The concrete technology of post pouring zone of raft foundation of Hongyun Building B tower

Yin Suhua1*, Liu Yu1, Wu Yanli2, Zhao Ying3
1Hebei College of Industry and Technology, Shijiazhuang 050091, China;
2HuangHe JiaoTong University Henan Jiaozuo;
3Liaoning Xuanhe Decoration Engineering Co., Ltd., Liaoning Shenyang 110034
1*E-mail: dongzhongqi@126.com

Abstract. The foundation of Hongyun building B tower is made of raft board foundation which is 3300mm in the thickness concrete pouring amount of large and the late poured band in the pouring settlement formed. The temperature of the pouring settlement was controlled in order to prevent the crack of the construction of the late poured band. The steel of post pouring band was designed and monitored. The quality of post pouring band quality is guaranteed in the raft concrete foundation of Hongyun Building B tower.

1. Project overview
Hongyun Building B tower is raft foundation includes four floors underground and thirty floors on the ground. The annex which podium is an independent foundation with waterproof plate and thickness of 650mm to 1200mm have underground four floors and five floors on the ground. The main core tubes are raft thickness 3300mm and core tube raft thickness 2800mm. The raft base plate is for C40 strength grade of concrete anti permeability level P10. Figure 1 is Hongyun Building B tower project. The thickness of raft foundation is large need the amount of concrete pouring, in which the concrete pouring is belongs to large volume concrete pouring and the settlement post pouring belt construction is high technical requirements.

![Fig. 1 Hongyun Building B Tower Project](image)

2. Technical difficulties
The raft foundation floor thickness of 2.8 ~ 3.3m need to the strength and durability requirements, and the shrinkage cracks is caused by the temperature stress necessary to control especially. The key technology of the large volume concrete foundation is to control the change of the construction caused
by the stress deformation in which the radiation conditions is different that heat is scowl at the concrete floor and concrete floor center but is quick on the surface, the basic side mode and plug wall column reinforced.

The period of the floor construction can late to December, during the time day and night temperature is low that the daytime temperature is \(-1 \degree C\), minimum night temperature can reach \(-16 \degree C\), the temperature difference between day and night is 17 \degree C. In the process of concrete construction the loss of temperature is faster. After the construction completed the temperature difference between the inside and outside is larger when the hydration heat begins to occur. The above factors are more likely to make concrete temperature cracks, so we must take into account the concrete thermal insulation emergency measures.

### 3. Construction technology of raft foundation reinforcement

The steel raft steel bracket is shown as shown in Figure 2. Figure 3 is the B tower reinforced support vertical steel bracket profile set diagram. The foundation raft was set to the raft thickness of 3.3m and 2.8m, the raft bottom three rows with 32 two-way three grade steel @150, raft top two rows of phi 28 two-way three grade steel @150, layout and practice of two middle road with 12 two-way two @300.

![Fig. 2 The layout of the steel bar bracket](image)

![Fig. 3 B tower reinforced support vertical and horizontal setting diagram](image)

Steel stent (horse stool) was used in high-rise buildings or some large equipment foundation and high thick concrete plate reinforced with welded steel bracket between the upper and lower reinforced mass concrete foundation slab. The steel frame is welded by the steel bar to support the weight of the upper reinforcement, control the elevation of the steel bar and the whole construction load of the upper platform. The No. 63 steel main adopted as channel. Steel brackets are arranged in rows. Column and the upper part of the general were used of steel and the slanting pole use of steel and steel bars. The strength and stiffness of the horizontal bar was checked, and the strength and stability of the column and the diagonal bar was checked.

### 4 Construction technology of post pouring belt

#### 4.1 Post cast strip formwork and support

The post pouring concrete is shown as in Figure 4. Both sides made of thin plate does not need to be dismantled with hot dip galvanized steel sheet will be attached. The post pouring concrete supported by steel and steel wire net can be used in which will be attached to support steel bar and steel support
can be welded to the steel structure or sealing plate. The post pouring bottom have each side reserved 250mm with 12mm thick Q345 plate post type water stop.

![Diagram of post poured strip template and support](image)

**Fig. 4** post poured strip template and support

### 4.2 Post cast steel

Reinforced transverse reinforcement and the structure part of late poured band continuous banding together, reinforced through the convenient reticulated position according to the design of pre lain, through convenient steel binding. The both sides was masonry 120mm high using the 240 thick brick, reinforced with plywood (plus block) to cover, to avoid contamination of steel before the post pouring concrete pouring.

### 4.3 Post pouring concrete pouring

The post pouring concrete is used to the micro expansive concrete pouring concrete is higher than the both sides. The B tower and podium raft settlement post pouring belt is poured according to the requirements of design drawings of casting time strength.

1. The part of the concrete shall be satisfied

   The grade of ordinary the cement or the slag cement is not less than 42.5. It is selected that good gradation of coarse and fine aggregate, in which the content mud less than 1% in the coarse aggregate, mud the content mud is less than 3% in the fine aggregate. The concrete expansion agent selection should be carried out according to the specifications, dosage according to the proportion.

2. Treatment of post pouring belt

   The impurities should be removed before the post pouring band poured. The post pouring band should be protected in order to prevent debris into the zone because the post pouring a long residence time. The concrete of the post pouring band on both sides of the slag concrete must be fully wet water 12h before poured. The loose mud is cleared on both sides of the post band before poured.

3. Post pouring concrete pouring

   The pouring concrete is used micro expansion concrete pouring a higher level than on both sides of the concrete. The concrete pouring should be poured concrete visa in conjunction with the construction units and supervision units with covert acceptance. The post pouring concrete should be a continuous pouring used concrete pouring pump, and the pouring process or intermittent time the setting time is larger than the beginning, no leakage of vibration.

4. Post poured concrete curing

   The maintenance of post pouring band is used conservation of water in which built two bricks on both sides that is covered with 1:2 cement mortar plastering thickness 20mm and 50 ~ 100mm water storage after concrete, as see Figure 5.
4.4 The protective measures

(1) The raw materials must be kept in order to ensure the continuous pouring of concrete that the pouring amount of the floor slab is large.

(2) Before the construction of concrete the technical is disclosure. The project manager is responsible for pouring. The section chief is shifts in 24 hours at pouring site. The quality of librarians should check concrete pouring quality. The test personnel according to the standard sampling should check the class of concrete slump.

(3) After pouring concrete should pay attention to finishing. The excess floating slurry is scraped to reach the elevation ruler poured concrete. It can avoid to shrinkage cracks before the initial compaction. The template at the post pouring zone is strict incremented to prevent the leakage of concrete slurry.

(4) Each pouring route possesses a grey tank in order to catch the concrete in the tube to remove pump tube. It is transported to the surface water bucket, not just into the floor.

5. Conclusions

The quality of Hongyun Building B tower raft concrete after pouring construction was guaranteed. According to the engineering of the cracks was prevented to control temperature of concrete construction pouring belt construction in which the reinforcement was designed and monitored and was maintenance.

Acknowledgements

The authors are grateful to the project supported by the Hebei provincial key research and development program (16214526), Hebei Provincial Higher Education Fund for science and Technology (QN2016006) and the project of Hebei Industrial University (ZY2016009).

References

[1] Lin Jinsheng, Wu Xinzhi, Chen Anmin, et al. Construction technology of Guangzhou new TV tower [J]. Construction Technology, 2009, 38 (3): 9-14.
[2] Zhong Shantong. Steel-concrete composite structure of skyscraper [M]. Guangzhou: South China University of Technology Press, 2003.
[3] Wang Jiansheng. Supervising points during steel tube concrete construction [J]. Shanxi Architecture, 2008, 34(2): 242-243.
[4] Building construction manual (4th edition) [M]. Beijing: China Architecture & Building Press, 2003.
[5] LI Wei-zhong, LI Tian-lang, LI Gui-qing, et al. Pumping of C100 Ultra High Performance Concrete(UHPC)[J]. Concrete, 2009, 33(3):82.
[6] M AO Shanhong, WU Jinbin, YU Bin, et al. Study on the characteristics of C100 ultra high performance concrete [J]. Concrete, 2015, 309(7):121.
[7] DONG Wen-jie, MA Shi-yu, WANG Xue-gang, et al. Research of C100 high performance concrete [J]. Concrete, 2011, 264(10):96.