Metal deck and cast-in channels

Edge fixing: Pourstop

Thin slabs and perimeter fixings

Concrete cast on metal decking is commonly only 130 mm thick, and the mix is generally lightweight (e.g. Lytag).

Also, fixings for the following trades, such as: curtain-walling; brickwork or masonry; pre-cast panels or lift guides, are often required at the perimeter of the metal deck.

These fixings may be required to provide both support and restraint.

Halfen cast-in channel fixings have proven performance in thin slabs and in perimeter locations. This section describes fixings into the edge of the slab; for fixings into the top of the slab, see page 20.

The multiple anchors on the back of the channel profile bond well with the concrete, provided they are located within the reinforcement cage, and the channel spreads the load over a longer length of slab edge. The inconvenience of drilling steel or adding brackets to steelwork can be avoided by using cast-in channel in the edge of the slab. Halfen channel is suitable for both deck-bearing and deck-parallel conditions.

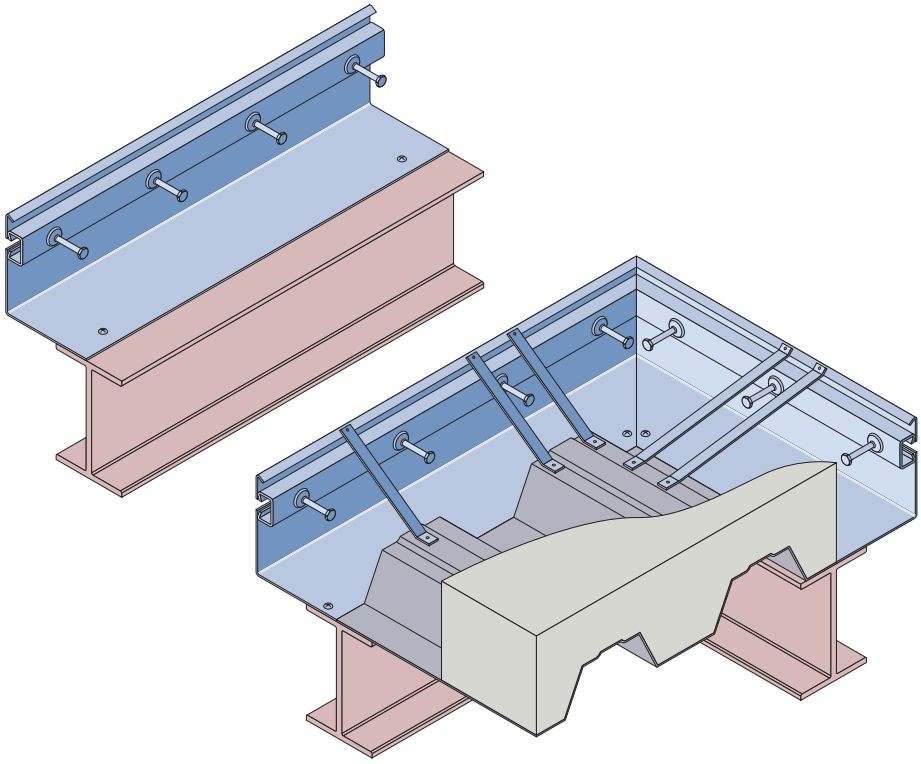
Pourstop

Installing Halfen channel in the edge of the slab can be carried out by using the traditional steel edge trim manufactured by Halfen, with the channel already installed in the trim. This is called Pourstop. The Halfen channel is continuous in the edge trim, which is normally manufactured and supplied in 3 metre lengths for butting together on site and fixing around the perimeter of the building. The last infill piece in any bay can be easily cut to length on site.

Attaching the channel to the edge trim on site is not recommended.

Channel casting level

Channel can be fixed in the edge trim at any level (dimension ‘d’), provided that the anchors are within the reinforcement cage, but is normally set as high as possible so that any component bolted to the channel has effective heel bearing.



Halfen Pourstop shown fixed ready for deck-parallel application and in deck-bearing application with restraint straps

Channel/anchor size range

Normally the smaller Halfen channels are used for edge fixing. The typical maximum allowable load per bolt at 200 mm nominal centres is 7 kN. The most common channel sizes (Code HPS – K) are shown below. The anchors on the back of the channel are normally fixed at 200 mm nominal centres for this edge detail (e.g. a channel 3 m long would have 15 anchors). Care should be taken to ensure that the larger channels 50/30 and 49/30 fit under the top reinforcement. These channels may only fit in deeper decks.

Channel profile	Bolt diameter	Allowable loads (kN)*
HPS 50/30 K	M12 or M16	10.0
HPS 49/30 K	M12 or M16	10.0
HPS 40/22 K	M12 or M16	8.0
HPS 40/25 K	M12 or M16	8.0
HPS 38/17 K	M12 or M16	7.0
HPS 28/15 K	M10	3.5

* Allowable loads in reinforced concrete (pull-out, transverse shear or resultant loads): continuous channel with anchors at 200 mm nominal centres and T-head bolts at 200 mm minimum centres.

Materials

The edge trim material is pre-galvanised mild steel Z275. The cast-in channels may be either carbon steel hot dip galvanised or stainless steel, depending on the application and the environment. T-head bolts may be either electro-plated, hot dip spun galvanised or stainless steel. For material specifications, see page 6.

How to specify

The vertical edge of the trim will be folded by Halfen to suit the overall slab thickness. The return leg can also be made to order to suit the design dimension from the vertical edge of the trim to the edge of the deck: see Pourstop order code below:

Order code for Pourstop assemblies

HPS	40/25	hdg	3000	(53)	130	200
type	channel size (mm)	channel material/ finish	channel length* (mm)	channel c/l from top of slab (mm) (dim. ‘d’)	overall slab thick-ness (mm)	return leg (mm)

* Normally only 3.0 metre lengths are manufactured. For other lengths please consult Halfen Limited.

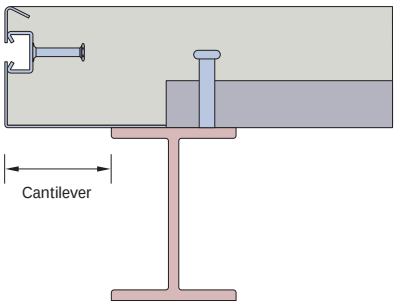
Edge fixing – design considerations

Direction of deck

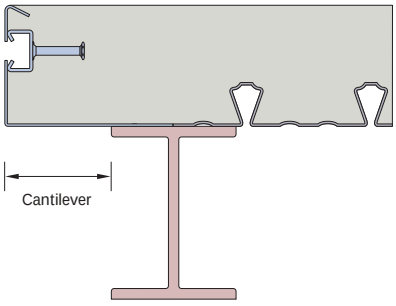
The channel has the same load capacity whether the deck is bearing on the beam or parallel to the beam, as shown below.

In deck-bearing applications, the deck may stop at the beam or it may cantilever, but it must always stop short of the edge trim so that there is a solid concrete edge in all cases.

This is required so that any component bolted to the Halfen channel has full bearing at the heel. (See typical details, page 26.)



Deck-bearing: solid concrete edge



Deck-parallel: solid concrete edge

Propping

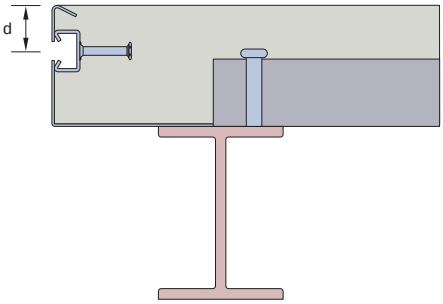
Ideally, the cantilever should be kept to a minimum. If the cantilever is large, the Pourstop may need to be propped:
1) for the temporary wet condition
2) for the final load-bearing condition.

If propping is required, this is normally designed by others.

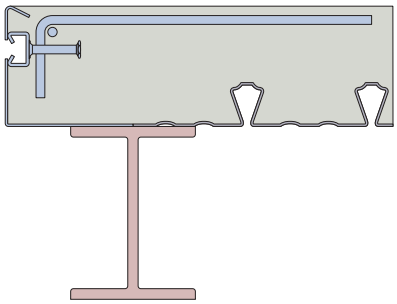
See also under ‘Cantilevers’.

Channel casting level

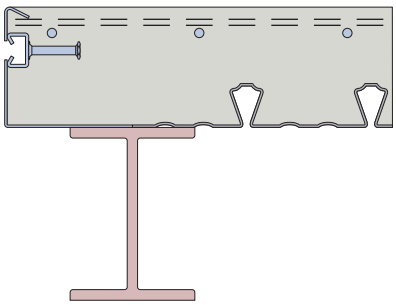
Channel is normally cast as high as possible, to achieve the maximum possible heel bearing for any component bolted to it. Halfen will agree the dimension on a job basis, having regard to the load applied and the production method. Dimension ‘d’ = casting level of channel from top of slab



Reinforcement

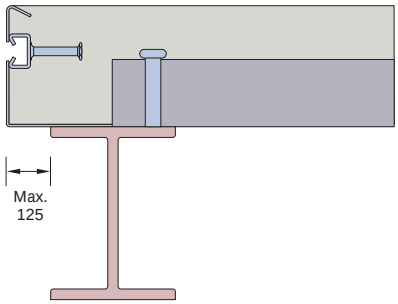


Halfen channel must be positioned within the reinforcement cage to prevent the anchor being pulled out of the concrete. Local bobs and links are normally sufficient to achieve this, but it may still be possible if only mesh reinforcement is available, please consult Halfen.

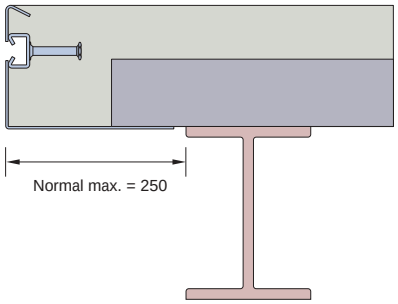


Cantilevers

When using Pourstop, the edge detail should be carefully designed. Halfen are always ready to discuss specific application details, but the main points to consider are as follows:



Cantilever up to 125 mm maximum: example above shows deck bearing on beam and Pourstop fixed to beam.



Cantilever 125 to 250 mm: Pourstop will be supplied by Halfen with a stiffening rib. The example above shows deck bearing on beam and Pourstop fixed to deck.

Cantilever greater than 250 mm: a stub may be required. Halfen would be pleased to discuss this on a job basis.

The return leg of the Pourstop can be any dimension to suit the fixing conditions shown above.

Applications for edge fixings

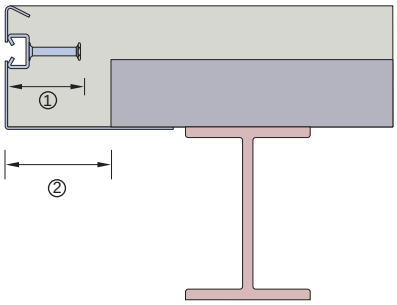
Normally, edge fixings are continuous channels for bolts at regular centres around the building perimeter. Brick or masonry support is the most common application, but channels are also ideal for fixing lift guides or mechanical services in riser shafts.

Metal deck and cast-in channels

Edge fixing (continued)

Halfen channel anchors

All Halfen channels for casting into concrete have anchors swaged or welded to the back. The deck bearing must be kept clear of the anchor zone, so that the anchors are surrounded by concrete, and any bracket or component subsequently fixed to the channel will have effective heel bearing. See the illustration and table below:



Channel size	Dimension ①	Dimension ②
50/30 or 49/30	90 – 130	150
40/22 or 40/25	76	110
38/17	68	110

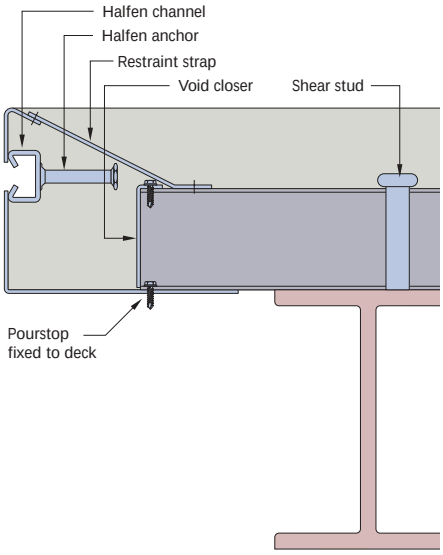
Deck thickness

The thicknesses of most metal deck slabs are in the range 130 to 150 mm, but Halfen Pourstop is made to order to suit any deck thickness. Over 150 mm, material thickness and restraint straps may vary. Halfen will be pleased to prepare job drawings.

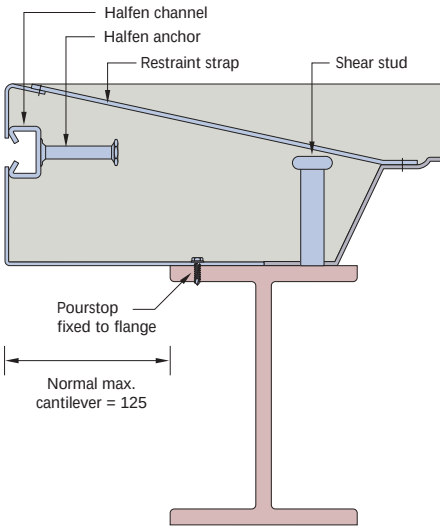
Concrete grade

The concrete density should be minimum 1900 kg and strength minimum C 35.

Typical details



Deck-bearing



Deck-parallel

For the above fixing details a minimum cantilever is preferable. The detail should also be designed to allow the most convenient use of self-tapping screws. The self-tapping screws holding the edge trim to the deck will normally be at 300 mm centres. The fixing contractor should note, when writing his method statement, that the encapsulated Halfen channel increases the weight of the edge trim. (Also, the self-tapping screws fixing the edge trim to the deck will be of a different design from those fixing the edge trim to the structural beam.)

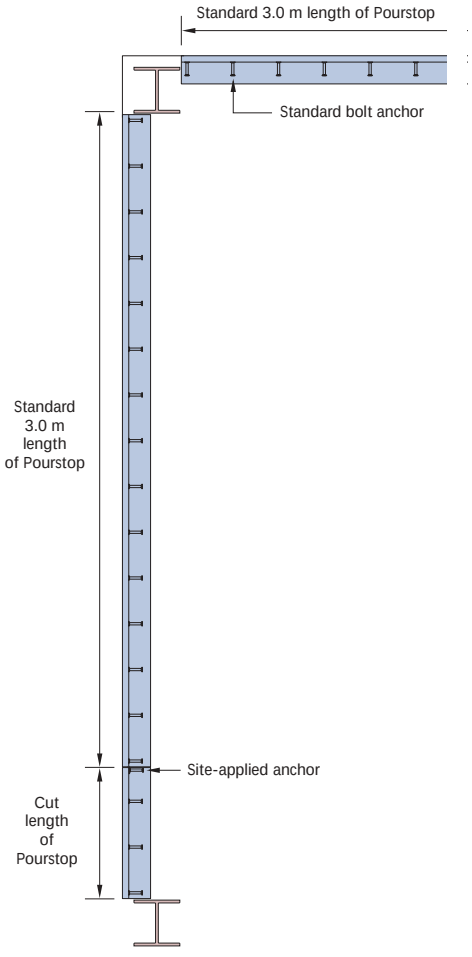
Normal Halfen Pourstop is adequate to take the load of the wet concrete in the minimum cantilever condition. For advice on stiffness for larger cantilevers, please consult Halfen Limited.

The Pourstop restraint straps are fixed back to the ribs by self-tapping screws at approximately 600 mm centres.

With its high strength and adjustability in a thin edge, the Halfen Pourstop System offers many advantages to the concrete contractor and the following trades. Use over many years has shown that the detail can be used effectively following the guidance given above, with minimal disruption to normal trade practice.

Setting-out plan

Set out Pourstop in 3 metre modules. Butt up as many 3 m lengths as possible before using site-applied anchors, code ANK-E, see page 28. (Note that butt joints should be taped to prevent concrete leakage.) Please consult Halfen Limited about column infill pieces.

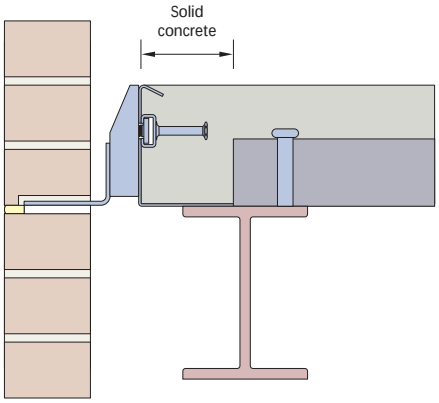


Metal deck fixings – variations

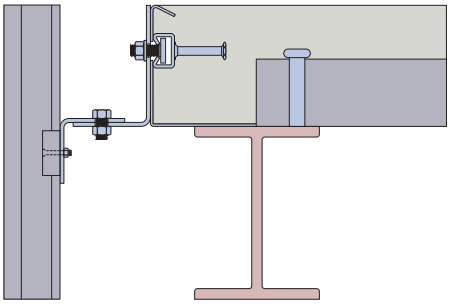
Common applications

The most common applications for Halfen Pourstop in the edge of metal deck are:

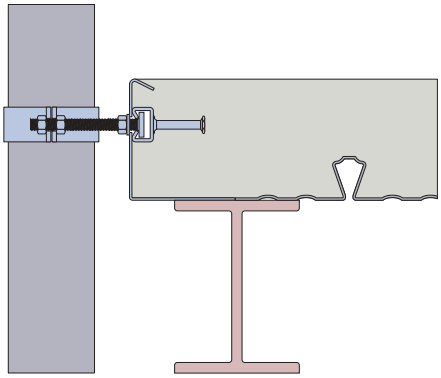
1) brickwork support: Pourstop provides a fixing for brick support systems above horizontal soft joints. (An example of bracket type HMA is shown below; solid concrete behind the edge trim is essential, as shown.)



2) lift guides: Pourstop allows lift manufacturers to use traditional details even in a thin slab.

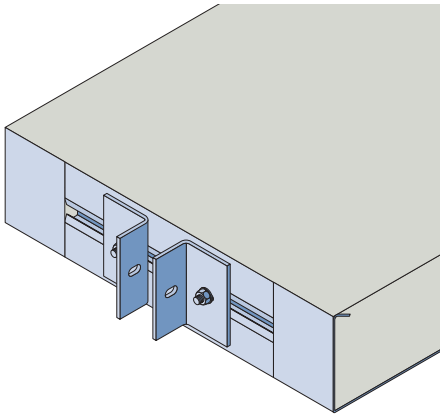


3) pipe risers: with Pourstop the mechanical and electrical contractor does not have to build a secondary structure for pipe support.



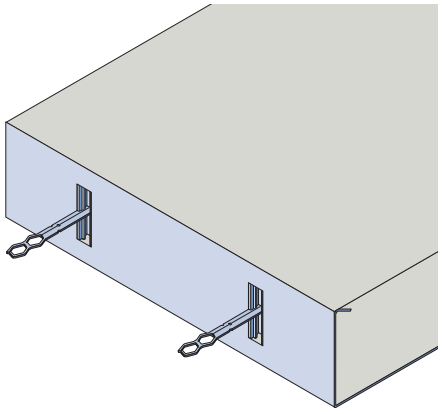
Short lengths of Pourstop

For point fixing of curtain wall mullions a short cut length of channel may be needed in the edge trim. The normal detail is a 350 mm length of Pourstop, which is set out on site to butt up against traditional edge trim. For details, please consult Halfen Limited.



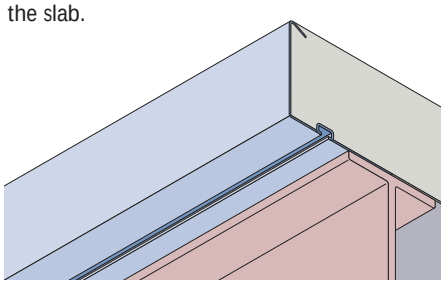
Vertical channel in edge trim

For brick ties, short lengths of vertical channel can be factory fixed into edge trim by Halfen at regular centres.



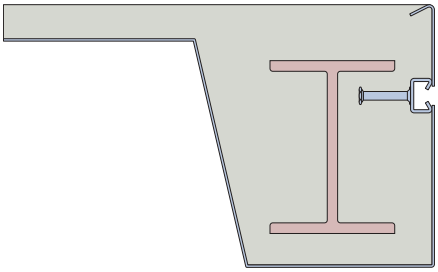
Soffit fixings

Halfen cast-in channel is also suitable for providing soffit fixings close to the edge of the slab.



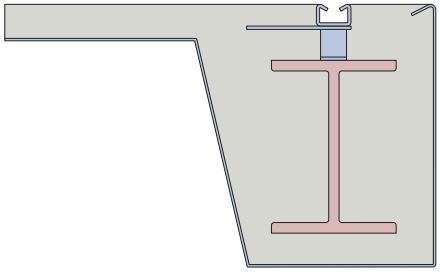
Deep edge trim

Halfen will design deep edge trim/Pourstop details to suit specific conditions.



Channel in the top of extra thin decks

Halfen will design anchors to suit the exceptionally thin decks that occur under some conditions.



Toothed channel

For in/out adjustment of components toothed channel may be used in metal deck, either singly or as a pair. By this means serrations on angles can be avoided, see example below.