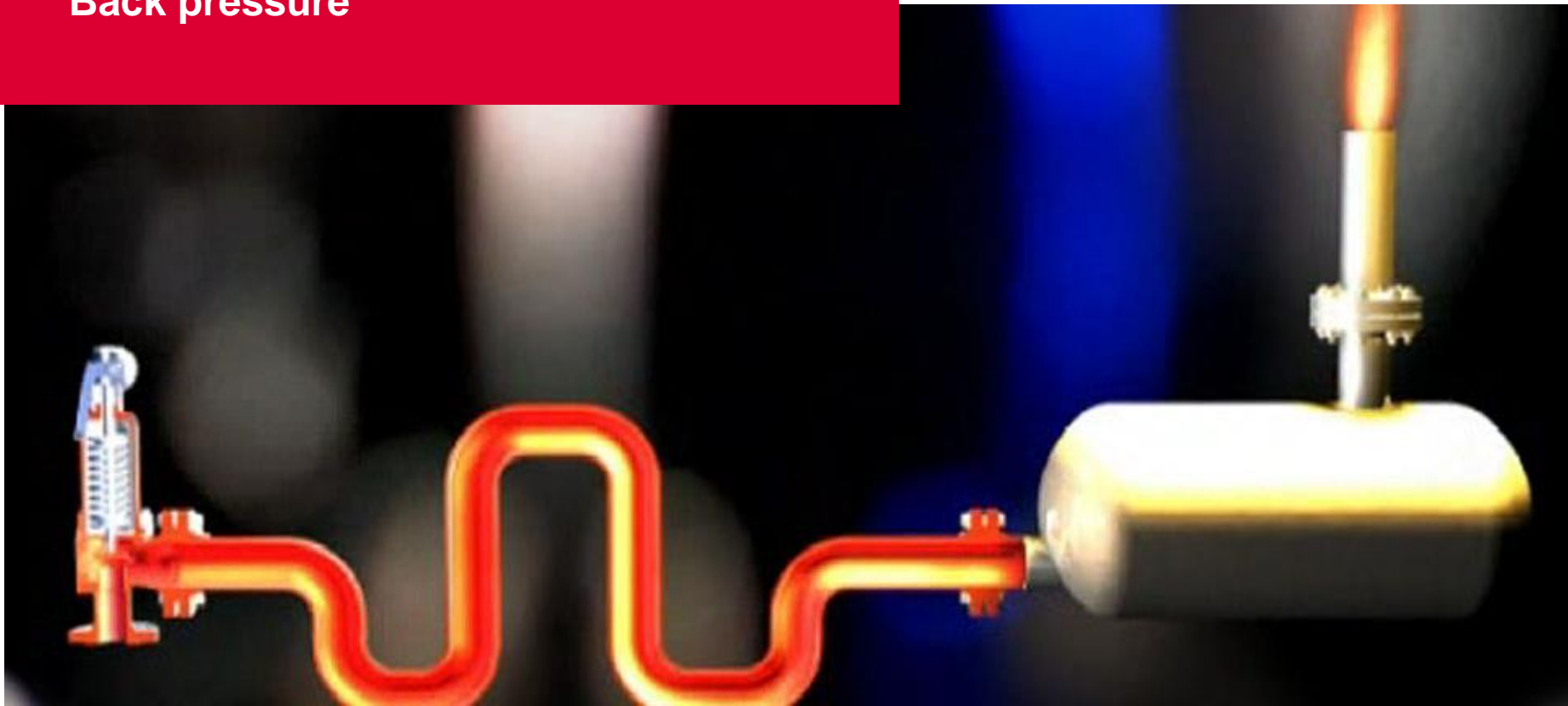


## Back pressure

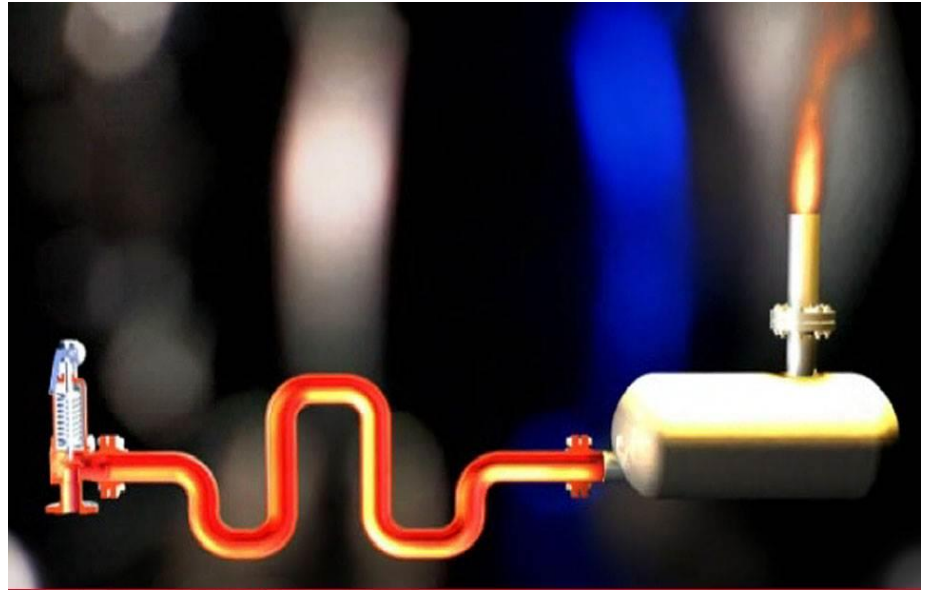


# Objective of this presentation. Enhanced expertise.

1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR

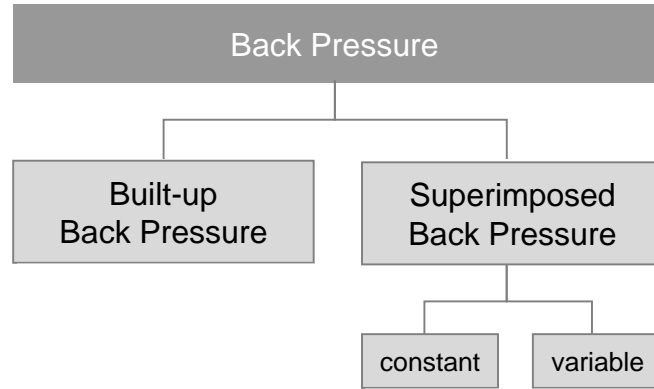
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The objective of this presentation is to explain the term **back pressure**, its effects and its impact and to provide information regarding measures for adjustment.



# Back Pressure. Effects.

1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR



Exists only at the outlet while the safety valve is discharging. It depends on the pressure loss in the outlet pipe.

Exists permanently in the blowdown system. The superimposed back pressure is independent of the discharge of the safety valve.

**Back pressure** is the pressure that exists at the **outlet of a safety valve**.



$$\text{Back Pressure} = \text{Built-up} + \text{Superimposed}$$

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# Back Pressure – Solutions. Solutions for Spring Loaded Safety Valves.

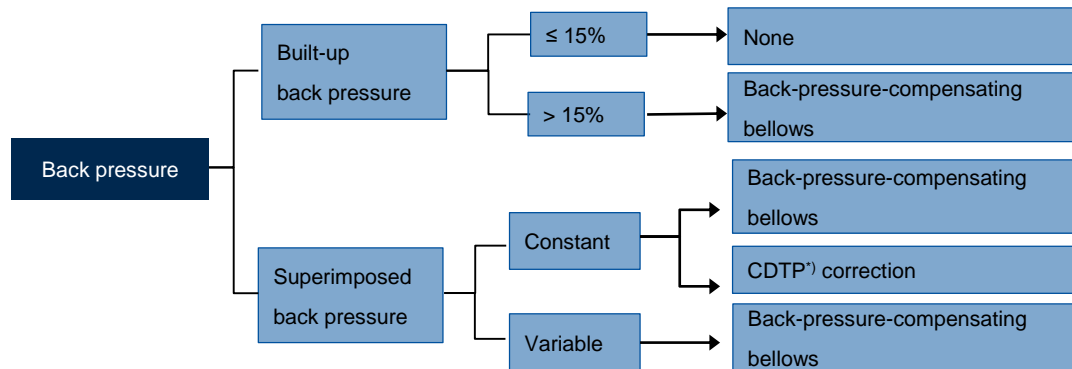
1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR

## ■ System - Reducing the built-up back pressure in the outlet pipe:

- Increasing pipe diameter
- Shorter outlet pipe

## ■ Safety valve - Product solutions:

Depending on the type of back pressure, the following measures are typically selected to prevent malfunction caused by back pressure:



\*) CDTP = Cold Differential Test Pressure

# Back Pressure – Solutions. Compensation of Back Pressure with Balanced Bellows.

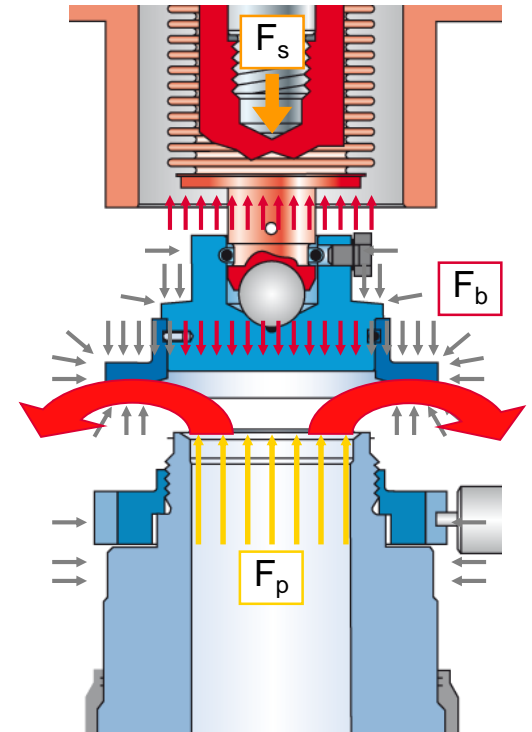
1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR

The installation of a **balanced bellows** **compensates** the force of the **back pressure** in closing direction.

The safety valve **works properly**.

Back pressure **compensation** in % of the set pressure:

- LESER API Series 526:  
**up to 50%** of the set pressure
- All other LESER safety valves:  
**up to 35%** of the set pressure



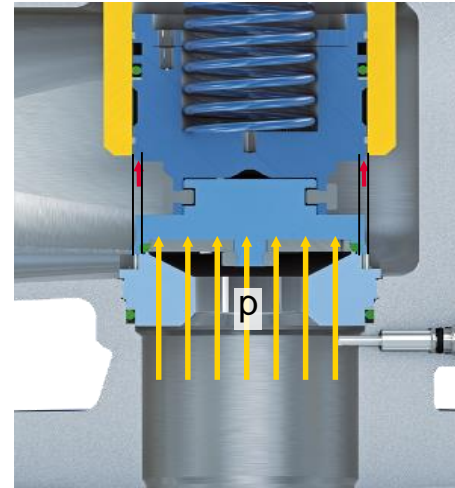
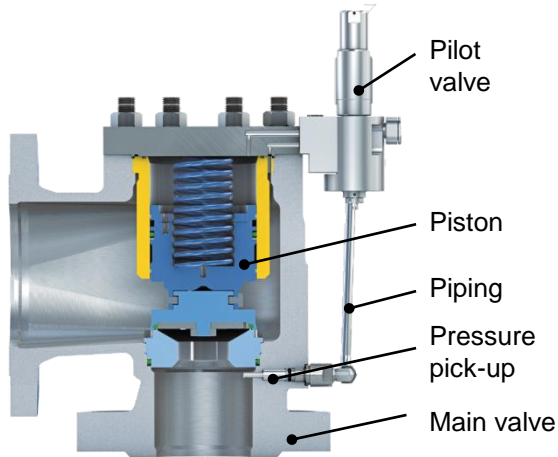
$F_p$  = Pressure force  
 $F_s$  = Spring force  
 $F_b$  = Resulting force

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# Back Pressure – Solutions. LESER POSV Series 810 and Series 820.

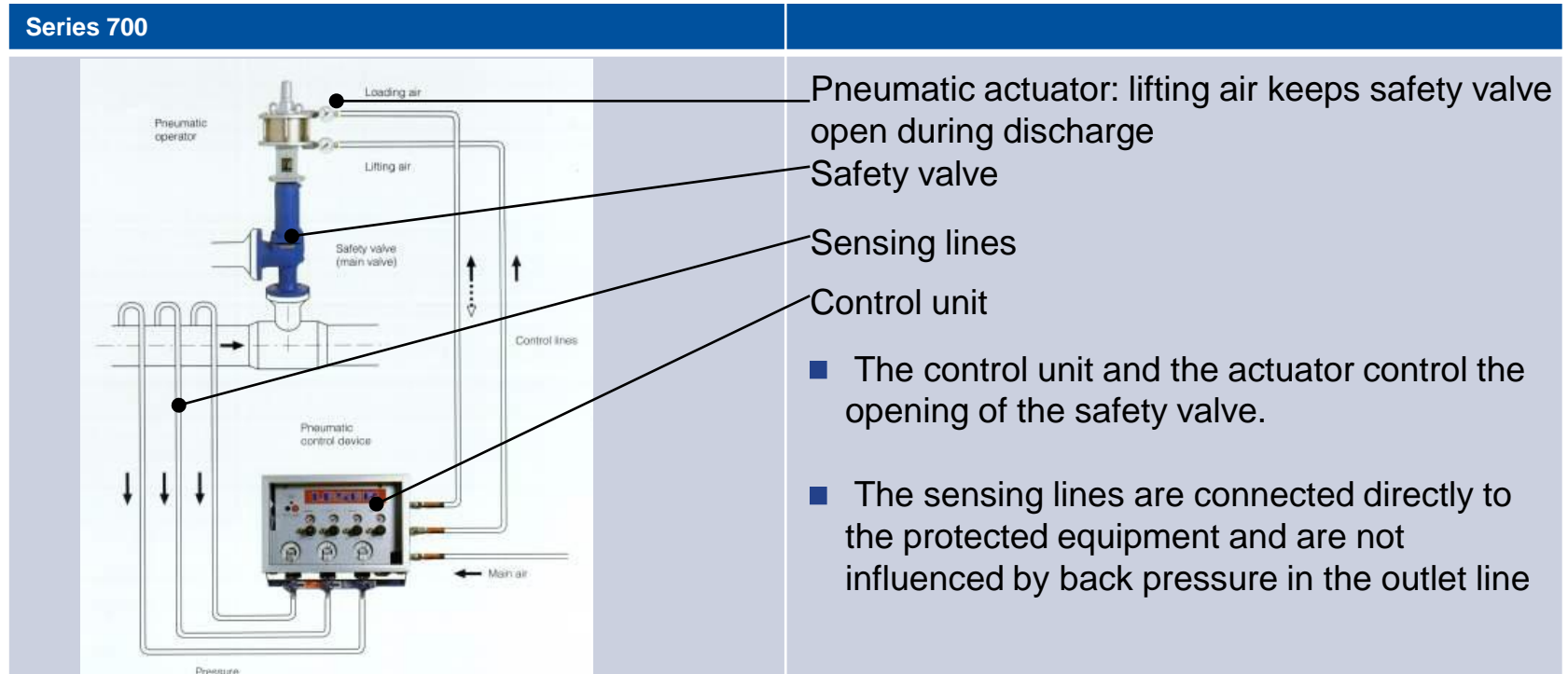
1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR



- The pilot valve controls the opening and closing of the main valve
- The pilot valve reacts only to the pressure at the valve inlet and is not influenced by the back pressure
- The maximum back pressure to set pressure ratio of a POSV is 70%

# Back Pressure – Solutions. Supplementary Loading System.

1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR



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# Calculation of built-up Back Pressure.

1. Objectives | 2. Definition | 3. Effects | 4. Solutions | 5. VALVESTAR

VALVESTAR® 7 supports the calculation of the built up back pressure based on the actual outlet piping.

Outlet Pipe designer

	Pipe #1	Pipe #2	Pipe #3	Pipe #4
DN	DN 80	-	-	-
Diameter	82,5 mm	- inch	- inch	- inch
Roughness	0,070	0,070	0,070	0,070
Length	0,5 m	- inch	- inch	- inch
Max. length	0,4 m	- inch	- inch	- inch

Eff. resistance  $\zeta$  0,114

Summary			
Pressure drop of silencer	$\Delta p$	0,5	bar
Coefficient of resistance permitted	$\zeta_l$	0,114	
Built up back pressure	pae	1,557	bar
Built-up backpressure ratio		15,60	%

Warnings

Built-up back-pressure has too high value.  
Maximum allowed pressure is  $p_{ae} = 0,15 \cdot (p - p_{af}) = 1,5$  [bar].  
Below is needed.  
Ask LESER if this valve works properly.

OK Cancel



## Back pressure

Thank you for your attention.

