API Urea Synthesis Design
Urea and Crystallizing Media

Application Examples.

Protecting corrosive media with a tendency for crystallization
(e.g. in the synthesis section of a urea plant).
Urea plant example :

- Protected medium: Carbamate gas
- Typical pressure / temperature: Up to 170 bar / up to 190°C (depending on licensor)
- Typical safety valve: API 526 3x4 with heating jacket, necessity for an individual check is dependent on plant capacity.
- Typical materials: Carbamate corrosion resistant materials (e.g. 316L UG, 1.4462, 1.4466, SAFUREX©)

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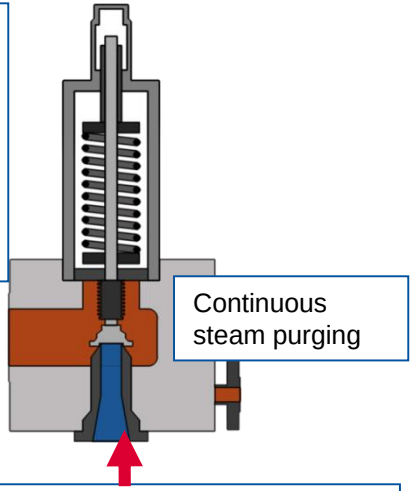
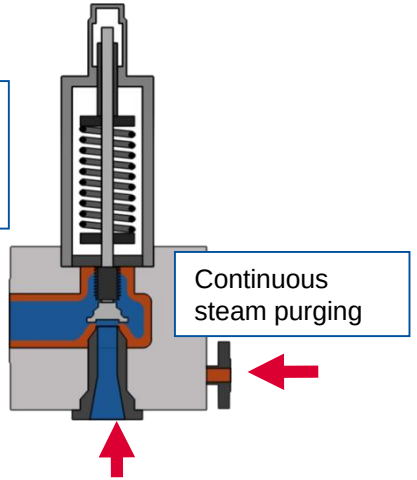
Application Examples.

- Typical challenges for safety valve: danger of carbamate crystallization and corrosion requires e.g. steam purging
- Further process optimization: Supplementary Loading System

Design. New LESER Safety Valve Technology for Urea Synthesis Section.

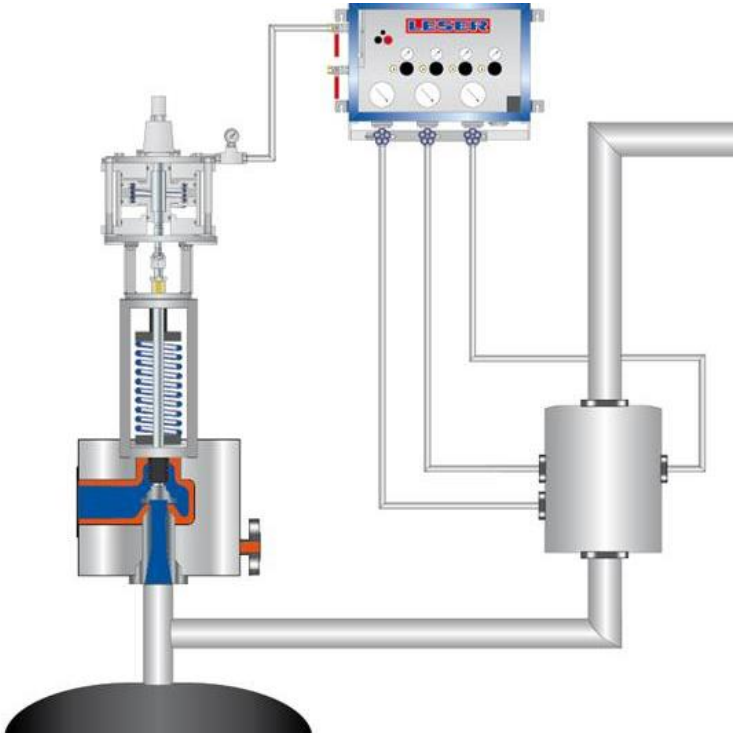
Closed position	Open position
Continuous steam flow prevents medium crystallization in case of small valve leakage  Continuous steam purging Protected medium – Carbamate gas	Continuous steam flow covers medium  Continuous steam purging Protected medium – Carbamate gas

Material	316L Urea Grade	1.4466 – UNS 31050	1.4462 – UNS 31803	SAFUREX – UNS 32906

Design.

High-end LESER Safety Valve technology with a Supplementary Loading System for the Urea Synthesis Section

- Main components are:
  Safety valve, actuator, control unit
- Improves the opening and closing characteristics of a safety valve
- Customer-optimized Supplementary Loading System uses pressure transmitters located directly on the protected system.
- Approved by TUV Nord authorities in Germany and PED / ISO 4126-5.



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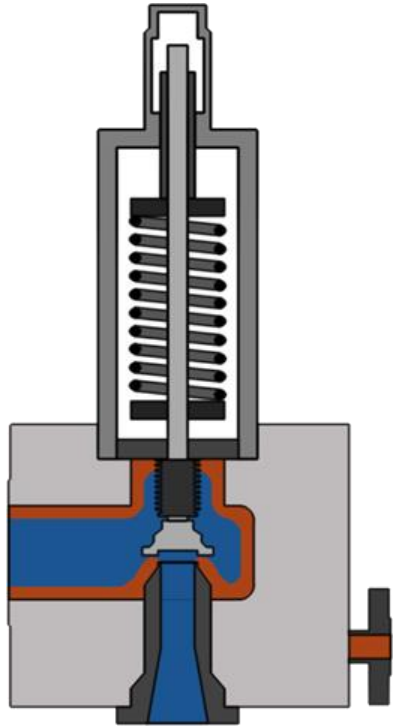
Benefits. LESER Urea Synthesis Design.

Feature	Benefit
Special stainless steel grades	Longer (2-3x) service intervals
Minimized steam requirement	Reduced operating costs
Only one injection point	Less piping needed
Continuous steam purging	▪ Prevents crevice corrosion and crystallization in outlet body ▪ Ensures media temperatures stay above critical 142° C.



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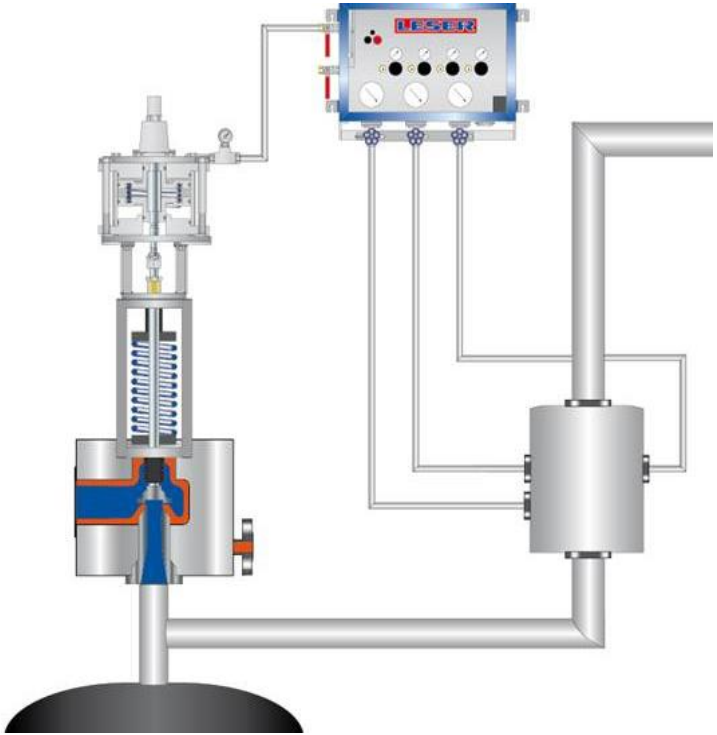
Benefits. LESER Urea Synthesis Design with a Supplementary Loading System.

Feature	Benefit
Increased safety and reliability	▪ Lower emissions due to reduced blow-off times ▪ Less sensitive to pressure surges and piping vibration ▪ Plant downtime for servicing not required after blow off ▪ Independent of back pressure
Increased operating pressure	▪ Higher plant capacities ▪ Seat-tightness until opening ▪ Accurate set pressures ▪ Lower energy consumption
Lower investment costs	For the design of new Urea plants the design pressure of the High Pressure equipment items can be reduced leading to lower investment figures
Lower maintenance costs	▪ Longer inspection interval means increased plant availability



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API Urea Synthesis Design.

Thank you for your attention..