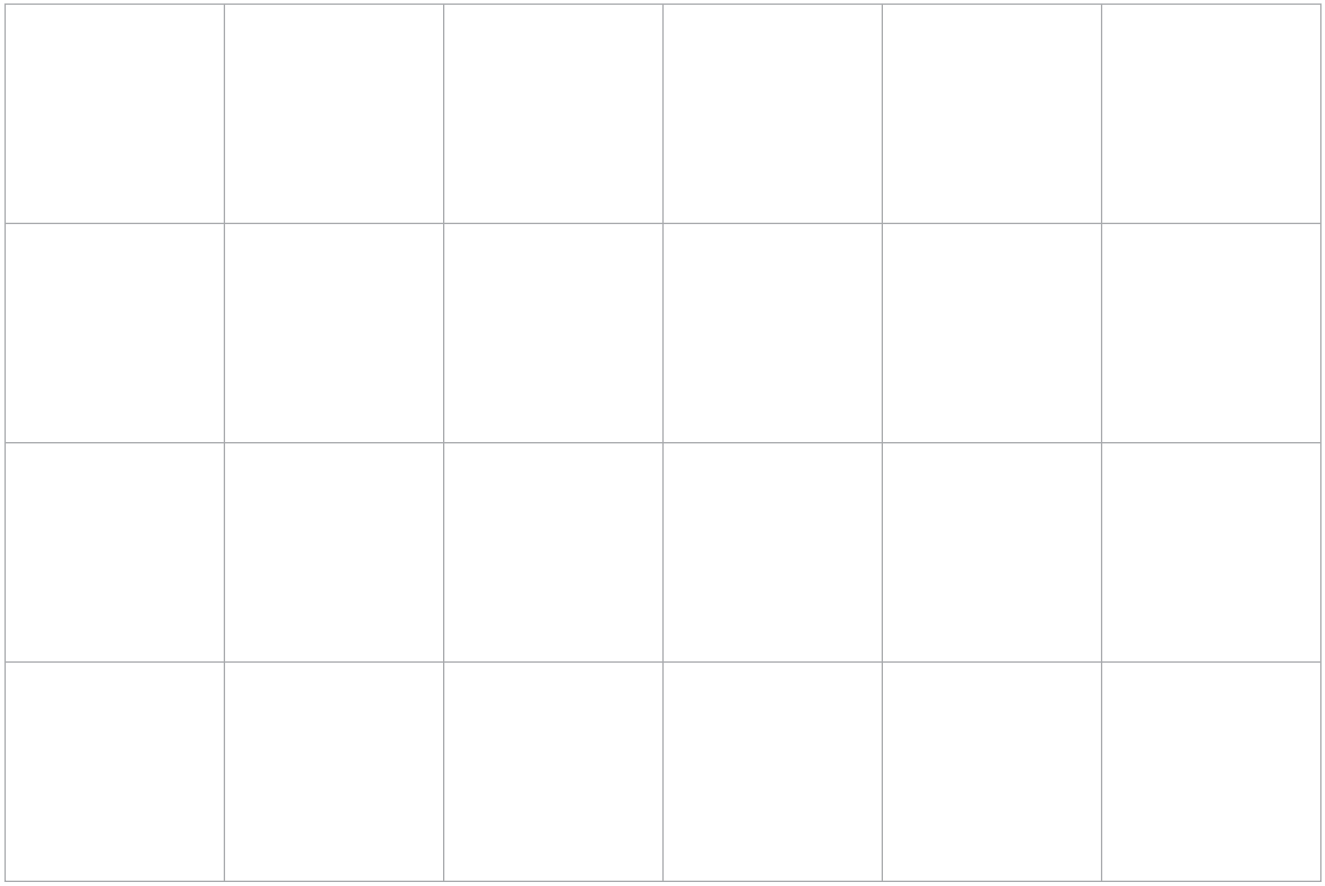
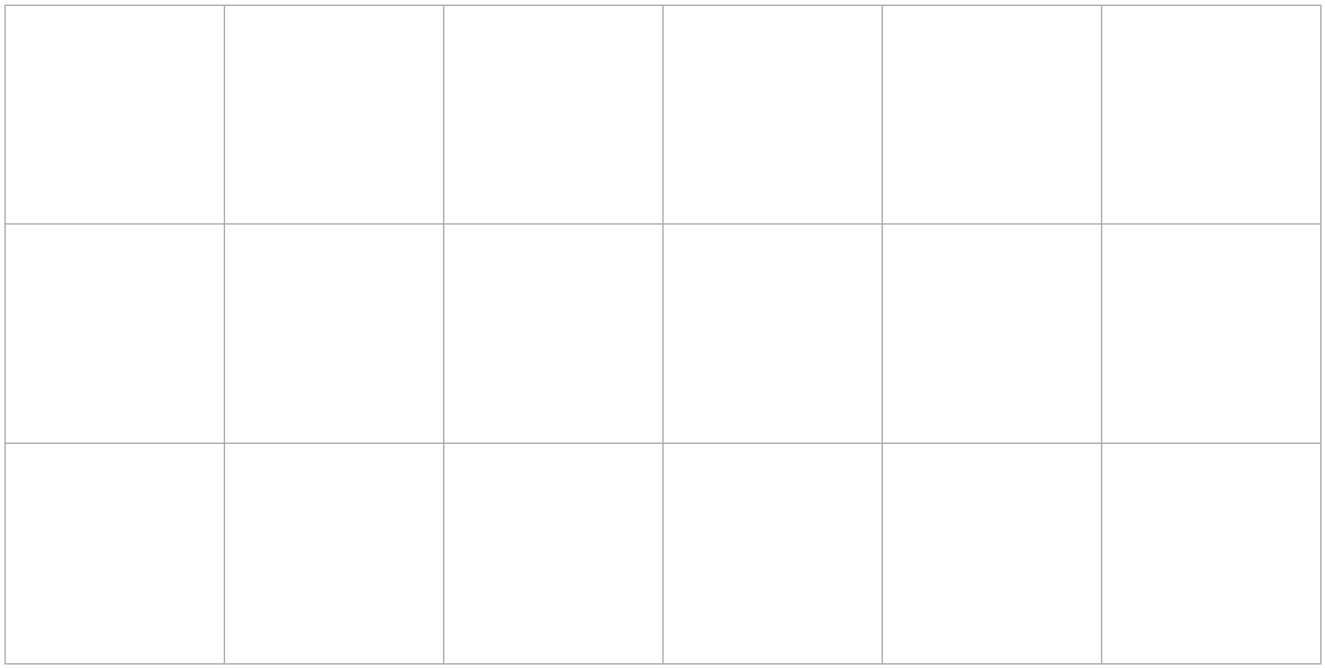
SCHOELLER-BLECKMANN NITEC GMBH

High-pressure equipment and vessel fabrication
for the fertilizer industry



CHRISTOF GROUP. TRUST IN SOLUTIONS.

ON THE BASIS OF CUSTOMER FOCUS - SOLUTION COMPETENCE, RELIABILITY, FLEXIBILITY, INNOVATION AND RESPONSIBILITY, THE CHRISTOF GROUP PURSUES THE AIM OF FINDING EFFICIENT SOLUTIONS FOR THE COMPLEX REQUIREMENTS OF ITS CLIENTS.



CHRISTOF GROUP

COMPLETE SOLUTIONS FOR PLANT ENGINEERING AND CONSTRUCTION.

The Company

Reliable. Flexible. Solution-oriented. The Christof Group is an expert partner of clients from a wide variety of industries world-wide for complex plant engineering and it turns innovative concepts and ideas into reality. With over 40 years of experience, the company is characterized by its flexible handling of the requirements of a wide variety of markets and serves over 100 satisfied customers world-wide through 18 branches. 1,100 projects have already been completed successfully and about 30 ongoing service partnerships show proof of the wide-ranging technical competencies of the over 2,000 employees world-wide.

By means of uncompromising customer focus, flexibility and investments in new technologies, the company takes up the many-sided challenges of different sectors – ranging from the chemical and petrochemical industry to the fertilizer, construction material, steel and paper industries, the power sector and medical devices.

The special know-how of the 13 established affiliates and their wide-ranging competence in the integration of the individual fields enable the company to generate more and more synergies for complete projects.

Areas of Activity

Turnkey solutions

As an integration specialist with the core competence of interface management, the Christof Group deliberately reduces complexity and ensures tailor-made complete system solutions with maximum efficiency. As a general contractor, the Christof Group assumes overall responsibility for the implementation of partial and fully integrated plant construction solutions.

Equipment construction and modular plant engineering

The Christof Group is active in the core areas of plant construction and relies on a wide variety of competencies from the business sectors of project management, detail engineering, equipment and vessel construction, EI&C technology and switchgear construction, pipeline construction, assembly of plants and machinery, welding technology, quality, safety and environmental management.

Integrated industrial services

As a service specialist, the Christof Group ensures the realization of comprehensive services for existing plants. In this way, the ongoing operation of plants can be optimized and long-term investment safety guaranteed. Training, maintenance and spare parts management are inlcuded in the range of services just like the planning and execution of shut-downs and revamps.

Stamicarbon Urea Plant

HIGH-PRESSURE EQUIPMENT AND VESSEL FABRICATION FOR THE FERTILIZER INDUSTRY

Benefits at a Glance

Schoeller-Bleckmann Nitec, member of the Christof Group, specializes in the manufacturing of equipment for the fertilizer and petrochemical industries and has a long established international reputation in this field. Today, SBN is one of the world's leading manufacturers of top-quality high-pressure equipment and vessels for ammonia and urea plants.

Complete solutions for the fertilizer industry
Highly efficient, integrated engineering and fabrication solutions based on the extensive integration of know-how within the competence network of the group members.

Best product quality for the most challenging temperature and pressure requirements of urea and ammonia synthesis
Top-quality product design and fabrication due to comprehensive know-how of the most advanced materials and long-standing expertise regarding the specific requirements of the fertilizer industry.

Innovative and state-of-the-art technologies
Robust monowall design for high-pressure vessels with shell thicknesses of up to 300 mm and innovative multilayer technology for extended vessel diameters and lengths.

Reliable project execution
High degree of reliability in project execution and strict deadline compliance for a fast and reliable start of operation.

Excellent services for long-term investment safety
Comprehensive on-site services such as spare parts management, maintenance and on-site repair of urea reactors and piping systems ensure operational efficiency and long-term investment safety.

High-Pressure Urea Heat Exchangers – Final Stage of Assembly

Market Requirements

Turnkey solutions and efficient system integration

Large-scale, complex plants in the petrochemical and fertilizer industries constitute enormous challenges for clients during project planning and implementation. These range from process definition and plant engineering to the selection and coordination of suitable system suppliers for all plant components. Smooth system integration is also essential and provides for enormous efficiency potential. With complete plants that get larger and larger, the growing technological variety on the market and the exacting requirements for a fast, on-time start-up of the plants, the need for complexity reduction and minimization of the project risk for clients increases. Production firms achieve this by ordering integrative complete solutions for plant construction and handing over the overall project responsibility for everything down to the hand-over of turnkey plants to general contractors.

High product quality, reliability and plant safety

Due to the critical process conditions in the petrochemical and fertilizer industries as a result of high operating pressures and temperatures as well as corrosive media, great demand is placed on manufacturers of such equipment. The best material and product quality enables the most productive use of the plants with regard to failure safety and a long useful life.

Long-term investment safety and productivity

The high investment costs involved in plant construction require a long-term productive use in order to maximize the return on investment. Long-term investment safety and maximum productivity of the plants are guaranteed to a large extent by means of professional services. More and more often, plant operators seek support from the suppliers of their plants and equipment for this and completely outsource the services to specialists in order to increase efficiency.

High-Pressure Pool Condenser

Approach

Turnkey solutions and efficient system integration from a strong corporate group with the core competency of interface management

SBN has many years of experience in the planning and implementation of complete plants for the petrochemical and fertilizer industries. As a broad-based specialist in interface management, SBN makes use of the multiple competencies within the Christof Group and interlinks them to the benefit of the clients. The company develops integrative, tailor-made complete solutions and takes over the complete responsibility for their implementation. In this way, complexity is reduced for the clients - and the project risk is assumed with regard to a specification-compliant, high-quality and on-time implementation of the plant is taken over.

Modern technology in engineering and production for reliable, top-quality solutions

The exacting requirements of product quality and maximum useful life and safety of plants drive the use of state-of-the-art technologies and methods in the engineering and production of plants. In order to ensure that the high-pressure equipment we design and manufacture for the fertilizer and petrochemical industries incorporates the latest and most innovative and efficient technologies, SBN maintains well-established, close working relationships with technical universities, process licensors, consultants and material producers.

Our engineers use the latest design and calculation methods, including finite element analysis, and a special design data management system. For instance, SBN was a pioneer in the extensive use of Safurex®, a steel grade developed by the Swedish steel producer Sandvik AB and the Dutch process licensor

High-Pressure
Scrubber

Stamicarbon B.V. SBN is already fabricating a new generation of process equipment, based on Stamicarbon's urea 2000Plus® process. In vessel design, SBN developed two outstanding technologies to meet the most challenging temperature and pressure requirements of urea and ammonia synthesis.

Depending on the specific customer requirements such as pressure and vessel diameter, SBN can offer either robust monowall designs for high-pressure vessels with shell thicknesses of up to 300 mm, or our most innovative multilayer technology for extended vessel diameters and shell lengths. State-of-the-art equipped fabrication shops guarantee production according to the latest standards. All production stages from fabrication of large diameter heads, tubesheet drilling and machining as well as final assembly work are carried out in a modern 3,000 sq.m. pressure vessel shop.

Integrated industrial services for highest plant availability, productivity and on-site safety

Plants with high productivity bring competitive advantages for companies vis-à-vis their competitors. Accordingly, high availability and reliability of the plants as well as the optimization of the plant performance are core requirements for plant operation. Therefore SBN offers consultancy, planning, execution and supervision of integrated and tailored service concepts that tremendously enhance plant availability, productivity and efficiency within the production process and ensure investment safety in the long run. The international presence of SBN enables it to react quickly to local requirements. A large pool of specialized service engineers from the other companies of the group is available, which ensures efficient operation of the complete plant in addition to the professional services for high-pressure equipment.

V

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SOLUTIONS

ENGINEERING, CONSTRUCTION AND SERVICE OF HIGH-PRESSURE VESSELS FOR AMMONIA AND UREA SYNTHESIS

Urea synthesis

For these critical plants, SBN fabricates high-pressure heat exchangers and reactors that are clad with corrosion resistant materials, together with the necessary built-in components such as liquid distribution systems, perforated sieve trays, etc.

Materials used include heat-resistant carbon steels and austenitic chrome-nickel steels. The tube-to-tubesheet welding in the heat exchangers is carried out using computer-controlled welding machines with a special SBN-developed technology. Tubesheets can be overlayed by strip or manual welding. With reactors and HP channels of heat exchangers the urea-resistant cladding is designed either as a core shell or as a loose lining.

- Stripper
  Urea solution from urea reactor is stripped with carbon dioxide (CO_2) to separate carbamate from urea.
- Scrubber
  NH3 and CO_2 in the inerts stream condense and are washed with carbamate.
- Pool condenser
  NH3 and CO_2 condense and form carbamate in a pool of liquid including some partial urea formation.
- Pool reactor
  NH3 and CO_2 condense and form carbamate in a pool of liquid, including urea formation until near equilibrium in a single vessel.
- Urea reactor
  Carbamate converts into urea until near equilibrium is reached.
- Carbamate condenser
  Ammonia (NH3) and carbon dioxide (CO_2) condense to form carbamate with the recovery of reaction heat.
- Internals
  Reactor trays, liquid distribution system for HP strippers.
- High-pressure pipe spools
  Prefabricated pipe spools, elbows, pipe fittings such as reducers, T-pieces, flanges etc.

Ammonia synthesis

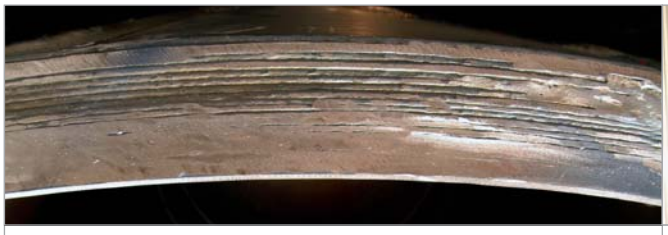
SBN can provide a range of high-pressure vessels to cover the complete process spectrum for ammonia plants, from primary and secondary reformers and various gas scrubbing stages to high-pressure vessels for ammonia synthesis and connecting pipework. The materials used particularly include temperature-resistant chrome-nickel steels and nickel-based alloys as well as hydrogen-resistant steels.

- Converter shell
  Catalytic reaction of synthesis gas to form ammonia.
- Synthesis loop heat exchangers
  Synthesis gas heat exchangers in gas–gas or gas–water design with the function of cooling or heating the respective medium according to the process stage.
- Waste heat boiler
  The waste heat boiler recycles the thermal energy from the reaction in the converter for the generation of high-pressure steam.

Chemical and petrochemical industries

Heat exchangers, reactors, separators and columns etc. for plants producing polyolefins, caprolactam, melamine and other organic and inorganic chemicals. Equipment for hydrogenation processes e.g.

- Hydrocrackers
- Hydrotreaters
- Vessels for CO_2 sequestration
- Separators for LDPE plants
- Reactors for wet air oxidation
- Reactors for caprolactam plants
- Absorbers for natural gas drying
- Reactors for melamine plants



Innovative multilayer and monowall technology

The internationally proven multilayer construction promoted by SBN can be used to advantage anywhere high pressures are combined with large-dimension high-pressure vessels and shell lengths (for example in urea reactors, pool condensers and pool reactors or ammonia converters).

Advantages of the SBN multilayer design

- The manufacturing of the shell from elements of small thicknesses (approx. 8–10 mm) produces better metallurgical characteristics such as higher yield strength and stability.
- For processes involving high corrosion attack, either the core shell is made of corrosion-resistant material or an appropriate loose lining is installed.
- The higher the operational pressures and pressure vessel diameters or lengths, the more favorable the weight ratio between multilayer and monowall design.
- Considerably greater safety factors are achieved by means of the more elastic overall behavior of the shell, ventilation holes through all layers and a special system in the vicinity of the longitudinal and circumferential welding seams.
- Spatial stresses and susceptibility to brittle fracture are virtually negligible. Furthermore, even on initial loading, behavior is similar to that of a solid wall.

Monowall technology

Irrespective of specifications such as pressure and diameter, SBN can offer classic monowall designs for high-pressure vessels with wall thicknesses up to 300 mm. Thus, all SBN heat exchangers are supplied in monowall design.

Integrated industrial service concepts

Installation and on-site repair

As a leading manufacturer of high-pressure vessels for the chemical industry, SBN can also provide its customers with special on-site services such as:

- Welding of high-pressure urea pipe spool systems;
- Installation of sieve trays in urea reactors;
- Repair or replacement of linings in strippers, scrubbers, condensers and urea reactors;
- Repair of heat exchangers by shortening or stretching damaged tubes as well as complete tube replacement;
- Dismantling or new installation of high-pressure vessels. SBN can assume either direct responsibility for the execution of these works or offer qualified supervision.

Spare parts

Bolts, gaskets, various semi-finished products such as plates, pipes, elbows, pipe fittings and special parts.

Modern fabrication sites

In order to establish adequate manufacturing conditions, SBN invested heavily in the extension of its production sites. In the Ternitz factory, a further production hall was built and equipped with the machinery and crane capacities necessary for the production of the critical equipment. And in order to be able to deliver the ultra-large and ultra-heavy equipment demanded by the market, SBN established an additional production site at the Danube port of Linz.

Production equipment

- CNC BTA deep-hole drilling machine for holes with diameters of up to 40 mm
- 4000 mm vertical lathe
- several welding manipulators with capacities of up to 50 tons
- six cranes with lifting capacities of up to 240 tons, ensuring smooth handling and loading

Technical data

- a wide range of welding equipment including electrode, TIG, MIG and MAG welding, submerged arc wire and strip overlay welding and computerized tube-to-tubesheet welding machines
- a number of vessel rotators with capacities of up to 500 tons

QUALITY MANAGEMENT SYSTEM

SBN's quality management system is the product of 25 years of constant improvement of quality assurance. This comprehensive system, in which highly trained quality managers collaborate closely with production staff, ensures that all quality specifications for individual production stages and inspection processes are precisely complied with. The system is EN ISO 9001:2008 certified by TUV Austria and ASME certified by OneBeacon America Insurance Company.

christof group®

SBN
Schoeller-Bleckmann Nitec GmbH

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CONTACT

Schoeller-Bleckmann Nitec GmbH
Hauptstrasse 2
2630 Ternitz, Austria
T: +43 (0) 2630 / 319-0
F: +43 (0) 2630 / 319-19
E: sbn@christof-group.com

www.christof-group.com