ICS 91.080.40
CCS P 25

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 50367-2013

Replacing GB 50367-2006

Code for design of strengthening concrete structure

Issued on: November 1, 2013 **Implemented on: June 1, 2014**

Issued by: Ministry of Housing and Urban-Rural Development of the People's Republic of China;
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China

Table of Contents

1 General

1.0.1 This specification is formulated in order to make the reinforcement of concrete structures to be technically reliable, safe and applicable, economical and reasonable, and to ensure quality.

1.0.2 This code is applicable to the design of reinforced concrete structure reinforcement of buildings and general structures.

1.0.3 Before the concrete structure is strengthened, according to the type of the building, the structural inspection or appraisal shall be carried out in accordance with the current national standard "Industrial Building Reliability Appraisal Standard" GB 50144 or "Civil Building Reliability Appraisal Standard" GB 50292 respectively. When it is combined with seismic reinforcement, the seismic capacity appraisal should be carried out according to the current national standard "Building Seismic Appraisal Standard" GB 50023 or "Industrial Structure Seismic Appraisal Standard" GB J 117.

1.0.4 The design of reinforcement of concrete structures shall not only comply with the provisions of this code, but also comply with the relevant current national standards.

2.1.1 Strengthening of structure

Measures such as reinforcement, partial replacement or adjustment of internal force shall be taken for load-bearing structures, components and related parts that are not reliable enough or required to be improved by the owner, so as to make them meet the current design specifications and the safety, durability and applicability required by the owner.

2.1.2 Existing structure member

The original components before reinforcement.

2.1.3 important structure important structure

Load-bearing structures in buildings with a safety rating of one.

2.1.4 general structure general structure

Load-bearing structures in buildings with safety class II.

2.1.5 important structure member

A load-bearing member whose failure by itself will affect or endanger the overall operation of the load-bearing structural system.

2.1.6 general structure member

Its own failure is an isolated event and does not affect the load-bearing member of the overall work of the load-bearing structural system.

2.1.7 Structure member strengthening with increasing section area

It is a direct reinforcement method that increases the cross-sectional area of the original member and adds reinforcement to increase its bearing capacity and stiffness, or change its natural frequency.

2.1.8 Structure member strengthening with externally wrapped shaped steel

For reinforced concrete beams, columns wrapped with section steel and steel panels, the reinforcement method is used to achieve joint stress and restrain the original components.

2.1.9 composite section reinforcement method structure member strengthening with externally bonded reinforced material By using structural adhesive bonding or high-strength polymer modified cement mortar (hereinafter referred to as polymer mortar) spraying, the reinforcing material is bonded to the concrete surface of the original component to form a composite section with integrity to improve its bearing capacity. A direct reinforcement method for strength and ductility. According to the different reinforcing materials, it can be divided into various reinforcement methods such as externally bonded section steel, externally bonded steel plate, externally bonded fiber reinforced composite material, and additional steel wire mesh-polymer mortar surface layer.

2.1.10 Structure member strengthening with wire wrapped

This method is a direct reinforcement method that binds the reinforced concrete of the

compression member by winding annealed steel wire, thereby improving its ultimate bearing capacity and ductility.

2.1.11 External prestressing reinforcement method structure member strengthening with externally applied compressing

An indirect reinforcement method that improves or adjusts the stress of the original structure and components by applying external prestress.

2.1.12 Embedded steel bar

It is one of the post-anchoring connection methods of planting ribbed steel bars or fully threaded screws in base concrete with special structural adhesives.

2.1.13 Structural adhesive

Adhesives used for the bonding of load-bearing structural components that can withstand design stress and environmental effects for a long time, referred to as structural adhesives.

2.1.14 Fiber reinforced polymer (FRP)

High-strength continuous fibers are arranged according to certain rules, and are impregnated with adhesives, bonded and cured to form composite materials with fiber-reinforced effects, commonly known as fiber composites.

2.1.15 polymer modified cement mortar

Cement mortar formulated with high molecular polymer as a modified material to enhance bonding performance. In addition to improving its own physical and mechanical properties, polymer-modified cement mortar for load-bearing structures should also significantly improve its ability to anchor steel bars and bond concrete.

2.1.16 Effective cross-sectional area effective cross-sectional area

The cross-section after deducting the weakened and failed parts such as holes, defects, rust layers, and weathered layers.

2.1.17 design working life for strengthening of existing structure or its member

The time during which the structures and components specified in the reinforcement design can be used according to their intended purpose without re-inspection and appraisal after reinforcement.

2.2.1 Material properties

Es0--Elastic modulus of the steel bar of the original member;

Es - elastic modulus of newly added reinforcement;

Ea - modulus of elasticity of newly added steel;

Esp--new elastic modulus of steel plate;

Ef-the elastic modulus of newly added fiber composite;

c0--the design value of the concrete axial compressive strength of the original member;

y0, 'y0--Design value of tensile strength and compressive strength of steel bar of original member;

y, 'y-design values of tensile and compressive strength of newly added reinforcement;

a, 'a-design value of tensile and compressive strength of newly added steel;

sp, 'sp--new design values of steel plate tensile and compressive strength;

f - the design value of the tensile strength of the newly added fiber composite material;

f, v-design value of bond strength between fiber composite material and concrete;

bd-design value of bond strength of structural adhesive;

ud-design value of tensile strength of anchor bolt;

epsilonf-design value of tensile strain of fiber composite material;

epsilonfe-design value of effective tensile strain of fiber composite hoop enclosure.

2.2.2 Action effect and bearing capacity

M - the design value of the bending moment after the component is strengthened;

M0k--Standard value of the initial bending moment of the original action on the checked section of the flexural member before strengthening;

N-design value of axial force after component strengthening;

V-design value of shear force after component reinforcement;

sigmas--the tensile stress of the newly added longitudinal reinforcement;

sigmas0--the stress of the longitudinal tensile reinforcement or the smaller compression side reinforcement of the original member;

sigmaa--the stress of the newly-added section steel in tension or compression;

epsilonf0-hysteresis strain of fiber composite;

omega--member deflection or prestressed anti-camber.