

Tradition and Innovation:

From Pioneer to Professional Partner

100

YEARS
HIGH-PRESSURE
TECHNOLOGY

HIGH-PRESSURE TECHNOLOGY

Engineering & Maintenance

150 years

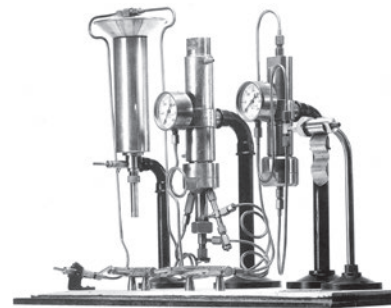
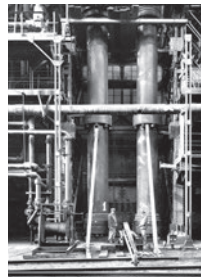
 **BASF**

We create chemistry

150 Years of BASF – 100 Years of BASF High-Pressure Technology

A Joint History of Success

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. About 100 years ago ammonia synthesis based on the Haber-Bosch process was developed in Ludwigshafen. 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.

We have manufactured components and systems for high-pressure technology since then

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.



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, which is celebrating its 150th anniversary this year.

Being successful for 150 years 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.



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



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



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 2015.

1913

The world's first ammonia synthesis plant is commissioned.

1937



1941

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

1997



2007

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

2015



1. Innovative by Tradition

Production Expertise in Equipment Engineering

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

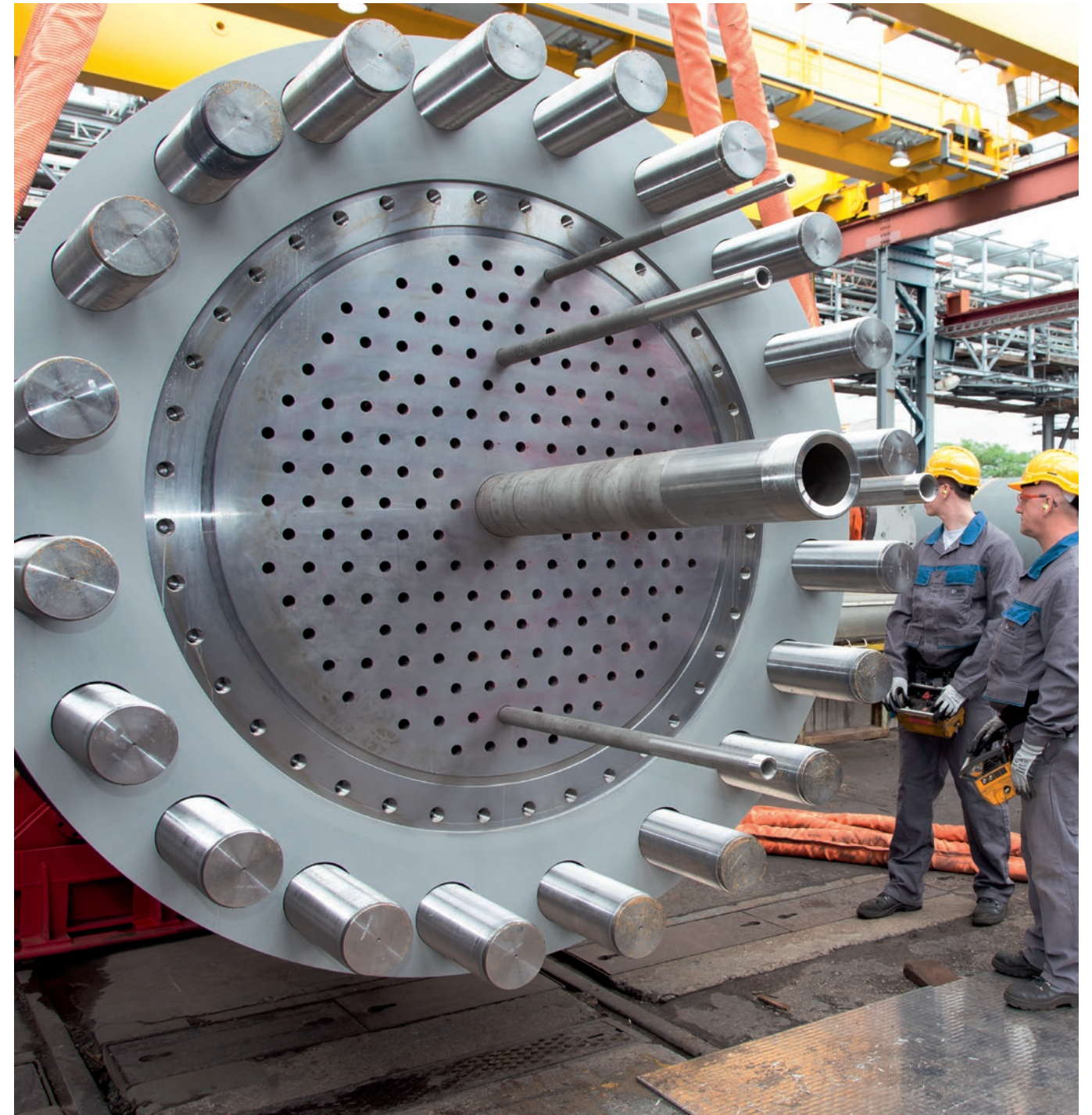


In the standard high-pressure range of 325 bar, we produce equipment with a weight of up to 300 t and dimensions of up to 25 m length and a diameter of 4 m in our own workshops.

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

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

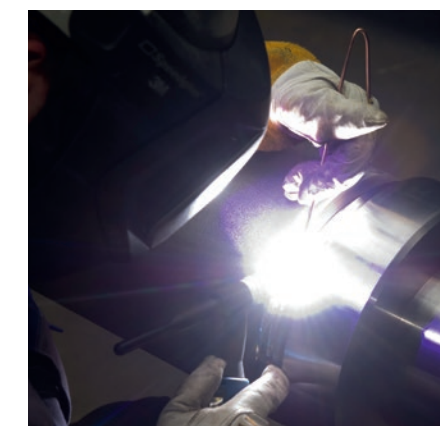
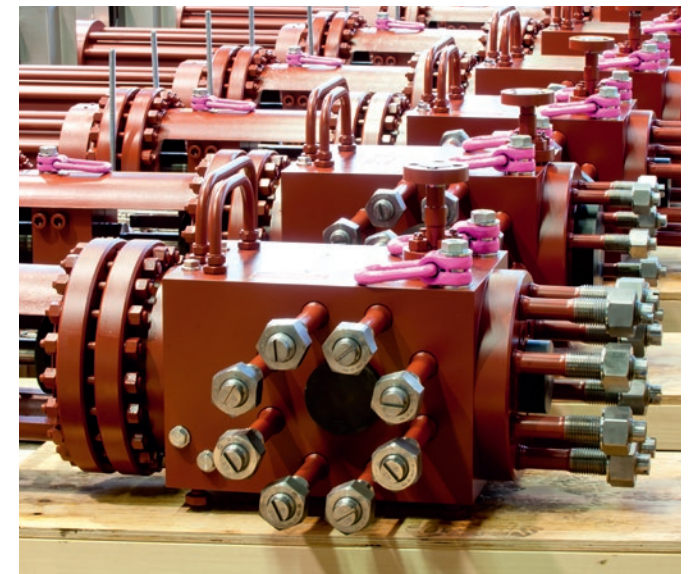
From Pioneer to Top Performer: LDPE Plants

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 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.



3. High-Tech from One Source

Custom-Made, Safe, and Especially Durable

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

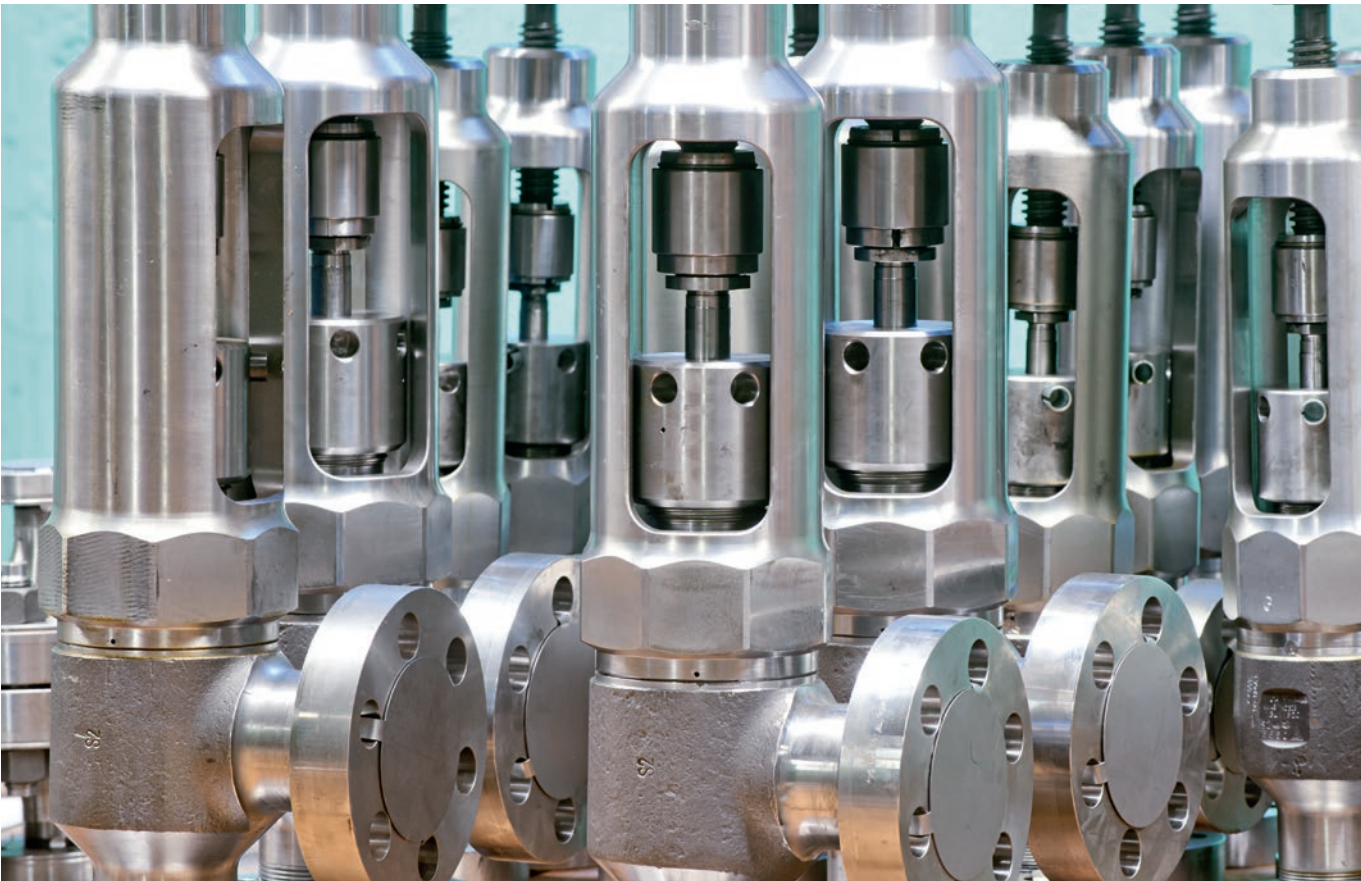
We cooperate closely together with BASF's internationally renowned Materials Engineering Department to continuously develop and enhance our materials. Our high-pressure steels are melted, tested, and accepted, based on our specifications.



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 97/23/EG, ASME, KGS, 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. Thanks to our large stock, 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.

BASF SE**Competence Center Engineering & Maintenance**

67056 Ludwigshafen, Germany

E-mail: technische-services@basf.com

www.technical-services.basf.com

Your contact in technical Sales:

Thomas Müller

E-mail: thomas.m.mueller@basf.com

Phone: +49 621 60-712 66

Fred Vogelsgesang

E-mail: fred.vogelsgesang@basf.com

Phone: +49 621 60-717 54

Your contact related to high-pressure technology

Frank Raue

E-mail: frank.raue@basf.com

Phone: +49 621 60-222 92

**HIGH-PRESSURE TECHNOLOGY**

Engineering & Maintenance