



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 50728-2011

**Technical code for safety appraisal of engineering structural
strengthening materials**

工程结构加固材料安全性鉴定技术规范

(English Translation)

Issued on: December 5, 2011

Implemented on: May 1, 2012

Issued by: Ministry of Housing and Urban-Rural Development of

Table of Contents

Foreword

1 General provisions

2 Terms

3 Basic requirements

4 Structural adhesives

5 Injection grouting for cracks

6 Cement-based grouting material for structural strengthening

7 Polymer modified cement mortar for structural strengthening

8 Fibre reinforced polymer

9 Steel wire ropes

10 Synthetics modified concrete and mortar

11 Steel fibre reinforced concrete

12 Post-installed fastenings

Annex A Suitable test method standards for safety appraisal

Annex B Calculation method for characteristic value of material properties

Annex C Quick determination of wedge for bond durability

Annex D Determination method for interlaminar shear strength of
Fibre reinforced polymer

Annex E Determination method for splitting tensile strength of filler-rich
Adhesive colloid and polymer modified cement mortar

Annex F Determination method and evaluation criteria for T impact peeling
Length of structural adhesive

Annex G Laboratory determination method and evaluation criteria for

1.0.1 This Code is formulated with a view of strengthening the quality control

and technical management of relevant materials and products used in the engineering structural strengthening to ensure the quality and safety of the engineering structural strengthening projects.

1.0.2 This Code is applicable to the safety inspection and appraisal of materials and products used in structure strengthening engineering.

1.0.3 The conclusions on the safety appraisal of application of engineering structural

strengthening materials and products shall be taken as the basis for the selection of materials for engineering strengthening, and shall not be used for replacing the sampling of strengthening materials and products at the construction site for re-inspection.

1.0.4 The safety appraisal of application of engineering structural strengthening materials and products shall be accepted by the inspection and appraisal institutions with corresponding qualifications approved by the competent authorities of the nation.

1.0.5 This Code shall be used in conjunction with the following current

national standards, namely GB 50367 Code for design of strengthening concrete structure, GB 50702 Code for design of strengthening masonry structures, GB 50550 Code for acceptance of constructional quality of strengthening building structures, etc.

1.0.6 Not only the requirements stipulated in this Code, but also those in the current relevant standards of the nation shall be complied with, during the safety inspection and appraisal of application of engineering structural strengthening materials and products.

2.0.1 Appraisal

A set of work activities carried out for demonstrating the reliability (including the safety, suitability and durability) of a strengthening material or product in involvement of load-bearing members of engineering structure under stress.

2.0.2 Verification test

A test to prove whether the properties of a strengthening material or product meet the specified requirements.

2.0.3 Sampling

The process of randomly selecting or composing samples according to certain rules.

2.0.6 Substrate

In the bonding engineering, both strengthening member and existing structure member are adherents. However, the two are different in properties. For ease of differentiation, the existing structure member or the portion to be adhered thereto is referred to as a substrate.

2.0.7 Structural adhesive

An adhesive that is used for bonding of load-bearing structures or members and is able to withstand long-term design stress and environmental effects, referred to as structural adhesive.

2.0.8 Primer

An adhesive used for surface treatment of reinforced members (substrates), for preventing surface contamination and improving surface adhesion.

2.0.12 Room temperature curing

For unmodified structural adhesives, it refers to the curing process that enables normal chemical reactions at room temperature of not less than 15°C. For modified structural adhesives, it refers to the curing process that enables normal chemical reactions at room temperature of not less than 5°C.

2.0.18 Fibre reinforced polymer

Composite materials prepared using specially treated high strength or high modulus continuous fibres arranged in accordance with certain rules, with the fibre-reinforced effect.

2.0.19 Fibre concrete

Composite materials prepared by mixing staple fibres distributed evenly in irregular directions in cement-based concrete. When mainly used for improving the strength of concrete, it is called fibre-reinforced concrete. When mainly used for improving the crack resistance or toughness of concrete, it is generally called fibre modified concrete.

2.0.20 Stainless-steel fibre reinforced concrete

It refers only to the stainless-steel staple fibre produced by melt extraction, mixed with nickel and chromium components. It is suitable for concrete or mortar layer strengthening, and is generally applied to important structures with strict requirements for corrosion protection and heat resistance.

3.0.1 Any engineering structural strengthening materials and products

involved in engineering safety must pass the safety appraisal according to the requirements of this Code.

3.0.2 The strengthening materials or products applying for safety appraisal shall meet the following conditions.

3.0.3 The sampling for safety appraisal of strengthening materials or products shall meet the following requirements.

3.0.6 The characteristic value of the properties of engineering structural strengthening material shall be calculated according to the requirements of Annex B in this Code. The confidence level of calculation, γ , shall meet the following requirements.

3.0.7 For the structural strengthening materials or products passing the safety appraisal, the safety appraisal report shall be submitted. The inspection report attached to the appraisal report shall specify the sampling rules, sampling objects, sampling methods and time used in the inspection.

4.1 General requirements

4.1.1

The structural adhesives for strengthening of engineering structures shall be divided into adhesive for concrete, adhesive for structural steel, adhesive for masonry and adhesive for timber, according to different adhesive substrates.

4.1.2

The highest service temperature category of room temperature curing structural adhesives shall be indicated in the manual, according to the following requirements. The corresponding conformity assessment criteria are set out in the sections of this chapter.

4.2.1 During safety appraisal of the structural adhesives using concrete

structural members as the substrates for steel, fibre reinforced polymer and anchor bonding, and the primer and putty that need to be used in conjunction with the structural adhesives, the requirements of this section shall apply.

4.2.4 The safety appraisal of low temperature curing structural adhesives for concrete substrates shall meet the following requirements.

4.3 Structural adhesive for masonry substrates

4.3.1

For composite masonry members whose surface layers are made of reinforced concrete, the safety appraisal of structural adhesives for strengthening shall meet the requirements of the structural adhesives for concrete substrates.

4.4.1 During safety appraisal of the structural adhesives using steel structural

members as the substrates for bonding strengthening materials, and the primer and putty used in conjunction with the structural adhesives, the requirements of this section shall apply.

4.8 Technical property requirements for engineering safety of structural adhesives

4.8.1 The technical properties with regard to engineering safety of structural adhesives shall also be used as an integral part of safety appraisal for inspection and appraisal. The test items and acceptable indices of Class I adhesives shall meet the requirements of Table 4.8.1.