

+ DEEP GROOVE BALL BEARINGS



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As one of the world's leading manufacturers of rolling bearings, linear technology components and steering systems, we can be found on almost every continent – with production facilities, sales offices and technology centres – because our customers appreciate short decision-making channels, prompt deliveries and local service.



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### The NSK company

NSK commenced operations as the first Japanese manufacturer of rolling bearings back in 1916. Ever since, we have been continuously expanding and improving not only our product portfolio but also our range of services for various industrial sectors. In this context, we develop technologies in the fields of rolling bearings, linear systems, components for the automotive industry and mechatronic systems. Our research and production facilities in Europe, Americas and Asia are linked together in a global technology

network. Here we concentrate not only on the development of new technologies, but also on the continuous optimisation of quality – at every process stage.

Among other things, our research activities include product design, simulation applications using a variety of analytical systems and the development of different steels and lubricants for rolling bearings.

## Partnership based on trust – and trust based on quality

Total Quality by NSK: The synergies of our global network of NSK Technology Centres. Just one example of how we meet our requirements for high quality.

NSK is one of the leading companies with a long tradition in patent applications for machine parts. In our worldwide research centres, we not only concentrate on the development of new technologies, but also on the continual

improvement of quality based on the integrated technology platform of tribology, material technology, analysis and mechatronics.

**More about NSK at [www.nskeurope.com](http://www.nskeurope.com) or call us on +44 (0)1636 605123**



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NSK – the World’s leading  
deep groove ball bearing manufacturer







Deep groove ball bearings, the most common form of rolling bearings, are used in many types of applications; particularly those where high speeds and low power loss are required. NSK deep groove ball bearings can handle not only radial forces, but also moderate axial loads in both directions. They are easy to install and can be deployed in a variety of configurations.

#### **Research and development**

At NSK, we invest around 100 million Euros a year in research and development of new bearing technologies, lubricants, materials and surfaces. New products are subjected to strenuous simulation tests on special test banks in order to ensure the highest quality and reliability, even under the harshest of conditions.

#### **Experience from experience**

Our engineers work closely with you. They have hands-on experience of applications and their respective demands and, as such, can advise you on the most profitable choice of deep groove ball bearings from our vast selection. With our profitability programme (AIP), onsite problem diagnosis, installation supervision and technical literature, our commitment goes way beyond just the delivery of the bearing.



#### **Your advantages at a glance:**

- › Investment in research and development
- › Continuous optimisation of quality
- › More than 150,000 types of deep groove ball bearings
- › Reliability even in extreme environments

# NSK quality is to be found in every detail

Because we focus rigorously on quality in raw material choice and in the finishing processes, NSK deep groove ball bearings guarantee strong performance, quiet running and maintenance-free operation for many years. In much the same way that every product is carefully checked several times using automated measuring equipment, each assembled unit undergoes various tests before delivery in order to guarantee the highest quality.



#### **Z-Steel**

- › ultra pure steel that increases a bearing's life by up to 80%

#### **Advanced lubrication technology**

- › for more performance and greater durability

#### **High Grade Balls**

- › quieter and more consistent operation at higher speeds

#### **Raceways**

- › specially honed to minimise running noise
- › better lubricant distribution and longer operating life

#### **Patented seals**

- › provide resistance to contamination in the toughest environments

**100% testing guarantees total product quality.**



### World leader in seal technology

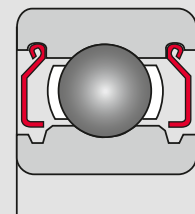
NSK shields and seals offer years of trouble-free operation. The patented labyrinth construction ensures the highest levels of sealing and, due to low torque, ensures low power loss too. The standard sealing material is an environmentally friendly nitrile rubber compound. Other materials are also available, for use in high temperature or corrosive environments, for instance.

Shield and seal comparisons				
	ZZ	VV	DDW	DDU
Dustproofing	Normal	Good	Excellent	Excellent
Waterproofing	Unsuitable	Unsuitable	Normal	Excellent
Torque	Very low	Very low	Low	Normal
Constant revolutions	High	High	Good	Normal
Protection against lubrication leakage	Normal	Good	Excellent	Excellent

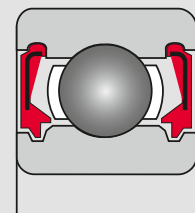
### Different cages for different applications

Within our deep groove ball bearings, there are a number of different cage types to choose from. The most common type is a pressed steel cage. Our close coined cage pockets and tightly controlled clearances reduce friction and ensure even distribution of lubricant. These pressed steel cages also have the advantage of high temperature resistance.

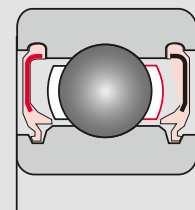
For high-speed applications, NSK offers cages made from advanced engineering plastics. These can help to extend grease life and reduce noise and power loss in the bearing. In addition, plastic cages offer excellent resistance to shock or misalignment.



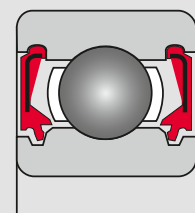
**ZZ**  
Non-contact shield



**VV**  
Non-contact seal



**DDW**  
Light-contact seal



**DDU**  
Contact seal

# Construction, lubrication and materials: all matched to your demands

Through our network of distributors, we work closely with you, analyse your needs and possible problem areas, in order to be able to give you the right answer for efficient production. Our products may be incredibly varied in their specifications, but they all have one thing in common: quality. Measurable quality that we are measured by.

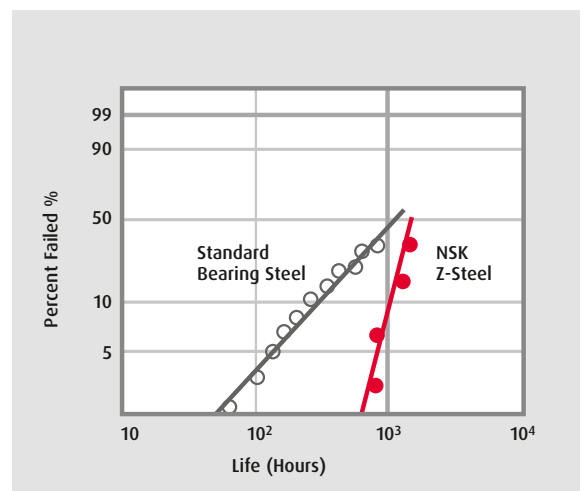
## Advanced lubrication technology – high performance, long operational life

We have developed environmentally-friendly lubricants for various applications:

NSK lubricant	Operating temp (°C)		Typical application	Key features
	MIN.	MAX.		
NS7	- 40	+ 130	motors, ventilators, pumps, compressors	Excelled low torque and low noise performance particularly at low temperature.
NSC	- 30	+ 140	motors, ventilators, pumps, compressors	Superior low noise performance for long periods with higher temperature durability.
ENS	- 40	+ 160	machine accessories, motors	High temperature resistance and speed capability with good resistance to water and contamination.
EA3	- 40	+ 150	vacuum cleaners, motors, electric tools	Superior sealing against contamination with excellent low torque and low noise performance.
EA5	- 40	+ 160	washing machines, pumps, compressors	Excellent water resistance and rust prevention with good performance under high loads.
EA6	- 40	+ 160	induction motors, compressors, ventilators, vacuum cleaners	Superior long life at high temperatures with good wear resistance and rust prevention.

## Z-Steel – uniquely pure

We have been working closely for years with steel makers to refine the necessary processes and conditions for the manufacture of Z-Steel. The result: a vacuum-degassed steel with such low levels of impurities that it can increase a bearing's life by up to 80% over a bearing made of ordinary steel.





## References

### Bearing Range

- R** Inch series
- 60** Metric extra light series
- 62** Metric light series
- 63** Metric medium series
- 68** Metric ultra thin section
- 69** Metric thin section
- BL3** Metric maximum capacity medium series

### Internal Clearance

- C2** Less than normal
- CN** Normal
- CM** Electric motor
- C3** More than normal

### Noise Level

- E** NSK electric motor noise quality
- ER** NSK critical noise quality

### Grease Fill

- L** Light fill
- S** Standard fill
- H** Heavy fill

62

05

T1X

ZZ

NR

C3

E

NS7

S

### Bore Size

- |                  |                   |
|------------------|-------------------|
| <b>Miniature</b> | <b>Normal</b>     |
| <b>1</b> : 1 mm  | <b>00</b> : 10 mm |
| <b>2</b> : 2 mm  | <b>01</b> : 12 mm |
| <b>3</b> : 3 mm  | <b>02</b> : 15 mm |
| Up to 00         | <b>03</b> : 17 mm |
|                  | <b>04</b> : 20 mm |

(Normal bearings: 04 and above multiply by 5 to get bore in mm)

### Shields and Seals

- Blank** Open bearing
- Z** Single metal shield
- ZZ** Double metal shields
- V** Single non-contact seal
- VV** Double non-contact seals
- DW** Single light-contact seal
- DDW** Double light-contact seals
- DU** Single contact seal
- DDU** Double contact seals

### Grease Code

NS7

NSC

ENS

EA3

EA5

EA6

### Cages

- J** Pressed steel cage (normally omitted)
- W** Pressed steel crown cage (miniature only)
- T1X** Polyamide crown cage

### Retention

- blank** Plain outer ring
- N** Snap ring groove in outer ring
- NR** Snap ring groove with snap ring in outer ring

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## Energy Efficient – Kinder to the environment

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With the growing global environmental pressure to reduce emissions, industry is looking more and more at ways to increase efficiency and reduce energy / power consumption. Voluntary EFF efficiency ratings introduced in 1998 are being superseded by efficiency classes defined in IEC 60034-30.





- › **2011:** All single speed, 3-phase induction motors rated 0.75 to 375 kW have to meet IE2 efficiency level
- › **2015:** All 7.5 to 375 kW motors have to meet IE3 efficiency level, or meet IE2 and be equipped with a VSD (Variable Speed Drive)

- › **2017:** Regulations extend to motors for 0.75 - 375 kW

**In bearing terms, this means reducing torque, and NSK have technologies available to achieve this.**

Features	Benefits
Glass reinforced polyamide cage	<ul style="list-style-type: none"> <li>› Reduced friction drag</li> <li>› Increased speed capability</li> <li>› Improved durability</li> <li>› Longer bearing life</li> <li>› Improved noise life</li> <li>› Greater response to misalignment</li> </ul>
Optimised grease fill with polyamide cage	<ul style="list-style-type: none"> <li>› Reduced friction drag</li> </ul>
Optimised raceway curvatures	<ul style="list-style-type: none"> <li>› Reduced contact friction</li> <li>› Reduced operating temperature</li> <li>› Longer grease life</li> </ul>

The above features are designed into our products to meet the specific needs of the user, with the intention of reducing motor power consumption, noise and increasing bearing life.

### Typical bearings for the most common applications

- › Industrial electric motors
- › Fans and blowers
- › Pump motors
- › Domestic appliances
- › Power tools

	6002	6003	6004	6201	6202	6203	6204	6205
Geometry	Low Friction Internal Design							
Cage	Glass Reinforced Polyamide							
Noise	E Noise Class							
Grease	Low Torque Grease							

**NSK have also developed shielded high capacity bearings. In some applications these bearings may enable downsizing, offering potential for component cost reduction and energy saving.**

- › ISO dimensions maintained
- › 17 to 30 mm bore size options available
- › All bearings fitted with non-contact metal shields as standard to prolong life (open type available as an option)
- › Dynamic capacity increased by up to 26%
- › No reduction in limiting speeds
- › Reduced contact pressure results in longer fatigue life and reduced friction
- › Reduced wear prolongs grease life and reduces vibration

# The SPACEA™ series – for service in special environments

Thanks to their advanced materials, lubricants and surface treatment technologies for special operating conditions, NSK SPACEA™ series ball bearings are the perfect choice for applications in operating environments that are too severe for standard bearings. So, even under conditions such as vacuum, clean, corrosive, temperatures up to +400°C, even outer space, these bearings will meet your highest quality and performance standards.

## Focal points in the development of our SPACEA™ series of deep groove ball bearings:



### Highly corrosion-resistant ceramics

The NSK research team has developed highly corrosion-resistant carbide- and oxide-based ceramics for use in cleaning machines.



### Clean environment lubricants

NSK clean room greases set standards in longer operational life, torque reduction and minimal contaminant output.



### Molded-Oil™ bearings

Our patented Molded-Oil™ is an oil-impregnated material with an oil content of at least 50%. In areas where hygiene is an issue, Molded-Oil™ increases bearing life and extends the time between maintenance intervals. The result: trouble-free production and reduced production costs.



### **Bearing solutions for industry – for diverse sectors and different applications**

Whether we are developing new technologies or continually improving the quality of our products, we only have one aim: to offer the best solution to your needs.

#### **Automotive industry**

Whether in a gearbox or alternator, deep groove ball bearings are an important part of any automobile. Thanks to our specially developed materials, heat treatment, sealing and lubricants, NSK deep groove ball bearings offer high performance and reliability. This way, for example, our patented TM seals make it possible for oil to move through gearbox bearings while foreign bodies are kept at bay. And for alternators that suffer early bearing failure due to the effects of vibration and micro slippage, we developed our HAB lubricant, a product that can greatly lengthen operational life.

#### **Electrical machinery**

Our bearing technology is based on our close working relationship with manufacturers. As such, we developed our special EP™ steel as well as EA5 lubricant for washing machines in order to triple the drum's bearing life; with our GR™ range of bearings we've been able to expand the rotational speed of vacuum cleaner motors; and our newly developed KPM fluorine lubricant can improve the performance of copiers at temperatures up to 200°C.

#### **Electric motors**

Our choice of deep groove ball bearings specifically for electric motors is extensive. Amongst these, are bearings with tight CM bearing clearance, or noise class E bearings for quieter operation. Apart from this, we also have special lubricants such as NS7 or NSC for low torque to minimise power losses.

#### **Machinery**

Compressors, pumps, transmissions and ventilators: this is where the right combination of material, seal and lubricant matters. That is why, for instance, we developed our NSA lubricant specifically to help avoid vibration damage in air conditioner bearings.







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