THREE BASIC COMPONENTS

1. Tension-bar

- Standard lengths 1000 to 4000mm
- Longer lengths are available by arrangement

2. End-stops

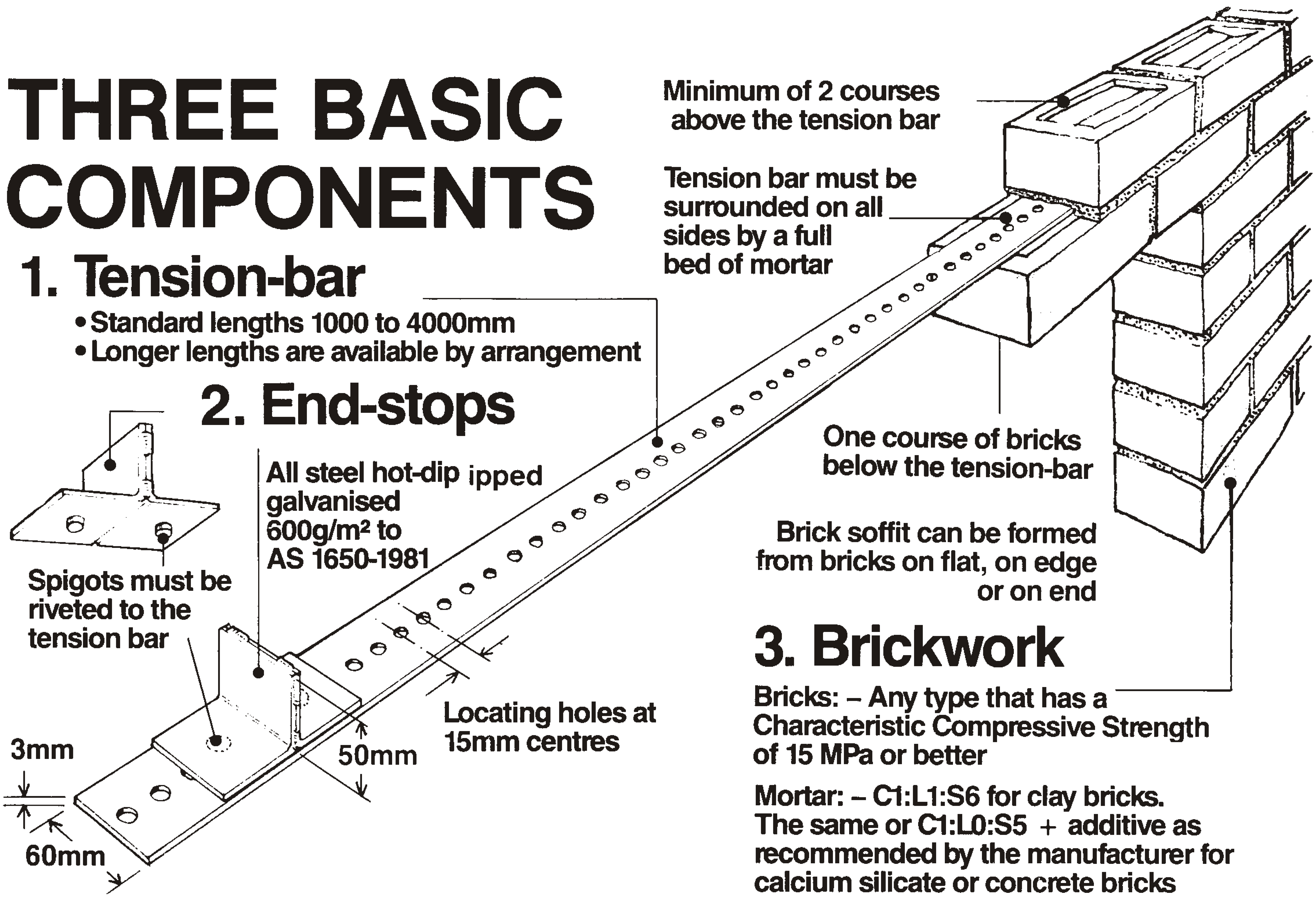
All steel hot-dip ipped galvanised 600g/m² to AS 1650-1981

Spigots must be riveted to the tension bar

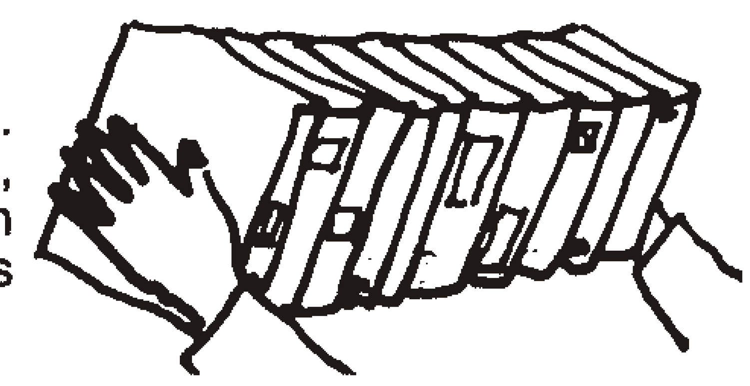
3. Brickwork

Bricks: – Any type that has a Characteristic Compressive Strength of 15 MPa or better

Mortar: – C1:L1:S6 for clay bricks. The same or C1:L0:S5 + additive as recommended by the manufacturer for calcium silicate or concrete bricks



WHAT HOLDS UP THE BOTTOM BRICKS?
People unfamiliar with reinforced brickwork sometimes ask what holds the bottom course of bricks in a HESBIA lintel in position. HESBIA lintels are designed to be very stiff; deflection being limited to 1/1200th of the span. With brickwork as rigid as this, bricks below the bar have no room to move and are therefore secure in all but the most exceptional circumstances. The situation is similar to the one where a row of books can be carried with none slipping out because of the pressure applied to the ends of the row by the two hands of the carrier. The end-stops make certain that those two hands are always there.



TECHNICAL DATA
BRICKWORK BRICKS
A brick of any size or type can be used provided it has a width of at least 90mm and a Characteristic Compressive Strength of at least 15 MPa. Effectively this will mean that all but some second hand bricks can be used, but a check should be made about strength when any doubt exists. This publication does not give details for the use of 90mm bricks except in tables 2 and 3.

MORTAR
The mortar used in a HESBIA lintel must not be weaker than an accurately batched 1:1:6 cement:lime:sand mix. Half a bag of cement and one third of a bag of lime will fill up the spaces between the sand grains in a three cubic foot mixer full of sand to provide a convenient way of achieving accuracy. No plasticisers should be added because their use is usually accompanied by the entrainment of too much air. This makes the mortar, and hence the brickwork, too weak to play its part in the lintel. If washed plasterer's sand is mixed with bricklayer's sand and the lime is included, the resulting mortar will need no plasticiser to make it workable and the brickwork will be stronger as a result.
With calcium silicate and concrete bricks, the manufacturer may recommend the use of a mortar of composition 1 cement: 5 washed sand plus the methyl cellulose water thickener that he supplies. Such a mortar is accepted as being equivalent to the 1:1:6 mortar required by this brochure.

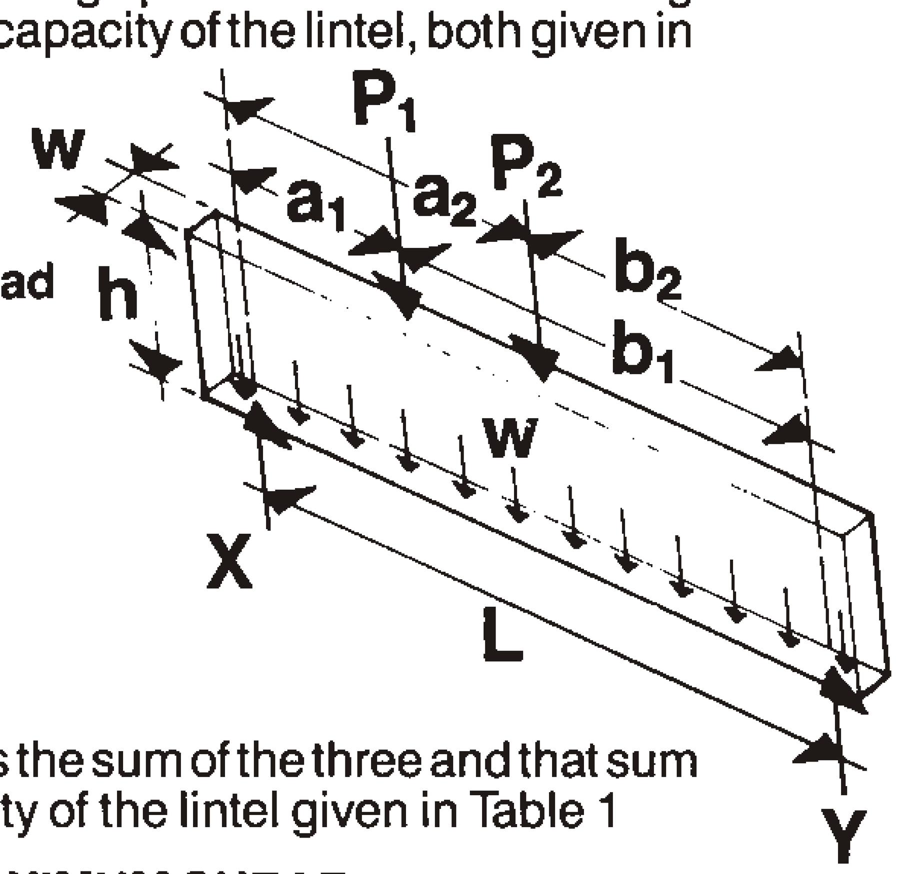
DESIGN OF HESBIA LINTELS
GENERAL
HESBIA lintels may be designed using the methods given in the SAA Brickwork Code AS 1640 or the tables that follow may be used. Table 1 assumes that F'_m is 1.77 MPa and the maximum stress in the steel is 133 MPa, both values being slightly lower than would be obtained from the code.

USING TABLE 1 WITH UNIFORMLY DISTRIBUTED LOADS
BRICKWORK DIMENSIONS FIXED
When the span of the opening and the number of courses over it is fixed, Table 1 can be used to calculate the maximum load that can be carried.
Example 1 Span equals 2400 and the lintel is four courses high. Table 1 shows that this member can carry a load of 2.3 kN/m as well as its own weight.

LOAD AND SPAN FIXED
When the span of the opening is fixed and the load is known, Table 1 is used to determine the number of courses of brickwork needed in the lintel.
Example 2 Span equals 2700 and the load is 5 kN/m. Table 1 shows that a six course lintel will carry a 4.5 kN/m load over the span – not enough – therefore use a seven course lintel with a capacity of 6.3 kN/m.

LOAD AND HEIGHT OF BRICKWORK FIXED
When the load and the number of courses in the lintel are fixed, Table 1 can be used to determine the maximum span of the lintel.
Example 3 The load on the lintel is 3 kN/m and it is three courses high. Table 1 shows that a three course 1800 span lintel will carry 2.1 kN/m and a 1500 span lintel 3.2 kN/m. By interpolating between these two values it is possible to determine that 1550 is the maximum span.

USING TABLE 1 WITH POINT LOADS
When point loads are applied, they will usually occur in conjunction with a uniformly distributed load, even if that load is only the mass of the brickwork in the lintel. In this case the design process is one of ensuring that neither the moment nor the shear capacity of the lintel, both given in Table 1, is exceeded.



CALCULATING AND CHECKING MAXIMUM BENDING MOMENTS
1) For the Uniformly Distributed Load
$\text{Max BM} = \frac{W L}{8}$

2) For the Point Loads
$P_1\text{:Max BM} = \frac{P_1 (a_1 \times b_1)}{L}$

$P_2\text{:Max BM} = \frac{P_2 (a_2 \times b_2)}{L}$

The total maximum bending moment is the sum of the three and that sum must be less than the moment capacity of the lintel given in Table 1

CALCULATING AND CHECKING MAXIMUM SHEAR
1) For the Uniformly Distributed Load
The shear at both X and Y is $\frac{W L}{2}$

2) For the Point Loads
The shear at X is $\frac{P_1 \times b_1}{L} + \frac{P_2 \times b_2}{L}$

The shear at Y is $\frac{P_2 \times a_1}{L} + \frac{P_1 \times a_1}{L}$

3) The Total Shear
at X is $\frac{P_1 \times b_1}{L} + \frac{P_2 \times b_2}{L} + \frac{W L}{2}$ and

at Y is $\frac{P_2 \times a_1}{L} + \frac{P_1 \times a_1}{L} + \frac{W L}{2}$

Provided neither value exceeds the shear capacity of the lintel, as given in Table 1, all is well.

Example 4 A HESBIA lintel of single leaf 110mm brickwork with a span of 2100mm and a total depth of 506mm is required to carry its own weight plus two point loads; one of 2kN located at 600mm from the left hand end