Application of Post-Pouring Strip Construction Technology in Engineering Projects

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Keywords: post-pouring strip construction technology; engineering application; construction process; quality control

Abstract: As a key technology for addressing differential settlement in engineering structures, controlling temperature cracks, and ensuring structural integrity, the post-pouring strip construction technique is widely applied in high-rise buildings, large-span structures, underground engineering, and other fields, significantly influencing the overall quality of engineering construction. After clarifying the essential application points of the post-pouring strip construction technique, this article delves into its specific applications in engineering projects. It outlines operational standards and precautions for various stages, including pre-construction preparation, formwork construction, concrete construction, crack treatment, and curing. The aim is to provide a reference for the scientific application of the post-pouring strip construction technique in engineering practice.

1. Introduction

With the continuous application of high-rise, large span and complex structure design in construction projects, problems like cracks caused by differential settlement and thermal deformation has become more prominent, which seriously threatens the structural safety and durability. This upcoming technique, the post-pouring strip construction method, solves these difficulties by intentionally leaving certain gaps in the footings that are temporarily supported and then filled early with concrete once settlement stabilization or thermal stress release has taken place. This has become an important technical method in modern construction engineering. Thus, the post-pouring strip technology application principles and operational procedures must be thoroughly investigated by construction enterprises to improve project quality, control structural defect risks and prolong service life.

2. Key Application Points of Post-Pouring Strip Construction Technology

2.1 Clarifying Construction Procedures

The construction of post-pouring strip needs to follow an essential workflow: pre-construction preparation → formwork setting → steel reinforcement → concrete pouring → concrete curing where every stage is interrelated with one another and depends on the previous stages in a sequential manner. Construction organizations endeavor to be completely prepared during planning and pre-construction readiness regarding materials, gear, laborers and site states to accomplish operational requirements. When installing formwork, attention must be paid to the selection of material types, construction accuracy and stability of this structure itself — because if it deforms/loses shape during pouring or there is leakage, it will affect the geometry of the finished concrete surface. The reinforcement of a steel structure must strictly follow the design requirements for spacing and quality of butt joints, and enforce anti-rust treatment. Precise timing when pouring is crucial, as well as standardized pour techniques and improved treatment of joints between new concrete and existing concrete. Also, a curing method was selected according to the type of concrete, while duration and temperature and humidity during the consumption in cured process were tightly controlled to assure enough strength can be reached by cement hydration [1].

  DOI: 10.25236/icacel.2025.052

2.2 Strict Control of Construction Material Quality

The quality of construction materials directly determines the performance and durability of post-pouring strip structures, requiring construction enterprises to implement rigorous quality management across procurement, inspection, storage, and utilization processes.

Concrete should be chosen according to the compressive strengths and degree of crack resistance specified in the design, and in particular appropriate expansion agents should be used. Concrete slump and workability tests must ensure that it complies with construction practices and design standards before site delivery. The reinforcement must be from certified suppliers, which will have specifications corresponding to the design requirements as well as factory certificates and quality documentation. Once it arrives, mechanical property testing; visual inspections to leave out corroded or deformed bars. The rigidity, flatness and sealing performance are required for the formwork materials, thus measurement of dimensional accuracy and surface flatness can be done before assembly to realize precision requirements. Ancillary items like a waterstop and bonding agent should be sourced from trusted manufacturers with verifiable performance history, tested on random samples after delivery to avoid leakage or bond failure due to poor quality materials.

2.3 Proper Execution of Formwork Construction

Formwork construction represents the most significant part of post-pour strip implementation — directly affecting quality and accuracy of concrete forming and structural dimensions. Formwork work system. Depending on the location of post-pouring strip, structural configuration, and construction conditions, construction enterprises also need to choose suitable formwork materials to ensure that it has sufficient capacity to resist lateral pressure and loading during concrete pouring. Control of these parameters by controlling method is required to ensure strict adherence to construction drawings and specification during installation. Concrete leakage over formwork joints should be sealed using foam strips, adhesive tapes or other sealing methods [2]. In the design of a support system, enterprises should evaluate load requirement and construction conditions to choose materials with proper strength and stiffness as a support. The spacing of supports should be based on structural analysis, so as not to cause excess deformation, along with the use of other reinforcement measures such as base plates and cross bracing that increase stability in the system. All of these precautionary measures work in combination to prevent the formwork from settling or warping while concrete is poured and cured.

3. Specific Applications of Post-Pouring Strip Construction Technology in Engineering Projects

3.1 Comprehensive Pre-Construction Preparations

Pre-construction preparation is the backbone of anything going smoothly with post-pouring strip work since they systemically galvanize all nonstandard variables where about material, equipment, manpower and site conditions are target driven as part of systematic process. Preparing materials -- Builders will source concrete, steel reinforcement, formwork, water stoppers and other materials in advance based on the construction plan to facilitate timely delivery. Steel bars should also be piled above the supports and covered with waterproof tarpaulins to prevent corrosion, so as to prepare for storage only during concrete supply scheduling in a manner that it allows continuous pouring operations. Equipment Preparation: Mobilizing equipment such as concrete mixers, transporters, vibrators and curing equipment and preparing for pre-operation tests and maintenance so that no problems will occur during operation of construction [3]. Personnel Preparation: Workers need to be trained in technical procedures and have safety briefings on techniques related with the building post-pour strip construction, quality standards, and safety measures. Establishing the teams — specialized technical supervisors and quality inspectors should be deployed for on-site guidance and enforcement of quality control at every step. Site Preparation — Cleanup and laitance removal of the base area surrounding the post pouring strip. Location, elevation and width of the strip should be verified dimensionally versus design drawings. Along with the above-mentioned scaffolding,

integrated safety barriers have to be installed in the Work Platforms; thus, workers can be able to work in a safe and technically proficient manner when working on the corresponding operations.

3.2 Post-Pouring Strip Formwork Construction

The construction of post-pouring strip formwork would utilize the requirements of the project structural type, construction environment and load requirements for key installation accuracy and support stability to determine whether pre-formed concrete pouring provides a high quality product after forming. For example, in high-rise building floor slab post-pouring strip construction, construction enterprises should select formwork materials with good stiffness, flatness and sealed performance. Selecting high-strength, smooth-surfaced panels not only improves the appearance quality of the cast-in-place concrete but also lessens the chance of grout leakage. As for materials used for joists, they are generally chosen based on calculated loads from formwork to effectively transfer loads and avoid deformation.

In the whole process of formwork installation, construction enterprises must do a good job in building high-level control lines according to construction drawings and on-site elevation measurement. Joints before panelsThe main and secondary joists have to be fastened first, since it is implemented into a uniform arrangement with secure connections: then only follow the formwork panels. Joints between panels are one of the key risk areas for leakage of grout and need to be sealed meticulously with sealing compounds in order to prevent quality failures including honeycombing or pitting on the surface of the concrete due to leakage [4].

The system design used in construction enterprises should take into account vertical loads and lateral pressures during concrete pouring phases, which is mainly based on a steel tubular scaffolding as the primary supporting structure. The vertical and horizontal member arrangement for the support should be based on load-bearing calculations, with base plates and diagonal bracing members: base plates increase stability at the foundation of a support to avoid settlement of vertical members, while diagonal bracing demands significantly higher loads to lateral displacement (i.e. tipping or collapse) during concrete placement. After the formwork is installed, construction enterprises need to comprehensively inspect that it meets design requirements such as elevation control, axial alignment accuracy, surface flatness and verticality, and stability of the support system. The project can only move on to the next construction phase if it meets all inspection criteria.

3.3 Post-Pouring Strip Concrete Construction

Pouring strip concrete construction dictates the timing, methods and treatment of joints to allow for optimum performance of high-quality concrete. Construction Businesses Need to Decide When to Pour Strips stricture behaviors: settlement and thermal post-pouring strips should be poured after completion of the high-rise building's main section, typically when 60–90 days have passed since roof sealing, and settlement might now be considered stable; or when 28 days past strength development of concrete placement in the working-loosening required for those types up from fixing temperatures. Appropriate pouring techniques are essential. Apply Commercial concrete grade one higher than the adjacent structural concrete level for transfer stair hall, with slump strictly controlled to 180±20 mm by pre-pouring test. For pumping, layers shall be poured up to a maximum of 500 mm thick You should carry on internal vibration using immersion vibrators until surface mortar emerges, and further compaction stops without over-vibrating or leaving it undone. For checking strength during pouring, test specimens should be prepared once for every 100 m^3 of concrete [5]. Before pouring concrete, the surfaces of old concrete on both edges of the post-pouring strip must be roughened by chipping to remove laitance and loose aggregates then thoroughly washed with high-pressure jets. Next, a concrete bonding agent of 1–2 mm in thickness should be deposited to improve adhesion between new and old layers of concrete.

3.4 Crack Treatment in Post-Pouring Strip Construction

A post-pouring strip is vulnerable to cracking from causes including temperature variation, shrinkage of the concrete or lack of curing and therefore require targeted repair. Hairline Cracks (≤0.2mm) on the surface: Can be sealed with resin grout Surface cleaning with acetone should be

done first to eliminate contaminants, followed by a uniform application of epoxy resin at 2–3 mm thickness in order to avoid excessive penetration into the crack. Cracks in Medium mode (0.2–0.5 mm): Recommend Pressure grouting Drill 8–10 mm diameter holes on both sides of the crack at intervals of 200–300 mm, insert grouting pipes and inject cement or epoxy resin grout using a high-pressure pump (0.3–0.5 MPa) until completely saturated. Wide Cracks (>0.5mm) or Through-Cracks: – V-shaped notch (depth to width ratio of no less than 1:2), remove debris, apply bonding agent To gain sufficient strength, repair is to be performed with micro-expansion concrete or cement mortar and cured under cover for 7–14 days (depending on expansion rate) [6]. Cause and Prevention of Roots: Construction companies should immediately investigate the causes of cracks. Make changes to the concrete formulation for mix proportion-related cracks; in case of curing-induced cracking, improve curing methods by adopting longer moisture retention periods and constant humidity conditions.

3.5 Curing of Post-Pouring Strip Concrete

It is necessary to cure post-pouring strip concrete intermittently so that the strength development remains constant and consequently crack occurrence is minimized. It should start as soon as the concrete is in place, with specific curing protocols designed for each type of concrete based on site environmental conditions and controlled duration and temperature-humidity parameters of curing. Before curing, workers prepare the surface of concrete by removing leftover laitance and debris so that curing materials can adhere properly. When mixing concrete using standard Portland cement, a moisture-retaining coverage method is advised as follows: within 12 hours of pouring, cover the surface with geotextile or hessian sacks, ensuring that the entire area is covered without any tears and that edges overlap by at least 10cm in order to avoid localized exposure. When subjected to quick evaporation of surface moisture, dry shrinkage cracking can occur if adequate moisture retention is not maintained through manual watering or automated landscape-style sprinkler system. No less than 14 days curing period of such concrete shall be permitted [7-8].

The strength development rate of concrete which uses supplementary cementitious materials like fly ash or ground granulated blast furnace slag (GGBS) is so slow that care must be taken to keep the humidity at nearly perfect for an extended period – usually needing a cure of at least 21 days. To improve water retention, under the geotextile covering, a layer of plastic film must be applied. Season Specific Curing Measures: High temperature Period: Watering frequency to increase and sunlight blocking shade shall be established on curing areas. Winter Construction: We cover with plastic film to shield cold air, then we blanket in thermal or rock wool insulation to keep temperatures at the core of concrete above 5°C. Under confined extreme low temperatures, steam curing is sometimes applied carefully checking all the variables related to controlling temperature and rates for heating/cooling the members are strictly monitored and managed as it could lead to thermal stress cracking. Daily monitoring and documentation: Special responsible personnel shall conduct daily temperature and humidity measurement of concrete surfaces, and keep detailed curing records during the whole process. Curing shall be continued until the concrete attains 100 percent of its design strength.

4. Conclusion

The post-pouring strip construction method occupies an irreplaceable position in solving the problems of structural settlement and thermal cracking while maintaining the overall integrity and stability of engineering structures. In the practical application of this technology, it is necessary to standardize the construction process, strengthen material quality control and formwork management. With its meticulously defined construction parameters, we can analyze and optimize its various applications at every stage of the project.

With the continuous advancement of building engineering technologies, post-pouring strip construction must further integrate innovative materials, intelligent technologies, and eco-friendly concepts. This includes optimizing construction processes through technological innovation and improving application standards to provide robust support for enhancing construction quality and

promoting sustainable development in the building sector.

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