

**OH 2** Series

**Technical Catalogue**

2012

### Our Vision

ASK's vision is to be a recognized leader in innovative, sustainable, engineered, and customer-focused solutions for performance critical applications in the oil and gas, hydrocarbon processing, power generation, pulp and paper, and other selected industries.

### Our Mission

ASK aims to be a multi-industry company with a strong brand, which provides solutions that combine products, services, engineering, and customer - application expertise.

The corporation is close to the customer by being primarily direct-sales driven.

Engineering, innovation, and technology are cornerstones.

ASK strives to be an attractive employer and to create an environment where employees can excel. The company focuses on creating value for its customers.

### ASK Innotec

The research and development unit of ASK supports the divisions of the company and industrial companies in their development projects by providing contract research and special technical services like diagnostics and certified testing as well as one-off production and engineering. ASK Innotec has expertise in materials and surface engineering, fluid technology, as well as in mechanics. Its core competencies in contract research also lie in these classical disciplines.

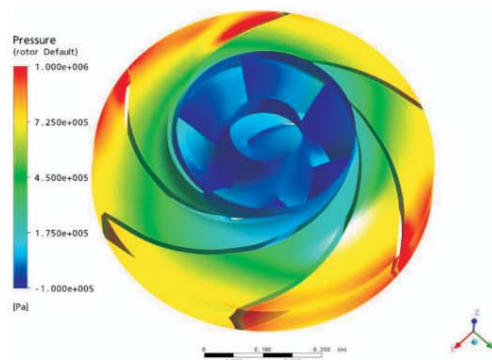


## Product description

Using modern computer aided design software the pumps are specifically designed as a heavy duty, minimal wear, long life pump which has been designed in a modular way, with a number of options available, to ensure full compliance to the customer's exact requirements and specifications. A fully compliant API 610 heavy duty baseplate helps achieve low vibration and noise levels which in turn extends the pump's life and ensures maximum running time. A 'space saving' reduced footprint baseplate is also available for use where space is at a premium.

The pumps can be fitted with a variety of proprietary components (i.e. seals, motors & couplings) from all the major manufacturers to cater for customer site preferences. Double mechanical seal arrangements can be fitted with a seal support system attached. This can be supplied by Protect System, which is designed and manufactured by famous manufacturer's seal support system can be fitted.

To complete the package a full range of standard material options from SG iron and stainless steel, to duplex are available to match your process fluid. NACE compliant materials are also available. Standard documentation packs including manufacturing data books, material certification, and installation & operating manuals are available to suit the application. Performance testing to API 610 / ISO 13709 and various NDE (non destructive examination) & NDT (non destructive testing) options are offered to ensure full compliance to our customer's specifications. Alternative bespoke packages can be tailored to fit your exact requirements.



## Fields of Application

ASK pumps provide a broad range of API centrifugal pumps for the demanding applications of the hydrocarbon processing industry. The pumps are designed for the delivery of most fluids found in refinery processes.

- Petroleum refining, production, and distribution
- Petrochemical and demanding chemical processing
- General industrial requiring high temperature
- Chemical plants



## Key features

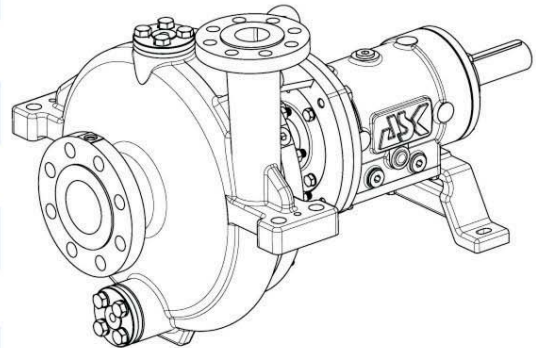
- OH2 single stage centerline mounted centrifugal pumps.
- 40 bar pumps to API 610 (11th edition) & ATEX Compliant
- -40°C to 400°C temperature applications
- Shrouded or Semi-Open Impellers
- A range of alloys available on request including NACE compliant materials
- Tested to API610 / ISO13709 procedures – Head, Flow, NPSH, Noise & Vibration
- A range of API 682 Seals & systems (PED compliant)
- Grouted and Non-Grouted Baseplates to API 610 dimensions

## Product Overview

### General description

A range of OH2 single stage, centerline mounted centrifugal end suction pumps with tangential discharge manufactured in a variety of alloys.

<b>Construction</b>	Back pullout design with metal to metal fits
<b>Design methodology</b>	Advanced computer techniques including 3D modeling, FEA & CFD
<b>Design standards</b>	API 610 11th : 2010 / ISO 13709 : 2009 ATEX EC-Directive 94/9/EC
<b>Design pressure rating</b>	Up to 40 bar g @ 20°C
<b>Suction pressure rating</b>	10 bar g (standard construction) 20 bar g (heavy duty construction)
<b>Temperature rating</b>	-15°C to 250°C (standard construction) -15°C to 400°C (with cooling)
<b>Design temperature</b>	180 °C (standard construction)
<b>Performance envelope Flow rate</b>	Up to 550 m³/h
<b>Differential head</b>	Up to 260 m
<b>Speed</b>	Up to 3000 rpm
<b>Configurations</b>	Long coupled pump Bare shaft pump Rotating assembly
<b>Frame sizes</b>	050x025x160 to 200X150X450
<b>Design life</b>	20 years (3 years uninterrupted operation)



### Material Options

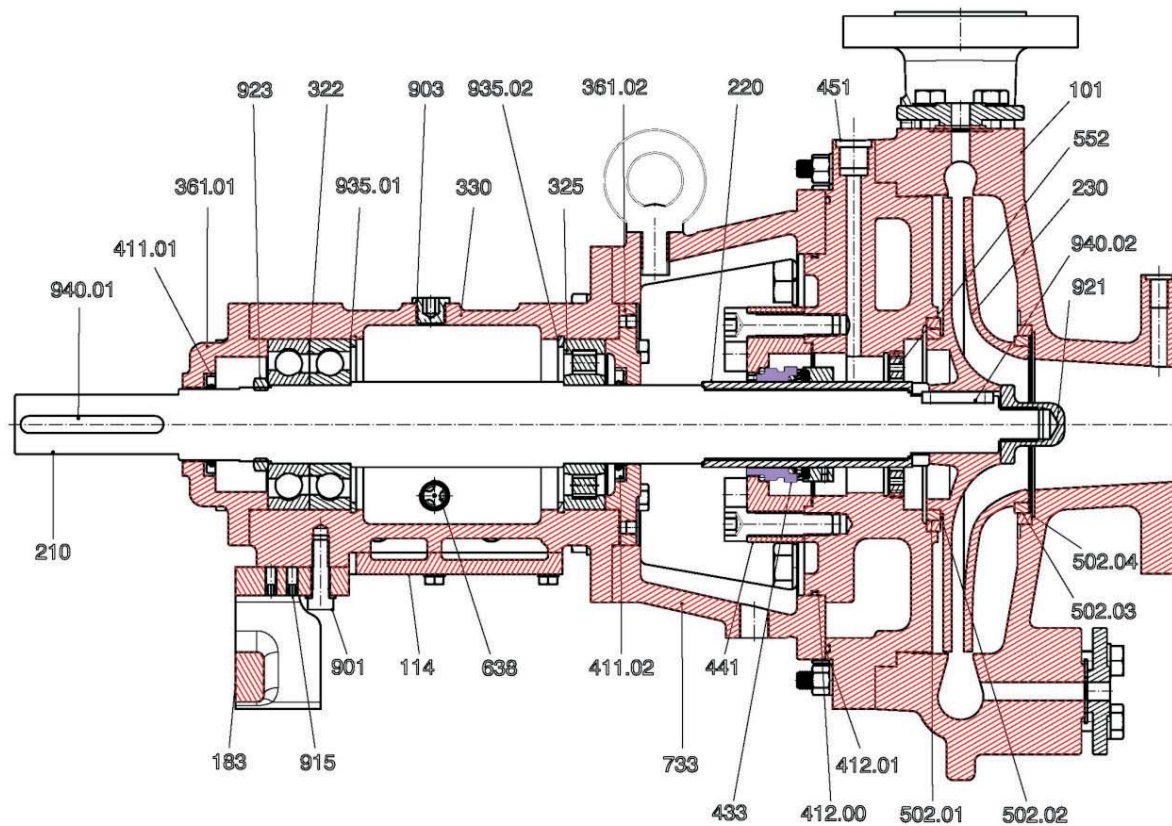
Materials	Casing	Impeller
I1 – Cast Iron / Cast Iron	ASTM A 48 Class 40B	ASTM A 48 Class 40B
I2 – Cast Iron / Bronze	ASTM A 48 Class 40B	C92200
S1 – Carbon Steel / Cast Iron	ASTM A 216 WCB	ASTM A 48 Class 40B
S3 – Carbon Steel / Ni-resist	ASTM A 216 WCB	ASTM A 436 Type 1,2,3
S4 – Carbon Steel / Cast Iron	ASTM A 216 WCB	ASTM A 48 Class 40B
S5 – Carbon Steel / Carbon Steel	ASTM A 216 WCB	ASTM A 216 WCB
S6 – Carbon Steel / 12% Cr SS	ASTM A 216 WCB	CA6NM
S8 – Carbon Steel / SS 316	ASTM A 216 WCB	ASTM A744 CF-3M
C6 – SS 304 / SS 304	304 Stainless steel	304 Stainless steel
A8 - SS 316 / SS 316	ASTM A744 CF-3M	ASTM A744 CF-3M
D1 – Duplex SS / Duplex SS	ASTM A 240-S31803	ASTM A 240-S31803

- Other alloys, including NACE compliant materials are available on request.
- We offer specific NDT and component documentation to ensure compliance to your exact requirements.





## General Sectional Drawing



Part Name	Part No.	Part Name	Part No.
Volute casing	101	Seal chamber	451
Bearing cooling jacket	114	Rear case wear ring	502.01
Pump support	183	Rear impeller wear ring	502.02
Shaft	210	Front impeller wear ring	502.03
Shaft sleeve	220	Front case wear ring	502.04
Impeller	230	Throat bushing	552
Angular contact BB	322	Level oiler	638
Roller bearing	325	Bearing bracket lantern	733
Bearing housing	330	Hex-head bolt	901
Bearing housing cover	361.01	Oil plug	903
Bearing housing cover	361.02	Cylindrical head cap screw	915
Oil seal	411.01	Impeller nut	921
Oil Seal	411.02	Tightening nut	923
O – Ring	412.00	Circlips	935.01
O – Ring	412.01	Circlips	935.02
Mechanical seal	433	Shaft key	940.01
Seal gland	441	Shaft key	940.02

### Product Benefits

- 3 mm corrosion allowance to API 610
- Renewable wear rings
- Low Nss Hydraulic for optimum selection to API 610
- 300# suction and discharge flange to API 610
- 2 API 610 allowable nuzzle loads
- Seal chamber to API 610. Accommodates all mechanical seals to API 682
- Cooling jacket for seal chamber and bearing bracket
- Max. Shaft diameter in acc. with API 610. Makes for very long service life of mechanical seal
- Bearing dimensioned for longer service life than specified by API 610, reduced maintenance expenditure and work

### Product Options

- Material variety acc. with API 610
- Shaft sealing arrangements acc. with API 682
- Vibration sensors
- Temperature sensors
- Oil mist lubrication
- Triple bearing arrangement for high suction pressure application
- Casing heating / cooling jacket for high temperature application
- Extra wide baseplate - Provided for seal systems with auxiliary components to improve maintenance access.



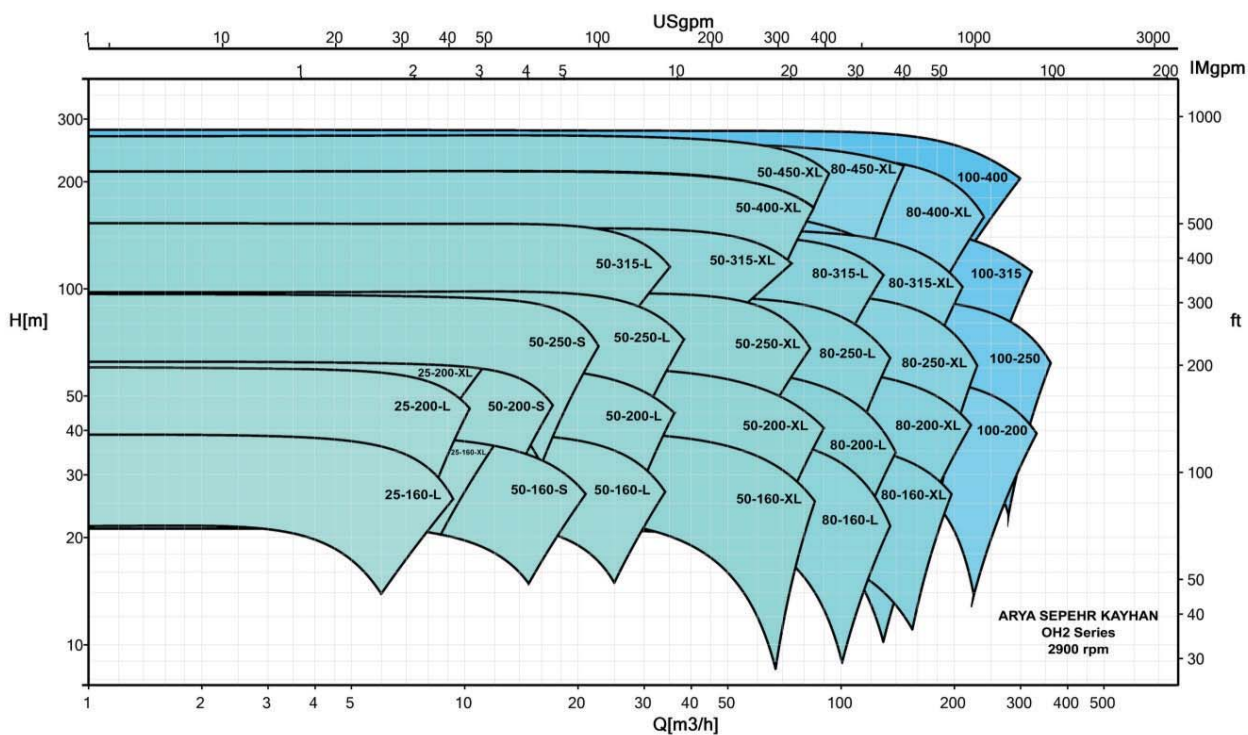


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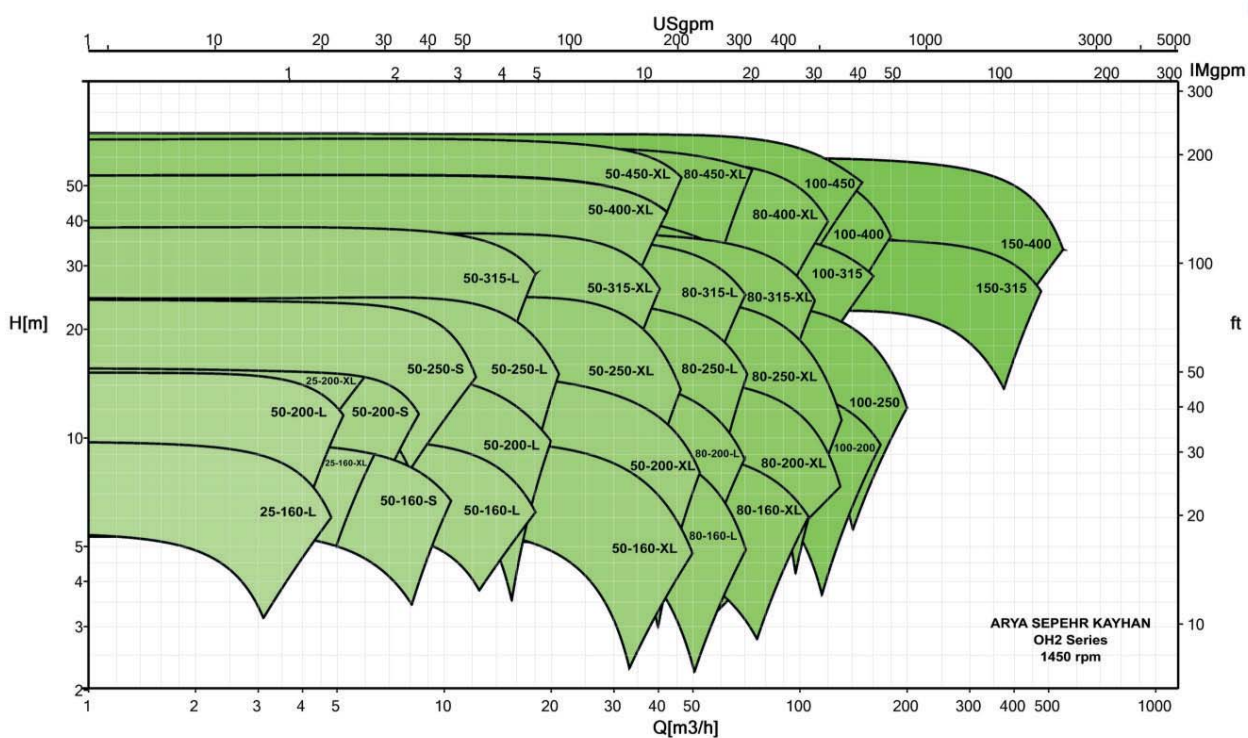
OH 2 Series

## Hydraulic Coverage

### 2900 rpm



### 1450 rpm



## Designation

Example: OH2 80 – 315 XL/90 2 S6 (S1.02-21Q3) A/EXT4

OH2	80	315	XL	90	2	S6	S1.02-21Q3	A	EXT4
Type Series	Discharge nominal diameter in millimeters	Impeller nominal diameter in millimeters	Impeller code	Nominal motor power in kW	No. of poles	Material class acc. with table H.1 API 610	Shaft seal code See individual designation	Options	Area classification
OH2: End suction horizontal centrifugal pump, centerline mounted acc. with API 610	25 50 80 100 150	160 200 250 315 400 450	S: Small L: Large XL: Very large	1.1 kW up to 160 kW	2: 3000 rpm 4: 1500 rpm 6: 1000 rpm	I-1 I-2 S-1 S-3 S-4 S-5 S-6 S-8 C-6 A-8 D-1	S1: Single Mechanical seal D1: Double Mechanical seal Q3: Quench  02: Basic arrangement 21: Orifice	A: no Option B: Oil mist lubrication C: Vibration sensors D: Temp. Sensors E: Heating jacket F: Triple bearing	SA: Safe area EX: Explosion proof T1-T6: Temperature class

## Shaft Seal code and API Plan

Row	Designation code	Description	API Plan	Explanation
1	P1.00	No piping, internal circulation	Plan 01	Soft packing – P1
2	P1.08	Fluid from an external source	Plan 32	Soft packing – P1
3	S1.00	No piping, internal circulation	Plan 01	Single mechanical seal – S1
4	S1.02	Circulated fluid from pump outlet to seal cavity (with internal return)	Plan 11	Single mechanical seal – S1
5	S1.02-21.11.41	Circulated fluid from pump outlet to seal cavity (with internal return)	Plan 11	Single mechanical seal – S1 Basic arrangement – 02, Orifice – 21 Shut off valve – 11, Pressure indicator – 41
6	S1.02-21Q3	Circulated fluid from pump outlet to seal cavity (with internal return) and quenching fluid supplied from external source	11+61	Single mechanical seal – S1 Basic arrangement – 02, Orifice – 21 Quench – Q3
7	S1.04-61	Circulation fluid via cyclone (with internal return); dirty line to pump inlet	31	Single mechanical seal – S1 Basic arrangement – 04, Cyclone – 61
8	S1.07	Internal circulation fluid to seal and return to pump inlet	13	Single mechanical seal – S1 Basic arrangement – 07
9	S1.08	Fluid from an external source	32	Single mechanical seal – S1 Basic arrangement – 08
10	S1.08-12.32.11.41	Fluid from an external source	32	Single mechanical seal, S1 Basic arrangement, 08 Hand control valve – 12, Filter – 32 Shut off valve – 11, Pressure indicator – 41
11	D1.10-21.64(63.41.42)Q3	Circulated fluid from pump outlet to seal cavity (with internal return) Buffer fluid supplied by tank	11+52+61	Double mechanical seal – D1 Basic arrangement – 10, Orifice – 21 Tank – 64, Heat exchanger (internal) – 63 Pressure indicator (internal) – 41 Temperature indicator (internal) – 42, Quench – Q3
12	D1.11-21.64(63.41.42)Q3	Circulated fluid from pump outlet to seal cavity (with internal return) Barrier fluid supplied by tank	11+53+61	Double mechanical seal – D1 Basic arrangement – 11, Orifice – 21 Tank – 64, Heat exchanger (internal) – 63 Pressure indicator (internal) – 41 Temperature indicator (internal) – 42, Quench – Q3

 **Note:** Other seal arrangements are available on request.

## Service Selection chart

This table is a general recommendation for selection of appropriate material class and shaft sealing plan. It does not provide a warranty or guarantee of any kind.

All the proposed material classes and seal codes based on engineering experiences and may be exposed to change without notice.



Fluid name	Formula	Mat. Class	Seal code
Acetic acid	CH <sub>3</sub> COOH	A8	S1.02-21.11.41
Benzol	C <sub>6</sub> H <sub>6</sub>	S1, S5	S1.02-21.11.41
Brine (anolyte with >30 mg cl <sub>2</sub> /l)		D1	S1.02-21Q3
Butadiene, liquid	CH <sub>2</sub> =(CH <sub>2</sub> ) <sub>2</sub> =CH <sub>2</sub>	S6, A8	S1.02-21Q3
Butane (liquefied gas)	C <sub>4</sub> H <sub>10</sub>	S1, S5, S6	D1.10-21.64(63.41.42)Q3
Butanol(Butanol 1)	C <sub>2</sub> H <sub>5</sub> (CH <sub>2</sub> ) <sub>2</sub> OH	S6, A8	D1.10-21.64(63.41.42)Q3
Carbon dioxide, aqueous solution	H <sub>2</sub> CO <sub>3</sub>	A8	S1.02-21.11.41
Caustic lime	Ca(OH) <sub>2</sub>	S6, A8	S1.02-21Q3
Caustic soda	NaOH	S6, A8	S1.02-21Q3, S1.08-12.32.11.41
Cresol	C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> )OH	S6, A8	S1.02-21Q3
Ethylene, liquid	CH <sub>2</sub> =CH <sub>2</sub>	S8	S1.02-21Q3
Ethylene oxide	(CH <sub>2</sub> ) <sub>2</sub> O	S6, A8	D1.11 21.64(63.41.42)Q3
Fuel oil		S1, S5	S1.02-21.11.41
Gas oil		S1	S1.00
Glycol (ethylene glycol)	(CH <sub>2</sub> OH) <sub>2</sub>	S6, A8	S1.02-21.11.41
Hexane	C <sub>6</sub> H <sub>14</sub>	S6, A8	S1.02-21Q3
Kerosene		S5, S6	S1.02-21.11.41
Naphtha		S1, S5, S6	S1.02-21Q3
Methanol	CH <sub>3</sub> OH	S6, A8	D1.10-21.64(63.41.42)Q3
Methyl mercaptan	CH <sub>3</sub> SH	S6, A8	D1.11 21.64(63.41.42)Q3
Monoethanol amine (MEA)	H <sub>2</sub> N-CH <sub>2</sub> -CH <sub>2</sub> OH	S1, S6	S1.02-21Q3
Petrol(gasoline)		S1	S1.00
Petroleum (crude oil)		S6	S1.02-21Q3
Propane	C <sub>3</sub> H <sub>8</sub>	S1, S5	S1.02-21Q3
Seawater		A8, D1	S1.00
Slop (distillation residue)		S5, S6	S1.02-21Q3
Styrene	C <sub>6</sub> H <sub>5</sub> -CH=CH <sub>2</sub>	S1, S5, S6	S1.02-21.11.41
Sulfur ,dioxide, aqueous solution	H <sub>2</sub> SO <sub>3</sub>	A8	S1.00
Sulfuric acid, pure , 98% , Cold	H <sub>2</sub> SO <sub>4</sub>	A8	S1.00
Sulfuric acid, pure , 98% , 70 °C	H <sub>2</sub> SO <sub>4</sub>	A8	S1.00, S1.02-21.11.41
Sour Water		D1	D1.11 21.64(63.41.42)Q3
Toluene (methibenzene)	C <sub>6</sub> H <sub>5</sub> -CH <sub>3</sub>	S5, S6	S1.02-21Q3
Water: Boiler feed water < 175°C	H <sub>2</sub> O	I1, S5	S1.00
Water: Condensate	H <sub>2</sub> O	I1, I2, S1	S1.00
Water: Condensate (not boiler)	H <sub>2</sub> O	S6	S1.00
Water: Cooling water	H <sub>2</sub> O	I1, I2, S1	S1.00
Water: Seawater with sand	H <sub>2</sub> O	A8, D1	S1.04-61, S1.08
Xylene	H <sub>2</sub> O	S5, S6	D1.11 21.64(63.41.42)Q3

## Basic Formula

### Determination of the electromotor power

In pump applications, selection of the minimum name plate power ( $P_N$ ) of an electric motor depends to various parameters. ASK set a methodology to determine minimum  $P_N$  for pumping applications.

$$P_N = P_{BHP} \times (F_S \times F_A \times F_T) / \eta_T \quad (1)$$

For special conditions other parameters such as air humidity, dusts and discontinuity of operation maybe take into account.

$$P_{BHP} = S.G \times 9.81 \times \text{Capacity} \times \text{Total head} / \text{pump efficiency} \quad (2)$$

$P_N$ : Minimum name plate power (kW)

$P_{BHP}$ : Break horse power for given condition (kW)

$F_S$ : Safety factor or de-rating factor

$F_T$ : Temperature factor

$F_A$ : Altitude factor

$\eta_T$ : efficiency of power transmission components

S.G: Specific gravity of fluid

Capacity (Q) express in m<sup>3</sup>/s

Total heads of pump express in meters

Pump efficiency express in 0 to 1

$F_S$  determine from table 1:

$P_{BHP}$ (kW)	$P_{BHP}$ (hp)	$F_S$
≤ 22	≤ 30	1.25
22 to 55	30 to 75	1.15
> 55	> 75	1.1

$F_T$  determine from table 2:

$F_T$	Ambient temperature (°C)				
	≤ 40	45	50	55	60
	1.00	1.04	1.08	1.15	1.20

Table 2: Determination of  $F_T$

To determine  $F_A$  use table 3:

$F_A$	Altitude above sea level (m)				
	≤ 1000	1500	2000	3000	4000
	1.00	1.03	1.06	1.16	1.3

Table 3: Determination of  $F_A$

$\eta_T$  may be selected according to table 4:

$\eta_T$	Power transmission component				
	Flexible couplings	Gear boxes spur, helical, bevel	Universal joints	V belt	Closed coupled
	0.95 – 0.97	0.98 – 0.99	0.95 – 0.99	0.90 – 0.94	1.00

Table 4: Determination of  $\eta_T$

If centrifugal pump start at open valve, we should consider end curve power ( $P_{Power\ end}$ ) of the pump:

$$\text{Open valve starting; } P_N < P_{Power\ end} \rightarrow P_N = P_{Power\ end} \quad (3)$$

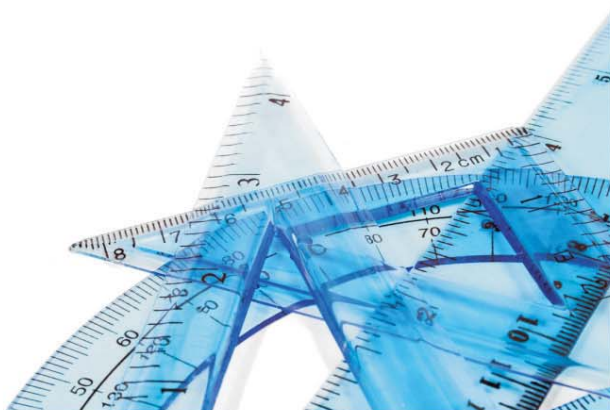
### Selection of the coupling size

The torque load of the coupling must be determined from the output of the driven machine and the coupling speed.

$$\text{Rated coupling load } T_N = 9550 \cdot P_N / n_n \\ (T_N \text{ in Nm; } P_N \text{ in kW; } n_n \text{ in rpm)}$$

The rated coupling load obtained in this way must be multiplied by factors and compared with the rated coupling torque. An ideal but expensive method is to measure the torque characteristic of the coupling.

The rated coupling torque  $T_{KN}$  is the torque which can be transmitted by the coupling over an appropriate period of use if the load is applied to the coupling purely statically at room temperature. Application factors are to express the deviation of the real coupling load from the "ideal" load condition.



### Coupling load in continuous operation

The operating principles of the driving and driven machines are divided into categories and the application factor FB derived from these in accordance with DIN 3990-1.

Application factor FB	Torque characteristic of the driven machine			
Torque characteristic of the driving machine	uniform	uniform	Non uniform	very rough
		with moderate shock loads		
uniform	1.0	1.25	1.5	1.75
uniform with moderate shock loads	1.25	1.5	1.75	2.0
non uniform	1.5	1.75	2.0	2.5

$$\text{Coupling size } T_{KN} \geq T_N \cdot FB$$

## Comprehensive Performance Test



A critical function of any pump manufacturer is the performance testing of their product across the pump's operating region to ensure that it meets design specifications. The ASK Pump Test Facility is designed to provide performance and NPSHR tests in accordance with the latest edition of API 610.

The heart of the ASK Test Facility is its custom designed PLC based automated pump test software (ASK LAB) that allows all system parameters to be monitored and controlled from a central control station. ASK LAB provides precise system control to achieve and maintain specific operating conditions so that data from calibrated precision electronic sensors can be collected and recorded for use in determining pump performance. This state-of-the-art facility utilizes Variable Frequency Drive technology to maintain precise speed control on units through 200 kW @ 400 volt, to achieve a controlled acceleration up to synchronous operating speed on units.

Flow is measured by one of three calibrated magnetic flow meters installed in dedicated metering runs, while calibrated electronic sensors measure pressure at API compliant metering spools connected to the suction and discharge nozzles of the pump.

A vacuum pump is employed to reduce pressure on our 10,000 gallon tank when low NPSH values are required.

### Test Facility Capabilities:

- Test flow up: 1,800 m<sup>3</sup>/hr
- Discharge test pressure up to 26 bar
- 13,000 gallon supply tank
- 400 volt through 200 kW
- Calibrated flow, pressure vibration, temperature, noise and speed measuring equipment
- Variable Frequency Drive for precise speed control through 200 kW @ 400 V
- Calibrated magnetic flow meters 2", 6" and 12" monitor flow through 1800 m<sup>3</sup>/hr
- NPSHR test accomplished through the use of a vacuum pump
- On-site electronic meteorological grade barometer provides data to accurately calculate NPSHR
- Baseplate mounted units can be tested using job motor. If horsepower rating is sufficient for testing with water
- ASK procedure based on API 610 criteria. Standards can be modified to meet specific customer requirements.

These features combined produce the most accurate test possible, the results of which are then compiled into a certified comprehensive report.



### Factory Acceptance Criteria






Performance Test	API 610 / ISO 9906
Mechanical Running Test	API 610
Hydrostatic Test	API 610
Rotor Dynamic Balance	ISO 1940.1
NPSHR Test	ISO 9906

## PRO services



### Product Repair

-  Service Center Repair
-  Turnkey Repair/Installation
-  Field Service
-  Emergency Service






### Reliability Improvement

-  Predictive Condition Monitoring
-  Root Cause Failure Analysis
-  Machine & System Assessment
-  Engineered Upgrades
-  Training

### Optimization of Assets

-  Replacement / Exchange
-  Contract Maintenance



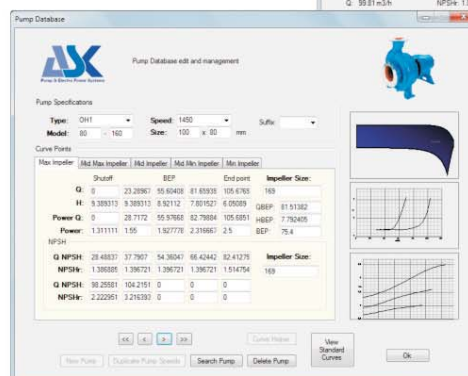
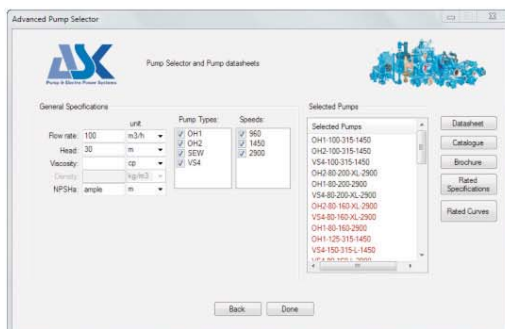
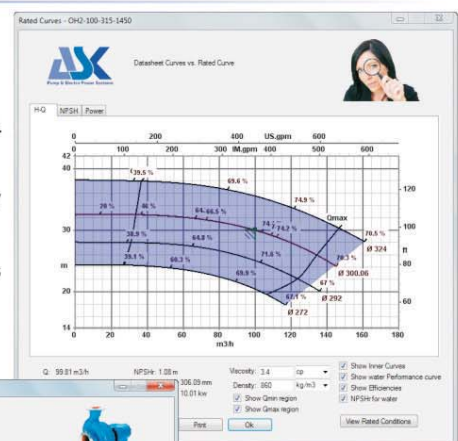
-  All Brands
-  Factory Trained Service Personnel
-  Quality
-  Fast Turnaround
-  Emergency Service
-  ISO and Safety Certified

## ASK PRO

### Smart Pump Selector

#### Powered by API 610

ARYA SEPEHR KAYHAN (ASK) is a leading company for engineering solutions. Our company based on R&D. Engineering, innovation and technologies are cornerstone. With using standard database, ASK Pro would be able to select proper data. By using ASK PRO, you would be able to select appropriate pumps which are completely accordance with API 610. ASK Pro v2.0 programmed accurately and it is an intelligent pump selector which has used innovative algorithms.



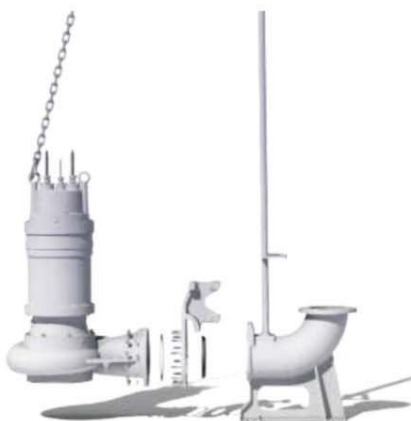


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OH 2 Series

## A Leader in Engineered Pump Package Solutions

### ASK Family of Pumps



Submersible Sewage Pump  
SEW Series



Single Stage Vertical In-Line  
Centrifugal Pump  
OH3 Series



Vertically Suspended, Single Stage  
Centrifugal Pump  
VS4 Series



End Suction Horizontal Centrifugal Pump  
Centerline Mounted  
OH2 Series



Rubber Lined Horizontal  
Centrifugal Pump  
OH1/SL series



End Suction Horizontal  
Centrifugal Pump  
Foot Mounted  
OH1 Series

ASK Series	Market Sector	Capacity m3/hr	TDH m	Temperature °C	Pressure barg
OH1	General Industries	1100	95	120	16
OH2	Oil	550	260	400	40
OH3	Gas	550	175	350	40
VS4	Petrochemical	1100	95	150	20
OH1/SL	Mining	800	130	85	20
SEW	Water and Waste water	1800	95	70	16

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PUMP & ELECTRO POWER SYSTEMS

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**Series**