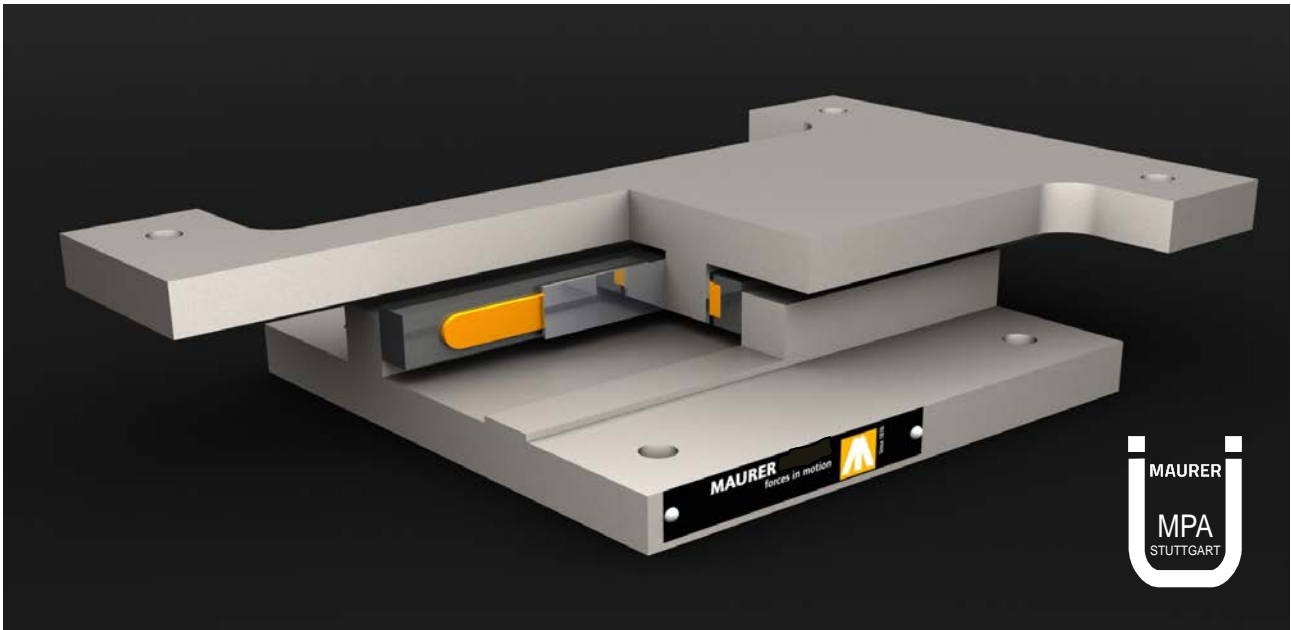


MAURER MSM®-Guide Bearings

National Technical Approval



MAURER MSM®-Guide Bearing - sectional view with special sliding material MSM® (orange)

As the first manufacturer, MAURER has gained a National Technical Approval for Guide Bearings with special sliding material. The approval Z-16.9-463 for **MAURER MSM®-Guide Bearings** permits a more comprehensive use of the well proven sliding material **MSM® (MAURER Sliding Material)**.

The approval concerns guide bearings according to EN1337-8, with the sliding material in the guides being replaced by the special sliding material MSM®. This modification is of deciding importance for the life time, the economics and the scope of usage of guide bearings. With obtaining the National Technical Approval, once more MAURER displays its role as pioneer in the field of bridge bearings.

The introduction of the sliding material MSM® was a revolution in the field of bridge bearings. In 2003, MAURER MSM®-Spherical Bearings were approved nationally, and 2006 on a European scale.

This type of bearing displays a high life time, small resistance to displacement, a compact and economic design mode, as well as a special suitability for soft structures with fast and frequent movements, like they occur in railway bridges. Like in the guides of such spherical bearings, now all design types of guide bearings can be equipped with MSM® strips and using the many advantages of MSM®:

- **Minimum life time of 50 years**
- **Absolutely maintenance-free**
- **Suitable for all climate zones worldwide certified from -50°C to +70°C**
- **Reduced strains onto the adjacent structure**
- **Very compact and rather flat constructions**
- **Combination with Elastomeric Bearings possible**
- **National Technical Approval with Ü-mark**

Life-time

Whereas the assumed life time of PTFE respectively the composite material CM1 in guides is 10 years, with the usage of MSM® the same is augmented to 50 years. And this absolutely maintenance free.

Furthermore, the new approval contains a calculation mode for the determination of the life time. Thus, it is now possible to make statements for the budget planning of the structure. Exact forecasts, when and whether the guide bearings have to be replaced, are now possible.

Economics

The 5 fold life time of the MSM® material permits longer inspection intervals and avoids a cost intensive replacement of bearings, and this often applying to the complete life time of the bridge structure.

Due to its double permissible compressive strength, **MAURER MSM® Guide Bearings** can be designed in a very compact mode and also rather flat. The compressive strength of MSM® lies approximately on the level of CM1 which is ruled in EN1337-2. Due to its incompressibility, CM1 reacts very sensibly to edge pressures, and so no rotations can be accommodated. For this reason, guide bearings with CM1 can only be used when the cooperating bearing parts themselves can realign into the direction of displacement. In combination with the friction coefficient of MSM® which is up to 65% smaller, in relation to CM1 the strains onto the adjacent structure are relatively small.

Scope of Application

MSM® enjoys the most comprehensive scope of application of all sliding materials which are available on the market. One example to be highlighted is the suitability for all climatic zones. It is possible to employ **MSM®-Guide Bearings** at temperatures as low as -50°C, which is required in cold regions like Siberia. PTFE already has its limits at -35°C. But also near the equator, PTFE, with its limitation to +48°C. is often no longer usable. Here, MSM® is the material of choice, which can be used under a correspondingly limited contact pressure until +70°C.

Friction coefficient	CM1	PTFE	MSM®
$\mu_{\max}(T_{o,\min} -5^{\circ}\text{C})$	-	-	0,07
$\mu_{\max}(T_{o,\min} -35^{\circ}\text{C})$	0,20	0,08	0,10
$\mu_{\max}(T_{o,\min} -50^{\circ}\text{C})$	-	-	0,12

Tab. 1 - Friction coefficient of MSM® in comparison

Combination with Elastomeric Bearings

The combination of guide bearings with elastomeric bearings is ruled separately. According to the implemented and mandatory usage of EN1337-8, in the guides only mating couples according EN1337-2 may be used. However, in deviation to this and in consideration of the so far usual practice, the corresponding German norm DIN 4141-13 was revised. The edition of July 2010 of DIN4141-13 only handles guide bearings with the mating couples steel/steel. This approval document as well as the EN1337-8 handles guide bearings with other mating couples but steel/steel. The usage of steel/steel as mating couples is subject to the following limitations:

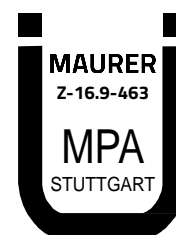
- Rotation around the main axes of the contact surfaces by max. 0.005 rad, with rounded design max. 0.01 rad
- Displacement in road bridges by max. ± 50 mm
- Expansion lengths max. 25 m at railway bridges
- Curvature of the structure min. 50 m

However, due to its lesser resistance to displacement as well as to its longer life time, also for these scopes of application the usage of MAURER MSM®-Guide bearings is recommended. Standard so far is the usage of the sliding material CM1. Because of the aforementioned missing rotational capacity, the usage of this material cannot be permitted without comprehensive additional measures.

At a similarly high contact pressure, MSM® can accommodate an edge deformation of 0.2 mm, and thus also rotations.

Because EN1337-2 does not regulate the usage of MSM®, a separate National Technical Approval had to be obtained. In order to document the compliance to the high quality requirements and conformity to the approval, all MAURER MSM®-Guide bearings will obtain an Ü-mark (supervision mark) according to the National Technical Approval Z-16.9-463 by the

Materials Testing Institute University of Stuttgart (MPA Stuttgart).



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