

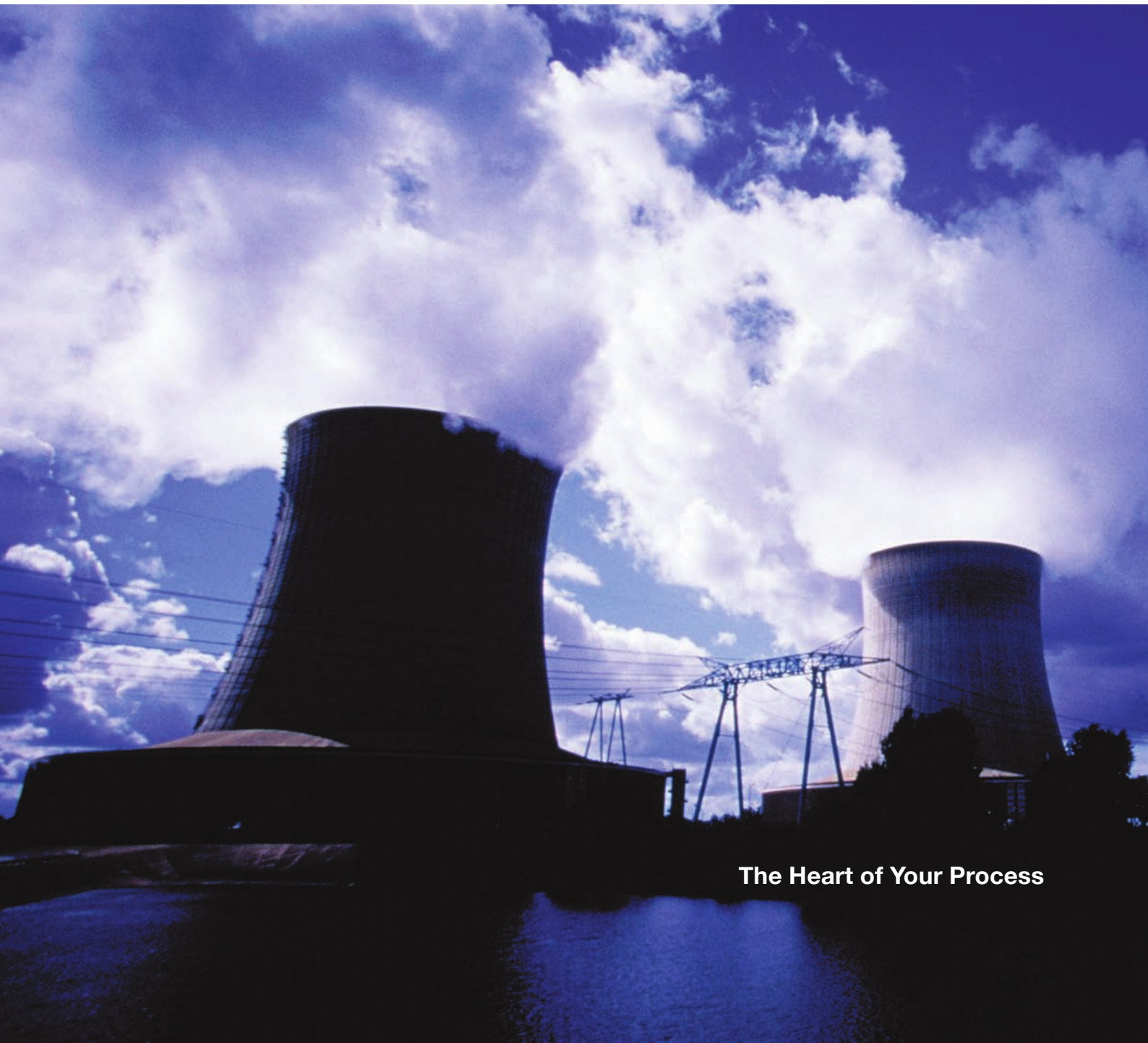
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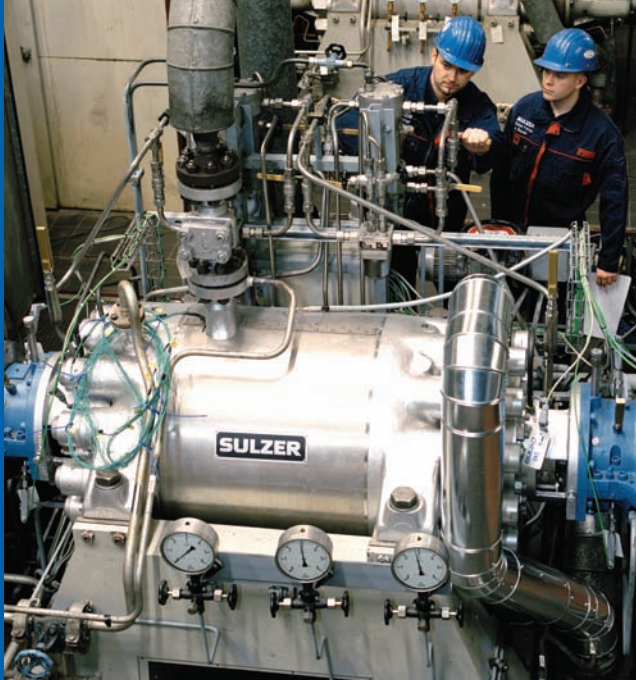
SULZER

Sulzer Pumps

Serving the Nuclear Power Industry



The Heart of Your Process



Sulzer Pumps in Diverse Power Markets

Nuclear Power

Sulzer Pumps—Innovator and major pump supplier worldwide for primary, secondary, safety systems and mechanical seals to ensure effective and reliable pumping solutions.

Fossil Fuel

Sulzer Pumps is a leading developer and manufacturer for boiler feed pumps in subcritical and supercritical plants, cooling water pumps, condensate extraction pumps and auxiliary services.

Combined Cycle

Providing technical expertise in a broad spectrum of pumping applications benefits our customers. These applications involve boiler feed, auxiliary, condensate and cooling water.

Industrial Power

Engineering and implementing reliable, cost effective pumping solutions to meet the demands of a continually evolving power generation industry is our focus.

Flue Gas Desulphurization

Sulzer Pumps offers a wide range of products for flue gas desulphurization plants which are economical in operation and of high technical standing.

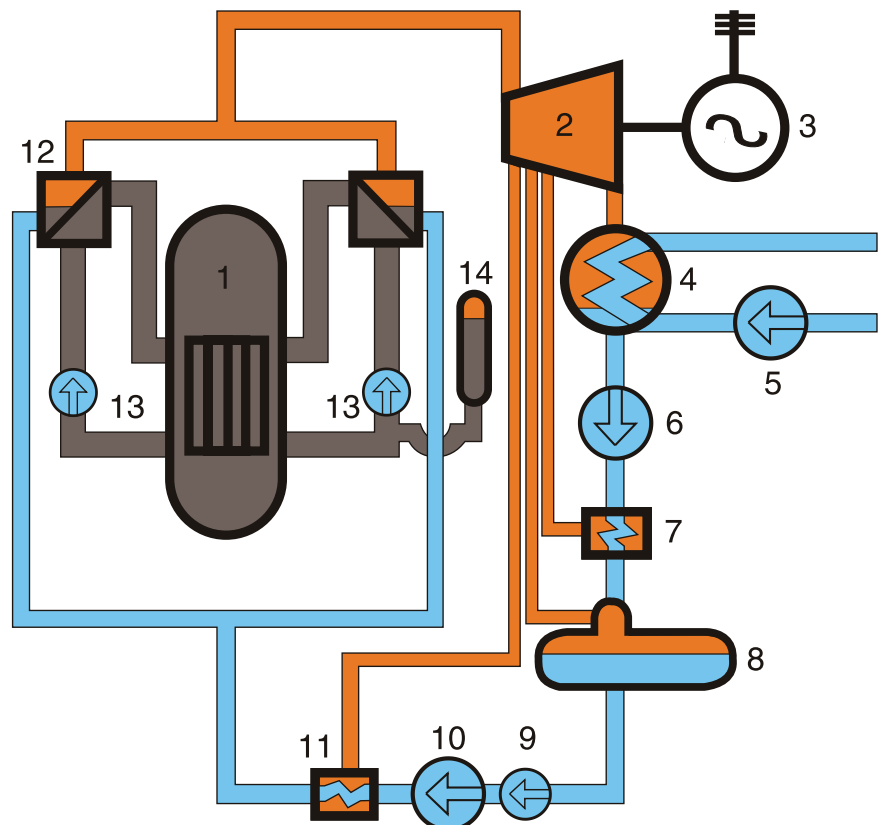




Pressurized Water Reactor

Services supported with Sulzer pumps:

1. Reactor
2. Turbine
3. Generator
4. Condenser
5. Cooling water pumps
6. Condensate pumps
7. LP pre-heater
8. Feedwater tank
9. Booster pump
10. Boiler feed pumps
11. HP pre-heater
12. Steam generator
13. Reactor circulating pumps
14. Pressure maintaining system

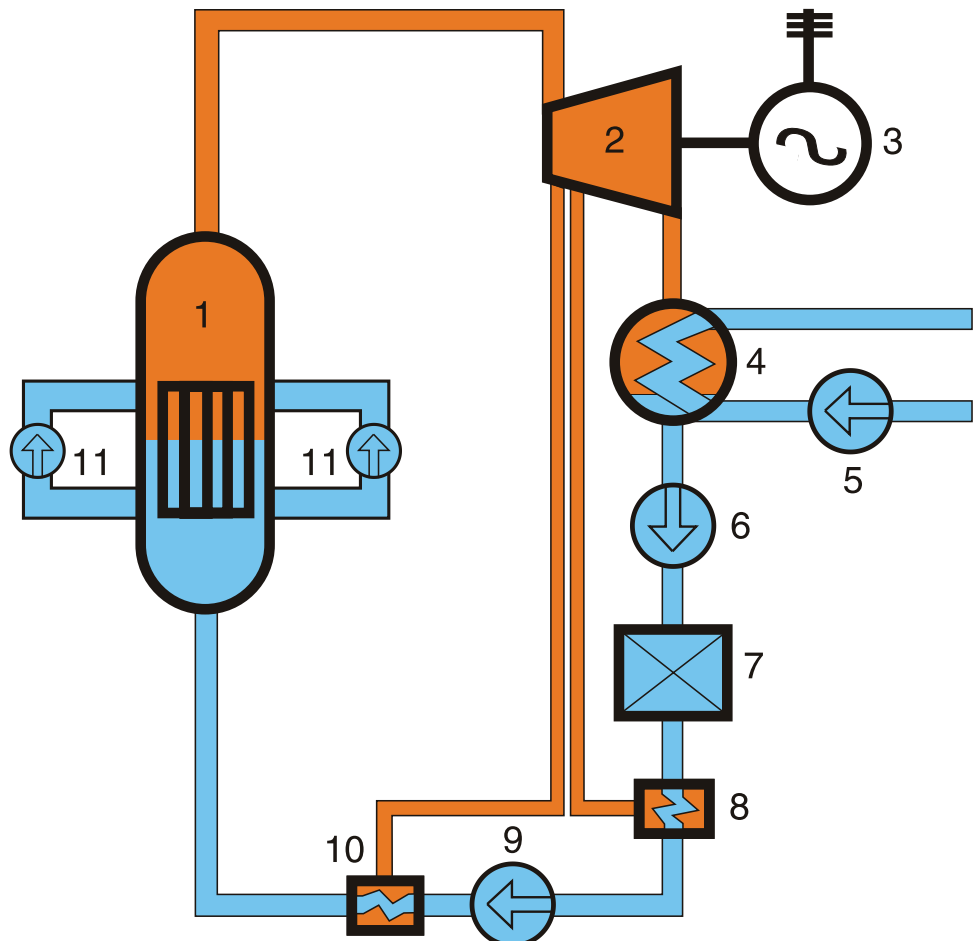




Boiling Water Reactor

Services supported with Sulzer pumps:

1. Reactor
2. Turbine
3. Generator
4. Condenser
5. Cooling water pumps
6. Condensate pumps
7. Condensate purification
8. LP pre-heater
9. Reactor feed pumps
10. HP re-heater
11. Reactor circulating pumps





Pumps for the Most Critical Applications and Demanding Conditions

Product Technology	Product Type	Boiler Feed	Condensate Extraction	Cooling Water	Nuclear Services	Auxiliaries
Barrel Pumps	GSG	•			•	
	CP	•			•	
Horizontal Split Pumps	SMN/SMNV			•		•
	ZPP			•		•
	HSA/HSB			•		•
	MSD	•			•	•
Ring Section Pumps	MBN/MC/MD/ME					•
Vertical Pumps	SJD/BDC		•			
	VCR		•		•	
	SJT/SJM/SJP			•	•	•
	RV/RVQ/RDV				•	
Single Stage Pumps Double Flow	HPTd	•				
	BBS	•				•
	HZB	•				•
	CD	•			•	•
Single Stage Pumps Single Flow	OHH/ZA/ZE/ZF				•	•
	A/CPT					•
	CVDS				•	•
	CVIC/CV				•	



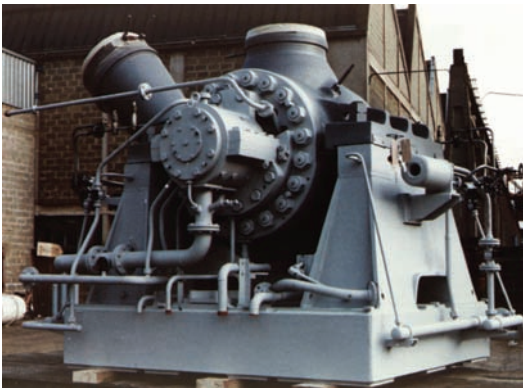
Boiler Feedwater and Booster Pumps

HPTd Single Stage Barrel Casing Boiler Feed Pumps

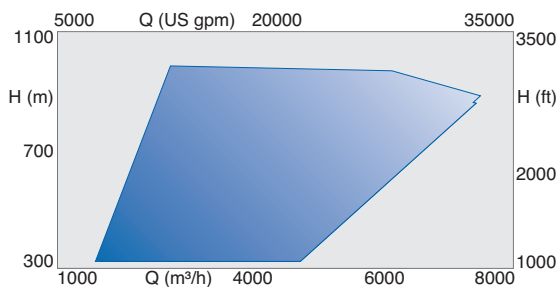
The pumps are specifically designed for boiler feed applications in nuclear power stations. These pumps are optimized to provide high efficiency operation over an extended period of time, reducing operation and maintenance costs. High availability and robust construction makes them all suitable for cyclic operation.

HZB Booster Pumps

HZB pumps are designed as hot water boosters for high energy boiler feed pumps in power plants. Their design is optimized for pumping hot water with relatively low NPSH available. The rugged design ensures the long term reliable operation that is critical in this application.

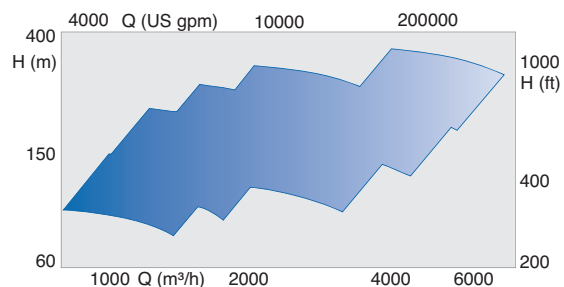


Performance range

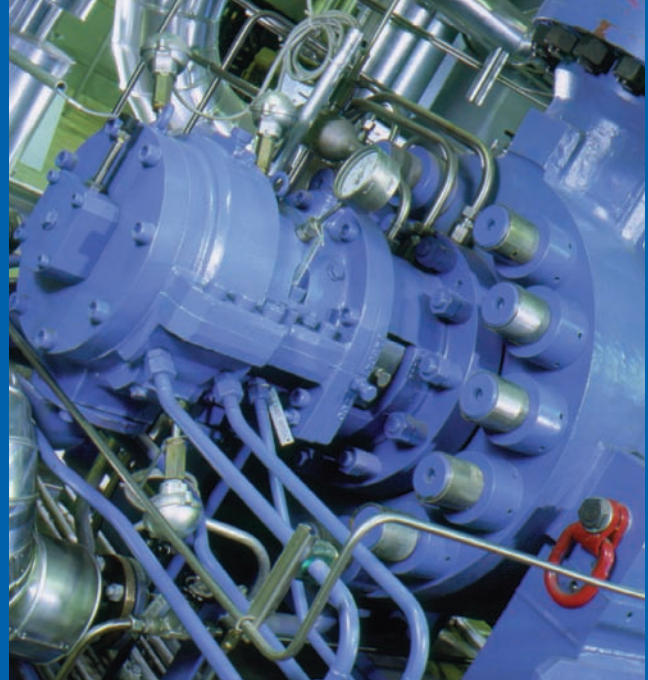


Pressure 150 bar / 2175 psi
 Temperatures 210° C / 410° F

Performance range



Pressure 48 bar / 700 psi
 Temperatures 210° C / 410° F



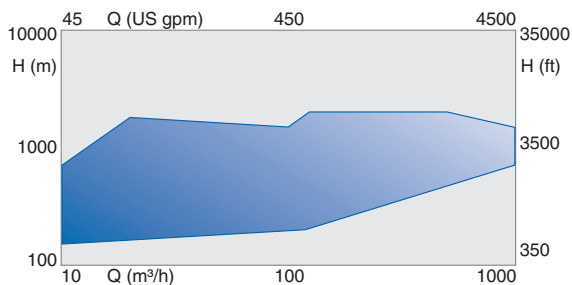
Nuclear Service Pumps

GSG Radially Split Barrel Casing Pumps

GSG radially split barrel casing pumps are used in nuclear services and boiler feed applications in nuclear power stations. Their design is optimized for synchronous speed direct drive applications thus avoiding unnecessary and expensive construction features. The GSG utilizes a full cartridge pullout design on sizes 100 and larger. A back-to-back option is also available.



Performance range



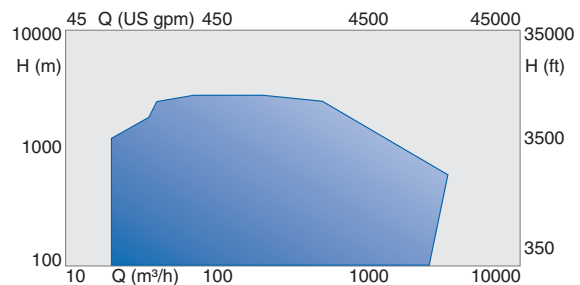
Pressure 250 bar / 3625 psi
 Temperatures 425° C / 800° F

MSD Multistage Pumps

MSD pumps are axially split case volute style multistage pumps used for high pressure applications in the nuclear power industry, designed in accordance to ASME Class III, ND category. Axial thrust is compensated by back-to-back impeller configuration.



Performance range



Pressure 310 bar / 4500 psi
 Temperatures 200° C / 400° F



Vertical Pumps

SJD/BDC

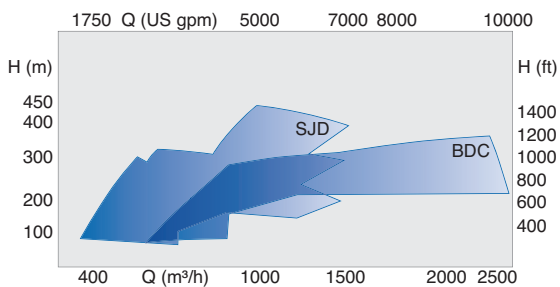
The SJD and BDC ranges of vertical pumps are ideal for applications where NPSHA is limited. The pumps are used in a wide range of applications ranging from simple industrial booster pumps to high pressure condensate return and heater drain pumps in power plants.

SJT

The SJT vertical turbine range offers incredible flexibility due to an extensive range of standard features. These include oil, grease, product or flushed bearing lubrication, sealing plans for all liquids above or below ground discharge and a wide range of materials of constructions. In addition, SJT pumps can be supplied to comply with ASME, Section III and Section VIII standards.

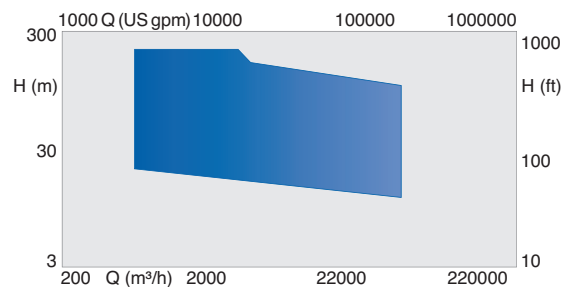


Performance range



Pressure 60 bar / 855 psi
 Temperatures 100° C / 212° F

Performance range

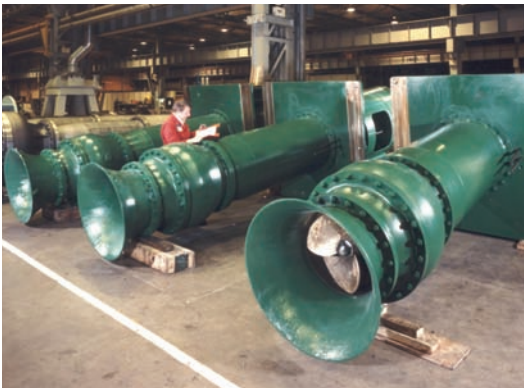


Pressure 40 bar / 570 psi
 Temperatures 85° C / 185° F

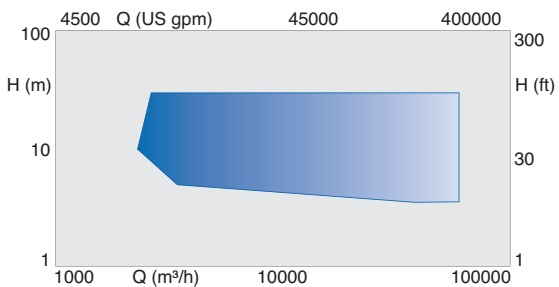


SJM

SJM mixed flow pumps are ruggedly designed for years of trouble free operation in a wide variety of applications. The basic components of head, column pipe and bowl assembly are combined and customized to perfectly match individual duty needs. In addition, the standard range of material options ensures the materials of construction can be matched to individual needs.



Performance range



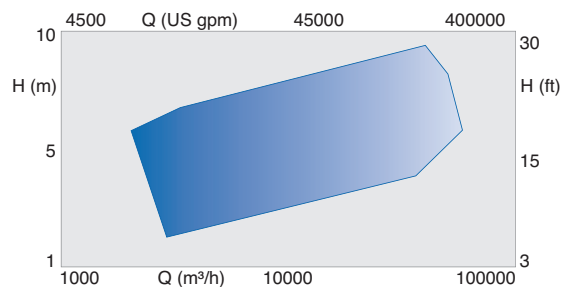
Pressure 6 bar / 85 psi
 Temperatures 85 ° C / 185° F

SJP

The SJP range of axial flow (propeller) pumps is specifically designed for high flow low head duties. Widely used in irrigation, flood control, drainage and condenser circulation applications. SJP pumps are designed for continuous service for extended periods of time. The pumps are available in a range of metallurgies to match individual application needs.



Performance range



Pressure 6 bar / 85 psi
 Temperatures 85 ° C / 185° F

Sulzer Pumps Production and Testing Facilities for the Nuclear Power Industry

Sulzer Pumps United States

The Sulzer Pumps USA facility (SPUSA) in Portland is a producer of engineered pumps focusing on the power generation, HPI and oil & gas production markets. Their quality control systems are independently audited to ISO 9001 standard.

Testing Facilities	
Flow	170 to 64,000 gpm
Head	6,000 psi
Power	20,000 hp
RPM	6,000 rpm
NPSH limits	2 ft to 500 ft
Electrical	110 / 13,200 volt
Crane	50 Ton

Sulzer Pumps Houston

Sulzer Pumps Houston (SPHO) is designed expressly to produce and test vertical pumps and features the latest computerized machining equipment, a large fabrication shop and a 180,000 gallon test laboratory.

Testing Facilities	
Flow	20 to 175,000 gpm
Head	720 psi (300 # flanges) Max
Power	4,000 hp / 7,200 volt (Max)
RPM	320 - 3,600 rpm
NPSH limits	6 ft to 39 ft
Electrical	4,000 hp / 13,200 volt (Max)
Crane	30 Ton

Sulzer Pumps Canada

Our Burnaby facility has the ability to manufacture the most advanced pump designs and focuses on combined cycle and nuclear power generation applications.

A key asset of this site is the test bed which is capable of running at 50 or 60 Hz specifically designed for testing pumps for nuclear applications. Complementing the manufacturing facility, the project management and quality control systems are certified for the supply of pumping equipment to the demanding nuclear power generation business.

Testing Facilities	
Flow	3.4 m ³ /h - 13,620 m ³ /h
Temp	Low Pressure Loop up to 94°C High Pressure Loop up to 316°C
Max. Pressure	Up to 38° C - 425 bar; up to 316° C - 314 bar
Storage Tank	2,271 m ³
Cooling	11,190 kW

Testing Facilities		
50Hz	7,640 kW	12.7 kV / 7.6 kV / 6.4 kV
	5,370 kW	3.83 kV
	3,133 kW	2.4 kV
	184 kW	375 V
60Hz	11,190 kW	13.8 kV
	8,206 kW	8.3 kV / 6.9 kV
	5,371 kW	4.16 kV
	3,096 kW	2.4 kV
	224 kW	600 V / 480 V
Test Bed	# 1	5.5 m x 3.0 m x 6.1 m
	# 2	3.7 m x 3.7 m x 7.6 m
	# 3	16.5 m x 2.7 m x 6.4 m
Crane	54 Ton	

Sulzer Pumps Germany

Sulzer Pumpen (Deutschland) GmbH is internationally recognized as partner for pre-engineered as well as engineered pumps with focus on the power generation, HPI and general industries. Within its focus segments Sulzer Pumps Germany offers a complete product range to serve the requirements of customers worldwide. Our management system follows the total quality management process and fully complies with the requirements of ISO 9001-2000.

Testing Facilities		
50 Hz and 60 Hz	4,000 kW	max 15,817 V
	3,500 kW	max 3,300 V
	630 kW	400 V / 690 V
Test Bed I	Sump Capacity	185 m ³ & 116 m ³ max 6.4 m deep
Crane	10 Ton and 3.2 Ton Single	
Test Bed II	Sump Capacity	550 m ³ , 6.4 m deep 2 x 900 mm pipes with orifice: 15,000 m ³ /h
Crane	20 Ton and 5 Ton single	

Sulzer Pumps Production and Testing Facilities for the Nuclear Power Industry

Sulzer Pumps France

The Sulzer Pompes France facility supplies engineered pumps focusing on the power generation and oil & gas production markets. The facility is equipped with one of the largest pump test beds in Europe and has extensive experience in supplying high energy boiler feed pumps to the world's major power contractors. The state of the art facilities ensure that the highest quality standards are maintained whilst the quality and managerial systems comply with the requirements of ISO 9001.

Testing Facilities	
Main Test bed	Sump Capacity: 1,200 m ³ 10 m deep 300 mm loop 1,800 m ³ /h @ 200°C 300 bar 1,000 mm loop up to 25,000 m ³ /h 1,500 mm loop up to 64,000m ³ /h
Power	50 Hz 1,000 kW 220 / 380 V 11,000 kW 5,500 V to 6,600 V adjustable 10,500 V
Crane	50 Ton & 20 Ton Single 9m Hook + Removable Roof
Other test Areas	Sump Capacity 400 m ³ 3.9 m to 9 m deep

Sulzer Pumps UK

Sulzer Pumps (UK) Ltd of Leeds has grown from a small engineering company to an international supplier of engineered pumps with a focus on the oil and gas, HPI and the power generation industries. With a purpose-built factory for the dedicated production of centrifugal pumps, some of the world's largest and most powerful pumps have been designed, manufactured, packaged and tested at Leeds for customers on all continents. Extensive facilities ensure the highest quality production from design and machining through to assembly and testing. Focusing on quality, our managerial systems comply with the requirements of British Standard BS EN ISO 9001.

Testing Facilities		
50Hz	1,000 kW	415 V - 1,134 A 3,300 V - 175 A 6,600 V - 87.5 A
	6,000 kW	3,300 V - 525 A 6,600 V - 525 A
	16,700 kW	11,000 V - 1,250 A
60Hz	1,000 kW	415 V - 1,477 A
	4,000 kW	4,150 ~ 6,600 V - 550 A
Main Test Bed	Sump Capacity	1,132 m ² 9 m deep
	350 mm Orifice	2,900 m ³ /h @ 200°C
	800 mm Orifice	10,800 m ³ /h
	1,500 mm orifice	28,800 m ³ /h
Crane	50 Ton	Tandem 8 m Hook
Large Closed Loop	Suppression Tank	Max Flow = 5,000 m ³ /h
	42 m ³	Max Power = 2,500 kW
Small Closed Loop	Suppression Tank	Max Flow = 2,500 m ³ /h
	30 m ³	Max Power = 1,000 kW

Sulzer Pumps Dalian

Sulzer Pumps Dalian, China, specializes in the manufacture of various industrial pumps. With complete quality inspection and control system, Sulzer Pumps Dalian has obtained the most prestigious quality qualification of ISO9001, and achieved Nuclear Pressure Equipment Design & Manufacturing Qualification Certificates issued by China National Nuclear Safety Bureau. Now this company is capable of manufacturing and packaging 24 pump series, including HPI, oil and gas, power generation, petrochemical processing, fertilizer, water supply, waster water treatment, chemical processing, nuclear power generation, textiles, iron and steel, marine, mining, pulp and paper, food and beverage industries, as well as many others.

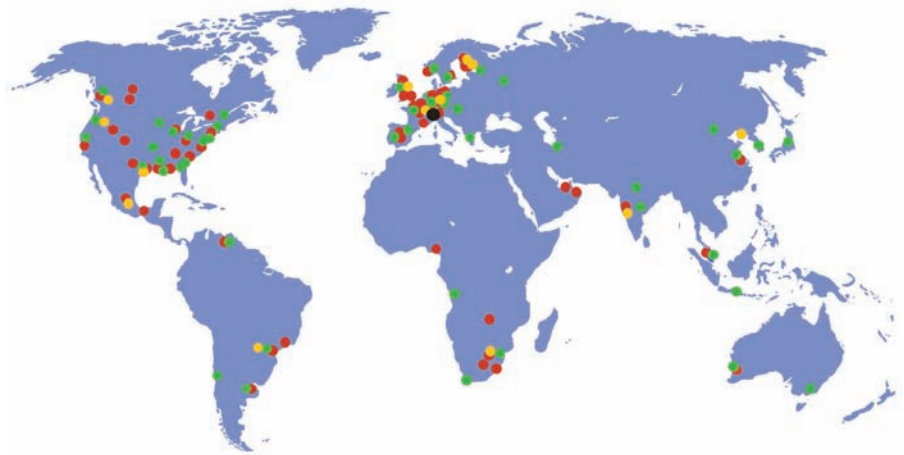
Sulzer (Dalian) Pumps & Compressors Ltd will continue to devote its effort to establishing a customer-oriented company, and to creating high lifecycle value for our customers with innovative products and services.

Testing Facilities		
Test Bed I (Main)	Sub Station	4 MW
	Hz	50 Hz
	Voltage	10,500 V / 6,300 V / 380 V
	Max Motor Start	3,200 kW
	Sump Capacity	1,500 m ³ 10 m deep
	Flow	1,300 m ³ /h
	Crane	20 Ton
	Test Bed II Closed Loop	Voltage
Max Motor Start		200 kW
Flow		1,000 m ³ /h
Crane		10 Ton

Sulzer Pumps – Your Partner for Full and Safe Service

Global Footprint

Sulzer Pumps' innovative technological solutions support the nuclear industry with world-class products and services. Sulzer Pumps is a supplier of primary equipment compliant with ASME and other internationally recognized standards. As a global supplier with a global footprint, we can always be at your site with our specialists. Local service centers and factories around the globe support the special requirements of the nuclear industry.



Quality

With our fully accredited global quality program we assure that all our facilities certified for design, production and service of pumps for or in nuclear power plants follow the same rigorous standards.

Testing

Sulzer Pumps operates test facilities worldwide. Our facilities are suitable for full scale testing of horizontal, vertical, open pit, high flow rate/high energy and multiphase pumps. We have the ability to perform test at 50 Hz and 60 Hz. A specialty of Sulzer Pumps is the ability to fully string test large high-energy pumps to prove the pump package as a whole to our customers. Successful test on packages of over 12,000 kW have been conducted.

Qualifications and Certificates

- ASME Section III (Cl. 1, 2 & 3)
- ASME N & NPT Certificate of authorization
- CSA B51
- CSA N285
- MIL-Q-9858-A
- NDT (MPI/LPI/RT/UT)
- ISO 9001
- CSA Z299.1/2/3/4
- Standard KTA 1401
- IAEA 50-C-Q
- AVS D 100/50
- FRA/N/100/OL3



Sulzer Pumps Customer Support Services

Performance Through People

If pumps and rotating equipment are critical to your operations, you seek specific qualities when selecting external service support:

- A service partner you can trust
- Reliability
- Responsiveness
- Rapid turn around
- Innovative Solutions

Our service professionals deliver these qualities and more to customers from all industry sectors around the globe. With services ranging from spare parts to trouble shooting, we can maintain your rotating equipment and improve your processes.

Service Partner

Our goal is to be your business partner who delivers customized service solutions that improve your operations. Our measure of success is the loyalty of our customers year after year, decade after decade.

Reliability

Reliability depends on the longevity of replacement parts and the quality of repair of damaged or worn equipment. You can count on our expertise to deliver and on our commitment to do the job right first time every time. Our teams are known in the industry for their extreme dedication. You can rely on us to stand by you if unexpected problems occur.

Responsiveness

You have specific needs, expectations and priorities—we are responsive to them and define with you the best possible solutions for your business. You need us urgently? We are present 24/7, 365 days per year.

Rapid Turn Around

You expect to receive quotations quickly and have your equipment repaired rapidly to minimize disruption and costs. We aim to exceed your expectations through our continuous investment in more effective shopfloor and administrative processes.

Innovative Solutions

Sulzer Pumps is renowned in the industry for its innovative technology and application know-how. We are able to make the best evaluation of your installation and optimize its performance. We can achieve increased throughput, lift efficiency and improve reliability in most pumps by replacing existing hydraulics with state-of-the-art Sulzer Pumps designs.



Reactor Coolant Pump Seal Retrofit

Balanced Stator™ Seal

Sulzer's patented Balanced Stator™ reactor coolant pump seal installs as a single cartridge, controls leakage, functions under all transients and runs trouble free for years.

Meeting the reliability challenge—In addition to safe operation, plant reliability is the key focus of the nuclear power generation industry today. Main coolant pump seal performance often hampers plant availability by causing forced outages and requiring more frequent change outs.

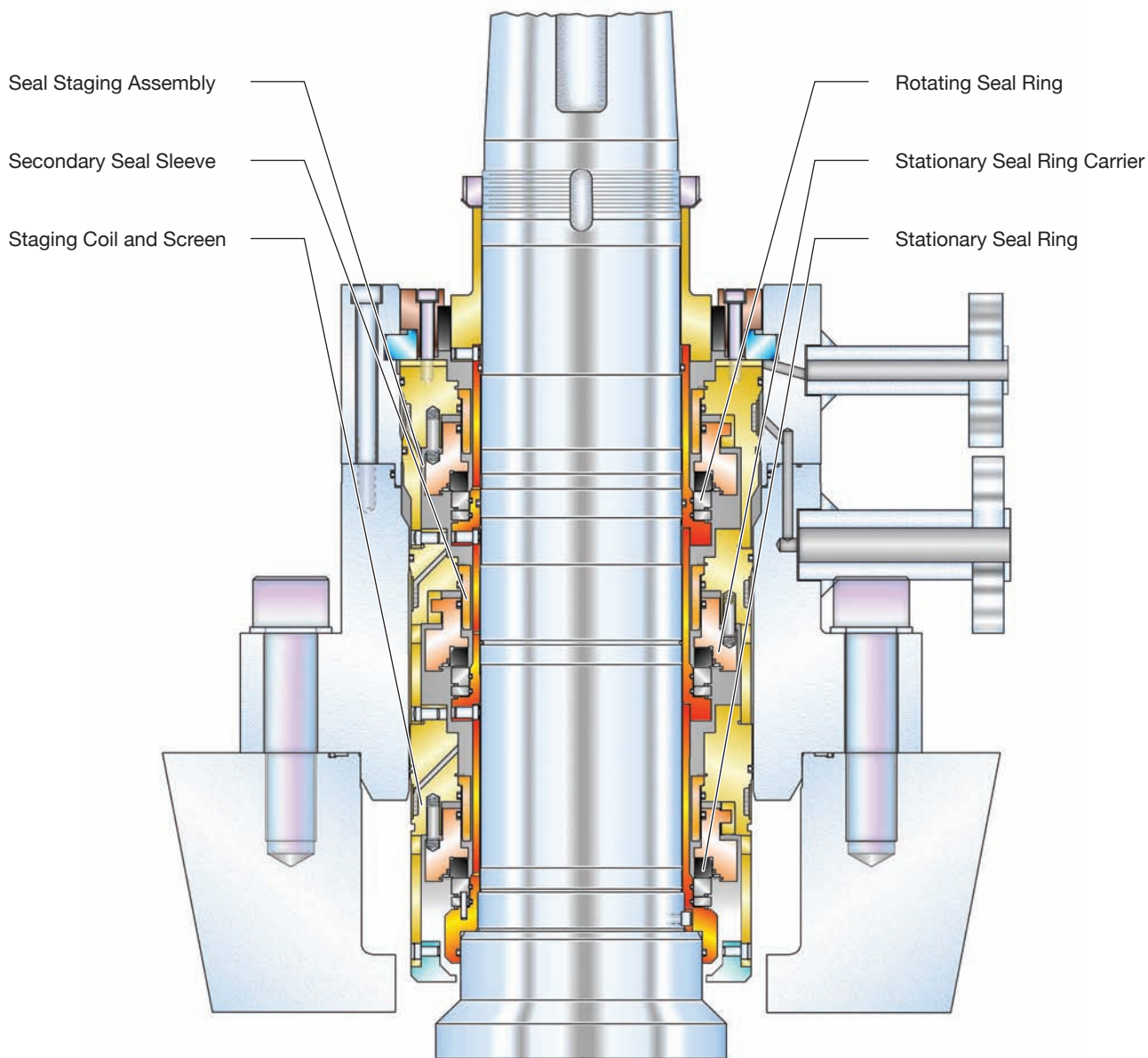
A seal that works and lasts—The Balanced Stator™ seal is an ultra-high-performance cartridge unit that provides lifespan and leakage control unmatched by conventional seals. Employing patented flexible stator geometry, the Balanced Stator™ seal automatically compensates for pump shaft deflections. Leakage is predictably controlled to less than 0.03 gpm. Maintenance-free periods extend from four to eight years.



Installation requires minimum downtime—The Balanced Stator™ seal is available for any reactor coolant or recirculation pump. Sulzer Pumps has approached the retrofit concept from the standpoint of requiring an absolute minimum of modifications to existing hardware. Two, three or four-stage seal cartridges with internal staging coils can be retrofitted into existing pumps with virtually zero plant impact. Existing cooling water and injection systems do not need to be changed. And our field-change package provides all procedures, instructions, tooling, training and factory assistance necessary to make a seal conversion within one normal maintenance outage.

The product of fully evolved technology—Sulzer's Balanced Stator™ seal is a proven product, ready to solve seal reliability, maintenance and cost problems today. Unlike other suppliers of reactor coolant pumps, Sulzer's seal development and testing experience dates from 1961 and the field-proven performance through all types of transients is a matter of record.

Design Features of the Balanced Stator™ Seal



The Balanced Stator™ seal's design features assure reliable, predictable performance.

The stationary seal ring carrier provides necessary support and isolation for the stationary seal ring. This critically important part was designed using computer FEA analysis. A single anti-rotation lug located over the secondary seal prevents carrier rotation and allows the carrier to track shaft deflection without restriction. The location of the anti-rotation lug near the secondary seal minimizes relative motion and wear that otherwise occur on the mating surface. The backseat surface which supports the stationary ring is lapped flat within two helium light bands (.000023 in.).

The stationary seal ring configuration was determined by computer analysis and development testing. Various balance ratios, face widths and cooling notch configurations were evaluated in the process of optimizing the design. The carbon material receives non-destructive examination to assure its internal integrity. The front and back faces are lapped flat.

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