



**MAURER SÖHNE**  
SINCE 1876

# Compact- Expansion Joints

...a MAURER-Expansion Joint System  
for traffic loaded building joints



# General

MAURER-Compact expansion joints are high-grade watertight joints for car parks, parking garages, access ramps, footbridges and cycle track bridges, as well as for floor slabs in industrial buildings such as factory or storage buildings, in supermarkets, in exhibition buildings or in airports.

They are comfortable to drive or walk over, can be crossed smoothly and joint-free by small-diameter wheels, such as those on supermarket trolleys, industrial transporting trucks or fork-lift trucks, and transmit dynamic loads from the wheels of heavy-duty vehicles to the adjacent structural members.

MAURER-Compact expansion joints can absorb movements of up to 50 mm at right angles to the joint and simultaneously up to  $\pm 25$  mm parallel to it. The permissible vertical displacement can be up to  $\pm 25$  mm.

The gap of the joint is closed flush with the surface by means of a sealing element made of non-ageing wear-resisting chloroprene rubber. Watertight positive connection of the sealing



Cologne airport



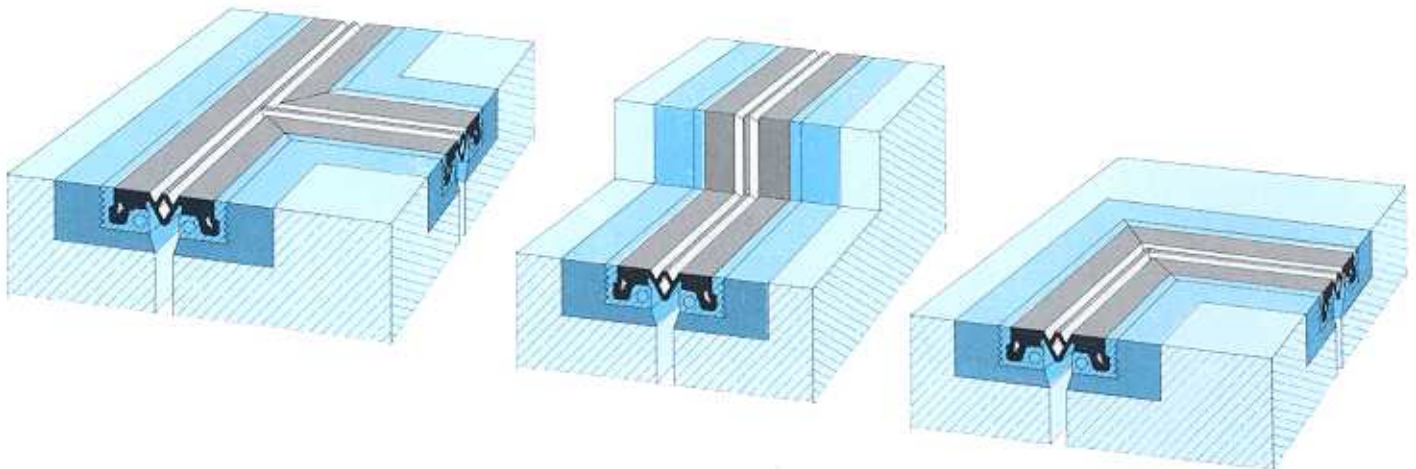
Footbridge at Munich

element with the edge sections made of stainless steel or a non-corroding aluminium alloy is achieved without using bolts, clamping strips or locking cords. The sealing element can be installed and removed quickly and simply at any width of the joint gap within the overall working range of movement.

The edge sections are securely anchored in the structure with the

aid of MAURER-BETOFLEX,<sup>®</sup> an elastomeric synthetic resin concrete developed by us, or by means of resin bonded anchors. Thus, they can resist even large dynamic wheel loads.

MAURER-Compact expansion joints can be adapted to any shape or layout of structural joints such as intersections, vertical or horizontal changes in direction.



The MAURER-Compact expansion joint was subjected to tests at the Testing Laboratory for Road Constructions, Technological University of Munich. Loading conditions corresponding to the most unfavourable encountered in actual practice were applied, while varying climatic conditions were at the same time taken into account.

The test specimen consisted of two sections of road slab in which the MAURER-Compact expansion joint was anchored by means of MAURER-BETOFLEX® elastomeric concrete. One half of the specimen had a mastic asphalt surfacing with waterproofing; the concrete slab of the other half directly supported the wheel loads. The edge sections extending along the expansion joint were butt-jointed at the centre of the wheel track.



Edge sections butt-jointed at the centre of the wheel track. Thermocouple for temperature measurement.



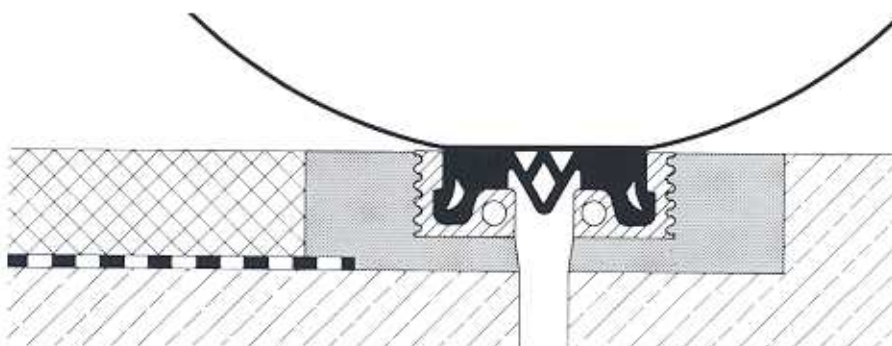
Wheel-load testing rig with test specimen.

The test specimen was subjected to 184000 passes of a wheel set, comprising dual low-load trailer wheels or stacker truck wheels, in the wheel-load testing rig.

The tests were performed in two loading stages with wheel loads of 36.2 kN and 50 kN. At the same time the temperature conditions were varied – winter – 40°C, room temperature and summer + 40°C – as was also the width of the expansion joint between its minimum and its maximum.

A test for watertightness was performed by flooding the surface of the test specimen with coloured water during the wheel passes. It revealed complete watertightness. This also constituted proof of satisfactory bond between the metal edge sections and the MAURER-BETOFLEX® as well as between the MAURER-BETOFLEX® and the mastic asphalt or the road slab concrete respectively.

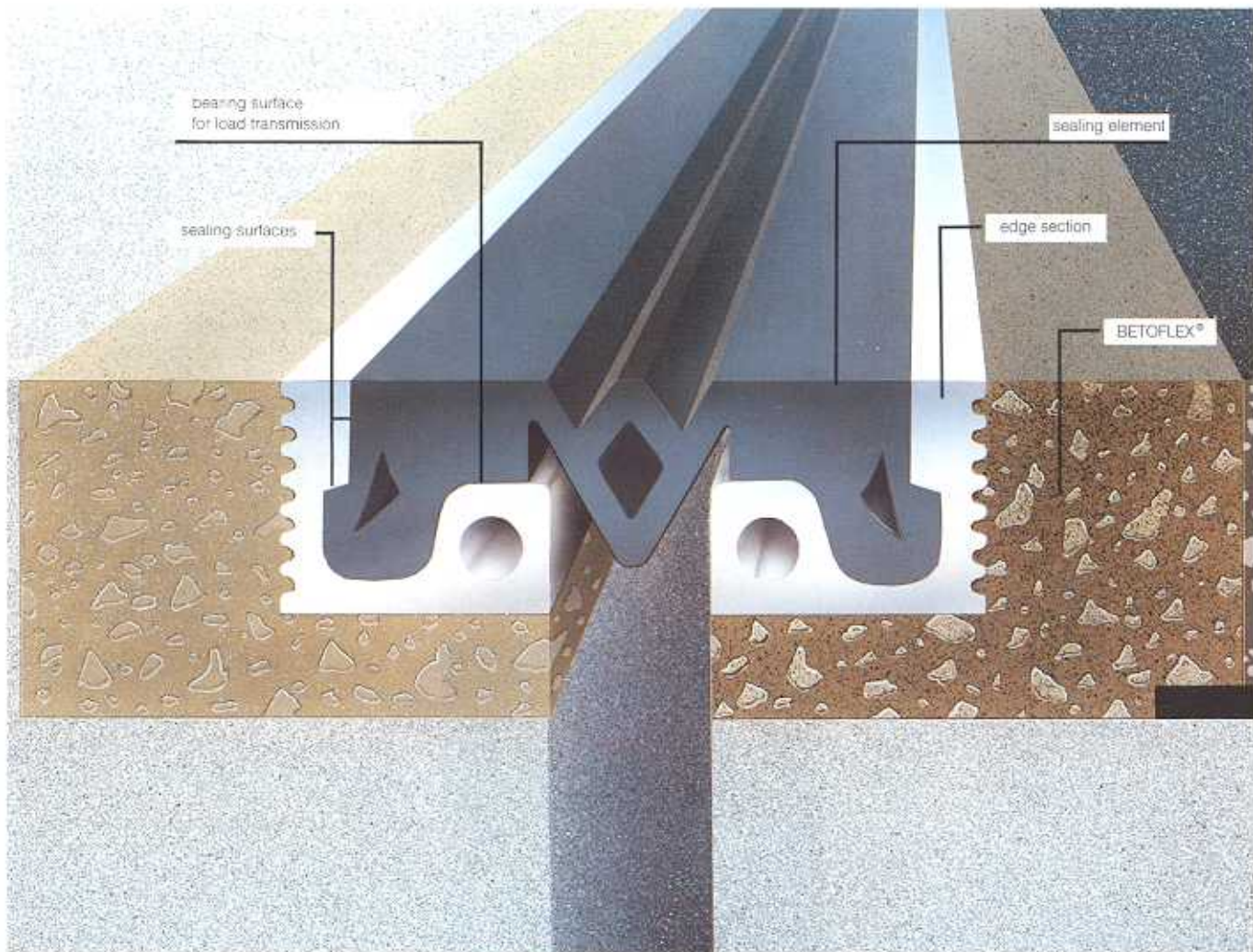
In consequence of the high temperature and the wheel pressure loading, deep ruts were formed in the mastic asphalt surfacing, whereas the MAURER-BETOFLEX® beams and the MAURER-Compact expansion joint showed no permanent deformations.



Section through the joint of the test specimen.



# Structure of the MAURER-Compact expansion joint



Edge sections of stainless steel or a non-corroding aluminium alloy are anchored in the two edges of the structural gap. They extend to the deck surface and form an edge protection for the surfacing and for the sealing element. Those parts of the edge sections that remain visible are narrow and therefore unobjectionable. Due to its shallow height the joints can normally be accommodated in the asphalt without any recesses in the structural concrete.

The sealing element cross-section is formed with bulbous protrusions which are pressed into U-shaped grooves in the edge sections until resilient projecting faces engage with undercuts in the grooves and are gripped there under prestress.

Each groove with its inclined inner wall (nearest the joint) and horizontal bearing surface is so shaped that wedge and lever action produces the necessary contact pressure at the sealing surfaces. At the vertical sealing surface this pressure is further increased by the wedge action and the lateral expansion of the bulbous protrusion of the sealing element during each wheel pass over the expansion joint. Therefore an open gap in the road surface as a result of the sealing element pulling away from the vertical sealing surface cannot occur. When a wheel travels over the expansion joint, the load is transmitted by the solid rubber sections of the sealing element directly to the ample horizontal bearing surfaces and is thus, with relatively low contact pressures, transmitted to the metal edge sections.

The movement-absorbing section of the sealing element consists of an appropriately formed folding mechanism which remains flush with the road surface and keeps the expansion joint gap sealed whatever its width. Because of the bellows-like folding movement (instead of elongation or shortening of the sealing element section) the tensile and compressive forces exerted on the edges of the expansion joint are minimal.

Small grooves in the movement-absorbing section interrupt the surface of the sealing element and thereby ensure skid resistance. They are so designed that, when the joint closes up, any dirt in them will not become jammed in them but will instead be squeezed out.



# Components and Materials

All the components and materials used are subject to regular quality control.

## MAURER-Edge sections

The edge sections can be supplied either as extruded aluminium or roll-formed stainless steel sections.

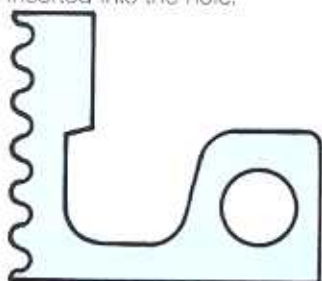
## MAURER-Aluminium edge section

It is produced from ALMgSi1F31 alloy by extrusion. It is a hardened alloy, resistant to de-icing salts, which is used also in shipbuilding. Because they are anchored with MAURER-BETOFLEX® elastomeric synthetic resin concrete, the edge sections do not come into contact with the alkaline cement constituents of the structural concrete.

Grooving on the vertical face of the edge section ensures even better bonding with the MAURER-BETOFLEX®.

The part of the section nearest the joint gap is hollow, i.e., formed with a hole, which reduces the cross-sectional area and also reduces the longitudinal forces generated in the edge section by differential thermal expansion of the edge section and the MAURER-BETOFLEX®.

At butt joints in the edge section, positive shear connection and accurate positional location can be obtained by means of a metal pin inserted into the hole.



MAURER-Aluminium edge section

## MAURER-Stainless steel edge section

This is made of 4 mm thick stainless austenitic steel plate (complying with German Standard DIN 17440) by roll-forming. This material is resistant to de-icing salts. Alternatively, structural steel grade St 37-2 provided with suitable corrosion protection may be employed.



MAURER-Steel edge section

## MAURER-Compact sealing elements

The sealing elements are made of a chloroprene rubber mix which is non-ageing, wear-resisting and resistant to the action of salt water and oil. It possesses high tear propagation resistance and has been very successfully used in MAURER-Expansion Joints for bridges for a good many years now.

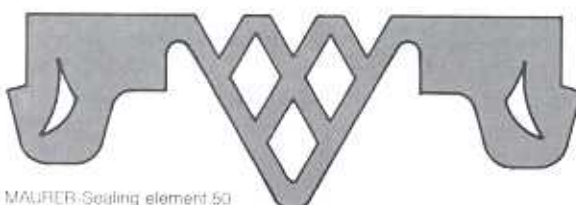
Two sectional shapes are available:

The MAURER-Sealing element 30 for a range of movement of 30 mm at right angle and simultaneously up to  $\pm 15$  mm parallel to the joint and  $\pm 15$  mm vertical displacement.

The MAURER-Sealing element 50 for a range of movement of 50 mm at right angle and simultaneously up to  $\pm 25$  mm parallel to the joint and  $\pm 25$  mm vertical displacement.



MAURER-Sealing element 30



MAURER-Sealing element 50

## MAURER-BETOFLEX®

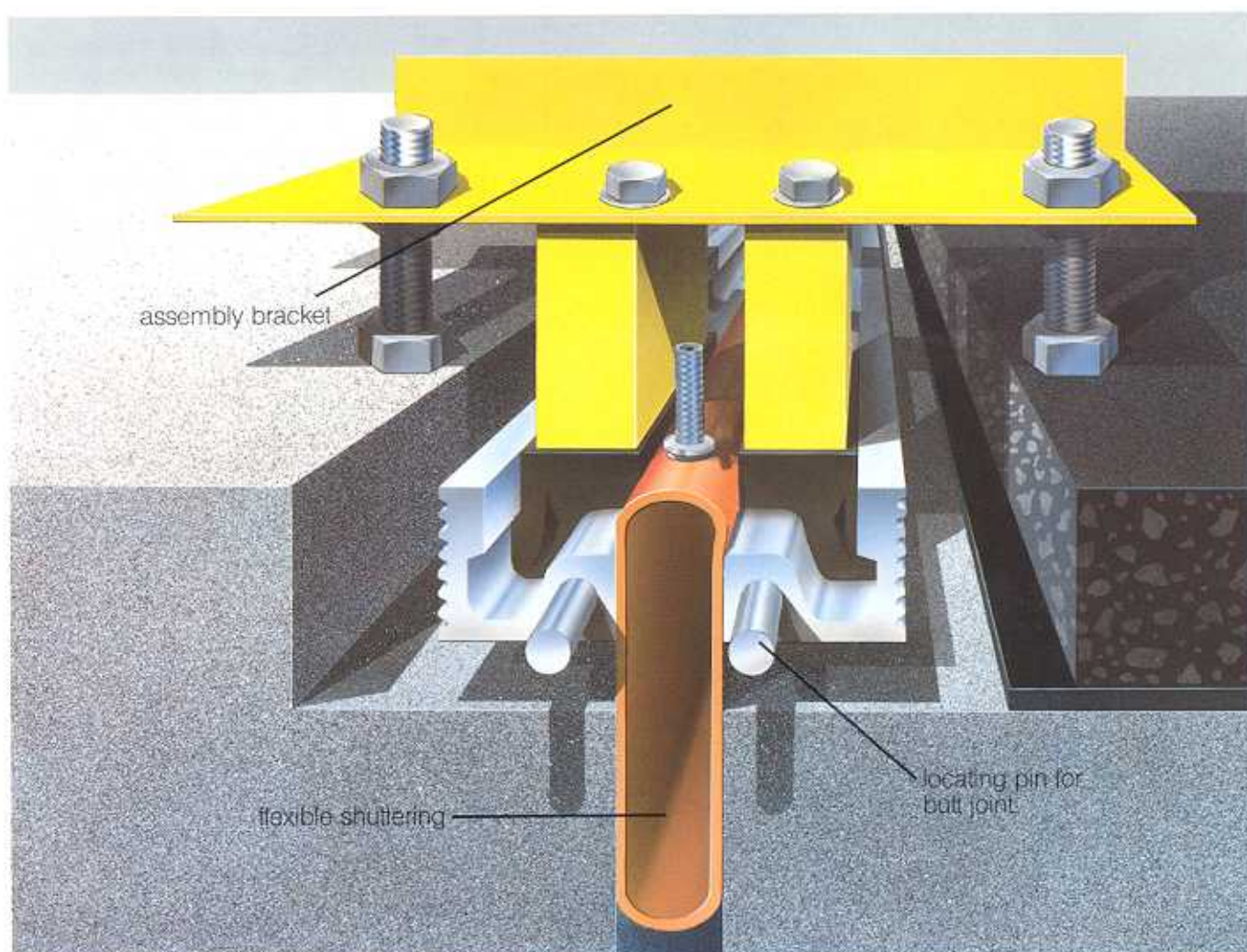
MAURER-BETOFLEX® is the name of a special concrete which has been developed for the anchoring of expansion joints in civil engineering structures. MAURER-BETOFLEX® is made with an elastomeric vulcanizable binder and has very good bond properties with regard to steel, concrete and asphalt. Even at temperatures as low as  $-20^{\circ}\text{C}$  it retains toughness and elasticity with a relatively low modulus of elasticity.

MAURER-BETOFLEX® is watertight and resistant to de-icing salts, oil, acids and solar radiation. It has high wear resistance. No subsequent consolidation occurs under traffic loads, so that a flush and smooth transition from the top of the edge section to the MAURER-BETOFLEX® beam is assured.

MAURER-BETOFLEX® is black but can, if required, be supplied in other colours, e.g., concrete grey. Further information is given in our special booklet „MAURER-BETOFLEX®“.



# Assembly and Installation



## Anchoring with MAURER-BETOFLEX®

The dimensions of the recess are indicated in the cross-sectional drawings (see page 7). There is no need to provide connecting reinforcement.

On asphalt-surfaced roads or floors the waterproofing and asphalt are preferably continued uninterrupted across the (temporarily covered) expansion joint gap in the structural concrete, and the asphalt is compacted. Later on (preferably just before the MAURER-Compact expansion joint is to be installed) the asphalt surfacing is cut away and removed over the required recess width and down to the structural concrete. This procedure ensures absolutely equal levels of the road or deck surface on each side of the expansion joint.

The concrete surfaces which will come into contact with MAURER-BETOFLEX® are now roughened and cleaned, so that the recess is thus ready for the installation of the expansion joint.

The aluminium or steel edge sections are supplied in lengths of up to 12 m to the construction site, where they are adapted and fitted to the layout of the structural joints. By means of inserted locating pins the sections are accurately aligned at butt joints.

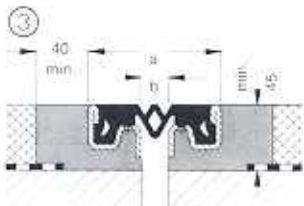
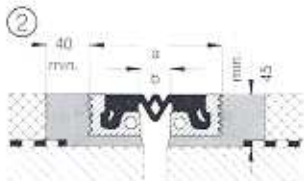
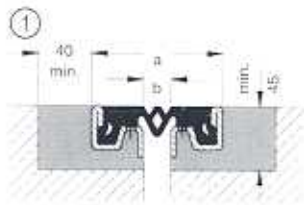
Then, with the aid of suitably designed assembly brackets, the edge sections, at a distance apart corresponding to their preliminary setting, are so suspended in the recess that the MAURER-Compact expansion joint is located centrally over the structural gap and the top surfaces of the sealing element are exactly level with the road surface.

After the insertion of a flexible shuttering the MAURER-BETOFLEX® mortar is poured. In this operation MAURER-BETOFLEX® flows also into the gaps at the butt joints in the edge sections, fills up these gaps and thus ensures a permanent, resilient, watertight connection.

A few hours after pouring, MAURER-BETOFLEX® attains so high a strength that traffic can be allowed to travel over the joint as soon as the assembly brackets and the shuttering have been removed, the edge section grooves have been cleaned and the sealing element has been installed.

# Table for selection

MAURER-Compact expansion joint	movement range in mm at right angles and parallel to joint	material of edge section	anchorage of edge section	type of connection	width of joint in mm			
					type K 30	type K 50	type K 30	type K 50
K	30 or 50	A = aluminium N = nirosta	B = BETOFLEX®  K = headed stud V = resin anchor (bonded fixing)	D = water-proofing W = wall connection	90 to 120	95 to 145	10 to 40	15 to 65



① Type K 30 N-B (stainless steel edge section/MAURER-BETOFLEX® anchorage); traffic travels directly on the concrete without waterproof membrane

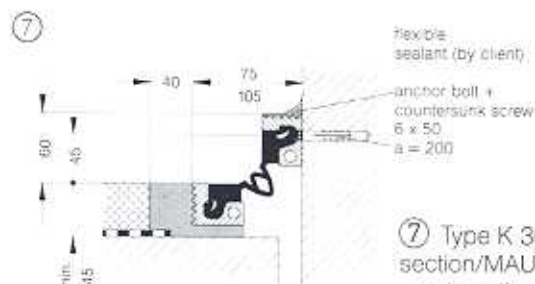
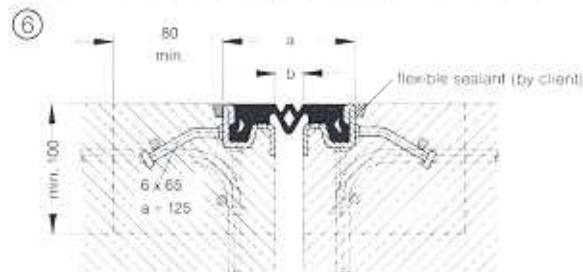
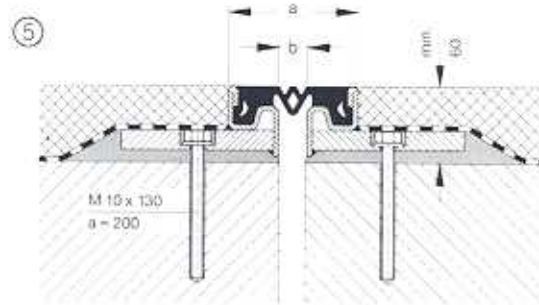
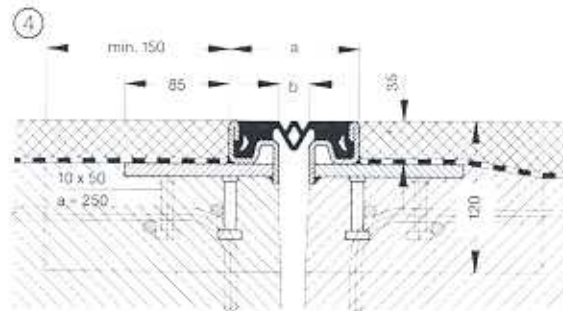
② Type K 30 A-B (aluminium edge section/MAURER-BETOFLEX® anchorage); concrete slab with waterproofing and asphalt

③ Type K 30 N-B (nirosta edge section/MAURER-BETOFLEX® anchorage); concrete with waterproof membrane and asphalt

④ Type K 30-N-KD (stainless steel edge section/headed stud anchorage); waterproof membrane connection

⑤ Type K 30 N-VD (stainless steel edge section/resin anchor); waterproof membrane connection

⑥ Type K 30 N-K (stainless steel edge section/headed stud anchorage); without waterproof membrane



⑦ Type K 30 A-BW (aluminium edge section/MAURER-BETOFLEX® anchorage); wall connection





Fabricated Steelwork  
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Environmental Engineering



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