

NGK

**CORROSION
RESISTANT PUMPS**

NGK utilizes its extensive technologies and experience in the field of corrosion resistance to provide top-grade corrosion resistant pumps.



EB Series ISO Standard PFA Pump

This is a centrifugal pump with a thick Teflon PFA on parts that come in contact with chemical solutions.

- Conforms to ISO 2858
- Capacity range: 0.05-5m³/min
- Head: 10-90 m
- Maximum service temperature: 150°C

Important notes concerning this catalog

- (1) The properties, service range, applications, dimensions, shapes, materials, and other specifications listed in this catalog are representative or standard specifications. Due to the conditions of use or other factor, the selected specifications of the actual product may differ from those listed in the catalog. For details, please contact the nearest sales office.
- (2) In order to ensure safe and correct use of the product, be sure to carefully read the instruction manual and other materials issued by NGK and correctly understand the product characteristics before performing product installation, maintenance, and inspection.
- (3) The information in this catalog may be changed without notice.

NGK CERAMIC PROCESS PUMP

ET SERIES



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CERAMIC PROCESS PUMP

ET SERIES

The ET series of ceramic pumps are process pumps that are trusted at the heart of all kinds of chemical processes worldwide.

The ET series of ceramic pumps are chemical process pumps developed by NGK INSULATORS, LTD. These pumps incorporate tough highly corrosion and wear resistant ceramics for parts in contact with corrosive chemicals.

They conform to International Standards (ISO 2858) and JIS standards, and are designed using unique technologies to meet user expectations to lower maintenance and running costs.

The superb corrosion-resistant type ET pump delivers power at the heart of chemical processes.

NGK manufactured the world's first ceramic pumps in 1931 and now offers an enhanced lineup in the ET series, ranging to high capacities and high heads.

Caution

This product is among the restricted product types listed in Appended Table 1 of the Export Trade Control Order. Export requires export permission based on the Foreign Exchange and Foreign Trade Act and other relevant laws.

CHARACTERISTICS

1 Corrosion Resistance

NGK Chemical Ceramics have been used in casing impellers and other parts in contact with corrosive solutions. These ceramics possess incredibly high resistance to practically all acids and organic solvents.

In addition there is no risk of corrosion caused by chemical penetration, which is an unavoidable downside of resins, or of electrical corrosion, which is frequently seen in titanium and other corrosion resistant metals.

However they cannot be used with alkalis, hydrofluoric acid, or fluorine compounds.

2 Maximum Service Pressure & Temperature Rating

Strength and heat resistance make ceramics the perfect material for the construction of this type of pump. In addition the pump exterior is covered by cast-iron armor, providing an extremely strong structure.

The use of ceramics avoids heat deformation and ensures extended superior performance.

Temperature range: -10 to 120°C

The heat resistance temperature varies depending on the liquid properties. Please consult with us regarding use at temperatures below -10°C or above 120°C.



CHARACTERISTICS

3 Wear Resistance

Since extra hard ceramics are used in the ET series, these pumps have high wear resistance and exhibit outstanding durability even when used for pumping slurry liquids.

Wear Resistance Tests (based on JIS-A5209)

Material	Wear		
	5	10	15mg
NGK Chemical Ceramics			
Former Ceramics			
High Silicon Cast Iron			

Note: In these tests the samples were set level and at 45°, and the weight reduction after abrasive material was dropped from a height of 1.1 m was used to measure the amount of wear. The above results show that the amount of wear with NGK Chemical Ceramics is 50% less than with other materials

Physical Properties of NGK Chemical Ceramics

	Unit	NGK Chemical Ceramics	Former Ceramics
Color		Blue	White
Apparent Specific Gravity		2.50	2.30
Bending Strength	(Unglazed)	122	93
	(Glazed)	137	103
Compressive Strength	MPa	588	490
Coefficient of thermal expansion	10 ⁻⁶ /°C	6.0	5.8
*Toughness	MPa.m ^{1/2}	0.94	0.8

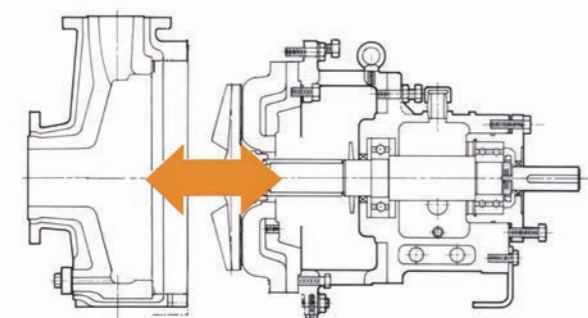
Note: The values here are representative values from test pieces.

*Toughness is a value indicating strength against damage and crack propagation under an impact load. Put simply it is one criteria for how difficult it is to break a product.)

4 Operation

The ET series multi-use pumps conform to international standards (ISO 2858) and new JIS standards. Their compact, modular design makes easy plant design possible.

As the pumps are back pull-out units, parts replacement and other maintenance can be carried out easily without removing piping.



5 Interchangeability

NGK pumps conform to international standards and have fully interchangeable parts. Parts are interchangeable with standard PFA pumps and large diameter Epolite pumps.



6 Pump Performance

Superior pump efficiency can be achieved due to the use of the inherently strong ceramic impeller, resulting in reduced running costs.

7 Reliable Shaft Seal

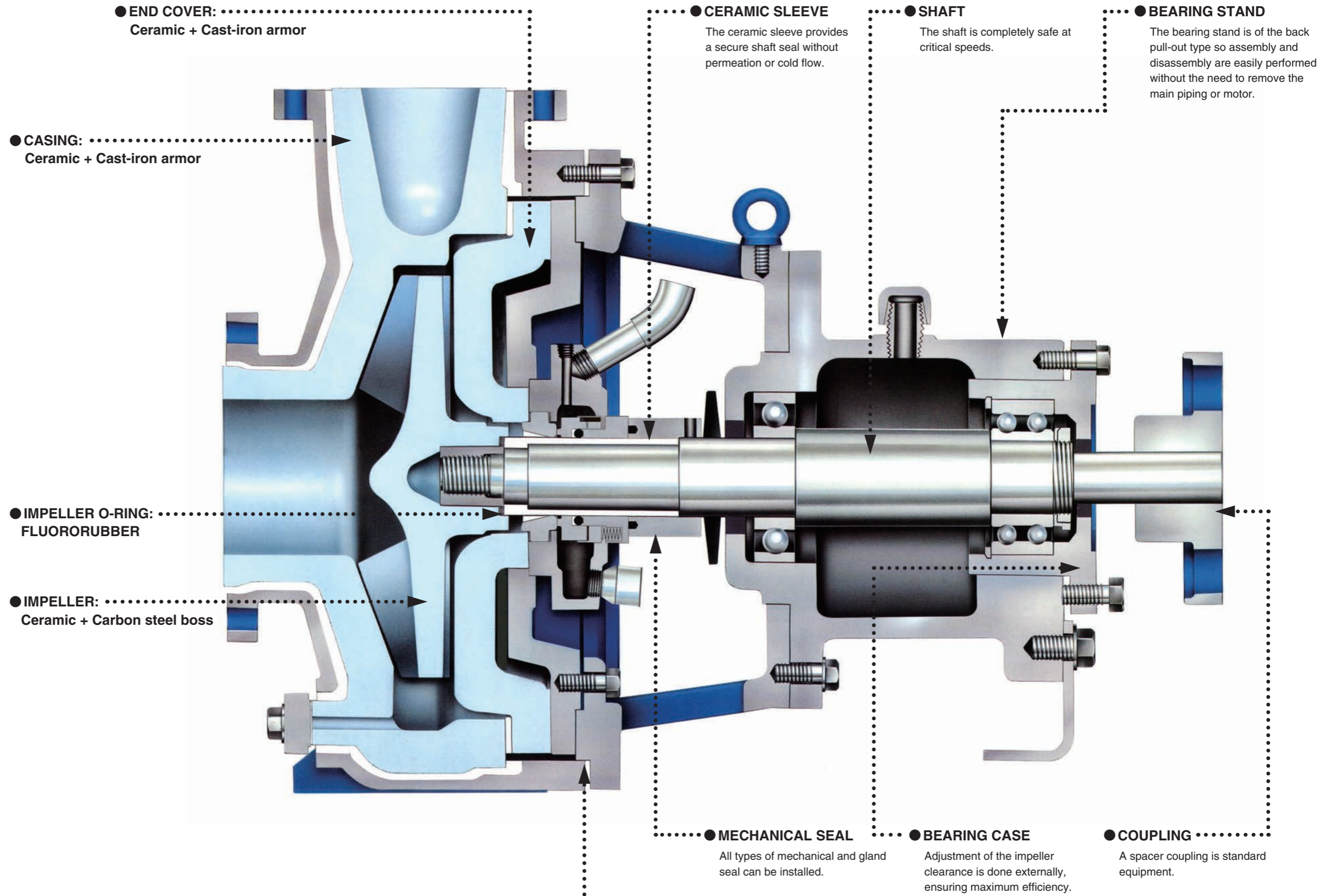
NGK's experience in the field of corrosion resistant and wear resistant pumps has resulted in the development of various types of shaft seals, all possessing superior performance.

Leak-less and trouble-free operation is assured over a long period of time. Maintenance costs are also reduced.

Model Configuration

Model	Suction Diameter	Discharge Diameter	Casing	Impeller	End Cover	Frame Adapter	Bearing Stand
ET-0516	25	25					
ET-1016	50	40					
ET-1021	50	40					
ET-1617	80	50					
ET-1621	80	50					
ET-1026	50	40					
ET-1626	80	50					
ET-2021	100	80					
ET-2026	100	80					
ET-3028	150	125					
ET-3034	150	125					

STRUCTURE



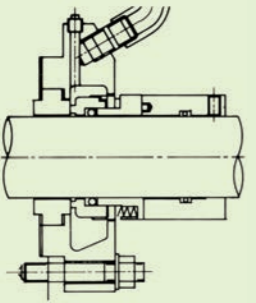
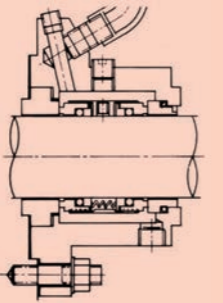
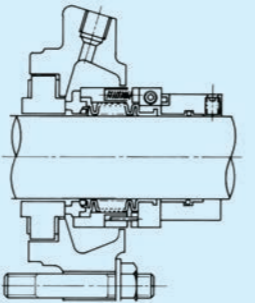
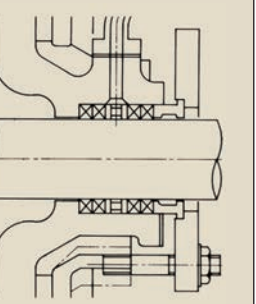
● **PUMP ASSEMBLY**
All parts of the pump that contact corrosive chemicals are assembled by metal fittings on both sides, for easy centering during reassembly.

COMPONENTS	
The following components are supplied as standard equipment.	
Chemflow bellows for the suction and discharge ports	1 set
Spacer coupling and cover	1 set
Anchor bolts.....	1 set
Totally enclosed fan-cooled outdoor type motor.....	1 unit

SHAFT SEALING

NGK has selected and installed the most economical and effective shaft sealing devices for the ET series.

The following list outlines the sealing systems available and the conditions under which their use is recommended (temperature, pressure, corrosiveness of the chemical used, presence of slurry, etc.).

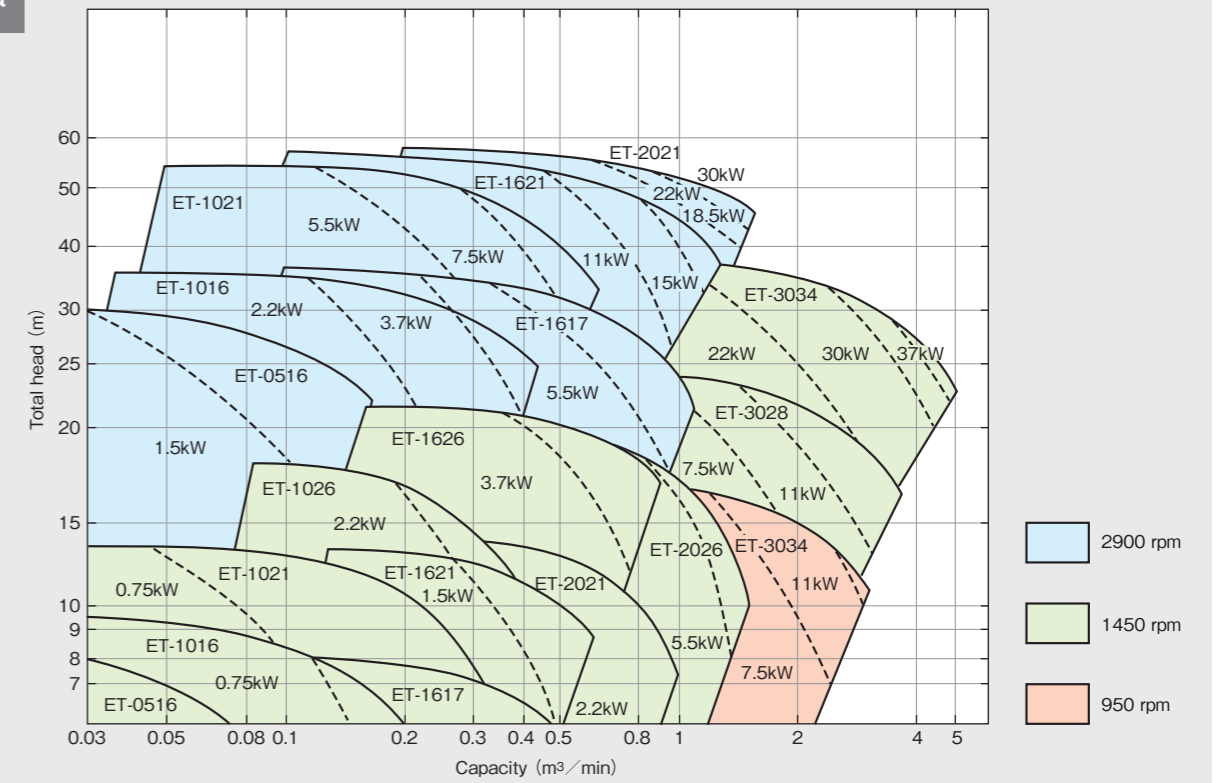
Shaft Seal Systems	Outside balance type mechanical seal	Double type mechanical seal	Bellows type mechanical seal	Gland type seal
Construction				
Stuffing box pressure MPaG	※ 0.3MPa or lower	※ 0.5MPa or lower	※ 0.35MPa or lower	※ 0.1MPa or lower
Operating temperature	※ 120°C or less	※ 120°C or less	※ 120°C or less	※ 100°C or less
Main application	Clear solutions containing no solids (if the solution contains slurry, external flushing is recommended)	Preventing external leakage (water supplied externally)	Clear solutions containing no solids	For solutions containing 15% slurry or less (water supplied externally)

※ In all cases when the stationary seal ring is ceramic and the rotary seal ring is carbon.

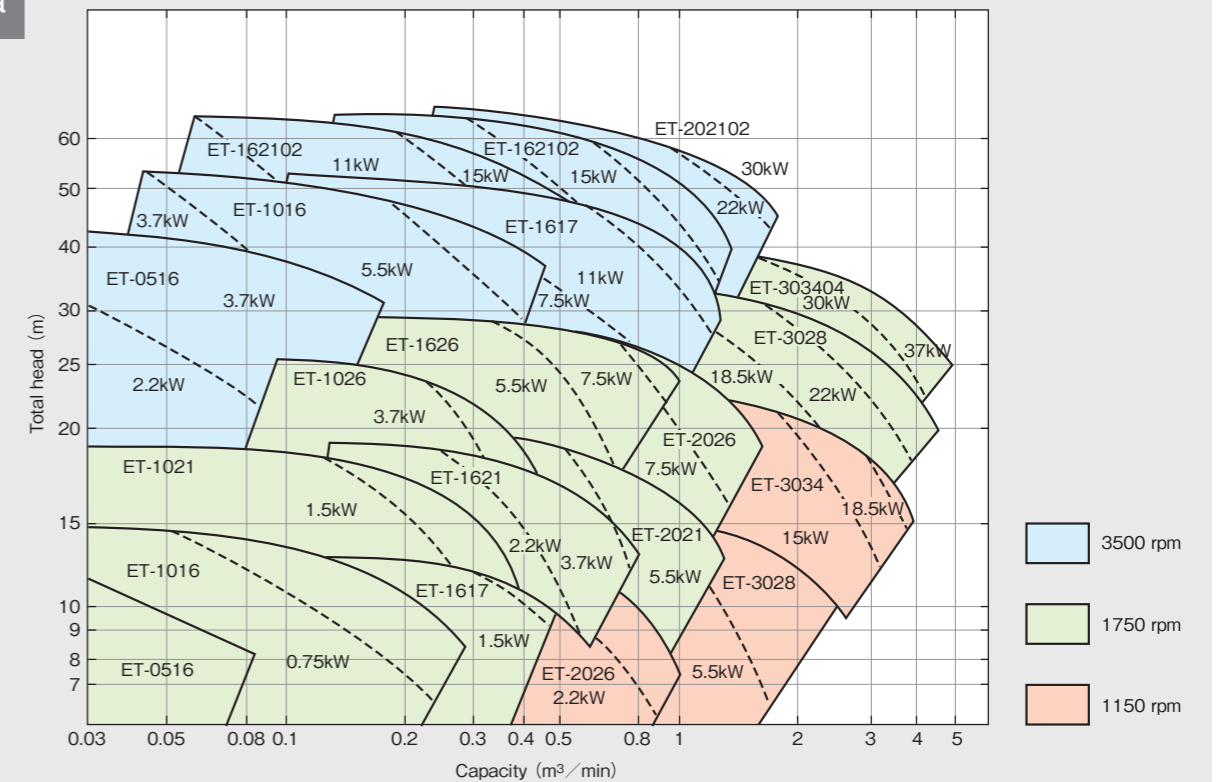
※ The above values change depending upon the specifications.

COMPOSITE PERFORMANCE CURVES

50Hz area



60Hz area

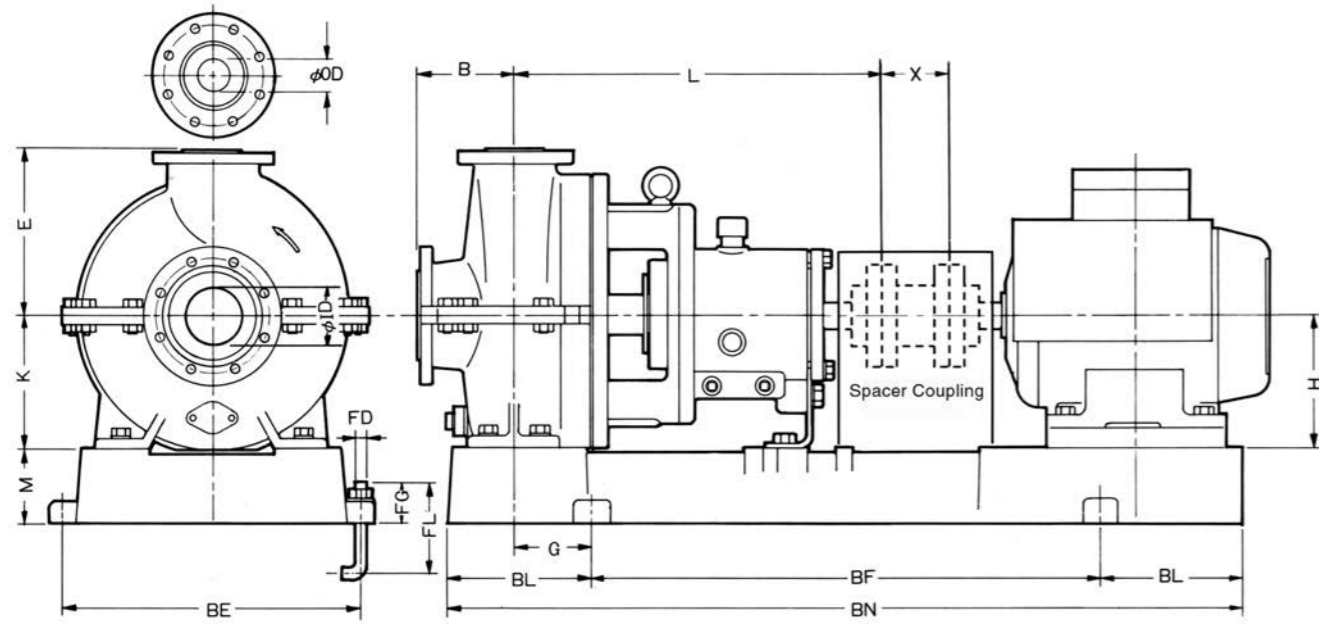


Power shown is measured with a specific gravity of 1.0

Centrifugal Pump Inquiry Checksheet

For pump inquiries, please check the following items and then contact an NGK sales office.

OVERALL DIMENSIONS



Flange standard: JIS 10K flange thin type equivalent.

Symbol Model	Pump (mm)						Spacer coupling X	Common base number for the applicable motor (with spacer coupling)																
	ID	OD	B	L	E	K		80	90L	100L	112M	132S	132M	160M	160L	180M	180L	200M	200L	225S	225M	250S	250M	
ET-0516	25	25			160	132																		
ET-1016		50	40	80																				
ET-1021				385	180		100			#33		#44		#55										
ET-1617		80	50			160																		
ET-1621			100		200																			
ET-1026		50	40							#44														
ET-1626		80	50	125	500	225	180																	
ET-2021			100					140			#55		#66									#77		
ET-2026		100	80	125		250	200																	
ET-3028		150	125	160	600	355	280	180																
ET-3034																								

COMMON BASE DIMENSIONS

(Unit : mm)

Base No.	BN	BL	BF	G	BE	M	FD	FL	FG
#33	910	155	600	90	350	90	M16	242	50
#44	1020	180	660	110	400	90	M20	310	70
#55	1140	200	740	130	440	100	M20	310	70
#66	1270	215	840	130	490	120	M20	310	70
#77	1420	240	940	155	550	160	M24	358	80
※ L-1	1460	Front 230 Rear 290	940	120	460	180	M24	358	60
※ L-2	1600	270	1060	160	460	180	M24	358	60

Note:
In case the height of the motor (H) is greater than that of the pump (K), spacers are inserted under the pump so that the heights match.

The ※ signifies the NGK large diameter pump standard base.

Check item	Check contents	Notes
Owner name		If overseas, enter the destination country name.
Application	Update or Spare or Addition or New or Change from other company or Change from different model	Required
Reason for inquiry		
Existing pump	Yes or No	Required
Serial No. of existing product		If the existing product is an NGK pump, enter the serial No.
Item No.		
Item name		
Pump series selection	ET or EB or EZ	
ET pump: Ceramic pump, EB pump: PFA-lined pump, EZ pump: Ceramic magnetic pump		
Quantity		Required
Liquid pumped		
PH of liquid pumped		Required. Entering "acidic" or "alkali" is also OK.
Liquid temp.	[°C]	Required
Liquid viscosity at O.T.	[mPa-s]	If unknown, a model will be selected for 1 mPa-s.
Liquid specific gravity at O.T.		If unknown, a model will be selected for specific gravity of 1.
Slurry	Yes or No	Required. If slurry is present, 4-pole is recommended.
Slurry name		
Slurry density	[wt%]	If unknown, a model will be selected for 0 wt%.
Slurry particle size	[μm]	
Slurry hardness		
Vapor pressure at O.T.		
Flow rate	[m³/h or m³/min]	Required
Total head	[m]	Required
NPSHa	[m]	
Suction pressure		
Motor supplied by	NGK or Customer	Required
Motor assembled by	NGK or Customer	Required
Frequency	60 Hz or 50 Hz	Required if motor is to be supplied by NGK.
Model	Non-explosion-proof or eG3 or d2G4	Required if motor is to be supplied by NGK.
Outdoor / Indoor	Outdoor or Indoor	Required if motor is to be supplied by NGK.
Voltage	200V or 220V or 400V or 440V or Other	Required if motor is to be supplied by NGK.
High efficiency motor	Required or Not required	Required if motor is to be supplied by NGK.
Special specifications	Packing type provided with threaded joint steel or Packing type leading method with threads for protective tube or Other	If a Packing type provided with threaded joint steel (or packing type leading method with threads for protective tube), specify the cable finished O.D. and wire conduit diameter.
Manufacturer	Toshiba or Other manufacturer	
Shaft seal type	Single seal or Double seal or Gland seal	
Flushing	Necessary (liquid type: Clean water or Other) or Not necessary	If necessary, enter the liquids that can be mixed on the process side.
Material of seal ring: Stationary x Rotary	SiC x SiC or Ceramic x Carbon or Other:	
Mechanical seal O-ring	FKM or Kalrez	
Paint	Standard or Specified	Standard paint: Green Suboid AR, undercoat and topcoat x 1 each, MUNSELL N6.5
If a paint is specified, enter the following.		
Specified paint	Standard paint or Specified:	Required
Paint coats	Under: ___ coats, Intermediate: ___ coats, Top: ___ coats	Required
Specified color	Standard or Specified	Required
Submitted documents		In addition to the following standard submitted documents, enter any other necessary documents.
Standards submitted documents: Test report, production specifications, performance curve, pump outline drawing, pump cross-sectional drawing, shaft seal drawing, drawings of accessories (drawing of motor, etc.)		
Testing		In addition to the following standard inspection items, enter any other necessary tests.
Standard inspection items: Performance test, Visual inspection, Dimensional inspection		
Witnessed test	Required or Not required	
Other		