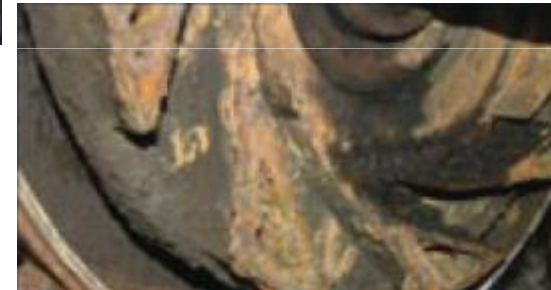


# Is this something you've seen recently?



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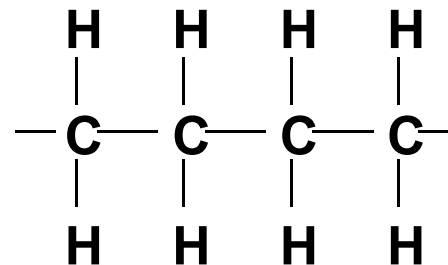
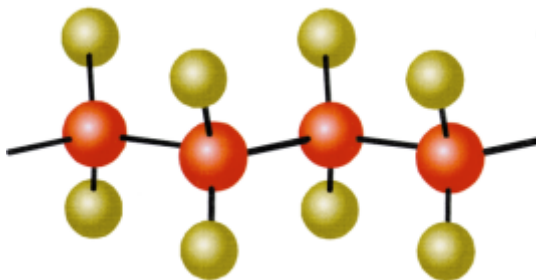
# An Answer to Corrosion



# Non-Fluorinated Polymers

## Ultra High Molecular Weight Polyethylene (UHMW-PE)

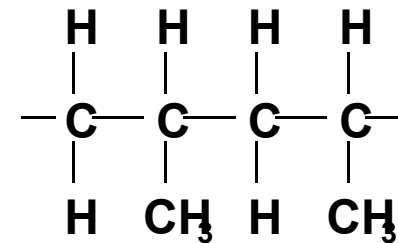
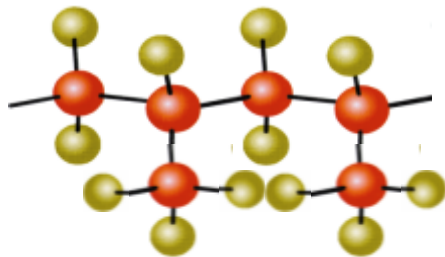
- Melting point 130°C. Application temp. range -140°C to 90°C
- Tradenames (manufacturers): RCH100 (Celanese)



# Non-Fluorinated Polymers

## Polypropylene (PP)

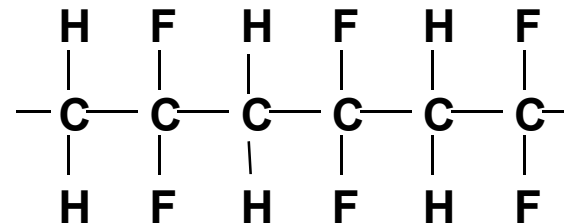
- Melting point 160 °C. Application temp. range -20 °C to 90 °C
- Very limited chem. resistance
- Tradenames (manufacturers): Hostalen PP (Basell)  
Vestolen (Sabic)  
etc....



# Partially fluorinated plastics

## Polyvinylidene fluoride (PVDF)

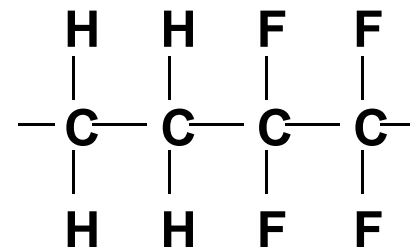
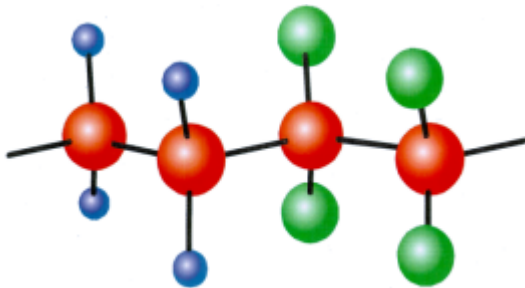
- Melting point range about 170 to 180°C  
Application temperature range approx. –100 °C to 130 °C.
- Limited chem. resistance but considerably better than PE and PP.
- PVDF is attacked e.g. by ketone, ester and organic amines.
- Tradenames (manufacturers): Kynar (Arkema)  
Solef, Hylar (Solexis)



# Partially fluorinated plastics

## Ethylene-Tetrafluoroethylene-Copolymer (ETFE)

- Semi-crystalline copolymer made of tetrafluoroethylene (TFE) and ethylene.
- Very high toughness, tear strength and good abrasion resistance.
- Good chemical resistance, Application temperatures up to 150 °C.
- Processing: transfermoulding, extrusion, injection moulding, rotomoulding.
- Tradenames (manufacturers): Tefzel (DuPont)  
 Dyneon (Dyneon)  
 Aflon (AGF)  
 Neoflon (Daikin)

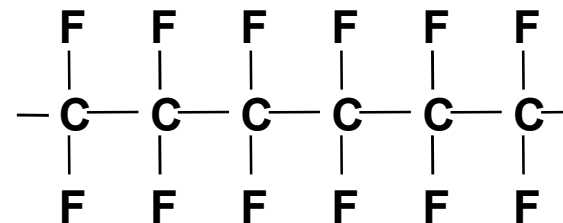
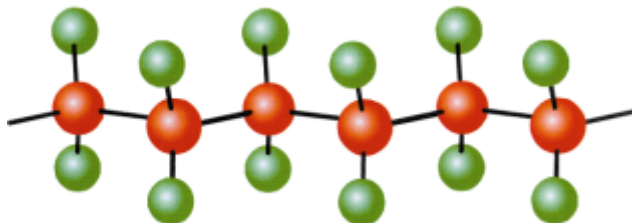


# Fully fluorinated plastics

## Polytetrafluorethylene (PTFE)

- Semi-crystalline material, polymerised TFE monomer
- Extremely strong bond btw. fluorine and carbon atoms
- Melting point 327°C. Application temperature range –200 °C to 260 °C
- Tradenames (manufacturers): Dyneon (Dyneon)

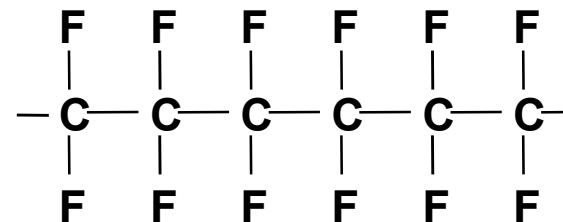
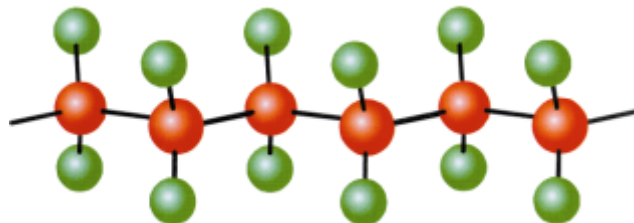
Teflon (DuPont) ...



# Fully fluorinated plastics

## Polytetrafluorethylene (PTFE)

- Semi-crystalline material, polymerisation of monomer tetrafluoroethylene (TFE).
- Extremely stable link btw. fluorine and carbon atoms  
Fluorine atoms form a tight protection around the carbon chain.
- Melting point 327°C. Application temperature range  
–200 °C to 260 °C (for valve / pump designs max. 200 °C)

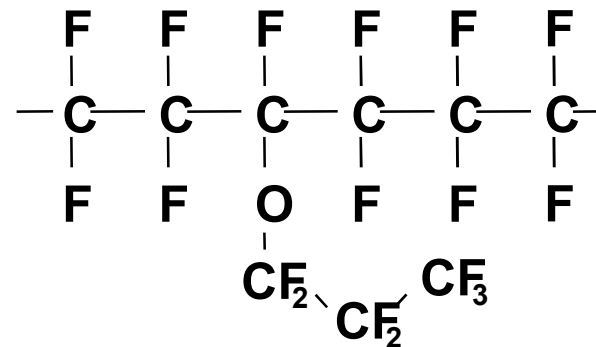
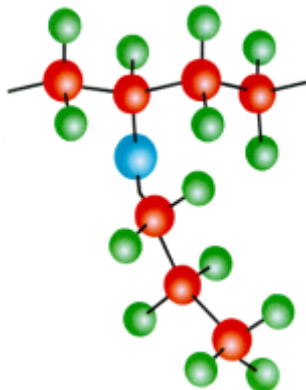




# Fully fluorinated plastics

## Perfluoroalkoxy – Copolymer (PFA)

- PTFE with approx. 4 % modifier perfluoropropylvinylether (PPVE)
- Melting point 310 °C. Application temperature range approx. –200 °C to 260 °C (for valves / pumps max. 200 °C).
- best chemical and high thermal resistance, nearly identical to PTFE
- Tradenames (manufacturer): Dyneon (Dyneon)  
Teflon (DuPont)



## Summary

|                              | Material | Corrosion resistance  | Max. Temp. °C <sup>1)</sup> (°F) <sup>1)</sup> | Temp. shock resist. | Impact resist. | Abrasion resist. |
|------------------------------|----------|-----------------------|------------------------------------------------|---------------------|----------------|------------------|
| <u>Fully fluorinated</u>     | PTFE     | universal             | 200 (400)                                      | good                | good           | limited          |
|                              | PFA      | universal             | 200 (400)                                      | good                | good           | limited          |
| <u>Partially fluorinated</u> | PVDF     | limited <sup>3)</sup> | 120 (250)                                      | good                | good           | fairly good      |
|                              | ETFE     | limited <sup>3)</sup> | 120 (250)                                      | good                | good           | fairly good      |
| <u>Not fluorinated</u>       | PP       | limited <sup>3)</sup> | 90 (195)                                       | good                | good           | limited          |
|                              | UHMW-PE  | limited <sup>3)</sup> | 90 (195)                                       | good                | good           | good             |

<sup>1)</sup> for applications in Richter valves and pumps

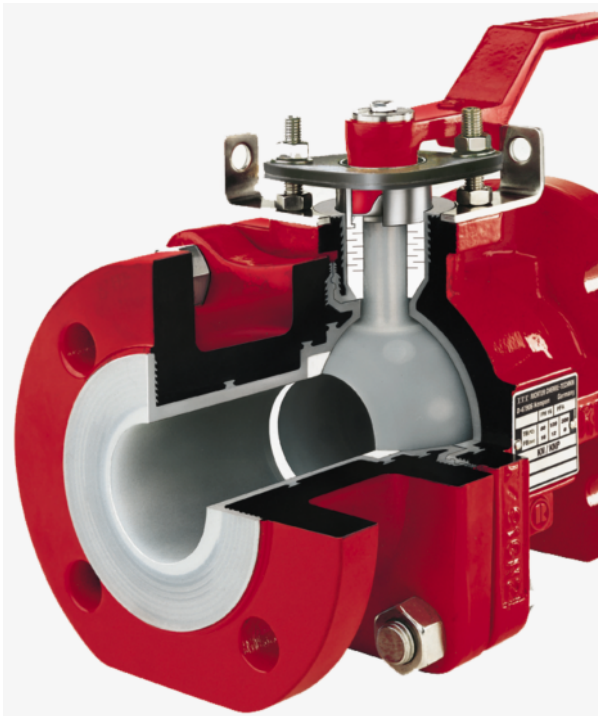
<sup>2)</sup> attention to exceptions for temperatures > 100 °C (210 °F)

<sup>3)</sup> also depending on temperature

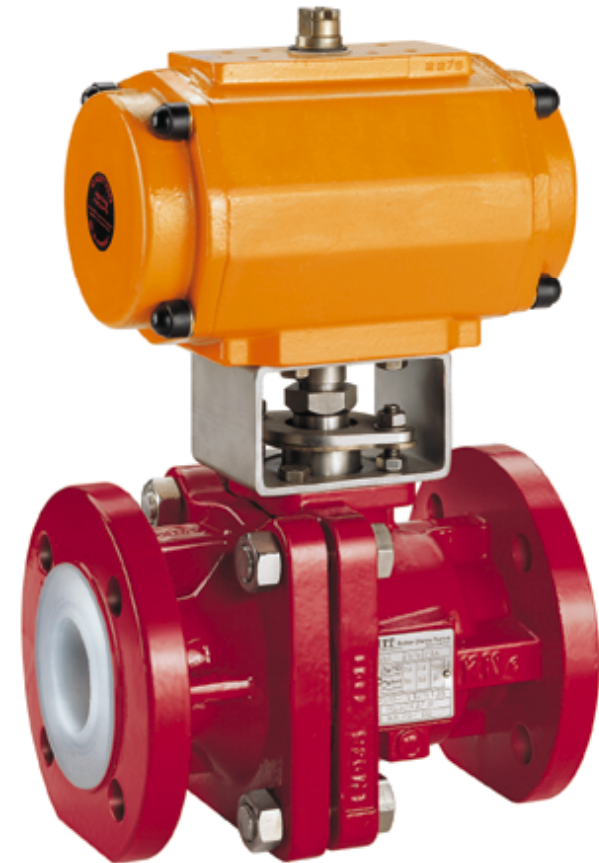
# The Company

## Products: Lined Valves

### Ball Valves



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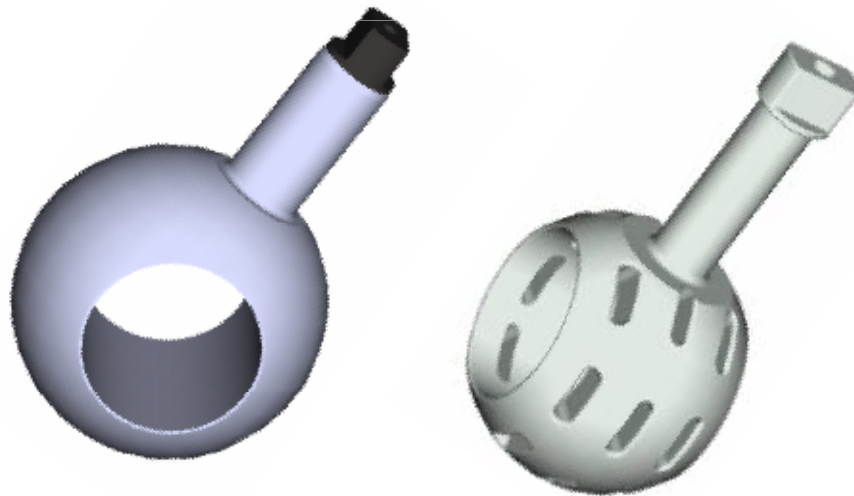
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# The Company

## Products: Lined Valves

### Ball Valves

One piece ball/stem design,  
PFA lined.



Metal core = one piece stainless steel 1.4462 or 1.4542

Two-piece:  $\text{Al}_2\text{O}_3$   
with lined SS stem



Ceramic ball

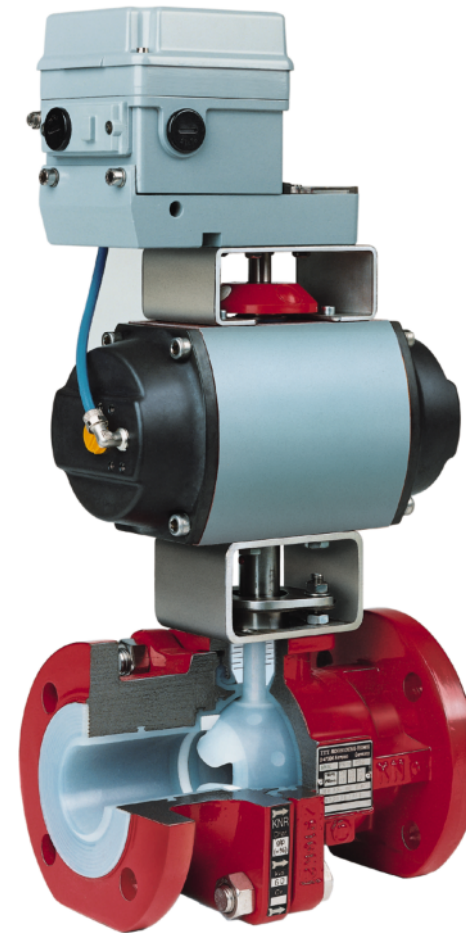
# The Company

## Products: Lined Valves

### Control Ball Valves

$K_{v100}$  values:

from 0.8 to 400 m<sup>3</sup>/h



# The Company

## Products: Lined Valves

### Butterfly Valves:

- Wafer Design
- Lug Design
- Double Flange



# The Company

## Products: Lined Valves

### Globe Control Valves





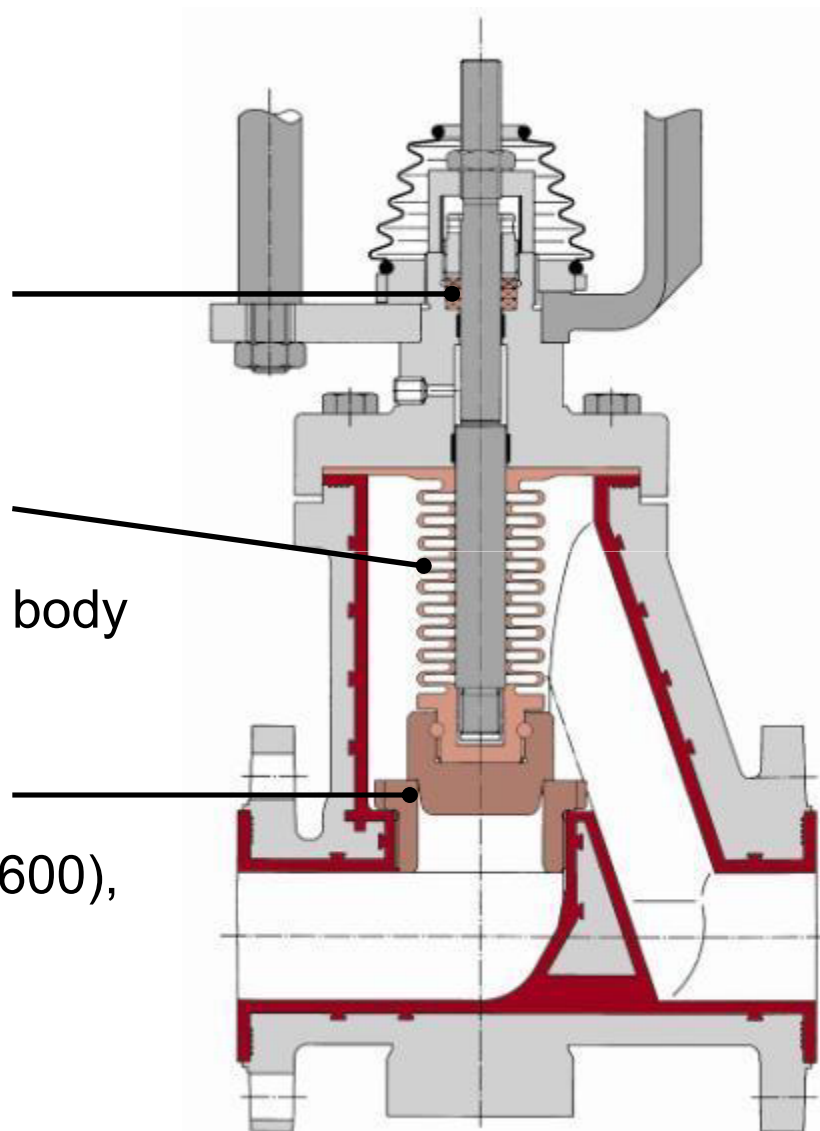
# Globe Control Valve RSS

## Sectional Drawing

**Safety stuffing box,**  
manually adjustable

**PTFE bellows,**  
protects the valve stem from  
corrosion and seals the valve body  
to the atmosphere.

**Seat and plug,**  
made of modif. PTFE (TFM 1600),  
interchangeable





# The Company

## Products: Lined Valves

### Diaphragm Valves

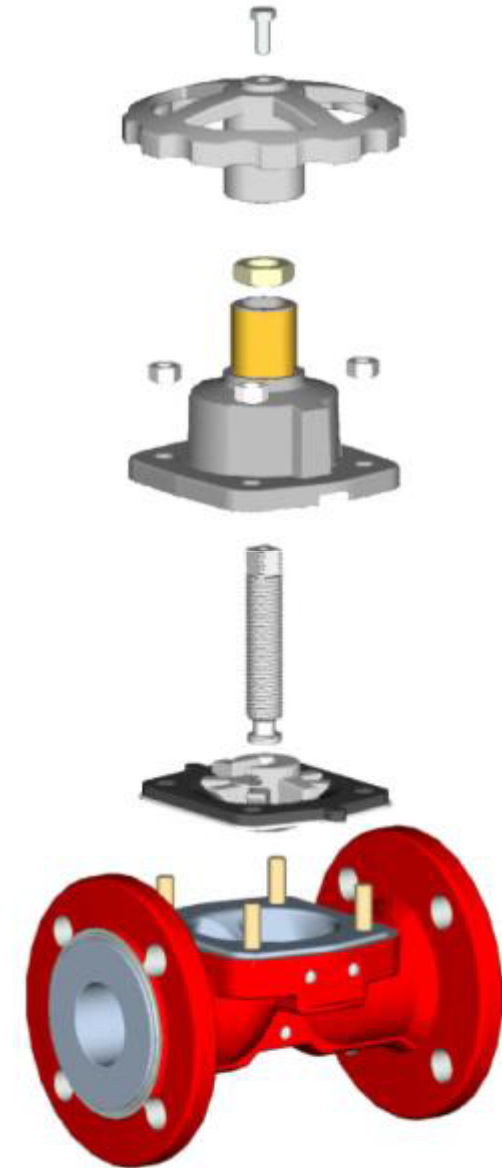


# The Company

## Products: Lined Valves

### Diaphragm Valves

- n ***Upper parts of stainless steel:*** bonnet, handwheel, stem, compressor, tube nut and screws
- n ***Diaphragms:***
  - o TM (PTFE) + EPDM
  - o Conductive
  - o 3-layer (TM + PVDF + EPDM)
- n ***Lining:*** PFA, PFA-P or PFA-L
- n ***Various face-to-face dimensions available:*** ISO/DIN, MSS, BS, ANSI



# The Company

## Products: Lined Valves

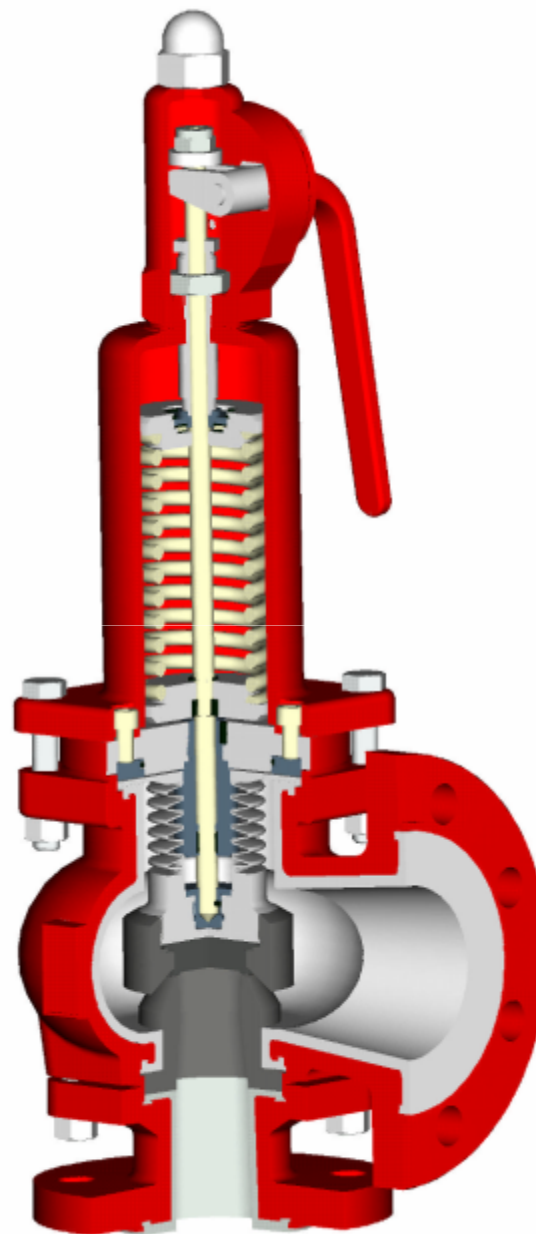
### Safety Valves



## Series KSE/F

### Valve Design

- n **Standard-Safety Valve**  
for highly corrosive fluids  
vapours / gases / liquids
- n **Spring loaded**
- n **Valve body - pressure rating**  
PN 16
- n **Valve Sizes** (Inlet / Outlet)  
DN 25/50,  
DN 50/80,  
DN 80/100,  
DN 100/150
- n **Set pressures** 0.1 bar - 13 bar
- n **Type Test No. -871- D/G/F**  
Vapours / Gases / Liquids



# The Company

## Products: Lined Valves

### Overflow and Pressure Relief Valves



# The Company

## Products: Lined Valves

### Ball Check Valves:



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### Strainers:



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# The Company

## Products: Lined Process Pumps

- Standards:

Both to **ISO 2858/DIN EN 22858** and **ASME/ANSI B 73**

- Sealing:

Both mechanical seal and sealless

- Capacity / Delivery:

up to 600 m<sup>3</sup>/h / up to 90 m





# The Company



# The Company

## Kempen, Germany

- Established 1957
- Staff: 260 worldwide (220 in Kempen)
- Processing of PTFE & PFA (transfer moulding and press-sintering)
- CNC machining centres for metal parts
- Research & Development, Manufacturing and Testing of Pumps & Valves



# Typical Applications

- manufacture / processing  
base / intermediate chemicals:

*Hydrofluoric acid*

*Sulfuric acid*

*Phosphoric acid*

*Hydrochloric acid*

*Caustic soda*

*Potassium hydroxide*

*Chlorine*

*Bromine*

*Fluorine*





# Typical Applications

- Fertiliser industry

*Phosphoric acid*

*Sulfuric acid*

*Nitric acid*

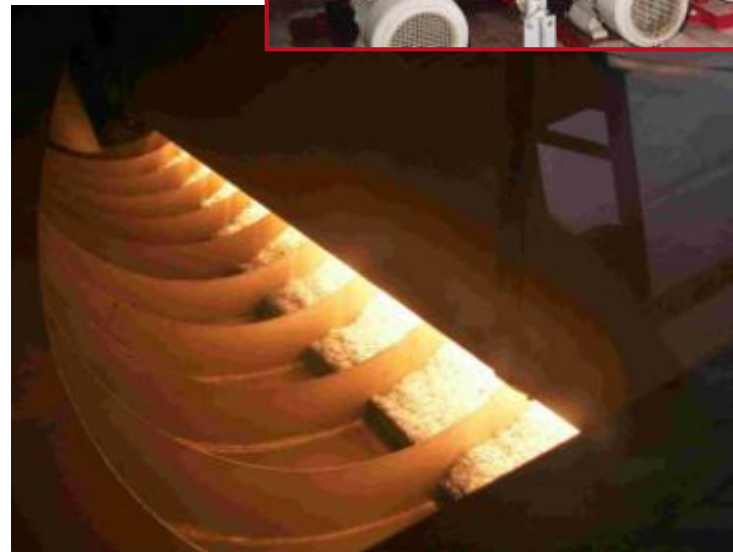
*Ammonia*



- Production of TiO<sub>2</sub> pigments

*Chlorine*

*Sulfuric acid*



# Typical Applications

- Desalination / Water Treatment

*Sea Water*  
*Chlorine*

- Electro-Chlorination

*Chlorine*  
*Caustic soda*  
*Brine*  
*Dryer Acid*

