Wall Ties

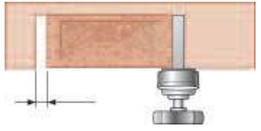
As a guide, when ties are installed at the rate of 2.5/m, a tensile load of 1.15kN per tie is ample to resist the wind loadings applied to any UK building that is up to 10 metres in height and set in an urban environment. BRE Digest 401 details sampling rates for carrying out pre-contract and in-process testing and should be used to determine minimum project specific performance criteria for such tensile proof loads (Table 5).
Each Thor Helical wall tie has a designated pull test adaptor that interlocks with the tie to provide accurate testing facilities, measuring load and deflection.

1. Twist test key on to near end of Thor Helical Tie.
2. Attach tension tester to test key
3. Load test unit to specified value

Masonry reinforcement

The criteria on which the BRE – Thor Helical Beam Table relies is that the horizontal shear strength of the masonry between the reinforced chords is at least 0.07N/mm² (3.1 kN in a half brick skin).
Thor Helical have developed a brick-bond slip gauge designed specifically for testing horizontal shear resistance.

1. Remove perp ends either side of one brick within the proposed web of the beam
2. Insert Thor Helical slip gauge test unit in one perp
3. Expand the load cell until dial reads the required level unless horizontal shear failure occurs beforehand



Earth anchors

Assessment of building load and specification for associated repairs must be determined by a Qualified Structural Engineer

COMPRESSION

1. Place compression test rig onto a line of three equally spaced and level piles.
2. Turn clockwise the knurled flange to the two outer anchor rod assemblies to tightly grip each of the outer piles.
3. Pump lever arm to apply 5kN bedding in load to central pile
4. Attach deflection gauge to underside of the compression tester and locate a clamp to pile head.
5. Apply further steady force up to required load ensuring deflection does not exceed 10mm
6. Hold the required load for 30 minutes (minimum) 24 hours (maximum) ensuring further deflection does not exceed 0.1mm

TENSION

1. Attach test plug rod to head of anchor and thread through eye of hydraulic tension tester ensuring rotation lock is set.
2. Attach deflection gauge to an adjacent static surface
3. Apply 5kN bedding in load and set deflection gauge needle on top of test plug rod
4. Apply further steady force up to required load ensuring deflection does not exceed 10mm
5. Hold the required load for specified duration ensuring further deflection does not exceed 0.1mm

Crack Injection Systems

Resin Repair Systems

Concrete Repair Systems

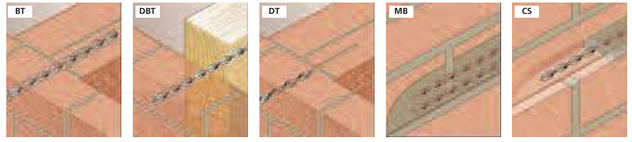
Specialised Plant and Machinery

Project Management

Training Facilities

Engineered Solutions

BRE Design Load Tables



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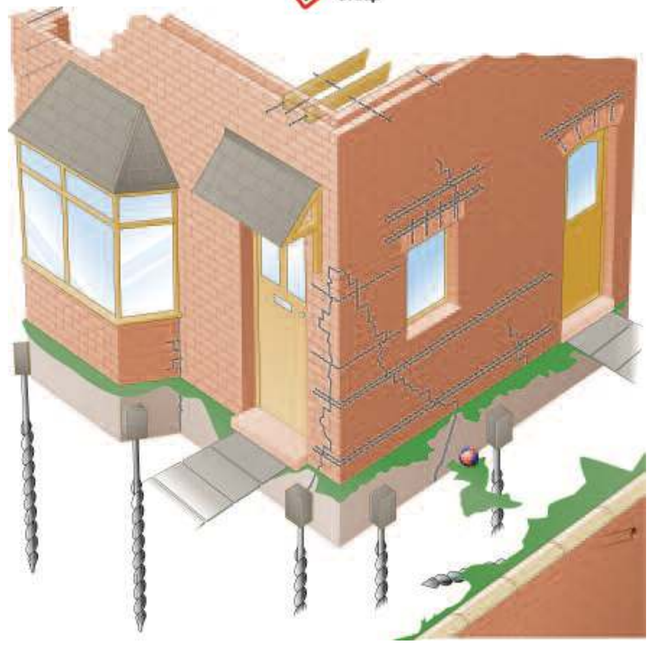
CI/SfB Xt
March 2006

ThorHelical™ Remedial

The Concise Guide to Masonry Repairs

Wykamol Group



2nd Generation

Helical Fixing Technology

Wall tie replacement

Large work hardened fins extend radially from an unhardened core to form a slackly pitched screw-like fixing or reinforcement member. When subjected to a series of axially applied impact blows the faces of angular helical fins react against the host material initiating controlled self-rotation of the fixing as it cuts a helical penetrative path.

The anchorage is achieved when the troughs of the helix interlock with the building material, acting upon the hosts cylindrical shear resistance at the notional circumscribed periphery of the helical fins. The interlocking helical connection exerts no expansive stress and is not dependant on friction or adhesion, providing reliability of connection whereby loads are spread along the full penetrative length of the fixing.

TIES

The 'Decision Tree' in BRE Digest 329 identifies helical Screw Ties, such as the Thor Helical Drive Tie, as being the only fixing type that can be selected for use in any particular situation, irrespective of substrate, compressive strength or requirement for the tie to maintain performance in the event of a fire.

Manufactured with 'precise pitch' technology to tolerance levels that have not previously been achievable. Thor Helical ties form a spiral path in the material into which they are driven, providing an accurate and tightly mating helical interlock. Balanced in profile, stiffness and pitch to optimise ease of driving and improve reliability Thor Helical ties provide a highly engineered, yet simple and user-friendly, alternative to earlier product designs.

DRIVEFIX TIES Ref: DT

Best with consistent quality masonry or AAC remote leaf

1. Drill pilot holes to both leaves using drill size 2–3mm (1/16th) less than tie Ø – Pilot not required in AAC and softwood components.
2. Drill clearance hole to near-side leaf (test ties only)
3. Drive in Thor Helical tie using telescopic SDS support tool & recess below brick face.
4. Apply test procedure at this point

BOND TIES Ref: BT

Best with inconsistent masonry quality or deep embedment

1. Drill clearance holes to both leaves using drill size 3-4mm (1/8th) greater than tie Ø. Clean all dust and debris from hole
2. Apply grout to remote leaf bore hole & insert tie into grouted remote leaf
3. Apply test procedure at this point
4. Grout tie to near-side leaf & make good hole in accordance with specification

NB: For solid walls fully grout bore hole & then insert tie.

DRIVE BOND TIES Ref: DBT

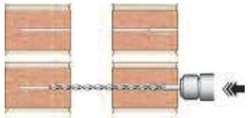
Best with remote leaf harder than near leaf or if timber

1. Drill pilot holes to both leaves using drill size 2-3mm (1/16th) less than tie Ø – Pilot not required in AAC and softwood components.
2. Drill clearance hole to near-side leaf using drill size 3-4mm (1/8th) greater than tie Ø & clean dust from hole.
3. Drive Thor Helical tie into remote leaf pilot hole using appropriate length SDS support tool
4. Apply test procedure at this point
5. Grout tie to near-side leaf & make good hole in accordance with specification

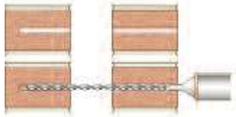
2nd GENERATION PRECISE PITCH TECHNOLOGY

CONVENTIONAL TECHNOLOGY

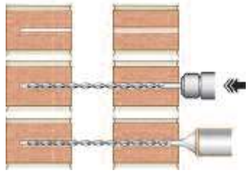
DRIVEFIX TIES Ref: DT



BOND TIES Ref: BT



DRIVE BOND TIES Ref: SG



INDICATIVE CHARACTERISTC PERFORMANCE

Application	Screw Connection (S)						Grout Connection (G)	
Material	AAC		Brick	Concrete	Timber -SC3		Brick	Concrete
Strength	2.8N/mm²	3.5N/mm²	>10N/mm²	>30N/mm²	Side Grain	End Grain	>10N/mm²	>30N/mm²
Penetration Depth	**85mm**	**85mm**	**75mm**	**50mm**	**50mm**	**75mm**	**75mm**	**75mm**
Thor 9mm	1.4kN	1.9kN	2.6kN	2.3kN	2.3kN	2.1kN	2.6kN	2.2kN
Thor 7mm	1.2kN	1.6kN	2.2kN	1.8kN	1.7kN	1.7kN	2.2kN	1.8kN
Thor 5mm	-	-	-	-	1.1kN	-	1.8kN	1.5kN

NOTES

Cavity Wall Tie Spacings – Subject to minimum tensile proof loads being achieved.

1. Masonry wall ties – 900mm x 450mm staggered centres in a domino 5 pattern (2.47ties/m²).
2. Timber frame ties – 600mm x 450mm centres following the line of timber frame (3.7ties/m²)

In both cases, additional ties should be placed at 300mm vertical centres (225mm for blockwork) adjacent to open reveals.

Selection of tie length – To determine the required cavity wall tie length simply add the penetration depths of each leaf to the width of the cavity and round up to the next 25mm increment (e.g. Brick to AAC with a 50mm cavity = 75+85+50=210 – Use 225mm tie).

Masonry reinforcement

The profile of the Thor Helical tie wires maximise bonding characteristics when embedded in grout. The wire/grout composite provides excellent compressive and axial strength along the full length of the helically grouted unit.

When subjected to an axial load, torsion (a rotational tendency) is transmitted to the helical wire via one side of its angular faces. This is resisted by an equal reaction on the opposite face of the helix. This torque enables the helical tie wire to progressively accumulate the load, to accommodate natural building movement and to avoid catastrophic or sudden failure.

REINFORCEMENT Ref: T

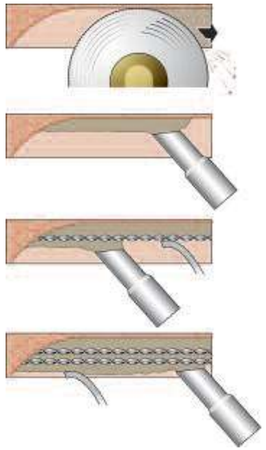
Lengths of helical wire are grouted into raked out slots and used to stitch across cracks in masonry. Combining axial strength with elastic yield, the grouted wires are utilised to distribute the loads along the full length of the reinforced zone to restore the integrity of the structure.

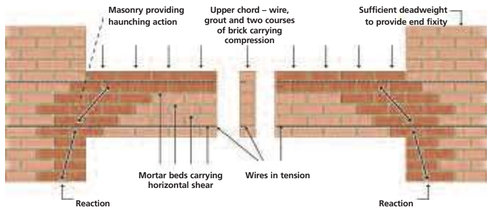
BRE DESIGN GUIDE – THOR HELICAL REINFORCEMENT BEAMS

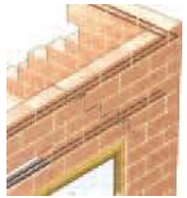
By reinforcing two separate mortar beds, each with a pair of Thor Helical 6mm reinforcement wires embedded in WHO 60 grout, a masonry girder beam is created. The reinforcement and the two surrounding brick courses, which contribute to compressive strength, form chords representing the upper and lower flanges of a beam, the un-reinforced masonry between the chords representing the web. The BRE have established a 'Design Method for Thor Helical Beams' including factored load tables identifying load capacities given satisfactory horizontal shear tests results and cracks within the beam zone being filled.

MASONRY BEAMS Ref: MB & CRACK STITCHING Ref: CS

1. Cut out mortar bed joints to specified depth and locations
2. Clean out slots and thoroughly soak with clean water
3. Using flat grout nozzle apply continuous bead of WHO 60 cementitious grout to back slot.
4. Insert length of Thor Helical 6mm reinforcement wire and push into face of grout bead
5. Repeat items 3 & 4 where twin wires are being used, when creating load bearing masonry beams.
6. Provide final bead of grout & make good in accordance with specification







Application Guide – Tolerance -0mm/+5mm

Wall Thickness & Application		Slot Depth	Depth of 1st wire	Depth of 2nd wire
102mm Wall	Crack stitch	30mm	20mm	–
	Beam	50mm	40mm	25mm
215mm Wall	Crack stitch	40mm	30mm	–
	Beam	60mm	50mm	35mm

NOTES

1. Wires to extend 500mm beyond the end of any opening or crack.
2. Where cracks are within 500mm of corners or reveals wire is to be bent and bonded 100mm around the corner
3. Overlap adjoining wires, where needed by at least 500mm

B.R.E. LOAD TABLES FOR THOR HELICAL MASONRY BEAMS

DEPTH OF BEAM (mm)	SPAN BETWEEN KNOWN SUPPORTS (mm)						
	1200	1600	2000	2400	2800	3200	3600
300	26.16kN	26.24kN	26.20kN	23.28kN	19.88kN	N/A	N/A
450	26.16kN	26.24kN	26.20kN	26.16kN	26.32kN	26.24kN	23.4kN
600	26.16kN	26.24kN	26.20kN	26.16kN	26.32kN	26.24kN	26.28kN

The Wykamol Shirepile & Shirestabilizers

The Wykamol shire stabilizer has been developed over a number of years to provide a cost effective, engineered solution for subsidence repairs, And as an alternative to using deep concrete foundations on lightly loaded structures. The system is made up of various lengths of Helical support, designed to cope with ground conditions Clay, fill, and granular material, each support having different load distribution characteristics.
The support is extended by screw coupled penetration depths in stiff clay and reduces extension tubes. Extension tubes are available in two different diameters to enable stiffening of the stem in situations where bending moment might be increased due to the Stabilizers are installed using an applied load or lack of ground support.

TESTING

Component parts of the system have been independently tested at Aston University Birmingham.

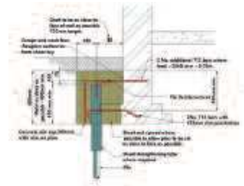
PERFORMANCE

Site performance of the installeden Stabilizers Is determined by measuring driving speed against driven distance. The relationship between driving speed and compressive load performance has been established by carrying out compression tests at control sites.

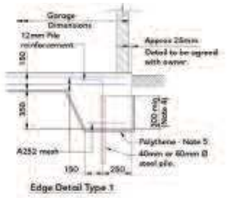
CAPPING DETAILS

Pile caps are determined on site, on exposure of existing foundation design. Engineered capping details are available for all traditional foundation types

Sample Remedial Capping detail



Sample new build capping detail



For further information on appropriate capping details, job specific design information or performance limits, please contact the Wykamol Shire pile technical Department on 01706 831223
Email technical@lectros.com
Www.thorremedial.com

CORROSION

Research carried out by British Steel has shown that corrosion in driven piles is unlikely to be significant due to the limited oxygen supply.

After fabrication the steel is given an electrolytic zinc coating to give enhanced protection.

After the zinc coating the surface is prepared and then given a further high slip powder barrier coat.
This increases driving speeds, increases penetration depths in stiff clay and reduces negative skin friction on the shaft.

INSTALLATION

The Stabilizers are installed using an adapted pneumatic driving hammer, enabling easy access for installation in confined spaces. Compact pile caps removes the need for time consuming and expensive mass excavation, keeping inconvenience to an absolute minimum

JACKING

Piles can be fitted with a jacking plates to enable the lifting of light weight structures such as conservatories, porches and garages, In some instances removing the need for disruptive and costly rebuilding