

Post tension Slab | Advantages, Disadvantages | Construction Process

What is post tension slab?

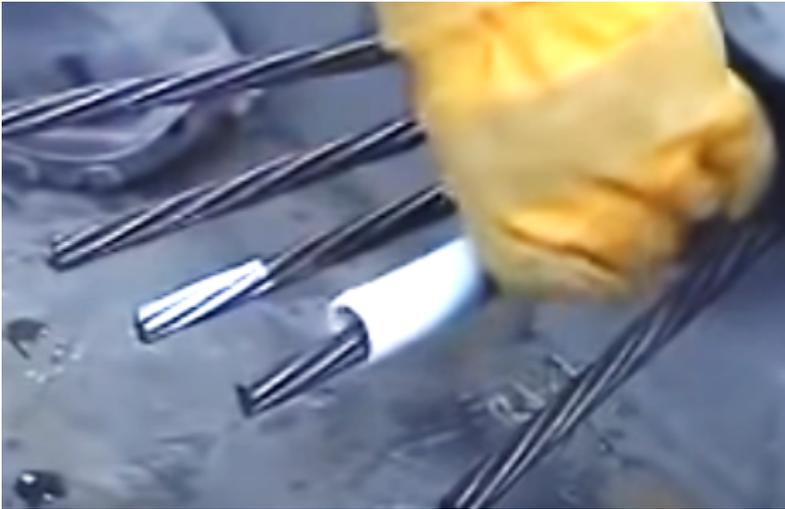
Concrete has high strength in compression but is weak in tension. Since it is brittle in nature it may crack suddenly after failure.

So, to make the concrete strong in tension and prevent the sudden collapse of the structure we have to provide tension-bearing materials like steel rods in the tension zone of the slab.



But nowadays slabs are provided tension with the help of tendons to reduce the amount of tension providing materials like steel rods.

Tendons are the group of steel wire. You can see in the picture below.



The slab which is subjected to tension with the help of tendons before casting of concrete for slab or after casting of concrete for the slab is known as pre-tensioned and post-tensioned slab respectively.

These types of slabs are used for many years for economic as well as time-saving purposes. Here we will discuss only the post-tensioned slab in detail.

Tension in the post-tensioned slab is provided in two steps after casting of concrete for the slab. Generally, it is provided in 7 days and then in 28 days, but I recommend you to provide tension as per design.

After providing tension in the tendons we have to grout with the help of cement, water, and some chemicals (Intraplaster) for strong bonding with the help of a pressure grouter. After that, the tendons wire is cut and tighten with anchors.

Post tension slab advantages

It has less deflection after loading.

It has high fatigue strength

Less numbers of steel are used which decrease the chance of corrosion.

It is time saving in nature

Generally it is prepared at site so no need to transport from one place to another.

It can be casted for large span because we have to provide tension at site.

Disadvantages of PT slab

Different tendons should be used for different members like slab, beam etc.

It is less reliable and less durable than pre-tension slab

It is costlier as compared to pre tension slab

Skilled human power is required.

Difficult to grout.

Why use post tension slab?

Sometimes due to natural calamities and overload slab got crack in some areas. It makes the steel rods inside the slab in contact with an atmosphere that corrode the steel and make the slab weak.

So for the following purpose post tension slab are used,

1. To avoid crack as it is post-tensioned.
2. To increase the strength of the slab with the help of tendons wire.
3. To reduce deflection in the slab, due to loading.

Uses of PT slab

It is used School auditoriums, cinema hall, shopping mall, bridge, parking garage etc.

It is also used in railway sleeper, water tank etc.

How post tension slab works?

First of all, we need high-strength concrete to prepare a post-tension slab. Because when tension is given in the slab then the slab has to shrink somewhat to be strong in tension. If high-strength concrete is not constructed then there will be shrinkage cracks in the slab which may damage the entire slab.

When tendons are given tension force and released then the lower portion of the slab becomes more strong in tension due to compression force already added by tendons to overcome tension force.



Tendons Stretcher

Now, whenever a load is applied on the slab then the lower portion of the slab balances the compression force by tendons first, and then tension forces are applied. In this way, tension resistance in the tension zone of the slab increases, and post-tension slabs are workable for more loads with low tension-steel rods.

Comparison in RCC Slab and PT Slab (Based on Costing)

It is for bay size 30'x30' (30 feet x 30 feet)

Parameters	Post tension Slab	RCC Slab
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Slab Thickness	8 inch	10 inch
Rebars per square feet	0.8 Kg.	2 Kg
Post-tension-steel per square feet	0.5 Kg	0 Kg
Cost per Square feet. (\$)	8.1	9.16

Construction process of Post tension Slab

At first, the tendons are laid down along with the other reinforcement according to the suggestion of structural engineers.

The tendons are fitted with the help of experienced labors or skilled person.

After that, the tendons should be wrapped with the help of a duct to prevent them from contact with moisture or water coming from the concrete.

One end of the tendons is fixed with the help of an anchor and another end of the tendons of the slab should be left free for proving the tension in the tendons.

Now the concrete should be cast to prepare the slab and let it take its strength till 20 to 24 days. The slab should have taken about 75% of the strength before providing tension in the tendons.

Now the tendons are provided tension force with the help of tendon stretcher.

The tension force is provided about 80% of the strength of the slab when tension is provided into tendons it gets elongated and the concrete slab get compressed to bear extra load against tension.

After the whole process, the tendons are fixed permanently

with the help of an anchor and an extra part of tendons are trimmed and insulated with the help of chemical coating to prevent them from corrosion.

Finally tendons area are covered and sealed with the help of concrete.

I hope this article on “Post tension Slab” remains helpful for you.

Happy Learning – Civil Concept

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