

# Sealing competence for power plant technology



# As versatile as the requirements of the power industry: Sealing solutions from EagleBurgmann.

RWE Weisweiler coal-fired power plant, Germany

**Fabric expansion joints on steam pipes.**

Hongyanhe power plant, China

**Mechanical seals in residual heat removal pumps.**

Connah's Quay gas-fired power plant, UK

**Mechanical seals in main cooling water pumps.**

Sines power plant, Portugal

**Fabric expansion joints in flue gas desulfurization systems.**

Dezhou Shandong Huaneng

Power Development Co. Ltd. power plant, China

**Carbon floating ring seals in air barrier systems in coal mills.**

Astoria II combined cycle plant, USA

**Metal expansion joints in HRSG boilers.**



Vattenfall coal-fired power plant Boxberg, Germany

**Mechanical seals in suspension delivery pumps on flue gas desulfurization systems.**

Gösgen power plant, Switzerland

**Magnetic couplings in secondary condensate pumps.**

Reliant Energy gas-fired power plant Parish, USA

**Mechanical seals in feed pumps.**

EnBW Stuttgart-Münster plant, Germany

**High-temperature packings in pumps with cooled seal housing.**

## **The sealing specialist for power generation**

EagleBurgmann is one of the world's leading system suppliers of sealing technology and has been a partner to the power industry for decades. From the beginning, we've brought our innovative approach to shaping the sealing technology in this demanding industry. Throughout the world, our products and solutions are successfully deployed in all primary and secondary power station processes.

## **Comprehensive industry-specific knowledge**

We understand the requirements of the power industry and have in-depth knowledge of its many processes. With our application expertise and technical consultancy skills we are able to provide reliable and cost-effective solutions for every need.

## **Full-service partner with a global presence**

Research and development, consulting, engineering, design, production and a broad range of modular services are competences that our customers use to their benefit. Our comprehensive network of production sites and sales and service centers means that we are always close to you, wherever you are in the world.

# Sealing technology: A key component in the operation of power stations.



## Reliably safe and very economical

No power station can be operated without seals. The number of sealing locations to be controlled is correspondingly large. So there are quite a number of plant components that need to be sealed: rotating equipment, such as pumps, agitators, coal mills and compressors; valves, flanges and pipes and ducts carrying gases and liquids.

The reliability of the entire power plant depends on a number of individual parts. The seals, as key components, play an important role. They protect the media in the process from external influences and help prevent emissions. They enhance process reliability, availability and economic viability of the power plant.

Sealing technology also often offers considerable potential for reducing costs – through process-orientated design and standardization, for example. The right product portfolio and knowledge of the processes and standards used allows EagleBurgmann to implement solutions that are not only technically safe and reliable, but economically first-rate as well.

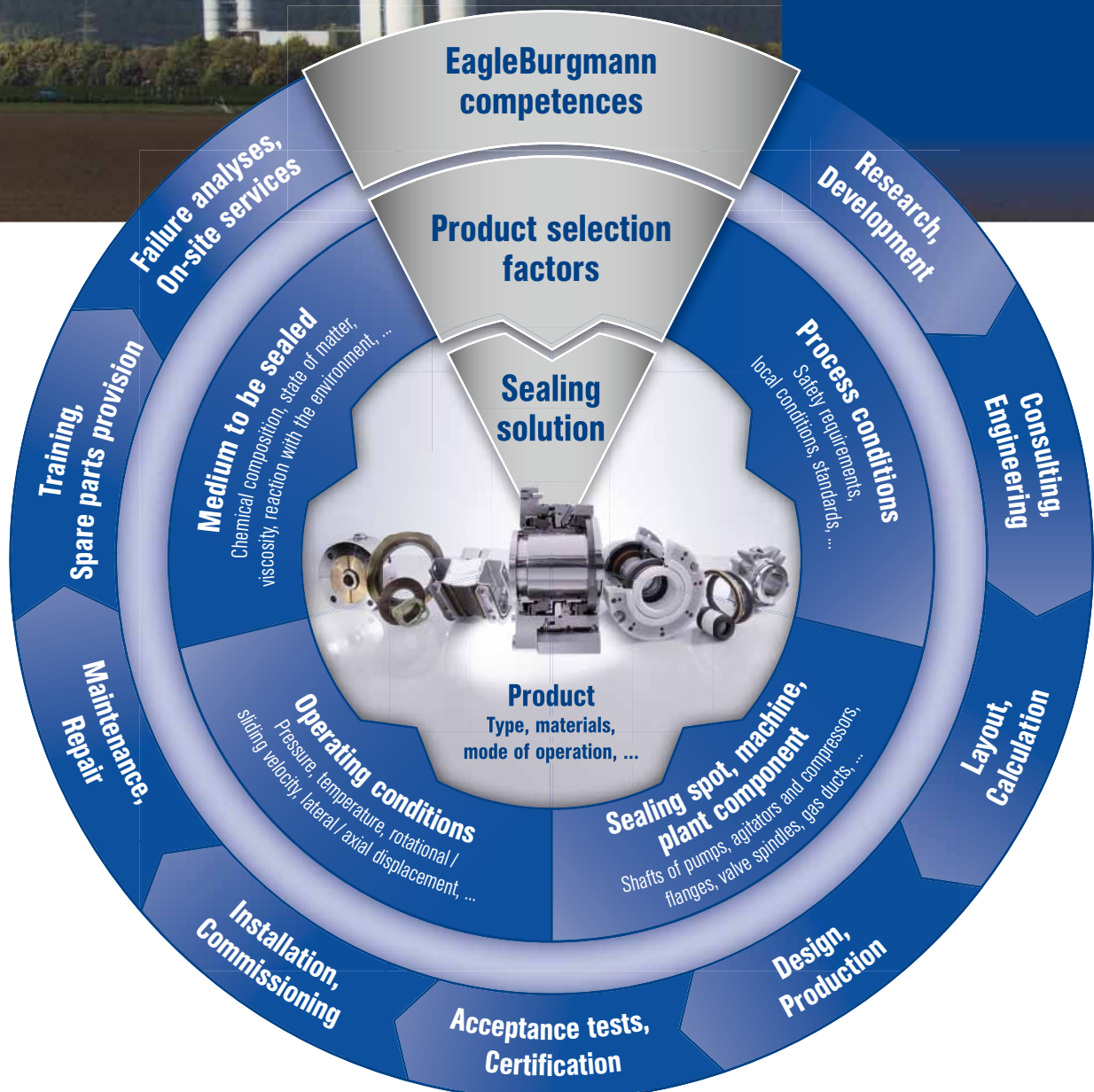




## Sealing solutions to meet any requirement

Several factors play a major role when choosing the product, the product type, the materials used and how it is operated: process conditions at the sealing location, operating conditions and the medium to be sealed.

No matter what requirements our customers have: we know how these factors affect functionality and economic viability, so we convert this know-how flawlessly into long-term, reliable sealing solutions. EagleBurgmann has the expertise needed to accompany and support the entire development, life and service cycle of its sealing solutions.



# Experience, demand and commitment: The building blocks for optimized sealing concepts.

## Reliable market partner with worldwide presence

With over 60 subsidiaries and 250 locations worldwide, we use our global focus to the benefit of our customers. Thus our production network, which has plants in Europe, Asia, North and South America, ensures that we are always in line with market requirements, produce on attractive terms and are able to supply regional markets.

We also have a comprehensive network of sales and service centers that covers every important economic region. Being close to our customers also means we are precisely acquainted with their processes and individual requirements.

EagleBurgmann is part of the German Freudenberg Group and the Japanese EKK Group. We have access to all the resources we need to offer optimum support to major customers at the international level and to become a long-term, reliable partner to them.

## Consulting and engineering with substance

Technical expertise grows from knowledge. This does not only have to mean knowledge of sealing technology, it also takes into account the machines, components and media to be sealed, along with the manufacturing process and products and the process conditions involved in power plant technology.

Knowledge management helps us keep our comprehensive knowledge up to date and make it available to the entire company. We use databases, courses and training to develop our employees and bring together our industry expertise from all around the world.

Our dedicated and committed employees use this wide and varied know-how to give our customers well-founded advice on how to choose the best product from the technical and economic viewpoints and how to calculate and design according to need.

## High-level research and development

We invest a great deal in research and development in order to consistently improve the performance of our products. EagleBurgmann carries out publicly sponsored research projects and works together with institutes and universities. Joint projects with customers and suppliers are a regular source of new solutions.

Two large research and development centers in Germany and Japan, combined with a worldwide network of testing facilities, allow us to respond flexibly to the requirements of our customers. We run acceptance test rigs for pump, agitator and compressor seals, development and testing laboratories for expansion joints and special test benches for acceptance tests.



## Wide-ranging standard portfolio and tailored solutions

Largely standardized and modular product series are an essential part of our portfolio. But we also offer individual solutions and provide the necessary development, engineering and production capacity for this purpose. Using the latest calculation and design methods, such as 3D-CAD, we adapt our products to customer-specific requirements or design new solutions. Worldwide design standards ensure that the most stringent technical requirements are met.

EagleBurgmann produces to the most demanding internal and external standards at various locations around the world. At all of these locations, we use ultra-modern equipment, optimized and standardized production processes and a great vertical production range – all building upon the reliable base of our excellent employees. Our Quality Management systems are certified e.g. to ISO 9001 and to Nuclear Standard KTA 1401.

We also have certifications and approvals that are relevant to the power industry including ASME (Tractebel), TÜV WHG, AD2000 Pressure Vessels Module H H1, ATEX and AEO.

## Protection of humans, the environment and industrial plants

Safety is an elementary requirement for industrial sealing technology. It is ultimately all about protecting humans, the environment, products and resources. A lot of what EagleBurgmann does goes far beyond legal requirements. This sense of responsibility is part of the company culture and is firmly anchored in the guiding principles of the group.

Our environmental management system is certified to ISO 14001 and our work safety management system to OHSAS 18001. Regular audits and numerous training courses raise awareness in employees and management alike. This develops a culture in which everyone feels responsible for work safety, the environment and health protection within the company and on our customers' own premises.

## Modular service concept ensures maximum flexibility

Products and services are both sides of the same coin. Professional installation and commissioning, practical knowledge transfer, intelligent inventory management and regular servicing and maintenance extend service life and protect investments.

The need for services varies according to the operator and the system and is as diverse as the industry itself. Failure mode analysis, tailored on-site services and engineering services related to sealing technology play an increasingly important role.

Be it for individual sealing systems, critical process elements, specific plant units, or a comprehensive service agreement for entire plants – our TotalSealCare modular service concept has the solution for every requirement. The individual service modules can be combined as needed to ensure maximum flexibility.



# Comprehensive product portfolio: Sealing solutions to meet any requirement.

## An overview of the EagleBurgmann product lines

Our comprehensive product portfolio covers all the needs of the power industry. The range includes mechanical seals for pumps, agitators and compressors, magnetic couplings, carbon floating ring seals, seal supply systems, compression packings and gaskets and single and multiple layered fabric, steel or rubber expansion joints.

Over the course of our long partnership with the power industry, we have developed a range of standard, high-grade solutions which meet many of the industry's diverse needs. We also design and manufacture special and one-off customer-specific solutions to suit individual applications.

This may mean a large series seal or an engineered one-off solution: EagleBurgmann products are always robust, reliable, easy to assemble and present a strong case due to their exemplary cost-benefit ratio.

On the following pages, we set out our product portfolio. This is followed by a number of sample applications from real life, divided between the fields of: conventional power generation, nuclear power and the renewable energy industries.

### Mechanical seals for pumps



The entire range of liquid or gas lubricated seals. Available as standard seals or special versions and as single or multiple versions.

#### Successfully utilized in the power industry:

- Component seals: e.g. H75, HJ, M7
- Cartridge seals: e.g. Cartex
- Elastomer bellows seals: e.g. MG1, MG9
- Special seals: e.g. SH, SA, HR
- Split seals: e.g. HGH

### Mechanical seals for agitators



For sealing shafts in mixers, reactors, filters and special machinery. Rugged, economical, designed for practical application. For steel and glass-lined tanks.

#### Successfully utilized in the power industry:

- Liquid-lubricated: e.g. M481, MR-D

### Mechanical seals for compressors



The entire range of seals for process gas compressors. Rugged, non-wearing, contact-free operation. Available as single and double seals, tandem seals and tandem seals with intermediate labyrinth.

#### Successfully utilized in the power industry:

- Compressor seals: e.g. DGS, PDGS

### Magnetic couplings



For very demanding applications. Hermetically sealed, leak-free and maintenance-free pumping and mixing. Media is reliably contained within closed-loop systems.

#### Successfully utilized in the power industry:

- Magnetic couplings: e.g. MAK66

### DiamondFaces: Groundbreaking coating technology for sliding faces

A microcrystalline layer with all the attributes of natural diamond is applied to the sliding faces by chemical vapor deposition (CVD) at 2,000 °C (3,632 °F) in a vacuum furnace. Seal faces with DiamondFaces are extremely hard and resistant to wear, have excellent thermal conductivity and exhibit excellent chemical resistance. They eliminate the problem of electro-corrosion, and layer adhesion exceeds all known practical requirements.

#### Tested under scientific conditions, a proven track record in the power industry

Used successfully in boiler feed pumps. In a joint project between EagleBurgmann and the University of Technology of Graz (Austria), a DiamondFace coating was tested under

scientific conditions using an original medium. After more than 10,000 hours of continuous operation, there were no signs of electrical corrosion on the seal face or seat, and the sealing solution was deployed successfully in practical application.

#### Electro-corrosion eliminated

One outstanding advantage is the elimination of electro-corrosion that has a destructive effect on silicon carbide rings. Even without feedwater conditioning, coated seal faces and seats have a much longer service life.



### Carbon floating ring seals



Long-life, maintenance-free compact labyrinth cartridge seals with low leakage.

#### Successfully utilized in the power industry:

- Carbon floating ring seals: e.g. Espey WKA300, Espey WKA600, Espey WD200/500, Espey WDB200, Espey WDKS-Eco

### Seal supply systems



Depending on the design, application and mode of operation, mechanical seals and magnetic couplings need supply units for flushing, cooling, pressurization and leakage compensation. EagleBurgmann supplies the entire range from a single source.

#### Successfully utilized in the power industry:

- Cooling / filter systems: e.g. SPF
- Cooler: e.g. WED, WDK
- Magnetic filters / separators: e.g. MAF, MAA
- Cyclone separators: e.g. ZY

### Compression packings



The economical and reliable method of sealing pump shafts and valve spindles. A broad product range, innovative materials, and material combinations and special impregnating agents and lubricants enable us to provide solutions for even the most demanding requirements.

#### Successfully utilized in the power industry:

- Compression packings for pumps: e.g. Buraflex HT, Buraflon, Suprafon
- Compression packings for valves: e.g. Isartherm, Isartherm-Flex, Rotatherm

### Gaskets



Ready-to-install seals or sheet materials. State-of-the-art materials, material combinations and production methods allow us to supply a multitude of versions, variations and shapes.

#### Successfully utilized in the power industry:

- Graphite seals: e.g. Statotherm, Rotatherm
- PTFE gaskets: e.g. Burasil
- Metal gaskets: e.g. Spiraltherm

### Expansion joints



For ducts and pipe systems carrying gas – to reliably compensate for pressure and temperature fluctuations, vibration and misaligned joints.

#### Successfully utilized in the power industry:

- Fabric expansion joints: e.g. Fluaflex, Flex-Gen, Fluastal, Fluachem
- Metal expansion joints: e.g. Bredan
- Rubber expansion joints: e.g. Masterflex

### Special products



Special applications require innovative and specific solutions. As well as special seals and sealing elements for marine technology and the aerospace industry, we also provide high-quality metal bellows and diaphragm couplings as well as sealing systems for rotary kilns.

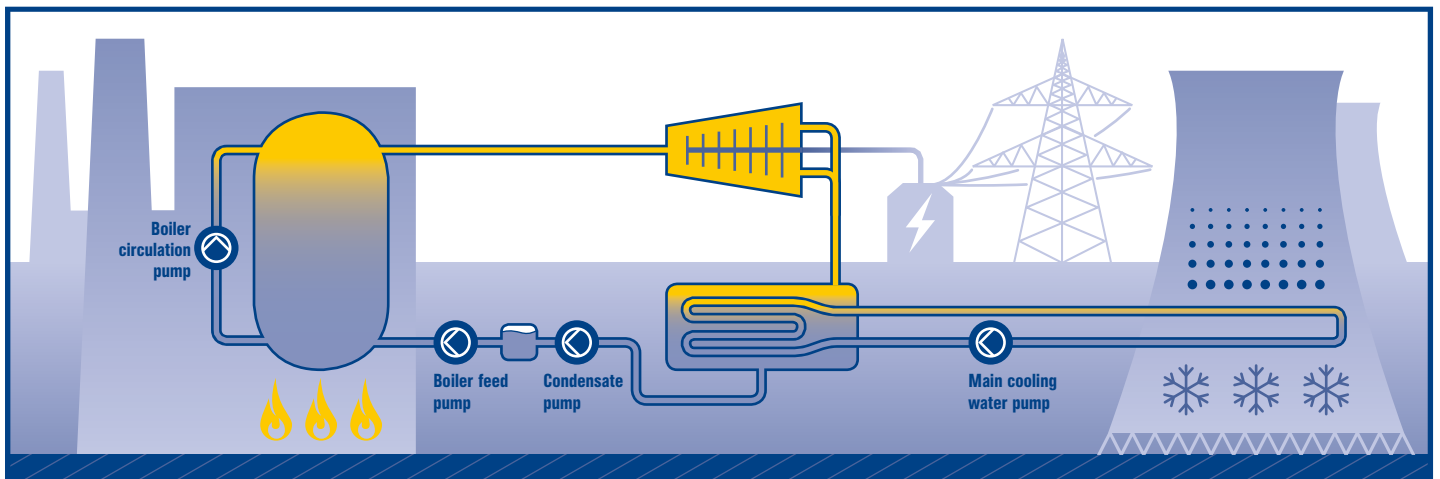
# A proven track record worldwide: EagleBurgmann sealing technology for conventional power plants.

## Fossil fuel-fired power plant applications – requirements and solutions

Fossil-fueled power plants are defined as coal, gas or oil-fueled power plants that are equipped with a flue gas desulfurization plant. Coal-fired power plants are often used as base load or medium load plants. The machinery and parts installed in them run continuously. Gas and oil-fired plants are generally designed to operate as peaking power plants, and they can also be used for voltage balancing when renewable (solar or wind) generation systems are on the grid. Seals at these plants are often exposed to highly fluctuating thermal and mechanical stress.

Machine reliability and low susceptibility to failure are the crucial criteria in all of these applications. The machinery must be rugged enough to withstand high pressures, temperatures and sliding velocities. The machinery also has to deal with different media, such as river, sea or ultra pure water in feedpumps and cooling circuits. Equipment in flue gas desulfurizations must be designed to be resistant against abrasive and corrosive lime milk suspensions and slurries.

Our SH, H75, Cartex and HR mechanical seals are utilized in cooling water, condensate, main feed and suspension pumps. EagleBurgmann supplies metal and rubber expansion joints for steam sub-systems, and WD200 or WD500 carbon floating ring seals with barrier gas port are used in coal mills. Our Isartherm and Buraflex compression packings are an ideal choice for venting and check valves.





A boiler circulation pump is installed in the feedwater circuit at the municipal power plant in San Antonio, Texas. The pump shaft is sealed by two **SHFV3/125-FTA** mechanical seals. Operating conditions:  $p = 170 \text{ bar}$  (2,465 PSI);  $t = 340 \text{ }^\circ\text{C}$  (644  $^\circ\text{F}$ );  $n = 1,800 \text{ min}^{-1}$ .



A suspension pump is used to circulate abrasive milk of lime at the RWE power plant in Frimmersdorf, Germany, sealed with an EagleBurgmann **HR325/270-G11-E6** mechanical seal. Operating conditions:  $p = 3 \dots 4.5 \text{ bar}$  (44 ... 65 PSI);  $t = 50 \text{ }^\circ\text{C}$  (122  $^\circ\text{F}$ );  $n = 890 \text{ min}^{-1}$ .



A steam-driven Sulzer HTP500-505-5s is installed at the Waigaoqiao Phase III power plant in China. EagleBurgmann **SAFV1/210-E1/-E2** mechanical seals are used for sealing the boiler feedwater. Operating conditions:  $p = 33 \text{ bar}$  (479 PSI);  $t = 180 \text{ }^\circ\text{C}$  (356  $^\circ\text{F}$ );  $n = 5,100 \text{ min}^{-1}$ .



The RWE power plant in Niederaussem, Germany uses a Weller pump in the feedwater circuit. A mechanical seal type **SAPV1/138-E2** along with a **SPF9025/A005-V1** seal supply system is applied. Operating conditions:  $p = 20.2 \dots 27.5 \text{ bar}$  (293 ... 399 PSI);  $t = 177 \text{ }^\circ\text{C} \dots 201 \text{ }^\circ\text{C}$  (351  $^\circ\text{F} \dots 394 \text{ }^\circ\text{F}$ );  $n = 1,000 \dots 5,100 \text{ min}^{-1}$ .



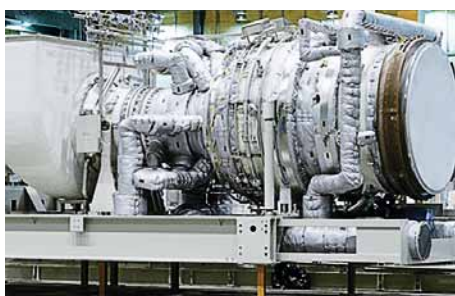
A **SHV1/200-E1** mechanical seal is installed in a KSB CHTA140 feedwater pump at the ENBW power plant in Heilbronn, Germany. Operating conditions:  $p = 30 \text{ bar}$  (435 PSI);  $t = 180 \text{ }^\circ\text{C}$  (356  $^\circ\text{F}$ );  $n = 5,100 \text{ min}^{-1}$ .



EagleBurgmann **HGH210/225-E1** are installed in the main cooling water pump at the KNG power plant in Rostock. Operating conditions:  $p = 2.25 \text{ bar}$  (23.63 PSI);  $t = 25 \text{ }^\circ\text{C}$  (77  $^\circ\text{F}$ );  $n = 490 \text{ min}^{-1}$ ; medium: brackish water with sand.

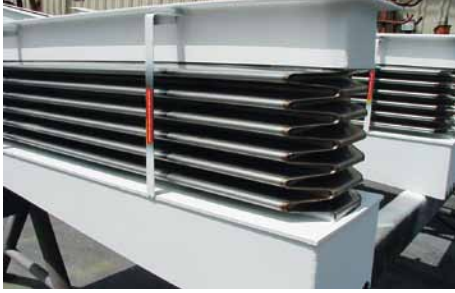


At the PT.Ipmomi coal-fired power plant in Indonesia, sealing for high temperature exhaust gas which contains fly ash and steam is needed on a soot blower. **Isartherm 6011A** and **Isartherm-Flex 6050** compression packings help to maintain safe and reliable operation. Operating conditions:  $p = 40 \text{ bar}$  (580 PSI);  $t = 400 \text{ }^\circ\text{C}$  (752  $^\circ\text{F}$ ).



A **fabric expansion joint** manufactured by EagleBurgmann Expansion Joints Solutions installed in a Siemens SGT 800 gas turbine. Operating conditions:  $p = -9.8 \dots +14 \text{ mbar}$  (-142 ... 203 PSI),  $t = 620 \text{ }^\circ\text{C}$  (1,148  $^\circ\text{F}$ ), gas flow rate: 40 m/s, axial displacement -34 mm, lateral displacement +4 mm.





**Expansion joints** with specially shaped edges are installed in an air preheater at East Kentucky Power in the US. Operating conditions:  $p = 0.07 \dots 0.24 \text{ bar}$  (1.02 ... 3.48 PSI);  $t = 34 \dots 540 \text{ °C}$  (640 °F ... 1,004 °F).



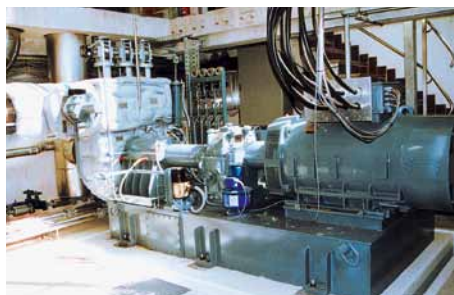
**Buraflex 2000 HT** compression packings are used to seal a feedwater pump at the cogeneration plant in Pforzheim, Germany. Operating conditions:  $p = 72 \text{ bar}$  (1,044 PSI);  $t = 180 \text{ °C}$  (356 °F).



**Fluastal** expansion joints (9 x 5 m) made of special fabric are installed in a flue gas duct at the EGAT Wang Noi power plant in Thailand. Operating conditions:  $p = 0.074 \text{ bar}$  (1.07 PSI);  $t = 580 \text{ °C}$  (1,076 °F).



At the Dezhou Shandong Huaneng Power Development Co. Ltd. power plant in China, sealing air is used to contain hot exhaust air laden with coal dust in the neck of a coal mill. The ideal solution: An **Espey WD200/500**. Operating conditions:  $p = 1.08 \text{ bar}$  (15.66 PSI);  $t = 110 \text{ °C}$  (230 °F);  $n = 15.8 \text{ min}^{-1}$ .



Hot steam has to be contained in a turbine at the Vapo Oy Pellet power station in Finland. An **Espey WKA400** carbon floating ring seal with steam and condensate leakage drain is used in this application. Operating conditions:  $p = 23 \text{ bar}$  (344 PSI);  $t = 495 \text{ °C}$  (923 °F);  $n = 8,200 \text{ min}^{-1}$ .



**TotalSealCare On-Site Service:** during boiler maintenance at the RWE power plant in Frimmersdorf, Germany, EagleBurgmann performed a control valve retrofit. The valves have been equipped with a life loading system and made compliant according to the European IPPC directive (TA-Luft).



**Isartherm-Flex 6050/KIN** compression packings are used to seal boiler control valves at Dubai Electricity and Water Authority in Saudi Arabia. Operating conditions:  $p = 100 \text{ bar}$  (1,450 PSI);  $t = 550 \text{ °C}$  (1,022 °F).



**EagleBurgmann**

**On-Site Service**  
**TotalSealCare**

# Safe and reliable: Our sealing solutions for the nuclear power industry.

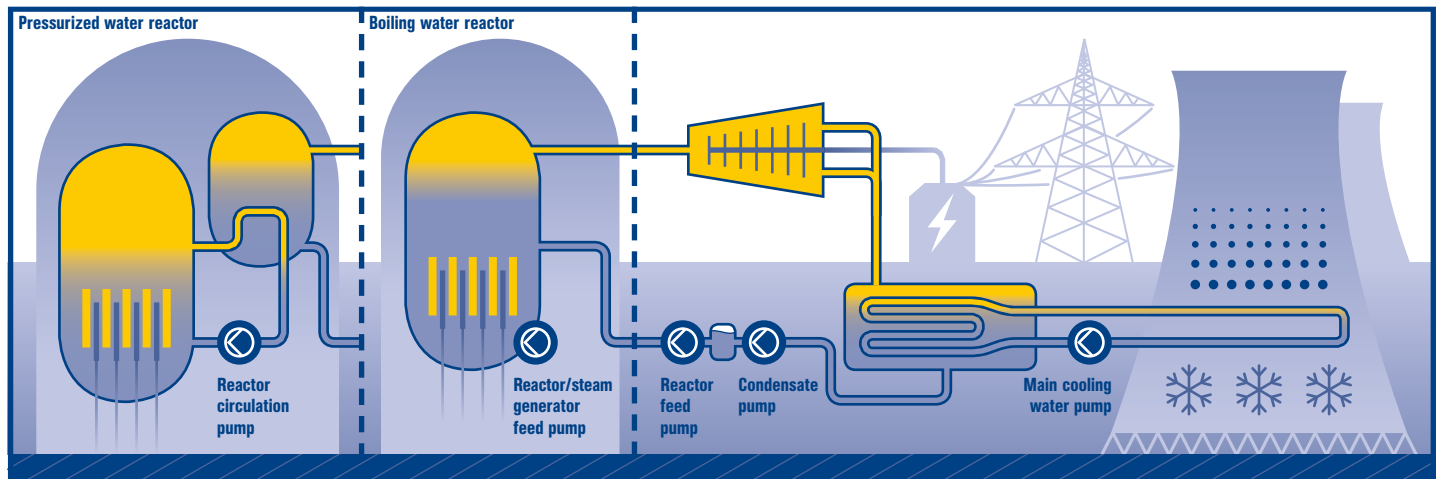


## Products for very demanding applications at nuclear power plants

There are two basic types of nuclear reactors. In a boiling water reactor, a complete loop containing radioactively contaminated steam and water has to be operated safely. In a pressurized water reactor, the primary loop, which is contaminated with radioactive particles, is limited to the containment structure.

Human safety and environmental protection have top priority in the nuclear power industry. There must always be certainty that all applications will meet the most stringent safety standards even in emergency situations. The sealing technology must reliably and at all times withstand extreme operating conditions including high pressure, temperature and sliding velocities and meet extremely demanding quality criteria.

EagleBurgmann SH, H75 and HGH series mechanical seals and our magnetic couplings have a proven track record going back more than 40 years in sealing applications that include main feed, condensate, main coolant, residual heat removal and fuel pool cooling pumps. Working together with our customers, we developed the innovative Espey WKA600S carbon floating ring seals for deployment in fast-action steam shut offs. Besides compression packings for pumps, we also offer nuclear-grade gaskets and pure graphite rings for special applications. Our on-site services include seal installation and replacement.







On a valve which closes isolation flaps in an emergency at the Olkiluoto (Block 3) power plant in Finland, an **Espey WKA600S** carbon ring floating seal with leakage drain is used to seal off the steam. Operating conditions:  $p = 11.6 \text{ bar}$  (168 PSI);  $t = 311 \text{ }^\circ\text{C}$  (592  $^\circ\text{F}$ ).



A reliable sealing solution for borated water was needed on a Sulzer fuel pool cooling pump at Olkiluoto (Block 3) in Finland, which is Europe's most modern nuclear power plant. The solution which was deployed is an **H75VN/95-E5-Q** mechanical seal. Operating conditions:  $p = 6 \text{ barg}$  (87 PSIG);  $t = 7 \dots 110 \text{ }^\circ\text{C}$  (45  $^\circ\text{F} \dots 230 \text{ }^\circ\text{F}$ );  $n = 1,460 \text{ min}^{-1}$ .



At the Olkiluoto (Block 3) nuclear power plant in Finland, a CVCS high-pressure feed pump which circulates radioactively contaminated reactor water must be absolutely reliable. An **SHFV-D4-/77-E1-Q** mechanical seal is used in this application. Operating conditions:  $p = 181 \text{ bar}$  (2,625 PSI);  $t = 15 \dots 100 \text{ }^\circ\text{C}$  (59  $^\circ\text{F} \dots 212 \text{ }^\circ\text{F}$ );  $n = 2,980 \text{ min}^{-1}$ .



An EagleBurgmann **SHV1/165-E2-Q** mechanical seal is applied as shaft seal on the main feedwater pump at the E.ON Isar I nuclear power plant in Germany. Operating conditions:  $p = 20 \text{ bar}$  (290 PSI);  $t = 185 \text{ }^\circ\text{C}$  (365  $^\circ\text{F}$ );  $n = 5,730 \text{ min}^{-1}$ .



At RWE's Emsland nuclear power plant in Germany an evaporator concentrate pump for radioactive waste is sealed with a **RKS2-DF/42-G11-E1-Q** mechanical seal. Operating conditions:  $p = 3.6 \text{ bar}$  (52 PSI);  $t = 110 \text{ }^\circ\text{C}$  (230  $^\circ\text{F}$ );  $n = 2,830 \text{ min}^{-1}$ .



EagleBurgmann **22P-10R-40-SC2** HE magnetic couplings are installed at the Gösgen nuclear power plant in Switzerland. They are installed on four Sulzer (TMC 200-400) pumps which circulate condensate in the cooling loop. The huge startup torque (1,120 Nm) is transferred very efficiently to the hermetically sealed system loop. Operating conditions:  $p = 26 \text{ bar}$  (377 PSI);  $t = 185 \text{ }^\circ\text{C}$  (365  $^\circ\text{F}$ ).



An EagleBurgmann **HSV9/142-Ta1** mechanical seal is installed on a KSB reactor circulation pump at Vattenfall's Krümmel nuclear power plant in Germany. Operating conditions:  $p = 71 \dots 90 \text{ bar}$  (1,030  $\dots$  1,305 PSI);  $t = 40 \text{ }^\circ\text{C} - 60 \text{ }^\circ\text{C}$  (104  $^\circ\text{F} \dots 140 \text{ }^\circ\text{F}$ );  $n = 2,000 \text{ min}^{-1}$ .



The E.ON Unterweser nuclear power plant and the EnBW Neckarwestheim nuclear power plant (Block 2) are two of the customers that take advantage of the services available in our modular **TotalSealCare** portfolio. The range of services includes seal cutting on site, seal procurement and delivery, measurement and generation of seal system drawings.

## Groundbreaking and innovative: Sealing technology for sustainable power generation.



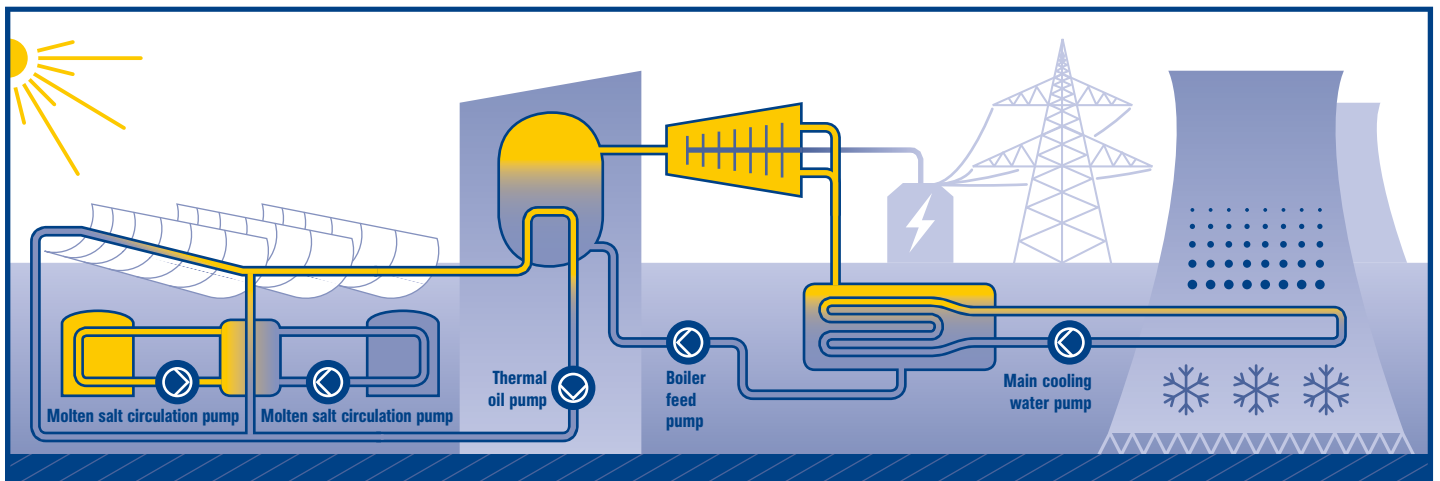
### Renewable power generation – operating conditions and solutions

Renewable power generation appears to be a technology of the future, and there are different ways of exploiting natural, sustainable sources of energy. Tidal power plants exploit the kinetic energy of the ocean tides. Hydroelectric power plants use the kinetic energy of flowing water (large height differential or flow rate) to produce electricity. Solar and geothermal power plants are based on principles which are similar to conventional power generation. Solar or geothermal heat generates steam pressure which drives turbines. In parabolic trough solar thermal systems, solar energy is used to heat a transfer medium, whereas geothermal plants extract heat from underground thermal springs.

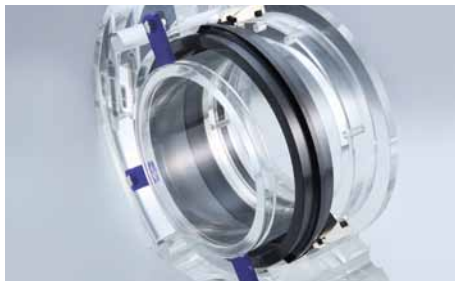
Specific operating conditions are associated with each of these applications, and the demands placed on the sealing technology vary considerably. Hot and toxic thermal oil needs to be safely sealed at solar thermal plants. Safe management of hot, highly abrasive thermal water under high pressure is the challenge at geothermal plants. EagleBurgmann has carried out intensive R&D to develop innovative sealing solutions for the solar and geothermal power industry.

MFLWT metal bellows seals, as well as our magnetic couplings, are the ideal choice for solar thermal power generation applications where thermal oil needs to be sealed.

Cartex-DN seals and our H75V special seals are installed on feed pumps at geothermal power stations. Besides static seals for flanges and fittings, Espey carbon floating ring seals are used on steam pipes and fast-action gas shut offs.

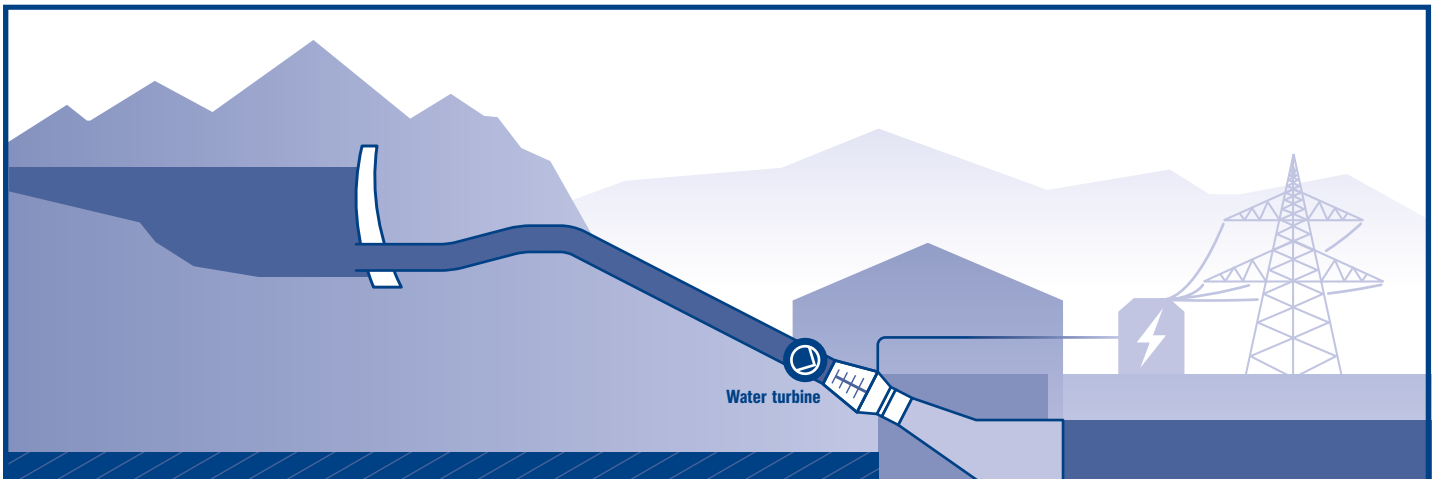






EagleBurgmann standard mechanical seals are installed on the boiler feed pumps at a number of CSP (Concentrated Solar Power) plants. An EagleBurgmann **SHV** mechanical seal is installed on an Ensival feedwater pump at the Gemasolar power plant in Fuentes de Andalucía (Seville, Spain). A **MAA2150** magnetic separator and a **WDK5150** heat exchanger were supplied. Operating conditions:  $t = \text{max. } 330\text{ }^{\circ}\text{C}$  (626  $^{\circ}\text{F}$ ),  $p = 117.38\text{ bar}$  (1,702 PSI),  $n = 2,970\text{ min}^{-1}$

EagleBurgmann can provide references for highly successful and durable sealing solutions in hydroelectric applications. For example, a **4600** stern tube seal in a VA Tech Hydro CAT compact turbine ran for more than ten years at the Sylvenstein power plant in Bavaria before the first inspection took place. An EagleBurgmann **HGH200S1/375-E1** split seal has been in operation for more than 10 years at the Sao Joaquim hydroelectric plant in Brazil. Operating conditions:  $p = 2.5\text{ bar}$  (36.25 PSI);  $t = 30\text{ }^{\circ}\text{C}$  (68  $^{\circ}\text{F}$ ).





# Service made to measure: TotalSealCare.





## Our seven service modules

Optimized services are major contributors to making sure that plants function smoothly – and that doesn't just begin with maintenance. With TotalSealCare, our modular service concept, we are able to cover all individual service requirements very flexibly. The individual modules can be combined as required.

### 1 Consulting & Engineering

After establishing and analyzing all of the installed seals in a system, we develop standardization concepts based on the "as-is" status. The results we strive for are to reduce the number of seal types, sizes and materials used and to improve the plant performance of the system. We advise you on codes of practice and statutory regulations and indicate what actions need to be taken.

### 2 Maintenance

In the plant or in the service center, qualified fitters and technicians look after all the aspects of seal maintenance – installation, start-up, servicing, conversion, overhaul and repair. We record and document functionally relevant data (failure reasons and related costs). This means it is possible to evaluate seal operating times and maintenance costs on a continuous basis, thereby defining measures for extending service intervals.

### 3 On-site Service

Our on-site service includes the components of an overhaul service, conversions and service container. We deploy a service unit directly to your premises: equipped with the basic range of seals or a stock of seals discussed with you in advance and staffed by qualified personnel. On-site, we assure production of the necessary gaskets, ensure that the documentation is complete and advise our customers on the selection and installation of seals. Our range of services also includes complete conversions (e.g. acc. to TA-Luft).

### 4 Inventory Management

Based on your individual requirements and the applicable quality regulations, we develop a concept for inventory management of complete seals and spare parts. Furthermore, we optimize stocking on-site or in the EagleBurgmann service center. In this way, you reduce your administration overhead and concentrate on your key operations.

### 5 Seminars & Training

We offer an extensive range of continuing education programs in sealing technology, developed for service and maintenance personnel, and skilled staff and engineers from various branches of industry including refining, chemical, power generation, foodstuffs, paper and pharmaceutical. Our program includes group seminars, individual training and seminars specifically tailored to your requirements held at our premises or at a location of your choice.

### 6 Technical Analysis & Support

A team of seal specialists is responsible for rectifying process malfunctions or "bad actors". The latest methods, such as thermography or data logging, are used for diagnosing critical items for the operation of the plant and for defining measures to resolve them. In our research and development centers, we perform realistic tests on test rigs or in original pumps. The objective is to extend the MTBF and to increase system reliability by individual and constructive solutions.

### 7 Service Agreements

We offer our customers specific agreements that are combined from the six service modules. Whether for individual seal systems, critical process elements, specific plant units or an extensive seal service for complete plants, the modular structure of our service makes it possible to satisfy individual requirements. With our well established monitoring instrument, SEPRO, we can also record all seal-related data for documentation and evaluation purposes.

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EagleBurgmann is one of the internationally leading companies for industrial sealing technology. Our products are used everywhere where safety and reliability are important: in the oil and gas industry, refining technology, the petrochemical, chemical and pharmaceutical industries, food processing, power, water, mining, pulp & paper, aerospace and many other spheres. Every day, more than 6,000 employees contribute their ideas, solutions and commitment towards ensuring that customers all over the world can rely on our seals. Our modular TotalSealCare service underlines our strong customer orientation and offers tailor-made services for every application.

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