

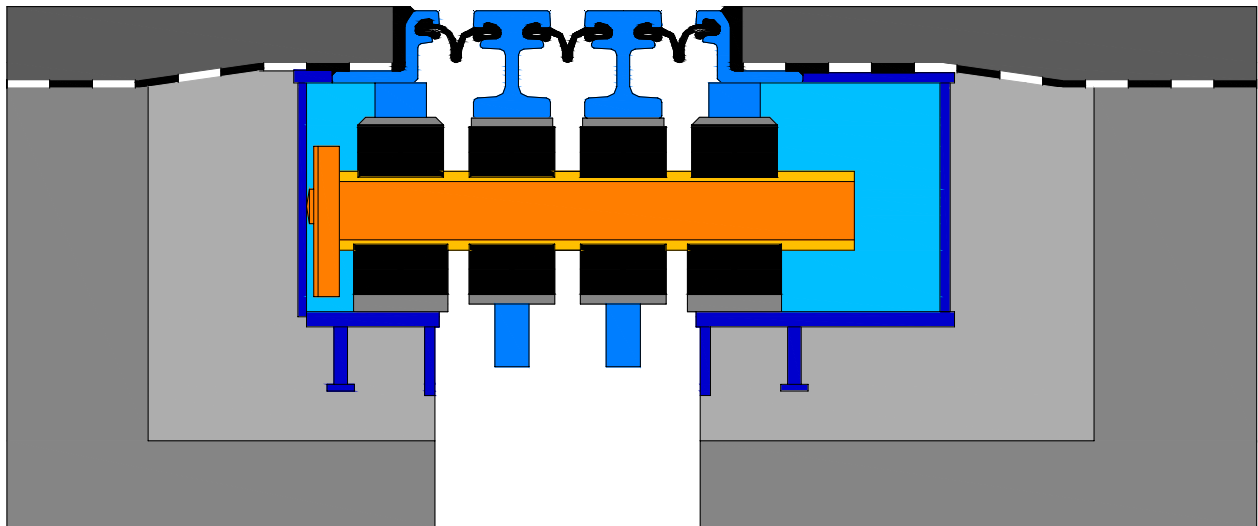


SWIVEL JOIST-EXPANSION JOINTS (with/without noise reduction)

TECHNICAL APPROVAL ACCORDING TO TL/TP FÜ (Stand: 03/05)

According to the requirements of:

German Federal Ministry of Transportation,
Building Industry and Housing
Department for Road construction, Road Traffic / Department S 18
Robert-Schuman-Platz 1
D-53175 Bonn



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Mister

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External controller:

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University Stuttgart
Pfaffenwaldring 32
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Technical Approval

*of static and construction engineering
aspect according to TL/TP FÜ (Stand: 03/05)
tested, see Inspection report-Nr.: 05/2007
dated 20.12.2007*

.....
Dipl.-Ing. W. Neumann, 58091 Hagen

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

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0. Field of Application

Due to the implementation of the Version 12/07 the hitherto valid Version of December 02, 2003 is now void.

The technical approval covers Construction of frequently repeated methods of construction. Currently there are the following limitations of the range of use to be considered:

- The carriageway may not exceed 10% of the transverse slope
- The carriageway may not exceed 9% of the slope with the DS640 type and 6% of the slope with larger types
- Allowed movements given by the Table 3.2 are to be considered.
- According to the ground plan, direction changes of the joint design are allowed only with Type STW between
 - the lying carriageway outside cross bar (joist) and the cornice or footway cross bar
- For noise reduction the use of rhombic elements is possible only between $60^\circ \leq \alpha \leq 120^\circ$.

Deviations from the above limitations and subsequent specifications are possible, but they require however a test for each single case separately.

1. Persons in charge

1.1 Applicant and Operator

MAURER SÖHNE GmbH & Co. KG
Frankfurter Ring 193
80807 Munich

Technical Office Munich
Dr. Ch. Braun, Mr. B. Volk

1.2 Manufacturer of the expansion joint

MAURER SÖHNE GmbH & Co. KG

Technical Offices:

Frankfurter Ring 193
80807 Munich

Zum Holzplatz 2
44536 Lünen

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02994 Bernsdorf

Manufacturing sites

Frankfurter Ring 193
80807 Munich

Kamenzer Str. 53
02994 Bernsdorf

Installation crews

Frankfurter Ring 193
80807 Munich

Zum Holzplatz 2
44536 Lünen

Kamenzer Str. 53
02994 Bernsdorf

1.3 Manufacturer of special components

See "The List of approved suppliers" in the appendix of the companies' work instruction QSA 1.810 in current version.

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1.4 Quality Assurance

QS-System

The quality management system meets the DIN EN ISO 9001 standards. It was certified by DVS-Zert.

Monitoring

The Monitoring is divided into external and internal supervision. The documents and working instructions that form the basis of this TECHNICAL APPROVAL will be tested on their compliance with these regulations. Responsible for the External Monitoring is the

German Federal Materials Testing Institute of the University Stuttgart
Pfaffenwaldring 32/ D-70569 Stuttgart

1.5 Approval and Verifications

Approvals for Welding

Munich Factory	"The Extensive Proof of Suitability" according to DIN 18800 Part 7, DIN 15018 (DIN 18809 included in DIN 15018), DIN 4099 and DS 804
Bernsdorf Factory	"The Extensive Proof of Suitability" according to DIN 18800 Part 7, DIN 4099 and DS 804 (DIN 18809)
Branch Lünen	"The Extensive Proof of Suitability" according to DIN 18800 Part 7, DIN 18809, and DS 804

Approval of Factory Welders

The condition required to obtain an Approval is a Licence according to DIN EN 287-1.

Approval of site Welders

According to component demands, only welders with a valid Verification Certificate according to DIN EN 287-1 and Concrete Reinforcement Steel Welder's Verification according to DIN 4099 are deployed. The related verification is available on the site.

1.6 Producer's statement

MAURER SÖHNE GmbH & Co. KG herewith declare

- Compliance with the design conditions of all documents with the test certificates, listed in the index from 1.12.2007
- Compliance with quality assurance standards listed in the supervision contract from 01st April 2002.

Munich, 01st December 2007

Company Management

Technical Office

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2. Description of the system

2.1 General

The lamellas are bedded movably on the diagonally arranged carriageway-joists. Each joist acts as a supporting component of all the lamellas of an expansion joint.

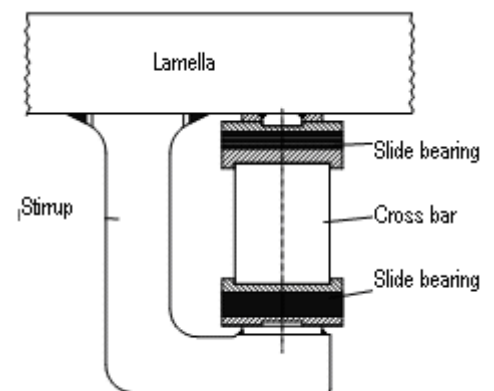
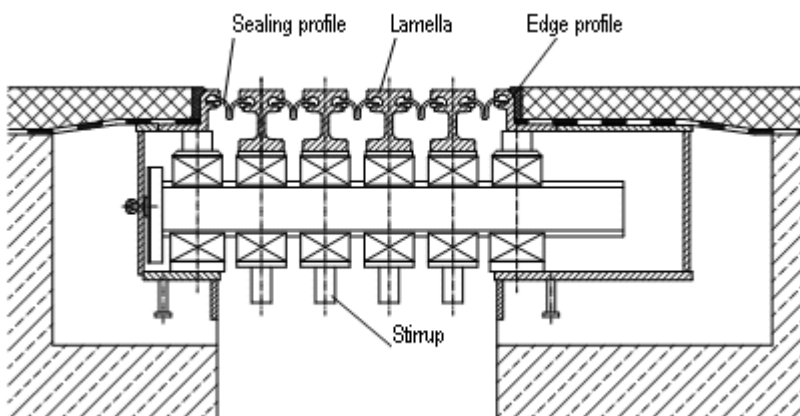
End stops limiting the movements of the lamellas can be designed, either one sided for both moving directions (normal case), or at both ends of the lamellas for one moving direction (special case). Depending on the operating condition, such construction can on the one hand (in the normal case) feature an extremely short cross bar box and at the counter bearing a long cross bar box, and on the other hand (in the special case) moderately long cross bar boxes on both sides.

Due to superstructure movement the cross bars are distorted when moving through the swivel guide sliding bearings. The swivel movement causes an even distribution of the movement on individual joint gaps due to a fixed swivel point clearance.

The load carrying and steering function is achieved simply without an additional steering mechanism within the ground plan by diagonally lying parallel aligned cross bars with the STP type and alternately aligned cross bars with the STW type.

This steering of the swivel bar construction has the advantage of controlling the exact leverage. Unlike the leverage controlling, it is also possible to compensate the manufacturing tolerances and different temperature dilatations of the lamellas and edge beams through its push flexible swivel joints.

The lamellas are slidable supported through trust rotary sliding bearings and springs with lateral guide bars in the cross bar direction. The bearing elements are twistingly mounted on the lamella resp. bearing holder at the vertical axis. Thereby their clearings are fixed.



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Due to their great possibility of adaptability the MAURER swivel cross bar joints are preferred with very large and / or complex movings of the bridge constructions and by the space constraints of the available construction site for expansion joint construction.

For very large movements the use of sviwel joist expansion joints is preferred for geometrical and economical reasons. This technical approval covers sviwel joist expansion joints with up to 975 mm allowed longitudinal construction movement. This maximum permissible value can be raised in individual cases through verification.

Due to the special kinematics of MAURER sviwel joist expansion joints, they are also applicable for the pin radiancy form of expansion joint edge movement, and for complex overlaps of different movement directions and twists in three space axis x, y and z. In section 3.2 the presented maximum values are therefore the only limitation.

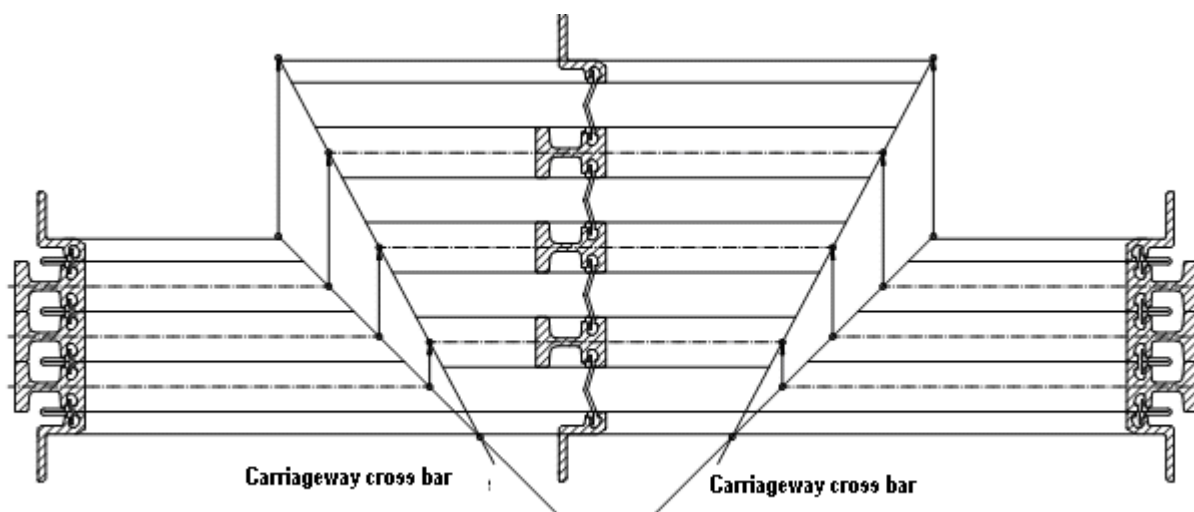
For larger swivel joints the use of swivel joint construction is recommended due to the small gap dimensions. They are especially suitable for joints to steel bridges and for the replacement of multi plate roll sealing.

2.2 Model STW

The cross bars are aligned alternately and that gives a different distance between the supports on each lamella. As the maximum distance of the cross bar is determinate, the same is true with the number of lamellas. All marginable displacements in the longitudinal joint direction are absorbed free of constraint.

The border areas of the change-over out of the carriageway are supported with special cornice cross bars.

The steering kinematics are composed of three carriageway cross bars arranged transverse to each other. The cross bars are sliding, supported in their longitudinal direction at the gap edge.



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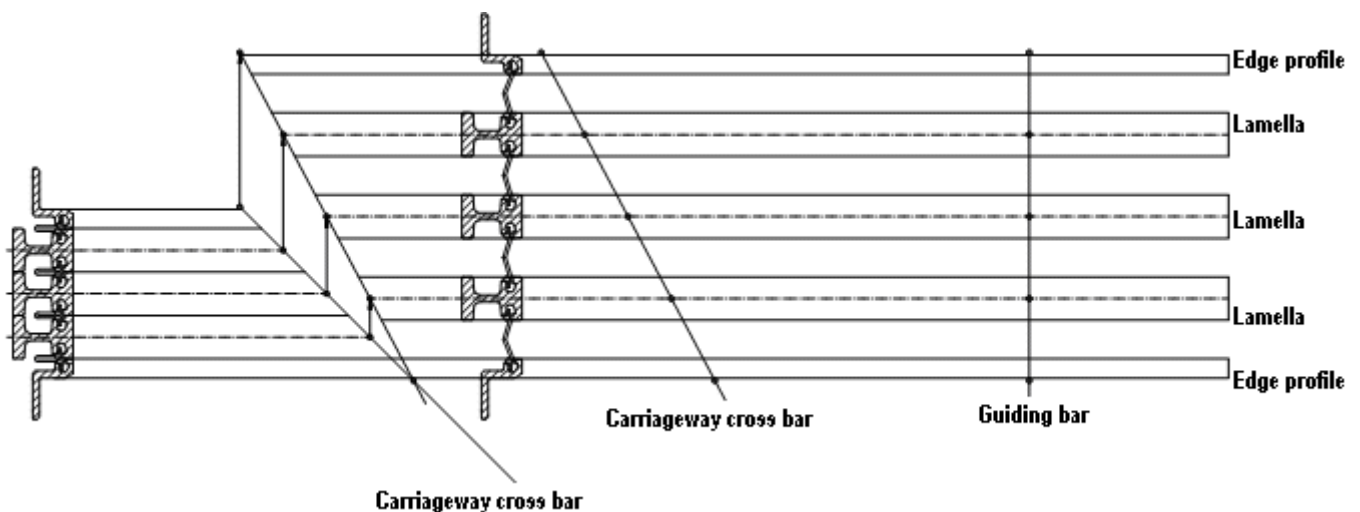
2.3 Model STP

The cross bars are aligned parallel and that gives an equal supporting distance on each lamella. So the maximum number of lamellas is not limited and is applicable right up to the largest extension paths in bridge construction.

Out of the carriageway there is a guiding cross bar, aligned at right angle to the gap axis in the central position of the gap.

The steering kinematic is set up through this guiding cross bar, positioned at right angle to the lamellas and clearly angular to the carriageway cross bars arranged to the lamellas. The cross bars are sliding, supported in their longitudinal direction at the gap edge.

With the use of a swivelling directional cross bar and without the use of a one axis movable footway cross bar, it is possible to combine all the movements of carriageway change over in any order according to the allowed movements from section 3.2, i.e. the fixing of of the bridge end bearing to a one way movement direction is unnecessary in such a case. On the contrary, the use of a directional cross bar without the swivelling part is possible for right angle bridge ends ($\alpha_2=90^\circ\pm 3^\circ$). But in such a case, each of the superstructure ends has to be guided through a minimal one-axis flexible bearing.




2.4 Force Transfer of the Wheel Loads

Vehicles travelling over the superstructure section, transmit vertical and horizontal forces to the bar. The section forces, which appear as a result of eccentric wheel loads are transmitted to the bar by means of the centre beam and via welding connections to the bar. From the bars they are transmitted via bearing elements and control springs to the joint's edges.

The cross bars, which bridge joint gaps are positioned diagonal to the lamella. Sliding bearings and sliding Springs respectively, positioned above or below the cross bars encompass the cross bar with lateral guiding bars. In this way forces can be transmitted diagonally to the cross bar.

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As a result of braking forces, the bearing elevation revolves. The displacements of the sliding bearings and the sliding springs on the bar, which occur due to revolving, affect propulsive forces in both bearing cushions. These produce via the big moment arm high return torque forces, which affect the high torsion stiffness bearing of the lamella attached to the cross bars.

2.5 Elastic support of joists

The lamellas on the joist as well as the joist at the structure's edges, are bedded spring-resilient on sliding bearings. A lift-off from the sliding bearing is prevented by means of a pre-stressed sliding spring that is arranged in the bearing holder underneath and in the joist-box.

Through this elastic support the momentum of the wheels is damped when transferred to the absorb elements of the cross section or to the neighbouring anchor parts. The arrangement of the elastomer bearing elements between all relatively converging components prevents any metal-to-metal contact and assures at the same time high damping of noises in rubber rolls.

The elastomer bearing elements allow rotations about all three space axis x, y and z, whereby for instance unplanned restraint forces on bearing points can be prevented.

2.6 Anchoring

Edge profiles are anchored with non stretchable anchor plates and welded round steel clamps in the concrete of the construction. The cross bar boxes have welded head bolt dowels to connect to neighbouring concrete. In steel bridges the edge construction is mounted on steel consoles or a support holder parallel to the end cross beam.

2.7 Sealing profile

The bulbous-shaped EPDM strip water- and pullout proof seal is installed in a claw in the edge beam and centre beams without the need for additional clamping bars. At the thickened places at the edge of the seal expansion joints a web is formed, which ends as a beaded rim. When the seal expansion joint is placed into the steel profile, the thickened part presses, using the wedging force, against the steel profile. By this means in addition to a form-locking connection, a friction-fitted Seal-/Steel profile contact is provided. At the same time the formed web with beaded rim acts as a lock which prevents jumping out in the case of dragging forces. The sealing element is set below the road surface level, and thus protected against direct wheel- or snowplough-contact.

The bulbous edge section of the sealing element locks it in the steel claw and is capable of withstanding wheel pressure on any impurities (e.g. stones, grit, snow etc.). The sealing element adapts to different kinds of joint design and bridge cross sections.

The admissible displacement of the sealing profile rectangular in the direction to the gap is 65 mm. With its preformed articulated section it is possible to move the strip seal in the direction of the carriageway without any appreciable strain. The admissible displacement in the direction to the gap of ± 40 mm causes a strain in the sealing profile.

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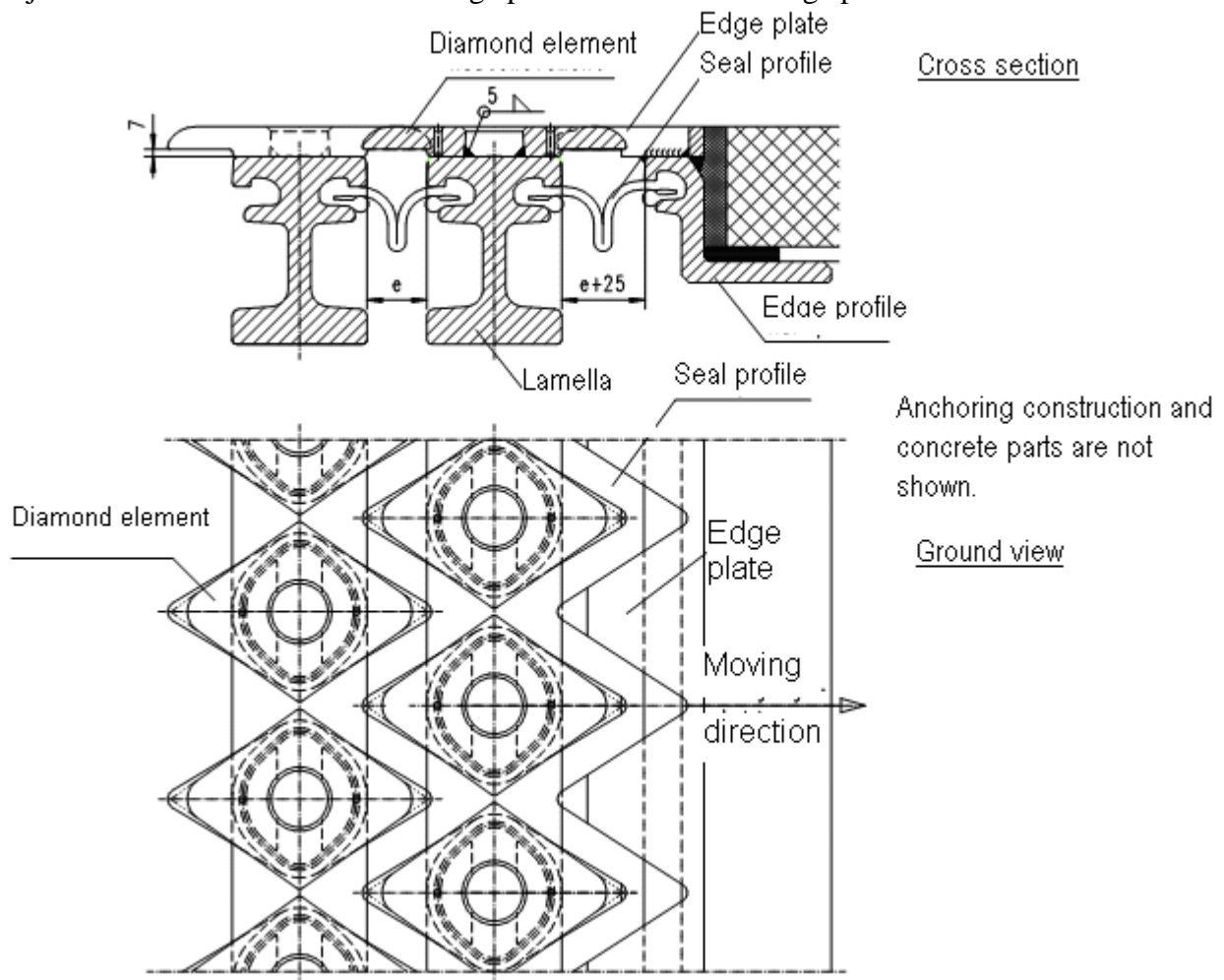
Sealing elements can be replaced from above with a pry bar when the individual gaps are ≥ 25 mm. If diamond elements are used for noise reduction, the individual gaps have to be ≥ 60 mm. The gap width can be enlarged by moving the lamellas.

2.8 Noise reduction (optional)

On bridges the noise radiates not only from the driving surface but also underneath and is often additionally amplified by the swinging impulses of the bridge superstructure. The noises on uneven road surface and on cross sections are sensed as especially disturbing.

With the use of rhombic elements the tyres do not hit the steel edges rectangularly but diagonally against rounded tops and so a noticeable impact and noise reduction is achieved.

The rhombic elements are attached to the underneath lamellas through punched welding. The rhombic elements tops project over the edges of the lamellas and don't touch neighbouring lamellas or the edge profile. The elements partly cover the neighbouring gap of the joint without building a passing through gap on the joint. There are sinusoid cut-out edge plates welded on the edge profiles.



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This gives a noise reduction of approximately 7dB for cars and trucks compared to the usual joints made with lamellas crossed over rectangular to the gap ($\varepsilon = 90^\circ$).

By welded rhombic elements, the carriageway geometry is also changed. The influence on the wheel load spreading at the cross section construction was technically experimentally tested at the TU-Munich, Prüfamt Landverkehrswege with comparative analysis of results for the lamellas with and without rhombic elements. The truck wheel was put centric above the middle lamella and at the second line of the experiment between two lamellas. Additionally the load position of 5 different gap widths was tested. The results showed that the lamellas with and without the diamonds had to absorb almost the same wheel load. In present forms there are also none static relevant differences.

All other known design concepts for carriageway cross sections have full validity for the rhombic variety too.

The tests showed no differences in traffic security concerning the tyre grip between the constructions of lamellas with and without rhombic elements at non profiled surfaces.


As the rhombic elements are hammer forged the driving surfaces obtain an additionally chequered structure. This provides a better grip between the wheel and the rhombic element and it is carried out as advancement of technical traffic security regardless of positive test results.

As the rhombic elements are pouched welded, there is a non welded gap on the outer edge of the contact surface. To prevent corrosion damages, the following method was developed to provide adequate sealing.



The gap is sealed to the outer edge by a special sealing material. Silicon mass is pressed through a bore-hole into a sealing groove of the welded construction. Two control gaps enable the operator to check whether there was enough sealing mass injected. After this procedure, the borehole is closed with a smashed in cylinder bolt. The hardening of silicon prevents later on lateral leaking later on.

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3. Hints for the user

3.1 Checklist for Planning and Control

At the girder planning and inspection respect following points:

1	Field of Application
1.1	Review of the ancillary conditions for the application area and the choice of the type of the cross-section.
2	Movements
2.1	The calculation of movements of the expansion joint from rotation and displacement of neighbouring components due to <ul style="list-style-type: none"> ■ Temperature ■ Creep and Shrinkage ■ Lifting to exchange the bearing ■ Braking/drive away ■ Displacement of fixed points ■ Elasticity of the foundation ■ Other Effects
2.2	Determining of most unfavorable moving combination at the expansion joint
2.3	Selection of the expansion joint considering the allowed movements according to specifications in tables in part 3.2
2.4	Check of final cross girder deformations in respect of specifications according to ZTV-ING
3	Loads
3.1	Check of loads affecting the expansion joint through load estimates according to TL/TP-FÜ (03/05) (special vehicles, inspection devices)
4	Pre-adjustment
4.1	Determination of the planned installation temperature and the appropriate rectangular and parallel pre-setting according to the expansion joint
4.2	Defining the change of dimensions of pre-adjustment in mm/°C
5	Recesses
5.1	Determination of the size und configuration of recesses according to Part 3.4 for expansion joint anchoring.
5.2	In special cases: Dimensioning of the recesses in co-ordination with company Maurer Söhne
6	Anchoring
6.1	Planning of connecting reinforcement or supporting constructions with steel constructions regarding the loads given in Part 3.5
6.2	Adjustment of reinforcements to the installation situation of carriageway expansion joints
6.3	Formation of reinforcement capable of trouble-free installation with anchoring at connecting brackets of the expansion joint
7	Handling by the company MAURER SÖHNE
7.1	Creating the assembly drawings and detail drawings specific for the construction
7.2	Examination and the proof of the geometrical operating conditions
7.3	Adjustment to the arrangement of the joist bars according to special construction requirements (clamping elements, recesses)

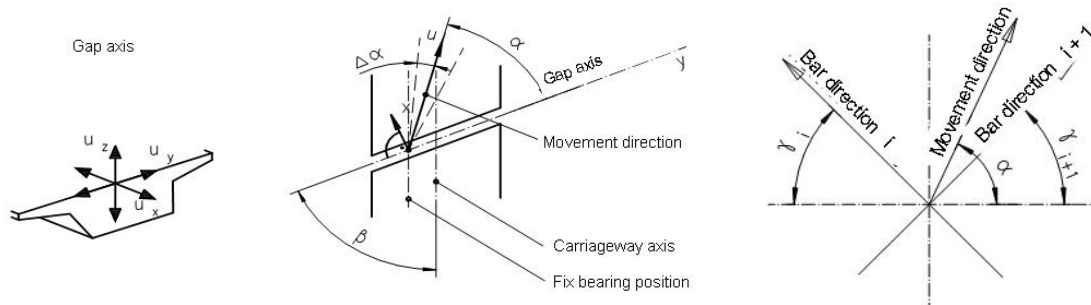
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3.2 Overview of the allowed movements determined within the scope of the Technical approval

- Model STW

All maximum allowed movements can occur within the whole range of allowed movements. For all φ angles and all u_z the formulae depending on e_{vorh} , u_x and B apply as stated below. The respective tabular values are merely guideline values for median operating conditions.

Directions x and y lie on the carriageway level!



n	Type	u_x [mm]	u_y [mm]	u_z [mm] e=37,5 mm	φ_x e=37,5 mm B=15 m	φ_y e=37,5 mm	φ_z e=37,5 mm B=15 m	α	β [°]	
2	DS160	130	±80	±10,0	±0,054°	±2,30°	±0,497°	90° ± 45°	any	
3	DS240	195	±120	±15,1	±0,081°		±0,745°			
4	DS320	260	±160	±20,3	±0,108°		±0,993°			
5	DS400	325	±200	±25,4	±0,135°		±1,241°			
6	DS480	390	±240	±30,5	±0,162°		±1,489°			
7	DS560	455	±280	±35,6	±0,189°		±1,737°			
8	DS640	520	±320	±39,0	±0,215°		±2,20°			±1,985°

The sealing profile needs to be installed in the median position ($s = 37,5$ mm). In this position the neighbouring cross bars need to be arranged laterally reversed to each other (inclination of the bar $\gamma = \pm 54,8^\circ$).

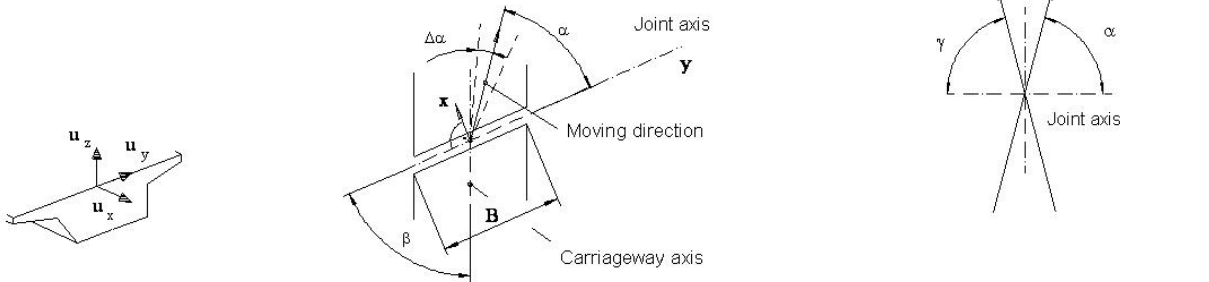
- | | |
|---|--|
| u_{\dots} main moving direction at the α angle
range of tolerance | deviations from the quoted values for α are possible within the whole range of tolerance |
| u_x ... moving component rectangular to joint axis | $(n \times 65)$ |
| u_y .. moving in the direction of the gap | $(\pm n \times 40)$ |
| u_z .. differences in height of the joint edges | $(\pm n \times (90 + e[\text{mm}]) \times \tan \varphi_y)$ |
| φ_x ... rotation about the axis rectangular to the joint | $(\pm \arctan((0,036 \times (e[\text{mm}])^{0,12} \times n \times (90 + s[\text{mm}])) / B[\text{mm}]))$ |
| φ_y ... rotation about the joint axis | (see Table) |
| φ_z ... rotation about the vertical axis | $(\pm \arctan((u_{x,zul} - u_{x,vorh}) \times 2 / B))$ |
| α ... angle between the moving direction and the joint axis | |
| β ... angle between the carriage axis and the joint axis | |
| e ... width of individual gaps | |
| B ... the width of the bridge, measured in the direction of the joint | |

If the above allowed distances are exceeded, always execute a check for each single case separately.

- Model STP

All maximum allowed movements can occur within the whole range of allowed movements. The bridge end has to be guided clearly through at least one one-axis flexible bearing, if the non-swivel direction cross bar is used. For all φ angles and all u_z the formulae depending on e_{vorh} , u_x and B apply as stated below. The respective tabular values are merely guideline values for median operating conditions.

The x and y directions are positioned at the carriageway level



n	Type	u_x [mm]	u_y [mm]	u_z [mm]	φ_x e=37,5 mm B=15 m	φ_y^* e=37,5 mm	z e=37,5 mm B=15 m	Directional cross bar		β [°]
								α_1 swiveling	α_2 non swiveling	
2	DS160	130	±17,4	±10,0	±0,054°	±2,30°	±0,497°	90° ± 15°	90° ± 3°	any
3	DS240	195	±26,1	±15,1	±0,081°		±0,745°			
4	DS320	260	±34,8	±20,3	±0,108°		±0,993°			
5	DS400	325	±43,5	±25,4	±0,135°		±1,241°			
6	DS480	390	±52,3	±30,5	±0,162°		±1,489°			
7	DS560	455	±61,0	±35,6	±0,189°		±1,737°			
8	DS640	520	±69,7	±39,0	±0,215°	±2,20°	±1,985°			
9	DS720	585	±78,4	±39,7	±0,242°	±1,99°	±2,233°			
10	DS800	650	±87,1	±40,1	±0,269°	±1,81°	±2,481°			
11	DS880	715	±95,8	±40,6	±0,296°	±1,67°	±2,729°			
12	DS960	780	±104,5	±41,0	±0,323°	±1,54°	±2,977°			
13	DS1040	845	±113,2	±41,0	±0,350°	±1,44°	±3,224°			
14	DS1120	910	±121,9	±41,6	±0,377°	±1,34°	±3,472°			
15	DS1200	975	±130,6	±41,6	±0,404°	±1,25°	±3,719°			

*) The angle $\varphi_y = 2,3^\circ$ can be maintained with all types through the spreading of box dimensions.

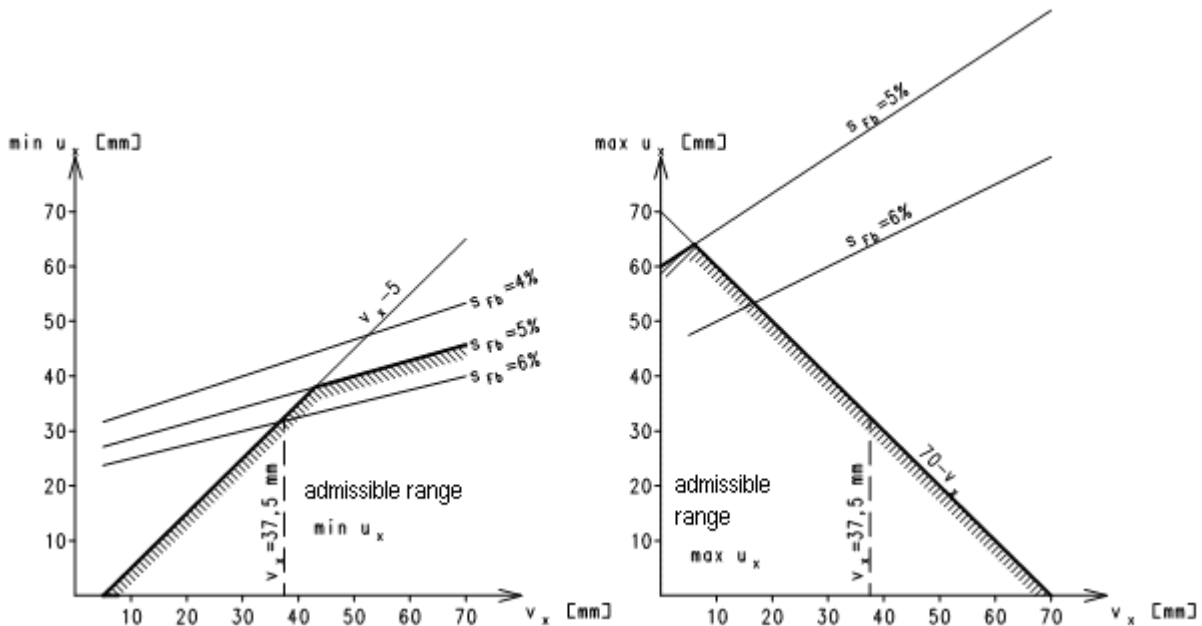
....at $\alpha \neq 90^\circ$ the α and γ have to lie in different quadrants of the angle in the floor path, see drawing.

- u... main moving direction at the α angle
 - u_x ... moving component rectangular to joint axis
 - u_y ... moving component parallel to the joint axis
 - u_z ... differences in height of the joint edges
 - φ_x ... rotation about the axis rectangular to the joint
 - φ_y ... rotation about the joint axis
 - φ_z ... rotation about the vertical axis
 - α_1 ... moving direction with the use of a swivel directional cross bar
 - α_2 ... moving direction with the use of a non-swivelling directional cross bar
 - β ... Vehicle crossing direction (carriageway axis)
 - e... width of individual gaps
 - B... the width of the bridge, measured in the direction of the joint
- deviations from the quoted values for α are possible within the whole range of tolerance
- (n × 65)
- (±n × 32,5 × tan15°)
- (±n × (90 + e[mm]) × tan φ_y)
- (±arctan ((0,036 × (s[mm])^{0,12} × n × (90 + e[mm])) / B[mm]))
- (see table)
- (±arctan (($u_{x,zul} - u_{x,vorh}$) × 2 / B))

If the above allowed distances are exceeded, always execute a check for each single case separately.



For carriageway surface inclinations rectangular to the joint $s_{Fb} > 5\%$, a restriction of the u_x dimension is possible depending upon the pre-adjustment of the expansion joint's cross section v_x . This is interrelated to the fact that the movements of the superstructure's end take place on the horizontal moving bearings, while the carriageway cross section is installed in the slope of the carriageway surface and this causes variations in inclination in the joint area. To comply with the requirements of the TL/TP FÜ (Stand: 03/05), section 3.5.6 (3); ($\Delta s_{Fb} \leq 2\%$) the following arises:



Opening process:

$$\frac{\max u_x \times s_{Fb}}{90 + v_x + \max u_x} \leq 0,02 \quad \Rightarrow \quad \max u_x = 0,02 \times \frac{90 + v_x}{s_{Fb} - 0,02} \leq 70 - v_x$$

Closing process:

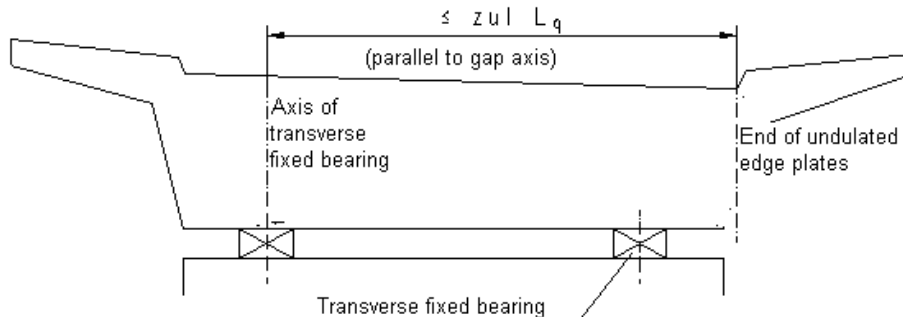
$$\frac{\min u_x \times s_{Fb}}{90 + v_x - \min u_x} \leq 0,02 \quad \Rightarrow \quad \min u_x = 0,02 \times \frac{90 + v_x}{s_{Fb} + 0,02} \leq v_x - 5$$

A total of:

$$\text{zul } u_x = n \times (\max u_x + \min u_x) \leq n \times 65$$

3.3 Additional regulatory framework for the use of rhombic elements

- Permitted lengths of construction in the carriageway area with the use of transversal fixed bearings



with;

n: number of sealing profiles
 zul L_q : permitted axis distance of carriageway edge from the transversal fixed bearing in y-direction

Where: $vorh L_q \leq zul L_q$

n [-]	Prestressed concrete bridge with shrinkage zul L_q [m]	Prestressed concrete bridge without shrinkage zul L_q [m]	Steel girder concrete and steel bridges zul L_q [m]
2	13,2	20,0	12,3
3	20,8	31,4	19,3
4-15	28,3	42,9	26,3

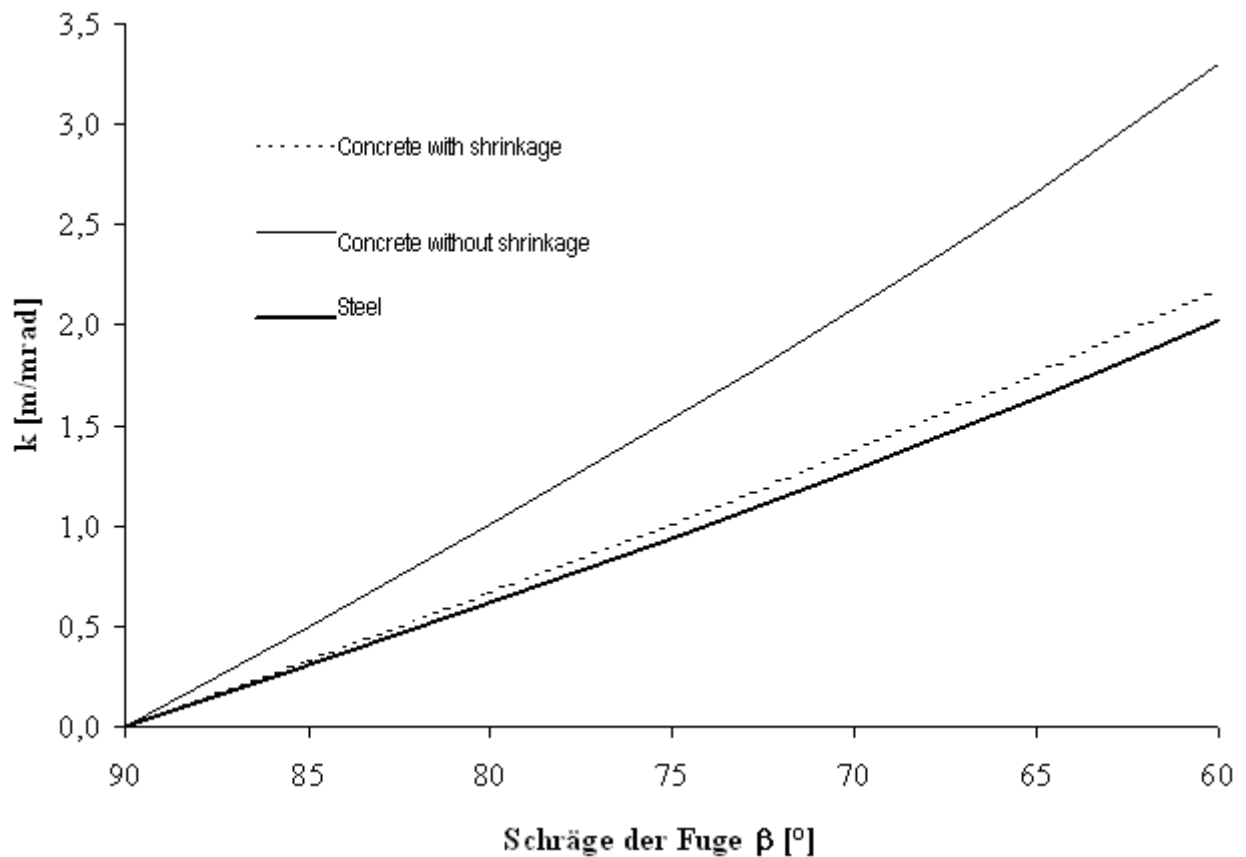
VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

With oblique bridge ends the end field twist φ_y [mrad] of the superstructure has an effect on the allowed construction length L_q .

The distance between the superstructure centre line and carriageway change-over is adopted with $h = 2$ m:

$$\text{zul}L_q = \text{zul}L_q - k \times \varphi_y$$

(with $\text{zul}L_q$ according to the above Table and und with k from the following graph)



BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	SEITE: 14	ARCHIV NR.
BLOCK : 3 - HINWEISE FÜR DEN ANWENDER		<i>Regelprüfung</i> Nr. 05/07 vom 20.12.07
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

- Admissible lateral displacement without lateral solid support

As rhombic elements are allowed also for joint constructions with established transversal displacement, a check has to be made, to define the worst case conditions that have to be maintained without any possible constraint.

If it is assumed that the minimal gap setting is always smaller than the centre position, the dependency for the allowed transversal displacement is as follows:

$$u_{q,zul} = \pm \left[n \times \left(6 - 1 - 1 + \frac{20}{32,5} \times (e_{min} - 5) \right) - L \times \alpha \times \Delta T \right]$$

with;

$u_{q,zul}$		(regular displacement transverse to main displacement direction u)
n		(number of sealing profiles)
e_{min}		(lowest emerging joint gap)
L	= 12000 mm	(assumed maximum value)
α	= $12 \cdot 10^{-6} \text{ 1/K}$	(coefficient of linear thermal expansion for Steel)
ΔT	= 47,5 K	(maximal temperature difference with Steel girder concrete and Steel bridges relating to an installation temperature of 10°C).

n	$e_{min} = 5 \text{ mm}$ $\pm u_{q,zul}$ [mm]	$e_{min} = 37,5 \text{ mm}$ $\pm u_{q,zul}$ [mm]
2	1	41
3	5	65
4	9	89
5	13	113
6	17	137
7	21	161
8	25	185
9	29	209
10	33	233
11	37	257
12	41	281
13	45	305
14	49	329
15	53	353

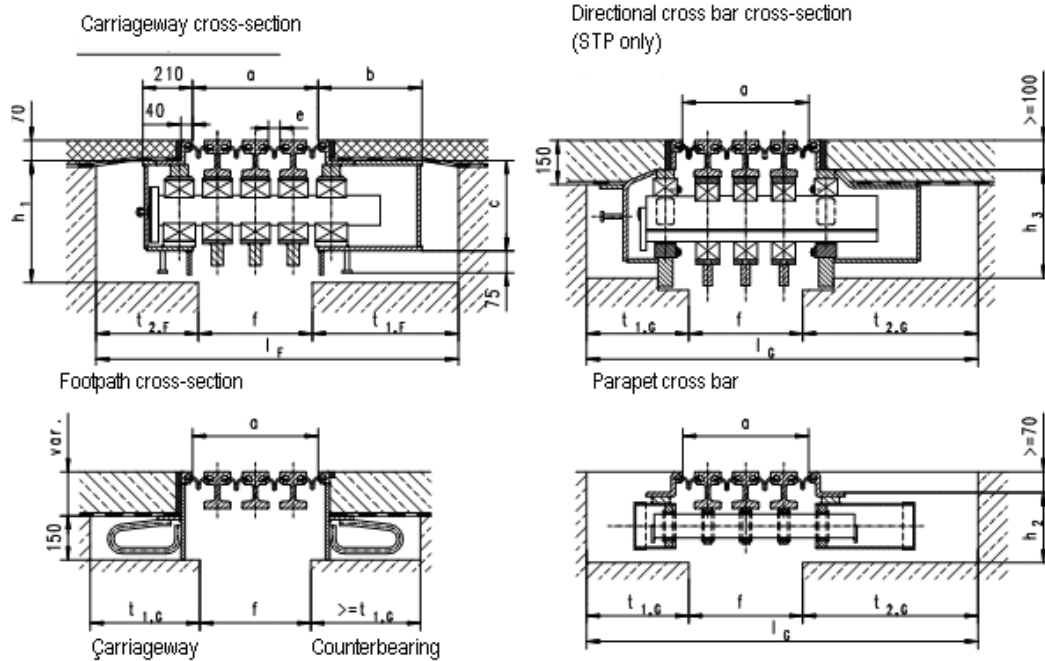
Interim values can be interpolated. By increasing of the number of sealing profiles the value for $u_{q,zul}$ can be enlarged. However, the given values for u_y from section 3.2 must not be exceeded!

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 3 - HINWEISE FÜR DEN ANWENDER	SEITE: 15
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; display: inline-block;">Regelprüfung Nr. 05/07 vom 20.12.07</div>



3.4 Recess-sizes

- One side cross bar displacement



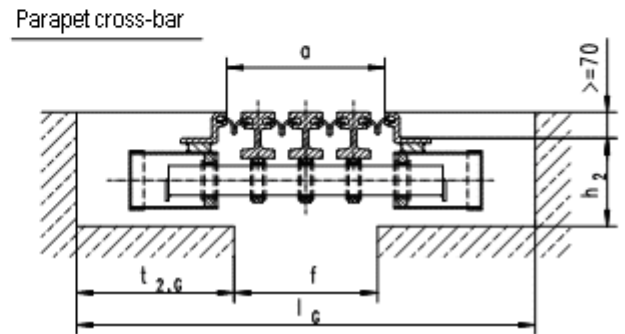
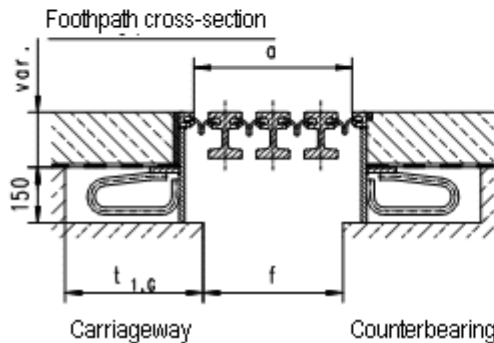
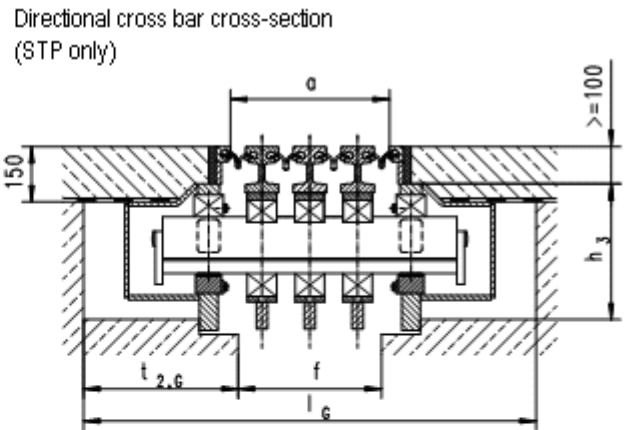
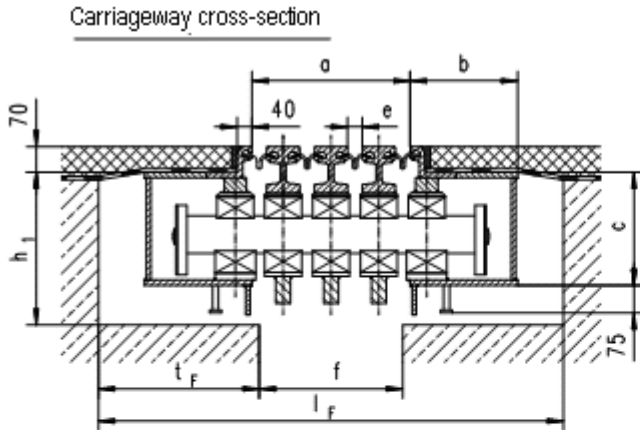
preliminary assumed adjustment dimension $e = 30 \text{ mm}$

MAURER expansion joint		Construction measurements			Concrete-Recess dimensions					Concrete-joint dimensions				
n	Type	a [mm]	b [mm]	c [mm]	h_1^* [mm]	h_2 [mm]	h_3 [mm]	$t_{1,F}$ [mm]	$t_{2,F}=t_{1,G}^{**}$ [mm]	$t_{2,G}$ [mm]	f_{\min} [mm]	f_{\max} [mm]	l_F [mm]	l_G [mm]
2	DS160	150	315	312	440	230	400	430	400	420	115	130	945	935
3	DS240	270						430		490	225	250	1055	1115
4	DS320	390	415	342	470	270	400	530	410	575	300	370	1230	1275
5	DS400	510						530		660	410	490	1340	1470
6	DS480	630	585	399	520	460	400	700	420	745	520	610	1630	1675
7	DS560	750						700		830	630	730	1750	1880
8	DS640	870	725	429	550	460	400	700	430	915	740	850	1870	2085
9	DS720	990						840		1000	850	970	2130	2290
10	DS800	1110	795	399	520	460	400	910	450	1085	960	1090	2320	2495
11	DS880	1230						950		1170	1070	1210	2480	2700
12	DS960	1350	983	429	550	460	400	1020	470	1255	1180	1330	2670	2905
13	DS1040	1470						1090		1340	1290	1450	2860	3110
14	DS1120	1590	1063	429	550	460	400	1170	490	1425	1400	1570	3060	3315
15	DS1200	1710						1220		500	1510	1510	1690	3230

- *) if the change over construction is fitted with diamond elements, the measure for h has to be enlarged by 20mm!
- **) For fixed side box design according to the version for projecting carriageway plates without final cross girder (bedded by welded anchor studs) for $t_{2,F}$ different conditions apply, see Construction Plans, Chapter 7, page 5..
- all dimensions apply rectangular to gap axis y
- The measurements b and t are valid for $75^\circ \leq \alpha \leq 105^\circ$ (other values need other gap dimensions)
- n = number of sealing profiles
- a , f and l apply for the adjustment dimension $e = 30 \text{ mm}$ for each joint gap, and have to be adjusted in case of a deviation of the dimension e for $n \times \Delta e$
- Recesses for footway joists, directional cross bars and cable conduits normally require an arrangement between the planner of the construction and the producer of the carriageway cross section.
- Consider specifications given in Part 6.1.

BAUTEIL	: SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	SEITE: 16	ARCHIV NR. <i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
BLOCK	: 3 - HINWEISE FÜR DEN ANWENDER		
VORGANG	: REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

- One side cross bar displacement



preliminary adopted adjustment dimension e = 30 mm

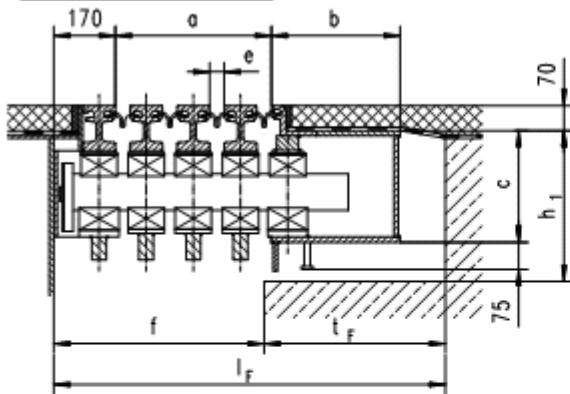
MAURER expansion joint		Construction measurements			Concrete-Recess dimensions					Concrete-joint dimensions		
n	Type	a [mm]	b [mm]	c [mm]	h1* [mm]	h2 [mm]	h3 [mm]	tF=t2,G [mm]	t1,G [mm]	fmin [mm]	fmax [mm]	lF=lG [mm]
2	DS160	150	263	312	440	230	400	415	400	115	130	945
3	DS240	270						415		225	250	1055
4	DS320	390	313	342	470	270	400	465	300	370	1230	
5	DS400	510						465	410	490	1340	
6	DS480	630	398	399	520	460	400	555	520	610	1630	
7	DS560	750						560	630	730	1750	
8	DS640	870	468	520	550	460	400	565	740	850	1870	
9	DS720	990						640	850	970	2130	
10	DS800	1110	503	429	550	460	400	680	960	1090	2320	
11	DS880	1230						527	1070	1210	2480	
12	DS960	1350	597	429	550	460	400	705	1180	1330	2670	
13	DS1040	1470						785	1290	1450	2860	
14	DS1120	1590	637	429	550	460	400	830	1400	1570	3060	
15	DS1200	1710						860	1510	1690	3230	

- *) if the change over construction is fitted with diamond elements, the measure for **h** has to be enlarged for 20mm!
- all dimensions apply rectangular to gap axis y
- The measurements b and t are valid for $75^\circ \leq \alpha \leq 105^\circ$ (other α values need other gap dimensions)
- n = number of sealing profiles
- a, f and l apply for the adjustment dimension e = 30 mm for each joint gap, and have to be adjusted in case of a deviation of the dimension e for n x Δe
- Recesses for footway cross bars, directional cross bars and cable conduits normally require an arrangement between the planner of the construction and the manufacturer of the carriageway cross section.
- Consider specifications given in Part 6.1.

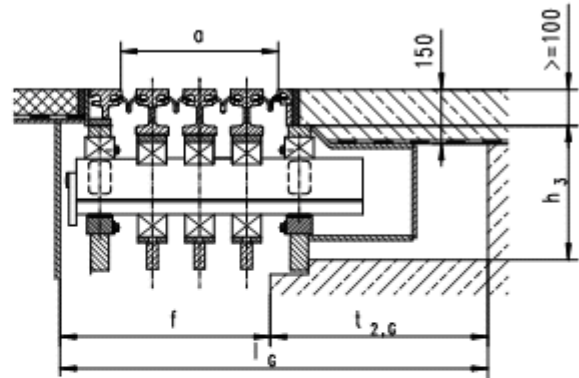


- Steel joint

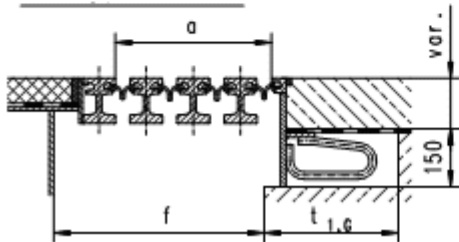
Carriageway cross-section



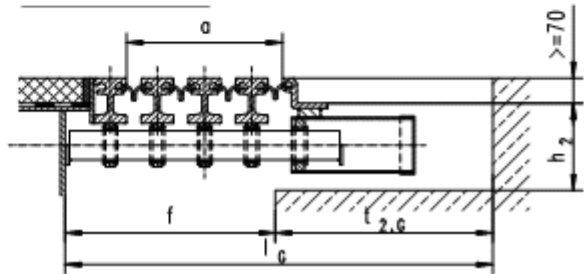
Directional cross bar cross-section] (STP only)



Footpath cross-section



Parapet cross bar



preliminary adopted adjustment dimension e = 30 mm

MAURER expansion joint		Construction measurements			Concrete-Recess dimensions							Concrete-joint dimensions			
n	Type	a [mm]	b [mm]	c [mm]	h ₁ * [mm]	h ₂ [mm]	h ₃ [mm]	t _F [mm]	t _{1,G} [mm]	t _{2,G} [mm]	f _{min} [mm]	f _{max} [mm]	l _F [mm]	l _G [mm]	
2	DS160	150	315	312	440	230	400	450	400	420	325	340	775	745	
3	DS240	270						460		490	435	460	895	925	
4	DS320	390	415	342	470	270	400	610	410	575	510	580	1120	1085	
5	DS400	510						620		660	620	700	1240	1280	
6	DS480	630	585	399	520	270	400	800	440	745	730	820	1530	1475	
7	DS560	750						810		830	840	940	1650	1670	
8	DS640	870	725	429	550	460	400	820	430	915	950	1060	1770	1865	
9	DS720	990						970		1000	1060	1180	2030	2060	
10	DS800	1110	795	399	520	270	400	1050	450	1085	1170	1300	2220	2255	
11	DS880	1230	843					1100		460	1170	1280	1420	2380	2450
12	DS960	1350	913	429	550	460	400	1180	470	1255	1390	1540	2570	2645	
13	DS1040	1470	983					1260		480	1340	1500	1660	2760	2840
14	DS1120	1590	1063	429	550	460	400	1350	490	1425	1610	1780	2960	3035	
15	DS1200	1710	1113					1410		500	1510	1720	1900	3130	3230

- *) if the change over construction is fitted with diamond elements, the measure for **h** has to be enlarged by 20mm!
- all dimensions apply rectangular to gap axis y
- The measurements b and t are valid for $75^\circ \leq \alpha \leq 105^\circ$ (other α values need other gap dimensions)
- n = number of sealing profiles
- a, f and l apply for the adjustment dimension e = 30 mm for each joint gap, and have to be adjusted in case of a deviation of the dimension e for n x Δe
- Recesses for footway cross bars, directional cross bars and cable conduits normally require an arrangement between the planner of the construction and the producer of the carriageway cross section.
- Consider the specifications given in Part 6.1.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200

BLOCK : 3 - HINWEISE FÜR DEN ANWENDER

SEITE: 18

ARCHIV NR.

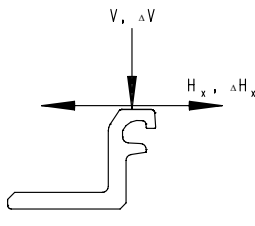
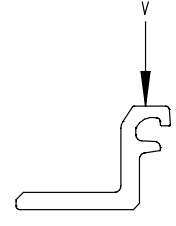
Regelprüfung
Nr. 05/07 vom 20.12.07

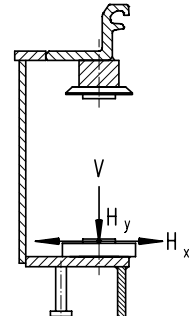
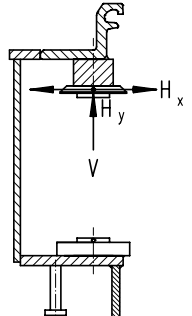
VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

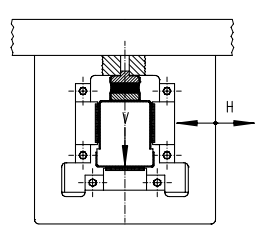
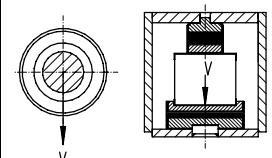
3.5 Anchoring powers

Moving resistance (friction and control)	
H_x [kN/m]	3,0 + n
H_y [kN/m]	2,6 × (n-1)

Irrespective of the inclination of the carriageway, the V forces always act vertically and the H forces horizontally. The forces given are characteristic values according to DIN-Expert report 101. Stated power specifications apply at the same size and direction for cross bar bearing boxes and edge profiles when connecting a steel bridge. The values for wear out evidence already contain the increase factor $\gamma_E = 1,25$.

Edge profile of the carriageway	Structural safety			Edge profile footway	Structural safety	
	n [-]	≤ 8	> 8		2-15	
	V [kN]	140	140		50	
	H_x [kN]	51,6	47,4		4,5	
	Tiredness					
	ΔV [kN]	140	140			
	ΔH_x [kN]	47,4	47,4			
	κ_v [-]	-0,3	-0,3			
	κ_h [-]	-0,66	-0,73			
	decisive edge width b=0,60 m				decisive edge width b=0,40 m	

Cross bar box lower	Structural safety			Cross bar box upper	Structural safety	
	n [-]	≤ 8	> 8		≤ 8	
	V [kN]	134,1	184,5		3,0	
	H_x [kN]	39,7	78,1		48,9	
	H_y [kN]	91,4	84,2		37,4	
	Tiredness					
	ΔV [kN]	130,8	159,1		29,3	
	ΔH_x [kN]	27,7	42,2			
	ΔH_y [kN]	52,5	45,5			
	κ_v [-]	-0,15	-0,15			
κ_h [-]	-0,5	-0,5				

Directional cross bar	Structural safety			Cornice- /footpath cross bar	Structural safety	
	n [-]	≤ 8	> 8		2-15	
	V [kN]	140	140		43,1	
	H_x [kN]	51,6	47,4			
	Ermüdung					
	ΔV [kN]	140	140			
	ΔH_x [kN]	47,4	47,4			
	κ_v [-]	-0,3	-0,3			
	κ_h [-]	-0,66	-0,73			
	directional cross bar only with STP				footpath cross bar only with STP	

The capacity specification applies in the same size and direction to the supports of the cross bars underneath the last bar on the superstructure's side (replacement for the edge profile, in profile axis) at the connection to steel bridge. The supporting elements must always be determined and checked individually.

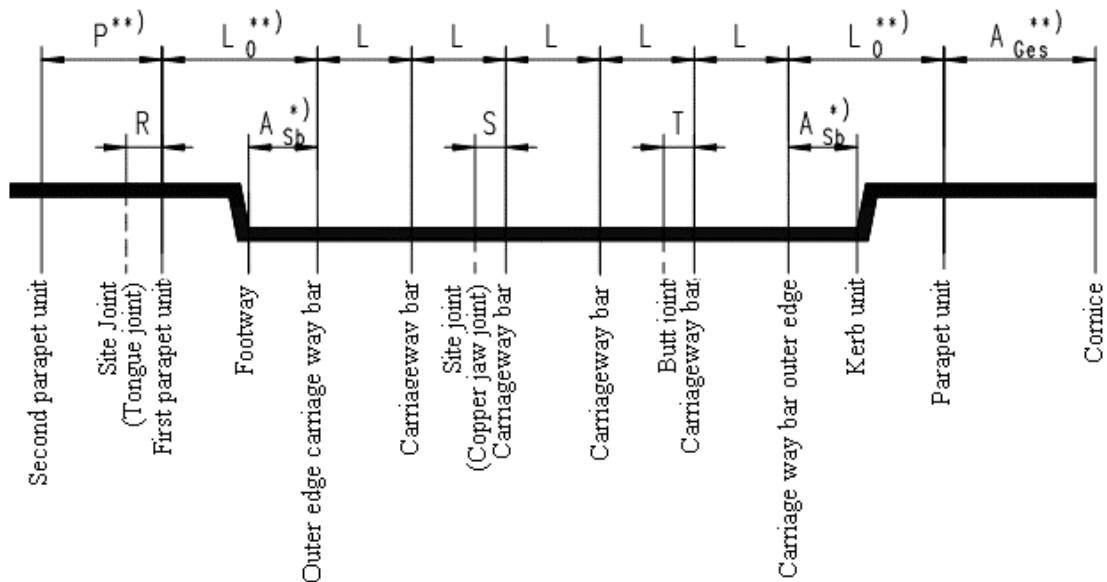
BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 3 - HINWEISE FÜR DEN ANWENDER	SEITE: 19
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; display: inline-block;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

4. Construction requirements for the technically approved carriageway cross-sections

4.1 Allowed cross bar interspaces and the arrangement of the joints

applies always to the median axis of the carriageway cross section.

Cross section in direction of the Joint-axis



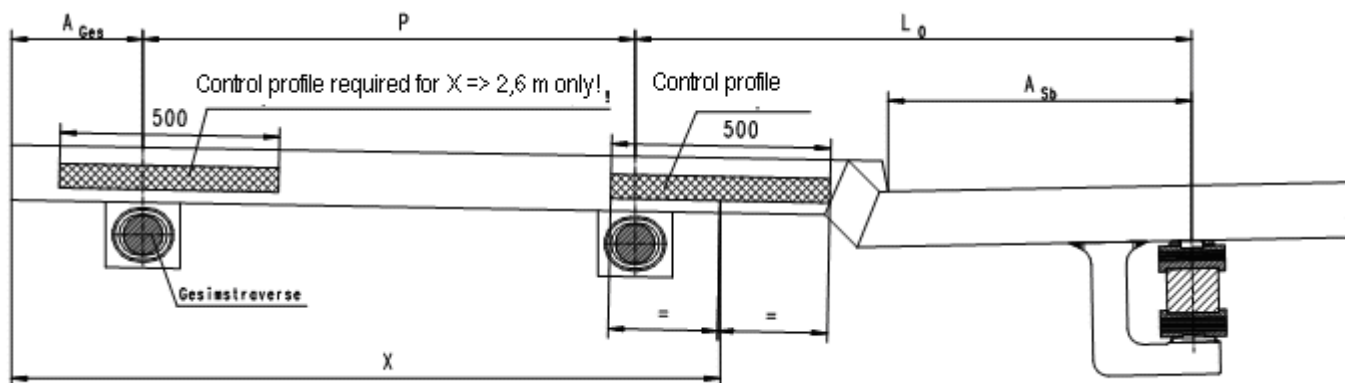
- *) In this area the lamella must not be attached either by butt joints or by site joints.
- **) The dimension applies for the lamella, positioned next to the edge beam. All other show shorter distances to the kerb unit.
- ***) see section 4.2

n	Design	Type	s	A _{Sb} [mm]	L [mm]	P [mm]	S _{min} [mm]	S _{max} [mm]	T _{min} [mm]	T _{max} [mm]
2 to 8	STW	DS160 to DS640	≤9%	≤770	≤1630	≤1630	160	425	180	290
	STP						95	375	30	225
9 to 15	STP	DS720 to DS1200	≤3%	≤950	≤1630	≤1630	95	375	30	225
			≤4%	≤900						
			≤5%	≤875						
			≤6%	≤850						

With increasing inclination of the carriageway rectangular to the joint axis additional steering profiles of 500 mm length are added (see drawings in sect. 7).


4.2 Arrangement of cross bars in the footway

When α is defined, all cornice cross bars can be laid in the direction of the carriageway change over. According to TL/TP- (03/05) the vertical self frequency $f_v = 120$ Hz and the horizontal self frequency $f_h = 40$ Hz are not to be undershot. Therefore the overhang length A_{Ges} has to be limited.



A_{Ges} [mm]	L_0 [mm]	P [mm]
≤ 400	≤ 1700	0
≤ 400	≤ 1700	≤ 1700
≤ 600	≤ 1700	≤ 1500
≤ 600	≤ 1500	0

If the clearance between the outer edge of the parapet area and the middle of the pavement steering at the kerbs shelf X is $> 2,6$ m, on the outer Parapet unit an 0,5 m long guiding profile has to be inserted additionally.

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4.3 Factory provided corrosion protection

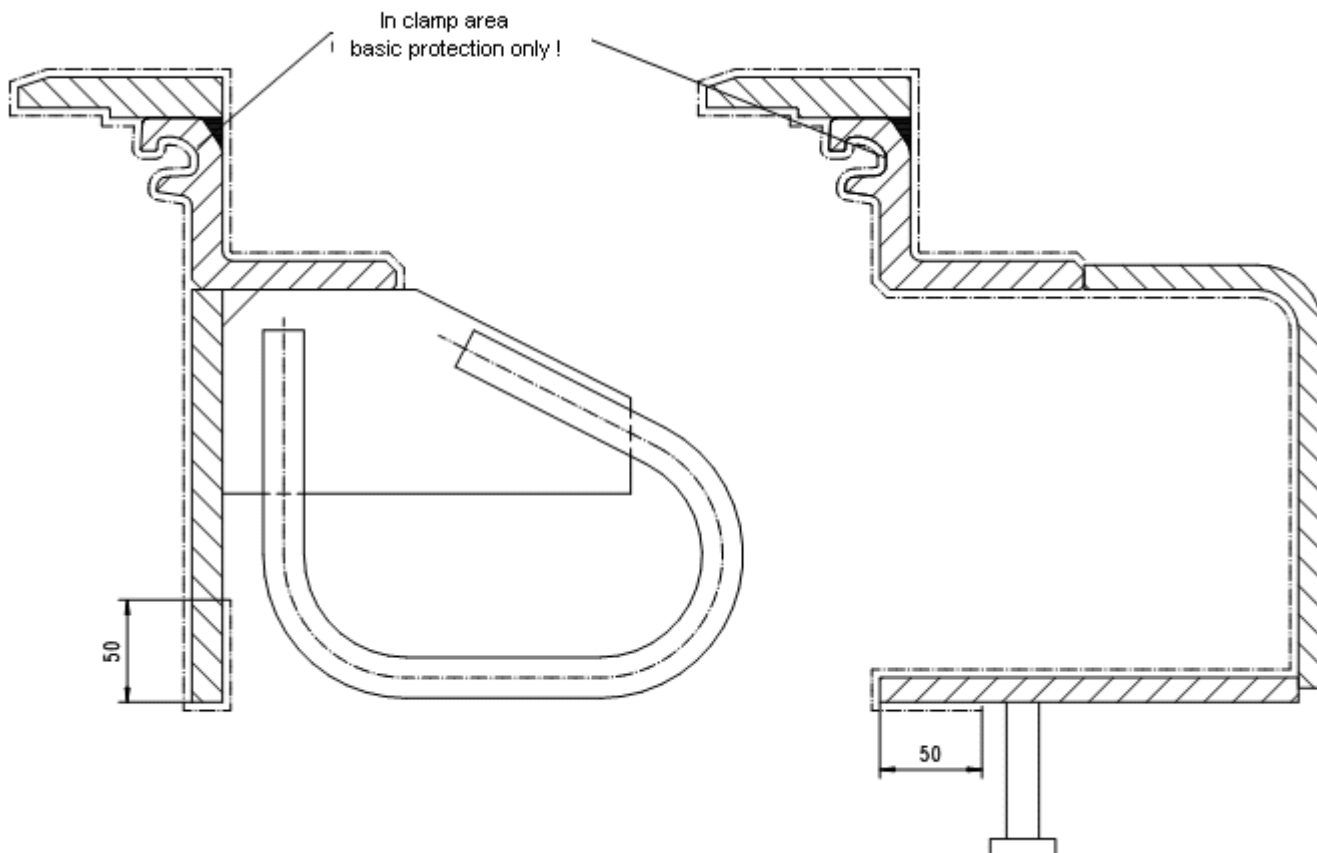
The corrosion protection of regularly tested constructions is executed according to ZTV-KOR-Steel constructions 2002.

Appendix A

Corrosion protection system No. 1		Target layer thickness	Surface preparation	Materials according to TL/TP-KOR-Steel constructions 2002 Page Nr.
GB	EP-zinc powder	70 µm	Sa 2½	94/95
1.DB	EP (miscaceous iron ore)	80 µm each DB		
2.DB				
3.DB				
4.DB				

The blasting takes place at a cycle construction and the coating using the airless-method immediately afterwards.

The following rough drafts show the corrosion-protected area:



BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 4 - GELTUNGSBEREICH	SEITE: 22
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

5. Installation instructions

5.1 Delivery

The expansion joints come delivered to the site in their full length and construction sections respectively and completely assembled. For the transportation, storing and the installation auxiliary constructions have been designed, which ensure that the cross section construction is held in the right installation position and allows an adequate loading. 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 i.e. they are to be stored on appropriate grounding (e.g. on square timbers). Damage and contamination must be avoided by means of well ventilated tarpaulins.

The following table contains weights per running-meter, which can be used as a guide value for the dimensioning of the crane.

Type	Weight[kg/m]	Type	Weight[kg/m]
DS160	300	DS720	1040
DS240	380	DS800	1140
DS320	480	DS880	1250
DS400	570	DS960	1390
DS480	690	DS1040	1510
DS560	790	DS1120	1620
DS640	890	DS1200	1740

Table: Weights per running meter for dimensioning of the crane (guiding values) iamond element

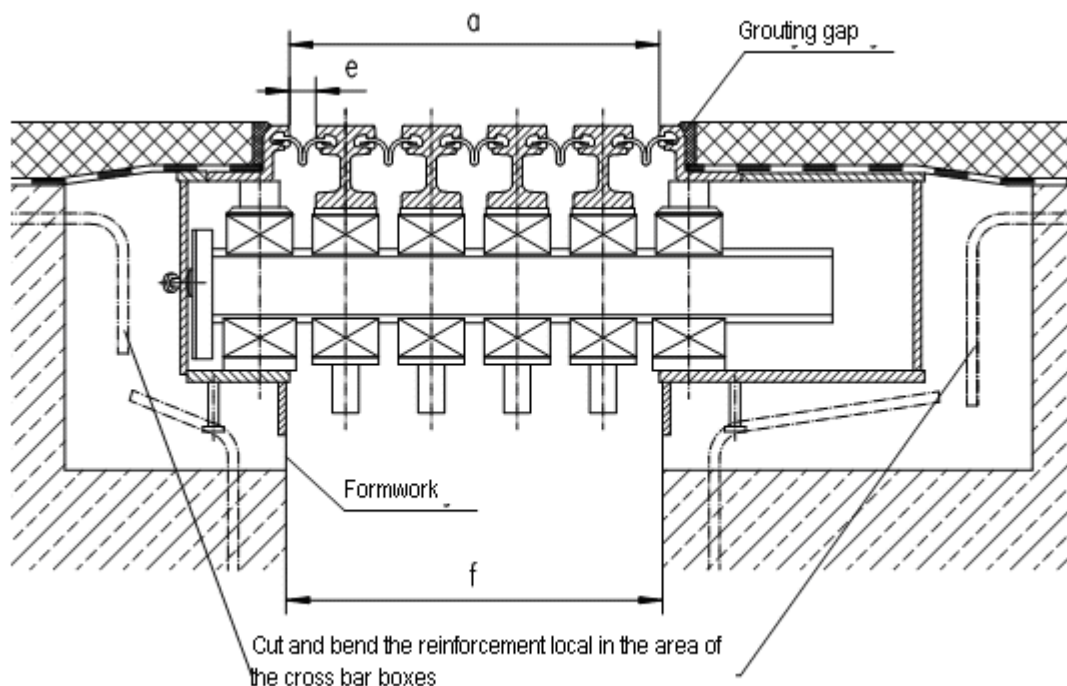
5.2 Installation and structural connection in case of concrete structural components

Size of the recesses in the structural concrete is to be determined in advance within the scope of the planning of the construction and according to section 3.4 or according to our engineering drawing and later to be realized accordingly. The width of the structural gap, related to the adjustment dimension of the expansion joint is always to be considered. Before the beginning of the installation, the recess dimensions are to be checked once again and adjusted if necessary. The surfaces of the recesses as well as the construction joints need to be treated as working gaps.

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BLOCK : 5 - EINBAUANWEISUNG	SEITE: 23
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; color: green; text-align: center;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

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A reinforcement in net or sling form has to be provided underneath the cross box as reinforcement against split drag. See the Construction Plan after Section 7 for appropriate data.



Picture 1: Cross section cross bar box


The construction has to be lifted into the recess by using an adequate truck-mounted crane, then levelled to the required height according to the site engineer and assembled parallel to the longitudinal and transverse slope of the carriageway. The edge profiles have to be aligned carefully along according to the ground plan and to the shear plan. Specifications of the height position of the cross section relating to the carriageway surface from TL/TP FÜ (Stand: 03/05) have to be regarded.

After the carriageway crossover is aligned vertical stiffeners are welded on the sides of the cross bar box as assistant support, and the anchor slings and head bolt dowels of the cross bar box are welded with existing reinforcement. Take care that the welding between the anchor slings and reinforcement first takes place on one side only. On the other side first additional structural steel for horizontal anchoring of head bolt dowels, or at each of the first anchor slings next to the cross bar boxes is added if missing and welded with the site reinforcement, but not with the construction of the cross section. To shorten the period till loosening the installation holder as much as possible, the welding is first done only in the area next to the cross bar boxes then the installations holders are loosened, but not removed, and so additional bending strength is achieved although the possibility of motion is present.

Welding the remaining anchors with the reinforcement fixes the carriageway crossover firmly in its final position.

After the attachment to reinforcements, the construction has to bear the appearing structure movements without influence on the later binding process of the concrete.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG	SEITE: 25
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; color: green;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

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After our personnel have finished the assembly, it must be checked and accepted by the Construction Supervisor and the completed installation of the construction has to be certified. Use the appropriate form referring to the construction.

Shuttering and concreting is carried out by the construction company. 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. It is obligatory to stick to the minimum measures of the concrete and the dimensions and position of reinforcements according to the constructional plan on page 4 after part 7.

Concreting the superstructure section requires the client's approval. The lean-mixed concrete must be low shrink and of an even or higher strength than the structural concrete, at least quality C30/37. 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 superstructure, must be removed. Lastly, the shuttering within the joint gap has to be removed and the joint has to be cleaned.

5.3 Anchoring in the cap area

The anchoring of the cross section in the cap area is not allowed. A bitumastic filler has to be provided between the edge profile of the cross section and the cap area in the marginal and median strip range. The joint shows a wedge-shaped design to avoid cavitations. The bitumastic filler only allows movements of a few millimetres between the cap area and the structural concrete. Constructional design should ensure that larger movements remain impossible.

While concreting the parapets, due to inevitable construction tolerances the end position of the possibly existent cover plates is to be considered. Shuttering aids can facilitate the accurate installation.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG	SEITE: 26
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; color: green; text-align: center;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

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5.4 Procedure for bridges with steel carriageways

The working processes are analogue to fastening to concrete components (See chapter 5.2). Basically there are three different methods:

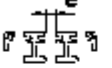
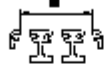
- a) Support on a continuous beam, mounted before the end cross girder.
- b) Support on individual consoles with connection to the end cross girder
- c) Direct connection of the supporting sides of the joist box to the end cross girder

The kind of construction strongly depends on structure and shall be planned, verified and proofed individually in detail. The technical approval covers no steel connections Start with the attachment of the cross section to the steel superstructure when installing.

5.5 Control of the installation dimension

The bridge design engineer determines the temperature-dependent gap and installation dimensions. If there are no special arrangements, the expansion joints are adjusted in the workshop for a provisional structure temperature of +10 °C. The presetting already done in the factory and the relevant expected installation temperature must be registered on the approved drawings The dimensions for the temperature-dependent presettings can be obtained from the Tables on the final drawings.

Installation dimensions for Type D...

Structural temperature		
°C	Gap dimension e	Installation dimension a
+ 5		
+10		
+15		
+20		

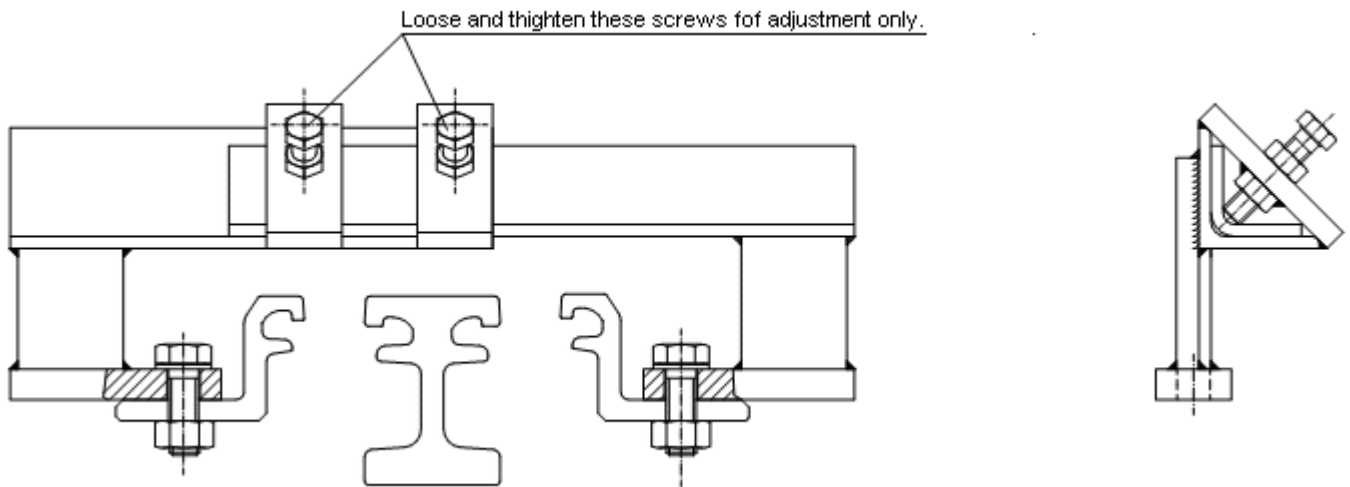
The mean structural temperature needs to be determined before assembly.

Picture 2: Example table for temperature dependent pre-adjustment

Directly before inserting the construction into the recesses, the presetting must be checked by the construction supervision and, if required, readjusted by our fitters. If a correction of the presetting becomes necessary, this has to take place in the expected direction of movement. A higher structural temperature requires a closing, a lower structural temperature an opening of the construction. For that purpose the screws of the movable installation holders (see picture 3) have to be unscrewed and then again tightened firmly after adjustment.

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BLOCK : 5 - EINBAUANWEISUNG	SEITE: 27
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; display: inline-block;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

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Picture 3: Movable installation holders

The slit opening f between the skewback chamber wall and the outer edge of the superstructure (See Picture 1) has to be checked. The rule is $a-10 \times n \text{ [mm]} \leq f \leq a+50 \text{ [mm]}$ (with the exception of the Type XL200, see Picture. 6.1).


Possible changes of measures have to be acknowledged in writing to our specialists by the site engineer.

5.6 Sealing of the structure

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 the perfect connection a horizontal flange of 80 mm has to be provided, which must be cleaned carefully before applying the insulation. The sealing has to be attached to the expansion joint over the entire length of the superstructure, i.e. also at 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 according to the standard drawing Übe 1 has to be provided as a connection to the edge profiles of the superstructure section.

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BLOCK : 5 - EINBAUANWEISUNG		<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

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5.7 Further hints

Appropriate measures should be taken in order to prevent driving over the cross section before the surfacing operation. If there is no possibility of redirecting the site traffic running over the carriageway cross sections, then these need to be protected by bridge-crossings.

If due to the transportation and traffic related reasons site joints are required, the following has to be considered:

- Construction of joints according to Chapter 5.8
- Sealing profiles generally are vulcanised (see Chapter 5.12)
- The rhombic elements in the connecting area are put in place after the connection of lamellas.

If the corrosion protection is damaged due to transport or installation, we recommend a touch up with a single component air humidity hardening coating system:

- Machined grinding of steel parts, standard purity level PMA
- If this is not possible or flying rust is present,
20 µm of Stelpant-PU-Repair has to be applied as holding bridge. If grinding was performed, this film must not be applied.

Surface coating system:

Priming coating: 1 x 80 µm Stelpant-PU-Zinc
Don't allow greater overlapping with existing coatingarger overlaps with eventually existing coatings are to be omitted!

Surface coating: 2 x 80 µm Stelpant-PU-Mica, UV

Final coating: 1 x 80 µm Stelpant-PU-Mica, UV (colouring according to plan)

The holding bridge, priming coating and surface coating can be applied on the same day. The final coating can be applied 8 hours after the surface coating. For smaller mending jobs the appropriate coating material is to be delivered to the local construction supervisor so the final coating can be applied on the following day. All products are single-component and can be applied using a roller or brush even at air humidity up to 98%. Even at relatively low temperatures (about 0(C) the coatings dry very quickly.

Further possibilities for improving the corrosion protection can be obtained from the ZTV-KOR (Steel constructions).

After all works are done, the "Übe 2" form as an appendix to the building book according to DIN 1076, as well as the enclosed protocol of the installation are to be filled in and signed. For cross sections, equipped with supervision marks of the external control institute, according to "Übe 2" lines 3 and 4, providing the certificates or test reports according to EN 10204 (DIN 50049) does not apply.

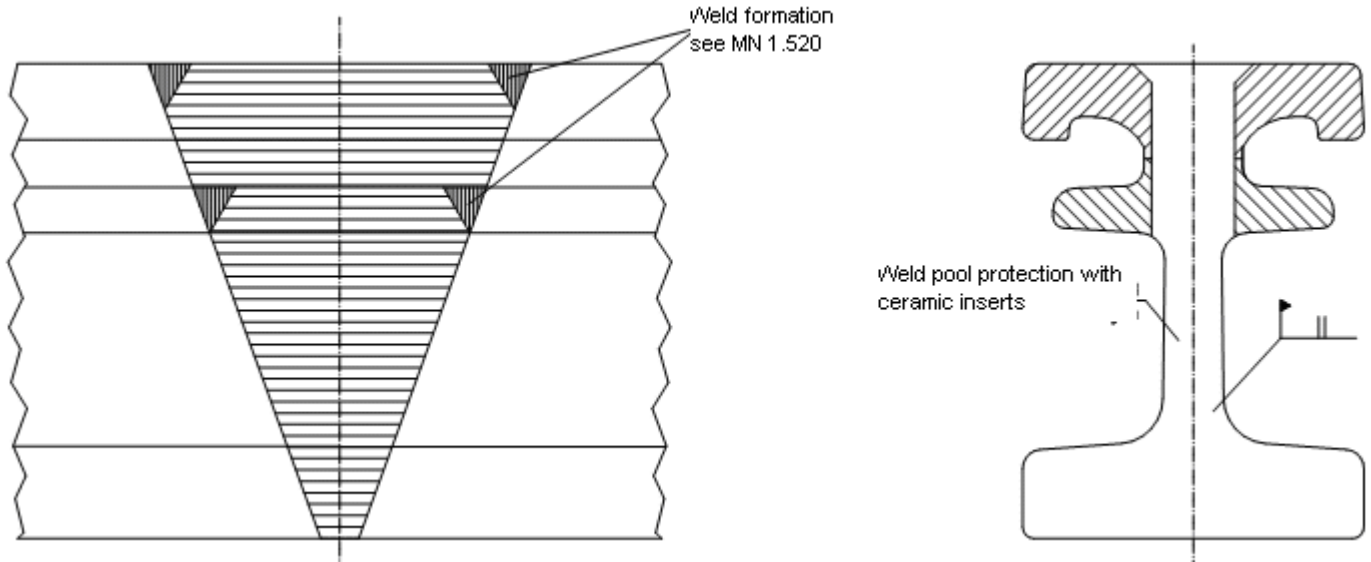
BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200		ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG	SEITE: 29	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

5.8 Site joints

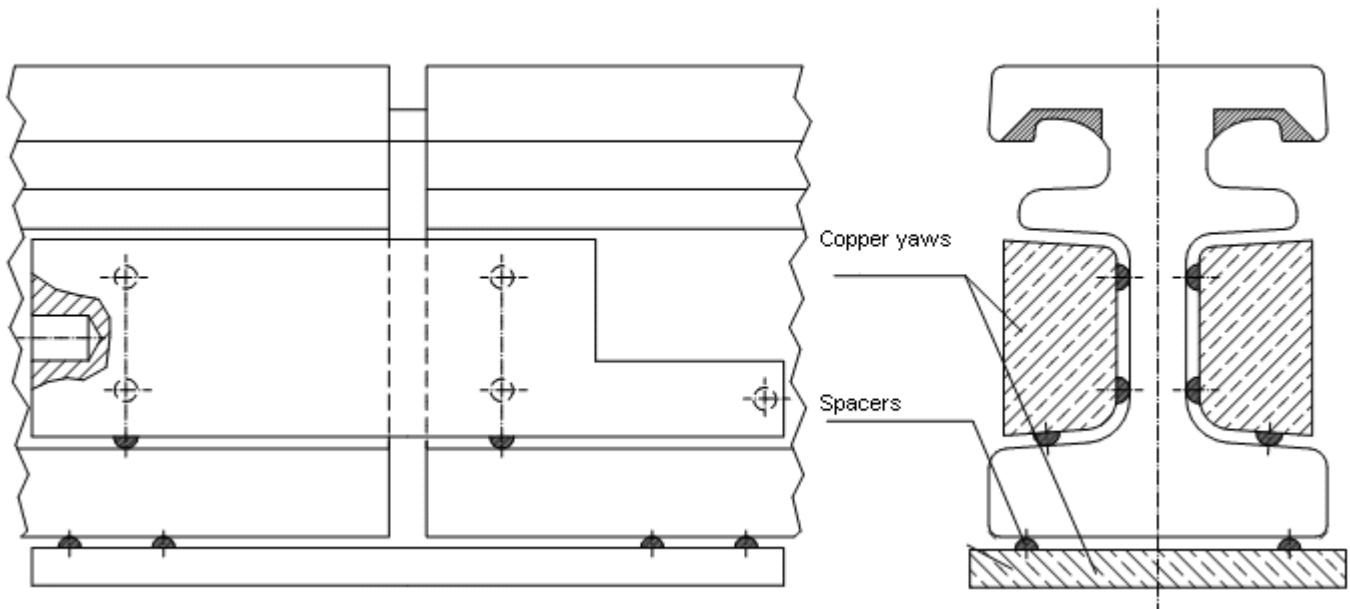
- CeraMag joint (in the carriageway)

Construction according to work instruction AA 1.541



- Copper jaw joint (in the carriageway as an alternative to CeraMag)

Construction according to work instruction AA 1.510



BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	SEITE: 30	ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG		<i>Regelprüfung</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		<i>Nr. 05/07 vom 20.12.07</i>

VERFASSER :



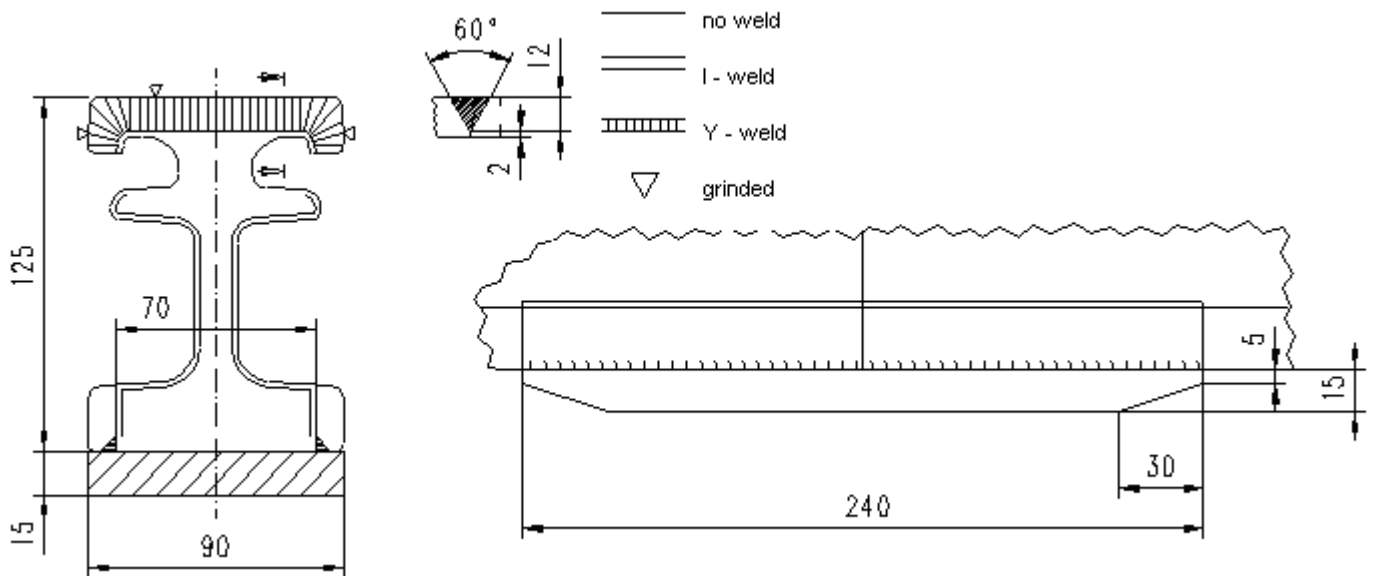
MAURER SÖHNE
Innovationen in Stahl

BAUWERK : STRASSEN- UND WEGBRÜCKEN

DATUM: 01.12.2007

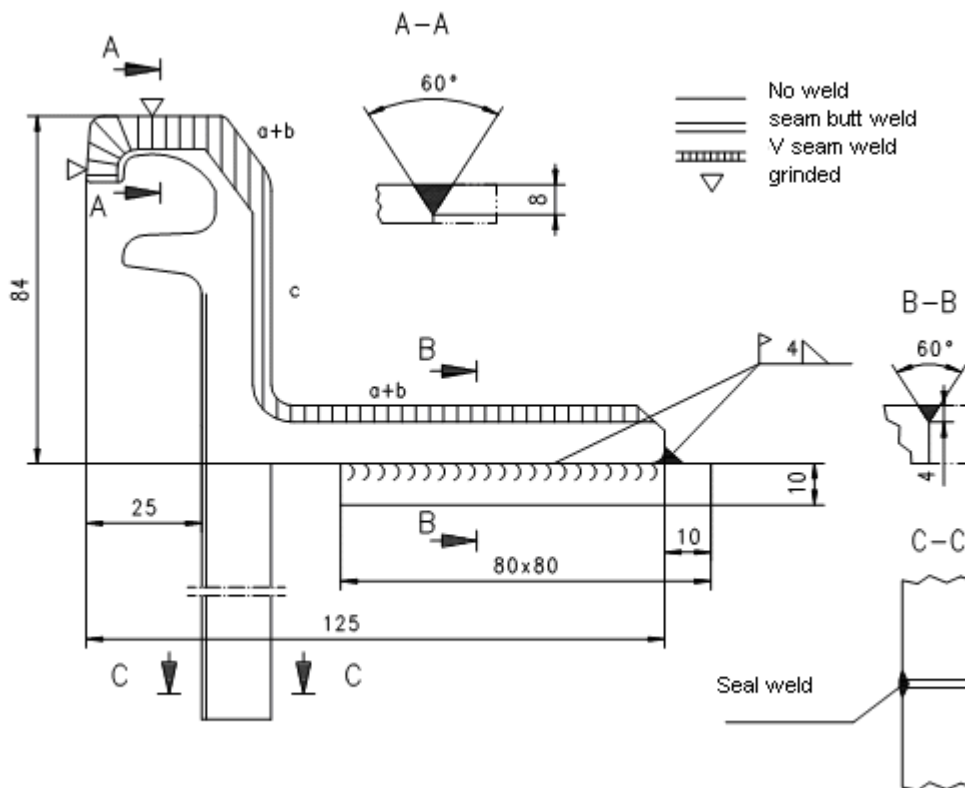
Site joint of the lamella outside the carriageway

Construction according to work instruction AA 1.510



- Site joint of the edge profile in the carriageway

Construction according to work instruction AA 1.510



BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200

BLOCK : 5 - EINBAUANWEISUNG

VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)

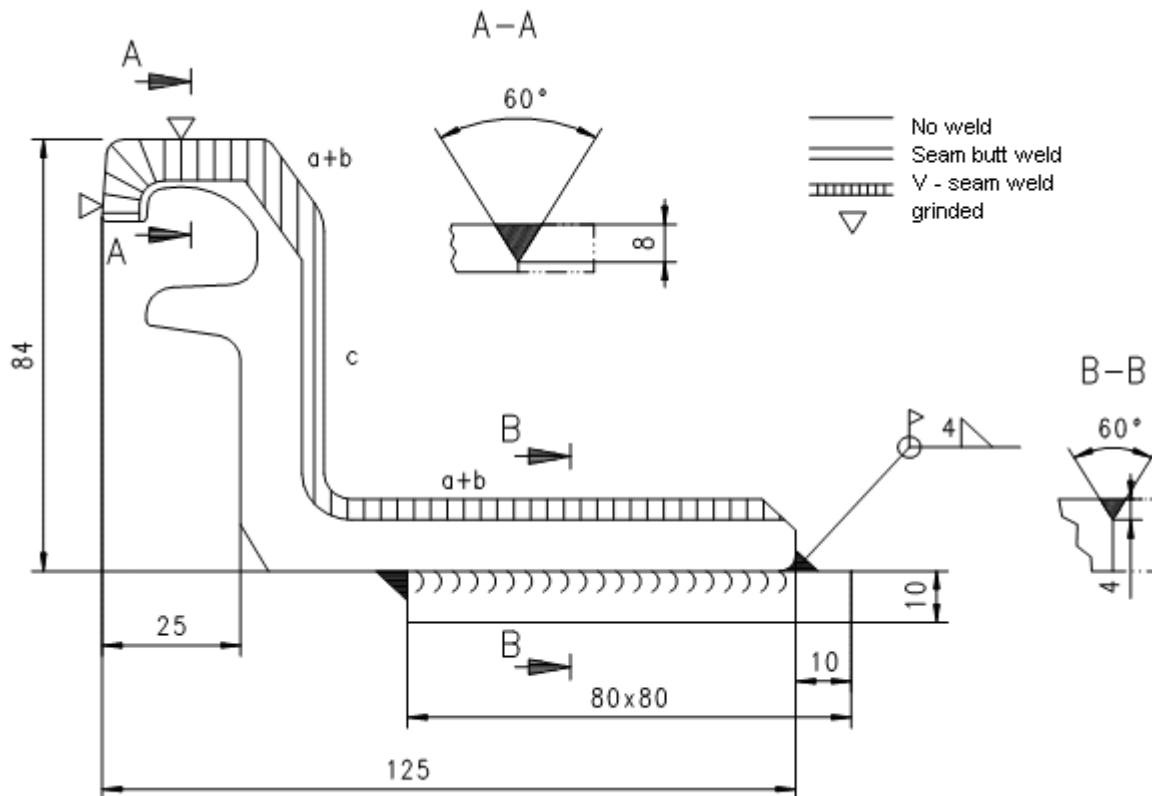
SEITE: 31

ARCHIV NR.

Regelprüfung
Nr. 05/07 vom 20.12.07

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
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Site joint of edge profiles outside of the carriageway
Construction according to work instruction AA 1.510




- Vulcanised joint of the sealing profile

If for technical reasons a joint on site is required, it has to be executed according to this instruction. The procedure matches the procedure inspection according to Prüfzeugnis GÜ 26/96 of the Institute for Road, Railway and Airfield Construction of the Technical University Munich.

The vulcanised joint is to be setup of displaced according to the steel profiles of welded joints.

The side joint has to be executed by specially trained staff only. The execution and control of such joints has to be Protocol led.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	SEITE: 32	ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG		<i>Regelprüfung</i> <i>Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

 MAURER SÖHNE	CERTIFICATE OF ACCEPTANCE / PROTOCOL OF INSTALLATION
---	---

Order Number:

Construction: _____
Client (Building enterprise): _____
Contractor: Maurer Söhne GmbH & Co. KG

S c o p e o f s e r v i c e s :

Type _____ r.m. _____ BA _____ Bl. _____ axis _____

Presetting at delivery: a = mm at BW-Temp. _____ °C

Presetting at mounting: a = mm at BW-Temp. _____ °C

Structural gap f = mm

Correction on request of _____.

Start of operation: _____, o'clock

Type _____ r.m. _____ BA _____ Bl. _____ axis _____

Presetting at delivery: a = mm at BW-Temp. _____ °C

Presetting at installation: a = mm at BW-Temp. _____ °C

Structural gap f = mm

Correction on request of _____.

Start of operation: _____, o'clock

Constructions correspond to the approved implementation plans

The corrosion protection is in due order

Approval of the mounting joint bar without complaints

Approval of site joints and vulcanisation joints of the sealing profiles without complaints

Defects:: _____

Comments: _____

At: _____, Date: _____

MAURER SÖHNE

CLIENT

∅ _____ This protocol is to be enclosed as an appendix to the Protocol Übe 2.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 5 - EINBAUANWEISUNG	SEITE: 33
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>

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6. Instructions for maintenance, preservation and exchange of wear and tear parts

MAURER-Lamella-expansion joints within the frame of the planned use period are maintenance-free for at least 20 years. But to spot eventually appearing defects on time before greater damage occurs, regular supervision and inspection of the components is appropriate. Periodic and extent are conforming to valid standards i.e.:

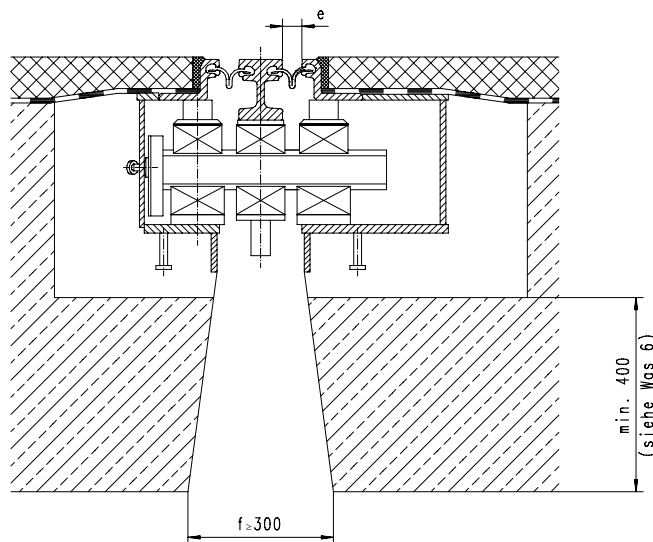
- DIN 1076
- Product specification sheet for construction supervision for buildings (M-BÜ-K)
- Form Übe 2
- Directive for the control, approval and preservation of constructional design and equipment of bridges (RBA-Brü 90)

6.1 Accessibility

All plastic parts can be replaced directly from the carriageway. A maintenance and inspection run has to be provided with new constructions according to Part 6.2 (Construction Plan WAS 6 and directive RBA-Brü). The light width in the structure gap adapts according to the movement of the gap and according to the number and width of the Lamellas. Just underneath the cross section construction the light clearance f is in the centre position of the construction (See page 11): 3.4):

Type	f_{\min} [mm]	f_{\max} [mm]	Type	f_{\min} [mm]	f_{\max} [mm]
DS160*	130	145	DS720	918	1033
DS240*	250	271	DS800	1035	1160
DS320	330	398	DS880	1153	1287
DS400	448	525	DS960	1270	1414
DS480	565	652	DS1040	1388	1541
DS560	683	779	DS1120	1505	1668
DS640	800	906	DS1200	1623	1795

*) You can reach the planned dimension 300 mm for the types DS160 and DS 240 through the enlargement under the gap for constructional reasons only.



With the change of the middle gap width $s=50$ mm of the carriage way crossover the dimension f changes for $n \times \Delta s$.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 6 – WARTUNG UND ERHALTUNG	SEITE: 34
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<div style="border: 1px solid green; padding: 2px; color: green;">Regelprüfung Nr. 05/07 vom 20.12.07</div>

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6.2 Components that must be regularly controlled

(1) Sealing profiles

- dirt
- ageing
- joint connections
- damage
- secure hold
- closeness
- regular and sufficient gap widths

(2) Sliding components

- dirt
- wearing out
- surface damage
- proper adjustment
- smooth movement
- rubbing between individual movable parts

(3) Bearing and spring elements

- correct position
- damage
- crack free
- sufficient prestressing and attachment
- remarkable noise production

(4) Corrosion protection

- On driven surfaces the corrosion protection is wearing out in a short time but this is of no meaning.
- underneath the sealing profiles
- in the footway area
- underneath the steel cover plates

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 6 – WARTUNG UND ERHALTUNG	SEITE: 35
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>

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(5) Steel support construction

- crack free at junctions and firm fit of mechanical joints
- welding seams lamella / cross bar (joist)
- site and factory butt joints of lamellas
- connection of steering construction (cams and stoppers)
- anchoring of edge constructions
- condition of the concrete underneath the cross bar boxes
- free movement of lamellas and cross bars (concrete defects)

(6) Coating joint

- condition of the pouring gap between the edge profile and the coating
- deformation of the edge profile in the carriageway
- deformation of the edge profile at the cap
- coating damages
- rut building
- height evenness of gap edges
- coating bank

(7) Steel cover plates in the sidewalks and the parapet area

- corrosion
- screw connection
- noise production
- constraints
- correct position

The control results have to be Protocol led.

6.3 Replacing the sealing profiles

The replacement or damage free installation and removal of sealing elements is possible from above at single gap widths ≥ 25 mm. If the joint is equipped with rhombic elements, the single gap widths have to be ≥ 60 mm. For that the lamellas have eventually to be displaced rectangular to the gap.

- opening of the gap slit with a hoist
- dismantling the old sealing profile using special fitting-levers
- control of corrosion-grade of the steel claws
- check and renewal of corrosion protection (if necessary)
- eventual vulcanizing of the joint between the remaining and new sealing profile
- paraffin oil greasing of the steel claws
- interlacing new sealing profiles using a special-fitting lever
- right position control

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200		ARCHIV NR.
BLOCK : 6 – WARTUNG UND ERHALTUNG	SEITE: 36	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

6.4 Replacing the wear parts

(1) sliding bearings and springs (from carriageway)

•Removal of sliding bearings

Remove welds of some rhombic elements by drilling.

Dismount the sealing profiles in the bearing holder area.

Ererect the lifting gear.

Hoist the lamella with the lifting gear (slide spring is compressed) at the bearing holders.

Enlarge the gap between lamellas using hydraulic moulding presses to approximately 80 mm.

ismount the slide bearing.

•Removal and installation of sliding springs

Remodel the lifting gear after dismantling the slide bearing.

Press down the lamella with a hydraulic press (slide spring is set free).

Dismount the slide spring.

Install a new sliding spring.

•Sliding bearing installation

Remodel the lifting gear.

Hoist the lamella with the lifting gear.

Install the slide bearing.

Take the lifting gear appart.

Set the gap between lamellas.

Install the sealing profile.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200	ARCHIV NR.
BLOCK : 6 – WARTUNG UND ERHALTUNG	SEITE: 37
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>

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(2) Slide bearing and spring from below

- Removal of sliding bearings

Arrange the removal equipment.

Lift the bearing holder together with the lamella with the hydraulic press (slide spring is pressed).

Dismount the sliding bearings

- Removal and installation of slide springs

Rearrange the lifting gear.

With hydraulic gear press down the lamella at bearing holders (slide spring is set free).

Dismount the slide spring.

Mount a new sliding spring.

- Slide bearing installation

Arrange the dismantling equipment.

Lift the bearing holder together with the lamella with the hydraulic press (glide spring is pressed).


Mount new slide bearing.

(3) Lamella

With the use of open holders the lamella can be dismantled without damage. For that the carriageway and guiding bars have to be aligned at least within each construction section. For parapet units the guiding lugs have to be ripped half aside and welded back after the procedure.

- Dismantling of sealing profiles, slide bearings and springs.
- Lateral displacement by 150 mm and lifting of the lamella.
- Installation of new parts.

BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200		ARCHIV NR.
BLOCK : 6 – WARTUNG UND ERHALTUNG	SEITE: 38	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		

VERFASSER :  MAURER SÖHNE Innovationen in Stahl	
BAUWERK : STRASSEN- UND WEGBRÜCKEN	DATUM: 01.12.2007

7. Constructional Drawings and Parts Lists (6.2 / 6.3)

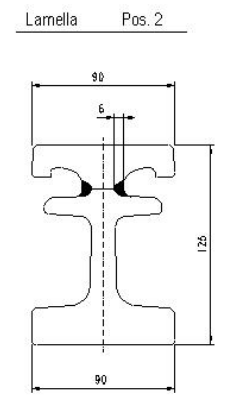
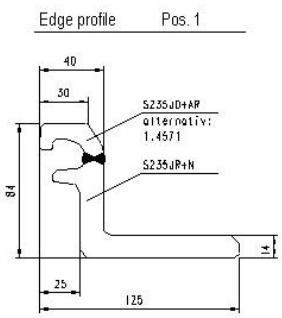
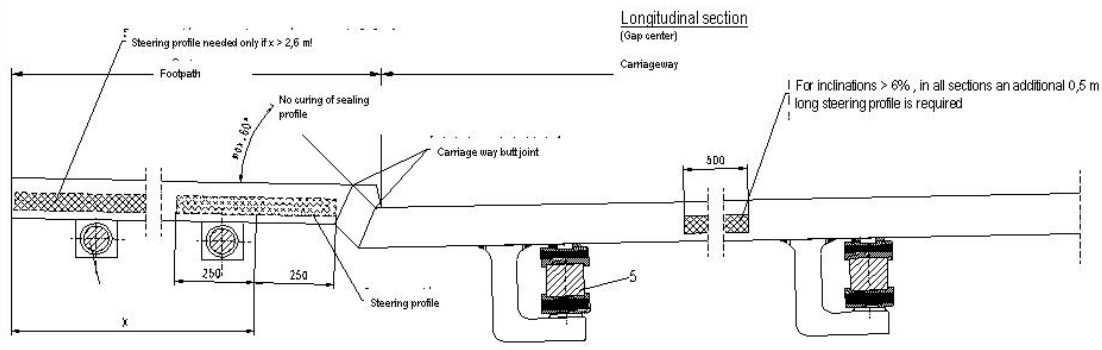
The constructional drawings show the main characteristics and measures of constructions. They are independent of type and direction and serve for general judgement. The following Constructional Drawings are part of the request for the Technical Approval:

Page No.	Description	Version	Date	Change
1	STW		1.12.2007	
2	STP		1.12.2007	
3	Cross sections 1		1.12.2007	
4	Cross sections 2		1.12.2007	
5	Diamond elements		1.12.2007	
6	Reinforcement plan 1		1.12.2007	
7	Reinforcement plan 2		1.12.2007	

The basis for the technical approval is a variety of work instructions and standard drawings. Elaboration of these in the course of the construction's approval is not planned. The following Table provides a summary of the materials of the main construction parts:

DESCRIPTION	Pos.	Tolerance	SEMI FINISHED PART	MATERIAL	WEIGHT
Blade catch profile	1	DIN ISO 2768-m	rolled section	S235J0+AR/(1.4571)	21,6 kg/m
Lamella	2	DIN ISO 2768-m	rolled section	S355J2+N	46,6 kg/m
Sealing profile	3	-		EPDM	1,45 kg/m
Steering profil	4	-		EPDM	4,7 kg/m
Cross bar box	5-7	DIN EN 10029 C		S355J2+N	
Parapet unit	8	DIN ISO 2768-m	Ø 60, 80, 90	1.4462	
Elastomer-Glide spring	9-10	M2 DIN 7715		S235JR+N /NR	
Elastomer-Glide bearing	11-14	DIN ISO 2768-m		S235JR+N /NR	
Glide intermediate layers	15			MSM	
Carriage way anchor	16	DIN EN 10029 C		S235JR+N	3,65 kg
Foothpath anchor	17	DIN 1013	Rd. St. Ø 20	S235JR+N	1,36 kg
Diamond element	20-21	DIN 7526 F	drop forge part	S3235R+N	1,35 kg
Edge plate	22	DIN ISO 2768-m	Thermal cut	S235JR+N	8,7 kg(m)

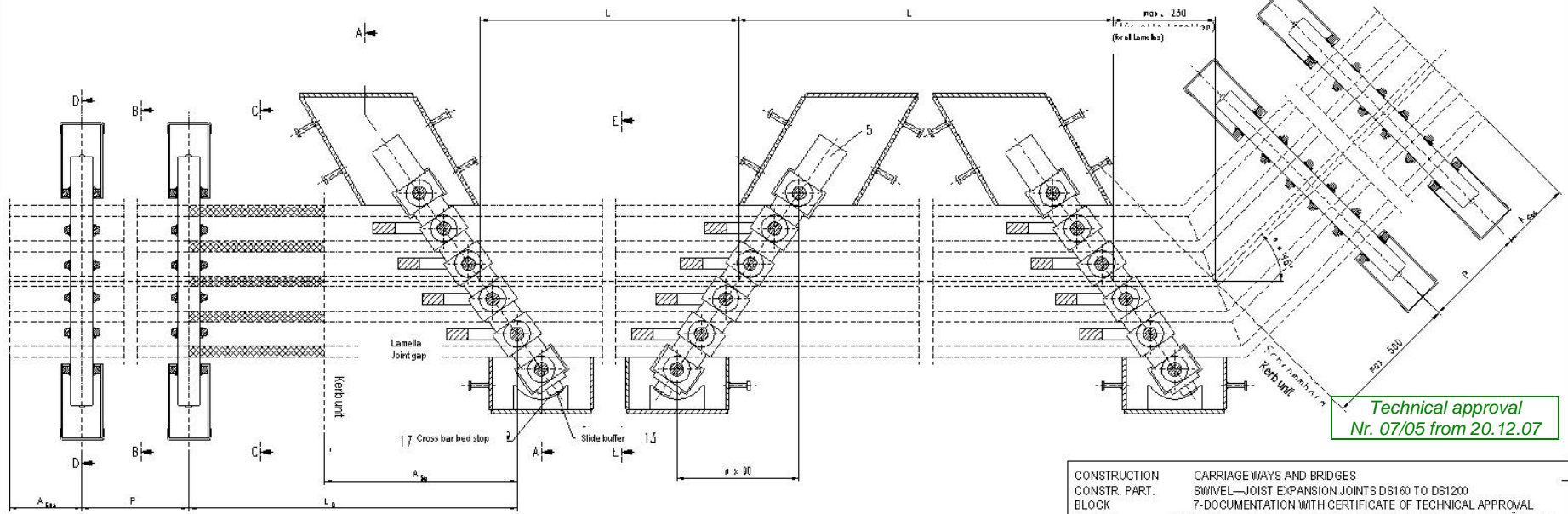
BAUTEIL : SCHWENKTRAVERSEN-DEHNFUGE DS160 BIS 1200		ARCHIV NR.
BLOCK : 7-REGELZEICHNUNGEN UND STÜCKLISTEN	SEITE: 39	<i>Regelprüfung Nr. 05/07 vom 20.12.07</i>
VORGANG : REGELPRÜFUNG NACH TL/TP FÜ (STAND: 03/05)		



View of the carriageway crossover with footpath construction towards the joint axis!

Top view Without Lamellas

Drawing of a carriageway cross-section with bending of the footpath

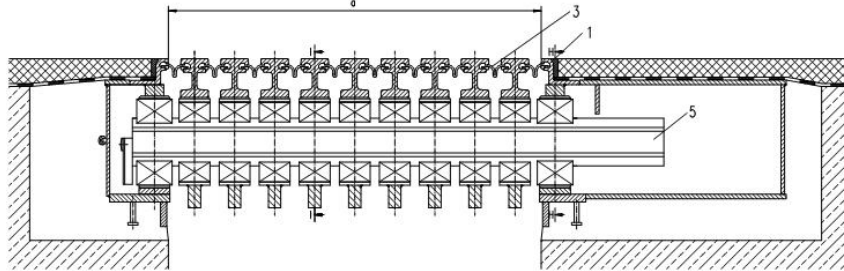


Technical approval
Nr. 07/05 from 20.12.07

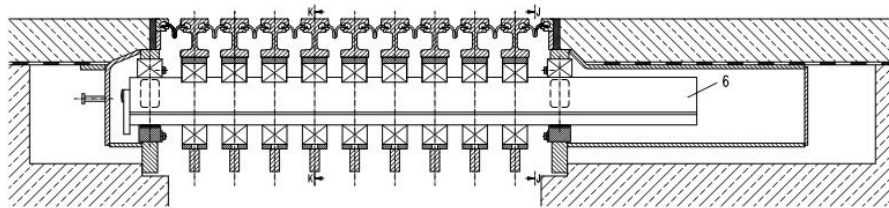
It is also possible to distribute the total movement in a different way as shown here (fixed point at a cross bar support). The distribution of the total movement to both supporting lines of the cross bar (for example percent each) results solely in geometrical dimensions of the cross bar boxes (see Page 12).
It is merely a constructive measure and will not be represented here separately.

CONSTRUCTION		CARRIAGEWAYS AND BRIDGES		Antrag - Nr.	
CONSTR. PART.		SWIVEL-JOIST EXPANSION JOINTS DS160 TO DS1200		Blatt - Nr. 1	
BLOCK		7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL		Aufsicht	
METHOD		APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TLTP FU (03/06)		Regist. Nr.	
Projektleitung	Geometrie	Herstellung / Werkstatt			
DIN ISO 2768	Teil 1	Bezeichnung		C T W	
Mittel	Leg. Name	STW (DS 160 to DS 540)			
Beib. 1, 12, 17	Voliz	Sozialnummer			
Leg.		Maurer Söhne München			
Name		Leitung für		51_1	
Abgabe	Datum	Name			

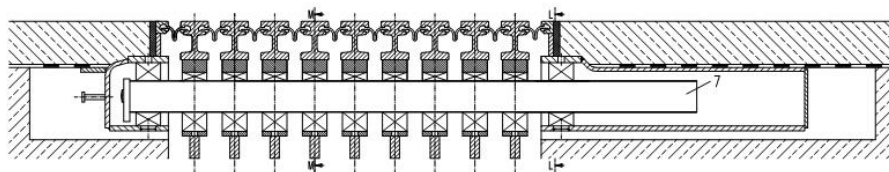
Cross-section F - F / Carriageway cross bar



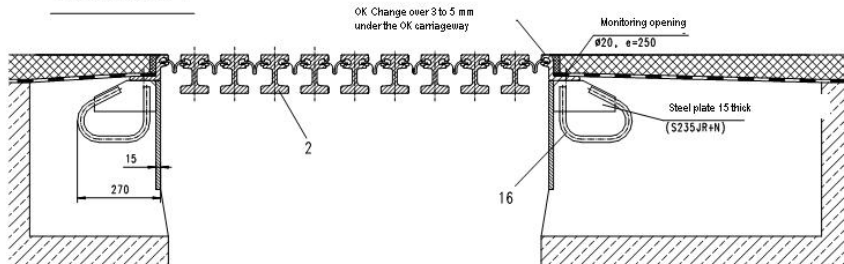
Cross-section D - D / Steering cross bar



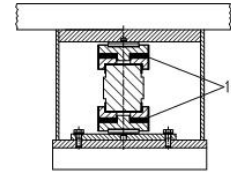
Cross-section D - D / Footpath cross bar



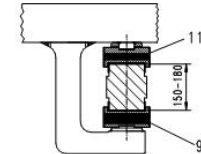
Cross-section E - E



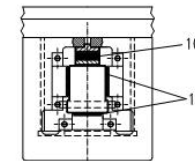
Cross-section H - H



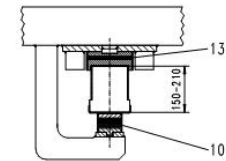
Cross-section I - I



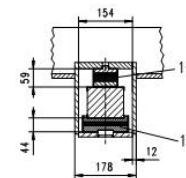
Cross-section J - J



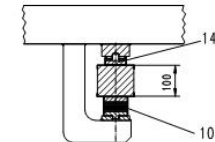
Cross-section K - K



Cross-section L - L



Cross-section M - M

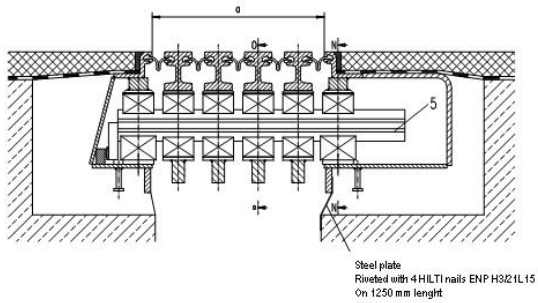


Applicable only for a defined movement direction. The footpath cross bar has to be arranged towards the movement direction!

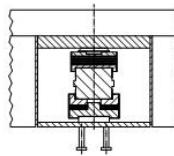
Regelprüfung
Nr. 05/07 vom 20.12.07

CONSTRUCTION		CARRIAGEWAYS AND BRIDGES	
CONSTR. PART.		SWIVEL-JOIST EXPANSION JOINTS DS160 TO DS1200	
BLOCK		7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL	
METHOD		APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TLTP FÜ (03/06)	
Freige tolerenzen DIN ISO 2768 Teil 1 m (Lc)	Devicht	Halbzeug, Werkstoff	Auftrag - Nr.
Bech. 7.12.07 Copr. Maur.	Eqc. None Volk	Benennung	Blatt - Nr. 3
Ausgabe		Maßstab	
Dotun		Sachnummer	
None		Regist. Nr.	
M MAURER SÖHNE MÜNCHEN		Ersatz für: ST_3	

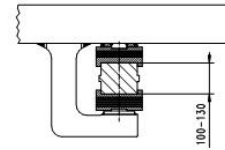
Cross-section C - C / Carriageway cross bar



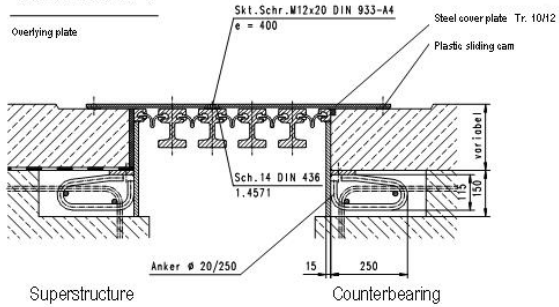
Cross-section N - N



Cross-section O - O

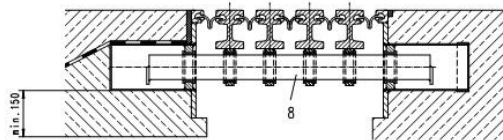


Cross-section B - B



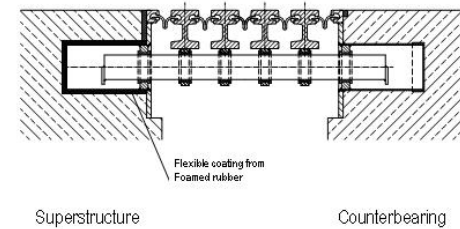
Cross-section D - D / Cornice cross bar

Anchored in the construction concrete



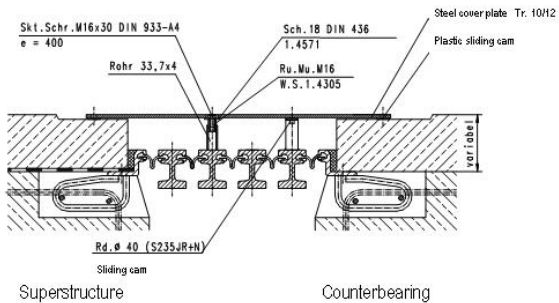
Cross-section D - D / Cornice cross bar

Anchored in the construction concrete

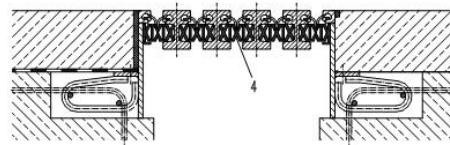


Cross-section B - B / variant

Steel plates arranged on the uprights



Cross-section C - C

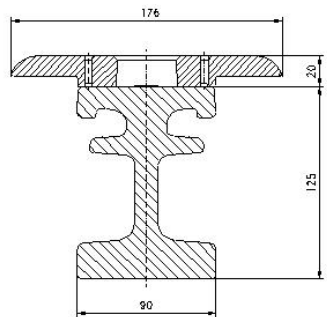


Regelprüfung
Nr. 05/07 vom 20.12.07

CONSTRUCTION CARRIAGEWAYS AND BRIDGES
CONSTR. PART. SWIVEL-JOIST EXPANSION JOINTS DS100 TO DS1200
BLOCK 7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL
METHOD APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TLTP FU (03/05)

VORGANG : ANLAG AUF REGELPRÜFUNG NACH IL/IF FU (03/05)		Freigelegenen DIN ISO 2768 Teil 1 mittel		Gezeichnet Hilfzeug, Werkstoff	Auftrag - Nr.
		Tag Beurk. 12.07 Schr. Name		Blatt - Nr. 4	
		Name Volk		Bezeichnung Querschnitte 2	
		M MAURER SÖHNE MÜNCHEN		Sachnummer Regist. Nr.	
An- gabe Datum Name		Ersatz für:		ST_4	

Sealing with silicon mass

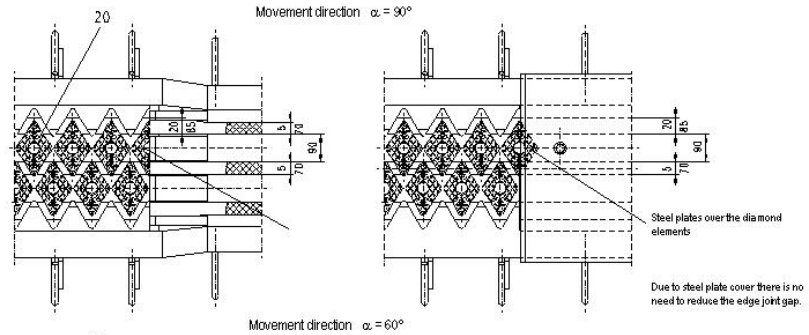
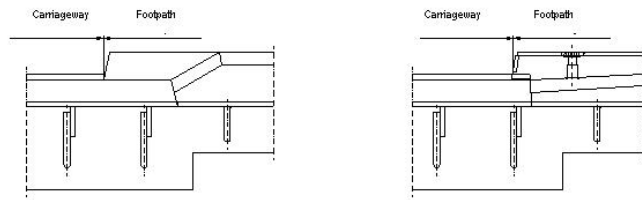
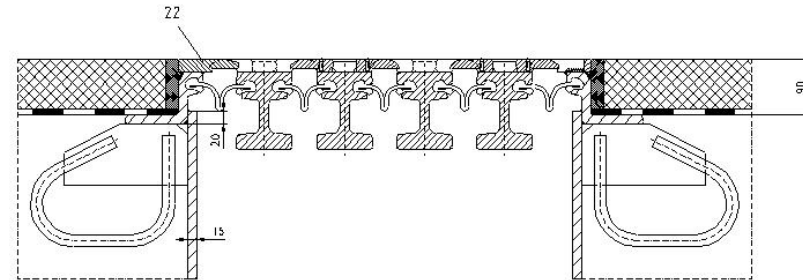


without steel plate cover

Rear view

with steel plate cover

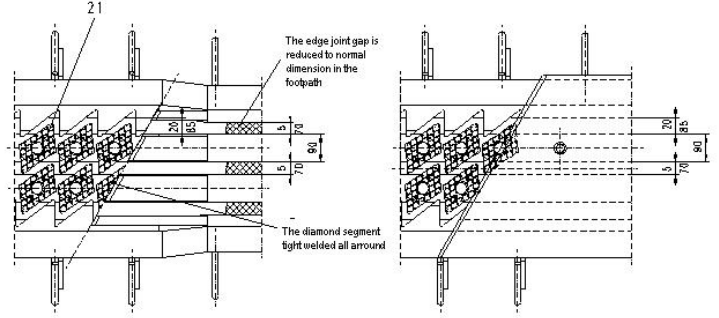
Cross-section carriageway with diamond elements



Movement direction $\alpha = 90^\circ$

Steel plates over the diamond elements

Due to steel plate cover there is no need to reduce the edge joint gap.



Movement direction $\alpha = 60^\circ$

The edge joint gap is reduced to normal dimension in the footpath

The diamond segment tight welded all around

All expansion joints of this Technical Approval can be featured with diamond elements.
With already installed joints a checking in each single case is necessary.

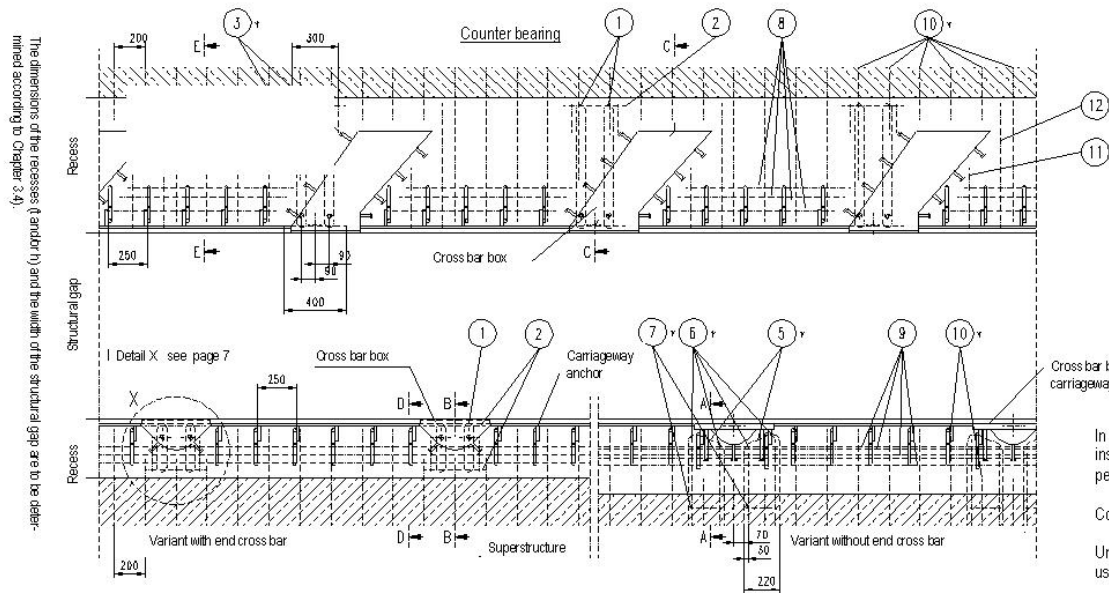
Nr	Benennung	Material
20	Roulelement ($\alpha=90^\circ; 10^\circ$)	SZ35JR+N
21	Roulelement ($\alpha=70^\circ; 10^\circ$)	SZ35JR+N
22	Randplatte	SZ35JR+N

Regelprüfung
Nr. 05/07 vom 20.12.07

CONSTRUCTION		CARRIAGEWAYS AND BRIDGES	
CONSTR. PART.		SWIVEL—JOIST EXPANSION JOINTS DS160 TO DS1200	
BLOCK		7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL	
METHOD		APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TLTP FÜ (03/06)	
Technische Norm	DIN 150 2768 Teil 1	Ort	Heilbronn, Reinstall
Titel	mittel	Tag	12.07
Strich	12.07	Monat	July
Zeichner		Benennung Diamond elements	
Prüfer			
Abgabe		Sachname	
Datum		Erstellt für	
Name		ST_5	
MAURER SOHNE MÜNCHEN		Regist. Nr.	

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Grundrissdarstellung



The dimensions of the recesses (and/or n) and the width of the structural gap are to be determined according to Chapter 3.4)

The reinforcement for the typ STP is presented here.

The design for the STW Type analogue.

In normal case, the reinforcement steel (Pos. 1,5/6 and 10) are to be inserted rectangular to the gap. Angle deviations in ground view are permitted in the range of $\pm 20^\circ$ only (TL/TP FU, sect. 6.1.6).

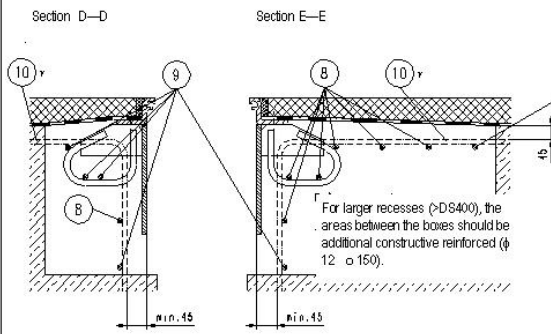
Concrete within the recess $\geq 30/37$ low-shrinkage concrete.

Undemeath the cross bar boxes additional grain (size 0/16) shall be used

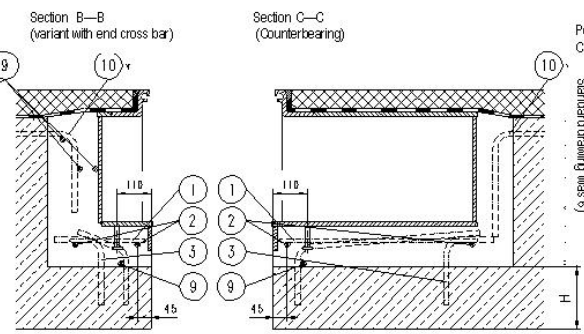
Reinforcement steel in general \geq BSt 500 S

Reinforcement positions, marked with *, are to be placed into the concrete of the girder.

Anchorage of the edge profile




Anchorage of the cross bar box



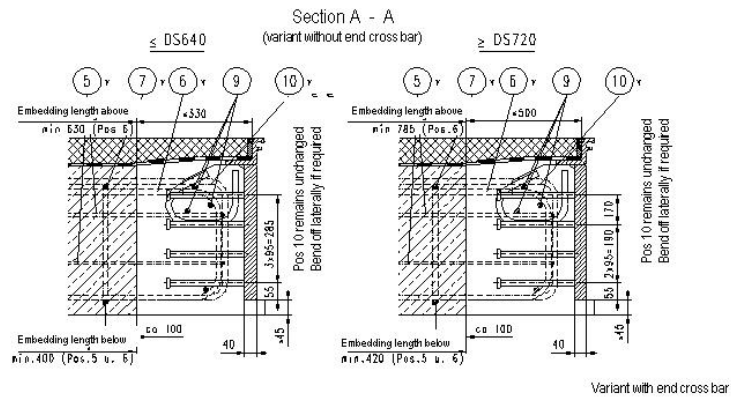
Pos. 10
Out and bend off laterally in the box area.

Minimum dimensions according to statically require and constructively criteria (for example Standard drawing 10.9)

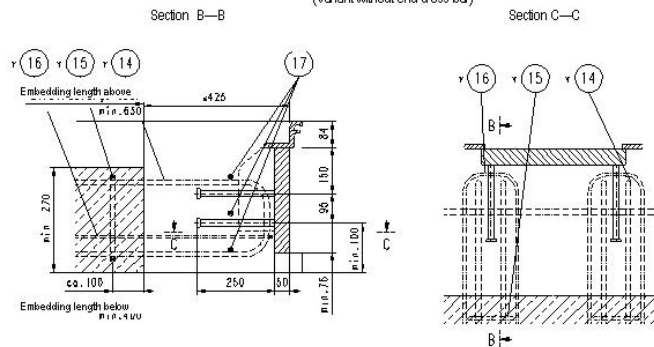
Regelprüfung
Nr. 05/07 vom 20.12.07

CONSTRUCTION		CARRIAGEWAYS AND BRIDGES	
CONSTR. PART.		SWIVEL-JOIST EXPANSION JOINTS DS160 TO DS1200	
BLOCK		7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL	
METHOD		APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TL/TP FU (03/05)	
Verfahrensnorm	Genieß	Werkzeug, Vorarbeit	Auflage - Nr.
DIN 150			Werk - Nr. 6
2768 Teil 1			
maß	Tag	Name	Werkstoff
12.07		Vzlk	
10h			
 MAURER SÖHNE MÜNCHEN		Reinforcement plan	
		For the recess of the carriage way across section	
Zeichner:		Projekt - Nr.	
Ersatz - Nr.		51_6	

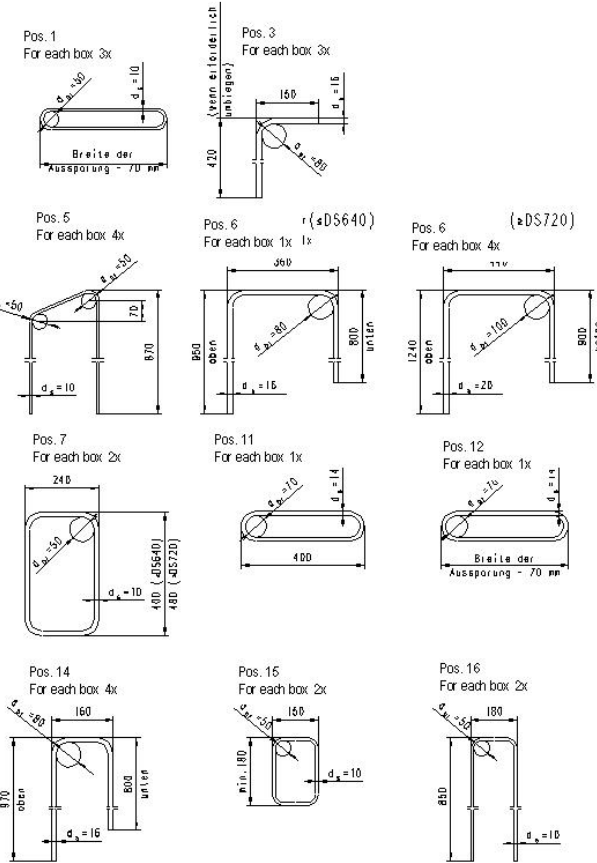
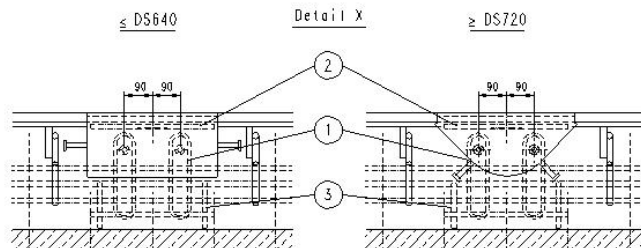
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Anchorage of the steering cross bar
(Variant without end cross bar)



The designer of the joint has to prove and include the reliable carrying of the horizontal forces of the steering cross bar together with associated fatigue load in dependence of the dimensions of bridge superstructure.



All dimensions in mm

Pos.	Dimension	Remark
1	Ø10	siehe Skizze
2	Ø16/400	siehe Skizze
3	Ø16	siehe Skizze
4	Ø10	siehe Skizze
5	Ø10	siehe Skizze
6	Ø16 bzw. Ø20	siehe Skizze
7	Ø10	siehe Skizze
8	Ø16	Lichtmass zwischen Kästen
9	Ø16	L=B (Tight.)
10	Ø16	siehe Skizze
11	Ø14	siehe Skizze
12	Ø14	siehe Skizze
13	Ø16/500	siehe Skizze
14	Ø16	siehe Skizze
15	Ø10	siehe Skizze
16	Ø10	siehe Skizze
17	Ø16	L=B (Geh.)

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Regelprüfung
Nr. 05/07 vom 20.12.07

CONSTRUCTION	CARRIAGEWAYS AND BRIDGES
CONSTR. PART.	SWIVEL-JOIST EXPANSION JOINTS DS160 TO DS1200
BLOCK	7-DOCUMENTATION WITH CERTIFICATE OF TECHNICAL APPROVAL
METHOD	APPLICATION FOR TECHNICAL APPROVAL ACCORDING TO TLTP FÜ 03/05
Projektleiter	Geprüft
Zeichner	Beauftragter
Blatt - Nr. 7	Blatt - Nr. 7
Reinforcement plan 2	
For the recess of the carriage way cross section	
MAURER SÖHNE MÜNCHEN	
Aut.	ST_7