BASF

We create chemistry

# Tradition and Innovation:

## From Pioneer to Professional Partner

**High-Pressure Technology**
**Engineering & Maintenance**

www.basf.com

# Innovative by Tradition

BASF has a unique global Engineering & Maintenance network with 14,000 colleagues collaborating around the world. Together we develop smart, sustainable technical solutions of utmost quality for our customers – and we have done so for more than 100 years.

**Our experience is crucial for your success**
When choosing high-pressure components, put your trust in the inventors of high-pressure technology. In 1908 the ammonia synthesis based on the Haber-Bosch process was patented in Ludwigshafen. We have manufactured components and systems for high-pressure technology since then. In 1931 Carl Bosch was awarded the Nobel Prize for Chemistry for his development of chemical high-pressure techniques. Solutions for the new methods were created in the newly built high-pressure workshop and the first material testing department in the chemical industry. Today both institutions still work on innovations for modern high-pressure methods.

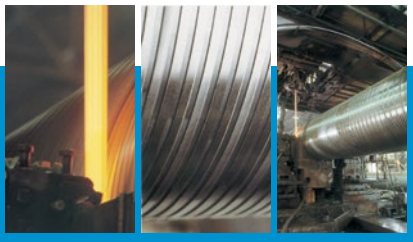
**Interdisciplinary collaboration guarantees success**
Ammonia synthesis is considered one of the great accomplishments of chemistry and laid the foundation for the successful business development of BASF in the field of high-pressure methods. It culminated approx. 25 years later in the patented LDPE (low-density polyethylene) method at 3,600 bar.

**1913**

The world's first ammonia synthesis plant is commissioned.

**1937**

BASF develops its own method for the polymerization of high-pressure polyethylene with a novel high-pressure double-pipe heat-exchanger system.

**1941**

Strip-wound vessels: a new production technology for high-pressure units is developed based on the work of Schierenbeck.

The close collaboration between chemists and engineers in the development of complex processes – the interplay of science and technology – became the foundation of constant success of BASF.

**Being successful for such a long time is a great accomplishment. It testifies to the creativity and assertiveness of the people who have worked for BASF in the past and today. They ensure the long-term success of BASF through their active commitment.**

**1997**

BASF is awarded the patent for thermocouples specifically developed for use in high-pressure plants.

**2007**

The first world-scale LDPE plant for the production of 400 kt/a LDPE, fitted with BASF equipment.

**2018**

From the start, the development of the processes is accompanied by the company's own production of the required components: valves PN 325 bar and DN 30 mm from 1910 until 2018.

# 1. Expertise in Manufacturing Pressure Vessels

## Security of investment for our customers

We offer innovative solutions that combine profitability and sustainability and ensure utmost security of investment thanks to durable products and reliable service.


In the standard high-pressure range of 325 bar, we produce equipment with a weight of up to 300 t and dimensions of up to 25 m length and a diameter of up to 4 m in our own workshops.

We manufacture high-pressure equipment in solid-wall and multi-layer designs as well as high-pressure piping with double jacket for reactors and heat exchangers, handling design pressures of up to 5,000 bar at temperatures ranging from –150 °C to +500 °C.

Regular inspections and qualifications of all manufacturing processes ensure that we can offer individual solutions for specific customer requirements.

## Equipment Engineering up to

**300 t** weight

**25 m** length

**4 m** diameter

## MAW, TIG, MIG, MAG, SAW, Plasma

**welding processes**

## 3D-CNC

**tube bending from DN 6 to DN 90 at PN 325 bar**

# 2. The Fascination of High Pressure

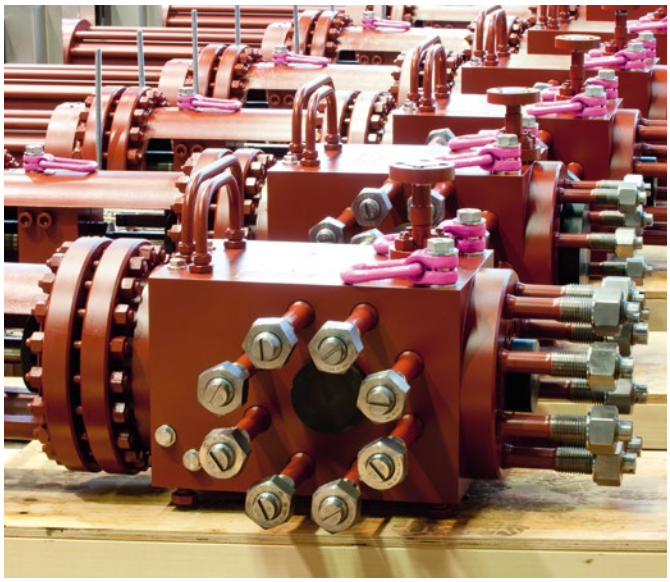
## From Pioneer to Top Performer: LDPE Plants

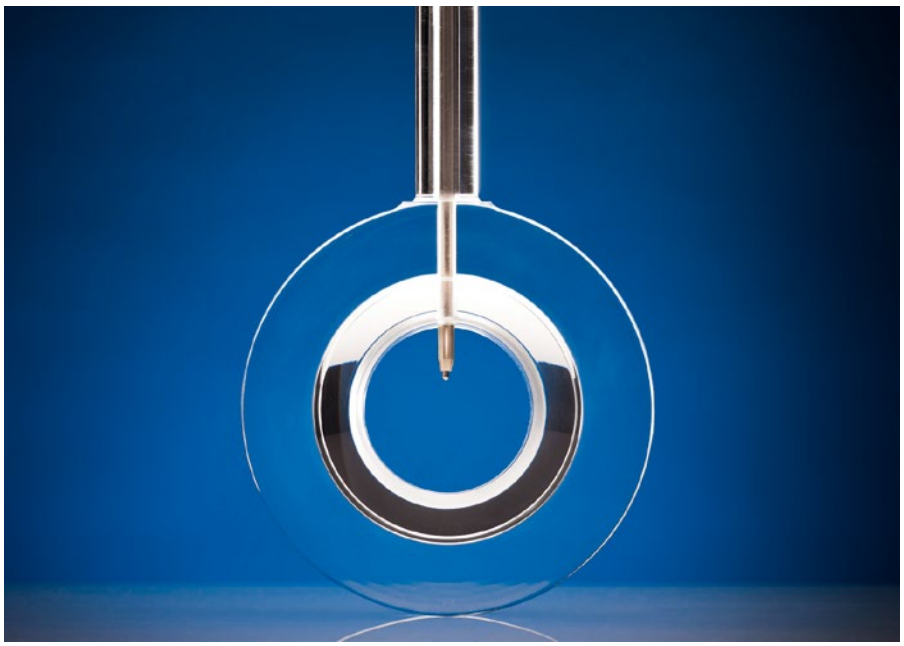
BASF is the only manufacturer of high-pressure equipment who is also a plant operator and who manufactures components for the high-pressure segment (up to 3,600 bar) at world-scale production levels.

BASF is a world-class leader in safety. We supply the safety equipment for the entire LDPE process of one of the largest PE manufacturers in the world and make a significant contribution to the safety and capacity of the plant. Productivity is also ensured thanks to our reactors and separators.

The design of the T-emergency valve with a diameter of up to 89 mm and operating pressures of up to 3,600 bar is an extraordinary safety device for LDPE plants. Despite its mass of about 2 t, it can open extremely fast (<200 ms).

Our unique kick valves ensure maximum availability during the ongoing process and are bound to more than satisfy you even after years of use – we are convinced of that.





Flexible installation solutions for thermocouples and pressure sensors: specially developed sensor lens ring gaskets or conventional ring joint gaskets

BASF offers not only a comprehensive range of high-pressure valves but also develops the related control systems. They are individually adjusted to your process and the function of your control valves, for instance our current kick valve controller (RPR+). The high-speed data logger, which we just recently developed, opens up comprehensive analysis options that cover your entire production process.

Our highly dynamic thermocouple is designed for use with process pressures up to 3,600 bar and responds 2.5–3 times faster than conventional models due to its patented design. It also offers a unique degree of safety thanks to a special production process. Our newly developed and intrinsically safe pressure sensor with front-flush diaphragm avoids product deposits and allows for reliable pressure measurements to ensure maximum plant availability. Installation may be done either conventionally with forged ring joint gaskets or with our specially developed sensor lens ring gasket. The sensor lens ring gasket allows redundant measurements to be made with multiple connections for measuring temperature and/or pressure in reactors or pipe systems.

The newly developed high-speed data logger offers you comprehensive options for analyzing your process.


mitter IS – 20 – H
HT max 350°C

# 3. High-Tech from One Source

## Custom-Made, Safe, and Especially Durable

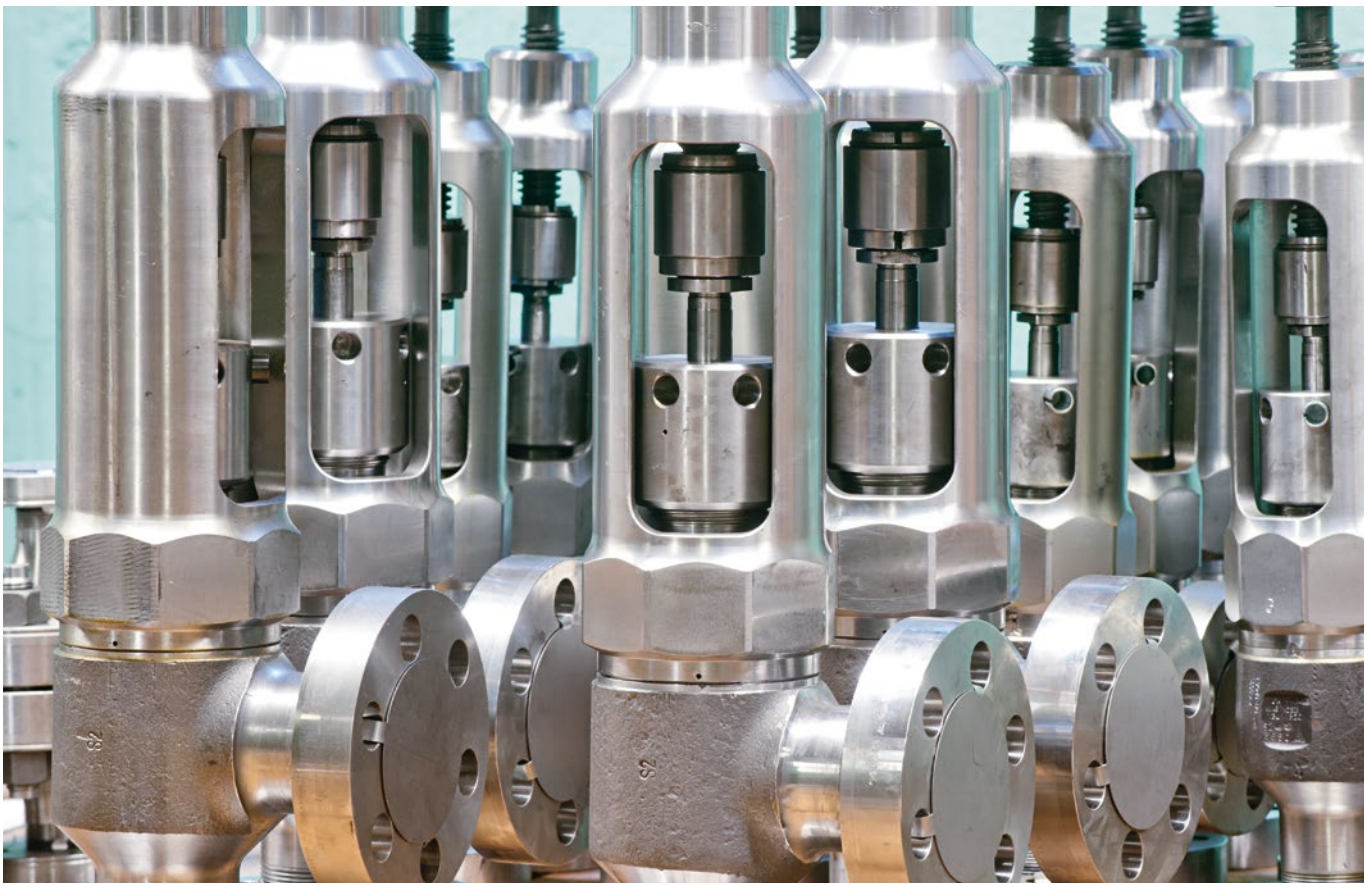
Supreme quality and safety requirements regarding materials and standards. After all, we are the only provider in the world manufacturing and operating high-pressure components at the same time.

We cooperate closely together with BASF's internationally renowned Materials Engineering Department to continuously develop and enhance our materials. Our high-pressure steels are melted, tested, and accepted, based on our specifications.


All major production steps are documented and can be traced over the entire life cycle of high-pressure components.

Our production is monitored by well-known international inspection agencies and certified according to the standard design codes, such as PED 2014/68/EU, ASME-Code as well as the China license for pressure vessels and safety equipment.

Every unscheduled plant shutdown is costly. To ensure that production plants can resume operation as quickly as possible, we hold the largest stock of high-pressure equipment in the world. We have a comprehensive range of high-pressure components available, from pre materials and forging blanks to ready-assembled, pressure-tested valves. Therefore we can usually supply what you need within a very short time. This degree of flexibility is globally unmatched.



## MATERIALS CONFORMING TO BASF STANDARDS

| | Item | St 45.8 | S2 | S3 | S4 | K2 (K3) | K5 | N5 | N9 | K10/ K10X | K12X | RA2 | RA4 | RM3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PN 325/32.5 MPa | Pipes | • | | | | | | | • | | | • | • | |
| | Valves and fittings | | • | | | | | | • | | | • | • | |
| | Threaded flanges | | | • | | • | | | | | | | | |
| | Bolts | | | • | | • | • | | | | | | | |
| | Lens ring gaskets | | • | | | | | • | | | | • | • | |
| PN 700/70 MPa | Pipes | • | | | | • | | | • | | | • | • | |
| | Valves and fittings | | • | | • | | | | • | | | • | • | |
| | Threaded flanges | | | • | | • | • | | | | | | | |
| | Bolts | | | • | | • | • | | | | | | | |
| | Lens ring gaskets | | • | | • | | | • | | | | • | • | |
| PN 1,600/160 MPa | Pipes | | | | | | | | | • | | | | • |
| | Valves and fittings | | | | | | | | • | | | | | • |
| | Threaded flanges | | | | | • | | | | | | | | |
| | Bolts | | | | | • | | | | | | | | |
| | Lens ring gaskets | | | | | | | | • | | | | | • |
| PN 3,600/360 MPa | Pipes | | | | | | | | | • | • | | | • |
| | Valves and fittings | | | | | | | | | • | • | | | • |
| | Threaded flanges | | | | | | • | | | | | | | |
| | Bolts | | | | | | | | | • | • | | | |
| | Lens ring gaskets | | | | | | | | | • | • | | | • |
| | DIN material* | 1.0405 | 1.0406 | 1.1181 | 1.7131 | 1.7218 (1.7258) | 1.7709 | 1.7276 | 1.7779 | 1.6580 | SA 732 | 1.4541 | 1.4404 (1.4571) | 1.4418 |

*The BASF high-pressure materials are similar to the related DIN materials, but are procured based on BASF-internal specifications with limited tolerances and special testing and acceptance requirements.

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