

MEMO 506	Dato: 23.09.2013	Sign.: sss
BSF - EXPANSION JOINTS	Siste rev.: 23.05.2016	Sign.: sss
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PLANNING		

BSF - EXPANSION JOINTS

If such a solution is favoured in the construction, it is possible to modify the BSF knife in order to use the connection in expansion joints. However, the details in such a solution must be evaluated on a case-to-case basis, as these will be customized special units. Below some principal considerations are given.

The system outlined here is based on a sliding bearing.

It is assumed the total longitudinal movement of the knife is decided, and that the sliding may be described as altering around a mid-value. The total longitudinal movement length is denoted $2 \times \Delta$ (total sum of \pm values). The mid value is used as the nominal situation for planning the gap between beam/column (A) and location of the knife in the column.

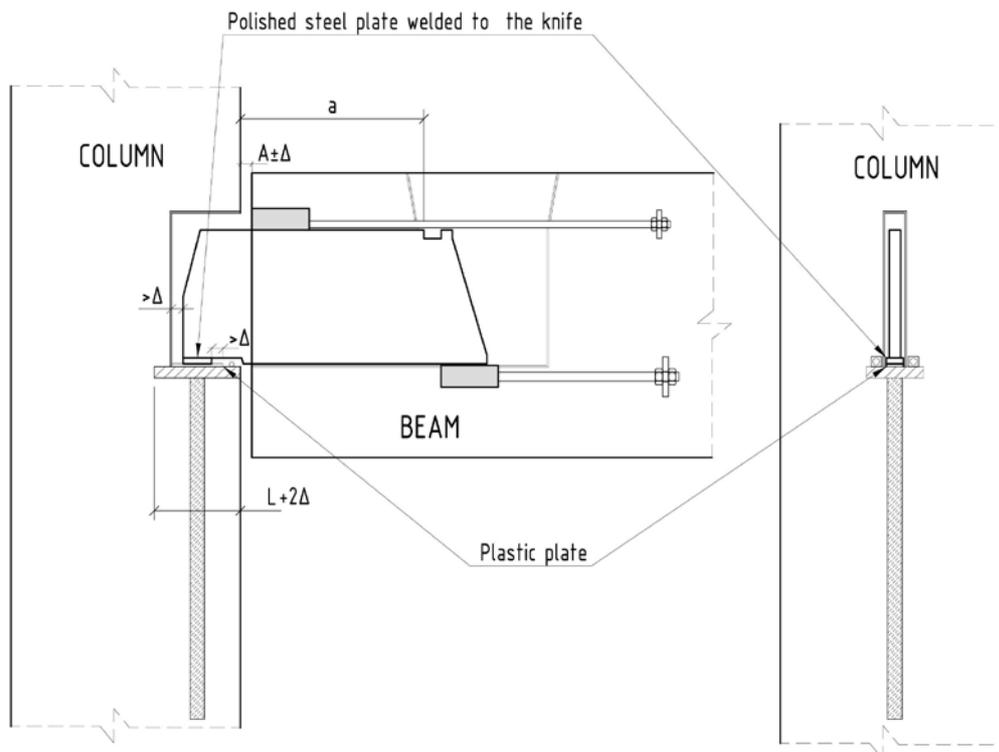


Figure 1: Assumed configuration.

The knife must be altered.

The solid lines in Figure 2 shows the new shape of the knife, while the standard shape is shown with dashed lines. Note that the notch must be cut back. Δ is half the total expected longitudinal movement of the beam.

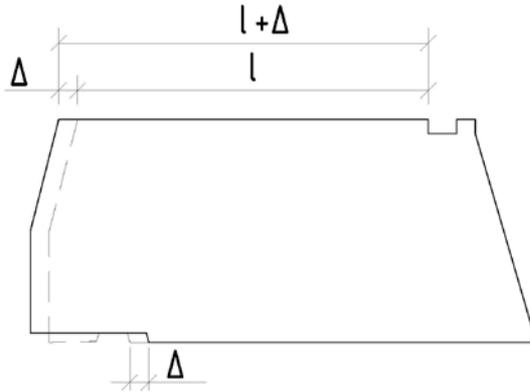


Figure 2: Alternations to the knife.

The column unit must be altered.

The increase in length (L) of the column unit must be at least the expected longitudinal movement of the beam. The increase in the moment arm for the knife is normally more than compensated by the reduction in the horizontal force. (However, a final evaluation of knife capacity should be carried out when the loads are known.) The increase in width will depend on the required area to transfer the load from the knife through the plastic plate into the column. Required thickness of the steel plate must be evaluated due to the possible eccentric loading when the knife is sliding. (The load from the knife will be centric on the reinforcement bar only at the mid temperature situation)

Description of system:

A layer of plastic (high density polyethylene) is placed in the bottom of the column unit. The thickness is normally 5mm and the dimensions in both directions should be 4mm less than the available space inside the for column unit. To distribute the load from the knife a polished carbon or stainless steel plate of thickness 10 to 15 mm is welded to the knife.

The required length of the polished plate must be calculated in each case, it depends on the actual loads and the compressive strength of the plastic. The length should at least equal to the original length of the knife in front of the notch.

To secure the correct location of the knife within the column unit the following method may be used: In the design, the structural engineer has assumed a mid-temperature at which the building shall operate. At that temperature the support point shall be centered in the column unit, as shown in Figure 1. Based on this, the distance "a" can be calculated. Now a table can be made, showing the distance "a" as a function of the temperature at the time of erection. This is vital information for the erection crew.

The beam unit shall be fully grouted in order to support the knife itself and prevent the knife from sideways movement inside the beam. Sideways movement of the knife inside the column unit must also be prevented. It is not obvious how this best can be done. Grouting on both sides of the knife may be a solution. However, it may be very difficult to avoid the grout from flowing into places where it should not be. For example, if grout

flows in front of the knife, the longitudinal movement is prevented and the expansion solution ruined. Other methods to prevent sideways movement inside the column unit may work better.

Special care must be taken to ensure proper fire protection of the BSF knife. The fire protection in the void between the beam end and the column must enable the longitudinal movement and alternating width of the gap (A).

REVISION HISTORY	
Date:	Description:
23.09.2013	First Edition. Principal solution is as given in "old" BSF memos
27.11.2013	Included comments from external review.
27.02.2015	Included a nut on the front side of the steel plate anchoring the threaded bars. (To ensure correct position of the plate when casting the concrete).
23.05.2016	New template