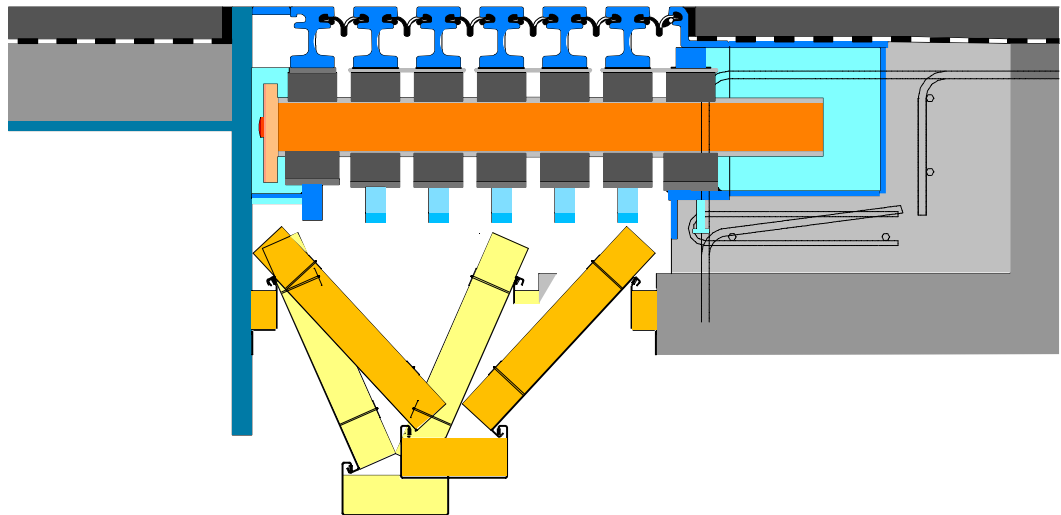




Noise Protection Devices for Expansion Joints

In order to reduce noise emission below a joint, most efficient counteraction is to close the structural gap from below by means of noise absorbing insulation material.



In crossing an expansion joint of whatever design type, more or less perceivable impact like noise emissions are created. Generally, we have to distinguish between noise emission at the surface of the carriageaway, that is above the joint, and noise emission in the structural gap that is created from below a joint. Particularly the noise emission directed downward is of embarrassing nature, because very often underneath a bridge the public does not perceive the basic noise emission which is created by passing vehicles.

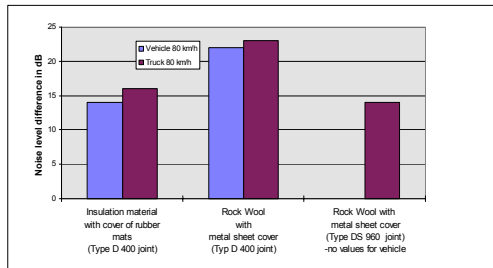
The devices that have been developed to reduce noise emission have to be able to accommodate the movement of the superstructure, and for maintenance purposes also must be removable. MAURER SÖHNE has developed and patented various solutions for a range of applications (see pages 5 - 7 and patent DE 19725116A1).



Noise Protection Devices for Expansion Joints

For insulation purposes underneath a joint, the solution that is considered to be the best one is to close the structural gap with rock wool.

The following diagram shows the measured differences in noise emission taken directly underneath an expansion joint in comparison to a non-insulated joint.



System A is being used with the simultaneous installation of an expansion joint at a structure (i.e. no retrofit), when the joint is accessible from below in case of more than 2 sealing elements. Via the horizontal element, the system can be adapted to the width of the structural gap. The length of the skew elements will be adapted to the movement range of the expansion joint. At the edges of the structural gap simple anchor elements shall be fixed. An den Bauwerksrändern werden in einfacher Weise Verankerungselemente befestigt. The adaptability to the gap opening is guaranteed by means of hinges.

For inspection purposes, the noise protection device can be dismantled in a very simple manner, without loosening any fixing elements. The length of the individual elements is limited by their weight.



So called „Scissor Control“ of a joint, to be covered by a partially mounted folding system.



Readily mounted noise protection device (System A)



Detail of a connection to the abutment wall



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Noise Protection Devices for Expansion Joints

System A can be considered as standard solution. This system can be specified as follows (following German specification standard):

... m Install noise protection devices for expansion joints of type MAURER (System A) or similar, according to the respective structural and constructive requirements.

The noise protection device shall consist of noise absorbing rock wool plates, Konstruktion bestehend aus thickness ≥ 8 cm, density ≥ 50 kg/m³ and noise reflecting steel plate that is located below, thickness ≥ 2 mm, stainless steel-Nr. 1.4301.

The noise protection has to be placed directly underneath the expansion joint over the total length of the joint. The dimensions of the maintenance room has to be considered according to WAS 6

A direct noise trespassing has to be avoided. Vertical openings are not permissible. In case of horizontal openings (e.g., in case of 2 sided cantilevered noise protection devices) the distance must not exceed 10mm, and in the same time the overlap of the 2 insulation mats must be a minimum of 10mm. Eventually protruding surface water or condensed water must be able to be drained at the lowest point.

Noise protection must be safeguarded in all opening stages of the expansion joint. All parts including the fixing elements must be covered with noise absorbing material. In order to prevent noise due to rattling, all moving parts shall be supported by plastic elements. Steel hinges are not permissible. The noise protection elements have to be dismantled in a simple manner. The noise reducing effect must also be granted at the butt connections of the individual elements.

The noise reducing effect must be proven by means of a standardised reference test. Directly underneath the noise protection device, this effect must be at least 15 dB (A) [truck passing at 80 km/h]. Test results of already executed projects are permissible to be used for the judgement of suitability.

System B is developed for expansion joints with 2 sealing elements. The installation shall be carried out simultaneously with the installation of the joint, or in case of accessibility from below also as secondary installation (retrofits).

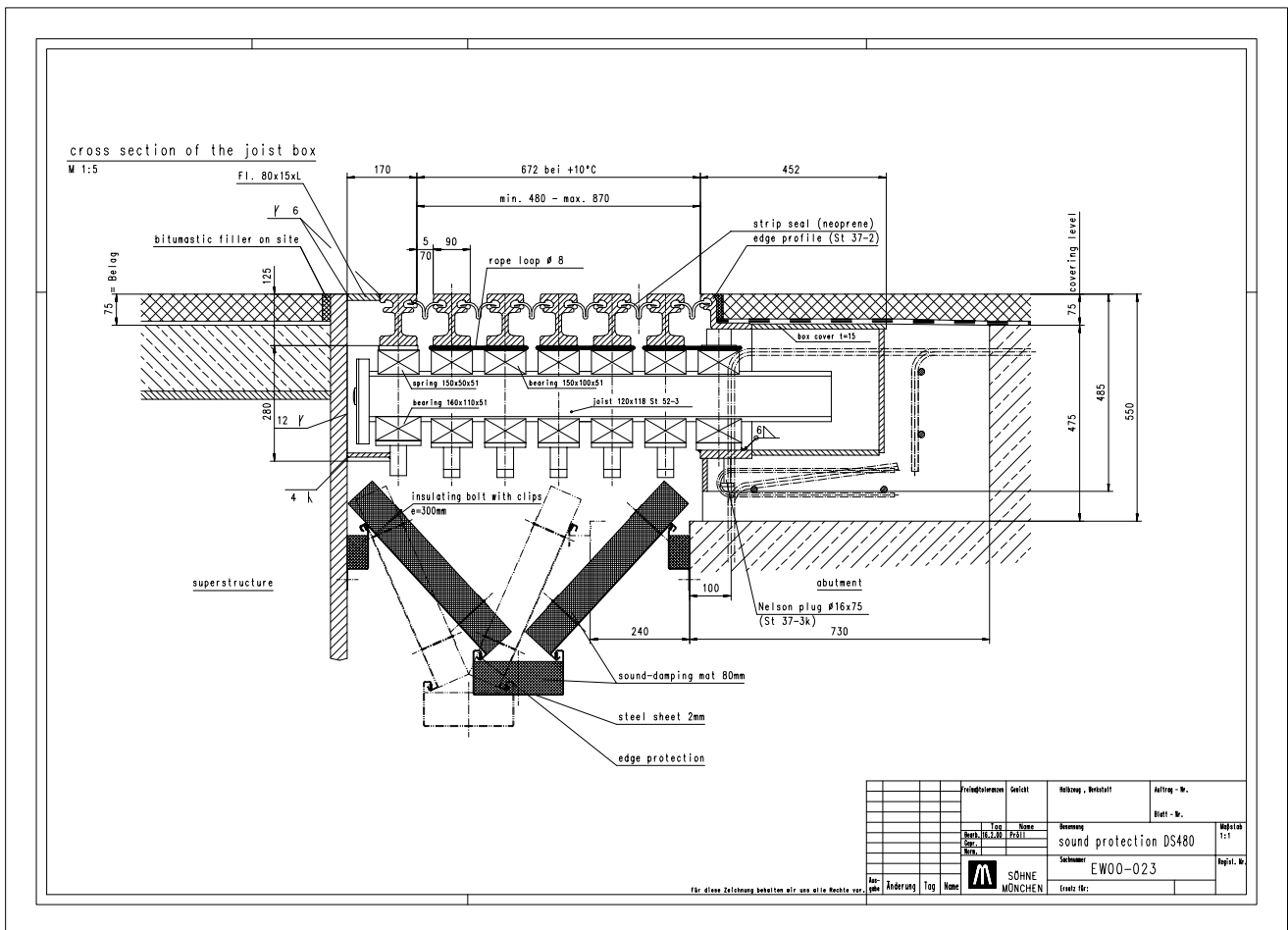
By means of the excentric center of gravity, the insulation element slides up and down at the edge of the structure, thus adapting to the opening of the structural gap.

System C caters to the most complicated condition which is the installation from above, that is when the structural gap is inaccessible from below. Thus system C is suited for retrofits.



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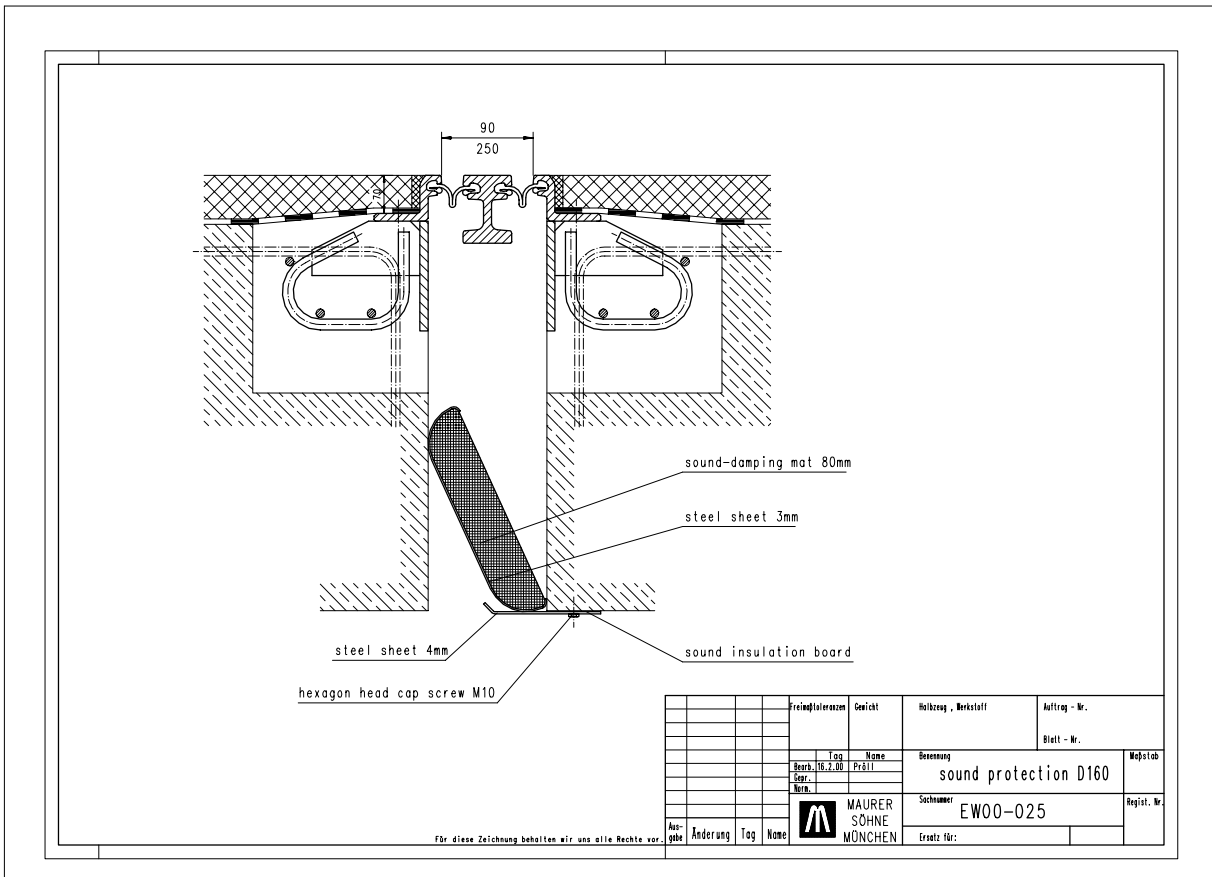
Noise Protection Devices for Expansion Joints (system A)





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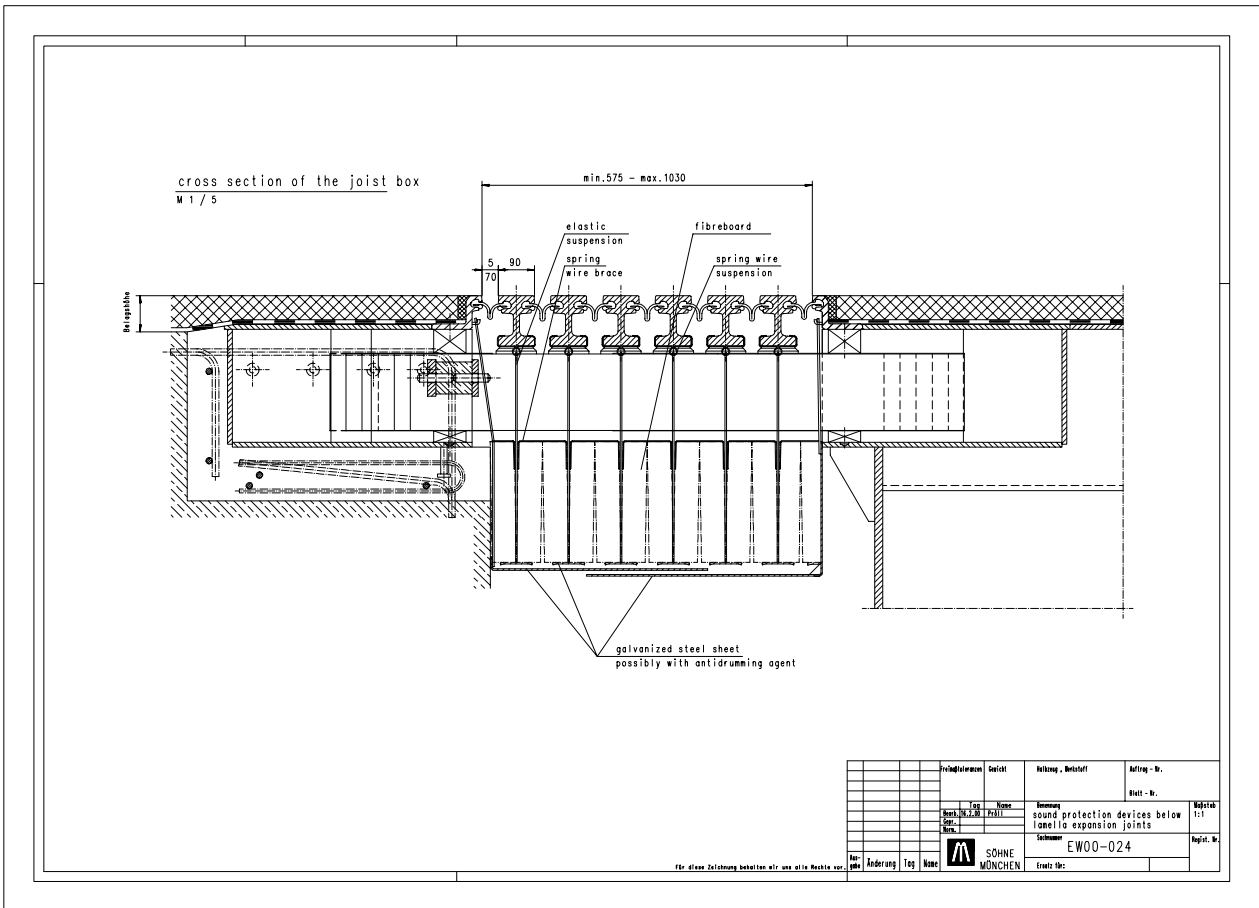
Noise Protection Devices for Expansion Joints (system B)





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Noise Protection Devices for Expansion Joints (system C)





Noise Protection Devices for Expansion Joints

REFERENCE LIST (PROJECTS IN GERMANY)

Bridge	Job Owner	Expansion Type	Joint- C / U *)
BW 96/359, Talbrücke Obere Argen	Autobahn-Betriebsamt Heidenheim, BL Wangen	DS 960	C
BW 357-1, Talbrücke Schnaittach	ABA Nürnberg	DS 800 DS 1120	C
BW 292, Talbrücke Lanzendorf	ABA Nürnberg	DS 800	C
BW 22, Kochertalbrücke	SBA Ellwangen	D 320 D 400	C
BW 6, Schornbachtalbrücke	SBA Schorndorf	Scissor joint (8 seals)	U
Havelbrücke Werder (linke + rechte RFB)	ABA Brandenburg	DS 480	C
BW 123-2, Talbrücke Röslau	ABA Nürnberg	D 400	C
Talbrücke „In der Grund“ (Egge-Übergang)	WSBA Bielefeld	D 240	C
BW 271, A9 München - Berlin Talbrücke Münchberg	ABA Nürnberg	D 400 D 480	C
BW 322-2, BAB A9 Talbrücke Trockau,	ABA Nürnberg	D 560	C
Talbrücke Bischmisheim	LfS Neunkirchen	D 180 D 240 B	U
B 10, Stahlbrücke Stuttgart-Zuffenhausen	SBA Schorndorf	DS 720	U
BAB A93 Los 25, BW 165-2	ABD Nürnberg	D 160 D 240	C
BAB A 93 Hof-Regensburg BW 159-1 südl. Regnitz	ABD Nürnberg	D 240	C
BW 30 and BW 31 A 10	ABA Brandenburg	D 80 B-Ü D 160	C

*) C = Complete set (new project)
U = Upgrade (for existing bridge)