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Plot No. A1, 1st Main Road, Opp. to AIEMA, Industrial Estate, Ambattur, Chennai - 600 058. (T) 044-2625 2006 | (E) baisouthern1950@gmail.com | (W) www.baisouthern.com

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🜢 ஆசிரியர் மடல்

அன்புடையீர் வணக்கம்,

ஜூலை திங்கள் 2 ஆம் தேதி அகவை 83ல் அடியெடுத்து வைக்கும் அகில இந்திய கட்டுநர் வல்லுநர் சங்கத்தின் ஆகச் சிறந்த செயல் திறனாளி சங்கத்தின் வளர்ச்சி, உறுப்பினர்களின் வாழ்வாதார போராட்டங்களுக்கு வழிகாட்டும் கலங்கரை விளக்கமாய் திகழ்ந்து தன் வாழ்நாளின் பெரும் பகுதியினை கட்டுநர் சங்கத்திற்கு அர்ப்பணித்து செயலாற்றி வரும் முன்னாள் அகில இந்திய தலைவர் மற்றும் காப்பாளர் அனைவராலும் பீஷ்மா என்று அழைக்கப்படும் திரு. R. இராதாகிருஷ்ணன் அவர்கள்



இன்னும் பல்லாண்டு நீடூழி வாழ்ந்து கட்டுநர் சங்கத்திற்கு சேவாரத்னா அவர்களின் சேவை தொடர்ந்திட வேண்டும் என் விழைந்து வாழ்த்தி வணங்குகிறோம்.

உலகம் தோன்றி விழிக்கும் முன்பே உதடுகள் விளித்த மொழி தமிழ் மொழி என்பதை உலகத்தார் உணர்ந்துள்ளனர். ஜி. யு போப் என தமிழர்களால் அறியப்பட்ட ஜோர்ஜ் உக்லோப்போப் 1820 ஆம் ஆண்டு கனடாவில் பிறந்தவர். உலகின் செம்மொழியாகிய தமிழ் மொழியை ஜி.யு போப் தனது 17வது வயதிலேயே கற்கத் தொடங்கினார். 1839 ஆம் ஆண்டு தமிழ்நாட்டிற்கு வந்து தமிழ் மொழியில் புலமை பெற்றார். திருக்குறள், திருவாசகம், நாலடியார் முதலிய தமிழ் இலக்கியங்களை ஆங்கிலத்தில் மொழி பெயர்த்தது அவரது சிறப்பான சேவையாகும். திரு ஜி யு போப் இங்கிலாந்து ஆக்ஸ்போர்ட் பல்கலைக்கழகத்தில் தமிழ் விரிவுரையாளராக பணியாற்றி பேரும் புகழும் பெற்றார். திரு ஜி. யு போப் பிறந்து இருநூறு ஆண்டுகளுக்குப் பின் கனடாவில் அவர் பிறந்த ஊரில் கனடிய தமிழ் மக்கள் திரு. ஜி.யு போப்பிற்கு ஜூலை திங்கள் 15ஆம் தேதி சிலை திறந்து வைத்து சிறப்பித்துள்ளார்கள்.

உலகத் தமிழர்கள் ஒன்றிணைந்த உலகத் தமிழ் ஆராய்ச்சி மாநாடு மலேசியாவில் நடைபெற்றது. இதில் ஜப்பான், சீனா,அமெரிக்கா, ஐரோப்பிய நாடுகள், ஆஸ்திரேலியா உள்ளிட்ட நாடுகளை சேர்ந்தவரும் கலந்து கொண்டு சிறப்பித்தது தமிழாலே உலகினை இணைக்க சாத்தியமாகும் என பெருமை கொள்ள வைக்கிறது.

மலேசியாவில் மலாய் மொழி சிங்கப்பூரில் ஆங்கில மொழி என்கிற ஆதிக்கம் இருந்தாலும் அந்நாடுகளில் வாழும் தமிழ் மக்கள் மொழி கலப்படத்தை தவிர்த்து தமிழில்தான் பேசுகிறார்கள். பல்வேறு கலாச்சாரங்களின் சங்கமமாக விளங்கும் சிங்கப்பூரில் அதிகாரத்துவ மொழிகளில் தமிழ் ஒரு முக்கியத்துவமான மொழியாக விளங்கி வருவதை காணும் போது தமிழ் மொழியில் உன்னதத்தை உணர முடிகிறது.

ஆங்கில மொழி உலகத் தொடர்புக்கு அவசியம் என்பது ஏற்புடையது ஆயினும், உலகத்தார் போற்றிடும் செம்மொழியாம் நம் தாய் தமிழ் மொழியின் உன்னதத்தை மண்ணின் மைந்தர்களுக்கு உணர்த்தி தமிழை நேசி, தமிழில் வாசி, தமிழில் பேசி, நம் தாய் தமிழுக்கு பெருமை சேர்க்க வேண்டும் என வலியுறுத்த வேண்டியதாய் உள்ளது.

04

குற்றம் இலனாய்க் குடிசெய்து வாழ்வானைச் சுற்றமாச் சுற்றும் உலகு

- திருக்குறள்

நன்றி, வணக்கம்

என்றும் அன்புடன் S. அய்யநாதன்

•Southern Builder •

மய்யத்தலைவர் மடல் 🌢

தென்னக மய்ய உறுப்பினர்களுக்கு வணக்கம் !

இந்த மாதம் நம் மாத இதழ் வாயிலாக தொடர்பு கொள்ளும்போது உங்களின் அனைவரின் சார்பாக நம் பீஷ்மா, சேவாரத்னா அவர்களுக்கு 83வது பிறந்த நாள் வாழ்த்துக்களை தெரிவித்து அவரிடமிருந்து ஆசி பெற்றுக் கொண்டோம். அகில இந்திய அளவில் கட்டுநர் சங்கத்திற்கு அவரின் பணி இந்த ஜூலை மாதத்தோடு 50 ஆண்டுகளை நிறைவு செய்து இனிதே தொடந்து கொண்டிருக்கின்றது என்பதை உங்கள் அனைவருக்கும் தெரியப்படுத்துவதில் மட்டற்ற மகிழ்ச்சி அடைகிறேன்.



தமிழக அரசின் பத்திரப்பதிவு கட்டணம் POWER OF ATTORNEY மற்றும் CONSTRUCTION AGREEMENT போன்றவைகளுக்கு முறையே 1% மற்றும் 3% சந்தை மதிப்பின்மேல் கூட்டப்பட்டது ஒரு பேரதிர்ச்சியாகவே கட்டுநர்களால் பார்க்க்பபடுகின்றது. இதை முன்னிட்டு உடனடியாக நம் மய்யத்தில் AFFILIATED ASSOCIATIONS நிர்வாகிகளை வரவழைத்து அவர்களின் கருத்துக்களை பெற்று தமிழக முதல்வர், பதிவுத்துறை அமைச்சர் மற்றும் துறை முதன்மை செயலாளர் ஆகியோருக்கு இந்த கட்டண அதிகரிப்பால் ஏற்படும் இடர்பாடுகள் மற்றும் திடீர் சுமை காரணமாக தொழிலில் ஏற்படப்போகும் தொய்வை விளக்கமாக பட்டியலிட்டு மனு ஒன்றை சமர்ப்பித்துள்ளோம். மேலும் பிற சங்கங்களுடன் இணைந்து பத்திரிக்கையாளர்கள் கூட்டத்தில் கலந்து கொண்டு கருத்துக்களை பகிர்ந்துள்ளோம் என்பதை தெரியப்படுத்திக் கொள்கிறேன்.

இம்மாதம் நமது மய்ய நிரந்தர உறுப்பினர் NAVIN'S கட்டுமான தளத்தில் சுமார் 300க்கும் மேற்பட்ட கட்டுமான தொழிலாளர்களுக்கு இலவசமாக தென்னக மய்யம் மற்றும் தென்னக மய்ய அறக்கட்டளை சார்பாக Apollo Hospital. Savitha Hospital மற்றும் Govt. Eye Hospital உடனான சுமார் 30க்கும் மேற்பட்ட மருத்துவர்கள் மிகச் சிறப்பான முறையில் மருத்துவ முகாமினை நடத்திக் கொடுத்தனர். கட்டுமான தளத்தில் NAVIN'S மேலாண்மை செய்திருந்த சிறப்பான ஏற்பாடுகள் நம்மை மிகவும் ஊக்குவிப்பதாக இருந்தது.

கட்டுமான தொழிலாளர்களுக்கு தேவையான மருத்துவ பரிசோதனை செய்து கொள்ள உங்களிடம் உள்ள தொழிலாளர்களை நம் மய்ய வளாக மருத்துவமனைக்கு அனுப்பி வைக்கலாம். அல்லது 100க்கும் மேற்பட்ட தொழிலாளர்கள் இருந்தால் உங்களின் பணித்தளத்திற்கே வந்து மருத்துவ சேவை செய்து கொடுக்கப்படும் என்பதை உங்களின் கனிவான கவனத்திற்கு கொண்டு வருகிறேன்.

இரண்டாவது மாநில அளவிலான மேலாண்மை மற்றும் பொதுக்குழு கூட்டம் செங்கை மய்யத்தின் உபசரிப்போடு மாமல்லபுரத்தில் நடைபெற்றது. பெரும்பான்மையான பொதுக்குழு உறுப்பினர்கள் கலந்து கொண்டனர்.

உங்களால் முடிந்த அளவிற்கு நம் மய்யத்தின் புதிய உறுப்பினர்கள் சேர்க்கைக்கு மனமுவந்து ஒத்துழைக்க வேண்டுகிறேன். மற்றும் சதர்ன் பில்டர் மாத இதழ்க்கான விளம்பரங்களை பெற்றுத் தருமாறும் அன்புடக் கேட்டுக்கொள்கிறேன்.

இப்படிக்கு, என்றும் அன்புடன் A.N. பாலாஜி

(GAD)

Use of Polymers in **Concrete**

Polymers or epoxies are used for imparting certain special properties to concrete. They have been used for the following reasons:

- (1) To improve strength and durability of hardened concrete
- (2) To improve chemical resistance and impermeability of hardened concrete
- (3) To modify the flow characteristics of fresh concrete
- (4) To improve the bond characteristics between old and new concrete for repair work

The prices of various polymers vary considerably, but as a rough guide it can be assumed that polymers cost approximately 20 times that of ordinary cement. However, direct cost should not be the sole basis of an economic assessment of their use, because the treatment could reduce the fabrication cost and substantially improved performance and durability.

Some popularly used polymers are listed below.

Urethanes: These are polymers and copolymers produced by the reaction of isocyanates with polyols.

Acrylics: These are polymers and copolymers of the esters of acrylic and methacrylic acids.

Styrene butadiene resins (SBR): SBR resins are basically synthetic rubber in solution.

Vinyl: This is a general term for substituted ethylenes and their copolymers such as polyethylene, polystyrenes (basically copolymers than homopolymers).

Epoxies: Synthetic polymers which are condensates of epichloro-hydrin and a suitable polyhydroxyl material; most commonly used polyhydroxyl material is bisphenol–A.

Polymers are used in the following ways with concrete:

- (1) Polymer impregnated concrete
- (2) Polymer concrete
- (3) Polymer-modified concrete/mortar
- (4) Polymer as protective coating
- (5) Polymer as bonding agent
- (6) Other applications

A comparison of some major properties of some polymers is shown in Table 1.

- Table Companson of properties of different polymer					
Property	Urethanes	Acrylics	SBR	Vinyl	Epoxies
Adhesion	Excellent	Excellent	Primer required	Excellent	Excellent
Resistance to acids	Very good	Fair	Poor	Fair	Excellent
Resistance to alkalis	Very good	Very good	Poor	Fair	Excellent
Resistance to oils/petroleum products	Excellent	Very good	Poor	Very good	Excellent
Flexibility	Very good	Fair	Excellent	Very good	Fair
Abrasion resistance	Very good	Good	Good	Very good	Excellent
Resistance to UV rays	Good	Very Good	Good	Very good	Good

Table Comparison of properties of different polymers

Figure 1 illustrates compressive stress as a function of strain in concrete at different levels of polymer content

A.R.Santhakumar Former Emeritus Professor, Department of Civil Engineering IIT Madras



[polymer used is methyl methacrylate (MMA)].



Fig. 1 Compressive-stress-bearing capacity of concretes at different levels of polymer content (Source: Seshadri & Ramana Kumar 1992)

1 Polymer-impregnated Concrete

The ways in which the polymer is introduced into the hardened concrete vary widely and depend upon the commercial objective. These include the following operations:

(1) The concrete is thoroughly dried, usually by heating.

- (2) They dry concrete is evacuated.
- (3) The concrete is immersed in the chosen monomer (or the monomer is applied to the surface of the concrete).
- (4) Pressure is applied.
- (5) The impregnated concrete is sealed to avoid loss of monomer.
- (6) The monomer is converted to polymer either by gamma radiation or by thermal-catalytic method.

(7) The concrete is cooled.

The full sequence of operations can only be followed in a precast concrete factory. In the site work it is normally possible to dry the concrete only partially, apply the monomer to the surface, and use heat to control the polymer conversion.

A wide range of monomers are being used in concrete. These include acrylonitrite, ethyl acrylate, methyl methacrylate (MMA), polyester styrene, styrene, and vinyl chloride. A mixture of 70% MMA and 30% of trimethylopropane trimethacrylate has also been used for high-temperature applications in de-salination plants.

Improvements in compressive strength and tensile strength result from the introduction of the polymer. However, the quantity of polymer that can be introduced depends upon the porosity of concrete, and hence the potential improvement of a particular concrete is substantial if the original concrete is weak (i.e., has a high porosity) but is relatively small if the basic concrete is of high strength and low porosity. In fact, by careful mix design, it is not difficult to make workable plain concretes from ordinary Portland cement and strong natural aggregates with a 28 day cube crushing strength of 100 N/mm2, whereas most polymer-impregnated concretes, irrespective of the strength of the basic unmodified concrete, have cube strengths in the range of 120–150 N/mm2. These high strengths are stable and do not increase further with age. But the strengths of plain concretes continue to rise and at one year the advantage shown by the polymer-impregnated concretes would have largely disappeared. On the other hand, for very high early-age strengths (at 7 days, say), the polymer impregnation technique could be used. However, even if the polymer/cement ratio is only 1:20, the material costs are about doubled and, with the addition of extra handling, curing, and polymerization costs, the resulting product is necessarily expensive.

1.1 Properties

Polymer-impregnated concretes normally have cube crushing strengths in excess of 100 N/mm2 irrespective of the strength of the original untreated concrete. The weaker concretes absorb a higher proportion of the monomer and hence have higher material costs. The flexural strengths are usually about 15 N/mm2, which is slightly higher than that for the highest strength plain concretes that can be made from normal constituents. The elastic moduli lie in the range from 30 to 60 kN/mm2, which are similar to those for high-strength plain concrete (about 45 kN/mm2).

As the strengths and elastic moduli of high-strength plain and polymer-impregnated concretes are not very different, the failure and cracking strains are unlikely to differ significantly. High-strength concretes of both types tend to be brittle and cracks, once initiated, propagate rapidly and frequently run through the aggregate. This can mean that the total energy expended in fracturing highstrength material is less than that demanded by more conventional (medium-strength) concretes, in which the aggregate delays the propagation of cracks and failure is relatively ductile and not explosive or catastrophic.

During the manufacturing cycle, polymer-impregnated concretes have often been heated to 150°C. Because of the reduced porosity and permeability, these concretes have low shrinkage and creep characteristics. If the temperature is above the ambient temperature, it is possible that the creep will be larger.

The polymer-impregnated concretes tested have improved resistance to sulphate, chloride, and acid attacks compared with the plain concretes from which they are made. While significant improvements have also been observed in the resistance to cycles of freezing and thawing, it is important to note that similar improvements are shown by good (high-strength) airentrained concretes devoid of any polymer.

1.2 Applications

It is likely that the greatest commercial potential for polymer-impregnated concrete will depend upon the enhanced resistance to damage from aggressive environments. It is impossible to make a general recommendation for the use of polymers in any particular application. Each must be judged separately and alternative solutions compared. With regard to the use of polymer impregnation to improve the durability of concrete in sub-zero temperatures, it is important to emphasize the adequate performance of correctly designed plain concrete and to dispel the view that polymer impregnation is essential in these conditions. The fact that dense concretes, such as prestressed kerbs, are also resistant to de-icing salts is important to note in this context.

Polymer impregnation can be used to repair damaged concrete, but it is impossible to make a general recommendation regarding the viability of the technique. Every potential application is different and must be considered separately. Sufficient information is already available for a rational decision to be reached for most applications.

There is some evidence that polymer impregnation can improve the resistance of the concrete surface to abrasive wear. So in factories where heavy equipment is likely to damage the floor, or in dense traffick areas in cities where frequent repair work would seriously impede the flow of traffic, these polymer-based special techniques can be advantageously employed.

2 Polymer-modified Cement Concretes

Concretes with polymers added during mixing to modify the properties of the hardened concrete are classified as polymer-modified cement (PMC) concrete. Polymers are added to concrete mixes either as an aqueous emulsion or in a dispersed form in an attempt to improve

- the tensile strength and extensibility of concrete,
- the impact resistance,
- the abrasion resistance,
- · durability and resistance to aggressive fluids, and
- bond between old and new concrete.

2.1 Properties

One of the earliest polymers used is polyvinyl acetate (PVA), but the range of polymers that have been tried is now extremely wide and includes PVA copolymers, acrylics, vinyls, natural rubber, and styrene butadiene rubber. The proportions of polymer incorporated also vary considerably and range from under 1% to over 30% of the solid volume of cement.

The addition of these polymers has certain common effects. Concrete mixes become more workable and so the water content can be reduced. Despite the higher workability, more air is entrained in polymer cement concretes. PMC concretes usually contain at least 3% more entrained air than plain concretes of similar workability. Reduction in the water content increases the crushing strength, but the extra voids have the reverse effect and, in consequence, the polymer admixtures generally have only a small effect upon the crushing strength. However, there is normally a significant increase in the flexural strength of the concrete, which may be attributed to an improved bond between the aggregate and the matrix.

As the elastic moduli of polymers are generally lower than those of cement pastes and concretes, the moduli

of polymer cement concretes are lower than those of the equivalent plain cement concrete. The additional entrained air reduces the moduli further.

The durability of concretes with polymer admixtures depends primarily upon the properties of the polymer used and upon the mix proportion. Hydrated Portland cement is alkaline (having pH value greater than 12.5) and some of the polymers hyrolyse in moist cement environments. PVA is particularly sensitive to such an environment and its use is recommended only in dry conditions. PVA copolymers have been used to resist hydrolysis in alkaline solutions, but these are more expensive.

At least 5% polymer by weight of cement is required to obtain substantial changes in the properties of the hardened concrete. The addition of polymer usually increases the setting time of the cement significantly.

The polymer concretes have a greater resistance to abrasion than plain concretes, wear rates being reduced by as much as 75%. For this reason, and because of improved durability, polymer cement concretes have been used for factory floors, where the abrasion resistance of conventional concretes may be inadequate. Polymer concrete floors provide a neat and clean floor usually needed by electronics industries.

2.2 Applications

Polymer cement concretes are several times more expensive than plain concretes. Therefore they are used only for special applications. The principal advantages shown by these concretes are (a) greater failure strain, (b) good bond with old concrete, (c) improved resistance to abrasion, and (d) improved durability and resistance to chemical attack. Some typical applications in which these properties have been worthwhile are the following.

(1) For factory floors, particularly where chemicals or oils are liable to be spilt.

- (2) For repair of old or damaged concrete.
- (3) For surfacing steel bridge or ship decks.
- (4) For flooring in frozen-food factories.

(5) For loading ramps, where the abrasive wear of concrete is high.

(6) For cementing ceramic tiles to concrete (the extra bond and flexibility are advantageous here).

(7) For concretes subjected to large doses of deicing salts.

3 Polymer Concrete

Just as cement is used as a binder in cement concrete, monomer or resin is added to bind preheated aggregates consisting of coarse, fine, ultrafine, and other particle sizes. The commonly used binders are styrene, methylmethacrylate, polyesters, and epoxies.

In the prepack method graded dry aggregates are packed in moulds and polymer is poured into the voids and, if necessary, impregnated by vacuum process. In the premix method polymer and aggregates are mixed in conventional mixers and the mix is transferred to moulds. The mix is vibrated for compaction.

3.1 Properties

They are highly resistant to chemical attack and freeze-thaw cycles. Permeability and absorption are almost zero. The typical properties of polymer concrete and plain concrete are shown in Table .2 for comparison. Table .3 compares some of the key properties achieved with cement concrete and polymer concrete.

Table .2 Comparison of properties of polymer concrete and plain concrete

Broporty	Polymer	Plain
Fioperty	concrete	concrete
Compressive strength, kg/cm ²	1200	300
Tensile strength, kg/cm ²	150	30
Flexural strength, kg/cm ²	350	80
Water absorption	0.5	5.5
Percentage of loss of weight on 90 days	Nil	9.5
exposure to chemicals		

	Table .	.3	Com	parison	of	key	pro	pertie
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Property	Test method	Polymer concrete* (epoxy screed)	Average concrete
Compressive strength (N/mm ²)	BS: 1881 Part 4	74	20
Flexural strength (N/mm ²)	BS: 4551 Part 10.3.1970	32	7
Tensile strength (N/mm ²)	BS: 12-1958 App. H	15	3.5
Abrasion resistance (mg/cycle)	Paint Research Assoc., UK, Taber abrasion test—wt loss	2.7	4.19
Bond strength of concrete (N/mm ²)	Electrometer pull-off test	3.0	Lower than typical cohesive strength of concrete

*Figures for polymer concrete are for a proprietary product.

3.2 Application

Even though the initial cost of polymer cement concrete (PCC) is high, the material cost efficiency is estimated to be 400% compared to ordinary cement concrete. Hence PPC is used to manufacture pipes for carrying chemicals in industries.

4 Polymer Composites

These are produced using polymers with cement, sand, or aggregates. The addition of polymers to concrete has been shown to improve its (a) compressive strength, (b) resistance to wear and tear, (c) fatigue resistance, (d) impact resistance, (e) impermeability, (f) durability, and (g) chemical resistance. Because of these properties, they have found application in the following areas:

(1) Precast products such as kerb stone

- (2) Bridge ducts
- (3) Chequered plates for industrial structures
- (4) Manhole covers
- (5) Sewers
- (6) Tunnel linings
- (7) Pipes carrying chemicals

5 Proportioning of Polymer Concrete

While using polymers it should be noted that polymer dispersion is water based and the ratios of mixing vary from manufacturer to manufacturer, depending upon solid contents. Ultimately, it is the proportion of solid content of polymer and cement content that reflects on the quality and cost of PCC. Typical mixing ratios for various applications are shown in Table .4. Economy is one of the most decisive guiding factors in determining the amount of polymer, in a particular PCC. More the content of polymer, the more is the enhancement in the properties of PCC and the durability of the repaired structure.

Table .4 Typical ratios for various applications

Type of application	Thickness/Mortar type	Mixing ratios (parts by volume)			
Bonding slurry for bonding new layers to hardened bases	Very Thin, < 10 mm	Cement:Sand = 1:1 Polymer: Water = 1:1			
Patching and repair mortars	Up to 10 mm thick	Cement:Sand = 1:2 Polymer:Water = 1:2			
Patching and repair monars	Above 10 mm thick	Cement:Sand = 1:3 Polymer:Water = 1:3			
Cement screeds with high abrasion resistance, high elasticity, and less dust formation	Above 10 mm thick Above 30 mm thick	Polymer:Water = 1:4 Polymer:Water = 1:6			
Levelling and smoothing mortars with increased oil and petrol resistance		Cement:Sand = 1:2 Polymer:Water = 1:2			
Plastic reinforced mortars for plasters, bonding and joint mortars, with better bonding and higher weather resistance	Cement mortars Lime and lime cement mortars Joint mortars Bonding mortars	Polymer:Water = 1:5 Polymer:Water = 1:10 Polymer:Water = 1:2 Polymer:Water = 1:2			

Depending on the type of the polymer and its contents, the degree of elasticity also varies.

6 Tests on Polymer Concrete

The best way to ensure the advantages of polymers is to conduct a series of tests on the polymer-modified mortars and to compare the results with mortars without polymers. In most of the practical cases, it suffices only to conduct the tests on polymer-modified concrete if the base concrete values are known. It is normally sufficient that the repair mortar has 10% higher strength than the base concrete. The following tests can be conducted to determine the suitability of the formulation:

- Compressive strength test
- Flexural strength test
- Bond strength test
- Air entrainment test
- Alkali resistance test
- Chloride content test

In the case of specialized repairs, the following tests may also be conducted:

- Water permeability test
- Vapour permeability test
- Carbonation resistance test
- Wear resistance test
- Impact resistance test
- · Chloride ion penetration test
- · Shrinkage characteristics test
- · Bond and shrinkage tests in typical repair case
- UV resistance test
- Modulus of elasticity test
- Dynamic modulus of elasticity test
- Coefficient of thermal expansion test

Only those tests which have a direct bearing on the given repair situation should be conducted.

Tables .5 and 6 show some typical test results for polymer-added mortars. The polymer used in these cases is an acrylic dispersion with solid content of 33%. The mix used is as follows:

Gauging solution 1 part of polymer dispersions:2 PBW of water Mixing ratio 100 PBW of mortar:12.5 PBW of gauging solution. Table .5 Typical compressive and flexural strengths of PCC

	Flexural strength and compressive strength of the polymer mortar					
	system Hardened mortar characteristics: 4×4×16 cm prisms					
	Age, days Flexural strength, N/mm ² Compressive strength, N/mm ²					

	~	0.0	20			
	7	7.0	36			
	28	11.0	55			
	Table.6 Typical bonding strengths in concrete					
Adhesive strengths in tension for storage at standard						

	referen	50% Rh	
After 7 days	After 28 days	After 90 days	Fracture
1.9 N/mm ²	2.4 N/mm ²	3.6 N/mm ²	In the concrete or in the concrete

Notes:

Stored at constant conditions = 2.1 N/mm2, Temperature cycling = 2.2 N/mm2 Temperature cycling + humidity cycling = 1.9 N/mm2 Fractures occurred mainly in concrete Mortar ratio 1 PBW cement:3 PBW of well graded sand (PBW = parts by weight)

6.1 Precautions While Testing

Since the setting behaviour and mixing proportions are peculiar to polymer mortars, it is advisable to observe a few precautions while testing polymer mortars. It is preferable to conduct an air-entrainment test, because some formulations tend to entrap air during the mixing process. The air entrapped is at times 20%. Therefore, if there is marked loss in the strength of polymer mortars as compared to cement sand mixture, it can be due to the air entrainment. The air entrained by polymer addition should not be more than 1–1.5% more than that in the control mix.

Secondly, since the polymer-modified mortars are used as thin overlays, it is preferable to test the compressive and flexural strengths on thinner sections.

Normally, as per DIN specification, the tests are conducted on prisms of $40 \times 40 \times 160$ mm. The prisms are tested for flexural strengths and the broken halves of the prisms are tested for compressive strengths, with special attachments in which the load is transferred to 40 × 40 mm area. If prisms are not available, $50 \times 50 \times 50$ mm cubes can be utilized for compression strength tests.

One of the most important properties of the polymers to be used in concrete should be the resistance to saponification. If, for example, the polymer suggested is PVA, the alkali reacts with the ester molecular group of PVA and makes PVA brittle and punky. This reaction, called alkali hydrolysis or saponification, leaves calcium soap on the surface, which attacks water and the strength of mortars. To avoid this problem, the polymer used should be of non-saponification type and the alkali resistance test should be conducted. This simple test, which exposes the specimen to calcium hydroxide reagents, is conducted after every 90 specimens for compressive and flexural strengths. The values are compared and if the compressive strength is 90% and flexural strength is 75% of the reference, respectively, the polymer is considered suitable for repair.

The test for bond and shrinkage for a typical repair situation is shown in Fig. .2. The coated mortar is

subjected to cyclic temperature changes from -20°C to +60°C and the surface is observed for cracks, which mostly occur along and above reinforcements.



Fig.2 Test specimen for bond and shrinkage in a typical repair case

6.2 Tests to Ensure Quality of the Product

There are instances when different polymer types with different solid content are used. Since polymer dispersion is based on water, it can have different concen-trations. One should consider solid contents of the type of polymer employed. Under such circumstances, tests should be resorted to using an infrared spectrometer. Figure .3 shows an infrared spectrometer.



Fig.3 Infrared spectrometer

The compositions of different samples can be qualitatively compared by infrared spectrometry. A typical spectrum for acrylic dispersion is shown in Fig. .4. The spectrum of the product intended for use should be compared with a chosen reference spectrum to ensure quality of the product used for repair.



Fig.4 A typical infrared spectrum for acrylic dispersion

Every batch of the product for repair should be tested to determine the solid content by the simple method of oven-drying.

These tests ensure the quality of the product and give a comparative evaluation procedure.

6.3 Tests on Epoxy Mortar Joints

To ensure adequate bond characteristics between old concrete and new concrete in repair work, epoxy joins are mostly used. These joints are subjected to a variety of loading conditions, such as compression, shear, tension, and bond.

To find the efficiency of the bonding agent, the precast concrete elements may be jointed by epoxy formulation and tested for failure. Figure.5 shows a series of six tests that can be conducted in a regular UTM to assess the following joint efficiencies:

- Compression [Fig. .5(a)]
- Direct shear [Fig. .5(b)]
- Split tension [Fig. .5(c)]
- Jacketing efficiency [Fig. .5(d)]
- Pull-out efficiency [Fig. .5(e)]
- Slant shear [Fig. .5(f)]





Polymers play a vital role in enhancing special properties of conventional concrete. Though they are costly, their application is increasing because of the economy that can be achieved by reduction in the construction time and fabrication difficulties. In this chapter, we discussed the various types of polymer concrete, their specific properties, and the fields in which they are applied. The use of polymers improves not only compressive strength in the hardened state but also workability when the concrete is fresh. Because there is no specific code of practice for the use of polymer concrete, it becomes necessary to test its performance and reconcile with the mix adopted based on requirements. A detailed description of the tests normally performed for assessing its basic behaviour characteristics such as shear and bond were described. It is felt that in the years to come, polymer use in concrete will increase especially in the area of repair and restoration technology.

7. Conclusion

In conclusion the use of polymers aids in various projects in concrete construction. A few of them are described in this presentation.

<u> Tax Corner</u>

Recommendations of **50th meeting of GST Council**

GST Council recommends Casino, Horse Racing and Online gaming to be taxed at the uniform rate of 28% on full face value

GST Council recommends notification of GST Appellate Tribunal by the Centre with effect from 01.08.2023

GST Council recommends exemption of cancerrelated drugs, medicines for rare diseases and food products for special medical purposes from GST tax

Recommends bringing down rates from 18 percent to 5 percent on 4 items - Uncooked, unfried & extruded snack palettes, fish soluble paste, LD slag to be at par with blast furnace slag, and imitation zari thread

GST Council also recommends several measures for streamlining compliances in GST.

Changes in GST Tax Rates:

I. Recommendations relating to GST rates on Goods A. Changes in GST rates of goods

1. It has been decided to reduce the rate on uncooked/ unfried snack pellets, by whatever name called, to 5% and to regularise payment of GST on uncooked /unfried snack pellets during the past period on "as is basis".

B. Other changes relating to goods

- 1. It has been decided to exempt IGST on Dinutuximab (Quarziba) medicine when imported for personal use.
- 2. It has been decided to exempt IGST on medicines and Food for Special Medical Purposes (FSMP) used in the treatment of rare diseases enlisted under the National Policy for Rare Diseases, 2021 when imported for personal use subject to existing conditions. Similarly, IGST exemption is also being extended to FSMP whenimported by Centres of Excellence for Rare Diseases or any person or institution on recommendation of any of the listed Centres of Excellence.
- 3. It has been decided to clarify that supply of raw cotton, including kala cotton, by agriculturists to cooperatives is taxable under reverse charge mechanism and to regularise issues relating for the past period on "as is basis".
- 4. It has been decided to reduce GST on imitation zari thread or yarn known by any name in trade parlance from 12% to 5% and to regularize payment of GST related to this matter during the past period on "as is basis".
- 5. It has been decided to amend the entry 52B in compensation cess notification to include all utility vehicles by whatever name called provided they meet the parameters of Length exceeding 4000 mm, Engine capacity exceeding 1500 cc and having Ground Clearance of 170 mm & above and to clarify by way of explanation that 'Ground clearance' means Ground Clearance in un-laden condition.
- 6. It has been decided to reduce GST rate on LD slag

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from 18% to 5% to encourage better utilisation of this product and for protection of environment.

- 7. It has been decided to regularise the matters relating to trauma, spine and arthroplasty implants for the period prior to 18.07.2022 on "as is basis" in view of genuine interpretational issues.
- 8. It has been decided to reduce the GST rate on fish soluble paste from 18% to 5% and to regularise payment of GST on fish soluble paste during the past period on "as is basis".
- 9. It has been decided to regularise the matters relating to dessicated coconut for the period 1.7.2017 to 27.7.2017 on "as is basis" in view of genuine interpretational issues.
- 10. It has been decided that on pan masala, tobacco products etc, where it is not legally required to declare the retail sale price, the earlier ad valorem rate as was applicable on 31st March 2023 may be notified in order for levy of Compensation Cess.
- 11. It has been decided to include RBL Bank and ICBC bank in the list of specified banks for which IGST exemption is available on imports of gold, silver or platinum and update the list of banks /entities eligible for such IGST exemption as per Annexure 4B (HBP) of Foreign Trade Policy 2023.
- 12. Consequential changes in notifications may be carried out in view of new Foreign Trade Policy 2023.
- 13. It has been decided to regularise the issues relating to GST on plates and cups made of areca leaves prior to 01.10.2019.
- 14. It has been decided to regularise the issues relating to GST on biomass briquettes for the period 01.7.2017 to 12.10.2017.

II. Recommendations relating to GST rates on Services

A. Changes in GST rates of services

 It has been decided that GST exemption on satellite launch services supplied by ISRO, Antrix Corporation Limited and New Space India Limited (NSIL) may be extended to such services supplied by organisations in private sector also to encourage start-ups.

B. Other changes relating to Services

Services

- 1. As a trade friendly measure, it has been decided that GTAs will not be required to file declaration for paying GST under forward charge every year. If they have exercised this option for a particular financial year, they shall be deemed to have exercised it for the next and future financial years unless they file a declaration that they want to revert to reverse charge mechanism (RCM).
- 2. It has also been decided that the last date of exercising the option by GTAs to pay GST under forward charge shall be 31st March of preceding Financial Year

instead of 15th March. 1st January of preceding Financial Year shall be the start date for exercise of option.

- 3. It has been decided to clarify that services supplied by a director of a company to the company in his private or personal capacity such as supplying services by way of renting of immovable property to the company or body corporate are not taxable under RCM. Only those services supplied by a director of company or body corporate, which are supplied by him as or in the capacity of director of that company or body corporate shall be taxable under RCM in the hands of the company or body corporate under notification No. 13/2017-CTR (SI. No. 6) dated 28.06.2017.
- 4. It has been decided to clarify that supply of food and beverages in cinema halls is taxable as restaurant service as long as (a) they are supplied by way of or as part of a service and (b) supplied independently of the cinema exhibition service. Where the sale of cinema ticket and supply of food and beverages are clubbed together, and such bundled supply satisfies the test of composite supply, the entire supply will attract GST at the rate applicable to service of exhibition of cinema, the principal supply.

III. Second Report of Group of Ministers (GoM) on Casinos, Race Courses and Online Gaming

A Group of Ministers (GoM) was constituted to look into the issues related to taxation on casinos, horse racing and online gaming. The GoM submitted its first report in June, 2022 and it was placed before the GST Council in its 47th GST Council meeting wherein, it was decided that the GoM may relook into all the issues once again. The GoM submitted its report and it was placed before the 50th GST Council meeting. The GoM, in its second report has recommended that since no consensus could be reached on whether the activities of online gaming, horse racing and casinos should be taxed at 28% on the full-face value of bets placed or on the GGR, the GST Council may decide. The GST Council has deliberated on the issues and has recommended the following:

- Suitable amendments to be made to law to include online gaming and horse racing in schedule IIIas taxable actionable claims.
- All three namely Casino, Horse Racing and Online gaming to be taxed at the uniform rate of 28%.
- Tax will be applicable on the face value of the chips purchased in the case of casinos, on the fullvalue of the bets placed with bookmaker/totalisator in the case of Horse Racing and on the fullvalue of the bets placed in case of the Online Gaming.

Measures for facilitation of trade:

1. Goods and Services Tax Appellate Tribunal (Appointment and Conditions of Service of President and Members) Rules, 2023: The Council has recommended the Rules governing appointment and conditions of President and Members of the proposed GST Appellate Tribunal for enabling smooth constitution and functioning of GST Appellate Tribunal. The Council also recommended that provisions of Finance Act, 2023 pertaining to GST Appellate Tribunal may be notified by the Centre with effect from 01.08.2023, so that the same can be brought into operation at the earliest. Further the council has recommended the Chief Secretary of Maharashtra to be nominated as one of the members of the Search cum selection committee as per Section 110(4)(b)(iii) of CGST Act 2017. Regarding the number of State Benches, it was decided to start them in a phase wise manner.

- 2. Annual Returns for FY 2022-23: The Council has recommended that the relaxations provided in FY 2021-22 in respect of various tables of FORM GSTR-9 and FORM GSTR-9C be continued for FY 2022-23. Further, for easing compliance burden on smaller taxpayers, exemption from filing of annual return (in FORM GSTR-9/9A) for taxpayers having aggregate annual turnover upto two crore rupees, to be continued for FY 2022-23 also.
- 3. The Council has recommended to clarify through a circular that Input Services Distributor (ISD) mechanism is not mandatory for distribution of input tax credit of common input services procured from third parties to the distinct persons as per the present provisions of GST law, and also to clarify issues regarding taxability of internally generated services provided by one distinct person to another distinct person. The Council has also recommended that amendment may be made in GST law to make ISD mechanism mandatory prospectively for distribution of input tax credit of such commoninput services procured from third parties.
- 4. Circular to be issued to provide clarity on various issues pertaining to the GST liability as well as the liability to reverse input tax credit in cases involving warranty replacement of parts and repair services during warranty period without any consideration from the customers, clarifying inter alia that no GST is chargeable by the manufacturer on such replacement of parts and/ or repair service and also, no reversal of input tax credit is required to be made by the manufacturer.
- 5. Circular to be issued to clarify various refund related issues: Consequent to amendment in rule 36(4) of CGST Rules 2017 with effect from 01.01.2022, refund of accumulated input tax credit (ITC) under Section 54(3) of CGST Act, 2017 for a tax period to be restricted to ITC on inward supplies reflected in FORM GSTR-2B of the said tax period or any previous tax period.Consequent to Explanation having been inserted in rule 89(4) of CGST Rules vide Notification No. 14/2022- CT dated 05.07.2022, the value of export goods, to be included while calculating "adjusted total turnover" in the formula under rule 89(4), will be determined as per the said explanation. Clarification regarding admissibility of refund in cases where export of goods, or the realization of payment for export of services, as the case may be, is made after the time limit provided under rule 96A of CGST Rules, 2017.

- Circular to be issued to provide clarification regarding TCS liability under Sec 52 of the CGST Act, 2017 in cases where multiple E-commerce Operators (ECOs) are involved in a single transaction of supply of goods or services or both.
- 7. To ease compliance burden of the taxpayers, clause (f) of rule 46 of CGST Rules, 2017 to amended to provide for requirement of only name of the State of the recipient, and not the name and full address of the recipient, on the tax invoice in cases of supply of taxable services by or through an ECO or by a supplier of OIDAR services to an unregistered recipient.
- 8. Issuance of the following circulars in order to remove ambiguity and legal disputes on various issues, thus benefiting taxpayers at large:
- a) Clarifying that the registered person, whose turnover exceeds the prescribed threshold for generation of e-invoicing, are required to issue e-invoices under rule 48(4) of CGST Rules. for the supplies made to Government Departments or establishments / Government agencies / local authorities / PSUs, etc., registered solely for the purpose of TDS,
- b) Clarification regarding the manner of calculation of interest amount liable to be paid under section 50(3) of CGST Act, 2017 in respect of wrongly availed and utilized IGST credit, clarifying inter alia that in cases of wrong availment of IGST credit, the balance of input tax credit (ITC) in electronic credit ledger, under the heads of IGST, CGST and SGST taken together, has to be taken in consideration while calculating such interest liability as per rule 88B of CGST Rules, 2017.
- c) Clarifying that mere holding of securities of a subsidiary company by a holding company cannot be treated as a supply of services and therefore, cannot be taxed under GST.
- 9. As per the recommendations of the Council in its 48th meeting, Circular No. 183/15/2022-GST dated 27th December, 2022 was issued to provide for the procedure for verification of input tax credit in cases involving difference in Input Tax Credit availed in FORM GSTR-3B vis a vis that available as per FORM GSTR-2A during FY 2017-18 and 2018-19. To provide further relief to the taxpayers, the Council recommended for further issuance of a circular to provide for similar procedure for verification of input tax credit in cases involving difference in Input Tax Credit availed in FORM GSTR-3B vis a vis that available as per FORM GSTR-2A during the period 01.04.2019 to 31.12.2021.
- 10. Special procedure to be provided under section 148 of CGST Act, 2017 to enable manual filing of appeal against the orders passed by proper officers in respect of TRAN-1/ TRAN-2 claims of the registered persons, filed in pursuance of the directions of Hon'ble Supreme Court in case of the Union of India v/s Filco Trade Centre Pvt. Ltd.
- 11. Rule 108(1) and rule 109(1) of CGST Rules, 2017 to be amended to provide for manual filing of appeal under certain specified circumstances.

(BAD)

- 12.Council recommended to extend the amnesty schemes notified vide notifications dated 31.03.2023 regarding non-filers of FORM GSTR-4, FORM GSTR-9 & FORM GSTR-10 returns, revocation of cancellation of registration and deemed withdrawal of assessment orders issued under Section 62 of CGST Act, 2017, till 31.08.2023.
- 13. In view of the prevailing law and order situation in the State of Manipur, the Council recommended toextend the due dates for filing of FORM GSTR-1, FORM GSTR-3B and FORM GSTR-7 for the months of April, May and June, 2023 for the registered persons of State of Manipur till 31.07.2023.

Measures for streamlining compliances in GST:

- In accordance with the recommendations of Group of Ministers (GoM) on implementation of E-way bill requirement for movement of Gold/ Precious stones under chapter 71, the Council has recommended to insert rule 138F in CGST Rules, 2017, as well as in SGST Rules, 2017 of the States, who want to mandate the requirement of generation of e-way bills for intra-State movement of gold and precious stones under Chapter 71 within their States.
- 2. In accordance with the recommendations of the Group of Ministers (GoM) on Capacity based taxation and Special Composition Scheme approved by the Council in 49th meeting, the Council has made the following recommendations: issuance of notification under section 148 of CGST Act, 2017 prescribing a special procedure to be followed by the manufacturers of tobacco, pan masala & other similar items inter alia for registration of machines and for filing of special monthly returns; insertion of section 122A in CGST Act, 2017 providing for special penalty for non-registration of machines by such manufacturers; provisions of section 123 of Finance Act, 2021, amending section 16 of IGST Act, to be notified with effect from 01.10.2023 and notification to be issued under section 16(4) of IGST Act. 2017 to provide for restriction of IGST refund route in respect of exports of tobacco, pan masala & other similar items as well as mentha oil.
- Amendment in CGST Rules, 2017 regarding 3. registration: The Council has recommended the following amendments in CGST Rules, 2017 to strengthen the registration process and to effectively deal with the menace of fake and fraudulent registrations in GST: Amendment in rule 10A to provide that the details of bank account, in name and PAN of the registered person, to be required to be furnished within 30 days of grant of registration or before filing of statement of outwards supply under section 37 of CGST Act in FORM GSTR-1/ IFF, whichever is earlier. Amendment in rule 21A(2A) to provide for systembased suspension of the registration in respect of such registered persons who do not furnish the details of valid bank account under rule 10A with the

time period prescribed under the said rule.Insertion of 3rd proviso in rule 21A(4) to provide for automatic revocation of such system-based suspension upon compliance with provisions of rule 10A.Amendment in rule 59(6) to provide that where a registered person has not furnished details of a valid bank account under rule 10A, the said registered person may not be allowed to furnish the details of outward supplies in FORM GSTR-1 orusing IFF.Amendment in rule 9 and rule 25 to do away with the requirement that the physical verification of business premises is to be conducted in the presence of the applicant and also to provide for physical verification in high risk cases even where Aadhaar has been authenticated.

- 4. Pilot to be conducted in U.T. of Puducherry for riskbased biometric-based Aadhaar authentication of registration applicants. The State of Andhra Pradesh also expressed its intent to join this pilot after the system's readiness is tested in the state of Gujarat and U.T. of Puducherry.
- 5. Procedure for Recovery of Tax and Interest in terms of Rule 88C(3): On the recommendations of the GST Council in its 48th meeting held on 17.12.2022, rule 88C was inserted in the CGST Rules, 2017 with effect from 26.12.2022 for system based intimation to the registered person in cases where the output tax liability in terms of FORM GSTR-1 of a registered person for any particular month exceeds the output tax liability disclosed by the said person in the return in FORM GSTR-3B for the said month by a specified threshold. The Council has now recommended insertion of Rule 142B in the CGST Rules. 2017 and insertion of a FORM GST DRC-01D to provide for manner of recovery of the tax and interest in respect of the amount intimated under rule 88C which has not been paid and for which no satisfactory explanation has been furnished by the registered person.
- 6. Mechanism to deal with differences in ITC between FORM GSTR-2B and FORM GSTR-3B: The Council has recommended a mechanism for system-based intimation to the taxpayers in respect of the excess availment of ITC in FORM GSTR-3B vis a vis that made available in FORM GSTR-2B above a certain threshold, along with the procedure of autocompliance on the part of the taxpayers, to explain the reasons for the said difference or take remedial action in respect of such difference. For this purpose, rule 88D and FORM DRC-01C to be inserted in CGST Rules, 2017, along with an amendment in rule 59(6) of CGST Rules, 2017. This will help in reducing ITC mismatches and misuse of ITC facility in GST.
- 7. To improve discipline in filing of annual returns, FORM GSTR-3A to be amended to provide for issuance of notice to the registered taxpayers for their failure to furnish Annual Return in FORM GSTR-9 or FORM GSTR-9A by due date.
- 8. Rule 64 and FORM GSTR-5A of CGST Rules, 2017

to be amended to require OIDAR service providers to provide the details of supplies made to registered persons in India in his return in FORM GSTR-5A. This will help in tracking due payment of tax on reverse charge basis by such registered persons in India in respect of supplies received from OIDAR service providers.

- 9. Explanation 3 to be inserted after rule 43 of CGST Rules, 2017 to prescribe that the value of supply of goods from Duty Free Shops at arrival terminal in international airports to the incoming passengers to be included in the value of exempt supplies for the purpose of reversal of input tax credit.
- 10. Sub-rule (3A) to be inserted in rule 162 of CGST Rules, 2017 to prescribe the compounding amount for various offences under section 132 of CGST Act, 2017.
- 11. The Council has recommended insertion of rule 163 in CGST Rules, 2017 to provide for manner and conditions of consent-based sharing of information of registered persons available on the common portal with other systems. The Council has also recommended issuance of a notification under section 158A of CGST Act, 2017 for notifying "Account Aggregators" as the systems with which information is to be shared by the common portal.
- 12. The Council has recommended insertion of a clause (ca) in sub-section (1) of section 10 of theIGST Act, 2017 to clarify the place of supply in respect of supply of goods to unregistered persons.
- 13. The GST Council has recommended to form a State level coordination Committee comprising of GST officers from both State and Central GST administrations for knowledge sharing on GST matters and coordinated efforts towards administrative and preventive measures.
- 14. The 2nd interim report of the Group of Ministers (GoM) on IT System Reforms was also discussed by the Council. The GoM has recommended various measures to curb frauds in GST through System based measures for strengthening registration process in GST, more use of third-party data for risk management and controlling flow of fake Input Tax Credit down the supply chain.

Note: The recommendations of the GST Council have been presented in this release containing major item of decisions in simple language for information of the stakeholders. The same would be given effect through the relevant circulars/ notifications/ law amendments which alone shall have the force of law.

⊢

Various Loads, Forces and Stresses on Different Structures

Introduction.

A structure will be exposed to loads, forces, stresses and strain during its lifetime. The materials used in structural members may be subject to flexural forces such as moment & shear force, other forces such as axial force torsion, lateral and vertical bucking, and stresses due to temperature, shrinkage, and creep depending on the geometry of the structures. The material undergoes deformation such as deflection, rotation, twist, vibration, etc. Structural members are to be designed to resist the forces and deformations within the limits.

Load is the force exerted on a surface or body and generally, an external force acts on a structural member. A load is a heavy or bulky object that requires effort to move or lift the weight. The effort is an applied force to bring desired change to the position (push or lift) of the load. A structural load or structural action is a force, deformation, or acceleration applied to structural elements. A load causes stress, deformation, and displacement in a structure. Engineers often evaluate structural loads based on published regulations (codes), contracts or specifications. The loads in buildings and structures can be classified as vertical loads, horizontal loads and longitudinal loads. The vertical loads consist of dead load, live load and impact load. The horizontal loads consist of wind load and earthquake load. Axial tension or compression loads are longitudinal loads. Force is a measure of the interaction between bodies and internal particles. It takes several forms including short-range atomic forces and electromagnetic and gravitational forces. Stress is the measure of what the material feels due to externally applied forces. It is simply a ratio of the external forces to the cross-sectional area of the material. Strain is the deformation of material from stress. Strain is the amount of deformation caused by stress. Creep, Shrinkage, Temperature, etc, causes strain. Pressure is the physical force exerted on an object. The force applied is perpendicular to the surface of objects per unit area.



DR. Colonel. P Nallathambi Ph.D (Structural Engg), ME, MBA, FIE, FIV)



A structure will be subjected to many types of loads or forces depending on the functional requirements, the geometry of the structure and the materials adopted. Most of us are familiar with commonly considered loads such as Dead Loads(DL), Impose Loads(IL), Wind Loads (WL), Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL), etc for the design of various structures. IS 875 Part-1 (DL), Part-2 (IL), Part-3 (WL), Part-4(SL), IS 1893 and IS 875 Part-5 for (TL) and Load combinations are referred for comprehensive applications of loads on structures. There are many other loads present in typical structures which are highlighted for our young engineers to understand.

Types of Structures.

There are numerous types of structures built for different purposes. Each structure has its own peculiarity. functionality or specialist due to its shape, purpose and materials used, accordingly, the load acting on a structure will be different. The various types of structures are: (a) Residential Buildings- (i) RCC and Steel, (ii) Low height, High rise and Tall buildings. (iii) Prefabricated and Prestressed buildings. (b) Commercial Buildings- (i) RCC and Steel, (ii) Low height, High rise and Tall buildings. (iii) Prefabricated and Prestressed buildings. (c) Industrial Structures- (i) Large Span. (ii) Open or closed structures (iii) Mild and Deep slope roofs. (d) Hangers and Repair bays, (e) Domes and Shell Structures, (f) Water Tanks and Liquid Retaining Structures. (f) Bridge Structures-(i) RCC and Steel (ii) Prefabricated and Prestressed members. (iii) Cable stay and Suspension bridge. (f) Metro and Elevated rail corridors- (i) RCC and Steel (ii) Prefabricated and Prestressed members. (g) Offshore Structures. (h) Onshore Structures. (i) Oil and Gas Facility Structures. (j) Transmission Line Structures. (k) Chimney and Silos. (I) Tunnel Structures. (m) Dams and Irrigation Structures. (n) Fire Resistance Structures. (o) Blast Resistance Structures. (p) Underground Sub Structures. (a) Nuclear Power Plant Structures. (r) Thermal Power Plant Structures. (s) Hydro Power Plant Structures.

Various Types of Loads, Forces and Stresses act on a Structure.

Forces induced by nature such as Gravity, Wind, Water, Snow, Cyclones, Seismic, Soil pressure, and Heat are the main forces subjected to static and dynamic structures. Some of the artificial loads such as Blasts. Machinery, Vehicles/ Trains, Fire, etc on the structure. Aerodrome, The various loads are: (a) Gravity Load-(i) Dead Load(DL). (ii) Imposed Load(IL). (iii) Finish Load(FL). (b) Wind Load (WL)- (i) Wind pressure (ii) Cyclone effect. (iii) Aerodynamic load. (iv) Wind tunnel effect (v) Aero elastic instabilities. (c) Earthquake Effects-(i) Earthquake Load(EL) (ii) Soil Liquefaction effect. (iii) Pounding each other. (iv) Limiting rooftop deflection. (c) Snow Load(SL). (c) Temperature Load (TL). (d) Dynamic Loads- (i) Machinery loads (ii) Impact loads. (iii) Resonance Effect. (e) Loads on Bridge- (i) Impact of Vehicle. (ii) Centrifugal Forces. (iii) Traction Force. (f) Loads on Metro- (i) Impact of Vehicle. (ii) Centrifugal Forces. (iii) Traction Force. (g) Loads below Ground-(i) Water Lateral Pressure. (ii) Lateral Soil Pressure. (iii) Uplift Pressure. (iv) Soil settlement. (v) Swell and shrinkage of clay soil. (h) Stress due to shrinkage, creep and deflection and Limiting crack width. (i) Pre-stressing forces and end anchorage bursting forces. (j) Stresses due to fire and high temperature on materials. (k) Load and pressure due to Blast and Explosive effect. (I) Hydro dvnamic. Uplift pressure in Dam Structure. (m) Electric Short circuit forces, Sag line forces in transmission lines. (n) Machine Foundation load- Limiting amplitude, Resonance, Reduce induced stress within limit due to machine vibration. (n) Impact and collision Forces. (n) Vandal loading is intentional human dynamic load and their induced effects on a footbridge, Vibration Loading and resonance force, Unknown forces,

Possible Forces on Some of the Structures.

All the possible forces that can act on some of the structures are listed below for the designer to verify during its stability checking. The designer should consider the appropriate forces and their combinations for the buildings as applicable. Like wind and earthquake forces are not considered to be acting together, many loads may not be acting at the same time are to be understood. Collapse limit state and service limit state combinations are to be considered in the design.

(a) Residential and Commercial Buildings. They may be subjected to Dead Loads(DL), Impose Loads(IL), Wind Loads (WL), Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL), Stress due to shrinkage, creep and deflection. For the tall building, wind tunnel effect, Cyclone effect, Soil liquefaction effect, Tower pounding each other effect, Limiting roof top deflection, Precast and Pre-stressing forces. For building a foundation, Lateral soil pressure, Water uplift pressure, Soil settlement, Swell and shrinkage of clay soil are considered.

(b) Industrial Structures. It may be subjected to Dead Loads(DL), Impose Loads(IL), Wind Loads (WL),

Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL), Accidental loads, Erecting loads, Crane load are considered. For building a foundation, soil pressure, wind uplift pressure, and Soil settlement are considered. **(c) Loads on Bridge Structures.** It may be subjected to Dead Loads(DL), Impose Loads(IL), Wind Loads (WL), Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL), Vehicle Impact loads, Centrifugal Forces, Traction Force, Longitudinal forces, Centrifugal forces, Buoyancy effect, Effect of water current, Deformation and horizontal effects and Erection stresses. On

the Bridge foundation, Soil pressure, pressure, Soil settlement, Swell and shrinkage of clay soil are considered. The designer should consider the appropriate force for the buildings as applicable.





Water uplift

Types of Bridges

Forces on different types of Bridges.

(d) Loads on Metro and Elevated Rail Corridors. Loading considerations include Dead Loads(DL), Impose Loads(IL), Wind Loads (WL), Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL). Train impact loads. Centrifugal forces, and Traction force. The Bridge foundation may be subjected to, Soil pressure, Water uplift pressure, Soil settlement, Swell and shrinkage of clay soil are considered. Other loads include the weight of track form plinth/rails/ fasteners/ cables/parapet/ hand-rail Overhead electrical mast/ cable trough/signalling equipment etc. Some other loads are: Footpath Live Load, Railway vehicular load, Temperature loads, Pre-Stress force, Coefficient of Dynamic Augment, Longitudinal Force due to braking and traction, Centrifugal forces due to curvature of the superstructure. Horizontal transverse loading due to racking, Temperature effects, Resistance to the movement of elastomeric bearings, Erection temporary load, Derailment loads, Differential settlement, Vehicle collision load, Gradient effect, Buffer load and Fatigue effect.





Covered Metro Line

Double Decker Metro Line Under Construction



Curved Metro Line Track

(e) Domes and Shell Structures. It may be subjected to Dead Loads(DL), Impose Loads(IL), Wind Loads (WL), Earthquake Loads(EL), Snow Loads(SL), Temperature Loads(TL), Bending, Shear, Meridian and Membrane Stresses, Torsional effects.



Different Types of Shell Elements (f) Transmission Line Structures.

The supports for an overhead line must be capable of carrying the load due to: Self-weight, Conductors, Insulators, Wind, Seismic, and Temperature on the support itself. Towers may be self-supporting and capable of resisting all forces due to conductor loads, unbalanced conductors, wind and ice in any direction. A guyed mast has a very small footprint and relies on guy wires intended to support the structure and any unbalanced tension load from the conductors. A guyed tower can be made in a V shape, which saves weight and cost. Loads are calculated on the structures in three directions: Vertical. Transverse. and Longitudinal. The transverse load is perpendicular to the line and the longitudinal loads act parallel to the line. Transverse loads consist of wind on the conductor. wind on the insulator, a component of wire tension in the transverse direction (deviation load), and wind on the tower body. The vertical load consists of the weight of the wire, the weight of the insulator, the weight of the lineman and tools, self-weight of the tower. Longitudinal load consist of a component of the unbalanced pull of the wire in the longitudinal direction.

Electrical Components Loads on Transmission Towers. A transmission line in a power transmission system consists of various components like the conductor, ground wire, insulator and connectors as well as many other components which must be carefully designed depending upon factors like climatic data and reliability levels to allow for maximum efficiency. Electric power is transmitted through these lines from generating stations to different load centres. The design of transmission lines involves calculating the necessary climatic loading, loads corresponding to security requirements and safety.



Self-Supporting

Conventional and Chainette



Single & Double Circuit Peak and Cross arm

Special Loads on Transmission Towers. In addition to weather-related loads, transmission line structures are designed for special loads that consider the security and safety aspects of the line. These include security loads for preventing cascading type failures of the structures and construction and maintenance loads that are related to personnel safety.

Security Loads on Transmission Towers. Longitudinal loads may occur on the structures due to accidental events such as broken conductors, broken insulators, or the collapse of an adjacent structure in the line due to an environmental effect. Longitudinal loadings are sometimes referred to as "anti-cascading", "failure containment", or "security loads".

(g) Loads on Coastal Structures. Besides gravity, the most important forces that cause and affect ocean currents are horizontal pressure-gradient forces, vertical water pressure, Coriolis forces resulting from the earth's rotation, and frictional forces between water and air, water and shore materials. Gravitational force (exerted by the moon and to some extent by the sun) is involved in the formation of tides in the sea. Waves form as a result of the water's motion, gravitational forces, and winds. The most common waves are created by wind. However other waves include those created by gravitational forces and those created by underwater disturbances, such as earthquakes, tsunamis, etc.



(h) Loads on Offshore Structures. The offshore structure shall be designed for the loads such as: (a) Permanent (dead) loads. (b) Operating (live) loads. (c) Environmental loads. (d) Wind load. (e) Wave load. (f) Earthquake load (g) Construction/ installation loads. (h) Accidental loads. (i) Ice and Snow Loads. (j) Temperature Load. (k) Marine growth is accumulated on submerged members. Its main effect is to increase the wave forces on the members by increasing exposed areas and drag coefficient due to higher surface roughness. The caissons are to retain water/soil as well as transmit the vertical and horizontal loads onto the subsoil.





Subsea Production Systems.

(i) Loads on Onshore Structures. The design of flexible rubble mound structures is complex as it involves various aspects such as wave-structure interaction, interlocking characteristics of armour, friction between armour and secondary layer etc. A major aspect in the design of rubble mound structures is the minimum weight of the armour units on the seaward slope, required to withstand the design waves. Resistance to hydrodynamic forces is also developed by unit interlocking, which depends on the unit shape, gradation and the method by which the units are placed during construction.

SPAR



components (j) Load on Chimney. The loads considered are: Dead loads, imposed loads, Wind loads, Seismic Loads and Temperature Loads (depending on flue gas temperature). Wind effects on chimneys play an important role in their safety as steel chimneys are generally very tall structures. The circular cross-section of the chimney is subject to aerodynamic lift under wind load. Static Wind Effects such as drag, Circumferential Bending and Wind Load on Liners are considered. Dynamic Wind Loads such as Gusty Wind Loading, Aerodynamic Effects, Vortex Formation, and Vortex Excitation are considered. Again seismic load is a major consideration for the chimney as it is considered a natural load. This load is normally dynamic in nature. Temperature load is an important factor in chimney design. In the majority of cases, flue gases with very high temperatures are released inside a chimney. Due to this a temperature gradient with respect to the ambient temperature outside is developed and hence caused stresses in the cell. Therefore, temperature effects are also important factors considered in the Chimney design.



(k) Load on Silos. They are subjected to DL, Grain Load. Wind and Earthquake loads. From the structure's reliability point of view, it is imperative to correctly identify the actions of the bulk solid on the wall shell during the filling, discharge and simultaneous filling and discharge of the silo. At the same time, one should also take into consideration any disturbances in the flow of the stored solid, due to the adopted structural and technological solutions cross-beams in a zone of transition between a shell and a hopper, or a structure protecting the rotor sweeping a solid into an outlet. In the case of cohesive biomass, one should also examine the effect of its moisture content on such properties as the internal friction angle, the angle of repose and bulk density. Consider the possibility of forming an arch in the silo chamber, which entails an exceptional loading that is not quantitatively formulated in design standards.



Grain Silos

Forces on Grain Silos

(I) Loads on Soil Retaining Walls. In addition to DL, IL, and WL, other loads such as lateral soil pressure, lateral water pressure, bearing pressure, and vertical uplift pressure are considered on the walls.



(j) Loads on Water Tanks and Liquid Retaining Structures. DL, LL and Water load, Water pressure, Soil pressure, Uplift pressure, and Bearing pressure is considered in UG tanks. Wind and Earthquake loads are considered as in overhead tanks.



Water pressure on a rectangular tank. Soil pressure on the sump.



. Circular tank wall & roof slab construction.

Water pressure on a rectangular tank. Soil pressure on the sump. Circular tank wall & roof slab construction. (k) Loads on Dam Structures. Weight of the dam, Water pressure, Uplift pressure, Earthquake forces (Horizontal and Vertical acceleration) and Hydrodynamic forces and their combinations.





(I) Loads on Footbridges. In addition to DL and LL, various forces on the footbridge are: Vandal loading, human dynamic loads and their induced effects, vibration loading, resonance force and unknown forces.





Summary.

Natural and artificial forces are acting on a structure which needs to be clearly understood while designing complex structures. Considering the load combinations may be a critical issue which may surprise the designer and it can generate unknown forces which cause the failure of structures. Lightweight structures are always risky due to dynamic forces. lateral movements, excess vibrations. resonance effects, overloading, etc. Overstressing, strain hardening, excess deflection and vibrations, need to be verified during the design. Designers need to read appropriate code and understand thoroughly for adopting suitable loads to avoid failure of structures. Interpretation of loads from code is a challenging aspect. It comes by practice and application for different conditions. Codes standardise the loads for various types and everyone considers the same loads for design so that the designer may not go wrong in deciding on loads. Every country has its own set of codes if needed other countries can be referred to. But some codes are not revised/ updated for many years and codes not available for special structures pose limitations to considering special loads.

"The structure can be sophisticated, eloquent and economic, but if it is late, ambiguous or difficult to construct, it will have failed." ~ Norman Train, Past President of IStructE.

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19

If you want to shine like a Sun, first burn like the Sun.

கான்கிரிட்டை பலப்படுத்தும் கம்பிகள்

லப்படுத்தப்பட்ட கான்கிரீட்டின் விலையில் மூன்றில் ஒரு பகுதி அதைப் பலப்படுத்தப் பயன்படுத்தப்படும் எஃகுக் கம்பிகளின் விலையாகும். ൺങെ கம்பிகளாகவும், கம்பிகளாகவும் சு<u>ற்ற</u>ுக் வலைகளாகவும் <u>உருவாக்கும்போது</u> எஃகின் கூடுக<u>ிறது</u>. மதிப்பு இதனால் அதன் 20-30 விழுக்காடு அதிகரிக்க<u>ிற</u>து. விலையும் கான்கிரீட்டை பலப்படுத்துவதற்கு எஃகுதான் அதிக அளவில் பயன்படுத்தப்படுகிறது. இந்த எஃகு கம்பியை அதிக இறுக்கம் உண்டாகும் சரியாகப் வகையில் கான்கிரீட்டுடன் பொருத்த வேண்டும். பலப்படுத்தப்பட்ட கான்கிரீட் கட்டுமானம், அந்த கட்டமானப் பணியில் ஈடுபடும் ஆட்களைப் பொறுத்தே கான்கிரீட் கட்டுமானம் பற்றி அமைகிறது. எந்த அளவிற்கு அவர்கள் சரியாகப் புரிந்து அதனை வடிவமைக்கிறார்கள், பொருட்களின் தன்மை என்ன, அவற்றை எந்த அளவிற்கு எந்த வகையில் பயன்படுத்தலாம் என்பதைப் பற்றி தெளிவு மற்றும் பணியாட்களின் திறன் ஆகியவற்றைப் பொறுத்தே பலப்படுத்தப்படும் கான்கிரீட் கட்டுமானம் அமைகிறது.

எஃகைக் கொண்டு பலப்படுத்துதல்

கான்கிரீட் பகுதி ஒன்றில் எப்பொழுதெல்லாம் இழுப்பு சக்தி (Tension Force) காணப்படுகிறதோ, எலகைக்கொண்டு அப்போதெல்லாம் அது பலப்படுத்தப்படுகிறது. சிறந்த இழுவைத்திறன் (Tensile Strength) கான்கிரீட்டுடன் உள்ள கூட்டணைப்பு விரிவடையும் நல்ல திறன் (Coefficient of expansion) ஆகிய அனைத்<u>து</u>ம் தன்மைக்கு கான்கிரீட்டின் எற்ப எஃகிற்கு அமைந்துள்ளதால் கான்கிரீட்டை பலப்படுத்த எஃகு பயன்படுத்தப்படுகிறது.

இறுக்கத்தன்மை கான்கிரீட்டின் பமுதடையாமல் இருக்கும் பொருட்டு நேரான (Longitudinal) இரும்புக் கம்பிகள் ஒரே கான்கிரீட்டின் அடிப்பகுதியில் உத்தரமாக அமைக்கப்படுகிறது கான்கிரீட் உடைந்து போவதைத் தடுக்கும் வகையில் எஃகுக் கம்பிகள் வளையங்களாக (Stirrups) மாற்றப்பட்டு உத்தரத்தின் க<u>ுற</u>ுக்கே செங்குத்தாகப் பொருத்தப்படுகிறது. ஒவ்வொருகால மாற்றத்தின்



Er.A.G.Marimuthuraj

போதும் தட்ப வெப்ப நிலை பாதிப்பாலும் ஆரம்பத்தில் கான்கிரீட்டில் ஏற்படும் சுருக்கம் காரணமாகவும் அதில்வேிரிசல் உண்டாவதைத் தடுக்க, கான்கிட்டின் மேற்பரப்பு மிதமான அளவில் பயன்படுத்தப்படுகிறது. வழக்கமாக பிரதானமாக பலப்படுத்தப்படும் இடத்திலிருந்த நேர் எதிராக (Right Angle) இந்த பலப்படுத்துதல் மேற்கொள்ளப்படுகிறது.

குளிர் முறுக்கல் (Cold Twisted)

1960 அம் அஈண்டு வரை இந்தியக் கட்டுமானத் துறை, கான்கிரீட்டை பலப்படுத்த குறைந்த அளவே பலம் தரக்கூடிய சாதாரண வலுவற்ற எஃகுக் கம்பிகளையே பயன்படுத்தி வந்<u>தது</u>. எஃகை பலமுள்ளதாக்க வழக்கமாக மேற்கொள்ளப்படும் முறையான கார்பன் அளவை அதிகப் படுத்தப் படும்போது. கம்பிகள் நீட்டப்படும் தன்மையில் (Weld abilitiy) குறைபாடு ஏற்படுகிறது. 1970ல் குளிர் முறுக்கு உருமாற்றக் கம்பிகள் (Cold Twisted Deformed-CTD) அறிமுகப்படுத்தப்பட்டன. கம்பிகளை தொழில்நுட்பத்தின் விசைக்கு உட்படுத்<u>த</u>ும் மூலம் கம்பிகளின் பலமும், நீட்டப்படும் திறனும் அதிகரிக்க்பபடுகிறது. இந்த முறையின் மூலம் கம்பிகளுக்கு நீட்டப்படும் வளைக்கப்படும் தன்மைகளைத் தரும் விதத்தில் அதில் சேர்க்கப்படும் கார்பன் அளவு கட்டுப்படுத்தப்பட்டது. அதே நேரம் *(மற்றுக்கல்* செயல்பாட்டில் மூலம் குளிர் கம்பிகளின் பலம் அதிகரிக்கப்பட்ட<u>து</u>. தகுந்த முறையில் நரம்பு அமைப்பைக் (Ribbing Pattern) கையாளுவதன் மூலம் கான்கிரீட்டுடனான கூட்ட இணைப்புத் திறன் அதிகரிக்கப்பட்ட<u></u>து.

1967-68බ இந்தியாவிலும், குறிப்பிட்ட உத்தரவாதம் தரக்கூடிய அளவு பலத்திற்கு சிடிடி (Ribbed CTD) கம்பிகள் நரம்பு பயன்படுத்தப்பட்டன. இவ்வகைக் கம்பிகள் வந்தபின் சாதாரண குறைந்த பலம் கொண்ட கம்பிகளைப் பயன்படுத்துவது நிறுத்தப்பட்டது. குறைந்த அளவிலான இதன் மூலம் கம்பிகளே பயன்படுத்த வேண்டியிருந்தததால், ஒட்டுமொத்த கட்டுமானச் செலவும் குறைந்தது. பலத்தை நிர்ணயம் செய்தல்

கான்கிரீட்டைப் பலப்படுத்த அதற்குப் பயன்படும் கம்பிகள் கீழ்க்காணும் தேவைகளுக்கு ஈடு கொடுப்பதாக இருக்க வேண்டும்.

1. இறுகும் திறன் (Tensile Strength)

2. கூட்ட பிணைப்புத் திறன் (Bond Strength)

3. நீளும் தன்மை (Ductility)

4. வளையும் தன்மை (Bend Ability)

5. இணைப்புத்தன்மை (Weldability)

6. உதிராது இருத்தல் தன்மை (Fatigue Strength)

7. துருப்பிடிக்காமை (Corrosion Resistance)

8. யீ எதிர்ப்புத்திறன் (Fire Resistance)

கான்கிரீட்டிற்கும் எஃகிற்கும் இடையில் சரியான பிணைப்பு ஏற்படும் வகையில் உருமாற்றம் ஏற்படுத்த வேண்டும். இரண்டிற்கும் அதிகபட்ச இணக்கத்தை ஏற்படுத்தும் வகையில் சரியான உருவமாற்ற செயல்பமுறை (Deformation Profile) ஒன்று வகுக்கப்பட வேண்டும்.

எந்த மாதிரியான கம்பிகள் பயன்படுத்தப்பட வேண்டும் என்பதற்கான விதிமுறைகள் ஆலோசனை செய்யப்பட்டுள்ளன. திருத்தல் (Cracking), முறுக்குதல் (Kincking) மற்றும் 90 டிகிரி அளவிற்கு வளைத்தல் நாம் கண்டுவரும் தன்மைகளாகும்.

ஆக பலப்படுத்தப் பயன்படும் கம்பிகளில் வளையும் தன்மை என்ப<u>து</u> ஒரு முக்கியமான தேவையாகும். இதுவும் கம்பிகளின் நீளும் திறன் மற்றும் உருமாற்ற குணாதிசயங்களுக்கு ஏற்பவே அமைகின்றது. சிடிடி கம்பிகள் என்பதை அடிப்படையில் ஒர ரசாயனக் கலவை சேர்ந்த எஃகாகும். இந்த இரசாயனக் கலவையானது அதிகபட்சமாக 0.42 சதவீத கார்பனுக்குச் சமமாக இருத்தல் வேண்டம். அப்போதுதான் தனியாக இதற்கென்று பிரத்தியகமான எலக்ட்ரோடுகளோ அல்லது இதற்கென<u>் ற</u>ு தனியாக இணைப்புத் தொழில்நுட்பமோ இன்றி கொண்டு சாதாரண தொழில்நுட்பத்தைக் இணைஙகக இய<u>லு</u>ம்.

டிஎம்டி கம்பிகள் (TMT Bars)

(88)

கான்கிரீட் பலப்படுத்துதலுக்கு, உயர்வலுக் கொண்ட வடிவமாற்று எஃகு தேவைப்படுகிறது. இதை உருவாக்க வெப்பப்படுத்தும் முறை அண்மையில் ஏற்பட்டுள்ள ஒரு தொழில்நுட்ப

இதை டிஎம்டி கம்பிகள் முன்னேற்றமாகும். (Thermo Mechanically Treated Bar) என்கிறார்கள். ஆனால் பண்டைக் காலத்திலும் இன்றும் கூட கிராமங்களில் தமிழர்கள் இரும்புக் கருவிகளை தொழில்நுட்பத்தில்தான் இந்த தொன்<u>ற</u>ு தொட்டுச் செய்கிறார்கள். சான்றாக அரிவாள், கோடரி,வேல் கடப்பாறை, போன்றவற்றை உருவாக்கும்போது இறுதியில் சிவந்த நிறத்தில் இருக்கும் அவற்றை தண்ணீருக்குள் வேகமாக முக்கி நடைத்தெடுப்பார்கள். அப்போது அவை மிகவும் உறுதியாக இருக்கும். இதைத்தான் டிஎம்டி கம்பி தொழில்நுட்பம் என்று இப்போது சொல்கிறோம்.

இந்தச் செயல்முறையின் மூலம் வெப்பச் சிகிச்சையின் காரணமாக கம்பிகளின் பலம் கூடும். அதே நேரம் கம்பிகள் சுற்றப்பட்ட (Rolling) உடனே அவை அதிகபட்ச அளவு குளிர்ச்சி அடைகின்றன. திடீரென்று குளிர்வடைவதால், கம்பிகளின் மேற்புறம் கடினமாகிறது. அதே நேரம் கம்பிகளின் மையப்பகுதி, சூடாகவே இருக்கிறது.

சுற்றுப்புறச் சூழ்நிலையால் மேலும் வெப்பம் குறையும்போது கம்பிகளின் மையப்பகுதியில் உண்டாகும் வெப்பத்தின் காரணமாக கம்பிகளுக்கு உறுதித்தன்மை கிடைக்கிறது. இந்த வெப்பச் சிகிச்சையின் காரணமாக கம்பிகளின் பலம் கூடுகிறது. அதே நேரம் நீளும் திறனும் அதிகரிக்கிறது.

டிஎம்டி கம்பிகளைப் பொறுத்தவரையில் வெப்பச் சிகிச்சையால் ஏற்படும் அனுகூலம் தவிர, இதில் சேர்க்கப்படும் கார்பன் அளவும் குறைகிறது. மேலும் ஒரு சிறப்புமிக்க கூட்ட உேஅலாக எஃகு (Special Alloy steel) ஒன்று அறிமுகப்படுத்தப்பட்டுள்ளது. இது மிக உயர்ந்த தரம் கொண்டதாக உள்ளது.

எந்த மாதிரியான கம்பிகள் பயன்படுத்தப்பட்டாலும், அவற்றைப் பயன்பாட்டிற்கு ஏற்றுக்கொள்ளும் முன்பு, அவற்றின் பலத்தையும் நீளும் தன்மையையும் சோதனை செய்து கொள்வது முக்கியம்.

real estate update



🕨 அதிகத் தளங்களைக் கொண்ட அடுக்குமாடி கட்டிடங்களுக்கு வைப்புதல் வழங்கும் அதிகாரம் அரசின் வீட்டு வசதி மற்றும் நகர்ப்புற வளர்ச்சித்துறையிடம் இருந்தது. இதை எளிமைப்படுத்துவதாகக் கூறி CMDA இயக்குநர் ஆகியோர் உறுப்பினர், DTCP 2021ல் ஒப்புதல் வழங்கலாம் என்று அறிவிக்கப்பட்டது. அதிகாரிகள் மட்டத்தில் பெரிய பெரிய கட்டுமானத் திட்டங்களுக்கு ஒப்புதல் வழங்குவதில் பல்வேறு குழப்பங்கள் கருத்தில் ஏற்படுவதை கொண்டு இந்த அனுமதி வழங்கும் அதிகாரத்தை மீண்டும் அரசின் கட்டுப்பாட்டிற்கே மாற்ற എത്തെ பிறப்பிக்கப்பட்டுள்ளது.

🕨 பதிவுத்துறை அறிவித்துள்ள கட்டண உயர்வுகளானது ஜூலை மாதம் 10ந்தேதி முதல் அமலுக்கு வந்தது. இதில் முக்கியமாக பொது அதிகார பதிவிற்கு 1 சதவிகிதமும், கட்டுமான ஒப்பந்ததத்திற்கு (Construction Agreement) 1 சதவிகிதத்திலிருந்து 3 உயர்த்தப்பட்டுள்ளது. சதவிகிதமாக பாகப்பிரிவினை, போன்று அது settlement செய்து கொள்வது, விடுதலை, போன்றவைகளுக்கான பதிவுக் குத்தகை கட்டணங்களும் உயர்த்தப்பட்டுள்ளது.

🕨 RERA – Real Estate சட்டத்தின்படி பதிவு வீடுகள், செய்யப்படாத கடைகள். அலுவலகங்கள், மற்றும் மனைகளை குத்தகைக்கு விட நிலை முடியாத இந்த சட்டத்தின்படி 8 ஏற்பட்டுள்ளது. வீடுகள், மனைகள் 500 ச<u>து</u>ர மீட்டருக்கும் மேல் இடங்களுமே உள்ள அனைத்து செய்ய Real Estate ஆணையத்தில் பதிவு அறிவுறுத்தப்பட்டுள்ளது. சொந்த பயன் பாட்டில் உள்ள வீடுகளும், மனைகளும் கூட இதில் அடங்கும். இவற்றின் உரிமையாளர்கள் இவை விற்பனைக்கானது அல்ல என்று ஆணையத்திடம் தடையின்மைச் சான்றிதழ் பெற வேண்டும்.

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S. இராமப்பிரபு Chairman-DTCP Committee



🕨 திருமழிசை துணை நகரத் திட்டத்தில் அடங்கும் 17 கிராமங்களின் வரைபடத்தை CMDA வெளியிட்டுள்ளது. அதன் மொத்த பரப்பளவு 34.10 சதுர கிலோ மீட்டராகும். கல்வி நிறுவனங்கள், குத்தம்பாக்கம் புதிய புறநகர் பேருந்து நிலையம், வீட்டு வசகி வாரிய குடியிருப்புத் திட்டம், வெளிவட்டச் மற்றும் தேசிய நெடுஞ்சாலைகள் சாலை ஆகியவற்றினை அடிப்படை ஆதாரமாக வைத்து திருமழிசையில் புதிய நகரம் ஏற்படுத்தப்பட உள்ளது.

🕨 சென்னை பெருநகர எல்லைக்குள் இணைக்கப்பட ஊாாட்சிகள் உள்ளது. புதிய செங்கல்பட்டு மேம்பாட்டு நகர திட்டத்தின் கீழ் 30 ஊராட்சிகள் CMDA–உடன் இணைக்கப்பட உள்ளது. இத்திட்டத்தின் கீழ் காட்டாங்குளத்தூர் ஊராட்சி ஒன்றியத்திற்கு உட்பட்ட 20 ஊராட்சிகளும், திருக்கழுக்குன்றம் ஊராட்சி ஒன்றித்திற்கு உட்பட்ட 8 ஊராட்டசிகளும், திருப்போருர் 📘 ஊராட்சி ஒன்றியத்திற்கு உட்பட்ட 2 ஊராட்சிகளும் ഞ மொத்தமாக 30 ஊராட்சிகள் இணைக்கப்பட உள்ளன.

பத்திரப்பதிவுகளுக்கும் 🕨 அனைத்து சொத்தின் மூலப்த்திரம் தர கட்டாயப்படுத்த 📘 முடியாது. சொத்தின் விற்பனையாளர் அச்சொத்தின் கூட்டு உரிமையாளராக அச்சொத்தின் இருந்து அசல் அவனம் கூட்டு உரிமையாளர்களிடம் மற்ற அவர்கள் இருப்பதாகக் கூறினால் அதை விற்பனையாளரிடமிரு<u>ந்</u>து தர மறுத்தால் உறுதிமொழிப்பத்திரத்தினை பெற்றுக் கொண்டு பதிவாளர் பதிவு செய்யலாம் என உயர்நீதி மன்றம் அறிவித்துள்ளது.





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APPLICATION

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- Soncrete Reinforcement
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- ✓ Temporary barricade

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AADHITIINDUSTRIES.IN SALES@AADHITIINDUSTRIES.IN 02.07.2023 அன்று பீஷ்மா R. இராதாகிருட்டிணன் அவர்களின் 83வது பிறந்த நாளை முன்னிட்டு தென்னக மய்ய நிர்வாகிகள் பிறந்த நாள் வாழ்த்துக்களை தெரிவித்து ஆசிபெற்றனர்



அகில இந்திய தலைவர் திரு. S. N. ரெட்டி, Trustee திரு. சச்சிதானந்த ரெட்டி, திரு. D.V.N. ரெட்டி ஆகியோர் பீஷ்மா R. இராதாகிருட்டிணன் அவர்களை அவரது இல்லத்தில் சந்தித்து உடல்நலம் விசாரித்தனர்.



கட்டுமானத் தொழிலாளர்களுக்கான மூன்றாவது இலவச மருத்துவமுகாம் 28.07.2023 அன்று சென்னை மேடவாக்கத்தில் "Navins Starwood Towers 3.0" பணித்தளத்தில் நடைபெற்றது.







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CREDAI ஏற்பாடு செய்திருந்த கூட்டு பத்திரிக்கையாளர் சந்திப்பு 18.07.2023 அன்று சென்னையில் நடைபெற்றது.



மாநில அளவிலான 2வது MC/GC கூட்டத்தில் கோவில்பட்டி புதிய மய்யத்திற்கான காசோலை பீஷ்மா R. இராதாகிருட்டிணன் அவர்கள் முன்னிலையில் மாநிலத்தலைவரிடம் வழங்கப்பட்டது.







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COMMAN CONSTRUCTION DEFECTS REASONS ADND REMEDIES



IDEAL STRUCTURES

- Morden Structures, If....
- Properly Designed
- Constructed With Good Quality Materials, Workmenship & Quality Assurance
- · Periodicaly Maintained.
- Then The Structure Serve For Life Span of 75 To 100 Years.

COMPARISION OF HUMAN BODY AND BUILDING



Si.No	Human body	Buildings
1.	Bone system	Reinforcement
2.	Flesh & Blood	Concrete & Masonry
3.	Blood veins &nerves	Service Lines(Electrical, Plumbing)
4.	Cardio vascular system	Pumps and tanks
5.	Ophthalmology and Respiratory system	Lighting and Ventilation
6.	Digestive system	Kitchen or production units
7.	Excretion System	Sewage disposal (Septic Tank, STP)
8.	ENT	Carpentry (Doors & Windows)
9.	Skin	Plaster & Paint

- Human body deteriorated by diseases.
- Building deteriorated by defects.
- Both Human body and Buildings badly affected by over stressing.
- Both Human body and Buildings become weak due to lack of care and maintenance.

CONSTRUCTION DEFECTS

- Improper geometry of structural components.
- Improper survey and marking
- Improper earth work excavation.
- Improper selection of materials.
- Improper construction of concrete and mansonry
- Improper formworks.
- Improper or lack of tools.

Improper maintenance or lack of maintenance



SIZE OF COLUMN

ish coat approx

- Legs are Stronger than Arms
- · Columns Should Be Stronger than Beam
- Ac>Ab, Ic>Ib, Kc>Kb,

So Before fix the size of column first fix Size of Beam. IS-456-2000 recommendation for span to eff depth ratio of beam,

De. SUESICIENT DEPTL

However, practically, 1 feet span requires 1inch depth Beam

ORIENTATION OF COLUMNS

• Maximum moment of Inertia of Column should face Major Axis. (longer span)



STABILITY OF STRUCTURE

ABC

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- A-Anchorage
- B-Bracing
- C-Continuity

(BR)

Surveying and Marking



IMPROPER EARTH WORK SHALLOW EXCAVATION

IS 3764:1992 (Re Affirmed :2002) Indian Standard

EXCAVATION WORK CODE OF SAFETY

• Depth of Excavation more than 1.5m is risk Requires proper safety

• Before Excavation site Engineer has to ensure any Pipelines, Sewers, Gaslines or Electrical conduits beneath the earth

• Scaffolds and Ladders are to be provided for workers inside the trench

• No excavation or earthwork below the level of any foundation of building or structure.



• No material shall be placed or stacked near the edge of any excavation, as it may endanger the persons employed below.

• Excavated material is not to be placed nearer than 1 m from the outer edges of the excavation but shall be placed anywhere within 50 metres.



• The bottom of foundation pits shall be dressed level in all directions and before any concrete is put in, shall be well watered and thoroughly rammed.

COMMON HAZARDS IN EXCAVATION

- Quick sand
- Water logging
- Effect of freezing and thawing
- Vibration from near by sources
- Adjacent Loose fills
- · Surcharge imposed by Adjacent structures



IMPORTANTS POINTS TO BE FOLLOWED FOR SHALLOW EXCAVATION

(1) Excavation for insertion of planking and strutting.

(2) Unless otherwise specified, removing slips or falls in excavation.

(3) Bailing out water on Excavation from rains, subsoil water etc..,

(4) Shifting or supporting pipes, electric cables, etc. met during excavation.



DEEP EXCAVATION USING CONTIGEOUS PILES

• In Urban scenario, multiples, malls, auditoriums requires huge parking space

• Metro stations below ground level required deep excavations upto 20m etc.,

• In such type of excavation retaining soil is very big challenge

• Contiguous piles are proven solution with some limitations.



REFILLING FOUNDATION TRENCH

All foundation shall be refilled to the original surface of the ground with approved materials, well watered and rammed.



Southern Builder

Table 16 Nominal Cover to Meet Durability Req (Clause 26.4.2)

FILLING IN BASEMENT / PLINTH

· In cases where the excavated foundation soil is to be used for refilling ensure that soil doest not have swell shrink characteristics and carefully rammed in regular layers of not more than 15 cm in thickness.

· When filling reaches finished level the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and compacted in order to avoid anv settlement at a later stage.

GRADEBEAM / PLINTH BEAM

· Ensure proper alignment of centering with planks/ sheets and avoid using coconut planks.

· Check the reinforcement as per design and ensure proper cover to the reinforcement bars by placing precast concrete cover block.

• Provide gauges at regular intervals for centering to prevent bleeding and weeping of cement slurry from concrete by proper filling of the gaps.

· During concrete, use needle vibrator





PCC FOR FOUNDATION & FLOOR

· Mark the top level of the mat concrete on the excavated wall surface.

• Ensure the size of 40mm metal and its shape. Avoid using Flaky materials.

· Control water cement ratio of the concrete to avoid dry mix.

• Avoid spreading aggregates and pour cement mortar slurry but mix properly and compact

· Tamp the concrete with specified cast Iron rammer and finish the top surface and edge truly.

· Ensure effective curing.





COVER FOR REINFORCEMENT

• The purpose of cover blocks is to protect the reinforcement bars from corrosion.



Provide Concrete Cover Blocks do not use brick bats/ stone, etc., 6) FOOTING COVER DETAILS:

<u>35</u> 45



· LACK OF COVER LEADS TO CORROSION-SLAB



LACK OF COVER LEADS TO CORROSION-BEAM



Form work

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• IS 14687 1999, Indian Standard False work for concrete structures Guidelines is available.

· IRC 87-1984-Guidelines on design and erection of formwork for road bridges.

- ACI 347r-94-guide to formwork for concrete
- ACI SP-4 -ormwork for concrete.

· BS 5975-British Standards for formwork.

PROVIDE PROPER FORMWORK FOR FOUNDATION





IS 456 REMOVAL OF FORMWORK

Туј	pe of Formwork	Minimum Period Before Striking Formwork
a)	Vertical formwork to columns, walls, beams	16-24 h
b)	Soffit formwork to slabs (Props to be refixed immediately after removal of formwork)	3 days
c)	Soffit formwork to beams (Props to be refixed immediately after removal of formwork)	7 days
d)	Props to slabs:	
	 Spanning up to 4.5 m Spanning over 4.5 m 	7 days 14 days
e)	Props to beams and arches:	
	 Spanning up to 6 m Spanning over 6 m 	14 days 21 days

PREMATURE REMOVAL FORMWORK

• Removal of forms Before the concrete has reached its proper strength may result compression and tension cracks

Re Propping

Back Propping



OF

ISOMETRIC VIEW OF SHALLOW FOUNDATIONS



REINFORCEMENTS DOS AND DONTS FOUNDATIONS Lapping error:



Development length error:



REINFORCEMENTS DOS AND DONTS COLUMNS

• Minimum 4 Nos. of longitudinal bars for Square/ Rectangular Cross section.

Minimum 6 Nos. of longitudinal bars for Circular Cross section

• The spacing of the longitudinal bars in the column

should be along the peripheral.

- Keep the dimension of the column constant as far as possible.
- Avoid use of different grades of vertical bars.
- Don't bend after weld (if done).

• All longitudinal bars shall not be lapped at same location, instead at least 50% of longitudinal bars should be at least 300 mm away from nearest lap



Contd.



REINFORCEMENTS DOS AND DONTS BEAMS

Flexural reinforcement not lapped at maximum tension zone (Mid span of bottom and Top of support)
At beam to beam intersection, Provide hanger type bars at the main beam to receive to receive the secondary beam loads to avoid shear crack.



REINFORCEMENTS DOS AND DONTS SLABS

- Provide Chair Rod to support the top reinforcement of slab.
- Use precast cover blocks (20mm Thk) for bottom reinforcement.

• Provide wooden benches on slab reinforcement to avoid people wall directly on reinforcement.





REINFORCEMENTS DOS AND DONTS - Sunshades

• Sunshades are essential for windows.

• Mostly sunshades are cantilever slabs.

• Ensure Reinforcement at the top with proper development length U Shape.

• Top of sunshade should be plastered in cement mortar (1:3), with sufficient slope for the rain water to drain.

• Avoid edge decorative walls on sunshade which make the sunshades as mini water tank and develop further corrosion.



REINFORCEMENTS-DOS AND DONTS-Staircase

• Staircases to be detailed diagrammatically in plan & section, placing and bending details of rebar.

• Mostly staircase rebar starts from Grade beam / Plinth beam, otherwise separate stiff foundation may be required.

• Mostly thickness of staircase is greater than or equal to thickness of roof slab. Don not provide less than that.

• Width, Raise and thread as per NBC Norms.

· Avoid winders.

• Ensure minimum head room height (2.4m), from each steps



CONCRETE PREPARATION Site mix concrete



Ready mix concrete



WATER CEMENT RATIO

• Water is the most essential ingredient to prepare concrete.

• Water only starts the Chemical reaction between cement and aggregate.

- Less water make the concrete not workable
- More the water, concrete Strength shall fall.
- · Optimum usage of water shall be emphasized



SLUMP TEST -(IS 1199:1959)

• Slump test is a field test on fresh concrete to measure its workability.

• Unless Slump test performed at site then very difficult to maintain optimum water cement ratio to achieve expected strength



WORKABILITY OF CONCRETE (SITE MIX)

7 WORKABILITY OF CONCRETE

IS 456 : 2000

be compacted with the means available. Suggested ranges of workability of concrete measured in accordance with IS 1199 are given below: 7.1 The concrete mix proportions chosen should be such that the concrete is of adequate workability for the placing conditions of the concrete and can properly

Placing Conditions	Degree of Workability	Slump (mm)
(1)	(2)	(3)
Blinding concrete; Shallow sections;	Very low	See 7.1.1
Pavements using pavers		
Mass concrete; Lightly reinforced sections in slabs,	Low	25-75
beams, walls, columns; Floors;		
Hand placed pavements; Canal lining; Strin footings		
Heavily reinforced sections in slabs,	Medium	50-100
beams, walls, columns; Slipform work; Pumped concrete		75-100
Trench fill; In-situ piling	High	100-150
Tremie concrete	Very high	See 7.1.2

required to be used (see also 13.3).

CUBE TEST-(IS516 1959)

· Cube test performed to find the compressive strength of concrete specimen.

 Concrete cubes cast at site and cured for either 7 days (0.66 fck) or 28 Days (fck) and then tested in

· Unless cube test performed then actual strength of concrete achieved unable to determine.

• If cube test results not favor to the desired Strength then repair and rehabilitation procedure has to be adopted.

Construction of Brick Masonry

· Use Header and Stretcher bond with proper closure to avoid vertical joints.

- Brick should be soaked in drum of water before it is laid.
- Maintain uniform thickness of mortar (10mm).
- The top Surface of every layer should be truly leveled.
- All joints should be racked to receive plastering.

• Unburnt, half burnt and brick bats should be avoided in construction

· Holes in the masonry should be filled with concrete only and proper care should be taken for curing of filled concrete

COMMON COSTRUCTION ERRORS • OUT OF PLUMB OF WALL /COLUMN

CONCRETE HACK BEFORE PLASTER

 All Concrete surface should be hacked at closed intervals.

Cover concrete should not be removed.

Plastering

· Before plastering, ensure that the entire room is fit for plastering of joineries Concealing electrical Lines etc.,

 The brick wall should be thoroughly cleaned and wetted before plastering.

• The inner wall plastering should be finished smoothly, while outer wall should be finished with medium roughness.

· All Corners of wall and edge should be finished with rich mortar.

Avoid chiseling of plastered Surface

· The top surface of the parapet wall should be filled with inward slope for main water.

BUTTON MARKING FOR PLASTER

 To maintain uniform thickness of plastering, (for ceiling 1012mm, for walls 15 20mm), buttons at regular intervals may be provided.

WEATHERING COURSE

· Concrete should be protected from UV rays and rain water.

· Weathering coarse using brick batts / jally with lime concrete and pressed clay tiles over lay proved best good old technology.

• Proper Slope & Drainage to be provided on the terrace.

DISTRESS SYMPTOMS CRACKS

LEAKAGE&DAMPNESS

- Source of moisture to be find.
- · Porosity is the main cause of dampness.
- Drainage to be improved.

• Appropriate water proofing techniques to be done with skilled manpower and tools.

SPALLING

DISINTEGRATION

HONEYCOMBED CONCRETE

CARELESS ABOUT SLOPE **OF WATER DRAIN**

DAMAGING STRUCTURAL CORROSION RUSTING CORROSION TREATMENT

ELEMENTS TO LAY

SERVICE PIPES/DUCTS

Additional of reinforcement

Application of

bonding Coat

REPALCED RENFORCEME

MICRO-CONCRETE FINISH

TESTS ON STRUCTURES •Non Destructive Tests **Rebound Hammer Test**

ULTASONIC PUSLE **VELOCITY TEST**

CARBONATION TEST

SI. No.	Observation	Result
1	Grey Color to Pink	No Carbonation
2	No change in color of concrete	Affected by Carbonation

CORE TEST (SEMI DESTRUCTIVE)

LOAD TEST

REHABILITATION TECHNIQUES

REBAR LOCATOR TEST

COVER METER TEST

• RCC & STEEL JACKETING

No Settlement

Total Settlement

Differential Settlement

FOUNDATION REPAIR UNDERPINNING

CONCLUSION

•Drawing is Engineers language.

- •Instead of telling and writing instructions, better clearly draw
- •If construction is drama Specifications are the Dialogue. •Adhere to Code of Practice & Standards.

•Site safety and economy both gives equal importance. •Avoid communication mistakes. Conduct site meeting Frequently.

•All drawings are valid only if the respective consultants check at site.

WRONG IS WRONG, EVEN IF EVERYONE IS DOING IT.

RIGHT IS RIGHT, EVEN IF NO ONE IS DOING IT.

Thank you

· Civil Engineering is not an intellectual practice even it has intellectual content but it is Action oriented - Prof. Ralph B.Peck

- (GAD)

REVISION OF STAMP DUTY AND REGISTRATION FEE W.E.F 10.7.2023

DESCRIPTION OF INSTRUMENT/SERVICE	EXISTING STAMP DUTY (Rs.)	REVISED STAMP DUTY (Rs.)	EXISTING REGISTRATION FEE (Rs.)	REVISED REGISTRATION FEE (Rs.)
Power of Attorney to Sell immovable property				
a) In favour of family member		No Change	1000/-	2,000/-
b) In favour of a non- family member		No change	Rs.10,000/-	1% market value of property
c) granted for consideration		No change	1% on consideration	2,000/- or 1% consideration or 1% market value of property, whichever is higher.
Construction Agreement		No change	1% on value of construction or cost of construction or consideration, whichever is higher	3% on value of construction or cost of construction or consideration, whichever is higher
Sale certificate				
Issued by Court or Government Revenue Officer		No change	1% on auction price	2% on auction price
Issued by Bank officer or Official Liquidator		No change	2% on the market value	4% on market value
Release Art 55A (including family release)	1% on the market value subject to a maximum of Rs.25,000/-	1% on the market value subject to a maximum of Rs.40,000/-	1% on the market value subject to a maximum of Rs.4,000/-	1% on the market value subject to a maximum of Rs.10,000/-
Partition between family members	1% on the market value	1% on the market value	1% on the market value subject to a	1% on the market value
Art 45(a)	subject to a maximum of Rs.25,000/- per share	subject to a maximum of Rs.40,000/- per share	maximum of Rs.4,000/- per share	subject to a maximum of Rs.10,000/- per share
Settlement in favour of family member	1% on the market value	1% on the market value	1% on the market value subject to a	1% on the market value

37

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Art 58(a) (i)	subject to a	subject to a	maximum of	subject to a
	maximum of	maximum of	Rs.4,000/-	maximum of
	Rs.25,000/-	Rs.40,000/-		Rs.10,000/-
Dissolution of	1% on the	1% on the	1% on the market	1% on the
partnership between	market value	market value	value subject to a	market value
family members	subject to a	subject to a	maximum of	subject to a
	maximum of	maximum of	Rs.4,000/- per	maximum of
	Rs.25,000/- per	Rs.40,000/- per	share	Rs.10,000/-
	share	share		per share
Lease		No change	1% (on rent,	1% (on rent,
			advance, etc.,)	advance, etc.,)
			subject to a	subject to a
			maximum of	maximum of
			Rs.20,000/-	Rs.40,000/-
Document not		No change	Rs.100/-	Rs.1,000/-
susceptible to money				
valuation Art 1(g) of				
Table of fee				
Collateral, auxillary,		No change	Max Rs.10/-	Max Rs.100/-
etc. <i>,</i> Art 40(c)				
Receipt		No change	Rs.20/-	Rs.200/-
Duplicate or		No change	Rs.20/-	Rs.100/-
counterpart				
If claimant/beneficiary		No change	Nil	Additional
is a single person,				fixed fee of
(except lease &				Rs.5,000/-
agreement)				
Mere Rectification not		No change	Rs.10/-	Rs.500/-
falling under Section				
47B				
Ratification/Supplement		No change	Rs.10/-	Rs.500/-
deed				
Cancellation/Revocation		No change	Rs.50/-	Rs.500/-
DOT {Art 6(1) (a)}	Rs.5/- for every	Rs.5/- for every	1% on amount	1% on amount
	Rs.1000/- on	Rs.1000/- on	secured subject to	secured
	amount secured	amount secured	a maximum of	subject to a
	subject to a	subject to a	Ks.6,000/-	maximum of
	maximum of	maximum of		Rs.8,000/-
	Rs.30,000/-	Rs.40,000/-	10/	10/
Nortgage without	1% on amount	1% on amount	1% on amount	1% on amount
possession	secured subject	secured subject	secured subject to	secured
{Article 40(b)}	to a maximum	to a maximum	a maximum of	subject to a
	ot Rs.40,000/-	ot Rs.50,000/-	Ks.10,000/-	maximum of
	40/	40/	40/	Ks.15,000/-
Further charge {Art	1% on amount	1% on amount	1% on amount	1% on amount
32(b)(II)}	secured subject	secured subject	secured subject to	secured
				subject to a

	to a maximum	to a maximum	a maximum of	maximum of
	of Rs.40,000/-	of Rs.50,000/-	Rs.10,000/-	Rs.15,000/-
Security Bond (Art 57)		No change	1% on amount	1% on amount
			secured subject to	secured
			a maximum of	subject to a
			Rs.10,000/-	maximum of
				Rs.15,000/-
Computer fee			Rs.100/-	Rs.200/-
Document Scanning fee			Rs.15/-For every	Rs.100/-For
			page in excess of	every page in
			first 10 pages	excess of first
				10 pages
				(endorsement
				excluded)
Memo fees			Rs.10/-	Rs.100/-
Opening of sealed cover			Rs.50/-	Rs.200/-
Deposit of sealed cover			Rs.200/-	Rs.2,000/-
Withdrawal of sealed			Rs.50/-	Rs.500/-
cover				
Attestation of power of			Rs.20/-	Rs.500/-
attorney				
Private attendance			Rs.200/-	Rs.1,000/-
Safe custody			Re.1/- subject to a	Rs.10/- Subject
			max of Rs.10/-	to a max of
				Rs.100/-
Appeal and Application			Rs.100/-	Rs.500/-
under section 72 and				
sec 73, enquiry under				
74, 35(3)				
Delay condonation in			Rs.10/-	Rs.100/-
presentation and				
appearance, filing				
special power, etc.,				
Protest petition,			Rs.20/-	Rs.100/-
petition for withdrawal				
from registration,				
partial/complete refusal				
partial/complete refusal of registration				
partial/complete refusal of registration Holiday registration,			Rs.200/-	Rs.1,000/-
partial/complete refusal of registration Holiday registration, deposit of sealed cover,			Rs.200/-	Rs.1,000/-
partial/complete refusal of registration Holiday registration, deposit of sealed cover, attestation of power of			Rs.200/-	Rs.1,000/-

(39)

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A D VILL	Southern Centre Es	sia : 1750
Estd : 1941	MEMBERSHIP APPLICA	TION FORM
To The Secretary, BAI - Head Office G-1/G-20, 7 th Floor, Commerce Cen J. Dadajee Road, Tardeo MUMBAI – 400 034 Ph : 022-2352 0507 / 2351 4802 Website : www.baionline.in Dear Sir, Please enroll my/our name am/are connected with the Build	tre (s) as PATRON / RENEWAL Mem ling Profession / Trade / Constru	Through The Honorary Secretary, BAI - Southern Centre Plot No.A1, 1st Main Road, (Opp. to AIEMA) Industrial Estate, Ambattur, Chennai - 600 058 Ph : 044-2625 2006 Web : www.baisouthern.com E.mail : baisouthern1950@gmail.com / baisouthern@yahoo.com aber of Builders' Association of India. I/We action industry as (please tick relevant box/s)
Civil Construction Contractors	Real Estate Developer / Promo	ter Registered With
Electrical	Architect/Engineer	Central PWD
Plumbing	Transporter	State PWD
Fabrication	Demolition	MES
Roads	Manufacturers/Suppliers	Railways
U Water Proofing	Dealers/Hirers	Other State/Central Govt.Dept.(specify)
Interior decorator	Engineering College/Polytechni	ics
Repairs/Maintenance	any other (specify)	
		any other (specify)
I /we specialise in		
I/We have read the Rules and Regu	lations of your Association and agree	e to abide by the same. Please find herewith sum of
Rs/- (Ru	pees	
2) by Cash/Cheque/[Demand Draft No Dated
drawn or	n in	favour of "BUILDERS ASSOCIATION OF INDIA"
towards the membership subscript	tion	
towards the memocranip subscript	.01.	
		Yours faithfully,
		(For & On Behalf of)
Date :	(To be signed by Proprietor / Pa	rtner / Director of Attorney / Authorised Signatory)
		(PTO)
•Southern Builder•	(40)	

BUILDERS' ASSOCIATION OF INDIA

(All India Association of Engineering Construction Contractors) Southern Centre Estd: 1950

Tel: Office: Res Mobile: E.mail: GSTIN : GSTIN : 2.Give names in case of partnership firm/ Ud Company / Institution and indicate against each whether Fartner / Director / Executive atomey Name of the Person who will attend and vote at the meeting with reside address and contact numbers a)	I. Full Name and Address		
Tel: Office : Res Mobile: E.mail : GSTIN : GSTIN : 2.Give names in case of partnership firm/ / Litz Company / Institution and indicate against each whether Partner / Diredor / Executive attorney Name of the Person who will attend and vote at the meeting with reside address and contact numbers a) b)			
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Proceedings in the partner / Director / Back Company / Institution and indicate against each whether Partner / Director / Executive attorney a) b) c) c) d) g) exercise and contact numbers a) b) c) c) d) d) d) g) exercise and contact numbers a) b) c) c) c) g) g) exercise and contact numbers a) b) c)	2 Give names in case of partnershin firm/	Name	of the Person
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a)	Executive attorney		
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c)	b)	b)	
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Southern Centre Activities

மணப்பாக்கத்தில் உள்ள L&T நிறுவனத்தின் கட்டுமான பிரிவு தலைமையகத்தில் உள்ள நீர் மற்றும் கழிவு நீர் சுத்திகரிப்பு அமைப்புகள் குறித்து ஆலோசனை மேற்கொள்ள சுத்திகரிப்பு பிரிவு Vice President & CTO திரு. S. ஜெகநாதன் அவர்கள் அழைப்பின் பேரில் மய்யத்தலைவர் திரு. A.N. பாலாஜி அவர்கள் சந்தித்து ஆலோசனை நடத்தினார்.

11.07.2023

04 07 2023

தென்னக மய்ய இணைப்புச் சங்கங்களுடனான ஆலோசனைக் கூட்டம் 11.07.2023 அன்று மய்யத்தலைவர் திரு. A.N. பாலாஜி அவர்களால் கூட்டப்பட்டது. இதில் காப்பாளர் மற்றும் அகில இந்திய முன்னாள் தலைவர் திரு. Mu. மோகன், மய்ய நிர்வாகிகள், Chennai Flat Promoters Association, Singara Chennai Builders Association, Flat Promoters Association Chennai South, Flat Promoters Association Tambaram, Flat Promoters Association (Ambattur & Avadi) மற்றும் Chennai Southern Builders Association ஆகிய சங்கங்களின் பிரதிநிதிகள் கலந்து கொண்டனர். கூட்டத்தில் தமிழ்நாடு அரசினால் அசையாச் சொத்துக்களை விற்பதற்கான Power of Attorney –க்கான பதிவுக் கட்டணம் Rs.10,000/ லிருந்து சொத்தின் சந்தை மதிப்பில் 1 சதவிகிதமாக உயர்த்தப்பட்டுள்ளதோடு Construction Agreement பதிவிற்கான கட்டணம் 1 சதவிகிதத்திலிருந்து 3 சதவிகிதமாக அறிவிக்கப்பட்டுள்ள உயர்வு குறித்து விவாதிக்கப்பட்டது. விவாதத்தின் முடிவில் மாண்புமிகு தமிழக முதல்வர், மாண்புமிகு வணிக வரித்துறை மற்றும் பதிவுத்துறை அமைச்சர் அவர்களுக்கும், அத்துறைகளின் அரசுச் செயலாளர் அவர்களுக்கும் கோரிக்கை மனு சமர்ப்பிக்கப்பட்டது.

18.07.2023

CREDAI ஏற்பாடு செய்திருந்த கூட்டு பத்திரிக்கையாளர் சந்திப்பில் தென்னக மய்யத்தலைவர் திரு. A.N. பாலாஜி அவர்கள் கலந்து கொண்டார்.

26.07.2023 - 27.07.2023

மாநில அளவிலான இரண்டாவது MC/GC கூட்டம் மாமல்லபுரத்தில் செங்கை மய்யத்தின் உபசரிப்பில் நடைபெற்றது. இக்கூட்டத்தில் தென்னக மய்ய நிர்வாகிகள் மற்றும் MC/GC உறுப்பினர்கள் கலந்து கொண்டனர்.

27.07.2023

சென்னை கலைவாணர் அரங்கில் மாண்புமிகு வணிகவரி மற்றும் பதிவுத்துறை அமைச்சர் திரு. பி. மூர்த்தி அவர்கள் தலைமையில் பதிவு நடைமுறைகள் குறித்த கருத்துக்கேட்புக்கூட்டம் நடைபெற்றது. இதில் RERA குழுத்தலைவர் திரு. L. சாந்தகுமார், CMDA குழுத்தலைவர் திரு. S. இராமப்பிரபு ஆகியோர் கலந்து கொண்டனர்.

28.07.2023

கட்டுமானத் தொழிலாளர்களுக்கான மூன்றாவது இலவச மருத்துவமுகாம் 28.07.2023 அன்று சென்னை மேடவாக்கத்தில் "Navins Starwood Towers 3.0" பணித்தளத்தில் நடைபெற்றது. காப்பாளர் மற்றும் அகில இந்திய முன்னாள் தலைவர் திரு. Mu.மோகன் அவர்கள் முன்னிலையில் மருத்துவ முகாம் தொடங்கியது. மய்யத்தலைவர் திரு. A.N. பாலாஜி மற்றும் மய்ய நிர்வாகிகள், EC/GC உறுப்பினர்கள் கலந்து கொண்டு சிறப்பித்தனர். சுமார் 200க்கும் மேற்பாட்ட கட்டுமான தொழிலாளர்களுக்கு மருத்துவ பரிசோதனை செய்யப்பட்டது.

19.07.2023

அன்று 4வது EC/GC கூட்டம் Hotel Accord –ல் திரு. A. கலையரசன், திரு. A. சத்தியநாரயாணா திரு. M.V. ஹரிகுமார் திரு. M. பசுபதி மற்றும் திரு. S. கருணாநிதி ஆகியோரின் உபசரிப்பில் நடைபெற்றது

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