We meet your requirements globally
Swiss precision and quality from the Emmental for the global industrial market

You are part of an environment in which product reliability and impeccable product quality enjoy top priority. You have to put full trust in your partners and put very great demands on them. This is what connects us, because we want customers who set very high standards.

With KASAG Swiss AG as a partner for the design, engineering and construction of apparatus, vessels, pressure vessels, reactors, heat exchangers, modules and plants for global use, you are on the safe side.

We are the experts for the welding of stainless steel and special materials such as Hastelloy and Duplex.

In close collaboration with our customers, we calculate and design plant components and systems for the chemical and pharmaceutical industry and for the fields of bio and food technology.

Decades of experience, well-founded expert knowledge, and a strong awareness of quality characterize our company as a competent partner.

KASAG is provided with a wide range of manufacturer approvals for the worldwide supply of pressure vessels, process equipment and plants.

Both the origin of the materials processed and the production steps are documented in detail and their traceability is always guaranteed. Furthermore we can offer almost all testing methods required in our organization.
We offer a universal range of services

Product range
Pressure vessels, reactors
Pharmaceutical vessels, biotech vessels
Process vessels, storage tanks
Modules, components, skids, panels, plants
High-pressure apparatus and plants
Heat exchangers, evaporators, condensers
Cryogenic vessels, cryogenic technology
Nuclear technology
Vacuum chambers, vacuum apparatuses
Columns
Transportation containers
Welded constructions.

Machinery for object sizes
Vessel diameter up to Ø 4 m
Object weight up to 13 t
Object length up to 16 m

Certifications, manufacturer approvals
ISO 9001 / ISO 3834-2
PED (EN13445 / AD-2000)
ASME (U-Stamp, Code Section VIII Div. 1)
China Stamp (A1), China License
TP TC 032/2013 (EAC), Customs Union
In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.)

Engineering
Strength calculation according to regulations
FEM (finite element analysis) calculations
Earthquake, wind loads and nozzle loads
Constructive design, engineering, optimization, choice of material, surfaces
Coordination with regulatory authorities
Constructive implementation and bills of material
CAD systems: Autodesk (AutoCAD 2D, Inventor 3D)
“In collaboration with our ambitious customers, we implement individual and complex projects in business fields ranging from chemicals, pharmaceuticals, biotech, cryogenic technology and nuclear technology with strong passion.”

Additional services
In addition to our existing activities, we design complete modules, components, skids, panels and plants. Furthermore we offer specific services. They include comprehensive engineering on the basis of specifications as well as P&I diagram for your apparatus and pressure vessels in 3D Inventor, including the pipeline routing required.

If required, we’ll attend to the purchase management of the purchased parts for you, prepare the electrical and pneumatic wiring including control system, and implement comprehensive testing procedures.

Do you have any questions?
If you have any general questions regarding offers and the construction of plants, apparatus, pressure vessels, our experts will be glad to assist you:
Phone +41 34 408 58 58
sales@kasag.com
“The KASAG experts are among the global leaders in the fields of process engineering, design, engineering, and the construction of pressure vessels, apparatus and plants for industrial companies.”

**Materials**
- Austenitic, stainless steel (1.4307, 1.4571, ...)
- Fully austenitic, stainless steel (1.4539, 1.4828, ...)
- Duplex (1.4462, 1.4410, ...)
- NiCrFeMo alloys with Ni > 40% (Inconel, Hastelloy, ...)
- Al – Mn and Mg alloys (AlMg 4.5 Mn)

**Surface treatment**
- Pickling, passivation, oxygen cleaning
- Grinding, brushing
- Electrolytic polishing and glass bead blasting (external)

**Testing procedures**
- X-rays RT
- Dye penetrant testing PT
- Visual inspection VT
- Material testing / Positive Material Identification PMI
- Helium leakage testing LT
- Riboflavin test
- Pressure tests of up to max. 1000 bar
- Surface roughness testing Ra/Rz
- Ferrit measurement Fe
- Wall thickness measurement
- Video endoscopy
- Pressure-loss test (liquid)

**Welding**
- Our certified experts master the procedures of MIG, MAG, TIG, Plasma and Orbital welding. We exclusively use certified filler materials for carrying out our welding operations.
For technical exclusivity worldwide
KASAG Swiss AG has a wide range of experience in the construction of pressure vessels and components for the pharmaceutical and biotech industry. Pharmaceutical and biotech equipment are designed and manufactured in accordance with your requirements and made of stainless steel and special materials. Thereafter, the products are ground and electro-polished to customer specifications. Finally, comprehensive non-destructive testing is performed. All of the materials, processes and procedures used are documented in a detailed QA documentation and traceability is given at any time. You can rely on KASAG.

The range of services that we provide consists of:

- Mobile or stationary process or batch containers
- Storage tanks, WFI (Water for Injection) or CIP (Cleaning in Place) containers
- Fermenters, bioreactors
- Bulk and transport containers
- Sheet metal and welded structures which come into contact with products
- Complete modules, assemblies, skids, plant components with pressure vessels, agitators, piping, safety equipment, valves and control systems

The highest manufacturing quality with optimal hygienic cleaning options (CIP cleaning-in-place / SIP sterilization-in-place) come as standard at KASAG.

This includes:

- The correct processing of materials such as 1.4404 or 1.4435 BN2 with tested and recorded ferrite content
- Impeccable welding seam quality and documentation
- Tested and recorded surface processing in ground, highly polished or electro polished versions with a roughness of up to Ra 0.2 μm
- Installation of cleaning equipment within the pressure vessels for optimal cleaning processes and complete discharge in accordance with ASME-BPE
- Extensive test methodology for intermediate testing and final FAT, including: x-ray RT, dye penetrant testing PT, visual inspection VT, material testing / positive material identification PMI, helium leakage testing LT, riboflavin tests, total discharge, pressure testing up to max. 1000 bar, surface roughness testing Ra / Rz, ferrite measurement Fe, wall thickness measurements, video endoscopy and pressure loss testing (liquids)

We use automated and manual welding machinery as well as a modern orbital welding equipment to weld our components.
Validation / Qualification

We support you with regard to GMP (Good Manufacturing Practice) requirements for the validation/qualification of equipment components produced by us for the manufacture of pharmaceutical products (DQ, IQ, OQ, PQ). The areas incorporated in our scope of delivery can include:

**Design Qualification, DQ**
Verification to ensure that the quality-relevant, GMP-related requirements were taken into consideration during the design of the equipment:
- Materials
- Dimensioning / design

**Installation Qualification, IQ**
Documented evidence that critical equipment has been implemented and installed in compliance with customer requirements and statutory provisions:
- Calculation and documentation in accordance with regulations
- Safety equipment, risk analysis
- Accessibility for maintenance and cleaning

**Operational Qualification, OQ**
Documented evidence that critical equipment operates in compliance with customer requirements within the stipulated limit values throughout the entire work area:
- Leak tightness
- Mechanically moving parts
- Safety equipment
- Operating parameters

**Certifications, manufacturer approvals**
- ISO 9001 / ISO 3834-2
- PED (EN13445 / AD-2000)
- ASME (U-Stamp, Code Section VIII Div. 1)
- China Stamp (A1), China License
- TP TC 032/2013 (EAC), Customs Union

In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.).
Special materials

KASAG Swiss AG has many years of experience in the processing and welding of special materials. Based on our knowledge of aluminium and stainless steel, we have continuously expanded our know-how and apply a comprehensive range of welding procedure qualifications and welder certificates in accordance with ISO 3834-2. We are well versed in all MIG, MAG, WIG, Plasma as well as Orbital welding processes, and work exclusively with certified welding materials.

Special materials include both corrosion and heat resistant materials as well as other special alloys with other specific advantages. The examples below illustrate two areas in which special materials are used:

**Duplex steels** comprise a blend of the characteristics of stainless chrome steels and stainless chrome-nickel steels (austenitic). These have higher strength than stainless chrome-nickel steels, but also greater ductility than stainless chrome steels. Like corrosion-resistant, purely austenitic steels, duplex materials have lower nickel content (approximately 4-8% less), but usually have a significantly higher chrome content.

**Nickel-based alloys** are materials whose main constituent is nickel, but which have been optimised by means of a smelting process with at least one other chemical element. These alloys offer good corrosion resistance and/or high-temperature performance. Most nickel alloys are classified in accord with international standards.

**Processing special materials**

The processing stages for special materials can be divided into cutting, mechanical processing, bending, welding and surface treatment. Every special material has specific processing requirements when compared to stainless steel. For example, pipes in 1.4462 cannot be bent in the same radii as stainless steel, or cutting speed when turning C22 are greatly reduced.

When welding special materials, attention must be paid to the various properties and requirements of each individual material, for example lower energy input or high levels of cleanliness.
Design, engineering and welding of special materials

Special material categories
A “Special Materials Overview” with brand names, material numbers, characteristics and areas of application for the following special material categories can be requested from KASAG (non-exhaustive and provided without guarantee):

Corrosion-resistant special alloys:
- Martensite
- Duplex
- Super austenite
- Nickel-based
- Nickel-copper
- Pure nickel

Heat-resistant special alloys:
- Ferrite
- Martensite
- Duplex
- Austenite
- Nickel-based

Special alloys:
- Titanium

Availability
The availability and price of special materials in raw material forms as sheet, pipe, profile, and forging forms are heavily dependent on worldwide demand. When demand is low, there is often no inventory on the procurement market for specific special materials. Because the cost of specialist production would be excessively high, it is not possible to use these special materials.

Area of application
Special materials are mostly used in the offshore, gas and oil industries, the maritime (desalination plants, ship construction), chemical, pharmaceutical and biotech industries, aviation (engine construction, aircraft construction, aerospace), the energy and environmental sectors (reactor construction, turbine construction, waste incineration plants, flue gas desulphurisation), defence technologies, industrial furnace construction and medical technologies.

Certifications, manufacturer approvals
ISO 9001 / ISO 3834-2
PED (EN13445 / AD-2000)
ASME (U-Stamp, Code Section VIII Div. 1)
China Stamp (A1), China License
TP TC 032/2013 (EAC), Customs Union
In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.).

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Nuclear technology

KASAG Swiss AG is a qualified nuclear technology subcontractor, based on our ASME and/or PED (AD2000 or EN13445) manufacturer’s approval. We process stainless steel and special materials for you in accordance with nuclear standards relating to complete material traceability and quality documentation. With KASAG as your partner safety comes first.

The manufacture of components for nuclear power plants requires stringent compliance with procedures and places the highest demands on our qualified professionals.

The range of services that we provide consists of:
- Calculations in accordance with regulations, including FEM calculations
- Generation of manufacturing drawings
- Material procurement
- Support for acceptance testing of materials
- Preparation of test sequence plan (Traveller), materials and welded joint lists
- Production
- Performance of non-destructive testing
- Acceptance
- Packaging support and implementation

Additional services
In addition to our existing activities, we design complete modules, components, skids, panels, and plants. Furthermore, we offer specific services. These include comprehensive engineering on the basis of specifications as well as P&I diagram for your apparatuses and pressure vessels in 3D Inventor, including the piping required. We can also take over the comprehensive test procedures according to your requirements.

Materials
Austenitic, stainless steel (1.4307, 1.4571, …)
Fully austenitic, stainless steel (1.4539, 1.4828, …)
Duplex (1.4462, 1.4410, …)
NiCrFeMo alloys with Ni > 40% (Inconel, Hastelloy, …)
Al – Mn and Mg alloys (AlMg 4.5 Mn)

Surface treatment
Pickling, passivation, oxygen cleaning
Cleaning in accordance with DIN25410
Grinding, brushing
Nuclear technology for use worldwide

Testing procedures
X-rays RT
Dye penetrant testing PT
Visual inspection VT
Material testing / Positive Material Identification PMI
Helium leakage testing LT
Riboflavin test
Pressure tests of up to max. 1000 bar
Surface roughness testing Ra / Rz
Ferrit calculations Fe
Wall thickness measurement
Video endoscopy
Pressure-loss test (liquid)

Welding
Our certified experts are masters of MIG, MAG, TIG, Plasma and Orbital welding procedures. We exclusively use certified filler metals in our welding operations.

Certifications, manufacturer approvals
ISO 9001 / ISO 3834-2
PED (EN13445 / AD-2000)
ASME (U-Stamp, Code Section VIII Div. 1)
China Stamp (A1), China License
TP TC 032/2013 (EAC), Customs Union
In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.)
Plant, apparatus, pressure vessel construction

Modules, Skids, Plants
for low-temperature, gas, energy, food technology applications

We are experts in the design, engineering and production of pressure vessels. In addition, KASAG Swiss AG also produces complete skids, modules, assemblies and plants based on your requirements. We offer complete engineering drawings in 3D-Inventor based on your piping and instrumentation diagram (P&ID) as well as your equipment specifications. Our specialist employees then produce your modules, assemblies and plants on this basis. You can rely on KASAG.

Our range of services includes:
- Comprehensive design and engineering of equipment, piping, etc. in 3D-Inventor (piping) on the basis of equipment specifications, P&I diagram and valve and/or instrument lists
- Design and engineering of apparatuses and components
- Support during the procurement of purchased parts in accordance with your specifications
- Acceptance checking of the purchased parts
- Production of complete modules, assemblies, skids, panels, plants
- Electrical, pneumatic wiring including control systems as required
- Performance of non-destructive testing
- Acceptance of modules, assemblies, skids, panels, plants including packaging as required

Testing procedures
- X-rays RT
- Dye penetrant testing PT
- Visual inspection VT
- Material testing / Positive Material Identification PMI
- Helium leakage testing LT
- Riboflavin test
- Pressure tests of up to max. 1000 bar
- Surface roughness testing Ra/Rz
- Ferrit measurement Fe
- Wall thickness measurement
- Video endoscopy
- Pressure-loss test (liquid)

Certifications, manufacturer approvals
- ISO 9001 / ISO 3834-2
- PED (EN13445/EN13480 / AD-2000)
- ASME (U-Stamp, Code Section VIII Div. 1)
- China Stamp (A1), China License
- TP TC 032/2013 (EAC), Customs Union

In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.).
Vacuum chambers, vacuum apparatuses
for vacuum technology

KASAG Swiss AG develops and builds customer-specific vacuum chambers and apparatuses which satisfy the highest quality requirements. These are used in the fine vacuum (> 10⁻³ mbar), high vacuum (> 10⁻⁷ mbar) and even ultra high vacuum (< 10⁻⁷ mbar to > 10⁻⁹ mbar) sectors. Pore-free welding and sealing technology comprise the key criteria in the construction of vacuum chambers and apparatuses. Comprehensive in-house testing using helium leak detection guarantee the absolute leak-tightness of your products. With KASAG, you are definitely tight.

Vacuum chambers, vacuum apparatuses
Vacuum chambers and apparatuses usually comprise a welded design made from stainless steel and special materials in order to contain a specific volume. Design and engineering, as well as the leak-tightness of the welded seams and sealing technology pose particular requirements.

Vacuum generation
In order to generate a vacuum in a previously gas filled volume, gas particles must be removed from the volume. This can be achieved using vacuum pumps, for example.

Permeability
The movement of electrical charge carriers in the vacuum is disrupted by the innate magnetism of the adjacent components, and has a negative impact on the intended vacuum. High-technology applications may therefore only use materials which have no innate magnetism and low permeability levels. As stainless steel can be magnetic as well as non-magnetic, material selection is a crucial step in this process. Materials with lower permeability levels include 1.4435 (μr ≤ 1.1), or very high alloy materials such as 1.4539 and 1.4529. During production, particular care must be paid to forming and welding, which increase permeability. Permeability can be reduced again using solution annealing.

Our test procedures for vacuum technology
All vacuum chambers and apparatuses manufactured by KASAG are tested according to the usual test procedures:
– X-ray RT, visual inspection VT
– Dye penetrant testing PT
– Material testing / Positive Material Identification PMI
– Helium leakage testing LT
– Surface roughness testing Ra / Rz
– Ferrite measurement Fe
– Wall thickness measurement, video endoscopy

Certifications, manufacturer approvals
ISO 9001 / ISO 3834-2
PED (EN13445 / AD-2000)
ASME (U-Stamp, Code Section VIII Div. 1)
China Stamp (A1), China License
TP TC 032/2013 (EAC), Customs Union
In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.).
Heat exchanger
Heat exchangers, evaporators, condensers

You formulate your requirements and provide your data on medias to KASAG Swiss AG. We then take on the thermal and hydraulic design of the heat exchanger that you want (pipe bundle heat exchangers, double pipe heat exchangers and spiral tube heat exchangers). This is then instructed on the basis of existing drawings or of complete engineering.

Our range of materials extends from stainless steel through to special materials. KASAG provides all of the processes necessary, such as the orbital welding process for the manufacture of heat exchangers. With KASAG, you retain permanent flexibility.

Terminology
Colloquially, heat transfer systems also refer to equipment which exchanges or swaps out heat.

In heat transfer systems, materials flowing in a counter current flow past each other in an accommodating manner. This enables the exchange of temperatures in the flow mediums so that the originally cold medium absorbs the temperature of the originally hot medium, and vice versa.

Condensers are apparatuses in which a substance is converted from a gaseous state into a liquid.

Evaporators are equipment for converting a liquid into a gas.

In parallel flow heat transfer systems, the substances flow side-by-side, in the same direction. Their temperatures adjust to each other, and their values always lie between the initial temperatures.

Certifications, manufacturer approvals
ISO 9001 / ISO 3834-2
PED (EN13445 / AD-2000)
ASME (U-Stamp, Code Section VIII Div. 1)
China Stamp (A1), China License
TP TC 032/2013 (EAC), Customs Union

In addition to our existing manufacturing approvals, we are able to perform the respective approval procedures for almost every country around the world (e.g. Singapore, Japan, Malaysia, Canada, etc.).