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Standard for design of concrete structure durability

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1 General

1.0.1 This standard is formulated to ensure that the durability of concrete structures reaches the specified design service life and ensure the reasonable service life of engineering structures.

1.0.2 This standard applies to the durability design of ordinary concrete structures and their components in infrastructure such as buildings, bridges, tunnels, and general structures under the action of various natural environments.

This standard does not consider the deterioration of structural performance caused by low-cycle repeated loads and long-term loads, and is not suitable for lightweight aggregate concrete, fiber concrete and other special concrete structures, as well as high-temperature and high-humidity environments, microbial corrosion environments, electromagnetic environments, and high-pressure environments in industrial production. Durability design of concrete structures in special corrosive environments such as stray currents and stray currents.

1.0.3 The durability provisions of this standard are the minimum requirements to make the

structure reach the design service life and have the specified guarantee rate. The design can be appropriately improved according to the specific characteristics of the project, local environmental conditions, practical experience, and specific construction conditions.

1.0.4 The durability design of concrete structures shall not only meet the provisions of this standard, but also meet the relevant current national standards.

2.1.1 Environmental action

The impact of temperature, humidity and its changes, as well as environmental factors such as carbon dioxide, oxygen, salt, acid, etc. on the structure or material properties.

2.1.2 degradation degradation

The degradation of the performance of a material or structure over time in its environment.

2.1.3 degradation model degradation model

A mathematical expression or test device describing the degradation process of a material or structure.

2.1.4 Structure durability structure durability

The ability of a structure or component to maintain its applicability and safety within the design service life under environmental effects and normal maintenance and use conditions.

2.1.5 general environment atmospheric environment

The exposure environment of concrete structures or components without the action of freeze-thaw, chloride and other chemical corrosive substances.

2.1.6 freeze-thaw environment freeze-thaw environment

Concrete structures or components subjected to repeated freeze-thaw exposures.

2.1.7 chloride environment chloride environment

Exposure of concrete structures or elements to the intrusion of chloride salts and corrosion of internal reinforcement, including marine chloride environments and other chloride environments such as de-icing salts.

2.1.8 Chemical environment chemical environment

Concrete structures or components are exposed to the corrosion of chemical substances in the natural environment, including chemical corrosion environments in water and soil and

air pollution corrosion environments.

2.1.9 design working life

The number of years that the structure or structural components specified in the design can be used for the intended purpose without major repairs.

2.1.10 chloride diffusion coefficient

It is a parameter that expresses the diffusion rate of chloride ions from high concentration area to low concentration area in concrete.

2.1.11 frost resistance durability index durability factor

The ratio of the dynamic elastic modulus to the initial dynamic elastic modulus of concrete after a specified number of rapid freeze-thaw cycles using standard test methods, usually expressed as a percentage.

2.1.12 air entrainment

When mixing concrete, surfactants are used to form uniform, stable, spherical closed micro-bubbles in the concrete.

2.1.13 air content in concrete

The ratio of the volume of air cells in concrete to the total volume of concrete, expressed as a percentage.

2.1.14 Spacing factor of air voids

A parameter representing the distance between the edges of adjacent air cells in a hardened concrete or cement paste.

2.1.15 maintenance

The various technical and management activities undertaken to maintain the required performance of a structure over its useful life.

2.1.16 repair restore

Restoration of damaged structures to the activities performed in normal use by repairing, replacing or reinforcing.

2.1.17 overhaul major repair

The normal use of the structure is stopped within a certain period of time, and it is

necessary to replace the damaged concrete in the structure in a large area or replace the main components of the structure.

2.1.18 Restorability

Damaged structures or components have the ability to be repaired economically and reasonably.

2.1.19 cementitious material, or binder

The general term for cement and fly ash, silica fume, granulated blast furnace slag powder and other mineral admixtures in concrete raw materials.

2.1.20 Water to binder ratio

The mass ratio of water consumption per unit volume of concrete mixture to the total amount of cementitious materials.

2.1.21 Concrete with supplementary cementitious materials

The cementitious material contains not less than 30% mineral admixtures (including the admixture in cement), and concrete that requires a lower water-binder ratio and special construction measures.

2.1.22 Concrete cover to reinforcement of reinforced concrete

The minimum distance from the concrete surface to the outer edge of the nominal diameter of the bar; for post-tensioned tendons, the distance from the outer edge of the casing or tunnel to the concrete surface.

2.1.23 Additional protective measures for corrosion protection

On the basis of conventional methods such as improving the compactness of concrete, increasing the thickness of the protective layer, and using waterproof and drainage measures, supplementary measures adopted to further improve the durability of concrete structures include concrete surface coating, epoxy-coated steel bars, and steel bar rust prevention. agent and cathodic protection etc.

2.1.24 protection life

The number of years that additional measures to prevent corrosion will maintain effective protection of the concrete or reinforcement.

2.1.25 multiple protective measures multiple protective measures

Various additional measures for corrosion protection are taken at the same time to ensure