo19-11-2 (1.4408) CF8M	C22.8 (1.0460) P265GH (1.0425)
Disc	X39CrMo17-1(1.4122) MT440			X2CrNiMo17-12-2(1.4404 - 316L) X2CrNiMoTi17-12-2 (1.4571 - 316Ti) X39CrMo17-1 (1.4122 - MT440)	
Seat	X2CrNiMo17-12-2 (1.4404, 316L)				St 35.8 (1.0305) ¹ C22.8 (1.0460) ¹
Temperature range ^{6, 7}					
Metallic seat	0°C up to +120°C	0°C ⁵ up to +350°C	-29°C up to +450°C	-165°C up to +400°C	-85°C up to +450°C

Note

¹ Stellite

² Valves of steel castings intended for the use at design temperatures below 0°C are to be Charpy-V tested at 5°C below design temperature or -20°C whichever is lower.
Refer to Pt.2, Ch.2, Sec.8 - 6 - Table 14.

³ Grey cast iron is not approved for application in pipe class I and II piping systems.

⁴ Nodular cast iron is not approved for application in pipe class I piping systems.

⁵ The use of grey cast and nodular cast iron for media having a temperature below 0°C shall be considered in each particular case.

⁶ For application below - 55°C refer to "Application / Limitation" on page 3

⁷ In case of soft sealed valve disc the temperature range is limited acc. to the O-ring material as specified in LESER specification LDeS 3027.01.

Requirements 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

The safety relief valves of type 431, 433 and 441,442 incl. DIN-, ANSI-, XXL and Full nozzle design are type approved for application in steam, gas, liquid and LPG services.

Size range

Type	431/433										
d ₀ (mm)	12	18	18	18	23	29	37	46	60	74	92
DN	15	20	25	32	40	50	65	80	100	125	100

Type	441/442											441/442XXL/441XXL			
d ₀ (mm)	18	23	29	37	46	60	74	92	98	125	165	165	200	235	295
DN	20	25	32	40	50	65	80	100	125	150	200	200	250	300	400
ANSI	-	1"	1½"	1½"	2"	3"	-	4"	-	-	8"	8"	10"	12"	16"

Cryogenic application

The valve types 4334 and 4414 are in addition type approved for cryogenic application in LNG and LEG piping systems with service temperatures below – 55°C down to – 165°C for the following sizes:

Type	Inlet	Outlet	do (mm)
4334	DN25, DN50, DN65	DN25, DN50, DN65	18, 29, 37
4414	DN25, DN32, DN50, DN65, DN80	DN40, DN50, DN80, DN100, DN125	23, 29, 46 60, 74

Coefficient of discharge K_D¹

Type	Reference and Size range	Coefficient of discharge K_D		
		Steam	Gases	Liquids
441, 442	ASME, Section VIII Div.1	0.699		0.521
	All sizes			
431, 433	DGRL / DIN EN ISO 4126-1	Steam	Gases	Liquids
	DN15 (metallic disc)	0.62		0.48
	DN15 (O-ring soft seal disc)	0.59		0.47
	DN20	0.29		0.19
	All other sizes	0.38		0.25

Note

¹ Valves with diameter $d_0 < 38$ mm for the Standard type (type 431 and 433) and < 20 mm for the Full lift type valve (type 441 and 442) are not to be used on boilers.

Sizing of pressure relief valves

In addition to the sizing tables specified in LESER product catalogue, Doc. No. 0777.5489, applicable DNV GL Rules are to be observed.

For steam boiler and pressure vessel application refer to DNV GL Pt.4, Ch.7, Sec.5.

Type Approval documentation

Tests carried out

Visual inspection, Pressure test on valve bodies, Tightness test at 90% of set pressure at room temperature and cryogenic conditions, Set pressure test at room temperature and cryogenic condition.

Production testing

Each relief valve is subject to production testing according to applicable DNVGL Rules as follows:

- Machinery piping systems Pt.4, Ch 6, Section 9 - 3 Valves
- Liquefied gas tanker piping systems and tanks Pt.5, Ch. 7 - Sec. 5 – 13.1 Valves
- Steam boilers, steam generators and pressure vessels Pt.4, Ch.7 – Section 7 – 4.6 Hydraulic test

Appropriate DNV GL product certificate to be issued, if required by the Rules.

Reference is made to Recognition Certificate MSARC0000ATE.

Marking of product

For traceability to this type approval certificate each valve is to be provided with a name plate with at least the following data:

	Example
Manufacturer's name or trade mark	LESER
Type designation	431 – H2, H3, H4
Nominal pressure rating Inlet	PN16
Size inlet / outlet	DN80
Diameter d_0 [mm]	32
Set pressure	12bar
Coefficient of discharge K_D / Media	0.38 S/G

Job Id: **262.1-002761-6**
Certificate No: **TAP0000100**

Periodical assessment

For retention of the type approval certificate periodical assessments shall be carried out at production places by DNVGL surveyor.

The objective of the periodical assessment is to verify that the design and production conditions for the type approval have not been altered.

Main scope of the assessment:

- verification of the production and quality control system
- review of quality control documentation of recent deliveries
- review of drawings in production to verify any design changes which may have an impact on data specified in the type approval certificate, performance and range of application
- verification of the product marking

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.