

WITZENMANN

managing flexibility

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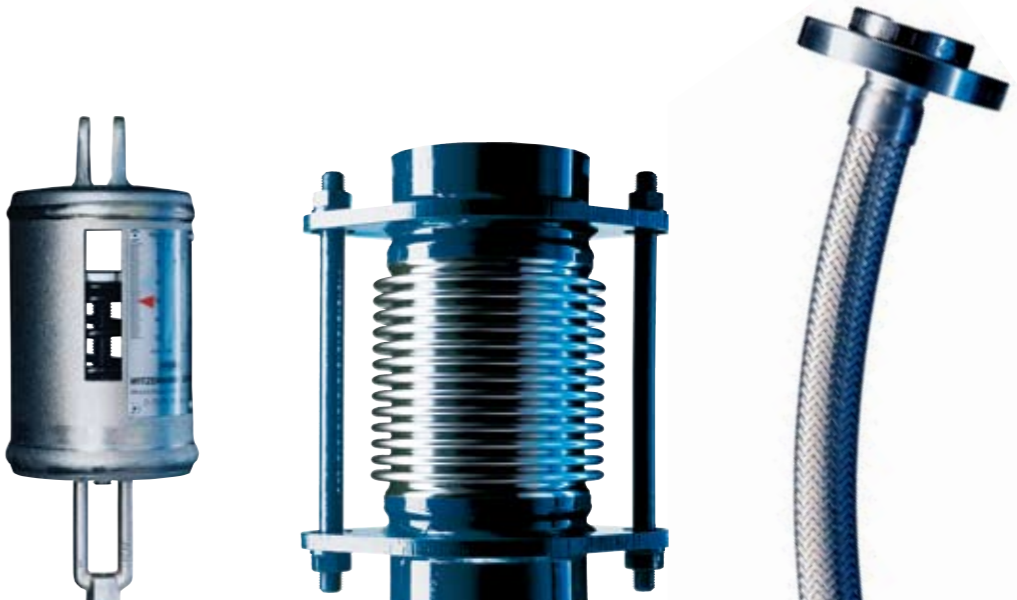


—> ALWAYS IN MOTION, FOR YOU.





EVERYWHERE. WHEREVER YOU NEED US.



Worldwide

America
USA
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Asia
China
India
Korea

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Austria
Belgium
Czech Republic
France
Germany
Great Britain
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Sweden

The world is changing every day – and with it the demands which are made on it. Today, thermal power plants work cleanly, efficiently and environmentally friendly. Machines and pipe assemblies meet the highest standards with respect to economy and ecology. As a consequence, there has been an increase in the demands on the components which keep these systems running: in functionality, in reliability and in economic efficiency.

Being the founder of the metal hose and expansion joint industry, we have been changing the world for more 100 years: in machine and system construction, in the chemical industry, in vacuum technology and in the construction of fittings.

Today, the Witzmann group is one of the leading manufacturers of flexible metal components worldwide, such as metal hoses, expansion joints and metal bellows. This, of course, also includes the availability of an efficient network of development, production, service and distribution.

This network is our basis for a maximum level of proximity to customers. 24 locations in 17 countries create the preconditions to be able to be a worldwide partner for our customers.

COMPREHENSIVE CONSULTING FROM THE BEGINNING: INTEGRATED ENGINEERING.



Software

4 in 1
For the first time, the whole knowledge of the market leader on one CD.
The Flexperte CD for metal hoses, expansion joints, metal bellows and supports.
As a menu guided design and calculation program, complete with technical drawings, description texts ...

In many cases, the first steps are decisive for the future position: In both real life and in business. We therefore are a companion to you on your way: From the first project discussion to delivery.

We promote and require your ideas. We build prototypes and put them on the most demanding tests. In special laboratory experiments, we test the life cycles of our products, material combinations and coatings. In brief, we just do everything to make your ideas develop into successful products.

In this demanding work, we can trust in a pool of highly qualified engineers combining technical know how and creativity, the feeling for the application of the appropriate technology, with a sense for what is technically possible and feasible.

The result is metal hoses which are universally applicable, expansion joints ensuring safety in pipelines, metal bellows which e.g. absorb high frequency vibrations totally, and flexible elements which are absolutely maintenance free even on sea. Standard or custom made products. And always the best solution in both technological and economic respect!



Rogesa Hochofen 5, Dillinger Hütte, Fotograf/Zeichner: „Stahl-Zentrum“, Datum: 2004

Complete Program

The Witzenmann group is the only supplier of complete supporting and compensation systems for piping engineering. This unique combination of product and system know how of many years make us a preferable partner for system and power plant construction companies.

A QUESTION OF DESIGN: SYSTEM AND POWER PLANT CONSTRUCTION



Supporting. Suspending. Compensating. Who wants to play the main part in system and power plant construction does not only have to master the different techniques, but must also have the ability of adapting the individual techniques to each other in an optimum manner.

Our product range for all fields of piping engineering is unique: metal hoses and bellows, expansion joints, hangers and supports, and also rolling and sliding supports, guides and sway struts, vibration dampers as well as special steel components for supports, an unparalleled product range. Just as versatile as our product range are also its fields of application: from -253 °C to +1,000 °C, from vacuum engineering to high pressure, from the simple pipeline to highly sensible safety engineering for nuclear power plants.

Extensive certifications and a pool of highly qualified engineers ensure at any rate the right solution – one of our key benefits in the industry. We have at our disposal both the experience from more than 100 years of project development and the know how which is required for the reliable implementation of complex system solutions.

Our design program Flexperte for flexible elements puts a final edge on this competence. It was developed especially for planners and design engineers in order to select and display metal hoses, expansion joints, metal bellows and bearings. Furthermore, the Flexperte CD includes a load chain program to design and display pipe supports.

METAL – THE SEAL FOR VALVE APPLICATIONS



Excellent Qualities

Can poisonous and aggressive fluids be handled and transported safely? They can. With the right material – and the right technology. We do not only use high quality materials for our bellows; we can also master the welding of high carbon steel grades. It is no wonder that we have our place in all plants of the world – even in chemical and food plants.



Corrosive fluids, radioactive fluids, chemical and toxic substances: Wherever critical fluids are to be conveyed, there cannot be any compromises when it comes to safety.

Valve spindles, for example: Gland seals are not sufficient for a safe sealing of the spindle against critical fluids. Only valve spindle seals with metal bellows allow for the required safety in this field, in order to protect man and the environment.

How can this be achieved? Firstly, with the right material. We therefore only apply high quality materials for our bellows: Stainless steel, nickel based alloys and titanium.

Secondly, with the right structure. The principle of multi-ply structure does not only provide a very high level of flexibility, it also allows for high pressure stress and high collective cycle stress.

The result: Witzenmann metal bellows guarantee hermetical sealing of the valve spindle even under extreme pressures of up to 500 bar. You thus can keep extremely volatile fluids such as chlorine gas safely sealed.



Quality

A complete quality management makes all processes of Witzmann transparent and efficient. It begins with development, includes the selection of suppliers and ends with the certification of the whole enterprise according to international standards.

A SAFE SOLUTION: CHEMICAL INDUSTRY



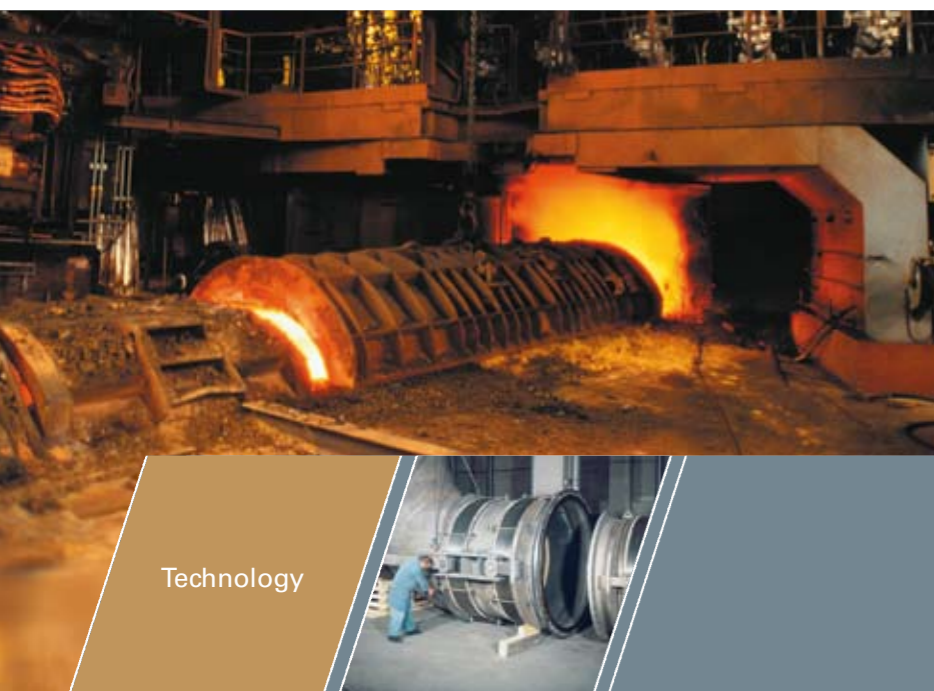
High pressures, extreme temperatures, aggressive fluid: The chemical industry is the most demanding challenge to flexible metal components. In this field, maximum safety standards and extreme product reliability of all system components are indispensable in order to provide reliable protection of humans and the environment.

Being the supplier with the widest range of flexible metal elements, we have the appropriate solution for every demand: From vacuum to high pressure. From critical fluids to aggressive ones. In this fields, we apply flexible elements which are absolutely

reliable in operation even under extreme pressure conditions. For fluids with high viscosity, we have developed heatable hoses and expansion joints which guarantee homogeneous flow.

Of course, we are also capable of mastering the welding of most different materials – from A as aluminium to T as tantalum. In the most modern manufacturing processes, we thus manufacture high quality products which increase the service lifetime of systems, machines and aggregates – and also reduce the operating expenses. A good solution.

CAPABLE OF TAKING A LOT OF STRESS: STEEL- AND ROLLING MILLS



Technology

For many years, Witzemann has been one of the leading technology suppliers for steel production. Tailor made solutions for the state-of-the-art blast furnace technology are used all over the world where high-grade materials are produced economically and environmental friendly.

For generations, steel has been one of the most important basic materials of global industry. The technology for steel production is continuously further developed. We from Witzemann, too, contribute our knowledge. So that the steel industry is able to economically produce efficient materials for the future markets.

An example for this are our lance hoses for use in blast furnaces. As flexible oxygen feed for blow lances, they must withstand highest temperatures. The interplay of several robust components ensures an extremely pressure-resistant and heat-proof system. Or the specially developed expansion joints for hot blast stoves of hot-blast furnaces which are designed for high pressures and working temperatures of up to 1,500 °C.

But this is far from being all. When our customers bring a plant up to date, Witzemann delivers several thousand metal hoses and expansion joints for it, designing the most different applications: from flexible connections for cooling elements up to special bellow solutions in valve systems.

HIGHER EFFICIENCY ON ALL OCEANS: SHIP CONSTRUCTION



Reliability

Ships are still the most important means of transport for goods in the global trade. A reason for this is the efficiency and reliability of this means of transport. This requires high-quality components which are designed for the hardest strains. On deck it is aggressive sea water, below deck it is temperatures of up to 700 °C and pressures of up to 80 bar. Here absolute reliability of each components is decisive.

This is why we have developed robust solutions for these application conditions. Flexible piping systems by Witzemann compensate vibrations and movements of aggregates and the same heat expansions. They are used in different versions in all relevant systems of ship technology – from hydraulic systems to exhaust systems.

Witzemann components are technically gas-tight, sea water resistant, burst- and flame resistant. Approvals by all well-known marine institutions are evidence for the quality of our solutions.

On the water and below the surface, on deck or in the machine room, flexible solutions by Witzemann allow for a maintenance-free continuous operation – also under the harshest conditions.



LIQUID GOLD: LIQUEFIED NATURAL GAS



Offshore gas gathering

Lowest temperatures, highly explosive media, projects in the most inefficient areas of natural gas gathering in the open sea is a challenge for man and technology. By means of Witzenmann technologies, visions become economically realizable – that is for certain.

High up in the north and in the depth of the sea, on rock islands in the Arctic Sea and on the Arctic continental shelf – under such extreme conditions, natural gas is gained today. For the long way up to civilisation, it is liquefied at a temperature of $-162\text{ }^{\circ}\text{C}$. The deep-frozen, highly inflammable fuel requires reliable solutions for safe loading, transport and later storage in reservoirs.

The piping systems for loading in the open sea, from ship to ship and from ship onshore must be highly flexible and simultaneously absolutely gas-tight also at lowest temperatures. Special bellow pipes by Witzenmann allow safe handling of the deep-frozen gas – also when the sea is rough. Cost-intensive and weather-related waiting periods are thus a thing of the past.

When the coveted fuel lies in the deep sea and is inaccessible for human beings, newly developed unmanned systems will be used. Here, too, it is about highest quality and precision, because already the smallest defect on the sea bottom would cause immense costs. For this, Witzenmann has developed maintenance-free, absolutely reliable solutions designed for use over several decades. But this is far from being all. Onboard the transport ships and in the storage tanks onshore, Witzenmann components ensure flexibility and safety.

Witzenmann here use their experience gained over decades in the aerospace industry. This includes the right selection of suitable materials and manufacturing process, tailor-made design of components just as the required product tests.

RESISTANCE TO HIGH VOLTAGE FOR DECADES



Long Service Lifetime

In vacuum insulated and SF6 gas insulated switch plants, safety and reliability have utmost priority. In these plants, a high number of guaranteed switching cycles as well as the fast decoupling of kinetic motions in the case of a short circuit must be mastered. Our metal bellows implement this demanding task within a few milliseconds – and they will still do so after decades.



We must admit that we cannot predict the future. But one thing is sure: The number of people on earth is increasing – and with it also the need for energy. This requires long-term concepts which meet the interests of both sides: Man and earth.

In electric power supply, for example, the idea of switching electric currents under vacuum nowadays is more important than ever. After all, vacuum is a really excellent insulation. The problem is that in protective vacuum pipes only materials with excellent vacuum properties, which also comply with high mechanical requirements, can be applied.

Our metal bellows make an effective contribution to this solution. In vacuum insulated and SF6 gas insulated switch plants, they provide maximum safety and reliability, since every metal bellows which leaves our plant is high quality welded – in such a high quality that its gas leakage resistance will be guaranteed for thirty years of service.

Our expansion cells in high voltage transformers also show our high flexibility in finding answers to the questions of tomorrow. Their special feature is their flat shape in contrary to conventional bellows versions. Nevertheless, they allow for a high volume compensation in closed oil circuits already at a low response pressure, due to their special profile. These bellows, of course, also have the long service lifetime which is proverbial with Witzemann products: No corrosion, no diffusion – but high load cycle reliability and absolute temperature resistance – for many years.