

WEBINAR

Dimensionering och val av säkerhetsventiler

AGENDA

- Kort presentation av Ramén Valves & HEROSE
 - Olika typer av säkerhetsventiler och säkerhetsanordningar
 - Funktion och användning
 - Juridiska krav
 - HEROSE VALVIO – Mjukvara för dimensionering och val av säkerhetsventiler
 - Frågor och svar
-



Ramén Valves



Safety valves – structure and function the simple way



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Agenda

Classification of safety devices

Function by means of force balance

Definitions

Lift-pressure diagram / Characteristics

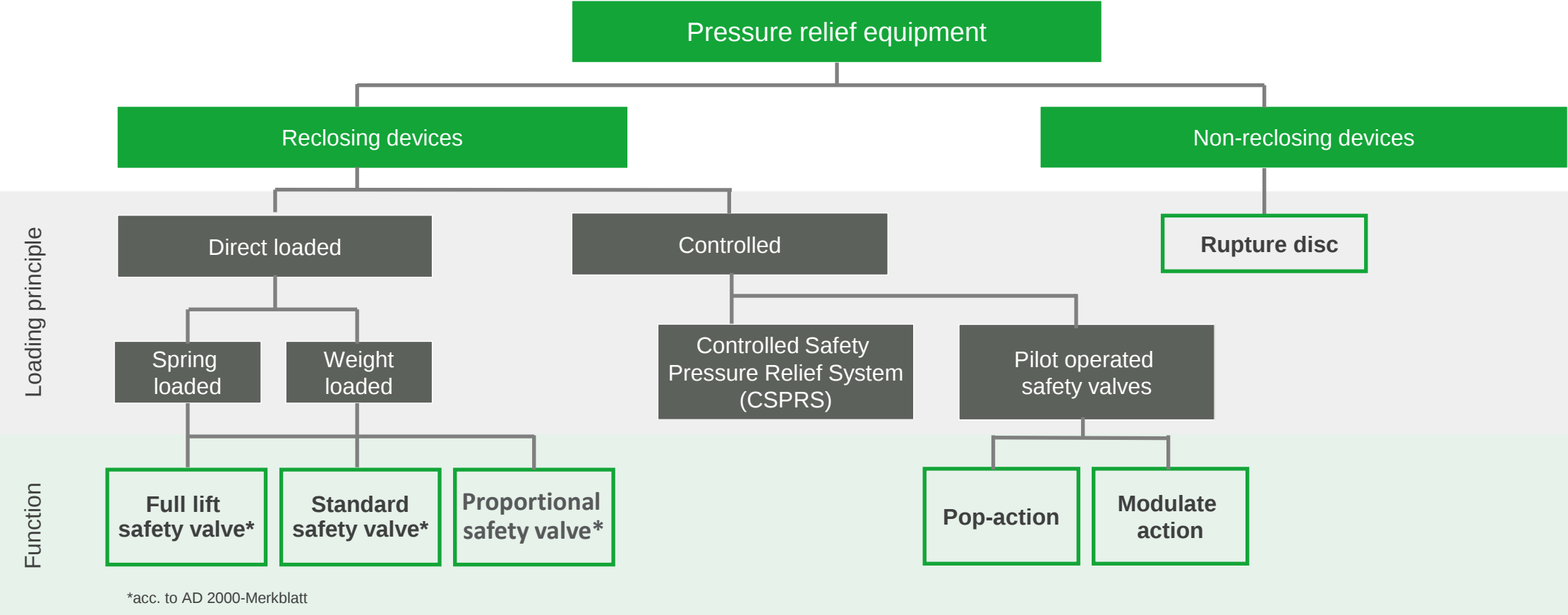
Legal framework

Testing of safety valves

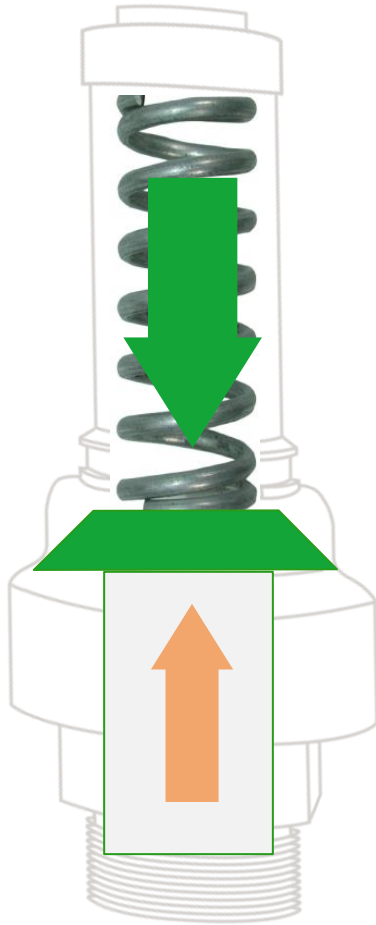
Sizing of Safety Valves

Summary

Classification of safety devices



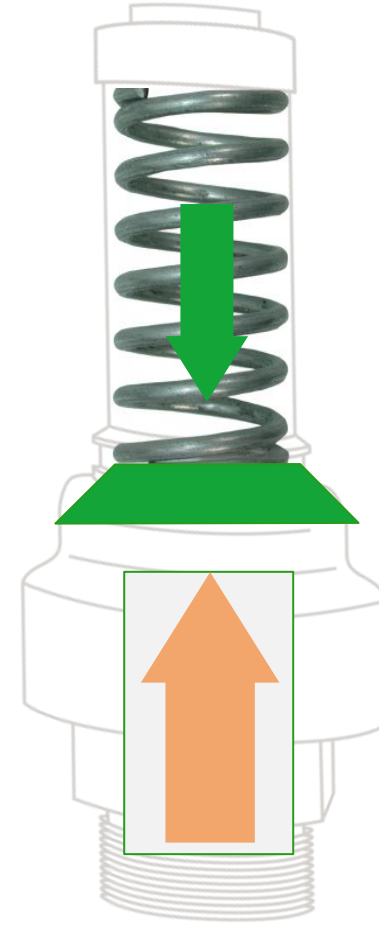
Function by means of force balance



Valve is closed $F_S > F_P$

Spring force
 $F_S = R \times s$
 Spring force [N] = Spring constant [N/mm] x Spring displacement [mm]

Compression force of the medium
 $F_P = p \times A_S$
 Compression force [N] = Pressure [Pa or N/m²] x surface [m²]



Valve is open $F_S < F_P$

Definition of terms

Set pressure (test lab conditions)

Pressure to which the valve is set under test bench conditions.
Setting pressure is the so-called audible opening, the exhaust outflow noise.

Set pressure (working conditions)

Specified pressure at which a safety valve starts to open under operating conditions. Start of lifting!

Opening pressure

Pressure at which the valve has reached the defined lift and can discharge under full power.

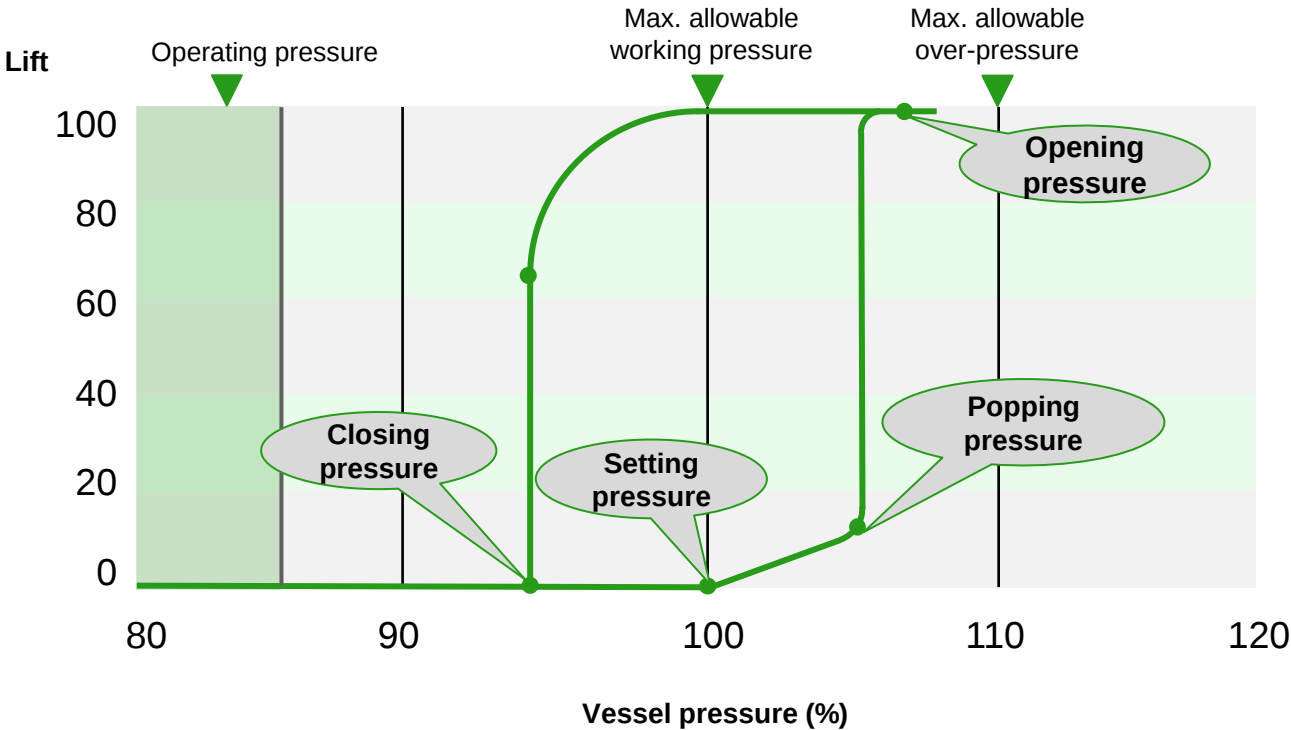
Closing pressure

Pressure at which the valve disc closes again after opening, Lift=0

Lift

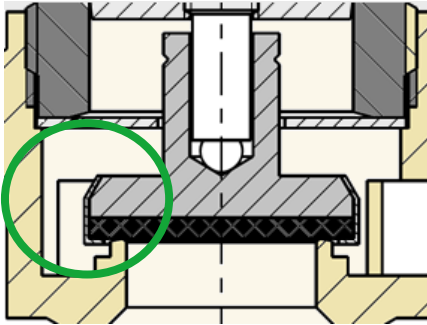
Way the valve disc (cone) is lifted off the seat.

Lift-pressure diagram

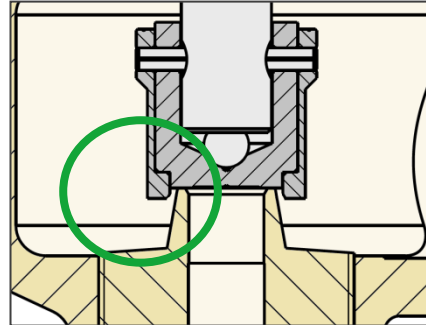


Charateristics

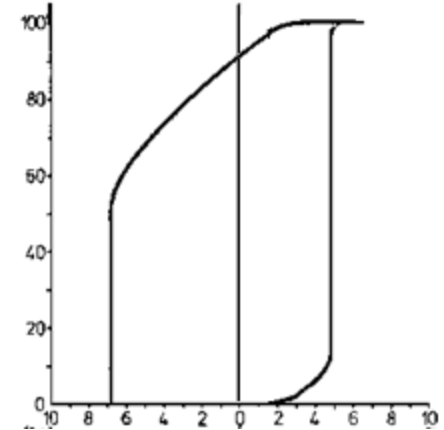
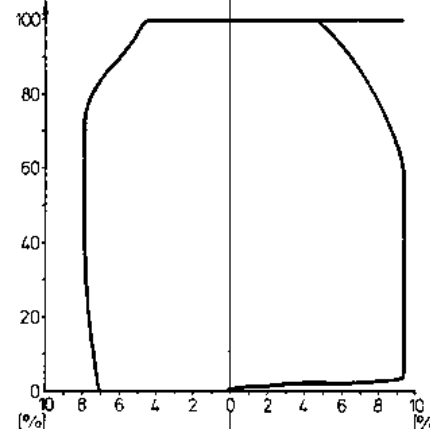
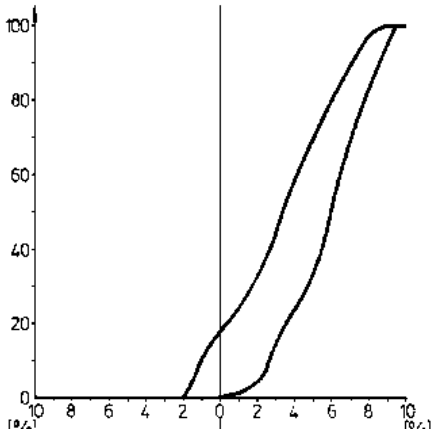
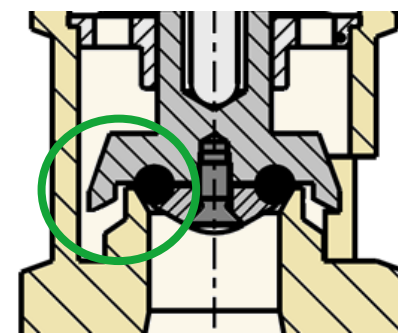
proportional



standard



full lift



The design of disc and seat is significantly influencing the function and lifting behavior of the safety valve.

Legal framework

- Safety valves must be dimensioned and adjusted in such a way that the **maximum permitted working pressure** of the vessel is **not exceeded by more than 10%**.

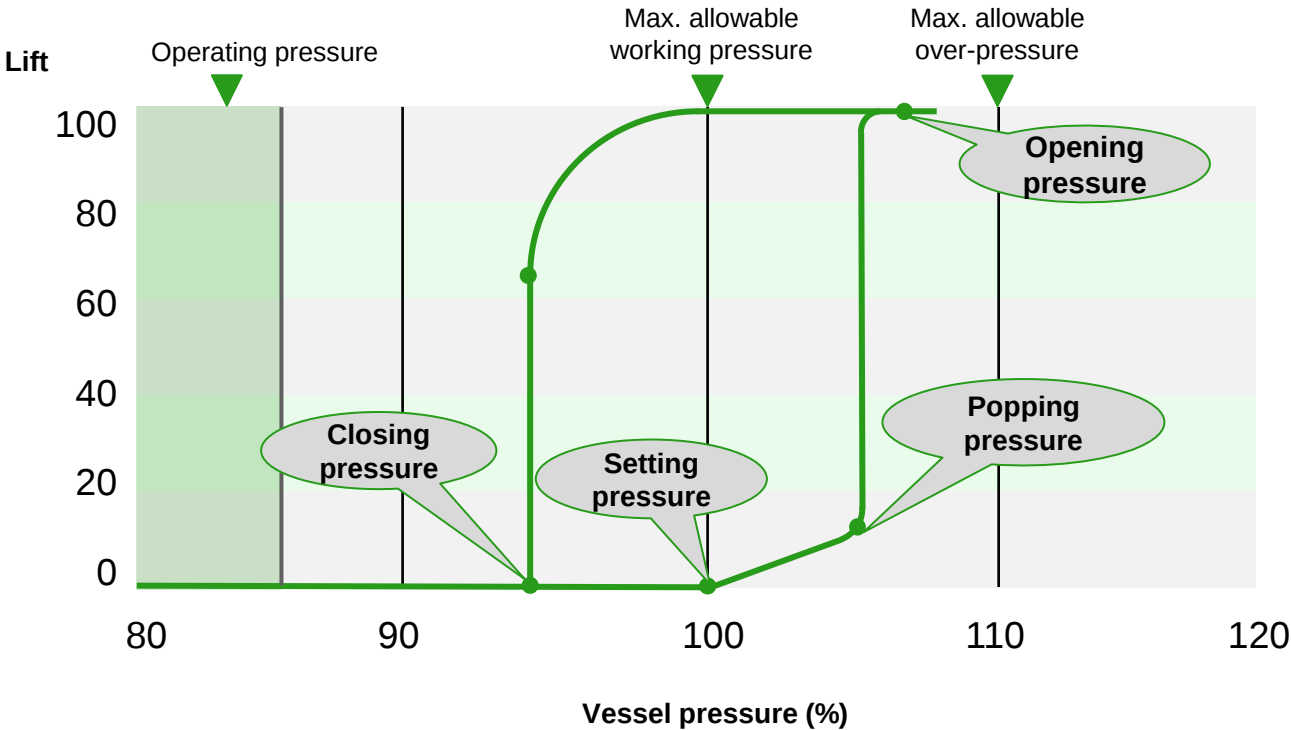
- **According to:**
 1. DIN EN ISO 4126-1
 2. AD-2000 A-2
 3. ASME Code Sec. I, IV oder VIII
 4. API 520



Opening and closing pressure

	Opening pressure		Closing pressure	
	Steam / gases	Liquids	Steam / gases	Liquids
DIN EN ISO 4126-1 / DIN EN13648-1	10 %	10 %	15 %	20 %
AD 2000-A2	5 % oder 10 %	10 %	10 %	20 %

Lift-pressure diagram



Testing of safety valves

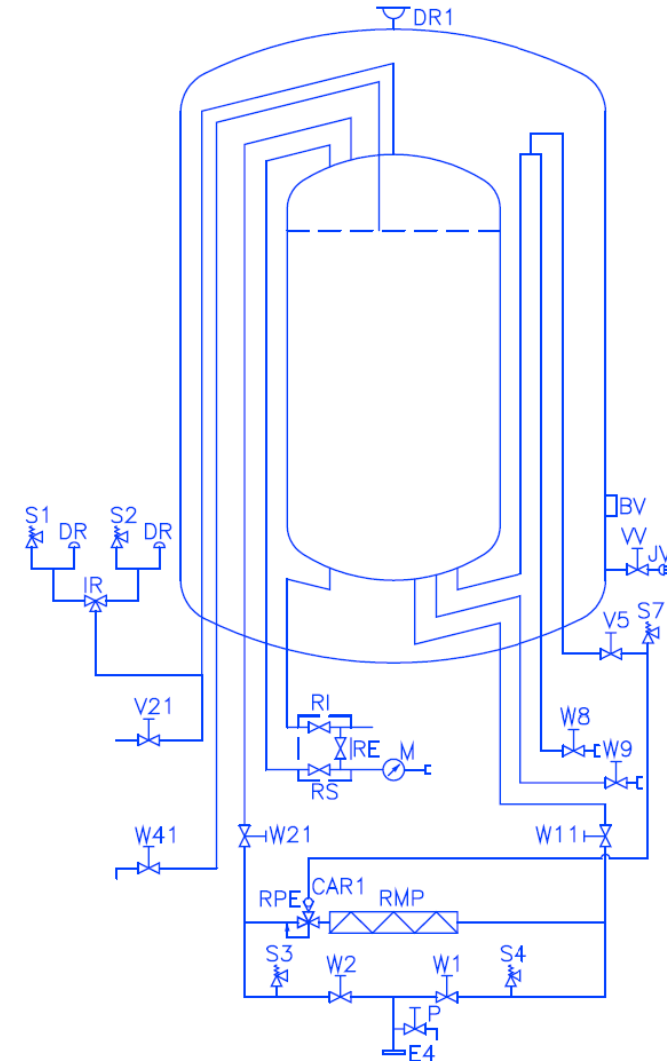
- Durability: acc. to DIN EN 12266-1/2
- Set pressure: first audible opening
- Functional testing: Popping of the valve
- Seat tightness: acc. to API 527
- Oil and grease free (for cryogenic safety valves)



Abnahmeprüfzeugnis / Test inspection certificate		EN 10204 – 3.1	
über die Einstellung und Prüfung von Sicherheitsventilen		gemäß / EN 10204 – 3.1	
Werkstoffdokumentation / Material documentation		acc. to	
Auftraggeber Customer	Linde AG / Seiterstr. 70 / 82049 Pullach	Zertifikats-Nr. Certificate No.	2984
Bestell-Nr. Order-No.	81436572	Datum Date	08.05.08
HEROSE-Kom-Nr. HEROSE-Ref-No.	473483	Pos. Item	10
Art-Nr. Part. No.	06388.1006.0800	Menge Quantity	1
VdTUEV- Bautellprüf-Nr. Type-test approval No.	02-780	K _{dr} / q _w Ausflussziffer Coefficient of discharge	SG Dampf / Gase Steam / Gase 0,58
DGR 97/23/EG PED 97/23/EC	CE	L Flüssigkeiten Liquids	0045
Anlüftung Lifting device	PN 40	DN Eintritt Inlet G 1/2	A _s [mm²] Engst-Strom. a Flow area 87
Ansprechdruck Set pressure p _s [bar g]	25,0	Austritt Outlet	
Serial Nr. / Valve No. : 479350			
Gehäuse Body	CC491K	Chargen-No. Batch-No.	4.8 von from Valfond
Sitzeinsatz Seat	1.4301	Chargen-No. Batch-No.	2549 von from Olarra
Prüfung der Armatur / Testing of Valve:			
Beschreibung / Description		Bemerkung / Remark	
Festigkeit des Gehäuses mit Wasser 1,5 x PN Body strength test with water 1,5 x PN		Test P10 gemäß / acc. to DIN EN 12266-1	
Funktionstüchtigkeit Functional test		Test F20 gemäß / acc. to DIN EN 12266-2	
Dichtheittest des Abschlusses Seat tightness		Test gemäß / acc. to HEROSE QMVA 10-006	
öl- und fettfrei für Sauerstoff cleaned for oxygen service		entspr. / in acc. LS141-74-S2 Sauberkeitsbereich S2 Functional test and leakage test acc. LS031-3XX on each valve were performed without any faults Die Prüfung der Funktion und Dichtheit nach LS031-3XX ergab kein Mängel	
Die Einstellung erfolgte mit: The setting was done with:		☒ Luft Air ☐ Wasser Water ☐ Dampf Steam	
Umgebungstemperatur [°C] Ambient temperature		Temp. [°C]	
☒ Plombe gekennzeichnet mit seal marked with		☐ Gehäuse gekennzeichnet mit body marked with	
Ergebnis der Prüfungen / Results of the inspections Die oben genannten Prüfungen wurden an jeder Armatur durchgeführt. Es wurden keine Mängel festgestellt. The above mentioned tests were carried out on each valve. No faults were observed.			
Anlagen / Enclosures: 2			
Bad Oldesloe, 29.05.08		Werkssachverständiger / Works inspector	
HEROSE GMBH		Elly-Heuss-Knapp-Str.12	
ARMATUREN UND METALLE		D-23843 Bad Oldesloe	
		Tel. (+49) 4531/509-0	
		Fax (+49) 4531/509-120	

Sizing of Safety Valves

- Determine the required mass / volume flow
 - What can happen to your equipment
 - trailer pump not stopping
 - vacuum loss
 - external fire
 - pressure building regulator fail
 - fresh filled media not saturated
 - ...
- Media
- Media state – liquid / steam / gas
- Set pressure
- Back pressure – constant / variable
- Temperature



VALVIO sizing software

- Convenient user guidance
- Realistic simulation
- Medium-appropriate sizing
- Standard-compliant sizing
- Free download

<https://www.herose.com/eng/services/valvio/index.php>



Factors influencing the function

Inlet pressure drop

To ensure the function of the safety valve, the pressure drop in the inlet pipe of the safety valves should not exceed 3% of the set pressure.

Back pressure

Pressure at the outlet of a safety valve. Distinction between built up and superimposed backpressure.

Oversizing

Everytime a properly sized safety valve should be used.

Oversizing

- Everytime a properly sized safety valve should be used.
- Oversizing can lead to an unstable opening and closing behaviour of the safety valve.

Summary

- There are different types of safety devices
- Function of a safety valve is characterised by means of force balance
- Proportional, standard and full lift safety valves have different capacity and are suitable for different application
- Over-pressure and closing pressure differences
- Function of a safety valve influenced by inlet pressure drop, back pressure and oversizing

Thank you for your attention.



Vi ses på Processteknik!

Mötesplatsen för framtidens processindustri



18–20 oktober 2022
Svenska Mässan,
Göteborg

process
teknik

Ramén Valves & HEROSE

→ Monter C04:31



Ta del av hela HEROSE's
sortiment av ventiler och
säkerhetsventiler för bla.
Vätgas, LNG/LBG, ånga &
kvävgas.