



SLOVENSKI STANDARD

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Specifikacija za dodatne komponente zidovine - 1. del: Vezna stremena, sidrni trakovi, obešala in konzole

Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets

Festlegungen für Ergänzungsbauteile für Mauerwerk - Teil 1: Maueranker, Zugbänder, Auflager und Konsolen

Spécification pour composants accessoires de maçonnerie - Partie 1 : Attaches, brides de fixation, étriers de support et consoles

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EUROPEAN STANDARD
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Specification for ancillary components for masonry - Part 1: Wall ties, tension straps, hangers and brackets

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Festlegungen für Ergänzungsbauteile für Mauerwerk - Teil
1: Maueranker, Zugbänder, Auflager und Konsolen

This European Standard was approved by CEN on 21 March 2013.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

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EN 845-1:2013 (E)**Foreword**

This document (EN 845-1:2013) has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 845-1:2003+A1:2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This part has been modified to take into account comments made in the five-year review on the 2003 version. A change has been made in the permission to use historic test data when arriving at declared values; a limited permission is also given for the use of calculation methods in certain cases. In view of their widespread use, austenitic ferritic stainless steels have been added to the materials that may be used.

SIST EN 845-1:2013

EN 845, *Specification for ancillary components for masonry*, consists of the following parts:

- *Part 1: Wall ties, tension straps, hangers and brackets*
- *Part 2: Lintels*
- *Part 3: Bed joint reinforcement of steel meshwork*

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies requirements for wall ties, tension straps, hangers and brackets for interconnecting masonry and for connecting masonry to other parts of works and buildings including walls, floors, beams, and columns. Where anchors or fasteners are supplied or specified as part of an ancillary component, the requirements including performance requirements apply to the complete product.

This European Standard is not applicable to:

- a) anchors and fasteners other than as part of an ancillary component;
- b) shelf angles;
- c) wall starter plates for tying into existing walls;
- d) products formed from materials other than:
 - 1) austenitic stainless steel (molybdenum chrome nickel alloys or chrome nickel alloys);
 - 2) austenitic ferritic stainless steel;
 - 3) ferritic stainless steel;
 - 4) copper;
 - 5) phosphor bronze;
 - 6) aluminium bronze;
 - 7) zinc-coated-steel with or without organic coating;
 - 8) polypropylene;
 - 9) polyamide (for expansion plugs only).

NOTE The resistance to fire performance of the products included herein cannot be assessed separately from the masonry element of which they are part and is therefore not covered under the scope of this part of this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 771 (all parts), *Specification for masonry units*

EN 846-2, *Methods of test for ancillary components for masonry — Part 2: Determination of bond strength of prefabricated bed joint reinforcement in mortar joints*

EN 846-3, *Methods of test for ancillary components for masonry — Part 3: Determination of shear load capacity of welds in prefabricated bed joint reinforcement*

EN 846-4, *Methods of test for ancillary components for masonry — Part 4: Determination of load capacity and load-deflection characteristics of straps*

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EN 846-5, *Methods of test for ancillary components for masonry — Part 5: Determination of tensile and compressive load capacity and load displacement characteristics of wall ties (couplet test)*

EN 846-6, *Methods of test for ancillary components for masonry — Part 6: Determination of tensile and compressive load capacity and load displacement characteristics of wall ties (single end test)*

EN 846-7, *Methods of test for ancillary components for masonry — Part 7: Determination of shear load capacity and load displacement characteristics of shear ties and slip ties (couplet test for mortar joint connections)*

EN 846-8, *Methods of test for ancillary components for masonry — Part 8: Determination of load capacity and load-deflection characteristics of joist hangers*

EN 846-9, *Methods of test for ancillary components for masonry — Part 9: Determination of flexural resistance and shear resistance of lintels*

EN 846-10, *Methods of test for ancillary components for masonry — Part 10: Determination of load capacity and load-deflection characteristics of brackets*

EN 846-11, *Methods of test for ancillary components for masonry — Part 11: Determination of dimensions and bow of lintels*

EN 846-13:2001, *Methods of test for ancillary components for masonry — Part 13: Determination of resistance to impact, abrasion and corrosion of organic coatings*

EN 846-14, *Methods of test for ancillary components for masonry — Part 14: Determination of the initial shear strength between the prefabricated part of a composite lintel and the masonry above it*

EN 998-2, *Specification for mortar for masonry — Part 2: Masonry mortar*

EN 10020, *Definitions and classification of grades of steel*
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EN 10029, *Hot-rolled steel plates 3 mm thick or above — Tolerances on dimensions and shape*

EN 10088 (all parts), *Stainless steels*

EN 10143, *Continuously hot-dip coated steel sheet and strip — Tolerances on dimensions and shape*

EN 10244 (all parts), *Steel wire and wire products — Non-ferrous metallic coatings on steel wire*

EN 10245-1, *Steel wire and wire products — Organic coatings on steel wire — Part 1: General rules*

EN 10245-2, *Steel wire and wire products — Organic coatings on steel wire — Part 2: PVC finished wire*

EN 10245-3, *Steel wire and wire products — Organic coatings on steel wire — Part 3: PE coated wire*

EN 10346, *Continuously hot-dip coated steel flat products — Technical delivery conditions*

EN ISO 75 (all parts), *Plastics — Determination of temperature of deflection under load*

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178)*

EN ISO 180:2000, *Plastics — Determination of Izod impact strength (ISO 180:2000)*

EN ISO 306, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST) (ISO 306)*

EN ISO 527 (all parts), *Plastics — Determination of tensile properties*

EN ISO 1133 (all parts), *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics*

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods (ISO 1461)*

EN ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method (ISO 1463)*

EN ISO 2039-2, *Plastics — Determination of hardness — Part 2: Rockwell hardness (ISO 2039-2)*

ISO 427, *Wrought copper-tin alloys — Chemical composition and forms of wrought products*

ISO 428, *Wrought copper-aluminium alloys — Chemical composition and forms of wrought products*

ISO 431, *Copper refinery shapes*

ISO 1183 (all parts), *Plastics — Methods for determining the density of non-cellular plastics*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Dimensions and terms relating to wall ties are given in Figure 1.

3.1.1

asymmetrical tie

1) wall tie which is of a different physical design at either end over its embedment depth (or end fixing) and for which the centre section may be symmetrical or asymmetrical in detail

Note 1 to entry: Examples are given in Figure 2 a).

2) wall tie which is physically identical at either end over its embedment depth (or end fixing) but which is fixed in a different manner at each end is also defined as asymmetrical for the purposes of the test procedure

Note 2 to entry: Examples are given in Figure 2 b).

3.1.2

bracket

device attached to structural elements, comprising an individual support for two adjacent masonry units, which form part of a masonry wall

Note 1 to entry: Examples are given in Figure 3.

3.1.3

cavity wall tie

device for connecting a masonry leaf across a cavity to another masonry leaf or to a structural frame to resist tension and compression forces while allowing limited differential movement in the plane of the wall

Note 1 to entry: Examples are given in Figure 2 and Figure 4.

Note 2 to entry: Wall ties are further sub classified as asymmetrical or symmetrical and as horizontal, slope-tolerant or movement-tolerant. Examples are given in Figures 2, 4 and 5 respectively.

EN 845-1:2013 (E)**3.1.4****cavity width**

distance between the cavity faces of the masonry leaves of a cavity wall, measured perpendicular to the plane of the wall

3.1.5**declared value**

value for a product property, determined in accordance with this standard, that a manufacturer is confident of achieving bearing in mind the variability of the manufacturing process

3.1.6**minimum embedment length**

minimum length to achieve the declared value of a wall tie, or hanger designed to be embedded in mortar

Note 1 to entry: The specification for the length to be built into the wall should be greater than the minimum used by the manufacturer for the declaration, so as to allow for tolerances in positioning on site (see Figure 1).

3.1.7**fixing**

device (e.g. a nail, screw, screw/plug, anchor or bolt) used to connect ancillary components to masonry or to supporting structures to resist tension and shear forces

3.1.8**horizontal wall tie**

cavity wall tie which is designed to be installed approximately horizontally and in the plane of the mortar joint across a cavity

Note 1 to entry: Examples are given in Figure 2 and Figure 4.

3.1.9**joist hanger (face fixing type)**

device for supporting a joist, beam, truss or rafter on a masonry wall via fixing bolts or screws

Note 1 to entry: Examples are given in Figure 6.

3.1.10**joist hanger (joint fixing type)**

device for supporting a joist, beam, truss or rafter on a masonry wall by direct loading via a flange which is embedded in a mortar joint

Note 1 to entry: Examples are given in Figure 7.

3.1.11**load capacity¹⁾**

individual value of the failure load, or load at an extreme displacement, given in the appropriate test method, whichever is the lesser

3.1.12**tensile/compressive/shear load capacity**

mean of the load capacities of the number of wall ties tested in tension/compression/shear

1) A convention has been adopted in this standard for terminology relating to the term 'load capacity'. It is also used in the EN 846 (all parts) test methods, which support EN 845. This term without a preceding qualifying adjective as shown in 3.1.11 denotes an individual value of 'load capacity', i.e. the result of one measurement on one specimen. Where the term is used with a preceding qualifying adjective, e.g. 'tensile load capacity' (see 3.1.12), this relates to the mean of the load capacities from a number of specimens tested.

3.1.13**vertical load capacity**

mean of the load capacities of the number of joist hangers/brackets tested

3.1.14**movement-tolerant cavity wall tie**

cavity wall tie which is designed to allow large in-plane differential movements of the walls, without generating large shear stresses, by the use of flexible body materials, free-running slot systems, articulated joints or other means

Note 1 to entry: Examples are given in Figure 8 and Figure 9.

3.1.15**profile height**

maximum overall height (distance between the upper and lower surface at right angles to the length and width of the joint) of the embedded portion of a wall tie, strap or hanger

Note 1 to entry: See Figure 1.

3.1.16**shear tie**

wall tie designed to transmit shear, tension and compression forces between two adjacent sections of masonry or between structural frames and masonry

Note 1 to entry: Shear ties are sub-classified as symmetrical or asymmetrical. (Examples are given in Figure 10.)

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3.1.17**slip tie (general purpose)**

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wall tie designed to transmit only shear forces between two adjacent sections of masonry or between masonry and structural frames while allowing in-plane movement

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Note 1 to entry: Examples are given in Figure 11.

3.1.18**slope-tolerant tie**

cavity wall tie designed to function satisfactorily with a significant slope from the horizontal

Note 1 to entry: Examples are given in Figure 5.

3.1.19**slot tie**

wall tie whose end fixing (at one end) is by means of engaging a re-entrant key (e.g. dovetail) into a slot either embedded in a concrete wall or surface fixed to concrete, steel or masonry walls or frame elements, and which is free to slide in the slot either only during installation (for adjustment purposes) or both during installation and while in service (to allow differential movement)

Note 1 to entry: Examples are given in Figure 9.

3.1.20**symmetrical tie**

wall tie which is physically identical at each end over its embedment length (or end fixing) and which is fixed in an identical manner at each end

Note 1 to entry: The centre section may be symmetrical or asymmetrical in detail.

Note 2 to entry: Examples are given in Figure 4.

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3.1.21

tension strap

device for connecting masonry walls to other adjacent components such as floors and roofs and which resists tension forces

Note 1 to entry: Examples are given in Figure 12.

3.1.22

wall tie

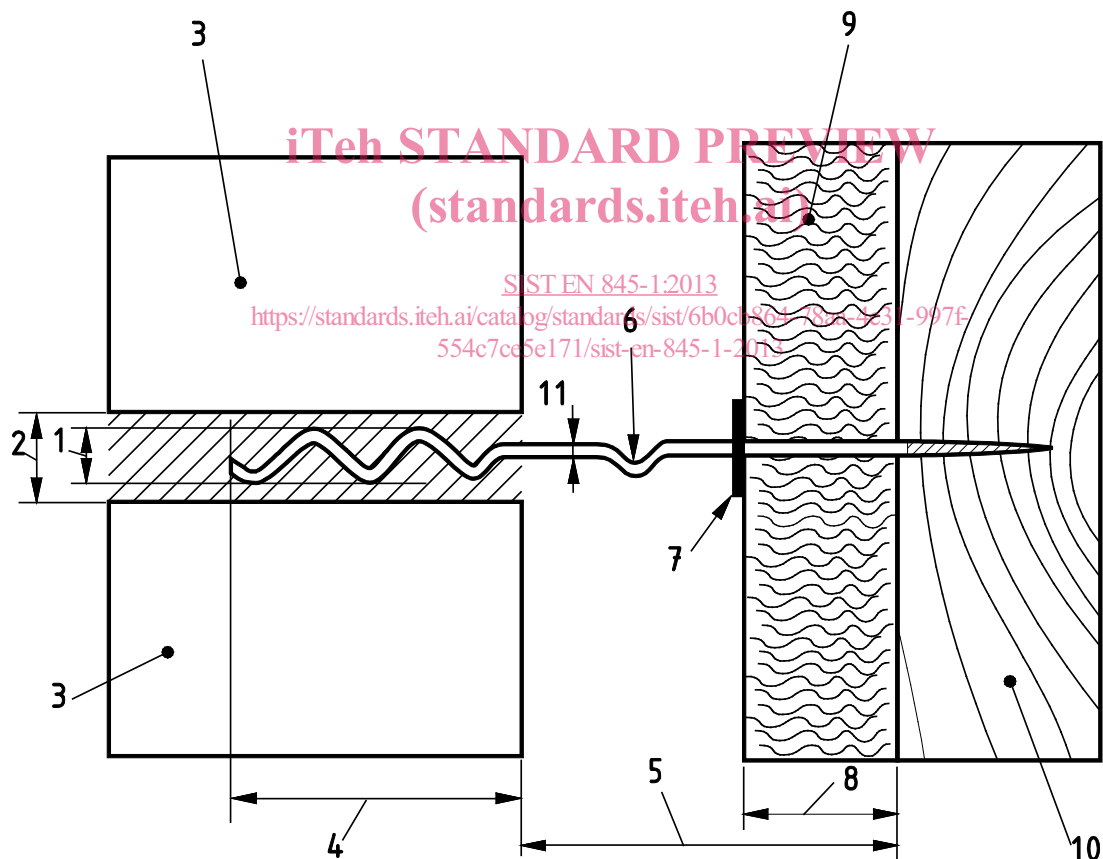
device capable of transferring loads between masonry leaves or between masonry and other structures, in order to limit their relative movement in purely one or more planes, as required

Note 1 to entry: Examples are given in Figure 1, Figure 2, Figure 4, Figure 8 and Figure 10.

3.2 Symbols

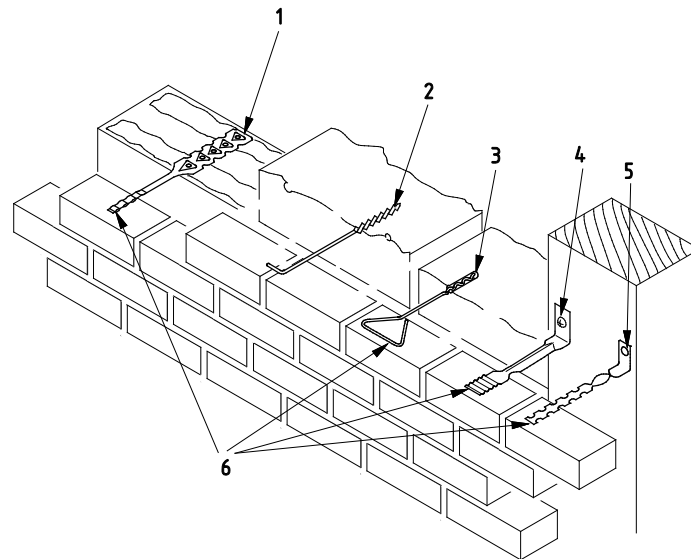
L the overall perpendicular length of a bracket from the fixing surface to the extremity of the support flange, in mm

NOTE Examples are given in Figure 3.

**Key**

1 profile height	5 cavity width	9 insulation
2 mortar joint thickness	6 drip	10 inner leaf material, e.g. timber
3 units forming outer leaf	7 insulation retaining clip	11 diameter of wire or thickness of plate
4 embedment length	8 insulation width	

Figure 1 — Dimensions and terms relating to wall ties



NOTE 1 For reasons of clarity, thermal insulation is not shown.

Key

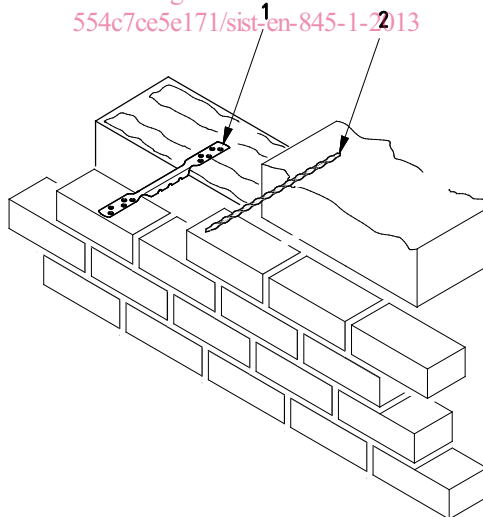
- | | |
|-------------------------------|-------------------------------|
| 1 thin layer mortar (far end) | 4 screwed to timber frame |
| 2 screw fixing | 5 nailed to timber frame |
| 3 resin anchor fixing | 6 bedded in mortar (near end) |

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a) Examples of asymmetrical wall ties

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NOTE 2 For reasons of clarity, thermal insulation is not shown.

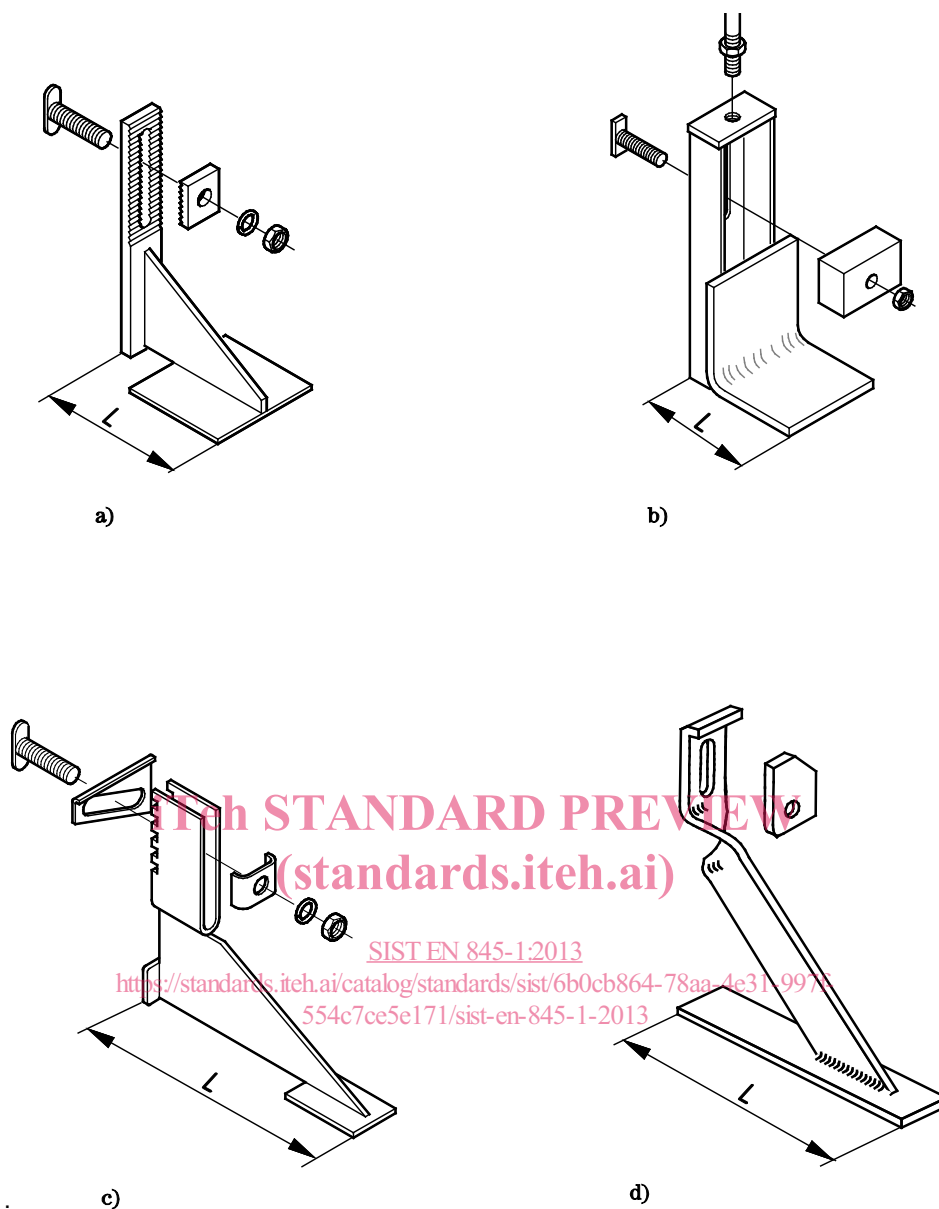
Key

- | |
|---|
| 1 deformed plate tie in masonry mortar (near end) and thin joint mortar (far end) |
| 2 helical tie in masonry mortar (near end) and screwed into block (far end) |

b) Examples of symmetrical wall ties used asymmetrically

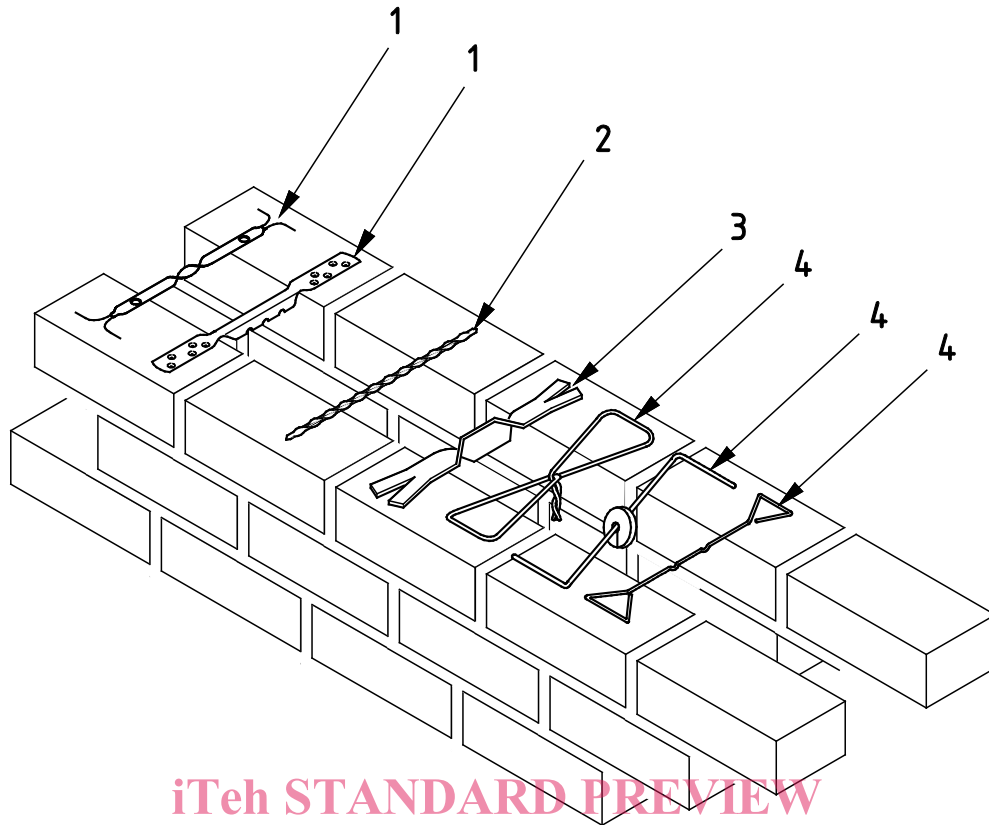
Figure 2— Examples of wall ties

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**Key**

- a) ribbed-plate adjuster type (and packing shim) c) toothed support and angled slot adjuster type
 b) screwed adjuster type (and packing shim) d) light duty cam washer adjuster type

Figure 3 — Examples of brackets



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NOTE For reasons of clarity, thermal insulation is not shown.

Key

1 thin plate types

2 helical (spiral) types

3 thick plate types

4 wire types

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Figure 4 — Examples of symmetrical wall ties