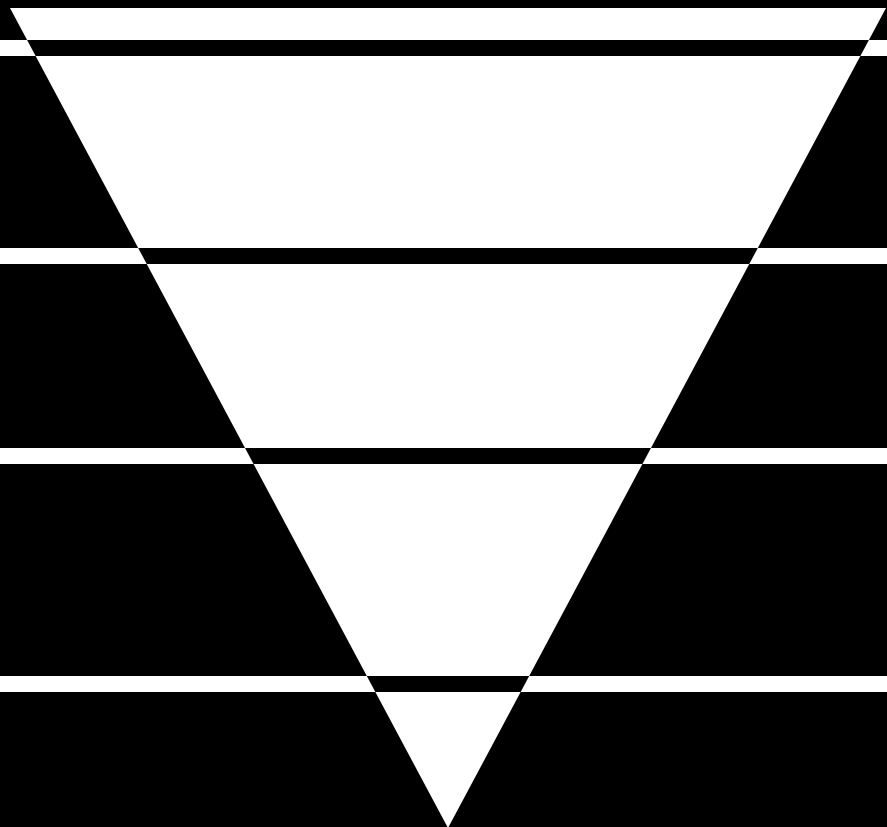
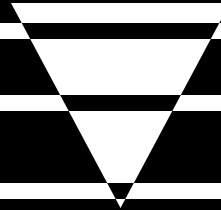
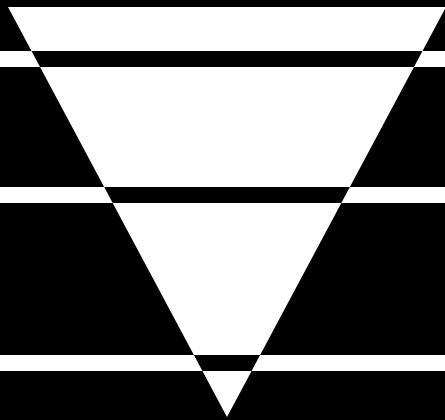


**PROPER PRACTICE FOR THE CLEANING,
MOUNTING, AND REMOVAL OF BEARINGS**



PROPER PRACTICE FOR THE CLEANING, MOUNTING, AND REMOVAL OF BEARINGS

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Many bearing failures are attributable to improper handling and, therefore, can be prevented by using proper handling procedures.

1. Bearing Advantages/Drawbacks

Advantages:

1. Exceptional power conservation
2. Outstanding lubricant efficiency
3. Clean
4. Low cost operation
5. Ensure high machine accuracy
6. Standardized (Common worldwide)
7. Preloadable
8. Can be lubricated with grease

Drawbacks:

1. Rusts easily
2. Sensitive to dirt
3. Requires careful handling

2. Bearing Mounting Precautions

The key point in handling a bearing is to keep the bearing clean.

Penetration of dirt or other contaminants is a major cause of early failure.

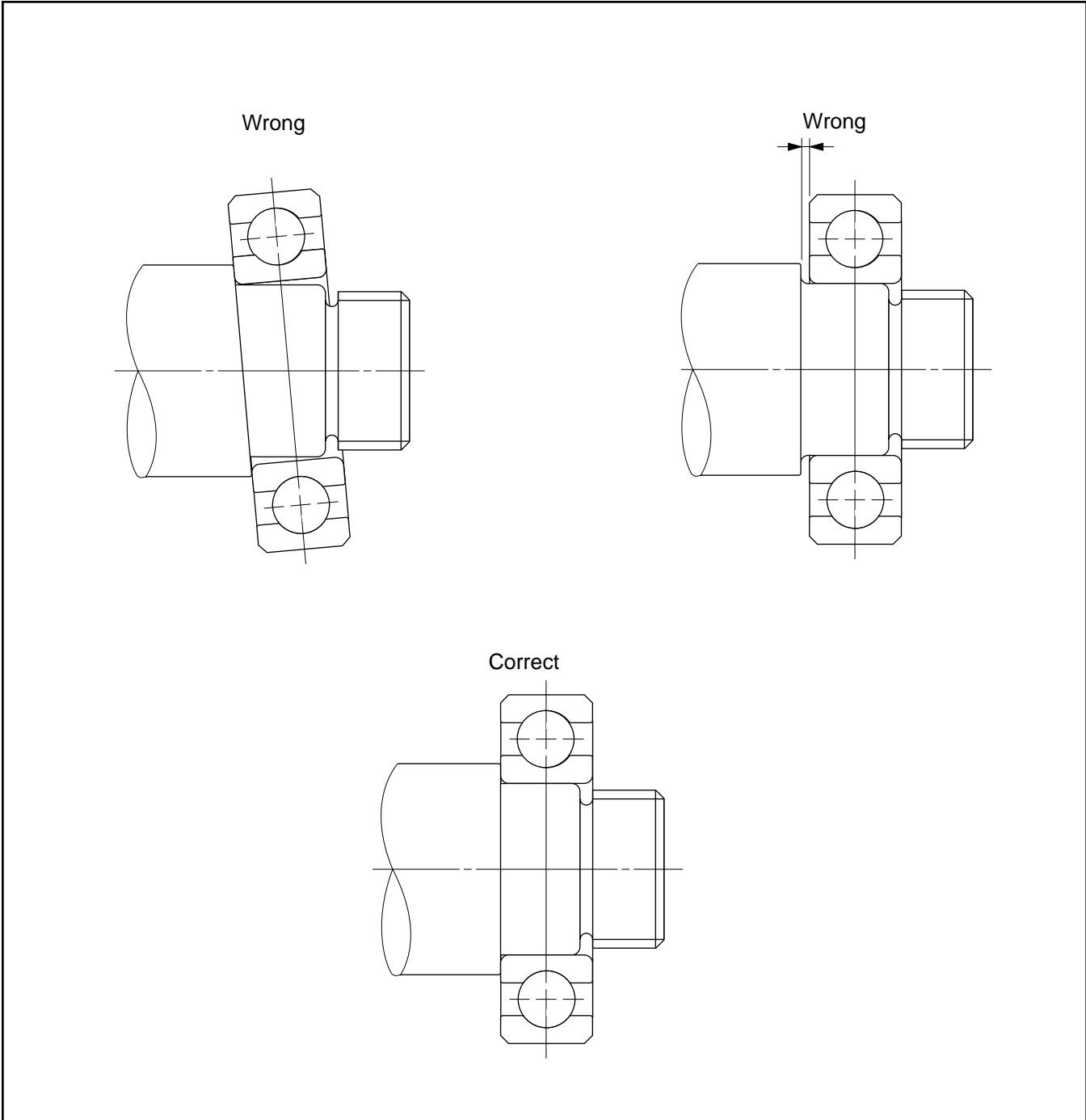
Observe the following precautions:

1. Mount bearings using clean tools in clean work places.
2. Use tools made of wood or light metal to install the bearing. Avoid a tool which will result in chipping of surfaces.
3. Open the bearing packaging just prior to use.
4. Clean hands before handling the bearing.
5. Most bearings may be mounted without removing the rust preventive grease from the bearing.
6. Do not bump or drop bearings. If the geometric precision is damaged, unsatisfactory operation will result.

3. Inspection Before Mounting

Inspect the shaft and the bearing housing to make sure that they have been finished to the dimensions specified in the drawing.

Check also that the corners and right angle of the shaft and bearing housing fit the side of the bearing.

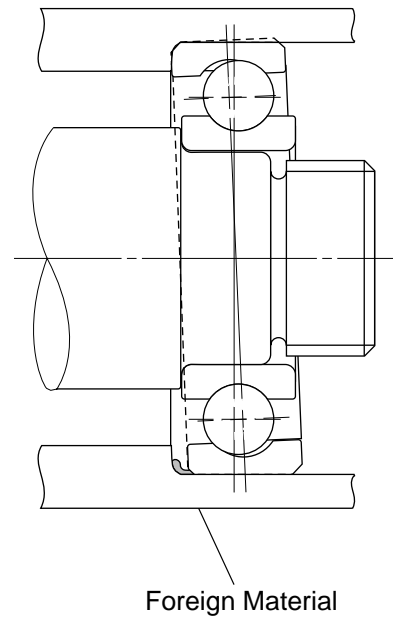
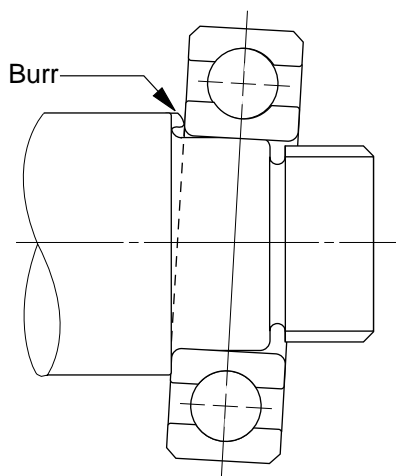


4. Preparations for Mounting

Make sure the fitting surfaces of the shaft and the bearing housing are free from scratches, burrs, dirt, and that no molding sand remains in the housing.

Remove scratches and burrs no matter how small

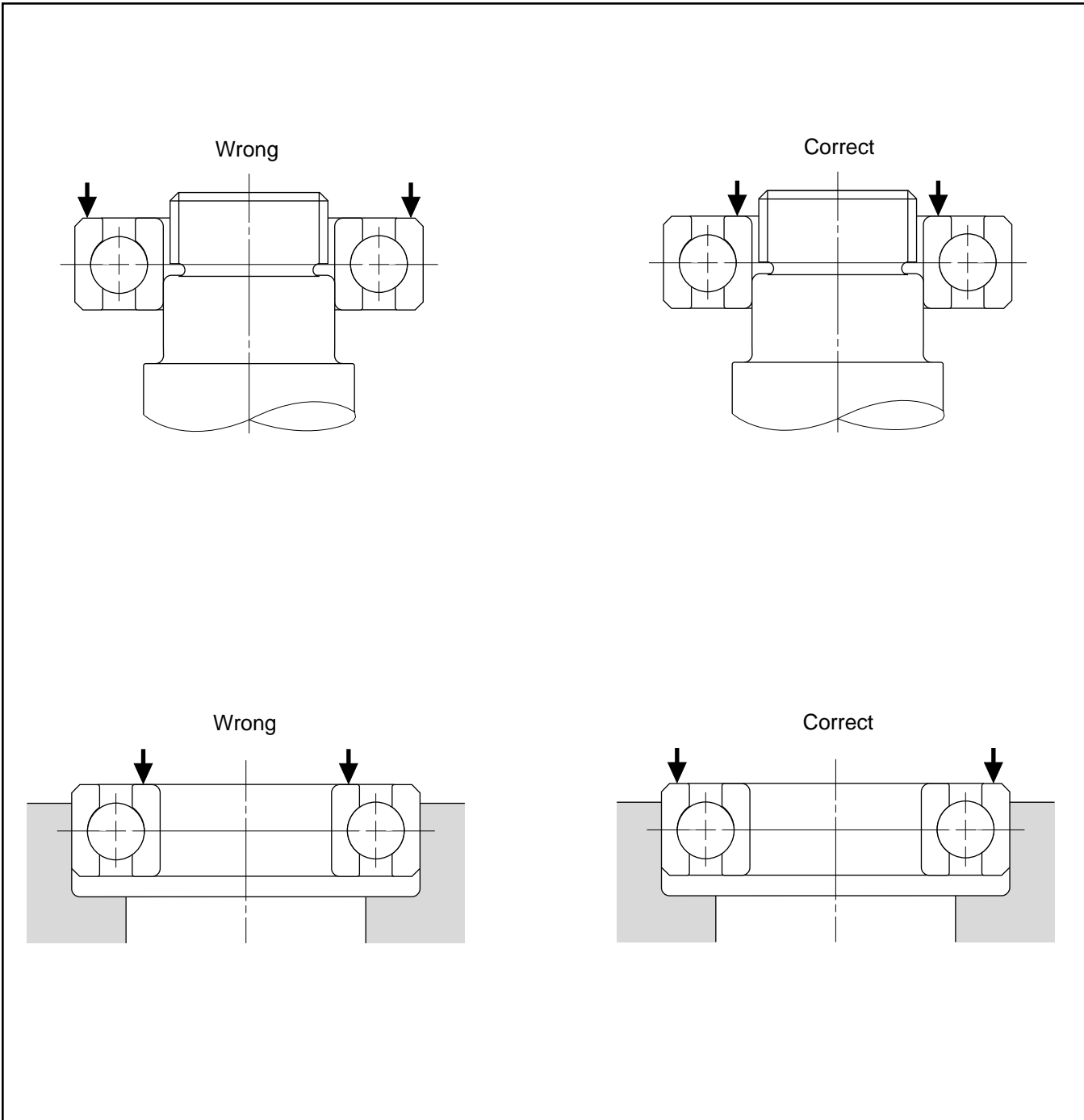
they are, using oilstone or fine sandpaper. Coat the area where the shaft and bearing housing meet with mineral oil to facilitate mounting of the bearing and prevent the area of contact from being scratched.



5. Bearing Mounting-Pressing Surfaces

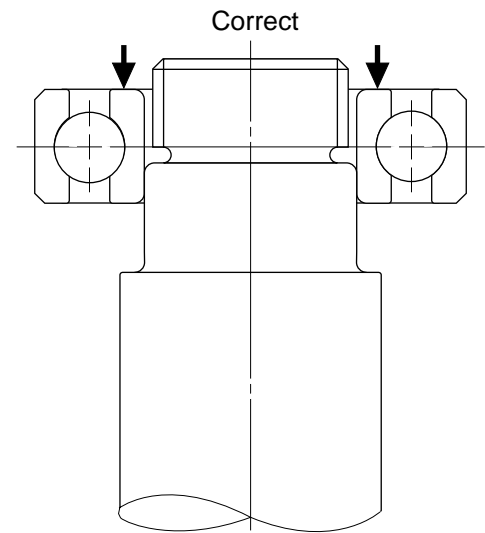
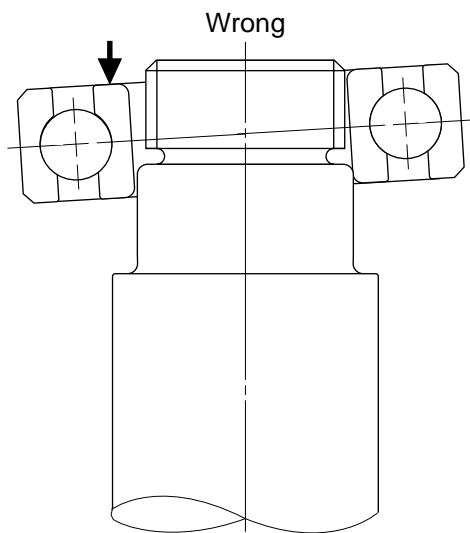
Press the inner ring to mount the bearing on the shaft. Likewise, press the outer ring to mount it in the housing. **DO NOT** press the outer ring to mount the bearing on the shaft, nor the inner ring

to mount in the housing; the raceways may be scratched and noise or early failure will result.



6. Bearing Mounting-Press Method

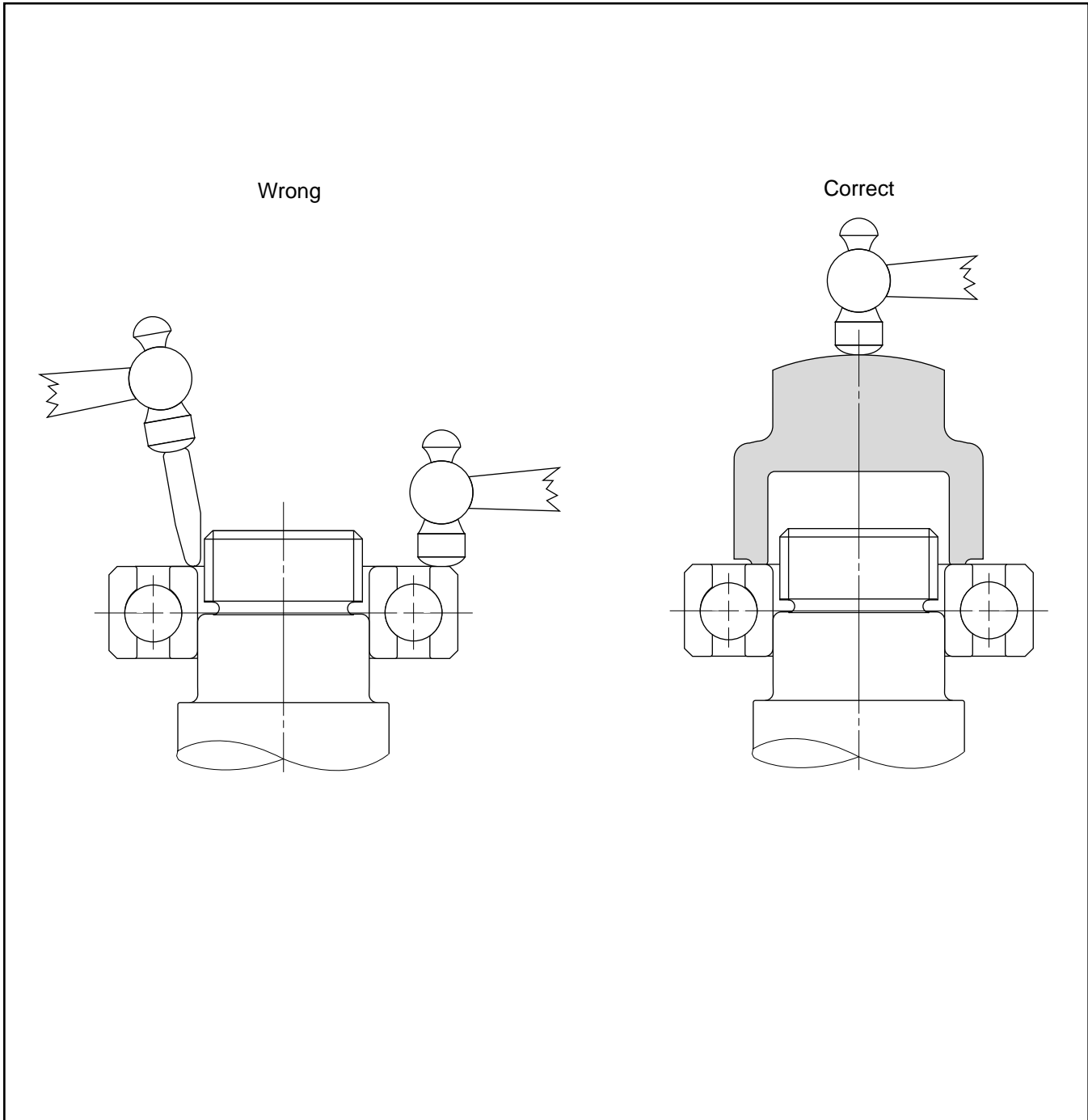
Apply even force to the bearing at a right angle. Avoid driving on only one side as this can damage the bearing. NEVER apply force to the bearing retainer or seal.



7. Mounting with Hammer and Mounting Device

The bearing is frequently mounted with a hammer and mounting device. Do not strike the bearing directly; this can damage the bearing. Hit the

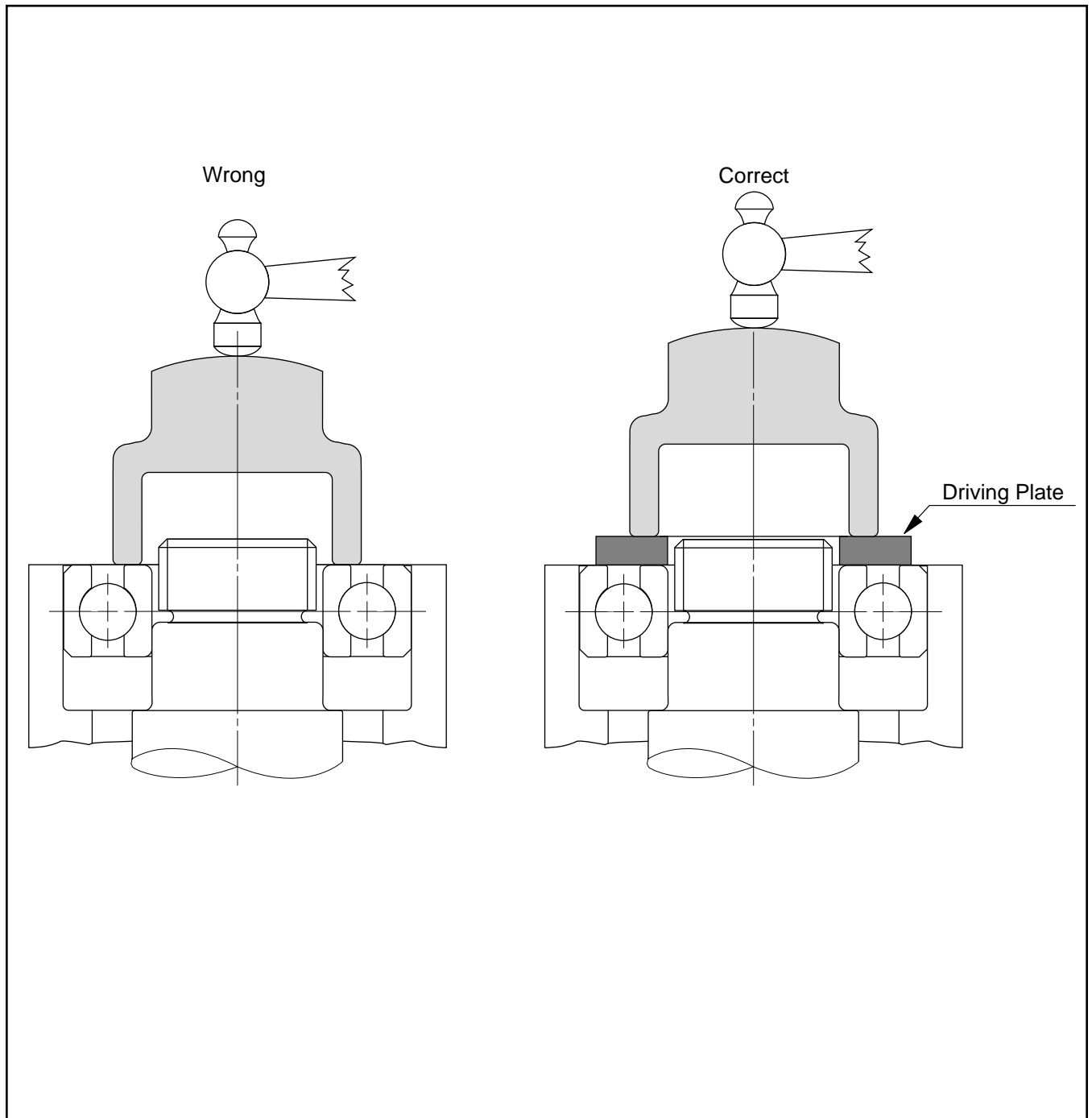
mounting device with a hammer, as illustrated below. Tap the mounting device lightly, using many strokes.



8. Mounting Inner and Outer Rings Together

If both the inner and outer rings must be mounted in an interference fit because of machine construction, then use a driving plate as illustrated below.

The driving force must be applied uniformly to the inner and the outer rings. If force is applied only to the inner ring, then damage to the bearing can result.



9. Temperature Mounting

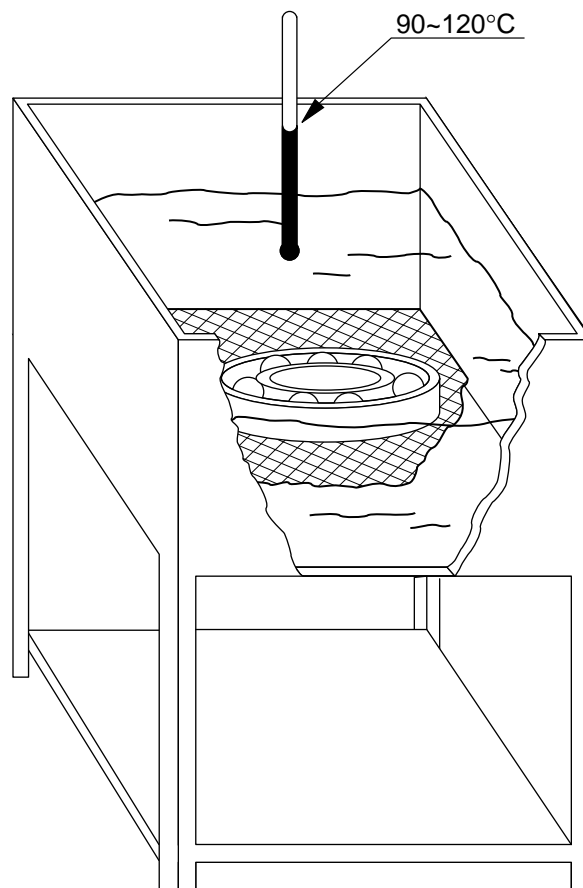
A popular method of mounting bearings to obtain a high interference fit is to heat the bearing in clean mineral oil to between 90° and 120°C. This will expand the bore diameter and facilitate mounting on the shaft.

DO NOT HEAT THE BEARING ABOVE 120°C BECAUSE THIS MAY REDUCE THE HARDNESS OF THE BEARING.

Suspend the bearing in the oil with a wire, or support it on a screen; **DO NOT** place the bearing on the bottom of the container.

When the temperature of the bearing reaches the desired level (120°C or less), mount it rapidly. The bearing will contract when cooled and a gap may occur between the shoulder of the shaft and the side of the bearing.

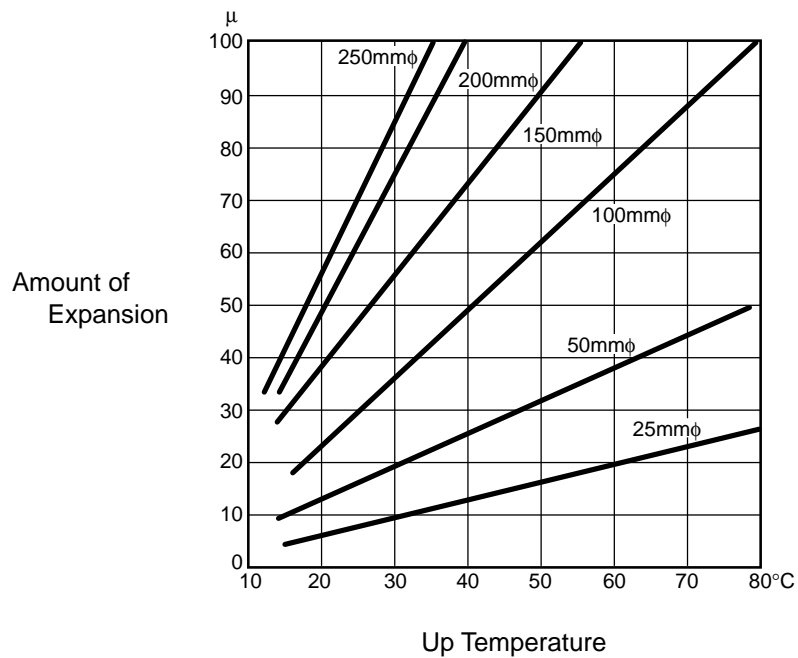
If this should occur, press the bearing against the shoulder using a mounting device.



Heating container

10. Expansion of Bearing

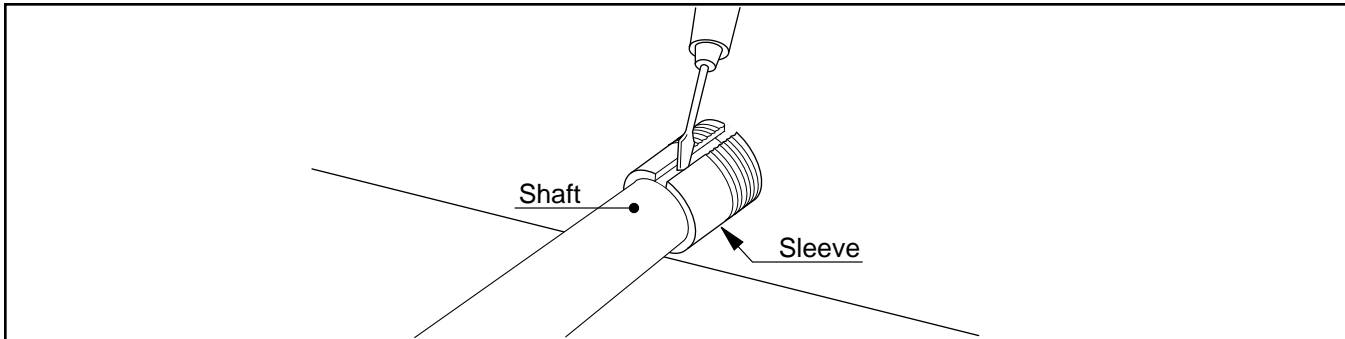
The bearing expands when heated as shown in the diagram below. The coefficient of linear expansion is 1.25×10^{-5} . Keep in mind that thermal expansion is 1μ per 1°C per 100-mm diameter.



11. Sleeve Mounting

In general, the adapter sleeve does not need to be cleaned with a solvent; just wipe off rust preventive grease with a clean cloth before mounting. The sleeve can be easily slipped on a shaft by applying a coat of mineral oil to the bore wall

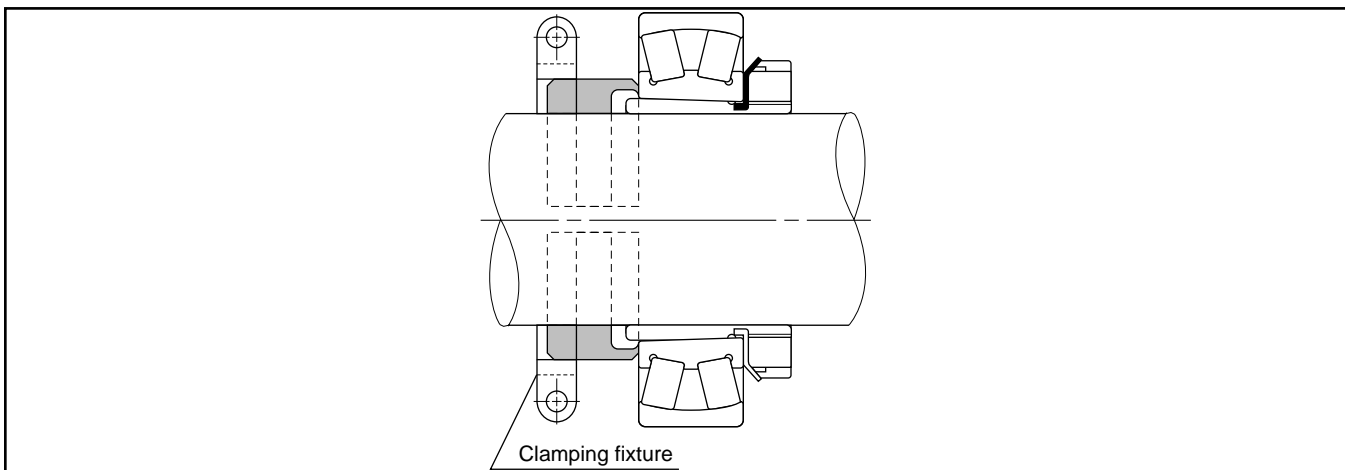
and the outer surface, and opening the sleeve by inserting a screwdriver into the slit. With an adapter assembly, measure the radial clearance of the bearing with a clearance gage to determine the amount of tightening before mounting.



12. Bearing Positioning

A bearing with an adapter assembly is convenient because it can be mounted at a specific longitudinal position on a shaft. However, it is difficult to mount it in an exact position. If the location of the bearing is critical, use a clamping fixture. This will allow the bearing to be mounted easily.

Tighten the nut so that the side of the clamp comes in contact with the bearing correctly. Do not remove the clamp until the bearing has been mounted accurately or the position of the bearing may deviate.



13. Nut Tightening

Tighten the nut with a wrench or a hammer and mounting device, repeatedly checking the radial clearance with a thickness gage. For a bearing with a common clearance under a common load, a rough guide to the amount of tightening is that

the clearance upon mounting completion is 50 to 60% of the clearance before mounting. Do not rotate the nut to align the tongue groove in the nut with the tongue of the washer.

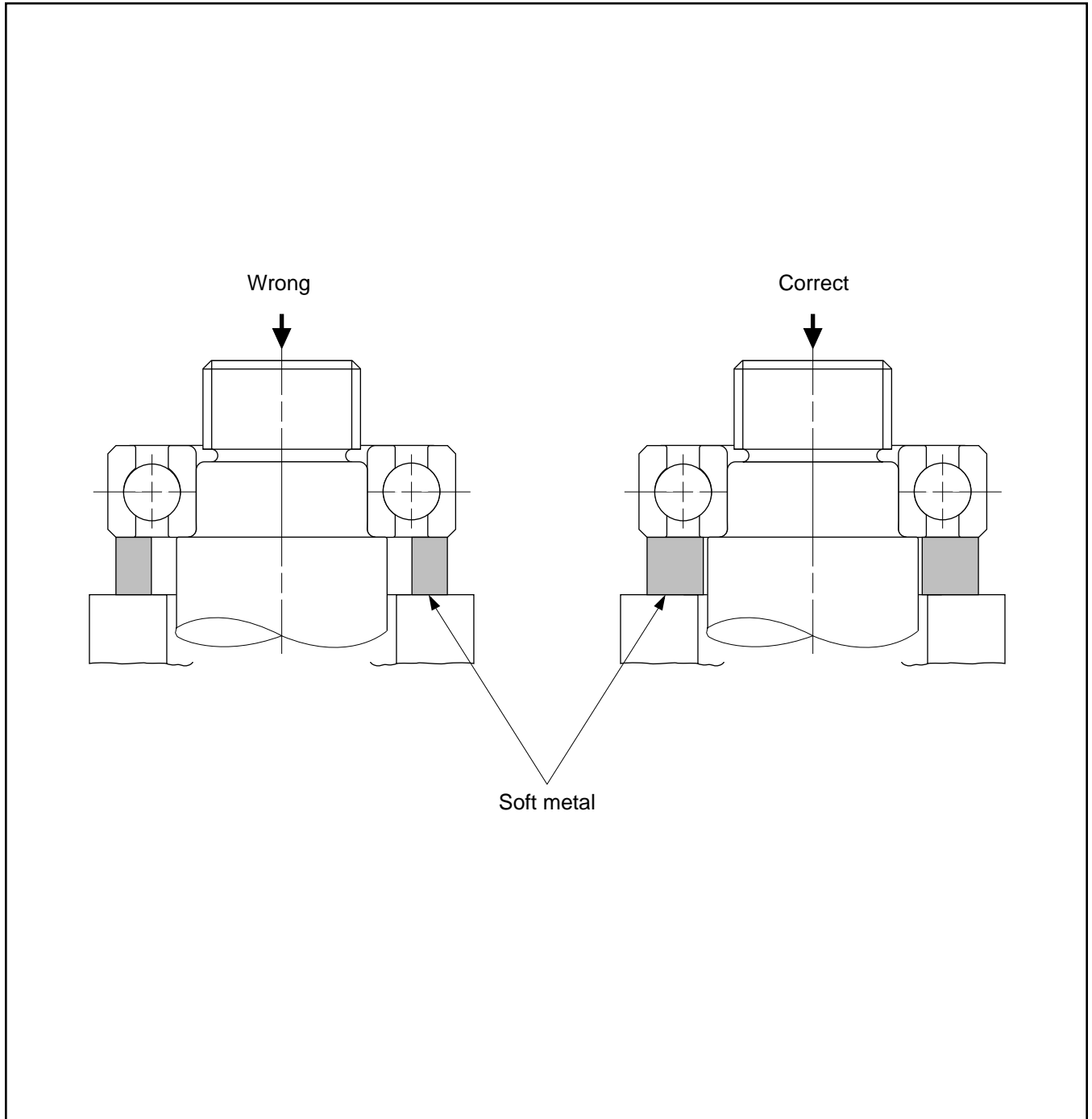
14. Bearing Removal-Precautions

1. Apply the force for removal to the inner ring when removing the bearing from the shaft, and to the outer ring when removing it from the housing.
2. Apply even force around the side of the bearing ring at a right angle.

15. Removal with Hand Press

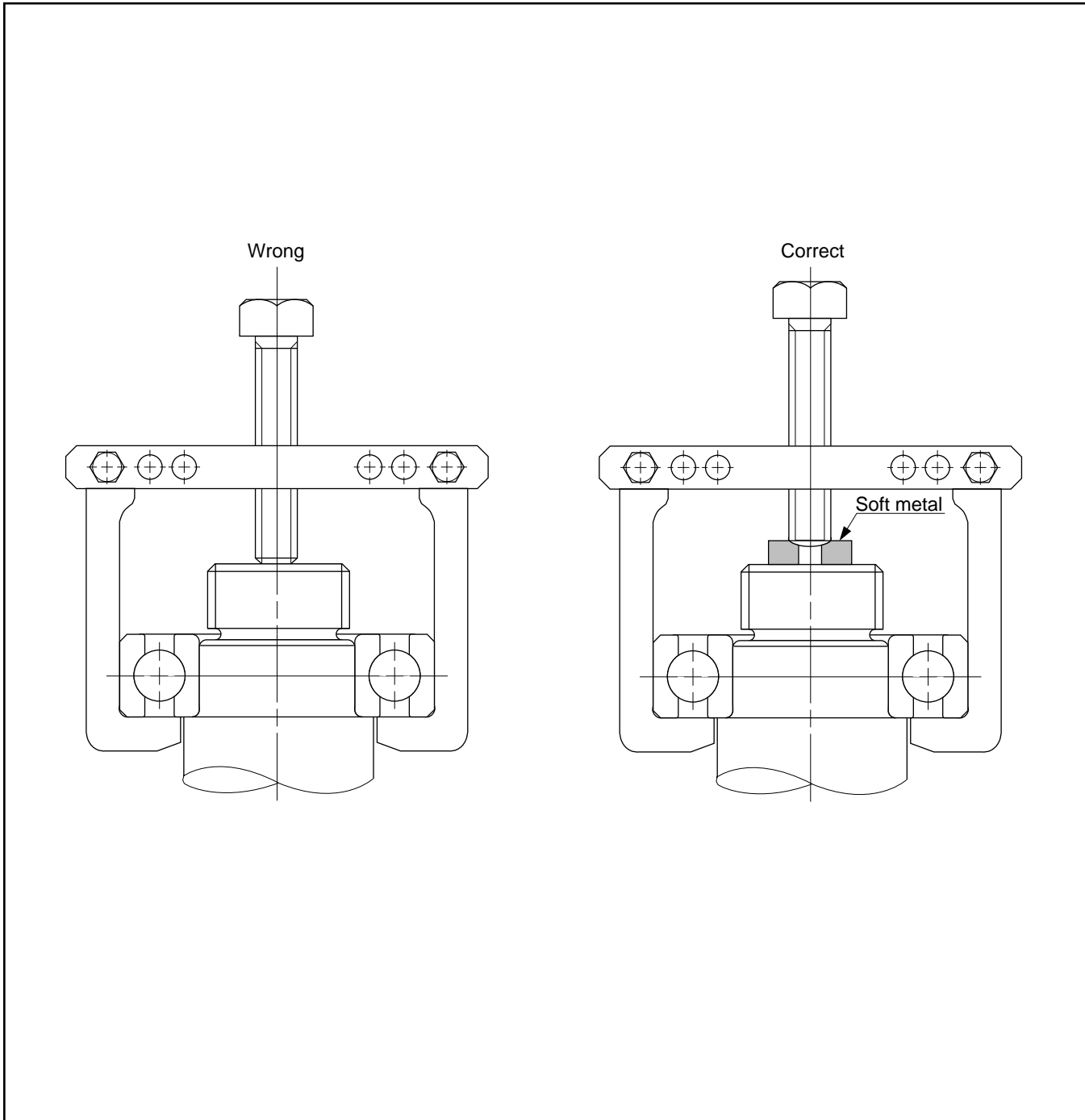
The most appropriate tool for removing a bearing is a hand press. When using the press, be sure that the arbor center and bearing center are aligned; and that the inner ring is supported by a bearing support plate.

If the plate supports the outer ring only, a driving force passes from the outer ring to the inner ring through the balls, causing brinell dents on the outer ring, which will lead to premature failure.



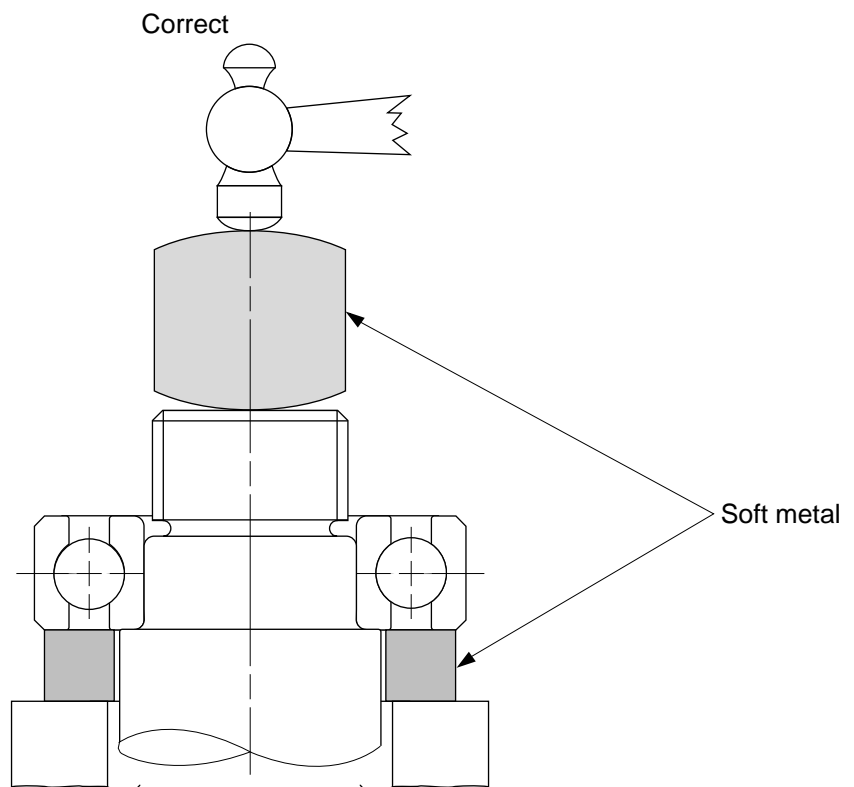
16. Removal Using Bearing Puller and Soft Metal Device

When removing the bearing with a bearing puller, use a piece of soft metal to protect the shaft from being scratched.



17. Removal with Hammer and Soft Metal Protector

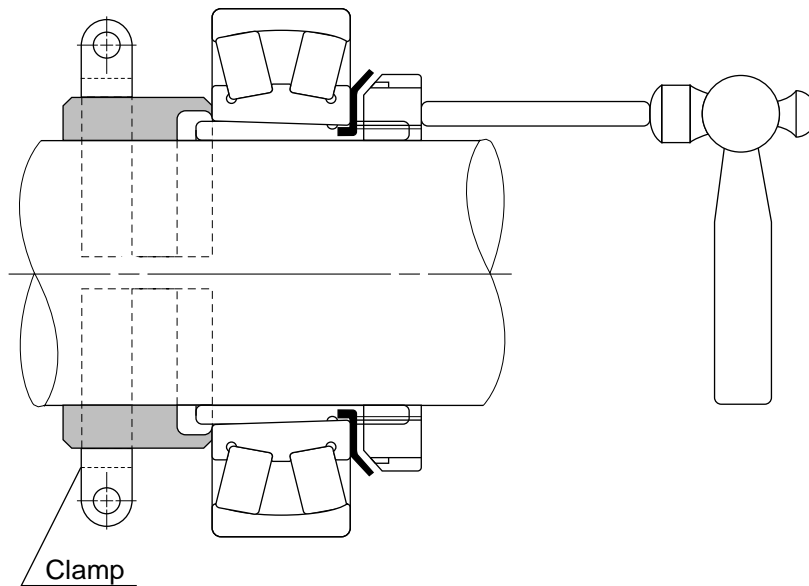
When removing the bearing with a hammer, use a soft metal protector, as illustrated below, to protect the shaft from being damaged.



18. Removal of Bearing Using Adapter Assembly

To remove the bearing with an adapter assembly, attach a clamp to the shaft. Position the clamp in contact with the side of the inner ring, raise the tongue of the washer, and loosen the nut two to three turns. Place a soft metal slug against the side of the nut and strike the slug with a hammer

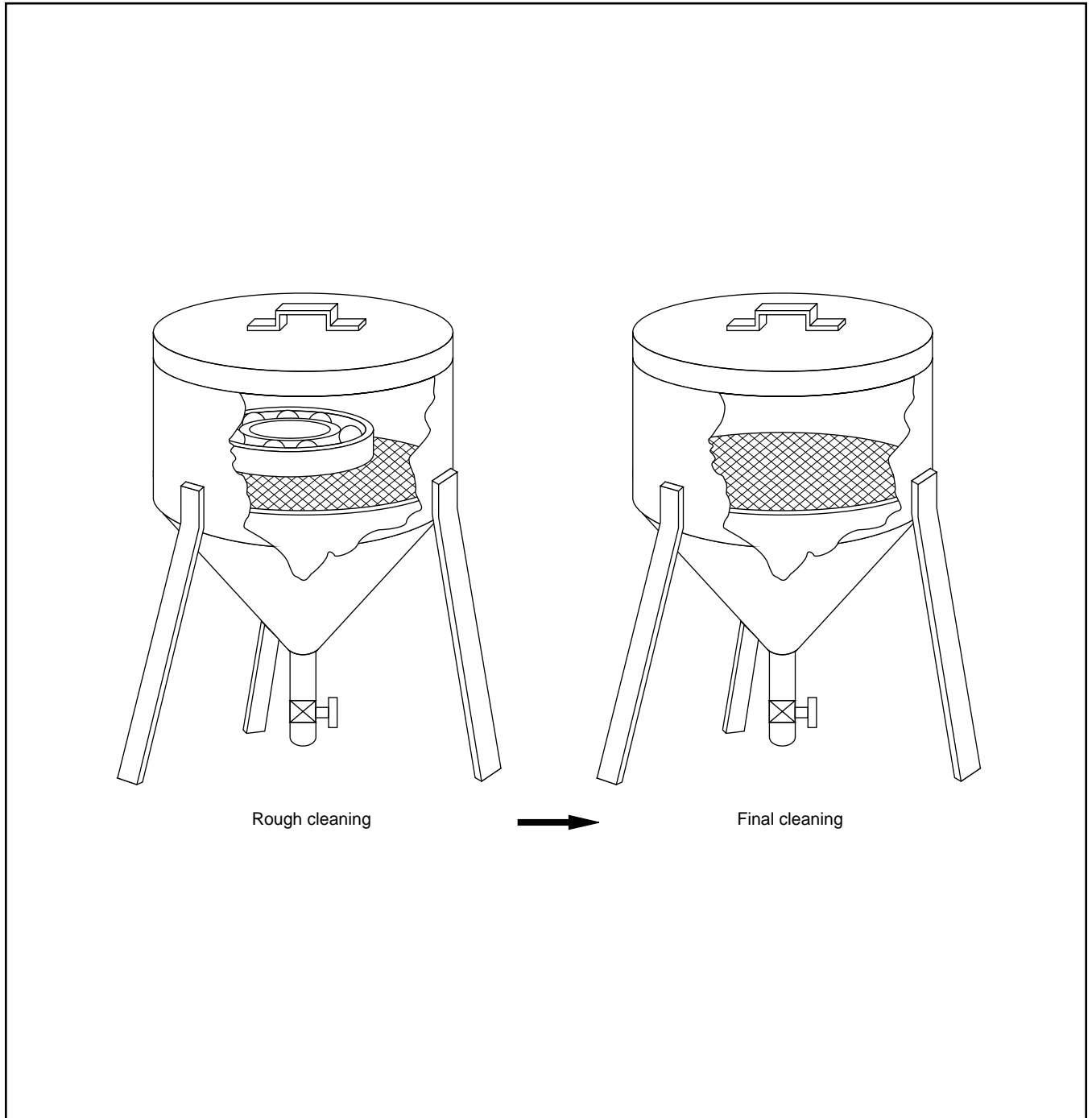
to drive the sleeve along the shaft. If the sleeve moves, the bearing can be removed easily. If the nut is turned back too much and only a few threads come in contact with the sleeve, the threads may be damaged when the slug is hammered.



19. Bearing Cleaning-Containers and Oil

Use separate containers for rough cleaning and final cleaning, and provide a screen to support a bearing in both steps. Containers like those illustrated below are desirable.

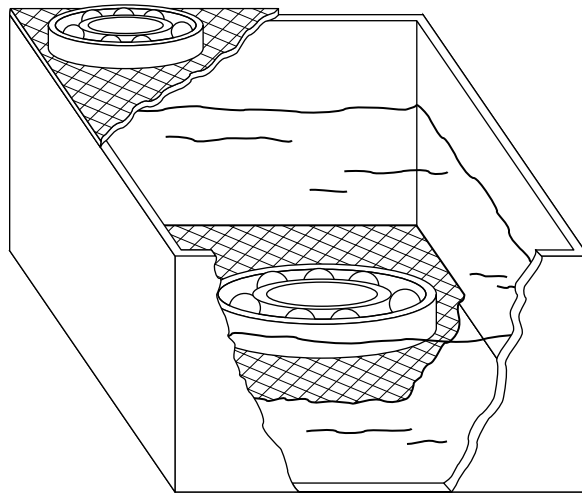
Clean paraffin is appropriate for cleaning bearings. If bearings are very dirty, gasoline may be used. Care should be taken, however, to prevent gasoline from igniting and to prevent rusting after cleaning.



20. Rough Cleaning

Do not revolve the inner or outer rings of a dirty bearing after immersing it in oil because the inside surfaces are easily scratched. Leave it in the oil until dirt or grease separate from the bear-

ing. If the oil is heated it cleans the bearing effectively. However, never heat the oil above 120°C.



21. Final Cleaning

After washing off the dirty grease in the rough cleaning process, place the bearing in the final cleaning container. While the bearing is submerged in clean oil, rotate the inner or outer ring so that the inside of the bearing will also be cleansed.

After cleaning, carefully wipe the bearing with a clean cloth, apply a coat of rust preventive oil to the bearing, and wrap it in rust preventive paper if the bearing will not be used immediately.

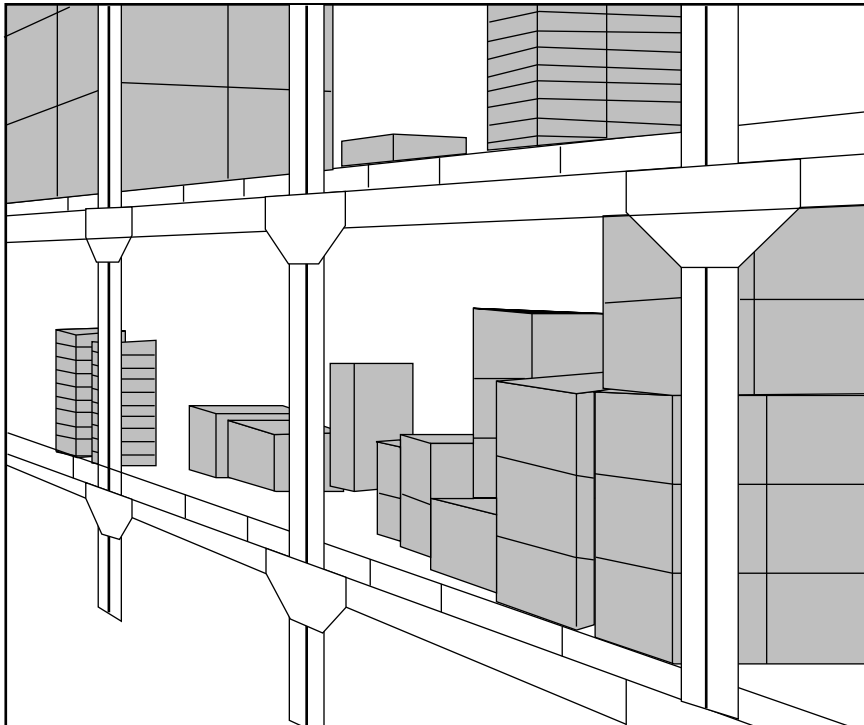
22. Inspection After Cleaning

To check the bearing after cleaning, hold the inner ring horizontally with one hand and spin the

outer ring. If the bearing is faulty, a vibration will be felt in the hand.

23. Storage of Bearings

- Avoid storing bearings in places with high humidity.
- Store bearings in a cool place.
- If bearings come packed in a wooden box, take them out of the wooden box immediately, and store them on a shelf.
- Do not take bearings out of cardboard boxes or protective wrappings.
- Do not stack bearings because the protective anti-rust compound may be squeezed out of bottom bearings.



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