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GB 50204-2015

Code for Quality Acceptance of Concrete Structure Construction

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Foreword

The code compiling group revised GB 50204-2002 *Code for Acceptance of Constructional Quality of Concrete Structures* after carrying out extensive investigation and study, earnestly summarizing practical experience, referencing related international standards and advanced foreign standards, and soliciting opinions widely according to the requirements of Ministry of Housing and Urban-Rural Development in the *Notice on Printing 2011 Development and Revision Plan of National Engineering Construction Standards and Codes* (Jian Biao [2011] No.17).

Main technical contents of this code: general provisions, terms, basic requirements, formwork subitem project, steel bar subitem project, prestress subitem project, concrete subitem project, cast-in-situ structure subitem project, precast structure subitem project, concrete structure sub-subsection project and relevant appendixes.

The revision of this code in main technical contents:

1. Basic requirements for acceptance are improved;
2. The requirements for expanding inspection lot capacity of certified products or eligible products in continuous inspection are added;
3. Requirements for acceptance of formwork stripping are deleted;
4. Requirements for acceptance of new technology applied to steel bars like fabricated steel bar are added;
5. Requirements for acceptance of fully-enclosed waterproof performance of unbonded prestressed tendon are added;
6. Requirements for site acceptance of premixed concrete are improved;
7. Requirements for site acceptance of precast members are improved;
8. Requirements for entitative inspection over structure position and dimension deviation are added;
9. Methods to inspect the structure entity concrete strength by rebound - core drilling method are added.

In this code, the provision(s) printed in bold type is (are) compulsory and must be enforced strictly.

The Ministry of Housing and Urban-Rural Development of the People's Republic of China is in charge of the administration of this code and the explanation of the compulsory provisions, and the China Academy of Building Research is responsible for the explanation of specific technical contents. During the process of implementing this standard, the relevant opinions and advice, whenever necessary, can be posted or passed on to China Academy of Building Research (Address: No.30 North 3rd Ring East Road, Chaoyang District, Beijing, 100013, China; E-mail: GB 50204@163.com).

Chief development organization of this code: China Academy of Building Research

Participating development organizations of this code:

National Center for Quality Supervision and Test of Building Engineering
Beijing Construction Engineering Group Co., Ltd
Shanghai Construction Group Co., Ltd.
Beijing Construction Project Management Association

1 General Provisions

1.0.1 This code is developed in order to strengthen the construction engineering quality management, unify acceptance of concrete structure engineering construction quality and guarantee project construction quality.

1.0.2 This code is applicable to construction quality acceptance of concrete structure.

1.0.3 Quality acceptance of concrete structure construction shall not only comply with those specified in this code, but also comply with those in the current relevant national standards.

2 Terms

2.0.1 Concrete structure

The structure mainly made of concrete, including plain concrete structure, reinforced concrete structure and prestressed concrete structure, which may be classified into cast-in-situ concrete structure and precast concrete structure according to the construction method.

2.0.2 Cast-in-situ concrete structure

The concrete structure is made by erecting formwork in situ and integral casting, hereinafter referred to as cast-in-situ structure.

2.0.3 Precast concrete structure

The concrete structure is made by assembling and connecting the precast concrete members or parts, hereinafter referred to as precast structure.

2.0.4 Defect

Inspection items or points of concrete structure construction quality failing to follow the requirements are classified into serious defects and common defects according to the degree.

2.0.5 Serious defect

Defects having dominating influence on the stressing property, durability or installation and service property of structural members.

2.0.6 Common defect

Defects without dominating influence on the stressing property, durability or installation and service property of structural members.

2.0.7 Inspection

Activity in which the features and performances of the inspected item are determined, inspected and tested, and the results are compared with the requirements specified in standards so as to verify the acceptance of each performance.

2.0.8 Inspection lot

The inspection body summarized according to the same production conditions or provisions for the sampling inspection and comprising of certain quantity of samples.

2.0.9 Site acceptance

The process in which the materials, members and accessories, instruments and semi-finished products on the construction site are inspected according to relevant standards and confirmation shall be given to their quality, mainly including appearance inspection, quality certificates inspection and sampling inspection.

2.0.10 Inspection of structural performance

The inspection over the structural members for the indexes of bearing capacity, deflection and crack control performance.

2.0.11 Entitative inspection of structure

The process in which a sample is taken from a structure entity and inspected on site or delivered to the testing body with qualification.

2.0.12 Quality certificate document

Effective documents, in accompany with approaching materials, members and accessories, instrument and semi-finished products, provided to certify the quality.

3 Basic Requirements

3.0.1 Concrete structure, as sub-subsection project, may be classified into subitem projects of formwork, steel bar, prestress, concrete, cast-in-situ structure and precast structure. Each subitem project may be classified into several inspection lots according to approaching lots, shift, storey, structural joint or construction section in the principle of consistence with production and construction mode and being convenient for construction quality control.

3.0.2 The quality acceptance of concrete structure shall cover quality control data inspection, appearance quality acceptance and entitative inspection of structure stipulated in 10.1 provided that the acceptance of subitem projects concerning steel bar, prestress, concrete, cast-in-situ structure and precast structure is eligible.

3.0.3 Quality acceptance of subitem projects shall cover quality acceptance record inspection provided that the acceptance of inspection lots contained is eligible.

3.0.4 Quality acceptance of inspection lot shall cover substance inspection and materials inspection and shall meet the following requirements:

1 The quality of all dominant items shall be subjected to sampling inspection and qualified.

2 The general items shall be eligible upon the sampling inspection and shall comply with this code where sampling inspection by counting is used; its rate of conformity points shall reach 80% or above and serious defects shall be avoided.

3 Complete quality inspection records shall be provided and complete construction and operation record shall be provided for important procedure.

3.0.5 The sampling shall be carried out randomly in inspection lot and distributed evenly and typically.

3.0.6 Treatment of ineligible inspection lot shall meet the following requirements:

1 It is not allowed to use ineligible inspection lot of materials, members and accessories, appliance and semi-finished products;

2 Ineligible inspection lot in construction quality before concreting shall be reworked or repaired and then re-accepted;

3 Ineligible inspection lot in construction quality after concreting shall be treated according to the relevant requirements of this code.

3.0.7 The certified products or the products with stable source and which are eligible upon inspection only once in continuous three lots may be allowed to expand to be double of the

4.2.3 Formwork and support of post-cast strip shall be arranged separately.

Inspection quantity: 100% inspection.

Inspection method: observing.

4.2.4 Support montant and vertical formwork, when installed on the soil layer, shall meet the following requirements:

1 Soil layer shall be solid and leveled, and its bearing capacity or compactness shall comply with construction scheme;

2 Waterproof and drainage measures shall be provided; freezing and thawing prevention measures shall be provided for frost heaving soil;

3 Pedestal or subplate shall be provided under support montant.

Inspection quantity: 100% inspection.

Inspection method: observing; inspecting soil layer compactness test report, soil layer bearing capacity check computations or site testing reports.

General Items

4.2.5 Formwork installation shall meet the following requirements:

1 The joints of the formwork shall be tight;

2 Formwork shall be free from sundries, seep or ice and snow inside;

3 The contact surface between formwork and concrete shall be even and cleaned up;

4 The terrace and moulding bed used as formwork shall be even and smooth, and free of sinking, cracking, dusting or bulking that influences the member quality;

5 As for fair-faced concrete and architectural concrete members, the formwork applied shall be able to bring about the design effects.

Inspection quantity: 100% inspection.

Inspection method: observing.

4.2.6 Release agent shall comply with the construction scheme in the variety and application methods and it shall not influence the structural performance and decoration construction or contaminate the joints where steel bar, prestressed bar are embedded parts are concreted or pollute the environment.

Inspection quantity: 100% inspection.

Inspection method: inspecting quality certificate documents; observing.

4.2.7 Formwork shall be arched according to the requirements of the current national standard GB 50666 *Code for Construction of Concrete Structures* and shall comply with design and construction scheme.

Inspection quantity: within the same inspection lot, as for beams with span longer than 18m, 100% inspection shall be carried out while as for the beams with span being 18m or less, 10% of the members and not less than 3 members shall be subjected to random inspection; as for slabs, 10% of the representative natural rooms and not less than 3 rooms shall be subjected to random inspection; as for large-space structures, inspection surface may be such divided for the slabs by the longitudinal and transverse axes, 10% and not less than 3 surfaces shall be subjected to random inspection.

Inspection method: measuring with level gauge or ruler.

4.2.8 As for cast-in-situ concrete structure, continuous formwork among multilayer shall comply with construction scheme. The montant of formwork support between two layers

diagonal	Wallboard	5	
Warping	Slab and wallboard	L/1500	Measuring with level gauge at both ends
Design bulging	Thin webbed girder, truss, beam	± 3	Pulling line and measuring midspan with ruler

Note: L is the member length (mm).

5 Steel Bar Subitem Project

5.1 General Requirement

5.1.1 Acceptance of concealed work shall be performed before concreting, covering:

- 1 designation, specification, quantity and position of longitudinal stressed bars;
- 2 connecting mode, joint position and mass, joint area percentage, overlapping length, anchoring mode and anchoring length of steel bars;
- 3 designation, specification, quantity, spacing and position of stirrup and transverse steel bar as well as the bending angle and straight section length of stirrup hook;
- 4 Specification, quantity and position of embedded parts.

5.1.2 For site inspection of steel bar and fabricated steel bars, the capacity in one inspection lost may be expanded by one time in case of one of the following conditions:

- 1 certified steel bar and fabricated steel bar;
- 2 continuous three lots of steel bars from the same manufacturer, in the same variety and with the same specification pass the inspection once;
- 3 continuous three lots of fabricated steel bars from the same manufacturer, in the same variety and with the same specification pass the inspection once.

5.2 Materials

Dominant Items

5.2.1 Where steel bars approach the site, test pieces shall be sampled for yield strength, tensile strength, elongation percentage, bending properties and weight deviation according to relevant current standards of the nation, and inspection results shall meet those specified in corresponding standards.

Inspection quantity: determine according to delivered batch and product sampling inspection scheme.

Inspection method: inspecting the product certificate document and the sampling inspection report.

5.2.2 Where fabricated steel bars approach the site, test pieces shall be sampled for yield strength, tensile strength, elongation percentage and weight deviation and inspection results shall meet the requirements of current relevant standards of the Nation.

As for the fabricated steel bars made of hot-rolled steel bar, only weight deviation inspection may be carried out when the representatives of constructor or supervisor monitor the production on the site and provide third party inspection reports of mechanical performance for raw material steel bar.

2 As for Grade 335MPa and 400MPa ribbed steel bar, it shall not be less than 4 times the diameter of steel bar;

3 As for Grade 500MPa ribbed steel bar, it shall not be less than 6 times the diameter of steel bar in the case of diameter less than 28mm and shall not be less than 7 times the diameter of steel bar in the case of diameter not less than 28mm;

4 Stirrup bending section shall not be less than diameter of longitudinal stressed bars.

Inspection quantity: at least three steel bars processed by the same equipment and in the same variety shall be randomly inspected in each shift.

Inspection method: measuring with ruler.

5.3.2 Straight section length of longitudinal stressed bar after bending shall meet the design requirements. Where the terminal of plain round bar is made into 180° hook, the length of straight segment of bent hook shall not be less than 3 times the diameter of steel bar.

Inspection quantity: at least three steel bars processed by the same equipment and in the same variety shall be randomly inspected in each shift.

Inspection method: measuring with ruler.

5.3.3 The terminal of stirrup and lacing bar shall be made into hooks according to the design requirements and the following requirements:

1 As for the general structural member, the bend angle of stirrup hook shall not be less than 90° and the length of straight segment after bending shall not be less than 5 times the diameter of stirrup; as for the structural member with requirements for seismic resistance or special design requirements, the bend angle of stirrup hook shall not be less than 135° and the length of straight segment after bending shall not be less than 10 times the stirrup diameter;

2 Overlapping length of circular stirrup shall not be less than its tension anchorage length; both terminals shall be made into the hooks not less than 135°; the length of straight segment after bending shall not be less than 5 times the stirrup diameter for the general structural member, which shall not be less than 10 times stirrup diameter for the structural member with requirements for seismic resistance;

3 For the beam-column composite stirrup, the bending angle of hooks at both ends of single-leg stirrup shall not be less than 135° and the straight section length after bending shall comply with the relevant requirements for stirrup in Item 1 of this article.

Inspection quantity: at least three steel bars processed by the same equipment and in the same variety shall be randomly inspected in each shift.

Inspection method: measuring with ruler.

5.3.4 Coil steel bar, after being straightened, shall be subjected to mechanical performance and weight deviation inspection and its strength shall comply with the requirements of current relevant standards of the Nation and its percentage elongation after fracture and weight deviation shall be in accordance with those specified in Table 5.3.4. The inspection over the mechanical performance and weight deviation shall meet the following requirements:

1 Three specimens shall be subjected to weight deviation inspection and two are subjected to mechanical performance inspection.

2 Weight deviation shall be calculated according to the following formula:

5.4.1 Steel bar connecting mode shall meet the design requirements.

Inspection quantity: 100% inspection.

Inspection method: observing.

5.4.2 When the steel bars are in a mechanical connection or welded connection, the mechanical performance and bending performance of mechanical connection joint and welded joint of steel bars shall comply with the requirements of current relevant standards of the Nation. The joint specimens shall be taken from the project substance.

Inspection quantity: determining according to those specified in the current professional standard JGJ 107 *Technical Specification for Mechanical Splicing of Steel Reinforcing Bars* and JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection method: inspecting the product certificate document and the sampling inspection report.

5.4.3 Where the steel bar is subjected to the mechanical connection, the screwed joint shall be inspected for the tightening torque and the squeezed joint shall be inspected for the impression diameter; the inspection result shall meet the relevant requirements of the current professional standard JGJ 107 *Technical Specification for Mechanical Splicing of Steel Reinforcing Bars*.

Inspection amount: determining according to those specified in the current professional standard JGJ 107 *General Technical Specification for Mechanical Splicing of Bars*.

Inspection method: inspecting with special torque wrench or special gauge.

General Items

5.4.4 The position of steel bar joints shall meet design and construction scheme requirements. As for structures provided with seismic fortification requirements, splicing of steel bars shall not be carried out within the scope of beam end, column end and stirrup densified area. The distance from the joint terminal to the bending starting-point of the steel bar shall not be less than 10 times the steel bar diameter.

Inspection quantity: 100% inspection.

Inspection method: observing, measuring with ruler.

5.4.5 The appearance quality of mechanical connection joints and welded joints of steel bars shall meet those specified in the current professional standard JGJ 107 *Technical Specification for Mechanical Splicing of Steel Reinforcing Bars* and JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection quantity: determining according to those specified in the current professional standard JGJ 107 *Technical Specification for Mechanical Splicing of Steel Reinforcing Bars* and JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection method: observing, measuring with ruler.

5.4.6 Where longitudinal stressed steel bar adopts mechanical connection joints or welded joints, the joint area percentage of longitudinal stressed steel bar within the same connection segment shall meet the design requirements; where there are not specific design requirements, the following requirements shall be met:

1 The tensile joint should not be greater than 50%; the compression joint may be unrestricted;

2 The structural members directly bearing the dynamic loads should not be welded; the

mechanical connection, if adopted, shall not exceed 50%.

Inspection quantity: within the same inspection lot, as for beams, columns and independent foundations, 10% of the members and not less than 3 members shall be subjected to random inspection; as for walls and slabs, 10% of the representative natural rooms and not less than 3 rooms shall be subjected to random inspection; as for large-space structures, inspection surface may be such divided for walls every other about 5m in height between adjacent axes and for the slabs by the longitudinal and transverse axes, 10% and not less than 3 surfaces shall be subjected to random inspection.

Inspection method: observing, measuring with ruler.

Notes: 1 Joint connection segment refers to the segment with length of $35d$ and not less than 500mm, here d is diameter smaller value of two interconnected steel bars.

2 Within the same connection segment, the joint area percentage of longitudinal stressed steel bars is the ratio of the sectional area of the longitudinal stressed steel bar with joint midpoint located in this connection segment and the complete sectional area of the longitudinal stressed steel bar.

5.4.7 Where the longitudinal stressed steel bar adopts binding and overlapping joint, the arrangement of joints shall meet the following requirements:

1 Transverse clear spacing of joints shall not be less than the steel bar diameter and shall not be less than 25 mm.

2 Within the same connection segment, the joint area percentage of longitudinal tensile steel bar shall meet the design requirements; where there are not specific design requirements, the following requirements shall be met:

- 1) Members like beam, slab and wall should not exceed 25%; the foundation raft slab should not exceed 50%.
- 2) Column members should not exceed 50%.
- 3) Where it is necessary to enlarge joint area percentage in projects, beam members shall not be greater than 50%.

Inspection quantity: within the same inspection lot, as for beams, columns and independent foundations, 10% of the members and not less than 3 members shall be subjected to random inspection; as for walls and slabs, 10% of the representative natural rooms and not less than 3 rooms shall be subjected to random inspection; as for large-space structures, inspection surface may be such divided for walls every other about 5m in height between adjacent axes and for the slabs by the longitudinal and transverse axes, 10% and not less than 3 surfaces shall be subjected to random inspection.

Inspection method: observing, measuring with ruler.

Notes: 1 Joint connection segment refers to the segment with length 1.3 times of overlapping length, which is taken the relatively small diameter of two interconnected steel bars.

2 Within the same connection segment, the joint area percentage of longitudinal stressed steel bars is the ratio of the sectional area of the longitudinal stressed steel bar with joint midpoint located in this connection segment length and the complete sectional area of the longitudinal stressed steel bar.

5.4.8 As for beam and column members within the range of their longitudinal stressed steel bar overlapping length, the arrangement of stirrups shall meet the design requirements; where there are no specific design requirements, the following requirements shall be met:

- 1 The stirrup diameter shall not be less than 25 % of the relatively large diameter of the lapped bars;

and with the same specification pass the inspection once.

6.1.3 Prestressing machine and pressure gauge for prestressed tendon shall be subjected to regular maintenance, both of which shall be accompanied with calibration and application, and the calibration period shall not exceed half a year.

6.2 Materials

Dominant Items

6.2.1 Where prestressed tendons approach the site, test pieces shall be sampled for tensile strength and elongation inspection according to relevant current standards of the nation, and inspection results shall meet those specified in corresponding standards.

Inspection quantity: determine according to the delivered batch and product sampling inspection scheme.

Inspection method: inspecting the product certificate document and the sampling inspection report.

6.2.2 Where unbonded prestressed steel strands approach the site, they shall be subjected to inspection on anticorrosive grease amount and sheath thickness, and the inspection result shall meet the requirements of the current professional standard JG 161 *Unbonded Prestressing Steel Strand*.

It is considered through observing that unbonded prestressed tendon may not be subjected to sampling inspection on grease amount and sheath thickness in case coating quality is acceptable and certified.

Inspection quantity: determine according to those specified in the current professional standard JG 161 *Unbonded Prestressing Steel Strand*.

Inspection method: observing, and inspecting the quality certificate document and the sampling inspection report.

6.2.3 Anchorage for prestressed tendon shall be used together with anchor backing plate and local reinforcing rib; where anchorage, grips and couplers approach the site, they shall be subjected to performance inspection according to relevant requirements of the current professional standard JGJ 85 *Technical Specification for Application of Anchorage, Grip and Coupler for Prestressing Tendons*, and the inspection result shall meet those specified in the said standard.

Static anchoring performance inspection may not be performed in case anchorage, grips and couplers needed are less than 50% of the specified quantity and the supplier provides valid inspection report.

Inspection quantity: determine according to those specified in the current professional standard JGJ 85 *Technical Specification for Application of Anchorage, Grip and Coupler for Prestressing Tendons*.

Inspection method: inspecting the product certificate document as well as the performance test report and the sampling inspection report for force transmission in anchorage zone.

6.2.4 The anchorage system for unbonded prestressed tendon under Class IIIa and Class IIIb environmental conditions shall be subjected to waterproof performance inspection according to the relevant requirements of the current professional standard JGJ 92 *Technical*

Bridge or JG 225 Corrugated Metal Ducts for Prestressed Concrete.

Inspection quantity: 100% inspection for appearance; inspection quantity for radial rigidity and anti-seepage performance shall be determined according to delivered batch and product sampling inspection scheme.

Inspection method: observing, and inspecting the quality certificate document and the sampling inspection report.

6.3 Fabrication and Installation

Dominant Items

6.3.1 Variety, specification, grade and quantity of prestressed tendons to be installed must meet the design requirements.

Inspection quantity: 100% inspection.

Inspection method: observing, and measuring with ruler.

6.3.2 Prestressed tendons installation position shall meet the design requirements.

Inspection quantity: 100% inspection.

Inspection method: observing, and measuring with ruler.

General Items

6.3.3 Fabrication quality of the anchorage at prestressed tendon end shall meet the following requirements:

- 1 on completion of extruding by steel strand extruding anchorage, the outer end of prestressed tendon stretching out of the extruding sleeve shall not be less than 1mm in length;
- 2 for steel strand embossing anchorage, the dimension of pear-shaped head and the length of linear anchoring section shall not be less than the design value;
- 3 Steel wire head shall be free from transverse crack, and the head strength shall not be less than 98% of the standard strength value of steel wire.

Inspection quantity: 5% and at least 5 pieces for extruding anchorage by each shift; 3 pieces for embossing anchorage by each shift; 6 test pieces regarding head strength for each lot of steel wires.

Inspection method: observing, measuring with ruler and inspecting the head strength test report.

6.3.4 Installation quality of prestressed tendons or pore-forming pipelines shall meet the following requirements:

- 1 connection of pore-forming pipelines shall be sealed;
- 2 prestressed tendon or pore-forming pipeline shall be smooth, and shall be bound firmly with the spacer bearing bars;
- 3 where the height difference between pore passage crest and trough of the curve for posttensioning bonded prestressed tendon is greater than 300mm and common grouting technology is adopted, vent holes shall be arranged at pore passage crest;
- 4 bearing surface of anchor backing plate shall be vertical to the tangent line on the terminal of prestressed tendon or pore passage curve. The length of the straight segment at terminal of prestressed tendon or pore passage curve shall meet those specified in Table 6.3.4.

Inspection quantity: 100% inspection for those listed in items 1~3; 10% of the total

3 where common grouting technology is adopted, the 24h-free swelling ratio shall not be greater than 6%; where vacuum grouting technology is adopted, the 24h-free swelling ratio shall not be greater than 3%.

Inspection quantity: once for the same mix proportion.

Inspection method: inspecting the test report for cement paste performance.

6.5.3 For cement paste test piece retained on site for grouting, the compressive strength shall not be less than 30MPa.

Compressive strength inspection of test piece shall meet the following requirements:

1 6 cube test pieces with side length being 70.7mm shall be retained for each group and subjected to standard curing for 28d;

2 the compressive strength of test piece shall be the average value of the 6 test pieces; if the difference between the maximum compressive strength or the minimum one and the average one of the test pieces in one group is greater than 20%, the average strength of the intermediate 4 test pieces shall be taken.

Inspection quantity: one group for each shift.

Inspection method: inspecting the test piece strength test report.

6.5.4 Sealing protective measures for anchorage shall meet the design requirements. Where no specific requirement is provided in design, the thickness of concrete cover for both exposed anchorage and prestressed tendon shall not be less than 20mm under Class I environment, 50mm under Class IIa and Class IIb environment, and 80mm under Class IIIa and Class IIIb environment.

Inspection quantity: 5% of the total prestressed tendons and at least 5 points within the same inspection lot.

Inspection method: observing, and measuring with ruler.

General Items

6.5.5 After the post-tensioning prestressed tendon is anchored, the exposed length of prestressed tendon outside of the anchorage shall not be less than 1.5 times its diameter and not less than 30mm.

Inspection quantity: 3% of the total prestressed tendons and at least 5 pieces within the same inspection lot.

Inspection method: observing, and measuring with ruler.

7 Concrete Subitem Project

7.1 General Requirements

7.1.1 Concrete strength shall be subjected to inspection and evaluation by lots according to the requirements of the current national standard GB/T 50107 *Standard for Evaluation of Concrete Compressive Strength*. As for the concrete in the same inspection lot, the construction duration should not exceed 3 months.

Concrete test pieces subjected to standard curing for 28d or duration specified in design shall be used for strength inspection and evaluation.

Concrete Admixtures and GB 50119 Code for Concrete Admixture Application.

Inspection quantity: at most 50t in one lot of admixtures from the same manufacturer, in the same variety, with the same performance and the same lot number as well as approaching the site continuously. Sampling shall be performed at least once per lot.

Inspection method: inspecting the product certificate document and the sampling inspection report.

General Items

7.2.3 Variety, technical index and delivery date of mineral admixtures for concrete in case of approaching the site shall be checked and relevant technical indexes shall also be inspected, for which the inspection result shall meet the requirements of the relevant current standards of the nation.

Inspection quantity: at most 200t in one lot of mineral admixtures, coal ashes, limestone powders, phosphorus powders and ground iron steel slags, 500t in one lot of granulated blast furnace slag powders and composite mineral admixtures, 120t in one lot of zeolite powders and 30t in one lot of silica fumes all from the same manufacturer, in the same variety, with the same technical index and lot number as well as approaching the site continuously. Sampling shall be performed at least once per lot.

Inspection method: inspecting the product certificate document and the sampling inspection report.

7.2.4 Quality of coarse aggregate and fine aggregate in concrete materials shall meet the requirements of the current professional standard JGJ 52 *Standard for Technical Requirements and Test Method of Sand and Crushed Stone* (or Gravel) for Ordinary Concrete, sea sand having been purified shall meet the requirements of the current professional standard JGJ 206 *Technical Code for Application of Sea sand Concrete*, and reclaimed concrete aggregate shall meet the requirements of the current national standard GB/T 25177 *Recycled Coarse Aggregate for Concrete* and GB/T 25176 *Recycled Fine Aggregate for Concrete and Mortar*.

Inspection quantity: determine according to those specified in the current professional standard JGJ 52 *Standard for Technical Requirements and Test Method of Sand and Crushed Stone* (or Gravel) for Ordinary Concrete.

Inspection method: inspecting the sampling inspection report.

7.2.5 Water for mixing and curing the concrete shall meet the requirements of the current professional standard JGJ 63 *Standard of Water for Concrete*. Drinking water, if adopted, may not be inspected; components of recycled water, cleaning water for mixing station, circulating water for construction site and other water sources, if adopted, shall be inspected.

Inspection quantity: at least once for the same water source.

Inspection method: inspecting the water quality inspection report.

7.3 Concrete Mixtures

Dominant Items

7.3.1 Quality of ready-mixed concrete in case of approaching the site shall meet the requirements of the current national standard GB/T 14902 *Ready-mixed Concrete*.

Inspection quantity: 100% inspection.

national standard GB/T 50080 *Standard for Test Method of Performance on Ordinary Fresh Concrete*.

Inspection method: inspecting the concrete air content test report.

7.4 Concrete Construction

Dominant Items

7.4.1 Strength grade of the concrete must meet the design requirements. Test pieces for inspecting concrete strength shall be taken randomly at the pouring site.

Inspection quantity: sampling and test piece retaining for the concrete with the same mix proportion shall meet the following requirements.

1 The sampling shall be performed at least once per 100 disks and no greater than 100m³ of mixed concrete;

2 The sampling shall be performed at least once if the mixed concrete with the same mix proportion per work shift are less than 100 disks;

3 The sampling shall be performed at least once per 200m³ if the concrete subjected to continuous pouring exceeds 1000m³;

4 The sampling shall be carried out at least once for each floor'

5 At least one group of test pieces shall be retained for each sampling.

Inspection method: inspecting the construction record and the concrete strength test report.

General Items

7.4.2 The position for retaining post-cast strip shall meet the design requirements. Retaining and processing methods for construction joint of the post-cast strip shall meet the requirements of the construction scheme.

Inspection quantity: 100% inspection.

Inspection method: observing.

7.4.3 The concrete shall be cured immediately after being poured, and both the curing time and the curing method shall meet the requirements of the construction scheme.

Inspection quantity: 100% inspection.

Inspection method: observing, and inspecting the concrete curing record.

8 Cast-in-situ Structure Subitem Project

8.1 General Requirements

8.1.1 Quality acceptance of the cast-in-situ structure shall meet the following requirements:

1 quality acceptance of the cast-in-situ structure shall be carried out after the formwork is removed and before the concrete surface is trimmed and decorated, besides, records shall be set up;

2 as for concealed work details which cannot be observed or measured directly, the acceptance record of concealed work may be inspected;

Serious defects having been caused shall be provided with technical processing scheme by the construction unit and processed after the scheme is approved by the supervising unit; the technical processing scheme for crack or serious defect at connecting position and other serious defects influencing structural safety shall also be approved by the design unit. Positions processed shall be accepted again.

Inspection quantity: 100% inspection.

Inspection method: observing, and inspecting the processing record.

General Items

8.2.2 Appearance of the cast-in-situ structure shall be free from common defect.

Common defects having been caused shall be processed by the construction unit according to technical processing scheme. Positions processed shall be accepted again.

Inspection quantity: 100% inspection.

Inspection method: observing, and inspecting the processing record.

8.3 Positional and Dimensional Deviation

Dominant Items

8.3.1 The cast-in-situ structure shall be free from dimensional deviation influencing structural performance or functions of use; the concrete equipment foundation shall be free from dimension position influencing structural performance or equipment installation.

As for positions having exceeded permissible dimensional deviation and influencing structural performance or installation and functions of use, they shall be provided with technical processing scheme by the construction unit and processed after the scheme is approved by the supervising unit and the design unit. Positions processed shall be accepted again.

Inspection quantity: 100% inspection.

Inspection method: measuring with ruler and inspecting the processing record.

General Items

8.3.2 Positional and dimensional deviation as well as inspection method of the cast-in-situ structure shall meet those specified in Table 8.3.2.

Inspection quantity: inspection lot is such divided by floors, structural joints or construction sections. Within the same inspection lot, as for beams, columns and independent foundations, 10% of the members and not less than 3 pieces shall be subjected to random inspection; as for walls and slabs, 10% of the representative natural rooms and not less than 3 rooms shall be subjected to random inspection; as for large-space structures, inspection surface may be such divided for walls every other about 5m in height between adjacent axes and for the slabs by the longitudinal and transverse axes, 10% and not less than 3 surfaces shall be subjected to random inspection; 100% inspection shall be carried out for elevator shaft.

9 Precast Structure Subitem Project

9.1 General Requirements

9.1.1 Acceptance of concealed work shall be carried out before pouring concrete on the connecting part of precast structure and composite member. Acceptance of concealed work shall include the following main content:

- 1 The rough surface quality of concrete and the size, quantity and position of key groove;
- 2 The designation, specification, quantity, position and spacing of steel bars, the bending angle of stirrup hook and the length of straight segment;
- 3 The connecting mode, joint position and quantity, joint area percentage, overlapping length, anchoring mode and anchoring length of steel bars;
- 4 The specification, quantity and position of embedment parts and reserved pipelines;

9.1.2 The joint construction quality and waterproof performance of precast structure shall meet the design requirements and the requirements of current relevant standards of the Nation.

9.2 Precast Members

Dominant Items

9.2.1 The quality of precast members shall meet those specified in this code, the requirements of current relevant standards of the Nation and the design requirements.

Inspection quantity: 100% inspection.

Inspection method: inspecting quality certificate documents or quality acceptance record.

9.2.2 When precast members produced by professional enterprise approaching the construction site, the structural performance inspection of precast members shall meet the following requirements:

1 When simple-supported bending precast members approaching the construction site, the structural performance inspection shall be carried out and shall meet the following requirements:

- 1) Structural performance inspection shall meet the relevant requirements of current relevant standards of the Nation and design requirements, inspection requirements and test methods shall meet those specified in Appendix B of this code.
- 2) Bearing capacity, deflection and crack width inspections of reinforced concrete members and crack-permitted prestressed concrete members shall be carried out; while bearing capacity, deflection and crack resistance inspections of prestressed concrete members of no cracks shall be carried out.

3) As for large members and those with reliable application experience, crack width, crack resistance and deflection inspections may be just carried out.

4) As for members with fewer quantity, structural performance inspection may not be carried out when there is reliable evidence.

2 As for other precast members (in addition to those with special design requirements), structural performance inspection may not be carried out when approaching the construction site.

3 As for precast members without carrying out structural performance inspection when approaching the construction site, the following measures shall be taken:

1) Representatives of constructor or supervisor shall supervise the production process residentially.

2) Where there is no residential supervision, entitative inspection shall be carried out for the quantity, specification, spacing, protective layer thickness and concrete strength of main stressed steel bar when approaching the construction site.

Inspection quantity: the precast members in the same type not exceeding 1000 are regarded as one lot, and one member sampled from each lot to carry out inspection of structural performance.

Inspection method: inspecting structural performance inspection report or entitative inspection report.

Note: "The same type" refers to the same steel type, same concrete strength grade, same production process and same structure type. Where taking out precast members, we should take out from precast members with the maximum design load, most unfavorable load carrying or most product quantity.

9.2.3 The appearance quality of [recast members shall be free from serious defects and any dimension deviation influencing the structural performances, installation and use functions.

Inspection quantity: 100% inspection.

Inspection method: observing, measuring by ruler; inspecting treatment record.

9.2.4 The specification and quantity of embedment parts, reserved steel dowels and embedded pipelines on precast members and the quantity of reserved pores and reserved holes shall meet the design requirements.

Inspection quantity: 100% inspection.

Inspection method: observing.

General Items

9.2.5 Precast members shall be provided with markings.

Inspection quantity: 100% inspection.

Inspection method: observing.

9.2.6 The appearance quality of precast members shall be free from common defects.

Inspection quantity: 100% inspection.

Inspection method: observing, inspecting the treatment record.

9.2.7 The dimensional deviation and inspection method of precast members shall meet those specified in Table 9.2.7. Where there are design requirements, the design requirements shall be met with. In the construction process, the permissible deviation of the center line position of embedment parts used temporarily may take two times of the value specified in Table 9.2.7.

Inspection quantity: the same kind of members not exceeding 100 is regarded as one lot, 5% of each lot, and not be less than 3 shall be randomly inspected.

Inspection quantity: 100% inspection.

Inspection method: observing.

9.3 Installation and Connection

Dominant Items

9.3.1 The temporary fixing measures of precast members shall meet the requirements of construction scheme.

Inspection quantity: 100% inspection.

Inspection method: observing.

9.3.2 Where the steel bar is subject to splicing by grouting coupling sleeve, the grouting shall be satiate and dense, and the material and connection quality shall meet the requirements of the current professional standard JGJ 355 *Technical Specification of Grout Sleeve Splicing for Rebars*.

Inspection quantity: determining according to those specified in the current professional standard JGJ 355 *Technical Specification of Grout Sleeve Splicing for Rebars*.

Inspection method: inspecting qualification certification documents, grouting records and relevant inspection reports.

9.3.3 Where the steel bar is subject to the welding connection, the joint quality shall meet the requirements of the current professional standard JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection quantity: determining according to those specified in the current professional standard JGJ 18 *General Technical Specification for Mechanical Splicing of Bars*.

Inspection method: inspecting quality certificate documents and inspection reports of parallel processing test pieces.

9.3.4 Where steel bar is subjected to mechanical connection, the joint quality shall meet those specified in the current professional standard JGJ 107 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection quantity: determining according to those specified in the current professional standard JGJ 107 *Technical Specification for Mechanical Splicing of Steel Reinforcing Bars*.

Inspection method: inspecting quality certificate documents, construction record and inspection reports of parallel processing test pieces.

9.3.5 Where precast members are subjected to connection modes like welding and bolt connection, the material performance and construction quality shall meet those specified in the current national standard GB 50205 *Code for Acceptance of Construction Quality of Steel Structures* and JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection quantity: determining according to those specified in the current national standard GB 50205 *Code for Acceptance of Construction Quality of Steel Structures* and JGJ 18 *Specification for Welding and Acceptance of Reinforcing Steel Bars*.

Inspection method: inspecting construction records and inspection reports of parallel processing test pieces.

9.3.6 Where precast structure is subjected to cast-in-situ concrete connecting members, the post-cast concrete strength at member connection point shall meet the design requirements.

Inspection quantity: determining according to those specified in Article 7.4.1 of this code.

member			
Central position of supporting	Slab, beam, column, wallboard and truss	10	Measuring with ruler
Joint width of wallboard		±5	Measuring with ruler

10 Concrete Structures Sub-subsection Project

10.1 Entitative Inspection of Structure

10.1.1 Entitative inspection of structure shall be carried out as for the representative positions in relation to the safety of concrete structures. Entitative inspection of structure shall include concrete strength, thickness of steel bar protective layers, structure position, dimensional deviation and the project stipulated in the Contract; other items may be inspected if necessary.

Supervisor shall organize constructor to carry out entitative inspection of structure, as well as witness the construction process. Constructor shall prepare special scheme of entitative inspection of structure and shall carry out after being approved by supervisor. Projects of entitative inspection of structure (in addition to structure position and dimensional deviation inspection projects) shall be completed by inspection organization with corresponding qualification.

10.1.2 Structure entity concrete strength shall be inspected respectively in accordance with different strength grades, and as for inspection method, test pieces of same curing conditions method should be adopted; where not obtaining test pieces of same curing conditions strength or test pieces of same curing conditions failing to meet the requirements, rebound - core drilling method may be adopted to carry out the inspection.

Test pieces of same curing conditions strength inspection of structure entity concrete shall meet those specified in Appendix C of this code; and rebound - core drilling method strength inspection of structure entity concrete shall meet those specified in Appendix D of this code.

The equivalent curing age of concrete strength inspection may take the corresponding age of the daily average temperature daily accumulated to $600^{\circ}\text{C} \cdot \text{d}$ and shall not be less than 14d. The age with the daily average temperature of 0°C or below is ignored.

During winter construction, equivalent curing age can be calculated by taking the actual curing temperature of structural members, or be jointly determined by supervising and construction parties according to the actual maintenance condition of structural members and the principle that test pieces of same curing conditions strength and 28d age test piece strength under standard curing conditions are equivalent.

10.1.3 Steel bar protective layers thickness inspection shall meet those specified in Appendix E of this code.

10.1.4 Structure position and dimensional deviation inspection shall meet those specified in Appendix F of this code.

10.1.5 During entitative inspection of structure, where the inspection result of concrete strength or steel bar protective layers thickness fail to meet the requirements, we shall carry

16 Other necessary documents and records.

10.2.4 After the construction quality acceptance of sub-subsection project of concrete structure engineering is qualified, acceptance documents shall be filed for record the relevant requirements.

Construction unit				Project director		Project technical director	
Subcontractor				Subcontractor project director		Subcontract content	
SN	Inspection lot name	Inspection lot capacity	Position/section	Inspection result of construction unit		Acceptance conclusion of supervising unit	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
Description:							
Inspection result of construction unit				Professional project technical director:			
				Date			
Acceptance conclusion of supervising unit				Professional supervising engineer:			
				Date			

A.0.3 Quality acceptance of sub-subsection project of concrete structure may be recorded according to Table A.0.3.

Table A.0.3 Records on Quality Acceptance of Sub-subsection Project of Concrete Structure No.:

Unit (subunit) project name				Sub-item project quantity	
Construction unit		Project director		Technical (quality) director	
Subcontractor		Subcontractor director		Subcontract content	
SN	Sub-item project name	Inspection lot quantity	Inspection result of construction unit	Acceptance conclusion of supervising unit	
1	Steel bar sub-item project				
2	Prestress sub-item project				
3	Concrete sub-item project				
4	Cast-in-situ structure sub-item project				
5	Precast structure sub-item project				

	Oblique pressure and tension of concrete along the oblique section is damaged; the tensile main steel bar is slipped at the ends or other anchorage is damaged.	1.55
	Laminated surface and contact point of laminated members	1.45

B.1.2 Deflection of precast members shall be inspected in accordance with the following requirements:

1 The following formula shall be met where the inspection is carried out according to the requirements for permissible value of deflection specified in the current national standard GB 50010 *Code for Design of Concrete Structures*:

$$a_s^0 \leq [a_s] \quad (\text{B.1.2-1})$$

Where,

a_s^0 ——the actual measured deflection value of members under standard combination of load or quasi-permanent combination of load for inspection;

$[a_s]$ ——the permissible value for deflection inspection, calculated according to those specified in Article B.1.3 of this code.

2 The following formula shall be met where the inspection is carried out according to the actual-arranged steel bar of members or only deflection, anti-crack or crack width of members are inspected:

$$a_s^0 \leq 1.2a_s^c \quad (\text{B.1.2-2})$$

Meanwhile, a_s^0 shall meet the requirements of Formula (B.1.2-1).

Where,

a_s^c ——the calculated deflection value of members determined according to the actual-arranged steel bar under standard combination of load or quasi-permanent combination of load for inspection, shall be determined according to current national standard GB 50010 *Code for Design of Concrete Structures*.

B.1.3 The permissible value $[a_s]$ of deflection inspection shall be calculated in accordance with the following formulae:

For flexural members of steel concrete, calculated according to quasi-permanent combination of load

$$[a_s] = [a_f] / \theta \quad (\text{B.1.3-1})$$

For flexural members of prestressed concrete, calculated according to standard combination of load

$$[a_s] = \frac{M_k}{M_q(\theta - 1) + M_k} [a_f] \quad (\text{B.1.3-2})$$

Where,

M_k ——the value of bending moment calculated according to standard combination of load;

M_q ——the value of bending moment calculated according to quasi-permanent combination of load;

θ ——the influence coefficient on deflection increment by considering long-term effect combination of load, which shall be determined according to current national standard GB 50010 *Code for Design of Concrete Structures*;

$[a_f]$ ——the deflection limit of flexural members, determined according to current national standard GB 50010 *Code for Design of Concrete Structures*.

B.1.4 The anti-crack inspection of precast members shall meet the requirements of Formula (B.1.4-1):

$$\gamma_{cr}^0 \geq [\gamma_{cr}] \quad (\text{B.1.4-1})$$

$$[\gamma_{cr}] = 0.95 \frac{\sigma_{pc} + \gamma f_{tk}}{\sigma_{ck}} \quad (\text{B.1.4-2})$$

Where,

γ_{cr}^0 ——the actual measured value of anti-crack inspection coefficient of members, i.e. the ratio of actual measured value of cracking load for test piece and standard combination of load for inspection (all including deadweight);

$[\gamma_{cr}]$ ——the permissible value of anti-crack inspection coefficient of members;

σ_{pc} ——the normal stress value of concrete at tensile end of members generated by pre-applied force, determined according to current national standard GB 50010 *Code for Design of Concrete Structures*;

γ ——the plastic influence coefficient of section resistance moment of concrete members, determined according to current national standard GB 50010 *Code for Design of Concrete Structures*;

f_{tk} ——the standard value of tensile strength of concrete;

σ_{ck} ——the normal stress value of concrete at tensile end of members calculated according to standard combination of load, determined according to current national standard GB 50010 *Code for Design of Concrete Structures*.

B.1.5 The crack width of precast members shall be inspected in accordance with the following requirements:

$$\omega_{s,max}^0 \leq [\omega_{max}] \quad (\text{B.1.5})$$

Where,

$\omega_{s,max}^0$ ——the actual measured value of maximum crack width at tensile main steel bar under the standard combination or quasi-permanent combination of load for inspection;

$[\omega_{max}]$ ——the permissible value of maximum crack width for inspection of members, taken according to Table B.1.5.

Table B.1.5 Permissible Value (mm) of Maximum Crack Width for Members

Limit of maximum crack width in design requirements	0.1	0.2	0.3	0.4
$[\omega_{max}]$	0.07	0.15	0.20	0.25

B.1.6 Qualification judgment of inspection result for structural performance of precast members shall be in accordance with the following requirements:

1 In case all the inspection results for structural performance of precast members meet the inspection requirements in Article B.1.1 ~ B.1.5 in this code, this lot of members may be judged as qualified;

2 In case the inspection result of precast members does not meet the requirements of Item 1 but meets the requirements of the second inspection, two precast members may be taken and inspected again. For the second inspection, the permissible values of bearing capacity and anti-crack inspection coefficient shall be taken as the permissible values specified in Articles B.1.1 and B.1.4 in this code minus 0.05; the permissible value of deflection shall be taken as 1.10 times the permissible value specified in Article B.1.3 in this code;

should be measured either by load sensor or by oil pressure gauge.

3 Beam or truss may be loaded horizontally by end to end, for which the member shall be leveled up and shall be free to move in horizontal direction. Beam may also be loaded vertically by end to end.

4 In case roof truss is inspected only for deflection, anti-cracking capacity or crack width, two roof trusses may be arranged in parallel and subjected to load test after installation of roof board.

B.2.5 Loading process shall meet the following requirements:

1 Precast members shall be loaded by stages. In case the load is less than standard load, load at each stage shall not be greater than 20% of the standard load; in case the load is greater than standard load, load at each stage shall not be greater than 10% of the standard load; in case the load is close to the load for anti-crack inspection, load at each stage shall not be greater than 5% of the standard load; in case the load is close to the load for bearing capacity inspection, load at each stage shall not be greater than 5% of the design value of load.

2 Weight of test equipment and deadweight of precast member shall be regarded as a part of the first-time load;

3 Prior to test, precast member should be pre-stressed to check if the test equipment works normally, and at the same time member shall be prevented from cracking due to pre-stress;

4 Members inspected only for deflection, anti-cracking capacity or crack width shall be unloaded by stages.

B.2.6 It shall hold 10~15 min after completion of loading at each stage and 30 min under standard load. During hold time, occurrence and expansion of cracks and slippage of steel bar shall be observed; at end of hold time, all readings shall be observed and recorded.

B.2.7 For inspection of bearing capacity, the member shall be loaded till occurrence of inspection marks at limit state of bearing capacity as shown in Table B.1.1 of this code. In case one of the above inspection marks occurs within the specified hold time of load, the average of loads at this stage and loads at previous stage shall be taken as the actual measured value of load for bearing capacity inspection; in case one of the above inspection marks occurs after end of the specified hold time of load, the load at this stage shall be taken as the actual measured value of load for bearing capacity inspection.

B.2.8 Deflection shall be measured in accordance with following requirements:

1 Deflection may be measured by dial gauge, displacement sensor and level gauge etc. Deflection near to the failure stage may be measured by level gauge or tie line, ruler etc.

2 During the test, the mid-span displacement of member and settlement of support shall be measured. For wide members, measuring points shall be arranged at two sides or two ribs of each measured section, and the average of their measurement results shall be taken as the displacement at this point.

3 In case the test load is applied straight downward, for horizontal test piece, the actual measured mid-span deflection at each stage of load shall be calculated in accordance with the following formulae:

$$a_t^0 = a_q^0 + a_g^0 \quad (\text{B.2.8-1})$$

Appendix C

Strength Inspection of Test Piece Cured at the Same Condition of Concrete Structure Entity

C.0.1 Sampling and retention of test piece cured at the same condition shall meet the following requirements:

1 Structural member or structure position corresponding to test piece cured at the same condition shall be selected jointly by construction and supervising parties, and sampling of test piece cured at the same condition should be evenly distributed within project construction cycle;

2 Sampling of test piece cured at the same condition shall be witnessed at concrete pouring injection mould point.

3 Test piece cured at the same condition shall be retained at proper positions near to relevant structural members and shall be cured with the same method.

4 Test piece cured at the same condition with the same strength grade should not be less than 10 groups and shall not be less than 3 groups. Test pieces for every continuous two layers shall not be less than 1 group; test pieces for every 2000m³ shall not be less than 1 group.

C.0.2 The strength value for each group of test piece cured at the same condition shall be determined according to the strength inspection result in accordance with those specified in current national standard GB/T 50081 *Standard for Test Method of Mechanical Properties on Ordinary Fresh Concrete*.

C.0.3 The strength value for test piece cured at the same condition with the same strength grade shall be divided by 0.88 and then evaluated in accordance with those specified in current national standard GB/T 50107 *Standard for Evaluation of Concrete Compressive Strength*; the concrete strength of structure entity may be judged as qualified if the evaluation result meets relevant requirements.

requirements:

1 The diameter of core test piece shall be measured at two mutually perpendicular positions in the middle with Vernier caliper and the arithmetic average is taken as diameter of core test piece, accurate to 0.1mm;

2 The height of core test piece shall be measured with steel ruler, accurate to 1mm;

3 The perpendicularity of core test piece shall be measured with Vernier protractor by measuring the included angle of two end lines and axis, accurate to 0.1° ;

4 The evenness of core test piece shall be measured with steel ruler or angle ruler against the end surface by rotating the steel ruler and measuring the gap between steel ruler and core test piece end surface with a feeler gauge; it may also be measured with other dedicated device.

D.0.6 Core test piece shall be subjected to compressive strength test in accordance with the requirements of cylinder concrete test piece specified in current national standard GB/T 50081 *Standard for Test Method of Mechanical Properties on Ordinary Fresh Concrete*.

D.0.7 In case concrete with the same strength grade meets the following requirements, concrete strength of structure entity may be judged as qualified:

1 The arithmetic average of compressive strength for three core samples is not less than 88% of the concrete strength grade value in design requirements;

2 The minimum value of compressive strength for three core samples is not less than 80% of concrete strength grade value in design requirements.

Appendix E

Inspection on Protective Layer Thickness of Steel Bar of Structure

Entity

E.0.1 Members for inspection on thickness of steel bar layer of structure entity shall be evenly selected and shall meet the following requirements:

1 For members other than cantilever beams and slabs, 2% and at least 5 pieces shall be selected respectively for inspection.

2 For cantilever beams, 5% and at least 10 pieces of members shall be selected for inspection; the cantilever beams shall be subjected to 100% inspection if the quantity is less than 10.

3 For cantilever slabs, 10% and at least 20 pieces of members shall be selected for inspection; the cantilever slabs shall be subjected to 100% inspection if the quantity is less than 20.

E.0.2 For selected beam members, protective layer thickness of all longitudinally-stressed steel bars shall be inspected; for selected slab members, protective layer thickness of at least 6 selected longitudinally-stressed steel bars shall be inspected. For each steel bar, the inspection shall be carried out by measuring the thickness at 3 points selected from different representative positions and averaging.

E.0.3 The thickness of protective layer of steel bars may be inspected with non-destructive or partially destructive method, or may be calibrated with non-destructive method and partially destructive method. In case of inspection with non-destructive method, the detection instrument to be used shall be subjected to metrology inspection, and the detection operations shall be in accordance with relevant regulations.

Detection error for the protective layer thickness inspection of steel bar shall not be greater than 1mm.

E.0.4 For the inspection on bar protective layer thickness of steel bar, permissible deviation for the protective layer thickness of longitudinally-stressed steel bars shall meet those specified in Table E.0.4.

Table E.0.4 Permissible Deviation for Protective Layer Thickness of Longitudinally-stressed Steel Bars of Structure Entity

Member type	Permissible deviation (mm)
Beam	+10, -7
Slab	+8, -5

E.0.5 The protective layer thickness of longitudinally-stressed steel bars of beam and slab members shall be subjected to acceptance inspection respectively and shall meet the following requirements:

1 In case the qualified rate of inspection on protective layer thickness of all steel bars is 90% or above, the inspection result may be judged as qualified;

2 In case the qualified rate of inspection on protective layer thickness of all steel bars is

Wording Explanation in This Code

1 Words used for different degrees of strictness are explained as follows in order to mark the differences in executing the requirements in this code:

- 1) Words denoting a very strict or mandatory requirement:
"Must" is used for affirmation; "must not" for negation;
- 2) Words denoting strict requirement under normal conditions:
"Shall" is used for affirmation; "shall not" for negation;
- 3) Words denoting a permission of a slight choice or an indication of the most suitable choice when conditions permit:
"Should" is used for affirmation; "should not" for negation;
- 4) "May" is used as word denoting a permission of choice or an indication of the most suitable choice when conditions permit.

2 "Shall comply with..." or "shall meet the requirements of..." is used in this code to indicate that it is necessary to comply with the requirements stipulated in other relative standards and codes.

List of Quoted Standards

1	GB 50010	Code for Design of Concrete Structures
2	GB/T 50080	Standard for Test Method of Performance on Ordinary Fresh Concrete
3	GB/T 50081	Standard for Test Method of Mechanical Properties on Ordinary Fresh Concrete
4	GB/T 50082	Standard for Test Methods of Long-term Performance and Durability of Ordinary Concrete
5	GB/T 50107	Standard for Evaluation of Concrete Compressive Strength
6	GB 50119	Code for Utility Technical of Concrete Admixture
7	GB 50205	Code for Acceptance of Construction Quality of Steel Structures
8	GB/T 50448	Code for Application Technique of Cementitious Grout
9	GB 50666	Code for Construction of Concrete Structures
10	GB 175	Common Portland Cement
11	GB 8076	Concrete Admixtures
12	GB/T 14902	Ready-mixed Concrete
13	GB/T 25176	Recycled Fine Aggregate for Concrete and Mortar
14	GB/T 25177	Recycled Coarse Aggregate for Concrete
15	JGJ 18	Specification for Welding and Acceptance of Reinforcing Steel Bars
16	JGJ/T 23	Technical Specification for Inspection of Concrete Compressive Strength by Rebound Method
17	JGJ 52	Standard for Technical Requirements and Test Method of Sand and Crushed Stone (or Gravel) for Ordinary Concrete
18	JGJ 63	Standard of Water for Concrete
19	JGJ 85	Technical Specification for Application of Anchorage, Grip and Coupler for Prestressing Tendons
20	JGJ 92	Technical Specification for Concrete Structures Prestressed with Unbonded Tendons
21	JGJ 107	Technical Specification for Mechanical Splicing of Steel Reinforcing Bars
22	JGJ/T 193	Standard for Inspection and Assessment of Concrete Durability
23	JGJ 206	Technical Code for Application of Sea Sand Concrete
24	JGJ 355	Regulation for Application of Rebar Sleeve Grout Connection
25	JG 161	Unbonded Prestressing Steel Strand
26	JG 225	Corrugated Metal Ducts for Prestressed Concrete
27	JT/T 529	Plastic Bellows for Prestressed Concrete Bridge

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