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FEBRUARY 2016

PRODUCT GUIDE

STRUCTURAL REFURBISHMENT AND RESTORATION

For more than thirty years Clan have provided their clients with a complete service in the field of structural engineering and remedial works to both the public and private sectors. Contracts undertaken have been diverse, from tower blocks and listed buildings to water treatment works and local authority housing estates.

success built on innovation

Since the early 1980's, Clan have been at the forefront of remedial cavity wall tie technology designing new remedial wall ties, the Kontrakt tie, lateral restraint systems, the Clanbolt, and the unique isolation process for treatment of corroding wall ties, the Clansleeve.

Over the years as we have been confronted with new problems within the refurbishment industry, we have introduced innovative solutions designed in conjunction with our structural engineers, with not just the specifier in mind, but also the contractor. A good product not only overcomes the structural problems but is simple to fix reducing operator error. All of our products are designed in accordance with the basic principles that Clan adhere to; a quick, simple and virtually unobtrusive repair.

In addition to our own range of structural fixings, Clan have brokered relationships with many European companies, exchanging ideas enabling us to introduce new methods of repair, such as Xypex crystalline waterproofing, high strength concrete repair materials and the latest carbon fibre technology for repairing structures.

Our range of services is continuing to grow with our sister company, Thin Joint Technology, which supplies tools, fixings and mortars for construction using thin jointed aerated blockwork. TJT also supply coloured render systems, external wall insulation systems and decorative plasters.

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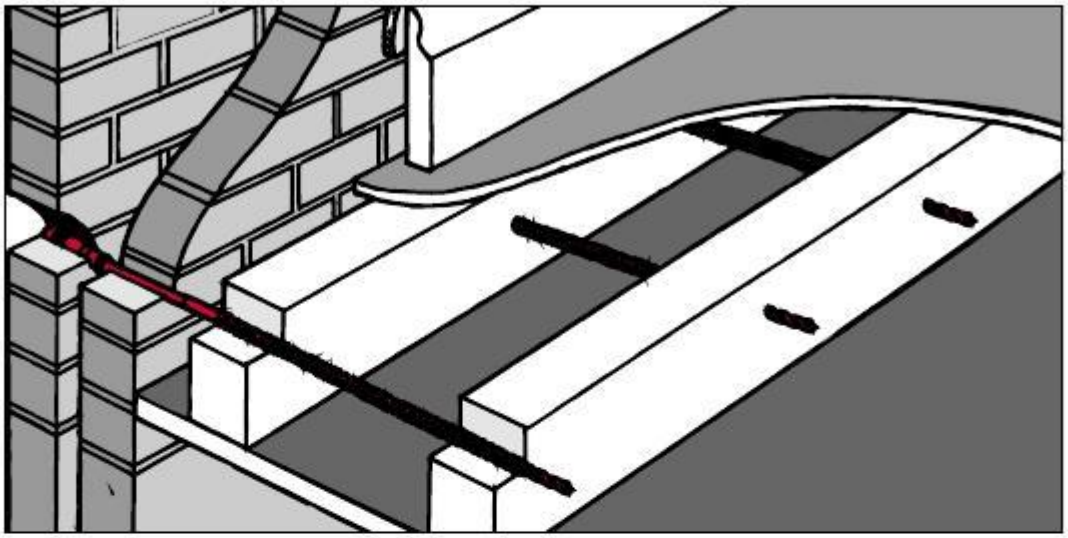
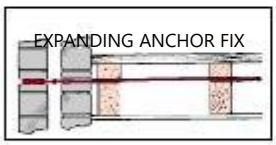
3 Albright Road Speke Approach Estate Widnes Cheshire WA8 8FY
Tel: *0151 422 8000* **Fax:** *0151 422 8001* **Web:** *www.clan.co.uk* **Email:** *sales@clan.co.uk*

Lateral restraints are used to tie the external walls of a building to the internal floor diaphragm and internal crosswalls. Where lateral restraints have been omitted they can reduce the robustness of a building, resulting in bulging walls or possibly even collapse. In new construction the provision of lateral restraint is covered by BS5628 Pt2 1989. and usually involves the introduction of a lightweight galvanised strap hooked into the cavity and fixed to the joists. Crosswalls are generally bonded, or simply tied together using strip ties.



CLANBOLT
THE UNIQUE LOW-COST WAY TO LATERAL RESTRAINT

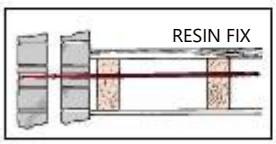
- Hidden wall to floor restraint
- No disturbance to internal decorations
- Single plane restraint
- Can be fully tested after installation
- Quality controlled restraint to ISO 9000



CLANBOLT RT12

Grade A4 stainless steel body, 9mm woodscrew thread with integral pilot drill.Overall length 1000mm, complete with RT12 expansion shell in accordance with BS1243.

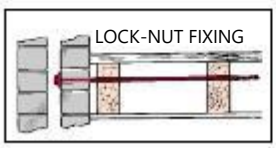
The Clanbolt RT12 is used to connect parallel joists to the external wall. The expanding shell is capable of connection to a wide variety of dense substrates. The RT12 is suitable for both solid and cavity construction and is virtually undetectable when fixed.



CLANBOLT RF1

Grade A4 stainless steel body, 9mm woodscrew thread with integral pilot drill. Overall length 1000mm, complete with Clan GP3 two part resin in lieu of RT12 expansion shell.

The Clanbolt RF1 is used to connect parallel joists to the external wall. The use of Clan GP3 resin provides a high performance solution to the problem of soft or perforated brick/block.



CLANBOLT WT1

Grade A4 stainless steel body, 9mm woodscrew thread with integral pilot drill. Overall length 1000mm, complete with 75x75x3mm Stainless Steel plate washer and lock nuts

in accordance with BS1243.

The Clanbolt WT1 is used to connect parallel joists to the external wall. This highly adaptable fixing is generally used when the outer leaf of a cavity wall is to be rebuilt. The stainless steel plate washer to the inner leaf can be augmented by the use of a WT4 frame cramp which can be incorporated in the outer leaf brickwork.

MASONRY DRILL 12mm - SPACING 1m Horizontal

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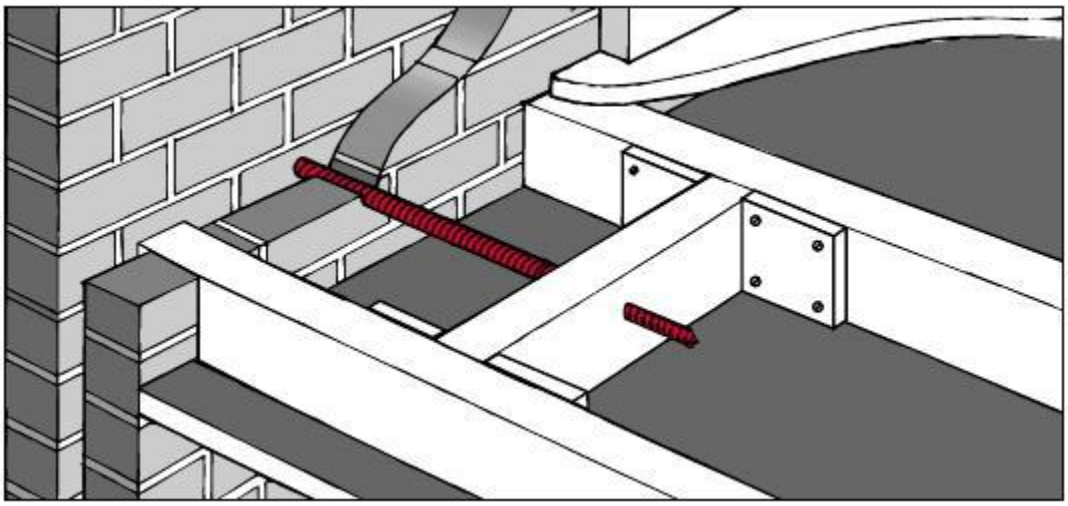
Lateral restraints were first widely used in this country with the introduction of the Building Regulations third amendment in 1978. Many domestic and commercial buildings in the UK were built without lateral restraint, leaving a legacy that we must now rectify.



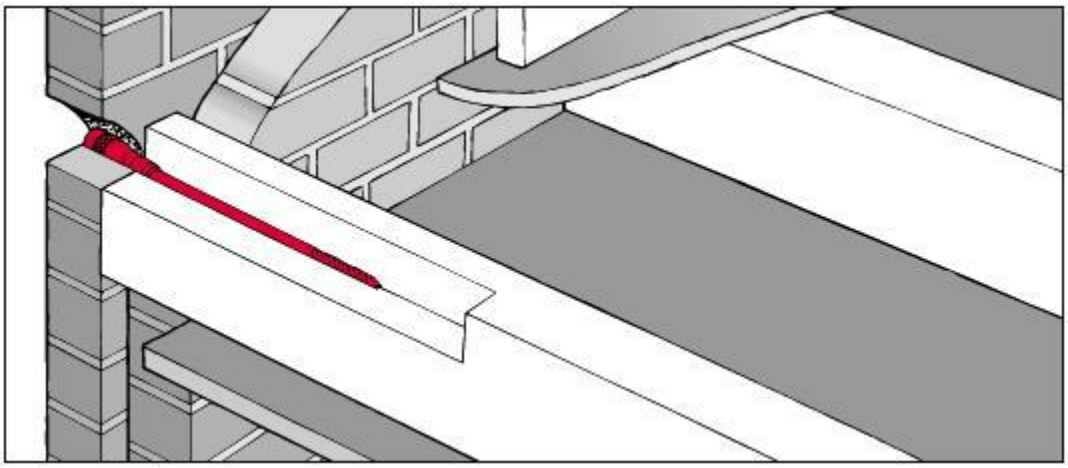
CLANSTUD

Grade A4 Stainless Steel body, 9mm woodscrew thread with integral pilot drill. Overall length 1000mm, complete with RT12 expansion shell, GP3 resin or 75mm plate washer and lock nuts to suit application.

The Clanstud is fixed through a 100x75 noggin which is in turn fixed to the joist with 4 No 19mm 75x75 plywood pads, screw fixed either side of the noggin.

The Clanstud provides secret lateral restraint to masonry walls with floor joists spanning at right angles. The Clanstud can be supplied in the RT12, RF1 or WT1 configuration, providing a comprehensive fixing for all substrates.

MASONRY DRILL 12mm - SPACING 1m Horizontal



CLAN FB JOIST FIXING

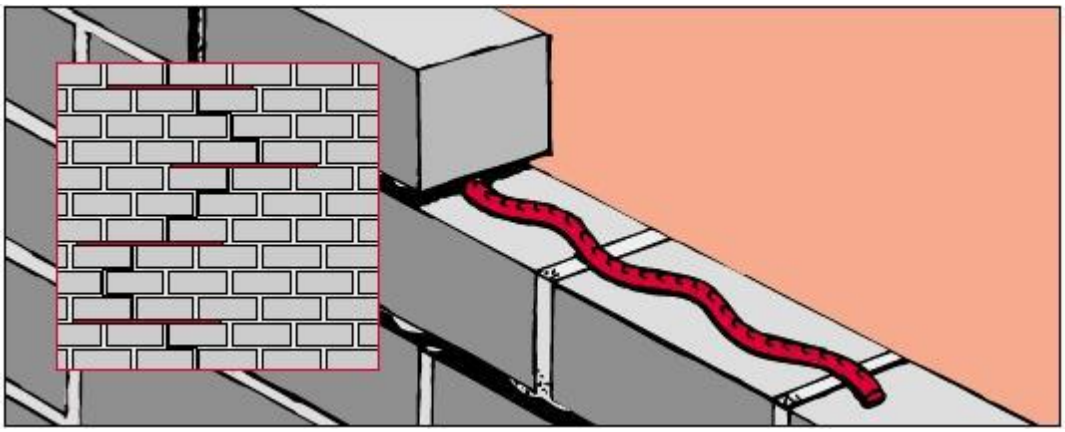
Grade A2 stainless steel body 6mm, 10mm woodscrew thread. Overall length 300mm, complete with RT12 expansion shell, GP3 resin or plate washer.

The FB joist fixing provides secret lateral restraint to masonry with floor joists that span at 90° to the wall where access to the property is restricted.

PILOT DRILL 8.5mm - MASONRY DRILL 12mm - SPACING 600mm Horizontal

SEE PAGE 14-16 FOR RESIN FIXING SYSTEMS

Masonry structures can move for many reasons; ground movement, thermal expansion, corroded steel lintels, reinforcement, etc. This movement almost always results in cracking of the masonry. The remedial treatments can be many and varied, from simple repointing to full demolition and rebuilding of the affected areas.
Whilst demolition and rebuilding is arguably the most comprehensive solution, it is time consuming, costly and when done in isolation can create more problems than it resolves. For this reason, reinforcement of the problem areas can be the most satisfactory solution.

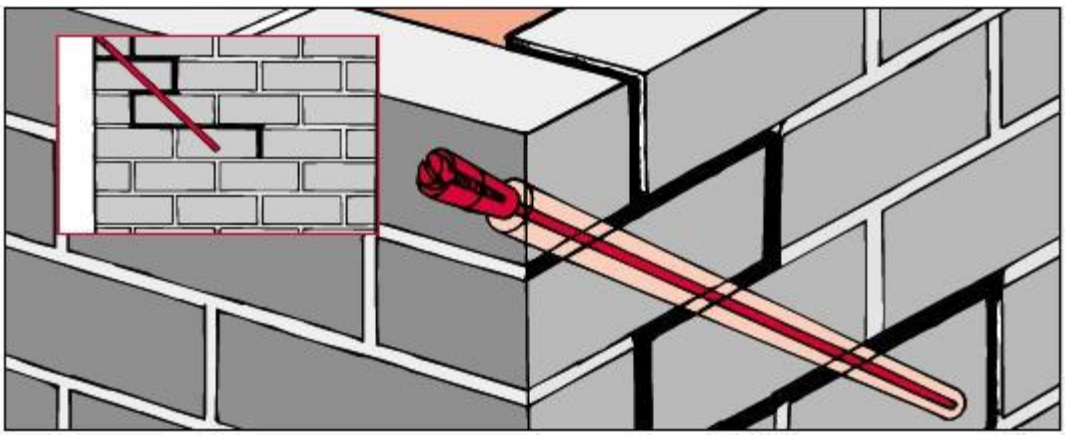


CRACKTIE

Grade A2 stainless steel 6mm reinforced anchor, 750mm long, deformed along its length to enhance the bond between resin/grout and brickwork. Used in conjunction with Clan GP3, EP4 and GT4 high performance mortars to suit on-site conditions. Non standard lengths of Clan Cracktie are available on request.

The Clan Cracktie is used to reinforce brickwork suffering from vertical or diagonal cracking and presents an alternative to traditional rebuild methods. Insertion of Clan Crackties into the the mortar joint together with the appropriate resin/grout, restores the bond without the need to remove/replace whole areas of brickwork.

40mm Embedment - SPACING 300mm Vertical Centre



CLANSTITCH

Grade A4 stainless steel 9mm reinforcing anchor, 500mm or 750mm long, complete with RT12 expansion shell in accordance with BS1234. The Clanstitch is an adaptation of masonry reinforcement techniques first developed abroad to provide secret strengthening of fragile masonry structures. The Clanstitch is used in conjunction with Clan EP4 epoxy resin or GT4 cementitious grout, depending on the substrate encountered.

The Clanstitch is used to enhance the connection between masonry walls where the original bond is inadequate or has failed due to structural movement. The expanding shell is capable of connection to a wide variety of dense substrates. The RT12 is suitable for both solid and cavity construction and is virtually undetectable when fitted. Specially designed diffusers are available for weak or hollow substrates.

MASONRY DRILL 12mm - SPACING 900mm Vertical Centre

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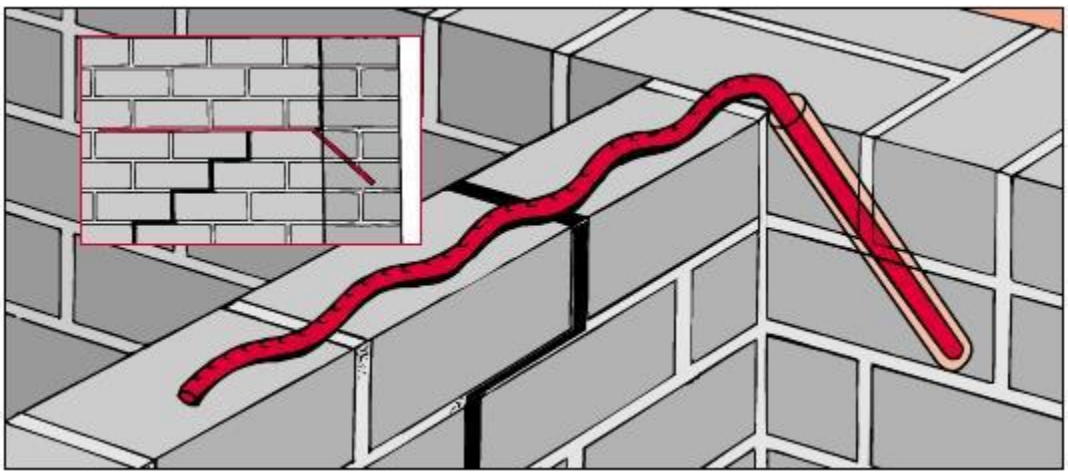
Before reinforcement of cracked masonry can be contemplated, the reasons for the cracking must be diagnosed and rectified. This, however, may leave areas of cracked unsupported masonry which must be repaired.
Clan products have devised a system of repair techniques which can be used to overcome the problem of cracked masonry. Consideration should be given to the original construction prior to designing the appropriate repair technique. ie. buildings constructed using lime mortar should be repaired using lime grouts.



CRANKTIE

Grade A2 stainless steel 6mm reinforcing anchor, 500mm long deformed for 400mm with cranked 100mm end.

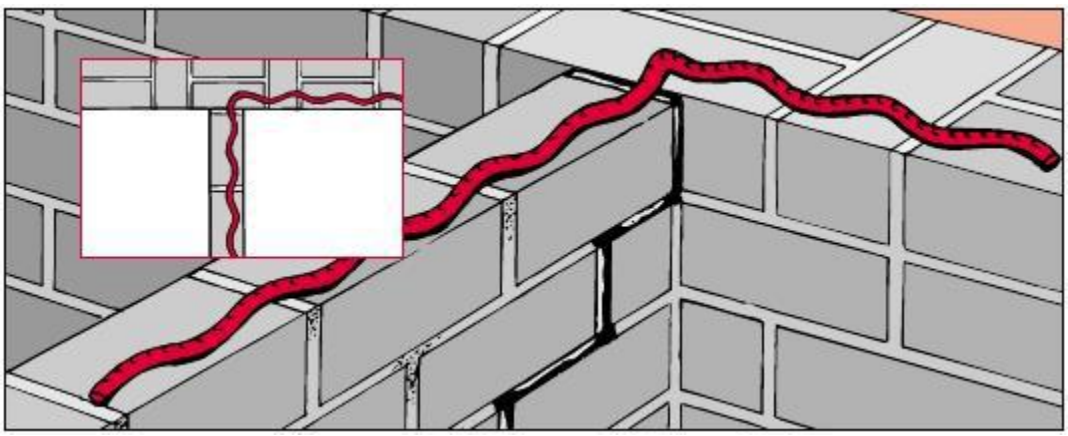
Used in conjunction with GP3, EP4 and GT4 high performance mortars to suit on-site conditions.

Non standard lengths are available on request.

The Clan Cranktie is used to reinforce masonry suffering from cracking at wall to wall junctions which have stepped cracks. The Cranktie is inserted into both the horizontal mortar joint, spanning the crack, and into a pre-drilled hole into the adjacent wall as shown above.

Insertion of the Clan Cranktie with the appropriate resin/grout restores the bond quickly and efficiently.

MASONRY DRILL 12mm - SPACING 300mm Vertical Centre



CORNER CRACKTIE

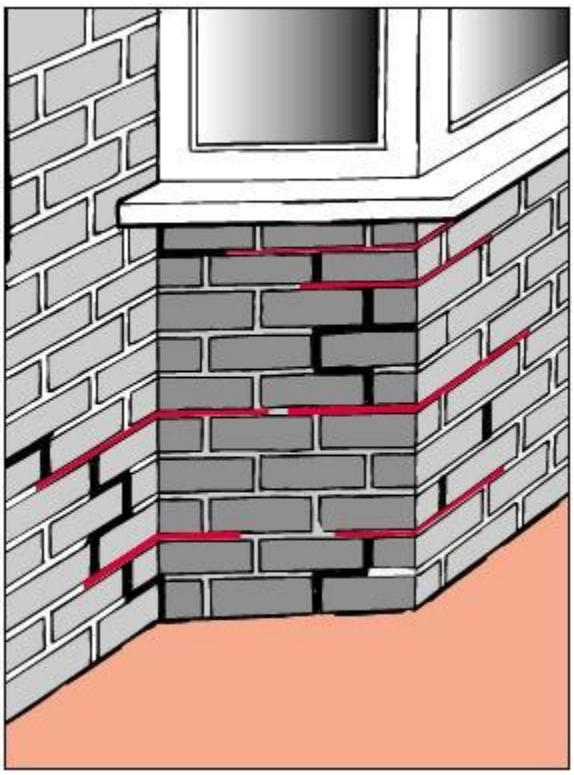
Grade A2 stainless steel 6mm reinforcing anchor, 800mm long, bent to 90° with each leg deformed along its length to enhance the bond between the resin/grout and brickwork. Used in conjunction with Clan GP3, EP4 and GT4 high performance mortars to suit on-site conditions. Non standard lengths are available on request.

The Clan Corner Cracktie is used to reinforce masonry suffering from cracking at wall to wall junctions.

Corresponding mortar joints should be raked out to a depth of at least 40mm to each of the adjacent walls.

Insertion of the Clan Corner Cracktie into the mortar joints, together with the appropriate resin/grout, provides a strong repair which is virtually undetectable.

SPACING 300mm Vertical Centre



BAY CRACKTIE

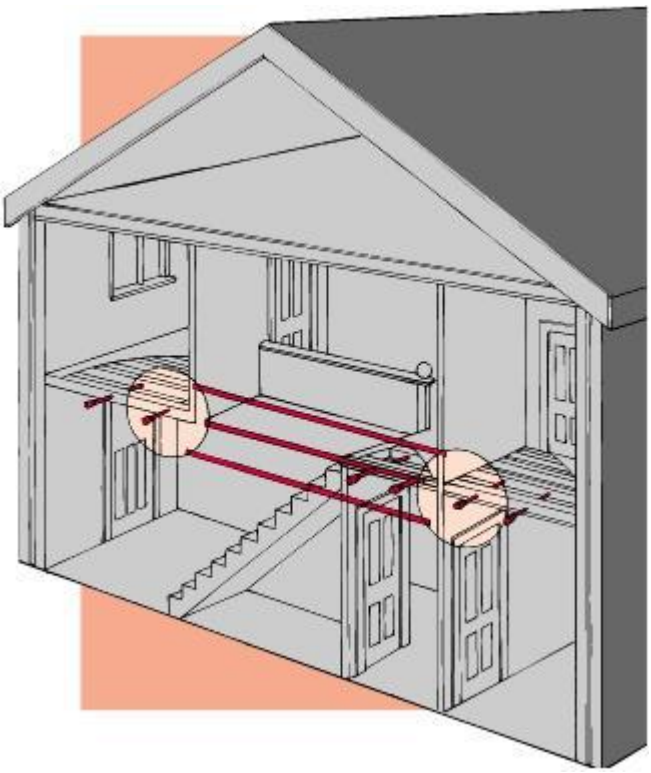
Grade A2 stainless steel 6mm reinforcing anchor, 800mm long bent to 135° with each leg deformed along its length to enhance the bond between the resin/grout and brickwork. Used in conjunction with Clan GP3, EP4 and GT4 high performance mortars to suit on-site conditions. Non standard lengths are available on request.

The Clan Bay Cracktie is used to reinforce masonry bay structures suffering from vertical and diagonal cracking.

Corresponding mortar joints should be raked out to a depth of at least 40mm to each of the adjacent walls.

Insertion of the Clan Bay Cracktie into the mortar joints, together with the appropriate resin/grout, restores the bond quickly and efficiently.

SPACING 300mm Vertical Centre



CLANBOLT AND BEAM FIX

The Clanbeam combines the Clanbolt lateral restraint and Clan Cracktie to help improve lateral stability where normal floor to wall restraints cannot be used, such as stairwells against gable walls.

The Crackties extend to at least within 1000mm diameter of Clanbolt utilising the restraint effect of the Clanbolt thus producing a bracing effect across the wall.

40mm Embedment - (Cracktie)

MASONRY DRILL 12mm - (Clanbolt)

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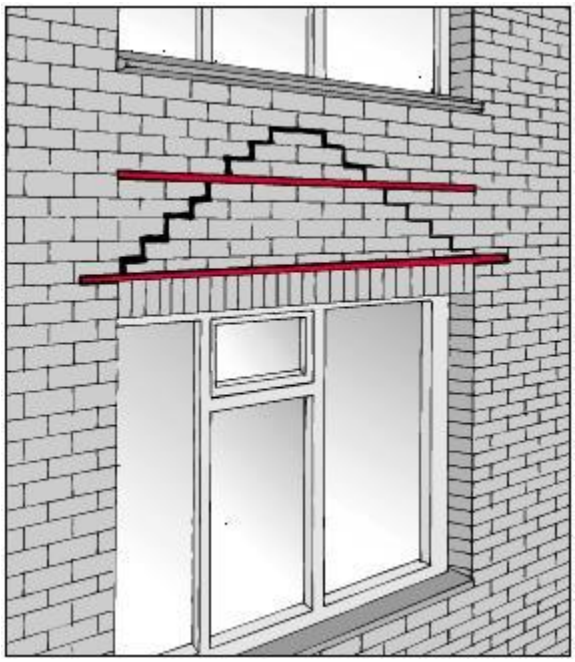
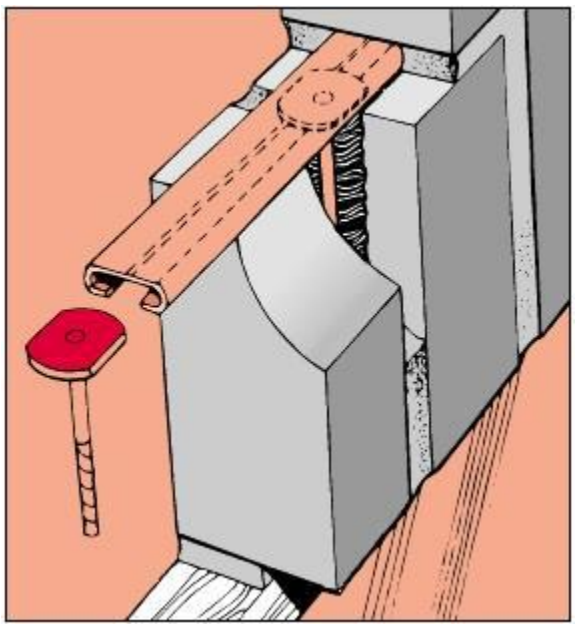
For some years, standard building practice in many parts of the country utilised the structural capacity of the window frames. The masonry outer leaf was laid directly on to the window frame, omitting the lintels.

This type of construction is entirely satisfactory until such time that the windows are replaced, causing two significant problems. Primarily the removal of the window frame will result in the probable collapse of the brickwork whilst the frame has been removed. A secondary, but much overlooked problem, is that the new frames are not generally capable of supporting the load exerted by the brickwork, especially when the new windows have transom features.

Consideration should be given to both of these problems when specifying the lintel system. The Clan 3608 System overcomes both these short and long term deficiencies.





LINTEL SUPPORT 3608

Grade A2 stainless steel channel section specially designed to fit within most masonry bed joints, together with integral polypropylene sliding friction hangers and Clan GP3 two part polyester resin. The support system is complemented where necessary by the addition of Grade 304 stainless steel reinforcing rods, embedded in two part polyester resin.

The Clan 3608 Lintel Support system is used to enhance the load bearing capabilities of brickwork above an opening where the original lintel has failed under load, or has been omitted during construction. The sliding friction hangers are located in the stainless steel channel and within the perpend bed joint prior to being resin fixed into the perpend joints using Clan GP3 resin.

SPECIFICATION

The Clan 3608 Lintel Repair System comprises of 16swg cold rolled grade A2 stainless steel channel section which is less than 8mm thick and polypropylene sliding friction hangers. The support system is complemented where necessary with the addition of a secondary stainless steel fixing - PL tie.

APPLICATION

The Clan 3608 Lintel Support System is used to enhance the load bearing capabilities of brickwork above an opening where the original lintel has failed under load, or has been omitted during construction.

PERFORMANCE

The Clan 3608 Lintel Support System is used in conjunction with Clan SF resin or GT4 cementitious grout, depending on the type of construction. All lintel systems are designed by our engineers, so please contact Clan Products for further information.

Patent applied for

50mm Embedment

SEE PAGE 4 FOR DETAILS OF CRACKTIES

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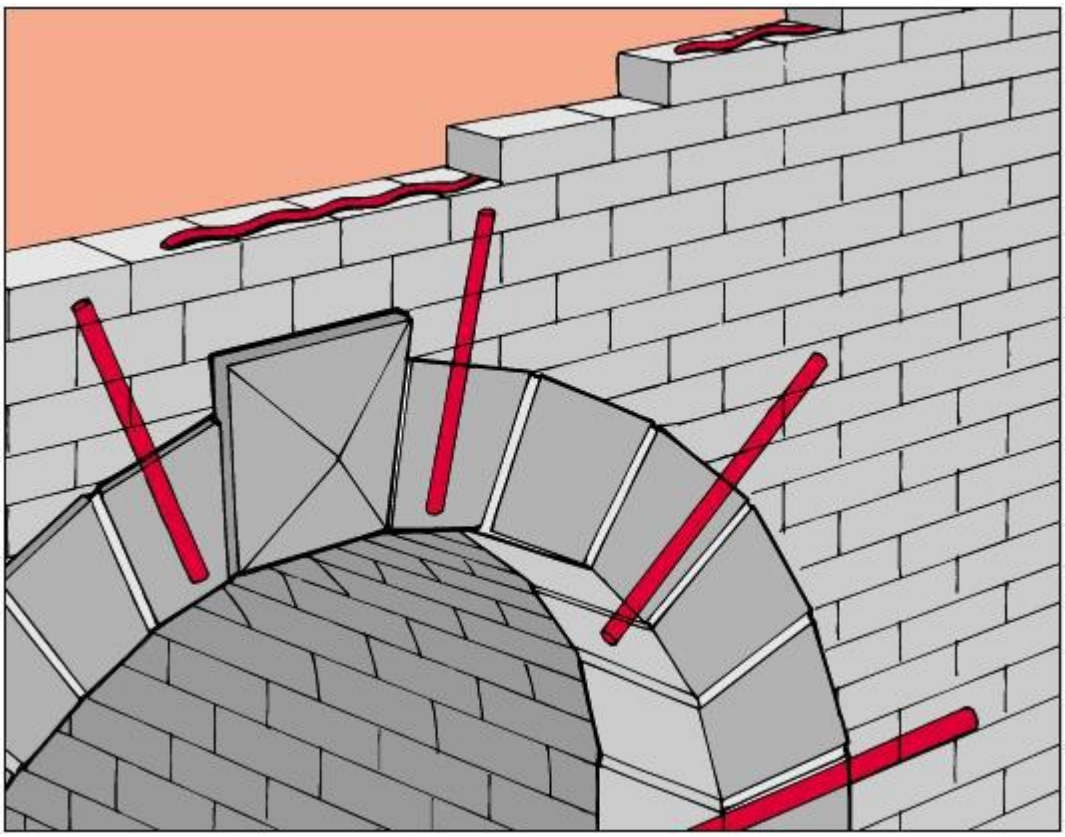
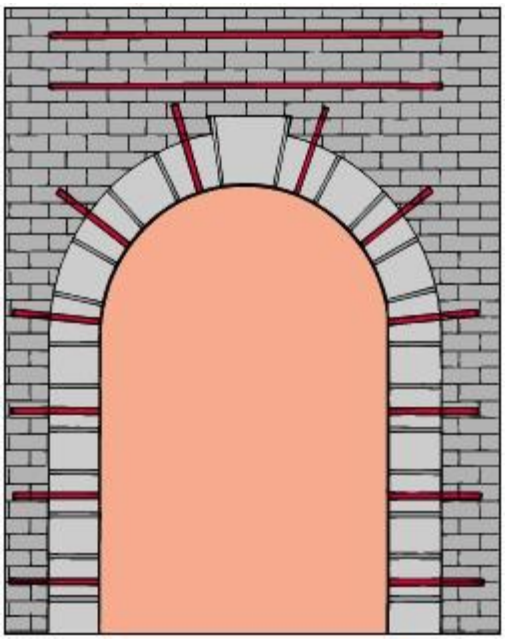




ARCH SUPPORT

Adaptation of the 3608 support system, including the insertion of corbel ties, Clanstitch, Cracktie etc, can be utilised to repair masonry arch structures, such as road and rail bridges.

Installation of the above techniques minimises the need for rebuilding, preserving the aesthetics of the facade which becomes of paramount concern when dealing with historic or listed structures. Disruption to road and rail services is also reduced to a minimum.

40mm Embedment

MASONRY DRILL 12mm

Traditionally horizontal cracking of every 5 mortar joints was a good indication of wall tie failure. The cracking is caused by "fishtail" wall ties corroding, expanding in size and lifting panels of brickwork. A building which has wall ties in this advanced state of corrosion has already been affected structurally and rebuilding of the outer leaf may be the best course of action.

Installation of wall ties into a structure should be used as a preventative measure before distortion of the brickwork has occurred.

Unfortunately it is virtually impossible to pinpoint the precise moment a building will begin to move. Movement would usually be due to a force being applied to the wall and the wall ties, whether due to corrosion, omission, poor design, bad workmanship or failure, all causing bulging of the wall, or in more extreme cases, collapse.

Identification of cracking caused by corroding wall ties can be seen as regular cracking of joints containing wall ties, usually every fifth course with occasional stepped cracking.

Generally vertical cracking is caused by moisture expansion, drying shrinkage or foundation movement.

Portland cement can suffer from sulphate attack causing cracking of every mortar joint, sulphate attack cannot affect black ash or lime mortars.

Location of the wall tie with a wall tie locater and the subsequent inspection with an endoscope will give an idea to the degree of corrosion but more importantly will give an experienced surveyor an idea of the particular crack patterns and movement that are generally associated with each type of tie.

It is important to understand that the wall tie will corrode in the outer leaf, where moisture and air are present, and more often than not, the middle section of the tie is still in good condition within the cavity.

A) Spacing of wall ties

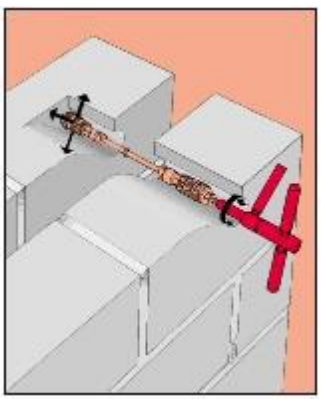
Least leaf thickness (one or both) mm	Type of tie	Cavity width mm	Equivalent number of ties /M$_2$	Spacing of ties Horizontal mm	Vertical mm
65 to 90	All	50-75	4.9	450	450
90 or more	See B below	50-300	2.5	900	450

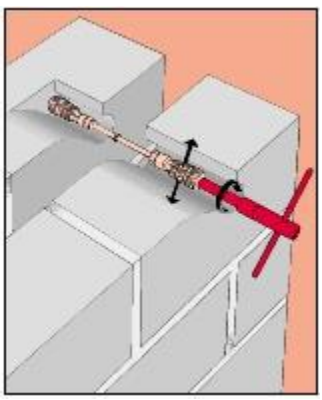
B) Selection of wall ties: Types and lengths

Least leaf thickness (one or both) mm	Cavity width mm	Tie length mm	Permissible type of tie[1]
90	15-30	195	Kontrakt tie or Griptie
90	30-65	195	Kontrakt tie or Griptie
90	50-90	220	Kontrakt tie or Griptie
90	80-140	250	Griptie[2]
90	130-180	300	Griptie[2]

NOTE 1
The list of ties is restricted to mechanical-mechanical ties as this should be the first choice for any remedial contract. However, some types of construction, such as lightweight block, hollow brick etc, will necessitate the use of resins and sieves.

NOTE 2
Where cavities increase to over 100 mm then remedial ties should be selected with a 6 mm body such as the Griptie. However, remedial ties with a 5 mm body can be used but the spacings should be increased to 5/M$_2$ (or 450 mm horizontally by 450 mm vertically)





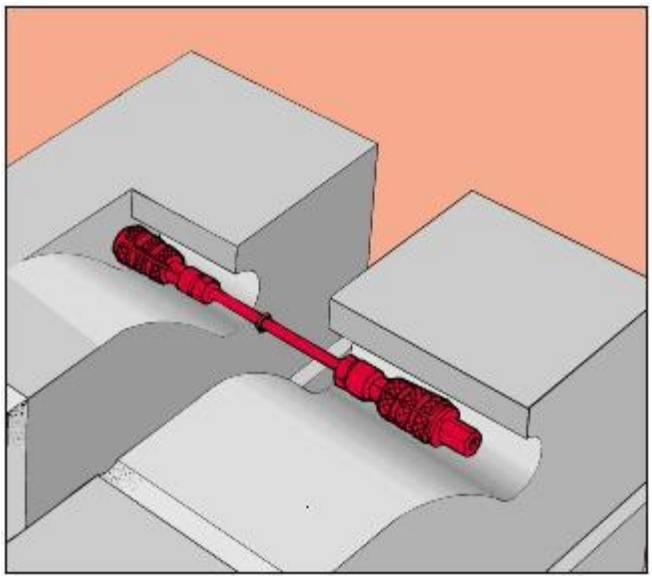
KEYS

Simple to use keys for use with remedial wall ties and lateral restraints.

Robust stainless steel design available in both 5mm and 6mm.

SEE PAGE 13 FOR INFORMATION ON CLANSLEEVES

Cavity wall tie corrosion is a problem which only became recognised and documented in the mid 1980's. Clan were already a leader in the field of wall tie replacement by 1984 and have since been at the forefront of product development and in producing the first Code of Practice for the installation of replacement wall ties.
Metal wall ties used in cavity wall construction over the past 70 years have been inadequately protected from corrosion and the resultant effects have caused structural defects. These defects, horizontal cracking, bulging of walls or stepped cracking around openings have now been recognised as common occurrences which had hitherto been unexplained.



KONTRAKT TIE MM

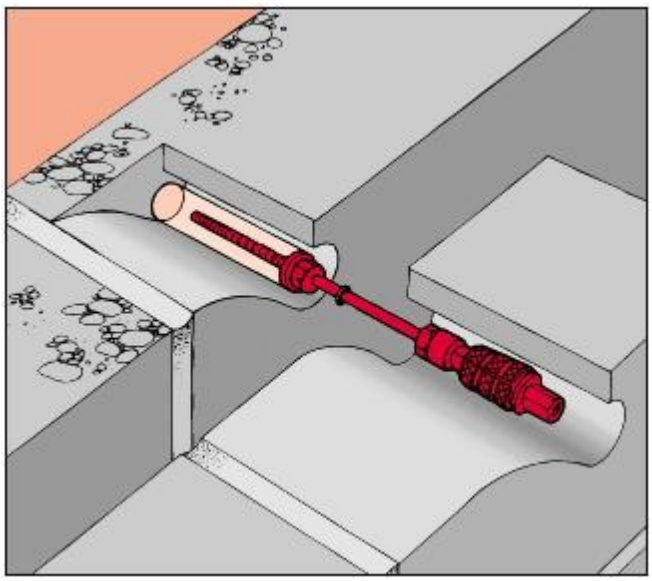
(Brick to brick)

Grade A2 stainless steel body, 5mm Ø with 10mm copper alloy shells in accordance with BS 1243

The Kontrakt MM tie is a general purpose fixing for use in brick, concrete and dense blockwork, having malleable expanding elements suitable for all but the most fragile of substrates.

The design of the expansion elements provide a malleable fixing which can be tested independently on the day of installation, or more importantly, in the years to come.

DRILL 10.5mm



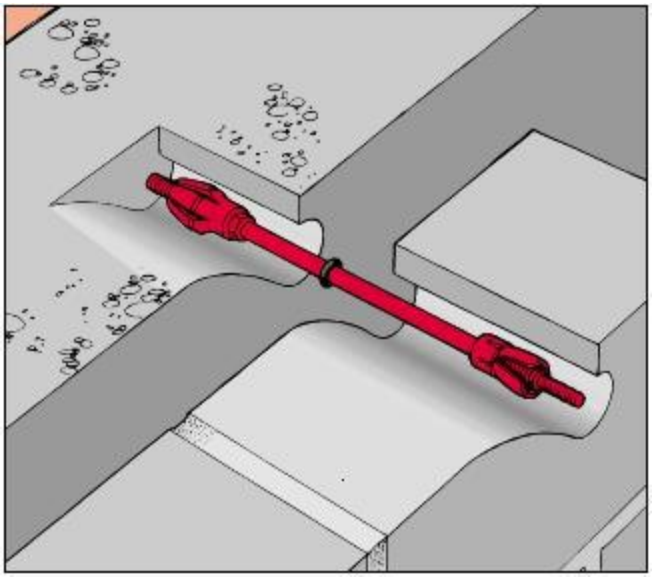
KONTRAKT TIE RM

(Brick to block)

Grade A2 stainless steel body, 5mm Ø with 10mm copper alloy shells in accordance with BS 1243 and a unique end profile for enhanced resin bond. Suitable for fixing of fragile inner leaf connections, but allowing testing at a later date. To be used in conjunction with Clan GP3 or Clan SF resin.

DRILL 10.5mm

To ensure the correct tie is used, a survey of the structure is essential to identify the existing makeup of the wall, i.e. type of inner/outer leaf cavity width etc. Include testing to check for correct tie type.
Before specifying the density and spacing, wall ties should conform to BS 5628 Pt3 1982.
Testing throughout the contract is essential to ensure the quality of workmanship and to ensure any changes encountered in the fabric of the buildings are noted, so that the correct remedial action can be taken.
Testing loads should be applied to the remote leaf only, with at least 5% of ties tested.



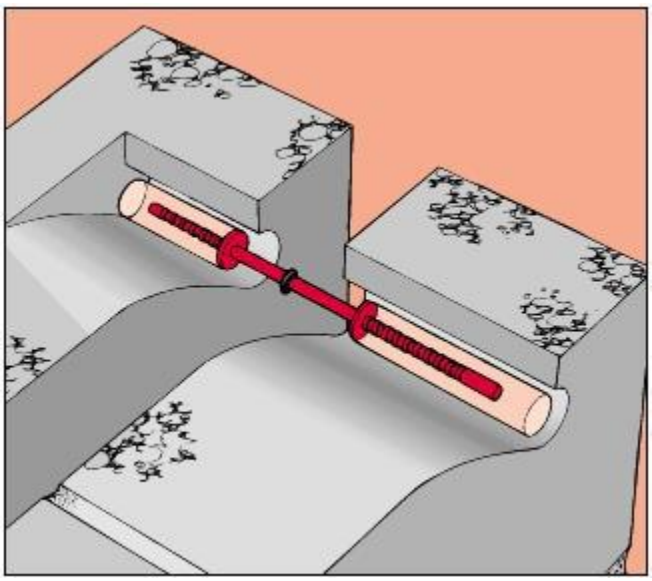
GRIPTIE

(Brick to concrete)

Grade A2 stainless steel body, 6mm Ø with 12mm stainless steel shells to BS 970 Part1 1991.

The Griptie is a high quality versatile fixing for use in solid base materials and for high rise applications, where ultra high performance is required.

DRILL 13mm



RESITIE

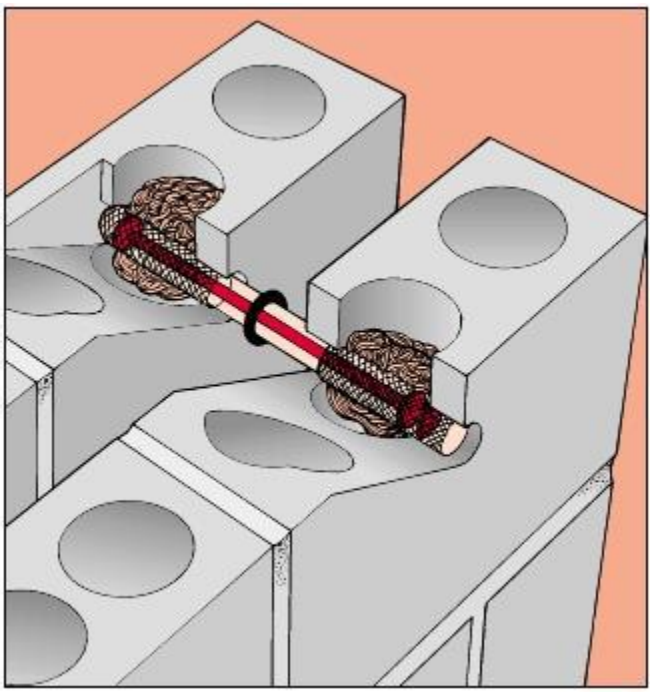
(Brick to block)

Grade A2 stainless steel rods, 5 or 6mm Ø with a unique end profile for enhanced resin bond.

The Resitie is designed to be used in conjunction with Clan GP3 resin.
The absence of expansion forces makes this tie an ideal choice where fragile substrates are encountered.

DRILL 10mm

SEE PAGE 14 - 17 FOR RESIN FIXING SYSTEMS

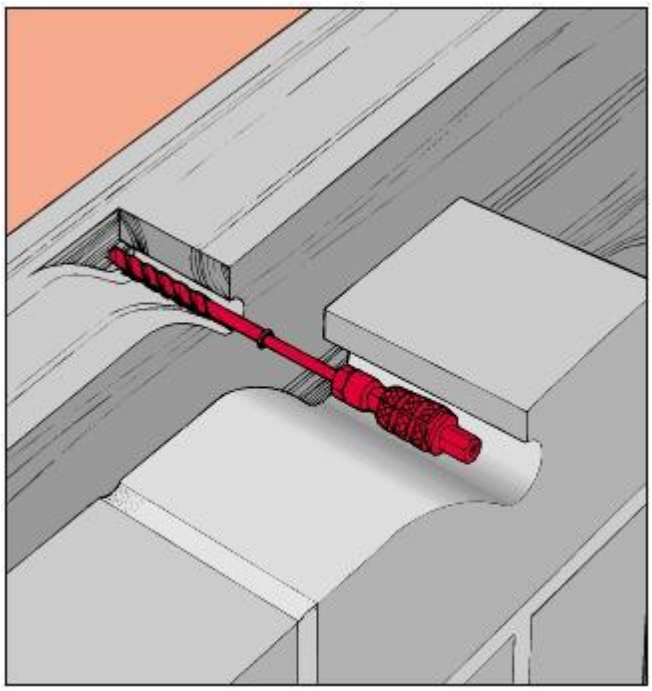


SIEVE TIE
(Hollow brick to hollow brick)

Grade A2 stainless steel body, 5mm or 6mm Ø with concentric rings at either end and plastic piston rings. Plastic mesh with polypropylene solid centre piece.

The Sieve Tie is designed specifically to re-tie hollow or perforated block/brick. Used in conjunction with Clan GP3 resin, the Sieve Tie will encapsulate resin within the outer casing. The plastic mesh ends control the flow of resin into the voids, providing a secure fix into virtually any problematic substrates.

DRILL 12mm

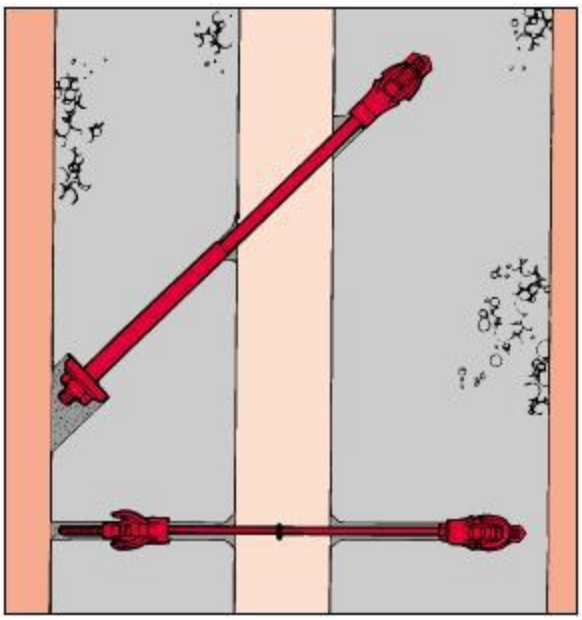


TIMBER TIE
(Brick to timber)

Grade A2 stainless steel rod with a formed timber thread one end and RT10 expansion anchor the other.

The Timber Tie is designed specifically to tie back masonry walls to timber framed buildings.

DRILL 10.5mm

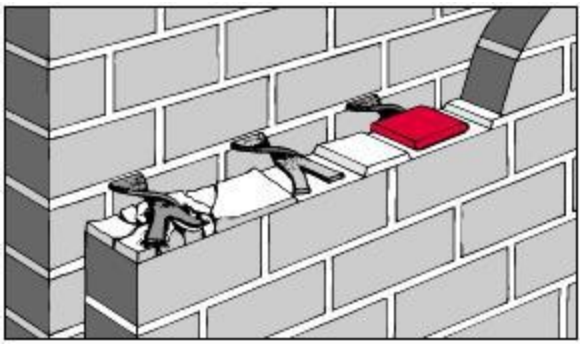


PANEL TIE

(Concrete frame to concrete panel)

Many concrete frame structures have prefabricated panels attached to the outside of the buildings. These panels are fixed to the frame by steel pins or frame cramps.
Fixings can fail due to corrosion, poor design or bad workmanship.

The panel tie has been designed as a remedial fixing, when failure of these fixings has been diagnosed. The system combines a large tie which suspends the panel and second fixing counteracts the lever arm and triangulates the system resulting in a strong economic fix.



The cost effective treatment for corroded wall ties

- No need for brickwork removal
- No internal disruption
- Quality controlled isolation to ISO 9000

CLANSLEEVE

The addition of new remedial wall ties to stabilise the outer leaf is insufficient on its own where solid fishtail ties exist, as continued corrosion will result in further disruption of the wall.
Insitu isolation of the existing wall tie was endorsed in BRE Digest 329. This treatment consisted of isolating the wall tie from the outer leaf of brickwork, using a simple and inexpensive method, patented by Clan. This method consisted of installing a PVC sleeve, containing a rust inhibiting compound over the end of the wall tie in the outer leaf and is widely recognised as the most economical way to treat existing ties to prevent further corrosion. The semi-rigid nature of the Clansleeve makes it easy to locate around the corroding tie and is pushed home by hand pressure. Sleeves can be installed over a wide area, awaiting inspection prior to the final process of repointing. This enables the supervising officer to approve the installation as part of on-going remedial work.

CHISELS

Isolating Chisel - SDS Max end

This chisel has been designed to open up the mortar joints around existing ties before the insertion of the Clansleeve.

The Isolating chisel is only 25mm wide and 4mm thick allowing removal of mortar above, below and to each side of existing fishtail ties.

SEE PAGE 14 - 17 FOR RESIN FIXING SYSTEMS

Clan resins and grouts provide a comprehensive range of cost effective high strength mortars to suit a wide range of applications

GP3 POLYESTER RESIN

Clan GP3 is a general purpose polyester resin, suitable for fixing wall ties, starter bars, studs, bolts and large screws in a wide range of substrates including brickwork, concrete masonry and stone. Where hollow base materials are encountered, Clan GP3 can be used in conjunction with our full range of diffusers.

Clan GP3 is a two part one shot chemical anchoring system based on polyester resin. It is applied in one single action to produce an extremely cost effective, tough, chemical resistant fixing. It is designed specifically for its rapid curing properties achieving high strengths in relatively short setting times.

TECHNICAL DATA

MIXING RATIO	10:1 by volume Supplied in 380ml cartridges	
Flexural Strength	(ASTM D790)	21N/mm$_2$
Compressive Strength	(ASTM D695)	78N/mm$_2$
Tensile Strength	(ASTM D638)	10N/mm$_2$
E Modulus		4570N/mm$_2$

TEMPERATURE ° C	° F	GEL TIME (Minutes)	MINIMUM LOADING TIME (Minutes)
0	32	14	120
5	41	12	90
10	50	9	60
15	59	6	40
20	68	5	30
25	77	3	18

ANCHOR SIZE mm	HOLE DIAMETER mm	TENSION Kn Ultimate Pull Out
8	10	24
10	12	26
12	14	43
16	18	53
20	22	58

Tension figures quoted are tested in accordance with BS 5080 part 1 in 63N/mm$_2$ concrete blocks (300mm x 300mm x 300mm). In all cases for 16mm and 20mm anchors, failure of the concrete blocks was observed before the anchor was dislodged.

The ultimate pull out strength is varied by:

1 The strength of both the substrate and bar.

2 The length of the resin bond to bar.

3 Hole preparation.

4 Anchor separation.

Safety factors of between 2:1 and 4:1 should be considered, depending on the strength and nature of the substrate. Due to the inconsistent nature of hollow blocks and bricks, tension figures may vary. Site testing should be carried out, where necessary, to determine the particular suitability. In order to achieve maximum performance, the distance between the centres of the anchors should be a minimum of 2.5 x the embedment depth and 1.25 x the embedment depth for minimum edge distances.

STORAGE

Store in a dry area. Do not expose to sunlight. Store cartridges nozzle upwards.

HEALTH AND SAFETY

Clan GP3 contains styrene and is flammable. Do not smoke and do not allow naked flames to come into contact with the material. Avoid breathing vapours. Wear suitable clothing such as gloves and overalls. On contact with skin, wash off immediately with plenty of soap and water.

IMPORTANT

This information is based on Clan Products own experience, research and testing and is believed to be reliable and accurate. However as Clan Products cannot know the varied applications of its products, no warranty as to the fitness or suitability of its products applies.

SF STYRENE FREE RESIN

Clan SF is a styrene free polyester resin suitable for all general purpose fixing applications and is ideally suited for use in internal applications. Clan SF also has the benefit of fire resistance, thereby allowing use in high rise applications.

Clan SF is a unique high performance chemical anchoring system on an unsaturated polyester resin in methacrylate monomers. Clan SF has an extremely mild odour and has no occupational exposure limit assigned to it. This is a major advantage over other styrene based unsaturated polyester resins with regard to health and safety.

TECHNICAL DATA

MIXING RATIO	10:1 by volume Supplied in 380ml cartridges	
Flexural Strength	(ASTM D790)	13.64N/mm$_2$
Flexural Modulus		2588N/mm$_2$
Compressive Strength	(ASTM D695)	45.05N/mm$_2$
Tensile Strength	(ASTM D638)	10.60N/mm$_2$
E Modulus		10203N/mm$_2$

TEMPERATURE ° C	° F	GEL TIME (Minutes)	MINIMUM LOADING TIME (Minutes)
0	32	11	60
5	41	9	50
10	50	8	40
15	59	6	35
20	68	5	30
25	77	3	35

ANCHOR SIZE mm	HOLE DIAMETER mm	TENSION Kn Ultimate Pull Out
8	10	24
10	12	26
12	14	43
16	18	53
20	22	58

Tension figures quoted are tested in accordance with BS 5080 part 1 in 63N/mm$_2$ concrete blocks (300mm x 300mm x 300mm). In all cases for 16mm and 20mm anchors, failure of the concrete blocks was observed before the anchor was dislodged.

The ultimate pull out strength is varied by:

1 The strength of both the substrate and bar.
2 The length of the resin bond to bar.
3 Hole preparation.
4 Anchor separation.

Safety factors of between 2:1 and 4:1 should be considered, depending on the strength and nature of the substrate. Due to the inconsistent nature of hollow blocks and bricks, tension figures may vary. Site testing should be carried out where necessary, to determine the particular suitability. In order to achieve maximum performance, the distance between the centres of the anchors should be a minimum of 2.5 x the embedment depth and 1.25 x the embedment depth for minimum edge distances.

STORAGE

Store in a dry area. Do not expose to sunlight.
Store cartridges nozzle upwards.

HEALTH AND SAFETY

Wear suitable protective clothing such as gloves and overalls.
On contact with skin wash off immediately with plenty of soap and water.

IMPORTANT

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SEE PAGE 9 - 13 FOR WALL TIE SYSTEM

EP4 EPOXY RESIN

Clan EP4 is a highly versatile general purpose epoxy resin, suitable for fixing wall ties, starter bars, studs, bolts and large screws in a wide range of substrates, including brickwork, concrete masonry and stone.

Clan EP4 is a one shot two part chemical anchoring system, based on solvent free epoxy resin. Clan EP4 is thixotropic and gives excellent adhesion to steel and concrete and due to its low shrinkage, is ideal for use where a higher performance fixing is required.

TECHNICAL DATA

MIXING RATIO	1:1 by volume Supplied in 400ml cartridges	
Flexural Strength	(ASTM D790)	32N/mm$_2$
Compressive Strength	(ASTM D695)	67N/mm$_2$
Tensile Strength	(ASTM D638)	15N/mm$_2$
E Modulus		3267N/mm$_2$

TEMPERATURE ° C	° F	GEL TIME (Minutes)	MINIMUM LOADING TIME (Hours)
5	41	210	18
10	50	9	12
15	59	6	8
20	68	5	6
25	77	3	5

ANCHOR SIZE mm	HOLE DIAMETER mm	TENSION Kn Ultimate Pull Out
8	10	24
10	12	32
12	14	52
16	18	68
20	22	96

Tension figures quoted are tested in accordance with BS 5080 part 1 in 63N/mm$_2$ concrete. In all cases for 16mm and 20mm anchors, failure of the concrete blocks was observed before the anchor was dislodged.

The ultimate pull out strength is varied by:

1 The strength of both the substrate and bar.

2 The length of the resin bond to bar.

3 Hole preparation.

4 Anchor separation.

Safety factors of between 2:1 and 4:1 should be considered, depending on the strength and nature of the substrate. Due to the inconsistent nature of hollow blocks and bricks, tension figures may vary. Site testing should be carried out where necessary, to determine the particular suitability. In order to achieve maximum performance, the distance between the centres of the anchors should be a minimum of 2.5 x the embedment depth and 1.25 x the embedment depth for minimum edge distances.

STORAGE

Store in a dry area. Do not expose to sunlight. Store cartridges nozzle upwards.

HEALTH AND SAFETY

Clan EP4 is classed as an irritant and may cause sensitisation by repeated skin contact. Wear suitable protective clothing such as gloves and overalls. On contact with skin wash off immediately with plenty of soap and water.

IMPORTANT

This information is based on Clan Products own experience, research and testing and is believed to be reliable and accurate. However as Clan Products cannot know the varied applications of its products, no warranty as to the fitness or suitability of its products applies.

GT4 CEMENTITIOUS GROUT

Clan GT4 is a shrinkage compensated fibre reinforced grout, ideally suited for use in conjunction with stainless steel structural fixings and our range of crack control ties. It can be applied directly into masonry or concrete voids using a hand operated grout pump or refillable cartridge. It can also be used for grouting rigid joints between concrete elements.

Clan GT4 is a ready mixed powder composed of highly resistant cements, selected aggregates, special additives and synthetic fibres. Once mixed with water, Clan GT4 becomes a thixotropic mortar with a high flexural and compressive strength and high adhesion qualities to steel, concrete or masonry components.

TECHNICAL DATA

Supplied in 5Kg buckets Yield 3.8 Litres

DESCRIPTION
Clan GT4 cementitious grout is a dry packed blend of Portland Cement to BS 1200 and additives to provide water resistance, thixotropy, workability and colour.

JOINT WIDTHS
Normal 5mm - 15mm (25mm Maximum)

MATERIAL CLASSIFICATION
Class 1 mortar as defined in BS 5628

PERFORMANCE AT 20° C

Pot Life	45 Minutes	
Initial Set	2 Hours	
Compressive Strength	24 Hours 7 days 28 days	10N/mm$_2$ 7N/mm$_2$ 20N/mm$_2$
Bulk Density	1600 Kg/M$_3$	

CHLORIDE
Less than 0.002%. Complies with DoT specification 2061

SULPHATE
Less than 0.002%. Complies with DoT specification 2061

STORAGE

Store in a dry area. Do not expose to sunlight.

HEALTH AND SAFETY

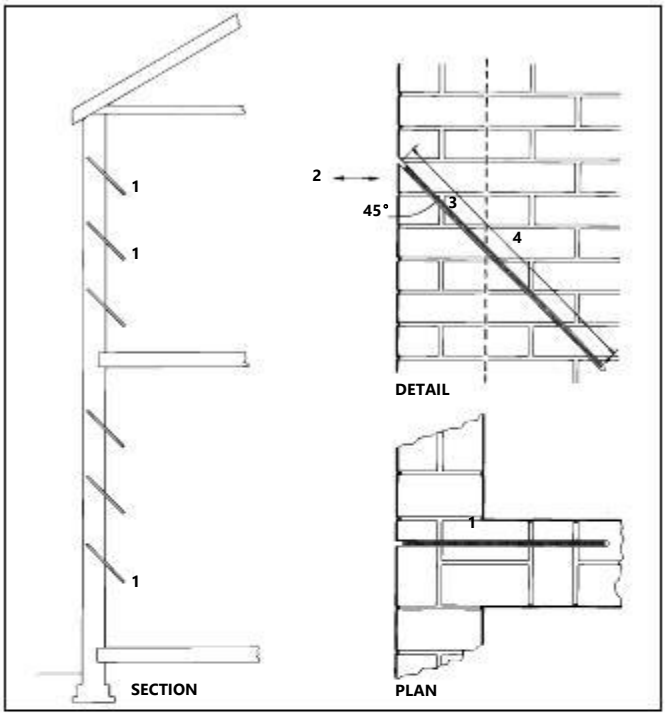
Clan GT4 is classed as an irritant and may cause sensitisation by repeated skin contact. Wear suitable protective clothing such as gloves and overalls.
On contact with skin, wash off immediately with plenty of soap and water.

IMPORTANT

This information is based on Clan Products own experience, research and testing and is believed to be reliable and accurate. However as Clan Products cannot know the varied applications of its products, no warranty as to the fitness or suitability of its products applies.

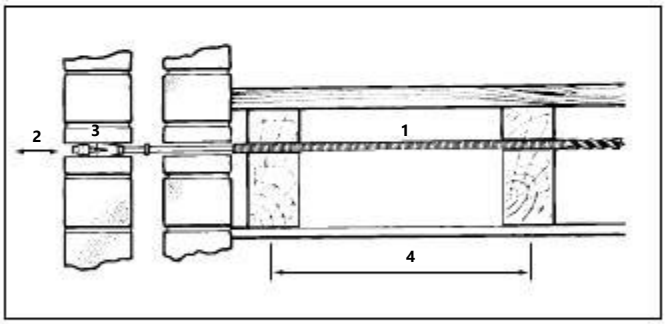
SEE PAGE 4 - 6 FOR CRACK CONTROL SYSTEMS

Specification Information is available in a number of formats. We can provide CAD drawings for our range of fixings, simple line drawings and boq pages in MS Word format.
This information is available from either our website - clan.co.uk, or a complete version on CD can be obtained from our Liverpool Office. Tel: 0151 260 2000. Email: sales@clan.co.uk



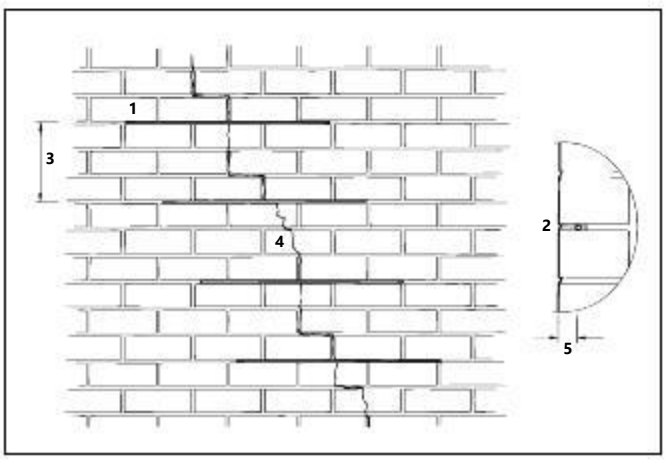
CLANSTITCH

1 Stud: 8mm Ø grade 304 stainless steel
2 Safe Load: 2.0KN
3 Grout: 2 part epoxy resin GT4 Grout or RT12 Shell
4 Length: 750mm



CLANBOLT

1 Shaft: 9mm Ø grade 304 stainless steel (length variable)
2 Safe Load: working load 2.0KN
3 Anchor: RT12 Shell or GP3 Resin
4 Joist Centres: Variations accommodated



CRACKTIE

1 Tie: 6mm Ø grade 304 stainless steel stud/750mm long, deformed along its length
2 Mortar: GP3 Resin, GT4 Grout, Lime Grout
3 Centres: 3 courses vertically
4 Repair: Fill cracks and renew badly broken bricks
5 Cover: 30mm

3 Albright Road Speke Approach Estate Widnes Cheshire WA8 8FY
Tel: *0151 422 8000* **Fax:** *0151 422 8001* **Web:** *www.clan.co.uk* **Email:** *sales@clan.co.uk*

COVERAGE 25 KG BAG 1M$_2$:

Yield in Litres/bag	5mm	10mm	15mm	20mm
10	2.00	1.00	0.67	0.50
11	2.20	1.10	0.73	0.55
12	2.40	1.20	0.80	0.60
13	2.60	1.30	0.87	0.65
14	2.80	1.40	0.93	0.70
15	3.00	1.50	1.00	0.75
16	3.20	1.60	1.06	0.80
17	3.40	1.70	1.13	0.85
18	3.60	1.80	1.20	0.90
19	3.80	1.90	1.26	0.95
20	4.00	2.00	1.33	1.00

N.B.
Yield of 25 Kg bag Mapegrout T40
Specific gravity 1-25 Kg/L
Yield = 25/1.25
Yield = 20 Litres

CONVERSION INFORMATION:
Volume of a cylinder: □r$_2$xL

Volume of a rectangle: Lxbxh
Annulus resin and rod (D+d)x(D-d) $\frac{x\ L\ x\ □}{4}$

1 cm = 0.394 inch
1 inch = 2.54cm
1 Pascal = 0.000001N/mm$_2$
1 Pascal = 1 N/m$_2$
1 MPa = 10$_6$ N/m$_2$
1 GPa = 10$_9$ N/m$_2$
1 MPa = 1 N/mm$_2$
1 GPa = 1000 N/mm$_2$
10 mm = 0.3935 inch

1 mm$_3$ - 1000 Litres
1 mm$_3$ = 35.31 ft$_3$
1 cm$_3$ = 0.000001m$_3$
1 m$_3$ = 1000 Litres

WEB ADDRESSES

Adjudication Society:
oxfordinformation.com
Barbour Index:
barbour-index.co.uk
British Architecture and Surveying Institute:
asi.org.uk
British Institute of Architectural Technologists:
biat.org.uk
British Wall Tie Association:
bwta.org.uk
Building Research Establishment:
bre.gov.uk
Department of Trade and Industry:
dti.gov.uk
Department of Transport Local Government & the Regions:
dtlr.gov.uk
Construction Industry Training Board:
citb.org.uk
Health and Safety Executive:
hse.gov.uk
Institute of Civil Engineers:
ice.org.uk
Institute of Clerk of Works of Great Britain Incorporated:
icwgb.com
Institute of Structural Engineers:
istructe.org.uk
Royal Institute of British Architects:
architecture.com
Royal Institute of Chartered Surveyors:
rics.org.uk
Society of Construction Law:
scl.org.uk

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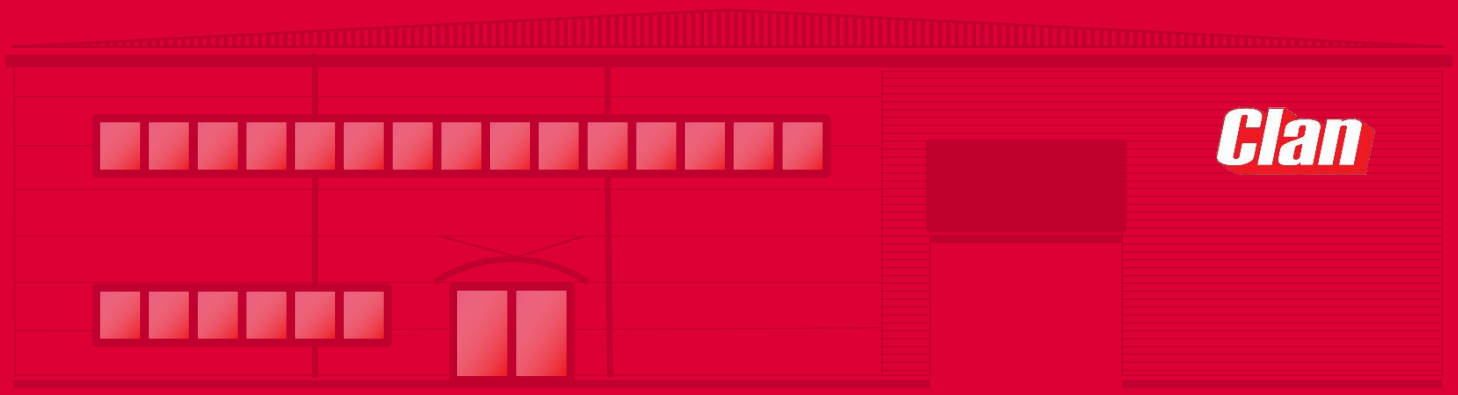

3 Albright Road
Speke Approach Estate
Widnes
Cheshire
WA8 8FY

Tel: 0151 422 8000
Fax: 0151 422 8001

E-mail: sales@clan.co.uk

Web: www.clan.co.uk