

AAG R-MAX

installation & maintenance



INTRODUCTION

This manual gives the main list of the most important operations to correctly install the AAG bridge bearings.

Under control of the Engineer who designed the bridge, bearings must be installed by expert workers, with precision to meet the bridge and bearing design criteria.

Inappropriate handling, storage and installation will have an adverse effect on the bearing life, usually estimated in more than 50 years (for more details about this matter, read the final chapter of this guide).

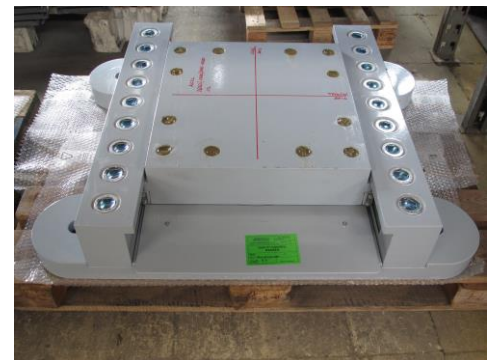
AAG structural bearings are manufactured to close tolerances by skilled technicians working in clean conditions.

To obtain the requisite performance from bearings it is imperative that they are properly handled at the work site and installed with the same care as when they were assembled in the factory.

AAG bearings are clearly identified and marked on the top plate to ensure correct installation. The typeface on the cover or sliding plate gives information on the type, size and number of the bearing.

Moreover, arrows indicate the movement axis and the presetting direction (if applicable).

Every bearing is provided with a steel identification label with all the most important bearing information.



HANDLING AND STORAGE

Care should be taken in storage to prevent contamination and damage to the working surfaces. AAG bearings should be stored in a controlled environment where they are protected from contamination, misuse and excessive moisture.

Robust transportation devices are fitted to all bearings to ensure that the components are maintained in their correct relative positions before and during installation.

The devices are normally finished in red paint.

Unless special devices have been specified, **they should not be used for slinging or suspending the bearings beneath beams.**

Due to unpredictable conditions, which may occur during transportation or handling on site, the alignment and presetting (if applicable) of the assembled bearing should be checked against the drawing.

Do not try to rectify any discrepancies on site.

Bearing too heavy to be lifted by hand should be properly slung using lifting equipment.



PRESETTING

If bearing are required to preset eg. where once only large movements may occur during stressing operations, this should be specified as a requirement and should only be carried out in AAG prior to despatch.

Do not attempt this operation on site.



BEDDING

Bearings must be supported on a flat rigid bed. Steel spreader plates must be machined flat and smooth to mate exactly with the bearings' upper and lower faces. Bearings may also be bedded on epoxy or cement mortar or by dry packing. Grout or mortar should be applied in accordance with the manufacturers instructions, to a minimum thickness of 25 mm (unless agreed otherwise).

Whichever system is preferred for the particular structure it is of extreme importance that the final bedding is free from high or hard spot, shrinkage, voids, etc..

Before casting the bearing in concrete, it should be adjusted to the correct position by the means of for wedges placed under the bearing bottom plate at four points. The bearing should be level and stable with 30-40 mm distance to the substructure.

Unless there is a specific design requirement, the planar surfaces must be installed in horizontal plane. The correct installation of the bearings is vital for the bearings performance. Costly repairs become necessary all too often due to inadequate specification or poor site supervision. The bearings should not be loaded until the bedding mortar has cured.

Special care must be taken to ensure that guided bearings are correctly oriented.



FIXING SPHERICAL BEARING

Bearings are normally bedded in a cementitious or chemical resin mortar. Cast-in anchors can be prefixed but it is generally found simpler to leave pockets in the abutment shelf or column top. The bearing complete with anchors can then be lowered onto a correctly levelled timber jig and the anchors grouted in position.

When the mortar in the anchors has set, the timber can be removed and the bearing grouted up.

The red temporary fixings must be removed before the bearing is allowed to rotate or slide.

Alternatively bearing must be fixed directly to metal bedding plates that may be cast-in or bedded on top of the supporting structure to the correct level and location. Only a thin layer of bedding mortar should be used and then other than synthetic resin mortar is used for this purpose it should be housed in a recess suitably reinforced on all sides.

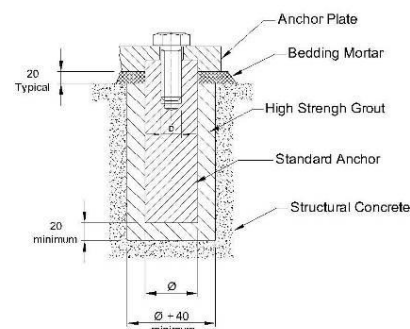
If the substructure is of steel, the bearing may be bolted directly to it. In such cases there may be difficulties in achieving location to line and level within the tolerances unless other provision is made. Before providing for adjustment, the need for such accurate location should be assessed.

The bearing should be installed within a tolerance of $\pm 0,0025$ radians of the intended inclination of the contact surfaces of the structure.

FIXING BEARINGS SUPPORTING CAST-IN-SITU STRUCTURE

Care must be taken to ensure that the bearings are not damaged by the formwork or contaminated by concrete seepage. The interface between the top plate and the formwork should be protected and sealed.

Owing to the loading effect of a wet concrete mass, the top plate should be propped to prevent rotation and plate distortion. Bearing to plate of PTFE sliding bearings are especially vulnerable in this respect.



FIXING BEARINGS SUPPORTING PRECAST CONCRETE OR STEEL ELEMENTS

A thin layer of synthetic mortar should be used between bearing and precast concrete beams. Alternatively, bearings with outer bearings plates may be bolted to anchor plates or anchors embedded in precast elements, or to machined sole plates on steel elements.



BEARING REMOVABILITY

Where possible, bearings should be fixed in such a manner as to facilitate removal. AAG bearing are generally been designed with this mind.

REMOVAL OF TRANSPORT DEVICES

The transport devices, normally painted red should only be removed when the bearing is properly installed and ready for operation.



Any tapped holes exposed after removal of transportation brackets etc (coloured red) should be sealed with self-vulcanizing silicon sealant.

SITE COATING

Care should be taken to ensure that working surfaces are not damaged in any site coating operation. After installation damaged coating must be repaired irrespective of any call for site coating. Exposed fixing bolts should be protected after final tightening.



MAINTENANCE OF BEARINGS

The service life of a spherical bearing is usually estimated in more than 50 years.

The most important thing to assure such a long life time is a correct and careful maintenance of the bearing, that is usually installed in a severe environment.

What follows is a general bearing inspection and maintenance program that must be adapted by the bridge designer to the specific service conditions of the bridge.

Immediately following the installation, bearings shall be inspected to ensure that all aspects of installation of bearings have been adhered to.

Bearings shall subsequently be re-inspected not less frequently than every five years after their installation.

The period between two subsequent maintenance inspections is dependent on such factors as the severity of the environment in which the bearings are located, loading and access.

On structures utilising bearing with PTFE where the movement is generally the result of thermal movements a five year inspection should be enough.

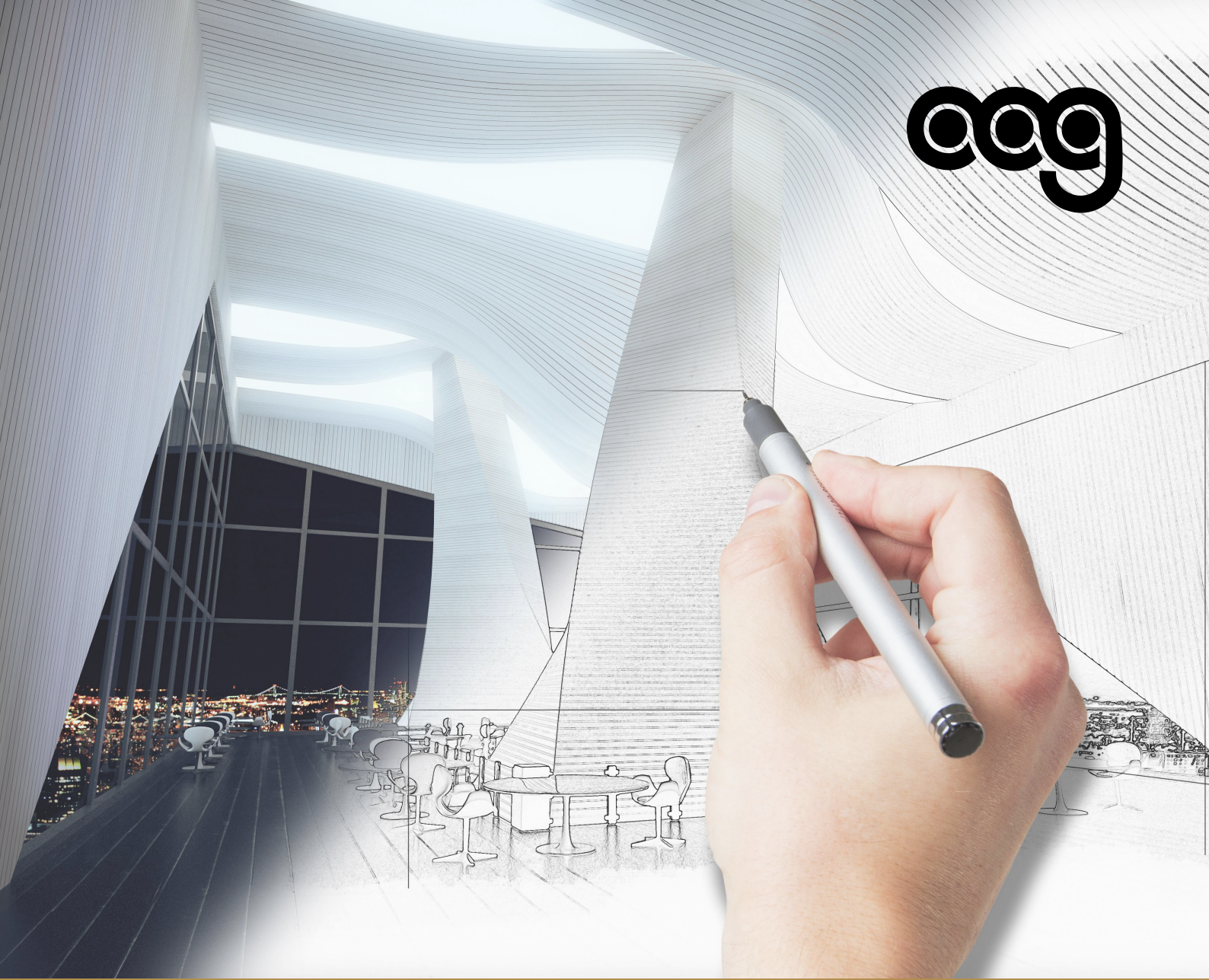
For bearings subject to consistent high loading fluctuation a reduced period of inspection may be considered relevant (the position of the bearing plates relative to the PTFE disc will vary with the season of the year).

For bearings installed in a particular severe environment (sea zones for example) it must be considered as recommendable an annual inspection.

A typical complete routine check of the bearing installed should be comprehensive of the following activities.



1. Paint and other specified protective coatings must be maintained in good and efficient condition and free from scratches or chips. Any areas of the protective coating showing damage or distress must be rectified as soon as it is seen.
2. Area surrounding the bearings must be kept clean and dry and free from the adverse effects of external influences such as airborne debris or water/salt (for example emanating from leaking joints).
3. The wearing surfaces of the bearing must be checked to ensure that they are continuing to operate efficiently
4. Where possible seals should be checked to ensure that they are intact.
5. Fixing bolts must be checked for tightness.
6. Any bedding material showing signs of distress or ineffectiveness must be replaced and the reason for its failure investigated and corrected.
7. Routine inspections shall include a check that translational and rotational capacities of the bearing have not been exceeded and show no sign of being likely to exceed the requirements specified at the design stage.
8. PTFE discs should be within limits of their design movement and have at least 1 mm thickness of material visible. Excess movement will be evident if the PTFE disc have travelled outside the limits of the stainless steel sliding plate.



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