

## Horizontal Installation and Shipping of Safety Valves



# Objectives of this Presentation. Knowledge to learn.

1. [Objectives](#) | 2. [Codes and Standards](#) | 3. [Approvals](#) | 4. [Statement](#) | 5. [Competitive Comparison](#) | 6. [LESER Valve Design](#) | 7. [References](#) | 8. [Horizontal Shipping](#)

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The aim of this presentation is to show the **practicability of horizontal installation** and its **preconditions**.

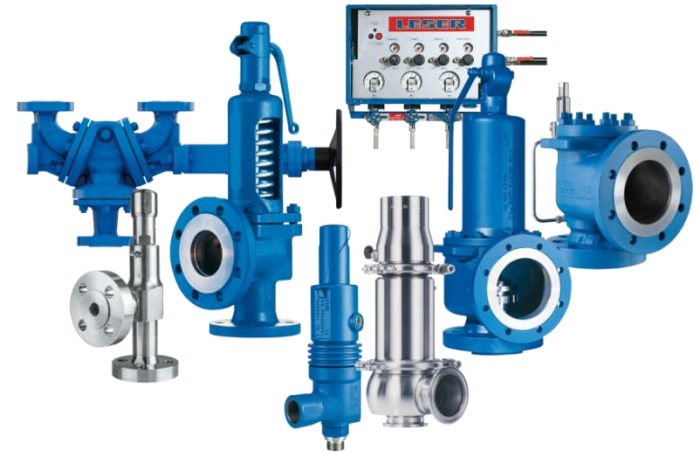


# Codes and Standards. ASME/API/ISO/AD.

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Most international standards for safety valves specify an upright position for installation of direct loaded safety valves, for example:

- **ASME Sec. VIII, Div. 1, App. M-11:**  
“Spring loaded safety valves and safety relief valves normally should be installed in the upright position with the spindle vertical. ...”
- **API 520, Part II – Installation, 7.4 –Mounting Position:**  
“Pressure relief valves should be mounted in a vertical upright position....”
- **DIN EN ISO 4126.1:**  
No statement.
- **AD 2000-Merkblatt A2, Part 6.1.2:**  
“Direct-acting safety valves are generally installed in an upright position taking the direction of flow into consideration. ...”



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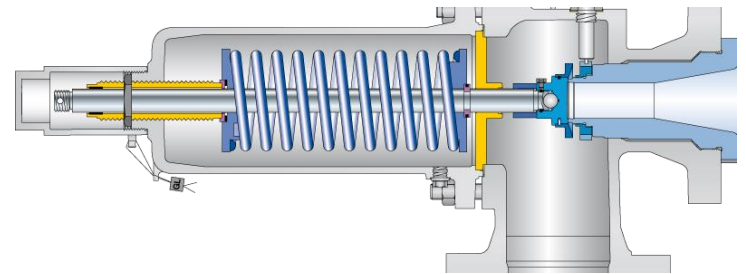
# Codes and Standards. Exceptions.

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## ASME Sec. VIII, Div. 1, App. M-11:

“... Where space or piping configuration preclude such an installation, the valve may be installed in other than the vertical position provided that:

- the valve design is satisfactory for such position
- the media is such that material will not accumulate at the inlet of the valve
- drainage of the discharge side of the valve body and discharge piping is adequate.”



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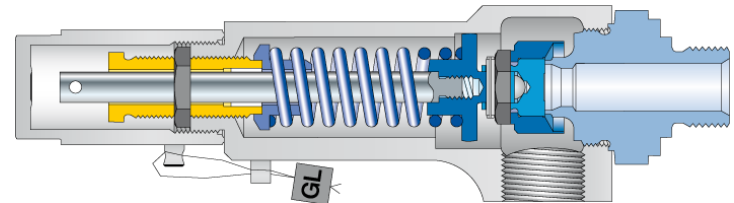
# Codes and Standards. Exceptions.

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## API 520, Part II – Installation, 7.4 – Mounting Position:

“... Installation of a pressure relief valves in other than a vertical upright position may adversely affect its operation.

The valve manufacturer should be consulted about any other mounting position, since mounting a pressure relief valve in other positions may cause a shift in the set pressure and a reduction in the degree of seat tightness.”



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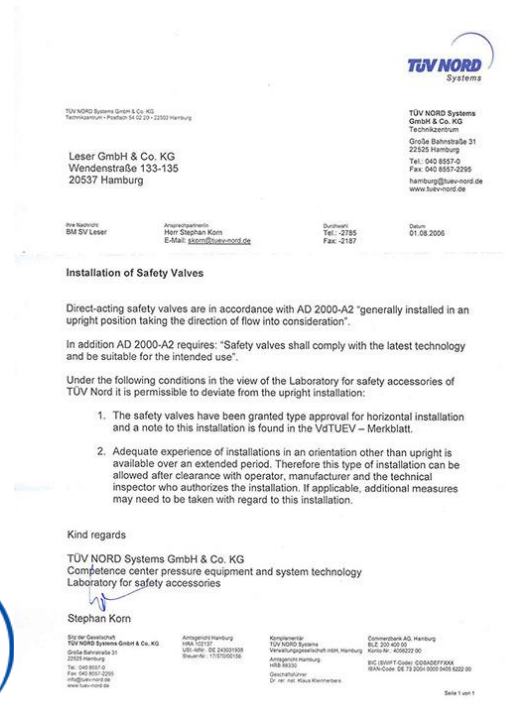
# Codes and Standards. Confirmation.

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## AD 2000-Merkblatt A2, Part 2.1:

“Safety valves shall comply with the latest technology and be suitable for the intended use.”

The notified body **TÜV Nord** confirmed the **suitability** of LESER safety valves in **non-upright position**.



# Approvals.

- The table shows LESER safety valves which are **tested and approved in non-upright position.**
- The proper operation in non-upright position is **certified in the VdTÜV type test approval.**



Approval			
Type	VdTÜV	Minimum set pressure	
	Approval No.	bar	psig
437	980	1.0	15
438	980	5.0	72.5
439	980	1.0	15
481	980	1.0	15
486 / 484 / 485	1047	1.0	15

# LESER Statement.

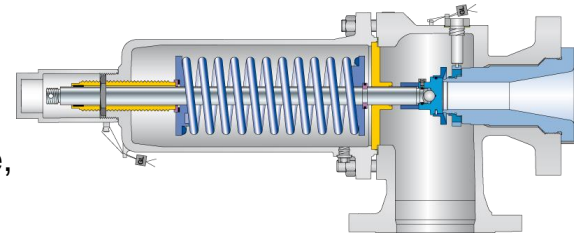
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For all other valve types the LESER statement in reference to point 2 of the TÜV Nord letter dated 01.08.2006 is as follows:

LESER confirms that it is possible to install every LESER spring loaded safety valves in a non-upright position if the following requirements are met:

- **sufficient drainage** is provided to prevent medium or condensate from parts which are important for the function of the safety valve, e.g. outlet facing downwards when installed horizontally
- **minimum set pressure:** 3 bar (45psig) unless the proper operation is confirmed by operating experience or tested at LESER test labs
- **preventive maintenance** ensures proper function of the safety valve, e.g. free drainage is checked periodically



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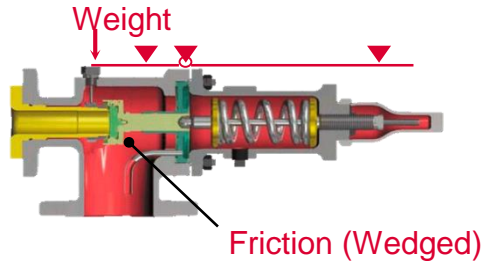
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# Competitive Comparison. Spindle Design.

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## Competitor

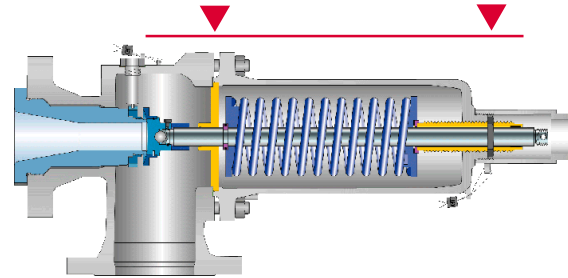


### Two piece spindle:

- heavy disc holder
- separate spindle
- short guiding

Weight of disc holder is not balanced in short guiding, leads to friction and wedging.

## LESER



### One piece spindle:

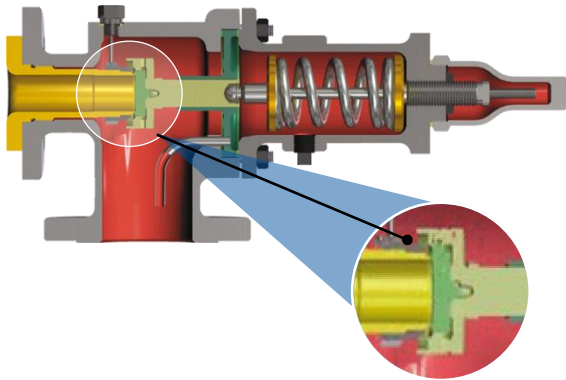
- lighter disc
- two point guiding

Weight of disc is much better balanced.

# Competitive Comparison. Clearance Nozzle-Disc.

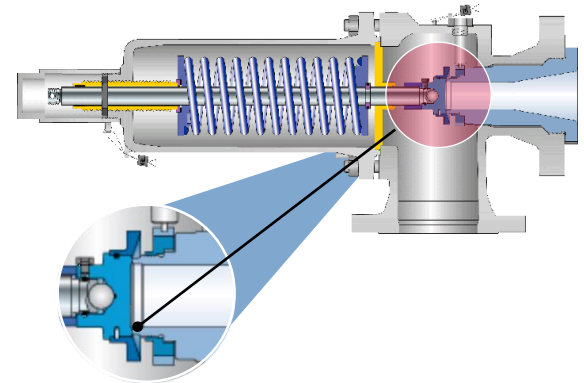
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## Competitor



- Tight tolerances between disc and adjusting ring for pop action
- **Result:** wedging/jamming

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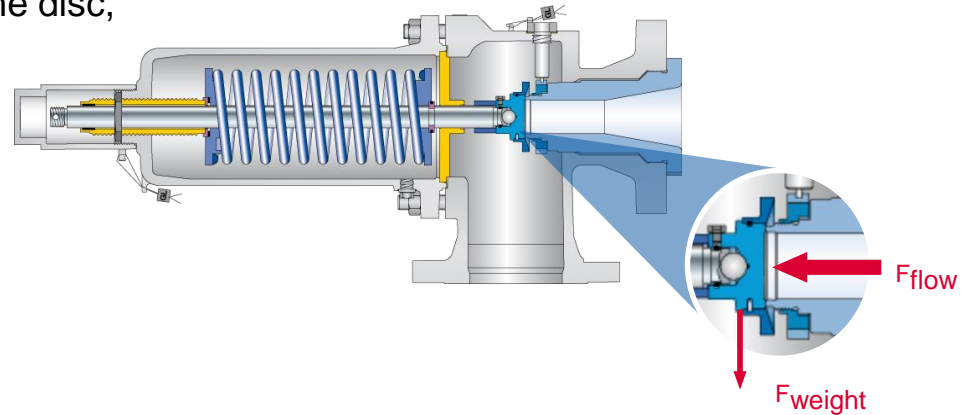


- Initial audible discharge, adjusting ring at lowest position
- **Result: no wedging / jamming**

# LESER Valve Design. Forces on the disc.

1. Objectives | 2. Codes and Standards | 3. Approvals | 4. Statement | 5. Competitive Comparison | 6. LESER Valve Design | 7. References | 8. Horizontal Shipping

- The forces on the disc created by the flow are much stronger than the forces by the weight of the disc.
- The flow forces determine the position and orientation of the disc.
- **Result:** always the same orientation of the disc, regardless of a vertically or horizontally installation of the valve.



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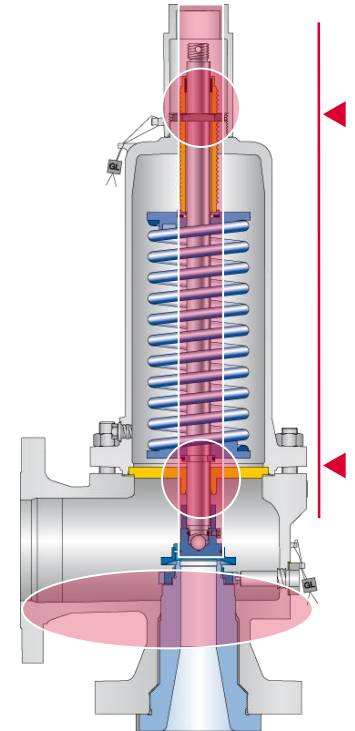
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# LESER Valve Design. Summary.

1. Objectives | 2. Codes and Standards | 3. Approvals | 4. Statement | 5. Competitive Comparison | 6. **LESER Valve Design** | 7. References | 8. Horizontal Shipping

LESERs design enables horizontal installation:

- One piece spindle
- Bushing between spindle and adjusting screw
- Widely spaced top and bottom guiding
- Reduced guiding surface area
- self-draining and flat bottomed body bowl



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## RKR GmbH

- Compressors & Blowers
- Horizontal and upside down
- Type 526 and Type 441



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## GEA Tuchenhagen

- Tank Top (Brewing tanks)
- Horizontal
- Type 488



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## SCHERING AG

- Autoclave, steam
- Horizontal
- Type 488



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## Dr. Leye Ltd.

- Metering pump
- Horizontal
- Type 437





# Horizontal Shipping.

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## Horizontally Shipping:

- on a pallet
- in card board boxes or crates
- the design features described before ensure that also horizontal shipping is unproblematic

## Tests with various valves and sizes:

- 5 transports back and forth by truck
- packing and unpacking
- final testing of tightness and function

## Advantages:

- requires little space
- less freight charge
- lower risk of damages in horizontal transport due to allocation of barycentre



**Horizontal Installation and**  
Thank you for your attention.

