

# Halfen systems for the support and restraint of brickwork

## Introduction

Halfen is a leading supplier of channel fixing systems and building components, with manufacturing and marketing centres throughout the world.

The product range consists of:

- cast-in channel fixings
- brickwork support systems
- brick ties and windposts
- reinforcement systems
- pre-cast lifting systems
- pre-cast fixings
- curtain wall restraints
- natural stone fixings
- framing systems.

This brochure covers systems for the support and restraint of brickwork/masonry.

## Brickwork systems

Support of brickwork above horizontal soft joints

The first section of this brochure details bracket systems for the support of brick, block and reconstructed stone outer skins above horizontal soft joints in framed structures.

### Lintels

Halfen also manufacture steel end-bearing lintels and reinforcement systems to allow the construction of fair-faced arches in facing brickwork or deep reveals.

### Brick ties

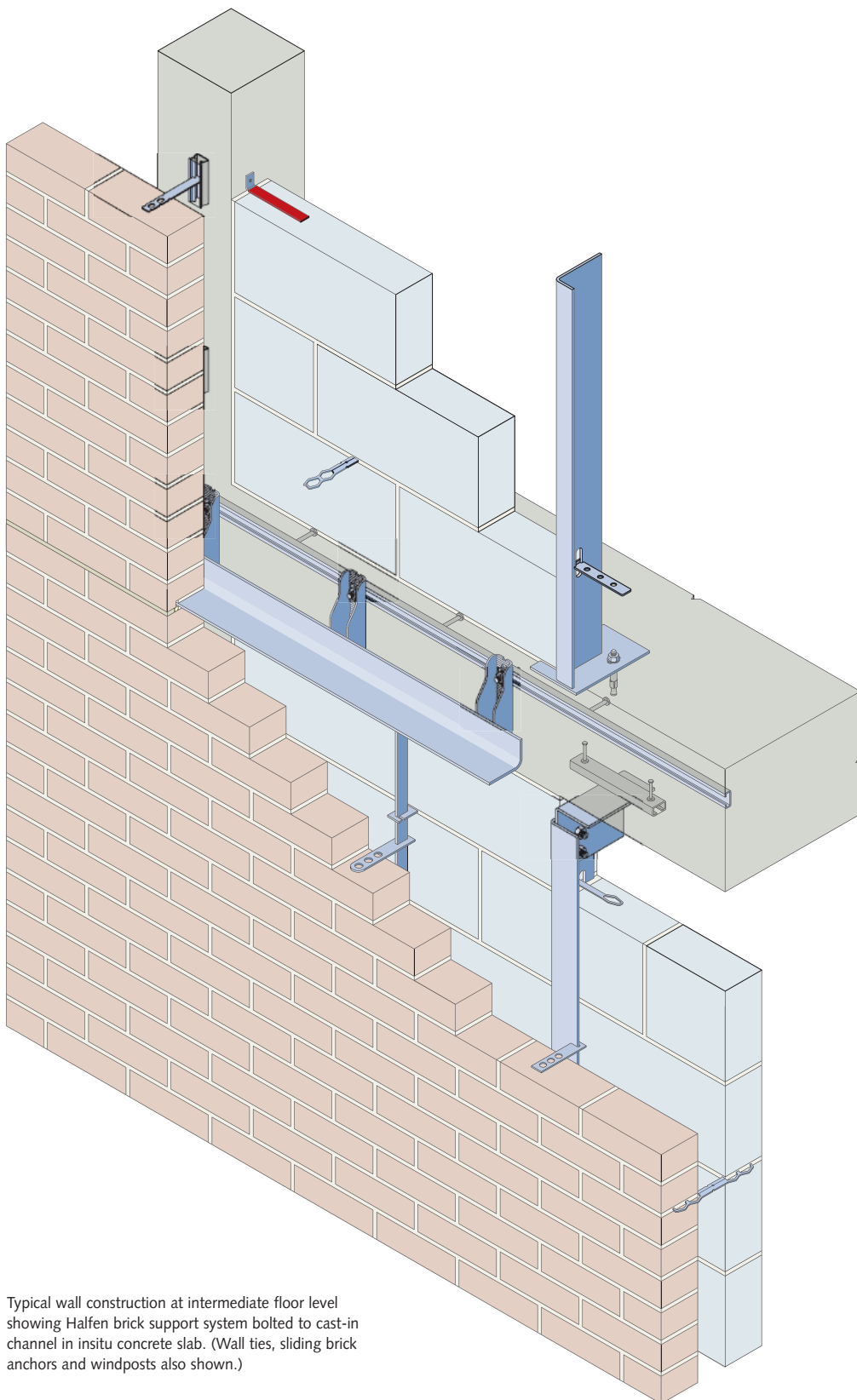
Full details are given of cavity wall ties, together with dovetail and other channel ties, ties for studwork, frame cramps, sliding brick anchors and specialist ties.

### Windposts

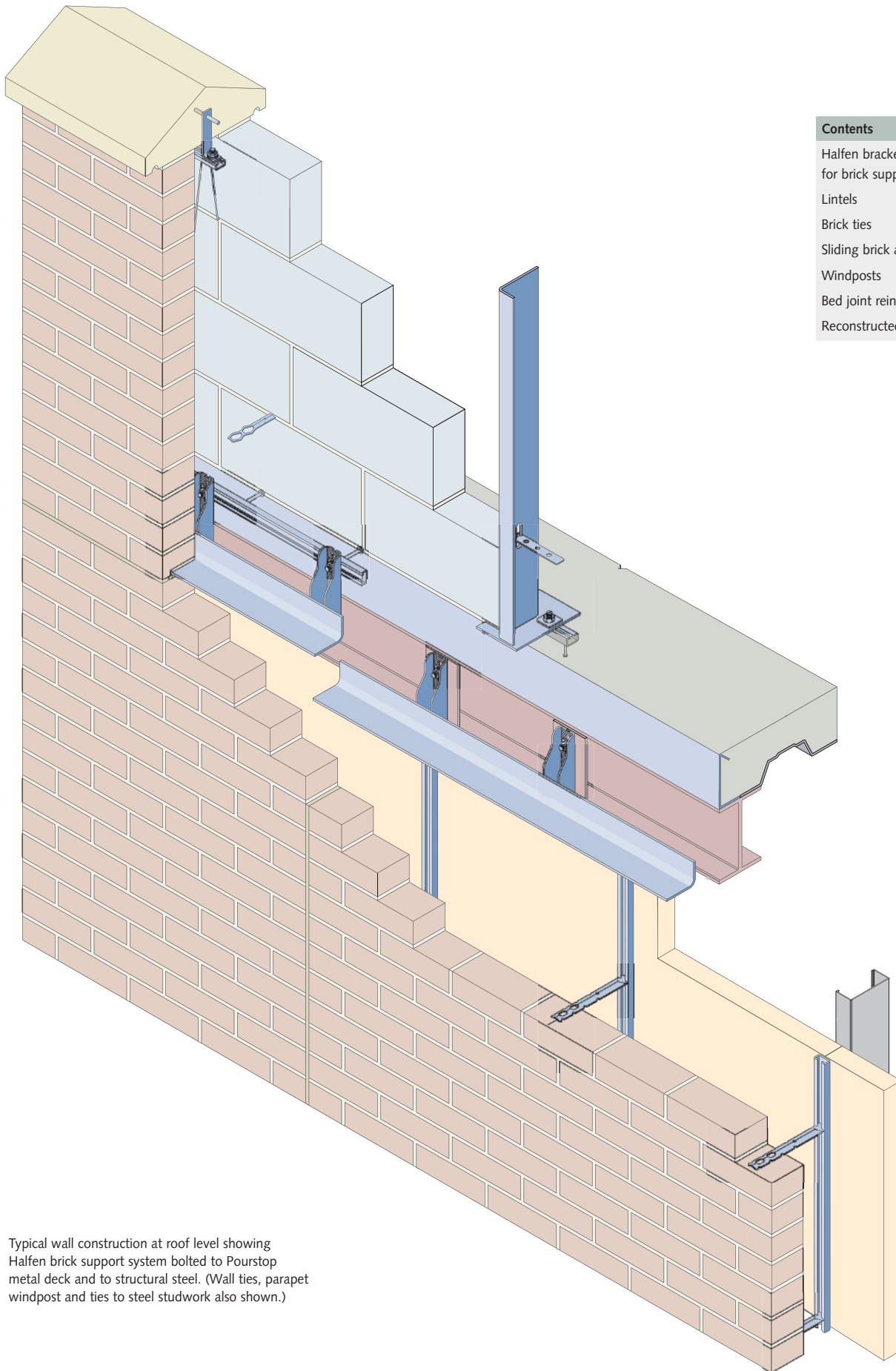
To transfer the wind load on large brick wall panels to the structure Halfen manufacture windposts that generally span from slab to slab in framed structures.

## Design Service

Halfen also offer a comprehensive design service. For full details, please contact Halfen Limited.



Typical wall construction at intermediate floor level showing Halfen brick support system bolted to cast-in channel in insitu concrete slab. (Wall ties, sliding brick anchors and windposts also shown.)



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Typical wall construction at roof level showing Halfen brick support system bolted to Pourstop metal deck and to structural steel. (Wall ties, parapet windpost and ties to steel studwork also shown.)

# Windposts

Halfen windposts have been specifically designed to strengthen masonry panels. They are set out between structural columns, as shown, and are used at storey height or as spandrel or parapet posts. Both cavity windposts and blockwork windposts are available.

## Cavity windposts

Cavity windposts can be used without cutting blockwork and are therefore the preferred option, where possible. Cavity windposts are available in 2 profiles:

### CW2

CW2 is formed from 4 or 5 mm thick folded C profile. Ties are normally the hook-on type WPT 1, but posts can also be slotted for ties.

### CW3

CW3 is formed from 2 CW2 channels welded back-to-back, providing a stiffer profile.

## Blockwork windposts

Blockwork windposts (BW1) are formed from angle and built into the blockwork inner skin, as shown. Blockwork windposts are available in a range of angle sizes.

### BW1

Normally the angle is folded from 4, 5 or 6 mm thick plate. Angle dimensions can be selected from the Halfen standard schedule (page 33), or to suit the project detail. Ties for the outer skin (if required) are the hook-on type WPT 1. The inner skin ties may be either WPT 3 or WPT 3PS to suit the slot in the spine.

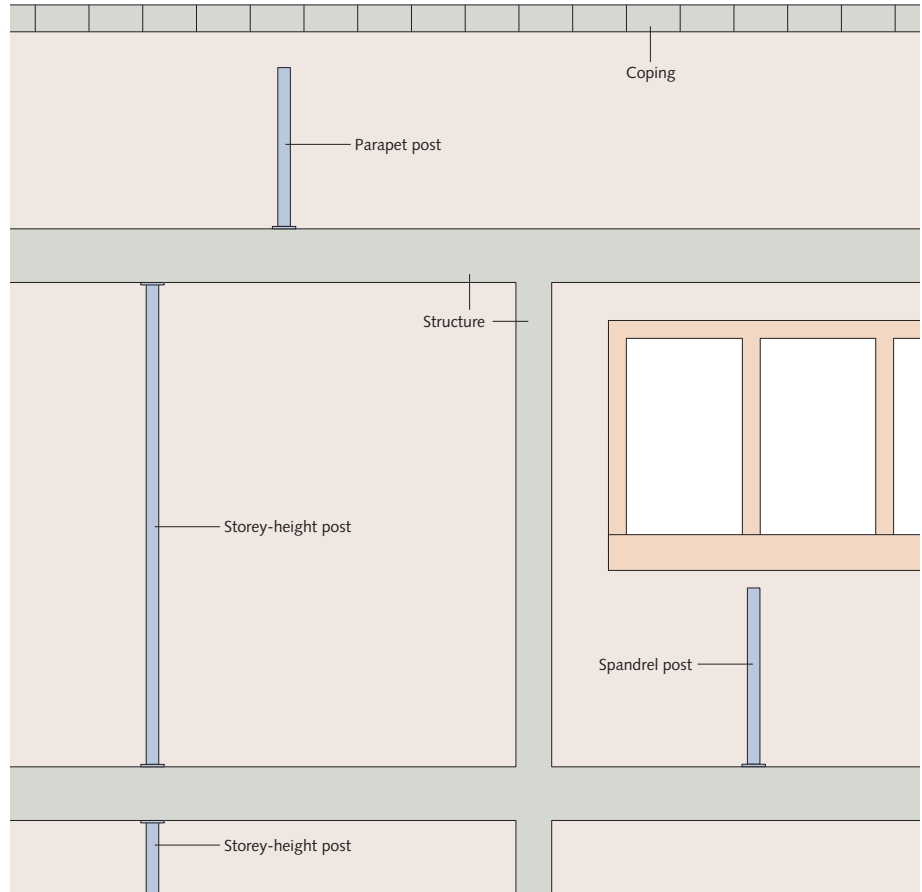
## Materials

Windposts and brick ties are normally manufactured from Grade 304 stainless steel. (Grade 316 is also available, if required.)

For dry internal applications hot dip galvanised windposts can be manufactured, but it is recommended that the ties in the outer skin are stainless, even if the windpost is hot dip galvanised.

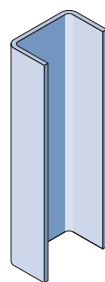
## Dimensions

Typical profile dimensions are given on page 33, however profiles are manufactured on a project basis, so any dimensions are possible. The lengths of windposts are specified to suit the project requirements.

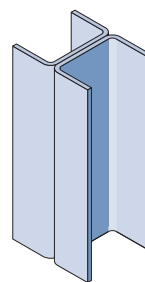


Elevation

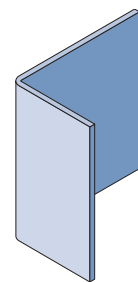
## Windpost profiles



CW2

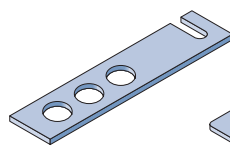


CW3

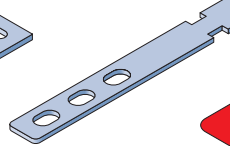


BW1

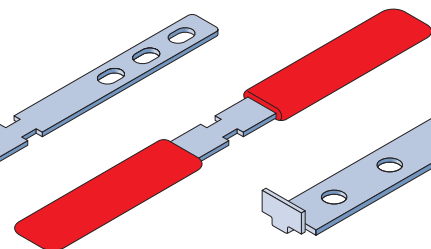
## Windpost ties



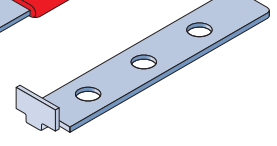
Flange tie  
WPT 1



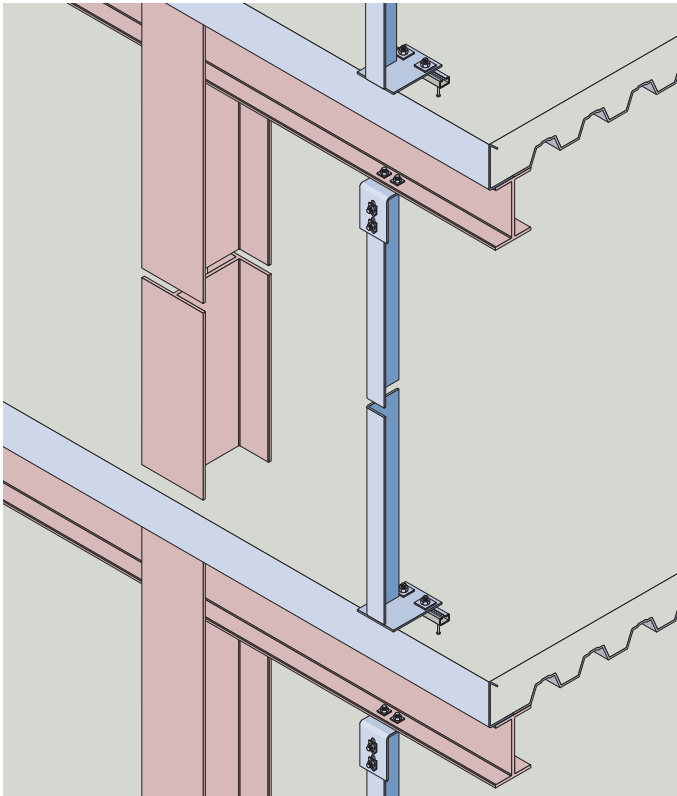
Web tie  
WPT 3



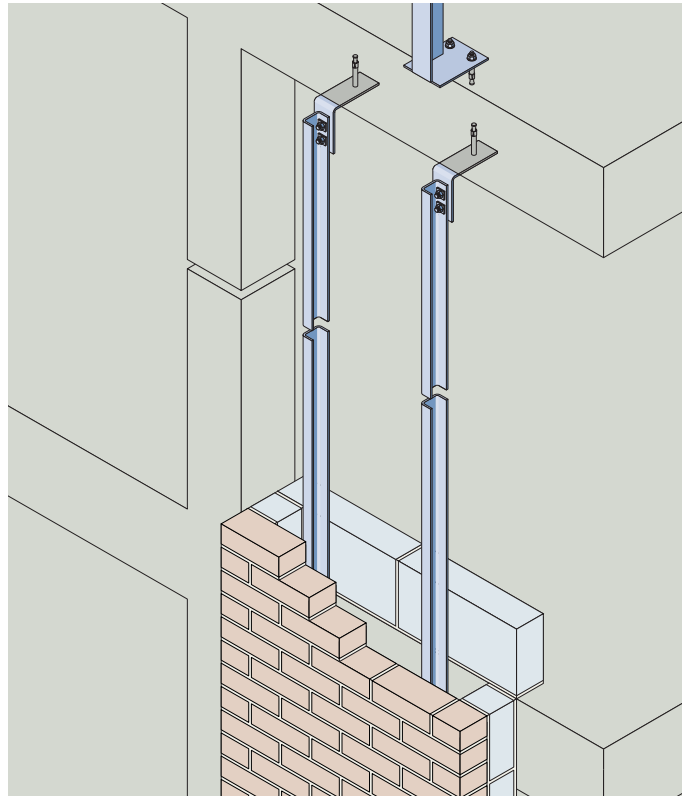
Web tie with plastic sleeves  
WPT 3 PS



One way web tie  
WPT 4



Storey-height windposts (BW1)



Storey-height windposts (CW2) with brick pier

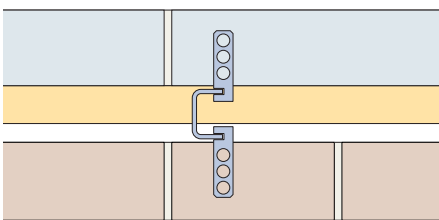
### Setting-out

#### Relationship to the structure

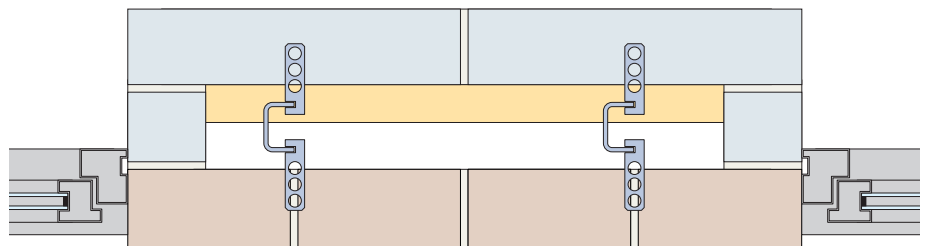
Windposts are set out between the structural columns at centres to suit the wind load. In piers it may be necessary to have 2 posts, as shown below right.

Posts are positioned in the cavity where possible, but, if an angle section is needed to take the load, the block is cut to allow the angle to be built into the inner skin. Posts can be fixed to any structure, as shown: concrete slabs, steel beams or metal deck.

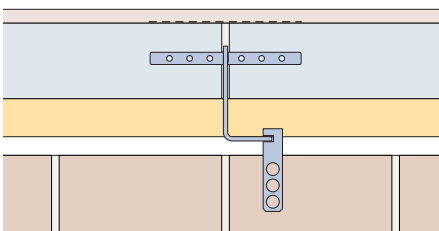
The top fixing on storey-height posts is normally a sliding fixing to allow for deflection, i.e. to prevent the post being pinched by the frame.



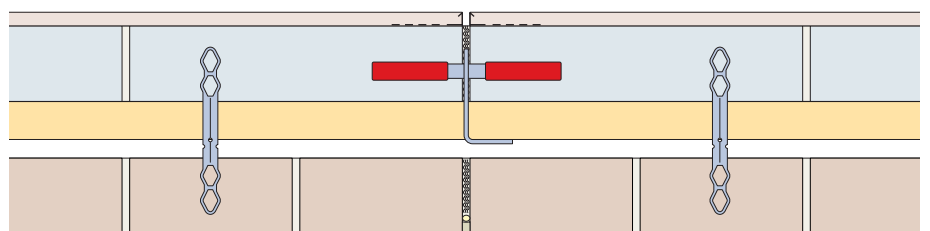
CW2 windpost with WPT 1 ties



CW2 windposts with WPT 1 ties



BW1 windpost inner skin bond  
WPT 3 tie in inner skin  
WPT 1 tie in outer skin



BW1 windpost inner skin de-bond  
WPT 3 PS tie with plastic sleeve in inner skin  
HTS-C 12 wall ties across cavity

# Windposts – fixing details

Windposts are designed and manufactured by Halfen complete with top or bottom angles or shoes for fixing to the structure. The detail varies on a project basis. Typical examples are shown on this page.

Windposts should be fixed at top and bottom before brickwork commences.

## Loadings

The data tables opposite show a range of typical windposts with their sectional properties and maximum allowable loads for various heights of post. Other windposts can be designed on a project basis.

The maximum loads are restricted either by the maximum allowable deflection or by a maximum allowable stress of 175 kN/mm<sup>2</sup>.

## Loading criteria

### Storey-height windposts

The windposts are assumed to be simply supported top and bottom with a uniformly distributed load acting over the full height of the windpost. The loads given opposite are total loads, i.e. udl x post height. The mid-span deflection is limited to SPAN/360.

### Spandrel and parapet windposts

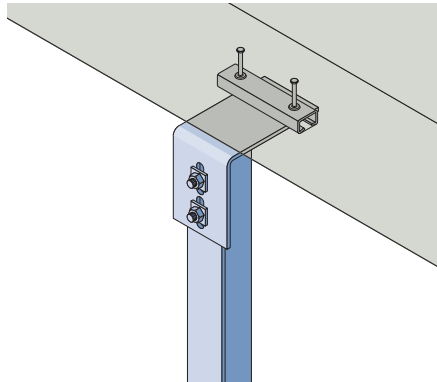
The windposts are assumed to be a cantilever with a horizontal point load acting at the unsupported end of the post. The deflection at the unsupported end of the post is limited to SPAN/180.

The sectional properties of a range of windposts are given opposite to allow engineers to calculate allowable loadings for conditions other than those quoted.

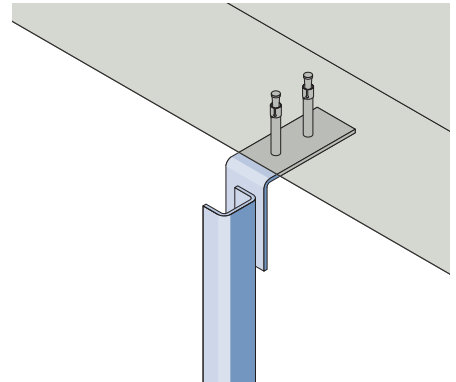
### Brick tie loadings

Halfen brick ties used with windposts provide a safe working load of 1.5 kN per tie in tension and compression. The spacing of the ties can be determined from the loading data table, but should not exceed 450 mm centres.

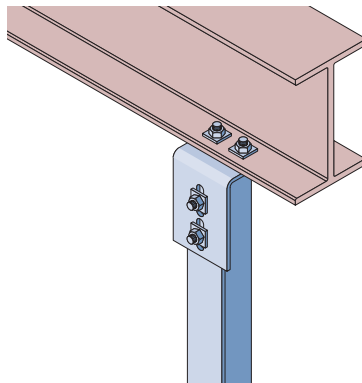
For applications requiring higher loads than those quoted, solutions are available using larger profiles and spines, and with increased sectional properties. Please consult Halfen.



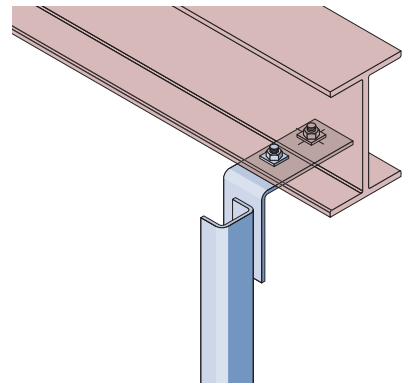
Type BW1 – top fixing to concrete



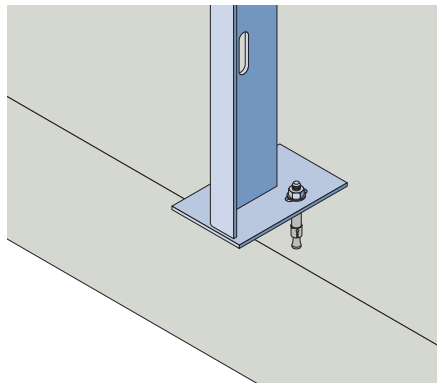
Type CW2 – top fixing to concrete



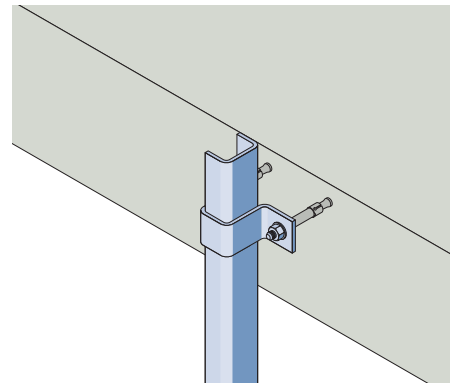
Type BW1 – top fixing to steel



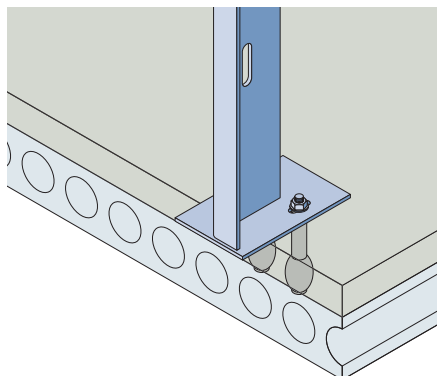
Type CW2 – top fixing to steel



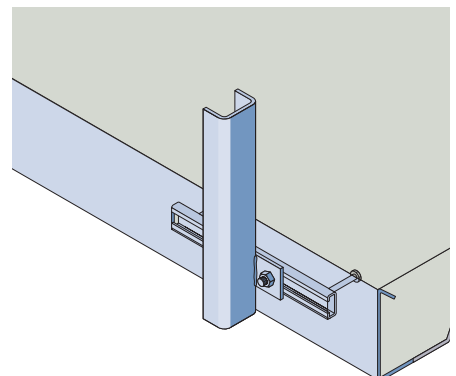
Type BW1 – bottom fixing to slab top



Type CW2 – top fixing to slab edge



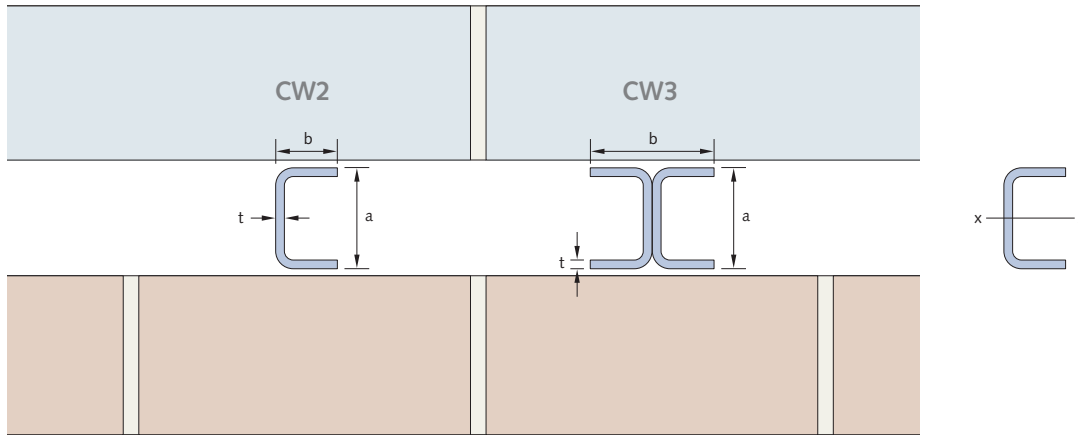
Type BW1 – bottom fixing to hollow core slab: example shows resin sock



Type CW2 – bottom fixing to metal deck

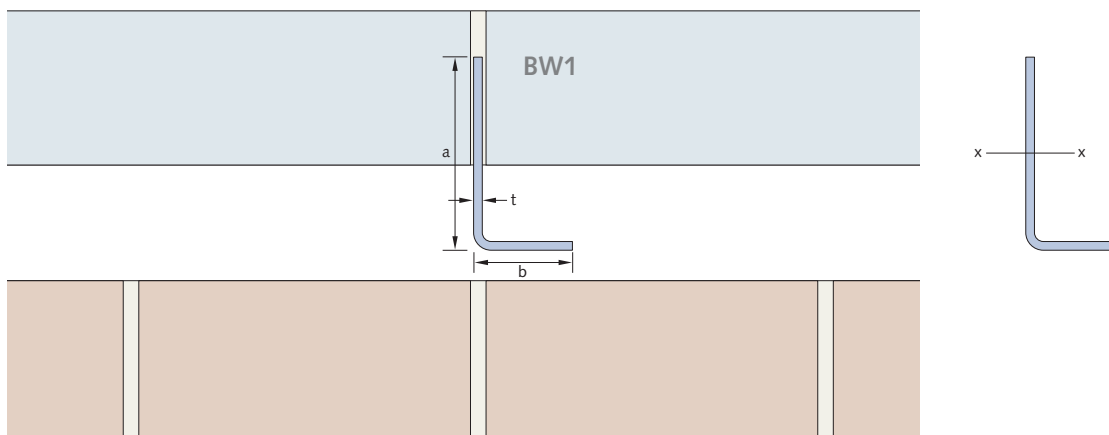
# Sectional properties and load data tables for windposts

## Cavity windpost type CW2/CW3



Code	a x b x t (mm)	Area (cm <sup>2</sup> )	Mass (kg/m)	I <sub>xx</sub> (cm <sup>4</sup> )	Z <sub>xx</sub> (cm <sup>3</sup> )	Maximum load on windpost (kN)							
						Storey height posts (m)				Spandrel/parapet posts (m)			
						2.5	3.0	3.5	4.0	0.75	0.90	1.05	1.20
CW2 6544	65 x 40 x 4	5.13	4.05	32.38	9.96	2.21	1.54	1.13	0.86	1.92	1.33	0.98	0.75
CW2 6545	65 x 40 x 5	6.21	4.90	37.43	11.52	2.56	1.77	1.30	1.00	2.22	1.54	1.13	0.87
CW2 8045	80 x 40 x 5	6.96	5.50	62.19	15.55	4.25	2.95	2.17	1.66	3.63	2.56	1.88	1.44
CW3 6584	65 x 80 x 4	10.26	8.11	64.76	19.93	4.42	3.07	2.26	1.73	3.84	2.67	1.96	1.50
CW3 6585	65 x 80 x 5	12.41	9.81	74.87	23.04	5.11	3.55	2.61	2.00	4.44	3.08	2.26	1.73
CW3 8085	80 x 80 x 5	13.93	11.00	124.39	31.10	8.49	5.90	4.33	3.32	7.26	5.12	3.76	2.88

## Blockwork windpost type BW1

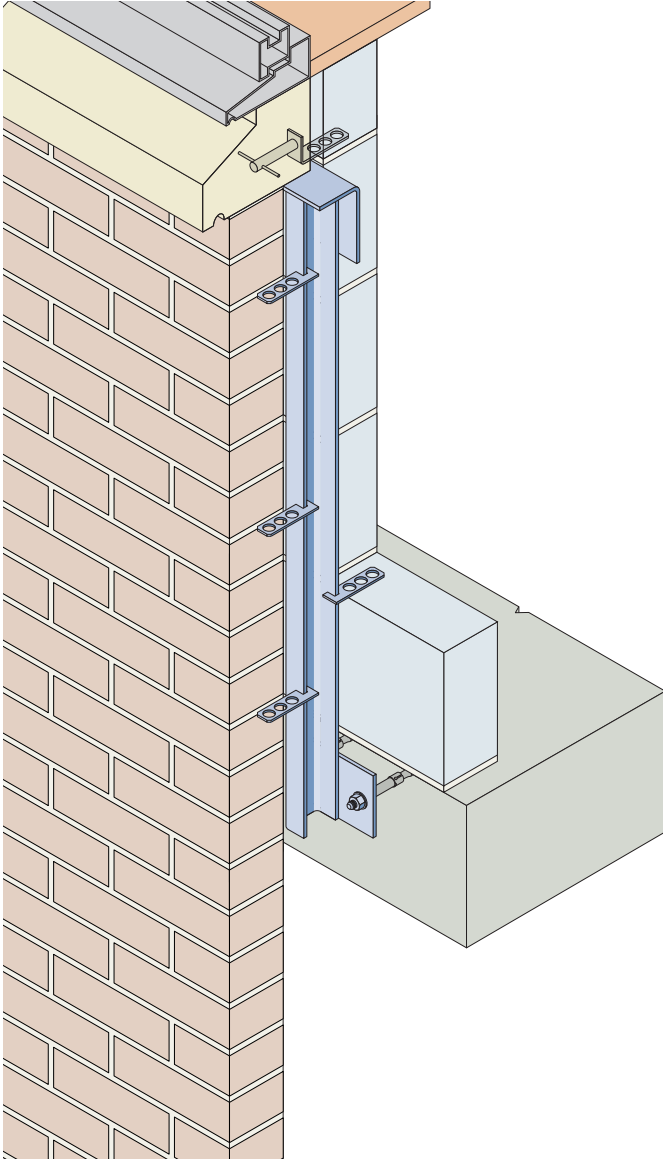


Code	a x b x t (mm)	Area (cm <sup>2</sup> )	Mass (kg/m)	I <sub>xx</sub> (cm <sup>4</sup> )	Z <sub>xx</sub> (cm <sup>3</sup> )	Maximum load on windpost (kN)							
						Storey height posts (m)				Spandrel/parapet posts (m)			
						3.0	3.5	4.0	4.5	0.75	0.90	1.05	1.35
BW1 1254	125 x 70 x 4	7.47	5.90	125.38	15.21	5.94	4.37	3.34	2.64	3.55	2.96	2.53	1.97
BW1 1255	125 x 70 x 5	9.23	7.29	153.60	18.78	7.28	5.35	4.10	3.24	4.38	3.65	3.13	2.43
BW1 1403	140 x 70 x 3	6.11	4.83	130.18	14.24	6.17	4.53	3.47	2.74	3.32	2.77	2.37	1.85
BW1 1406	140 x 70 x 6	11.85	9.36	246.20	27.53	11.67	8.58	6.57	5.19	6.42	5.35	4.59	3.57
BW1 1605	160 x 70 x 5	10.98	8.68	300.53	29.76	13.89	10.47	8.01	6.33	6.94	5.79	4.96	3.86
BW1 1606	160 x 70 x 6	13.05	10.31	354.15	35.32	16.48	12.34	9.44	7.46	8.24	6.87	5.89	4.58
BW1 2006*	200 x 70 x 6	15.45	12.21	650.90	53.52	24.98	21.41	17.36	13.71	12.49	10.41	8.92	6.94

\*Example for extreme condition in 140 mm blockwork.

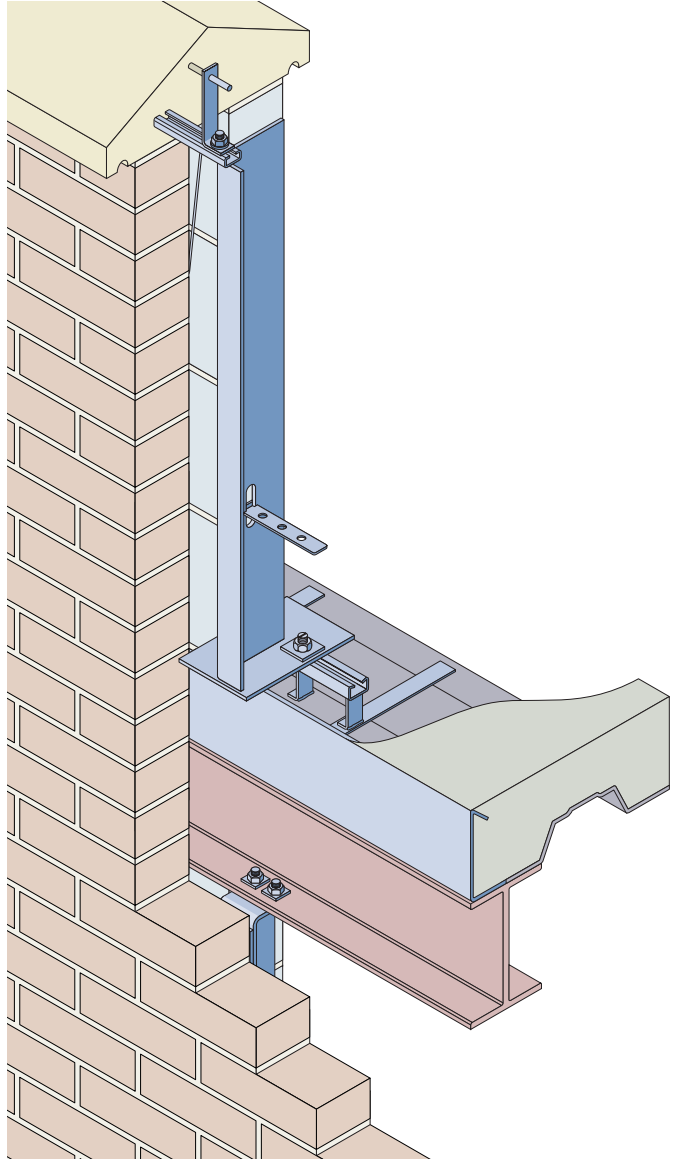
Note: any size can be made to order, i.e. all windposts are made on a project basis.

# Windposts – applications



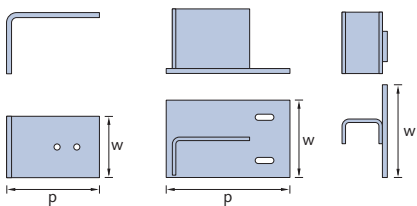
Spandrel Windpost (CW2)

Windpost below window sill, showing possible horizontal rail bolted to windpost, and restraint for reconstructed stone sill



Parapet Windpost (BW1)

Windpost below stone coping, showing fixing to cast-in channel ski assembly in floor slab. Also showing Halfen channel 28/15 built into cavity wall to provide total adjustability for coping ties  
 Note: cast-in channel ski assembly is effective at minimal edge distance in slab



Dimensioning examples

Normally fixing plates are designed by Halfen on a project basis.

## How to specify windposts

The following codes are examples only; any profile requested can be manufactured to suit the design detail. Posts may be stainless steel Grade 304 or hot dip galvanised after manufacture. Ties are always stainless steel Grade 304. All posts are supplied complete with welded base fittings; the design will vary according to fixing type, position and structure.

For storey-height posts the length will be made to suit the structure. A suitable sliding top shoe will be designed by Halfen to accommodate differential movement; this will normally be an angle (code AC).

Fixing bolts can be supplied for fixing to either cast-in channel or structural steel, or for site-drilling into concrete.

For spandrels or parapets the post can be made any length to order, to avoid clashes with sills or copings.

Windpost complete with welded base and sliding top shoe				
Storey height				
<b>BW1 1254</b>	<b>hdg</b>	<b>3300</b>	<b>SF</b>	<b>AC</b>
Code	Material	Length (mm)	Structure	Type of sliding top fitting
a x t				

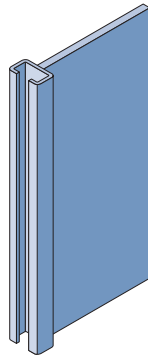
Windpost complete with welded base				
Parapet				
<b>CW3 6584</b>	<b>ss</b>	<b>1050</b>	<b>RC</b>	<b>-</b>
Code	Material	Length (mm)	Structure	
a x b x t				

Windpost ties			
<b>WPT 1</b>	<b>ss</b>	<b>70</b>	<b>inner &amp;/or outer skin</b>
<b>WPT 3</b>	<b>ss</b>	<b>200</b>	<b>inner skin</b>
Code	Material	Projection	Brick skins tied

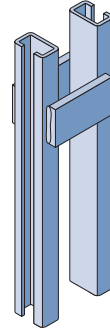
### Abbreviations

Dimensions	a x b x t	windpost dimensions (see page 33)
Top fitting	AC	angle cleat
Structure	RC	concrete
	SF	steel
	PS	Pourstop
Material/finish	hdg	hot dip galvanised
	ss	stainless steel

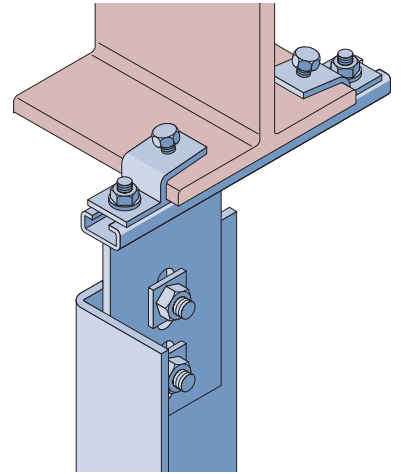
## Windpost variations



28/15 channel windpost with fin for building into blockwork, Code BW2

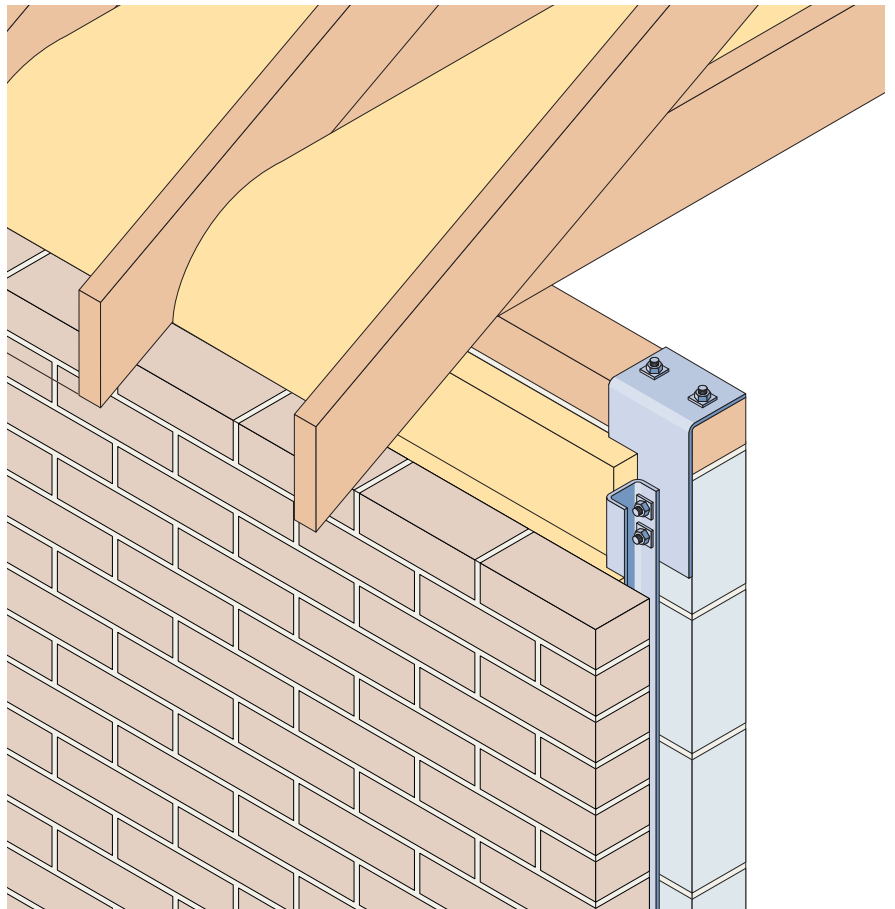


28/15 channels welded back-to-back for building into cavity, Code CW1



To avoid drilling of steel beams the top fixing of the windpost can be made to suit beam clamps to order, Code ND AC

## Fixing variation



CW2 windpost fixed to wall plate in timber roof construction