

Masonry Panel Design Service
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February 2014			



Masonry Reinforcement for the Construction Industry



BS EN 845-3
BS EN 1090-1

Ancon[®]
BUILDING PRODUCTS

Masonry Reinforcement

Strengthening Masonry Panels

Large panels of masonry or panels with openings can often be difficult to design. The traditional solutions have been to either increase the thickness of the wall or introduce a masonry pier.

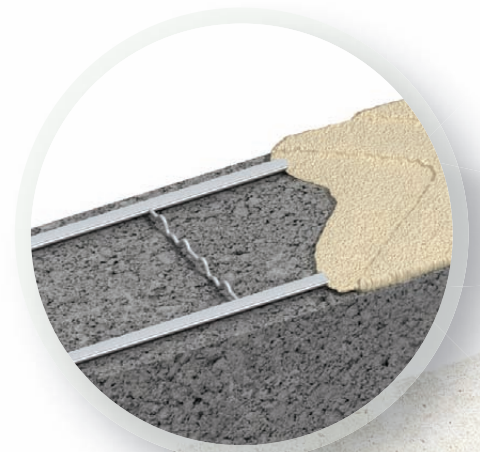
Ancon AMR Bed Joint Reinforcement and Ancon Windposts are designed to provide additional lateral support for panels of masonry. Windposts can be installed into either the inner leaf of blockwork or into the cavity leaving the blockwork undisturbed. Ancon AMR is a fabricated and flattened stainless steel or carbon steel reinforcement which locates in the bed joint to strengthen a wall.

Parapet Posts are used as vertical support for brickwork in parapet panels.

Masonry Panel Design

Ancon provides a free masonry panel design service which will recommend the optimum arrangement of windposts and reinforcement. A standard design sheet is available on page 12 to summarise details of your specific application.

Ancon AMR Masonry Reinforcement is featured in CADS Masonry Wall Panel Designer.



CE Marking

Construction products which fall within the scope of a harmonised European Standard should now carry CE marking under the Construction Products Regulation. For windposts and parapet posts, the harmonised standard is BS EN 1090-1 Execution of steel structures and aluminium structures: Requirements for conformity assessment of structural components. Ancon complies with all CE marking requirements of this Standard, including designs to EN 1993 (Eurocode 3) and external certification of our factory production controls by an approved body.

Ancon is certified to undertake welded fabrication work to Execution Class 2 which covers most building applications and is the default class when unspecified.

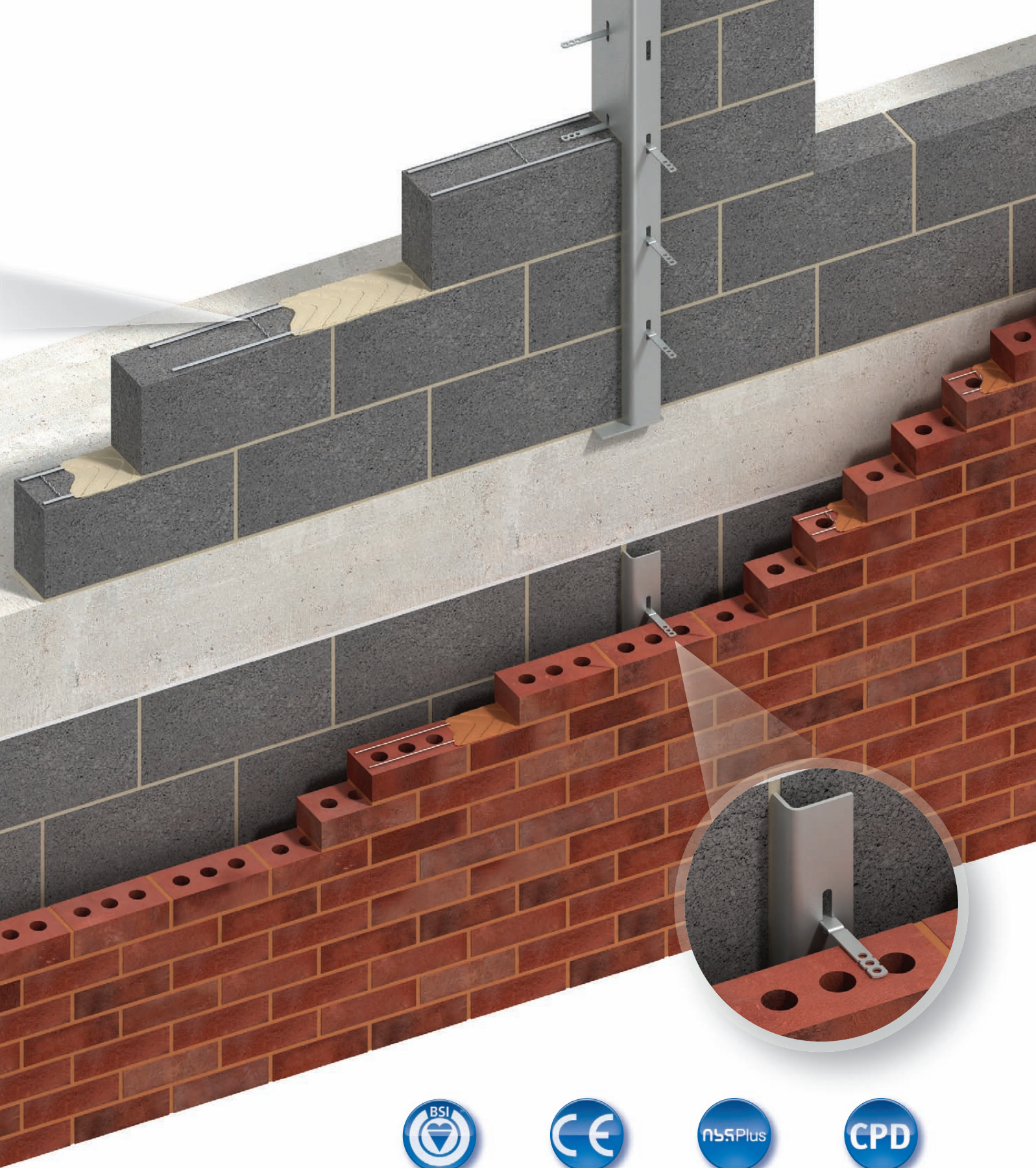
For AMR masonry reinforcement, the harmonised standard is BS EN 845: Part 3 and Ancon has undertaken all necessary product testing at a notified laboratory. For more information on Execution Class 2 or to download a Declaration of Performance, please visit www.ancon.co.uk/CE.



Factory Production Control Certificates and Declarations of Performance are available to download from www.ancon.co.uk/CE

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BIM Objects
available



ISO 9001, ISO 14001
& OHSAS 18001



CE Marking
compliance



Product information
in NBS format



CPD seminars
available



Improve structural
performance



Minimise wall
thickness



Reduce risk of
cracking

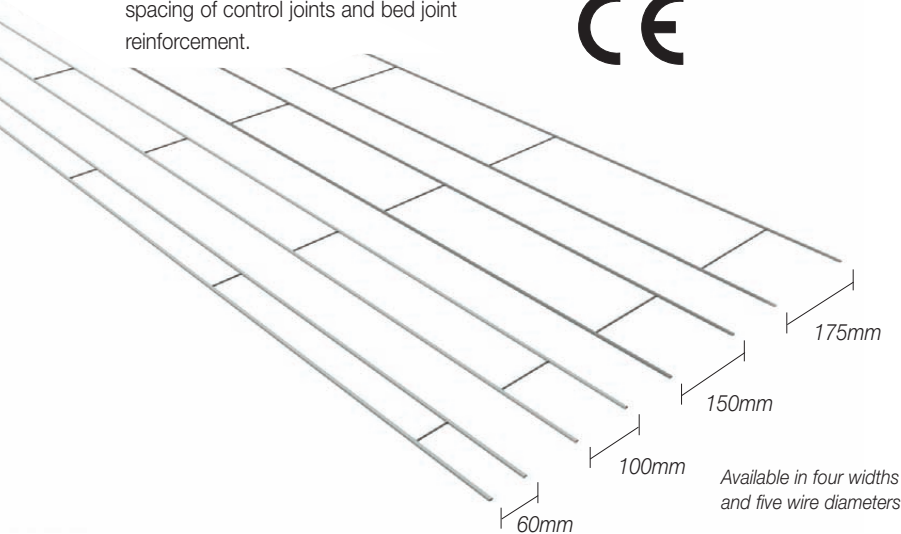


Masonry panel design
service available

Masonry Reinforcement

Bed Joint Reinforcement

Bed joint reinforcement is used to improve the structural performance of masonry walls by providing additional resistance to lateral loads e.g. wind. It can also be used to reduce the risk of cracking either at stress concentrations around openings or as a result of movement, including the control of shrinkage. For external walls subject to wind loading, a structural engineer should be consulted to assess the spacing of control joints and bed joint reinforcement.



Bed joint reinforcement may be used for a variety of purposes and locations, as set out in the table below.

Purpose / Location	Ladder Type Reinforcement
Increase panel sizes	✓
Increase movement joint spacing	✓
Feature courses, corbels, plinths	✓
Collar-jointed walls	✓
Corner and T junctions	✓
Stack-bonded panels	✓
Differential movement control	✓
Above and below openings	✓

In walls which have door and window openings, bed joint reinforcement can reduce the frequency of control joints. Reinforcement should be provided in the first and second courses above and below all openings and should extend no less than 600mm either side of the opening.

Bed joint reinforcement can also be used near the top of the structural walls abutting concrete roofs and to provide additional strength to parapet walls.

Ancon AMR 'Ladder Type' Masonry Reinforcement

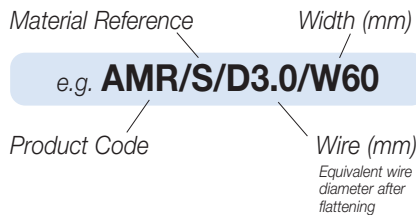
Available in various standard configurations, Ancon AMR suits a wide range of structural load conditions and wall widths. The longitudinal wires have a minimum characteristic yield strength of 500N/mm².

Ancon AMR is supplied with CE marking to demonstrate compliance with BS EN 845-3.



Specification / Identification

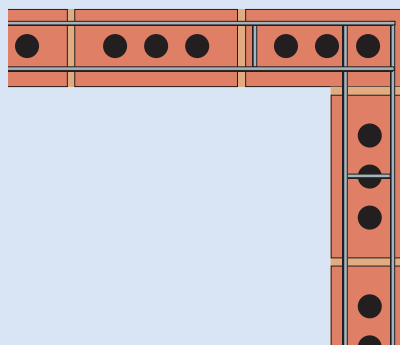
AMR is specified using the simple reference structure shown below. Each length of AMR is marked with a product reference to aid identification on site.



Note: For the AMR-X enhanced system shown on page 5, replace AMR with AMR-X.

Corners

Prefabricated corner units can be manufactured to provide true continuity of reinforcement. Alternatively, Ancon AMR can be cut and bent on site.



Materials

Ancon AMR is available in Austenitic stainless steel (ref. S) and galvanised steel (ref. G). Stainless steel provides the greatest corrosion resistance and life-cycle costing benefits, and is suitable for use in any application. Galvanised steel is not suitable for use in the external leaf of a cavity wall.

Wire Diameters

Ancon AMR is manufactured from five wire sizes which, after flattening, have an equivalent wire diameter of 3.0, 3.5, 4.0, 4.5 and 5.0mm. This range suits the majority of load conditions.

Depth

The main longitudinal wires are flattened to less than 3mm. These wires are joined by cross wires welded in the same plane at 450mm centres. This profile ensures good mortar cover is maintained, even when the product is lapped or used with wall ties.

Length

Ancon AMR is manufactured in standard lengths of 2700mm.

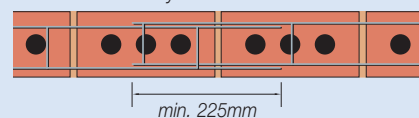
Widths

Available in four standard widths (60, 100, 150, 175mm), Ancon AMR can be used in wall widths from 100mm to 215mm. Care must be taken in selecting the correct width of reinforcement which should be approximately 40mm less than the width of the masonry unit.

Laps and Positioning

Laps should be a minimum of 225mm in length and must include at least one cross wire. The lap can be achieved by either stacking the product or positioning lengths side by side. The position of laps should be staggered throughout the masonry panel.

Positioned side by side



Stacked



Overall thickness when lapped is max. 6mm

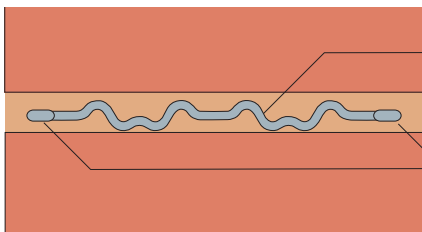
Ancon AMR-X, Enhanced Masonry Reinforcement

When compared to other ladder-type reinforcement, Ancon AMR-X can accelerate the speed of construction, improve build quality and reduce the requirement for site supervision.

To provide additional resistance to lateral loads and improve the structural performance of a masonry wall, it is important that the reinforcement is surrounded by mortar.

The designed performance of a wall panel may not be achieved if the bed joint reinforcement is simply laid directly onto dry masonry with a mortar layer applied above. Unfortunately, research has shown that this is common site practice, which has led Ancon to develop the new AMR-X reinforcement.

The product is based on the existing Ancon AMR masonry reinforcement, but with shaped rather than straight cross wires. This innovative design is a simple, cost-effective way to correct poor site practice.



Material

Ancon AMR-X is manufactured from stainless steel wire. It is suitable for use in internal and external wall panels.

Wire Diameters

The longitudinal wires are manufactured in two sizes which, after flattening, have an equivalent wire diameter of 3mm and 5mm. This range suits the majority of load conditions.

Depth

The main longitudinal wires are flattened to less than 3mm to allow the product to be lapped or used in the same joint as cavity wall ties.

Length

Ancon AMR-X is available in a standard length of 2700mm.

Widths

Available in two standard widths (60mm, 100mm), Ancon AMR-X can be used in masonry units from 100mm to 150mm wide.



Shaped cross wires elevate outer wires
Longitudinal wires surrounded by mortar

100mm
(5mm wire dia.)

100mm
(3mm wire dia.)

60mm
(5mm wire dia.)

60mm
(3mm wire dia.)

If applied to dry bricks or blocks, only the modified cross wires are in contact with the masonry; the longitudinal wires are elevated. When the next masonry unit is lowered, the mortar layer disperses around the steel, leaving the reinforcement fully surrounded.

The cross wires have been designed so the AMR-X can be installed either way up.

AMR-X is available in various configurations, suitable for brickwork or blockwork, internal or external walls and the majority of load applications.

BIM Objects

BIM objects for AMR-X masonry reinforcement are available to download from www.NationalBIMLibrary.com/Ancon or www.ancon.co.uk.



Applications & Product References

Wall Thickness	Product Reference
102mm Brick/ 100mm or 125mm Block	AMR/S/D3.0/W60 *AMR-X/S/D3.0/W60 AMR/S/D3.5/W60 AMR/S/D4.0/W60 AMR/S/D4.5/W60 AMR/S/D5.0/W60 *AMR-X/S/D5.0/W60
140mm or 150mm Block	AMR/S/D3.0/W100 *AMR-X/S/D3.0/W100 AMR/S/D3.5/W100 AMR/S/D4.0/W100 AMR/S/D4.5/W100 AMR/S/D5.0/W100 *AMR-X/S/D5.0/W100
190mm or 200mm Block	AMR/S/D3.0/W150 AMR/S/D3.5/W150 AMR/S/D4.0/W150 AMR/S/D4.5/W150 AMR/S/D5.0/W150
215mm Block	AMR/S/D3.0/W175 AMR/S/D3.5/W175 AMR/S/D4.0/W175 AMR/S/D4.5/W175 AMR/S/D5.0/W175

Note: Product references shown are for stainless steel reinforcement. For galvanised steel 'S' should be replaced with 'G'. *AMR-X only available in stainless steel and 60mm / 100mm widths.

'Bed joint reinforcement should be completely surrounded with mortar'.

Recommendation given in PD6697: 2010

'Using Ancon AMR-X will ensure bed joint reinforcement is accurately installed without compromising on build time'.

Technical Services Manager, Carillion

'I have recommended that we use this product as it can eliminate the risk of inadequate mortar bond around bed joint reinforcement'.

Project Manager, Reussir Ltd

Masonry Reinforcement

Reinforcing Stack-Bonded Masonry

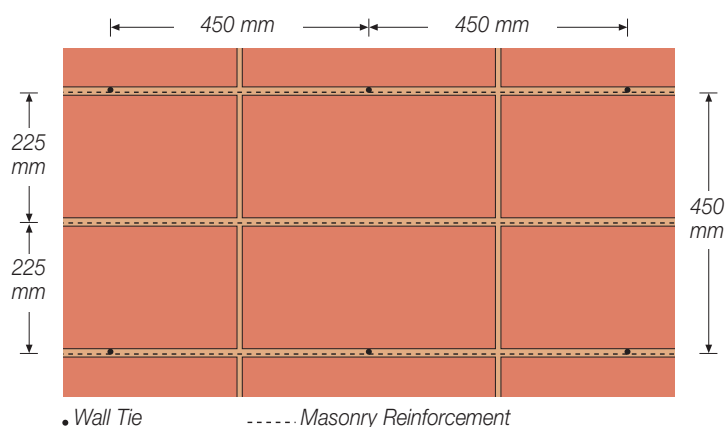
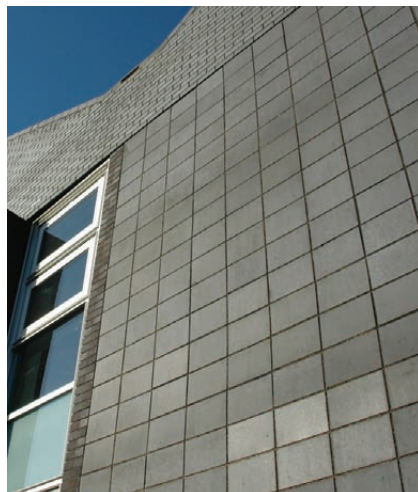
Stack bonding has a distinctive uniform bond pattern and is often detailed for its aesthetic appearance without consideration for its design limitations.

Where large format masonry units are stacked one above the other, the lack of bonding between them will greatly reduce the overall flexural strength of the panel and the ability of the wall to spread vertical loads. In stack bonded masonry, concentrated loads will be carried down to the support by the particular vertical 'column' of masonry under load, with little distribution to adjacent masonry.

Ancon AMR Masonry Reinforcement, located in the bed joints, will increase the panel's flexural strength and improve the capacity to resist lateral loads and spread vertical loads.

The use of Ancon reinforcement referenced AMR/S/D3.5/W60 is normally recommended at vertical centres no greater than 300mm, usually every course or every other course depending on the height of the masonry unit.

The adjacent illustration uses a 215mm unit height. This is typical advice for stack-bonded masonry up to 125mm wide. Thicker blocks require wider reinforcement. The addition of masonry reinforcement will also help with crack control.



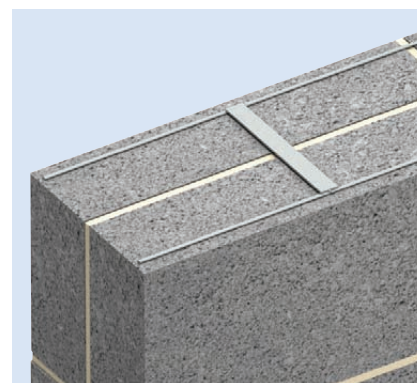
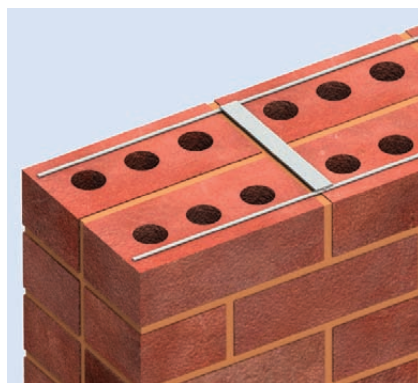
Ancon AMR-CJ for Collar Jointed Walls

Ancon AMR-CJ masonry reinforcement allows the construction of collar-jointed walls i.e. two leaves of thin masonry used in place of a single leaf of wider, heavier blockwork. Ancon AMR-CJ is used to tie the two leaves together, so it acts as a single unit.

The product consists of 20 x 2.5mm flat ties welded to flattened longitudinal wires at 450mm centres. The longitudinal wires have a minimum characteristic yield strength of 500N/mm².

AMR-CJ is supplied in a standard width of 175mm to suit wall widths of 215mm comprising two leaves of either standard bricks or 100mm blocks.

It is manufactured in a standard length of 2700mm from five wire diameters which, after flattening, is the equivalent wire diameter of 3.0, 3.5, 4.0, 4.5 and 5.0mm. Selection is based on calculation.



Product Codes

Stainless Steel	Galvanised Steel
AMR-CJ / S / D3.0 / W175	AMR-CJ / G / D3.0 / W175
AMR-CJ / S / D3.5 / W175	AMR-CJ / G / D3.5 / W175
AMR-CJ / S / D4.0 / W175	AMR-CJ / G / D4.0 / W175
AMR-CJ / S / D4.5 / W175	AMR-CJ / G / D4.5 / W175
AMR-CJ / S / D5.0 / W175	AMR-CJ / G / D5.0 / W175

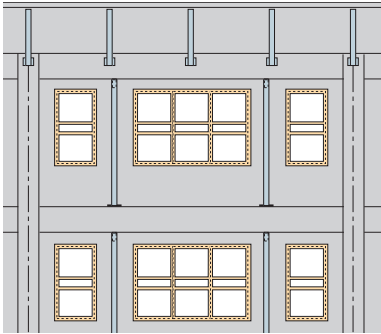


Corner Units and T-Sections

Pre-fabricated corner units and T-sections can be manufactured to provide true continuity of reinforcement.

Windposts and Parapet Posts

Ancon Windposts are designed to suit your specific construction and load conditions. They are suitable for use where standard AMR ladder type masonry reinforcement is inadequate or when there is a requirement to split a large masonry panel.



Typical Layout of Windposts and Parapet Posts on an Elevation of Brickwork

Windpost Design

Ancon Windposts are designed to span vertically between floors to provide lateral support for panels of brickwork. The windposts will usually be restrained by the brickwork and designed as 'simply supported beams'.

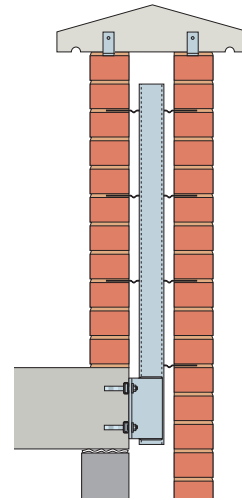
Deflection under wind load will often limit the maximum loading. Windposts can be designed as 'propped cantilevers' to limit deflection, this however will require a much larger base connection which in many cases may be difficult to accommodate.

Connections to the frame are designed to permit adjustment during installation. Serrated surfaces will be provided where adjustment is in the direction of the load. The top connection allows for shrinkage or vertical movement of the frame to take place. The type of fixing will depend on the nature of the frame. Expansion bolts are normally supplied for concrete frames and set screws will be supplied for steel frames. The tables on page 10 include part of the Ancon range of windposts. For further information or advice on specific applications, please contact Ancon's Technical Services Team.

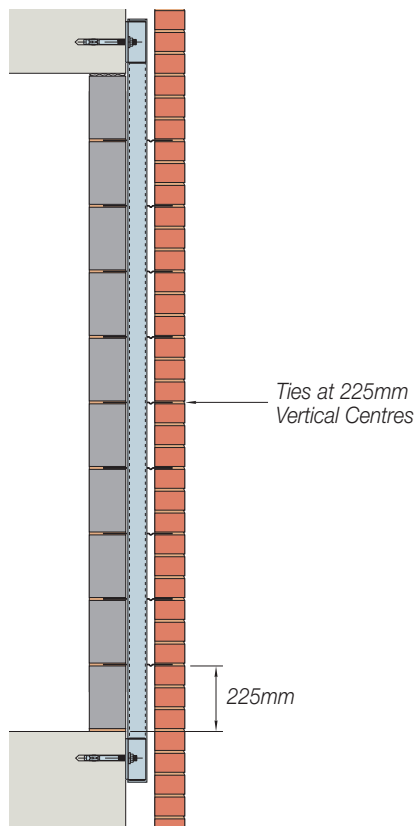
Please note, it is the responsibility of the Engineer to design a suitable structure for connecting a windpost or parapet post.

Parapet Posts

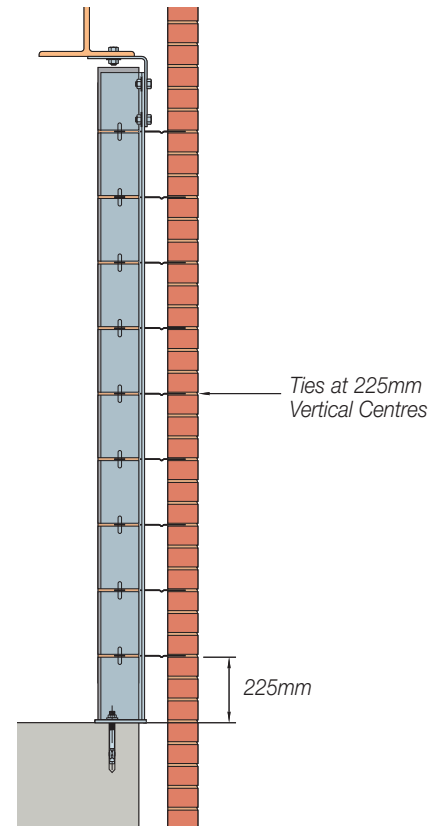
Ancon Parapet Posts provide lateral restraint to masonry that projects above the main structure. They are designed as 'cantilevers' and include a substantial base connection to transfer the bending moment to the structure. To ensure a practical base connection the posts are usually less than 1.6 metres in height. The tables on page 11 show part of the Ancon range of parapet posts. For further information or advice on specific applications, please contact Ancon's Technical Services Team.



WP1/WP3 Parapet Post
Fixed to Face of Concrete



WP1/WP3 Windpost Fixed to
Face of Concrete Structure



WP2 Windpost Fixed to Top of
Concrete and Underside of Steel Beam

Details for Specification and Ordering

Ancon Windposts are CE marked, designed to BS EN 1993 (EC3) and manufactured to BS EN 1090-1. Sufficient time should be allowed for the design, approval and manufacturing process when placing orders for windposts.

The following clause can be adapted for your bill of quantities to aid the specification of Ancon Windposts and Parapet Posts.

Ancon Windposts WP3 65 x 60 x 4 in grade 1.4301 (304) stainless steel, overall length 2750mm complete with all ties and end connections. Fixed with Ancon FBNII 12/50 Expansion Bolts.



BIM Objects

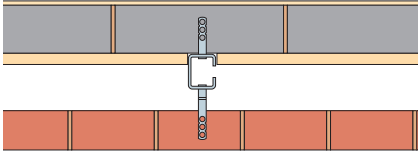
BIM objects are available to download from www.NationalBIMLibrary.com/Ancon or www.ancon.co.uk.



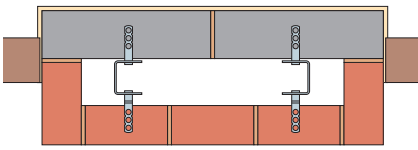
Masonry Reinforcement

Ancon WP1 and WP3 Windposts

Ancon WP1 and WP3 Windposts are channel section windposts which are designed to be installed within the cavity leaving the blockwork undisturbed. The windposts are complete with end connections and ties which fit into the vertical slots in the flanges of the channel section.



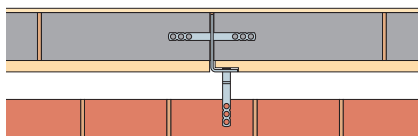
WP1 Windpost with SDN and SPN Ties in Cavity Wall



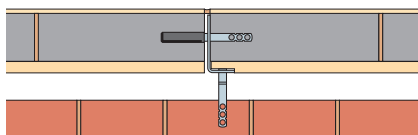
WP3 Windposts with SDN and SPN Ties Providing Support for Brick Pier

Ancon WP2 Windposts

Ancon WP2 Windposts are angle section windposts designed for either small cavities or where wind loads are high. One leg of the angle windpost is built into the blockwork, and the blockwork tied through the leg of the windpost to minimise any possible movement or cracking of internal finishes. The design of Ancon WP2 Windposts assumes full restraint to the longer leg of the post located within the vertical masonry joint. To prevent lateral movement of the post within this joint and ensure the windpost performs to its full capacity, it is essential that this joint is tightly packed with mortar. If a vertical movement joint is required in place of a tied joint, ties with a plain end on one side can be supplied. The capacity of the post will be reduced in this configuration.



WP2 Windpost with SDN and SNS Ties in Cavity Wall



WP2 Windpost at Vertical Movement Joint in the Inner Leaf of Blockwork with Debonded Ties Across the Post

Note that the capacity of the windpost will be reduced in this configuration.

Ancon WP4 Windposts

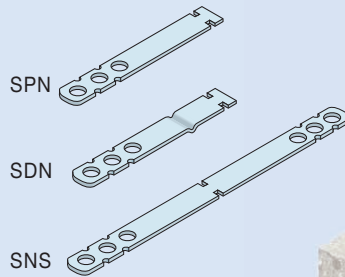
Ancon WP4 Windposts are generally used in internal blockwork walls that have a 'fair faced' finish to both sides and where the windposts cannot protrude beyond either face. Sometimes referred to as 'spine' posts they are flat plates designed to fit within the wall. Although the depth of a WP4 post is limited by the width of the masonry (ideally 20mm less than the wall width), the thickness of the post can vary to increase its load capacity. Blockwork is tied through the post.



WP4 Windpost with SNS Tie in Single Skin Blockwork

Windpost Ties

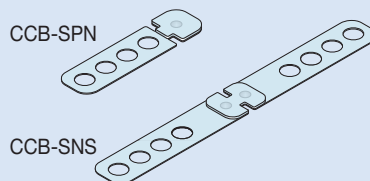
A range of ties is available to suit Ancon Windposts. SDN Ties are used to the outer leaf and SPN Ties to the inner leaf. SNS Ties are used across the posts in the inner blockwork and can be supplied with a debonding sleeve for use where there is a vertical movement joint.



Windpost Ties for Cellular Clay Blockwork

A range of ties is available to suit Ancon windposts when used with an inner leaf of cellular clay blocks.

The CCB-SPN connects channel profile posts to the inner cellular clay block leaf and CCB-SNS ties are used across angle shaped posts installed in the inner leaf.



WP3 Fixed to Concrete at the Base and a Steel Beam at the Top



WP2 Windpost with SNS and SPN Wall Ties

Fixings for Windposts and Parapet Posts

Connections to the frame can be made in a variety of ways and will depend on the type of post, structure and fixing being used. Typical examples of connections are shown below.



Base Connection of a WP3 Windpost to Combideck



Top Connection of a WP3 Windpost to the Face of the Concrete



Top Connection of a WP3 Windpost to the Underside of a Concrete Beam



Top Connection of a WP2 Windpost to the Underside of a Steel Beam



Top Connection of a WP1 Windpost to the Underside of a Steel Box Beam



Top Connection of a WP3 Windpost to the Underside of a Steel Beam



Top Connection of a WP2 Windpost to the Underside of a Timber Wall Plate



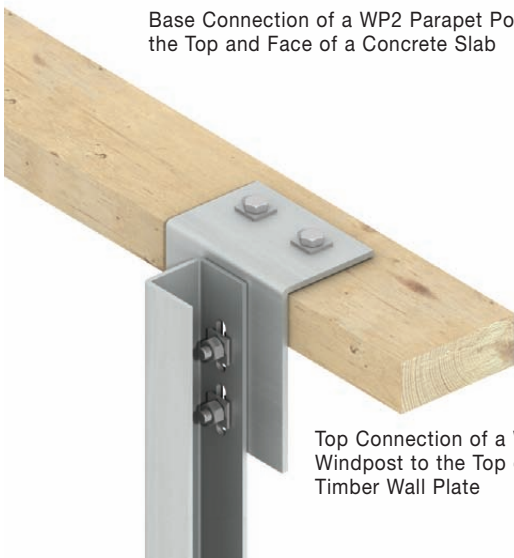
Base Connection of a WP2 Parapet Post to the Top and Face of a Concrete Slab



Base Connection of a WP3 Windpost to the Top of a Concrete Slab



Base Connection of a WP2 Windpost to a Concrete Infill in the Top of a Beam and Block Floor



Top Connection of a WP3 Windpost to the Top of a Timber Wall Plate

Connections

The choice of fixing and its position is dependent on the type and length of the windpost and the structure to which it is being fixed. Ancon designs fixing details for the top and base of each windpost and a drawing is issued for approval prior to manufacture.

The bolt in the slotted connection at the top of the windpost is positioned so that vertical movement of the frame can take place.

Masonry Reinforcement



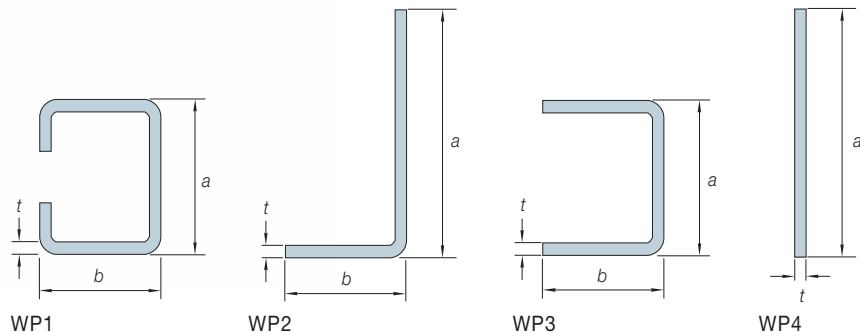
Properties and Recommended Loads for Windposts to BS EN 1993 (EC3)

Ancon Windposts are designed as 'simply supported beams' with a maximum deflection of span/360. The tables below include examples of Ancon's range of Windposts with maximum design loads to BS EN 1993 (Eurocode 3). The design resistances shown should be compared to factored loads.

Ancon Windposts comply with all CE marking requirements of BS EN 1090-1, including designs to EN 1993 (Eurocode 3) and external certification of our factory production controls by an approved body.



The section sizes shown are an example of those available. For further information or advice on specific applications please contact Ancon's Technical Services Team.



Performance of WP1 and WP3 Windposts to Eurocode 3

	Size a x b x t	Design Resistance (kN) per Post (uniformly distributed) for Various Windpost Spans							
		2.5m	3.0m	3.5m	4.0m	4.5m	5.0m	5.5m	6.0m
WP1	60x60x4	4.28	2.98	2.19	-	-	-	-	-
	80x60x4	8.57	5.98	4.40	3.37	2.67	2.16	-	-
	55x60x4	3.19	2.22	-	-	-	-	-	-
	55x60x5	3.93	2.73	-	-	-	-	-	-
	65x60x4	4.68	3.25	2.39	1.83	-	-	-	-
	65x60x5	5.80	4.03	2.96	2.27	-	-	-	-
WP3	75x60x4	6.49	4.53	3.33	2.55	-	-	-	-
	75x60x5	8.07	5.62	4.14	3.17	2.50	-	-	-
	85x60x4	8.62	6.03	4.44	3.40	2.69	2.18	-	-
	85x60x5	10.75	7.51	5.54	4.24	3.35	2.72	2.24	-
	95x60x5	13.83	9.72	7.17	5.49	4.35	3.52	2.91	2.45
	105x60x5	14.63	12.22	9.04	6.94	5.49	4.45	3.68	3.09
	115x60x5	14.63	14.34	11.03	8.58	6.80	5.51	4.56	3.83
	115x60x6	14.63	17.20	12.77	9.82	7.77	6.30	5.22	4.38
	115x65x8	14.63	17.29	16.97	13.06	10.34	8.39	6.93	5.82

Note: Table based on tie spacing of 225mm. Figures in bold indicate capacity limited by tie capacity

Performance of WP2 Windposts to Eurocode 3

	Size a x b x t	Design Resistance (kN) per Post (uniformly distributed) for Various Windpost Spans							
		2.5m	3.0m	3.5m	4.0m	4.5m	5.0m	5.5m	6.0m
WP2	125x70x4	9.46	7.07	5.46	4.32	3.48	2.86	2.38	2.01
	140x70x4	12.28	9.25	7.20	5.74	4.66	3.84	3.21	2.72
	150x70x4	14.21	10.86	8.49	6.80	5.54	4.59	3.85	3.26
	130x70x6	15.83	11.93	9.30	7.42	6.03	4.98	4.17	3.53
	170x70x4	17.92	14.48	11.41	9.21	7.56	6.30	5.31	4.53
	160x70x5	20.33	15.94	12.54	10.11	8.30	6.91	5.82	4.96
	150x70x6	21.90	16.64	13.09	10.54	8.64	7.19	6.05	5.15
	170x70x5	22.75	18.29	14.44	11.69	9.63	8.04	6.79	5.80
	180x70x5	24.76	20.80	16.48	13.37	11.05	9.26	7.85	6.72
	150x80x8	24.76	22.59	17.76	14.31	11.74	9.77	8.23	7.01
	185x70x6	24.76	26.71	21.24	17.31	14.36	12.08	10.28	8.82
	170x80x8	24.76	29.26	23.81	19.31	15.96	13.37	11.33	9.70
	180x80x8	24.76	29.26	27.15	22.09	18.31	15.38	13.07	11.22

Note: Table based on tie spacing of 225mm, ties on each leg, no vertical movement joint and long leg restrained by the masonry. Figures in bold indicate capacity limited by tie capacity

Properties and Performance of WP4 Windposts to Eurocode 3

	Size a x t	Design Resistance (kN) per Post (uniformly distributed) for Various Windpost Spans							
		2.5m	3.0m	3.5m	4.0m	4.5m	5.0m	5.5m	6.0m
WP4	90x8	4.89	3.43	-	-	-	-	-	-
	100x8	6.65	4.68	3.46	2.65	2.10	-	-	-
	110x8	8.74	6.20	4.59	3.53	2.79	2.26	-	-
	120x8	11.18	7.98	5.94	4.57	3.62	2.94	2.43	2.04

Note: Table based on post restrained by the masonry



Properties and Recommended Loads for Parapet Posts to BS EN 1993 (EC3)

Ancon Parapet Posts are designed according to BS EN 1993 (Eurocode 3) for a maximum deflection of height/180. The tables below indicate the maximum uniformly distributed design load and the maximum point load at

the top. The design resistances shown should be compared to factored loads. Posts should be selected from the appropriate table. If the post is to be designed for both uniformly distributed and point loads, please contact Ancon's Technical Services Team.

Performance of WP1P and WP3P parapet posts to Eurocode 3 under uniformly distributed load

	Size		Design Resistance (kN) per Post (uniformly distributed) for Various Parapet Post Spans					
	a x b x t	0.8m	1.0m	1.2m	1.4m	1.6m	1.8m	2.0m
WP1P	60x60x4	3.99	5.32	3.77	2.81	2.16	1.71	1.40
	80x60x4	3.99	5.32	6.65	5.46	4.26	3.41	2.78
	55x60x4	3.99	5.32	2.94	2.19	1.68	1.34	1.08
	55x60x5	3.99	5.32	3.48	2.58	2.00	1.58	1.20
WP3P	65x60x4	3.99	5.32	4.22	3.18	2.46	1.95	1.59
	65x60x5	3.99	5.32	5.04	3.78	2.93	2.33	1.88
	75x60x4	3.99	5.32	5.67	4.32	3.38	2.70	2.19
	75x60x5	3.99	5.32	6.65	5.18	4.04	3.21	2.63
	85x60x4	3.99	5.32	6.65	5.60	4.43	3.56	2.91
	85x60x5	3.99	5.32	6.65	6.77	5.33	4.26	3.48

Note: Figures in bold indicate capacity limited by tie capacity. Table based on restrained parapet post with tie spacing of 225mm

Performance of WP1P and WP3P parapet posts to Eurocode 3 under point load

	Size		Design Resistance (kN) at Top of Parapet Post for Various Spans					
	a x b x t	0.8m	1.0m	1.2m	1.4m	1.6m	1.8m	2.0m
WP1P	60x60x4	3.12	2.05	1.44	1.07	0.81	0.65	0.51
	80x60x4	5.79	3.96	2.84	2.12	1.64	1.29	1.05
	55x60x4	2.45	1.61	1.12	0.83	0.63	0.50	0.40
	55x60x5	2.90	1.90	1.33	0.97	0.75	0.59	0.48
WP3P	65x60x4	3.47	2.32	1.64	1.21	0.93	0.73	0.59
	65x60x5	4.15	2.76	1.95	1.44	1.10	0.87	0.71
	75x60x4	4.51	3.14	2.25	1.67	1.29	1.02	0.75
	75x60x5	5.56	3.78	2.69	2.00	1.54	1.22	0.99
	85x60x4	5.32	4.06	2.95	2.21	1.71	1.36	1.10
	85x60x5	7.11	4.91	3.55	2.65	2.05	1.63	1.32

Note: Table based on restrained parapet post with tie spacing of 225mm

Performance of WP2P parapet posts to Eurocode 3 under uniformly distributed load

	Size		Design Resistance (kN) per Post (uniformly distributed) for Various Parapet Post Spans					
	a x b x t	0.8m	1.0m	1.2m	1.4m	1.6m	1.8m	2.0m
WP2P	125x70x4	6.75	6.33	5.27	4.52	3.95	3.51	3.02
	140x70x4	6.75	7.81	6.51	5.58	4.88	4.34	3.90
	150x70x4	6.75	8.88	7.40	6.34	5.55	4.93	4.44
	130x70x6	6.75	9.00	8.74	7.49	6.55	5.83	5.05
	170x70x4	6.75	9.00	9.33	8.00	7.00	6.22	5.60
	160x70x5	6.75	9.00	10.59	9.07	7.94	7.05	6.35
	150x70x6	6.75	9.00	11.26	9.79	8.57	7.61	6.85
	170x70x5	6.75	9.00	11.26	10.15	8.88	7.90	7.11
	180x70x5	6.75	9.00	11.26	11.29	9.88	8.78	7.90
	150x80x8	6.75	9.00	11.26	13.50	13.13	11.06	9.47
185x70x6	6.75	9.00	11.26	13.50	12.66	11.25	10.13	
170x80x8	6.75	9.00	11.26	13.50	15.75	14.57	12.52	
	180x80x8	6.75	9.00	11.26	13.50	15.75	16.49	14.19

Note: Figures in bold indicate capacity limited by tie capacity. Table based on tie spacing of 225mm, ties on each leg, no vertical movement joint and long leg restrained by the masonry

Performance of WP2P parapet posts to Eurocode 3 under point load

	Size		Design Resistance (kN) at Top of Parapet Post for Various Spans					
	a x b x t	0.8m	1.0m	1.2m	1.4m	1.6m	1.8m	2.0m
WP2P	125x70x4	3.95	3.16	2.63	2.24	1.82	1.51	1.27
	140x70x4	4.88	3.90	3.25	2.79	2.36	1.97	1.66
	150x70x4	5.55	4.44	3.70	3.17	2.77	2.31	1.96
	130x70x6	6.55	5.24	4.37	3.73	3.05	2.54	2.15
	170x70x4	7.00	5.60	4.66	4.00	3.50	3.08	2.62
	160x70x5	7.94	6.35	5.29	4.53	3.97	3.39	2.88
	150x70x6	8.57	6.85	5.71	4.89	4.22	3.54	3.01
	170x70x5	8.88	7.11	5.92	5.07	4.44	3.88	3.31
	180x70x5	9.88	7.90	6.58	5.64	4.94	4.39	3.77
	150x80x8	15.55	11.36	8.75	6.99	5.74	4.80	4.09
	185x70x6	12.66	10.13	8.44	7.23	6.33	5.62	4.85
	170x80x8	20.12	14.82	11.48	9.22	7.60	6.39	5.45
		180x80x8	22.58	16.69	12.97	10.44	8.62	7.26

Note: Table based on tie spacing of 225mm, ties on each leg, no vertical movement joint and long leg restrained by the masonry

Design Sheet - Masonry Panel Design to BS EN 1996 (UK National Annex)

Please ensure all fields marked with an asterisk * are completed. The following assumptions will be made in order to provide a design: general purpose mortar is used, vertical joints are filled perpend joints, mortar strength class is M4, masonry unit group is group 1 i.e. solid (<25% voids), water absorption is 7-12% and execution class is class 2.

1. CONTACT DETAILS

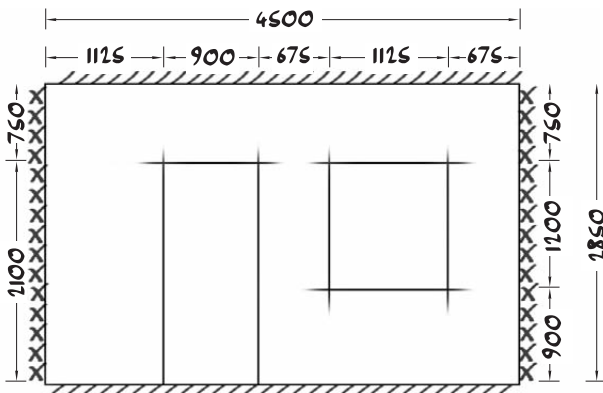
- * Contact name.
- * Company
- * Address
-
-
- * Tel.
- * Email
- * Project name and town.
-

KEY TO SUPPORT CONDITIONS

- Free edge
- Simply supported
- Full continuity

Note: The information that you provide below will be applied to both the inner and outer leaves unless otherwise specified.

EXAMPLE SKETCH



2. DESIGN CONDITIONS

Type of Wall:

- * Single Leaf or Cavity Wall
- * Cavity Width (mm)

Outer leaf:

- * Material¹
- * Width (mm)
- * Unit Strength (N/mm²)
- * Density as laid (kN/m³)

Inner leaf:

- * Material¹
- * Width (mm)
- * Unit Strength (N/mm²)
- * Density as laid (kN/m³)

Loads:

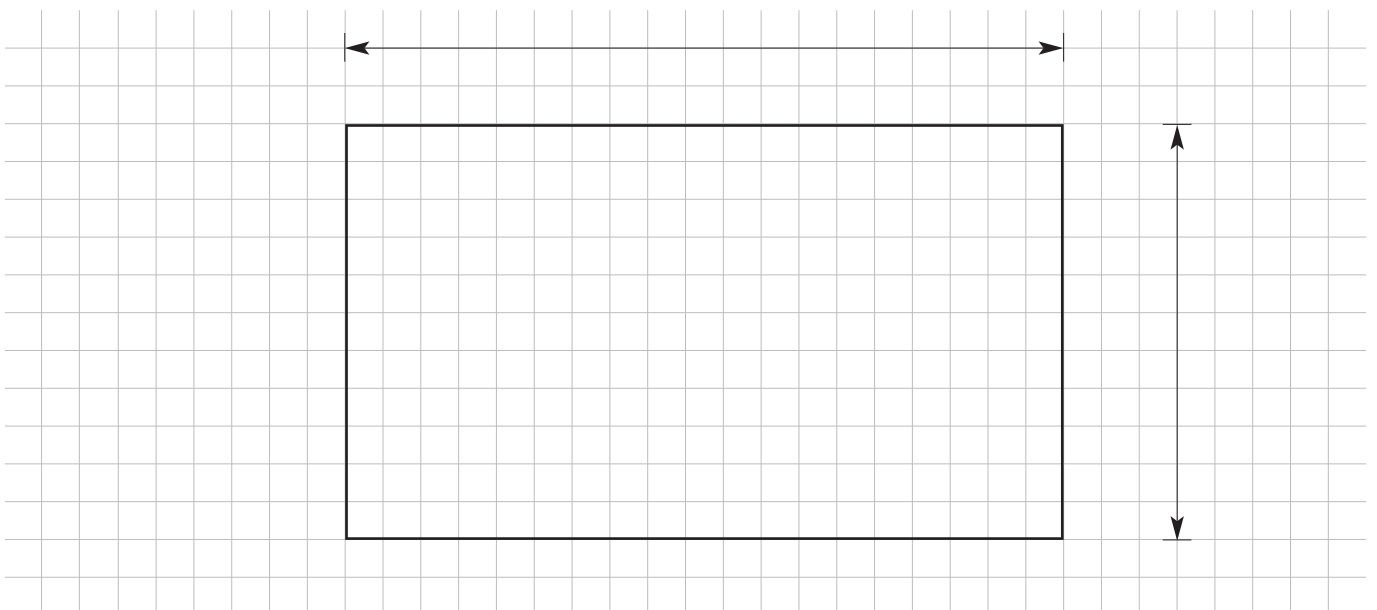
- * Characteristic lateral load (kN/m²)
- * Characteristic vertical dead load on panel (kN/m):
 Inner leaf
- Outer leaf

¹Please select from the following materials:

- | | | | |
|--------------------------|--------------------------|---------------------------|--------------------------|
| Clay brick | <input type="checkbox"/> | Aerated concrete block | <input type="checkbox"/> |
| Calcium silicate brick | <input type="checkbox"/> | Aggregate concrete block | <input type="checkbox"/> |
| Aggregate concrete brick | <input type="checkbox"/> | Clay block | <input type="checkbox"/> |
| Aerated concrete brick | <input type="checkbox"/> | Manufactured stone | <input type="checkbox"/> |
| | | Dimensioned natural stone | <input type="checkbox"/> |

3. PANEL REF.

* Add all support conditions (see key) and dimensions below



Please note openings in adjacent panels are not taken into consideration, including where windposts are used to divide into sub-panels. Load combinations used are those automatically calculated by the CADs software.

Faxback to +44 (0) 114 276 8543 or email: tech@ancon.co.uk

Ancon Building Products, President Way, President Park, Sheffield S4 7UR, United Kingdom
 Tel: +44 (0) 114 275 5224, Web: www.ancon.co.uk

Design Sheet - Masonry Panel Design to BS EN 1996 (UK National Annex)

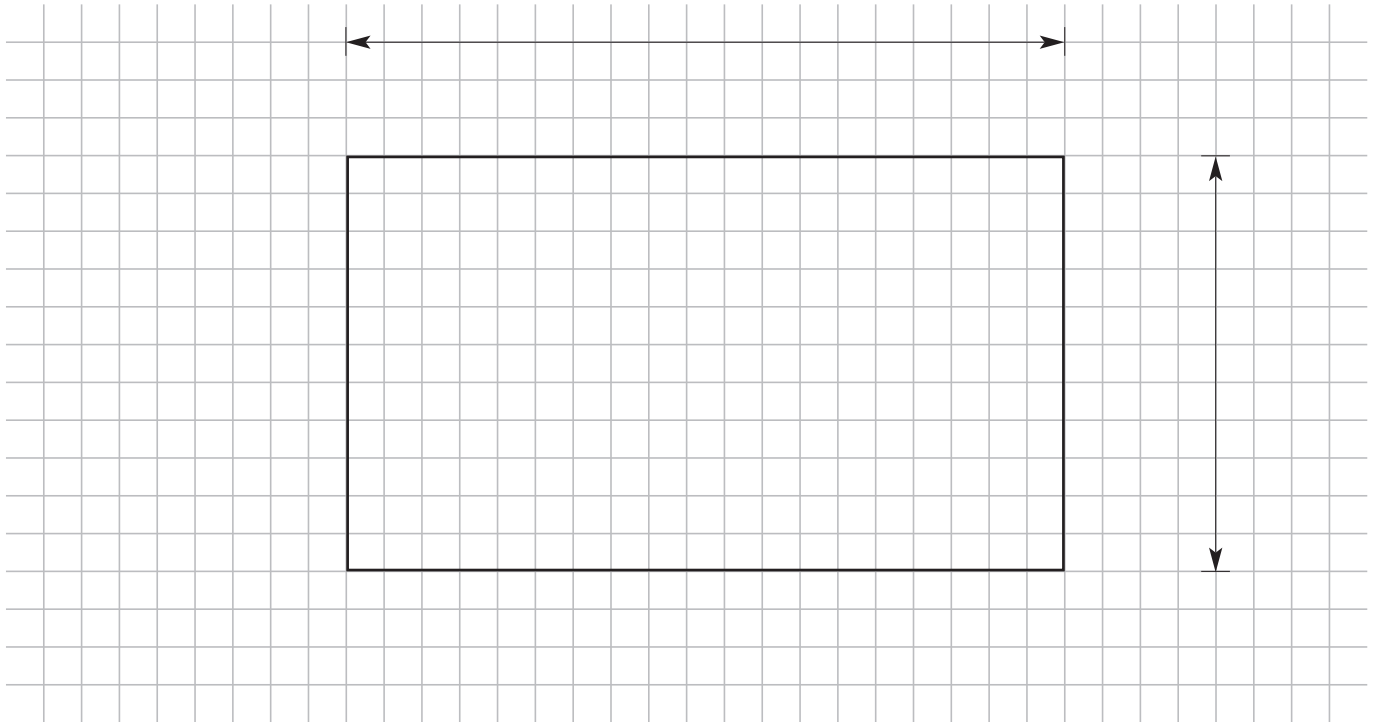
Only for use as a continuation page to an Ancon design sheet and where all loads and wall construction details are unchanged

COMPANY

PROJECT NAME & TOWN

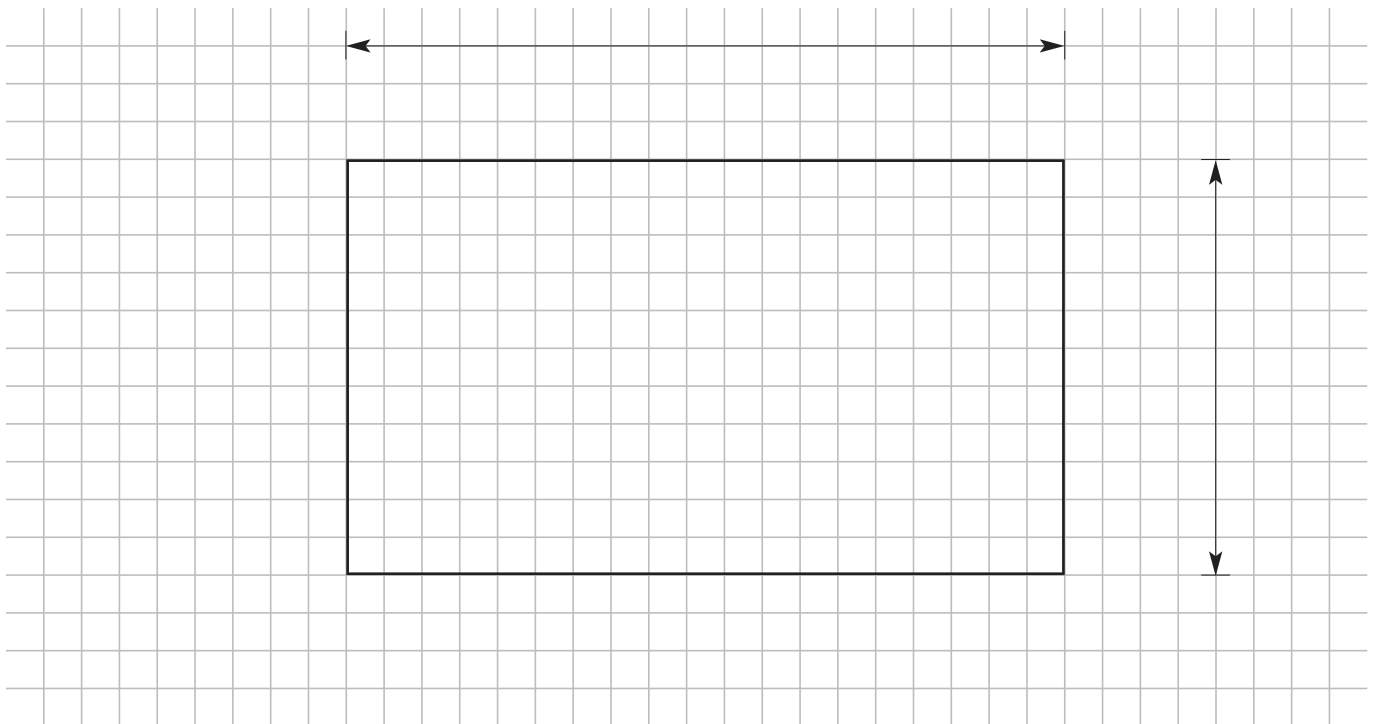
PANEL REF.

Add all support conditions and dimensions



PANEL REF.

Add all support conditions and dimensions



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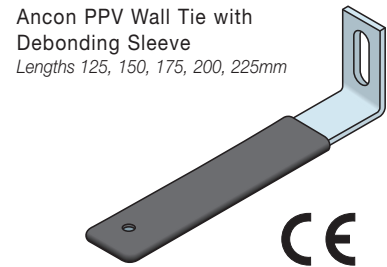
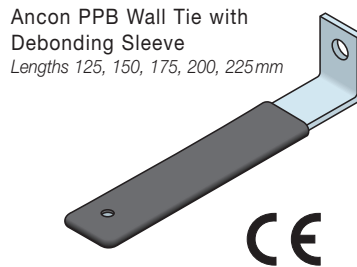
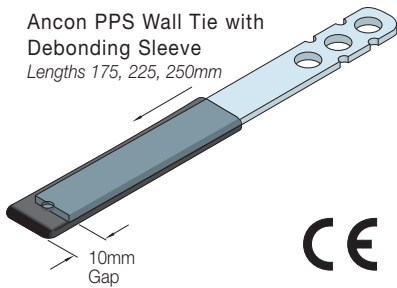
Masonry Reinforcement

Ties for Connecting Masonry Panels to Adjoining Structures



Ties for Edge of Panels

Debonding sleeves are used on plain-ended wall ties, like the Ancon PP21 or PPB, at vertical movement joints. The tie will restrain the masonry against lateral wind loads whilst the sleeve allows the masonry to expand and contract. Debonding sleeves should be installed with a 10mm gap at the end to allow for expansion of the masonry.



Ties for Top of Panels

Ancon Head Restraints provide the necessary restraint to the top of masonry walls. They allow for vertical movement to accommodate shrinkage or thermal movement of the wall or structural frame, while restraining wind loads.

Ancon IHR Head Restraints

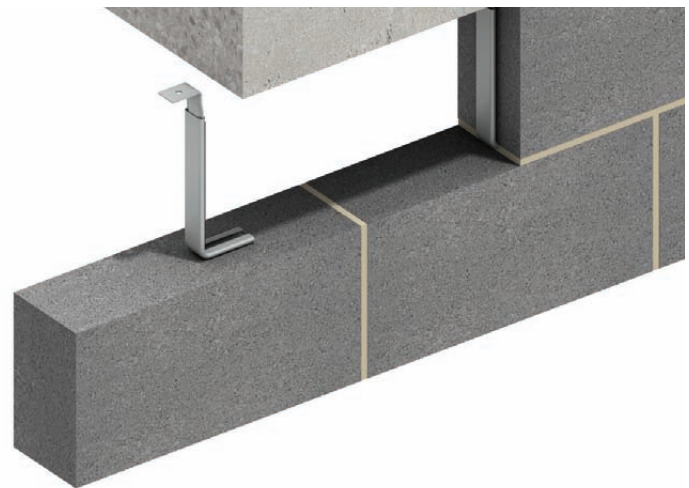
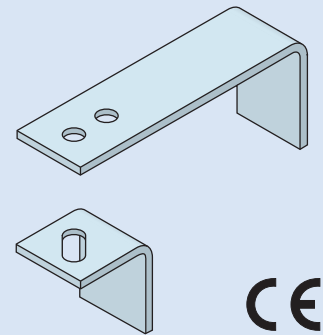
Ancon Internal Head Restraints are used for restraining the top of internal walls or the top of the inner leaf of a cavity wall. The opening at the front of the channel stem is sealed to prevent mortar ingress and to ensure that vertical movement can take place between the blockwork and the structure.

When used at 900mm centres the IHR provides a design resistance of 1714N/m and at 450mm centres provides a design resistance of 3429N/m. The standard IHR will suit a 215mm block; other sizes between 150 - 250mm are available.

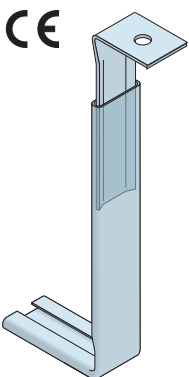
*The IHR-H, when fixed at 450mm centres staggered each side of the lower beam flange (effective centres 900mm on each side), has a design resistance of 1133N per metre in either direction.

Ancon FHR Head Restraint

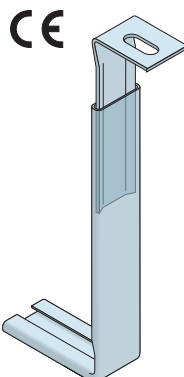
The Ancon FHR Head Restraint is used for restraining the top of internal walls or the internal leaf of a cavity wall. The two angles clamp the top of the wall and have 10mm diameter holes to suit M8 bolts. They are supplied with two holes in the longer angle to allow the restraint to fit 100mm and 140mm blockwork. Each restraint provides a design resistance of 1890N.



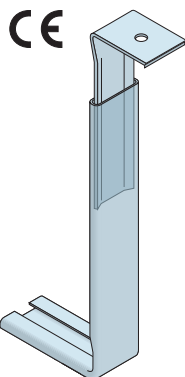
Ancon IHR - B with 10mm dia. hole



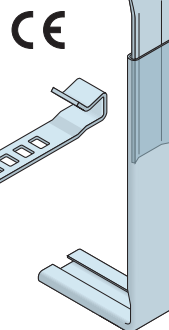
Ancon IHR - V with slot



Ancon IHR - S with 6mm dia. hole



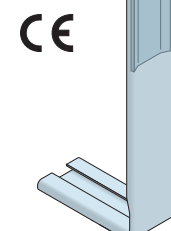
Ancon IHR - H* supplied with Hammer-On Section



Ancon IHR - C to suit cast-in channel

IHR - C 38 to suit 38/17

IHR - C 30 to suit 30/20



For further information please refer to Ancon's Wall Ties and Restraint Fixings brochure.

Other Ancon Products

Wall Ties and Restraint Fixings

Ancon's standard range includes cavity wall ties for all types of construction including traditional brick/block, thin-joint blockwork, cellular clay blockwork and timber or steel frames. Many fixings can be supplied within twenty-four hours of receiving an order. Bespoke wall ties can be ordered by using a simple reference system for the head, shank and tail of the tie.



Masonry Support Systems

Masonry cladding on steel or concrete framed structures is normally supported from a stainless steel support system, positioned above the horizontal movement joints. Ancon designs solutions for all conditions including the support of special masonry features. The range includes the standard AnconOptima system consisting of short lengths of angle and interchangeable brackets of various depths to accommodate variations in cavity width on site.



Channels and Bolts for Fixing to Concrete

Cast-in channels are used for fixing masonry support systems to the edges of concrete floors and beams. Channels are available in different sizes ranging from simple self anchoring channels for restraints, to large capacity channels with integral anchors. A selection of channels can also be supplied plain-backed for surface fixing. Stainless steel expansion bolts and resin anchors complete the range.



Tension and Compression Systems

Tie bars are increasingly being used in structures and buildings as an architectural as well as a structural element. Ancon Tension Systems comprise a range of components which can be supplied in carbon steel or stainless steel in a variety of sizes and finishes. A variety of assemblies can be created from simple tie bars to complex bracing systems involving several bars joined at one point.



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Insulated Balcony Connections

Ancon's range of thermally insulated connectors minimise heat loss at balcony locations while maintaining structural integrity. They provide a thermal break by inserting a material with a low thermal conductivity between elements with a higher conductivity and most also provide local insulation at the joint. As a critical structural component, they transfer moment, shear, tension and compression forces. Standard solutions are available for concrete-to-concrete, steel-to-concrete and steel-to-steel applications.



BIM objects are available to download from www.NationalBIMLibrary.com/Ancon or www.ancon.co.uk.

Masonry Support Systems

Lintels

Masonry Reinforcement

Wall Ties and Restraint Fixings

Channel and Bolt Fixings

Tension and Compression Systems

Insulated Balcony Connectors

Shear Load Connectors

Punching Shear Reinforcement

Reinforcing Bar Couplers

Reinforcement Continuity Systems

Stainless Steel Fabrications

Flooring and Formed Sections

Refractory Fixings



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