



MAURER expansion joints



Fitting instructions and check list for engineers

1. Supply



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The expansion joints are supplied to site in one length completely assembled. For transport, storage and installation transit brackets are provided, to hold together the expansion joint for installation purposes and for shipment to site. The lifting points for loading and unloading are marked by colour, the location is labelled and the total weight of each expansion joint is indicated on separate appendixes or stickers. The joints have to be stored carefully on site (e.g. on square timbers). Damage and contamination must be avoided by means of well ventilated tarpaulins.

Final assembly of an expansion joint type D800 in the workshop

2. Recesses and connection of the supporting framework to concrete components

Talbrücke
Obere Argen
type DS960



The size of the recesses for the expansion joint construction in the structural concrete on superstructure and abutment side has to be specified during project planning by using the tables (see brochures of our girder grid and swivel-joint expansion joints) and according to our final structural drawings, and must be scheduled before construction.

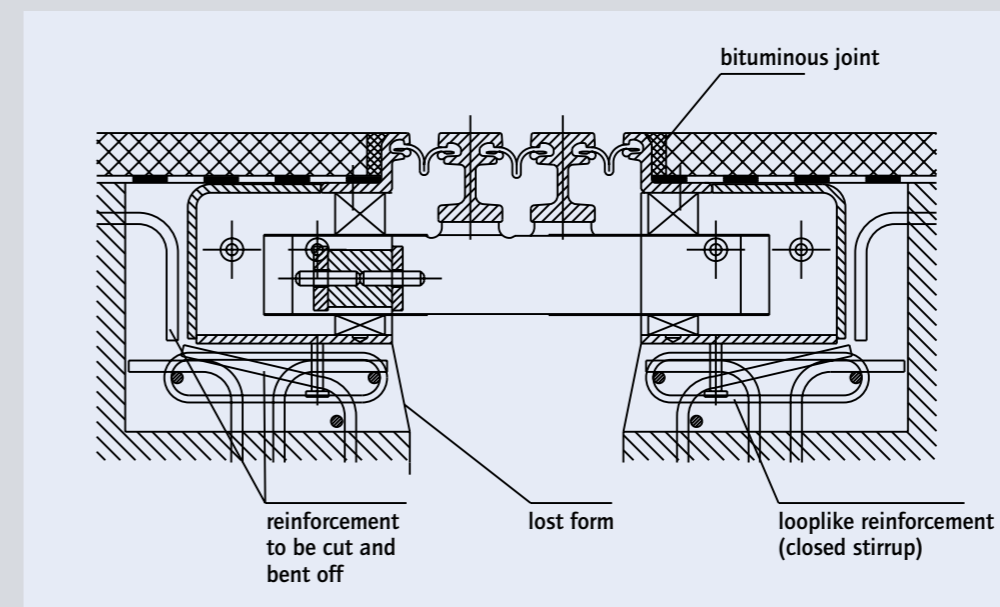
The recess dimensions of the construction have to be examined by the local construction supervision together with our fitter before starting the assembly and to be corrected if required.

The surfaces of the recesses have to be treated as construction joints. The connection of the supporting framework is to be implemented according to specification for reinforced concrete construction and/or steel structure. A suitable connecting reinforcement has to be provided at the recesses.

The anchor loops at the edge beams of the expansion joint are usually arranged in the longitudinal direction of the bridge. This means that the main reinforcement is formed parallel to the anchor loops.

Under the joist boxes a mesh and/or looplike armoring against splitting tension must be provided.

For relevant data see our final drawings.



Cross section
girder grid
expansion joint
type D240
joist box

3. Control of gap and installation dimensions


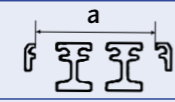
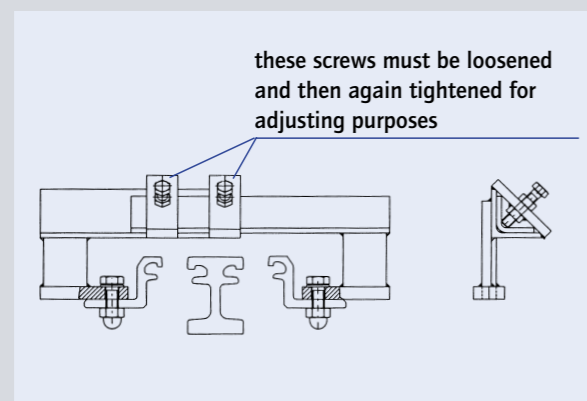
structural temperature		
°C	gap dimension e	assembly dimension a
+5		
+10		
+15		
+20		

Table to fill-in the gap and assembly dimensions

Transit clamp



screws of the movable clamps (see: transit clamps) have to be unscrewed and then again tightened firmly after adjustment.

The gap between ballast wall of the abutment and the outer edge of the superstructure has to be controlled.

The construction supervision has to certify any changes of the assembly dimension to our fitters.

The bridge design engineer determines the temperature-dependent gap and assembly dimensions. If there are no special requirements, the expansion joints are adjusted in the workshop for a structure temperature of +10 °C. The pre-setting already done in the factory and the relevant expected assembly temperature must be registered on the approved drawings. The dimensions for the temperature-dependent pre-settings can be obtained from the tables on the final drawings.

Directly before inserting the expansion joint into the recesses the pre-setting must be checked by the construction supervision and, if required, readjusted by our fitters. If a correction of the pre-setting becomes necessary, this has to take place in direction of the angle of movement. A higher structural temperature requires a closing, a lower structural temperature an opening of the construction. For that purpose the



Assembly of an expansion joint construction type D80

4. Expansion joint assembly



Insertion of the complete expansion joint into the construction joint

The expansion joints will be removed from the truck by a crane (lifting apparatus) and inserted into the construction joint. According to indication of the local construction supervision the joint is levelled to the required height and assembled parallel to the longitudinal and transverse slope of the bridge's cross section. According to the standard drawing Übe 1 the expansion joint should be located approx. 5 mm under the regular height of the carriageway surfacing. Under no circumstances must the top edge of the sealing element rise above the carriageway surfacing.

After the expansion joint has been aligned in the construction joint and before pouring the concrete, the joist boxes and the anchor loops are welded into the structural reinforcement as auxiliary support.

After concreting, the connecting screws of the assembly devices are loosened, so that the expansion joint can take up the structural movement without affecting the setting procedure of the concrete.



Expansion joint in the parapet cover with cable conduit

After our personnel have finished the assembly, it must be checked and accepted by the construction supervisor and the completed installation of the expansion joint has to be certified. (See special acceptance report).

5. Shuttering and concreting

Covering of the sealing element before concreting



Shuttering and concreting is done by the construction firm. The recesses must be shuttered in such a way that the scheduled dimensions are obtained at the edge beam and the joist boxes. Attention must be paid to careful and close shuttering to avoid concrete tearing into the joist boxes and the joint gap between superstructure and abutment. A sealing drainage (acc. to drawing Was 11) must be assigned for the prevention of banking behind the edge beams.

The recesses must be cleaned carefully before concreting. Levels and axial position as well as the correct width of the expansion joint must be checked once again. Concreting the expansion joint requires the client's approval. The lean-mixed concrete must be low-shrink and of even or higher

strength as the structural concrete, at least quality B 35. During concreting special attention must be paid to the compression of the concrete at the anchor plates, under the base plates of joist boxes and under the horizontal flange of the edge beams so that a solid bearing of the steel elements to the concrete is guaranteed and a sufficient composite action is obtained.

The steel and sealing elements must be protected during concreting or be cleaned with water immediately after the concreting procedure, so that there is no setting of concrete anywhere on the expansion joint.

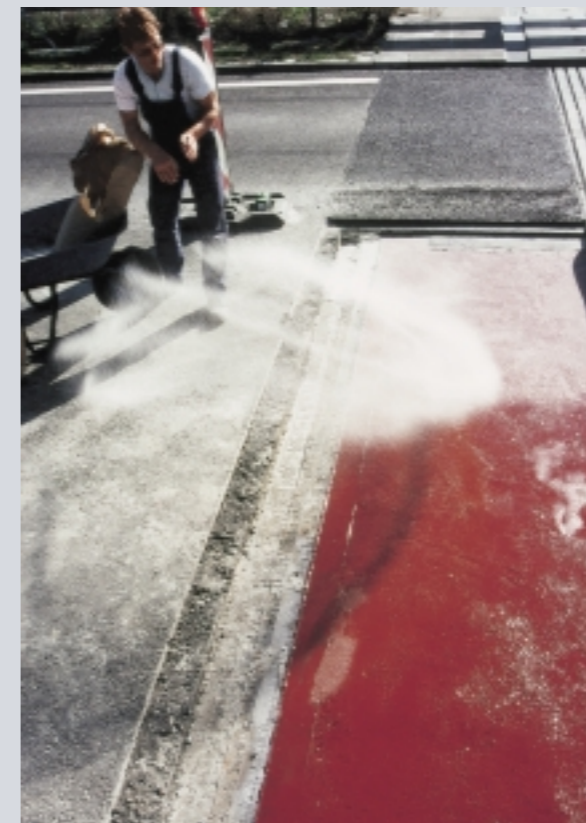
After the setting of concrete the transit clamps, fastened on the expansion joint, must be removed. The shuttering in the structural gap between superstructure and abutment has to be removed and the joint claw sections located between the steel edge profiles have to be cleaned.

Concreting the recesses

6. Sealing of the construction



The sealing is glued on hot



Gravelling the sealing with quartz sand

In order to prevent the penetration of water between the edge profiles of the expansion joint and the concrete, the waterproofing has to be attached carefully and according to the relevant regulations. For perfect connection a horizontal flange of 80 mm in accordance with ZTV-K has to be provided, which must be cleaned carefully before applying the isolation. The sealing has to be attached to the expansion joint over the entire length, i.e. also in the marginal and median strip range.

During the surfacing operation the steel and sealing elements must be protected against impurities and excessive heat. A bitumastic filler acc. to the standard drawing Übe 1 has to be provided as a connection to the edge profiles of the expansion joint.

7. Workmanship at the parapet cover

A bitumastic filler has to be provided between the edge profile of the expansion joint and the parapet cover in the marginal and median strip range. The joint shows a wedge-shaped design to avoid cavitation. The bitumastic filler only allows movements of a few millimetres between parapet and structural concrete. Constructional design should ensure that larger movements remain impossible. These may occur in particular in a case of loose position without parapet connection. In such cases the cornice must be connected firmly with the structural concrete directly before the expansion joint in the carriageway area. If necessary, a secondary joint has to be provided at the parapet cover.



Design of the kerb unit
(carriageway – footway)

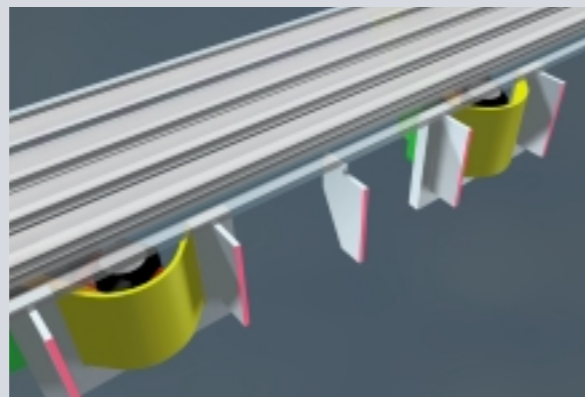
8. Connections at bridges with steel carriageways

Principally three different types exist:

- Bearing on continuous beams
- Bearing on individual consoles
- Direct connection of supporting sides of the joist boxes

The design varies with each construction and must therefore be designed, certified and tested accordingly. The technical approval acc. to TL/TP-FÜ 92 is only applicable restrictively to the superstructure sides.

Assembly is done according to the expansion joint assembly (see par. 4: Expansion joint assembly). First the expansion joint is welded to the steel construction on the superstructure side when starting the assembly.



Direct connection of supporting
sides of the joist boxes to steel
superstructure

For further information we refer to the technical approvals acc. to TL/TP-FÜ 92 for swivel-joint or girder grid expansion joints

9. Check list for the structural planner resp. the inspector

Expansion joints	<ul style="list-style-type: none"> ■ Type of expansion joint ■ Does a valid technical approval exist? ■ Number and distances of joists ■ Position of butt joints and site joints ■ Corrosion protection acc. to ZTV-KOR or the requirements of the project ■ Check geometry of the expansion joint's cross sections with reference to the standard drawings ■ Are cover plates required for footways?
Movements	<ul style="list-style-type: none"> ■ Determination and/or check of quantity and direction of movement (DIN 1072, bearing). ■ Within the range stated in the technical approval TL/TP-FÜ 92 the MAURER swivel-joint type STP admits structural movements laterally and longitudinally to the joint which are independent to each other. Thus a fixing of the direction of movement of the bridge's end by bearing itself is not required, if the permissible movement is adhered to. ■ Determination and/or check of movements per °C. ■ Determination and/or check of reciprocal displacement of side wall and superstructure's end when lifting to exchange the bearing acc. to DIN 1072 par. 3.6 and ZTV-K par. 9.1.1. ■ Determination and/or check of possible combinations of movement. ■ Have the permissible movements been obeyed?
Preadjustment	<ul style="list-style-type: none"> ■ State the required installation temperature and the required age of concrete on assembly. ■ Determination and/or check of the expansion joint's preadjustment for the assembly (dimensions "a" and "e") for the required installation temperature and the required age of concrete. ■ A change of the preadjustment "e" dependent on the measured structural temperature, necessary? If so, state and/or check the modified dimension of the preadjustment with reference to the structural temperature. ■ If necessary state and/or check the required preadjustment in transversal bridge direction (in direction of the joint).
Recesses	<ul style="list-style-type: none"> ■ Observe the required recess acc. to the technical approval TL/TP-FÜ 92 – 3.3, 3.4 resp. 3.5. or to the approved workshop drawings ■ Adhere to the recesses for guide and parapet units. ■ If necessary consider changes in the joint gap, dependent on the preadjustment "e". ■ Are clamping elements or their anchorages located at the edge of the recess? (To be considered in case of exchanging the expansion joints).
Reinforcement	<ul style="list-style-type: none"> ■ Minimum concrete cover 4.5 cm acc. to standard drawing for reinforcement. ■ Position of the reinforcement to the front edge of the joist box. ■ The connection to the existing reinforcement has to be established individually.
Structural edges	<ul style="list-style-type: none"> ■ Flush coating ■ Observe geometry (shuttering), the joint dimensions, longitudinal and lateral inclination as well as possible angular deviations on the recesses of the carriageway at the end of the bridge. ■ Transmission of anchorage force and kinetic resistance in the structure must always be established individually. ■ Adhere to the permitted movement of the final cross girder (see ZTV-K) ■ Concrete quality (at least B 35 at the recess) ■ Regarding steel bridges the superstructural bearing of the support bars has not been seized by the technical approval. Loadbearing capacity (acc. to DIN 18 809) and fatigue strength (corresponding to DS804) of the relevant elements must always be determined and/or checked individually. ■ Geometry, material and enforcement of the final steel cross girder must be obeyed.

10. Instruction for vulcanisation

Scope

This instruction is applicable to MAURER expansion joints with strip profile 80 made of EPDM. The quality assurance regulations correspond to the TL/TP-FÜ.

Normally site joints of the sealing elements have to be avoided. If a site joint becomes necessary for technical reasons, it must be executed according to the existing regulation. The execution corresponds to the procedural testing in accordance with test certificate GÜ 26/96 of the 'Prüfamt für Bau

von Landverkehrswegen' of the Technical University of Munich. The vulcanisation joint has to be arranged staggered to the associated weld joints of the steel profiles.

Quality assurance

The site joint connection may be done only by specially trained personnel. The execution and evaluation of the connections are to be recorded.

Description of the jobs

1. Profiles to be cut off rectangularly.



2. Roughen cutting edges by means of a wire brush or coarse emery paper.

3. Roughened cutting edges to be painted with EPDM solution (article code: 2.1259).



4. Use an extruded non-vulcanised profile, approx. 10 mm thick, as crude rubber

Ensure good ventilation!
Durability of the solution: 3 to 4 weeks.
Check expiry date!
Solution to be securely closed and put into cold storage.

5. Adequately paint crude rubber with solution (article code: 2.1259).



6. Put EPDM profile onto vulcanising core.

7. Assemble EPDM profile and put it into the preheated (100° to 120° C) vulcanising mould (base part).



8. Clamp the profiles into tensioning device and solidly press the profile ends against each other.

9. Control of prestress by deformation of the strip profile. The maximum deformation lateral to the profile axis should be 2 to 3 mm.



10. Put on upper part of the mould.

Important!
Pressure is absolutely necessary for vulcanising.

11. Close heating device.



12. Heat mould to 160° C.

Starting time for vulcanisation when reaching a temperature of 160° C.

Duration of vulcanisation: 60-80 minutes, depending on the ambient temperature at site.

13. Cooling process:
Breaking of circuit.
Cooling to 70° - 80° C.



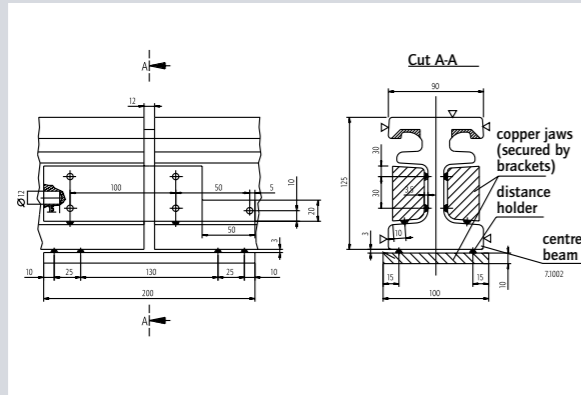
Open the mould.

Carefully separate and remove profile from the heating mould.

Let it cool off to ambient temperature.

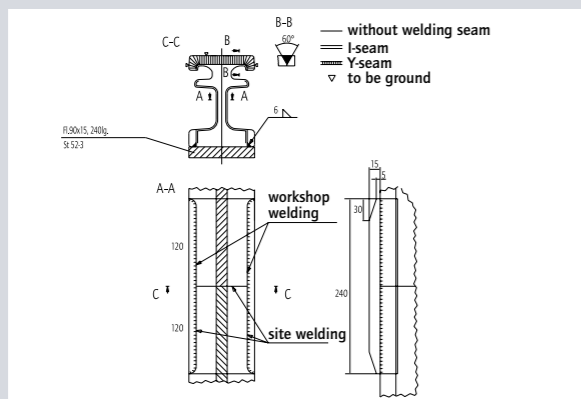
The profile may only be installed to the expansion joint when completely cooled down.

11. Site joints



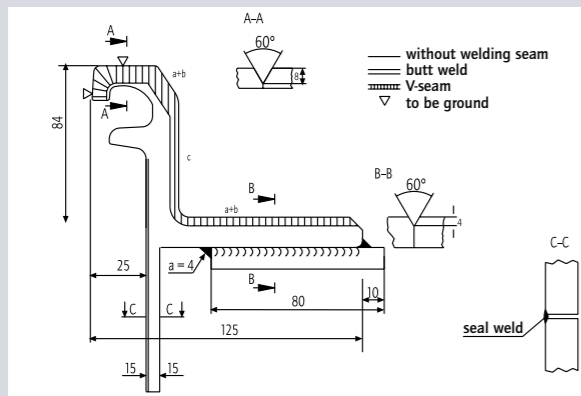
Site joint of the centre beam in the carriageway

The site joints of the centre beams in the carriageway are performed according to the welding system for copper jaw sockets.



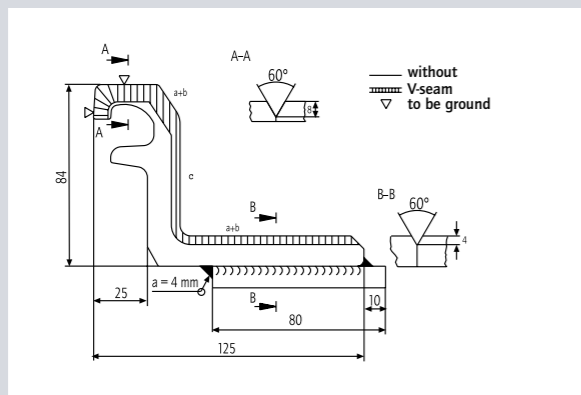
Site joint of the centre beam outside of the carriageway

The site joints of the centre beams outside of the carriageway are welded at the joint side with supporting flange. Welding the other profiles is executed by means of fillet and butt welds.



Site joint of the edge beam in the carriageway

Edge profiles in the carriageway are joined by tacking and welding the upper and lower flanges and welding the web. The fronts of the girder's top ∇ are to be ground flush.



Site joint of the edge beam outside of the carriageway

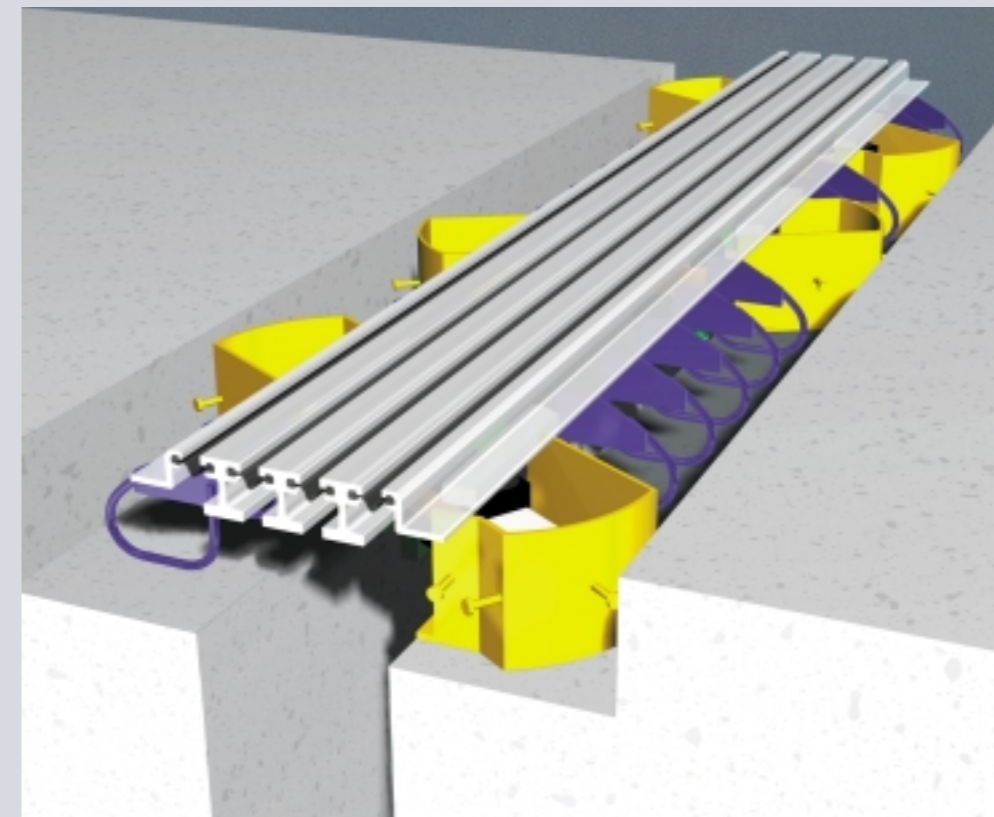
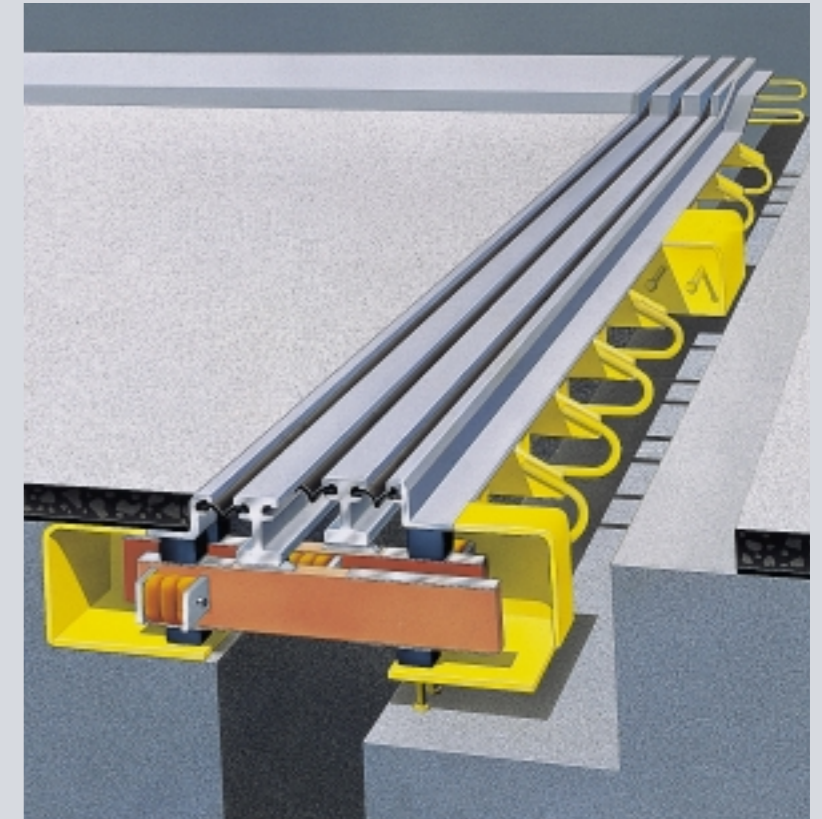
Edge profiles outside of the carriageway are joined by tacking and welding the upper and lower flanges and welding the web. The fronts of the girder's top ∇ are to be ground flush.

For further information regarding the execution of the site joints see the relevant documents of the technical approval acc. to TL/TP-FÜ 92

12. Product information MAURER Modular Expansion Joints

MAURER girder grid expansion joints

Flexibly controlled, beared flexibly and prestressed. This system is applicable for concrete and steel bridges up to a maximum movement of 520 mm.



MAURER swivel joint expansion joints

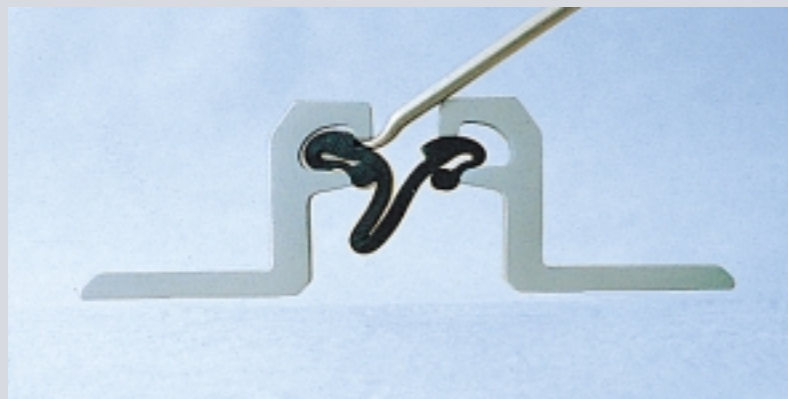
Flexibly controlled, beared flexibly and prestressed. Small number of joists, clearly static system. Compact building method. Used for larger movements. So far installed for movement up to 2000 mm. This system is applicable for concrete and steel bridges.

For further information see the relevant documents of the technical approval acc. to TL/TP-FÜ 92

13. Exchange of wearing parts

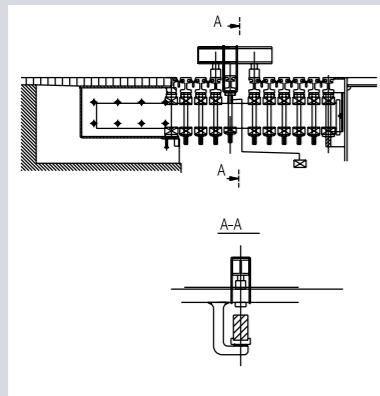
In case of MAURER modular expansion joints
 - girder grid expansion joints
 - swivel joist expansion joints
 wearing parts such as sliding bearings and sliding springs as well as control springs and sealing elements can be replaced with simple aids from above the carriageway or from beneath the structural gap.

Insertion of the strip profile into the edge beam

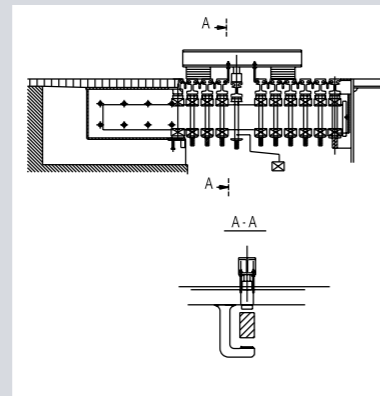


The bulbous shaped strip seal is fastened waterproof and secured against extraction in the claw-shaped cavities of the edge and/or centre beams without additional clamping strips. The sealing element is lower than the deck level and thus is protected against direct contact with vehicle tires and/or snow plough.

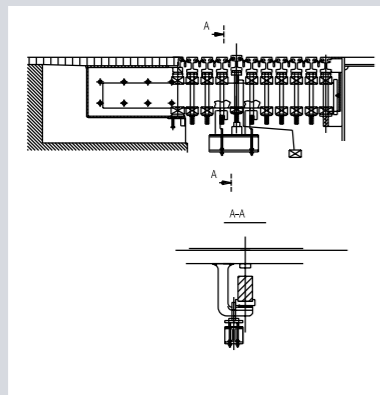
Replacing the sliding bearings from top of the carriageway



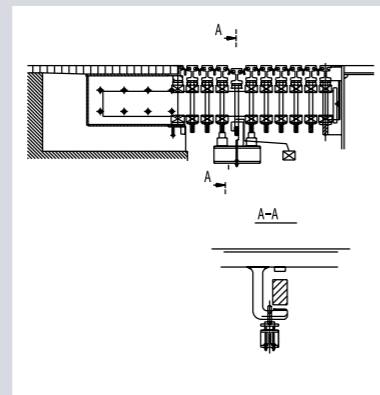
Replacing the sliding spring from top of the carriageway



Replacing the sliding bearings from beneath the carriageway



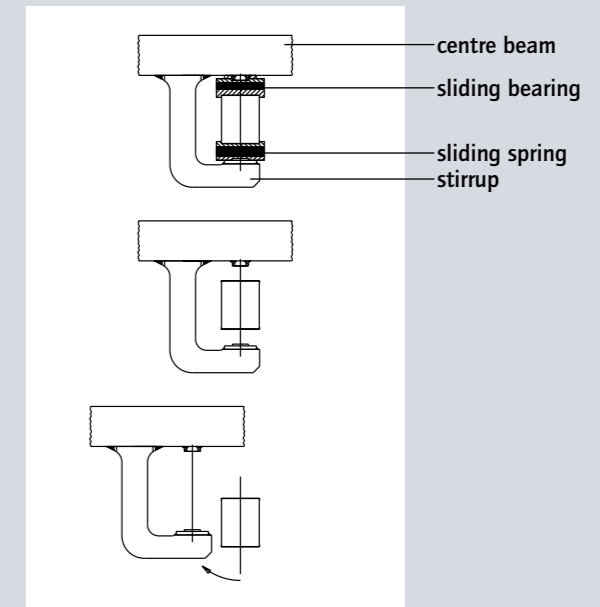
Replacing the sliding spring from beneath the carriageway



Disassembly of the centre beam MAURER swivel joist expansion joints

When using open stirrups the centre beam can be disassembled without destruction. The stirrups of the carriageway and guide bars must be aligned parallel at least for each section. The guidance eyes of the guide units must be isolated half laterally and welded later again. The eyes of the guide units must be separated semi-sided and welded again subsequently.

- disassembly of sealing element, sliding bearings and sliding springs
- lateral shifting of approx. 150 mm and lifting of the centre beam
- installation of the new components



14. Further instructions



For further detailed data concerning welding proofs, site joints as well as notes for maintenance, preservation and the exchange of wearing see our technical approvals according to TL/TP-FÜ 92:

- a) girder grid expansion joints
- b) swivel joist expansion joints type STP
- c) swivel joist expansion joints type STW

Site housing

**Airport
Athens-Spata**



Maurer Söhne Head Office:
P.O. Box 44 01 45, D-80750 München
Frankfurter Ring 193, D-80807 München
Telephone (49)(89) 3 23 94-0
Fax (49)(89) 3 23 94-306
e-mail ba@mchn.maurer-soehne.de
Internet www.maurer-soehne.de

Maurer Söhne Main Branch Office:
P.O. Box 63 40, D-44520 Lünen
Zum Holzplatz 2, D-44536 Lünen
Telephone (49)(231) 4 34 01-0
Fax (49)(231) 4 34 01-11

Maurer Söhne Subsidiary Plant:
P.O. Box 55, D-02992 Bernsdorf
Kamenzer Str. 4-6, D-02994 Bernsdorf
Telephone (49)(3 57 23) 2 37-0
Fax (49)(3 57 23) 2 37-20