FLUID SCIENCE DYNAMICS

FLUID PROCESS DYNAMICS

3S FLUID SCIENCE

LEADERSHIP • COMPETENT • EXPERIENCE

HIGH SPEED CENTRIFUGAL PUMP

中国航天 CASC

流体与旋转机械事业部
Liquid and Rotating Machinery Division

Beijing Aerospace Propulsion Institute [No.11 Institute of SASC (Beijing)]
Beijing Aerospace Petrochemical Technology and Equipment Engineering Corporation Limited

COMPANY PROFILE

Founded in 1958, Beijing Aerospace Propulsion Institute (also known as Beijing No. 11 Institute of the 6th Academy of China Aerospace Science and Technology Corporation) is the cradle of China's Liquid Propellant Rocket Engines (LPREs). With sophisticated research and development 9R&D) foundation and profound enter-prise culture, the Institute has developed various kinds of LPREs with state-of-art technology and strong power to boost major national aerospace projects in China's aerospace history, such as " Atomic and Hydrogen Bombs and Man-made Satellite Project" , 'Manned Spaceflight Project" and " Lunar Exploration Project". It has supported the modernization of China's national defence and promoted the development of China's aerospace industry.

The Institute is devoted to the application of LPRE technologies in aerospace and other fields and has formed two main business, that is, aerospace propulsion industry and aerospace technology application industry. It brings the aerospace high-tech to common industries and daily lives and has become the pioneer of using military technology to benefit social economy in aerospace arena.

Established in 1991, Beijing Aerospace Petrochemical Technology and Equipment Engineering Corporation Limited (BAPC) is the institute;'s wholly-owned subsidiary. With "National Engineering Research Center for Special Pump and Valve" as its innovation platform, based on aerospace technologies, BAPC has cultivated many proprietary technologies and competitive products in the fields of thermal engineering, fluid rotating machinery, special pumps and valves, boosted the technology innovation and industrialization of those fields. It has developed cutting-edge products, provided efficient and environment-friendly system solutions and built national demonstration projects.

BAPC serve energy, petrochemical, coal chemical and other key industrial area of national economy. It is a strategic cooperation partner and excellent supplier of many famous domestic and overseas enterprises, such as CNPC, Sinopec, CNOOC and Shenhua Group. "BAPC" is well-Known for applying advanced aerospace technology to key industrial areas in the national economy, thus becomes a model in this field.

Beijing Aerospace Propulsion Institute (Beijing Aerospace Petrochemical technology and Equipment Engineering Corporation Limited) boots the development of national economy by aerospace science and technology and adds national honors with self-developed brands. It has gained many national prozes and awards, such as " Great Contributor to the National Major Special High-Tech Projects", "Science and technology Prize for a Major Breakthrough in the Special National Defense Field" and "Outstanding Contributor to Lunar Exploration Project".

It has created a development mode of "specialization, engineering, industrialization and internationalization" and keepson advancing in order to realize the goal of building a civil-military integration and international well-known high-tech enterprise.

Trying to fulfil the Chinese Dream by contributing to the aerospace industry, BAPC will inherit and carry forward the aerospace merits of independent innovation and persistent hard working which have a history over 50 years and continue to create new milestones.

In 2015, Fluid Science Dynamics Singapore and BAPC started the International Collaboration and since then FSD-BAPC has earned a reputation for providing innovative solutions and unmatched expertise and global service in the International EPCs and Oil & Gas and Petrochemical Companies.

Fluid Science Dynamics is Industrial solutions provider and after market parts & services. FSD offers specialized technological solutions in mission-critical rotating, machinery and metallurgy products/services. The Company well position in China, Europe, middle East and South East Asia

CAPABILITIES AND FACILITIES

1. Engineering Background

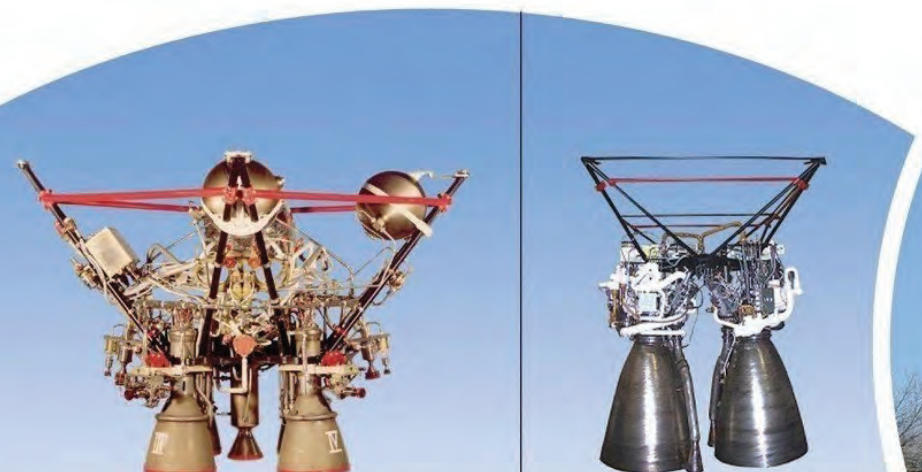
Liquid and Rotating Machinery Division was engaged in developing turbopumps. A turbo-pump is the heart of liquid rocket engine, which delivers oxidizer and fuel to the combustion chamber, the speed is (6,000-7,000) rpm, the head is normally (1,500 – 3,000)m, for the hydrogen pump, the head can reach 6,430m, the temperature can be -253 deg C. based on our technical advantages, we have developed high speed pups and gained several national level scientific research awards.

2. Advanced Manufacturing capability

The quality of pumps is secured by ISO 9001 quality assurances system and aerospace product manufacturing regulations. Every step of manufacturing process is monitored and controlled. Key parts are processed by high precision machining center and/or special equipments, and are carefully inspected.

3. World Class Engineering Capability

Our Engineering team has over 50 members, 30 of them are senior engineers and above. We are highly experienced in pump structure design, optimization of inducer and impeller, flow field calculation, vibration control, rotor dynamics analysis, material, high loading and high speed bearing design, high PV value dynamic seal for ultra low viscosity liquid, and gear design, etc. we have self-developed advanced pump engineering software. Other commonly used software includes ANSYS, FLUENT, NREC, ARMD and SOLIDWORKS. These factors enable us to pursue pumps of high efficiency and stability and with advanced cavitation features.



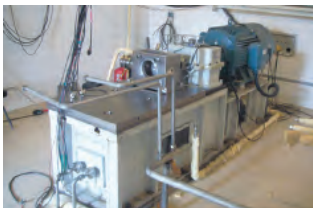
ADVANCE TEST CENTERS

We have diverse test stands which include pump test stand, high speed bearing test stand, internal lube oil pump test stand, rotor dynamics test stand and turbo test stand. Every product is strictly tested before delivery. Thus quality is tightly secured.

Advanced Test Center

Rotor Dynamics Test Stand

Turbo Pump Test Stand



Bearing Test Stand

Data Acquisition and Control Room

SERVICES

All Service staffs are well trained technicians. They are qualified to solve problems which may occur during equipment installation and commissioning and also during normal production. Moreover, the modular design concept has enabled us to have adequate spare part stocks. Spares are delivered fast.

PRODUCT BRIEFS

MAIN LINE PRODUCT GSB HIGH SPEED PUMP

High Performance Gearbox
Mature manufacturing processes have been formed through years of experience. As of the key components of high speed pumps and compressors, the heat treatment processes are complicated and precision requirements are high for the gearbox casing and gear shaft. Chemical ingredients and heat treatments are strictly controlled for the casting parts. Multiple stability of the gearbox casing. All finished parts are strictly inspected, and inspection records are kept if file.

Tilt pad Bearing Applied
Structure of a high speed shaft is determined by rotor kinetics analysis/ various types of tilt pad bearing have been developed, which are good for axial direction, radial direction or axial/radial direction combined according to customers operating modes. Since all types of tilt pad bearings have the same installation dimensions, one type of tilt pad bearing can be easily replaced by another type according to actual needs.

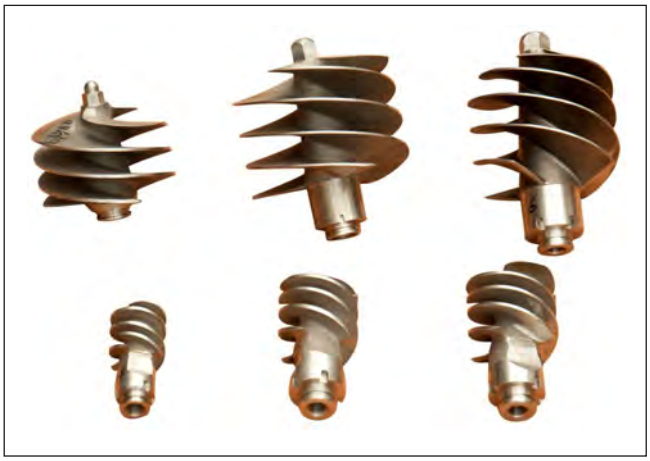
Fluid Section Optimized
Induces, impellers, diffusers and pump casings, which are the main components of the fluid section, are optimized with the aid of CFD software.

Seals of Various Types Applicable
Single seals, tandem seals, double seals and dry gas seals are applicable according to API standards, as per actual operating modes.

Lube oil pump

Gear and shaft

Shaft sleeve



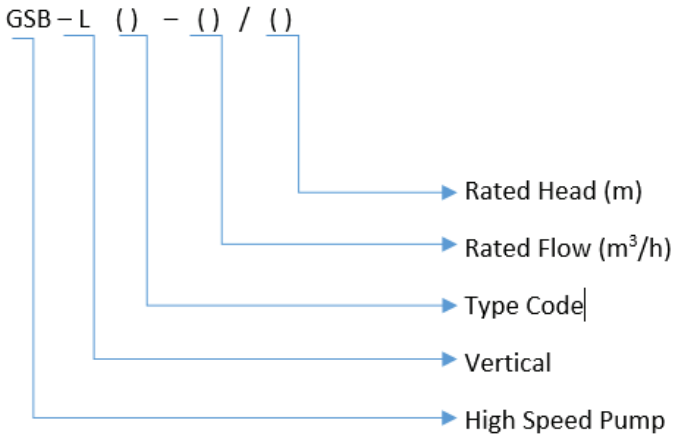
Inducer

Gearbox housing

GSB-L VERTICAL HIGH SPEED PUMP

Suction and discharge flanges of GSB-L vertical high speed pump have a common centreline, so that the pump has strong stiffness, good thermal-shock resistant feature, and the piping has high load-bearing capacity.

Type Designation



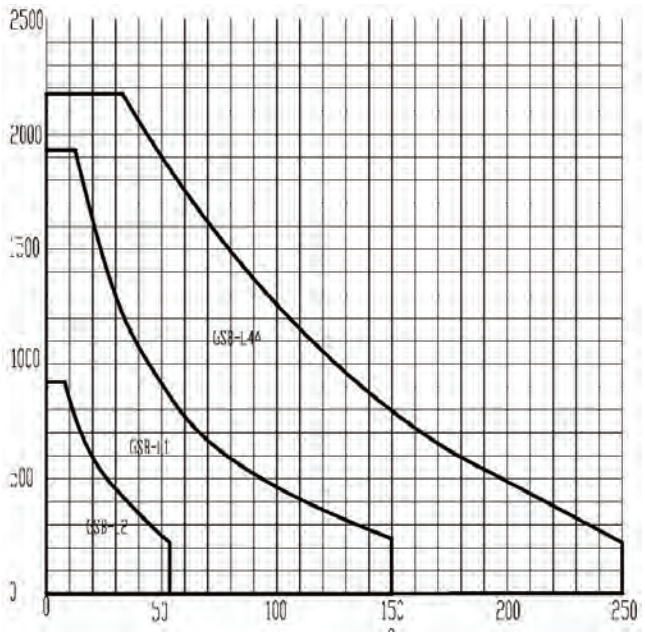
Note:
GSB-L1: Double-stage speed up vertical high speed pump

GSB-L2: Single-stage speed-up vertical high speed pump

GSB-L4A: Double-stage speed up large power vertical high speed pump.

Suction and discharge flanges of GSB-L vertical high speed pump have a common centreline, so that the pump has strong stiffness, good thermal shock resistant feature, and the piping has high load-bearing capacity.

Performance Envelope Of Horizontal High Speed Pump



Parameters of GSB-L Vertical High Speed Pump

Pump type	GSB-L1	GSB-L2	GSB-L4A
Max. Flow (m^3/h)	150	52	250
Max. head (m)	1920	915	2180
Max. Suction pressure (MPa)	6.8	4.0	6.8
Max. Working Pressure (MPa)	20.0	10.0	20.0
Max. Motor Power (kW)	132	37	315
Temperature range (°C)	-130 ~ +340	-130 ~ +340	-130 ~ +340
Speed range (rpm)	4950 ~ 2370	4900 ~ 14179	4950 ~ 28000

GSB-L1 Vertical High Speed Pump

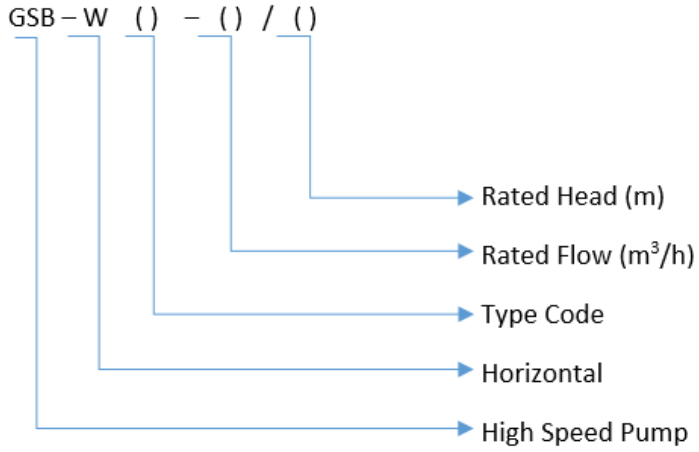
GSB-L2 Vertical High Speed Pump

GSB-L4A Vertical High Speed Pump

GSB-W HORIZONTAL HIGH SPEED PUMP

GSB-W are single stage, single-suction and overhung horizontal high speed pump series, which are mainly composed of motor, gearbox, pump unit, lubrication system and baseplate. GSB-W series pumps have stable characteristic parameters, simple structures, high reliability and long serve life, and are easy to maintain. A backflow stabilizer is integrated into the GSB-W5/W7 pump unit, which improves the pump performances at the low flow section and broadens the flow regulating ranges Hing speed thrust bearings are adopted, which enables the suction pressure to reach 10.0MPa

Type Designation

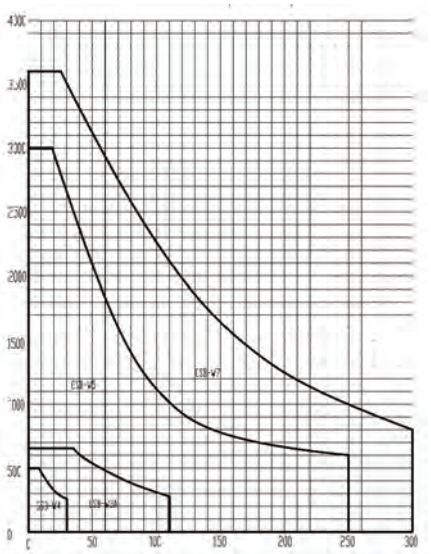


Note:
GSB-W1/W4: Motor connects with the gearbox by elastic diaphragm coupling, bearings and gears are lubricated by oil-mist.

GSB-W3: Motor connects with the gearbox by elastic diaphragm coupling. Forced lubricating is used for gears and bearings.

GSB-W5/W7: Single-stage speed-up large power horizontal high speed pump. Motor connects with the gearbox by elastic diaphragm coupling. Forced lubricating is used for gears and bearings.

Performance Envelope Of Horizontal High Speed Pump



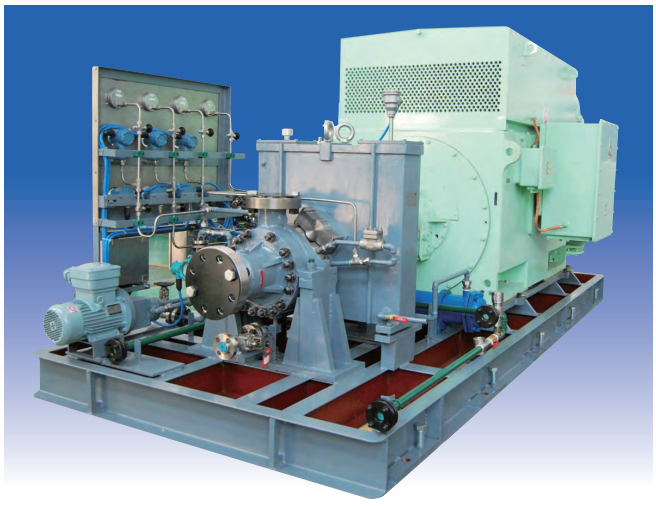
Parameters of GSB-W Horizontal High Speed Pump

Pump type	GSB-W1/W4	GSB-W3	GSB-W5	GSB-W7	GSB-W9
Max. Flow (m^3/h)	30	110	250	300	360
Max. head (m)	600	1000	3000	2400	3000
Max. Suction pressure (MPa)	2.0	2.5	10.0	10.0	10.0
Max. Working Pressure (MPa)	6.0	10.0	25.0	30.0	40.0
Max. Motor Power (kW)	45	132	400	710	2000
Temperature range (°C)	-100 ~ +250	-100 ~ +250	-130 ~ +340	-130 ~ +340	-130 ~ +340

GSB-W1/W4 Horizontal High Speed Pump

GSB-W3A Horizontal High Speed Pump

GSB-W5 Horizontal High Speed Pump



GSB-W7 Horizontal High Speed Pump

CERTIFICATION

ISO CERTIFICATE


CERTIFICATE OF CONFORMITY
OF QUALITY MANAGEMENT SYSTEM
CERTIFICATION

Beijing Aerospace Petrochemical Technology and Equipment Engineering Corporation

is in conformity with

GB/T19001-2008/ISO9001:2008 standard

This certificate is valid to the following area

Design, Development, Production and Servicing of Special Valves (Including Safety Valves), High Speed Pumps, Organic Heat Transfer Material Heaters (Boilers) and Pipe Heaters; Design, Development, Production (outsourcing) and Servicing of Burners and Incinerators

Expiration Date: 2012.08.17-2015.08.16
Variation Date:2013.07.02

China Xinshidai Certification Body

Director:

XQC SYSTEM CERTIFICATION IAF CNAS MANAGEMENT SYSTEM CNAS C006-Q

ISO 9001 Certificate


CERTIFICATE OF CONFORMITY
OF OCCUPATIONAL HEALTH AND SAFETY
MANAGEMENT SYSTEM CERTIFICATION

BEIJING AEROSPACE PETROCHEMICAL INSTITUTE

is in conformity with

GB/T28001-2011 standard

This certificate is valid to the following area

Related Management Activities of Design, Development, Production and Service of High-speed Pumps, Heaters, Incinerators, Slag Crushers, Flares, Eject Vacuum Systems, Gasifier Burners (Out Worker), Electronic Weighing & Packing System, Within Qualification Scope of Safety Valves, Liquid Organic Heat Transfer Material Heaters (Boiler)(Only Use Beijing Aerospace Petrochemical Technology and Equipment Engineering Corporation)and Other Products (See Internal Control Annex), Design, Development and Service of Special Valves, Gas Organic Heat Transfer Material Heaters (Boiler)
(Branch Information See Annex)

Expiration Date: 2012.12.28-2015.12.27
Variation Date:2013.12.10

China Xinshidai Certification Body

XQC SYSTEM CERTIFICATION CNAS MANAGEMENT SYSTEM CNAS C008-S

Environmental Management System Certification


CERTIFICATE OF CONFORMITY
OF OCCUPATIONAL HEALTH AND SAFETY
MANAGEMENT SYSTEM CERTIFICATION
ANNEX B

Beijing Aerospace Petrochemical Technology and Equipment Engineering Corporation

This certificate is valid to the following area

Related Management Activities of Design, Development, Production and Service of High-speed Pumps, Heaters, Incinerators, Slag Crushers, Flares, Eject Vacuum Systems, Gasifier Burners (Out Worker), Electronic Weighing & Packing System, Within Qualification Scope of Safety Valves, Liquid Organic Heat Transfer Material Heaters (Boiler), Design, Development and Service of Special Valves, Gas Organic Heat Transfer Material Heaters (Boiler)

Expiration Date: 2012.12.28-2015.12.27
Variation Date:2013.12.10

China Xinshidai Certification Body

Director:

XQC SYSTEM CERTIFICATION CNAS MANAGEMENT SYSTEM CNAS C008-S

Occupational Health and Safety Management System Certificate

QUALIFIED VENDOR CERTIFICATE


中国石油天然气集团公司
CHINA NATIONAL PETROLEUM CORPORATION

物资供应商
准入证

CERTIFICATE OF
MATERIAL SUPPLIER

Material Supplier of China National Petroleum Corporation


中国石化物资资源市场成员

证书

Material Supplier of China Petrochemical Corporation


CHEMCHINA
中国化工集团公司

供应商证书
Supplier Certificate

北京航天石化技术装备工程公司

兹认定贵单位进入中国化工集团
公司供应商管理库，可为我下属企业
提供核准产品。

Material Supplier of China National Chemical Corporation


全国机泵网成员单位证书
Certificate for Member of National Compressor & Pump Net

Certificate for Member of National Compressor and Pump Net

CERTIFICATION

MANUFACTURE LICENSES


中华人民共和国
特种设备制造许可证
Manufacture License of Special Equipment
People's Republic of China
（压力容器）

Manufacture License of Special Equipment (Pressure Vessel)


中华人民共和国
特种设备制造许可证
Manufacture License of Special Equipment
People's Republic of China
（压力管道）

Manufacture License of Special Equipment (Pressure Pipeline)

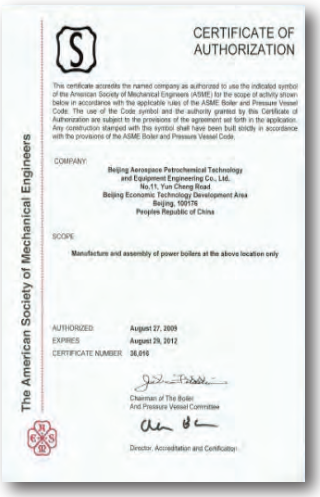

中华人民共和国
特种设备制造许可证
Manufacture License of Special Equipment
People's Republic of China
（锅炉）

Manufacture License of Special Equipment (Heater)


中华人民共和国
特种设备制造许可证
Manufacture License of Special Equipment
People's Republic of China
（安全附件及安全保护装置）

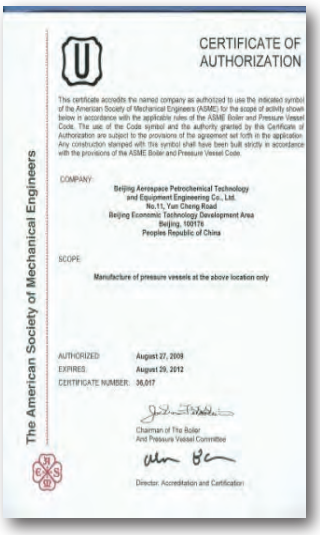
Manufacture License of Special Equipment (Safety Accessories and Safety Protection Devices)

ASME CERTIFICATES


CERTIFICATE OF AUTHORIZATION

The American Society of Mechanical Engineers

ASME S Certificate

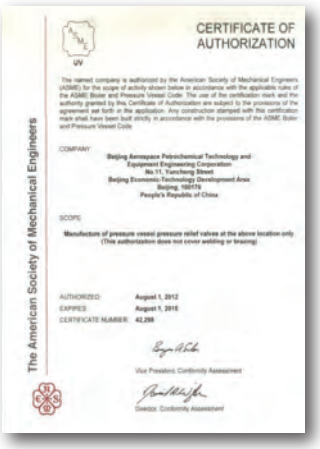

CERTIFICATE OF AUTHORIZATION

The American Society of Mechanical Engineers

ASME U Certificate


THE NATIONAL BOARD OF BOILER & PRESSURE VESSEL INSPECTORS
Certificate of Authorization

NBBI Certificate


CERTIFICATE OF AUTHORIZATION

The American Society of Mechanical Engineers

ASME UV Certificate

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