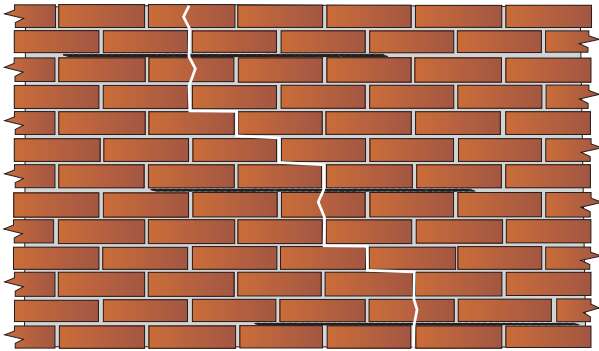


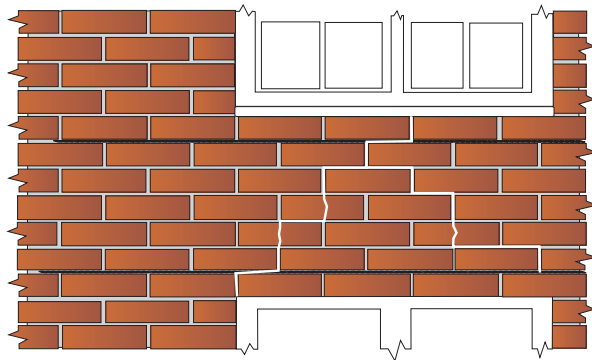
Tri-bar

Tri-bars are three finned helical Stainless Steel reinforcement rods, which can be used in accordance with (BS 5628 part 2) for reinforcing bed-joints to enhance lateral loading resistance in new and existing buildings, Tri-bars can also be used to repair many structural defects in existing masonry by using our repair strategies like over-pinning with ring beams, general crack stitching repairs, lintel failures and re-tying (disconnected and unconnected) solid or cavity masonry panels.

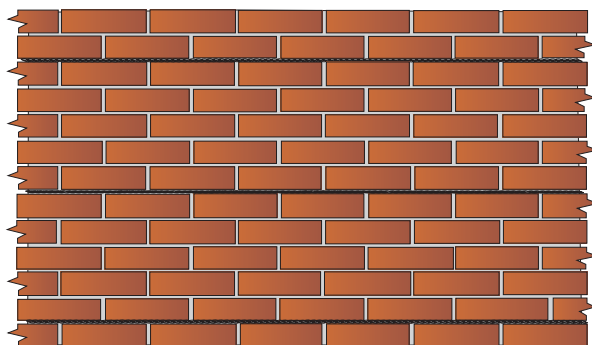
Crack stitching.



Re-stabilising existing masonry above failed lintels.



Ring beams to improve lateral load resistance and over pinning to reduce the under pinning cost.



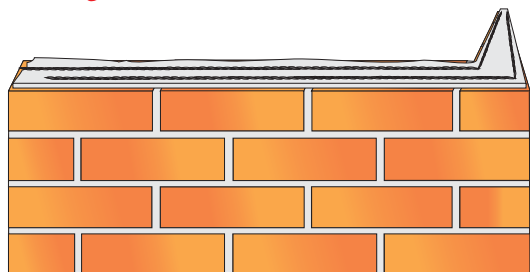
Benefits

- Quick installation.
- Low labour costs.
- Tensile strength more than double required by BS 5628.
- Good bonding to resins and grouts.
- Lengths up to 8 metres.
- Easily installed in bed-joints.
- Minor visual and structural disturbance
- Enhances lateral loading resistance.

Features

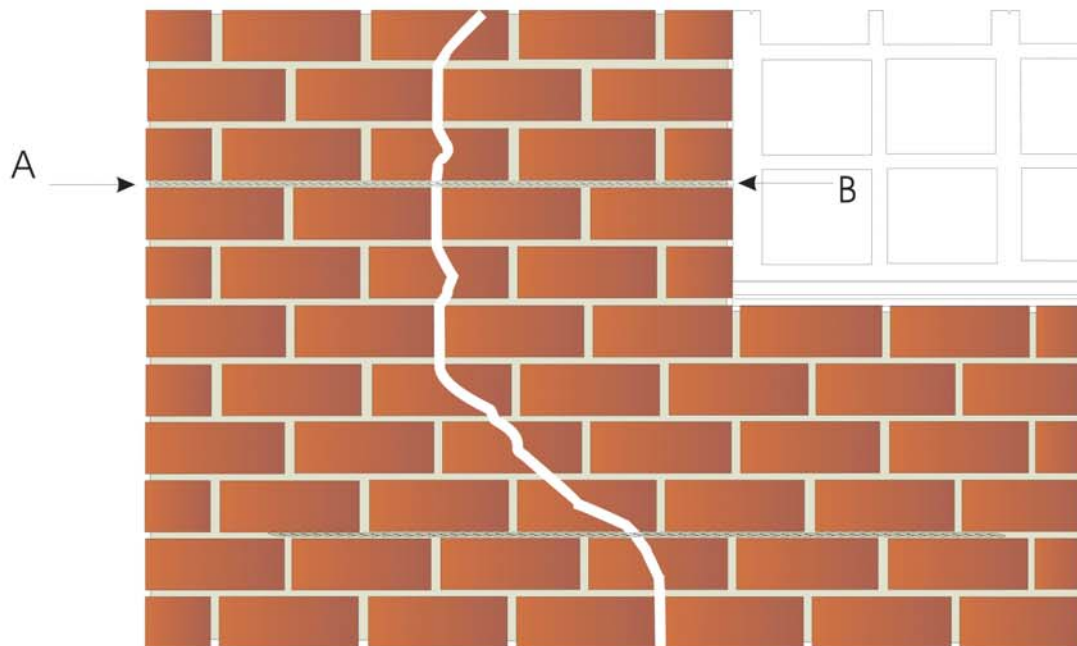
- Easy and problem free installation.
- Austenitic 304 or 316 Stainless Steel.
- Effective in cavity and solid walls.
- Bonded with Tri-set resin or cemspand grout.

Reinforcing mortar beds to enhance lateral loading resistance in new construction.



General Crack stitching

TB-01

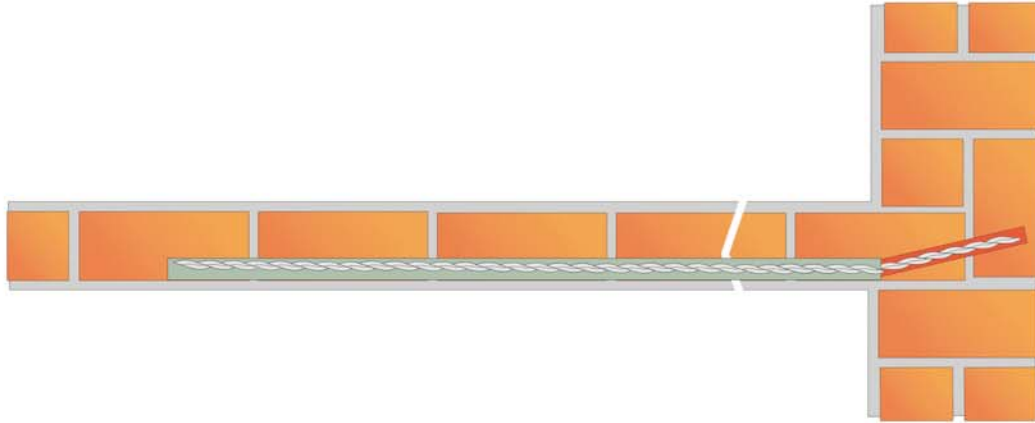


- (1) Cut out slots into horizontal mortar joint to specified depth and at required vertical spacing.
- (2) Blow out slots and thoroughly flush with water.
- (3) With the aid of a grout gun insert a 10mm bead of Cemspand cementitious grout into the back of the slot.
- (4) Push the Tri-bar rod into the grout until a good coverage is achieved.
- (5) Insert a second 10mm bead of Cemspand cementitious grout over the exposed rod and iron into slot using a finger trowel.
- (6) When Cemspand has set repoint joint to match existing mortar joint.

Installation Notes: Unless specified otherwise the following criteria are to be used

- a) The depth of slot to be 25 to 35mm
- b) Normal vertical spacing of crack stitches is 450mm(6 brick courses).
- c) Tri-bars are to extend a minimum of 500 mm each side of crack.
- d) Where a crack is within 500mm of the end of a wall (as shown by A above) the Tri-bar is to be continued for at least 100mm around the corner
- e) Where a crack is within 500mm of an opening (as shown by B above) the Tri-bar is to be bent back and fixed into the reveal.

Reconnect of Internal Walls with Solid External Walls

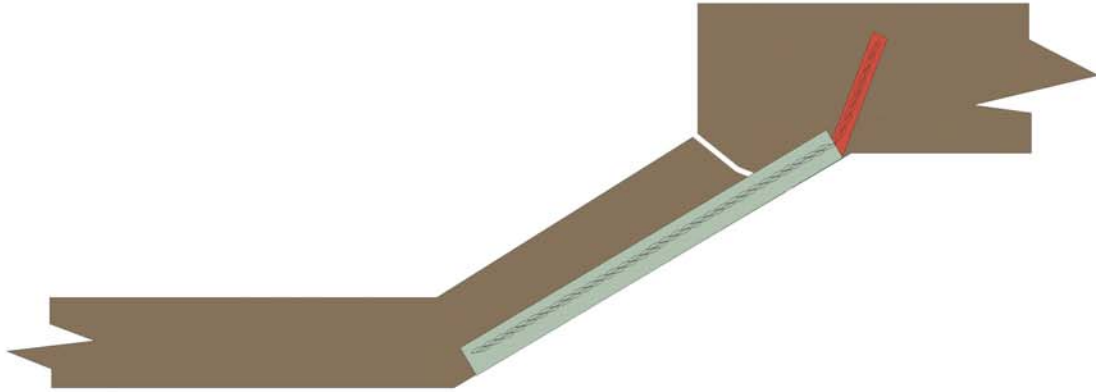


- (1) Cut out slots into horizontal mortar joints to specified depth and at required vertical spacings, continue slots into corner.
- (2) Blow out slots and thoroughly flush with water.
- (3) Where slots meet an internal corner, drill 10 mm hole into the adjoining wall as shown.
- (4) Blow out hole to remove dust debris.
- (5) Cut Tri-bar to required length and bend the end to suit hole and slot
- (6) With the aid of a grout gun insert a 10mm bead of Cemspand cementitious grout into the back of the slot.
- (7) Fill hole with Tri- set resin push Tri-bar rod into the resin and grout until a good coverage is achieved.
- (8) Insert a final 10mm bead of Cemspand cementitious grout over the exposed rod and iron into slot using a finger trowel.
- (8) When Cemspand has set replaster joints.

Installation Notes: Unless specified otherwise the following criteria are to be used.

- a) The depth of slot to be 25 to 35mm (not including plaster).
- b) Normal vertical spacing of internal crack stitching is 450mm and Tri-bars to extend 500mm beyond any cranks in the internal wall

Bay Window Repair, Crack Confined to Junction

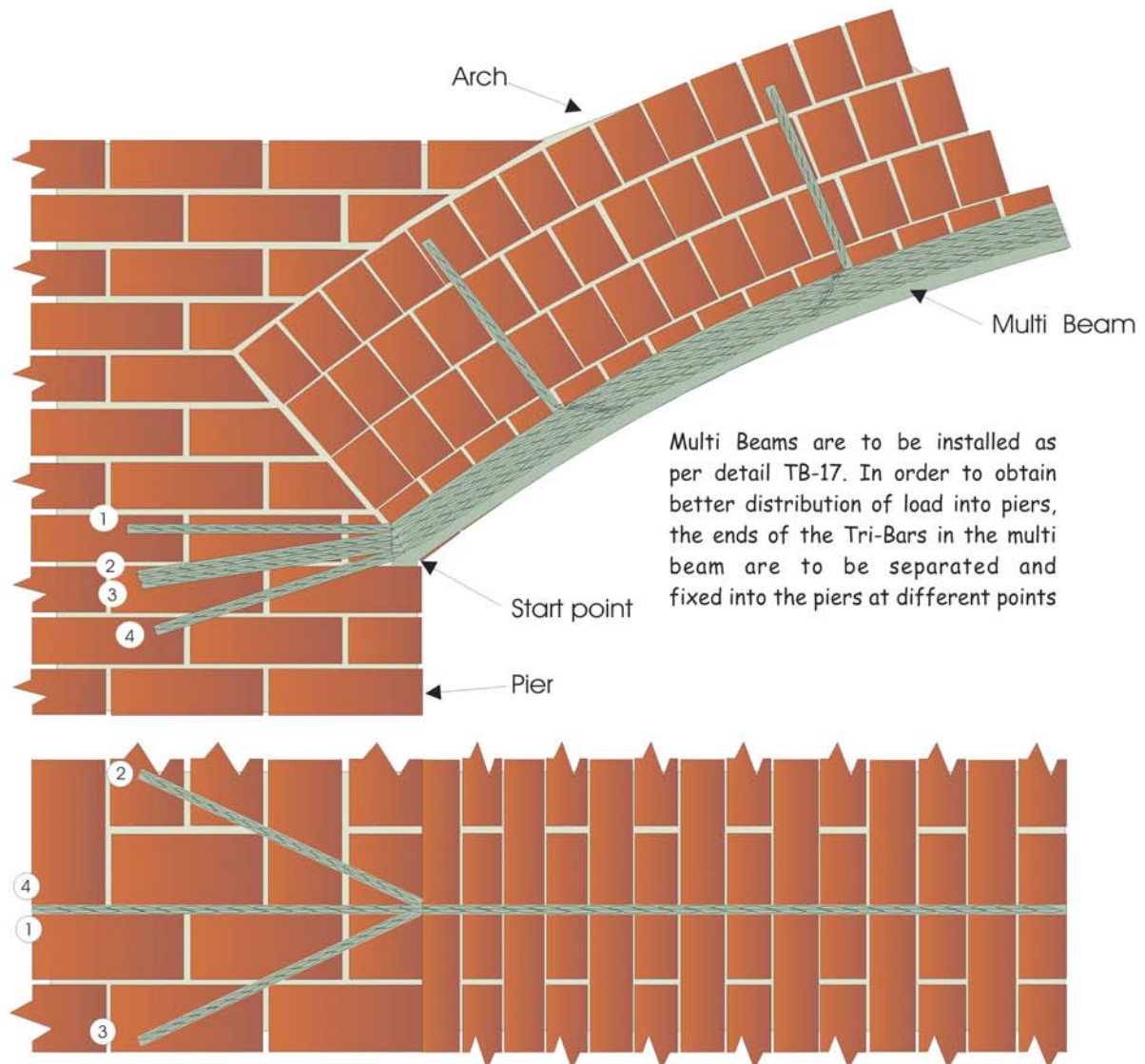


- (1) Cut out horizontal slots to specified depth and at required vertical spacings, continue slots into bay junction.
- (2) Blow out slots and thoroughly flush with water.
- (3) Where slots meet an internal corner, drill 10 mm hole into the adjoining wall as shown.
- (4) Blow out hole to remove dust debris.
- (5) Cut Tri-bar to required length and bend the end to suit hole and slot.
- (6) With the aid of a grout gun insert a 10mm bead of Cemspand cementitious grout into the back of the slot.
- (7) Fill hole with Tri- set resin push Tri-bar rod into the resin and grout until a good coverage is achieved.
- (8) Insert a final 10mm bead of Cemspand cementitious grout over the exposed rod and iron into slot using a finger trowel.
- (8) When Cemspand has set replaster joints.

Installation Notes: Unless specified otherwise the following criteria are to be used.

- a) The depth of slot to be 25 to 35mm (not including plaster).
- b) Normal vertical spacing of crack stitching is 450mm and Tri-bars to extend 500mm beyond any cranks in the Bay.

Repairing Brick Arch Structures, Beam End Fixing



(1) Cut out slots for multi Beams down to start point of arch. Drill clearance holes (12mm-16mm diameter depending upon length of tie to be used) to required depth in line with slot for Tri-Bar 1 (Top) and Tri-Bar 4 (bottom). The holes should be angled upwards and downwards from the line of the reinforcing to give an angle of about 30 degrees between them.

(2) Drill clearance holes (12mm-16mm diameter depending upon length of tie to be used) to required depth outwards from the slot for Tri-Bars 2 and 3 (central bars). The holes should be angled left and right to give an angle of about 30 degrees between the line of the hole and the line of the reinforcing to be 60 degrees between holes.

(3) Blow out holes and thoroughly flush with water. With the aid of a grout gun and correct length of nozzle, pump Cemspan cementitious grout until nozzle is full. Insert nozzle to the full depth of drilled hole and pump grout to fill hole. Allow the back pressure to push nozzle out while filling or voids with grout. Bend Tri-Bar to correct shape and insert end of tri-bar into full depth of grout filled hole. Install remainder of Tri-Bar around arch as per detail in TB-17.

Installation Notes: Unless specified otherwise the following criteria are to be used.

a) The depth of holes in pier to be 450mm.

Tri-bar

Repair Strategy's

- TB-01** General Crack Stitching 110mm walls
- TB-01b** General Crack Stitching 220mm walls
- TB-02** Repairing Failed Lintels in Solid Walls
- TB-03** Repairing Failed Lintels in Cavity Walls
- TB-04** Repairing Failed Angle Iron Lintels in Cavity Walls
- TB-05** Reconnecting of Internal Walls to Solid External Walls
- TB-06** Reconnecting of Internal Walls to Cavity External Walls
- TB-07** Repairing Cracks in Corners of Solid Walls
- TB-08** Repairing Cracks in Corners of Cavity Walls
- TB-09** Installing Reinforcement Beams to Cavity Wall Bed Joints
- TB-10** Installing Reinforcement Beams to Solid Wall Bed Joints
- TB-11** Installing Movement Joints in Solid Walls
- TB-12** Installing Movement Joints in Cavity Walls
- TB-13** Repairing Cracks at Junction of Solid and Cavity Walls
- TB-14** Bay Window Repair, Crack Confined to Junction
- TB-15** Bay Window Repair, Cracks in Various Places around Bay
- TB-16** Bay Window Repair, Cracks in Various Places around Bay brickwork in Poor Condition
- TB-17** Repairing Brick Arch Structures, Brick Arch Reinforcement
- TB-18** Repairing Brick Arch Structures, Beam End Fixing
- TB-19** Repairing Brick Arch Structures, Brick Arch Reinforcement
- TB-20** Reconnect internal corners in Solid Walls
- TB-21** Reconnect internal corners in Cavity Walls
- TB-22** Repairing Cracks at Junction of untied Solid Walls

PRODUCT DATA SHEET

Chemical Composition, Mechanical & Design Properties for product profiles used in the manufacture of Tri-bars, Ties and Fixings.

Chemical Composition

Austenitic Steel	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
304.S15	0.06	1.0	2.0	0.045	0.030	17.5-19.0	-	8.0-11.0
316.S31	0.07	1.0	2.0	0.045	0.030	16.5-18.5	2.00-2.50	10.5-13.5

Mechanical Properties

Size Ømm	0.1%PS N/mmsq	0.2%PS N/mmsq	1%PS N/mmsq	2%PS N/mmsq	UTS% N/mmsq	ELONG ON 50mm
4.5	813.1	911.8	1205.0	1276.3	1284.9	5.18
6.0	698.7	803.4	1015.1	1132.1	1155.38	7.37
8.0	707.9	814.0	1065.0	1147.1	1170.6	7.28

Design features

Size Ømm	Cross Section Area mm ²	Pitch of Helix mm	Angle of Helix Degrees	Core Diameter mm	Number of Finns Units	Length of Finns mm	Radius of Finn end mm
4.5	5.250	10	25	1.5	3	1.5	0.35
6.0	10.056	14	25	1.8	3	2.5	0.35
8.0	10.913	16	25	1.95	3	3.0	0.35

Cem-Spand

Cem-spand is a specially formulated High performance injectable cementitious grout for bonding metal to all types of common masonry substrates. Cem-spand has the added benefit of being able to control its properties to suit the required applications when carrying out structural works and repairs. Cem-spand is supplied in a bucket container with a controlled amounts of clean aggregates, liquid milk and additional expanding agent.



Cem-spand with injection gun

Benefits

- / Controlled expansion.
- / Controlled compression strength.
- / Thixotropic grout
- / Rapidly cures and develops high compressive strength.
- / Clean, safe and easy to use.



Testing Compression strength



Monitoring expansion

Cemspan Cementitious Grout

Compression strength with different amounts of expanding agents per 5 Kgs

	Day 1	Days 7	Days 28
Standard			
3 GMS of Expanding Agent			
Compression strength	9.9 N/mm ²	44.0 N/mm ²	52.0 N/mm ²
Expansion	1%	1%	1%
Cube Size	100mm	100mm	100mm
Cube mass	1940g	1876g	1899g
Density	1940 kg/m ³	1880 kg/m ³	1900 kg/m ³
Failure Load	99.1 kN	442 kN	522 kN

* Supplied on request

* 12 GMS of Expanding Agent

Compression strength	11.0 N/mm ²	27.5 N/mm ²	30.5 N/mm ²
Expansion	4%	4%	4%
Cube Size	100mm	100mm	100mm
Cube mass	1787g	1775g	1736g
Density	1790 kg/m ³	1780 kg/m ³	1740 kg/m ³
Failure Load	110 kN	274 kN	304 kN

* 25 GMS of Expanding Agent

Compression strength	7.7 N/mm ²	15.0 N/mm ²	18.5 N/mm ²
Expansion	16%	16%	16%
Cube Size	100mm	100mm	100mm
Cube mass	1558g	1580g	1560g
Density	1560 kg/m ³	1580 kg/m ³	1560 kg/m ³
Failure Load	76.7 kN	152 kN	165 kN

* 50 GMS of Expanding Agent

Compression strength	7.2 N/mm ²	12.0 N/mm ²	13.5 N/mm ²
Expansion	20%	20%	20%
Cube Size	100mm	100mm	100mm
Cube mass	1579g	1520g	1580g
Density	1580 kg/m ³	1520 kg/m ³	1580kg/m ³
Failure Load	71.9 kN	119 kN	133 kN

* 100 GMS of Expanding Agent

Compression strength	0.7 N/mm ²	3.7 N/mm ²	4.9 N/mm ²
Expansion	40%	40%	40%
Cube Size	100mm	100mm	100mm
Cube mass	1248g	1258g	1283g
Density	1250 kg/m ³	1260 kg/m ³	1280kg/m ³
Failure Load	7.4 kN	37.0 kN	48.7 kN