

COMPARATIVE ANALYSIS BETWEEN TWO STANDARDS TCVN 5574:2018 AND TCVN 5574:2012 Part 1: Some general notes

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ABSTRACT

In the new standard TCVN 5574:2018, replacing TCVN 5574:2012, there are significant changes in structure, materials and calculation methods compared with the old version TCVN 5574:2012. The standard TCVN 5574-18 has approached EC2 and ACI standards to increase international integration, and it has also changed the perspective of computational modeling, converted from stress model to strain model. This article analyzes and compares two standards to highlight new points, helping designers to distinguish easily and conveniently apply TCVN 5574:2018 in practice. To achieve the goal, the authors organize into five main contents as follows: Part 1: Some general notes; Part 2: Comparison of materials in two quality standards; Part 3: Comparison of calculation methods in two quality standards; Part 4: Evaluation method and analysis of results.

Keyword: TCVN 5574:2018, TCVN 5574:2012, Reinforced concrete, Standard, Strain model

1. INTRODUCTION

The design standards of reinforced concrete structures of countries around the world are often updated and changed regularly. The period for updating and modifying is usually about every 3 years and renewal about every 10 years. The current standard for the design of concrete and reinforced concrete structures TCVN 5574:2018 [2] took effect from December 10, 2018, and replaces the old version of TCVN 5574:2012 [1]. TCVN 5574:2012 [1] was published in 2012. It has been moved from TCXDVN 356:2005 [3] and had been retained in its entirety, only renamed. Furthermore, TCXDVN 356:2005 is translated from the Russian standard SNIP 2.03.01-84 which was made more than 30 years ago. Thus, we had used too old standards compared with the progress of science and technology in the world. This problem had caused many inadequacies in the design process. Standard [1] stipulates the use of steels (such as CI, C-II, C-III...) according to the old standards before, so it is not linked with the new standards of Vietnam. as standard on current reinforcement steel, or prestressed steel (pre-stressed): TCVN 1651:2008 [4], TCVN 6284:1997 [5, 6, 7], TCVN 6288:1997 [8].

Therefore, to update new information in the field of design of concrete and reinforced concrete structures, standard [1] has been replaced by TCVN 5574:2018 [2]. This standard has been written mainly based on the Russian standard SP 63.13330.2012. With this approach, it will not cause much confusion in teaching and designing practice. In this new standard [2], it has many new points that deserve attention: the calculation perspective is changed from the stress model to the strain model (accepting the flat section assumption), calculating Puncture math and other new points are presented below.

2. MAIN CONTENT

The new standard consists of 12 sections and 13 annexes which has been studied towards the EC2 standard approach. The whole structure in the new standard [2] is not the same as the structure of the old standard [1], it separates 3 separate parts for concrete structure, non-prestressed reinforced concrete and reinforced concrete pre-

stressed. At the same time, it adds some new content such as: more detailed reinforcement classification, reduced calculated strength; require more complete reinforcement structure; requirements for the restoration and reinforcement of reinforced concrete structures are more concise; considering reinforcement to limit horizontal deformation; member subjected to eccentric compression according to nonlinear strain; change the calculation method for inclined, bending, torsion sections.

Table 1. Comparison of General Issues

Numerical order	TCVN 5574:2018	TCVN 5574:2012 (356-2005)
1	Clearly distinguish four types of reliability coefficients: load, material, working condition factor; importance factor.	The reliability coefficient is not well defined.
2	Strength grade of concrete (tensile, compressive) and reinforcement	Durability of concrete and reinforcement.
3	Working height h_0 of section	Useful height h_0 of the cross-section
4	Resistance, durability: ensure that the reinforcement is used normally throughout the term.	Force-resistance
5	<p>Article 5.2. Calculate reinforced concrete according to durability.</p> <ul style="list-style-type: none"> - Reinforced concrete structural members with M, N effects: Calculated according to the nonlinear deformation model. - Reinforced concrete structural members with simple cross-section (T, I, rectangular): Calculated according to limited internal force (same as old standard). - Calculated on inclined cross section, space section: According to limited internal force (same as before). - Short structure calculation: according to the model of virtual truss bar. - Nonlinear strain model: the strength criterion on the perpendicular section is the relative strain in concrete or reinforcement reaching the limit value. 	<p>Article 5.2.</p> <ul style="list-style-type: none"> - All are calculated according to the internal force limit. $M \leq [M]$ $N \leq [N]$ $Q \leq [Q]$

3. CONCLUSIONS

The design standard of concrete and reinforced concrete structures TCVN 5574-18 has gradually approached the EC2 standard and a little approach to ACI ($\epsilon_b = 0.003$). It has changed the view of computational modeling and has moved from the stress model to the strain model. This model is recommended to be used as a priority for calculation according to limit states (first and second) for members subjected to bending moments and longitudinal forces. It still allows using the limited internal force method for members with simple cross-sectional shapes such as rectangle, T, and I.

4. ACKNOWLEDGEMENT

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5. REFERENCES

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- [4]. TCVN 1651:2008, Reinforced steel for concrete.
- [5]. TCVN 6284-2:1997 (ISO 6934-2:1991), Prestressed concrete reinforcement – Part 2: Cold drawn wire.
- [6]. TCVN 6284-4:1997 (ISO 6934-4:1991), Prestressed concrete reinforcement – Part 4: Strips.

- [7]. TCVN 6284-5:1997 (ISO 6934-5:1991), Prestressed concrete reinforcement – Part 5: Hot-rolled bar steel with or without further treatment.
- [8]. TCVN 6288:1997 (ISO 10544:1992), Cold drawn steel wire for concrete reinforcement and production of welded wire mesh for reinforcement.

