

Wall Ties

The selection and spacing of wall ties depends upon the type of masonry to be tied, the cavity width, the type and height of the building, its location, tie embedment, installation density, positioning and design life.

Masonry wall ties are classified in accordance to PD6697 whilst timber frame wall ties are classified in accordance to BS 5268-6.1 (BS 5268-6.1 was officially withdrawn on the implementation of Eurocodes in March 2010, however, until further guidance is made available, timber frame wall ties should still be selected from the type classifications given in Annex B of BS 5268-6.1:1996).

Construction products that fall within the scope of a harmonised standard must be CE marked before they can legally be sold. Wall ties fall into the scope of BS EN 845-1, thus must carry the CE marking.

Wall ties type classifications and minimum performance requirements are as stated in the following tables:

Classification of Wall Ties by end use

Tie Type	Application	Building Height	Location
Masonry Wall Ties			
Type 1 (Heavy Duty)	Suitable for most masonry cavity and cladding walls and most building sizes. Not very flexible and not recommended for applications where there is expected to be excessive differential movement between leaves.	Any	Suitable for use on most sites. For relatively tall buildings located in vulnerable locations, and for buildings of unusual shapes, the necessary tie provision should be calculated.
Type 2 (General Purpose)	Suitable for domestic dwellings and small commercial buildings.	Up to 15m	Suitable for buildings on flat sites where the fundamental basic wind speed velocity is up to 31 m/s, except areas where the site is at an altitude of 150m or more above sea level.
Type 3 (Basic)	As Type 2.	Up to 15m	As Type 2 but fundamental basic wind velocity limited to 27 m/s.
Type 4 (Light Duty)	Suitable only for masonry cavity walls, comprising two leaves of similar thickness in the range of 90mm to 150mm. Suitable for internal separating cavity walls in most buildings.	Up to 10m	Suitable for flat sites within towns and cities anywhere in the UK except the north western fringes of Scotland and Ireland (where the fundamental basic wind velocity exceeds 27 m/s) and any areas where the site is at an altitude of 150 m or more above sea level.
Timber Frame Wall Ties			
Type 5	Suitable for tying masonry outer cladding on to softwood structural framework of residential and industrial/commercial buildings up to three storeys.	Up to 15m	Flat sites within towns and cities where the basic wind speed does not exceed 25 m/s and altitude is not more than 150m above sea level.
Type 6	As Type 5, but suitable for developments of up to four storeys.	Up to 15m	Flat sites within towns and cities where the basic wind speed does not exceed 25 m/s and altitude is not more than 150m above sea level.
Type 7	As Type 5, but suitable for developments of between 5 and 7 storeys, being designed to accommodate the increased vertical differential movement.	Up to 18m	Calculated for actual performance value required for each location.

Performance of Wall Ties

The tensile and compressive load capacity of tie types should be equal to, or greater than, the specified load capacity for a specified embedment length, but should not be less than the figures given in the following table.

Minimum declared tensile load capacity and compression load capacity for tie type for design embedment length.

Tie Type	Minimum Mortar Class & Designation	Declared Tensile Load Capacity [N]	Declared Compressive Load Capacity [N]
1	M2 (iv)	2500	2500 (2000)
2	M2 (iv)	1800	1300 (1050)
3	M2 (iv)	1100	800 (650)
4	M2 (iv)	650	450 (350)
5	M4 (iii)	600	425
6	M4 (iii)	630	440
7	M4 (iii)	To be declared by the Wall Tie Manufacturer	

Note: Values in brackets for Declared Compressive Load Capacity are those confirmed for inclusion in the next issue of PD6697 following a change to test procedures in BS EN 846-5. Therefore, ties originally tested to BS EN 846-5:2002 need to achieve the un-bracketed performance values whilst new ties tested to BS EN 846-5:2012 need to achieve the bracketed performance values.

Wall Ties

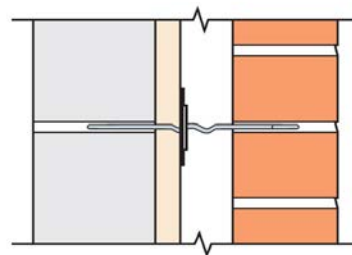
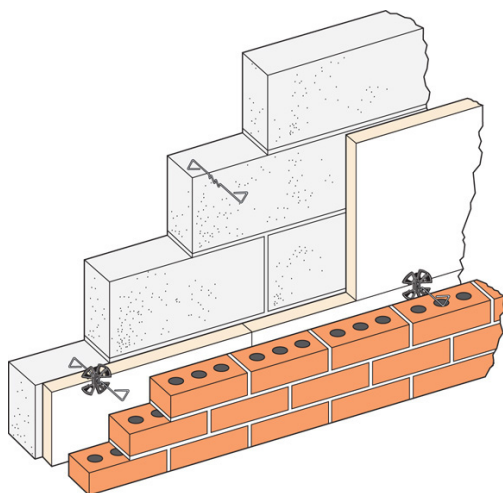
Recommended Density & Positioning

Masonry wall ties should be evenly distributed, typically at a density of 2.5 ties/m² (900mm horizontal x 450mm vertical) except around openings, and should preferably be staggered. At the vertical edges of openings and at vertical unreturned or unbonded edges (for example at movement joints and up the sloping verge of gable walls), additional wall ties should be used at a rate of one tie per 300 mm height or equivalent, placed not more than 225 mm from the edge.

Insulation Board

Where insulation board is installed within the cavity and restrained by wall ties with insulation clips, it may be necessary to reduce the horizontal spacing of the ties to 600mm, to suit board widths.

Timber frame masonry wall ties should be evenly distributed, typically at a density of 4.4 ties/m² (600mm horizontal x 375mm vertical). However in more severe locations the tie density should be increased to 7 ties/m² (600mm horizontal x 225mm vertical)



Length of Tie and Embedment

Wall ties should be of the correct length to ensure they are fully embedded in the masonry.

The tie should have a minimum embedment of 50mm in each leaf, but also allow for site tolerances relating to the cavity width of the tie.

The recommended tie lengths will therefore achieve an embedment of between 62.5mm and 75mm.

Installation

To ensure wall ties are effective they should be installed as the inner leaf is constructed and not pushed into a mortar joint. The wall ties should be pressed into fresh mortar, NOT positioned directly onto the masonry with mortar placed around. It is important that the embedded portion of the tie is surrounded by mortar.

Ideally, ties should be installed level, or with a slight fall towards the outer leaf with the installed ties being free of mortar droppings to ensure the drip functions correctly.

The tie should be positioned such that the minimum required embedment is achieved and the drip portion of the tie is central within the open cavity.

The practice of 'bending up' installed wall ties should be discouraged as this can adversely affect the performance of the tie.

Sound Resistance

As stated within the Approved Document E 2003 - Resistance to the Passage of Sound - wall ties used in external and separating cavity walls have to have a minimum value of dynamic stiffness to reduce the transmission of airborne noise. Ties are separated into Type A and Type B.

- Type A: Can be used in separating walls and external walls subject to them also having the required structural capacity. They can be butterfly ties or other ties with a dynamic stiffness of less than 4.8 MN/m³.
- Type B: Can only be used in external cavity walls subject to them also having the required structural capacity. They can be butterfly ties or other ties with a dynamic stiffness of less than 113 MN/m³.

WTS

Wire Wall Tie

The WTS is a range of wall ties designed for connecting masonry walls to masonry walls.

- Available in Type 2,3 and 4.
- Suitable for use with cavities ranging from 50mm to 175mm.
- Use in conjunction with IRC001 to hold rigid insulation in place.

Material: Austenitic stainless steel.

Installation: For walls in which both leaves are 90mm or thicker, masonry ties need to be placed at not less than 2.5 per square metre (900mm horizontal x 450mm vertical centres). The ties should be evenly distributed throughout the wall areas, with the exception of around openings and should be staggered where possible.



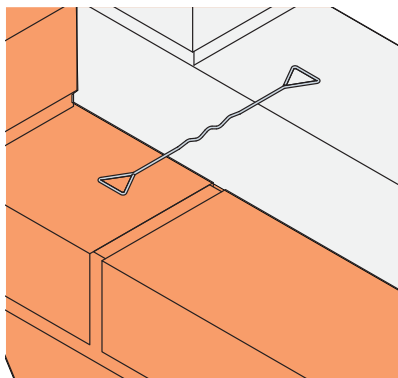
Product Dimensions

	Model No.	Type Classification	Cavity Width [mm]	B mm]
	Central Drip			
SS	WTS2-200	Type 2	50-75	200
SS	WTS2-225		76-100	225
SS	WTS2-250		101-125	250
SS	WTS2-275		126-150	275
SS	WTS3-300	Type 3	151-175	300
SS	WTS4-200	Type 4	50-75	200
SS	WTS4-225		76-100	225
SS	WTS4-250		101-125	250
SS	WTS4-275		126-150	275
	Offset Drip			
SS	WTODS2-225IRCP50	Type 2	76-100	225
SS	WTODS2-250IRCP50		101-125	250
SS	WTODS2-275IRCP50		126-150	275
SS	WTODS2-300IRCP50	Type 3	151-175	300

Note: The offset drip variation is for use where insulation materials are in the cavity. Box contains wall ties and insulation disc.

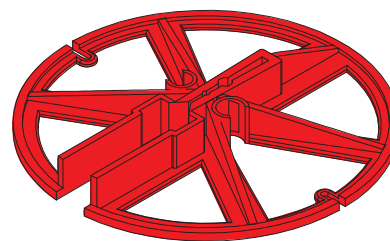
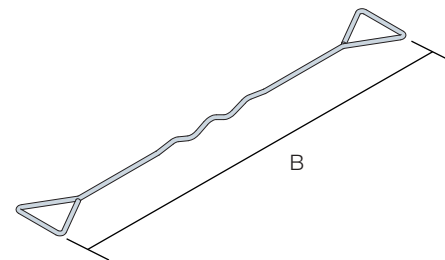
WTS4: Type A Approval

WTS4-200 and WTS4-225 ties meet the requirements of Approved Document E: Resistance to the passage of Sound and are suitable for use in separating party walls of new build attached dwellings.



Typical installation

Please note: Tie should be embedded into the mortar. Not shown above for clarity.



IRC001 Retaining Clip

- Suitable for use with all cavity wall ties.
- Used to hold rigid insulation material back to structure.