

Foreword

According to the requirements of Document JIANBIAO [2011] No. 17 issued by the Ministry of Housing and Urban-Rural Development of the People's Republic of China(MOHURD)–"Notice on Printing and Distributing 'the Development and Revision Plan of National Engineering Construction Standards in 2011", this code is revised from the former GB 50212–2002 *Specification for Construction and Acceptance of Anticorrosive Engineering of Buildings* by China Petroleum & Chemical Engineering Survey and Design Association and National Chemical Construction Standardization Management Center Station and cooperated with relevant organizations.

During the compiling process, the drafting group finalized this code upon extensive investigation and study, earnestly summarizing practical experience, coordinating with relevant international standards and advanced foreign standards and extensively soliciting for opinions.

The code consists of 15 chapters and 2 appendixes, covering: general provisions, terms, basic requirements, base course treatment, anticorrosive project of resin type, anticorrosive project of water soluble silicate type, anticorrosive project of polymer cement screed, anticorrosive project of block material, anticorrosive project of sprayed polyurea, anticorrosive project of coating type, anticorrosive project of asphalt type, anticorrosive project of plastics type, safety technique, technical measure for environment protection, hand over of project, etc.

The main technical contents of the revision of this code are:

1. Three chapters are added, including basic requirement, sprayed polyurea anticorrosion layer and technique measure for environment protection, and the arrangement sequence of related chapters is adjusted.

2. The following provisions are added: resin content in fiber-reinforced plastics, compressive strength of resin fine stone concrete, bonding strength of fiber reinforced plastics to concrete, rules for construction of resin fine stone concrete and resin gravity flow flat surface. The construction regulations for the jointing of resin mortar and resin screed paving blocks were removed.

3. Performance index and construction regulations for epoxy emulsion cement screed are added.

4. Performance index and construction regulations for anticorrosion carbon bricks are added.

5. Construction regulations for fluorine coatings, vinyl ester resin coatings, epoxy polyurethane coatings, waterborne inorganic zinc-rich coatings, etc. are added. Construction regulations for perchloroethylene coatings, polystyrene coatings, vinyl chloride-vinyl acetate copolymer coatings, polyurethane polysubstituted ethylene interpenetrating network coatings, etc. were removed.

6. Performance index and construction regulations for polyethylene and polypropylene plastics are added.

7. Determination of tensile strength of resin mortar and resin screed in the test method for the finished products in Appendix A is revised. Measurement methods such as "resistance of resin fine stone concrete", "bond strength of fiber reinforced plastic and concrete, and bond strength of polymer cement screed" are added.

8. Value, loading speed and determination method of the test results of raw materials and finished

products in Appendix A are supplemented.

9. Transfer form of the project handover and construction ratio of Appendix B are adjusted.

The provisions printed in bold type are mandatory ones and must be implemented strictly.

The Ministry of Housing and Urban-Rural Development of the People's Republic of China is in charge of administration of this code and explanation of the compulsory provisions. The Branch of Chemical Industry, China Association for Engineering Construction Standardization is responsible for daily management, and the National Chemical Construction Standardization Management Center Station is responsible for the explanation of specific technical contents. If any opinions or advice during the implementation, please send it to the National Chemical Construction Standardization Management Center Station (Address: Room 1-1-1107, Renhe Business, No. 28, Huai'an East Road, Qiaoxi District, Shijiazhuang City, Postcode: 050020).

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1 General provisions

1.0.1 This code is prepared with a view to improve the construction level of building anticorrosion engineering, strengthen the quality control of the building anticorrosion engineering construction process, and ensure the construction quality and safety.

1.0.2 This code is applicable to the construction of anticorrosion engineering for construction, extension and renovation of buildings and structures.

1.0.3 The building anticorrosion materials entering the site shall have product quality certificate, quality technical indicators and testing methods, and quality inspection report or technical identification documents.

1.0.4 Mix ratio of materials to be used with on-site preparation shall be determined by experiment. The mix ratio determined by the test shall not be arbitrarily changed.

1.0.5 Construction of building anticorrosion engineering shall be carried out in accordance with the provisions of the design documents. When design changes, material substitutions, or new materials are required, the design department's consent shall be obtained.

1.0.6 The construction and use of materials for construction anticorrosion engineering shall be complied with, not only the requirements stipulated in this code, but also those in the current relevant standard of the nation shall be complied with.

2 Terms

2.0.1 Potassium silicate material

A silicate type acid-resistant and heat-resistant material prepared by using an aqueous solution of potassium silicate as a cementing material, condensed aluminum phosphate as a curing agent, a silicon-aluminum oxide as a powder and an aggregate, and a small amount of auxiliary materials.

2.0.2 Assort of matched coating

A composite coating reasonably combined with all kinds of compatible coating in material selection, structure matching, application procedure and other aspects.

2.0.3 Jet flow of high pressure

The high-pressure, low-flow water pumped by the high-pressure pump passes through the pressurization pipeline to the rotary nozzle and is converted into a low-pressure high-flow jet with high impact kinetic energy to impact the surface to be cleaned.

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3 Basic requirements

3.1 General requirements

3.1.1 The construction organization shall establish a quality management system and safety management system for the anticorrosion construction site, and shall have sound quality management regulations, safety management regulations and corresponding construction technical standards.

3.1.2 The following conditions shall be available before implementation of building anticorrosion construction:

1 The engineering design drawings and related technical documents are complete, and the design and the drawings have been explained and reviewed in accordance with the established procedures.

2 The construction organization design or construction plan has been approved, and technical and safety disclosure has been carried out.

3 Construction personnel are qualified in accordance with relevant regulations.

4 The project start-up documents are ready.

5 Machinery and tools used for anticorrosion construction shall be qualified; the measuring instruments shall be within the validity period of the verification.

6 The corresponding emergency plan for occupational health and safety and environmental protection has been formulated.

3.1.3 Building anticorrosion construction shall meet the requirements of the current national standards for environmental protection, safety technology and labor protection.

3.1.4 Construction shall be carried out according to the construction design or construction plan.

3.1.5 Each process in the construction shall have a complete construction record.

3.2 Base course requirements

3.2.1 The base course of the anticorrosion engineering shall include concrete base course, steel structure base course and wood base course.

3.2.2 The base course shall meet the design requirements. Before the construction of anticorrosion engineering, the base course shall be checked and accepted and the handover procedures shall be completed.

3.2.3 The concrete base course shall be in accordance with the following requirements:

1 The base course shall be dense and shall be free of cracks, peeling, pitting, sanding, and hollowing. The strength shall be tested and shall meet the design requirements, and there shall be no groundwater leakage or uneven subsidence.

2 The surface flatness of the base course shall be checked with a 2m guiding ruler. Where the thickness of the anticorrosion layer is not less than 5mm, the allowable interstice shall not be larger than 4mm; where the thickness of the anticorrosion layer is less than 5mm, the allowable interstice shall not be larger than 2mm.

3 The slope of the base course shall meet the design requirements.

4 When pouring concrete, formwork of the fair-faced concrete should be used. When using steel

formwork, the release agent shall not contaminate the base course.

5 The inner and outer corner angle of the base course should be made into a bevel or rounded corner. Where the surface of the base course is paved, the inner and outer corner angle of the base course shall be made into right angles.

6 There shall be no white precipitate on the surface of the base course that has been cured.

7 The surface of the leveling course that has been cured shall not have defects such as cracking, peeling, pitting, sanding, and hollowing.

3.2.4 The steel structure base course shall be in accordance with the following requirements:

1 The installation of the steel structure has been completed and passed the acceptance.

2 The surface shall be flat and clean, and there shall be no defects such as welding slag, welding scar or burr.

3 Welds shall be full and shall be free of defects such as air hole and slag inclusions.

4 The radius of the arc of the outer angle should not be less than 3mm.

3.2.5 The surface of the wood base course shall be dry, flat, smooth and free of resin.

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4 Base course treatment

4.1 General requirements

4.1.1 The surface treatment of concrete base course shall be in accordance with those specified in Table 4.1.1.

Table 4.1.1 Surface treatment of concrete base course

Concrete strength	Processing method
\geq C40	Shot blasting, sand blasting, high pressure jet
C30–C40	Shot blasting, sand blasting, high pressure jet, sanding
C20–C30	Shot blasting, sand blasting, high pressure jet, milling, sanding, grinding
\leq C20	Grinding, high pressure jet, milling, grinding

4.1.2 The surface roughness of anticorrosion structural layers and concrete shall be in accordance with those specified in Table 4.1.2.

Table 4.1.2 Surface roughness of anticorrosion structural layer and concrete

Anticorrosion structural layer	Roughness requirements
Resin, coating, polyurea, fiber reinforced plastic	$\geq 30\mu\text{m}$
Resin screed, polymer cement screed, potassium silicate material, block	$\geq 70\mu\text{m}$

4.1.3 The surface roughness of the anticorrosion structural layer and the steel structure base course shall be in accordance with those specified in Table 4.1.3.

Table 4.1.3 Surface roughness of corrosion-resistant structural layer and steel structure base course

Anticorrosion structural layer	Roughness requirements
Resin, coating	$\geq 30\mu\text{m}$
Fiber reinforced plastic, polyurea, block, polymer cement screed	$\geq 70\mu\text{m}$

4.1.4 Base course concrete shall be cured. In the thickness layer of 20mm depth, the water content shall not be larger than 6%. Where the design has special requirements on humidity, it shall be carried out according to the design requirements.

4.2 Base course of concrete

4.2.1 The surface treatment of concrete base course shall be in accordance with the following requirements:

- 1 After sanding with hand or power tools, the surface of the base shall be free of cement residue and loose deposits.
- 2 After shot blasting, sand blasting or high pressure jet, the surface of the base course shall form a uniform rough surface.
- 3 After mechanical grinding, the surface of the base course shall be flat.
- 4 The surface of the base course after treatment shall be cleaned up.

4.2.2 The surface of the concrete base course that has been contaminated by grease or chemicals or the loose base course that has been eroded in the renovation or extension project shall be surface treated. The treatment method shall be in accordance with the following requirements:

1 Where the surface of the base course is eroded by the medium and is loose, high-pressure jet, sand blasting or mechanical milling and chiseling should be used.

2 Where the surface is uneven, it should be repaired with fine stone concrete, resin screed or polymer cement screed. After curing, it shall be treated as a new base course.

4.2.3 Pipes, casings, reserved holes and embedded parts that pass through the anticorrosion layer shall be pre-embedded or pre-retained.

4.2.4 The surface of the overall anticorrosion structure base course should not be leveled. Where leveling must be performed, the treatment shall be in accordance with the following requirements:

1 Where the thickness of the screed is not less than 30mm, it should be leveled with fine stone concrete, and the strength grade shall not be less than C30.

2 Where the thickness of the screed is less than 30mm, it should be leveled with polymer cement screed or resin screed.

4.3 Base course of steel structure

4.3.1 Surface treatment of steel structures may be carried out by shot blasting or sand blasting, manual or power tools, high-pressure water jetting, etc.

4.3.2 The blast-cleaning grade, hand and power tool cleaning grade shall meet the relevant requirements of the current national standard GB/T 8923.1 *Preparation of Steel Substrates before Application of Paints and Related Products—Visual Assessment of Surface Cleanliness—Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings*.

4.3.3 The surface treatment quality of high-pressure water jetting shall be in accordance with the following requirements:

1 The surface of the steel shall be free of visible grease and dirt, and the deposits such as mill scale, rust and coating shall be removed, and the exposed surface of the substrate shall have a metallic luster.

2 The surface of the steel treated by high-pressure water jetting shall be coated with primer within 4 hours after drying.

4.3.4 The surface of the treated steel structure shall not be contaminated again. Where secondary pollution is caused, the surface treatment shall be carried out again.

4.3.5 The treated base course surface of the steel structure shall be coated with primer in time, and the interval shall not exceed 5 hours.

4.4 Base course of wood

4.4.1 The surface of the wood base course shall be clean.

4.4.2 The wood base course shall be dry and the water content shall not be larger than 15%.

4.5 Quality inspection

4.5.1 The surface of the treated concrete base course shall be dense, flat and clean. Roughness shall

meet the requirements of the provisions of Article 4.1.2 of this code.

4.5.2 The surface of the treated steel structure base course shall be free of impurities such as welding slag, burrs, rust, oil stains and other attachments. Roughness shall meet the requirements of the provisions of Article 4.1.3 of this code.

4.5.3 The surface of the treated wood base course shall be free from defects such as oil, dust and resin.

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5 Anticorrosive project of resin type

5.1 General requirements

5.1.1 The resins listed in this chapter shall include epoxy resin, vinyl ester resin, unsaturated polyester resin, furan resins and phenolic resin. Resin type anticorrosion projects shall include the following contents:

1 Integral surface course of fiber reinforced plastic lined with resin binder.

2 Integral surface course made of resin thin mortar, screed, fine stone concrete, self-leveling and glass flake cement.

5.1.2 The temperature of the construction environment should be 15°C–30°C, and the relative humidity should not be larger than 80%. Where the construction environment temperature is lower than 10°C, heating and insulation measures shall be taken. The temperature at which the raw materials are used shall not be lower than the allowable construction environment temperature.

5.1.3 Where using benzenesulfonyl chloride curing agent for phenolic resin, the construction environment temperature shall not be lower than 17°C.

5.1.4 Where using low-temperature-construction furan resin, the ambient temperature of construction and curing should not be lower than –5°C, and the construction environment temperature of the integral surface course of resin screed should not be lower than 0°C.

5.1.5 Where using furan resin or phenolic resin for anticorrosion construction, epoxy resin binder, vinyl ester resin binder, unsaturated polyester resin binder or fiber reinforced plastic shall be used as isolation layer on the surface of the base course.

5.1.6 Before the construction of resin type anticorrosion project, large-area construction shall be carried out after selecting the appropriate construction mix ratio and determining the construction operation method.

5.1.7 The construction interval between the various layers of the resin type anticorrosion project shall be determined according to the curing characteristics of the resin and the environmental conditions.

5.1.8 Open flame or steam must not be used for direct heating during construction.

5.1.9 During construction and curing, measures such as ventilation, dustproof, waterproof, fireproof and anti-exposure shall be taken.

5.1.10 Resin anticorrosion project construction shall not be carried out with other types of works.

5.1.11 Resin, curing agent, thinner and other materials shall be sealed and stored in a cool, dry and ventilated place. Fiber reinforced materials, powder materials and other materials shall be stored in a moisture-proof manner.

5.2 Requirements for quality of raw materials and finished products

5.2.1 The quality of liquid resin shall be in accordance with the following requirements:

1 Epoxy resin varieties include EP01441-310 and EP01451-310 bisphenol A epoxy resin, the quality of which shall meet the relevant requirements of the current national standard GB/T 13657 *Bisphenol-A Epoxy Resin*.

2 The quality of vinyl ester resin shall meet the relevant requirements of the relevant provisions of the current national standard GB/T 50590 *Technical Code for Anticorrosion Engineering of Vinyl Ester Resins*.

3 Unsaturated polyester resin varieties include bisphenol A type, xylene type, isophthalic type and orthophthalic type, and the quality shall meet the relevant requirements of the current national standard GB/T 8237 *Liquid Unsaturated Polyester Resin for Fiber Reinforced Plastics*.

4 The quality of furan resin shall be in accordance with those specified in Table 5.2.1-1.

Table 5.2.1-1 Quality of furan resin

Items	Indexs
Appearance	Brownish black or tan liquid
Viscosity (coating-4 viscometer, 25°C, s)	20-30
Shelf life	1 year at room temperature

5 The quality of phenolic resin shall be in accordance with those specified in Table 5.2.1-2, and its appearance should be light yellow or brownish red viscous liquid.

Table 5.2.1-2 Quality of phenolic resin

Items	Indexs	Items	Indexs
Free phenol content (%)	<10	Shelf life	Not more than 1 month at normal temperature; where using cold storage or adding 10% benzyl alcohol, it should not exceed 3 months
Free aldehyde content (%)	<2		
Water content (%)	<12		
Viscosity (falling ball viscometer, 25°C, s)	40-65		

5.2.2 The curing agent commonly used for resins shall be in accordance with the following requirements:

1 Epoxy resin curing agent shall preferably use low-toxic curing agent, or amine curing agent such as ethylenediamine. A moisture-curing epoxy curing agent may be used for the wet base course.

2 Curing agents for curing at room temperature of vinyl ester resins and unsaturated polyester resins shall include initiators and accelerators, and shall be used in the following combinations:

- 1) A styrene solution of methyl ethyl ketone peroxide or cyclohexanone peroxide and cobalt salt.
- 2) A styrene solution of dibenzoyl peroxide and dimethylaniline.

3 The curing agent of furan resin shall be an acidic curing agent, which has been added to glass fiber reinforced plastic powder, mortar powder, screed powder and concrete powder.

4 The curing agent of phenolic resin shall preferably use a low-toxic acidic naphthalenesulfonic acid curing agent, or a curing agent such as benzenesulfonyl chloride.

5.2.3 Thinner of resin materials shall be in accordance with the following requirements:

1 The thinner of epoxy resin should be a reactive thinner such as n-butyl glycidyl ether or phenyl glycidyl ether, or inactive thinner such as acetone, absolute ethanol or xylene.

2 The thinner of the vinyl ester resin and the unsaturated polyester resin should be styrene.

3 The thinner of furan resin and phenolic resin should be anhydrous ethanol.

5.2.4 The selection of fiber reinforced materials shall be in accordance with the following requirements:

1 Types of glass fiber reinforced materials include boron-free alkali-free glass fiber, alkali-free glass fiber and medium-alkali glass fiber. Glass fiber fabrics produced by clay crucible shall not be used.

2 When glass fiber cloth is used, the thickness should be 0.1mm to 0.4mm, and the quality shall meet the requirements of the current national standard GB/T 18370 *Glass Fiber Woven Roving*.

3 When using glass chopped strand mat, the unit mass should be 300g/m² to 450g/m², and the quality shall meet the requirements of the current national standard GB/T 17470 *Glass Fiber Mats-Chopped Strand and Continuous Filament Mats*.

4 The glass fiber surface mat used in the resin-rich layer includes chemical resistant surface mat and medium alkali type surface mat, and the unit mass should be 30g/m² to 50g/m². Where used in alkaline medium, organic synthetic material such as polyamide should be used.

5 The coupling agent used for the surface treatment of glass fiber shall be matched with the resin selected.

6 Where used in anticorrosion engineering of fluorine-containing media, polyester lattice cloth or polyester mat should be used.

5.2.5 The quality of the powder shall be in accordance with the following requirements:

1 It shall be clean and dry, its acid resistance shall not be less than 95%.

2 Where using acidic curing agent, the acid resistance shall not be less than 98%, and the volume stability shall be qualified.

3 The water content shall not be larger than 0.5%, the fineness requirement 0.15mm square hole sieve residue shall not be larger than 5%, and the 0.075mm square hole sieve residue shall be 10% to 30%.

4 Where used in fluorine-containing media, barium sulfate powder or graphite powder shall be used; where used in alkali-containing media, quartz powder should not be used.

5.2.6 The quality of the coarse and fine aggregates shall be in accordance with the following requirements:

1 The acid resistance shall not be less than 95%, and the water content shall not be larger than 0.5%.

2 Where using acidic curing agent, the acid resistance shall not be less than 98%.

3 The particle size of fine aggregate for resin screed shall not be larger than 2mm.

4 The maximum particle size of the coarse aggregate of resin fine stone concrete shall not be larger than 1/4 of the minimum size of the structural section.

5 Where used in fluorine-containing media, barite sand shall be used.

5.2.7 The resin type of glass flake mortar includes vinyl ester resin, epoxy resin and bisphenol A type unsaturated polyester resin, the quality of which shall meet the relevant requirements of the requirements of Article 5.2.1 of this code. The glass flakes should be selected from the medium alkali type, and the quality shall meet the relevant requirements of the current professional standard HG/T 2641 *Middle Alkali Content Glass Flake*.

5.2.8 Resin self-leveling type includes vinyl ester resin and epoxy resin, the quality of which shall meet the relevant requirements of the current national standard GB/T 50590 *Technical Code for Anticorrosion Engineering of Vinyl Ester Resins* and GB/T 50589 *Technical Code of Construction for Epoxy Resins Self-Leveling Flooring*.

5.2.9 The quality of finished products of resin materials shall be in accordance with those specified in Table 5.2.9.

Table 5.2.9 Quality of finished products of resin materials

Items		Epoxy resin	Vinyl ester resin	Unsaturated polyester resin				Furan resin	Phenolic Resin
				Bisphenol A type	Xylene type	Isophthalic type	Orthophthalic type		
Compressive strength (MPa)	Mortar	≥80.0	≥80.0	≥70.0	≥80.0	≥80.0	≥80.0	≥70.0	≥70.0
	Screed	≥70.0	≥70.0	≥70.0	≥70.0	≥70.0	≥70.0	≥60.0	-
	Fine stone concrete	≥60.0	≥70.0	≥70.0	≥70.0	≥70.0	≥70.0	≥60.0	-
	Self-leveling	≥70.0	≥70.0	-	-	-	-	-	-
Tensile strength (MPa)	Mortar	≥9.0	≥9.0	≥9.0	≥9.0	≥9.0	≥9.0	≥6.0	≥6.0
	Screed	≥7.0	≥7.0	≥7.0	≥7.0	≥7.0	≥7.0	≥6.0	-
	Fiber reinforced plastic (cloth)	≥100.0	≥100.0	≥100.0	≥100.0	≥90.0	≥90.0	≥80.0	≥60.0
Bond strength (MPa)	Mortar and acid-resistant brick (cross method)	≥3.0	≥2.5	≥2.5	≥3.0	≥1.5	≥1.5	≥2.5	≥1.0
	Fiber reinforced plastic(primer) and C30 concrete (pull-off test)	≥1.5	≥1.4	≥1.4	≥1.2	≥1.2	≥1.2	≥1.5 (epoxy primer)	≥1.5 (epoxy primer)
	Fiber reinforced plastic (primer) and polymer cement screed (pull-off test)	≥2.5	≥2.0	≥1.7	≥1.7	≥1.6	≥1.6	≥2.5 (epoxy primer)	≥2.5 (epoxy primer)
Glass fiber reinforced plastic resin content (%)	Cloth	≥45.0							
	Chopped mat	≥70.0							
	Surface mat	≥90.0							

5.2.10 The quality of finished products of glass flake mortar shall be in accordance with those specified in Table 5.2.10.

Table 5.2.10 Quality of finished products of resin glass flake mortar

Items/Types		Vinyl ester resin	Epoxy resin	Unsaturated polyester resin
Tensile strength (MPa)		≥25.0	≥25.0	≥23.0
Bending strength (MPa)		≥35.0	≥30.0	≥32.0
Abrasion resistance (1 000g,500r,g)		≤0.05	≤0.05	≤0.05
Bond strength (MPa)	With cement base (cross method)	≥1.5	≥2.0	≥1.5
	Primer and C30 concrete (pull-off test)	≥1.3	≥1.5	≥1.2
Impermeability (MPa)		≥1.5	≥1.5	≥1.5

5.2.11 The test methods for the quality of resin raw materials and finished products shall meet the relevant requirements of Appendix A of this code.

5.3 Preparation of materials

5.3.1 The construction mix ratio of resin materials may be selected according to Table B.0.1 to Table B.0.4 of Appendix B of this code.

5.3.2 Containers and tools for preparation of materials shall be kept clean, dry, free of oil, and free of solid residue.

5.3.3 The preparation of epoxy resin binder, mortar, screed and fine stone concrete shall be in accordance with the following requirements:

1 Preheat epoxy resin to about 40°C, add thinner in suitable proportion into epoxy resin in the container, stir the mixture to be uniform and cool it down to room temperature to prepare epoxy resin solution.

2 During application, fetch certain amount of resin solution, add the curing agent in proper proportion and stir the mixture to be uniform to prepare resin binder.

3 Add the powder to the prepared resin binder and stir evenly to make mortar.

4 Add the powder and fine aggregate to the prepared resin binder, stir evenly to make screed.

5 Add powder and coarse and fine aggregates to the prepared resin binder and stir evenly to make fine stone concrete.

6 Where there is color requirement, the color paste or the pigment slurry evenly mixed with thinner shall be added to the epoxy resin solution and mix well.

5.3.4 Vinyl ester resin or unsaturated polyester resin binder, mortar, screed and fine stone concrete shall be formulated in accordance with the following requirements:

1 Mix the vinyl ester resin or unsaturated polyester resin with the accelerator according to the construction mix ratio, and then mix it with the initiator to prepare resin binder.

2 **Must not to mix the accelerator directly with the initiator.**

3 Add the powder to the prepared resin binder, stir evenly to make mortar.

4 Add powder and fine aggregates to the prepared resin binder, stir evenly to make screed.

5 Add powder and coarse and fine aggregates to the prepared resin binder, stir evenly to make fine stone concrete.

6 Where there is color requirement, the color paste or the pigment slurry evenly mixed with thinner shall be added to the vinyl ester resin or the unsaturated polyester resin and mixed well.

7 Where a vinyl ester resin or unsaturated polyester resin binder sealant is used, the final sealant resin compound shall be filled with styrene paraffin.

5.3.5 The preparation of furan resin binder, mortar, screed and fine stone concrete shall be in accordance with the following requirements:

1 Mix the furan resin in proportion with the fiber reinforced plastic powder containing the acidic curing agent, and stir evenly to make a fiber reinforced plastic resin binder.

2 Mix the furan resin in proportion with the mortar powder containing the acidic curing agent, stir evenly to make mortar.

3 Mix the furan resin in proportion with the screed powder and fine aggregate containing the acidic curing agent, stir evenly to make screed.

4 Mix the furan resin in proportion with the concrete powder and the coarse and fine aggregate containing the acidic curing agent, stir evenly to make a fine stone concret.

5.3.6 The preparation of phenolic resin binder and mortar shall be in accordance with the following requirements:

1 Weigh a certain amount of phenolic resin, add the thinner and stir evenly, then add the curing agent and stir evenly to make resin binder.

2 In the prepared resin binder, add the powder and stir evenly to make mortar.

5.3.7 The preparation of resin self-leveling materials shall be in accordance with the following requirements:

1 Factory-produced resin self-leveling materials and matching curing agents shall be used.

2 Stir the epoxy self-leveling material after the barrel is opened, then add the curing agent according to the construction mix ratio, stir evenly and wait for use.

3 Stir the vinyl ester resin self-leveling material after the barrel is opened, mix it with the accelerator according to the construction mix ratio, and then add the initiator, stir evenly and wait for use.

4 Where using vinyl ester resin self-leveling material containing pre-accelerator, stir the material evenly after opening the barrel, then add the initiator according to the construction mix ratio, stir evenly and wait for use.

5 Styrene paraffin solution shall be added to the vinyl ester resin self-leveling binder when final coat is applied.

5.3.8 Resin glass flake mortar shall be prepared in accordance with the following requirements:

1 The primer and top coat of resin glass flake mortar shall be prepared with the same resin as the resin glass flake binder.

2 Weigh the epoxy resin glass flake mortar and weigh the epoxy resin curing agent according to the mix ratio. It should be placed in a vacuum mixer and stirred evenly under the condition of vacuum not lower than 0.08MPa.

3 Weigh the quantitative vinyl ester resin or unsaturated polyester resin glass flake mortar, add the matching agent according to the mix ratio, stir evenly, then add the matching initiator, and it should be placed into the vacuum mixer. Stir evenly under the condition of vacuum not lower than 0.08MPa.

4 Where using vinyl ester resin or unsaturated polyester resin glass flake mortar containing pre-accelerator, the matching initiator shall be added, and it should be placed in vacuum mixer under the condition of vacuum not lower than 0.08MPa and stir evenly.

5.3.9 The prepared resin binder, mortar, screed, fine stone concrete and self-leveling material shall be used up before initial solidification. Shall not be used when there is solidification, agglomeration, etc.

5.4 Construction of fiber reinforced plastics

5.4.1 The construction of fiber reinforced plastics should be done by hand lay-up method. The hand lay-up method is divided into batch method and continuous method. Furan and phenolic fiber reinforced plastics shall be applied by batch method.

5.4.2 Construction before fiber reinforced plastic lining shall be in accordance with the following requirements:

1 Underlayment: On the surface of the treated base course layer, the primer shall be evenly brushed, and there shall be no defects such as leakage coating and sag.

2 Repair layer: The depression in the surface of the primer shall be filled with resin mortar to make it even. The phenolic or furan fiber reinforced plastic may be repaired by scraping the base course layer with an epoxy resin or a vinyl ester resin or a mortar of an unsaturated polyester resin.

5.4.3 Fiber reinforced plastic lining construction by batch method shall be in accordance with the following requirements:

1 Firstly apply a layer of lining resin binder evenly, then lining a layer of fiber reinforced material, which must be pasted firmly, clear the air bubbles, and then apply a layer of resin compound, the resin compound shall be full.

2 After the surface shall be cured and trimmed, line the following layers according to the above procedure until the required number of layers or thickness is reached.

3 The quality of the previous lining shall be checked before each lining. Where there are defects such as burrs, delamination and bubbles, it shall be repaired.

4 When lining, the overlapping width of the same layer of fiber reinforced materials shall not be less than 50mm; the joints of the upper and lower layers of fiber reinforced materials shall be staggered, the staggering distance shall not be less than 50mm; 1 layer to 2 layers of fiber reinforced materials shall be added at inner and outer corners.

5.4.4 The construction of continuous fiber reinforced plastic lining shall be in accordance with the following requirements:

1 The number of layer or thickness of the continuous lining shall not cause slippage and shall not be peeled or delaminated after curing.

2 When lining, the joints of the upper and lower layers of fiber reinforced materials shall be staggered, the staggering distance shall not be less than 50mm; 1 layer to 2 layers of fiber reinforced materials shall be added at inner and outer corners.

3 The construction of the next continuous lining shall be carried out after the previous continuous lining is cured.

4 After the continuous lining reaches the number or thickness of the design requirements, the cover layer shall be applied after curing.

5.4.5 For the construction of the fiber reinforced plastic cover layer, the top coat shall be evenly applied. When applying more than two times, after the previous layer is cured, apply the next layer.

5.4.6 When fiber reinforced plastic is used as isolation layer of the integral surface layer or block surface layer of resin thin mortar, resin screed, resin fine stone concrete and water soluble silicate concrete, after the final layer of cloth has been laid, a layer of top coat shall be applied, and a fine aggregate with a particle size of 0.7mm to 1.2mm shall be evenly spread at the same time.

5.5 Construction for integral surface course coated by dilute resin

5.5.1 The integral surface course of the resin includes resin thin mortar, resin screed, resin fine stone concrete, resin self-leveling and resin glass flake mortar and other integral surface layer.

5.5.2 The construction of the integral surface course of resin thin mortar shall be in accordance with the following requirements:

1 Where there is no isolation layer on the base course, the primer shall be evenly coated on the base course; the depression of base course shall be filled with resin motor to make the surface even.

2 Where there is fiber reinforced plastic isolation layer on the base course, a layer of resin binder

shall be evenly applied on the fiber reinforced plastic isolation layer.

3 The resin thin mortar shall be spread on the surface of the base course and shall be flattened according to the design requirement thickness.

4 Where using a surface layer of a vinyl ester resin mortar or an unsaturated polyester resin mortar, the same resin binder shall be used as cover.

5.5.3 The construction of the integral surface course of resin screed shall be in accordance with the following requirements:

1 Where there is no fiber reinforced plastic isolation layer on the base course, primer shall be evenly coated on the surface-treated base course; after curing, resin mortar is used to repair the unevenness of the base course. Then, primer should be applied again and evenly spread a layer of fine aggregate with a particle size of 0.7mm to 1.2mm. After the curing, carry out the construction of resin screed.

2 Before the resin screed is paved, a layer of resin binder shall be applied on the construction surface. The thickness shall be controlled during spreading. The spread resin screed shall be immediately compacted and smoothed.

3 The integral surface course of the resin screed should not be left with construction joints. Where construction joint is required, a miter shall be left. Where the construction is continued, the support shall be cleaned, and the resin binder shall be applied while paving.

4 The construction of the top coat shall be evenly applied. When the two-layer resin compound is applied, after the first layer of resin compound is cured, the second layer is applied.

5.5.4 The construction of the resin fine stone concrete integral surface course shall comply with not only the provisions of Article 5.5.2 of this code, but also the following requirements:

1 Vibrator shall be used in the construction of the resin fine stone concrete surface layer, and the stone concrete surface layer shall be tamped and smoothed.

2 Where using the division method, divide the partition on the base course and pour the resin fine stone concrete into the grid. After gelation, remove the divider and then grout caulking with resin screed or resin mortar. Where the thickness of the caulking exceeds 15mm, it should be carried out in several stages.

5.5.5 The construction of the resin self-leveling integral surface course shall be in accordance with the following requirements:

1 Where there is no fiber reinforced plastic isolation layer on the base course, the primer shall be evenly coated on the base course; repair the unevenness of the base course with resin mortar.

2 Apply the resin self-leveling material evenly to the surface of base course.

3 Where there is fiber reinforced plastic isolation layer or resin screed on the base course, the resin self-leveling layer construction may be directly performed.

4 Thickness of each construction: self-leveling of vinyl ester resin or solvent-based epoxy resin should not exceed 1mm, self-leveling of solvent-free epoxy resin should not exceed 3mm.

5.5.6 The construction of the integral surface course of the resin glass flake mortar shall be in accordance with the following requirements:

1 The primer shall be evenly applied on the base course, and the resin mortar shall be used to repair the unevenness of the base course.

2 Pave the resin glass flake mortar on the surface of the base course and apply it evenly with a

spatula in one direction. The thickness should not be larger than 1mm each time. The interval between layers should be 12 hours.

3 After the resin glass flake mortar is applied, it shall be rolled and compacted in one direction until smooth and uniform before initial setting.

4 During the construction process, the surface shall be kept clean. If there are runny marks, dripping or protrusions, it shall be flattened.

5 The end connection lined on the same layer shall not be connected directly, but the miter splicing method shall be adopted.

6 Where using vinyl ester resin or unsaturated polyester resin glass flake mortar surface layer, the same resin binder cover shall be used.

5.6 Curing and quality inspection

5.6.1 The curing period of resin type anticorrosion projects at normal temperature shall be in accordance with those specified in Table 5.6.1.

Table 5.6.1 Curing period of resin type anticorrosion projects at normal temperature

Resin type	Curing period (d)		
	Mortar, screed, fine stone concrete	Fiber reinforced plastic	Resin self-leveling, glass flake mortar
Epoxy resin	≥10	≥15	≥10
Vinyl ester resin	≥10	≥15	≥10
Unsaturated polyester resin	≥10	≥15	≥10
Furan resin	≥15	≥15	-
Phenolic resin	≥20	≥20	-

5.6.2 All kinds of surface layers of resin type anticorrosion projects shall be flat, uniform in color, firmly bonded with the base course, without defects such as delamination, peeling and incomplete curing.

6 Anticorrosive project of water soluble silicate type

6.1 General requirements

6.1.1 The water soluble silicate listed in this chapter includes sodium silicate and potassium silicate. Water soluble silicate type anticorrosion project includes the following contents:

- 1 Integral surface course of the potassium silicate screed trowelled .
- 2 Integral surface course, equipment foundation and structure of water soluble silicate concrete pouring.

6.1.2 The environment temperature of water soluble silicate anticorrosion project construction should be 15°C to 30°C, the relative humidity should not be larger than 80%; where the ambient temperature of construction for the sodium silicate material is lower than 10°C, or for the potassium silicate material is lower than 15°C, heating and insulation measures shall be taken; the temperature of the raw materials for the sodium silicate shall not be lower than 15°C, and for the potassium silicate shall not be lower than 20°C.

6.1.3 Water soluble silicate shall be protected from freezing. The frozen water soluble silicate shall be heated and mixed well before use.

6.1.4 Water soluble silicate anticorrosion projects shall be in accordance with the following requirements during construction and curing:

- 1 **Must not allow contact with water or water vapor.**
- 2 Shall prevent premature dehydration in the early stage.

6.2 Requirements for quality of raw materials and finished products

6.2.1 The quality of sodium silicate shall meet the requirements of the current national standard GB/T 4209 *Sodium Silicate for Industrial Use* and Table 6.2.1, and its appearance shall be a colorless or slightly colored transparent or translucent viscous liquid.

Table 6.2.1 Quality of sodium silicate

Items	Indexs	Items	Indexs
Density (20°C, g/cm ³)	1.38-1.43	Silica (%)	≥25.70
Sodium oxide (%)	≥10.20	Modulus	2.60-2.90

Note: The density of sodium silicate for construction (20°C, g/cm³): for mortar: 1.40-1.43; for screed: 1.40-1.42; for concrete: 1.38-1.42.

6.2.2 The quality of potassium silicate shall be in accordance with those specified in Table 6.2.2, and its appearance shall be white or grayish white viscous liquid.

Table 6.2.2 Quality of potassium silicate

Items	Indexs
Density (g/cm ³)	1.40-1.46
Modulus	2.60-2.90
Silica (%)	25.00-29.00
Potassium oxide (%)	>15%
Sodium oxide (%)	<1%

Note: The content of potassium oxide and sodium oxide should be tested according to the relevant requirements of the current national standard GB/T 176 *Methods for Chemical Analysis of Cement*.

6.2.3 Sodium silicate curing agent is sodium fluorosilicate, the purity shall not be less than 98%, the water content shall not be larger than 1%, and the fineness requirement that all particles shall pass through the square hole sieve with the pore diameter of 0.15mm. Where it is agglomerated by moisture, it shall be dried at a temperature not higher than 100°C and grinded and sieved before use.

6.2.4 The curing agent of potassium silicate shall be condensed aluminum phosphate, which should be incorporated into potassium silicate mortar, screed and concrete mixture.

6.2.5 The quality of powder, coarse and fine aggregates of sodium silicate materials shall be in accordance with the following requirements:

1 The acid resistance of the powder shall not be less than 95%, the water content shall not be larger than 0.5%, the fineness requirement that 0.15mm square hole sieve residue shall not be larger than 5%, and 0.075mm square hole sieve residue shall be 10% to 30%.

2 The acid resistance of fine aggregate shall not be less than 95%, the water content shall not be larger than 0.5%, and it shall not contain soil. Where the fine aggregate is made of natural sand, the mud content shall not be larger than 1%. Where the sodium silicate screed is made of fine aggregate, the particle size shall not be larger than 1.25mm. The particle size distribution of fine aggregate for sodium silicate concrete shall be in accordance with those specified in Table 6.2.5-1.

Table 6.2.5-1 Particle size distribution of fine aggregate

Square hole screen (mm)	Cumulative percent of screening residue (%)
4.75	0-10
1.18	20-55
0.30	70-95
0.15	95-100

3 The acid resistance of the coarse aggregate shall not be less than 95%, the acid pickling stability shall be qualified, the water content shall not be larger than 0.5%, the water absorption rate shall not be larger than 1.5%, and the soil shall not be contained. The maximum particle size of the coarse aggregate shall not be larger than 1/4 of the minimum size of the structure. The particle size distribution of the coarse aggregate shall be in accordance with those specified in Table 6.2.5-2.

Table 6.2.5-2 Particle size distribution of coarse aggregate

Square hole screen (mm)	Cumulative percent of screening residue (%)
Maximum particle size	0-5
1/2 maximum particle size	30-60
4.75	90-100

6.2.6 The quality of finished sodium silicate products shall be in accordance with those specified in Table 6.2.6.

Table 6.2.6 Quality of finished sodium silicate products

Items	Dense type			Ordinary type		
	Mortar	Screed	Concrete	Mortar	Screed	Concrete
Initial setting time (min)	≥45	≥45	≥45	≥45	≥45	≥45
Final setting time (h)	≤12	≤12	≤12	≤12	≤12	≤12

Table 6.2.6(continued)

Items	Dense type			Ordinary type		
	Mortar	Screed	Concrete	Mortar	Screed	Concrete
Compressive strength (MPa)	-	≥20.0	≥25.0	-	≥15.0	≥20.0
Tensile strength (MPa)	≥3.0	-	-	≥2.5	-	-
Bond strength with acid-resistant bricks (MPa)	≥1.2	-	-	≥1.0	-	-
Impermeability grade (MPa)	≥1.2	≥1.2	≥1.2	-	-	-
Water absorption rate (%)	-	-	-	≤15.0	≤15.0	≤15.0
Acid pickling stability	Qualified					

6.2.7 The quality of potassium silicate mortar, screed and concrete mixture shall be in accordance with the following requirements:

1 The water content of the potassium silicate mortar mixture shall not be larger than 0.5%, the fineness requirement for 0.45mm square hole screening residue shall not be larger than 5%, and 0.15mm square hole screening residue should be 30% to 50%.

2 The water content of the potassium silicate screed mixture shall not be larger than 0.5%, and the fineness should be in accordance with those specified Table 6.2.7-1.

Table 6.2.7-1 Fineness of potassium silicate screed mixture

Maximum particle size (mm)	Screening residue (%)	
	Maximum particle size sieve	0.15mm square hole sieve
1.18	0-5	60-65
2.36	0-5	63-68
4.75	0-5	67-72

3 The water content of the potassium silicate concrete mixture shall not be larger than 0.5%. The maximum particle size of the coarse aggregate shall not be larger than 1/4 of the minimum dimension of the structural section; where used as the overall floor covering, it shall not be larger than 1/3 of the thickness of the covering.

4 The quality of the finished product of potassium silicate shall be in accordance with those specified in Table 6.2.7-2.

Table 6.2.7-2 Quality of finished potassium silicate products

Items	Dense type			Ordinary type		
	Mortar	Screed	Concrete	Mortar	Screed	Concrete
Initial setting time (min)	≥45	-	-	≥45	-	-
Final setting time (h)	≤15	-	-	≤15	-	-
Compressive strength (MPa)	-	≥25.0	≥25.0	-	≥20.0	≥20.0
Tensile strength (MPa)	≥3.0	≥3.0	-	≥2.5	≥2.5	-
Bond strength with acid-resistant bricks (MPa)	≥1.2	≥1.2	-	≥1.2	≥1.2	-
Impermeability grade (MPa)	≥1.2	≥1.2	≥1.2	-	-	-

Table 6.2.7-2(continued)

Items		Dense type			Ordinary type		
		Mortar	Screed	Concrete	Mortar	Screed	Concrete
Water absorption rate (%)		-			≤10.0		-
Acid pickling stability		Qualified			Qualified		
Heat-resistant limit temperature (°C)	100-300	-			Qualified		
	301-900	-			Qualified		

Notes: 1 The tensile strength and bond strength of the screed in the table are only used for the potassium silicate screed with a maximum particle size of 1.18mm.

2 The heat-resistant limit temperature in the table is only used for anticorrosion engineering with heat resistance requirements.

6.2.8 The test methods for the quality of water soluble silicate raw materials and finished products shall meet the relevant requirements of Appendix A of this code.

6.3 Preparation of materials

6.3.1 The construction mix ratio of sodium silicate materials may be selected in accordance with Table B.0.5 of Appendix B of this code, and shall be in accordance with the following requirements:

- 1 Sodium silicate mortar consistency shall be 30mm to 36mm.
- 2 The water soluble silicate screed cone sinking degree should be 30mm to 40mm where used for paving blocks; 30mm to 35mm where used for trowelled plane; 40mm to 60mm where used for trowelled facade.
- 3 The slump of sodium silicate concrete shall not be larger than 25mm where mechanically tamped; it shall not be larger than 30mm where artificially tamped.
- 4 The amount of sodium fluorosilicate shall be calculated according to the following formula:

$$G = 1.5 \times \frac{N_1}{N_2} \times 100 \quad (6.3.1)$$

Where, G —the percentage of sodium fluorosilicate used in the amount of sodium silicate (%);

N_1 —the percentage of sodium oxide contained in sodium silicate (%);

N_2 —purity (%) of sodium fluorosilicate.

6.3.2 The preparation of sodium silicate mortar and sodium silicate screed shall be in accordance with the following requirements:

- 1 Mechanical mixture: first add powder, fine aggregate and curing agent into the mixer, dry mix evenly, then add sodium silicate to wet mix, wet mixing time shall not be less than 2min; when preparing sodium silicate mortar, do not add fine aggregate.
- 2 Manual mixture: first mix the powder and curing agent, after sieving twice, add fine aggregate and mix well, then gradually add sodium silicate to wet mix until uniform; when preparing sodium silicate mortar, fine aggregate should not be added.
- 3 When preparing dense sodium silicate mortar or screed, sodium silicate together with admixture furfuryl alcohol monomer may be added, and wet mix until uniform.

6.3.3 Preparation of sodium silicate concrete shall be in accordance with the following requirements:

- 1 Mechanical mixture: The forced concrete mixer shall be used, put fine aggregate, mixed powder

and curing agent and the coarse aggregate into the mixer and mix well, then add the water soluble silicate and mix until it is even.

2 Manual mixture: The powder and curing agent shall be mixed first. After sieving, add fine aggregate and coarse aggregate and mix well. Finally, add water soluble silicate. Wet mixing should not be less than 3 times until uniform.

3 When preparing dense sodium silicate concrete, add sodium silicate together with admixture furfuryl alcohol monomer, and wet mix until uniform.

6.3.4 The construction mix ratio of potassium silicate materials may be selected in accordance with Table B.0.6 of Appendix B of this code and shall be in accordance with the following requirements:

1 Potassium silicate mortar should have a consistency of 30mm to 35mm.

2 The cone sinking degree of potassium silicate screed should be 30mm to 40mm where used for paving blocks; 30mm to 35mm where used for trowelled plane; 40mm to 45mm where used for trowelled facade.

3 Potassium silicate concrete slump should be 25mm to 30mm.

6.3.5 When preparing potassium silicate material, the potassium silicate mixture shall be dry mixed evenly, and then add potassium silicate to mix until uniform.

6.3.6 No material shall be added to the mixed water soluble silicate mortar, water soluble silicate screed or water soluble silicate concrete, and it shall be used up before initial setting.

6.4 Construction for integral surface course of potassium silicate screed

6.4.1 Construction for integral surface course of potassium silicate screed in dense type should be in grids or sections.

6.4.2 The horizontal integral surface course of the potassium silicate screed should be trowelled at one time.

6.4.3 The vertical integral surface course of the potassium silicate screed shall be trowelled by layer.

6.4.4 It should not go back and forth when trowelling the potassium silicate screed. The plane shall be flatted in the same direction; the facade shall be smoothed from bottom to top. After each layer is trowelled, when the surface is not sticky, it may be gently tapped. There shall not be wrinkles and cracks.

6.5 Construction of water soluble silicate concrete

6.5.1 The formwork shall be supported firmly, the joints shall be tight, the surface shall be flat, and the release agent shall be applied.

6.5.2 The iron parts in the water soluble silicate concrete shall be rust-removed and shall be coated with anticorrosion coating.

6.5.3 The pouring of water soluble silicate concrete shall be in accordance with the following requirements:

1 Water soluble silicate concrete shall be vibrated to the slurry before the initial setting, no bubble discharge.

2 When using a plug-in vibrator, the thickness of each poured layer should not be larger than 200mm, the spacing of the insertion point shall not be larger than 1.5 times the radius of action, the vibrator shall be pulled out slowly, and no holes shall be left. When using a flat vibrator and manual tamping in real time, the thickness of each poured layer should not be larger than 100mm. When the

thickness of the poured layer is larger than the above, it shall be continuously poured in layers. When it is poured in layers, the upper layer shall be completed before the next layer is initially set. The pouring of the acid-resistant storage tank shall be completed at one time, and no joints shall be left.

3 After the top layer is tamped, the surface shall be compacted and smoothed before initial setting.

4 When pouring ground, the flatness and slope shall be controlled at any time; the flatness shall be checked with a 2m ruler, and the allowable clearance shall not be larger than 4mm; the slope shall meet the design requirements.

5 The water soluble silicate concrete overall ground shall be constructed in grids. The spacing of the division joints should not be larger than 3m, and the width of the joints should be 15mm to 30mm. After the curing, the same type of screed shall be used for secondary construction of the construction joints.

6.5.4 Where it is necessary to reserve construction joint, the joint end shall be roughed and cleaned before continuing pouring, and a layer of water soluble silicate is applied.

After the surface is dry, pouring is continued. Ground construction joints shall be left in a miter.

6.5.5 The facade demoulding time of water soluble silicate concrete shall be in accordance with those specified in Table 6.5.5.

Table 6.5.5 Facade demoulding time of water soluble silicate concrete

Material name		Demoulding time (d) not less than			
		10℃-15℃	16℃-20℃	21℃-30℃	31℃-35℃
Sodium silicate concrete		5	3	2	1
Potassium silicate concrete	Ordinary type	-	5	4	3
	Dense type	-	7	6	5

6.5.6 The removal of the load-bearing mold shall be carried out only where the compressive strength of the water soluble silicate concrete cured under the same conditions reaches 70% of the design strength. After the mold is removed, there shall be no defects such as honeycomb surface and cracks. Where there are a large number of defects mentioned above, they shall be reworked; where there are a few defects, the concrete shall be cut off and cleaned. After a little dry, repair with the same type of water soluble silicate mortar or water soluble silicate screed.

6.6 Curing and quality inspection

6.6.1 The curing period of water soluble silicate materials shall be in accordance with those specified in Table 6.6.1.

Table 6.6.1 Curing period of water soluble silicate materials

Material name		Curing period (d) not less than			
		10℃-15℃	16℃-20℃	21℃-30℃	31℃-35℃
Sodium silicate material		12	9	6	3
Potassium silicate material	Ordinary type	-	14	8	4
	Dense type	-	28	15	8

6.6.2 After curing of the anticorrosion engineering of water soluble silicate materials, the surface

acidification treatment shall be carried out with a concentration of 30% to 40% sulfuric acid, and acidification treatment until no white crystal salt is precipitated. The number of acidification treatments should not be less than 4 times. At each interval; sodium silicate material shall not be less than 8 hours; potassium silicate material shall not be less than 4 hours. The white precipitate on the surface shall be removed before each treatment.

6.6.3 The surface layer of water soluble silicate material shall be flat, smooth and free of cracks and wrinkles. The surface layer shall be firmly bonded to the base course without defects such as delamination and peeling.

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7 Anticorrosive project of polymer cement screed

7.1 General requirements

7.1.1 Polymer cement screed anticorrosion project shall include the following contents:

- 1 Integral surface course of polymer cement screed.
- 2 Leveling layer of polymer cement screed and mortar.
- 3 Plastering layer of polymer cement paste.

7.1.2 The environment temperature of polymer cement screed construction should be 10°C to 35°C. Where the construction environment temperature is lower than 5°C, heating and insulation measures shall be taken. Construction should not be carried out in strong winds, rain or direct sunlight high temperature environments.

7.1.3 Storage of polymer cement screed emulsion shall be protected from direct sunlight during the summer and frozen during the winter.

7.1.4 Polymer cement screed shall not be applied to concrete or cement screed base course with a curing period of not less than 3 days.

7.1.5 When the polymer cement screed is applied on the concrete or cement screed base course, the base course shall be washed first with clean water and kept in a damp state. There shall be no water accumulation in the base course during construction.

7.1.6 When the polymer cement screed is applied on the metal base course, the surface of the base course shall meet the design requirements, and the uneven portion shall be leveled with polymer cement screed or polymer mortar before construction.

7.1.7 Before construction, the construction shall be carried out according to the on-site construction environmental conditions, etc., after determining the appropriate construction mix ratio and construction operation method through tests.

7.1.8 The machinery and tools used for construction shall be cleaned in time.

7.2 Requirements for quality of raw material and finished products

7.2.1 The quality of the polymer emulsion shall be in accordance with those specified in Table 7.2.1.

Table 7.2.1 Quality of polymer emulsion

Items	Cationic neoprene latex	Polyacrylate emulsion	Epoxy emulsion
Appearance	Milky white uniform emulsion		
Viscosity(coat 4 cups, 25°C, s)	12.0-15.5	11.5-12.5	14.0-18.0
Total solid content(%)	47-52	39-41	48-52
Density(g/cm ³)	≥1.080	≥1.056	≥1.050
Storage stability	5°C-40°C no obvious precipitation for 3 months		

7.2.2 When preparing polymer cement screed, cationic neoprene latex, polyacrylate emulsion or epoxy emulsion with additives shall be selected.

7.2.3 The quality of the cement used to prepare the polymer cement screed shall be in accordance with the following requirements:

1 The cement in the neoprene latex cement screed shall be selected from ordinary portland cement labeled P.O 32.5 or portland cement labeled P.I 42.5 and P. II 42.5.

2 Cement in polyacrylic acid emulsion cement screed shall be selected from ordinary portland cement labeled P.O 42.5 or portland cement labeled P.I 42.5 and P. II 42.5.

3 Cement in epoxy emulsion cement screed shall be selected from ordinary portland cement labeled P.O 42.5 or sulphoaluminate cement labeled 42.5.

7.2.4 The fine aggregate of polymer cement screed shall be quartz sand or river sand. The sand shall meet the relevant 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*. The particle size distribution of fine aggregates shall be in accordance with those specified in Table 7.2.4.

Table 7.2.4 Particle size distribution of fine aggregate

Square hole screen(mm)	Cumulative percent of screening residue(%)
4.75	0
2.36	0-25
1.18	10-50
0.60	41-70
0.30	70-92
0.15	90-100

Note: The maximum particle size of fine aggregate shall not exceed 1/3 of the thickness of the coating or the width of the butt joint.

7.2.5 The quality of finished products of cement screed shall be in accordance with those specified in Table 7.2.5.

Table 7.2.5 Quality of finished products of polymer cement screed

Items	Cationic neoprene latex cement screed	Polyacrylate emulsion cement screed	Epoxy emulsion cement screed
Compressive strength(MPa)	≥30.0	≥30.0	≥30.0
Flexural strength(MPa)	≥4.5	≥4.5	≥4.5
Bond strength with cement screed(MPa)	≥1.2	≥1.2	≥1.8
Impermeability grade(MPa)	≥1.5	≥1.5	≥1.5
Water absorption rate(%)	≤4.0	≤5.5	≤4.0
Initial setting time(min)		>45	
Final setting time(h)		<12	

7.2.6 The test methods for the quality of raw materials and finished products of polymer cement screed shall meet the relevant requirements of Appendix A of this code.

7.3 Preparation of screed

7.3.1 The mix ratio of polymer cement screed should be selected according to Table B.0.7 of this code.

7.3.2 When preparing polymer cement screed, the cement and aggregate shall be mixed evenly, then poured the polymer and stirred evenly.

7.3.3 The mixed polymer screed shall be used up before initial setting. Where there is gel or agglomeration, it shall not be used.

7.4 Construction for integral surface course

7.4.1 Before applying the polymer cement screed, the polymer cement paste shall be applied once evenly, and when it is dry to touch, the polymer cement screed is applied.

7.4.2 Polymer cement screed shall be divided into strips or blocks, each area should not be larger than 12m^2 , the strip width should not be larger than 1.5m, and the interval between the joints and the staggered construction shall not be less than 24 hours. The seam wood strips or seam PVC strips on the slope surface shall be fixed on the substrate in advance. After the screed is applied, the seam strips may be taken out. After 24 hours, the polymer slurry is applied to the reserved seams, and then the polymer cement screed is used to make up the seams. When construction in layers, the positions of the seams shall be staggered from each other.

7.4.3 Polymer cement screed should be paved and trowelled at the same time. It should not be repeatedly trowelled and should be smeared at once. Where there are air bubbles, it shall be punctured and compacted, and the surface shall be dense.

7.4.4 When constructing on the facade or the inner surface of the top, when the thickness of the trowelled surface is larger than 10mm, it shall be constructed in layers the thickness of the trowelled surface should be 5mm to 10mm. When the previous layer is dry till it is not sticky, proceed to the next layer of construction.

7.4.5 After polymer cement screed construction for 12 hours to 24 hours, a layer of polymer cement slurry should be applied on the surface layer.

7.5 Curing and quality inspection

7.5.1 When it is dry to touch, it may be cured by mist spray or covering plastic film which shall be tightly sealed around. Wet curing shall be carried out for 7 days, and then it may be used after 21 days of natural maintenance.

7.5.2 The integral surface course of the polymer cement screed shall be firmly bonded to the base course, the surface shall be flat, and there are no defects such as cracks and hollowing.

7.5.3 For metal base course, thickness gauges shall be used to determine the thickness of the polymer cement screed surface layer. For cement screed and concrete base course, destructive cutting is performed to measure thickness. The parts that are not qualified and damaged in the inspection shall be completely repaired and re-inspected until they are qualified.

7.5.4 The allowable gap of the integral surface course flatness shall not be larger than 4mm.

7.5.5 The slope of the integral surface course shall meet the requirements of Article 3.2.3 of this code.

8 Anticorrosive project of block material

8.1 General requirements

8.1.1 The blocks listed in this chapter include acid-resistant bricks, acid-resistant and heat-resistant bricks, anticorrosion carbon bricks, natural stone and so on.

8.1.2 Paving materials shall include resin mortar or screed, water soluble silicate mortar or screed, polymer cement screed and so on.

8.1.3 The isolation layer material shall include resin, coating, fiber reinforced plastic, polyurethane waterproof coating, high polymer modified asphalt coil, and polymer coil.

8.1.4 Before the block is paved, it shall be selected, cleaned and dried, and it shall be used after trial paving. Where polymer cement screed is used to pave the surface layer of acid-resistant bricks, etc., the block shall be immersed in water for 2 hours, and dry the water traces before paving.

8.1.5 The construction of the block shall be carried out after the construction of the bottom isolation layer or the isolation layer on the surface of the base course. The surface of the base course shall be cleaned before construction.

8.1.6 The paving sequence shall be from low to high, first pit, trench, then ground, skirting board or wall skirt. The facade block at the corner of the inner angle shall be pressed against the plane block. The plane block at the outer corner shall cover the facade block. The block paved shall not have a cross joint, and the multi-layer block shall not have overlapping seam.

8.1.7 The continuous paving height of the facade block shall be compatible with the curing time of the mortar, and the masonry shall not be deformed.

8.1.8 When paving, the excess mortar or screed in the joint shall be scraped off at any time.

8.1.9 In the process of construction, where the paving material has solidification and agglomeration, it shall not be used continuously.

8.1.10 Resin coating, fiber reinforced plastic, and polyurethane waterproof coating isolation layer shall be evenly spread with a fine aggregate of 0.7mm to 1.2mm at the end of the final process.

8.1.11 The facade isolation layer of the anticorrosion engineering shall not be made of flexible materials or coil materials.

8.2 Requirements for quality of raw material

8.2.1 The quality index of the block shall meet the design requirements; where there is no design requirement, shall be in accordance with the following requirements:

1 The quality index of acid-resistant bricks and acid-resistant and heat-resistant bricks shall meet the requirement of the current national standard GB/T 8488 *Acid Resisting Bricks and Tiles* and JC/T 424 *Acid and Heat Resisting Bricks*.

2 The quality index of anticorrosion carbon bricks shall meet the requirements of the current national standard GB 50726 *Code for Anticorrosive Engineering Construction of Industrial Equipment and Pipeline*.

3 Natural stone shall be evenly organized, dense structure and no weathering. There shall be no

cracks or non-corrosion-resistant interlayers, must be no missing edges or missing corners, and shall be in accordance with those specified in Table 8.2.1.

Table 8.2.1 Quality of natural stone

Items		Natural stone type		
		Granite	Quartz	Limestone
Acid pickling stability(%)		No significant change in 72h	No significant change in 72h	-
Compressive strength(MPa)		≥100.0	≥100.0	≥60.0
Flexural strength(MPa)		8.0	8.0	-
Surface flatness	Mechanical cutting	±2.0mm		
	Manual processing or mechanical planing	±3.0mm		

8.2.2 The quality and preparation of the resin raw materials and finished products shall meet the requirements of Sections 5.2 and 5.3 of this code. The phenolic resin shall not be used to prepare resin screed.

8.2.3 The quality and preparation of water soluble silicate raw materials and finished products shall meet the requirements of Sections 6.2 and 6.3 of this code.

8.2.4 The quality and preparation of polymer cement screed and finished products shall meet the requirements of Sections 7.2 and 7.3 of this code.

8.2.5 The selection of polyurethane waterproof coatings shall meet the requirements of the current national standard GB/T 19250 *Polyurethane Waterproof Coating*. Fiber reinforcement materials shall meet the requirements of the provisions of Article 5.2.4 of this code.

8.2.6 High-polymer modified asphalt coil raw materials shall meet the relevant requirements of the current national standard GB 18242 *Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials* and GB 18243 *Atactic Polypropylene (APP) Modified Bituminous Sheet Materials*.

8.2.7 The raw material of the polymer coil isolation layer shall meet the relevant requirements of the current national standard GB 18173.1 *Polymer Water-Proof Materials—Part 1: Water-Proof Sheet*.

8.3 Construction of isolation layer

8.3.1 The construction of resin and coating isolation layer shall be in accordance with the following requirements:

- 1 Resin and coating may be sprayed, rolled, brushed and scraped.
- 2 Surfaces shall not have defects such as leakage, drumming, cracking, etc.
- 3 Intermittent method should be adopted for the construction of resin and coating isolation layer.

8.3.2 The construction of fiber reinforced plastic isolation layer shall meet the requirements of Section 5.4 of this code.

8.3.3 The construction of the polyurethane waterproof coating isolation layer shall be in accordance with the following requirements:

1 Polyurethane waterproof isolation layer is divided into primer and topcoat, the total thickness should be 1.5mm, and the fiber reinforcement material shall not be less than one layer.

2 The surface of the treated base course coated with a primer, the primer should be applied by roller or brush.

3 The topcoat should be applied by scraping. The first layer of topcoat shall be applied after the primer has cured.

4 There shall be no defects such as leakage, bubbling, cracking, etc. on the surface of each layer of coating.

5 The polyurethane waterproof coating isolation layer shall be fully cured before subsequent construction.

8.3.4 The construction of high-polymer modified asphalt coil isolation layer shall be in accordance with the following requirements:

1 The isolation layer should be made of non-film type high-polymer modified asphalt coil with surface aggregate.

2 The surface of the base course shall be coated with a base course treatment agent. The base course treatment agent shall be compatible with the material of the coated coil. The coating shall be uniform, and the coil shall be laid after drying.

3 The number and thickness of the coil shall meet the design requirements. The seams shall be staggered when applying multiple layers. The spray gun should be 300mm away from the heated surface. The lap joint shall be fully viscous and the lap width shall not be less than 80mm. A layer of coiled material shall be affixed at the inner and outer corners, and the overlap width on both sides shall not be less than 100mm.

4 When heating the coil with flame heater, it shall be even and shall not be burnt through the coil; after the surface of the coil is hot-melted, the coil shall be rolled and laid immediately, the air shall be exhausted, and use the roller pressure to firmly bonded, and there shall be no hollowing.

5 The coil joint is heated with a spray gun and shall be firmly bonded. The seam part of the coil shall overflow the hot-melt modified asphalt glue; the end is tightly packed with the matching sealing paste.

6 The paved coil shall be flat and straight, and the overlap size shall be accurate and shall not be twisted or wrinkled.

8.3.5 The construction of the polymer coil isolation layer shall be in accordance with the following requirements:

1 The surface of the base course shall be painted with a base course treatment agent. The coating shall be uniform and shall be dried for 4 hours.

2 When applying the base course adhesive on the surface of the base course and the surface of the coil, it shall be brushed evenly and shall not be repeated. The reserved lap joint portion of the coil material should be 100mm.

3 When laying, the coil should not be pulled too tightly. It shall be laid on the surface of the base course naturally, and the air on the surface of the coil and the base course shall be excluded.

4 For the 100mm lap joint reserved for the coil material, the special adhesive shall be evenly applied, and the roller pressure treatment shall be carried out after the adhesive is dry to touch.

8.4 Construction of block material

8.4.1 Construction method of the block material shall include squeezing method, sitting method and filling method.

8.4.2 Acid-resistant bricks, acid-resistant and heat-resistant bricks, anticorrosion carbon bricks and

blocks with thickness not larger than 30mm should be constructed by squeezing method and shall be in accordance with the following requirements:

- 1 Scrape a layer of thin mortar on the lining of the block and on the surface of the paved base course.
- 2 Apply the block firmly to the surface of the base course. The mortar shall be full and shall be free of air bubbles.
- 3 Scrape off excess mortar from the butt joint.

8.4.3 Where the natural stone is constructed by the sitting method, it shall be in accordance with the following requirements:

1 Firstly apply a layer of thin resin binder to the paving surface of the block, and lay a layer of bonded screed on the paved base course. The thickness of the screed shall be slightly higher than the thickness of the specified joint layer.

2 Place the block flat on the bonded screed, and evenly tap the surface of the block with a rubber hammer or a wooden hammer until the surface shall be flat and until the screed liquid shall be squeezed out.

8.4.4 Where the facade of natural stone is constructed by the filling method, it shall be in accordance with the following requirements:

- 1 The butt joint shall be dense and the bond shall be firm.
- 2 After the mortar is cured, the thin mortar is poured from the top. Where the facade is a single-layer block, the grout may be filled once, and the multi-layer block has a one-time grouting depth of 2/3 of the height of each block.

8.4.5 During construction, the thickness of the bonding layer of blocks and the width of the butt joint shall be in accordance with those specified in Table 8.4.5.

Table 8.4.5 Bonding layer thickness and butt joint width

Block type		Bonding layer thickness(mm)						Butt joint width (mm)		Butt joint depth (mm)
		Resin		Water soluble silicate		Polymer cement		Squeeze	Caulking	
		Mortar	Screed	Mortar	Screed	Mortar	Screed			
Acid-resistant brick, acid-resistant and heat-resistant brick, anticorrosion carbon brick		4-6	-	4-6	-	4-6	-	2-5	-	Full
Natural stone	Thickness ≤ 30mm	4-8	-	4-8	-	4-8	-	3-6	8-12	Full
	Thickness > 30mm	-	8-15	-	8-15	8-15	8-15	-	8-15	Full

8.4.6 The caulking of blocks shall be in accordance with the following requirements:

- 1 When use resin mortar to pave blocks, it shall be carried out after the initial curing of the mortar and screed for paving blocks.
- 2 When use water soluble silicate mortar to pave blocks, resin mortar shall be used to fill the seam after the bonding layer of mortar or screed is fully cured.

3 Butt joint shall be clean and dry.

4 When caulking, it should be carried out in several stages. The butt joint shall be dense and the surface shall be flat and smooth.

8.5 Curing and quality inspection

8.5.1 The curing period of resin materials shall meet the requirements of Article 5.6.1 of this code.

8.5.2 The curing period of water soluble silicate materials shall meet the requirements of Article 6.6.1 of this code.

8.5.3 After the construction of the polymer cement screed paving block, the wet curing need to be carried out for 7 days, then natural curing for 21 days before putting into use.

8.5.4 The allowable clearance of the flatness of the block surface shall not be larger than the following values:

1 The surface layer of acid-resistant brick, acid-resistant and heat-resistant brick and anticorrosion carbon brick: 4.0mm.

The surface layer of mechanically cut natural stone (thickness not larger than 30mm): 4.0mm.

The surface layer of manually cut or artificially processed natural stone (thickness larger than 30mm): 6.0mm.

2 The height difference between adjacent blocks of the block surface layer shall not be larger than the following values:

The surface layer of acid-resistant brick, acid-resistant and heat-resistant brick and anticorrosion carbon brick: 1.5mm.

The surface layer of mechanically cut natural stone (thickness not larger than 30mm): 2.0mm.

The surface layer of artificially processed or mechanically planed natural stone (thickness larger than 30mm): 3.0mm.

8.5.5 The slope shall meet the requirements of Article 3.2.3 of this code. When the splashing water test is carried out, the water shall be smoothly eliminated.

9 Anticorrosive project of sprayed polyurea

9.1 General requirements

9.1.1 Sprayed polyurea anticorrosion project shall be constructed with special two-component high-pressure spraying equipment.

9.1.2 Before construction, test spray acceptance shall be carried out in conjunction with the construction process.

9.1.3 The construction of sprayed polyurea shall not be cross-worked with other types of work.

9.1.4 The temperature of the construction environment should be larger than 3°C, and the relative humidity should be less than 85%. Construction should not be carried out under wind, fog, snow or conditions with wind speeds larger than 5m/s.

9.1.5 Construction personnel shall be trained in the application of sprayed polyurea construction technology and qualified for employment.

9.2 Quality requirements for raw material and coating layer

9.2.1 The material technical indicators of the sprayed polyurea anticorrosion project shall meet the relevant requirements of the current professional standard HG/T 3831 *Sprayed Polyurea for Materials Protection*.

9.2.2 The auxiliary materials used in sprayed polyurea anticorrosion project shall meet the relevant requirements of the current professional standard HG/T 20273 *Technical Code for Coating Engineering of Spraying Polyurea Protection Materials*.

9.3 Preparation of polyurea

9.3.1 Sprayed polyurea two-component materials shall be mixed with construction equipment with a volume ratio of 1:1.

9.3.2 Two-component materials shall be continuously delivered by a extraction pump.

9.3.3 The temperature of the raw material shall be 15°C to 40°C.

9.4 Construction

9.4.1 Concrete base course treatment shall be in accordance with not only the provisions of Section 4.2 of this code, but also the following requirements:

1 The treatment of concrete structure expansion joints shall meet the relevant requirements of the current professional standard JGJ/T 200 *Technical Specification for Sprayed Polyurea Waterproofing*.

2 The radius of the arc of the inner and outer corner of the concrete base course shall be 10mm to 20mm.

9.4.2 The base course treatment of steel structural parts shall meet the requirements of Section 4.3 of this code.

9.4.3 Primer construction shall be in accordance with the following requirements:

1 The construction method should be roller, brush and spray.

- 2 The coating shall be continuous and uniform and shall not be missed.
- 3 The interval between primer and sprayed polyurea coating shall be in accordance with those specified in Table 9.4.3-1.

Table 9.4.3-1 Interval between primer and sprayed polyurea coating

Primer type	Temperature(°C)	Time(h)
Polyurethane primer	>30	1-3
	15-30	1-6
	<15	6-24
Epoxy primer	>15	4-6
	8-15	6-10
	<8	24-48

- 4 Primer over the interval shall be treated before sprayed polyurea coating.
- 5 Adhesion between primer and base course shall be in accordance with those specified in Table 9.4.3-2.

Table 9.4.3-2 Adhesion between primer and base course

Items	Indexes	
	Epoxy primer	Polyurethane primer
Bonding strength between primer and concrete base(MPa)	≥2.0	≥2.0
Bond strength between the primer and the base of the steel structure(MPa)	≥4.5	≥3.5

9.4.4 Polyurea spray coating and repair shall meet the relevant requirements of the current professional standard HG/T 20273 *Technical Code for Coating Engineering of Spraying Polyurea Protection Materials*.

9.5 Curing and quality inspection

9.5.1 The curing of polyurea coating shall meet the relevant requirements of the current professional standard HG/T 3831 *Sprayed Polyurea for Materials Protection*, and can be used after curing for 7 days under the ambient temperature of 23°C.

9.5.2 The quality inspection of polyurea coatings shall be in accordance with the following requirements:

- 1 The polyurea coating shall be flat and the color shall be uniform.
- 2 The polyurea coating shall be firmly bonded to the base and shall have no defects such as peeling, blistering or cracking.
- 3 Polyurea coating and base shall be free of penetrating pinholes and other defects.
- 4 The thickness of the coating shall meet the design requirements.

10 Anticorrosive project of coating type

10.1 General requirements

10.1.1 The anticorrosion coatings listed in this chapter shall include the following varieties:

1 Epoxy coating, polyurethane coating, acrylic resin coating, high chlorinated polyethylene coating, chlorinated rubber coating, chlorosulfonated polyethylene coating, polyvinyl chloride YINGDAN coating, alkyd resin coating, fluorine coating, organic silicone resin high temperature coating, vinyl ester resin coating.

2 Zinc-rich coating.

3 Resin glass flake coating, epoxy self-leveling coating.

10.1.2 The basic technical indicators of anticorrosion coatings shall meet the requirements of the relevant national standards.

10.1.3 The coating supplier shall provide coating requirements and coating application guidelines in accordance with current national standards. Where there is no current national standard, it shall meet the requirements of this code.

10.1.4 The relative humidity of the construction environment should be less than 85%, and the temperature of the surface of the coated steel structure shall be 3°C larger than the dew point temperature.

10.1.5 The selection, layer number and thickness of anticorrosion coatings shall meet the design requirements of coatings.

10.1.6 The derusting grade of steel base course shall meet the relevant requirements of the current national standard GB 50046 *Code for Anticorrosion Design of Industrial Constructions*.

10.1.7 The parts of the base surface where welds, corners, and inside of the holes are difficult to be constructed shall be treated by pre-coating.

10.1.8 On the concrete or wood base course, the diluted epoxy resin and the matching diluted primer shall be used for the bottom sealing treatment, and then the corrosion-resistant resin is used to prepare the mortar to repair the unevenness. After the repaired area is dry, it shall be flatted, cleaned, and then the primer is applied.

10.1.9 Shall not mix the coating with powder to prepare mortar. Shall not use the resin to prepare coating on site.

10.1.10 Outdoor construction should not be carried out under strong wind, rain, fog, snow or strong sunlight.

10.1.11 **Mandatory ventilation must be used when working in confined or limited spaces.**

10.1.12 **During the transportation, storage, construction and curing of anticorrosion coatings and thinners, open flame must not be used, and shall be protected from dust and sun exposure, and shall not be in contact with chemical media such as acid or alkali.**

10.1.13 Coating may be applied by brush, roller and spray. The thickness of the coating shall be uniform and there shall not be missed or mistakenly applied.

10.1.14 Construction tools shall be kept dry and clean.

10.2 Coating preparation and construction

10.2.1 The preparation and construction of epoxy resin coatings shall be in accordance with the following requirements:

- 1 Epoxy coatings shall include one-component epoxy ester primers and two-component epoxy coatings.
- 2 The two components shall be prepared according to the mass ratio and mixed evenly. The prepared coating should be used after ripening.
- 3 The coating of each layer of coating shall be carried out after the coating of the previous layer is dried.

10.2.2 Polyurethane coatings shall include modified polyurethane coatings. The preparation and construction shall be in accordance with the following requirements:

- 1 Polyurethane coating shall be divided into one-component and two-component. When two-component is used, it shall be prepared according to the mass ratio and shall be mixed evenly.
- 2 Each coating shall be carried out after the previous layer of coating is dried. The interval between constructions should not exceed 48 hours. For the coating that has been cured for a long time, sandpaper shall be used and then the next coating is applied.
- 3 The construction environment temperature of the coating shall not be lower than 5°C.

10.2.3 The preparation and construction of acrylic resin coating shall be in accordance with the following requirements:

- 1 Acrylic resin coating shall include one-component acrylic resin coating, acrylic resin modified chlorinated rubber coating and acrylic resin modified polyurethane two-component coating.
- 2 When using acrylic resin coating for construction, epoxy resin coating should be used as the primer.
- 3 Acrylic resin modified polyurethane two-component coating shall be prepared according to the specified mass ratio, and shall be mixed evenly.
- 4 Each coating shall be carried out after the previous layer of coating is dry. The construction interval shall be larger than 3 hours, and should not exceed 48 hours.
- 5 The ambient temperature of the coating shall be larger than 5°C.

10.2.4 The preparation and construction of high chlorinated polyethylene coating shall be in accordance with the following requirements:

- 1 High chlorinated polyethylene coating shall be one-component.
- 2 Each application may be carried out after the previous layer of coating is dry.
- 3 The construction environment temperature shall be larger than 0°C.

10.2.5 The preparation and construction of chlorinated rubber coatings shall be in accordance with the following requirements:

- 1 Chlorinated rubber coating is one-component, which may be divided into normal type and thick film type. The dry film thickness of the thick film coating shall not be less than 70μm per layer.
- 2 Each coating shall be carried out after the previous layer of coating is dry. The interval between coatings shall be in accordance with those specified in Table 10.2.5.

Table 10.2.5 Interval time of coating

Temperature(°C)	Interval time(h)
-10-0	18
1-14	12
Above 15	8

3 The construction environment temperature should be -10°C to 30°C .

10.2.6 The preparation and construction of chlorosulfonated polyethylene coating shall be in accordance with the following requirements:

1 Chlorosulfonated polyethylene coating is divided into one-component and two-component, and the two components shall be prepared according to the mass ratio and shall be mixed evenly.

2 Each application shall be carried out after the previous layer of coating has dried.

10.2.7 The preparation and construction of polyvinyl chloride YINGDAN coating shall be in accordance with the following requirements:

1 Polyvinyl chloride YINGDAN coating is two-component, two components shall be prepared according to the mass ratio, and shall be mixed evenly.

2 Each application shall be carried out after the previous layer of the coating is dry.

10.2.8 The preparation and construction of alkyd resin coating shall be in accordance with the following requirements:

1 Alkyd resin acid-resistant coating is one-component.

2 Each coating shall be carried out after the previous layer of coating is dry. The interval between coatings shall be in accordance with those specified in Table 10.2.8.

Table 10.2.8 Interval time of coating

Temperature(°C)	Interval time(h)
0-14	≥ 10
15-30	≥ 6
> 30	≥ 4

3 The construction environment temperature of the coating shall not be lower than 0°C .

10.2.9 The preparation and construction of fluorine coating shall be in accordance with the following requirements:

1 Fluorine coating is two-component, shall be prepared according to the mass ratio, and shall be mixed evenly.

2 Coating shall include fluororesin coating and fluoroelastomer coating.

3 Coating shall be used as a set of primer, intermediate coating and topcoat.

4 The coating should be applied by spraying method.

5 The construction environment temperature should be 5°C to 30°C .

10.2.10 The preparation and construction of silicone temperature-resistant coating shall be in accordance with the following requirements:

1 The primer layer shall be selected with matching primer.

2 Silicone temperature-resistant coating is two-component, shall be prepared according to the mass ratio, and shall be mixed evenly.

- 3 After the primer is cured for 24 hours, the top coating shall be applied after the surface is dry.
- 4 The construction environment temperature should not be lower than 5°C.

10.2.11 The preparation and construction of vinyl ester resin coating shall be in accordance with the following requirements:

- 1 The construction environment temperature should be 5°C to 30°C.
- 2 It may be applied by roller coating or brushing process.
- 3 Prepare according to the proportion, firstly add the accelerator and stir evenly, then add the initiator in proportion and stir evenly.
- 4 Before each coating, it shall be done after the previous layer of coating is dry.
- 5 After the coating is prepared, it should be used within 30 minutes.

10.2.12 Zinc-rich coating shall include organic zinc-rich coating, inorganic zinc-rich coating and waterborne inorganic zinc-rich coating. Its preparation and construction shall be in accordance with the following requirements:

- 1 Zinc-rich coating should be sprayed.
- 2 After construction, it shall be closed with a matching coating.
- 3 Zinc-rich coating shall not be exposed to air for long periods of time.
- 4 When white precipitates appear on the surface of the zinc-rich coating, it shall be polished to remove the precipitate and then recoated.
- 5 The construction temperature and humidity of water-based inorganic zinc-rich coatings shall meet the requirements of the current national coating technical specifications.

10.2.13 Glass flake coating includes epoxy resin glass flake coating and vinyl ester resin glass flake coating. Its preparation and construction shall be in accordance with the following requirements:

- 1 Glass flake coating shall be prepared according to the specified mass ratio and shall be mixed evenly.
- 2 Each coating shall be carried out after the drying of the previous coating film. The interval between coatings shall be in accordance with those specified in Table 10.2.13.

Table 10.2.13 Interval time of coating

Temperature(°C)	Interval time(h)
5-10	≥30
11-15	≥24
16-25	≥12
26-30	≥8

- 3 The construction environment temperature shall not be lower than 5 °C.
- 4 Glass flake coating may be applied by roller, brush or spray.

10.2.14 Epoxy resin self-leveling coating shall be two-component. Its preparation and construction shall be in accordance with the following requirements:

- 1 Epoxy resin self-leveling coatings shall be prepared in proportion and shall be mixed evenly. The prepared coating should be used after ripening.
- 2 The base course should be poured with C25 and above concrete or leveled with C25 fine stone concrete.
- 3 The allowable clearance of the flatness of the concrete base course shall not be larger than 2mm.

Where the flatness does not meet the requirements, the grinding machine may be used.

4 The primer should be applied by brushing, spraying or roller coating; the top coating should be applied by scrape coating, smearing or roller coating, and shall be defoamed.

5 The curing time of the coating shall be in accordance with those specified in Table 10.2.14.

Table 10.2.14 Curing time of the coating

Temperature(°C)	Curing time(d)
10-20	≥10
20-30	≥7
>30	≥5

10.3 Curing and quality inspection

10.3.1 After the coating is completed, the normal temperature curing time of the coating shall not be less than 7 days.

10.3.2 The thickness of the coating shall be uniform, and the number and thickness of the coating shall meet the design requirements.

10.3.3 The adhesion of the coating to the steel base course should not be lower than 5MPa; the adhesion to the cement base should not be less than 1.5MPa. When using the cross-cut method, the adhesion should not be larger than level 1.

10.3.4 The coating shall be smooth and flat, the color shall be uniform, and there shall be no defects such as rust, air bubbles, sag, cracking and peeling.

11 Anticorrosive project of asphalt type

11.1 General requirements

11.1.1 Asphalt anticorrosion project shall include the following contents:

- 1 Integral surface layer of asphalt screed and asphalt concrete.
- 2 Gravel asphalt cushion.
- 3 Insulation layer of asphalt coated with dilute mortar.

11.1.2 The ambient temperature of the construction should not be lower than 5°C; the working surface shall be kept clean and dry during construction.

11.1.3 Asphalt mixture shall be mechanically mixed.

11.1.4 Asphalt materials shall not be heated directly with an open flame.

11.1.5 The storage of asphalt shall be protected against exposure and pollution.

11.2 Quality requirements for raw material and finished products

11.2.1 Road petroleum asphalt and construction petroleum asphalt shall meet the requirements of the current national standards NB/SH/T 0522 *Petroleum Asphalt for Road Pavement*, and GB/T 494 *Asphalt Used in Roofing* and those specified in Table 11.2.1.

Table 11.2.1 Quality of roads and construction petroleum asphalt

Items	Road petroleum asphalt	Building petroleum asphalt		
	60 [#]	40 [#]	30 [#]	10 [#]
Penetration(25°C,100g,5s)(1/10mm)	50-80	36-50	26-35	10-25
Ductility(25°C,5 cm / min)(cm)	≥70	≥3.5	≥2.5	≥1.5
Softening point(ring and ball method)(°C)	45-58	≥60	≥75	≥95

Note:"5cm/min" in the ductility refers to the construction petroleum asphalt.

11.2.2 The powder should be quartz powder. The acid resistance shall not be less than 95%; the fineness requirement that 0.15mm square sieve sieve residue shall not be larger than 5%, and 0.075mm square hole sieve residue shall be 10% to 30%; the hydrophilic coefficient shall not be larger than 1.1.

11.2.3 Quartz sand should be used for fine aggregates. Medium coarse sand with particle size of 0.25mm to 2.5mm should be used. The acid resistance shall not be less than 95%, the mud content shall not be larger than 1%, and the particle size distribution shall be in accordance with those specified in Table 11.2.3.

Table 11.2.3 Particle size distribution of fine aggregate

Square hole screen(mm)	Cumulative screening allowance(%)
4.75	0-10
1.18	35-65
0.3	80-95
0.15	90-100

11.2.4 Quartz stone should be used for coarse aggregate. The particle size of asphalt concrete aggregate should not be larger than 25mm. The particle size of gravel-filled asphalt shall be 30mm to 60mm. The acid resistance shall not be less than 95%.

11.2.5 The compressive strength of asphalt screed and asphalt concrete shall not be less than 3MPa at 20°C and shall not be less than 1MPa at 50°C. The saturated water absorption (volume) of the asphalt screed shall not be larger than 1.5%. Acid pickling stability shall be qualified.

11.3 Integral surface course of asphalt screed and asphalt concrete

11.3.1 The construction mix ratio of asphalt screed and asphalt concrete should be selected according to Table B.0.8 of Appendix B of this code.

11.3.2 The particle size distribution of powder and aggregate mixture shall be in accordance with those specified in Table 11.3.2.

Table 11.3.2 Particle size distribution of powder and aggregate mixtures

Type	Total sieve residue of the mixture(%)								
	19	13.2	4.75	2.36	1.18	0.6	0.3	0.15	0.075
Asphalt screed	-	-	0	20-38	33-57	45-71	55-80	63-86	70-90
Fine grained asphalt concrete	-	0	22-37	37-60	47-70	55-78	65-88	70-88	75-90
Medium grained asphalt concrete	0	10-20	30-50	43-67	52-75	60-82	68-87	72-92	77-92

11.3.3 When using a flat plate vibrator or a hot roller for compaction, the asphalt number should be 30; when using the rolling machine for compaction, the number should be 60.

11.3.4 The preparation of asphalt screed and asphalt concrete shall be in accordance with the following requirements:

- 1 Heat the dried powder and aggregate to about 140°C and mix well.
- 2 According to the construction mix ratio, the asphalt heated to 200°C to 230°C is gradually added, and the mixture is continuously turned until all the powder and aggregate are covered by asphalt. The stirring temperature should be from 180°C to 210°C.

11.3.5 Asphalt screed and asphalt concrete shall be compacted by a flat plate vibrator or a rolling machine and a hot roller. The inner and outer corners shall be compacted with a hot iron.

11.3.6 Before asphalt paving and asphalt concrete paving, a layer of asphalt thin clay shall be applied.

11.3.7 After the asphalt screed and asphalt concrete are paved, they shall be flattened and compacted immediately. The thickness of initial paving shall be determined by pressure test, and when the vibration of the flat plate vibrator is used to compact, thickness of initial paving should be 1.3 times of the compacted thickness.

11.3.8 When asphalt screed and asphalt concrete are vibrated with a flat plate vibrator, the initial compaction temperature shall be 150°C to 160°C. When the construction environment temperature is lower than 5°C, the initial compaction temperature shall be 160°C. The temperature at which compaction is completed shall not be lower than 110°C.

11.3.9 Construction of construction joints shall be in accordance with the following requirements:

- 1 Vertical construction joints shall be left with a miter and compacted with a hot iron.
- 2 When continuing construction, the miter shall be cleaned and then preheated the construction joints. After preheating, a layer of hot asphalt shall be applied, and then asphalt screed or asphalt

concrete shall be continuously paved. Hot iron shall be used to compact the seam, and flatten it to no trace.

3 When layering paving, the vertical construction joints of the upper and lower layers shall be staggered from each other, and the horizontal construction joints shall be coated with a layer of hot asphalt.

11.3.10 The asphalt screed applied to the facade shall be layered. The thickness of each layer shall not be larger than 7 mm. After the last layer is applied, a hot iron shall be applied to flatten it. When paving with precast blocks of asphalt screed, it shall be constructed in accordance with the requirements of Section 8.4 of this code.

11.4 Isolation layer of asphalt coated with thin mortar

11.4.1 The surface of the base course shall be evenly coated with two layers of cold primer oil. The surface of the cold primer oil shall be cleaned and dried before the isolation layer may be applied. The quality ratio of cold primer oil shall be in accordance with the following requirements:

1 The mass ratio of construction petroleum asphalt to gasoline in the first layer shall be 30:70; the mass ratio of construction petroleum asphalt to gasoline in the second layer shall be 50:50.

2 The ratio of construction petroleum asphalt to kerosene or light diesel oil shall be 40:60.

11.4.2 The construction ratio of asphalt thin mortar shall be 100:30 for the mass ratio of asphalt to powder.

11.4.3 The pouring temperature of asphalt thin mortar shall not be lower than 190°C. When the ambient temperature is lower than 5°C, measures shall be taken to increase the temperature before construction.

11.4.4 The number of coating isolation layers, when the design does not require, two layers should be used, and the total thickness should be 2mm to 3mm. When the isolation layer is constructed with sodium silicate materials, the acid-proof sand particles with the particle size of 1.2mm to 2.5mm should be evenly scattered and cleaned immediately.

11.5 Gravel asphalt cushion

11.5.1 The gravel asphalt cushion shall not be applied to watery or frozen base soil.

11.5.2 The softening point of asphalt shall be lower than 90°C; the gravel shall be dry and the material shall meet the design requirements.

11.5.3 The construction of the cushion layer of gravel-filled asphalt shall be in accordance with the following requirements:

1 Firstly, a layer of gravel with a particle size of 30mm to 60mm shall be laid on the base soil. After compaction, a layer of gravel with a particle size of 10mm to 30mm is laid, leveled and compacted, and then hot asphalt is poured.

2 The penetration depth of asphalt shall meet the design requirements.

3 When the design requires the surface of the cushion layer to be flat, the hot asphalt shall be poured evenly, then a layer of fine stone with a particle size of 5mm to 10mm shall be evenly distributed. After leveling, a layer of hot asphalt is poured.

11.6 Curing and quality inspection

11.6.1 The paved asphalt screed and asphalt concrete shall be firmly bonded to the base course. The

surface layer shall be dense and flat, and shall not have cracks, bubbles and delamination, and shall not be treated with asphalt.

11.6.2 When there are above defects, the defects shall be removed and cleaned. After preheating, apply a layer of hot asphalt and then fill and compact with asphalt screed or asphalt concrete.

11.6.3 The allowable gap of the flatness of the ground surface layer shall not be larger than 6mm, and the slope shall meet the design requirements.

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12 Anticorrosive project of plastics type

12.1 General requirements

12.1.1 The plastic anticorrosion projects listed in this chapter shall include:

- 1 Pool lining made of hard polyvinyl chloride plastic plates.
- 2 Pool lining or floor layer made of soft polyvinyl chloride plastic plates.
- 3 Pool lining made of polyethylene plastic plates.
- 4 Pool lining made of polypropylene plastic plates.

12.1.2 The construction environment temperature should be 15°C to 30°C, and the relative humidity should not be larger than 70%.

12.1.3 Polyvinyl chloride, polyethylene, polypropylene plastic plates shall be stored in a dry, ventilated, clean warehouse and away from heat sources.

12.1.4 The soft polyvinyl chloride and polyethylene plastic plates shall be unpacked 24 hours before use and placed flat at the construction site.

12.1.5 The arc radius of the base course inner and outer angles during construction should be 30mm to 50mm.

12.1.6 Polyvinyl chloride plastic plates may be formed by welding method, adhesive bonding method, border adhibiting method or strip and screw fixing method.

12.1.7 Polyethylene plastic plates may be formed by welding method, border adhibiting method or strip and screw fixing method.

12.1.8 Polypropylene plastic plates may be formed by welding method or strip and screw fixing method.

12.1.9 Welders engaged in plastic welding operations shall be certified to work. Before the construction, the welder shall weld the test pieces and samples, accept the process testing, and pass the test pieces, sample test and process test identification.

12.2 Quality requirements of raw material

12.2.1 The quality of the rigid PVC sheet shall meet the relevant requirements of the current national standard GB/T 22789.1 *Plastics-Unplasticized Poly(Vinyl Chloride) Sheets-Types, Dimensions and Characteristics—Part 1: Sheets of Thickness Not Less than 1 mm*.

12.2.2 The quality of soft PVC sheets shall meet the relevant requirements of the current national standard GB 50726 *Code for Anticorrosive Engineering Construction of Industrial Equipment and Pipeline*.

12.2.3 The quality index of polyethylene sheets shall be in accordance with those specified in Table 12.2.3.

Table 12.2.3 Quality index of polyethylene sheets

Items	Indexs
Relative density(g/cm ³)	0.94-0.96
Tensile strength(vertical, horizontal, MPa)	≥21

Table 12.2.3(continued)

Items	Indexs
Compressive strength(MPa)	≥ 22
Linear expansion coefficient($10^{-5}, K^{-1}$)	12.6
Operating temperature($^{\circ}C$)	-70-120
Integrity	No crack

12.2.4 The quality index of the polypropylene sheet shall be in accordance with those specified in Table 12.2.4.

Table 12.2.4 Quality indicators of polypropylene

Items	Indexs
Relative density(g/cm^3)	0.90-0.91
Tensile strength(vertical, horizontal, MPa)	33
Compressive strength(MPa)	40
Linear expansion coefficient($10^{-5}, K^{-1}$)	11
Operating temperature($^{\circ}C$)	-30-115
Integrity	No crack

12.2.5 The surface of PVC sheet, polyethylene sheet and polypropylene sheet shall be flat, clean, no crack, uniform color, uniform thickness; shall be no bubbles or debris in the sheet, shall be no delamination, the edge of the board shall not have a gap of more than 3mm in depth.

12.2.6 Adhesives shall be used in conjunction with sheets and shall be low-toxic and environmentally friendly.

12.2.7 The welding rod shall be of the same material as the weldment. The surface shall be smooth and flat, and shall be free of nodules, creases, cracks, bubbles or impurities, and the color shall be uniform.

12.3 Construction

12.3.1 The cutting and marking of plastic plate shall be accurate. For complex shapes, the sample shall be made first, and pre-assembly shall be done before construction.

12.3.2 Groove treatment shall be carried out at the joints of plastic plates. When welding, it shall be made into a V-shaped groove. Groove angle: when the sheet thickness is larger than or equal to 10mm, it shall be 75° to 80° ; when the sheet thickness is less than 10mm, it shall be 85° to 90° . When the soft PVC is pasted, the groove shall be made in the same direction, and the overlap width shall be 25mm to 30mm.

12.3.3 Plastic plates shall be welded in accordance with the following requirements:

1 The relationship between welding rod diameter and sheet thickness of polyvinyl chloride, polyethylene and polypropylene shall be in accordance with those specified in Table 12.3.3.

Table 12.3.3 Relationship between welding rod diameter and sheet thickness(mm)

Weldment thickness	Welding rod diameter
2.0-5.0	2.0 or 2.5
5.5-15.0	2.5
More than 16.0	2.5 or 3.0

2 When the PVC sheet is constructed by hot air welding, the angle between the welding rod and the weldment shall be 90° ; the angle between the welding torch and the weldment should be 45° ; the temperature of the welding torch for the welded PVC should be 210°C to 250°C . The welding speed should be 150mm/min to 250mm/min; the weld seam shall be 2mm to 3mm higher than the surface of the base material.

3 When the soft PVC sheet is welded, the overlap width should be 25mm to 30mm. At the inner lap joint between the upper and lower sheets, spot welds are fixed every 200mm, and then hot air gun is used for body-melt-pressure welding, or use hot air welding with soft PVC welding rod. The temperature of the hot air welding torch should be 110°C to 180°C ; when hot air welding, the hot air flow rate should be 10L/min to 15L/min. The outer seam of the two sheets shall be overlapped and sealed fully with a welding rod.

4 Polyethylene sheets should be hot air welded. The torch temperature should be 200°C to 240°C ; hot air flow should be 10L/min to 15L/min; hot air should be nitrogen or carbon dioxide or other inert gases. The welding rod shall be pressed when welding, and it may be relaxed until the melting zone is cooled to opaque.

5 When welding polypropylene plate, the temperature of the welding torch should be 210°C to 250°C ; the angle between the welding rod and the weldment should be 60° ; the welding speed should be 100mm/min to 120mm/min; the hot air flow should be 10L/min to 15L/min; The hot air shall be an inert gas such as nitrogen or carbon dioxide.

12.3.4 When the soft PVC sheet and the polyethylene sheet are constructed by border adhibiting method and strip and screw fixing method, shall be in accordance with the following requirements:

1 The inner surface of the pool shall be flat, without protrusions, sand, cracks, honeycombs, pockmarks, etc.

2 The joints shall be overlapped during construction, and the overlap width should be 20mm to 25mm. The facade shall be lined first, and then the plane shall be lined.

3 Support flat steel or strip cutting shall be accurate. The corners shall be ground, the end of welded joint shall be smoothed, the support flat steel and the inner wall of the pool shall be tightened, and the strip shall be tightened with screws. The support flat steel or strip shall be covered with a soft sheet and welded.

4 When fixing with strip and screw, the screws shall be arranged in a triangle shape with a line spacing of 500 mm.

12.3.5 The adhesion of soft PVC sheets shall be in accordance with the following requirements:

1 Soft PVC sheet shall be degreased with alcohol or acetone before sticking. The adhesive surface shall be roughened to no reflection.

2 Apply an electric spark detector for leak detection.

3 The surface of the soft sheet shall not be scratched.

4 The soft PVC plate may be pasted by a full-adhesive method or a partial-adhesive method.

5 When using the partial-adhesive method, the adhesive shall be applied on both sides of the joint or around the base course. The distance between the adhesive strips in the middle of the soft sheet should be 500mm, and the width should be 100mm to 200mm.

6 Adhesive shall be applied twice on the soft sheet and the base course when pasting, and shall be staggered crisscross. The brush shall be even and shall not be leaked. The second pass shall be applied

the first time the adhesive is dry and is dry to touch. When the second time adhesive is dried to the slightly sticky hand, the plastic plate is pasted.

7 When pasting, the gas between the bonding surfaces shall be drained in order, and the roller shall be pressed and compacted. The joints must be tightly pressed, and no defects such as peeling or warping shall occur.

8 When the adhesive does not meet the corrosion resistance requirements, the welding rod shall be used to seal the joint.

12.4 Curing and quality inspection

12.4.1 After the soft PVC is pasted, it shall be cured. The curing time shall be determined according to the curing time of the adhesive used.

12.4.2 The anticorrosion surface of the plastic plate shall be flat, clean and uniform in color, free from wrinkles and perforations, and shall not have defects such as warping or bubbling.

12.4.3 The allowable gap of the surface flatness of the plastic plate shall not be larger than 2mm. The joint height difference between adjacent plates shall not be larger than 0.5mm.

12.4.4 When checking the adhesion of the fully coated adhesive, the stripping of the 3mm thick sheet shall not be larger than 20cm²; the stripping of the 0.5mm to 1mm thick sheet shall not be larger than 9cm²; the distance between the stripping points shall not be less than 50cm.

12.4.5 The surface of the weld shall be full, flat, smooth and light yellow. The extruded paste on both sides shall be free of coking and no weld beading, and the unevenness shall not be larger than ± 0.6 mm. The weld shall be firm and the tensile strength of the weld shall not be less than 60% of the strength of the plastic plate.

12.4.6 The welding rods are arranged closely, without corrugation, and each welding rods joint shall be staggered by 100mm.

12.4.7 The lining of border adhibiting method and the lining of strip and screw fixing method shall be subjected to a water injection test for 24 hours, and no leakage shall occur in the leak-detecting hole. When leakage is found, it shall be repaired. After repair, it shall be retested until it is not leaking.

12.4.8 When performing pinhole inspection, the concrete base course shall be pre-set with a conductive layer.

13 Safety technique

13.0.1 The safety technique and labor protection of anticorrosion engineering shall meet the relevant requirements of the current national standard GB 50656 *Code for Construction Company Safety Manage Criterion* and GB/T 33000 *Guideline of China Occupational Safety and Health Management System*.

13.0.2 The development organization shall sign a safety agreement with the construction organization before construction.

13.0.3 The construction organization design and construction plan of the construction unit shall include safety technique measures and emergency plans.

13.0.4 The storage and identification of chemical dangerous goods shall meet the requirements of the current national standards GB 15603 *Rule for Storage of Chemical Dangers* and GB 18218 *Identification of Major Hazard Installations for Hazardous Chemicals*.

13.0.5 On-site construction equipment and facilities shall be inspected before use and in accordance with the relevant national product standards.

13.0.6 The safety of construction electricity shall meet the relevant requirements of the current national standard GB/T 13869 *General Guide for Safety of Electric User*, GB 19517 *National Safety Technical Code for Electric Equipments* and JGJ 46 *Technical Code for Safety of Temporary Electrification on Construction Site*.

13.0.7 The maximum allowable concentration of hazardous gases, steam and dust in the anticorrosion construction site shall meet the relevant requirements of current national occupational health standard *Occupational Exposure Limits for Hazardous Agents in the Workplace—Part 1: Chemical Hazardous Agents* and the current national standard GB 50726 *Code for Anticorrosive Engineering Construction of Industrial Equipment and Pipeline*.

13.0.8 The coating application shall meet the relevant requirements of the current national standard GB 7691 *Safety Code for Painting-Safety Management General Rule*.

13.0.9 The work at heights shall meet the relevant requirements of the current professional standard JGJ 80 *Technical Code for Safety of Working at Height of Building Construction*.

13.0.10 Construction sites such as on-site hot fire, restricted space construction and use of pressure equipment shall be in accordance with the following requirements:

- 1 On-site operations shall be approved for operation.
- 2 Safety enclosures and safety signs shall be set in the work area, and special personnel shall be set up for guarding and monitoring.
- 3 Operators shall specify a uniform operational contact method.
- 4 At the end of the operation, hidden danger shall be checked and eliminated before leaving the site.

13.0.11 The safety of the testing equipment and instruments for the quality inspection of anticorrosion engineering shall meet the requirements of the safety regulations of the relevant products.

13.0.12 The labor protection articles provided by the operators shall meet the relevant requirements of the current national standard GB/T 11651 *Code of Practice for Selection of Personal Protective Equipments*.

14 Technical measure for environment protection

14.0.1 Anticorrosion construction shall establish a list of important environmental factors, and shall prepare specific environmental protection technical measures.

14.0.2 The construction site shall be set up with living area, construction area and office area respectively.

14.0.3 The disposal of various types of waste generated during construction shall be in accordance with the following requirements:

1 Coverage measures shall be taken when collecting, storing, transporting, utilizing and disposing of various types of waste. Packaging materials shall be recyclable, easy to handle or easy to dispose of.

2 When the construction is completed, the materials shall be cleaned and the site shall be cleaned up, and all kinds of wastes shall be cleaned up in time according to environmental protection requirements and cleared for shipment.

3 Hazardous waste shall be piled up in a dedicated place, set up a unified identification mark according to the national environmental protection regulations, establish a management system for the prevention and control of hazardous waste pollution, and formulate preventive measures and emergency plans for accidents.

4 Hazardous waste shall be contained in a container. Space between the top of the container containing liquid or semi-solid hazardous waste and the surface of the liquid shall be more than 100mm. Incompatible hazardous wastes shall not be mixed or combined. Regularly check the stored hazardous waste packaging containers and storage facilities, and if damage is found, measures shall be taken to clean it up and replace it.

5 When handling all types of hazardous waste, organizations shall go through the disposal formalities with the local environmental protection department, or entrust a unit that is qualified (approved by the local environmental protection department) to organize centralized treatment.

6 When transporting hazardous waste, it shall comply with national and local regulations governing the transport of dangerous goods and chemical dangerous goods.

14.0.4 The prevention and control of dust and other pollution during construction shall be in accordance with the following requirements:

1 When transporting or handling fine materials or loose materials that are prone to dust, confined measures or other protective measures shall be taken.

2 Segregation measures shall be taken when performing demolition work.

3 Stirring sheds shall be set up in the mixing place, surrounded by enclosures, and dustproof measures shall be taken. The cutting point shall be selected for the cutting operation and shall be enclosed. When performing base course surface treatment, mechanical cutting or spraying, measures shall be taken to prevent dust.

4 Shall not engage in sand screening, ash screening, etc. during windy weather.

5 A closed garbage station shall be installed at the construction site. Construction waste and domestic garbage shall be stored separately and shall be promptly cleared for shipment.

14.0.5 The prevention and control of construction noise pollution during construction shall be in accordance with the following requirements:

1 The construction site shall formulate noise reduction measures in accordance with the current national standard GB 12523 *Emission Standard of Environment Noise for Boundary of Construction Site*. Regularly measure the noise and indicate the measurement time, location, and method. Make noise measurement records, and measures shall be taken when exceeding the standard.

2 In the noise sensitive area of the construction site, low noise equipment should be selected, or other noise reduction measures may be taken.

3 The time of mechanical cutting operation shall be arranged during the daytime construction time, and the location shall be selected in a relatively closed room.

4 Vehicles transporting materials shall not whistle after entering the construction site. Handle materials with care when loading and unloading.

14.0.6 Corrosion of water and soil shall not occur during anticorrosion construction.

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15 Hand over of project

15.0.1 The handover of building anticorrosion engineering shall include intermediate handover, concealed project handover and handover acceptance.

15.0.2 After the construction organization has completed all the anticorrosion engineering projects according to the scope stipulated in the contract, it shall go through the formalities of acceptance, delivery and handover. The project shall not be put into production and use without prior handover acceptance.

15.0.3 Before the handover of the anticorrosion project, the construction organization or the supervision organization shall organize the relevant organizations to inspect and accept it, and shall confirm the following contents:

1 The scope and content of the construction are in compliance with the contract.

2 The quality of the project complies with the design documents and the provisions of this specification.

3 When the construction quality does not meet the relevant requirements of this code and the current national standard GB/T 50224 *Standard for Acceptance of Construction Quality of Anticorrosive Engineering of Buildings*, the records of repair or rework shall be included in the handover acceptance document.

15.0.4 For the completion acceptance of the building anticorrosion project, the following documents shall be submitted:

1 Raw material factory certificate, quality inspection report or re-inspection report.

2 Design change form, material substitute form.

3 Base course surface treatment inspection record.

4 Anticorrosion construction record.

5 Intermediate handover record.

6 Concealed engineering record.

7 Repair or rework record.

8 Handover acceptance record.

15.0.5 The base course surface pretreatment, concealed engineering inspection, intermediate handover and construction handover acceptance record of anticorrosion engineering construction may be filled in according to Table 15.0.5-1 to Table 15.0.5-4; the anticorrosion engineering handover acceptance data transfer summary may be filled in according to Table 15.0.5-5.

Table 15.0.5-1 Concrete base course surface pretreatment inspection record

Project number or name:

Project:		Unit plant:	Job number:
Part name		Construction drawing number	
Ambient temperature		Relative humidity	
Surface pretreatment requirements		Surface pretreatment method	
Condition before surface pretreatment			
Surface pretreatment record			
Condition after surface pretreatment			
Conclusion	住房城乡建设部信息公开 浏览专用		
General contractor:	Construction organization(supervisory organization):	Construction organization:Project technical person in harge:	
Field representative:	Professional technical person in charge of construction organization project (supervising engineer):	Project professional quality inspector:	
Date:	Date:	Construction team leader:	
		Date:	

Table 15.0.5-2 Steel structure base course surface pretreatment inspection record

Project number or name:

Project:		Unit plant:					Job number:						
Part name							Construction drawing number						
Ambient temperature							Relative humidity						
Descaling grading requirement							Surface pretreatment method						
Actual test items													
Items		Rust removal grading					Roughness						
Part		1	2	3	4	5	Average	1	2	3	4	5	Average
Conclusion		住房城乡建设部信息公开 浏览专用											
General contractor:		Construction organization (supervisor organization):					Construction organization:						
Field representative:		Professional technical person in charge of construction organization project (supervising engineer):					Project technical person in charge:						
Date:		Date:					Project professional quality inspector:						
							Construction team leader:						
							Date:						

Table 15.0.5-3 Concealed construction inspection record

Project name		Partial item name	
Drawing number		Hidden date	
Hidden content			
Construction sketch or description			
Inspection opinion			
General contractor: Field representative: Date:	Construction organization(supervisor organization): Professional technical person in charge of construction organization project(supervising engineer): Date:	Construction organization: Project technical person in charge: Project professional quality inspector: Construction team leader: Date:	

Table 15.0.5-4 Anticorrosion engineering handover report

Project name			
Start date	Date:	Handover date	Date:
Project brief content:			
Construction situation: (compliance level with design, major defects and treatment advice)			
Engineering Quality:			
Project reception:			
General contractor:	Construction organization (supervisor organization):	Construction organization:	
Field representative:	Professional technical person in charge of construction organization project (supervising engineer):	Project technical person in charge:	
Date:	Date:	Project manager:	
		Date:	

Note: This form is suitable for using in intermediate handover and construction handover.

Table 15.0.5-5 Anticorrosion engineering handover acceptance data summary table

No.:

Project name				
Construction organization				
No.	Data name	Number of copies	Verification opinion	Verifier
1	Raw material factory certificate, quality certificate or re-inspection report			
2	Design change form, material substitute form			
3	Base course inspection handover record			
4	Anticorrosion construction record			
5	Intermediate handover record			
6	Concealed engineering construction record			
7	Repair or rework record			
8	Handover acceptance record			
Conclusion:				
Construction organization project manager:		Chief supervising engineer: (management unit project leader)		
Date:		Date:		

Appendix A Testing method for raw material and finished products

A.1 Main raw material sampling method

A.1.1 The sampling quantity of resin, water soluble silicate and polymer emulsion raw materials is randomly sampled of 3 barrels from each batch of barreled resin or water soluble silicate, sampling no less than 1 000g per barrel, may be mixed and tested; when the batch number is less than or equal to 3 barrels, 1 barrel may be randomly sampled, and the sample amount is not less than 3 000g.

A.1.2 The powder shall be randomly sampled of 3 bags from each batch, each bag not less than 1 000g, which may be mixed and tested. When the batch is less than or equal to 3 bags, 1 bag may be randomly sampled, and the sample amount is not less than 3 000g.

A.1.3 Sampling of acid-resistant bricks and anticorrosion carbon bricks, acid-resistant and temperature-resistant bricks and natural stone shall comply with the current national standards GB/T 8488 *Acid Resisting Bricks and Tiles*, JC/T 424 *Acid and Heat Resisting Bricks* and GB/T 18601 *Natural Granite for Building Slab*.

A.1.4 Block asphalt shall be taken from 2 blocks to 3 blocks at different points (not less than 10) for each point in each batch. After mixing, average samples shall be taken.

The number of sampling barrels of barreled asphalt shall be 10% of the total number of barrels.

A.2 Test methods for raw materials

A.2.1 The quality of resin materials shall be in accordance with the following requirements:

1 The viscosity of furan resin shall comply with the current national standard GB/T 1723 *Determination of Viscosity of Coatings*.

2 The determination of free phenol content, free aldehyde content, water content and viscosity of phenolic resin shall be in accordance with the following requirements:

1) Determination of free phenol content: 1g of a sample shall be weighed with a ten thousandth precision balance and applied to a 1 000mL round bottom flask, and 20mL of ethanol is added thereto to dissolve. 50mL of distilled water is added, and then the free phenol is distilled off with steam, and the distillate is collected in a 1 000mL volumetric flask, and the distillation speed is controlled to evaporate about 500mL of the distillate in 40min to 50min. The distillation is stopped when there is no white precipitate in the distillate while dropping saturated bromine. Dilute the distillate to 1 000mL with water and shake well.

Pipette 100mL of the distillate and transfer it into a 500mL stoppered conical flask. 25mL of bromine solution [$C(\text{Br}_2)=0.1\text{mol/L}$] is added, and then 5mL of reagent grade hydrochloric acid is added, and it is placed in the dark for 15min at room temperature. Add 20mL of 10% potassium iodide solution and let it rest for another 10min in the dark. Then 1mL of chloroform is added. The sodium thiosulfate standard solution [$C(\text{Na}_2\text{S}_2\text{O}_3)=$

0.1mol/L] was titrated until the iodine color nearly disappeared, and then about 1mL of the starch indicator is added, and the titration is continued until the blue color just retreated.

A blank test was also performed. 20mL of ethanol shall be diluted to 1 000mL with distilled water, then 100mL shall be taken and tested according to the above procedure.

The mass percentage (X) of free phenol shall be calculated according to the following formula:

$$X = \frac{(V_1 - V_2) \times C \times 0.01568}{m} \times 100 \quad (\text{A.2.1-1})$$

Where, V_1 —the volume of the sodium thiosulfate standard solution the blank test consumes (mL);

V_2 —the volume of the sodium thiosulfate standard solution the sample test consumes (mL);

C —the concentration of substance of the sodium thiosulfate standard solution(mol/L).

m —the mass of the sample(g).

0.015 68—equivalent grams of phenol per millimolar titration.

- 2) Determination of free aldehyde content: 3g of a sample shall be weighed with a ten thousandth precision balance and applied to a 300mL flask. 100mL of absolute ethanol is added, and the mixture is stirred uniformly with a glass rod to prepare a sample solution, which is covered for use. 50mL of absolute ethanol is added to the beaker, 3 drops of 1% bromophenol blue indicator solution is added, 10mL of the sample solution is added, and then neutralized to yellow with dilute hydrochloric acid. 10mL of 10% amine hydrochloride is added, shaken for 10min to 15min, and titrated to green with a sodium hydroxide standard solution [$C(\text{NaOH})=0.1 \text{ mol/L}$].

A blank test shall be carried out with a solution without adding the sample in the same manner as above.

The mass percentage (X) of free aldehyde shall be calculated according to the following formula:

$$X = \frac{(V_1 - V_2) \times C \times 0.03}{m} \times 100 \quad (\text{A.2.1-2})$$

Where, V_1 —the amount of sodium hydroxide standard solution consumed in the sample test(mL);

V_2 —the volume of the sodium thiosulfate standard solution the blank test consumes(mL);

C —the concentration of the substance of the sodium hydroxide standard solution (mol/L);

m —the mass of the sample(g).

0.03—grams of formaldehyde per millimole of titration.

- 3) Determination of water content: 10g of the sample shall be weighed with a ten thousandth precision balance and applied to a 250mL round bottom flask, and 50mL of cresols tri-mixture is added, followed by 80mL of water-saturated benzene. The distillation receiver and the reflux condenser are installed, and the temperature shall be controlled so that the solvent reflux rate is 2 drops to 5 drops per minute, and reflux for 1 hour or more until no water is distilled off. The water content (X) shall be calculated according to the following

formula :

$$X = \frac{m_1}{m} \times 100 \quad (\text{A.2.1-3})$$

Where, m_1 —the mass of distilled water(g);

m —the mass of the sample(g).

4) The determination of viscosity shall comply with the relevant provisions of the current national standard GB/T 1723 *Determination of Viscosity of Coatings*.

A.2.2 The powder water content, fineness and volume stability of the acid-resistant powder shall be determined in accordance with the following requirements:

1 Determination of water content: 100g of sample shall be weighed using a 1% balance, dried to constant weight at 105°C to 110°C, weighed after cooling, and shall be calculated according to the following formula:

$$\text{Water content}(\%) = \frac{m - m_1}{m_1} \times 100 \quad (\text{A.2.2})$$

Where, m —the mass of the sample before drying(g);

m_1 —the mass of the sample after drying(g).

2 Determination of fineness: 50g of a sample dried to a constant weight at 105°C to 110°C shall be weighed using a 1% balance and poured into a sieve of a prescribed sieve opening. When sieving, it shall be shaken and beaten back and forth, and the sample shall be evenly distributed on the sieve cloth at a shaking speed of 125 times per minute. When the sieve is nearly finished, the sieve screen is removed and sieved on the paper until the mass per pass through the sieve hole does not exceed 0.05g per minute. The sieve residue is weighed and multiplied by 2 in grams to obtain the sieve residue percentage. When the fineness is controlled by two kinds of sieves, the sample passing through the first sieve shall be poured into the next sieve to be sieved and shall not lost.

3 Determination of the volume stability of acid-resistant powder: the phenolic resin shall be mixed with a proportion of the acidic curing agent, then add an appropriate amount of acid-resistant powder and stir evenly; if it is a furfuryl alcohol furfural type, add a proportional amount of furfuryl alcohol furfural type glass fiber reinforced plastic powder, then add an appropriate amount of acid-resistant powder and mix well. The prepared phenolic resin mortar or furan resin mortar is placed in a test mold of 30mm×30mm×30mm, and the surface is ground and smoothed. After the specimen is hardened, there is no bubbling on the surface, then the stability is qualified.

A.2.3 The determination of the hydrophilicity coefficient of the powder shall be in accordance with the following requirements:

1 Using a 1% balance to weight two samples of 5g of powders which were dried to a constant weight at 105°C to 110°C and cooled to room temperature, and placed in two porcelain dishes. Add 15mL to 30mL of distilled water in a porcelain dish, carefully grind with a rubber rod for 5min, then rinse the sample into a 100mL measuring cylinder (the cylinder scale is 0.5mL, the scale shall be corrected by a dropper), so that the water surface reading of the measuring cylinder is 50mL. In another porcelain dish, dehydrated kerosene was used instead of distilled water, and the process was carried out in the same manner as above.

2 When the expansion of the deposited powder in the two measuring cylinders stops, read the volume.

3 The hydrophilicity coefficient of the powder shall be calculated according to the following formula:

$$\text{Hydrophilic coefficient} = \frac{V_1}{V_2} \quad (\text{A.2.3})$$

Where, V_1 —volume of sediment in water(mL);

V_2 —volume of sediment in kerosene(mL).

4 Take the average of the two tests as the test results. The difference between the two tests shall not exceed $\pm 0.2\text{mL}$ when using the same liquid, and the difference between hydrophilicity coefficient shall not exceed $\pm 3\%$.

A.2.4 The quality of water soluble silicate materials shall be determined in accordance with the following requirements:

1 The calculation of the modulus of sodium silicate, the determination of the content of sodium oxide and silicon dioxide shall comply with the current national standard GB/T 4209 *Sodium Silicate for Industrial Use*.

2 Determination of the density of sodium silicate: The sample shall be placed in a 250mL measuring cylinder, the temperature is adjusted to 20°C , and the standard hydrometer with four digits shall be gently immersed into the test solution, and then wait for it stop to sink. Observe the liquid level horizontally and read the value of the hydrometer, which is the density.

3 Determination of the modulus of potassium silicate: The determination of potassium oxide content shall comply with the relevant provisions of the current national standard GB/T 176 *Methods for Chemical Analysis of Cement*.

4 Determination of the silica content of potassium silicate shall be in accordance with the following requirements:

1) Weigh 2.5g of potassium silicate with a 1% balance and rinse it into the porcelain evaporating dish with hot distilled water. Stir well with a glass rod. While stirring, add 25mL of hydrochloric acid (density $1.19\text{g}/\text{cm}^3$) with a dropper or a small cylinder, then cover the evaporating dish with a clean surface dish, boil it in a water bath until boiling, remove the surface dish, and rinse the edge of surface dish and evaporating dish with distilled water.

2) The silicic acid gel which is precipitated from the obtained solution is evaporated to dryness on a boiling water bath, and the residue is pulverized with a glass rod. When the residue is heated on a water bath to a hydrogen chloride-free odor, heating is continued for another 2 hours to completely dehydrate the silicic acid gel.

3) After the residue is cooled, hydrochloric acid (density $1.19\text{g}/\text{cm}^3$) is added dropwise to a wet state. Thereafter, a minimum volume of hot distilled water is poured into the porcelain evaporating dish, and the solution and the precipitate in the dish are stirred with a glass rod, and then allow to stand for several minutes. Then filter with ashless fine filter paper, and rinse the precipitate on the filter paper with hot distilled water until no chloride ion reacts. The obtained precipitate is placed in the weighed sputum, dried and ashed, and finally at a high temperature of $1\ 000^\circ\text{C}$ to $1\ 100^\circ\text{C}$ burned to constant weight, the quality of the material after burning is the quality of silica.

4) The silica mass percentage (S) of potassium silicate shall be calculated according to the

following formula:

$$S = \frac{m_1}{m} \times 100 \quad (\text{A.2.4-1})$$

Where, m_1 —the mass of silica after burning(g);

m —the mass of potassium silicate(g).

5 The determination of the density of potassium silicate shall be in accordance with the following requirements:

- 1) The potassium silicate sample shall be placed in a 300mL measuring cylinder and the temperature adjusted to 20°C. Gently immerse the four-digit standard hydrometer into the test solution, wait for it to stop sinking, look at the liquid level, and read the specific hydrometer count value, plus the unit g/cm^3 , which is the density.
- 2) When the density is too large, the density may be reduced by adding water method, and then repeated according to the method of the second paragraph of Appendix A.2.4 of this code until the requirement is met. The amount of water added may be calculated according to the following formula:

$$\text{Water added} = \frac{D_0 - D}{D - 1} \times G_0 \quad (\text{A.2.4-2})$$

Where, D_0 —the density of potassium silicate before dilution(g/cm^3);

D —density of potassium silicate after dilution(g/cm^3);

G_0 —the mass of potassium silicate before dilution(kg).

- 3) When the density is too small, the density may be increased by heating and evaporation method, and then the measurement is carried out several times according to the method of the first item of Article A.2.4 of this code until the requirement is met.
- 6** The water content of the potassium silicate material mixture shall be determined in accordance with the following requirements:

- 1) Samples of potassium silicate material mixture shall be sampled separately in three different parts, mixed and used.
- 2) Weigh the sample with a 1% balance, weigh 100g of potassium silicate mortar or potassium silicate screed mixture, and weigh 1 000g of potassium silicate concrete mixture. Dry at 105°C to 110°C to constant weight, weighed after cooling.
- 3) The water content of the potassium silicate mixture shall be calculated according to the following formula:

$$\text{Water content}(\%) = \frac{m - m_1}{m_1} \times 100 \quad (\text{A.2.4-3})$$

Where, m —the mass of the sample before drying(g);

m_1 — the mass of the sample after drying(g).

7 Determination of the fineness of the potassium silicate material mixture: 100g of the sample that has been dried to a constant weight at 105°C to 110°C shall be weighted by the 1% balance, poured into the electric sieve machine, and after 15 min of vibration, the sieve residue of each stage is weighed. The mass of the material is the amount of sieve residue in each stage, that is, the mass of the sieve residue in each stage is the sieve residue.

A.2.5 The quality of the polymer emulsion shall be determined in accordance with the following

requirements:

1 The appearance, total solid content and density of the polymer emulsion shall comply with the relevant provisions of the current professional standard DL/T 5126 *Test Code on Polymer—Modified Cement Mortar*.

2 The determination of viscosity shall comply with the relevant requirements of the current professional standard SH/T 1152 *Synthetic Rubber Latex—Determination of Apparent Viscosity*.

3 The construction sand for polymer cement screed shall comply with the relevant requirements of the current national standard GB/T 14684 *Sand for Construction*.

A.2.6 The determination of the quality of the block shall be in accordance with the following requirements:

1 The acid resistance of acid-resistant bricks, acid-resistant and heat-resistant bricks and powders shall be determined in accordance with the relevant requirements of the current national standard GB/T 8488 *Acid Resisting Bricks and Tiles*.

2 The water absorption rate and thermal stability of acid-resistant bricks and acid-resistant and heat-resistant bricks shall be determined in accordance with the relevant requirements of the current national standard GB/T 8488 *Acid Resisting Bricks and Tiles*.

3 The acid resistance, bulk density, apparent porosity, compressive strength and flexural strength of anticorrosion carbon bricks shall be determined according to the current national standard GB/T 8488 *Acid Resisting Bricks and Tiles*, GB/T 2997 *Test Method for Bulk Density, Apparent Porosity and True Porosity of Dense Shaped Refractory Products*, GB/T 5072 *Refractories-Determination of Cold Compressive Strength* and GB/T 3001 *Refractory Products-Determination of Modulus of Rupture at Ambient Temperature*.

4 The determination of compressive strength and pickling stability of natural stone shall comply with the following requirements:

1) The determination of compressive strength shall comply with the relevant requirements of the current national standard GB/T 18601 *Natural Granite for Building Slab*.

2) Determination of pickling stability: 4 pieces of block with a diameter of about 5cm shall be taken (check carefully with a magnifying glass before the test, and the crack-free ones may be used), and put it at a temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ in a container with 95% to 98% chemically pure sulfuric acid. The bottom of the test block shall be overhead, the sides shall be separated, and the acid solution shall be higher than the surface of the test block. During the soaking period, the appearance change of the test piece shall be checked frequently and the acid concentration shall be maintained.

After soaking for 45 days, the test pieces are taken out, rinsed with water, and then dried with gauze to check whether the test pieces have cracks, peeling and swelling. When the test pieces are complete, the surface of the test pieces and the soaking acid solution are not significantly discolored, then it is qualified.

A.2.7 The quality of sprayed polyurea raw materials shall be determined in accordance with the relevant requirements of the current professional standard HG/T 3831 *Sprayed Polyurea for Materials Protection*.

A.2.8 The quality of asphalt raw materials shall be determined in accordance with the following requirements:

1 The determination of penetration shall comply with the relevant requirements of the current national standard GB/T 4509 *Standard Test Method for Penetration of Bitumen*.

2 The determination of ductility shall comply with the relevant requirements of the current national standard GB/T 4508 *Standard Test Method for Ductility of Bitumen*.

3 The determination of softening point shall comply with the relevant requirements of the current national standard GB/T 4507 *Standard Test Method for Softening Point of Bitumen—Ring-and—Ball Apparatus*.

A.3 Test methods for finished products

A.3.1 The roughness of the surface of concrete and steel structure base course shall be tested by instruments conforming to the current professional standard JJG 2018 *Verification Scheme Measuring Instruments for Surface Roughness*.

A.3.2 The determination of the water content of the concrete base course shall be in accordance with the following requirements:

1 Weighing method: The sample within the thickness layer of 20mm surface shall be drilled or chiseled with a long drill at 3 to 4 of the surface of the base course. Weigh with a balance. Then, the sample taken is mixed and ground, and shall be baked to a constant weight at 100°C to 105°C, and the mass after drying is weighed.

The water content shall be calculated according to the following formula:

$$\text{Water content (\%)} = \frac{m - m_1}{m_1} \times 100 \quad (\text{A.3.2})$$

Where, m —the mass of the sample before drying(g);

m_1 —the mass of the sample after drying(g).

2 Plastic film covering method: The transparent polyethylene film with a size of 45cm×45cm shall be firmly adhered to the surface of the base layer with tape paper and avoid sunlight or damage of the film. The plastic film shall be observed after 16hours, and it can be qualified without water droplets or moisture. A sample should be made every 40m².

A.3.3 The performance of the finished resin products shall be determined in accordance with the following requirements:

1 The performance test of finished resin products is based on three test blocks. The average value of three test blocks is the test result. When the test result of one block exceeds or falls below 15% of the average value, shall take the average of the remaining 2 blocks as the final result. When the test results of two test pieces exceed 15% of the average value, the test results of the test pieces of this group are invalid. The rounding precision is taken as 0.1.

2 Determination of tensile strength of resin mortar and screed: The test shall adopt "8" shaped metal test mold(Figure A.3.3-1), first wipe the "8" shaped test mold clean, and apply a layer of release agent. The resin mortar or resin screed is loaded into the mold, vibrated 25 times on the jumping table, the excess resin mortar or screed is scraped off, the surface is leveled, and the condition is maintained at a temperature of 23°C ± 2°C and a humidity of 50% ± 5%. After 14 days of curing, the tensile strength is measured. Place the "8" shaped sample into the fixture(Figure A.3.3-2), start the tensile machine at a speed of 10mm/min, till the sample is broken. Record the tensile machine reading. The tensile strength is expressed in MPa.

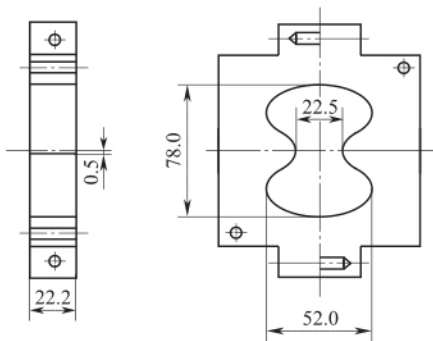


Figure A.3.3-1 "8" shaped metal test mold

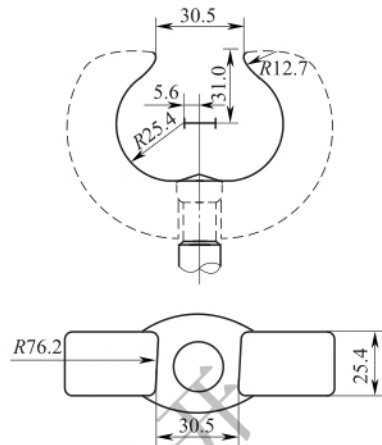


Figure A.3.3-2 Fixture for tensile strength of "8" shaped specimen

Tensile strength shall be calculated according to the following formula:

$$R_{\text{pull}} = \frac{P}{F} \quad (\text{A.3.3-1})$$

Where, R_{pull} —tensile strength(MPa);

P —damage load(N);

F —the cross-sectional area of the narrow portion(mm^2).

3 Resin mortar, screed, self-leveling compressive strength measurement: Put the resin mortar, screed, self-leveling into a $30\text{mm} \times 30\text{mm} \times 30\text{mm}$ cube test mold and tamp it, vibrating 25 times on the jumping table and scraping the surface till leveling. After molding for 24 hours, the mold was released. Curing at a temperature of $20^{\circ}\text{C} - 30^{\circ}\text{C}$, the number of days of curing shall be in accordance with those specified in Table 5.6.1 of this code.

4 Determination of compressive strength of resin fine stone concrete: A cubic test mold of $150\text{mm} \times 150\text{mm} \times 150\text{mm}$ is used. When using artificial tamping, the resin fine stone concrete shall be loaded into the test mold in two parts, and the height of each loading is equal; if the vibrator is used to tamp it, the resin fine stone concrete is loaded into the test mold with a little margin. After that, the test mold is placed on the vibrating table, and hold it by hand, and the vibrating table is started to vibrate until the surface of the resin fine stone concrete excludes air bubbles and becomes slurry. After the end of the vibration for 25 times, apply the metal ruler to scrape off the excess concrete along the edge of the test piece, and then smooth the surface with a spatula.

After molding for 24 hours, the mold was released. Curing at a temperature of 20°C to 30°C , the number of days of curing shall be in accordance with those specified in Table 5.6.1 of this code.

5 The determination of the bond strength between resin mortar and acid-resistant brick, resin glass flake mortar and cement screed shall be in accordance with the following requirements:

1) Determination of the bond strength between resin mortar and acid-resistant brick: The acid-resistant brick is processed into a size of $70\text{mm} \times 30\text{mm} \times (25\text{mm} - 30\text{mm})$, washed and dried, and the resin mortar is cross-bonded together and scrape excess mortar. The thickness of the bonding layer shall be 2mm to 3mm. After curing at 20°C to 25°C for 14 days, the bond strength shall be measured. Place the cross-shaped test piece in the fixture (Figure A.3.3-3), and then start the tension machine to load evenly, until the test piece is pulled separated, record the tensile machine reading, and the bond strength is expressed in MPa.

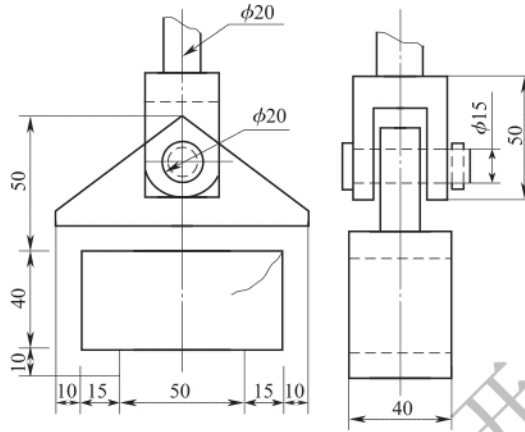


Figure A.3.3-3 Bond strength test fixture

The bond strength shall be calculated according to the following formula:

$$R_{\text{bond}} = \frac{P}{F} \quad (\text{A.3.3-2})$$

Where, R_{bond} —the bond strength of the mortar(MPa);

P —damaging load(N);

F —force area(mm).

- 2) Determination of the bond strength between resin glass flake mortar and cement screed: Make the cement screed with Portland slag cement with a strength grade of 32.5MPa and standard sand, with a mold size of 70mm×30mm×(25mm–35mm). After curing for 28 days, the cement screed are bonded together with resin glass flake mortar in a crisscross and the excess mortar was scraped off. The thickness of the bonding layer shall be 2mm to 3mm. After curing at 20°C to 25°C for 14 days, the bond strength shall be measured. The test fixture and measurement method shall meet the above-mentioned requirement "Determination of the bond strength between resin mortar and acid-resistant brick".

6 Determination of the bond strength of glass fiber reinforced plastic primer and resin glass flake primer with concrete and polymer cement screed: On the flat concrete or polymer cement screed base course, after surface treatment, according to the mix ratio requirements, after brushing the resin primer for 2 times, and then coating the resin primer with the surface dry, and curing at 20°C to 25°C for 3 days (if below this temperature, the curing period shall be extended), the bonding strength shall be carried out by pull-off test. For the determination, the test procedure shall be in accordance with the following requirements: lightly rub and scrub the surface of the tensile test head(Figure A.3.3-4) and the surface of the resin primer layer, and bond 3 head in the test zone, spacing larger than 10mm, using epoxy or other adhesive. After the adhesive is cured and the bond strength requirement is reached, the resin primer layer to be tested is cut along the head to the concrete base layer and the cutting tool(Figure A.3.3-5). Connect the head to the bond strength tester, connector see(Figure A.3.3-6), draw at a constant speed, and record the load and damage position when the bond is broken.

The bond strength shall be calculated according to the following formula:

$$\sigma = F/A \quad (\text{A.3.3-3})$$

Where, σ —bond strength(MPa);

F —damaging load(N);

A —the bonding area of the test piece(mm²).

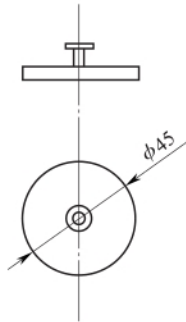


Figure A.3.3-4 Tensile test head

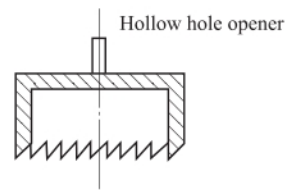


Figure A.3.3-5 Cutting tool hollow hole opener

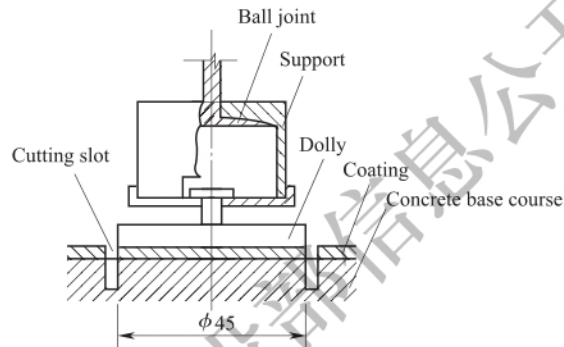


Figure A.3.3-6 Connector

After the measurement is completed, the damaged part of the resin primer layer shall be repaired in accordance with Article 5.4.2 of this code.

A.3.4 The tensile strength and the resin content of glass fiber reinforced plastics shall comply with the following requirements:

- 1 The tensile strength of glass fiber reinforced plastics shall comply with the relevant requirements of the current national standard GB/T 1447 *Fiber-Reinforced Plastics Composites-Determination of Tensile Properties*.

- 2 The determination of the resin content of glass fiber reinforced plastics shall comply with the relevant requirements of the current national standard GB/T 2577 *Test Method for Resin Content of Glass Fiber Reinforced Plastics*.

A.3.5 The determination of resin glass flake mortar shall be in accordance with the following requirements:

- 1 The tensile strength of the resin glass flake mortar shall comply with the relevant requirements of the current national standard GB/T 1447 *Fiber-Reinforced Plastics Composites-Determination of Tensile Properties*.

- 2 The flexural strength of the resin glass flake mortar shall comply with the relevant requirements of the current national standard GB/T 1449 *Fiber-Reinforced Plastics Composites-Determination of Flexural Properties*.

- 3 The determination of the abrasion resistance of the resin glass flake mortar shall comply with the relevant requirements of the current national standard GB/T 1768 *Paints and Varnishes-Determination of Resistance to Abrasion-Rotating Abrasive Rubber Wheel Method*.

- 4 Determination of permeability resistance of resin glass flake mortar: The bottom-mold of the test piece is prepared by using Portland slag cement with a strength grade of 32.5MPa and standard sand. The bottom-mold size is 80mm diameter on the bottom surface, 70mm diameter on the top surface

and 30mm in height, 3 pieces each group, after curing for 28 days, apply glass flake mortar on the bottom surface of the bottom-mold, the thickness is 1mm. The anti-penetration test may be performed after the curing is completely cured at room temperature. The water pressure is maintained from 0.2MPa for 2 hours and then increased to 0.3 MPa. The water pressure is increased by 0.1MPa every 1hours until the top surface of all the test pieces seeps. Record the maximum water pressure of each test piece and the time to maintain the maximum water pressure (in hour). When the water pressure increases to 1.5MPa and the test piece is not yet permeable, the pressure will no longer be increased, and the test was stopped after 6 hours.

A.3.6 The performance of water soluble silicate materials shall be in accordance with the following requirements:

1 Determination of the consistency of water soluble silicate mortar: The cone consistency meter used in the test shall meet the relevant requirements of the current professional standard JC/T 727 *Apparatus for Determining Normal Consistency and Setting Time of Cement Paste*.

Put the powder into the mixer according to the mixing ratio, then add water soluble silicate, wet mix for about 2min, and record the time, put the uniform water soluble silicate mortar mixed into the conical mold, and vibrate for 25 times, manual tamping may also be used, then the excess mortar is scraped off and the surface is leveled.

Move the conical mold containing the mortar under the cone consistency meter and loosen the brake screw. Lower the cone tip to the surface of the mortar. When touching, tighten the brake screw. At the same time, adjust the scale pointer to 0 position, add water soluble silicate wet mix for 10min and start measuring. Then suddenly loosen the brake screw, start the stopwatch at the same time, let the test cone sink freely into the mortar, and tighten the brake screw after 5s. At this time, the scale reading is the consistency of the mortar.

When measuring, the conical mold shall not be subjected to any vibration, and shall be kept in an air environment with a temperature of 20°C to 25°C and a relative humidity of less than 80%. The average of the two measurements shall be taken as the final result.

2 Determination of the setting time of water soluble silicate mortar: The water soluble silicate mortar with uniform mixing may be filled into the conical mold at one time, and the artificial vibration is shaken 25 times with the bottom plate, then the excess mortar is smoothed with a clean spatula, and the surface is leveled.

The conical mold of the mortar is moved to the test needle of the apparatus for determining standard consistency and setting time of cement paste. The diameter of the needle is $1.10\text{mm} \pm 0.04\text{mm}$ and the mass is $300\text{g} \pm 2\text{g}$. Loosen the brake screw. When lowering the lower end of the test needle to contact the surface of the mortar, the brake screw shall be tightened, and then the brake screw shall be loosened to allow the test needle to freely sink into the mortar. During the initial measurement, the movable rod at the upper end of the test needle shall be gently held to prevent the test needle from bending against the bottom plate, but the initial setting time shall be based on the result of the free fall measurement. Before initial setting, it shall be measured every 5 minutes; after initial setting, it shall be measured every 15 minutes. The test needle shall be wiped clean after each measurement. From the time of adding water soluble silicate, until the test needle sinks into the depth of the mortar 39.0mm to 39.5mm and no longer sinks, the time required is the initial setting time; the time required from the time of adding water soluble silicate to the time when the test needle sinks into the mortar shall not exceed

1mm is the final setting time.

When measuring, the conical mold shall not be subjected to any vibration, and shall be kept in an air environment with a temperature of 20°C to 25°C and a relative humidity of less than 80%.

3 Determination of tensile strength and pickling stability of water soluble silicate mortar: The water soluble silicate mortar with uniform mixing may be loaded into six "8" shaped test molds, and they are placed on the jumping table with bottom plates, and the hand is slightly supported and vibrate 25 times. You may also use manual tamping method and scrape off excess mortar and level the surface, place the test piece together with the bottom plate on the jumping table, hold it by hand, and vibrate 25 times. It shall be demolded after being cured for 2 days in air at a temperature of 20°C to 25°C and a relative humidity of less than 80%, and shall continue to be cured for 14 days in the above environment. Take out 3 test blocks and measure the tensile strength according to the second item of Article A.3.3 of Appendix A of this code (the loading speed is changed to 5mm/min). The test results shall meet the requirements of the first item of Article A.3.3 of this code. The other 3 pieces shall be boiled in industrial sulfuric acid with a concentration of 40% for 1 hour, and slowly cooled to normal temperature in the acid solution. After removing the test piece, rinse with water and wipe it clean. After 1 day, the test block shall be inspected for cracks, corners, looseness and expansion. When the test piece is intact, the surface and the acid solution are not significantly discolored, it is qualified.

4 Determination of water absorption of water soluble silicate mortar: The prepared water soluble silicate mortar shall be filled into 30mm×30mm×30mm test molds pre-coated with butter and lining with a polyethylene film with a thickness of not less than 0.05mm, each set of 3 pieces, vibrating 25 times with the bottom plate, then scrape the excess mortar with a scraper wiped with a damp cloth to level the surface.

The test pieces shall be demolded after being cured for 2 days in air at a temperature of 20°C to 25°C and a relative humidity of less than 80%, and shall be maintained in the above environment for 14 days, and then dried at 105°C to 110°C to a constant weight. And from the 3 test blocks, select the 2 with the least porosity and other defects, and weigh to the nearest 0.01g, placed in a glass container, and kerosene with a density of 0.81g/cm³ to 0.84g/cm³ was injected in three times within 1 hour, and the liquid level was 1cm higher than the test piece. After soaking for 7 days, remove the test piece, wipe off the excess kerosene on the surface of the test piece with a wrung wet towel, and immediately weigh it to the nearest 0.01g.

The water absorption rate shall be calculated according to the following formula:

$$\text{Water absorption rate (\%)} = \frac{m_1 - m}{m \times \rho} \times 100 \quad (\text{A.3.6-1})$$

Where, m_1 —the mass of the test block after soaking(g);

m —the mass of the test block before soaking(g);

ρ —the density of kerosene(g/cm³).

5 Determination of compressive strength of water soluble silicate screed and water soluble silicate concrete: Water soluble silicate screed and water soluble silicate concrete shall be formed by manual tamping and vibration to discharge air bubbles. The test block of the water soluble silicate screed shall be 7.07cm×7.07cm×7.07cm, the test piece of the water soluble silicate concrete shall be 15cm×15cm×15cm, and the result shall be multiplied by a factor of 1.00; when the test piece is 20cm×20cm×20cm, The result shall be multiplied by a factor of 1.05; when the test piece is 10 cm×10 cm×10cm, the

result shall be multiplied by a factor of 0.95.

When concrete is tamped with a vibrator, put the concrete into the test mold with a slight margin, then place the test mold on the vibrating table, hold it slightly by hand, start the vibrating table, and vibrate until the surface of the concrete eliminates air bubbles and becomes slurry. After the vibration is finished, use a metal ruler to scrape off the excess concrete along the edge of the test mold and then smooth the surface with a spatula. When tamping the concrete manually, the concrete shall be loaded into the test mold in two portions, and the height of each load is equal. The number of times of tamping each time: when the test mode is 20cm×20cm×20cm, it is about 50 times; when the test mode is 15cm×15cm×15cm, it is about 25 times; when the test mode is 10cm×10cm×10cm, it is about 12 times. The tamping shall be performed uniformly from the edge to the center in the spiral direction.

After tamping, it shall be demolded after being cured for 2 days in air at a temperature of 20°C to 25°C and a humidity of less than 80%. After demolding, it shall continue to be cured in the above environment for 14 days and then test pressed on the press.

There are 3 test blocks in each group, and the average of the 3 test blocks is taken as the test result. When one test result exceeds or falls below 15% of the average value, the other two average values shall be taken as the final result. When the test results of two test pieces exceed 15% of the average value, the test results of the test pieces of this group are invalid. The rounding precision is taken as 0.1.

6 Determination of acid pickling stability of water soluble silicate screed and water soluble silicate concrete: The test block shall be shaped and cured according to the requirements of determination of compressive strength of water soluble silicate screed and water soluble silicate concrete. Then, the test piece is immersed in a covered container containing 40% industrial sulfuric acid. The bottom of the test block shall be overhead, the sides shall be separated, the acid shall be higher than the surface of the test block, and the soaking temperature shall be kept at 20°C to 25°C. After soaking for 28 days, the test piece shall be taken out, rinsed with water, dried in the shade for 24 hours, and checked for cracks, bubbles, crisps and corners. When the test piece is intact, the surface of the test piece and the soaking acid solution are also not discolored, then it is qualified.

7 Determination of bond strength between water soluble silicate mortar and acid-resistant brick (also known as cross-cross test method) : The adhesion test of brick board shall adopt 230mm×113mm×65mm standard acid-resistant brick, wash with water and dry, and cool down to room temperature.

The prepared mortar is applied to the middle of the bonding surface of the two standard acid-resistant bricks, and applying the squeeze method to make two bricks cross and stick together, and the thickness of the mortar is 3mm. The excess mortar that was extruded was scraped off with a spatula. The bond strength was measured after curing for 14 days (the dense potassium silicate mortar curing 28 days) in an air environment having a temperature of 20°C to 25°C and a relative humidity of less than 80%.

The bond holder shall be placed on the press to fix the position, adjust the distance, and put the test block. The press was evenly loaded, and the running speed of the press was 6 mm/min, till the test piece was pulled apart. Record the press dial readings.

The bond strength shall be calculated according to the following formula:

$$R_{\text{bonding}} = \frac{P}{A} \quad (\text{A.3.6-2})$$

Where, R_{bonding} —the bond strength of the mortar(MPa);

P —damaging load(N);

A —tension area(mm²).

There are 3 test blocks in each group, and the average of the 3 test blocks is taken as the test result. When one test result exceeds or falls below 15% of the average value, the other two average values shall be taken as the final result. When the test results of two test pieces exceed 15% of the average value, the test results of the test pieces of this group are invalid. The rounding precision is taken as 0.1.

8 Determination of impermeability of sodium silicate concrete: weigh the material according to the mixing ratio, firstly mix the powder evenly with sodium fluorosilicate, then put it on the iron plate and mix it evenly with the sand, then add the sodium silicate and mix evenly. It should be mixed 3 times.

The mixed concrete shall be placed in the impermeability test mold coated with machine oil with a slight margin. The test mold has a bottom diameter of 185mm, a top surface diameter of 175mm and a height of 150mm. Then place the test mold on the vibrating table, vibrate until the surface is slurry, and smooth the surface with a spatula, each group of 3 pieces, the concrete test block is demolded after curing at 20°C to 25°C for 1 day, and after 14 days of curing, the impermeability may be measured.

A layer of molten yellow wax or paraffin shall be applied to the surface of the cured test piece. The top and bottom surfaces of the test piece are not waxed. After a little cold, the test piece is placed in a set of impervious sleeve-mold with a certain heat.

The above test piece shall be attached to the concrete permeation instrument together with the sleeve-mold, the rubber gasket shall be placed, and the screw shall be tightened.

When the predicted impermeability pressure is not more than 0.8MPa, the water pressure at the start of the test shall be 0.1MPa, and the water pressure shall be increased by 0.1MPa every 8 hours. When the predicted impermeability pressure is expected to be larger than 0.8 MPa, the water pressure at the start of the test shall be 0.2MPa, and the water pressure shall be increased by 0.2MPa every 8 hours, and the end face of the test piece shall be watched at all times. When the end of the test piece shows water seepage, the current water pressure shall be recorded.

The impermeability of concrete shall be calculated according to the maximum water pressure when no water seepage is found in 2 of the 3 test pieces. When two test pieces have water seepage, the test results of the test pieces are invalid. The rounding precision is taken as 0.1.

9 Determination of impermeability of potassium silicate: When curing the test block, the ambient temperature shall be kept at 20°C to 25°C, the relative humidity shall be less than 80% and larger than 50%; the time of demoulding of dense potassium silicate material test piece is 3 days, the normal type potassium silicate material test block has a demoulding time of 2 days, and a curing time of 28 days.

1) Determination of impermeability grade of potassium silicate concrete: The mixed water soluble silicate concrete is filled into the impermeability test mold with machine oil, with a slight margin. The test mold size is 185mm of the bottom surface diameter and 175mm of the top surface diameter, 150mm high. Put the test mold on the vibrating table, vibrate until the surface is slurry and eliminate air bubbles, and wipe the surface with a spatula, each set of 6 pieces.

Apply a layer of melted yellow wax or paraffin on the surface of the cured test piece. The top and bottom surfaces of the test piece are not waxed. After a little cold, the test piece is placed in a impervious sleeve-mold with certain heat.

Attach the above test piece together with the sleeve mold to the concrete penetrator, pad

the rubber ring, and tighten the screws.

When the predicted impermeability pressure is not more than 0.8MPa, the water pressure at the start of the test shall be 0.10MPa, increasing by 0.1MPa every 8 hours; when the predicted impermeability pressure is larger than 0.8MPa, the water pressure at the start of the test shall be 0.2MPa. Attention shall be paid to the end face of the test piece at any time. When there is water seepage on the end face of the test piece, the water pressure at that time shall be recorded.

The impermeability of concrete shall be calculated according to the maximum water pressure when no water seepage is found in two of the three test pieces. When two specimens have water seepage, the test results of the specimens are invalid. The rounding precision is taken as 0.1.

- 2) Determination of the impermeability grade of potassium silicate mortar and screed: The water soluble silicate mortar or screed mixed well is filled into the impermeability test mold of the machine oil, with a slight margin. The size of the test mold is 80mm of the bottom surface diameter, the top surface diameter is 70mm and the height is 30mm. Place the test mold on the vibrating table, vibrate it to the surface is slurry and remove the air bubbles, and smooth the surface with a spatula, each set of 6 pieces.

Apply a layer of melted yellow wax or paraffin on the surface of the cured test piece. The top and bottom surfaces of the test piece are not waxed. After a little cold, the test piece is placed in a impervious sleeve-mold with certain heat.

Put the above test piece together with the sleeve-mold on the cement penetrator, pad the rubber ring, and tighten the screws.

When the predicted impermeability pressure is less than 0.8MPa, the water pressure at the start of the test shall be 0.1MPa, and then increase by 0.1MPa every 1 hour; if the predicted impermeability pressure is larger than 0.8MPa, 0.2MPa will be added every 1 hour thereafter. And pay attention to the surface condition of the test piece at any time. When there is water seepage on the end face of the test piece, the current water pressure shall be recorded.

The impermeability of potassium silicate mortar or screed shall be calculated according to the maximum water pressure when no water seepage is found in two of the three test pieces. When two test pieces have water seepage, the test results of the test pieces are invalid. The rounding precision is taken as 0.1.

- 10** Determination of the heat resistance limit of potassium silicate materials: 3 pieces of tensile strength test pieces for potassium silicate mortar, and 3 pieces of compressive strength test pieces for potassium silicate screed and concrete.

When the heat-resistant limit temperature is 100°C to 300°C, the test piece is first dried at 110°C ± 5°C for 8 hours, and then the test piece is placed in the heating furnace, the heating rate shall not be larger than 150°C / h, the temperature rises to 300°C, constant temperature for 4 hours, cool to room temperature with the furnace. When the heated test piece has no crack appearance and the strength is not lower than the original strength, it is qualified.

When the heat-resistant limit temperature is 300°C to 900°C, the heat resistance of the test piece is measured in accordance with the physical test method of the refractory concrete.

A.3.7 Determination of the performance of polymer cement screed shall be in accordance with the

following requirements:

1 The strength determination of polymer cement screed shall meet the relevant requirements of the current national standard GB/T 17671 *Method of Testing Cements—Determination of Strength*.

2 Determination of the bond strength of polymer cement screed shall meet the requirements of the "Cement screed bond strength test" in Appendix A of the current industry standard JTJ 270 *Testing Code of Concrete for Port and Waterwog Engineering*.

3 Determination of the setting time of polymer cement screed shall meet the relevant requirements of the current national standard GB/T 1346 *Test Methods for Water Requirement of Normal Consistency, Setting Time and Soundness of the Portland Cement*.

4 Determination of the impermeability grade of polymer cement screed shall meet the relevant requirements of the current professional standard SL/T 352 *Test Code for Hydraulic Concrete*.

5 Determination of water absorption rate of polymer cement screed shall meet the relevant requirements of the current professional standard DL/T 5126 *Test Code on Polymer—Modified Cement Mortar*.

A.3.8 The physical properties of the sprayed polyurea lining shall be determined in accordance with the following requirements:

1 The quality of the polyurea lining coating shall comply with the relevant requirements of the current professional standard HG/T 3831 *Sprayed Polyurea for Materials Protection*.

2 The adhesion of polyurea lining coatings shall comply with the relevant requirements of the current professional standard JGJ/T 110 *Testing Standard of Adhesive Strength of Tapestry Brick for Construction Engineering*.

A.3.9 The film color, appearance, viscosity, drying time and adhesion of the coating shall comply with the following requirements:

1 The color of the film shall comply with the relevant requirements of the current national standard GB/T 1722 *Estimation of Colour of Varnishes, Boiled Oils and Thinners*.

2 The appearance of the film shall comply with the relevant requirements of the current national standard GB/T 1721 *Determination of Appearance and Transparency of Varnishes, Boiled Oils and Thinners*.

3 Determination of viscosity shall comply with the relevant requirements of the current national standard GB/T 1723 *Determination of Viscosity of Coatings*.

4 The drying time shall comply with the relevant requirements of the current national standard GB/T 1728 *Determination of Drying Time of Coatings and Puttys Films*.

5 Determination of adhesion shall comply with the relevant requirements of the current national standard GB/T 1720 *Circle-Drawing Test of Coating Films*.

A.3.10 Determination of sparks for finished plastic lining products shall comply with the relevant requirements of the current professional standard HG/T 4090 *Spark Test Method for Equipments Lined with Plastics*.

A.3.11 The performance measurement of finished asphalt products shall be in accordance with the following requirements:

1 Determination of compressive strength of asphalt screed and asphalt concrete: Asphalt screed shall be applied to a cylindrical test mold with a diameter and height of 50.5mm. Asphalt concrete is applied to a cylindrical test mold with a diameter and height of 71.4mm. The test mold shall be cleaned

and heat up.

The mixed asphalt screed or asphalt concrete shall be filled with the test molds, and each set of 3 pieces shall be evenly inserted 10 times with a hot scraper, and then constant molding pressure is applied for 3min. When the construction adopts the flat vibrator pressure, the molding pressure of the asphalt screed shall be 0.25MPa, and the molding pressure of the asphalt concrete shall be 5MPa. After constant pressure, the mold may be released. The test block shall be complete, smooth and without corners, the height difference shall not be larger than 1mm, and the upper and lower sides shall be parallel. After the test block is cured at room temperature for 1 day, it shall be placed in water at the specified temperature for 2 hours. When measuring the compressive strength at 20°C, the water temperature shall be 20°C; when measuring the compressive strength at 50°C, the water temperature shall be 50°C. After removing the test piece, apply a cloth to dry it, and place a piece of paper on each of the upper and lower sides of the test piece, and then perform a pressure test. At the time of pressure test, the speed at which the press piston rises shall be 3cm per minute, and the ultimate load is read by the dynamometer when the pointer is no longer rotating.

The compressive strength shall be calculated according to the following formula:

$$R = \frac{P}{F} \quad (\text{A.3.11-1})$$

Where, R —compressive strength(MPa);

P —limit load(N);

F —the pressure area of the test block(mm²).

The average of 3 test blocks shall be taken as the final result. The deviation of each measurement shall not exceed 10% when R_{20} , and shall not be larger than 5% when R_{50} .

2 Determination of saturated water absorption of asphalt screed and asphalt concrete: at the same time as preparing the compressive strength test block, test blocks for measuring the saturated water absorption rate shall be prepared, with 3 blocks in each group. After the test piece is demolded, it shall be cured for 1 day at room temperature and wiped clean with gauze.

After the test piece was weighed in air, it is weighed in water and weighed to the nearest 0.01g. After weighing, place the test block in a container filled with water. The test block shall be completely submerged by water. The water temperature is 22°C ± 2°C. Then, the container and the test piece are placed in a vacuum dryer or a vacuum cover, and vacuum is applied to a mercury column having a residual pressure of 10mm to 15mm for more than 1 hour. After returning to normal air pressure, the test block was still kept in the water for 1 hour. Then, the test piece was taken out, the surface moisture was wiped off with a gauze, and the air was weighed to the nearest 0.01g.

The saturated water absorption rate shall be calculated according to the following formula:

$$\text{Saturated water absorption rate}(\%) = \frac{m_3 - m_1}{m_1 - m_2} \times 100 \quad (\text{A.3.11-2})$$

Where, m_1 —the mass of the test block in air before vacuuming(g);

m_2 —the mass of the test block in water before vacuuming(g);

m_3 —the mass of the test block in air after vacuuming(g).

Take the average of the parallel test of 3 test blocks as the final result. The error of the parallel test shall not be larger than 0.2%.

3 Determination of pickling stability of asphalt screed and asphalt concrete: at the same time as

preparing the compressive strength test block, test blocks for pickling shall be prepared, each group being 6 pieces. After the test piece is demolded, it shall be cured at room temperature for 2 hours and wiped clean with gauze.

The test block is immersed in a covered container containing 55% sulfuric acid. The bottom of the test block shall be overhead, the sides shall be separated, and the acid shall be higher than the surface of the test block. After soaking for 30 days, the test piece shall be taken out, rinsed with water, then wiped clean with gauze, and the test piece shall be inspected for cracks, corners, bubbles and looseness. If the test piece is intact, the test piece surface and soaking acid solution is no significant discoloration, it is qualified.

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Appendix B Mixture ratio of construction

Table B.0.1 Construction mix ratio(mass ratio)of epoxy materials

Material name		Epoxy resin	Thinner	Low toxicity curing agent	Ethyl-enediamine	Mineral pigment	Acid resistant powder	Quartz sand	Quartz
Primer		100	40-60	15-20	(6-8)	-	-	-	-
Base repair mortar		100	10-20	15-20	(6-8)	-	150-200	-	-
Resin binder	Laminate	100	10-20	15-20	(6-8)	0-2	-	-	-
	Binder					-	-	-	-
Mortar	Masonry or caulking	100	10-20	15-20	(6-8)	-	150-200	-	-
Thin mortar	Filling or floor covering	100	10-20	15-20	(6-8)	0-2	100-150	-	-
Screed	Surface layer or masonry	100	10-20	15-20	(6-8)	0-2	150-200	300-400	-
	Stone grout	100	10-20	15-20	(6-8)	-	100-150	150-200	-
Fine stone concrete	Surface material	100	10-20	15-20	(6-8)	-	150-200	250-300	250-350

- Notes: 1 In addition to low-toxic curing agent and ethylenediamine, other amine curing agents may be used. Low-toxic curing agents shall be preferred. The dosage shall be determined according to the ratio provided by the supplier or experimentally determined.
- 2 When ethylenediamine is used, in order to reduce toxicity, the mixing ratio of ethylenediamine may be preliminarily prepared into an ethylenediamineacetone solution(1:1).
- 3 When using reactive diluents, the amount of curing agent shall be increased appropriately, and the mixing ratio shall be determined according to the ratio provided by the supplier or experimentally determined.
- 4 This table is exemplified by epoxy resin EP01451-31(E-44).
- 5 Epoxy glass flakes and epoxy resin self-leveling material and curing agent mix ratio is provided by the supplier or experimentally determine.

Table B.0.2 Construction mix ratio(mass ratio)of vinyl ester resin and unsaturated polyester resin material

Material name	Resin	Initiator	Accelerator	Styrene	Mineral pigment	Styrene paraffin	Powder		Fine aggregate		Coarse aggregate
							Acid powder	Barium sulfate powder	Quartz sand	Barite sand	
Primer			0.5-4	0-15	-	-	-	-	-	-	-
Repair material			0.5-4	-	-	-	200-350	(400-500)	-	-	-
Laminate					0-2	-	0-15	-	-	-	-
Resin binder			0.5-4	-	0-2	3-5	-	-	-	-	-
Binder				-	-	-	-	-	-	-	-
Mortar			0.5-4	-	-	-	200-300	(250-350)	-	-	-
Thin mortar	100	1-4	0.5-4	-	0-2	-	120-200	-	-	-	-
Screed			0.5-4	-	0-2	-	150-200	(350-400)	300-450	(600-750)	-
Fine stone concrete			0.5-4	-	-	-	120-150	-	150-180	-	-
			0.5-4	-	-	-	150-200	-	250-300	-	250-350

Notes: 1 The data in parentheses in the table is for fluorochemical-resistant media engineering.

2 Benzoyl dibutyl ester paste initiator is matched with N,N-dimethylaniline styrene accelerator; cyclohexanone dibutyl ester peroxide, methyl ethyl ketone peroxide initiator is matched with cobalt salt (cobalt content not less than 0.6%) of styrene liquid accelerator.

3 The mixing ratio of styrene paraffin liquid is styrene:paraffin=100:5; when preparing, the paraffin wax is first cut into pieces, added with styrene, and added to 60°C by water bath. After the paraffin is completely dissolved, it is cooled to normal temperature. Styrene paraffin shall be used in the last cover material.

4 Vinyl ester resin self-leveling material and curing agent compounding ratio, provided by the supplier or experimentally determined.

5 The ratio of the glass flakes of the vinyl ester resin and the bisphenol A type unsaturated polyester resin to the curing agent is provided by the supplier or experimentally determined.

Table B.0.3 Construction mix ratio of furan resin materials(mass ratio)

Material name	Furan resin	Sterol aldehyde type				Quartz sand	Quartz
		Glass fiber reinforced plastic powder	Mortar powder	Screed powder	Concrete powder		
Primer		Same as epoxy resin, vinyl ester resin or unsaturated polyester resin primer					
Repair material		Same as epoxy resin, vinyl ester resin or unsaturated polyester resin repair material					
Resin binder		100	40-50	-	-	-	-
Resin mortar	Masonry	100	-	250-400	-	-	-
	Caulking	100	-	250-300	-	-	-
Resin screed		100	-	-	400-450	-	-
		-	-	-	-	300-400	-
		-	-	-	-	200-250	-
Resin concrete		100	-	-	-	250-270	100-150
		-	-	-	-	-	100-200
		-	-	-	-	-	150-250
						250-400	

Table B.0.4 Construction mix ratio(mass ratio)of phenolic materials

Material name		Phenolic resin	Thinner	Low toxicity acid curing agent	Phenylsulfonyl chloride	Acid resistant powder
Primer		Same as epoxy resin, vinyl ester resin or unsaturated polyester resin primer				
Repair material		Same as epoxy resin, vinyl ester resin or unsaturated polyester resin repair material				
Resin binder	Laminate	100	0-15	6-10	(8-10)	-
Mortar	Masonry	100	0-15	6-10	(8-10)	150-200
Thin mortar	Stitching material	100	0-15	6-10	(8-10)	100-150

Table B.0.5 Construction mix ratio of sodium silicate materials

Material name		Mix ratio(mass ratio)		
		Normal type		Compact type
		1	2	
Sodium silicate		100	100	100
Sodium fluorosilicate		15-18	-	15-18
filler	Cast stone powder	250-270	-	250-270
	Porcelain powder	(200-250)	-	-
	Quartz powder: cast stone powder=7:3	(200-250)	-	-
	Graphite powder	(100-150)	-	-
	Acid powder	-	220-270	-
Sterol monomer		-	-	3-5

Notes: 1 The amount of sodium fluorosilicate in the table is adjusted according to the change of sodium oxide content in water soluble silicate, and the purity of sodium fluorosilicate is 100%.

2 You may choose one of the fillers in mix ratio 1.

3 Acid-resistant screed mix ratio: sodium silicate: screed mix = 100:340-420;
acid-resistant concrete mix ratio: sodium silicate: concrete mix = 100:490-750.

Table B.0.6 Construction mix ratio of potassium silicate materials

Material name	Mixture maximum particle size(mm)	Mix ratio(mass ratio)			
		Potassium silicate	Mortar mixture	Screed mix	Concrete mix
Mortar	0.45	100	220-250	-	-
Screed	2.5	100	-	320-420	-
Concrete	25	100	-	-	490-750

Notes: 1 Potassium silicate mortar powder already contains potassium silicate curing agent and other admixtures.

2 Ordinary type of potassium silicate mortar shall use ordinary type of mortar powder; dense type of potassium silicate mortar shall use dense type of mortar powder.

Table B.0.7 Polymer cement screed mix ratio (mass ratio)

Items	Neoprene latex cement screed	Neoprene latex cement slurry	Neoprene latex mortar	Polyacrylate emulsion cement screed	Polyacrylate emulsion cement slurry	Polyacrylate emulsion mortar	Epoxy emulsion cement screed	Epoxy emulsion cement slurry	Epoxy emulsion mortar
Cement	100	100-200	100-200	100	100-200	100-200	100	100-200	100-200
Sand	150-250	-	-	100-200	-	-	200-400	-	-
Cationic neoprene latex	45-65	45-65	25-45	-	-	-	-	-	-
Polyacrylate emulsion	-	-	-	25-42	50-100	25-42	-	-	-
Epoxy emulsion	-	-	-	-	-	-	50-120	50-120	25-60
Hardener	-	-	-	-	-	-	5-20	5-20	2.5-10

Note: The ratio of the polymers listed in the table is the range of values after the addition of additives. The actual ratio shall be determined according to the ratio provided by the polymer supplier and field test.

Table B.0.8 Construction mix ratio(mass ratio)of asphalt screed and asphalt concrete

Types	Powder and aggregate mixture	Asphalt(%)
Asphalt screed	100	11-14
Fine grain asphalt concrete	100	8-10
Medium granular asphalt concrete	100	7-9

Note: This table is the amount of asphalt used to vibrate with a flat vibrator. When using a rolling press or hot roller pressure, the amount of asphalt shall be appropriately reduced.

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Explanation of wording in this code

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

1) Words denoting a very strict or mandatory requirement:

"Must" is used for affirmation, "must not" for negation.

2) Words denoting a 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 to express the option available, sometimes with the conditional 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.

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List of quoted standards

- GB 50046 *Code for Anticorrosion Design of Industrial Constructions*
- GB/T 50224 *Standard for Acceptance of Construction Quality of Anticorrosive Engineering of Buildings*
- GB/T 50589 *Technical Code of Construction for Epoxy Resins Self-Leveling Flooring*
- GB/T 50590 *Technical Code for Anticorrosion Engineering of Vinyl Ester Resins*
- GB 50656 *Code for Construction Company Safety Manage Criterion*
- GB 50726 *Code for Anticorrosive Engineering Construction of Industrial Equipment and Pipeline*
- GB/T 176 *Methods for Chemical Analysis of Cement*
- GB/T 494 *Asphalt Used in Roofing*
- GB/T 1346 *Test Methods for Waters Requirement of Normal Consistency, Setting Time and Soundness of the Portland Cement*
- GB/T 1447 *Fiber-Reinforced Plastics Composites—Determination of Tensile Properties*
- GB/T 1449 *Fiber-Reinforced Plastics Composites—Determination of Flexural Properties*
- GB/T 1720 *Circle-Drawing Test of Coating Films*
- GB/T 1721 *Determination of Appearance and Transparency of Varnishes, Boiled Oils and Thinners*
- GB/T 1722 *Estimation of Colour of Varnishes, Boiled Oils and Thinners*
- GB/T 1723 *Determination of Viscosity of Coatings*
- GB/T 1728 *Determination of Drying Time of Coatings and Puttys Films*
- GB/T 1768 *Paints and Varnishes-Determination of Resistance to Abrasion-Rotating Abrasive Rubber Wheel Method*
- GB/T 2577 *Test Method for Resin Content of Glass Fiber Reinforced Plastics*
- GB/T 2997 *Test Method for Bulk Density, Apparent Porosity and True Porosity of Dense Shaped Refractory Products*
- GB/T 3001 *Refractory Products-Determination of Modulus of Rupture at Ambient Temperature*
- GB/T 4209 *Sodium Silicate for Industrial Use*
- GB/T 4507 *Standard Test Method for Softening Point of Bitumen—Ring-and-Ball Apparatus*
- GB/T 4508 *Standard Test Method for Ductility of Bitumen*
- GB/T 4509 *Standard Test Method for Penetration of Bitumen*
- GB/T 5072 *Refractories-Determination of Cold Compressive Strength*
- GB 7691 *Safety Code for Painting-Safety Management General Rule*
- GB/T 8237 *Liquid Unsaturated Polyester Resin for Fiber Reinforced Plastics*
- GB/T 8488 *Acid Resisting Bricks and Tiles*
- GB/T 8923.1 *Preparation of Steel Substrates before Application of Paints and Related Products-Visual Assessment of Surface Cleanliness—Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings*
- GB/T 11651 *Code of Practice for Selection of Personal Protective Equipments*
- GB 12523 *Emission Standard of Enviroment Noise for Boundary of Construction Site*
- GB/T 13657 *Bisphenol-A Epoxy Resin*

GB/T 13869 *General Guide for Safety of Electric User*
GB/T 14684 *Sand for Construction*
GB 15603 *Rule for Storage of Chemical Dangers*
GB/T 17470 *Glass Fiber Mats-Chopped Strand and Continuous Filament Mats*
GB/T 17671 *Method of Testing Cements—Determination of Strength*
GB 18173.1 *Polymer Water-Proof Materials—Part 1: Water-Proof Sheet*
GB 18218 *Identification of Major Hazard Installations for Hazardous Chemicals*
GB 18242 *Styrene Butadiene Styrene(SBS)Modified Bituminous Sheet Materials*
GB 18243 *Atactic Polypropylene(APP)Modified Bituminous Sheet Materials*
GB/T 18370 *Glass Fiber Woven Roving*
GB/T 18601 *Natural Granite for Building Slab*
GB/T 19250 *Polyurethane Waterproof Coating*
GB 19517 *National Safety Technical Code for Electric Equipments*
GB/T 22789.1 *Plastics-Unplasticized Poly (Vinyl Chloride) Sheets-Types , Dimensions and Characteristics—Part 1:Sheets of Thickness Not Less than 1mm*
GB/T 33000 *Guideline of China Occupational Safety and Health Management System Occupational Exposure Limits for Hazardous Agents in the Workplace—Part 1: Chemical Hazardous Agents*
JGJ 46 *Technical Code for Safety of Temporary Electrification on Construction Site*
JGJ 52 *Standard for Technical Requirements and Test Method of Sand and Crushed Stone (or Gravel for Ordinary Concrete*
JGJ 80 *Technical Code for Safety of Working at Height of Building Constructoin*
JGJ/T 110 *Testing Standard of Adhesive Strength of Tapestry Brick for Construction Engineering*
JGJ/T 200 *Technical Specifications for Sprayed Polyurea Waterproofing*
JC/T 424 *Acid and Heat Resisting Bricks*
JC/T 727 *Apparatus for Determining Normal Consistency and Setting Time of Cement Paste*
HG/T 3831 *Sprayed Polyurea for Materials Protection*
HG/T 4090 *Spark Test Method for Equipments Lined with Plastics*
HG/T 20273 *Technical Code for Coating Engineering of Spraying Polyurea Protection Materials*
HG/T 2641 *Middle Alkali Centent Glass Flake*
SH/T 1152 *Synthetic Rubber Latex—Determination of Apparent Viscosity*
NB/SH/T 0522 *Petroleum Asphalt for Road Pavement*
JTJ 270 *Testing Code of Concrete for Port and Waterwog Engineering*
SL/T 352 *Test Code for Hydraulic Concrete*
DL/T 5126 *Test Code on Polymer—Modified Cement Mortar*
JJG 2018 *Verification Scheme Measuring Instruments for Surface Roughness*