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54 Cavity wall tie, method and cavity wall construction.

57 A wall tie (10) for a timber frame cavity wall (19, 20) which is made as a generally flat rectangular stainless steel strip having first and second stiffening formations (12, 15) in the form of pressed ribs, separated by an unstiffened transverse junction (16). The tie (10) can be bent about the junction (16), to bring abutment faces (17, 18) of the stiffening formations (12, 15) into abutment and limit the angle through which the tie (10) is bent. In this condition, the tie is strong both in compression and in tension, while remaining flexible enough to permit differential movement of the inner and outer leaves (19, 20) of the wall. Chevron mortar keying formations (27) are formed on the other end portion (23) of the tie. A method and cavity wall construction are also described.

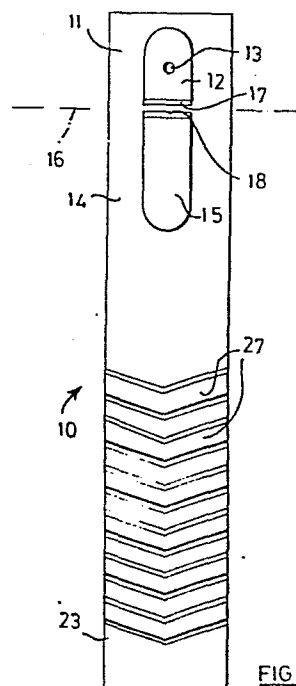


FIG 2

82.42

TITLE:**Cavity Wall Tie, Method and Cavity Wall Construction**

This invention relates to a cavity wall tie for timber frame construction of buildings. Such a wall tie will hereinafter be called a "frame tie". It also relates to a method and to a cavity wall construction.

05 In a cavity wall, the inner and outer leaves of the wall are linked by wall ties extending across the cavity.

Where the inner leaf of the wall consists of one of
10 more timber frames and the outer leaf consists of facing masonry, such as brickwork, the wall ties used (frame ties) have to allow for differential movements between the inner and outer leaves in a vertical plane. However, the frame ties also need to have strength under
15 tension and preferably also under compression to hold the inner and outer leaves correctly located. Additionally, the frame tie should have some means for allowing moisture to drip off at a position spaced from the inner leaf.

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An early form of frame tie consisted of a stainless steel strip having embossed chevron formations for mortar keying, and appropriate fixing holes. The inner ends of these ties were nailed to the timber frame and,

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as the outer leaf of masonry was built up, the ties were bent out at approximately right angles to the inner timber frame so as to lie in the coursing joints of the outer leaf with the chevrons keying firmly into the mortar.

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These ties had the disadvantage that, although strong in tension, they were relatively weak in compression and the unpredictable position and angle of the bend could result in water penetration to the inner leaf.

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A second form of frame tie at present in use overcame these disadvantages. This second form of frame tie has an upright inner part, to be nailed to the timber frame, a downwardly inclined part to promote removal of water drops away from the inner leaf and an outer horizontal part with chevron formation, intended to key with a mortar coursing joint of the outer leaf.

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The upright inner part and downwardly inclined part have a continuous stiffening formation which rigidifies them and ensures that the tie has compressive strength and that the water-shedding, downwardly inclined part lies at a suitable angle of about 45° to the inner leaf. The bend between the downwardly inclined part and the outer horizontal part is not stiffened, permitting some degree of vertical movement between the inner and outer leaves and allowing the generally horizontal outer part to be positioned in a mortar coursing joint.

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Unfortunately, this second form of frame tie, although having desirable characteristics in use, has some drawbacks from the point of view of the builder. If all the ties are nailed to the inner timber frame leaf of the wall before the outer masonry leaf is built, they project a substantial distance from the inner leaf and could injure a workman.

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If the ties are nailed in place only as the bricklayer reaches the appropriate level with the outer leaf masonry, the impacts of the hammer tend to loosen the mortar bond of the ties already installed. Furthermore, the bricklayer cannot keep up his usual speed, and he
05 may not position the ties correctly on the inner leaf timber frame, where their fixings should be firmly anchored in the solid timber studding.

It is an object of the present invention to provide
10 a frame tie for use in the timber frame construction of buildings which has both tensile and compressive strength and which overcomes or reduces the disadvantages mentioned.

15 According to the invention there is provided a frame tie comprising an elongate, metal member having a pair of end parts, one end part and an adjoining second part of the member having first and second stiffening formations respectively, said parts being separated by a
20 narrow transverse unstiffened junction into which the first and second stiffening formations do not extend, said one end part having fixing means for securing the tie to a timber element of an inner leaf of a wall and the other end part of the member having mortar-keying
25 means for securing the tie to a masonry outer leaf of the wall.

The first and second stiffening formations may be so shaped that, by bending the elongate member at the
30 unstiffened junction, the first and second stiffening formations are brought into abutment.

The first and second stiffening formations may be arranged to abut when the elongate member has been bent
35 to an obtuse angle of between 100° and 160° .

The angle may be between 125° and 145° and is preferably approximately 135° .

The first and second stiffening formations may comprise a rib pressed from the material of the elongate member and having a respective abutment end adjacent the unstiffened junction.

Each of the first and second stiffening formations may comprise a plurality of ribs or corrugations pressed from the material of the elongate member.

The mortar keying means may comprise a plurality of chevrons formed in the material of the elongate member at said other end part.

The elongate metal member may comprise a generally rectangular sheet metal strip.

The metal may be stainless steel. Alternatively, it may be galvanised mild steel.

The invention also provides a method of connecting a masonry outer leaf to a timber frame inner leaf of a timber frame cavity wall, the method comprising: taking a frame tie according to the invention; securing said one end part thereof to the timber frame inner leaf by means of a fastener such as a nail; bending the tie at said transverse unstiffened junction; and inserting said other end part of the tie in a mortar coursing joint of the masonry outer leaf.

The invention also provides a timber frame cavity wall comprising a masonry outer leaf, a timber frame inner leaf, and at least one frame tie according to the first aspect of the invention connecting the inner and outer leaves.

A frame tie embodying the invention will now be described in more detail by way of example only, with reference to the accompanying drawings, in which:-

05 FIGURE 1 is a sectional view through a timber frame cavity wall, showing the frame tie in use;

FIGURE 2 is a front elevation of the frame tie in a flat condition as supplied to site;

10 FIGURE 3 is a side elevation of the frame tie.

 Referring firstly to Figures 2 and 3 of the drawings, a frame tie is shown in a flat condition, as supplied to site. The tie 10 consists of a single
15 elongate rectangular member of stainless steel which is pressed to the shape shown. At a first end 11, the metal of the member is embossed to form a stiffening formation 12. A hole 13 for a fixing nail is provided
20 in the centre of this first end portion 11.

 An immediately adjacent portion 14 of the member is provided with a second stiffening formation 15, again in the form of an embossed central part of the member.

25 Between the first and second stiffening formations, 12 and 15, there is a narrow, unstiffened, transverse junction 16, indicated by the dotted line in Figures 2 and 3. The frame tie 10 is bent about this junction 16
30 in use.

35 The side elevation of Figure 3 shows more clearly the profile of the stiffening formations 12 and 15. Each has an abutment face adjacent the junction 16, these faces being shown at 17 and 18 respectively. The abutment faces 17 and 18 are inclined at an angle to the general plane of the member so that, when the frame tie 10 is bent about the junction 16, the two abutment faces

come into contact and limit the angle to which the frame tie can be bent.

Figure 1 shows the frame tie 10 in use in a cavity wall which comprises an inner timber frame leaf 19 and an outer masonry leaf 20, separated by a cavity 21. The first end portion 11 of the frame tie 10 has been secured to the timber frame at a suitable position by means of a nail 22, preferably having annular rings formed in its shank for maximum holding power in the timber studding. It is intended that the frame ties should all be nailed in place before the masonry outer leaf 20 is built up, but that they should remain in the flat form, as supplied, and as illustrated in Figures 2 and 3, until the bricklayer has laid the masonry up to the level of each tie.

He then merely bends the tie at the unstiffened junction 16 between the first and second stiffening formations until the abutment faces 17 and 18 come into contact, preventing further bending. The portion 14 of the tie adjacent the junction will then be inclined downwardly at an angle determined by the angles of the abutment faces. The obtuse angle between the first end portion 11 and the adjacent portion 14 of the frame tie will be in the range between about 100° and 160° , more preferably in the range between 125° and 145° . In the example shown, the portion 14 inclines at an angle of 135° .

The other end portion 23 of the frame tie 10 is then laid on the mortar bed 24 between adjacent courses of masonry 25, 26, forming the outer leaf 20 of the wall. It will be seen that the end portion 23 has a series of ribs 27 of chevron shape, which have been found under test to give extremely good resistance against being pulled out of the mortar.

Between the portions 14 and 23 of the frame tie, the metal member is unstiffened and fairly flexible, so that the bricklayer can readily insert it in the coursing joint of the outer leaf at the nearest level.

05 The frame tie 10, in use as shown in Figure 1, can allow for movement of the inner and outer leaves of the wall 19 and 20 relative to each other in vertical planes, because of the flexibility of the relatively thin stainless steel member. However, movement of one
10 leaf away from the other is prevented by the securely fixed member having the necessary tensile strength. Movement of one leaf towards the other is resisted because the member is stiffened so as to have sufficient compressive strength.

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Once the member has been bent at the junction 16 to bring the abutment faces into contact, it behaves in compression exactly as the conventional stiffened type of frame tie behaves. However, it does not have the
20 disadvantage that it is supplied in an angled shape to the site, with consequent risk of personal injury or inadequate fixing strength, as explained above.

The frame tie described also acts to shed water
25 drops which might form on it in the cavity, because of its predetermined angle of inclination away from the inner leaf 19.

The frame tie may be modified within the scope of
30 the invention, for example by being made of a different material or by modification in the shape of the stiffening formations or mortar-keying formations. The material could be mild steel, galvanised or otherwise treated to resist corrosion. The stiffening formations
35 could be in the form of a plurality of ribs or corrugations on the end portion 11 and adjacent portion 14, meeting at a plurality of abutments when the member is

bent at the junction 16.

Although the tie described by way of example has abutment faces 17 and 18 to limit the angle at junction 16, these are not essential. The frame tie will still
05 have strength in both compression and tension without such abutment faces, but the angle at junction 16 will need to be judged by the builder.

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CLAIMS:

1. A frame tie comprising an elongate, metal member having a pair of end parts, characterised in that one end part (11) and an adjoining second part (14) of the member have first and second stiffening formations (12, 15) respectively, said parts (11, 14) being separated by
05 a narrow transverse unstiffened junction (16) into which the first and second stiffening formations (12, 15) do not extend, said one end part (11) has fixing means (13) for securing the tie (10) to a timber element (19) of an inner leaf of a wall and the other end part (23) of the
10 member has mortar-keying means (27) for securing the tie (10) to a masonry outer leaf (20) of the wall.

2. A frame tie according to Claim 1 further characterised in that the first and second stiffening formations
15 (12, 15) are so shaped that, by bending the elongate member at the unstiffened junction (16), the first and second stiffening formations (12, 15) are brought into abutment.

20 3. A frame tie according to Claim 2 further characterised in that the first and second stiffening formations (12, 15) are arranged to abut when the elongate member has been bent to an obtuse angle of between 100° and 160° .

25 4. A frame tie according to Claim 3 further characterised in that the obtuse angle is between 125° and 145° .

5. A frame tie according to Claim 4 further characterised in that the obtuse angle is approximately 135° .
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6. A frame tie according to any preceding claim further characterised in that the first and second stiffening formations (12, 15) each comprise a rib pressed from the
35 material of the elongate member and having a respective

abutment end (17, 18) adjacent the unstiffened junction.

7. A frame tie according to any one of Claims 1 to 5 further characterised in that each of the first and second stiffening formations (12, 15) comprises a plurality of ribs or corrugations pressed from the material of the elongate member.

8. A frame tie according to any preceding claim further characterised in that the mortar keying means comprises a plurality of chevrons (27) formed in the material of the elongate member at said other end part (23).

9. A frame tie according to any preceding claim further characterised in that the elongate metal member comprises a generally rectangular sheet metal strip.

10. A method of connecting a masonry outer leaf to a timber frame inner leaf of a timber frame cavity wall, the method being characterised in that it comprises the steps of: taking a frame tie (10) according to any one of Claims 1 to 9; securing said one end part (11) thereof to the timber frame inner leaf (19) by means of a fastener (22) such as a nail; bending the tie at said transverse unstiffened junction (16); and inserting said other end part (23) of the tie in a mortar coursing joint (24) of the masonry outer leaf (20).

11. A timber frame cavity wall characterised in that it comprises a masonry outer leaf (20), a timber frame inner leaf (19), and at least one frame tie (10) according to any one of Claims 1 to 9, connecting the inner and outer leaves (19, 20).

