



FLOOR

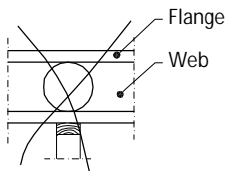
Improvement of misplaced holes/cutouts

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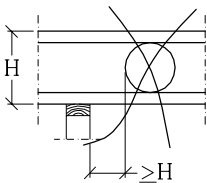
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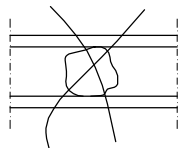
This building detail describes the improvement that can be made to a beam that have a misplaced hole, or an unwanted cutout in the flange. This can also be used for damages that have occurred during transport. Below are some examples of misplaced/wrong made holes.



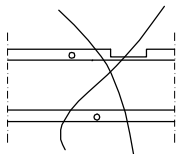
Holes should not be placed over or under a bearing wall.



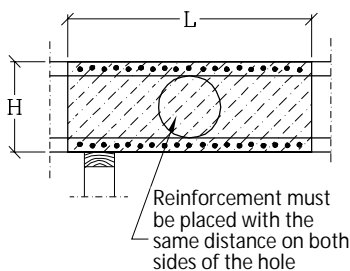
Holes should not be placed closer to support than the beam height. Information regarding the reduction of shear capacity caused by a hole can be found in ETA 12/0018.



Circular holes must always be circular, else they should be evaluated according to the rules for holes in ETA 12/0018.



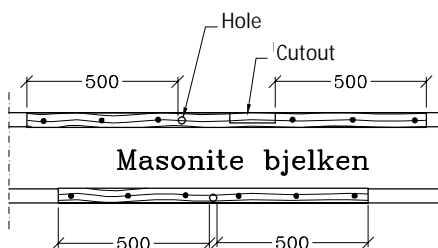
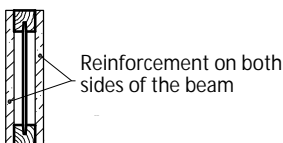
No holes or cutouts are allowed in the flanges.



Reinforcement of misplaced hole in the web must be done on both sides of the beam with moisture resistant particleboard, plywood or OSB, with a minimum thickness of 18 mm. Length of reinforcement and number of nails can be seen in the table to the right. The nails must have a minimum diameter of 2,5 mm and a length of 60 mm. Shorter nails can be used provided that they penetrate at least 35 mm into the flange. The distance between nails must be 30 mm.

Tabell		
Dimension	Length, L (mm)	Number of nails per flange 1)
200 - 220	480	16
250 - 300	540	18
350 - 400	600	20
450 - 500	660	22

1) Number of nails on ONE side of the flange



Flanges with holes or cutouts must be reinforced with wood (without defects) on both sides of the flange, lengths are show in the figure to the left. The wood must have a minimum dimension of 38x48 mm for H-quality beams and 48x48 mm from HI-quality. Knot sizes under 7 mm is allowed. The wood must be glued with construction glue (Polyurethane or epoxy based) and fastened with screws 15-20 mm into the flange. Screws must be placed according to the figure to the left. Nails must not be used.

