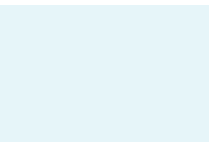


# ***Applications***



P06



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Fans & Blowers  
Vacuum Cleaners  
Floor Polisher  
Washing Machines  
Tumble Dryers  
Kitchen Appliances

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Tough Machinery



**Panasonic**



**SANYO**



**SERVO**

**TOSHIBA**



**OTIS**

**Welling®** | 威靈電機

**SIEMENS**

**Haier**

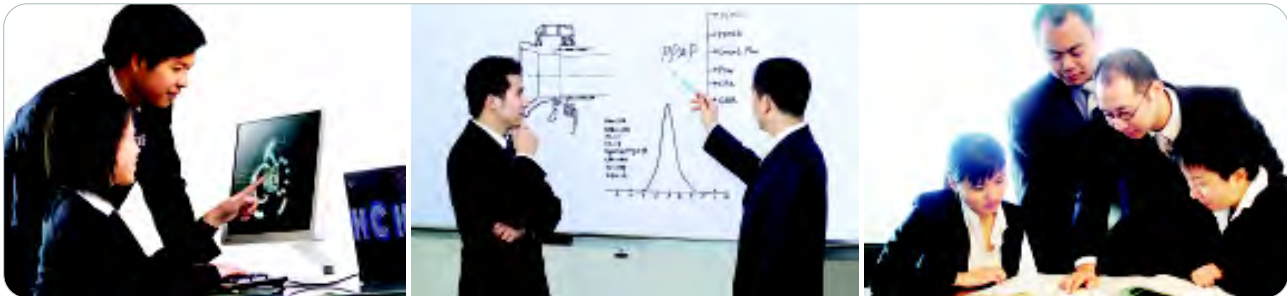


**A.O.SMITH**  
史密斯

**AUX**

**FOTILE** 方太

At HCH, we recognize that the key to customer satisfaction and success is delivering superior, cost-effective bearings and application solutions. Our commitment to continually combine and advance technology and engineering enables us to produce solutions that provide a competitive advantage for our customers. With HCH, you can rely on products and services that are designed to meet the specific demands of your application and specific conditions. We achieve this by applying the latest technology and our accumulated application knowledge and experience doing our part to add customer value and contribute to a more efficient, profitable process.



Lucas-TVS

HONDA



Pioneer



荣事达 Royalstar



Our customers are important to us and we work closely with them to ensure they get all the support they need to enable them to design new products and applications. Currently, more than 500 world leading manufacturers of household appliances, electric motors, pumps, gearboxes, electric power tools, automotive etc like Sanyo, Panasonic, Mitsubishi, Samsung, Hyundai, GE, Midea, AUX, Gree, Fotile has further established relationship with HCH.

At the mean time, with good reputation in continuous stable and quality bearings' supplying, HCH aftermarket sales volume also increased rapidly.



## 1. Household Appliances

Today, we are surrounded by the machines that make our life easier in a way that we can dedicate our free time to ourselves instead, for instance, of washing clothes or dishes manually. Home appliances make people enjoy life more.

Bearings for household electrical appliance motors are a very important market for HCH. Household electrical appliance motors mainly include air conditioner fan motors, range hood fan motors, washing machine motors, vacuum cleaner motors and ceiling fan motors. In line with appliance manufacturers' increasingly stringent requirements, motor manufacturers demand bearings of higher quality and better performance.

HCH understands your requirements of low noise, silent running, long life, high quality, less friction and more energy saving for household appliances. HCH bearings are at the very heart of all the answers. Worldwide availability of HCH products is supported by a comprehensive technical advisory service. In committing itself to excellence in products and performance, HCH puts at the service of household appliance industry its expertise acquired through years of research and commitment and we highly appreciate our customers in household appliances to share their requirements and improve together with HCH.



All over the world, manufacturers of household appliances rely on the products and services of HCH. We have the wide product range in this field. Our experienced application engineers optimize the standard bearing solutions by choosing the bearing dimensions, clearances, lubrication and sealing best suited to the different requirements.





## General requirements for household appliances

### Reduce noise & vibration

Household appliances are usually working in indoor places. Excessive vibration and noise levels associated with household appliances are strongly required to be eliminated. Excessive vibration can cause premature equipment failure. High vibration levels also increase energy consumption. High noise levels, in turn, result in a poorer life environment for personnel and family. HCH offers a range of solutions for exceptionally smooth and quiet bearing operation.



### Energy saving

The cost for energy rises day by day. Reduced energy consumption is of ever increasing importance. Energy consumption can be reduced in several ways. However, the most important for bearings is to reduce the friction inside, by choosing low-friction grease, optimized seals and shields design.

### Environment concerning

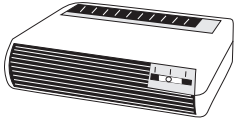
When environmental legislation becomes more stringent, environment protection also comes important of ever, especially in household appliance, which is the closest part to personnel. Even the bearing is an inner part of a household appliance, HCH bearings all pass RoHS to make sure that no single piece is with harm.



### Less weight

In many applications of household appliances, especially when we talk about a portable tool, the reduction of weight is extremely important. As a result of the engineering knowledge application on new materials, advanced calculation tools and integrated solutions, it is now possible to increase the power density. This improvement has a strong impact on weight and size reduction with the highest level of reliability.

## 1.1 Air Conditioners



With fast social development level, consumption level and ideology, air-conditioning equipment is more and more spreading all over the world. For Japan, USA and China, the families that have air conditioners have reached more than 70%. Even in the warm country, Australia, 45% families are currently using air conditioners in their houses.

For the air conditioners, the conditioning process is helped by two fans (one for the cold and the other for the hot circuit) that improve the efficiency of the system. Since the air conditioners are usually placed in bedrooms or sitting rooms, a low noise level is essential.

There are numerous fan motor manufacturers in China and many are affiliated with Chinese, Japanese, American and European air conditioner manufacturers. An estimated 20 to 30 million fan motors are produced per year in China for air conditioners. Worldwide air conditioner fan motor consumption is approximately 50 million per year and 50 percent of these motors are produced in China. HCH are at the leading position in this area. Top 10 brand air conditioners are with HCH bearings inside their fan motors.

### Window and portable air conditioners

Window and portable air conditioners require silent running characteristics. Comparatively, these air conditioners are usually small and easy for carrying. They are less energy consumption and are applied in small rooms. The conditioning process is helped by two fans (one for cold and the other for hot circuit) that improve the efficiency of the system. Blower motors are usually single-phase induction motors (permanent split capacitor or shaded pole).

### Split-system air conditioners

They are used for flat and house conditioning. The hot circuit (condensing unit) is separated from the cold circuit, which is usually placed in an air handler inside the house. The air handler system is commonly placed in the basement or a dedicated room. The low noise requirement here is less demanding. The condensing unit is placed outside the building. For this reason the unit and all the components must be weather resistant.



### HCH bearings for air conditioners

608, 6200, 6201, 6202 bearings with inside diameters ranging from 8mm to 15mm are the main bearings used in air conditioner fan motors. Blower motors are usually single-phase induction motors (permanent split capacitor or shaded pole). HCH can offer deep groove ball bearings with high running accuracy and special bore tolerances if required by the design. Lubrication using special greases gives good performance for noise and vibration dampening needs. The internal radial clearance is specially chosen to meet the silent running requirements. Bearings are usually supplied fitted with metal shields but for special applications can be zinc coated. If required, glass fiber reinforced polyamide cages can be offered as well.

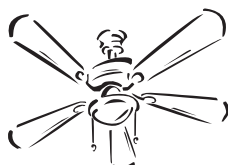
performance for noise and vibration dampening needs. The internal radial clearance is specially chosen to meet the silent running requirements. Bearings are usually supplied fitted with metal shields but for special applications can be zinc coated. If required, glass fiber reinforced polyamide cages can be offered as well.



The quiet running is critical. Serving this industry for long time, HCH has accumulated abundant of knowledge. Moreover, HCH EMQ quality bearings for air conditioners again significantly reducing noise and internal friction compared to the previous standard product. Now these bearings are widely applied as bearing standard of air conditioner in the world leading air conditioner manufacturers.



## 1.2 Fans & Blowers



Bearings in fans and blowers often operate at high speed and relatively light radial loads. They may also operate in inaccessible surroundings. This will reduce uptime and the service life of the fan. From long and genuine experience, HCH has developed a range of excellent solutions for industrial fans and blowers. These solutions improve cost-efficiency and provide trouble-free operation.

For fan and blower industry, compare to air-conditioner and other household appliances, the noise demand is less and rotation speed is usually not exceeding 2000 rpm. But since it is also used indoors, HCH still suggests low noise and vibration bearings should be applied.

### Ceiling fans:

These are used to move air around rooms. This action helps to improve bodily evaporation giving a cooling sensation. Vibration levels need to be kept as low as possible. Maintenance free is also important to cut the cost of repairing.

### Other fans:

Applications here include drive blowers, bathroom ventilators, attic ventilators and fan coils. The requirements for these fans are less restrictive. However, low noise capability and good resistance to environmental conditions (humidity) is important.



The bearings need to conform to the specific technical requirements of high cooling efficiency and long service life.



### HCH bearings for fans

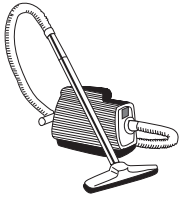
For ceiling fans, two deep groove ball bearings are often used. They are usually metal-shielded. In order to maintain vibration levels within acceptable limits, the internal radial clearance is optimized to suit operating conditions. Bearings are lubricated for life with grease having properties including noise dampening qualities, good humidity and corrosion resistance together with high service life at medium

temperature. The grease fill is dependent upon the application needs.

Since many fan producers inject the grease between the rotators and bearings, open type deep groove ball bearings are also common now. In such application, for the sealed bearings with grease, special attention should be paid to the compatibility between bearing grease and fan grease.

For other domestic fans, HCH can provide metal-shielded deep groove ball bearings, which are grease lubricated for life and meet the needs of low noise and resistance to adverse environmental conditions. For further information please contact your HCH Application Specialist.

## 1.3 Vacuum Cleaners



Vacuum cleaner manufacturers are driven by consumer needs for increased efficiency, more compact and value for money devices. To meet this challenge, producers have looked at ways to:

- > Improve suction through increased motor power.
- > Introduce higher speed motors (above 50 000 rpm).
- > Improve air circulation giving increased ventilation efficiency and more compact machines.
- > Reduce noise levels.
- > Review ways to reduce power consumption.

The effect of the higher power requirement has been an increase in temperature (above 110 °C). Friction torque therefore needs to be as low as possible.

### Wet vacuum cleaner

Since these kinds of vacuum cleaners are working in humid environment, special attention should be paid to ensure the safety from electric attack. Bearings are usually fitted with heavy contact rubber seals incorporating a steel insert. Cages can be made of glass fiber reinforced plastic. Lubrication is often special grease designed for good performance at high speed and temperature together with good resistance to contamination and condensation.



### Dry vacuum cleaner

For dry vacuum cleaners, single row deep groove ball bearings with metal shields are particularly versatile. The shields of bearings are designed with a special labyrinth to improve sealing capability. Lubrication consists of grease, which can meet the stringent requirements of high speed and high temperature conditions. Nylon cages are also available for HCH bearings.



### HCH bearings for vacuum cleaner

Vacuum cleaner motors are commonly used to drive the fan, which produces the air suction. It is supported by two small single row deep groove ball bearings normally with metal shields. They should be suitable for high speed and are robust in operation, requiring little maintenance. Deep raceway grooves and the close conformity between the raceway grooves and the balls enable deep groove ball bearings to

accommodate axial loads in both directions, in addition to radial loads, even at high speeds.

For very high speed, a special design is needed. The internal radial clearance will depend on the design requirements for speed and running temperature. Please contact HCH Application Specialists for further information. HCH will be pleased to find the best solution for your design.

HCH has wide experience in this area. Moreover, HCH offers extra benefits to the manufacturers of vacuum cleaner manufacturers. In close cooperation with our customers' development engineers, we design bearing concepts for new generations of vacuum cleaner motors with the focus on technical and economical optimization.

## 1.4 Floor Polisher



The development of compact motors and cleaning tools has increased the use of floor polishers both in industry and in the household. The cleaning part of these appliances consists of two or three brushes or pads for functions including:

- > Polishing/buffing hardwood floors and other materials.
- > Removing stains from carpets.
- > Stripping floors and applying wax.

The brush and pad rotation is achieved by universal motors. These motors can be placed either in the machining or brush cases. Motor power varies between 0.5-1.5 KW giving a rotor speed of approximately 1000 rpm.



### HCH bearings for rotor movement

The rotor of the universal motor is supported by two single row deep groove ball bearings. To ensure good protection against ingress of dust and other particles whilst cleaning, the bearings need to be fitted with contact rubber seals. The internal radial clearance is optimized to meet the machine design and to achieve a good compromise between noise and temperature rise. The bearings are charged with the optimum quantity of the appropriate grease to ensure good lubrication for the machine's service life.

Improved service life can be achieved for HCH bearings due to:

Improved service life can be achieved for HCH bearings due to:

- > Extended grease life
- > Good performance in air-streams and condensation
- > High wear resistance against particulate contamination (sand, pigments, abrasives, steel, iron oxides etc.)
- > Resistance to electric current

### ● The radial clearances of bearings with electric motor quality

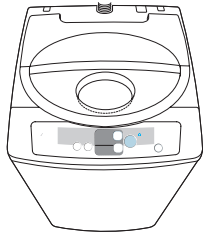
Tolerance in  $\mu\text{m}$ .

| Bore |        |           |        | CM            |               |
|------|--------|-----------|--------|---------------|---------------|
| Over |        | Including |        | Min.          | Max.          |
| mm   | Inch   | mm        | Inch   | $\mu\text{m}$ | $\mu\text{m}$ |
| 10   | 0.3937 | 18        | 0.7087 | 4             | 11            |
| 18   | 0.7087 | 24        | 0.9449 | 5             | 12            |
| 24   | 0.9449 | 30        | 1.1811 | 5             | 12            |
| 30   | 1.1811 | 40        | 1.5748 | 9             | 17            |
| 40   | 1.5748 | 50        | 1.9685 | 9             | 17            |
| 50   | 1.9685 | 65        | 2.5591 | 12            | 22            |



In today's floor polisher industry, demands for lightweight, compactness, cost efficiency and high performance components have steadily increased under the background of environmental problems and competition among manufacturers both in cost and performance. HCH's advanced technology and high capacity motor bearings production can satisfy these demands better.

## 1.5 Washing Machines

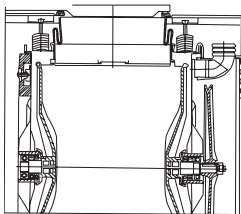


Technological advances and recent environmental demands have led manufacturers to focus their efforts on improving washing and rinsing efficiency whilst lowering power and water consumption. Labels are placed on each appliance to aid consumers in their purchasing decisions. These regulations take into account energy efficiency, noise level, service life and rust free. In addition to the normal features we look for in a washer, there are now new developments:

- >Increasing speeds in the spin cycle (1600 rpm and over) to improve water removal
- >Systems that can electronically control drum speed, position and rotation sense
- >Reduction in machine size and silent running that gives flexibility in room installation placement
- >Electronic power managing systems that regulate water consumption according to laundry load

### Horizontal axis - front loading washing machines

The drum is overhung in respect to the two support single row deep groove ball bearings. The out of balance load is predominantly taken by the bearing closest to the drum. Therefore,, this bearing tends to be larger than that on the pulley side.



### Horizontal axis - top loading washing machines

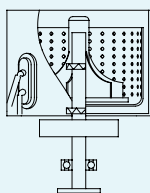
The drum is supported at both sides usually with deep groove ball bearings. The out of balance load is centered between the two support bearings, so the maximum speed of the drum is not as critical as it is for the front-loading design. This means that for the same load size and speed, the bearings used in the top loading design are usually smaller than those used in front loading applications.



### Vertical axis - top loading washing machines

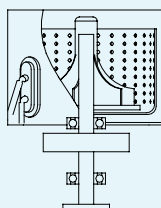
Contrary to horizontal axis washing machines, in vertical axis washing machines, the nature of the load is predominantly axial and the drum is stationary during the washing cycle (only the agitator is in motion) and rotates during the spinning operations.

Arrangement for the vertical axis washing machine



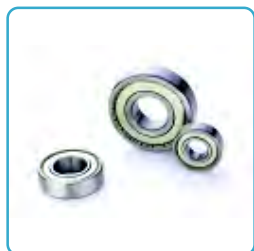
Solution with one deep groove ball bearing

Arrangement for the vertical axis washing machine



Solution with two deep groove ball bearings

Generation mechanism of the HCH bearing material and performance were studied by leading washing machine manufacturers through qualitatively, combining experimental and FEM analysis result. HCH bearings have been fully accepted. Now HCH has been successfully supplying large quantity of deep groove ball bearings to world renowned washing machine manufacturers in Japan, Korea and Europe.



### **HCH deep groove ball bearings for washing machines**

The ball bearings commonly used have metal shields and an internal radial clearance dependent on the press-fit required and material of the housing. For high-speed washers (over 1 000 rpm), HCH offers special greases with extreme pressure additives to withstand the higher unbalanced loads and vibrations. Following are the reasons that why so many world famous washing machine manufacturers choose HCH deep groove ball bearings:

- > Noise dampening capabilities
- > Long life at medium temperatures
- > Good resistance to corrosion and humidity

### **HCH bearings for vertical axis - top loading washing machines**

The ball bearings commonly used have heavy contact seals to prevent the ingress of contaminants from the outside environment. Higher than normal internal radial clearances are suggested in order to compensate for the tight press-fit of the bearing outer ring inside the housing. The application commonly calls for greases with high temperature capability.



## **1.6 Tumble Dryers**

Except for the huge demand of washing machines, tumble dryers are considered critical in the washing system especially in Europe and USA. With the increased attention to environmental pollution, improved efficiency and low public noise of tumble dryers has developed. Requirements of silent running and high efficiency with an expectation of long service life are strongly demanded by the manufacturers. In the tumble dryers, a small electric motor drives a drum while a ventilating fan provides the hot air through the clothes.



HCH has developed a high-load, long-life ball bearings to satisfy the needs of compactness and low cost. With optimized sealing function, grease selection, and material heat treatment, this bearing has the same boundary dimensions as those of a corresponding standard deep groove ball bearing, but with longer life and higher rigidity than the standard ones.



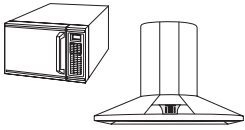
### **HCH bearings for drums in dryers**

The deep groove ball bearings for this application are commonly supplied with metal shields. The working conditions will determine whether standard or special internal radial clearance is needed. Lubrication is often a high temperature grease with good oxidation stability combined with good corrosion resistance in wet conditions.

### **HCH bearings for electric motors in dryers**

Two deep groove ball bearings are mounted to support the motor shaft. Typically the bearings have metal shields. The internal radial clearance is normally standard except where special technical needs arise. The choice of lubricant depends on the application requirements for noise and temperature.

## 1.7 Kitchen Appliances



As one of the most demanding appliances for both clean and contaminated environments, HCH has the solutions to meet the needs of the kitchen appliances. From dishwashers, cooker hoods, electric ovens, to food processors and sliding doors - we have the products to meet the variety of applications found in your industry.

### Dishwashers



The layout and number of spray arms is designed to ensure that every dish comes out sparkly clean. Typically, dishwashers are placed in the kitchen. Therefore noise and vibration requirements are stringent. This is reflected in the newer machines, which have an improved noise level (in many cases below 45 dB).

### Cooker hoods



In every cooker hood, there is an electric motor that has to rotate at high speed and low noise. A fractional single-phase induction motor usually drives the blower. The motor is supported by two single row deep groove ball bearings with special vibration characteristics. They are metal-shielded with optimized internal radial clearance.

### Electric oven



Components for this application usually need to meet the requirements of high temperature and low speed. HCH deep groove ball bearings can be used. Internal radial clearance is larger than normal to accommodate the high temperatures involved. Cages are usually metallic, which are more suitable for very high temperatures.

### Food processors



The main requirements for the bearings used in mixer knives are for food compatibility and resistance to pollution from food processing. HCH also specially designed the internal radial clearance to meet the application needs. HCH environment policy for its bearings further confirm your equipment will leave unnecessary trouble from environment harasses.

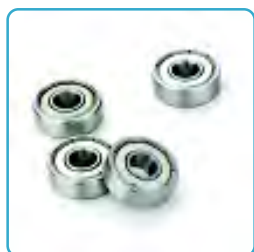
### Sliding doors

Where the space is limited or the owner wants to create a specific effect and a traditional door does not fit then sliding door is used. A sliding door is usually supported by a couple or more (depends on the load) trolleys mounted in a built-in frame. The requirements of a sliding door are low friction, reduced free play and low noise in operation.



A House and especially a kitchen is full of appliances. Think about all the electrical motors, sliding system that are around us, in each of them the HCH knowledge can be applied to make the life easier and better.



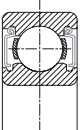
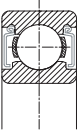
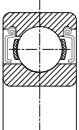
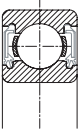
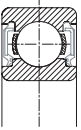
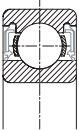
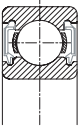
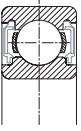
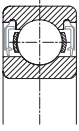


### HCH bearings for kitchen appliances

The requirements for the bearings are similar to those found in other appliances:

- > Low noise and vibration levels
- > Medium and high temperature environment
- > Long service life
- > Maintenance-free components

However, due to various specific applications in kitchen appliances, more requirements are raised. HCH can offer stainless steel shields or rubber seals for deep groove ball bearings of this application. Following lists common type sealing structures applied in HCH:

|                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>"V" sealing groove (inner ring)</b><br><br>Metal shields (ZZ)<br>Non-contact<br>High temperature<br>Very high speed<br>For small and medium size bearings         | <b>"L" sealing groove (inner ring)</b><br><br>Metal shields (ZZ)<br>Non-contact<br>High temperature<br>Very high speed<br>For miniature size bearings       | <b>No sealing groove (inner ring)</b><br><br>Metal shields (ZZ)<br>Non-contact<br>High temperature<br>Vert high speed<br>Applicable due to assembly requirement    |
| <b>"V" sealing groove (inner ring)</b><br><br>Rubber seals (2RS)<br>Multi-lips contact<br>Excellent dust and water proofing<br>For small and medium size bearings   | <b>"L" sealing groove (inner ring)</b><br><br>Rubber seals (2RS)<br>Multi-lips contact<br>Excellent dust and water proofing<br>For miniature size bearings | <b>No sealing groove (inner ring)</b><br><br>Rubber seals (2RS)<br>Tight contact<br>Good dust and water proofing<br>Applicable due to assembly requirement        |
| <b>"V" sealing groove (inner ring)</b><br><br>Rubber seals (2RZ)<br>Non-contact<br>Very high speed<br>Good dust proofing<br>For small and medium size ball bearings | <b>"L" sealing groove (inner ring)</b><br><br>Rubber seals (2RZ)<br>Non-contact<br>Very high speed<br>Good dust proofing<br>For miniature size bearings    | <b>No sealing groove (inner ring)</b><br><br>Rubber seals (2RZ)<br>Non-contact<br>Very high speed<br>Good dust proofing<br>Applicable due to assembly requirement |

- Note:**
- 1) This chart lists double shielded and double sealed bearings, but single shielded (Z) and single sealed (RZ, RS, RW) are also available.
  - 2) The above sealing structures are only for reference. We reserve the right to change specifications and other information included in this catalogue without notice.
  - 3) HCH also could provide bearings with other sealing designs including customized sealing design. Please consult HCH engineers for more information.



Thanks to the high quality standard in manufacturing, which also includes 100% noise and vibration testing, HCH bearings already meet most of the noise requirements placed by electric motor applications for kitchen appliances.