

IRAN INDUSTRIAL PUMPS Co.

I.I.P Group



Introduction

Iran Industrial Pumps Co. was founded in 1978 and currently, it is known as one of the biggest manufacturers of process pumps in the oil, gas and petrochemical industries, as well as large water and power pumps in Iran and the Middle East. With more than 40 years of experience and brilliant history/record in production of the different kind of pumps in the fields of Oil, Gas and petrochemical, electricity and various industries and by developing technical knowledge, Iran Industrial Pumps Group has been achieved complete self-sufficiency.

The Iran industrial Pumps Co. is known as one of the top pump manufacturing plants in Iran and the Middle East and by utilizing the latest innovations and technology developments in the world's pump industry, it has upgraded its products and has achieved significant successes in providing the needs of the clients & related industries. Additionally, in the respect of optimal management of its products, IIP Group has employed part of its engineering ability to teach advanced methods of production to other users by holding training courses and numerous seminars; and by providing a powerful technical team, sales and after-sales services, it has done a great effort to meet the needs of its customers.

The company has a well-equipped plant in the Hashtgerd Industrial city which includes divisions such as R&D, design and engineering, modeling, casting, machining, assembling, QC, testing, laboratory, HSE and so on; therefore, applying the technical knowledge & expertise along with utilizing machines, testing & production equipment, gave IIP ability to produce various types of pumps in diverse industries with accordance to the international standards.



Mission & Outlook

“Our proficiency is our obligation”

We believe that to be the best, our proficiency must be our obligation and in this regards, we are proudly announced that by relying on knowledge, skills and modern management systems, technology and superior design quality and production and powerful employees in the field of products and services, we have managed to provide the best for our customers.

As a manufacturing and service organization, we obliged to utilize our expertise, technical knowledge, skills and manpower in order to develop products and services required by our customers. In this regard, while our customers are the main focus of our business, we use our experience on a global scale to turn insights and observations into useful ideas for serving our customers; and we are continuously searching highest quality and improvement for whatever we do.

Strategic goals

The main strategy of the company is the low final-cost and high quality, which includes five key issues in this regard:

- Becoming the largest manufacturer of industrial pumps in the region
- Diversity and innovation in products
- Development of export markets
- Increasing quality and lowering the final price
- Decreasing the delivery time



Iran Industrial Pumps Products

PUMPS

- The process pumps

Currently, the major part of the IIP's production is dedicated to process pumps for oil, gas and petrochemical industries. These pumps, in the field of design, manufacturing and test, cover all the requirements for the latest revision of international standards, including API 610, HI, ASTM, ANSI and ISO. In addition, the construction of pumps and their related equipment are adhered to the IPS standards of the Iranian Oil Ministry; and all the technical documentations required by the operator and the client's engineering sector are provided at the time of construction and delivery of the pumps.

The production of process pumps in the Iranian Industrial Pumps Company is based on the various types of the API 610, which includes Overhung (OH), Between Bearing (BB) and Vertical Suspended (VS); and at the customer request, changing in design (considering API requirements) is also possible.

In the process of product preparation, the technical interaction with the various sections of the client's engineering sector (Mechanical, Process, Piping, Electrical) is performed for the proper selection of the pump type and the variation of the hydraulic parameters in the process of optimizing the design and construction of the pump.

The ability to build all kinds of vertical and horizontal pumps in all classes of API 610 standards are possible in the Iran Industrial Pumps Plant and based on work experience at the time of selection the appropriate material is provided to the clients.



- **Cryogenic Pumps**

Cryogenic pumps are one of the required products in the oil and petrochemical industry and in particular, in South Pars projects (gas and petrochemical phases) as well as LNG fields and projects. These pumps are mainly used for the transferring of cryogenic fluids such as N₂, Ethylene, Ethane, LPG, etc., and are designed to operate at very low temperatures. Therefore, the design of these pumps is in a way that minimizes the heat leakage from the pump to the process fluid. From years ago, the IIP group has begun technical and economic studies to design, manufacture and test these kinds of pumps in Iran and currently, various models of vertical cryogenic submerged pumps have been designed and built by this company.

- **Water Pumps (General Service)**

Since its establishment in 1978, Iran Industrial Pumps Company has been one of Iran's most famous manufacturers in the field of manufacturing water pumps (general service) and booster of residential and water supply pumps; and for the first time in the IRAN, Patent of the design and manufacture of these types of pumps has been registered under the name of Iran Industrial Pumps Company.

Over the past years, due to the implementation of development plans, the production of large utility pumps with capacity up to 25,000 m³/hr has been performed, and it is possible to construct these pumps in accordance with API 610, ISO and DIN standards. The factory has the experience and ability to build water pumps in horizontal and vertical models of various dimensions & materials, from cast iron to duplex steel, as well as various alloys of bronze and aluminum.

- **Fire-Fighting Pumps**

Over the past 40 years, the production of pumps under the NFPA20 standard for use in firefighting packages has a long record in various projects of Iran Industrial Pumps Company. For these pumps, a compliance certificate with the NFPA20 standard has been obtained from international organizations in respect to the manufacture of fire-fighting pumps. The production of different models of BB1 and VS1 for fire-fighting application purposes is performed in the IIP Group with different classes of grades from cast iron to duplex.



- **Mechanical Seals**

The IIP's Mechanical Seal Division, with the aim of self-sufficiency in this area and upgrade knowledge, is started designing mechanical seals concurrent with major manufacturers and in accordance with API682 standard. Products manufactured in this section include different types of mechanical seals, and seal supports system.

This division independently can design and produce various types of mechanical seals under difficult working conditions such as very high and very low temperatures, high pressures and highly toxic and corrosive chemicals.

- **Couplings**

Couplings of process pumps are all-metal and equipped with flexible elements made of metal (mainly stainless steel) and have a standard spacer dimension for assembly and disassembly of the pumps on the site. Chemical and mechanical tests for the material parts as well as the static and dynamic balances of the parts are made in full for the related couplings.

The production of these couplings from low power of 2 KW to 2000 KW is carried out at the plant of Iran Industrial Pumps Company. Furthermore, coupling for non-process pumps with rubber-type flexible element is also manufactured in the production line of couplings at the plant of IIP.

Pumps

BB1 Pumps

These models are one of the BB type pumps of the API610 and designed & manufactured to operate at high capacity and medium pressure and temperatures up to 200°C. The axis in BB1 pumps is horizontal, and their impeller is placed between the bearings. Their casings are axially split, and the impeller of these pumps operate as a single or double suction, and can be one or two stages.

- **Application:** Hydrocarbon and chemical processes, water projects, water pumping and discharge stations, industrial water supply systems, fire-fighting systems, ships and marine industries.



BB2 Pumps

These models are one of the BB type pumps of the API610 standard. The axis is horizontal, and the impeller is positioned between the bearings. Their casings are radially split, and the impeller of these pumps operate as single or double suction, and they can be one or two stages.

- **Application**
Hydrocarbon and chemical processes, power plants, paper-making industry

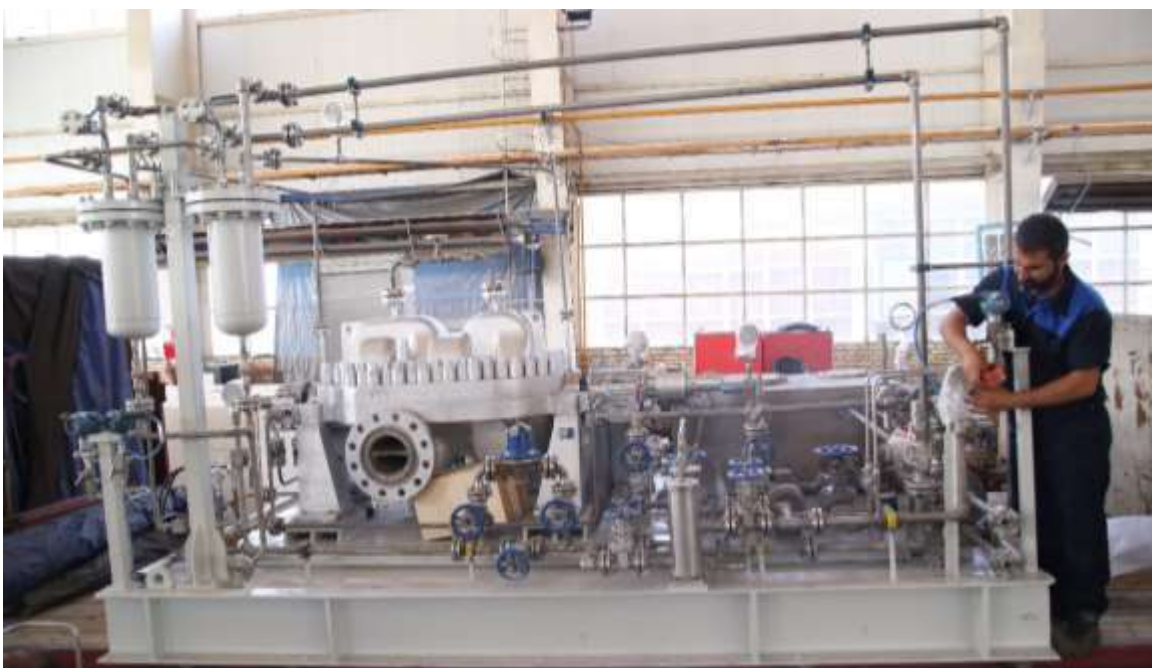


BB3 Pumps

These models are one of the BB type pumps of the API610 standard for high pressure and temperature applications. The axis is horizontal, and the impeller are placed between the bearings. Their casings are axially split and their stages are more than two.

- **Application**

Oil and gas, Hydrocarbon processing, Refinery Applications, Petrochemical Complexes, Power Plants, Water Transfer, RO systems.

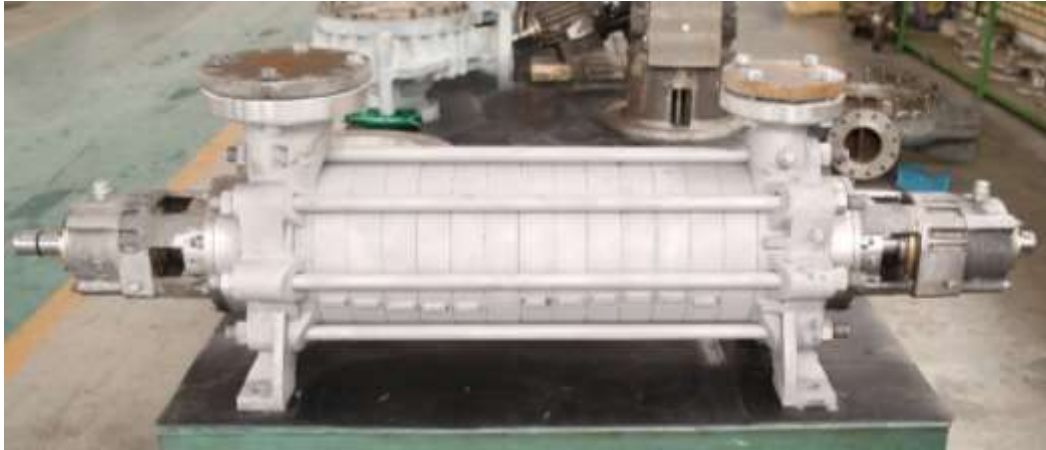


BB4 Pumps

The BB4 Pumps are heavy duty, horizontal ring-section multistage pumps. The pump's high efficiency hydraulics provides premium performance resulting in lower life cycle cost. This pump is available in various materials of construction, from cast iron to special alloy steels.

- **Application**

General industrial applications, pumping stations, pumping water supply at power plants



BB5 Pumps

These pumps are manufactured in accordance with the API610 standard and are suitable for medium capacity, & high pressure, temperatures above 150 °C and specific fluid weight less than 0.7. These pumps are designed and manufactured as Double Casing and are equipped with the internal balancing system, which allows the various bearing positions to reduce the axial and radial force. The design of the pumps is such that the suction and discharge flange is in the top position.

- **Application**

high temperature and pressure services in refineries, low density services in gas refineries, hydrocarbon transfers, petrochemical complexes, boiler feed pumps (BFW).



VS1 Pumps

Wet pit, vertically suspended, single-casing diffuser pumps with discharge through the column shall be designated pump type VS1 in API610 standard. The Diffuser is used in the design of these pumps, and they can have several stages.

- **Application**

Sea water suction, cooling towers, fire-fighting systems, process fluid tanks.

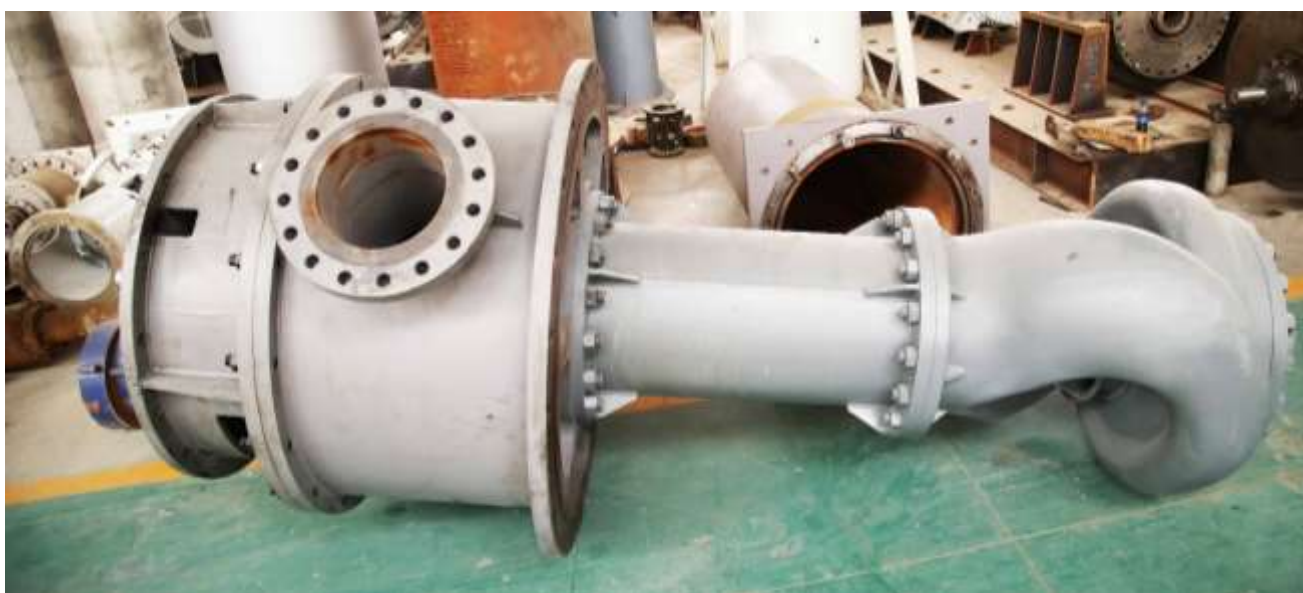


VS2 Pumps

These pump is one model of the VS2 type of the API610 standard. These pumps are installed vertically, and the fluid is suctioned in the lower part, and through the column is transmitted to discharge head and flange. In the design of these pumps, a screw is used.

- **Application**

Sea water suction, cooling towers, fire-fighting systems, process fluid tanks.



VS3 Pumps

Wet pit, vertically suspended, single-casing axial-flow pumps with discharge through the column shall be designated pump type VS3 in API610 standard. The pump impeller is in the form of axial flow.

- **Application**
Sea water suction, cooling towers, agricultural uses and flood discharge

VS4 Pumps

These pumps are from VS types of the API610 standard. The VS4 pumps are designed in a single-stage vertical form and are used for reliable operation under difficult conditions. These pumps have columnar discharge, and the pump engines are securely mounted on the flange holders.

- **Application**
These pumps are widely used in process services in refineries, especially in tank and storage pumps, designed and constructed for services with low capacity and low & medium head.



VS6 Pumps

VS6 series pumps are radially-split, multi-stages, high pressure, vertical can pumps. Double-casing diffuser or ring section vertically suspended pumps shall be designated pump type VS6 in API610 standard. Because of their particular design, VS6 pumps are used in cases where the service has a low NPSHA.

- **Application**
These pumps are suitable for pumping clean and slightly polluted liquids. The permissible operating pressures and permissible operating temperatures depend upon the material specification.



VS7 Pumps

pump type VS7 in API610 standard shall be designated Double-casing volute vertically suspended pumps. The VS7 pump is designed for installation inside a barrel and operates in a closed-loop system. A VS7 pump may be made of heavy casing (or bowl assembly) to handle higher working pressure.

▪ Application

Pumping a variety of fluids, including flammable materials, toxic, and other hazardous liquids.

Transmission of Crude Oil, Refinery Applications, Petrochemical Complexes, Power Plants.

OH2 Pumps

The IOH2 pumps have been developed to meet the rigorous requirements of API-610. The casing is end suction; top delivery centerline mounted type (OH2 type according to API-610) to withstand nozzle loads. The rotating assembly is designed for back pull-out to prevent disturbing the driver, suction and discharge piping connections. Rugged shaft design is well within the API-610 shaft deflection and run out criteria.

- **Application**

Oil and gas, hydrocarbon processing, petrochemical complexes, refineries, power plants, pulp and paper industry, chemical industry, water and wastewater, public industry.

- **Performance range**

Capacity (Q): up to 750 m³/h

Head: (H): up to 150 m

Speed (N): 980/1500/1180/3000 rpm

Working temperature (T): -50 to 350 °C

Working pressure (P): up to 25 Bar



OH3 Pumps

This model is one of the OH type of the API610 standard. The pump axis is a vertical and installed in-line.

- **Application**

Hydrocarbon and chemical processes, power plants, paper-making industry, water transmission and public industries.

Cryogenic Pumps

Due to the importance and sensitivity of the manufacturing process, assembly and testing of cryogenic pumps, the IIP by considering the perspective of the cryogenic pumps' market in IRAN and the Middle East region, has established a separate workshop that includes the following equipment and facilities:

- Lightweight and heavy machinery required for the parts machining
- Vertical cryogenic pump assembly line
- Specific test line for cryogenic pumps
- Preparation, packaging, delivery equipments

Because of the necessity of performing a specific performance test of cryogenic pumps which is done with liquid nitrogen at a temperature of $-196\text{ }^{\circ}\text{C}$; an independent workshop to install specific equipment of test lines (including large test tank, large reservoir of liquid nitrogen storage, metal structure for test, 24 in & 16 tubes in of Test Line, Equipment for precision measuring, Nitrogen outlet gas pipeline and Test Control Room) were established before the first prototype of these pumps was manufactured in 2012 in IIP.

Due to the specific structure of the mechanical and electrical design of these pumps, the assembly line for cryogenic pumps has been created for a specific and precise monitoring in the preparation process for this workshop, with an area of approximately 3000 m^2 .



○ Structure and design of cryogenic pumps:

According to the classification and variety of models and the application of cryogenic pumps, the IIP Group has been designing and manufacturing retractable in tank cryogenic pumps. These types of pumps are used in low pressure tanks. The design of these pumps is submerged and vertical with an electric motor, which a motor axis and a pump are close-coupled. The cryogenic pump flows through a tube in the tank and sits on a suction valve near the bottom of the tank. The inlet valve of these pumps is such that it allows the pump to be installed and removed from the column without the discharge tank. The fluid is sucked through a nozzle and will be pumped toward some large holes designed on the pump casing to be driven through the discharge pipe of the storage tank.

- **Mechanical design**

In mechanical design of the pump, we have tried to minimize the radial and axial distortion of the pump with using new methods, based on design knowledge, which ensures a longer lifetime and reliability of its operation. The reduction of axial and radial forces is done using a force balancing system and roller bearings.

- **Material parts**

Hydraulic parts and pump casing are made of a special aluminum alloy for cryogenic services. Casting methods are developed for parts such as impeller, diffuser, inducer, etc. by the Research and Development Unit of IIP to ensure the proper casting quality together with the proper strength of the parts.

- **Hydraulic design**

The design of the hydraulic parts of the pump is “diffuser style” and the pump impellers are “closed style” with high efficiency. The pump is equipped with an Inducer to increase the positive suction pressure of impellers. Depending on the head which is required by the pumps, the number of stages can vary. After designing the pump, the hydraulic components of the pump are designed to be analyzed by the CFD. After this analysis, one can be sure that the quality of the pump meets the specific design requirements.

- **Vibration Monitoring System**

A robust vibration monitoring system equipped with precision sensors appropriate for cryogenic services, with protection panels and suitable designed programmable Alarm-shut down system, is considered for these pumps which can also be upgraded to the advanced troubleshooting system.

- **Accessories and parts**

In-tank Cryogenic pumps are equipped with additional equipment such as an inlet valve, lifting Cable, power junction box, the head plate of the discharge pipe and ... all are produced in IIP factory.

- **Cryogenic pump test line**

All equipment for testing the performance of cryogenic pumps with liquid nitrogen fluid at a temperature of $-196\text{ }^{\circ}\text{C}$ is provided in the form of a special cryogenic test line at the plant of the IIP Group which is equipped with capacity, head and vibrations measurement devices and control system for electric motor parameters to obtain the functional curves of the pump and its electric drive. The test line is equipped with a full control room to automatically analyze the functional characteristics of the pump.



Mechanical seal

In almost all pumps with rotary shaft, a sealing process is performed. During this process, there is a barrier between what is inside the pump and the outside space. There are many methods for sealing, but today the use of mechanical seal is the dominant method in the pumps. In mechanical seals there are two flat surfaces, which are carefully machined and polished, one of them fixed and the other rotating. These levels require a small amount of material leakage between them to create a hydraulic film, but the amount of this leak is small and evaporates after exiting the plates due to heat. Mechanical seals require clean water or other compatible fluids for lubrication of the plates, and this lubricant is supplied to the working fluid from the pumped liquid or external source.

Choosing the right mechanical seal is possible only if the working condition is properly understood. Among these conditions, pressure, working temperature and transient fluid are determined by their size and material. The Iran industrial Pumps Co. according to the needs of customers, working conditions and standard requirements, designs and constructs mechanical seals based on reliability and long service life.

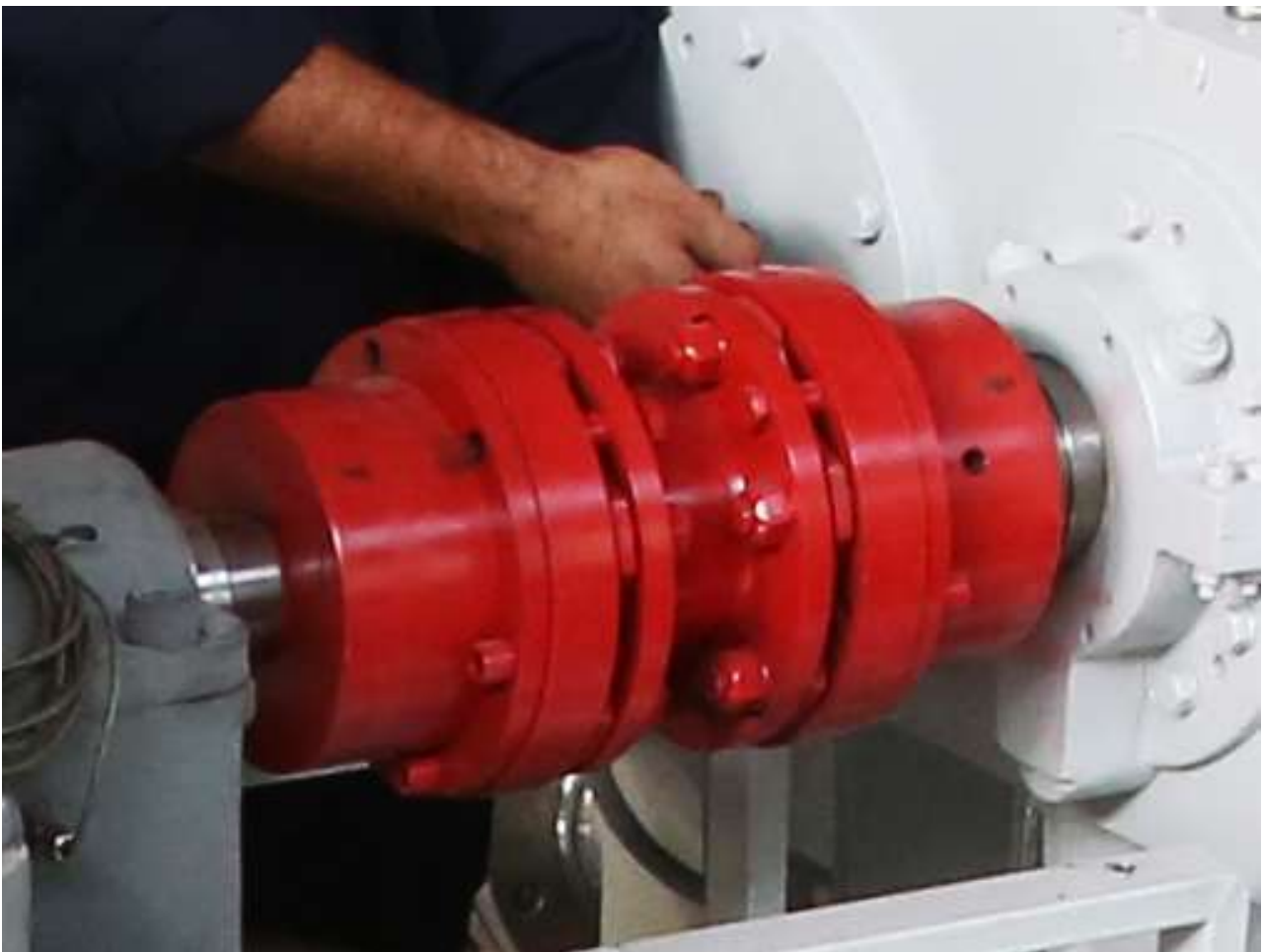


Couplings

Couplings are components that receive movement and drive power from the end of a shaft and transfer them to the other shaft. Couplings can not cut off the link between the driver and the driving shafts. Flexible and Small Couplings (FSC) can tolerate axial, angular, and parallel asymmetries between driver and the driving shafts. In summary, the duties of these couplings are:

- Power, torque and speed transmission from the driver to the driving shaft
- Eliminating small non-alignments that have increased during operation.
- Protect connected equipments
- shock absorption and damping due to shock forces, vibrations and fluctuations
- Reduction of radial (transverse) loads on bearings
- Absorption of alternating loads (cyclic)
- Lowering the clearance and minimizing response loads (retreating)
- Neutralize and damping of system vibrations

The Iran Industrial Pump Co. is proud that have been designed and manufactured flexible FSC series couplings in accordance with API671 with the aim of competent and capable personnel, and these couplings are able to meet all API610 standard requirements for inlet pumps.



Coupling size		21	53	120	216	368	560	800	1184	1488	2240
Nominal Power (R) (KW/1000RPM)		21	53	120	216	368	560	800	1184	1488	2240
Momentu m	Continue s (Nm)	112	284	644	1160	1976	300 8	4298	6359	7993	1203 2
	Maximu m (Nm)	279	711	1611	2898	4941	752 4	1074 6	1590 3	1998 0	3006 0
Maximum Speed (RPM)		2295 0	1800 0	1485 0	1296 0	1080 0	945 0	8550	7200	6300	5400
Power Transition Mass	Minimu m Spacer (Kg)	1	3	5	9	13	16	20	25	33	46
	Added Spacer (Kg/m)	3	5	7	11	13	13	16	20	23	31
Hubs Interface Distance (HID) A		69	83	104	127	137	138	140	145	155	180
B		42	47	58	65	74	95	100	112	121	137
C		57	72	95	118	138	171	190	216	234	260
D		90	110	137	160	188	207	233	259	286	312
Maximum Hole Diameter (MHD)	Type I (mm)	34	44	62	76	86	109	121	133	147	163
	Type II (mm)	48	67	86	97	115	-	-	-	-	-
Mass of Un-holed Hub	Type I (Kg)	1	2	3	6	9	16	21	29	38	52
	Type II (Kg)	2	3	6	9	14	0	0	0	0	0
Power transition unit mass	Minimu m Spacer (Kg)	1	3	5	9	13	16	20	25	33	46
	Added Spacer (Kg/m)	3	5	7	11	13	13	16	20	23	31

Factory



Factory Devisions

Research & Development

The world of science and technology is moving forward at a very fast pace, and definitely using the progress in this area, will lead to a high quality product and service delivery. The research and development team of IIP, composed of the country's leading elite, is rapidly researching in various fields of research and development. New products, the update of old products, the development of systems and production methods, and ... are only part of activities of this section.



Design and engineering

In engineering unit of this company, more than 80 people with doctoral, MS and BS degree in the field of mechanical, metallurgy, industrial, electrical and control engineering had been working and by using the latest achievements of modern knowledge of Turbo-machinery design and their related accessories as well as utilizing recent engineering software, have been providing all engineering services to the manufacturing units of this factory.

The activities of the engineering and technical units of the factory are very extensive and include material identification, design and production of the parts, preparation of the production drawings, preparation of the production processes, design of the production process equipments, preparation of the assembly process schedule, provision of technical documentations, and cooperation throughout the preparation of test procedures and pumps delivery. Furthermore, the preparation of technical documentation for pumps for use in the client's operation & engineering unit is one of the most important activities of the technical & engineering unit in the Iran Industrial Pumps Plant.



Modeling

In the first stage of production, many parts of the pump are casted; hence a model for molding and casting is required. In the factory, various models for pump parts are available and are also made if needed.



Casting

Casting is the first and one of the main sections of the production of industrial pumps, and in the IIP Casting Workshop, there are different types of furnaces with different capacities, and according to the functional conditions, several kinds of materials such as steel and ... are being cast.



Laboratory

The Laboratory of Iran Industrial Pumps plant is the most well-equipped laboratory pump in Iran and has the necessary equipment for testing materials (destructive and non-destructive) as well as dimensional inspection of parts. All precision measuring dimensioning instruments, devices for reading and measuring mechanical and hydraulic parameters, and Identification of parts material are available in this lab. The laboratory is equipped with quantum-meters and metallography devices in order to determine the elements of the parts' material, as well as precision microscopes to detect the structure of two-phase steels. The facility such as MT, PT and UT tests under the supervision of the ASNT Institute, is another feature of the complex.





Machining

The machining unit of Iranian Industrial Pumps Company is equipped with a complete range of machines for producing various types of pumps. In this unit, heavy-duty pumps with a diameter of 4.5 m and a weight of 60 tonnes can be machined with advanced CNCs. CNCs with a tonnage of 25 and a length of 6 m and a width of 280 cm for machining of casting models as well as the complicate parts of the pumps give a special ability to this unit. Some of the various machine tools in IIP factory includes milling, CNC milling, shaper and planner, EDM, horizontal and axial machining, sawing, drilling, carousel.

Assembly

Different parts of the pump are assembled after QC unit approval. Experts in this section are doing assembly operations with using modern and high-precision equipments to ensure that pump activity is optimized.



metalworking

The complete set of a pump is mounted on a chassis before being shipped, and the various parts are being fixed in their places, and the necessary wiring and connections are being installed. Due to the large number of production pumps in this complex, a separate section carries out the whole process of chassis production and metal working.



Sandblasting and painting

In this section, the products are prepared and after painting, will be ready to send to the customer.



Quality control

In the QC department of Iran Industrial Pumps factory, with standardized methods, the company will be assured from the quality of the manufactured products. These methods and systems are usually designed in collaboration with other sectors such as engineering and commerce. The control of the quality of the parts and products is the main activity of this unit, while the control of the production process is also done using statistical methods.

This unit has six QC stations in different parts of the factory and the specialists of this section carefully monitor all manufacturing operations at all stages of production and if necessary, they will be issued with appropriate permissions.



Testing

The Pump Performance Testing Workshop at Iran Industrial Pump Plant is one of the largest pump tests in the country. The workshop is equipped with four separate test tanks to perform functional tests. The largest tank/reservoir volume is 500,000 liters, and the functional test of the pumps up to 25,000 m³ are feasible. Furthermore, the testing workshop is equipped with 48-inch tubes with a 100-degree tolerance power, and this complex is utilizing power supply with three-megawatt power and 400 V, 330 V, 600 V and 11000 V.

Performing essential tests of centrifugal pumps, including mechanical running, performance, hydrostatic and NPSH tests, are carried out at this workshop. Measuring the important hydraulic and mechanical parameters of pumps such as capacity, head, NPSH, power, efficiency, vibration, temperature, sound level, etc., are carried out with the most accurate measurement tools.



HSE

The HSE standard is a managerial process to cover the safety and health weaknesses of an industrial complex. In fact, HSE is the unitary system that has been proposed by industry to integrate and achieve a rational and comprehensive vision on safety, health and the environment.

After-sales service

Provision of services, support and spare parts after the sale of the pump, are the obligations of the Iran industrial Pumps group. In other words, we are committed to never leave our customers alone and always be with them.





“Award Ceremony of Iran's Selected Industrial Company, 2016”

Acknowledgements



Bu-Ali Sina Petrochemical Co.



Shahid Hasheminejad Refinery



Ehsan participation



National Iranian Oil Engineering and Construction Company



Ehsan participation



Kavian Petrochemical Co.

Acknowledgements-cont.



SPEC



CNPC



Management of IRAN Industrial Projects



Iran International General Contractor



SPEC



SPEC

Acknowledgements-cont.



Khark Petrochemical Co.



Khark Petrochemical Co.



Kermanshah Refinery



FALAT



Khark Petrochemical Co.



Khark Petrochemical Co.

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Photo Gallery























