

# Miniature Bearings Australia

[www.minibearings.com](http://www.minibearings.com)

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## Abec Information - Basic

### What is the meaning of ABEC?

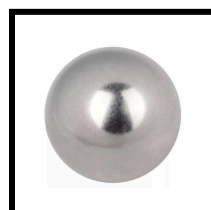
ABEC is an acronym for Annular Bearing Engineering Committee of the AFBMA (Anti-Friction Bearing Manufacturers Association Inc). The ABEC bearing grades are a set of standards for the manufacturing tolerances of bearings. Quality bearing manufacturers throughout the world manufacture to at least ABEC 1 or a regionalised equivalent.



If you were to ask your local bearing supplier for a 608ZZ, a common size used in roller skates, you would almost certainly receive an ABEC 1 bearing.

### Are there any other standards for measuring Bearing precision?

Yes. The other commonly used standard is the ISO standard. ISO is short for International Standards Organisation. There are slight differences between ISO and ABEC, but basically ISO Grade P0 is approximately equal to ABEC 1, ISO P6 approximates ABEC 3, ISO P5 approximates ABEC 5, ISO P4 approximates ABEC 7 and ISO P2 approximates ABEC 9.





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## What is the purpose of precision bearings higher than Abec 1?

Higher precision bearings are designed to allow high precision machinery to operate smoother, more precisely and sometimes at higher speeds than a standard bearing allows. Keeping this in mind, no matter how good your skates are, they are not high precision machinery. A standard ABEC1 608ZZ has a limiting speed of 32,000 RPM with grease lubrication and 38,000 RPM with oil lubrication. The actual speed the bearing will attain without failure depends on the loads and other running conditions, but there is really no need to go into that too heavily here.

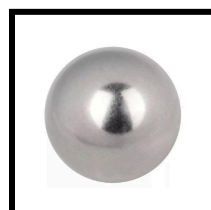


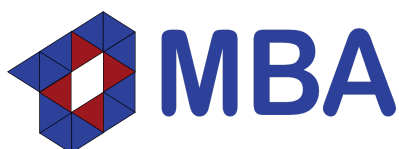
We must stress here that the purpose of higher precision bearings is not *to go faster*, but amongst other things, to allow high precision machinery to operate smoother, more precisely, and at higher speeds than a standard bearing allows.

## What are the grades of bearings available?

From Lowest to Highest:

- ABEC 1 Approximately equal to ISO P0
- ABEC 3 Approximately equal to ISO P6
- ABEC 5 Approximately equal to ISO P5
- ABEC 7 Approximately equal to ISO P4
- ABEC 9 Approximately equal to ISO P2





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## How do the grades differ?

There are a number of factors covered by the ABEC grades, but to give you an idea we will just examine one of these; the eccentricity (out of roundness) of the track in the inner ring. For an ABEC 1 (lowest grade) bearing, the maximum eccentricity allowable is 0.0075 mm (0.000295"). This is quite precise - more than precise enough for skates and skateboards.

The eccentricity allowed for other grades are:



ABEC3: 0.005 mm (0.000197")

ABEC5: 0.0035 mm (0.000138")

ABEC7: 0.0025 mm (0.000098")

ABEC9: 0.0012 mm (0.000047")

If used in high precision, high speed machinery, these tiny variations can make a big difference. The fact is that no matter which of these bearings you use in skates or skateboards, after 5-10 minutes of use the tracks won't just be eccentric, they will become damaged enough to be indistinguishable from one another. Your high priced ABEC 9 bearing might as well be a \$0.50 ungraded cheapie.

## What features of a bearing are covered by the ABEC standards?

The attributes of a bearing that affect its performance are many and varied, but the most important features that would affect the performance in a skating application are as follows. None of these attributes are covered by ABEC standards.





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## Lubricant type and quality

Heavier lubricants such as grease for longer life. Lighter lubricants such as oils for freer running.

## Quality of the bearing steel

Bad quality steels can fail very quickly. Stick with known bearing brands for the best results. Also, remember that bearings that have been reboxed in a pretty "skate brand" box, are not necessarily made by a quality bearing manufacturer.

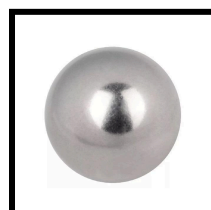
## Internal axial and radial clearance

How much movement there is in both directions when the rings of the bearing are pushed in opposite directions. Too little or too much clearance can be detrimental to bearing performance. You can usually feel this movement with your fingers but you will not be able to determine whether it is within acceptable limits just by feel.

Check the manufacturers specifications on the bearings and try to stay within the MC3 to MC4 range for normal skating applications. The terminology MC3 and MC4 will be recognised by quality miniature bearing suppliers.



A higher internal clearance will allow the bearings to spin more freely. If speed is the goal, you might like to try using MC5 clearance with an oil lubricant. Just be prepared to replace the bearings more often, because oil won't protect the races from damage as well as grease.





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## Manufacturing quality control and cleanliness

Not all bearing manufacturers adhere to the same levels of cleanliness or quality control. As mentioned previously, stick with the well known bearing brands - not necessarily well known skate brands.

## What is a serviceable bearing?

Serviceable, is a term used in the skating industry for bearings with shields that can be removed easily. Removing the shields and relubricating the bearings is not recommended. If the bearing is running well, don't open it. You will most likely allow very small dust particles into the bearing and decrease any future life. If the bearing is not running well, you may get a little more life out of greasing them, but don't expect peak performance from the re-greased bearings.

See also:

[Bearing Precision](#)

[Measuring Small Parts](#)

[Bearing Tolerances for 440C & Chrome Steel](#)

[Bearing Tolerances for 316 Stainless & Plastic](#)

