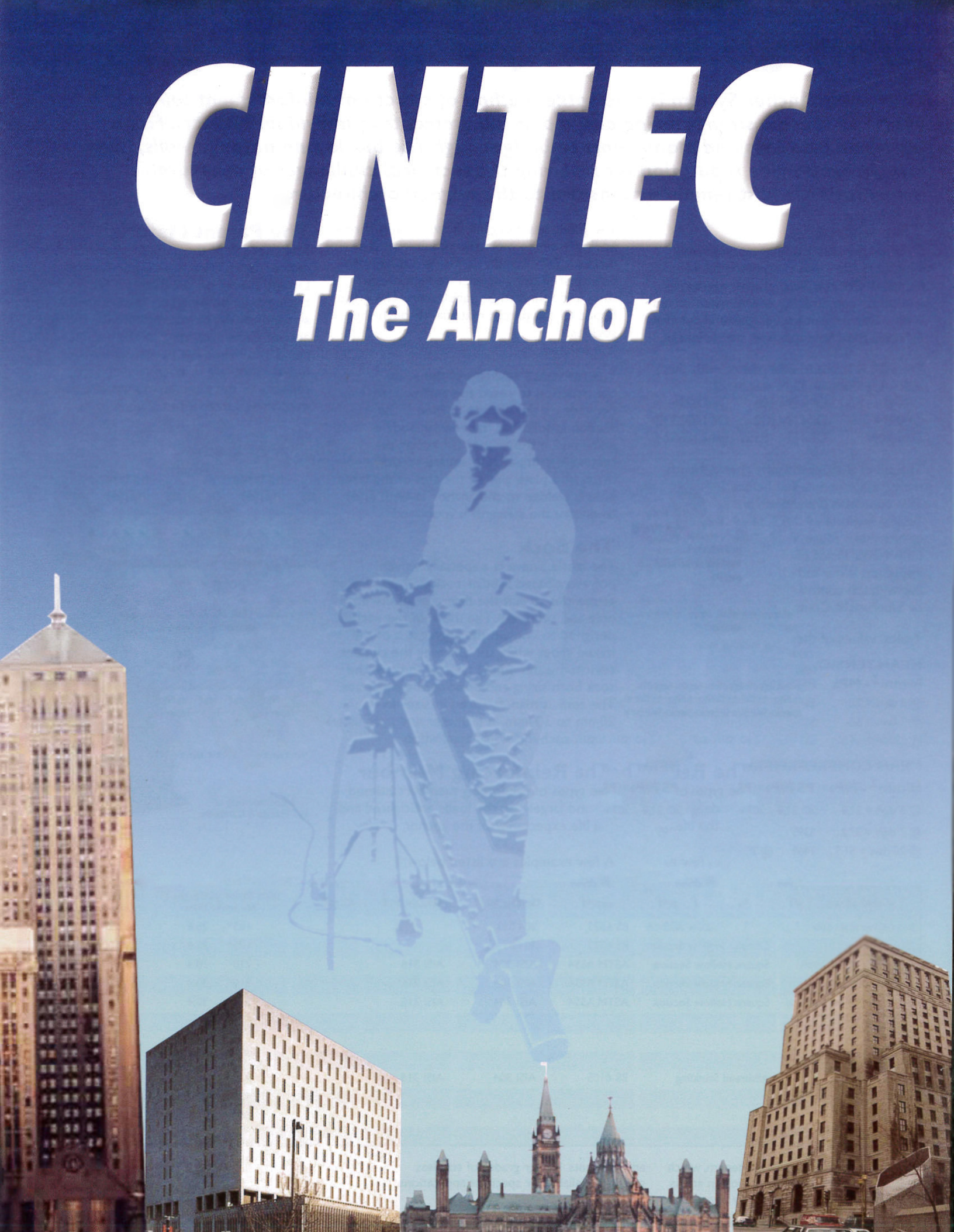


CINTEC

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, whilst remaining sensitive to the original architecture.

The Grout

Presstec grout is a one component mix, which has the same characteristics as Portland Cement, with 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 EN 197-1 DIN EN 196 DIN 4226
 DIN EN 1367 DIN EN 932 DIN EN 933
 DIN 1097 DIN EN 18555 DIN 18557

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		PRESSTEC 2000	
N/mm ² - MPa	PSI	MPa	PSI
@ 3 days = 2.5	362	@ 24 hrs = 3	435
@ 7 days = 3.5	507	@ 7 days = 5	725
@ 28 days = 4.5	652	@ 28 days = 9	1305

MEAN COMPRESSION		PRESSTEC 2000	
N/mm ² - MPa	PSI	MPa	PSI
@ 3 days = 21.2	3074	@ 24 hrs = 40	5800
@ 7 days = 37.2	5395	@ 7 days = 54	7830
@ 28 days = 51.5	7469	@ 28 days = 65	9425

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.

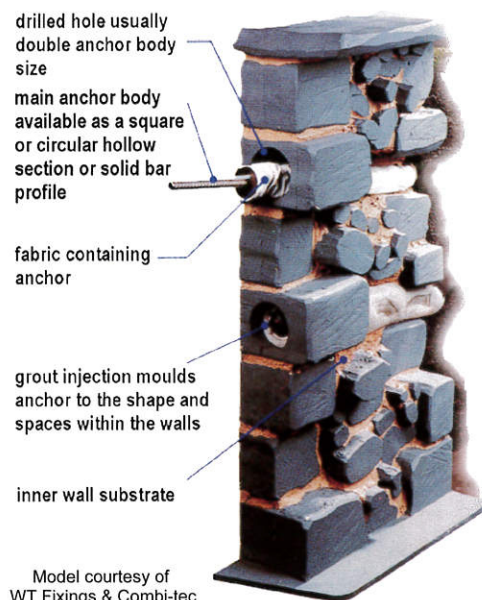
The Reinforcing Member

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)		Ultimate Tensile (KSI)	
						N/mm ²	MPa	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.

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.



Applications



The Cintec System

The Cintec Commitment

Cintec world wide recognizes and respects the feelings of local communities in respect to what they regard as Heritage or Historic buildings and structures, regardless of whether or not the buildings/structures are formally designated as such. To this end Cintec works to the guidelines of the Secretary of the Interior's Standards for Historic rehabilitations, the principles of the Venice Charter of 1964 and the Burra Charter of 1979.

Bridge Requirements

In North America, there are over 1,000 masonry arch bridges. Europe has many thousands of such structures; 40,000 in the UK alone are in continual use by highways, railways and waterways. Most are well over 100 years old, and as of January 1999 the European directive 96/58/EEC requires that all major (trunk) road bridges be capable of 40 Tonne (89,500 lbs) axle loading.

Archtec Response

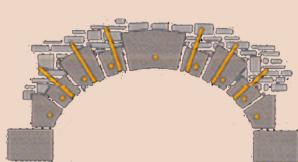
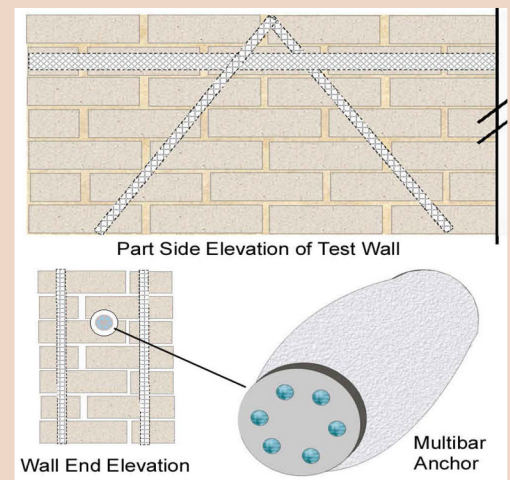
Archtec provides a unique bridge reinforcement system - a complete diagnostic, design and installation service, utilising state of the art technology and drilling methods specially designed to strengthen masonry arch bridges.

How it Works

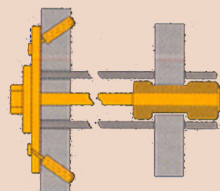
The Cintec Anchor System comprises a steel bar enclosed in a mesh fabric sleeve into which a specially developed grout is injected under low pressure.

Installation is through drilled holes produced by wet or dry diamond coring technology. The flexible sleeve of woven polyester restrains the grout flow and expands up to twice its previous diameter, moulding itself into the shapes and spaces within the walls to provide a strong mechanical bond along the entire length of the anchor. This will often dispense with the need for patress plates on the exterior of the structure.

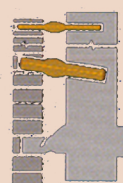
The grout is a Portland cement based product, containing graded aggregates and other constituents which, when mixed with water, produce a pumpable cementitious grout that exhibits good strength without shrinkage.



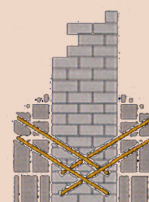
Arches and Bridges



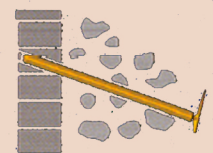
Structural Reinforcement



Hanging Walls



Viaduct Foundation



Retaining Walls

Applications



Paratec

Parapet Wall Strengthening from Cintec

No two masonry bridges are the same and this also applies to their parapet walls. The requirements specified for individual walls can differ considerably and must reconcile a variety of needs. These may include impact containment, vehicle redirection, the protection of others in the vicinity, compatibility with the masonry structure as a whole, as well as the visual appearance of the strengthening solution implemented.

The Anchor

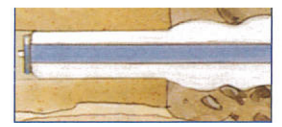
The Cintec Anchor System provides a highly versatile method of internal structural reinforcement that is tailored to meet the specific requirements of each parapet wall. This service, known as Paratec is backed by extensive research and development, this includes advanced computer modelling, practical testing and also the experience built up from numerous strengthening projects. The Paratec system can strengthen a masonry wall while remaining sensitive to the original architecture and without any narrowing of the road way.

Research & Development

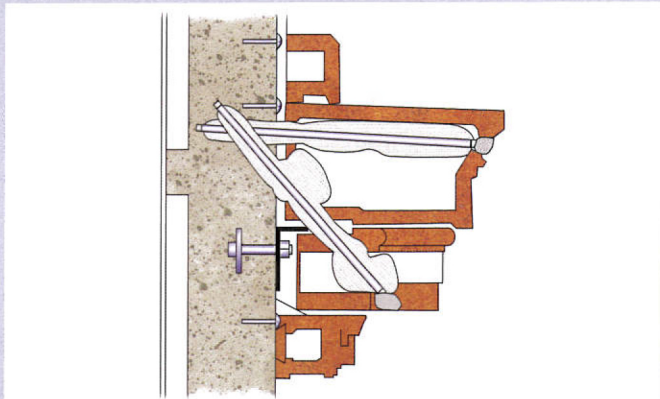
The comprehensive service offered by Paratec includes advanced computer modelling techniques that simulate the effects of a vehicle impact upon a specified masonry wall. Working in conjunction with both software specialists and consulting engineers, Paratec utilises an advanced dynamic software incorporating a discrete element analysis technique that enables the behaviour of parapet walls to be accurately predicted under various circumstances.



Anchor Principles

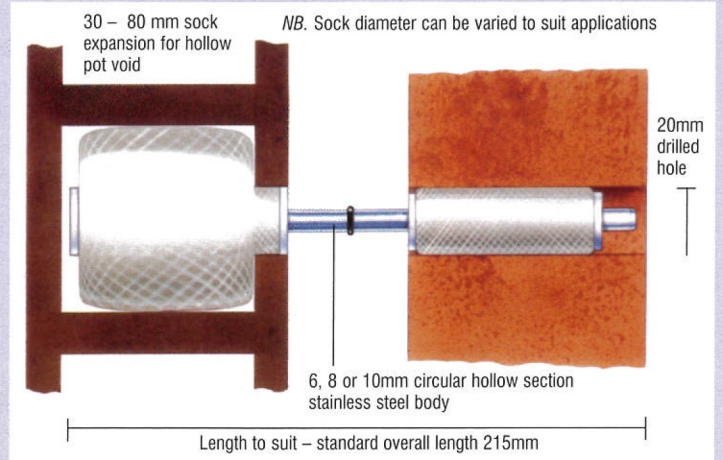


TERRA-COTTA – Typical Detail

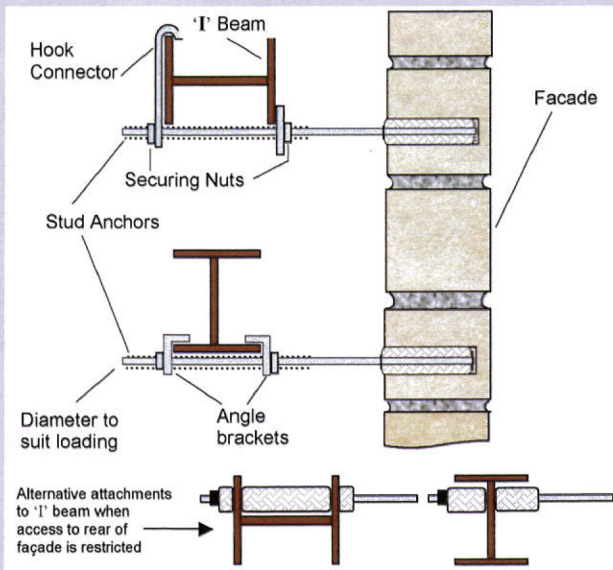


Typical, 12mm dia. solid round threaded Cintec Anchor in 32mm dia hole 64mm dia. sock min. 2 Per T/C unit size & length subject to site conditions.

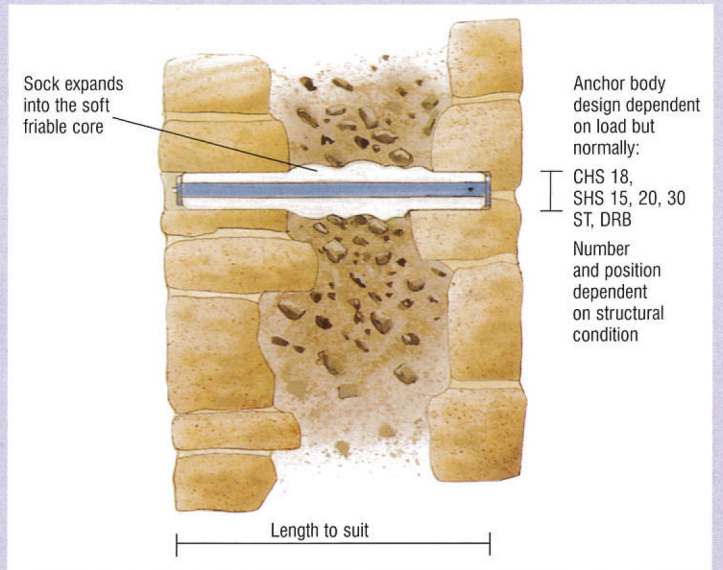
RAC for Hollow Pot/Brick Cavity Wall



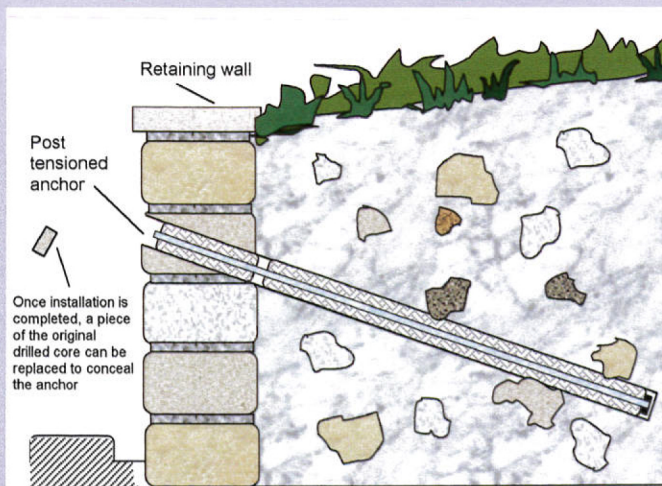
'I' Beam Securements to Masonry Facades



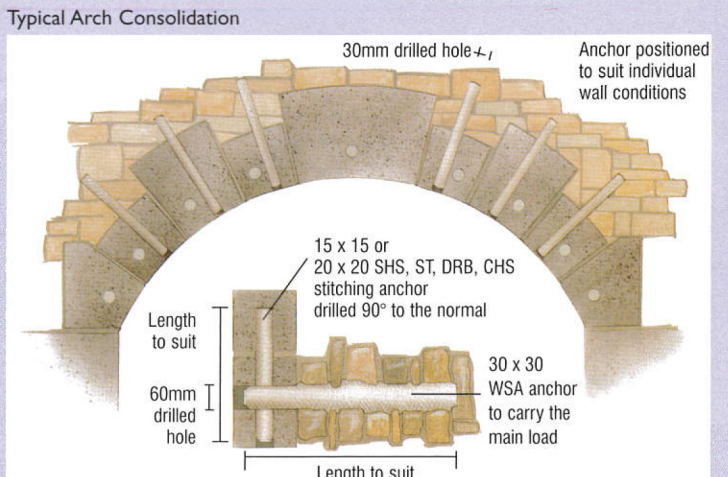
Stitching Anchor – Type CHS



Retaining Wall/Ground Anchoring



Stitching Anchor Application – Type CHS

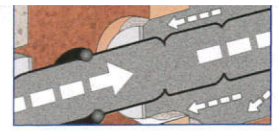


CHS – Circular Hollow Section
ST – Stud

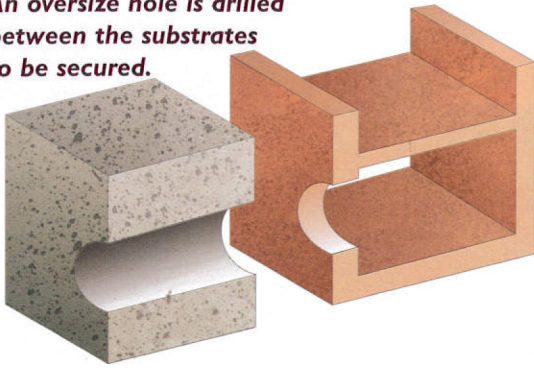
RAC – Remedial Anchor Cavity
DRB – Deformed Rib Bar

SHS – Square Hollow Section
WSA – Wall Supporting Anchor

Anchor Principles

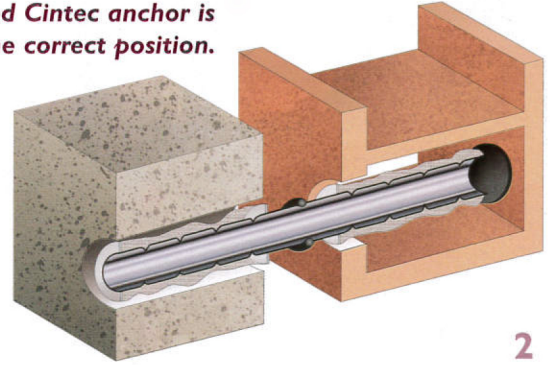


An oversize hole is drilled between the substrates to be secured.



1

The designed Cintec anchor is placed in the correct position.

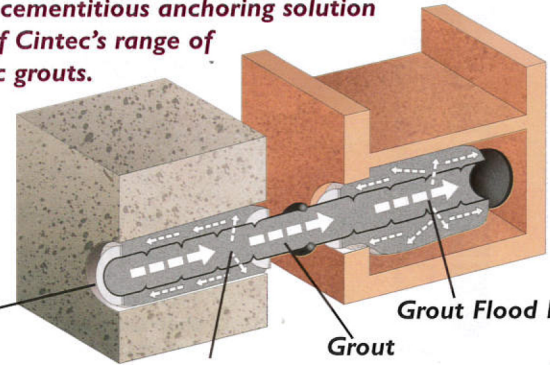


2

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.

Grout Flood

Grout

Grout Flood Hole

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 Fullers' Brewery

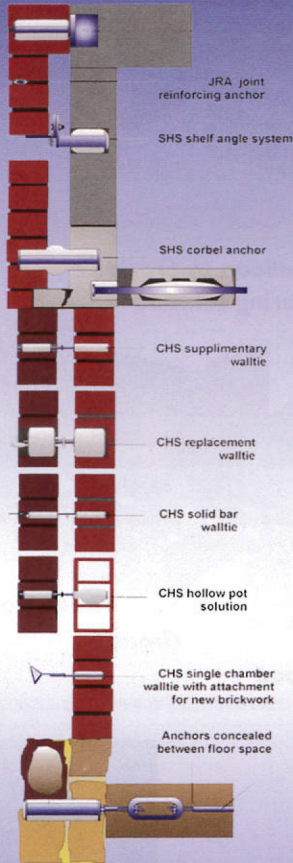


On location tensile load testing in Sandstone

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

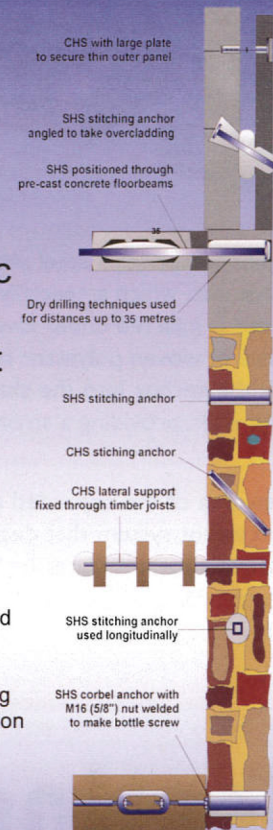


CINTEC



- 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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