POST TENSIONING

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A brief overview of post tensioning has been presented here, followed by its advantages and economics.

BRIEF

Post tensioning is the technique of pre-loading the concrete in a manner which eliminates, or reduces, the tensile stresses that are induced by the dead and live loads; High strength steel wires called strands are arranged to pass through the concrete floor. When the concrete has hardened, each set of strands is gripped by means of a hydraulic jack and stretched to a pre-determined force. At this stage the strands are locked in a purpose made device called an anchorage, which has been cast in the concrete; this induces compressive stress in the concrete. The strand is there after held permanently by the anchorage.

The non jacking end of the strand may be bonded in concrete or may be fitted with similar device on the other end as the case may be. In order to allow the strand to stretch in the hardened concrete under the load applied by the jack, bond between the concrete and strand is prevented by a tube through which the strands pass. This tube is termed as duct or sheathing and is made of galvanized iron. After stressing the duct is filled with grout material. Grout filling of ducts transfers load to the entire concrete element and ensures corrosion protection.

ADVANTAGES

Post Tensioning offers various advantages, some of which have been listed below:-

- Larger Clear Spans
- Thinner Slabs (Spans of 7mm to 8mm = 210mm thick slab)
- Lighter Structures
- Reduced Cracking
- Reduced Deflection
- Rapid Construction
- Better Water Tightness
- Less Manpower
- Reduced Passive Reinforcement

ECONOMICS

Conventional reinforced concrete slabs are best suited for spans up to 7m to 8m and also where the spans are uniform and form work is simple, so that formworkers can work quickly. This is common in simple residential blocks up to three storeys. Further, in the driveways often wider spans are required to provide parking access.

More columns and thicker slabs are required for conventional reinforced slabs, and this is where the labour costs come in.

As in post tensioned slabs the slabs will be thinner, with larger spans and thereby reduced columns and formworks. The works can be carried out faster, and also the slab can be de shuttered quicker than conventional slabs.

GROWTH TREND/DEMAND FOR POST TENSIONING

With the above mentioned advantages and economics becoming prominent, post tensioning in buildings is becoming a trend in the region and world over. The economics are being harnessed in each and every possible way by the client and the contractors, by selecting post tensioning for their projects. Thus, in all there is a good scope of growth for post tensioning ahead.

THE C-POST COMPANY LIMITED
POST-TENSIONING SYSTEM
FLAT TENDON SYSTEM – MULTI STRAND SYSTEM

Our Company

The C-Post is one of leading Thai companies in design, production and installation of post-tension slab. The company is operated by a group of engineer and technicians who have high knowledge and experiences in his business for many years. With continuous technical and service improvements to meet our customer satisfaction.

We also would like to make sure that our products and services will optimize your needs.

Service

Feasibility and cost estimate for your project

Design for Post-Tension Slab Conform to ACI or AIT Standard

Sales and Installation Service

- Post-Tensioned Slab
- Precast Concrete Wall Panel
- Precast Concrete Element

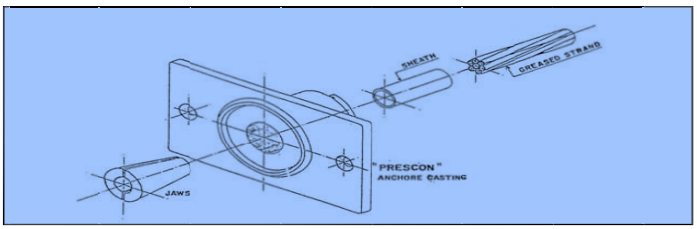
Product

The C-Post Post-tensioning product are designed and manufactured under quality program to meet international standards. The products comprise of complete range of post tensioning components including.

- Unbonded grease and P.E. coated P.C. strand
- Bonded P.C. strand
- Post-tensioned anchorage components for bonded and unbounded tendons
- Tendon support chairs
- Corrugated metal ducts for flat and round tendon.

Slab Post-tensioning System

There are 2 system for Post-tension slab. One is unbounded system that consist of cast iron (FCD45) anchorage and monostrand with nominal diameter of 0.5”(12.7mm.) inserted in PE. Duct with grease.



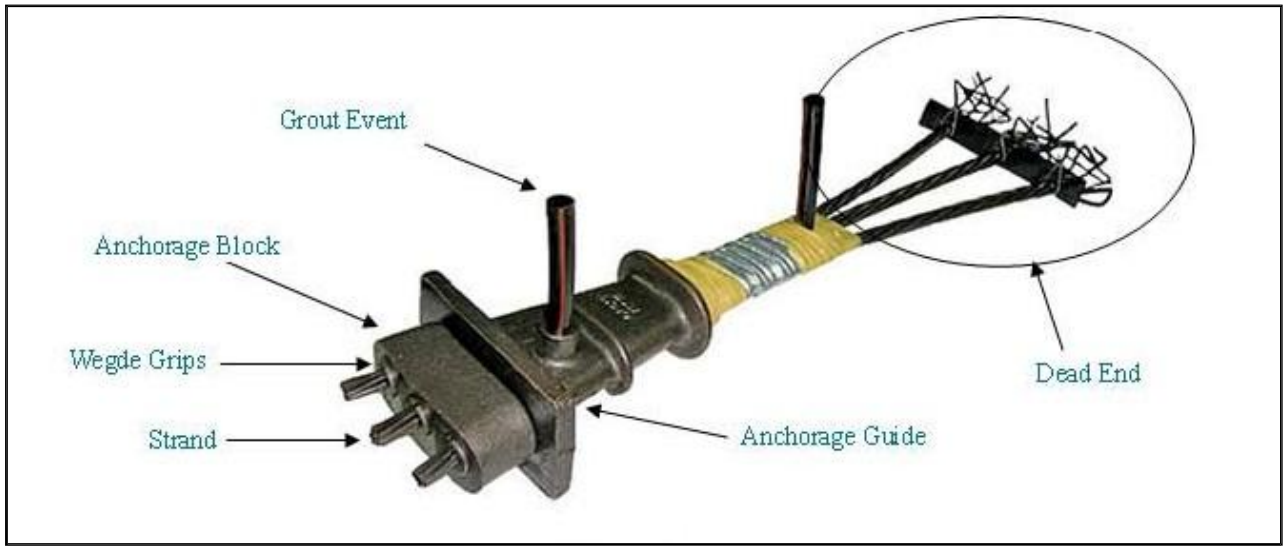
The other is bonded system that consist of3 Type of anchorage systems (3BS13,4BS13, 5BS13) with multistrand flat duct.

The C-Post Co.,Ltd use “ANCHORA post-tensioning system” that Developed by Dr. BijanO. Aalami and our company.

The strands are individually gripped in one flat anchor head unit that consistof Block and Guide. The strands are stressed individually by means of monostrand jack and their prestressing forces shall be transmitted by means of flat type anchorage system. The strands are contained in one flexible flat duct which is made of corrugated galvanized metal. To ensure corrosion protection and to give adequate bond strength, the tendons are filled with suitablecement grout mix after complete stressing of the strands.

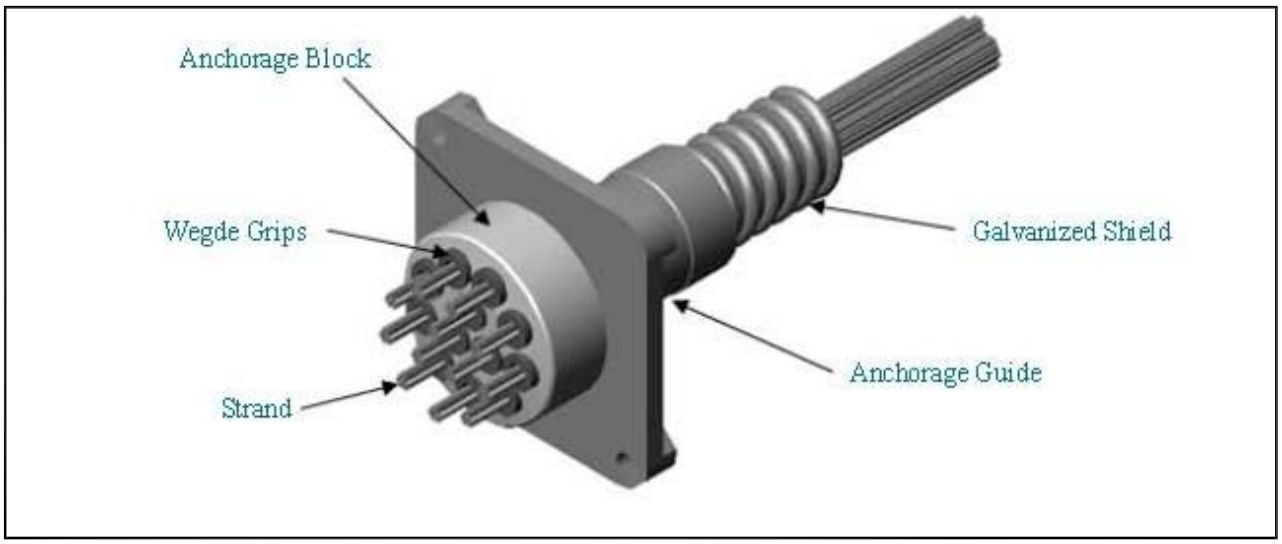
The same anchorage for stressing anchorage can be used as dead end anchorage in which case the wedges are preseated in the anchor head unit by applying nominal force to the strand using the stressing jack.

Alternatively an onion dead end anchorage can be used with simpler solution and more cost effective. In this case each strand is formed into an onion shape by means of special forming jack.



Slab Anchorage

The other civil structure such as bridge, silo etc. are normally applied by multi strand system. The system are normally adopted for bonded tendons that consist of a bundle of strand with a nominal diameter of 0.5"(12.7 mm) or 0.6" (15.2 mm). The number of strands per tendon can be from 7 strand up to 19 strands. The tendons are contained in one round duct which is made of corrugated galvanized metal.



Multistrand Anchorage

POST-TENSIONING HARDWARE

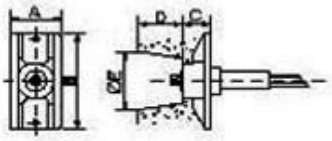
STRAND PROPERTIES

7-wire low relaxation strand

Standard	Nominal tensile strength N/mm²	Nominal diameter mm.	Nominal area mm²	Nominal weight kg/1000m.	Minimum breaking strength kN	Relaxation 1000 hrs. %
TIS 420-2510 & ISO 6934-4 : 1991	1860	12.7	98.7	774	184	2.5*
		15.2	139	1101	259	
ASTM A416-96	Grade 271 (1860)	12.7	98.7	775	183.7	2.5*
		15.2	140	1102	260.7	

Note
*Initial force of 70% of minimum breaking strength
Modulus of elasticity = 1.95 x 10⁵ - 1.98 x 10⁵ N/mm²
(1.98 x 10⁴ - 2.0 x 10⁴ kg/cm²)

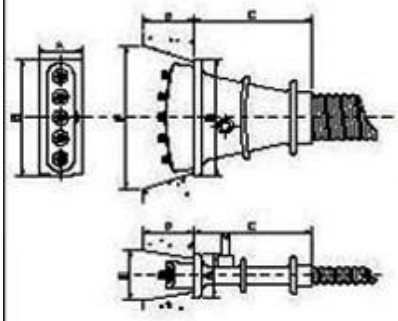
ANCHORAGES



MONO-STRAND ANCHORAGES

"US" Series For Unbonded Tendon

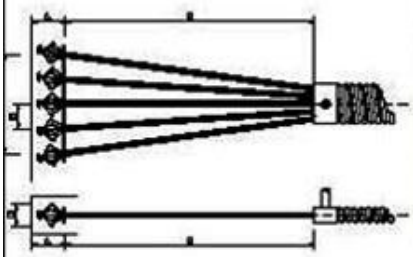
Type	No. of Strands	Strand Diameter	A	B	C	D	ØE	
US13	1	12.7	65	125	45	40	85	



STRESSING ANCHORAGES

"BS" Series For Bonded Tendon

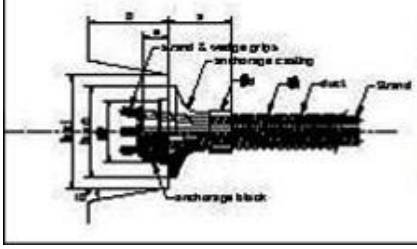
Type	No. of Strands	Strand Diameter	A	B	C	D	E	F
3BS13	3	12.7	78	155	170	90	90	190
4BS13	4	12.7	78	190	195	90	90	230
5BS13	5	12.7	78	210	205	90	90	260
3BS15	3	15.2	78	190	195	90	105	230
4BS15	4	15.2	78	210	205	90	105	260



DEAD END ANCHORAGES

"DS" Series For Bonded Tendon

Type	No. of Strands	Strand Diameter	A	B	C	D		
3DS13	3	12.7	80	800	80	160		
4DS13	4	12.7	80	800	80	240		
5DS13	5	12.7	80	800	80	320		
3DS15	3	15.2	80	900	80	160		
4DS15	4	15.2	80	900	80	240		



K-Type ANCHORAGES

"K" Series For Multistrand Oval Tendon

Type	A	B	C	D	E	F	G	H	I	J
7KS13	110	170	170	74	50	120	110	220	220	62
12KS13	150	215	215	90	55	140	120	270	270	72

All dimensions are in mm.

SERVICES & PRODUCTS (Slabs & Deck Floor)

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SERVICES AND PRODUCTS

ESFPT is basically involved in the post tensioning works in buildings. Following are the services and products offered:-

- Value Engineering
- Structural Design
- Optimization and Execution
- Supervision
- Production
- Trading
- Ducts
- Anchorage Sets
- Post tensioning equipments
- Strands and Reinforcement Installation
- Related Accessories

ESFPT has its own structural department comprising of well experienced structural engineers, proficient of carrying out most economical and safe post tension slab designs considering the architectural requirements as well and also at the same time skilful enough of handling work of any enormity.

Further, as there is a lot co ordination required to be done with the clients, consultants, main contractor, sub contractors during the design stage as well as execution stage, ESFPT engineers are readily available for discussions and solutions. Having designed and executed vast number of projects, the discussions with the various approving authorities can be handled by the ESFPT structural engineers.

ESFPT has also carried out value engineering studies for some of the projects, where there was a requirement from the client to check the feasibility of opting to post tensioning.

Also, ESFPT provides alternate post tensioning design solutions with the expected advantages as against the existing conventional concrete designs if available.

ESFPT has a strong execution and supervision team comprising of well experienced engineers, supervisors and technicians in the field of post tensioning. They are supported by well maintained equipments for the various stages in the execution works.

ESFPT has its own maintenance department lead by an experienced mechanical engineer, wherein all the equipments are thoroughly examined and their maintenance being carried out on a regular basis. The ducts and bar chairs are manufactured in house with material procured from approved resources.

To summarize, ESFPT is capable of handling projects of any size with its well experienced staff, sufficient equipments and materials being readily available.

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POST TENSIONING SYSTEM

ESFPT has been working in the Buildings as well as bridge structures and it has been nominated by world class systems for its applications in the respective fields.

POST TENSIONING SYSTEM- BUILDINGS

ESFPT has been nominated to adopt bonded system for post tensioning by C-Post in the Middle East and other major parts of the world as well.

C – Post is one of the leading companies with its own post tensioning system. Also apart from the system production it has its own design and execution divisions as well.

C-Post is also into the post tensioning works of special structures like silos, tanks, etc. Apart from post tensioning C-Post is involved in the Pre cast Concrete Wall Panels and Pre cast Concrete Elements. The system supplier's company profile has been attached for reference.

MEXPRESA POST TENSIONING SYSTEM- BRIDGES

MEXPRESSA is devoted to the Development and Site implementation of highly technified construction systems for large structures, mainly bridges and buildings.

Since 1976 MEXPRESA has been an active partner in the construction of relevant bridges and structures in Mexico and elsewhere; from detailed design through on site furnishing of purpose materials, equipment and personnel. ESFPT has been appointed to solely adopt the bridge post tensioning system of MEXPRESSA.