

Target Fixings Ltd

Heli Pile

Foundation Systems

INTRODUCTION

The need for a quick and simple lightweight piling system was determined in the early 1990's. It was not until the middle of that decade that this desire, with the help of a "Smart Grant" from the DTI, bore fruit. The result was the "Millennium Product" award winning Heli Pile.

Since the introduction of the Heli Pile at the Civils Exhibition in 1998 it has lead the way in modern mini piling concepts and techniques.

Originally developed as a lightweight piling system for remedial works to housing affected by subsidence, its versatility has allowed the applications to be much wider and more varied than first imagined.

Used in combination with the Bar Flex masonry reinforcement system the Heli Pile can be designed and used as a standard "pile and beam" repair method. The system is very quick and easy to install giving an efficient and cost-effective solution.

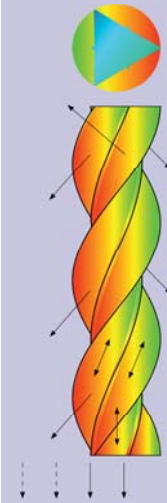
New build applications are not forgotten and as such new foundations may also be cast or bolted on to the previously driven Heli Piles. The lightweight equipment ensures that there is little disruption, even on the wettest or most difficult sites.

Because of its unique design it is very effective in tension. This allows it to be used for retaining wall stabilisation and mobile telephone mast and tower base foundations to name just a few.

A series of Standard Details are available showing the various uses and giving a full method statement. Full specification details can also be supplied.



PERFORMANCE



The Heli Pile is installed using lightweight driving equipment and transmits the induced loads via the wedge-shaped fins at an angle into the surrounding substrate. The shape of the fins compresses the substrate and increases the effective diameter of the pile. The skin friction is greatly enhanced by compression and the mechanical effect of the fins. The end bearing load is greatly enhanced by the 'cone' effect of the compression.

MATERIALS

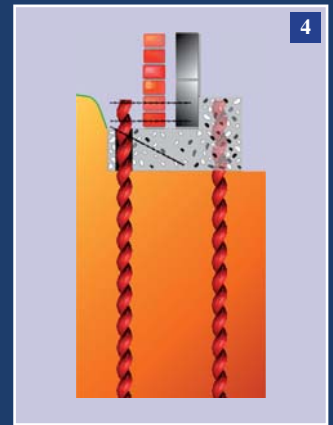
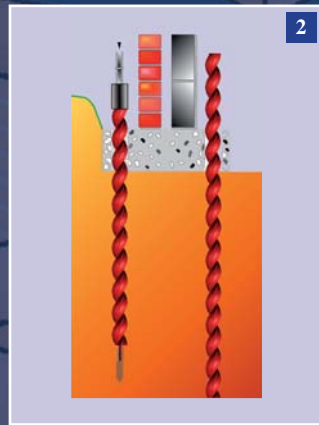
The Heli Pile is now manufactured in-house in two diameters, 60mm and 100mm. Both sizes are die cast from Grade LM25 (Al Si7 Mg) Aluminium Alloy. This alloy finds application in the chemical, marine, construction and many other industries, above all, in road transport vehicles where it is used for wheels, cylinder blocks and other engine and body castings. It is, in practice, the general purpose high strength casting alloy. It is also used in nuclear energy installations and for aircraft parts. It is recyclable and part of its chemical composition includes up to 10% of recycled aluminium. The "green" credentials are clear to see.

SPECIAL FEATURES

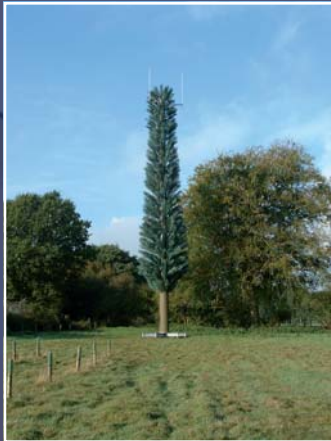
- Millennium Product award winner.
- Quick and cost effective installation.
- Clean alternative to traditional methods.
- Achieves loads of up to 200kN
- Complements the Bar Flex beaming system.
- In-situ on site proof testing.
- Easily installed in poor access areas.
- Reuseable and recycleable.
- Minimal disruption.

INSTALLATION PROCEDURE

1. Inspect & Scan area for services.
2. Mark out positions of Heli Piles avoiding any services.
3. Create a pilot hole using the Heli Spike with a sacrificial Heli Cone.
4. Extract the Heli Spike leaving the pilot hole ready for the Heli Pile.
5. Start Heli Pile in the pilot hole by hand.
6. Secure Drive Head Washer to top of pile and drive the first metre.
7. Remove the Drive Head Washer and attach another section of Heli Pile, replace Drive Head Washer.
8. Continue 7 to required depth.
9. For tensile testing place load spreaders local to the installed Heli Pile.
10. For compression testing attach beam across other installed Heli Piles.
11. Attach Heli Pile Load Test Unit and load test Heli Pile. If there is a shortfall in the loading repeat 7 above or allow a period of time for strength gain.
12. After testing drive Heli Pile to final position.
13. For remedial work, as shown below, ensure masonry is clean and install Bar Flex as per the project specific Standard Detail.
14. Shutter local area to Heli Pile and pour concrete to size and strength detailed on the project specific Standard Detail.



SITE TESTING



Site testing is achieved by means of a small hydraulic testing kit and, to suit all site conditions, it may be performed either in tension, for soil stabilisation, or compression where it is utilised as a pile. Because of the ease of testing, it is also possible to use a correlation between a tensile test and a compressive load.

Instead of working to “characteristic” loadings which have been attained in laboratory conditions the capability of simple in situ testing allows the Heli Pile to be tested in the actual site conditions in which it is installed. Proof testing gives the specifier confidence in the Heli Pile to cope with the imposed loads and permits

a much lower factor of safety to be utilised. Heli Pile mast bases for the telecommunications industry have become widely accepted by the major networks. The in situ proof testing of the Heli Pile and Insurance Backed Guarantee have been a major influence on this market. The fact that the Heli Pile can be uprated or even extracted at a later date is also seen as a major green credential.

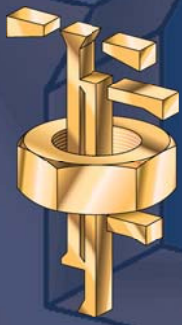
RESEARCH & DEVELOPMENT

In addition to the data recorded from sites around the World additional independent testing of the tensile, compressive and ductile strength, cyclic loading, pile cap design and general performance of the Heli Pile has been carried out by the Universities of Bath and Plymouth in the UK as well as the CEBTP in France.

Further technical information, including the above reports, is available on request.



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Dri Flex

Remedial Wall Tie

INTRODUCTION

During the 1970's research was conducted into the need for replacement wall ties. The actual durability of the protective zinc or galvanised coatings of the original built in wall ties was studied and this now affects the design and use of wall ties for both new build and replacement. The results of the research was found to be quite beyond any previous expectations:

1. Vertical twist ties ("fish tails") were found to have a life expectancy of only 30 years - half of that originally intended.
2. Wire ties ("butterflies") were found to have a service life of only 15 years.
3. Mortar is alkaline which actually protects and enhances the working life of wall ties.
4. A reaction between mortar and the air causes a process called carbonation which turns the mortar acidic which then attacks the wall ties.

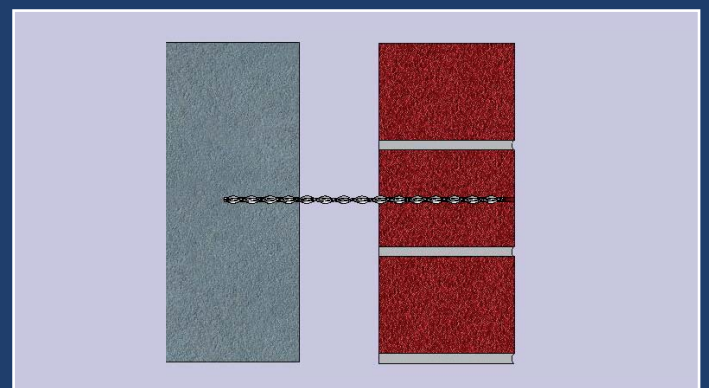
Early attempts at producing a method for replacing existing wall ties highlighted many of the pitfalls that were to be encountered. The expansion type of tie has been found to induce additional stresses into the masonry - similar to the expansion caused by the existing, rusting wall ties - and were costly to make and fit. The use of heavy section re-bars was soon outlawed because of the need for flexibility to allow the necessary differential horizontal and vertical movement between the two leaves of the wall. Generally a connection between each leaf using a bar of 8mm diameter or above was found to act like mini crowbars and would eventually work themselves loose. The introduction of BSI DD140, BRE Digest 329 and the more recent BRE Digest 401 at last gave guidance for manufacturers and specifiers of remedial wall ties.

THE SYSTEM

Dri Flex ties were developed as a result of the identified need to drill smaller holes in masonry to control the amount of spalling caused when drilling the near leaf. A large hole drilled through a brick using a SDS hammer

drill can result in up to half of it spalling away. This material can cause bridging of the cavity and moisture transfer, and leaves a much reduced fixing thickness for the near leaf connection. Drilling for the Dri Flex tie requires hole sizes reduced to between 5mm and 7mm, which dramatically reduces the spalling of the brick. Dri Flex offers the advantage of a non-expanding mechanical fixing to both the far and near leaf. Pre-installation testing should be performed to the requirements of local standards and technical help and advice is available. Because the fixing method employed does not induce additional stresses into the substrate Dri Flex can be used in many and varied materials, from poured concrete columns to aircrete blocks, with satisfactory results. Edge distance spacings, so critical with any expansion-type fixing, are not a requirement with Dri Flex.

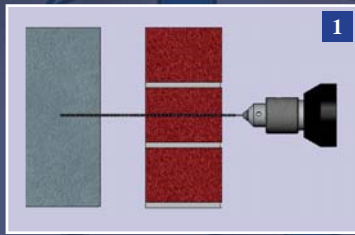
The design of the Dri Flex remedial tie ensures that any potential for installer error can be minimised. The multiple drip design of each fin allows the Dri Flex to be installed at an angle of up to 25° towards the inner leaf without the possibility of any water transfer across the cavity. It is recommended that each Dri Flex is installed horizontally. The full installation process is described overleaf.



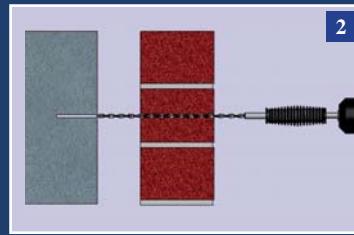
SPECIAL FEATURES

- One piece design - no moving parts to lose
- Multiple drip points to deter water transfer
- Flexible design allows natural building movement
- Fixes through insulation material.
- Minimal disfiguration to structures
- Strong yet flexible connection
- Lightweight installation equipment
- Corrosion resistant materials

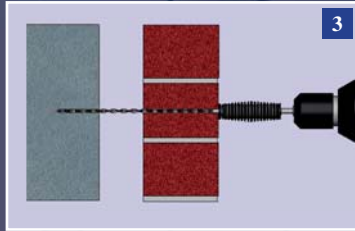
INSTALLATION PROCEDURE



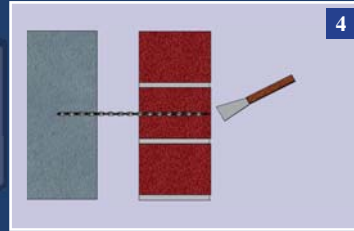
1 Drill a 5mm to 7mm pilot hole through the near leaf and into the far leaf 15mm deeper than the length of Dri Flex tie being installed, using a rotary percussion drill. The hole should be 25mm from the end of any brick and on its horizontal centre line.



2 Insert the Dri Flex tie into the Power Support Tool, offer the free end of the tie up to the hole in the near leaf and, using a SDS hammer drill, drive the Dri Flex tie into the pilot hole.



3 Once the Dri Flex tie is installed into the near leaf pilot hole it will proceed across any cavity and into the far leaf. The Dri Flex Power Support Tool is designed so that the end of the Dri Flex Tie is set below the surface of the near leaf.



4 The near leaf pilot hole may then be filled with a mastic material and/or colour matched for an excellent finish.

THE MATERIALS

Dri Flex ties are manufactured from Grade 304 austenitic stainless steel. The 8mm diameter Dri Flex has a tensile strength in excess of 10kN. The manufacturing process produces very hard fins that are able to cut a thread into the hardest concrete, but maintains a very soft and flexible core. Dri Flex Ties may also be used where there is a need for a fire resistance in excess of 30 minutes.

FIXING DENSITIES

In general terms the fixing densities for Dri Flex remedial wall ties would be the same as new build - 2.5 per m² or 450mm vertically and 900mm horizontally in a domino five pattern. This density would, however, be subject to on site testing to ensure that the required tensile loadings are being achieved. It should also be borne in mind that around all openings - doors and windows - ties should be installed at no more than 300mm vertical centre and no more than 225mm from the edge of the opening. BRE Digest 401 gives more information on the proof test load requirements.

If the masonry is so weak or friable that the required proof test load for standard density fixings cannot be achieved, it is quite acceptable to increase the density of Dri Flex ties to ensure that the overall loading per m² is achieved.

Lowering the installation density below the standard is not recommended.

The compact and balanced Dri Flex support tool.



TESTING

Because Dri Flex ties cannot be randomly tested on site it is necessary to perform comprehensive pre-installation tests.

There are several different methods of performing tests, but the most straightforward way is to drill into both leaves as described in Installation Procedures - 1 above. The near leaf hole may then be over-drilled to 12mm. The Dri Flex Tie should then be installed into the far leaf and a test performed using the Target Load Test Unit. The fixing capability into the near leaf material may be ascertained by drilling into the near leaf as in Installation Procedures - 1 above and inserting the Tie to a maximum depth of 80mm and then test using a Target Load Test Unit. It is recommended that testing is performed in accordance with the requirements of BRE Digest 401. Only in exceptional circumstances does the proof test load requirement exceed 1kN.



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Target Fixings Ltd

Turbo Flex

Thin Joint Wall Tie

INTRODUCTION

With a number of the autoclaved aerated concrete (aac) manufacturers now heavily promoting the new 'thin joint system' into the UK, traditional wall ties are becoming obsolete. With joints 'squeezed' to 3mm it is no longer possible to insert even standard 'butterfly' wire wall ties in the conventional manner.

Installation of ties into the joints becomes impossible when using 'Jumbo Units', 450mm aac blocks, simply because of the lack of joints. The Turbo Flex drive in wall tie easily overcomes these problems by being driven directly into the aac block, in the required location, as the outer masonry proceeds, to achieve the required fixing density.

The increased speed of construction using the thin joint system is complemented by using the Turbo Flex tie. During the construction of the outer leaf the Turbo Flex tie is laid over the top of the masonry and hammer-driven into the aac blocks. Where insulation panels are to be included within the wall cavity an insulation retaining clip is easily attached to the Turbo Flex and 'wound' along the tie to hold the insulation panels securely in position.

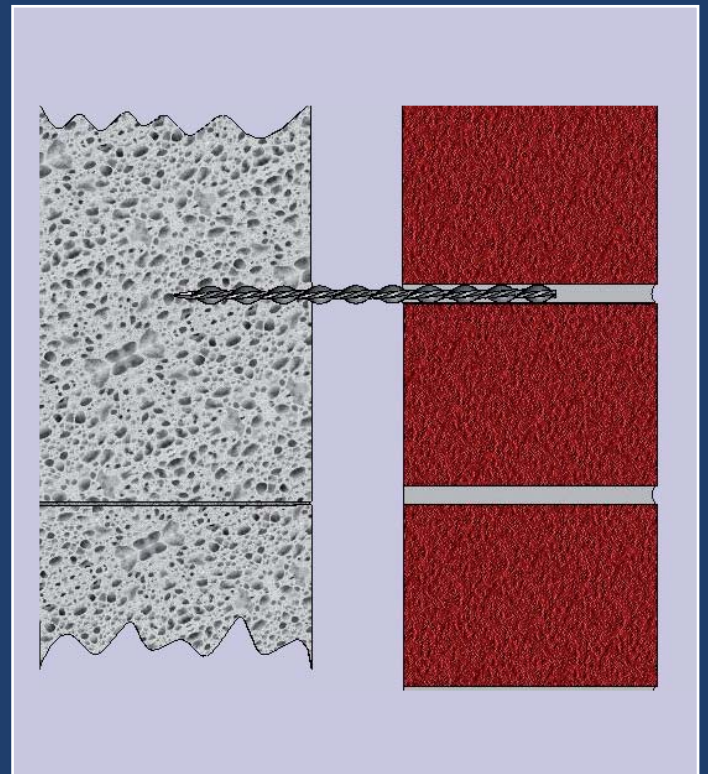
Both the design and manufacturing process of the Turbo Flex ensures that flexibility of the tie is maintained to accommodate all normal building movements yet is capable of transferring imposed loads in both tension and compression in cavity widths of up to 140mm at normal densities. For information regarding use of the Turbo Flex ties in cavities over 140mm please contact our Technical Department.

THE SYSTEM

The Turbo Flex system of thin joint wall tie installation offers the advantages of a non-expanding mechanical fixing on the far leaf and a mortar fixing on the near leaf. Proof testing of the far leaf using a Target Load Test Unit can be performed randomly as installation proceeds. Because the fixing method employed does

not induce additional stresses into the substrate Turbo Flex can be used in many and varied materials, from poured concrete columns to aircrete blocks, with satisfactory results and, because they are stress free the edge distance spacings are negated.

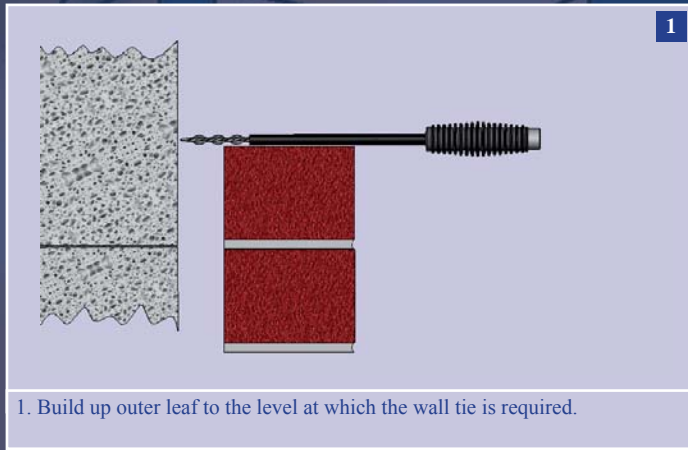
The design of the Turbo Flex remedial tie ensures that any potential for installer error can be minimised. The multiple drip design of each fin allows the Turbo Flex to be installed at an angle of up to 25° towards the inner leaf without the possibility of any water transfer across the cavity. It is recommended that each Turbo Flex is installed horizontally.



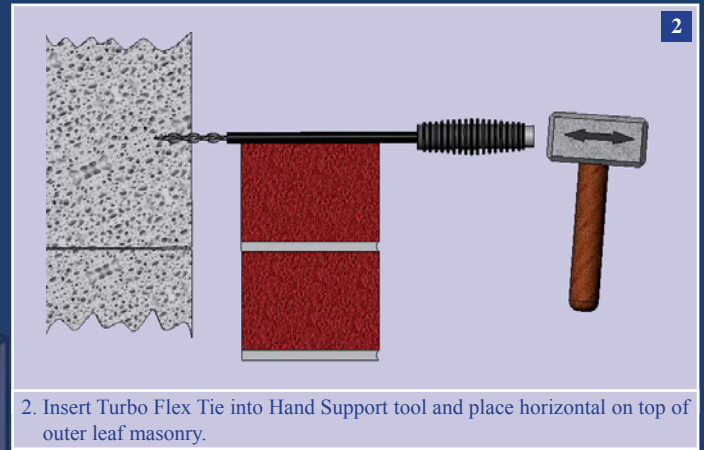
SPECIAL FEATURES

- One piece design - no moving parts to lose.
- Immediate proof testing of connection.
- Multiple drip points to deter water transfer.
- Flexible design allows natural building movement.
- Fixes through insulation material.
- Fixes into all commonly found building materials.
- Quick and easy installation.

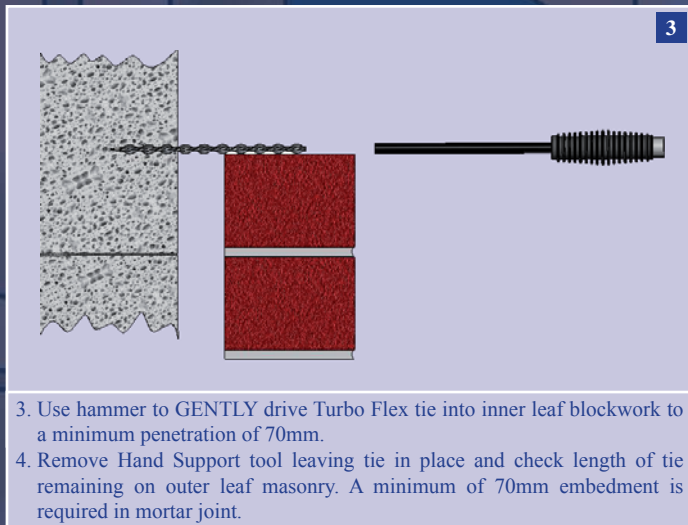
INSTALLATION PROCEDURE



1. Build up outer leaf to the level at which the wall tie is required.

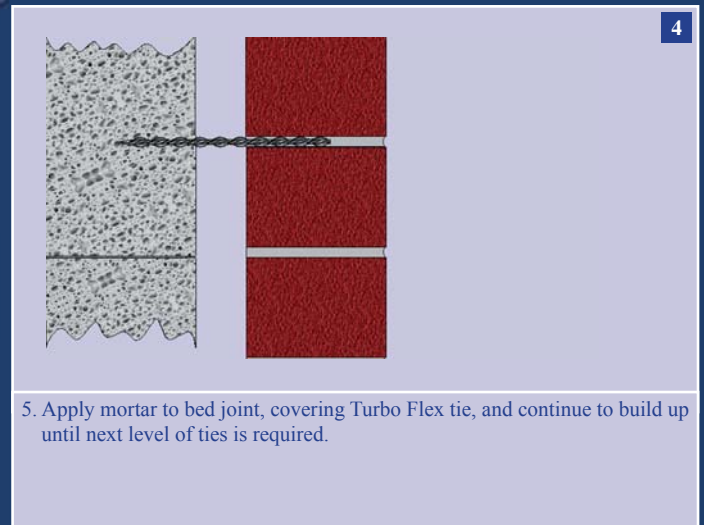


2. Insert Turbo Flex Tie into Hand Support tool and place horizontal on top of outer leaf masonry.



3. Use hammer to GENTLY drive Turbo Flex tie into inner leaf blockwork to a minimum penetration of 70mm.

4. Remove Hand Support tool leaving tie in place and check length of tie remaining on outer leaf masonry. A minimum of 70mm embedment is required in mortar joint.



5. Apply mortar to bed joint, covering Turbo Flex tie, and continue to build up until next level of ties is required.

THE MATERIALS

Turbo Flex ties are manufacture from Grade 304 austenitic stainless steel. The 8mm diameter Turbo Flex tie has a tensile strength in excess of 10kN. The manufacturing process produces very hard fins that are able to cut a thread into the hardest concrete, and a very soft and flexible core.

FIXING DENSITIES

In general terms the fixing densities for Turbo Flex wall ties would be the same as any new build - 2.5 per m² or 450mm vertically and 900mm horizontally in a domino five pattern. This density would, however, be subject to on site testing to ensure that the required tensile loadings are being achieved. It should also be borne in mind that around all the openings – doors and windows - ties should be

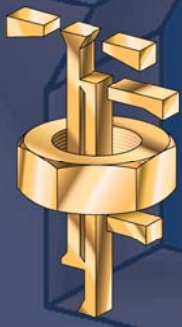
installed at no more than 300mm vertical centre and no more than 225mm from the edge of the opening. BRE Digest 401 gives more information on the proof test load requirements.

TESTING

It is recommended that testing is performed in accordance with the requirements of BRE Digest 401. This publication gives a wind zone chart and the various proof test requirements for different parts of the country in differing situations. Most of the information is in table form which negates the need for complicated calculations. It must be understood that wall ties are designed as load sharing devices and as such there is no necessity to have a high point loading on any individual tie. Only in exceptional circumstances does the proof test load requirement exceed 1kN.



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Target Fixings Ltd

Cem Flex

Solid Masonry Connector

INTRODUCTION

Originally developed in conjunction with British Rail, the Cem Flex method of pinning delaminated rings in masonry arches has now become widely accepted as a simple and economic solution.

Cem Flex ties are also used in standard construction repair techniques for bonding across cracks in masonry and as a restraint for bowing solid walls.

The 8mm diameter austenitic Grade 304 stainless steel helical reinforcing rod is combined with Bond Flex XL, a unique formula of pumpable, but thixotropic, non-shrink cementitious grout.

As the installation of Cem Flex is via a 12 to 16mm diameter drilled hole, the potential disfiguration to the structure can be minimised, and the installation time is greatly reduced - this is especially important where access and working times are restricted.

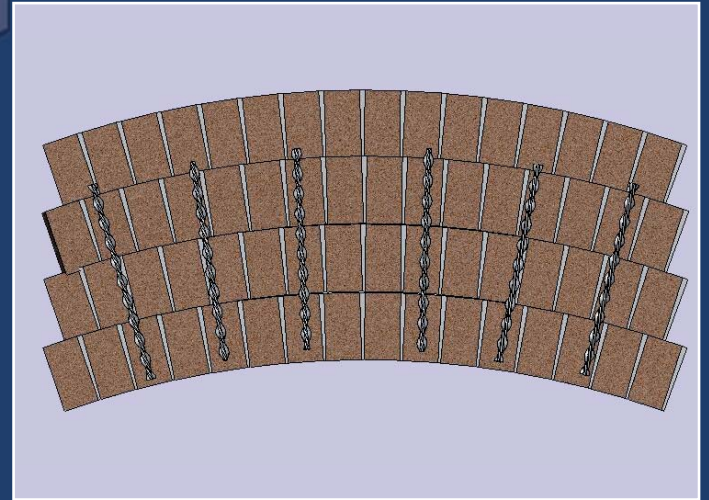


PERFORMANCE REQUIREMENTS

Because of the method of installation it is not possible to perform random, non-destructive site testing. Bond strengths can, however, be checked prior to the full installation programme. An overlong Cem Flex can be installed as normal leaving a short length (50-75mm) proud of the surface.

A Target Load Test unit can then be used to determine the tensile loading. The full cure time for the Bond Flex XL grout is 28 days, but limited testing can generally be performed after 24 to 48 hours. To check the flow of Bond Flex XL grout into any voids

requires destructive testing methods and is normally only performed in critical situations.



FIXING DETAILS

The only restriction on the length of Cem Flex that may be fixed is the length of hole that can be drilled. In general terms this is restricted to 1.5m. The insertion hole is varied from 12 to 16mm diameter and is usually formed with a SDS hammer drill.

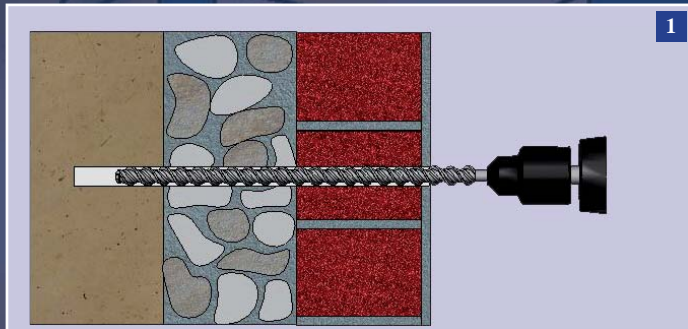
To ensure a good bond strength between the Bond Flex XL cementitious grout and the substrate it is necessary to thoroughly wet the drilled hole before the installation of the tie.

Installation of the tie is performed very simply by the use of a hand-held grout injection gun kit. The Bond Flex XL grout is installed under hand pressure and flows readily under light pressure to fill any voids in the masonry structure. Full installation details are given overleaf.

SPECIAL FEATURES

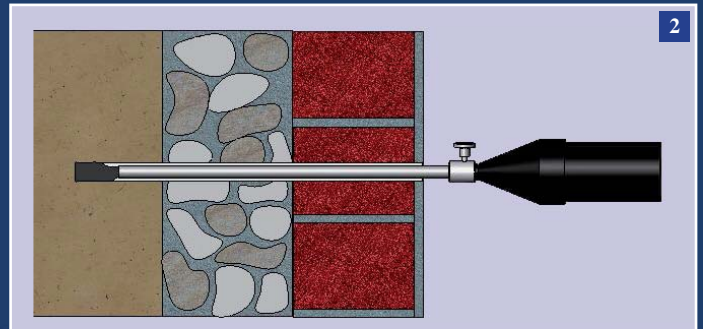
- Quick and easy to install.
- Cementitious grout fills any voids.
- Minimal disfiguration to structures.
- Strong yet flexible connection.
- Lightweight installation equipment.
- Corrosion-resistant materials.

INSTALLATION PROCEDURE



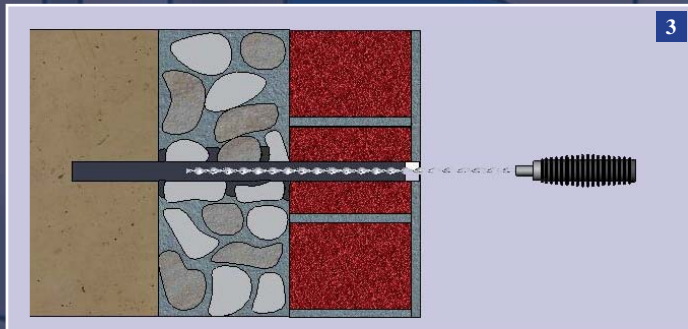
1

1. Drill a 12 to 16mm diameter hole to the required depth.
2. Blow out any debris.
3. Thoroughly wet the hole.



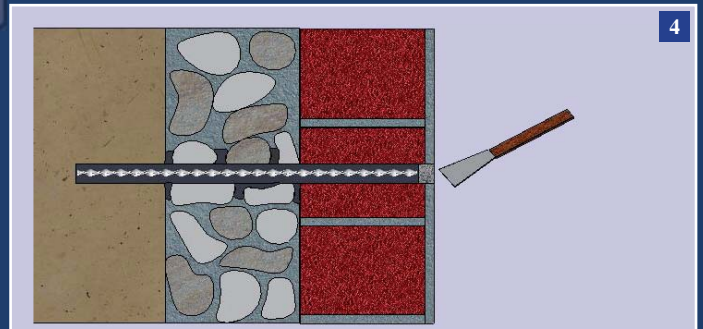
2

4. Insert the grout gun nozzle to the bottom of the drilled hole and pressure inject the Bond Flex



3

5. Using the Cem Flex Insertion tool, push the Cem Flex tie into the grout-filled hole.



4

6. Remove any excess Bond Flex cementitious grout and finish the hole in the desired manner.

THE MATERIALS

The compatibility of the Bond Flex XL and the 8mm Cem Flex have been assessed and approved to work together. Whilst the Bond Flex XL cementitious grout is a very high strength material - $\approx 40 \text{ N/mm}^2$ - by incorporating the flexible and elastic Cem Flex the treated structure is permitted a degree of movement. Experience has shown that allowing continual but controlled movement in a structure is very beneficial to its long term life. A heavy duty anchor that attempts to stop movement altogether has been shown to store up potential problems, and may even end in a sudden and catastrophic failure.

Bond Flex XL cementitious grout is formulated to produce a thixotropic material that flows readily under pressure - allowing rapid void filling in deep holes - but will not drip if used overhead.

The initial cure time is very rapid and a non-shrink agent ensures that a good even bond is achieved. It is supplied as a complete material in either 3 or 6 litre packs offering a consistent mixture time after time.

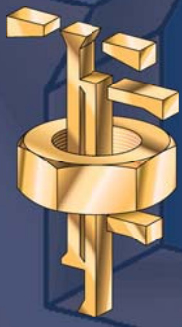
The contractor does not need to add any extra material and has a clean mixing bucket for each mix. The working life of the material can be extended by re-agitation and will be in excess of 30 minutes.



Cem Flex is a Grade 304 austenitic stainless steel material with a very pronounced profile to ensure a good bond with the Bond Flex XL cementitious grout. Being stainless steel the issue of 'coverage' requirements does not arise.



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Retro Flex

Remedial Wall Tie

INTRODUCTION

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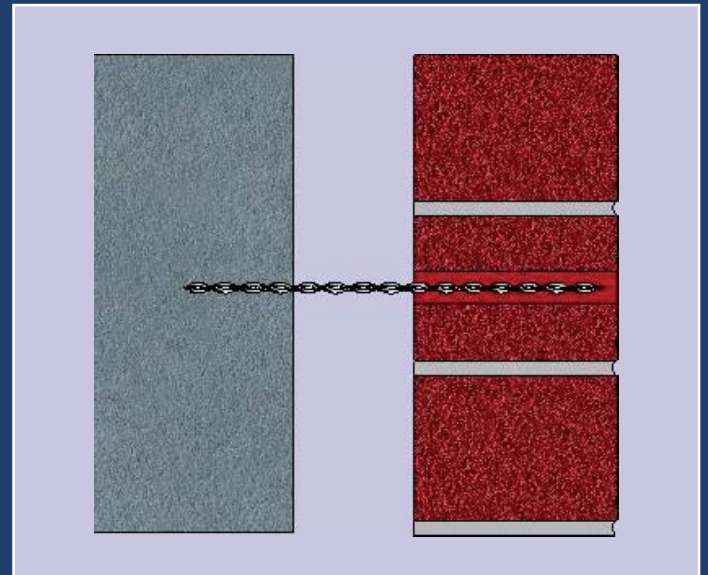
THE SYSTEM

The Retro Flex system of wall tie replacement is available in three different diameters of 6mm, 8mm & 10mm. It offers the advantages of a non-expanding mechanical fixing on the far leaf and a polyester resin

or cementitious grout fixing on the near leaf.

Proof testing of the far leaf using a Target Load Test Unit can be performed randomly as installation proceeds. Because the fixing method employed does not induce additional stresses into the substrate Retro Flex can be used in many and varied materials, from poured concrete columns to aircrete blocks, with satisfactory results and there is no concern to achieve the vital edge distance spacings necessary with any expansion fixing. The design of the Retro Flex remedial tie ensures that any potential for installer error can be minimised. The multiple drip design of each fin allows the Retro Flex to be installed at an angle of up to 25° towards the inner leaf without the possibility of any water transfer across the cavity. It is recommended that each Retro Flex is installed horizontally.

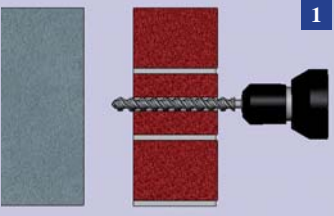
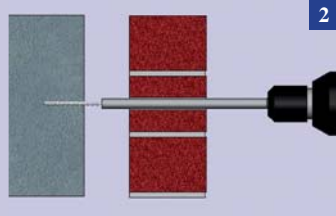
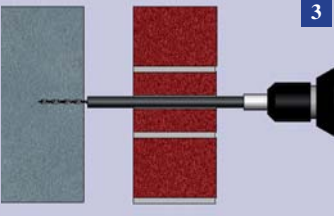
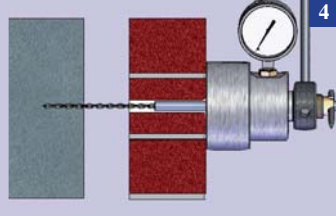
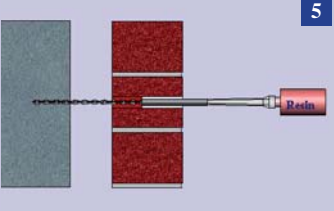
The full installation process is described overleaf.



SPECIAL FEATURES

- One piece design - no moving parts to lose.
- Immediate proof testing of connection.
- Multiple drip points to deter water transfer.
- Flexible design allows natural building movement.
- Fixes through insulation material.
- Minimal disfiguration to buildings.
- Fixes into all commonly found building materials.
- Quick and easy installation.
- Three different diameters for all applications.

INSTALLATION PROCEDURE

	1 Drill a 10 mm or 12 mm hole through the near leaf using a SDS hammer drill. The hole should be 25 mm from the end of any brick and on its horizontal centre line.		2 Push the Pilot Drill and Drill Extension through the previously drilled hole and drill a pilot hole into the far leaf. Note: If the far leaf is a soft material this procedure may be omitted.
	3 Insert the Retro Flex tie into the Power Support tool, insert the combination through the hole in the near leaf and, using a SDS hammer drill, drive the Retro Flex tie into the pilot hole in the far leaf.		4 Once the Retro Flex tie is installed into the far leaf pilot hole the holding capability can be checked using a Target Load Test Unit. As a general rule about 1kN loading in tension is an adequate bond.
	5 After an acceptable proof test is performed the near leaf connection is made using Target Polyester Resin or Bond Flex XL Cementitious Grout. The drilled hole may then be colour matched for an excellent finish.		

THE MATERIALS

Retro Flex ties are manufactured from Grade 304 austenitic stainless steel. The 6mm diameter Retro Flex has a tensile strength in excess of 9.7kN. The manufacturing process produces very hard fins that are able to cut a thread into the hardest concrete, and a very soft and flexible core.

The near leaf fixing can be achieved by the use of Target Polyester Resin material or Bond Flex Cementitious Grout. Bulk mix epoxy resins are not recommended for normal installation as it has been noted that many of these resins are not reliable due to their accurate mixing requirements.

Where there is a need for a fire resistance in excess of 30 minutes only Bond Flex cementitious grout should be used.

FIXING DENSITIES

In general terms the fixing densities for Retro Flex remedial wall ties would be the same as new build - 2.5 per m² or 450mm vertically and 900mm horizontally in a domino five pattern. This density would, however, be subject to on site testing to ensure that the required tensile loadings are being achieved. It should also be

borne in mind that around all openings - doors and windows - ties should be installed at no more than 300mm vertical centres and no more than 225mm from the edge of the opening. BRE Digest 401 gives more information.

If the masonry is so weak or friable that the required proof test load for standard density fixings cannot be achieved, it is quite acceptable to increase the density of fixings to ensure that the overall loading per m² is achieved. Lowering the density below the standard is not recommended.

TESTING

It is recommended that testing is performed in accordance with the requirements of BRE Digest 401. This publication gives a wind zone chart and the various proof test requirements for different parts of the country in differing situations. Most of the information is in table form which negates the need for complicated calculations. It must be understood that wall ties are designed as load sharing devices and as such there is no necessity to have a high point loading on any individual tie. Only in exceptional circumstances does the proof test load requirement exceed 1kN.



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Target Fixings Ltd

Bow Flex

Lateral Restraint Tie

INTRODUCTION

The cause of bowing walls in many old buildings may well be due to the fact that there was no mechanical connection between the floor and ceiling joists and the masonry. The traditional method of connection has been to rely on friction due to gravity. When this frictional resistance is released, due to movement over the years within the timbers or masonry, it can leave a freestanding wall of considerable height that is very susceptible to bowing.

The problem of bowing walls has been addressed in the past by the use of S or X ties bonded right through the building with bars to connect the front and rear walls or the two side walls together.

The Bow Flex tie uses the same principles as this proven, but unsightly, method of restraint for bowing walls. The advantage of the Bow Flex is that it can be installed invisibly and externally and uses the existing structural members to provide the necessary stability.

The current method of standard repair is to introduce a galvanised strap tying the floor to the wall. Although the product is very cheap the disruption involved during the installation - removing furniture, carpets, skirting and floorboards, the chasing out of plaster, the fixing with plugs and screws or nails and the subsequent making good - make this a very expensive in-place option which relies on the holding capacity of one plastic plug and a screw.

THE SYSTEM

The Bow Flex system of wall restraint is available in 8mm material. Installation is performed from outside the building through a 12mm hole in the building fabric. It must be emphasised that a check must be made for any services that may run through the floor/ceiling cavity. It is quite common for wiring to be present and is certainly not unknown to have water pipes for the heating system or even a mains water pipe in this location. It is recommended that checks are made in this area with the use of a boroscope.

The connection to the wall is either made into the second floor joist, if they run parallel with the wall,

or into the ends of the floor joists if they run into the wall. A proof test of the connection into the timber can be made immediately after installation using a Target Load Test Unit.

UTILISING STRUCTURAL ELEMENTS

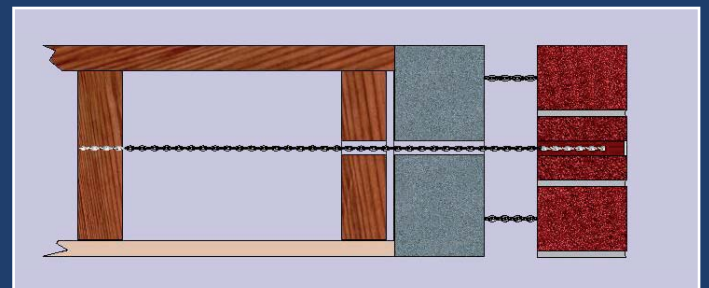
By utilising the existing structural elements of the building the solution is simple, cost-effective, less disruptive and much quicker to install.

If the Bow Flex tie is fitted into the side of the second floor joist the strength and load sharing is achieved via the floor boards on top of the joists and the ceiling boards below the joists crossing from one joist to the next. The old X or S connecting bar is effectively replaced by the floor and ceiling boards already in place.

When the joists run into the wall and sit in pockets within the masonry the fixing is achieved with a short Bow Flex tie being fixed into the end grain of each joist. If the joist is continuous through the property a fixing at each end should produce the required effect. Care must be taken to ensure that any unconnected overlaps, perhaps on a central load bearing wall, are structurally jointed to allow continuity through the full joists.

A series of Standard Details are available.

The full installation process is described overleaf.

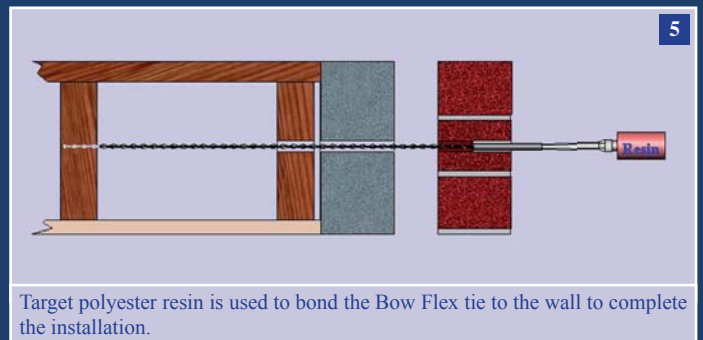
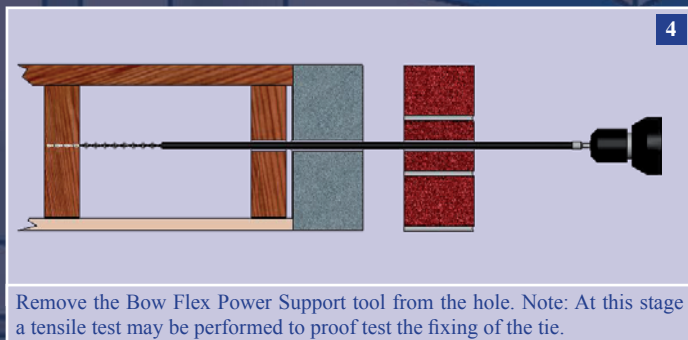
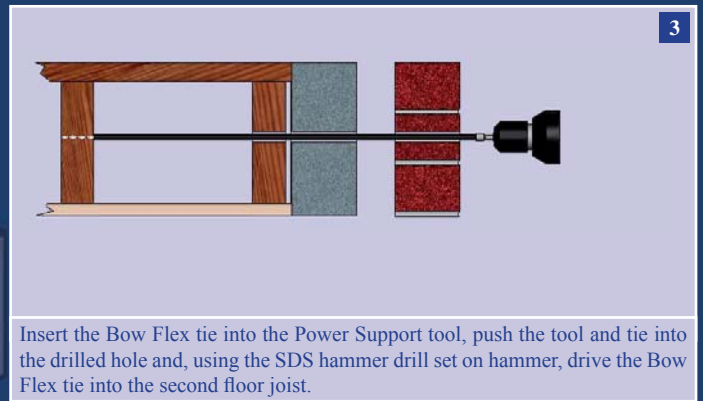
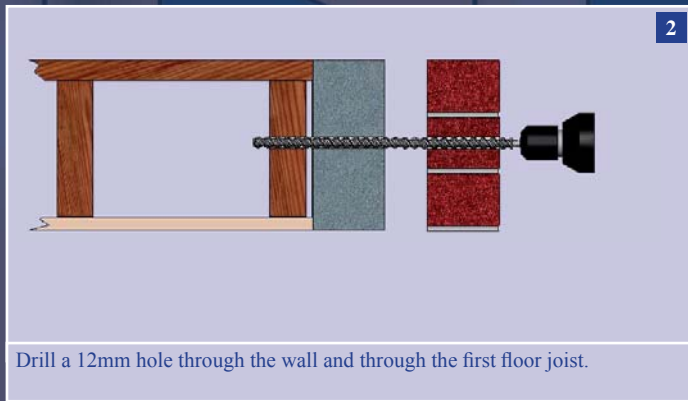


SPECIAL FEATURES

- One piece design - no moving parts to lose.
- Easily tested after installation.
- Quick and easy installation.
- Minimal disruption to building occupants.
- Fixes into end grain and side grain.
- Virtually invisible and unobtrusive.

INSTALLATION PROCEDURE

1 Before carrying out any works check in the floor and wall cavities for any services.



THE MATERIALS

Bow Flex ties are manufactured from Grade 304 austenitic stainless steel. The 8mm diameter Bow Flex has a tensile strength in excess of 11kN. The manufacturing process produces very hard fins that are able to cut a thread into the timber and a soft and flexible core. The near leaf fixing is achieved by the use of Target polyester resin.

TESTING

It is recommended that each Bow Flex tie is proof tested using a Target Load Test Unit. The actual tensile loading required for stabilising a bowed wall is surprisingly low.

For example, considering a wall of 5m height and bowing outwards at its mid point by 50mm, it is straightforward to calculate, by using a triangle of forces, that a horizontal load of 1kN is sufficient to withstand a vertical load of 50kN or 5 tonnes! With

Bow Flex ties fixed at 600mm centres a load resistance in excess of 80kN per metre run is easily achieved.

USES

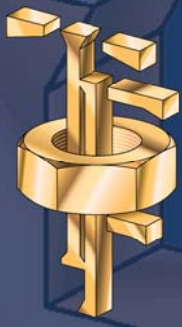
The ability to test after installation makes this a versatile and effective repair method for stabilising bowed walls. It must be borne in mind that Bow Flex will NOT pull a bowed wall back to its original position; it is designed to stabilise walls in their current positions. Bow Flex is recommended for use in bowed walls of two storey properties that have moved no more than 50mm from the perpendicular. More severe conditions can be accommodated but the opinion of the manufacturer or a suitably qualified structural engineer should be sought.

Proof test requirements have been discussed more fully under the “Testing” heading, but a loading of around 1kN should be sufficient for most situations.

It must be understood that this is a PROOF load and not a test to failure. If higher loadings are required this can be achieved by introducing more Bow Flex ties.



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Target Fixings Ltd

Bar Flex

Masonry Repair Material

INTRODUCTION

Bar Flex is a Grade 304 austenitic stainless steel reinforcing material that has many unique properties. Being rolled from a plain round wire the fins are work-hardened to a very high level whilst the core remains relatively soft. The subsequent tensioned, free-twisting process places the hardened fins in tension and the soft core into compression. The tensile strength of the base material is more than doubled during the manufacturing process. The deformation of the fins makes the bonding characteristics of Bar Flex far superior to alternative standard reinforcing materials.

TECHNICAL

The University of Bath School of Architecture and Civil Engineering has performed independent tests on the Bar Flex material to ascertain its tensile and shear loadings. A full report of this testing, including the methods employed, is available on request, but a summary is given in the table below. One of the properties of the Bar Flex material is that it performs in a similar manner to a strong coiled spring when it is stressed within its elastic limit. All of the load calculations for design are based within this elastic limit.

Bar Flex	Tensile kN	Shear kN	Cross-Sectional Area mm ²
6 mm	9.75	8.1	> 8.2
8 mm	11.67	9.2	> 11.2
10 mm	14.51	10.5	> 14.2

SIZES

Bar Flex is available in four different diameters of 4.5mm, 6mm, 8mm and 10mm for use in different applications. Lengths are available up to 10 metres long. The uses for Bar Flex are both wide and varied and it can be utilised in new build and for many specialised refurbishment requirements. In general terms the 6mm Bar Flex is used for the

reinforcing of existing masonry structures. By combining the Bar Flex with Bond Flex XL cementitious grout, beams that can span over openings, as a lintel, or over soft areas of ground when footings have failed, can be installed into existing masonry with very little disturbance. Crack stitching can be achieved by using 1m lengths of Bar Flex.

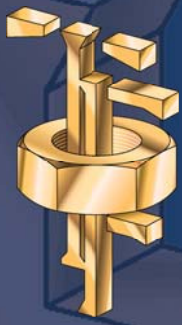
The 8mm Bar Flex is used for new build masonry reinforcing. The larger fin dimensions gives it a far better bond into a standard building mortar than the alternative round section wire. The increase in the tensile strength during the manufacturing process also requires less overall material to be used.

For heavy duty applications the 10mm Bar Flex is in a class of its own. Very strong in tensile and shear, when combined with the bonding capabilities makes this a truly versatile, high strength product.



SPECIAL FEATURES

- Grade 304 austenitic stainless steel.
- Excellent bonding capabilities.
- Coiled spring properties within elastic limit.
- High stress material.
- No sudden or catastrophic failure point.
- Lengths up to 10m - less wastage.
- Less intrusive than standard repairs.



Target Fixings Ltd

Bond Flex

Cementitious Grout

INTRODUCTION

Bond Flex XL cementitious grout is a non-shrink, pumpable, thixotropic, high performance, cement-based grout suitable for injection with a hand applicator.

Supplied in a 16 litre bucket, Bond Flex XL contains the dry powder and liquid component individually packed to make either 3 or 6 litres of injectable grout.

The low liquid to powder ratio ensures a thixotropic grout which develops its compressive strength rapidly. It is designed to fill all the voids into which it is injected and the bond stress is greatly enhanced by its expansive properties.



TECHNICAL

Bond Flex XL is suitable for bonding metal components into most masonry substrates including concrete, brick, stone, blocks and most masonry materials. It is designed for use with the other Target products Bar Flex, Cem Flex, and Retro Flex as a bonding agent. Further details are given in those product brochures.

Bond Flex XL has been found to be an ideal alternative product to polyester resin and is particularly useful when fire risks are an issue - replacement wall ties on high-rise structures is a good example. Being non-flammable and odourless Bond Flex does not have the inherent drawbacks of many resin-based alternatives.

PACKAGING

The packaging of Bond Flex XL ensures that consistent results are obtained with every mix. There is nothing to leave out, and, more importantly, nothing to add. Contractor error has been eliminated.

Although packaged in the same 16 litre bucket for a clean mix every time, for extra convenience Bond Flex XL is available in two different sizes. XL3 contains enough mixture for 3 litres of grout whilst XL6 contains two packs of each XL3 component and hence produces 6 litres of usable grout.

STORAGE

Bond Flex XL buckets may be stacked up to 4 high and should be kept in dry conditions. A temperature range of 5°C to 35°C is ideal and should be maintained.

PERFORMANCE DATA

The typical compressive strength development at 20°C, 100mm cubes cast under restraint and wet cured is given in the table below.

1 Day	3 Days	7 Days	28 Days
20 N/mm ²	25 N/mm ²	30 N/mm ²	40 N/mm ²

SPECIAL FEATURES

- Thixotropic. Will not drip when used overhead.
- Non-shrink property increases bond stress.
- Fully packaged for consistent mixing.
- Easily pumpable over long distances.
- Fills voids when injected.
- Non-flammable material.



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