

Application of Post-Pouring Strip Construction Technology in Engineering Projects

Zonghao Hu

Anhui Guoxin Construction Group (Chaohu) Jianxun Engineering Management Co., Ltd., Chaohu, Anhui, 230000, China

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

As construction projects increasingly adopt high-rise, large-span, and complex structural designs, issues such as cracks caused by differential settlement and thermal deformation have become more prominent, significantly compromising structural safety and durability. The post-pouring strip construction technique addresses these challenges by strategically reserving temporary gaps in the structure, which are later filled with concrete after settlement stabilization or thermal stress release. This method has emerged as a critical technical solution in modern construction engineering. Therefore, construction enterprises must thoroughly investigate the key application principles and operational procedures of post-pouring strip technology to enhance project quality, mitigate structural defect risks, and extend service life.

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

2.1 Clarifying Construction Procedures

Post-pouring strip construction must adhere to a core workflow: "pre-construction preparation → formwork installation → steel reinforcement → concrete pouring → concrete curing," with each stage interconnected and sequentially dependent. During pre-construction preparation, construction enterprises must ensure comprehensive readiness in terms of materials, equipment, personnel, and site conditions to meet operational requirements. For formwork installation, emphasis should be placed on selecting appropriate formwork types, ensuring installation accuracy, and maintaining structural stability of the support system to prevent issues such as formwork deformation or concrete leakage during pouring. Steel reinforcement work must strictly comply with design specifications for bar spacing and joint quality, with proper rust prevention measures implemented. Concrete pouring requires precise timing control, standardized pouring techniques, and enhanced treatment of joints between new and existing concrete. During curing, an appropriate curing method should be selected based on concrete type, with strict control over curing duration, temperature, and humidity to guarantee optimal concrete strength development ^[1].

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 must be selected based on design-specified strength grades and enhanced crack resistance, with appropriate expansion agents added. Prior to site delivery, concrete slump and workability tests must confirm compliance with construction and design standards. Reinforcing steel bars should originate from certified suppliers with specifications matching design requirements, accompanied by factory certificates and quality documentation. Mechanical property testing and visual inspections must be conducted upon arrival to eliminate corroded or deformed bars. Formwork materials require high rigidity, flatness, and sealing performance, with dimensional accuracy and surface evenness verified before installation to meet precision requirements. Ancillary materials such as waterstops and bonding agents must be sourced from reliable manufacturers with proven performance records, subjected to random sampling inspections post-delivery to prevent leakage or bonding failures caused by substandard materials.

2.3 Proper Execution of Formwork Construction

Formwork construction constitutes a critical phase in post-pouring strip implementation, directly influencing concrete forming quality and structural dimensional accuracy. Key considerations include formwork selection, installation precision, and support system design. Construction enterprises must select formwork materials based on post-pouring strip location, structural configuration, and construction requirements to ensure adequate capacity to withstand lateral pressure and loading during concrete placement. During installation, strict adherence to construction drawings and specifications is required to control formwork elevation, axial alignment, and verticality. Joints between formwork panels must be properly sealed using foam strips, adhesive tapes, or other sealing methods to prevent concrete leakage ^[2]. For support system design, enterprises should calculate load requirements and construction conditions to select support materials with sufficient strength and stiffness. Support spacing must be determined through structural analysis to avoid excessive deflection, while additional reinforcement measures such as base plates and diagonal bracing should be implemented to enhance system stability. These measures collectively ensure formwork remains free from settlement or deformation during concrete pouring and curing processes.

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

3.1 Comprehensive Pre-Construction Preparations

Pre-construction preparations are fundamental to ensuring smooth execution of post-pouring strip works, requiring systematic coordination across materials, equipment, personnel, and site conditions. **Material Preparation:** Construction enterprises must procure concrete, steel reinforcement, formwork, waterstops, and other materials in advance according to the construction schedule, ensuring timely delivery. Proper storage measures should be implemented, such as elevating steel bars on supports and covering them with waterproof tarpaulins to prevent corrosion, while concrete supply must be scheduled to guarantee continuous pouring operations. **Equipment Preparation:** Essential machinery including concrete mixers, transporters, vibrators, and curing equipment should be mobilized and subjected to pre-operation testing and maintenance to ensure optimal performance, thereby avoiding delays caused by equipment failures during construction ^[3]. **Personnel Preparation:** Workers must undergo technical training and safety briefings covering post-pouring strip construction methods, quality standards, and safety protocols. Specialized technical supervisors and quality inspectors should be assigned to provide on-site guidance and enforce quality control measures throughout the process. **Site Preparation:** The base area surrounding the post-pouring strip must be cleared of debris and laitance to ensure a clean, level surface. Dimensional verification of the strip's location, elevation, and width should be conducted against design drawings. Additionally, scaffolding and work platforms with integrated safety barriers must be erected to create a secure, efficient working environment for subsequent

operations.

3.2 Post-Pouring Strip Formwork Construction

Post-pouring strip formwork construction must be tailored to the structural type, construction environment, and load requirements of the project, with a focus on installation accuracy and support system stability to ensure high-quality concrete pouring and structural formation. Taking the post-pouring strip construction of high-rise building floor slabs as an example, construction enterprises should prioritize formwork materials with adequate stiffness, flatness, and sealing performance during selection. Opting for high-strength, smooth-surfaced panels not only enhances the aesthetic quality of the finished concrete but also minimizes the risk of grout leakage. For joist materials, the selection should be based on calculated formwork loads to ensure effective load transfer and prevent deformation.

During the formwork installation process, construction enterprises should first mark clear control lines for formwork positioning based on construction drawings and on-site elevation measurements. Following the principle of "joists before panels," the main and secondary joists must be secured first, ensuring uniform arrangement and robust connections before laying the formwork panels. The joints between panels represent critical areas for preventing grout leakage and require meticulous treatment with sealing materials to avoid quality defects such as honeycombing or pitting in the concrete caused by leakage^[4].

Construction enterprises must thoroughly account for vertical loads and lateral pressures during concrete pouring when designing the support system, typically employing steel tubular scaffolding as the primary support structure. The arrangement of vertical and horizontal members in the support system should comply with load-bearing requirements, with the inclusion of base plates and diagonal bracing: base plates enhance stability at the support foundation to prevent vertical member settlement, while diagonal bracing significantly improves the system's resistance to lateral displacement, thereby avoiding tilting or collapse during concrete placement. Following formwork installation, construction enterprises must conduct a comprehensive inspection to verify compliance with design specifications, including elevation accuracy, axial alignment precision, surface flatness, and verticality, as well as the structural integrity and stability of the support system. Only after passing all inspection criteria may the project proceed to the next construction phase.

3.3 Post-Pouring Strip Concrete Construction

Post-pouring strip concrete construction requires precise control over pouring timing, techniques, and joint treatment to ensure high-quality concrete performance. Construction enterprises must determine optimal pouring timing based on structural behavior: for settlement post-pouring strips, concrete placement should occur after completion of the high-rise building's main structure and stabilization of settlement (typically 60–90 days after roof sealing); for thermal post-pouring strips, pouring should be delayed until at least 28 days after initial concrete placement and after thermal stress release. Appropriate pouring techniques are essential. Commercial concrete with a strength grade one level higher than adjacent structural concrete should be used, with slump strictly controlled at 180 ± 20 mm through pre-pouring testing. Delivery via concrete pumps should employ layered pouring with each layer not exceeding 500 mm thickness. Internal vibration using immersion vibrators should continue until surface mortar appears and further compaction ceases, avoiding over-vibration or omission. During pouring, test specimens must be prepared at a rate of one set per 100 m³ of concrete for strength verification^[5]. Prior to concrete placement, the old concrete surfaces on both sides of the post-pouring strip must be roughened by chipping to remove laitance and loose aggregates, followed by thorough cleaning with high-pressure water jets. A 1–2 mm thick concrete bonding agent should then be applied to enhance adhesion between new and existing concrete layers.

3.4 Crack Treatment in Post-Pouring Strip Construction

Post-pouring strip construction is prone to cracking due to factors such as temperature fluctuations, concrete shrinkage, and improper curing, necessitating targeted remedial measures.

Surface Hairline Cracks ($\leq 0.2\text{mm}$): These can be sealed with epoxy resin grout. The crack surface should first be cleaned with acetone to remove contaminants, followed by uniform application of epoxy resin at a thickness of 2–3 mm to prevent excessive penetration into the crack. Medium-Width Cracks (0.2–0.5mm): Pressure grouting is recommended. Drill 8–10 mm diameter holes on both sides of the crack at 200–300 mm intervals, insert grouting pipes, and inject cement or epoxy resin grout using a high-pressure pump (0.3–0.5 MPa) until full saturation is achieved. Wide Cracks ($>0.5\text{mm}$) or Through-Cracks: These require V-shaped notching (depth-to-width ratio $\geq 1:2$) followed by debris removal and application of bonding agent. Repair with micro-expansion concrete or cement mortar, then cure under protective covering for 7–14 days to ensure adequate strength development^[6]. Root Cause Analysis and Prevention: Construction enterprises must promptly investigate crack origins. For mix proportion-related cracks, adjust the concrete formulation; for curing-induced cracking, enhance curing protocols by extending moisture retention periods and maintaining stable humidity conditions.

3.5 Curing of Post-Pouring Strip Concrete

Curing of post-pouring strip concrete is critical for ensuring steady strength development and minimizing crack formation. It should commence immediately after concrete placement, with tailored curing protocols developed based on concrete type and site environmental conditions, while strictly controlling curing duration and temperature-humidity parameters. Before initiating curing, workers must remove residual laitance and debris from the concrete surface to ensure proper adhesion of curing materials. For concrete prepared with ordinary Portland cement, a moisture-retaining covering method is preferred: within 12 hours of placement, cover the surface with geotextile or hessian sacks, ensuring complete coverage without tears and with overlapping edges of at least 10 cm to prevent localized exposure. Continuous moisture retention must be maintained through manual watering or automated sprinkler systems to prevent dry shrinkage cracking caused by rapid surface moisture evaporation. The curing period for such concrete shall not be less than 14 days ^[7-8].

When concrete incorporates supplementary cementitious materials such as fly ash or ground granulated blast furnace slag (GGBS), its strength development rate slows significantly, necessitating an extended curing period of at least 21 days with more precise humidity control. A plastic film layer should be applied beneath the geotextile covering to enhance moisture retention. Season-Specific Curing Measures: High-Temperature Season: Increase watering frequency and erect sunshades over curing areas to mitigate thermal impacts on concrete. Winter Construction: Prioritize thermal insulation by first covering with plastic film to block cold air, followed by thermal blankets or rock wool insulation to maintain core concrete temperatures above 5°C. Steam curing may be employed under extremely low temperatures, with strict control over steam temperature and heating/cooling rates to prevent thermal stress cracking. Monitoring and Documentation: Designated personnel must conduct daily temperature and humidity measurements on concrete surfaces, maintaining detailed curing records throughout the process. Curing shall continue until the concrete achieves 100% of its specified design strength.

4. Conclusion

The post-pouring strip construction technique plays an irreplaceable role in addressing structural settlement and thermal cracking issues while ensuring the overall integrity and stability of engineering structures. When applying this technology in practice, it is essential to standardize construction procedures, strengthen material quality control, and enhance formwork management. By rigorously implementing key construction requirements, its specific applications across all project stages can be effectively analyzed and optimized.

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.

References

- [1] Liu, D. Research on the Application of Post-Pouring Strip Construction Technology in Engineering Projects[J]. China Construction Metal Structure, 2025, 24(15): 10-12.
- [2] Li, M. Exploration of Post-Pouring Strip Construction Technology in High-Rise Building Engineering[J]. Building Materials Development Orientation, 2025, 23(11): 103-105.
- [3] Jia, X.B. Application of Post-Pouring Strip Construction Technology in High-Rise Residential Building Projects[J]. Juye, 2025(5): 67-69.
- [4] Guo, K. Analysis of Key Application Points for Post-Pouring Strip Construction Technology in Building Engineering[J]. Building Materials Development Orientation, 2025, 23(7): 85-87.
- [5] Li, Z.H. Research on the Application of Post-Pouring Strip Construction Technology in Housing Construction Projects[J]. Construction Machinery Technology & Management, 2024, 37(6): 106-108.
- [6] Liao, Q.S. Application of Post-Pouring Strip Construction Technology in High-Rise Residential Building Projects[J]. Jushe, 2024(33): 32-35.
- [7] Lin, H. Technical Analysis of Post-Pouring Strip Construction Process Applications in Building Engineering[J]. Ceramics, 2024(10): 231-233.
- [8] Wang, G.W., Guo, S.B. Application Analysis of Post-Pouring Strip Construction Technology in Housing Construction Projects[J]. Sichuan Architecture, 2023, 43(5): 244-245+248.