

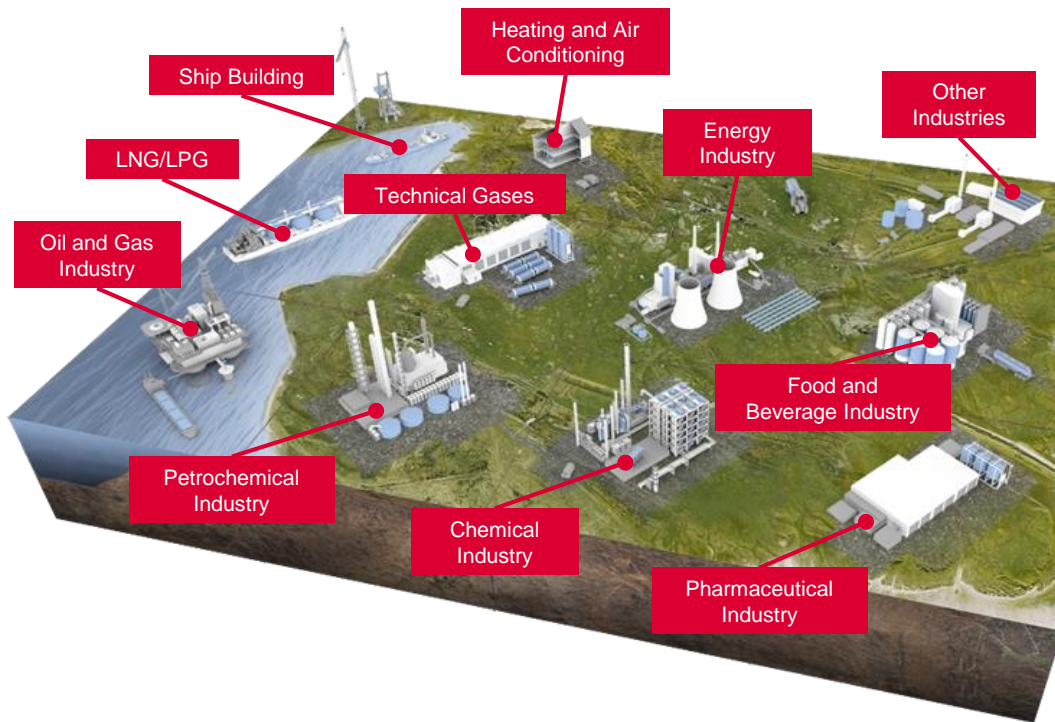
## Application Areas

All application for LESER safety valves



# Application Areas. All fields of application for LESER safety valves.

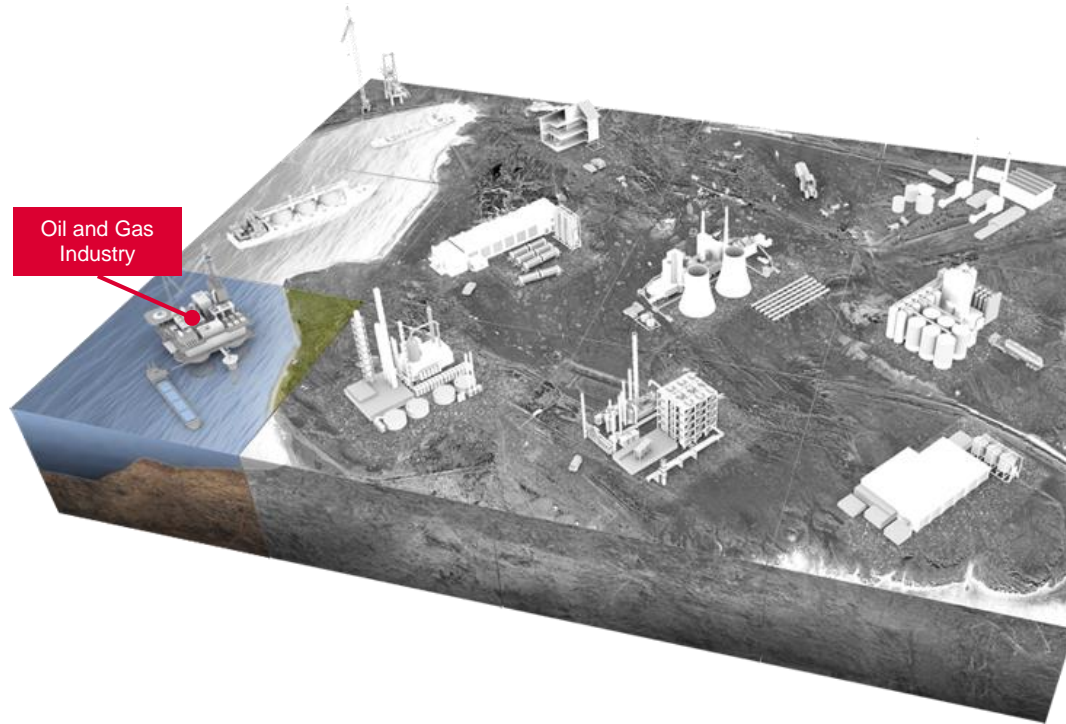
1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



# Oil and Gas Industry. Upstream / Downstream.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Oil and Gas Industry. Upstream / Downstream.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER safety valves are **used by leading companies** in the upstream (exploration, production and transportation) and downstream (cracking) **oil and gas industry**.



| Applications   | LESER references (examples)  |
|--|--|
| <ul style="list-style-type: none"><li>■ Pressurized vessels</li><li>■ Thermal expansion in piping systems</li><li>■ Pressure-increasing stations</li><li>■ Christmas trees</li></ul> | <ul style="list-style-type: none"><li>■ BP plc</li><li>■ Keppel Corporation</li><li>■ Petrobras S.A</li><li>■ PetroChina Ltd</li><li>■ Petronas</li><li>■ Royal Dutch Shell plc</li><li>■ Saudi Aramco</li><li>■ Total S.A.</li><li>■ Wintershall GmbH</li><li>■ NEUMAN &amp; ESSER</li><li>■ Joh. Heinr. Bornemann GmbH</li><li>■ SPX Flow Technology</li><li>■ Lewa GmbH</li></ul> |




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# Oil and Gas Industry. Upstream / Downstream.

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LESER understands the requirements of the oil and gas industry and can therefore offer **optimal safety for the plant and lower lifecycle costs.**

| Requirements   | LESER Product Solution  |  |
|--|---|--|
| <ul style="list-style-type: none"><li>■ High valve capacity at low weight and size</li><li>■ Corrosive environment (e.g. sea water)</li><li>■ High pressures and backpressures</li><li>■ Comprehensive documentation and customer-specific inspections</li></ul> |  | <b>API</b> <ul style="list-style-type: none"><li>■ Complies to delivery specification API 526</li><li>■ Alloys (e.g. Duplex, Hastelloy) with short delivery times</li></ul>                    |
|  |  | <b>Compact Performance</b> <ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul>                          |
|  |  | <b>High Efficiency (POSV)</b> <ul style="list-style-type: none"><li>■ Pilot-operated safety valve</li><li>■ Operating pressure close to set pressure</li><li>■ Low weight and height</li></ul> |

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# Petrochemical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. **[Petrochemical](#)** | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Petrochemical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. **[Petrochemical](#)** | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER safety valves are **used by leading companies in the Petrochemical Industry worldwide.**



| Applications   | LESER references (examples)  |
|--|--|
| <ul style="list-style-type: none"><li>■ Pressurized vessels</li><li>■ Thermal expansion in piping systems</li><li>■ Pressure-increasing stations</li><li>■ Rectification columns</li></ul> | <ul style="list-style-type: none"><li>■ BP plc</li><li>■ Chevron Corporation</li><li>■ Conoco Phillips Company</li><li>■ Exxon Mobil Corporation</li><li>■ Petrobras S.A.</li><li>■ Petronas</li><li>■ Royal Dutch Shell plc Petrobras</li><li>■ Saudi Aramco</li><li>■ SABIC</li><li>■ Total S.A.</li></ul> |

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# Petrochemical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. **[Petrochemical](#)** | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER understands the requirements of the Petrochemical industry and can therefore offer optimal safety for the plant and lower lifecycle costs.

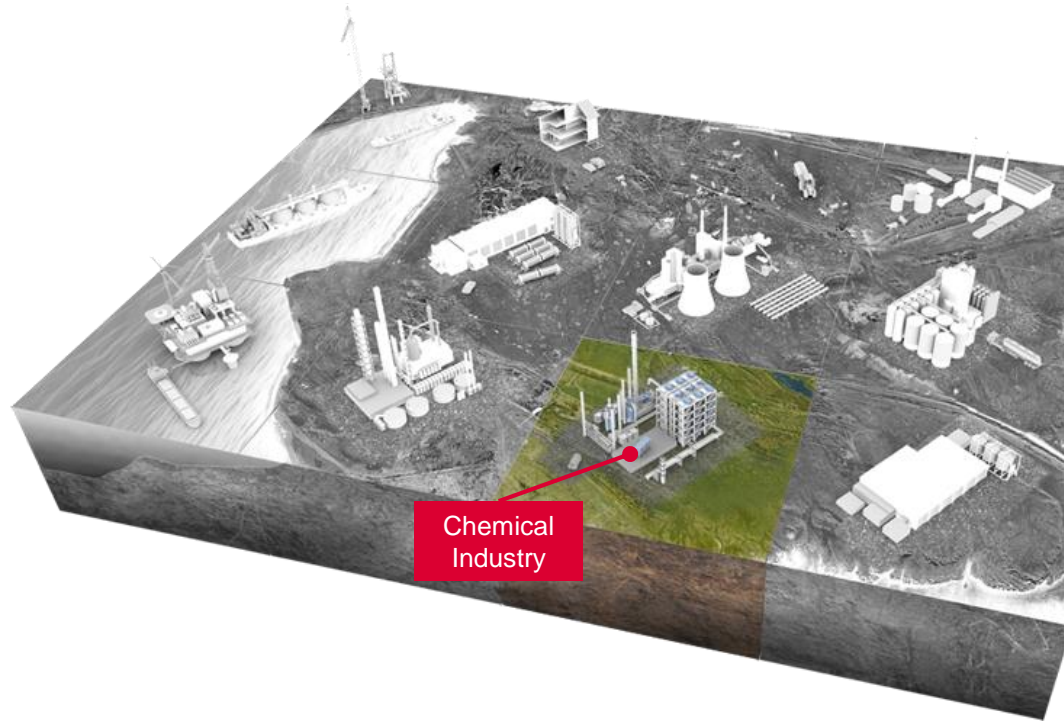
| Requirements  | LESER Product Solution  |  |
|---|---|--|
| <ul style="list-style-type: none"><li>■ High valve capacity at low weight and size</li><li>■ High pressures and backpressures</li><li>■ Comprehensive documentation and customer-specific inspections</li></ul> |  | <b>API</b> <ul style="list-style-type: none"><li>■ Complies to delivery specification API 526</li><li>■ Alloys (e.g. Duplex, Hastelloy) with short delivery times</li></ul>                    |
|   |  | <b>Compact Performance</b> <ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul>                          |
|   |  | <b>High Efficiency (POSV)</b> <ul style="list-style-type: none"><li>■ Pilot-operated safety valve</li><li>■ Operating pressure close to set pressure</li><li>■ Low weight and height</li></ul> |



# Chemical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. **[Chemical](#)** | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

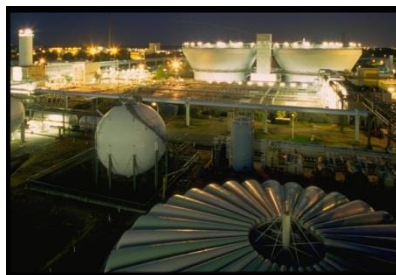
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# Chemical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. **[Chemical](#)** | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER safety valves are **used by leading companies in the chemical industry** for a **variety of applications with gas, steam and liquid.**



Photos courtesy of Chemiepark Hoechst



| Applications   | LESER references (examples)   |
|--|---|
| <ul style="list-style-type: none"><li>■ Pressurized vessels</li><li>■ Thermal expansion in piping systems</li><li>■ Pressure-increasing stations</li><li>■ Chemical reactors or autoclaves</li></ul> | <ul style="list-style-type: none"><li>■ Akzo Nobel N.V.</li><li>■ BASF SE</li><li>■ Bayer AG</li><li>■ Dow Chemical Company</li><li>■ Eastman Chemical Company</li><li>■ Evonik Industries AG</li><li>■ Merck KGaA</li><li>■ Sinopec Yangyi Company</li><li>■ Solvay S.A.</li><li>■ Wacker Chemie AG</li><li>■ Yihsheng</li></ul> |

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LESER has been **working with leading chemical companies for decades** and could therefore **develop a range of products ideally suited to their needs.**

## Requirements

- Wide product range for gas, steam and liquid
- Lower total costs of ownership and easy maintenance
- Suitability for aggressive and toxic media

## LESER Product Solution

- All LESER valves have Single Trim (identical internal parts for steam/gas/liquids) for economical maintenance



### High Performance

- High blow-off capacity in comparison to valve size
- Universal valve for many applications



### Critical Service

- PTFE for highly-corrosive media
- Economical alternative to high-alloyed materials



### Compact Performance

- For high pressure up to 850 bar
- For small and medium capacities (e.g. thermal expansion)

# Chemical Industry. Urea Plants.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. **[Chemical](#)** | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER valves are **used by Urea plants and licensors around the world.**  
In close cooperation with the industry, LESER developed an **application solution for the protection of the highly corrosive Carbamate in the synthesis reactor.**



| Applications  | LESER references (examples)  |
|---|--|
| <ul style="list-style-type: none"><li>■ Protection of the Urea Synthesis Reactor</li><li>■ CO2 – Compressor</li><li>■ NH3 - Pump (liquid)</li><li>■ Stripper</li><li>■ Recirculations</li></ul> | <ul style="list-style-type: none"><li>■ Stamicarbon B.V.<ul style="list-style-type: none"><li>– Tierra del Fuego/ Argentina</li><li>– Wushen/ China</li><li>– Hulun Buir/ China</li></ul></li><li>■ Uhde GmbH<ul style="list-style-type: none"><li>– Damietta/ Egypt</li><li>– Arzew/ Algeria</li></ul></li><li>■ Uraca</li><li>■ Räcklebe &amp; Tötz<ul style="list-style-type: none"><li>– SKW Piesteritz/ Germany</li></ul></li></ul> |

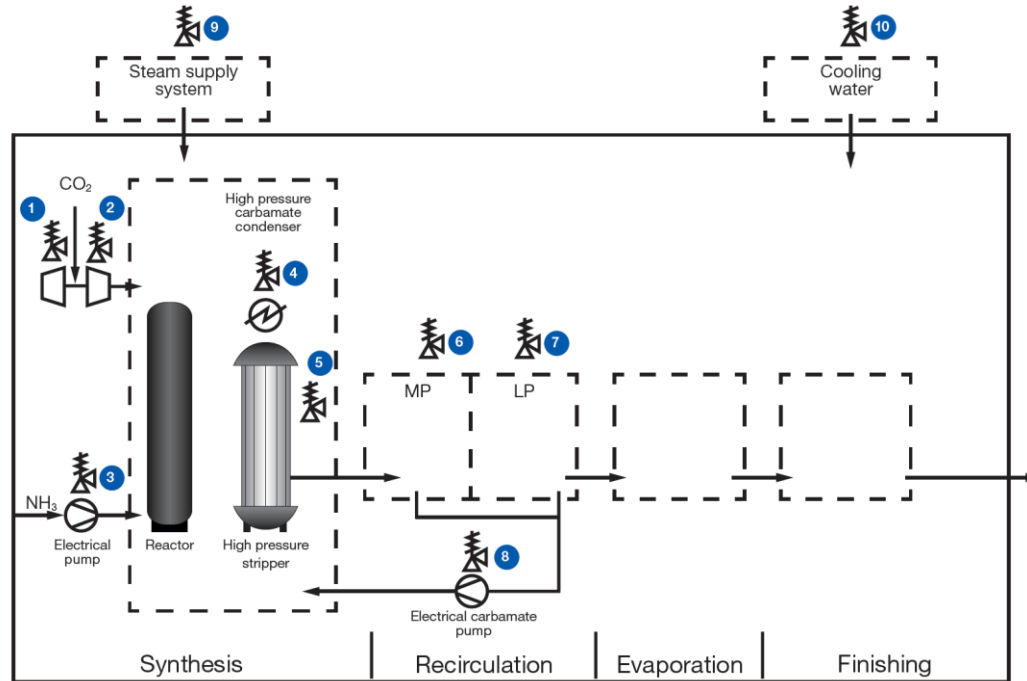
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# Chemical Industry. Urea Plants.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. **[Chemical](#)** | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

## Setup of a Urea plant:



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# Chemical Industry. Urea Plants.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. **[Chemical](#)** | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER has more than ten years experience with steam purging. This experience is the basis for the **innovative refinement of the steam purging for the Urea synthesis protection.**

## Requirements

- Prevention of corrosion
- Prevention of crystallisation of the carbamate
- High set pressures
- High temperatures

## LESER Product Solution



### API in Urea Synthesis Configuration

- Corrosion-resistant materials
- Minimized steam requirement
- Only one steam cycle necessary
- Permanently steam purged



### API

- Suitable for a wide range of applications throughout the urea plant
- Alloys (e.g. Duplex, Hastelloy) with short delivery times

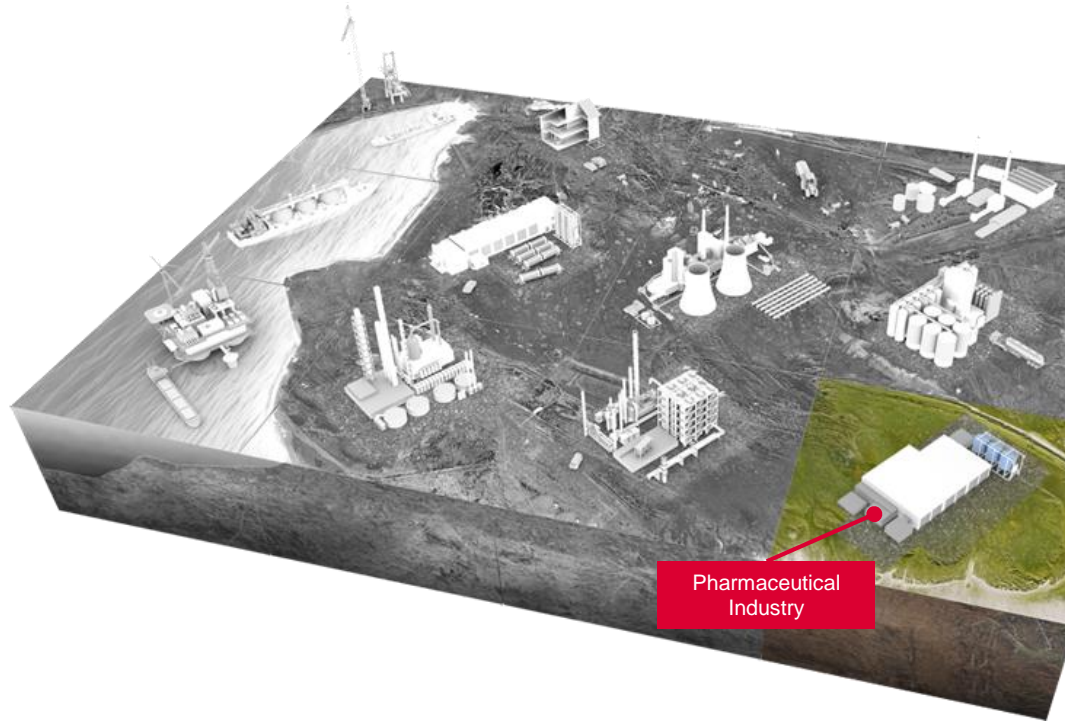
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# Pharmaceutical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. **[Pharmaceutical](#)** | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Pharmaceutical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. **Pharmaceutical** | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



LESER safety valves are **used by leading companies in the Pharmaceutical Industry** which fulfill all the special **requirements regarding the cleanability, materials and documentation**. LESER provides safety valves **for all hygienic applications as well as for utilities**.

| Applications   | LESER references (examples)  |
|--|--|
| <ul style="list-style-type: none"><li>■ Pressurized vessels</li><li>■ Piping systems</li><li>■ Reaction vessels</li><li>■ Filling stations</li></ul> | <ul style="list-style-type: none"><li>■ AstraZeneca plc</li><li>■ Bayer AG</li><li>■ Boehringer Ingelheim AG &amp; Co. KG</li><li>■ F. Hoffmann-La Roche AG</li><li>■ Fresenius Medical Care Ag &amp; Co. KGaA</li><li>■ L`Oreal S.A.</li><li>■ Merck KGaA</li><li>■ Novartis International AG</li><li>■ Pfizer Inc.</li></ul> |

# Pharmaceutical Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. **Pharmaceutical** | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER has more than ten years experience with steam purging. This experience is the basis for the **innovative refinement of the steam purging for the Urea synthesis protection.**

## Requirements

- Excellent cleanability
- Regulation-compliant materials
- Wide range of aseptic connections

## LESER Product Solution



### Clean Service

- Low dead space
- Made of stainless steel in industry-specific surface grades
- Elastomer bellows



### Compact Performance

- For high pressure up to 850 bar
- For small capacities e.g. in thermal expansion

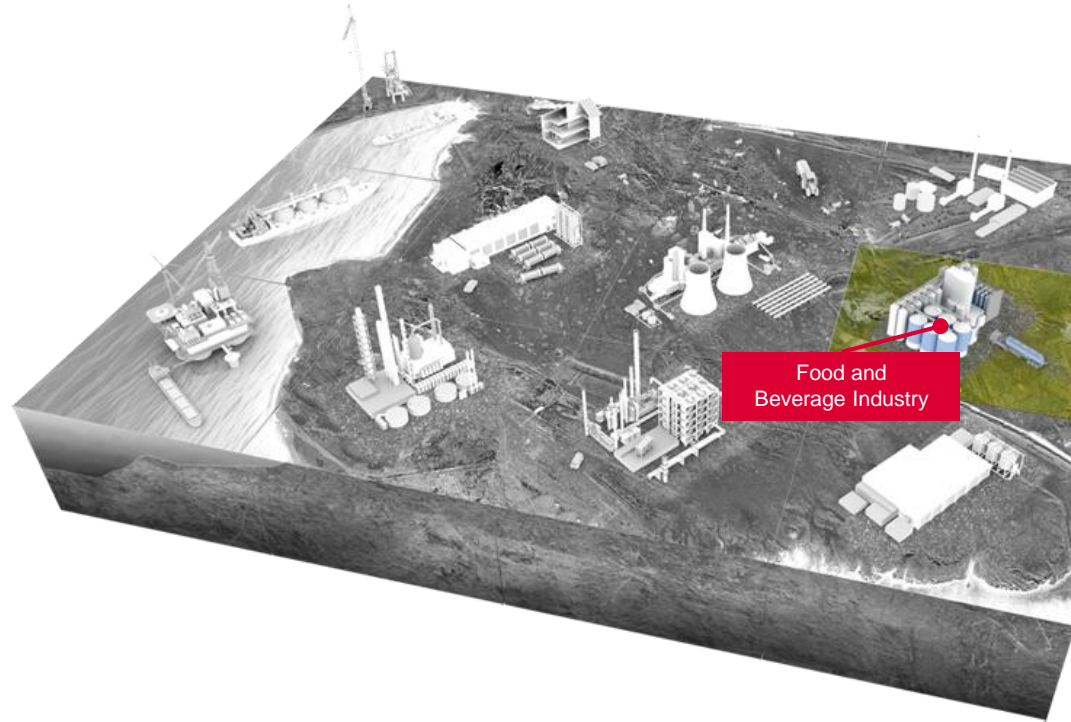
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# Food and Beverage Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. **F & B** | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Food and Beverage Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



LESER offers safety valves which **fulfill all the special requirements regarding the cleanability and tightness of the food and beverage industry**. LESER provides safety valves for all **hygienic applications as well as for utilities**.

| Applications  | LESER references (examples)  |
|---|--|
| <ul style="list-style-type: none"><li>■ Sterilized Vessels</li><li>■ Solidifying media</li><li>■ Filling stations</li></ul> | <ul style="list-style-type: none"><li>■ Anheuser Busch Companies, Inc.</li><li>■ GEA Group AG</li><li>■ Guinness Brewery</li><li>■ Krones AG</li><li>■ Nestlé S.A.</li><li>■ Procter &amp; Gamble Company</li><li>■ PepsiCo, Inc.</li><li>■ Tetra Pak International S.A.</li><li>■ Unilever N.V.</li></ul> |

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# Food and Beverage Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. **F & B** | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER understands the requirements of the food and beverage industry and can therefore offer **optimal safety for the plant and lower lifecycle costs.**

## Requirements

- Good cleanability
- Approvals for global application
- Lower total costs of ownership
- Smaller valve size
- Simple and sturdy design

## LESER Product Solution



### Clean Service

- Low dead space
- Made of stainless steel
- Optional pneumatic lifting



### High Performance

- For high span of temperature  
-270°C to 550°C
- High discharge capacity relative  
to valve size

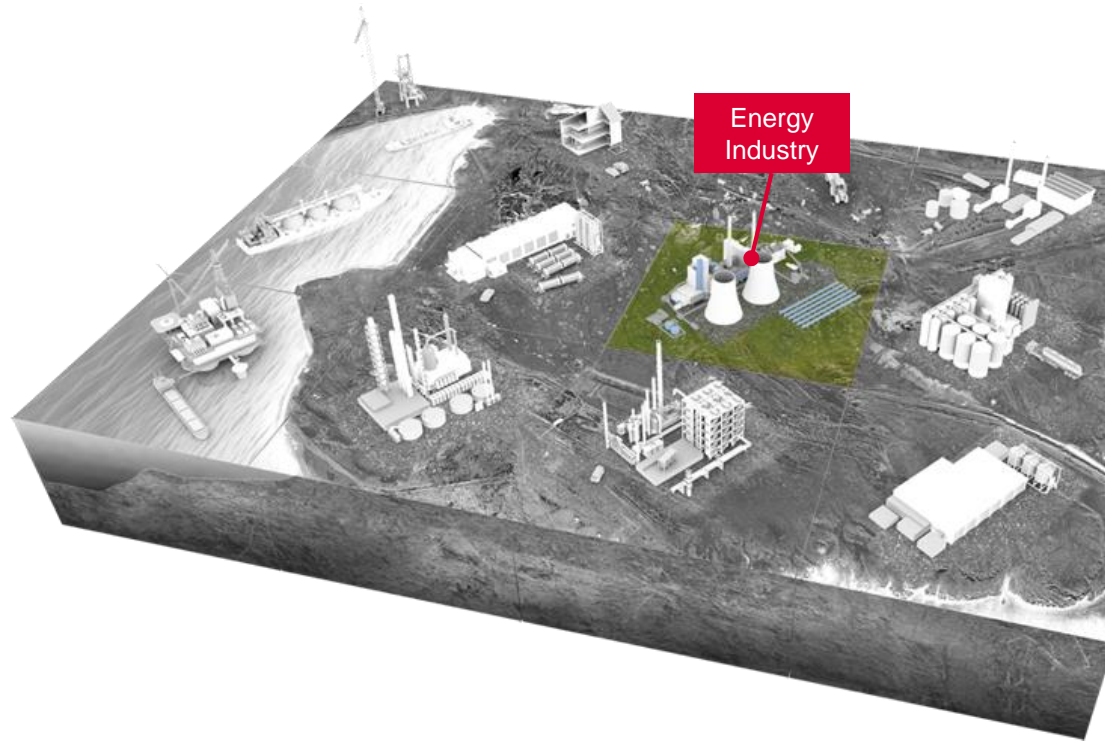
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# Energy Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **[Energy](#)** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Energy Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **Energy** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



In the energy industry safety valves are used in conventional power plants and for renewable energies. In order to **use the plants at high pressures and high temperatures at possibly fullest capacity**, the plants are operated as close as possible to the set pressure. LESER supplies **safety valves for all applications within the power generation** and enables with its products a **positive utilization of the plant**.

| Applications  | LESER references (examples)  |
|---|--|
| <ul style="list-style-type: none"><li>■ Boilers</li><li>■ Superheaters</li><li>■ Turbines</li><li>■ Thermal expansion</li></ul> | <ul style="list-style-type: none"><li>■ Siemens AG</li><li>■ Vattenfall Europe AG</li><li>■ EON</li><li>■ RWE</li><li>■ HESCH Industrietechnik</li><li>■ VKK Standardkessel Köthen GmbH</li><li>■ FISIA BABCOCK ENVIRONMENT GMBH</li><li>■ ALSTOM Power Service GmbH</li></ul> |

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# Energy Industry.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **Energy** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

LESER understands the requirements of the Energy Industry and can therefore offer **optimal safety for all power plants.**

| Requirements  | LESER Product Solution  |
|---|---|
| <ul style="list-style-type: none"><li>■ High pressures and backpressures</li><li>■ Set pressure near to operating pressure</li><li>■ Low lifecycle cost</li></ul> | <div><b>High Performance</b><ul style="list-style-type: none"><li>■ High blow-off capacity in comparison to valve size</li><li>■ Universal valve for many applications</li></ul></div>                                       |
|   | <div><b>Compact Performance</b><ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul></div>  |
|   | <div><b>High Efficiency</b><ul style="list-style-type: none"><li>■ Supplementary Loading System</li><li>■ Operating pressure close to set pressure</li><li>■ Opening process is independent of back pressure</li></ul></div> |

# Energy Industry. Concentrated Solar Power Plants..

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **[Energy](#)** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



Photo: Schott AG

LESER has **much experience** in the field of **solar power plants** and **offers specially developed standardized safety valves** even for the **application of heat carrier oils**. With the standardization of the safety valves **tried and tested solutions** and **short delivery times** are **guaranteed**.

| Applications  | LESER references (examples)   |
|---|---|
| <ul style="list-style-type: none"><li>■ Solar field with thermo oil or water / saturated steam</li><li>■ Heat exchangers</li><li>■ Tanks</li><li>■ Power plants</li></ul> | <ul style="list-style-type: none"><li>■ Abengoa Solar</li><li>■ Abener Energia, S.A.</li><li>■ MAN Solar Millenium</li><li>■ Helios 1 Hyperion Energy</li><li>■ Foster Wheeler Energia</li><li>■ Novatec Solar</li><li>■ GDF SUEZ / Solar Power Group</li></ul> |

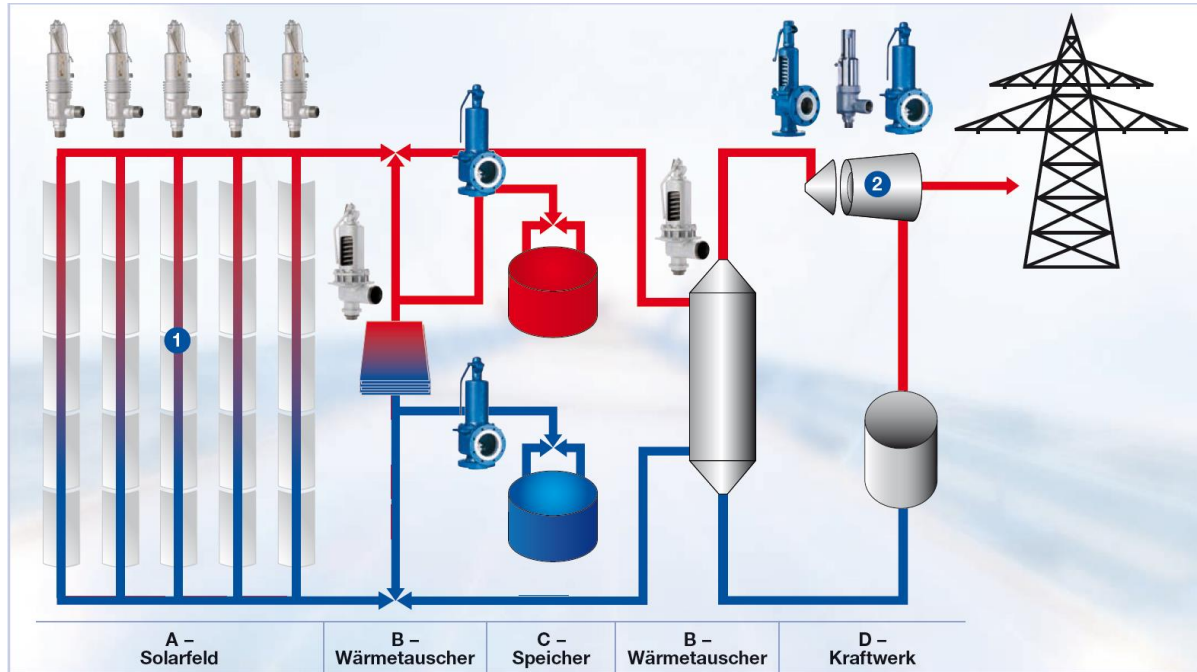
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# Energy Industry. Concentrated Solar Power Plants.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **Energy** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



Setup of a solar thermal power plant:



# Energy Industry. Concentrated Solar Power Plants.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. **[Energy](#)** | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

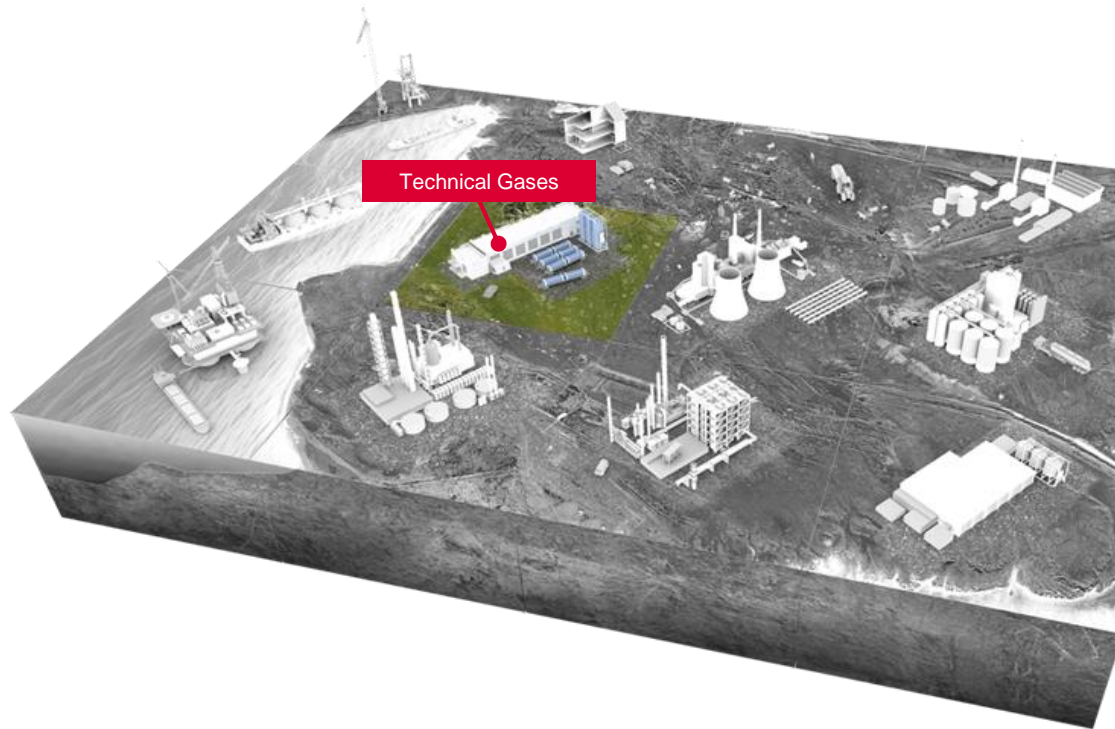
LESER understands the requirements of concentrated solar power plants and can therefore offer **optimal safety for this type of power generation.**

| Requirements   | LESER Product Solution   |
|--|--|
| <ul style="list-style-type: none"><li>■ Good heat resistance</li><li>■ No external loss of creeping medium</li><li>■ Compensation for high backpressure</li><li>■ Protection of small up to very high capacities</li><li>■ Resistance to salt corrosion for heat storage</li></ul> | <div><ul style="list-style-type: none"><li>■ <b>Compact Performance in Solar configuration</b></li><li>■ For set pressure up to 40 bar</li><li>■ Temperatures up to 400 °C</li><li>■ Special materials, sealings and connections</li></ul></div> <div><ul style="list-style-type: none"><li>■ <b>API in Solar configuration</b></li><li>■ For medium and high capacities</li><li>■ Special materials, sealings and connections</li></ul></div> |

# Technical Gases.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. **Technical Gases** | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

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# Technical Gases.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. **Technical Gases** | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)



**LESER safety valves are used by leading companies in the technical gases industry for gas storage and processing.**

| Applications  | LESER references (examples)  |
|---|--|
| <ul style="list-style-type: none"><li>■ Thermal expansion in piping systems</li><li>■ Pressure-increasing stations</li><li>■ Vessels and other process equipment</li><li>■ Air separation</li></ul> | <ul style="list-style-type: none"><li>■ Air Liquide S.A.</li><li>■ Air Products &amp; Chemicals, Inc</li><li>■ Cepsa S.A.</li><li>■ Enagas S.A.</li><li>■ Linde AG</li><li>■ Messer Group GmbH</li><li>■ Petronas</li><li>■ Tyczka GmbH &amp; Co KGaA</li><li>■ Westfalen AG</li></ul> |




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# Technical Gases.

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LESER understands the requirements of the Technical Gases industry and can therefore **offer optimal safety for the plant and lower lifecycle costs.**

| Requirements  | LESER Product Solution  |
|---|---|
| <ul style="list-style-type: none"><li>■ High valve capacity at low weight and size</li><li>■ High pressures and backpressures</li><li>■ Comprehensive documentation and customer-specific inspections</li></ul> |  <b>High Performance</b> <ul style="list-style-type: none"><li>■ For high span of temperature -270°C to 550°C</li><li>■ Flange connection according to DIN EN, ASME BPE or other</li></ul> |
|   |  <b>Compact Performance</b> <ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul>                     |
|   |  <b>API</b> <ul style="list-style-type: none"><li>■ Complies to delivery specification API 526</li><li>■ Alloys (e.g. Duplex, Hastelloy) with short delivery times</li></ul>               |

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# LNG/LPG.

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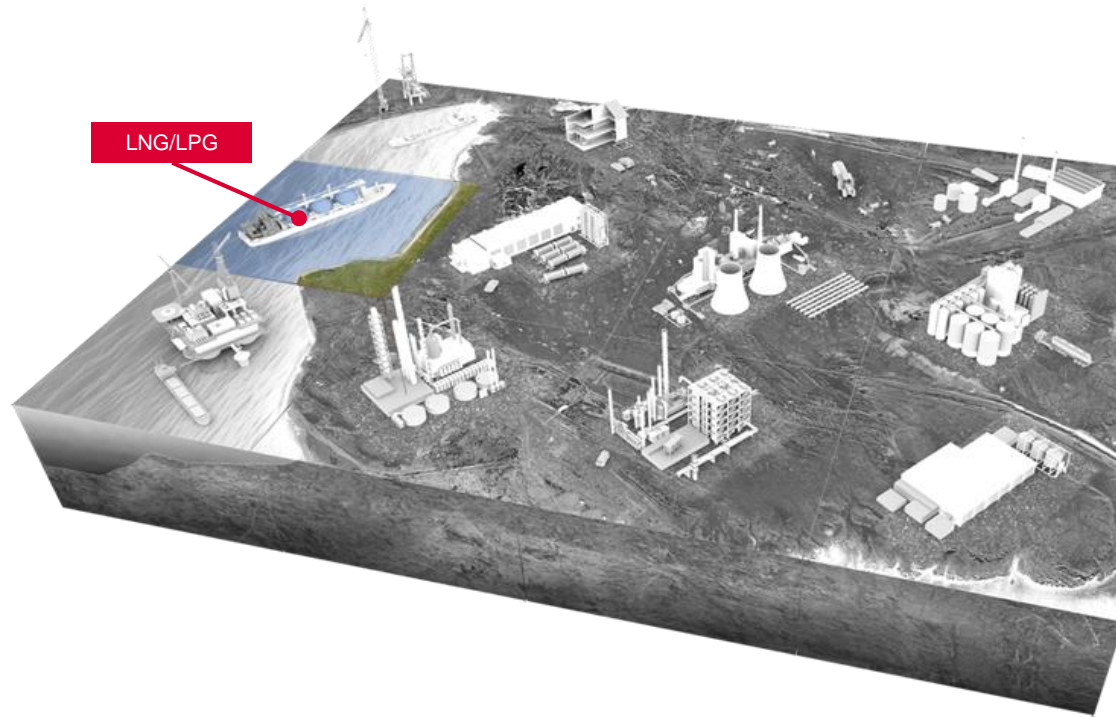







Photo: Shell International Ltd

The gases LNG and LPG liquefied for transport purposes make requirements on **safety valves concerning low temperatures and tightness**. The standard stainless steel designs of the LESER safety valves can be **applied for temperatures up to -270° C**.

**LESER has the approvals for LNG and LPG.**

| Applications  | LESER references (examples)   |
|---|---|
| <ul style="list-style-type: none"><li>■ LNG Carrier</li><li>■ LNG Liquefaction</li><li>■ LNG Regasification</li></ul> | <ul style="list-style-type: none"><li>■ TGE</li><li>■ Hamworthy</li><li>■ Hartmann Schiffahrt</li><li>■ P.I.A Pitow Industrieausrüstungen</li></ul> |

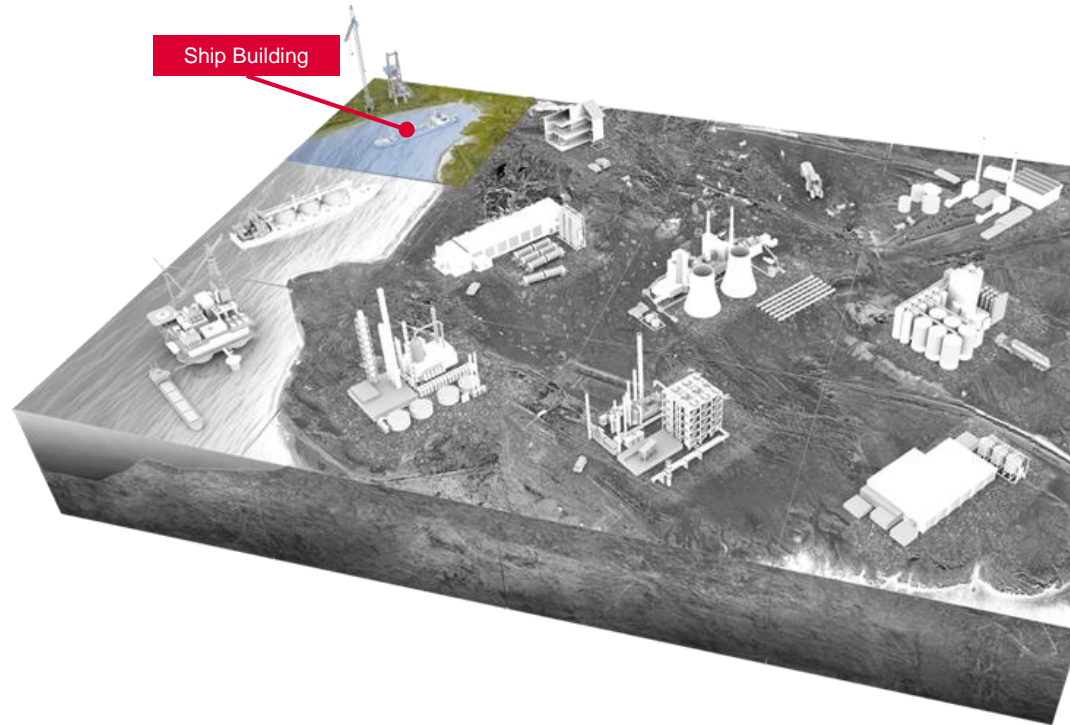
LESER understands the requirements of the LNG/LPG industry and can therefore offer **optimal safety for all applications as well as for utilities.**

| Requirements   | LESER Product Solution  |  |
|--|---|--|
| <ul style="list-style-type: none"><li>■ Operation in cryogenic environments</li><li>■ Sealing plates</li><li>■ High and low pressures</li><li>■ One-piece spindle for optimised setting accuracy</li></ul> |  | <b>High Performance</b> <ul style="list-style-type: none"><li>■ High blow-off capacity in comparison to valve size</li><li>■ Universal valve for many applications</li></ul> |
|  |  | <b>Compact Performance</b> <ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul>        |
|  |  | <b>API</b> <ul style="list-style-type: none"><li>■ Complies to delivery specification API 526</li><li>■ Alloys (e.g. Duplex, Hastelloy) with short delivery times</li></ul>  |

# Ship Building.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. **[Ship Building](#)** | 11. [HVAC](#) | 12. [Other](#)

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# Ship Building.

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In the classic shipbuilding there are two application areas for safety valves: all **systems for the operation of a ship** and **the necessary systems for the transport of liquids or gases**.

LESER has **approvals of the worldwide leading classification societies**. Inspections are made daily for many societies which **guarantees accelerated deliveries and short delivery times**. By means of worldwide stocks **short delivery times can also be assured for spareparts**.



Photo: TGE Marine Gas Engineering GmbH

| Applications  | LESER references (examples)  |
|---|--|
| <ul style="list-style-type: none"><li>■ Circulation of steam, water, fuels and lubricants</li><li>■ Protection of chemicals, oil or gas</li></ul> | <ul style="list-style-type: none"><li>■ Kröger Werft GmbH &amp; Co.KG</li><li>■ MEYER WERFT GmbH</li><li>■ Lehnkering Reederei GmbH</li><li>■ Bauer Kompressoren GmbH</li><li>■ J. P. Sauer &amp; Sohn</li><li>■ MAN Diesel &amp; Turbo SE</li><li>■ Hamworthy Serck Como GmbH</li><li>■ TGE</li></ul> |

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# Ship Building.

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LESER understands the requirements of the ship building industry and can therefore offer **optimal safety for all necessary applications as well as for utilities.**

## Requirements

- Seawater resistance
- Short delivery times worldwide
- Extensive documentation and inspection program
- Approval of the relevant classification societies

## LESER Product Solution



### High Performance

- High blow-off capacity in comparison to valve size
- Universal valve for many applications



### API

- Complies to delivery specification API 526
- Alloys (e.g. Duplex, Hastelloy) with short delivery times



### Compact Performance

- For high pressure up to 850 bar
- For small capacities e.g. in thermal expansion

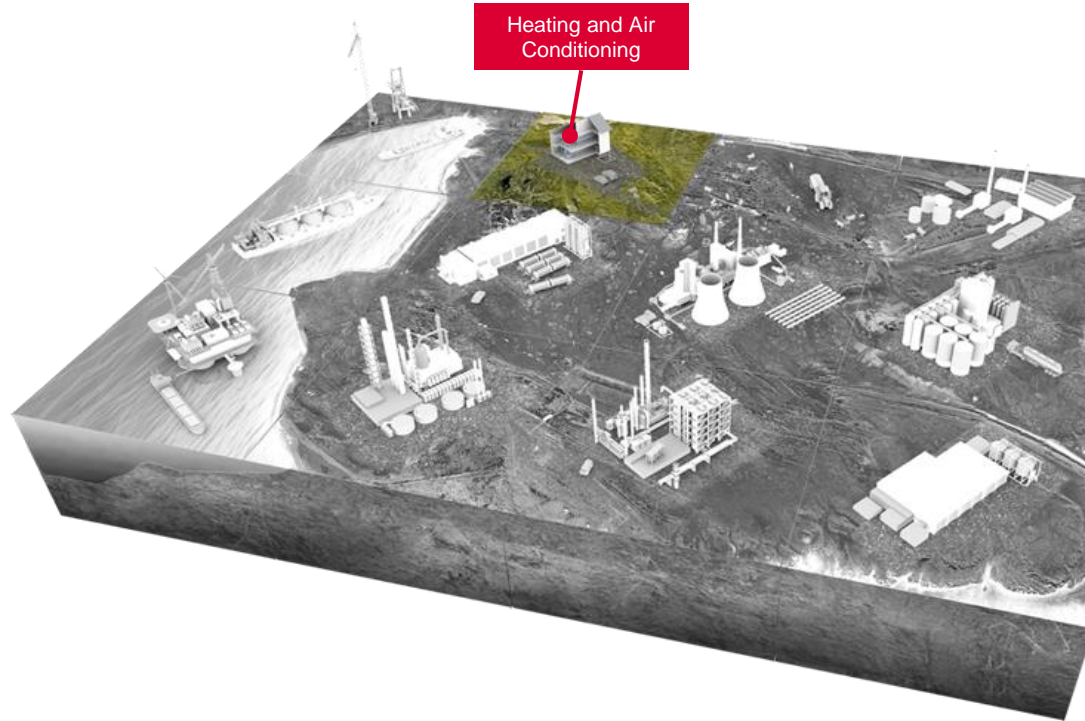
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# Heating and Air Conditioning.

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# Heating and Air Conditioning.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)

In the Heating and Air Conditioning Industry the **TRD 721 is the central regulation**. Clause 5 and 6 define concrete requirements for the safety valve design.

LESER enables a **very easy order process** and **offers short delivery times by means of stock holding of all components**.



| Applications  | LESER references (examples)   |
|---|---|
| <ul style="list-style-type: none"><li>■ TRD-721 clause 6: Water heating systems up to 120° C with soft sealing disc and elastomer bellows</li><li>■ TRD 721 clause 5: Steam generator up to 1 bar overpressure with metallic sealing disc and elastomer bellows</li></ul> | <ul style="list-style-type: none"><li>■ Max Weishaupt GmbH</li><li>■ Siegle &amp; Epple GmbH &amp; Co. KG</li><li>■ Deinzer + Weyland GmbH</li><li>■ Karl Lausser GmbH</li><li>■ Cordes &amp; Graefe KG</li><li>■ Hermann Stitz &amp; Co. KG</li><li>■ HTI Gienger KG</li></ul> |

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# Heating and Air Conditioning.

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LESER understands the requirements of the Heating and Air Conditioning industry and can therefore **offer optimal safety for all applications.**

## Requirements

- Easy ordering
- Short delivery times
- Simple and sturdy design

## LESER Product Solution



### S&R

- Optimised for heating and air conditioning requirements
- Flanged safety valves according to TRD 721
- In-line safety valves

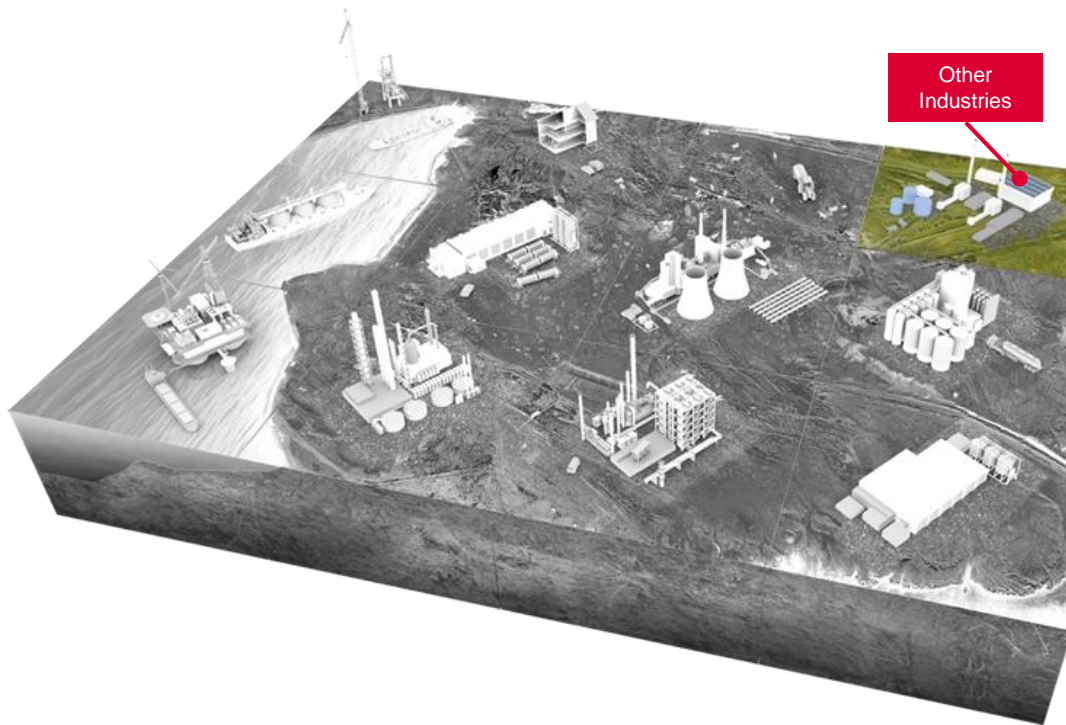
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# Other Industries.

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## Other Industries.

1. [Overview](#) | 2. [Oil & Gas](#) | 3. [Petrochemical](#) | 4. [Chemical](#) | 5. [Pharmaceutical](#) | 6. [F & B](#) | 7. [Energy](#) | 8. [Technical Gases](#) | 9. [LNG/LPG](#) | 10. [Ship Building](#) | 11. [HVAC](#) | 12. [Other](#)






Every industrial plant has its specialties and must correspondingly been considered individually. Consequently, pressure, backpressure, temperatures and media are highly different. LESER supplies **safety valves for all applications**. Besides standard products LESER also realizes **customer-specific solutions**.

| Applications  | LESER references (examples)   |
|---|---|
| <ul style="list-style-type: none"><li>■ Individual requirements</li><li>■ Standard products</li><li>■ Delivery on time</li><li>■ Paper mills</li><li>■ Gas caverns</li><li>■ Pipeline construction</li><li>■ Fire extinguishing systems</li></ul> | <ul style="list-style-type: none"><li>■ Aerzner GmbH &amp; Co. KG</li><li>■ Alstom S.A.</li><li>■ Atlas Copco AB</li><li>■ Enerflex Systems Ltd.</li><li>■ Herrenknecht AG</li><li>■ Pall Corporation</li><li>■ Siemens AG</li><li>■ Tetra Pak S.A.</li></ul> |

## Other Industries.

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LESER understands the requirements of all industries and can therefore **offer optimal safety for all applications as well as for utilities.**

| Requirements  | LESER Product Solution  |  |
|---|---|--|
| <ul style="list-style-type: none"><li>■ Individual requirements</li><li>■ Standard products and individual solutions</li><li>■ On time delivery</li><li>■ Approvals for worldwide application</li></ul> |  | <b>API</b> <ul style="list-style-type: none"><li>■ Complies to delivery specification API 526</li><li>■ Alloys (e.g. Duplex, Hastelloy) with short delivery times</li></ul>                    |
|   |  | <b>Compact Performance</b> <ul style="list-style-type: none"><li>■ For high pressure up to 850 bar</li><li>■ For small capacities e.g. in thermal expansion</li></ul>                          |
|   |  | <b>High Efficiency (POSV)</b> <ul style="list-style-type: none"><li>■ Pilot-operated safety valve</li><li>■ Operating pressure close to set pressure</li><li>■ Low weight and height</li></ul> |

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# Application Areas

Thank you for your attention

