

CINTEC

The Anchor



Design Concepts



The Cintec Anchor System is a versatile method of structural reinforcement tailored to meet the specific strengthening and repair requirements of individual projects. From historical buildings and monuments to bridges, high-rise blocks and harbour walls, Cintec has the worldwide reputation for resolving the technical challenges of structural preservation, while remaining sensitive to the original architecture.

The Grout

Presstec grout is a one component mix, which has the same characteristics as Portland cement. The grout contains graded aggregates and other constituents which, when mixed with water, produce a pumpable grout that exhibits good strength with no shrinkage.

Presstec is made in accordance with the following German DIN standards:
DIN 1045 DIN 18200
DIN 18156 DIN 18555

The grout is independently checked both during manufacture and before final despatch. This control is undertaken by the Material Testing Institute of the German Federal State of Northern Rhine-Westfalia MPA NRW. Proof of the inspection is marked on every bag with the control mark 'U' or 'Überwacht Controlled'.



Typical values of the grout are:-

MEAN TENSION

| N/mm ² - MPa | PSI |
|-------------------------|-----|
| @ 3 days = 2.5 | 362 |
| @ 7 days = 3.5 | 507 |
| @ 28 days = 4.5 | 652 |

MEAN COMPRESSION

| N/mm ² - MPa | PSI |
|-------------------------|------|
| @ 3 days = 21.2 | 3074 |
| @ 7 days = 37.2 | 5395 |
| @ 28 days = 51.5 | 7469 |

The grout has inorganic flow and anti-shrink additives which meet the requirements of German DIN standards. The grout has also been tested using accelerated shrinkage tests and found to be satisfactory. The grout bonds to the parent material through the sock as it is inflated.

The resistance strength of the insitu construction to resist the anchor load depends on the section utilised. If the section is solid bar, the anchor body is deformed. If the anchor is circular, the section is crimped. On square section material, a plate almost the size of the bore hole is welded to the anchor at both ends to ensure the strength is mobilised.

The Sock

The fabric sleeve is a specially woven polyester based tubular sock with expansion properties to suit the diameter of the bore hole and substrate. The mesh of the sock is designed to contain the aggregates of the mixed grout while still allowing the cement enriched water (milk) to pass through the sock both sizing and bonding the substrate. The sock is manufactured in sizes from 20mm to 300mm in diameter and is adjusted to suit each individual application.

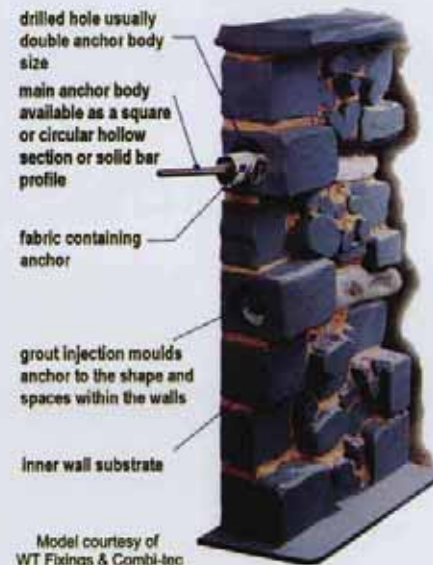
The Reinforcing Member

The types of reinforcing members utilised depend largely on the loads anticipated and the life expectancy of the anchor.

A few examples are listed below:

The Parent Material

The strength of the parent material and/or mortar can govern the anchor capacity. Design checks on the parent material capacity can be based on the resistance strength of the insitu construction to the anchor force according to the national standards. When the parent material or mortar strength is indeterminate, the capacity of the material/mortar can be determined from insitu anchor tests.



| Steel Sizes | Steel Types | Standard | Grade 304 | Grade 316 | Class | 0.2% Proof Stress (KSI) N/mm ² / MPa | Ultimate Tensile (KSI) Strength N/mm ² / MPa |
|--------------------------------------|-------------------------|-----------|-----------|-----------|-------|--|--|
| 8mm x 0.75mm (5/16 x 0.04) | Circular Hollow Section | BS 6323 | 304 S11 | | | 185* 26.8 | 480* 69.6 |
| 10mm x 1mm (3/8 x 0.04) | Circular Hollow Section | BS 6323 | 304 S11 | | | 185* 26.8 | 480* 69.6 |
| 15 x 15 1.5mm (5/8 x 5/8 x 0.06) | Square Hollow Section | ASTM A554 | AISI 304 | AISI 316 | | 210* 30.4 | 510* 73.9 |
| 20 x 20 x 2mm (3/4 x 3/4 x 0.08) | Square Hollow Section | ASTM A554 | AISI 304 | AISI 316 | | 210* 30.4 | 510* 73.9 |
| 30 x 30 3mm (1 1/16 x 1 1/16 x 0.12) | Square Hollow Section | ASTM A554 | AISI 304 | AISI 316 | | 210* 30.4 | 510* 73.9 |
| M8 to M50 | Allthread Studding | BS 6105 | AISI 304 | AISI 316 | | 210 30.4 | 500 72.5 |
| 5/16 2" | | | | | | 450 62.2 | 700 101.5 |
| | | | | | | 600 87.0 | 800 116.0 |

The grade 316 contains Molybdenum, which improves the resistance to corrosion and is beneficial especially in chemically aggressive

environments. Higher grades of stainless steel are available for specialist applications.

* For guidance only. Figures are based on steel before forming and welding.

Anchor Principles

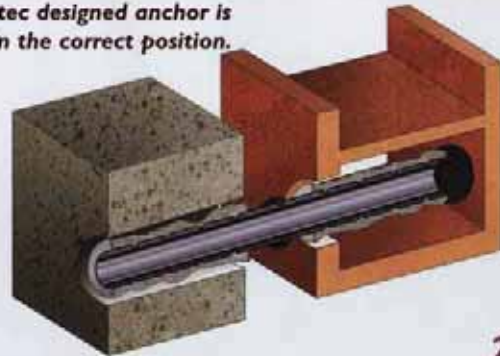


An oversize hole is drilled between the substrates to be secured.



1

The Cintec designed anchor is placed in the correct position.

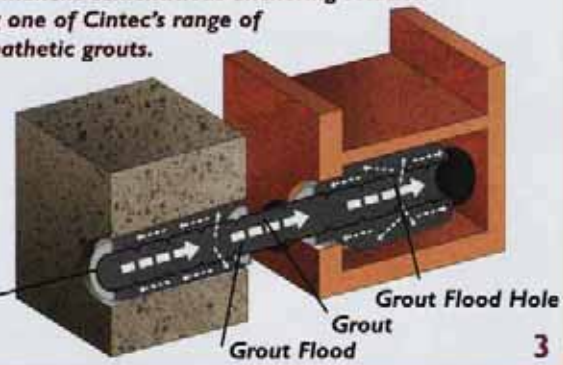


2

The Cintec system comprises a steel section in a mesh fabric sleeve, into which a specially developed cementitious grout is injected under low pressure. The flexible sleeve of woven polyester restrains the flow and moulds the anchor into the shapes and spaces within the walls, providing a strong mechanical bond.

The large surface area of the expanded anchor creates a reinforcement system that dispenses with the need for unsightly patress plates on the exterior of the structure, providing an invisible mend.

The anchor is inflated like a balloon to provide a permanent cementitious anchoring solution using one of Cintec's range of sympathetic grouts.



Presstec grout pumped under pressure through the anchor body into the fabric sock.

3

Testing Regimes



Seismic testing on full scale model of Sao Vicente de Fora Monastery - Italy

Anchor pull out tests following exposure to extreme heat in the burnt out remains of Fuller's Brewery



On location tensile load testing in Bathstone (Limestone).

Measurements being taken during load testing of masonry arch bridge at T.R.L.

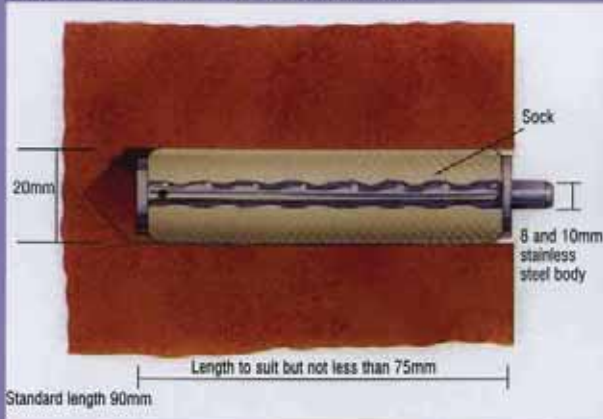


Anchor Applications

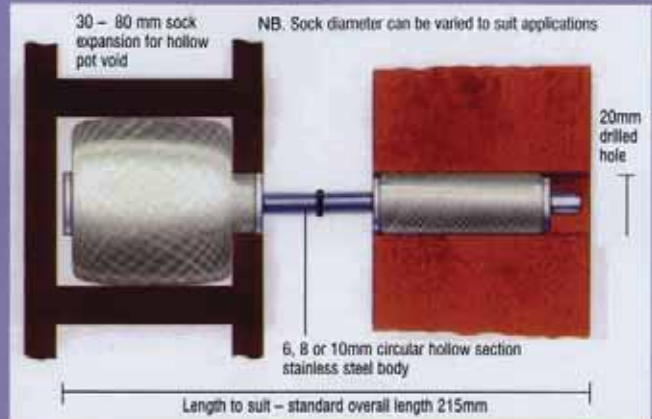


Wall Tie – Single Skin

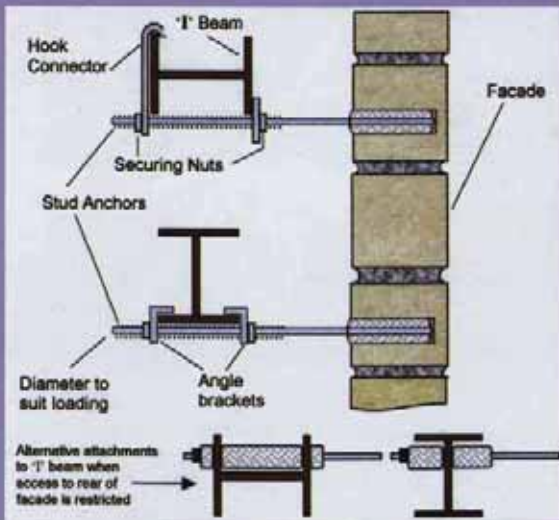
Single fixing CHS 8 for single brick application



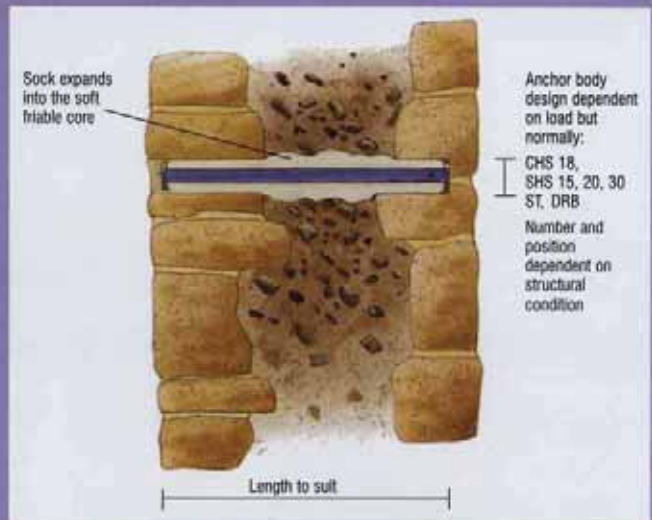
RAC for Hollow Pot/Brick Cavity Wall



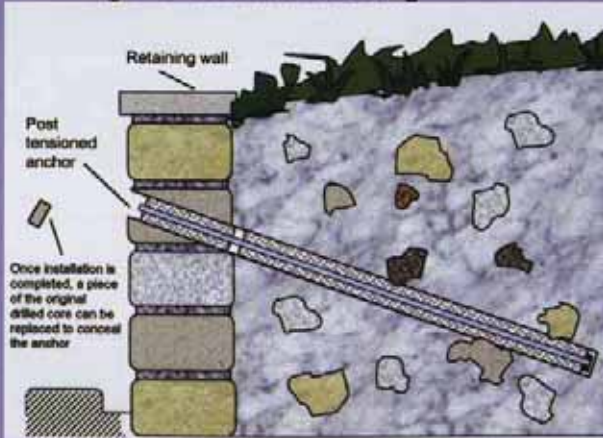
'I' Beam Securements to Masonry Facades



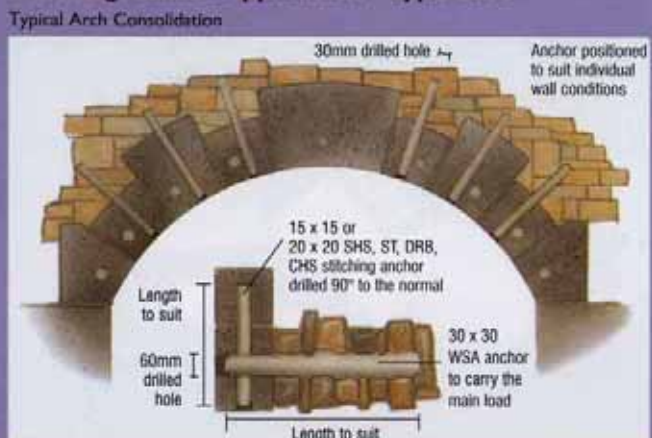
Stitching Anchor – Type CHS



Retaining Wall/Ground Anchoring



Stitching Anchor Application – Type CHS



CHS – Circular Hollow Section
ST – Stud

RAC – Remedial Anchor Cavity
DRB – Deformed Rib Bar

SHS – Square Hollow Section
WSA – Wall Supporting Anchor

Applications



Archtec – “Key hole surgery for bridges”

Archtec is a partnership of companies with specific skills brought together to provide an innovative masonry arch strengthening system. Archtec utilises Cintec anchors for an optimum level of bridge reinforcement. It is both efficient and cost effective and keeps traffic disruption to a minimum. Bridge strengths have been increased by as little as 3 tonnes gross vehicle weight to 40 tonnes plus HB or special loading.



Paratec – Parapet wall strengthening

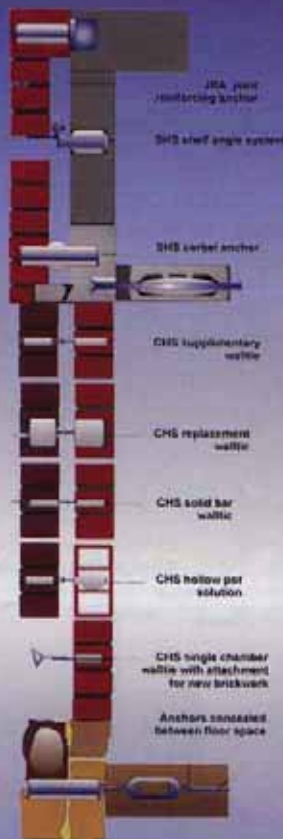
Cintec anchors are an effective method for strengthening parapet walls from stress and impact. In the above image, a test section of existing masonry wall has been post-tensioned against wind and dynamic pressure. The positive results demonstrate Cintec to be an economic and aesthetic solution. Designs to achieve vehicle containment ratings as high as P6 have been completed.



The Smart Anchor – “The anchor with inside information”

With the development of internal electronic sensors located on the anchor, it is now possible to monitor grout flow during the installation of unsighted anchors, as well as measure variations in the forces to which the anchor is subjected over a long period of time.

CINTEC



- Designed to the requirements of each application
- Quickly installed
- Age tested for durability
- Fire resistant
- Cementitious, therefore sympathetic to the original structure
- Controlled grout flow & containment
- Invisible when installed
- Effective for structural repairs, ground anchoring, parapet walls & masonry arch strengthening

This brochure offers a simple guide to the standard applications undertaken with the CinteC Anchor System. It does not give detailed technical information necessary for a specific design, but indicates the types of problem solvable within the design parameters of the system. CinteC has both in-house and contracted engineers offering advice and providing the entire design work without initial consultation fees. The cost of specialist engineering advice is normally incorporated in the final anchor price.



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